

## Catalog 2013



**Safety Sensors  
Safety Systems  
Safety Services**

# HOW TO FIND YOUR PRODUCT!

| I am looking for ...  |   | I will find it in chapter ...  |
|---|---|--|
| An introduction to and overview of the topics: Machine safety, the principles of risk reduction, functional safety of control systems                     | ➤ | Machine Safety                                |
| Information for selecting and using optoelectronic protective devices and hard guards   | ➤ | Machine Safety                                |
| Application advice and start-up support, safety inspections or other services, such as stopping time measurements or on-site service                      | ➤ | Machine Safety Services                       |
| PC software for the methodical safety engineering of machinery and plant systems  | ➤ | Safety Engineering Software                   |
| "Flexible in use" optoelectronic protective devices for stationary and mobile machines (e.g. driverless transport systems)                                | ➤ | Safety Laser Scanners                         |
| Optoelectronic protective devices for hand and finger protection with or without tool blanking, and danger zone guarding and access guarding on machinery | ➤ | Safety Light Curtains                         |
| Optoelectronic protective devices for access guarding on production cells, with or without muting function for unobstructed material transport            | ➤ | Multiple Light Beam Safety Devices            |
| Preassembled Light Beam Safety Devices Sets that can be quickly and easily put into operation   | ➤ | Light Beam Safety Device Sets                |
| Single Light Beam Safety Devices in various construction designs for optimum integration into the machine concept   | ➤ | Single Light Beam Safety Devices            |
| Protective devices with integrated AS-Interface, AS-i Safety Monitors and AS-i coupling modules   | ➤ | AS-Interface Safety at Work                 |
| Safety transponders or Magnetically Coded Safety Sensors for guards   | ➤ | Safety Proximity Sensors                    |
| Safety Switches and Safety Locking Devices for guarding protective doors, flaps, or covers, for example   | ➤ | Safety Switches and Safety Locking Devices  |
| E-Stop Rope Switch and E-Stop button as Safety Command Device for machinery   | ➤ | Safety Command Devices                      |
| Compact safety monitoring devices and Safety Relays   | ➤ | Safety Relays                               |
| Programmable Safety Controllers (Safety Controller base modules, extension modules, fieldbus modules)   | ➤ | Programmable Safety Controllers             |
| Suitable and harmonized accessories for Leuze electronic safety sensors   | ➤ | Accessories                                 |
| The product's catalog page via an alphabetical list of names  | ➤ | Product Finder                              |



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At Leuze electronic, we are "the sensor people": for 50 years we have been the specialists for innovative and practical solutions in the area of optical sensors for factory automation. Our systems are used in the automobile industry, in conveyor and storage technology as well as in packing material and analysis technologies, not to mention in handling and assembly technology and electronics.

Our dedicated employees are especially well recognized for their astute level of customer orientation, There's one thing Leuze electronic customers can count on – on us.

The range of products extends from optical electronic sensors, inductive switches and identification and data transmission systems to image processing systems and optical electronic solutions for safety at work.

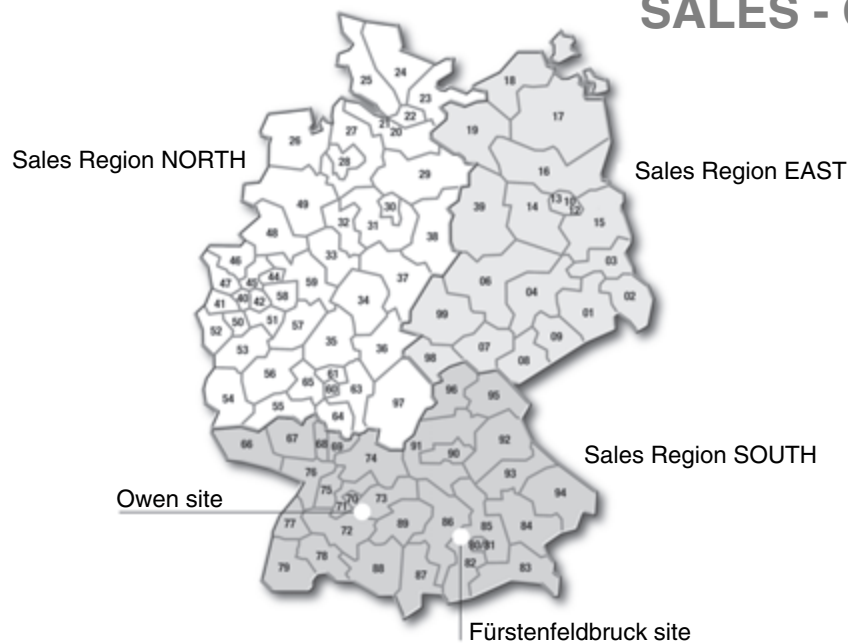
On the basis of extensive research and development work and the large application know-how possessed by our engineers, we are constantly further developing our systems.

All with the goal of being able to offer our customers increasingly efficient and higher performance solutions at an optimal price / performance ratio.



We are the right partner for both standard applications as well as for high-end solutions, and with an extensive sales and service network, we can always be reached quickly.

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With a staff of qualified field representatives and our capable Customer Support Center, we are able to provide you with service around the clock. Our dedication to qualified service and focus on the customer have always been among our distinguishing characteristics.

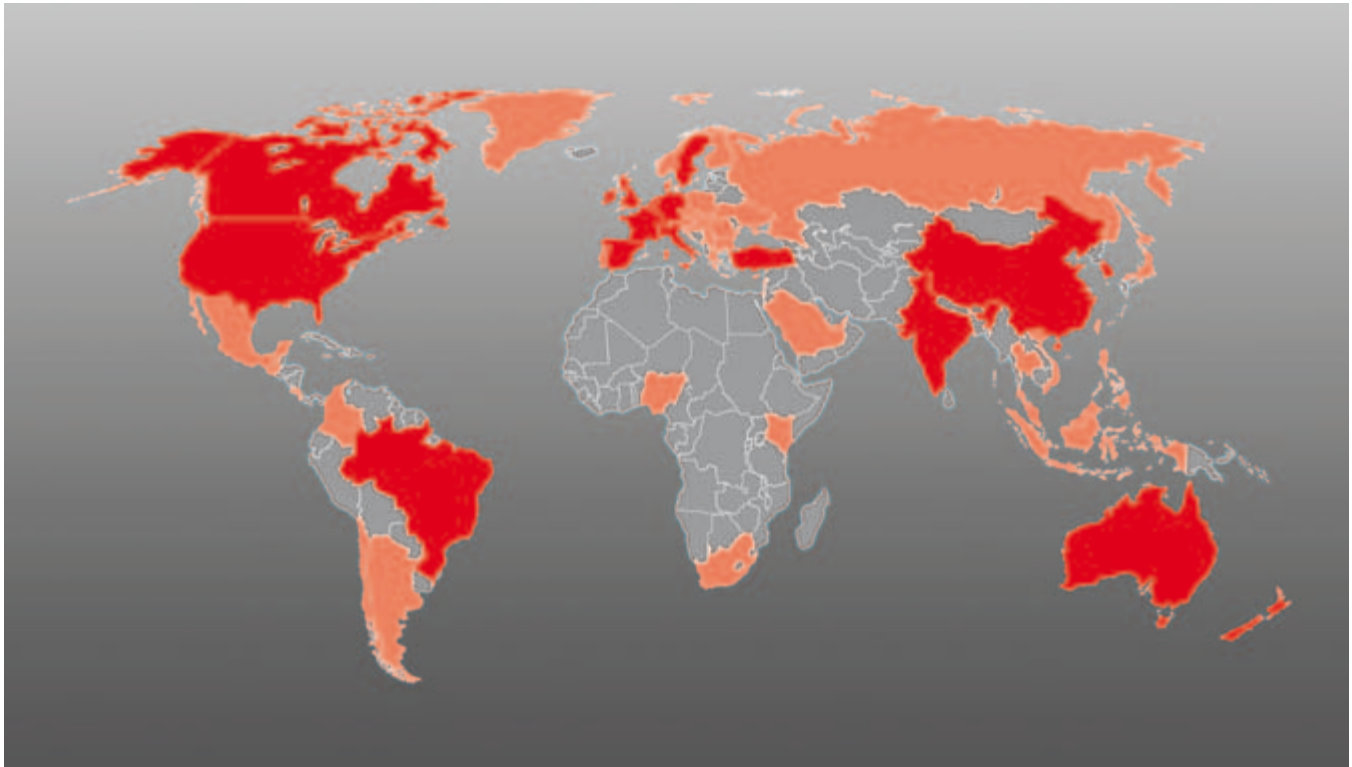
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Machine Safety  
Machine Safety Services  
Safety Engineering Software  
Safety Laser Scanners  
Safety Light Curtains  
Multiple Light Beam Safety Devices  
Light Beam Safety Device Sets  
Single Light Beam Safety Devices  
AS-Interface Safety at Work  
Safety Proximity Sensors

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**Machine Safety Services**

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Machine Safety

Machine Safety Services

Safety Engineering Software

Safety Laser Scanners

Safety Light Curtains

Multiple Light Beam Safety Devices

Light Beam Safety Device Sets

Single Light Beam Safety Devices

AS-Interface Safety at Work

Safety Proximity Sensors

## CONTENTS

|   | <b>Page</b>   |
|---|---------------|
| <b>Machine Safety</b>   | <b>8</b>      |
| 1. Introduction .....   | 8             |
| 2. Machine Safety in the EU .....                                 | 8             |
| 3. Machine Safety in the USA .....                                | 26            |
| 4. Protective devices .....                                       | 31            |
| <br><b>Machine Safety Services</b>                                | <br><b>46</b> |
| Overview .....  | 46            |
| Qualified product training and seminars .....                     | 48            |
| Safety consulting and safety engineering .....                    | 50            |
| Start-up support, hotline .....                                   | 51            |
| Initial and follow-up safety inspections .....                    | 52            |
| Stopping time measurements and determining safety distances ..... | 54            |
| On-site service, repairs and device replacement service .....     | 56            |
| <br><b>Safety Engineering Software</b>                            | <br><b>58</b> |
| Safexpert .....   | 58            |
| SISTEMA .....   | 64            |
| <br><b>Safety Laser Scanners</b>                                  | <br><b>68</b> |
| Overview .....  | 68            |
| ROTOSCAN RS4 .....  | 70            |
| <br><b>Safety Light Curtains</b>                                  | <br><b>82</b> |
| Overview .....  | 82            |
| MLC 500 .....   | 84            |
| MLC 300 .....   | 100           |
| SOLID-4, SOLID-4E .....   | 108           |
| SOLID-2, SOLID-2E .....   | 134           |
| COMPACT <i>plus</i> -m .....                                      | 148           |
| COMPACT <i>plus</i> -b .....                                      | 166           |



|   | Page       |
|---|------------|
| <b>Multiple Light Beam Safety Devices</b>             | <b>186</b> |
| Overview .....  | 186        |
| MLD 500 .....   | 188        |
| MLD 300 .....   | 216        |
| <b>Light Beam Safety Device Sets</b>                  | <b>232</b> |
| Overview .....  | 232        |
| MLDSET .....  | 234        |
| MLD-UDC .....   | 240        |
| <b>Single Light Beam Safety Devices</b>               | <b>244</b> |
| Overview .....  | 244        |
| MLD 500 .....   | 246        |
| SLSR 25B .....  | 260        |
| SLSR 46B .....  | 266        |
| SLS 96 .....  | 272        |
| SLS 318 .....   | 278        |
| <b>AS-Interface Safety at Work</b>                    | <b>282</b> |
| Overview .....  | 282        |
| Safety Monitors, ASM1, ASM1E .....                    | 284        |
| Safety Monitor, ASM2E .....                           | 292        |
| ROTOSCAN RS4/AS-i Safety Laser Scanners .....         | 300        |
| COMPACT <i>plus</i> /AS-i Safety Light Curtains ..... | 302        |
| MLD 500/AS-i Single Light Beam Safety Devices .....   | 304        |
| MLD 500/AS-i Multiple Light Beam Safety Devices ..... | 306        |
| <b>Safety Proximity Sensors</b>                       | <b>308</b> |
| Overview .....  | 308        |
| MC330 Magnetically Coded Sensor .....                 | 310        |
| MC336 Magnetically Coded Sensor .....                 | 318        |
| MC388 Magnetically Coded Sensor .....                 | 324        |
| RD800 safety transponder .....                        | 330        |

## CONTENTS

|  | <b>Page</b>    |
|--|----------------|
| <b>Safety Switches</b>                 | <b>338</b>     |
| Overview .....                         | 338            |
| S20 Safety Switch .....                | 340            |
| S200 Safety Switch .....               | 350            |
| S300 Safety Position Switch .....      | 360            |
| S400, S410 Safety Hinge Switches ..... | 368            |
| <br><b>Safety Locking Devices</b>      | <br><b>378</b> |
| Overview .....                         | 378            |
| L10 .....                              | 380            |
| L100 .....                             | 388            |
| L200 .....                             | 396            |
| <br><b>Safety Command Devices</b>      | <br><b>406</b> |
| Overview .....                         | 406            |
| ESB200, ESB210 E-Stop button .....     | 408            |
| ERS200 E-Stop Rope Switch .....        | 414            |
| <br><b>Safety Relays</b>               | <br><b>426</b> |
| Overview .....                         | 426            |
| MSI-SR4 .....                          | 428            |
| MSI-SR5 .....                          | 434            |
| MSI-RM2 .....                          | 440            |
| MSI-CM .....                           | 446            |
| MSI-DT .....                           | 452            |
| MSI-MC310, MSI-MC311 .....             | 458            |
| MSI-2H .....                           | 468            |
| MSI-T .....                            | 474            |



# CONTENTS

|   | Page       |                                    |
|---|------------|------------------------------------|
| <b>Programmable Safety Controllers</b>                                  | <b>480</b> | Machine Safety Services            |
| Overview .....  | 480        | Safety Engineering Software        |
| MSI 100 Safety Controller .....   | 482        |                                    |
| MSI 200 Safety Controller, expandable .....                             | 488        |                                    |
| MSI-EM extension modules (I/O extension) .....                          | 494        |                                    |
| MSI-FB-PB fieldbus modules (Profibus) .....                             | 496        |                                    |
| <b>Accessories</b>  | <b>498</b> | Safety Laser Scanners              |
| UDC, DC Device Columns .....  | 498        | Safety Light Curtains              |
| Muting Sensor Sets .....  | 502        |                                    |
| UMC Deflecting Mirror Columns / Individual Mirrors .....                | 510        |                                    |
| US Deflecting Mirrors .....   | 512        |                                    |
| UMC Deflecting Mirror Columns/continuous mirror .....                   | 514        |                                    |
| UM60 Deflecting Mirrors .....   | 516        |                                    |
| Protective Screens .....  | 520        |                                    |
| Connection cables – Areas of application and ordering information ..... | 522        |                                    |
| Display and control units .....   | 532        |                                    |
| Muting indicators .....   | 534        |                                    |
| Laser alignment aids .....  | 538        | Multiple Light Beam Safety Devices |
| <b>Glossary</b>   | <b>542</b> |                                    |
| <b>Product Finder</b>   | <b>544</b> | Light Beam Safety Device Sets      |

# MACHINE SAFETY

## 1. Introduction

Machine safety is becoming more and more important, and becoming an integral element of machine construction. In addition to the moral obligation to protect and maintain the health of their workers, the topic of machine safety is also a question of financial sense for the operating company and machine operator. Each and every workplace accident results in costs – and the costs of costs. The examination and explanation of responsibility occupies many departments in the company, right up to executive level.

Our objective is to produce safety sensors and evaluation units that enable a cost-effective integration into various machine and system concepts, and that also provide effective people protection in accordance with international safety standards, without hampering production workflows in the process.

Throughout the various regions and countries of the world there are different concepts of machine safety and protection in the workplace. Along with differences with the requirements and evaluation of safety concepts, there are also differences with regard to responsibilities and legal consequences. The laws and bodies of rules and regulations of the country in which the machine is operated always apply, even if the machine was constructed in another country.

The following information is intended as a guiding overview of the topic of machine safety and does not detract from the in-depth study and compliance with the respectively applicable regional and machine-specific regulations and specifications, as well as the devices' operating instructions. It shall therefore not be possible to derive any form of legal claim from the following information.

## 2. Machine Safety in the EU



The European Union (EU) now has 27 member states with 500 million residents. The member states of the EU have set up bodies that apply across the Union, to which they have transferred parts of their single state sovereignty. The EU Commission



and the EU Council compile directives with basic requirements that then must be adopted by the member states into their national law. The European standards organizations, CEN, CENELEC and ETSI are commissioned to draw up EU standards that technically solidify the applicable directives and legal provisions.

### 2.1 European Directives

#### EU product directives as the basis for free merchandise traffic

20 product directives have so far been drawn up to dismantle obstacles to trade in the single European market. The relevant products may only be distributed if they satisfy these basic requirements. If a product complies with the relevant harmonized EU standards, it is assumed that the basic requirements are met. A manufacturer can also use other technical solutions if the same level of safety is proven. Fulfillment of the basic requirements is determined in a formal conformity assessment procedure. This is performed, depending on the potential risk of the products, as much as possible within the manufacturer's own area of responsibility.

#### Important EU directives in the area of machine safety and their implementation under German Law

|  EU Directives |  German Law |
|---|--|
| Machinery Directive 2006/42/EC  | 9th ProdSichG (Device and Product Safety Law) ordinance  |
| Low Voltage Directive 2006/95/EC  | 1st ProdSichG (Device and Product Safety Law) ordinance  |
| ATEX Directive 94/9/EC  | 11th ProdSichG (Device and Product Safety Law) ordinance   |
| General Product Safety Directive 2001/95/EC   | Produktsicherheitsgesetz (ProdSichG) (Device and Product Safety Law)                             |
| EMC Directive 2004/108/EC   | EMC Law  |



# 1. INTRODUCTION

## 2. Machine Safety in the EU

### EU safety at work directives

Safety at Work Framework Directive 89/391/EEC contains minimum requirements and general basic principles for the prevention of work-related hazards, for safety and health protection, for minimizing and eliminating risk and accident factors, and for the appropriate instruction of employees. These are minimum requirements. Each EU Member State may increase the protection level in its national implementation or, for example, set higher test requirements.

### Important directives in the area of EU work safety and their implementation under German Law

|  EU Directives |  German Law  |
|---|---|
| Safety at Work Framework Directive 89/391/EEC   | Safety at Work Law Ordinance On Industrial Safety and Health  |
| Use of Work Equipment Directive 89/655/EEC amended by 95/63/EC                                  | Regulations of employers' liability insurance associations (BG):<br>– Regulations of employers' liability insurance associations continue to be legally binding.<br>– These regulations solidify state health and safety regulations and apply as compliant with the latest state of technology.<br>– The information of employers' liability insurance associations is provided by special topic-specific publications of the respective associations. |
| Directive 89/655/EEC amended by 2001/45/EC  |   |

#### 2.1.1 EU machinery directive 2006/42/EC

Machinery Directive 2006/42/EC regulates a uniform level of safety for machines in order to enable free merchandise traffic and distribution within the European Economic Area. It applies to manufacturers and distributors of machinery and devices. The Machinery Directive can be found in its original text at [www.eur-lex.europa.eu](http://www.eur-lex.europa.eu).

#### Structure and content of the machinery directive:

|                |  |
|----------------|--|
| Recitals       | No. 1 - 28   |
| Part available | Article 1 - 28   |
| Annex I:       | Essential health and safety requirements for the design and construction of machines     |
| Annex II:      | Content Declaration of Conformity  |
| Annex III:     | CE conformity assessment   |
| Annex IV:      | Listing of machinery regarded as particularly hazardous or components relevant to safety |

|             |   |
|-------------|---|
| Annex V:    | Non-exhaustive list of "safety components"                                    |
| Annex VI:   | Assembly instructions for partly completed machinery                          |
| Annex VII:  | Technical documents for machinery   |
| Annex VIII: | Assessment of conformity with internal checks on the manufacture of machinery |
| Annex IX:   | EC Type Examination   |
| Annex X:    | Full quality assurance  |
| Annex XI:   | Minimum criteria for the notification of test centers                         |
| Annex XII:  | Correlation table old/new directive   |

### What do machine manufacturers and distributors have to comply with?

- The basic safety requirements of Appendix I must be met.**  
This means that early in the design phase the designer must perform a parallel risk assessment so that all required measures for risk reduction are already considered in the machine's construction phase.

#### Note

The **Safexpert** PC software for machinery safety engineering contains a list of hazards and supports the process of risk assessment and risk reduction in accordance with EN ISO 12100. The software enables an isolated consideration of all hazardous points of operation and life phases of the machine and ensures transparent and comprehensible documentation. For more information and details see chapter Safety Engineering Software, Safexpert, page 58.

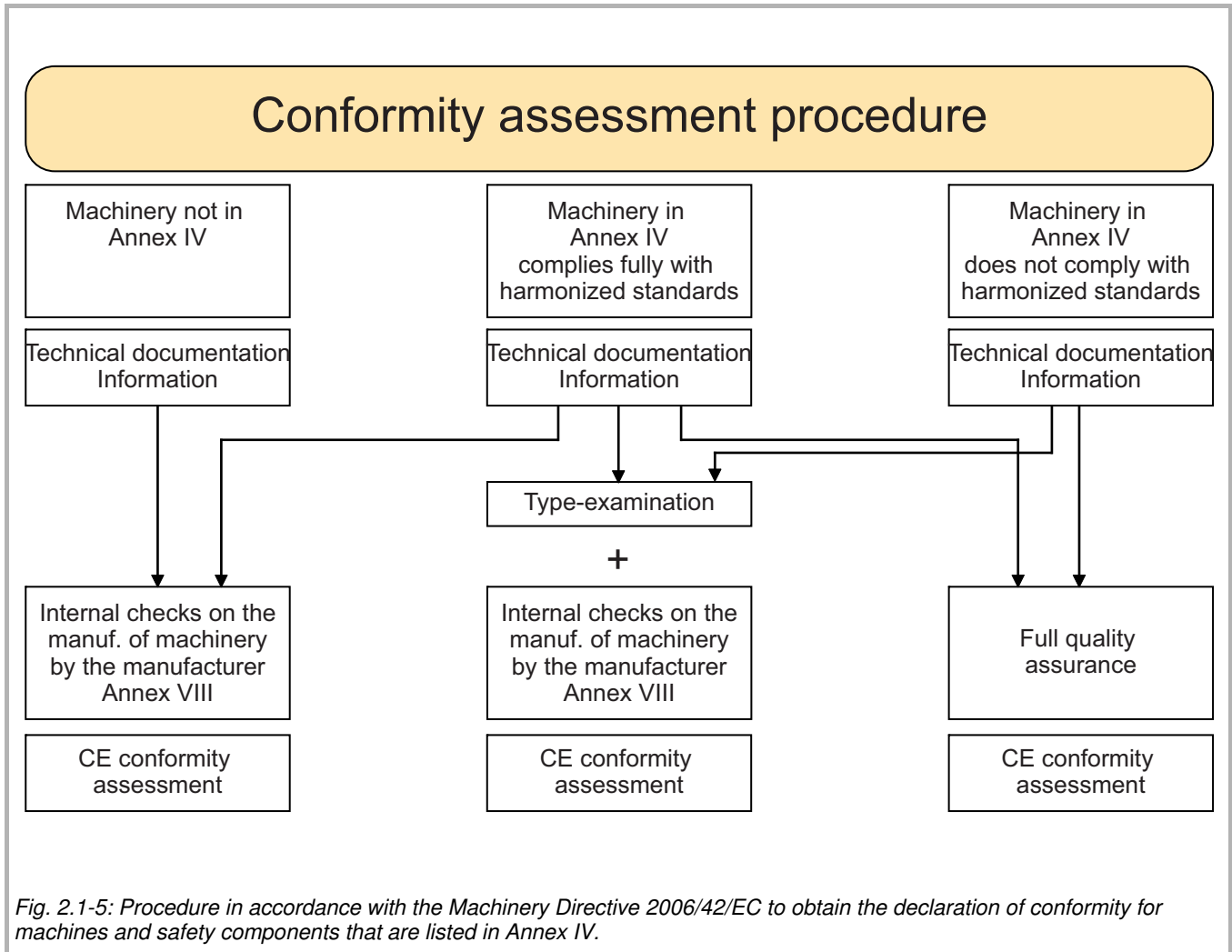
- A declaration of conformity must be obtained for every machine.**

For machines and safety components that are not listed in Annex IV, the actual manufacturer has responsibility for providing the CE conformity assessment; they obtain a declaration of conformity and consequently certify compliance with the Machinery Directive. They must document all records, such as measurement and test results, and be able to produce them when requested by national authorities.

Another certification procedure is required for machines and safety components that are listed in Annex IV (figure 2.1-5, page 10).

# MACHINE SAFETY

## 2. Machine Safety in the EU



# 1. INTRODUCTION

## 2. Machine Safety in the EU

### A few important statements acc. to the machinery directive include:

- The same machine regulations apply for exchangeable equipment, **safety components**, chains/ropes/belts for lifting purposes, cardan shafts and load-carrying equipment. They have to be distributed with **CE conformity assessment**, declaration of conformity and the required user information.
- For "partly completed machinery" the manufacturer has to supply special technical documents (Annex VII Part B), installation instructions (Annex VI) and a declaration of incorporation (Annex II, Part 1, Section B), which must specify which requirements of the directive apply to the part-machine and have been complied with. Installation instructions must be provided with the machine's documentation.
- Lifting devices with a speed of up to 0.15 m/s of the load carrier are subject to the Machinery Directive; with a speed of more than 0.15 m/s they are subject to the Lift Directive (if they are not covered by its rules of exception).
- Construction site lifts are subject to the Machinery Directive.
- Clearer delimitation of the Machinery Directive for the Low Voltage Directive.
- Internal production controls for series machines (Annex VIII).
- The validity of EC Type Examination certifications must be checked by the test center every 5 years. Manufacturers and test centers are obligated to retain the relevant technical documents for 10 years.

The Machinery Directive 2006/42/EC can be found in its original German text at <http://eur-lex.europa.eu>.

### 2.1.2 Use of work equipment directive 89/655/EEC

Use of Work Equipment Directive 89/655/EEC supplemented by Directive 95/63 EC contains the minimum specifications for safety and health protection with the use of work equipment. It applies to the **operating company (employer)** and in Section II includes the following 8 articles:

- **Article 3 General Obligations** regulates the obligations of the employer and logically requires that the employer ensures that the safety and protection of health are guaranteed with the operation of the work equipment provided.
- **Article 4 Regulations for work equipment**
- **Article 4a Checking the work equipment**  
The employer ensures that the work equipment has undergone an initial test in line with the individual national legal regulations before the initial operation and after every new installation. The Member States define the modalities for these checks. In Germany this is the Ordinance On Industrial Safety and Health (see below).
- **Article 5 Specifically hazardous work equipment**
- **Article 5a Ergonomics and health protection in the workplace**
- **Article 6 Informing workers**
- **Article 7 Training of workers**
- **Article 8 Consultation and involvement of the worker**

Use of Work Equipment Directive 89/655/EEC can be found in its original text at <http://eur-lex.europa.eu>.

# MACHINE SAFETY

## 2. Machine Safety in the EU

### Ordinance on Industrial Safety and Health

With the Ordinance on Industrial Safety and Health, Directives 89/655/EEC, 95/63/EC and other directives from the work safety area are implemented in German Law. Extracts of just two paragraphs of section 2 will be presented in the following:

#### §3 Hazard evaluation

- (3) "Type, scope and periods of required tests must in particular be determined for the work equipment. Furthermore the employer must determine and define the necessary requirements that the people that are commissioned by the employer with the testing work equipment must satisfy."

**Note**

Leuze electronic provides competent advice and support services in this respect in its **Machine Safety Services** service package (see chapter Machine Safety Services, page 46).

#### §10 Work equipment test

- (1) "The employer must ensure that the work equipment, the safety of which depends on the installation conditions, is tested after installation and before initial operation, as well as after every installation at a new construction site or at a new location. The purpose of the test is to verify the proper installation and safe functioning of this work equipment. The test may only be performed by qualified personnel."
- (3) "The employer must ensure that the safe operation of work equipment is tested by qualified personnel after maintenance work that could impair the safety of the work equipment."

**Note**

Leuze electronic provides safety inspections before the initial operation and regular safety inspections thereafter in its **Machine Safety Services** service package (see chapter Machine Safety Services, page 46).



## 2.2 The European safety standards system

### 2.2.1 Correlation between directives and harmonized European standards

Harmonized European standards specify the basic requirements of the EU directives for safety and health protection as they are named, for example, in Annex I of the Machinery Directive. In accordance with the Machinery Directive, Article 5 (2), it applies here that when the protective level of an applicable harmonized standard is reached the corresponding requirement from the directive also applies as satisfied (i.e. conformity with the corresponding directive).

In contrast to directives and their national implementation under the national law of the Member State, standards are not legally binding. If the level of protection described in standards of this kind is reached by other measures, then such solutions are also possible. The difference between satisfying an applicable harmonized standard and a deviating solution, however, does have consequences. The manufacturer must prove compliance with the directive with additional documentation. Differences can also result with the conformity procedure when harmonized standards are only partly met or no applicable harmonized standards are available, see the versions in chapter 2.1.1, page 9.



# 1. INTRODUCTION

## 2. Machine Safety in the EU

### 2.2.2 Formulation process of a harmonized standard

Technical committees and working groups below them, which for the most part recruit from national standards committees and to some degree from the employees of manufacturers in the machinery manufacturing and sensor technology sector, occupy themselves in the CEN and CENELEC standards organizations with the formulation of standards in the area of machine safety. At the end of this work phase there is an approval process in which the members of the CEN, including Switzerland, decide in accordance with a quota system for or against the adoption of a standard as a harmonized European safety standard.

A total of 29 states participate in this process. With the publication of a harmonized European safety standard in the Official EU Journal, the aptly-name "presumption of conformity" applies, i.e. it is assumed with the achievement of the protective objectives of this standard that conformity with the corresponding directive for this safety aspect is ensured.

| Member State   | Votes | Member State | Votes |
|----------------|-------|--------------|-------|
| France         | 29    | Switzerland* | 10    |
| Germany        | 29    | Bulgaria     | 10    |
| The UK         | 29    | Slovakia     | 7     |
| Italy          | 29    | Denmark      | 7     |
| Spain          | 27    | Finland      | 7     |
| Poland         | 27    | Norway*      | 7     |
| Romania        | 14    | Ireland      | 7     |
| Holland        | 13    | Lithuania    | 7     |
| Greece         | 12    | Latvia       | 4     |
| Czech Republic | 12    | Slovenia     | 4     |
| Belgium        | 12    | Estonia      | 4     |
| Hungary        | 12    | Cyprus       | 4     |
| Portugal       | 12    | Luxembourg   | 4     |
| Sweden         | 10    | Malta        | 3     |
| Austria        | 10    | Iceland*     | 3     |

\*) EFTA States

An EU standard is harmonized with a simple majority and at least 71% of the weighted votes

Table 2.2.2-1: Vote weighting with the approval of a harmonized EU standard

# MACHINE SAFETY

## 2. Machine Safety in the EU

### 2.2.3 Hierarchy of European standards for machine safety

European safety standards can be divided into basic safety standards (type A standards), safety group standards (type B1 standards and type B2 standards) and machine-specific technical standards (type C standards).

The design principles and the basic concepts of type A standards, such as EN ISO 12100, for example, are binding for all machines. Instructions for determining risks that are connected with the machine can be found here. Avenues of approach and their order for preventing risks are provided with the objective of integrating safety, even before the machine manufacturing begins. The steps that cover risk assessment and the prevention of such risks are examined in more detail in chapter 2.3, from page 18.

Type B1 standards describe general safety aspects and provide solutions for this, e.g. for the design of hard guards, or the approach speed that is required for calculating the safety distance for Safety Light Curtains or Multiple Light Beam Safety Devices. This topic is also examined in detail in chapter 4.

Normative requirements of special protective devices, such as E-Stop buttons, safety door switches, safety mats and strips or Safety Light Curtains are grouped together in the type B2 stan-

dards. Notes on the design and testing of safety components that both the manufacturer of such products and the machine designer must take into account with the use in their machine can be found here.

Type C standards describe significant hazards, specific risks and measures for reducing these risks at special machines or machine types. If a C standard exists for the machine type in question, it takes priority over a B or A type standard. If there are additional hazards that are not addressed in the standard, or if there is no special C standard for the machine being planned, risk reduction in accordance with A and B standards must be made.

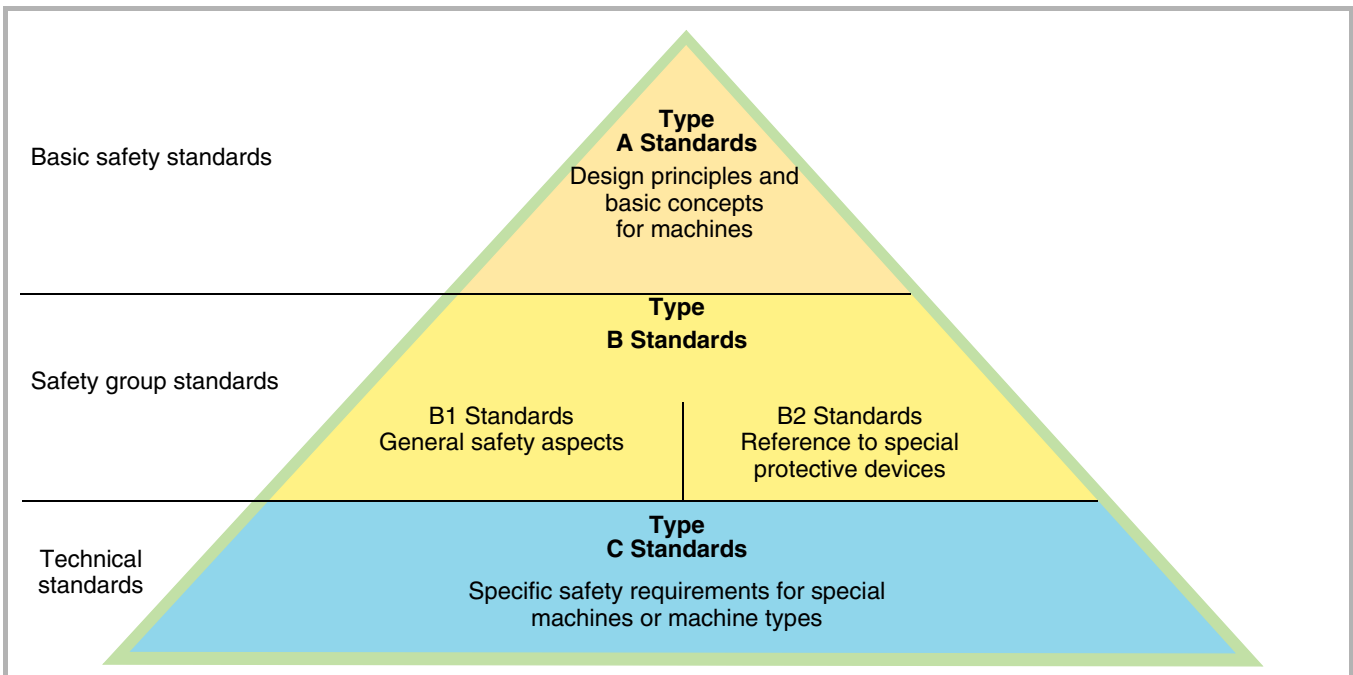


Fig. 2.2.3-1: The hierarchy of the European standards system

# 1. INTRODUCTION

## 2. Machine Safety in the EU

### Examples of EN and ISO/IEC standards in the machine safety area

| Standard type            | European (EU) and international (ISO/IEC) standards Reference   | Standard name  |
|--------------------------|---|--|
| A                        | EN ISO 12100  | Safety of machinery – Basic concepts, general principles for design - Risk assessment and risk reduction   |
| B                        | EN ISO 13857  | Safety of machinery – Safety distances to prevent dangerous areas being reached by the upper and lower limbs   |
|                          | EN 349<br>ISO 13854   | Safety of machinery – Minimum gaps to avoid crushing of parts of the human body  |
|                          | EN ISO 13849-1  | Safety of machinery – Safety-related parts of control systems – Part 1: General principles for design  |
|                          | EN ISO 13849-2  | – Part 2: Validation   |
|                          | EN ISO 13855  | Safety of machinery – The positioning of protective equipment in respect to approach speeds of parts of the human body   |
|                          | EN 1037<br>ISO 14118  | Safety of machinery – Prevention of unexpected start-up  |
|                          | EN/IEC 60204-1  | Safety of machinery – Electrical equipment of machines – Part 1: General requirements  |
|                          | EN/IEC 62061  | Functional safety of safety-related electrical, electronic and programmable electronic control systems   |
|                          | prEN/TS 62046<br>IEC/TS 62046   | Safety of machinery – Application of protective equipment to detect the presence of persons  |
|                          | EN ISO 13850  | Safety of machinery – E-STOP – Design principles   |
|                          | EN 574<br>ISO 13851   | Safety of machinery – Two-hand control devices - Functional aspects – Principles for design  |
|                          | EN 953<br>ISO 14120   | Safety of machinery – Guards – General requirements for the design and construction of fixed and movable guards  |
|                          | EN 1088<br>ISO 14119  | Safety of machinery – Interlocking devices associated with guards – Principles for design and selection  |
|                          | EN 1760-1<br>ISO 13856-1  | Safety of machinery – Pressure sensitive protective devices – Part 1: General principles for the design and testing of safety mats and pressure sensitive floors |
| EN 1760-2<br>ISO 13856-2 | – Part 2: General principles for the design and testing of pressure sensitive edges and pressure sensitive bars |  |

Machine Safety Services

Safety Engineering Software

Safety Laser Scanners

Safety Light Curtains

Multiple Light Beam Safety Devices

Light Beam Safety Device Sets

Single Light Beam Safety Devices

AS-Interface Safety at Work

Safety Proximity Sensors

## MACHINE SAFETY

### 2. Machine Safety in the EU

#### Examples of EN and ISO/IEC standards in the machine safety area

| Standard type | European (EU) and international (ISO/IEC) standards   |   |
|---------------|---|---|
|               | Reference   | Standard name   |
| B             | EN 1760-3<br>ISO/DIS 13856-3  | – Part 3: General principles for the design and testing of pressure sensitive bumpers, plates, wires and similar devices                                    |
|               | EN/IEC 61496-1  | Safety of machinery – Electro-sensitive protective equipment<br>– Part 1: General requirements and tests  |
|               | prEN/IEC 61496-2  | – Part 2: Particular requirements for active optoelectronic protective devices  |
|               | EN/IEC TS 61496-3   | – Part 3: Particular requirements for active optoelectronic protective devices responsive to diffuse reflection (AOPDDR)                                    |
| C             | EN 81-1   | Safety rules for the construction and installation of lifts<br>– Part 1: Electric lifts   |
|               | EN 289  | Plastics and rubber machines – Presses – Safety requirements  |
|               | EN 415-6  | Safety of Packaging Machines<br>Palletizers and Depalletizers   |
|               | EN 422  | Plastics and rubber machines – Blow molding machines – Safety requirements  |
|               | EN 528  | Rail dependent storage and retrieval equipment – Safety   |
|               | EN 692  | Tool manufacturing - Mechanical presses – Safety – (notice: however form-fitting clutches do not satisfy the safety requirements of the directive 98/37/EC) |
|               | EN 693  | Machine tools – Safety – Hydraulic presses  |
|               | EN 710  | Safety requirements for foundry molding and coremaking machinery and plant and associated equipment   |
|               | EN ISO 10218-1  | Industrial robots – Safety requirements - Part 1: Robots  |
|               | EN 848-1  | Safety of woodworking machines – One side molding machines with rotating tool<br>– Part 1: Single spindle vertical molding machines                         |
|               | EN 869  | Safety requirements for high pressure metal diecasting units  |
|               | EN 940  | Safety of woodworking machines – Combined woodworking machines  |
|               | EN 972  | Tannery machines – Reciprocating roller machines – Safety requirements  |
|               | EN 1010-1<br>ISO 1010   | Safety of machinery – Safety requirements for the design and construction of printing and paper converting machines<br>– Part 1: Common requirements        |
|               | EN 1010-2   | – Part 2: Printing and varnishing machines including pre-press machinery  |
|               | EN 1114-1   | Rubber and plastics machines – Extruders and extrusion lines – Safety requirements for extruders  |
| EN 1218-1     | Safety of woodworking machines – Tenoning machines<br>– Part 1: Single tenoning machines and slotting machines with sliding table |   |
| EN 1525       | Safety of industrial vehicles – Automated guided vehicles (AGV) and their systems   |   |



# 1. INTRODUCTION

## 2. Machine Safety in the EU

### Examples of EN and ISO/IEC standards in the machine safety area

| Standard type | European (EU) and international (ISO/IEC) standards |   |
|---------------|---|---|
|               | Reference   | Standard name   |
| C             | EN 1526   | Safety of industrial vehicles – Additional requirements for automated functions on AGV  |
|               | EN ISO 11111-1                                      | Textile machinery – Safety requirements – Part 1: Common requirements   |
|               | EN ISO 11553-1                                      | Safety of machinery – Laser processing machines – Part 1: General safety requirements   |
|               | EN 12387  | Footwear, leather and imitation leather goods manufacturing machines – Modular shoe repair equipment – Safety requirements        |
|               | EN 12622  | Safety of machine tools – Hydraulic press brakes  |
|               | EN 12629-1  | Machines for the manufacture of constructional products from concrete and calcium-silicate – Safety – Part 1: Common requirements |

This is not a complete list. You will find more information on machinery standards at [www.vdma.org](http://www.vdma.org) or [www.zvei.org](http://www.zvei.org) for example. Standards in their original version can be obtained from Beuth Verlag GmbH, [www.beuth.de](http://www.beuth.de), for example.

**Note**

Finding instead of searching! With a powerful search and filter function, Leuze electronic's Safexpert software for the safety engineering of machinery and plant systems allows one to locate relevant standards within seconds. Full-text searches are performed in 11 important EU-machinery safety standards and, with the appropriate standards package, in more than 60 standards (see chapter Safexpert, page 58).

[www.leuze.com/en/safety-at-work/](http://www.leuze.com/en/safety-at-work/)

# MACHINE SAFETY

## 2. Machine Safety in the EU

### 2.3 Safety of machinery, risk analysis and risk assessment

The declared objective is to construct and operate machinery in such a way that injuries and harm will not occur with proper use of the machinery. Accident statistics show that a hazard at a machine will cause harm or injury sooner or later if no protective measures are taken. Protective measures are a combination of the measures performed by the designer and the user. Measures that can already be implemented in the construction phase take priority over the measures performed by the user and are generally more effective than these.

identification of hazards, describes the risks that designers must take into consideration, contains principles for design and a method for safe construction and risk reduction. EN ISO 12100 also describes an iterative method for risk analysis, risk assessment and risk reduction to achieve the required machine safety. Existing machine-specific standards, such as type C EN standards, for example, must be considered with priority.

The international standard, EN ISO 12100 "Safety of machinery – Basic concepts, general principles for design - Risk assessment and risk reduction", provides detailed help with the

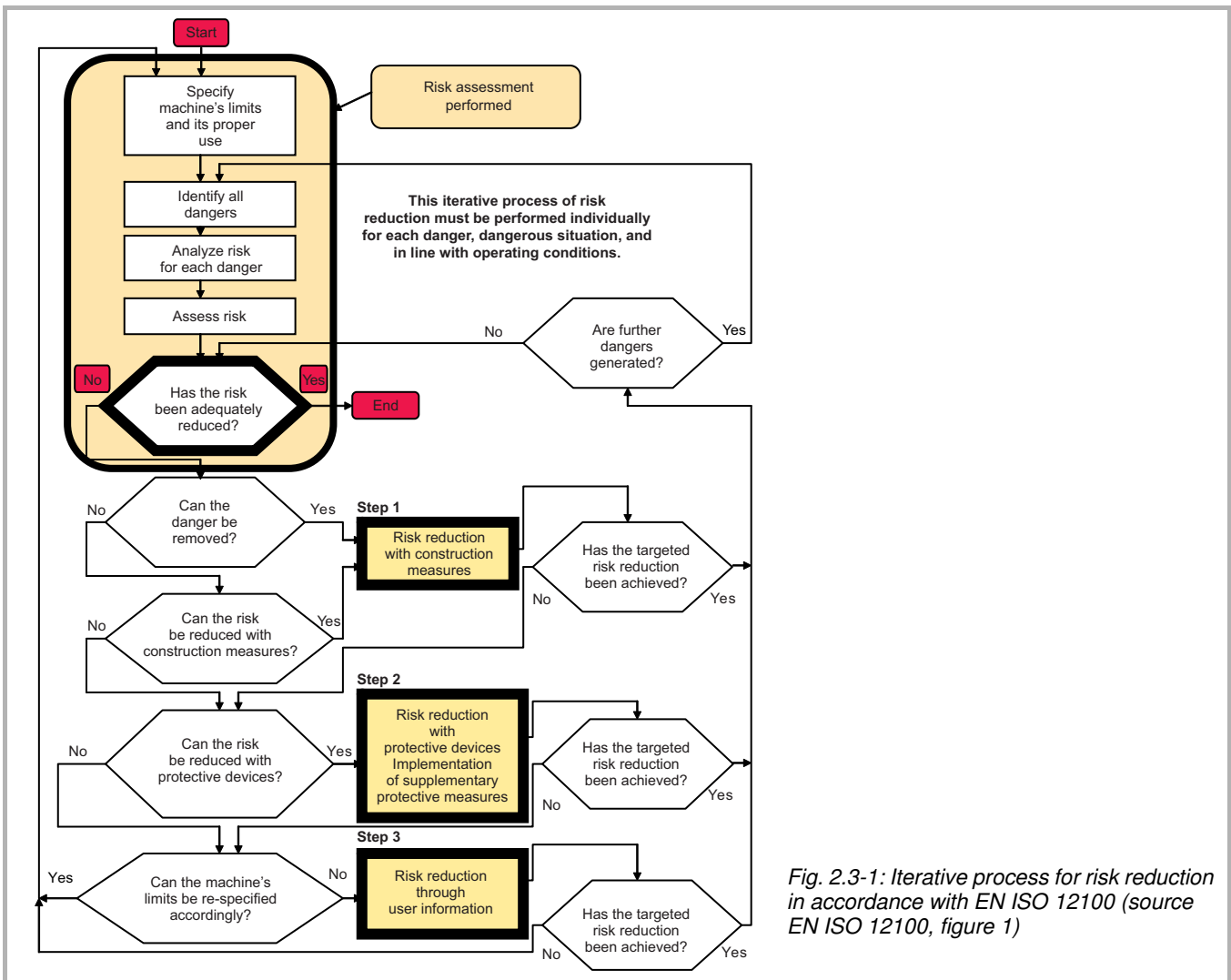


Fig. 2.3-1: Iterative process for risk reduction in accordance with EN ISO 12100 (source EN ISO 12100, figure 1)

# 1. INTRODUCTION

## 2. Machine Safety in the EU

EN ISO 12100 recommends that the machine designer use the following step-by-step procedure for risk reduction:

1. Specification of the limits and proper use of the machine
2. Identification of possible hazards and hazardous situations
3. Estimation of the risk of each identified hazard and each hazardous situation and parallel consideration of the foreseeable malpractice or faulty operation by operating personnel
4. Evaluation of each individual risk and decision on whether a risk reduction is required or not
5. Attempts to remove or reduce the risk with constructive measures. If this does not work then:
6. Reduction of the risk with the use of protective devices (separating protective devices, such as hard guards or covers, or electro-sensitive protective equipment, such as Safety Light Curtains, for example)
7. Informing and warning machine operators about the remaining risks of the machine by using warning notes and plates on the machine and in the operating instructions

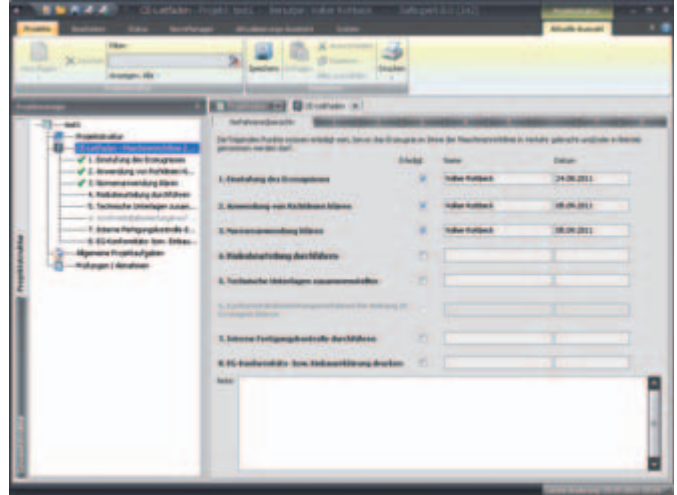
The first four steps describe the risk analysis and risk assessment. It is important that the risk analysis and risk assessment be carried out methodically and that it be comprehensibly documented.

In addition to these protective measures selected by the machine designer/constructor, further protective measures may also be required by the operating company or machine operator to reduce the remaining risk. This may be, for example:

- Organizational measures (e.g. safe work processes, regular inspections, etc.)
- Personal protective devices
- Training and instruction for operating personnel

**Note**

The Safexpert PC software for machinery safety engineering contains a list of hazards and supports the process of risk assessment in accordance with EN ISO 12100. The software enables an isolated consideration of all hazardous points of operation and life phases of the machine and ensures transparent and comprehensible documentation. For further information and ordering info see chapter Safexpert, page 58.



Step-by-step, Safexpert supports the user with their tasks right through to provision of the declaration of conformity and manufacturer's declaration.

# MACHINE SAFETY

## 2. Machine Safety in the EU

### 2.4 Safety-related parts of control systems

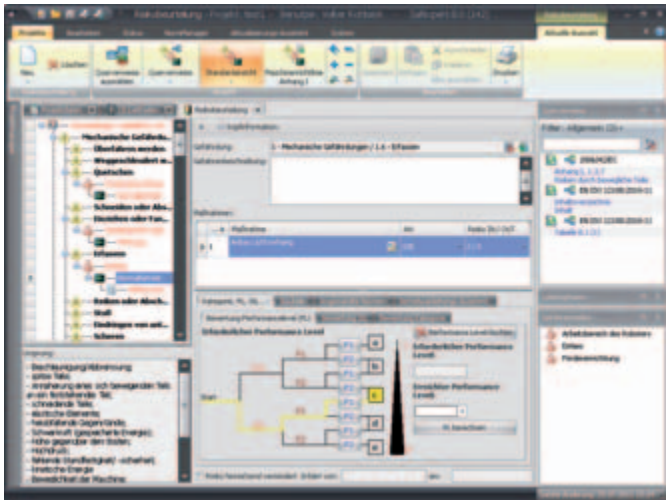
Parts of machine control systems performing safety tasks are described by those who set standards as "safety-related parts of control systems". These parts can consist of either hardware or software and stand-alone or integrated components of the machine control system. Safety-related control components incorporate the entire effective chain of a safety function provided by sensor, control unit and actuator. Each can be complexly set up in different ways, and, for example, consist of a Safety Switch and a Safety Relay, or they can also be implemented as a safety related PLC of an entire system.

The general objective is to design these control components so that the safety of the control function and the behavior of the control unit in case of a fault corresponds with the level of risk reduction determined in the risk assessment. Specific control-related measures for fault prevention in systems used in low-risk applications may not be sufficient for applications with a higher risk. For these applications, for example, additional measures for fault tolerance or fault detection would then be required.

The higher the risk reduction to be provided by the safety-related control component, the higher the required safety level or the safety-related performance level of the control component. The standards described in the following use different classification systems and definitions for these safety levels.

**Note**

Safexpert, the PC software from Leuze electronic for the systematic safety engineering of machinery and plant systems supports the designer when determining the required Performance Level in accordance with EN ISO 13849-1 on the basis of a risk assessment in accordance with EN ISO 12100. For further information and ordering info see chapter Safexpert, page 58.



| Performance level (EN ISO 13849-1) | PFH <sub>d</sub> Average probability of a failure to danger [1/h] | SILCL Level EN/IEC 62061 |
|------------------------------------|---|--------------------------|
| a                                  | $10^{-5} \leq PFH_d < 10^{-4}$                                    | --                       |
| b                                  | $3 \cdot 10^{-6} \leq PFH_d < 10^{-5}$                            | SIL 1                    |
| c                                  | $10^{-6} \leq PFH_d < 3 \cdot 10^{-6}$                            | SIL 1                    |
| d                                  | $10^{-7} \leq PFH_d < 10^{-6}$                                    | SIL 2                    |
| e                                  | $10^{-8} \leq PFH_d < 10^{-7}$                                    | SIL 3                    |

Fig. 2.4-1: Performance Level and SIL Level (source: ZVEI Flyer "Safety of machinery")



# 1. INTRODUCTION

## 2. Machine Safety in the EU

### 2.4.1 EN ISO 13849-1 "Safety of machinery – Safety-related parts of control systems – Part 1: Basic principles"

In October 2006 EN ISO 13849-1 was officially adopted as the successor standard to EN 954-1. Like EN 954-1, it incorporates the safety-related parts of control systems (SRP/CS) in its area of application and all types of machines, regardless of the technology and energy form used (electric, hydraulic, pneumatic, mechanical, etc.). It focuses on the established categories of EN 954-1 and contains special requirements for SRP/CS with programmable electronic systems. With EN ISO 13849-1, in addition to the qualitative approach of EN 954-1, a quantitative consideration of the safety functions is also included. Performance levels (PL) are defined in EN ISO 13849-1 to classify different safety-related capacities into their respective categories. The five PLs (a, b, c, d, e) represent different average probability values of a failure to danger per hour.

#### Performance levels (PL) in accordance with EN ISO 13849-1

| Performance level (PL) | Average probability of a failure to danger per hour (1/h) |
|------------------------|---|
| a                      | $\geq 10^{-5}$ to $< 10^{-4}$                             |
| b                      | $\geq 3 \times 10^{-6}$ to $< 10^{-5}$                    |
| c                      | $\geq 10^{-6}$ to $3 \times 10^{-6}$                      |
| d                      | $\geq 10^{-7}$ to $< 10^{-6}$                             |
| e                      | $\geq 10^{-8}$ to $< 10^{-7}$                             |

#### Determining the required performance level PL<sub>r</sub>

A risk assessment must be performed and documented in order to define the required PL<sub>r</sub> for each safety function of the safety-related control system. The informative Annex A of the standard presents a qualitative procedure for assessing the risk and for determining the PL<sub>r</sub>.

#### Risk parameters:

##### S Seriousness of injury

S1 Minor (usually reversible) injury

S2 Serious (usually irreversible injury including death)

##### F Frequency and/or duration of the exposure to the hazard

F1 Seldom to not very frequent and/or exposure to hazard is brief

F2 Frequent to continuous and/or exposure to hazard is long

##### P Possibility of preventing the hazard or limiting the harm

P1 Possible under certain conditions

P2 Not really possible

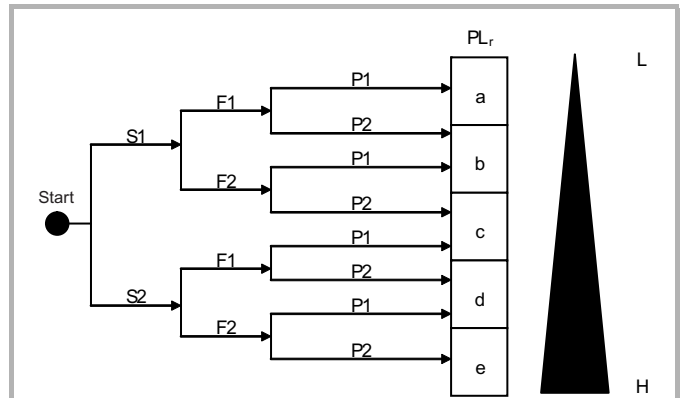


Fig. 2.4.2-1: Risk graph for determining the PL<sub>r</sub> for each safety function (source: EN ISO 13849-1)

#### Legend

- Start Point at which the evaluation of the required contribution of the safety device to the risk reduction begins
- L Low contribution to risk reduction
- H High contribution to risk reduction
- PL<sub>r</sub> Required performance level

# MACHINE SAFETY

## 2. Machine Safety in the EU

### Determination of the performance level reached

The following safety-related parameters are required for determining the performance level of components/devices:

| EN ISO 13849-1 parameters | Meaning   |
|---------------------------|---|
| Cat.                      | Category (B, 1, 2, 3, 4), structural setup as the basis for determining a specific PL   |
| PL                        | Performance level (a, b, c, d, e)   |
| MTTF <sub>d</sub>         | Mean time to dangerous failure  |
| B <sub>10d</sub>          | Number of cycles with which 10% of a random selection of the considered abrasion-prone pneumatic or electro-mechanical components have a failure to danger. |
| DC                        | Diagnostic coverage   |
| CCF                       | Common cause failure  |
| T <sub>M</sub>            | Service life, intended usage time (mission time)  |

Further parameters to be considered are the influence that operational factors such as request rate and/or the test rate of the safety function can have on the resulting PL.

**Note**  
 The SISTEMA PC software of the Institut für Arbeitsschutz (IFA) is used for the calculation and evaluation of the functional safety of control systems in accordance with EN ISO 13849-1. It is an ideal complement to Safexpert and can be downloaded as freeware from [www.leuze.com/en/sistema](http://www.leuze.com/en/sistema). For more information see chapter SISTEMA, page 64.

Figure 2.4.2-3 shows a simplified method for determining the achieved PL. It illustrates a graphical method for roughly estimating the PL using the stated safety-related characteristic parameters of the components (EN ISO 13849-1).

The combination of category and DC<sub>avg</sub> determines which column is to be selected. The respective shaded area is then determined in the column in accordance with the MTTF<sub>d</sub> of each channel. The resulting PL can now be read on the vertical axis.

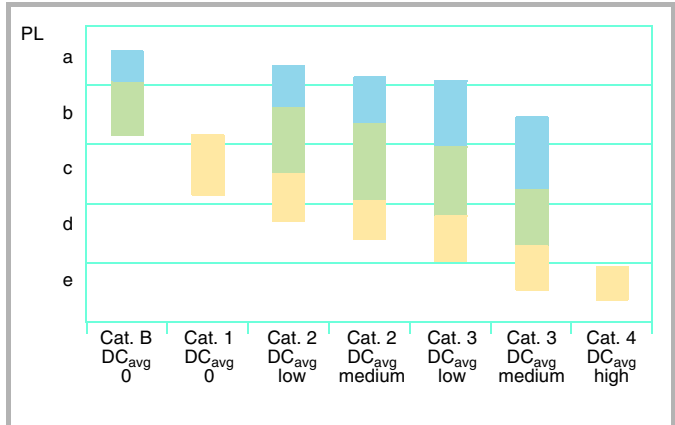


Fig. 2.4.2-3: Relation between the categories, DC<sub>avg</sub>, MTTF<sub>d</sub> of each channel and the resulting PL (source: EN ISO 13849-1)

**Legend**

MTTF<sub>d</sub> in years

- Blue: MTTF<sub>d</sub> / each channel = low    3 < MTTF<sub>d</sub> < 10
- Green: MTTF<sub>d</sub> / each channel = medium    10 < MTTF<sub>d</sub> < 30
- Yellow: MTTF<sub>d</sub> / each channel = high    30 < MTTF<sub>d</sub> < 100

Diagnostic coverage DC

- no    DC < 60%
- low    60% ≤ DC < 90%
- medium    90% ≤ DC < 99%
- high    99% ≤ DC ≤ 100%

### Assessing of the CCF effect

This qualitative process should be applied to the entire system. Each component of the safety-related part of the control should be considered.

The following table lists a portion of the processes for quantification for measures against CCF.

|   |
|---|
| <b>Draft/Application/Experience</b>   |
| Protection against overvoltage, overpressure, overcurrent etc.  |
| Use of approved components  |
| <b>Evaluation/Analysis</b>  |
| Have the results of a failure mode and effect analysis been taken into account in order to avoid failures resulting from a common cause during development? |
| <b>Competence/Training</b>  |
| Have designers/technicians been trained in recognizing the causes and effects of failures resulting from a common cause?                                    |

# 1. INTRODUCTION

## 2. Machine Safety in the EU

### Validation

The design of a safety-relevant control function must be validated. The validation must show that the design of each safety function satisfies the corresponding requirements (source: EN ISO 13849-2).

### 2.4.2 EN/IEC 62061 "Safety of machinery – Functional safety of safety-related electrical, electronic and programmable electronic control systems"

This standard contains requirements and recommendations for drafting, integrating and validating safety-related electrical, electronic and programmable control systems (SRECS) for machinery, which cannot be carried by hand during the work. In contrast to EN ISO 13849-1, it does not define any requirements for the performance of non-electrical (e.g. hydraulic, pneumatic, electro-mechanical) safety-related control elements for machines. Within the full scope of EN ISO 12100 it is used as an alternative to EN ISO 13849-1 for specifying the safety-related performance of safety-related electrical control systems that are required for risk reduction. As a sector-specific standard that falls within the scope of IEC 61508 for the application area of machines, the EN/IEC 62061 incorporates the entire SRECS lifecycle, from the concept phase until taking out of operation. The safety-related capacity is described by the "Safety Integrity Level (SIL)".

### Safety Integrity Level (SILCL) in accordance with EN/IEC 62061

| Safety Integrity Level | Probability of a failure to danger per hour (PFH <sub>d</sub> ) |
|------------------------|---|
| 3                      | $\geq 10^{-8}$ to $< 10^{-7}$                                   |
| 2                      | $\geq 10^{-7}$ to $< 10^{-6}$                                   |
| 1                      | $\geq 10^{-6}$ to $< 10^{-5}$                                   |

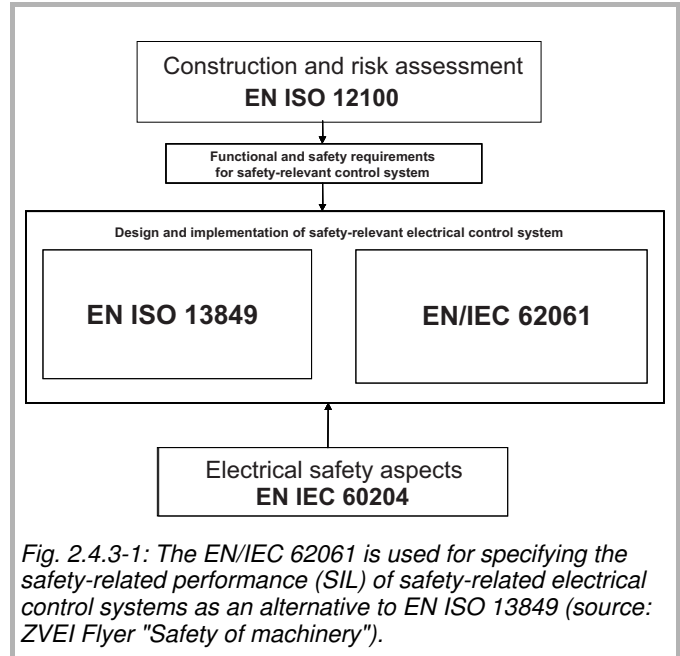


Fig. 2.4.3-1: The EN/IEC 62061 is used for specifying the safety-related performance (SIL) of safety-related electrical control systems as an alternative to EN ISO 13849 (source: ZVEI Flyer "Safety of machinery").

### SIL risk assessment and definition

The informative Annex A of EN/IEC 62061 includes an example of a procedure for qualitative risk assessment and definition of the SILCL. This procedure must be implemented for each special hazard, for which an appropriate risk reduction is to be achieved with the help of an SRECS. It is based on the method presented in EN ISO 12100 and is used for evaluating the risk parameters.

- S** Seriousness of the possible harm or injury
- F** Frequency and duration of exposure
- W** Probability of a hazardous event occurring
- P** Possibility of avoiding or limiting the harm

For every special hazard, the individual risk parameters are considered and evaluated with a corresponding value according to their features (e.g. seriousness, frequency, probability).

# MACHINE SAFETY

## 2. Machine Safety in the EU

| Seriousness                                   | S | Frequency of exposure | F | Probability of occurrence | W | Possibility of prevention | P |
|---|---|-----------------------|---|---------------------------|---|---------------------------|---|
| Irreversible: death, loss of an eye or arm    | 4 | ≤ 1h                  | 5 | very high                 | 5 | impossible                | 5 |
| Irreversible: broken limbs, loss of a finger  | 3 | > 1h to ≤ 1 day       | 5 | probable                  | 4 | rare                      | 3 |
| Reversible: treatment by a physician required | 2 | > 1 day to ≤ 2 weeks  | 4 | possible                  | 3 | probable                  | 1 |
| Reversible: first aid required                | 1 | > 2 weeks to ≤ 1 year | 3 | rare                      | 2 |                           |   |
|   |   | > 1 year              | 2 | negligible                | 1 |                           |   |

Table 4.3-1: Classification of risk parameters in accordance with EN/IEC 62061

The **class of the probability of harm K** is calculated by adding the numbers for the frequency of the exposure F, the probability of occurrence W and the possibility of avoidance P ( $K = F + W + P$ ). The two parameters S and K are then used in a matrix to define the SILCL. The intersection point of line S with the applicable column K shows whether and which need for treatment exists.

| Seriousness (S) | Class of probability of harm (K) |        |         |          |          |
|-----------------|----------------------------------|--------|---------|----------|----------|
|                 | 3 to 4                           | 5 to 7 | 8 to 10 | 11 to 13 | 14 to 15 |
| 4               | SIL 2                            | SIL 2  | SIL 2   | SIL 3    | SIL 3    |
| 3               |                                  | (AM)   | SIL 1   | SIL 2    | SIL 3    |
| 2               |                                  |        | (AM)    | SIL 1    | SIL 2    |
| 1               |                                  |        |         | (AM)     | SIL 1    |

### Legend




|   |   |
|---|---|
|  | SIL reference value for the safety-related control function |
|  | Recommendation of application of other measures (AM)        |
|  | No need for treatment                                       |

Table 4.3-2: Matrix for defining the SIL (source: EN/IEC 62061, Annex A)

### Draft and integration of an SRECS in accordance with EN/IEC 62061

The necessity of safety functions as measures for risk reduction emerges on the basis of the risk analysis and risk assessment in accordance with EN ISO 12100. Safety functions that are implemented with SRECSs are divided into sub-safety functions to design the system architecture. These virtual sub-safety functions are then assigned real sub-system elements.

These are either finished developed devices, such as sensors, control units, actuators or complex new components to be designed in accordance with the existing specifications in accordance with IEC 61508 and consisting of hardware with embedded software or application software. In accordance with the system design the achieved safety integrity level (SILCL) is determined and verifies whether or not the SIL has been achieved.

# 1. INTRODUCTION

## 2. Machine Safety in the EU

### Determining the safety integrity level (SILCL) of an SRECS

The achieved SIL is always lower or the same as the lowest value of the SILCLs of one of the sub-systems.

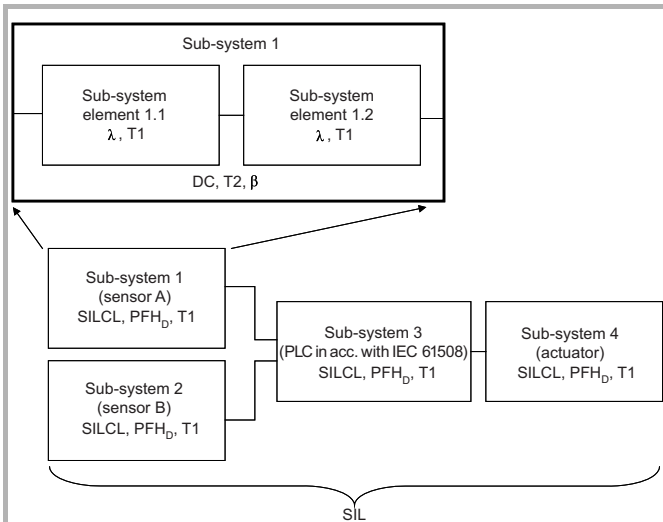


Fig. 2.4.3-2: SRECS architecture consisting of sub-systems and sub-system elements (source: ZVEI Flyer "Safety of machinery")

The sub-systems are described safety-related by the parameters, SILCL, PFH<sub>d</sub> and T<sub>1</sub>.

| EN/IEC 62061 parameters | Meaning  |
|-------------------------|--|
| SILCL                   | SIL claim limit (maximum SIL value) of a sub-system  |
| PFH <sub>d</sub>        | Probability of dangerous failure per hour  |
| T <sub>1</sub>          | Lifetime of the sub-system or proof test interval if this value is less than the lifetime. Note: The proof test is used to uncover errors in SRECSs and their sub-systems. |

Sub-systems can consist of various switched sub-system elements (devices) with the following parameters:

| EN/IEC 62061 parameters | Meaning   |
|-------------------------|---|
| $\lambda$               | Failure rate; with electro-mechanical devices the failure rate is provided by the manufacturer as B <sub>10</sub> value with reference to a number of switching cycles. The time-related failure rate and the lifetime must be determined on the basis of the switching frequency for the respective application. |
| SFF                     | Safe Failure Fraction   |
| T <sub>2</sub>          | Diagnostic test interval  |
| $\beta$                 | Susceptibility to failures as a result of common cause  |
| DC                      | Diagnostic coverage   |

A chapter of the standard describes a simplified method for estimating the probability of hazardous hardware failures of sub-systems. 4 different sub-system architectures (A, B, C, D) form the basis here. The corresponding calculation formulas for the probability of a failure to danger of the sub-system (PFH<sub>d</sub>) are provided for each of these architectures. The PFH<sub>d</sub> value of the safety-related control system is determined by adding the individual PFH<sub>d</sub> values of the sub-systems.

### Validation

Chapter 8 contains requirements for validating the safety-related electrical control system. With the validation it is ensured by inspection and testing that the design of each safety function meets the corresponding requirements of the specification.

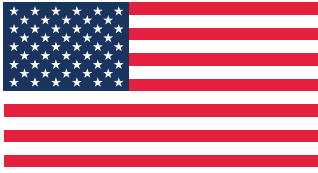
### Validity of EN/IEC 62061

IEC 62061 was adopted at the end of 2004 and accepted without change as a European standard. EN 62061 has been listed in the Official EU Journal since 31.12.2005 as a standard with presumption of conformity with Machinery Directive 2006/42/EC.



# MACHINE SAFETY

## 3. Machine Safety in the USA



In 1970, Congress enacted a law entitled the "Occupational Safety and Health Act (OSHA)". Its objective was to reduce the existing dangers to safety and health at the workplace and continuously improve the occu-

pational health and safety regulations already in place. The Occupational Safety and Health Administration (OSHA) was set up as the responsible supervisory authority.

The following text provides an overview of the essential US American body of rules and regulations and standards in the machine safety area and in no way does it replace the required intensive study of the respective documents. It neither raises objection to completeness nor allows any legal claim to be derived from it. The respective currently applicable regional specifications or machine-specific standards must be observed.

### 3.1 OSHA Regulations

All general and machine-specific safety standards for machines are included in the U.S. Code of Federal Regulations, Title 29, Part 1910, Subpart 0. The following list shows a few examples. Supplementary information can be found at [www.osha.gov](http://www.osha.gov).

#### Extract from the U.S. Code of Federal Regulations, Title 29, Part 1910, Subpart 0

| Document number | Title and content  |
|-----------------|--|
| OSHA 1910.211   | Definition   |
| OSHA 1910.212   | General requirements for all machines  |
| OSHA 1910.213   | Woodworking machinery requirements   |
| OSHA 1910.214   | Cooperage machinery requirements   |
| OSHA 1910.215   | Abrasive wheel machinery requirements  |
| OSHA 1910.216   | Mills and calendars in the rubber and plastics industries  |
| OSHA 1910.217   | Mechanical presses<br>1910.217(b)(7) Revolution Clutch Controls<br>1910.217(b)(14) Brake System Monitoring<br>1910.217(c) Safeguarding the Point of Operation<br>1910.217(c)(3) Point of Operation Devices<br>1910.217(c)(3)(iii) Presence Sensing Devices<br>1910.217(c)(3)(5) Additional Requirements for Safeguarding |
|                 | 1910.217(e) Inspection, Maintenance and Modification of Presses<br>1910.217(5)(c) Operation of Power Presses   |
|                 |  |
| OSHA 1910.218   | Forging machines   |
| OSHA 1910.219   | Mechanical power-transmission apparatus  |

There is no uniform federal legislature in the USA that regulates the responsibility of the manufacturer or supplier. Each federal US state, however, is required by OSHA, 1970, Section 18 to develop its own occupational health and safety program. For each of these programs OSHA provides additional information on the websites, [www.osha.gov](http://www.osha.gov) or [www.osha-slc.gov](http://www.osha-slc.gov).

### 3.2 US Standards ANSI, NFPA, UL (National Consensus Standards)

In addition to the OSHA standards, the OSHA authority is authorized to monitor and enforce compliance with National Consensus Standards. These are standards, occupational health and safety regulations or modifications of such, which

- have been adopted and published by a nationally recognized standards-setting organization (e.g. ANSI, UL),
- are recognized by the Secretary of Labor as standards,
- deal as international standards (IEC, ISO) with topics or specialist areas that are not covered by a US standard.

U.S. National Consensus Standards are therefore standards that apply as supplementary to the OSHA standards. The following are some of the bodies that provide such standards:

- American National Standards Institute (ANSI)  
[www.ansi.org](http://www.ansi.org)
- European Committee for Standardization (CEN)  
[www.cen.eu](http://www.cen.eu)
- European Committee for Electrotechnical Standardization (CENELEC)  
[www.cenelec.org](http://www.cenelec.org)
- International Electrotechnical Commission (IEC)  
[www.iec.ch](http://www.iec.ch)
- International Standardization Organization (ISO)  
[www.iso.org](http://www.iso.org)
- National Fire Protection Agency (NFPA)  
[www.nfpa.org](http://www.nfpa.org)

# 1. INTRODUCTION

## 3. Machine safety in the USA

Selection of important U.S. National Consensus Standards in the machine safety area (this list is not complete).

| Standard    | Title and content  |
|-------------|--|
| ANSI B11.1  | Mechanical Power Presses – Safety Requirements for Construction, Care, Use   |
| ANSI B11.2  | Hydraulic Power Presses – Safety Requirements for Construction, Care, Use  |
| ANSI B11.3  | Power Press Brakes – Safety Requirements for Construction, Care and Use  |
| ANSI B11.4  | Machine Tools – Shears – Safety Requirements for Construction, Care, Use   |
| ANSI B11.5  | Machine Tools – Iron Workers – Safety Requirements for Construction, Care, Use   |
| ANSI B11.6  | Lathes – Safety Requirements for Construction, Care and Use  |
| ANSI B11.7  | Cold Headers and Cold Formers – Safety Requirements for Construction, Care and Use   |
| ANSI B11.8  | Drilling, Mining and Boring Machines – Safety Requirements for Construction, Care and Use  |
| ANSI B11.9  | Grinding Machines – Safety Requirements for Construction, Care and Use   |
| ANSI B11.10 | Metal Sawing Machines – Safety Requirements for Construction, Care, Use  |
| ANSI B11.11 | Gear-Cutting Machines – Safety Requirements for Construction, Care, Use  |
| ANSI B11.12 | Machine Tools – Roll-Forming and Roll-Bending Machines - Safety Requirements for Construction, Care and Use  |
| ANSI B11.13 | Machine Tools – Single- and Multiple-Spindle Automatic Bar and Chucking Machines - Safety Requirements for Construction, Care and Use                              |
| ANSI B11.14 | Machine Tools – Coil-Slitting Machines - Safety Requirements for Construction, Care and Use  |
| ANSI B11.15 | Pipe, Tube and Shape-Bending Machines - Safety Requirements for Construction, Care and Use   |
| ANSI B11.16 | Metal Powder Compacting Presses - Safety Requirements for Construction, Care and Use   |
| ANSI B11.17 | Machine Tools – Horizontal Hydraulic Extrusion Presses - Safety Requirements for Construction, Care and Use  |
| ANSI B11.18 | Machine Tools – Machines and Machinery Systems for Processing Strip, Sheet or Plate from Coiled Configuration - Safety Requirements for Construction, Care and Use |

| Standard     | Title and content   |
|--------------|---|
| ANSI B11.19  | Performed Criteria for the Design, Construction, Care and Operation of Safeguarding when referenced by other B11 Machine Tool Safety Standards            |
| ANSI B11.20  | Machine Tools – Manufacturing Systems/Cells - Safety Requirements for Construction, Care and Use  |
| ANSI B11.21  | Machine Tools – Using Lasers for Processing Materials - Safety Requirements for Construction, Care and Use  |
| ANSI B11.TR1 | Ergonomic Guidelines for Design, Installation and Use of Machine Tools  |
| ANSI B11.TR2 | Mist Control on Machines Using Metal Working Fluids   |
| ANSI B151.27 | Safety Requirements for Robots Used with Horizontal Injection Molding Machines  |
| ANSI B56.5   | Safety Standards for Guided Industrial Vehicles and Automated Functions of Manned Industrial Vehicles   |
| ANSI R15.06  | Safety Requirements for Robots and Robot Systems  |
| ANSI B65.1   | Safety Standards for Printing Press Systems   |
| NFPA 70E     | Electrical Safety Requirements for Employee Workplaces  |
| NFPA 79      | Electrical Standard for Industrial Machinery  |
| UL 508       | Industrial Control Equipment  |
| UL 61496-1   | Electro-Sensitive Protective Equipment, Part 1: General Requirements for Design, Construction and Testing of Electrosensitive Protective Devices (ESPDs). |
| UL 61496-2   | Electro-Sensitive Protective Equipment, Part 2: Particular Requirements for Equipment Using Active Optoelectronic Protective Devices (AOPDs).             |

Machine Safety Services

Safety Engineering Software

Safety Laser Scanners

Safety Light Curtains

Multiple Light Beam Safety Devices

Light Beam Safety Device Sets

Single Light Beam Safety Devices

AS-Interface Safety at Work

Safety Proximity Sensors

# MACHINE SAFETY

## 3. Machine Safety in the USA

### 3.3 Strategy for Risk Reduction

The U.S. Code of Federal Regulations, Title 29, Part 1910, Subpart O requires that with the construction of machinery risks must be analyzed and, where required, protective devices must be provided to protect the operator.

Technical Report ANSI B11.TR3:2000 includes proposals for assessing, analyzing and reducing risks on tool-making machines.

OSHA/ANSI provides the following hierarchical procedure for risk reduction:

1. Identification and analysis of the risk (see ANSI B11.TR3:2000)
2. Removal of the risk with constructive measures
3. Reduction of the risk with technical protective devices
4. Warning signals and warning information
5. Personal protective equipment for the operating personnel
6. Operator training

The international standard, EN ISO 12100 "Safety of machinery – General principles for design - Risk assessment and risk reduction" is similarly structured. It provides detailed assistance with the identification of hazards, describes the risks to be considered by the designer, contains design principles and a method for safe construction and risk reduction. It also describes an iterative method for risk analysis, risk assessment and risk reduction to achieve the required machine safety. Existing machine-specific standards, such as type C EN standards, for example, must be considered with priority.

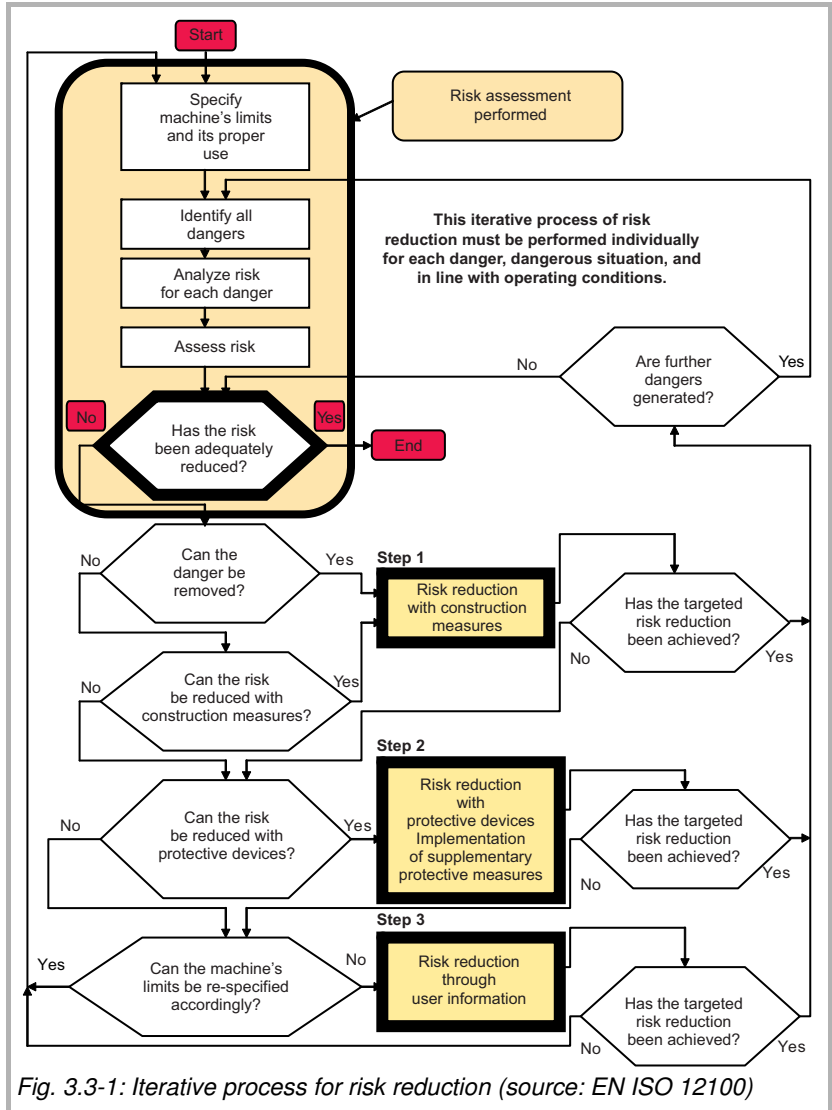


Fig. 3.3-1: Iterative process for risk reduction (source: EN ISO 12100)

# 1. INTRODUCTION

## 3. Machine safety in the USA

EN ISO 12100 recommends that the machine designer use the following step-by-step procedure for risk reduction:

1. Specification of the limits and proper use of the machine
2. Identification of possible hazards and hazardous situations
3. Estimation of the risk of each identified hazard and each hazardous situation and parallel consideration of the foreseeable malpractice or faulty operation by operating personnel
4. Evaluation of each individual risk and decision on whether a risk reduction is required or not
5. Attempts to remove or reduce the risk with constructive measures. If this does not work then:
6. Reduction of the risk with the use of protective devices (separating protective devices, such as hard guards or covers, or electro-sensitive protective equipment, such as Safety Light Curtains, for example)
7. Informing and warning machine operators about the remaining risks of the machine by using warning notes and plates on the machine and in the operating instructions

The first four steps describe the risk analysis and risk assessment. It is important that the risk analysis and risk assessment be carried out methodically and that it be comprehensibly documented.

In addition to these protective measures selected by the machine designer/constructor, further protective measures may also be required by the operating company or machine operator to reduce the remaining risk. This may be, for example:

- Organizational measures (e.g. safe work processes, regular inspections, etc.)
- Personal protective devices
- Training and instruction for operating personnel

### Note

The Safexpert PC software for machinery safety engineering contains a list of hazards and supports the process of risk assessment and risk reduction in accordance with EN ISO 12100. The software enables an isolated consideration of all hazardous points of operation and life phases of the machine and ensures transparent and comprehensible documentation. For further information and ordering info see chapter Safexpert, page 58.

### 3.4 Control Reliability

#### OSHA 1910.211

Logically contains the following requirements: A control system must be constructed in such a way that

- a fault that occurs inside the system does not prevent the normal stop process from being activated,
- another machine cycle cannot be executed before the fault has been removed and
- the fault can be revealed by a simple test, or displayed by the control system.

#### ANSI B11.19-2003

Subpart 3.14 logically defines "Control Reliability" as follows:

Control reliability is the capability of the machine control system, the safeguarding, other control components and related interfacing to achieve a safe state in the event of a fault within their safety related functions.

Subpart E.6.1 specifies and limits:

Control Reliability can't prevent the reinitiation of a machine cycle in case of a:

- severe mechanical failure or
- a simultaneous failure of more components.

The standard provides the following information on the structural setup:

*Control reliability is not guaranteed by simple redundancy. Monitoring must be made to ensure that the redundancy remains effective.*

#### ANSI B11.20

The following is also logically stated with regard to the control system structure in ANSI B11.20, Subpart 6.13:

"Protection against the consequences of failure of control components should not depend solely upon simple redundancy". A failure of one component of two or more parallel or serially switched control components can remain unnoticed with simple or unmonitored redundancy. The appearance of a safe operation is maintained. If another element now also fails in another redundant circuit, this can result in a dangerous state. A monitoring of redundant control system structures and the uncovering of and safe reaction to such single errors is therefore mandatory.

## MACHINE SAFETY

### 3. Machine safety in the USA

#### ANSI/RIA R15.06-1999

This ANSI standard contains further functional requirements for control reliability and also includes statements on errors that have common causes, such as overvoltage. Note: The term "common" means that these causes can have the same, simultaneous effect on the redundantly set up control channels.

- The monitoring must activate a stop signal when a fault is detected.
- A warning must be issued if the hazard continues to exist after the movement has been brought to a stop.
- After the fault has been detected a safe state must be maintained until the fault has been removed.
- Failures with common causes (e.g. overvoltage) must be considered when the probability of occurrence of such failures is high.
- A single fault should be detected at the time at which it occurs. If this is not practical the fault should be detected the next time the safety function is requested.

#### Comparison of the ANSI, IEC/EN requirements for safety-related controls

There is no precise concurrence on the definition of functional safety or control reliability in the US and IEC/EN world of standards. The requirements of Category 3 of EN ISO 13849-1 come relatively close to the OSHA/ANSI requirements:

- The safety-related parts of control systems and/or their protective devices and their components must be designed, constructed, selected and combined in accordance with the applicable standards in such a way that they can withstand the expected influences and effects.
- Proven-in-practice safety principles must be applied in design and construction. Safety-related parts must be designed so that:
  - A single fault in each of these parts does not cause the loss of the safety function.
  - The single faults are detected whenever this is reasonably possibly.

The behavior when a fault of a safety-related control unit in accordance with category 3 occurs is specified as follows:

- If a single fault occurs, the safety function is always maintained.
- Some but not all faults are detected.\*
- An accumulation of undetected faults can lead to loss of the safety function.\*

\*) The risk assessment shows whether or not the complete or partial loss of the safety function(s) that the faults cause is manageable

#### Note

The SISTEMA PC software of the Institut für Arbeitsschutz (IFA) is used for the automatic calculation and evaluation of the functional safety of control systems in accordance with EN ISO 13849-1. It is an ideal complement to Safexpert and can be downloaded as freeware from [www.leuze.com/en/sistema](http://www.leuze.com/en/sistema). For more information see chapter SISTEMA, page 64.



# 1. INTRODUCTION

## 4. Protective devices

### 4.1. Selecting protective devices




#### Standard EN ISO 12100 notes on selecting protective devices

If the hazards cannot be prevented or sufficiently limited by constructive measures, protective devices must be planned and provided. The selection of a suitable protective device should be made either in accordance with an existing machine-specific provision, e.g. a European C standard, or on the basis of a risk assessment of the respective machine.

The protective device should generally enable a simple and ergonomic operation of the machine and not obstruct its proper use. If this is not the case this can lead to the protective devices being bypassed in order to achieve an easier operation of the machine.

A fixed hard guard (e.g. a fence) should be used, where the access to the danger zone is not required by the operator during normal operation. If the operation requires a more frequent access, an electro-sensitive protective equipment (e.g. Safety Light Curtain) or a moveable guard (e.g. doors with Safety Switches) should be used.

#### Selecting protective devices: Application advantages – application limits


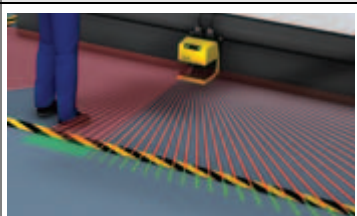

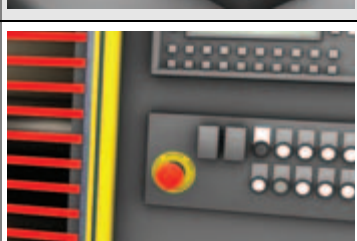
|   | Type of protective device  | Application advantages  | Application limits  |
|---|--|---|---|
|   | Fixed hard guard (e.g. fence, cover).  | Long lifetime, protection against injury caused by projected (thrown out) parts, objects.   | Cannot be used if frequent access to the danger zone is required. More difficult access with maintenance work. Can be removed without being noticed. Safety distance required (EN ISO 13857).   |
|  | Moveable guard without guard interlocking (e.g. doors with flaps) with Safety Switches (without guard interlocking). | Access to machine is possible. Doors cannot be removed without being noticed.   | Protective door can be opened during the operation. Cannot be used if the machine's stopping time is greater than the person's access time. Hampers operation when frequent access to the danger zone is required. Safety distance required (EN ISO 13855). |
|  | Moveable guard with guard interlocking (e.g. door or flap with safety guard interlocking).                           | The protective door can only be opened with an electric unlocking signal. Prevention of unexpected production interruptions. No safety distance required. | Limited use if frequent access to the danger zone is required.  |



# MACHINE SAFETY

## 4. Protective devices

### Selecting protective devices: Application advantages – application limits

|   | Type of protective device  | Application advantages  | Application limits  |
|---|--|---|---|
|    | Light Beam Safety Devices, Multiple Light Beam Safety Devices, Safety Light Curtains | Access and ergonomic operation of the machine possible. Unobstructed material transport through the protective field is possible with combination with a muting function. | Safety distance required, EN ISO 13855. No protection against injury caused by projected (thrown out) parts, objects.   |
|    | Safety Laser Scanners  | Access and ergonomic operation of the machine possible. Flexible adjustment of the protective field according to the respective danger zone.                              | Limited use in environments with heavy dirt build-up. Safety distance required, EN ISO 13855. No protection against injury caused by projected (thrown out) parts, objects. |
|   | Two-hand controls  | Location-dependent protective device with control function. Both of the operator's hands are required for machine activation and therefore protected against injuries.    | Only protects the person operating the two-hand control device. Other people nearby are not protected. Safety distance required, EN ISO 13855.                              |
|  | E-Stops  | Press button(s) for stopping the machine to prevent immediate or threatening hazardous situations.  | Additional cautionary measures for emergencies. Not a replacement for other protective measures. The press buttons must be placed within range of the points of operation.  |

# 1. INTRODUCTION

## 4. Protective devices

### General requirements for construction of protective devices

EN ISO 12100 "Safety of machinery - Basic concepts, general principles for design" contains the following general constructive requirements:

#### Guards and electro-sensitive protective devices

- Must take mechanical and other hazards into account.
- Must be built hard-wearing and robust.
- Must not cause any additional hazards.
- Must not be easily bypassed or made ineffective.
- Must be a sufficient distance away from the danger zone (see EN ISO 13857 or EN ISO 13855).
- Must not obstruct the machine operation and the work process more than necessary in order to reduce every incentive to go around it.
- Must permit interventions to use or change tools or for maintenance work as much as possible without removing the protective devices. The access here must remain restricted to the area required for the work.

#### 4.2 Guarding with optoelectronic protective devices

IEC TS 62046 "Safety of machinery – Application of protective equipment to detect the presence of persons" contains basic information for selecting, applying, connecting and putting electro-sensitive protective equipment and safety mats into operation. It addresses the authors of machine-specific C-standards, designers, test centers and anyone that is involved with the professional installation of such protective devices.

The following information refers to the recommendations of IEC TS 62046 as the international state of technology. In principle to be observed **with priority**: the operating instructions of the protective devices, regional regulations or machine-specific standards



#### European C-standards, for example:

- EN 692 Machine tools – Mechanical presses – Safety
- EN 693 Machine tools – Hydraulic presses – Safety



#### And in the USA for example:

- OSHA 1910.217 Mechanical Power Presses
- ANSI B11.1 Mechanical Power Presses – Safety Requirements for Construction, Care, Use
- ANSI B11.2 Mechanical Power Presses – Safety Requirements for Construction, Care, Use
- ANSI B11.19 Performed Criteria for the Design, Construction, Care and Operation of Safeguarding when referenced by other B11 Machine Tool Safety Standards

#### 4.2.1 Selecting and applying optoelectronic protective devices

In the following it is assumed that a risk assessment, e.g. in accordance with EN ISO 12100, has been performed (see chapter 2.3, page 18 and 3.3. page 28) and an optoelectronic protective device has been selected as a measure for minimizing risk.

#### General safety notes:

- Optoelectronic protective devices do not protect against injuries caused by projected (thrown out) objects or emissions from the machine.
- The machine must allow the dangerous movement to be stopped at any point of the workflow cycle.
- Optoelectronic protective devices must be mounted in such a way that reaching into/access to the point of operation is only possible through the protective field. Reaching over, under or stepping behind must be prevented by additional protective devices (e.g. hard guards, chapter 4.3, page 43).
- With point of operation guarding (finger and hand protection) and danger zone guarding, people may not enter or be present in the danger zone undetected. Additional protective devices may need to be provided, e.g. stepping behind protection with a host/guest light curtain, for example.
- The safety distance from the protective device to the point of operation must be big enough that the dangerous movement will have stopped before a part of the person's body can reach the point of operation (see chapter 4.2.1 step 4, page 33).
- Reflective surfaces near optoelectronic protective devices can cause objects not to be detected because of the protective device's beams being reflected. An appropriate minimum distance according to the operating instructions must be observed to prevent this.

# MACHINE SAFETY

## 4. Protective devices

### Step 1: Perform risk assessment e.g. in accordance with EN ISO 12100



(see chapter 2.3, page 18 and 3.3 page 28)







### Step 2: Select type of optoelectronic protective device and protective function

#### Depends on:

- Specifications of regional or machine-specific regulations
- Geometric dimensions of the area to be protected
- The protective function to be performed (e.g. machine stop with hand or finger detection)
- Ergonomic factors (ease of operation, manual cyclical insertion of parts, yes/no)
- Accessibility of danger zones: process-conditional, maintenance-conditional
- Financial criteria

The suitable optoelectronic protective device must be selected on the basis of the above information (see table).

|   | Protective function   | Application   | Leuze electronic products  |
|---|---|---|--|
|  | Machine stop with detection of person accessing the danger zone and prevention of the restart with constant presence detection. | Safeguarding danger zone at (accessible) feeding-in areas of machines or guarding driveways on driverless transport systems | Safety Laser Scanners, Safety Light Curtains (installed at an angle or horizontal), Light Curtains in host/guest configuration |
|  |   |   |  |

|   | Protective function   | Application   | Leuze electronic products  |
|---|---|---|--|
|  | Machine stop with hand or finger detection                      | With small operator distance to the danger zone, e.g. with feeding-in work at a press | Safety Light Curtains, Safety Laser Scanners (-E model)  |
|  |   |   |  |
|  |   |   |  |
|  | Machine stop with detection of person accessing the danger zone | With accessible danger zones and bigger distance to the danger zone                   | Single Light Beam and Multiple Light Beam Safety Devices, Safety Laser Scanners (-E model), Safety Switches and Safety Locking Devices (in combination with hard guards) |
|  |   |   |  |
|  |   |   |  |

### Step 3: Selecting the required safety type of optoelectronic protective device

The optoelectronic protective device is a component of the safety-related part of the machine control system and a component in the effective chain of a partial safety function consisting of sensor, control unit and actuator. From the risk assessment (graph) in accordance with EN ISO 13849-1 or EN/IEC 62061, the designer determines the safety-related performance required for the risk reduction for this partial safety function (see chapter 2.4 Safety-related parts of control systems, page 20 and 3.4 Control Reliability, page 29). Regardless of the control system applied, the achieved level of safety-related performance (category, PL, SIL) of the entire safety function is always less than or equal to the lowest value (category, PL, SILCL) of one of its partial systems. Put simply, the chain is therefore as strong as its weakest link.

Optoelectronic protective devices have different safety-related capacities, depending on the detection principle and the internal technical setup. EN/IEC 61496 and UL 61496 "Safety of machinery – Electro-sensitive protective equipment" define 3 different types of Electro Sensitive Protective Equipment (ESPE), which differ in their effectiveness and frequency of error detection, i.e. their safety-related performance. The following table 4.2.1-1 shows the requirements of this standard. For applications in the USA it must be determined which OSHA / ANSI control reliability requirement is relevant for the respective application case (observe machine-specific and regional specifications!) – see chapter 3 and 3.4, page 29). The corresponding ESPE type must then be selected.

# 1. INTRODUCTION

## 4. Protective devices

| ESPE type according to IEC / EN / UL 61496         | Functional safety (control reliability) of ESPEs in accordance with IEC / EN / UL 61496 and requirements for the effectiveness and frequency of the error detection   |
|--|---|
| Type 2   | <p>A type 2 ESPE shall have means for a periodic test. A loss of the protective function between the tests is possible if a fault occurs.</p> <p>A fault shall be detected</p> <ul style="list-style-type: none"> <li>– immediately</li> <li>– either with the next periodic test</li> <li>– or with activation of the sensor component</li> </ul> <p>and must result in the switching off of at least one ESPE output.</p>   |
| Type 3<br>(Only defined for Safety Laser Scanners) | <p>Despite a single fault the protective function of a type 3 ESPE is maintained. An accumulation of faults can lead to loss of the safety function.</p> <p>A single fault that causes the loss of the detection capability shall be detected</p> <ul style="list-style-type: none"> <li>– immediately</li> <li>– either with activation of the sensor function,</li> <li>– with switching on/switching off</li> <li>– with start/restart interlock reset (if available)</li> <li>– or with an external test (if available)</li> </ul> <p>and shall result in the ESPE outputs being switched off.</p> <p>A single fault that impairs the detection capability shall be detected within the time specified in the relevant part of EN/IEC 61496 (5 seconds for Safety Laser Scanners). With the non-detection of the first fault, a second fault may not result in the loss of the protective function.</p> |
| Type 4   | <p>With the occurrence of several faults the protective function of a type 4 ESPE is also maintained.</p> <p>A single fault that causes the loss of the sensor detection capacity shall be detected within the ESPE response time and shall result in the outputs being switched off.</p> <p>A single fault that impairs the response time or the switching off capacity of one of the ESPE outputs shall result in the ESPE outputs being switched off either</p> <ul style="list-style-type: none"> <li>– within the specified ESPE response time</li> <li>– with addressing the sensor component,</li> <li>– with switching on/switching off</li> <li>– or with the resetting (reset)</li> </ul> <p>and shall result in the ESPE outputs being switched off.</p>   |

Table 4.2.1-1: Types and functional safety (control reliability) of electro-sensitive protective equipment in accordance with EN/IEC 61496 and UL 61496.

# MACHINE SAFETY

## 4. Protective devices

### Characteristic parameters, selection aid and risk parameters

**Parameters of Leuze electronic protective devices for determining the PL in accordance with EN ISO 13849-1 and SIL in accordance with IEC 61508 and SILCL in accordance with EN/IEC 62061.**

For the products of the ASM1, ASM1E, COMPACTplus, ROTOSCAN RS4, SOLID, and MSI series, SIL in accordance with IEC 61508/SILCL in accordance with EN/IEC 62061 or PL in accordance with EN ISO 13849-1 is specified in the technical data.

**Note**

The SISTEMA PC software of the Institut für Arbeitsschutz (IFA) is used for the automatic calculation and evaluation of the functional safety of control systems in accordance with EN ISO 13849-1. It is an ideal complement to Safexpert and can be downloaded as freeware from [www.leuze.com/en/sistema](http://www.leuze.com/en/sistema). It includes a components library with the safety-related parameters of selected Leuze electronic products. For more information see chapter SISTEMA, page 64.

### Help with selecting Leuze electronic protective devices

In the event that no regional or machine-specific specifications, such as European C-standards or OSHA /ANSI standards specify specific types of optoelectronic protective devices, the following selection aid can be used to select the appropriate Leuze electronic safety sensor for the risk reduction. The qualitative method presented in EN ISO 13849-1 is used for determining the required safety level. A risk assessment, e.g. in accordance with EN ISO 12100 must basically be performed beforehand and the notes of chapter 4.2.1 must be observed.

### IEC TS 62046 recommends across the board:

- With low risk: Type 2 ESPE and higher
- With medium risk: Type 3 ESPE (Safety Laser Scanners) or type 4 Safety Light Curtains
- With high risk: Type 4 ESPE

**Safety note**

The selection of the appropriate type of protective devices for sufficient risk reduction is always the responsibility of the machine constructor or system integrator. No legal claims can be derived from the following selection aid. Regional laws or machine-specific specifications, reasons for product liability or the amount of the material damage can result in the selection of another type of protective device with higher safety-related capacity, contrary to the presented recommendation. If the possibility of serious, irreversible injuries exists, we recommend using an ESPE of at least type 3.

### Risk parameters:

**S Seriousness of injury**

- S1 Minor (usually reversible) injury
- S2 Serious (usually irreversible injury including death)

**F Frequency and/or duration of the exposure to the hazard**

- F1 Seldom to not very frequent and/or exposure to hazard is brief
- F2 Frequent to continuous and/or exposure to hazard is long

**P Possibility of preventing the hazard or limiting the harm**

- P1 Possible under certain conditions
- P2 Not really possible

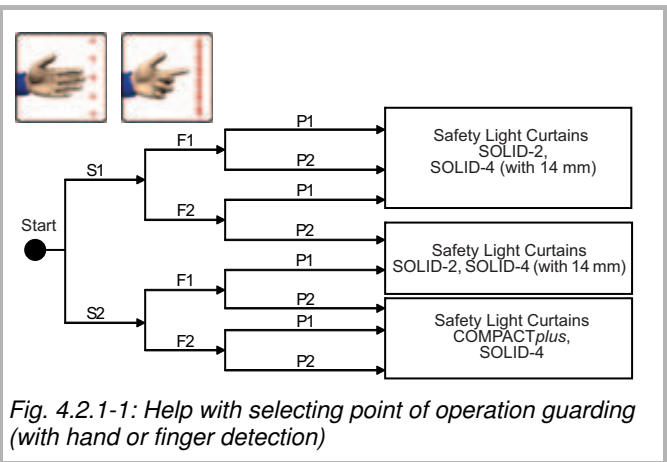


Fig. 4.2.1-1: Help with selecting point of operation guarding (with hand or finger detection)



# 1. INTRODUCTION

## 4. Protective devices

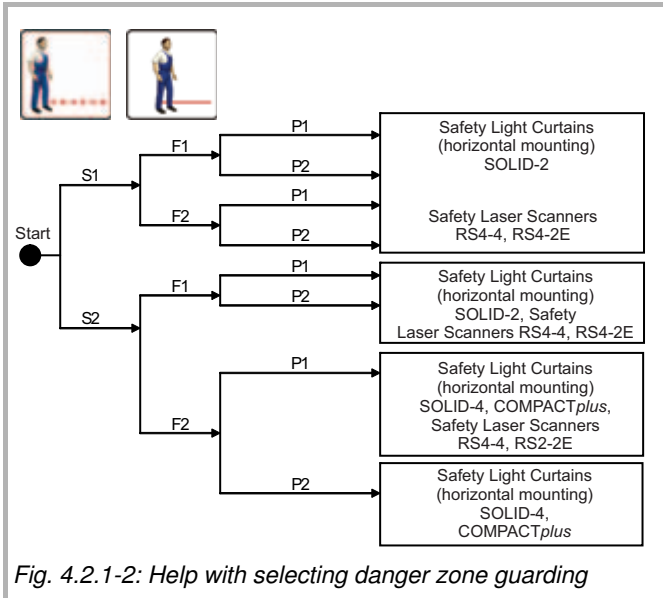


Fig. 4.2.1-2: Help with selecting danger zone guarding

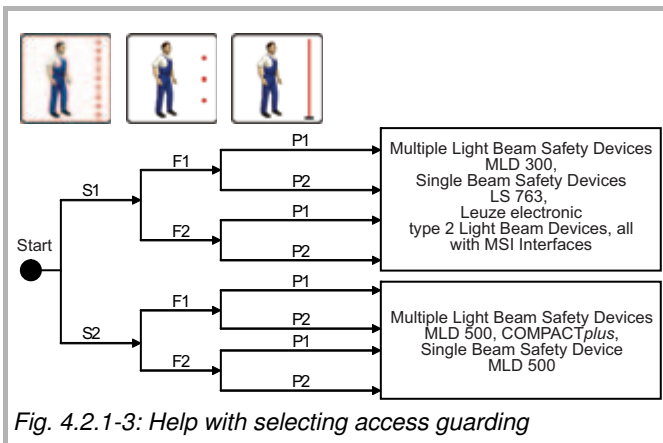


Fig. 4.2.1-3: Help with selecting access guarding

### Step 4: Calculating safety distance

Optoelectronic protective devices can only perform their protective function if they are installed with a sufficient safety distance from the nearest danger point of operation. The safety distance from the protective device to the point of operation must be big enough that the dangerous movement will have stopped before a part of the person's body can reach the point of operation (see also, ANS IB11.19-2003). After calculating the safety distance it should be checked and ensured that this minimum distance allows an ergonomic operation of the machine for the operator. If this is not the case either an entire stop time of the machine or an ESPE with higher resolution must be selected.

The following overview refers to the calculation formulas of EN ISO 13855 "Safety of machinery – Positioning of protective equipment with respect to the approach speeds of parts of the human body" and the recommendations of IEC TS 62046. If the machine is the subject of a certain specification, such as machine-specific European C-standards and OSHA / ANSI standards, then reference must be made to this. This overview does not, of course, detract from the observation of the installation notes of the operating instructions.

### Safety distance calculation in accordance with EN ISO 13855 and IEC TS 62046

The minimum distance of a "stop-activating" protective device from the nearest danger point of operation on the machine must be calculated with the following formula:

$$S = (K \times T) + C$$

- S** The minimum safety distance in millimeters from the next point of operation to the detection point (protective field) of the protective device. An "S" of 100 mm must be observed regardless of the calculated value.
- K** Approach speed in millimeters per second, derived from data of the approach speeds of the body and body parts.  
Speed (lower limbs): K = 1600 mm/s  
Speed (upper limbs): K = 2000 mm/s
- T** Stopping time of the entire system (protective device response time + interface response time + machine stopping time) in seconds (IEC TS 62046 requires at least an additional 10% on top of the determined stopping time to allow for possible deteriorations).
- C** An additional distance in millimeters. This additionally added distance is based on the fact that, depending on the resolution of the protective device, a body part can get a certain distance closer to points of operation before it is detected by the protective device.



# MACHINE SAFETY

## 4. Protective devices

### General procedure for ESPE with right-angle approach (point of operation guarding and access guarding)

According to EN ISO 13855, not only is the direction of movement through the protective field to be taken into account, so too is the circumventing of the protective device by possibly reaching over or under. Consequently, the value S is to be calculated for both the safety distance with respect to reaching / walking through the protective field  $S_{RT}$  (Reach Through) and with respect to reaching under / over  $S_{RO}$  (Reach Over). The larger of the two values is to be used as the safety distance S.

For danger zone guarding with parallel approach, reaching under and over is already implicitly taken into account.

### Calculation formula for the minimum safety distance for ESPE with perpendicular approach with respect to reaching through (point of operation guarding):

The following calculation formulas apply for applications of optoelectronic protective devices with approach direction of body parts in an angle of 30° to 90° to the protective field level:

#### S for protective devices with detection value d (resolution) ≤ 40 mm:

$$S = (2000 \times T) + 8 \times (d - 14)$$

#### Attention:

S must always be at least 100 mm. If the calculation results in  $S > 500$  mm, the calculation may be made again with  $K = 1600$  mm/s. In this case S must be at least 500 mm.

If electro-sensitive protective equipment is also used to control the machine (Safety Light Curtains with single or double cycle function), its resolution must be ≤ 30 mm. A minimum distance S of 150 mm may not be exceeded regardless of the calculation. With  $d = 14$  mm this minimum distance is 100 mm.

#### Attention:

Machine-specific regulations such as EN 692 or EN 693 may prescribe values for S that differ from the formula.

#### S for protective devices with 40 < d ≤ 70 mm:

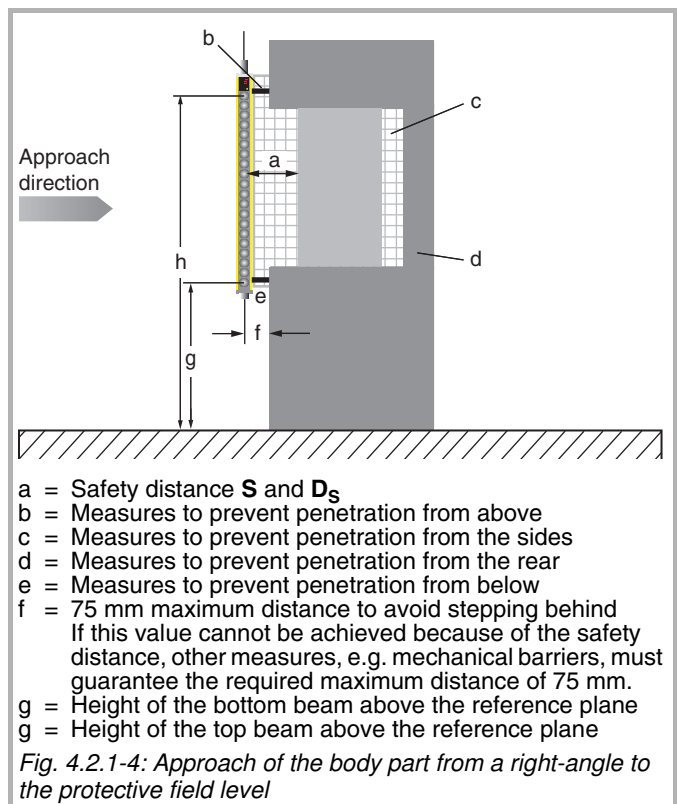
These kinds of protective devices may only be used if the risk assessment determines that the insertion of the hands does not have to be detected. The additional 850 mm to be added on corresponds with the arm length:

$$S = (1600 \times T) + 850 \text{ mm}$$

#### Attention:

Height of the top beam of the protective device ≥ 900 mm

Height of the lowest beam of the protective device ≤ 300 mm



# 1. INTRODUCTION

## 4. Protective devices

### Calculation formula for the minimum safety distance of Multiple Light Beam Safety Devices for access guarding with respect to reaching through and stepping through:

If the risk assessment determines that a detection of the penetration of the entire body is sufficient, the following calculation formula must be applied. The additional 850 mm to be added on corresponds with the arm length:

$$S = (1600 \times T) + 850 \text{ mm}$$

#### Attention:

This type of arrangement of the protective device allows an operator to be between the sensor and the point of operation without being detected after crossing the protective device. A start/restart interlock function that prevents the machine from starting is provided in every case. The command device (reset button) must be positioned so that the entire danger zone can be seen and it cannot be operated from the danger zone.

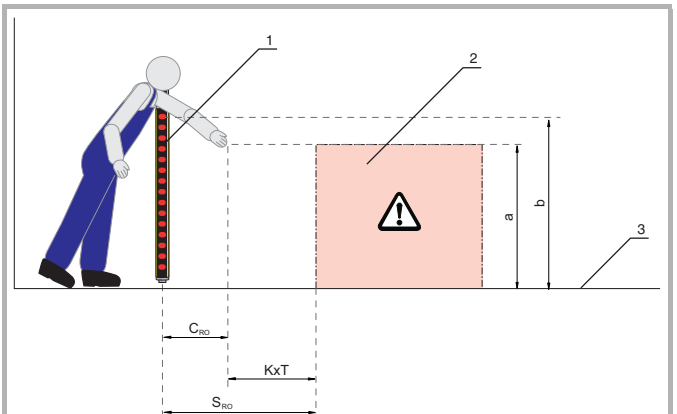
With the risk assessment and selection of the appropriate protective device, a possible getting around, e.g. crawling under the lowest beam, reaching over the highest beam, reaching through or climbing through two beams must be taken into account. If the risk assessment allows the use of a single beam protective device, the minimum distance must be calculated according to the following formula:

$$S = (1600 \times T) + 1200 \text{ mm}$$

### Calculation formula for the minimum safety distance for ESPE with perpendicular approach with respect to reaching over

If it is possible to reach over or under a vertical protective field, an additional distance  $C_{RO}$  added to safety distance  $S_{RO}$  is to be taken into account according to EN ISO 13855.

|   |   |
|---|---|
| $S_{RO} = K * T + C_{RO}$   |   |
| K = Approach speed for point of operation guarding with approach reaction and approach direction perpendicular to the protective field  | 2000 mm/s or 1600 mm/s when $S_{RO} > 500 \text{ mm}$ |
| T = Total time of the delay, sum ( $t_a + t_i + t_m$ ) from<br>$t_a$ : Response time of the protective device<br>$t_i$ : Response time of the safety interface device<br>$t_m$ : Stopping time of the machine | [s]   |
| $C_{RO}$ = Additional distance in which a body part can move towards the danger zone before the protective device triggers  | Value from table 4.2.1-2                              |



- 1 ESPE
- 2 point of operation
- 3 reference plane

Figure 4.2.1-5: Additional distance to be added to the safety distance for reaching over and under

## MACHINE SAFETY

### 4. Protective devices

| Height a of the point of operation [mm]                 | Height b of the upper edge of the protective field of the electro-sensitive protective equipment |      |      |      |      |      |      |      |      |      |      |      |
|---|--|------|------|------|------|------|------|------|------|------|------|------|
|   | 900  | 1000 | 1100 | 1200 | 1300 | 1400 | 1600 | 1800 | 2000 | 2200 | 2400 | 2600 |
| Additional distance $C_{RO}$ to the dangerous area [mm] |  |      |      |      |      |      |      |      |      |      |      |      |
| 2600  | 0  | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    |
| 2500  | 400  | 400  | 350  | 300  | 300  | 300  | 300  | 300  | 250  | 150  | 100  | 0    |
| 2400  | 550  | 550  | 550  | 500  | 450  | 450  | 400  | 400  | 300  | 250  | 100  | 0    |
| 2200  | 800  | 750  | 750  | 700  | 650  | 650  | 600  | 550  | 400  | 250  | 0    | 0    |
| 2000  | 950  | 950  | 850  | 850  | 800  | 750  | 700  | 550  | 400  | 0    | 0    | 0    |
| 1800  | 1100   | 1100 | 950  | 950  | 850  | 800  | 750  | 550  | 0    | 0    | 0    | 0    |
| 1600  | 1150   | 1150 | 1100 | 1000 | 900  | 850  | 750  | 450  | 0    | 0    | 0    | 0    |
| 1400  | 1200   | 1200 | 1100 | 1000 | 900  | 850  | 650  | 0    | 0    | 0    | 0    | 0    |
| 1200  | 1200   | 1200 | 1100 | 1000 | 850  | 800  | 0    | 0    | 0    | 0    | 0    | 0    |
| 1000  | 1200   | 1150 | 1050 | 950  | 750  | 700  | 0    | 0    | 0    | 0    | 0    | 0    |
| 800   | 1150   | 1050 | 950  | 800  | 500  | 450  | 0    | 0    | 0    | 0    | 0    | 0    |
| 600   | 1050   | 950  | 750  | 550  | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    |
| 400   | 900  | 700  | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    |
| 200   | 600  | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    |
| 0   | 0  | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    |

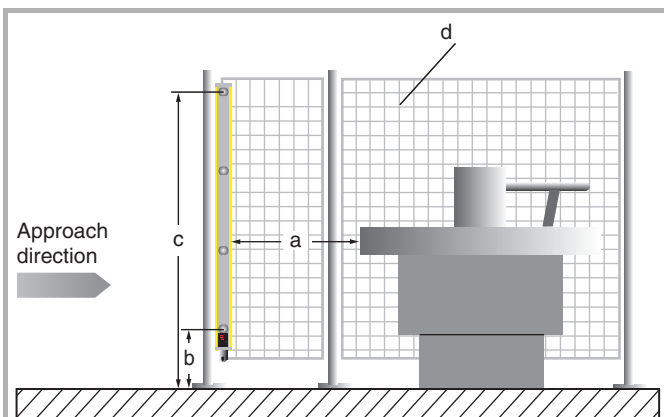
Table 4.2.1-2: Additional distance  $C_{RO}$  for reaching over the vertical protective field of an electro-sensitive protective equipment according to EN ISO 13855

# 1. INTRODUCTION

## 4. Protective devices

### Number of beams and beam heights of Multiple Light Beam Safety Devices for access guarding in accordance with EN ISO 13855

| Number of beams of the protective device | Height of the beams above reference plane |
|--|---|
| 4  | 300, 600, 900, 1200 mm                    |
| 3  | 300, 700, 1100 mm                         |
| 2  | 400, 900 mm                               |



- a = Safety distance **S** and **D<sub>S</sub>**
- b = Height of the lowest beam above the reference level, see table above
- c = Height of the highest beam, see table above
- d = Measures to prevent access from the sides

Fig. 4.2.1-6: Safety distance and beam heights of Multiple Light Beam Safety Devices for access guarding

### Calculation formula for the minimum safety distance for ESPE with parallel approach with respect to reaching through (danger zone guarding):

The following calculation formula applies for applications of optoelectronic protective devices with approach direction of body parts parallel or in an angle up to 30° to the protective field level:

$$S = (1600 \times T) + C \text{ with}$$

$$C = (1200 - 0.4 \times H)$$

**C** Additional distance for lower limbs. C always greater than 850 mm (arm length)

**H** Height of protective field above reference plane (floor). Relative installation heights H of a protective device with resolution d:

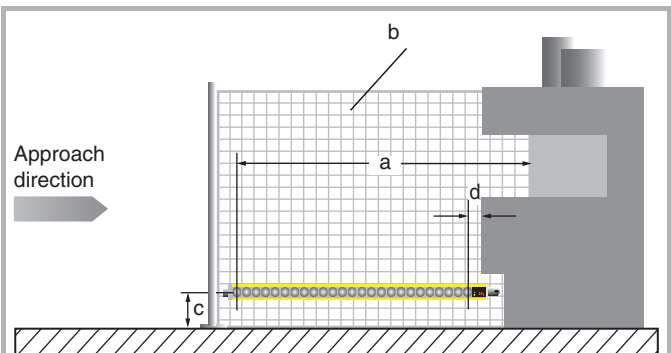
$$15 \times (d - 50) \leq H \leq 1000 \text{ mm}$$

Required resolution d of a protective device with installation height H:

$$d [\text{mm}] \leq H / 15 + 50 \text{ mm}$$

#### Attention:

If H is greater than 300 mm the danger exists of room to crawl under. This must be taken into account with the risk assessment.



- a = Safety distance **S** and **D<sub>S</sub>**
- b = Measures to prevent access from the sides
- c = Height H above the floor
- d = 50 mm – Maximum distance to avoid stepping behind  
If this value cannot be achieved because of the safety distance, other measures, e.g. mechanical barriers, must guarantee the required maximum distance of 50 mm. From 375 mm height above the floor 75 mm are permissible.

Fig. 4.2.1-7: Body part approach parallel or up to max 30° to the protective field level

# MACHINE SAFETY

## 4. Protective devices

### US specifications for safety distance calculation



The U.S. Code of Federal Regulations, Volume 29, Part 1910, Subpart 0 defines the calculation of the minimum safety distance of a protective device. OSHA 1910.217 requires that **with the installation of a Safety**

**Light Curtain a minimum distance, which corresponds with the prescribed distance of a hard guard, is observed in every case (see OSHA 1910.217, table 0-10). If the safety distance calculation results in a greater value, this must be used.**

### ANSI B11.19-2003 calculation formula for the minimum safety distance for ESPE with right-angle approach (point of operation guarding):

The following calculation formula applies for applications of optoelectronic protective devices with approach direction of body parts in an angle of 30° to 90° to the protective field level (see page 38, fig. 4.2.1-4):

$$D_s = H_s \times (T_s + T_c + T_r + T_{bm}) + D_{pf}$$

$D_s$  The minimum safety distance in inches or millimeters between the next danger zone and detection point (protective field)

$H_s$  Hand speed (approach speed of body parts or bodies) in inches/s or millimeters/s. ANSI B11.19-2003 provides hand speeds of 63 - 100 inch/s. 63 inches/s is frequently calculated, which equals 1600 mm/s

### Elements of the entire stop time of the machine:

$T_s$  Stopping time of the machine measured at the last control element in s

$T_c$  Response time of the machine control system in s (note:  $T_s + T_c$  are usually measured together with a stopping time measuring device)

$T_r$  Response time of the protective device (incl. interface module) in s

$T_{bm}$  Additional response time for the brake wear and tear which is not detected by the tracking monitoring of the brakes. If the machine does not have a brake monitoring unit, approx. 20% of the measured tracking time ( $T_s + T_c$ ), or a factor in accordance with the specifications of the machine manufacturer must be added as a reference value for the brake wear and tear

$D_{pf}$  Penetration factor in inches or millimeters. This additionally added distance is based on the fact that, depending on the resolution of the protective device, a body part can get a certain distance closer to points of operation before it is detected by the protective device.

$$D_{pf} \text{ (inches)} = 3.4 \times (\text{resolution} - 0.276), \text{ result} > 0$$

| Resolution | $D_{pf}$ (mm) | $D_{pf}$ (inches) |
|------------|---------------|-------------------|
| 14 mm      | 24            | 0.9               |
| 20 mm      | 44            | 1.7               |
| 30 mm      | 78            | 3.1               |

### Calculation formula for the minimum safety distance for ESPE with parallel approach (danger zone guarding):

The following calculation formula applies for applications of optoelectronic protective devices with approach direction of body parts parallel or in an angle up to 30° to the protective field level: The formula is derived from the ANSI formula and is based on the principles of EN 999. With protective devices arranged in this way the safety distance from the point of operation is measured from the furthest away protective field boundary, as the detection of the body part begins here (see page 41, fig. 4.2.1-5).

$$D_s = H_s \times (T_s + T_c + T_r + T_{bm}) + D_H$$

$$D_H = 1200 \text{ mm} - (0.4 \times H)$$

$D_H$  Additional distance for lower limbs.  $D_H$  always at least  $\geq 850$  mm (arm length)

$H$  Height of protective field above reference plane (floor). Permissible installation heights  $H$  of a protective device with resolution  $d$  [mm]:

$$15 \times (d - 50) \leq H \leq 1000 \text{ mm}$$

Required resolution  $d$  of a protective device with installation height  $H$ :

$$d \text{ [mm]} \leq H / 15 + 50 \text{ mm}$$

### Attention:

If  $H$  is greater than 300 mm (12 inches) there is danger of room to crawl under. This must be taken into account with the risk assessment.

# 1. INTRODUCTION

## 4. Protective devices

### Calculation formula for the minimum safety distance of Multiple Light Beam Safety Devices for access guarding:

If the risk assessment determines that a detection of the penetration of the entire body is sufficient, the following calculation formula must be applied (see also, fig. 4.2.1-6, page 41). The additional 850 mm to be added on corresponds with the arm length:

$$D_s = H_s \times (T_s + T_c + T_r + T_{bm}) + D_H$$

$D_H = 850 \text{ mm}$

#### Attention:

This type of arrangement of the protective device allows an operator to be between the sensor and the point of operation without being detected after crossing the protective device. A start/restart interlock function that prevents the machine from starting is provided in every case. The command device (reset button) must be positioned so that the entire danger zone can be seen and it cannot be operated from the danger zone.

With the risk assessment and selection of the appropriate protective device, a possible getting around, e.g. crawling under the lowest beam, reaching over the highest beam, reaching through or climbing through two beams must be taken into account.

| Number of beams of the protective device | Height of the beams above reference plane |
|--|---|
| 4  | 300, 600, 900, 1200 mm                    |
| 3  | 300, 700, 1100 mm                         |
| 2  | 400, 900 mm                               |

#### Note

It is possible to crawl under beams of more than 300 mm in height and climb over beams of less than 900 mm in height.

### 4.3 Guarding with hard guards (fence heights, fixing instructions, safety distances, etc.)

Hard guards prevent access to danger zones and at the same time also protect (depending on the model) against projected (thrown out) objects and (depending on the model) against dangerous emissions from the machine. EN ISO 12100 and EN 953 "Safety of machinery - Guards - General requirements for the design and construction of fixed and moveable guards" contain normative requirements for their construction. Extracts of the most important requirements are listed in the following sections. The height of the protective fences, openings or mesh sizes of wire screens must be dimensioned and far enough away from the point of operation that they cannot be reached with any body parts (see e.g. EN ISO 13857).

#### 4.3.1 Fixed hard guards

Fixed hard guards can always be used when the access to the danger zone is not required during the normal operation. These include protective fences, barriers, fixed covers, etc. Fixed hard guards are also frequently used in combination with optoelectronic protective devices as supplementary protective devices.

EN ISO 12100 requires that fixed hard guards must be firmly held in their place with constructive measures:

- either permanently (e.g. welded)
- or with fixing elements (nuts, bolts) that require the use of a tool. If possible, it should not be possible to keep them in the protective position after the fixing elements have been loosened
- or position-monitored with the control-connected Safety Switches so that the dangerous movement is blocked with the removal of the protective device (see EN 1088).



# MACHINE SAFETY

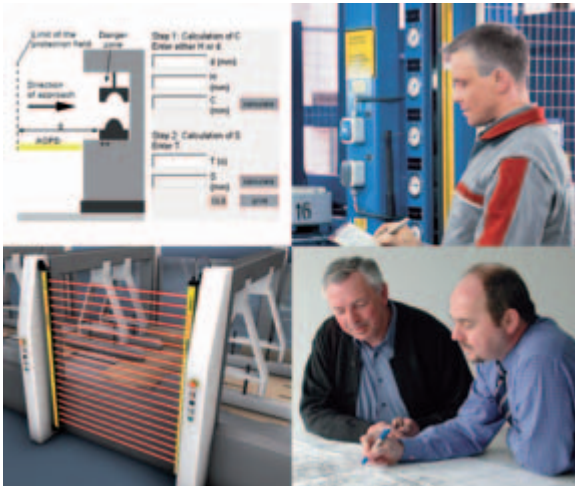
## 4. Protective devices

### Height and safety distances of fixed hard guards

EN ISO 13857 "Safety of machinery - Safety distances to prevent danger zones being reached" contains two tables for dimensioning the height and required safety distance of fixed hard guard protective devices in accordance with the height of the point of operation. Table 1 contains dimensioning recommendations for hazards with low risk; table 2 contains measurement recommendations for applications with high risk.

**Note**

The Leuze electronic online advice service "Safety-Know-How" at [www.leuze.com/en/safety-at-work](http://www.leuze.com/en/safety-at-work) contains an interactive calculation wizard for dimensioning fixed hard guards in accordance with EN ISO 13857 in the application information chapter.



### 4.3.2 Moveable hard guards

If the access to the danger zone is required during the normal operation or for maintenance work, electro-sensitive protective equipment, such as Safety Light Curtains or moveable hard guards such as protective doors or flaps, must be used. These kinds of moveable protective devices must be position-monitored via Safety Switches or Safety Locking Devices, and electrically connected with the control unit (for further requirements see EN ISO 12100).

EN 1088 essentially differentiates two types of Safety Switches (referred to as "interlocking devices" in the standard). "Interlocking devices without guard interlocking" and "Interlocking devices with guard interlocking". These Safety Switches must be set up so that they cannot be easily manipulated.



### Moveable hard guards with Safety Switches (without guard interlocking)

Safety Switches (without guard interlocking) are used for position monitoring of protective doors or flaps, for example. The hard guard can be opened at any time. As soon as the hard guard is no longer closed a stop command is generated. An appropriate safety distance from the protective device to the point of operation must be observed so that the dangerous movement is stopped in good time before the point of operation can be reached.

If C standards or other machine-specific specifications are not available, the required safety distance S can be determined with the calculation formula provided in EN ISO 13855, for example:

$$S = (K * T) + C$$

- S** Minimum distance in millimeters measured from the danger zone to the Safety Switch
- K** 1600 mm/ms approach speed of the body or body parts in millimeters per second
- T** Run-on of the entire system in seconds
- C** Additional distance (taken from table 4 of ISO 13857, if it is possible to insert fingers or hand through the opening towards the hazard zone before a stop signal is generated.)

**Note**

Leuze electronic Safety Switches (without guard interlocking), see pages 338 to 376.

# 1. INTRODUCTION

## 4. Protective devices



### Moveable hard guards with Safety Locking Devices

Safety Locking Devices keep the hard guard in a closed position. They are always used when the dangerous machine function has not ended after the protective device has been opened, before a person can reach the point of operation (e.g. with long machine stopping times). With the guard interlocking the hard guard stays closed until the dangerous state has ended (see also EN/IEC 60204-1, Item 9.4.1).

Machine protection is a further application area. Safety Locking Devices are frequently also used when undefined interruptions of the production process are to be prevented for process safety reasons.

EN 1088 differentiates with the technical configuration of power-actuated interlocking devices between two variants:

- Spring force-actuated and electrically unlocked (e.g. electrical signal)
- Power-actuated (e.g. electromagnet) and spring-force unlocked

Safety Locking Devices with spring force-actuated interlocking also remain interlocked with a power failure on the entire machine and therefore keep a protective door blocked, including during the machine's overtravel period. Because of this property they are preferred over the power-actuated (magnetic-force actuation) Safety Locking Devices for people protection applications. Magnetic-force actuated guard interlockings are frequently used for machine guarding.

**Note**

Leuze electronic Safety Locking Devices, see pages 378 to 404.

Machine Safety Services

Safety Engineering Software

Safety Laser Scanners

Safety Light Curtains

Multiple Light Beam Safety Devices

Light Beam Safety Device Sets

Single Light Beam Safety Devices

AS-Interface Safety at Work

Safety Proximity Sensors

## MACHINE SAFETY SERVICES

Overview

# Service and support for all aspects of machine safety

Whether it is Planning and Engineering or Safety at Work Management in Operations, the use of Industrial Safety Technology requires a high degree of responsibility awareness and well-established expertise.

With the "Machine Safety Services" service package, we provide product-related services and support for everything related to machine and plant system safety. The individual services are coordinated with the safety-related application during the machine's lifecycle and can be applied individually or combined as requirements dictate.



*The service packet for everything having to do with the lifecycle of your machines*

Training, seminars  
p. 48

Safety Consulting  
p. 50

Start-up, hotline  
p. 51








Inspections  
p. 52

Stopping time measurements  
p. 54

Repairs  
p. 56

Selection table

# Our services: So what can we do for you?

|   | Type of service   | Explanation   | Features              |                                  |                              | Page |
|---|---|---|-----------------------|----------------------------------|------------------------------|------|
|   |   |   | Also possible on-site | Free of charge telephone service | Also for competitor products |      |
|   | Qualified product training and seminars                     | Well-trained employees ensure that your machines and systems are reliably constructed and that fault-free production is guaranteed.   | ●                     |                                  |                              | 48   |
|  | Safety consulting and safety engineering                    | Our consultancy and advice competence and solutions help you develop economical safety concepts and guarantee maximum system productivity.  | ●                     | ●                                | ●                            | 50   |
|  | Start-up support, hotline                                   | Our quick and competent support with start-up helps you to save time and money  | ●                     | ●                                |                              | 51   |
|  | 24-hour On-Call Service                                     | Our 24-hour On-Call Service offers quick and uncomplicated telephone assistance.  |                       | ●                                |                              | 51   |
|  | Initial and follow-up safety inspections                    | Our initial inspections help to minimize risks, ensure EU conformity and provide legal certainty. Regular safety inspections help to reduce accident risk and machine downtimes, as well as complying with quality standards. | ●                     |                                  | ●                            | 52   |
|  | Stopping time measurements and determining safety distances | Our measurements performed by experts and comprehensibly documented results create a secure basis for the correct positioning of optical protective devices.  | ●                     |                                  | ●                            | 54   |
|  | On-site service, repairs and device replacement service     | We offer fast help in the event of a fault with the quick exchange of devices from our standard range, on-site if necessary, by our competent service technicians.  | ●                     |                                  |                              | 56   |

[www.leuze.com/en/services/](http://www.leuze.com/en/services/)

# MACHINE SAFETY SERVICES

## Qualified product training and seminars



*Get into top shape in safety technology with our training courses and seminars*

### Benefits

- **Efficient and specialist use of protective devices by qualified employees**
- **High level of system availability by preventing faulty operation and application errors**
- **Small cause – big consequences. Optimal product knowledge helps to detect application problems quickly and prevent production downtimes**
- **Direct dialog between our specialists and your employees for experience exchanges, application tips and problem-solving**
- **A certificate attests that your employees have participated in our seminars**

A customized training program helps you keep your knowledge of safety technology current. In addition to the various product training courses, we also offer seminars on basics of the Machinery Directive, on CE conformity assessment and practice-related safety technology as well as on Safexpert, our PC tool for EC conformity assessment and risk assessment. We will also gladly provide instruction on-site at your facilities or in English.

You will find our training program in the service area on our website at [www.leuze.com/en](http://www.leuze.com/en). Should this not cover your training requirements, with the appropriate number of participants, we will be happy to combine the relevant training content according to your individual wishes.

### Note

The Safexpert PC software for machinery safety engineering contains a list of hazards and supports the process of risk assessment and risk reduction in accordance with EN ISO 12100. The software enables a consideration of all hazardous points of operation and life phases of the machine and ensures transparent and comprehensible documentation. For further information and ordering info see chapter Safexpert, page 60.

**Training,  
seminars  
p. 48**

Safety  
Consulting  
p. 50

Start-up, hotline  
p. 51

Inspections  
p. 52

Stopping time  
measurements  
p. 54

Repairs  
p. 56

## Training courses and seminars

### Selected topics from our range of training courses and seminars (in German)

| Part no. | Article   | Description  |
|----------|-----------|--|
| S991020  | CS-SCF/FR | Safety consultation, whole-day flat-rate, incl. travel costs and, if necessary, accommodation expenses in Germany *                          |
| S991021  | CS-SCH/FR | Safety consultation, half-day flat-rate, incl. travel costs and, if necessary, accommodation expenses in Germany *                           |
| S991030  | CS-KRS/AS | Product training (Leuze electronic safety devices), day flat-rate, incl. travel costs and, if necessary, accommodation expenses in Germany * |
| S991038  | CS-KRS/SE | Safexpert application training in Germany, daily flat-rate, incl. travel costs and, if necessary, accommodation expenses in Germany *        |
| S991031  | CS-KRS/NM | Standards workshop   |
| S991032  | CS-KRS/SS | Safety seminar   |

\*) For work abroad: travel costs and accommodation extra, according to expenditure

#### Note

For optimally planning an individually tailored training course and seminar offering, we request that you contact us well in advance. You can reach us by telephone at +49 (0) 8141 5350-111 (service hotline).

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# MACHINE SAFETY SERVICES

## Safety consulting and safety engineering



*Know-how from the experts – an effective cooperation for productive safety*

Whether it be a new system or a modernization, for the designer the important thing is to integrate the safety technology into the machine in such a way that optimum productivity, ergonomics and cost effectiveness are achieved while incorporating and considering the relevant standards and specifications. Make good use of the long-standing years of application experience of our engineers in hammering out the respectively most optimum safety concept.

### Higher level of safety due to good consultation

In line with our individual safety consultations, we are pleased to support you in all things having to do with machine safety, whether they be general or very specific. We help you to perform CE documentation consistent with the law. From risk assessment to the creation of customized safety and control concepts as well safety evaluations of completed machines, you can count on our qualified employees. We are happy to document complete risk assessments or create specific safety concepts for you.

### Safety know-how whenever you need it

A selection of European directives and important standards of machine safety can be found online in our "Safety Know-how" advice service at [www.leuze.com/en/safety-at-work](http://www.leuze.com/en/safety-at-work). Here, you can find detailed help with the selection and application of protective devices. Interactive calculation wizards support the person setting up, for example, with the standards-compliant dimensioning of hard guards or the calculation of required safety distances with electro-sensitive protective equipment.

### Save time with computer-aided engineering

For the quick and easy integration into your design drawings and circuit diagrams, both 3D-CAD drawings ([www.leuze.com/en](http://www.leuze.com/en)) and EPLAN product macros for our products are available as free downloads at the EPLAN Data Portal ([www.eplan.de/](http://www.eplan.de/)).

#### **Note**

The SISTEMA PC software of the German Institut für Arbeitsschutz (IFA) is used for the automatic calculation and evaluation of the functional safety of control systems in accordance with EN ISO 13849-1. It is an ideal complement to Safexpert and can be downloaded as freeware from [www.leuze.com/en/sistema](http://www.leuze.com/en/sistema). For more information see chapter SISTEMA, page 64.

### Trainings

| Part no. | Article   | Description   |
|----------|-----------|---|
| S991020  | CS-SCF/FR | Safety consultation, whole-day flat-rate, incl. travel costs and, if necessary, accommodation expenses in Germany * |
| S991021  | CS-SCH/FR | Safety consultation, half-day flat-rate, incl. travel costs and, if necessary, accommodation expenses in Germany *  |
| S991001  | CS-WTM/HR | Labor per hour in Germany and Europe  |

\*) For work abroad: travel costs and accommodation extra, according to expenditure

Training, seminars  
p. 48

**Safety Consulting**  
p. 50

**Start-up, hotline**  
p. 51

Inspections  
p. 52

Stopping time measurements  
p. 54

Repairs  
p. 56

**Start-up support, hotline**



*Our service hotline can clear up a lot of your application questions on the phone*

**Fast assistance during commissioning**

Deadline pressure means: there's often just too little time for starting up a protective device. Our competent service hotline can answer a lot of questions at the early phone call stage. On our website at [www.leuze.com/en](http://www.leuze.com/en) we support you around the clock with a free of charge download option for operating instructions, technical descriptions, parametering/configuration software, data sheets, parameter files and FAQs for fast troubleshooting.

**Contact**

Service hotline: +49 8141 5350-111  
Monday to Thursday, 8.00 a.m. to 17.00 p.m. (UTC+1) and Friday, 8.00 a.m. to 16.00 p.m. (UTC+1)

E-mail: [service.protect@leuze.de](mailto:service.protect@leuze.de)

**In the event of an emergency, we are available around the clock**

For emergencies, the Leuze electronic 24-hour On-Call Service is available to you around the clock:  
+49 7021 573-0

| Start-up support |           |  |
|------------------|-----------|--|
| Part no.         | Article   | Description  |
| S991005          | CS-SCP/FR | MLC, SOLID, MLD, COMPACT <sup>plus</sup> start-up support (per safety sensor, max. 2 h), incl. stopping time measurement and initial inspection, without travel and accommodation expenses |
| S991002          | CS-SRS/FR | RS4 start-up support (per safety sensor, max. 2 h), incl. stopping time measurement and initial inspection, without travel and accommodation expenses                                      |
| S991017          | CS-SSF/FR | Start-up support, whole-day flat-rate, incl. travel costs and, if necessary, accommodation expenses in Germany   |
| S991018          | CS-SSH/FR | Start-up support, half-day flat-rate, incl. travel costs and, if necessary, accommodation expenses in Germany  |

[www.leuze.com/en/services/](http://www.leuze.com/en/services/)

## MACHINE SAFETY SERVICES

### Initial and follow-up safety inspections



*We look after safety with machinery and complex plant and systems*

Safety at work is the employer's responsibility and therefore the "boss's business". In Germany the Ordinance on Industrial Safety and Health legally requires that machinery be tested before being put into operation (initial operation), after long idle periods, after changes and modifications and at regular intervals. Regardless of the respective legal requirements, regular safety inspections guarantee compliance with safety and quality standards, serve as precautionary maintenance measures and consequently help to reduce undesirable machine downtimes to a minimum.

By concluding a service contract, in addition to a good price, you will get the safety of knowing you will be reminded of your next service appointment.

#### **Manufacturers also profit**

We support machine manufacturers in complying with the safety level required by standards for their quality assurance and internal approval processes.

### Benefits

- **EU conformity and legal certainty with proof of safety and quality standards**
- **Solution proposals for the rapid removal of safety deficiencies**
- **Comprehensible and well-documented test results in accordance with DIN ISO 9001:2000**
- **Standards-specific test protocol**
- **Accident risk and machine downtime minimization**
- **High availability of the machine due to regular inspections**

Training,  
seminars  
p. 48

Safety  
Consulting  
p. 50

Start-up, hotline  
p. 51

**Inspections**  
**p. 52**

Stopping time  
measurements  
p. 54

Repairs  
p. 56

# INSPECTIONS

## Initial and follow-up safety inspections

### Scope of safety inspections

- Recording the identification of machine and protective device
- Testing the technically-compliant installation of the protective device (reaching under, reaching over, ...)
- Stopping time measurement (optional) and testing the safety distance from the protective device to the point of operation
- Testing the circuit diagrams for safe switching-related integration of the protective device into the machine control system
- Testing all functions of the protective device and the safe interaction with the machine control system
- Proven-in-practice assistance with problem analysis and presentation of solutions
- Documentation of all test results in a test log and attaching the inspection sticker
- Log in pdf format
- Safety inspections of other manufacturers' products possible

### Initial and follow-up safety inspections

| Part no. | Article   | Description  |
|----------|-----------|--|
| S991015  | CS-SIL/FR | Initial safety inspection for Leuze electronic devices   |
| S991004  | CS-SIN/FR | Follow-up safety inspection for Leuze electronic devices |
| S991016  | CS-SIF/FR | Initial safety inspection for foreign devices            |
| S991019  | CS-SIO/FR | Follow-up safety inspection for foreign devices          |
| S991003  | CS-TXP/FR | Flat-rate for travel to Germany with trip planning       |
| S991011  | CS-TXN/FR | Flat-rate for single journey                             |

[www.leuze.com/en/services/](http://www.leuze.com/en/services/)

## MACHINE SAFETY SERVICES

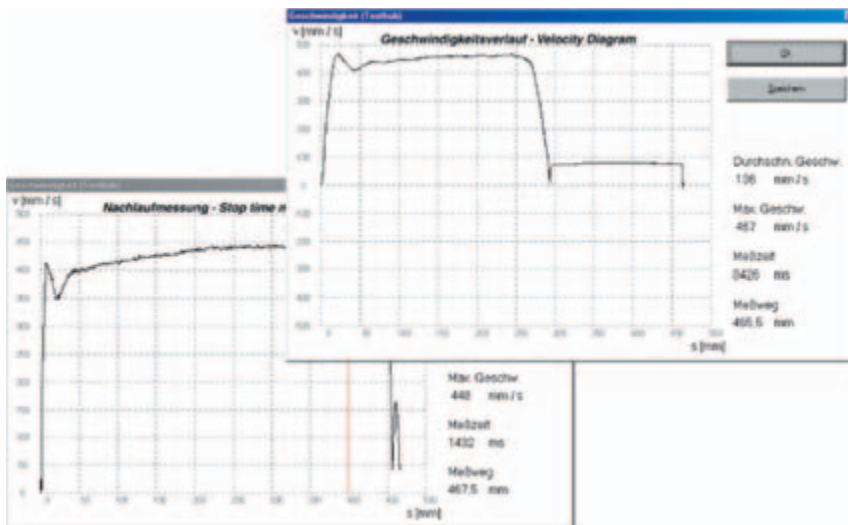
### Stopping time measurements and determining safety distances



Only with a sufficiently dimensioned safety distance that corresponds with the stopping time of the machine can it be guaranteed that the dangerous movement will stop before the person reaches the point of operation. Wear and tear can, however, extend the stopping times of machines. The causes for this can, for example, be a defective brake device or a faulty spark absorber. Stopping the dangerous movement in good time and therefore reliable protection by the protective device is no longer guaranteed. Stopping time measurements are therefore, in our opinion, an extremely important part of a properly carried out safety inspection.

Of course, we also offer this service independent of an inspection.

*Our stopping time measurements are an important basis for the correct positioning of protective devices*



*The results of measurements and calculations can also be evaluated graphically*

Training,  
seminars  
p. 48

Safety  
Consulting  
p. 50

Start-up, hotline  
p. 51

Inspections  
p. 52

**Stopping time  
measurements  
p. 54**

Repairs  
p. 56



# STOPPING TIME MEASUREMENTS

## Stopping time measurements and determining safety distances

### Benefits

- Measurements performed by experts with calibrated measurement devices provide a safe and sound basis for positioning the protective device
- Comprehensible and well-documented test results in accordance with DIN ISO 9001:2000 and optional graphic analysis of the braking motion
- Early detection of wear and tear in brake components with periodical inspections

### Scope of stopping time measurements

- Standards-compliant performance of 10 measurements per machine per dangerous movement
- Graphic evaluation of the brake behavior on request
- Stop activation with "Autohand" without electrical intervention in the machine control system
- Use of appropriate measurement instruments for the respective machine type: Rotary encoder for rotation movements (e.g. rotary indexing table) and rope length transmitter for linear movements
- State-of-the-art calibrated measurement devices; documented test results in accordance with DIN ISO 9001:2000

### Stopping time measurement and definition of the safety distance

| Part no. | Article   | Description   |
|----------|-----------|---|
| S991007  | CS-SMS/FR | "Standard" stopping time measurement, flat-rate   |
| S991008  | CS-SMX/FR | "Extended" stopping time measurement, flat-rate (e.g., for multiple movements, rotary indexing table, robot applications) |



## MACHINE SAFETY SERVICES

### On-site service, repairs and device replacement service



*Our technicians also provide rapid help, e.g. with fault searches and removals*

In the event of a functional fault, speedy help is the order of the day. Our device exchange service allows for quick device swap-out. As part of our guarantee, you receive a free of charge replacement device after the serial number has been provided. Within Germany, the delivery of a replacement device from our standard range generally takes 2 to 3 working days. Overseas, the corresponding transport times are added to these. In the event a device fails after the warranty period has ended, for selected devices, we can provide you with replacement devices quickly and at a low price upon consultation. In this way, we make sure your machines exhibit the safety and availability required of them.

#### **Customized on-site support**

if necessary, our technicians will assist with start-up and removal of faults on-site. In this case please contact our service hotline at **+49 8141 5350-111** or the Leuze electronic sales partner responsible for you.

For emergencies, the Leuze electronic On-Call Service is available to you around the clock at **+49 7021 573-0**.

Repairs are performed in our service center competently and quickly.

Training,  
seminars  
p. 48

Safety  
Consulting  
p. 50

Start-up, hotline  
p. 51

Inspections  
p. 52

Stopping time  
measurements  
p. 54

**Repairs**  
**p. 56**

# REPAIRS

## On-site service, repairs and device replacement service

### Benefits

- Fast help around the world with the swap-out service
- Start-up support and fault search on-site
- Competent device repairs and maintenance
- 24 hour telephone On-Call Service for emergencies

### Travel and accommodation costs

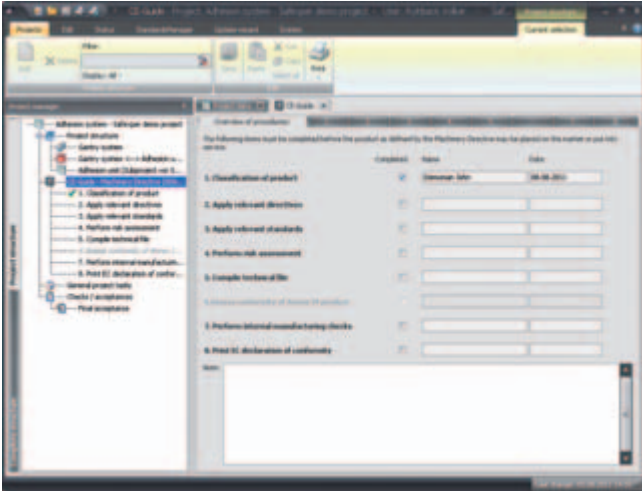
| Part no. | Article   | Description   |
|----------|-----------|---|
| S991001  | CS-WTM/HR | Labor per hour  |
| S991006  | CS-TTX/HR | Travel costs per hour                                     |
| S991000  | CS-TTD/KM | Personal car travel costs per km                          |
| S991009  | CS-WT1/FR | Waiting time per hour                                     |
| S991012  | CS-THO/CT | Accommodation expenses upon presentation of an invoice    |
| S991013  | CS-THO/FR | Flat-rate for accommodation expenses per night in Germany |
| S991014  | CS-TTX/CT | Travel costs upon presentation of an invoice              |

\*) For work abroad: travel costs and accommodation extra, according to expenditure

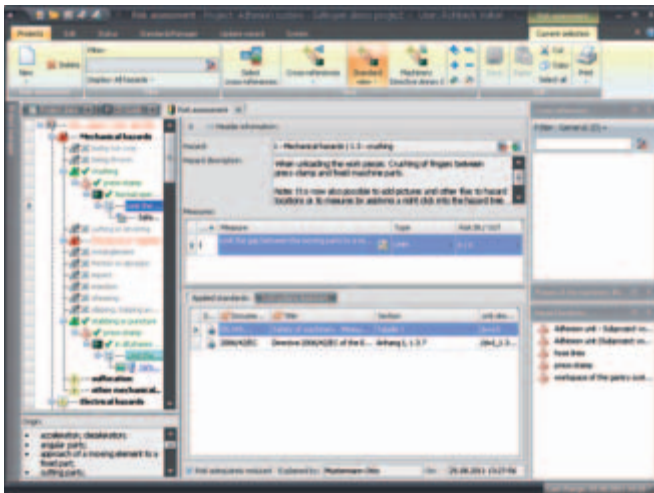
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# SAFETY ENGINEERING SOFTWARE

## Safexpert



*Step-by-step, Safexpert supports the user with their tasks right through to provision of the declaration of conformity and manufacturer's declaration.*



*Hazard assessment in accordance with EN ISO 12100 – quick, easy and structured*

Safexpert is a PC software for the systematic safety engineering of machinery and systems. The network-enabled PC program takes you step-by-step through CE conformity assessment, culminating in the CE sign of approval. It supports the design engineer with risk assessment, in locating relevant standards within seconds, with the creation of the technical documentation and operating instructions, and ultimately guides them through to the standards-compliant CE conformity declaration and CE manufacturer declaration of conformity.

The Safexpert Project Manager structures and manages complex projects, enables the project team to use centrally administered data, and with job-related checklists, ensures that nothing is overseen.

Safexpert guides machine and plant manufacturers through the CE process acc. to the machinery directive (2006/42/EC). Safexpert also offers an interface to SISTEMA software for performing risk evaluations and failure probability calculations as per the requirements according to Performance Level (EN ISO 13849-1).

### Product features

- User-friendly user guidance in current Windows® design with context menus, drag & drop, etc.
- Licensing model: first license and additional licenses instead of single-user / multi-user licenses
- Sub-projects can either be linked or embedded
- Report designer
- Standards can be stored directly in the database
- All updates are performed via the Internet

### Typical users

- Mechanical and electrical designers in machine and system construction
- Control system manufacturers
- Engineering offices for refitting or converting old machinery
- Safety specialists, CE commissioned experts
- Work equipment construction and servicing departments

**Important technical data, overview**

|                                 |   |
|---------------------------------|---|
| Software packages for selection | 3 (Basic, Compact, Professional)  |
| Standards packages              | 2 (Standard, Standard Plus)   |
| Operating system                | Windows XP SP3, Windows Vista SP2, Windows 7, Windows Server 2003 SP2, Windows Server 2008, Windows Server 2008 R2, both 32 and 64 bit  |
| System requirements             | 500 MB free hard disk capacity, 1 GB RAM (2 GB RAM for 64 bit system), .NET 4.0 Full Framework, Internet Explorer min. V8.0, graphics resolution of at least 1024 pixels x 768 pixels |
| Installation                    | Setup per download, release via Internet  |
| Networks                        | Networkability  |
| Languages                       | German, English, French   |
| Documentation                   | User manual   |
| Helps                           | Online help, search function, filter function   |

**Special advantages and features**

- Saves time and money by re-using data from earlier projects
- Ensures more legal certainty with liability issues
- Enables direct data transfer to technical documentation
- Supports safety know-how accumulation in your company
- Brings the various construction departments in the company together with uniform safety standards
- Enables central data storage of CE-relevant data and network usage in the team
- Helps to maintain a good overview in complex, comprehensive projects
- Update service keeps you constantly at the latest standardization status
- Maximum overview with the risk assessment with colored identifications
- Status information at the press of a button
- Determination of the necessary PL and SIL values in accordance with EN ISO 13849 and EN/IEC 62061
- Automatic conversion of existing projects: Calculation of the PLr and required SIL according to available data



**Features**



**Further information**

|   | <b>Page</b> |
|---|-------------|
| ● Ordering information  | 61          |
| ● Safexpert supplementary modules                               | 61          |
| ● Ordering information for standards packages                   | 62          |
| ● Safexpert standards packages                                  | 62          |
| ● Safexpert maintenance contracts, updates and upgrade packages | 63          |

## SAFETY ENGINEERING SOFTWARE

### Functions

|   | Safexpert software packages |         |              |
|---|-----------------------------|---------|--------------|
|   | Basic                       | Compact | Professional |
| CE project management and project documentation   | ●                           | ●       | ●            |
| Machine classification and standards selection wizard   | ●                           | ●       | ●            |
| CE guidelines   | ●                           | ●       | ●            |
| Risk assessment in accordance with EN ISO 12100   | ●                           | ●       | ●            |
| Classification of the machinery on the basis of the Machinery Directive   | ●                           | ●       | ●            |
| Selection function for applicable standards and directives  | ●                           | ●       | ●            |
| Cross references and hyperlinks to important standard and directive centers                                     | ●                           | ●       | ●            |
| Conformity and manufacturer declaration with customized adjustment options                                      | ●                           | ●       | ●            |
| Selection function of safety-related sections of regulations in accordance with EN ISO 13849-1 and EN/IEC 62061 | ●                           | ●       | ●            |
| Interface to software program SISTEMA   | ●                           | ●       | ●            |
| Icons library (approx. 200 icons and symbols for machine safety)  |                             | ●       | ●            |
| Example of CE-compliant operating instructions  |                             | ●       | ●            |
| NormManager   |                             | ●       | ●            |
| Standards package: Standard (9 important CE standards in full text)   |                             |         | ●            |

## Ordering information

### Safexpert

Delivery contents: link to download and license code via e-mail

**Functions:** depending on the software package; Basic, Compact, Professional

### Safexpert Software for the safety engineering of machines and systems

| Part no.                        | Article   | Description  |
|---------------------------------|-----------|--|
| <b>Safexpert basic packages</b> |           |  |
| 600192                          | SE-BPB/F  | Basic package - BASIC, first license   |
| 600193                          | SE-BPB/S  | Basic package - BASIC, additional license  |
| 600194                          | SE-BPC/F  | Basic package - COMPACT, first license   |
| 600195                          | SE-BPC/S  | Basic package - COMPACT, additional license  |
| 600196                          | SE-BPP/FD | Basic package - PROFESSIONAL, language version of standards: German, first license       |
| 600197                          | SE-BPP/SD | Basic package - PROFESSIONAL, language version of standards: German, additional license  |
| 600198                          | SE-BPP/FE | Basic package - PROFESSIONAL, language version of standards: English, first license      |
| 600199                          | SE-BPP/SE | Basic package - PROFESSIONAL, language version of standards: English, additional license |

Only simultaneous access to the database is licensed. The number of clients to be installed is unlimited.

### Safexpert supplementary modules

| Part no.                  | Article  | Description  |
|---------------------------|----------|--|
| <b>Individual modules</b> |          |  |
| 600162                    | SE-ASN/F | NormManager, first license   |
| 600163                    | SE-ASN/S | NormManager, additional license  |
| 600164                    | SE-ASB/F | Operating instructions wizard, first license   |
| 600165                    | SE-ASB/S | Operating instructions wizard, additional license                                    |
| 600166                    | SE-ASP/F | Test and acceptance wizard incl. test list in accordance with MD, first license      |
| 600167                    | SE-ASP/S | Test and acceptance wizard incl. test list in accordance with MD, additional license |

Only simultaneous access to the Normmanager is licensed. The number of clients to be installed is unlimited.

[www.leuze.com/en/safexpert/](http://www.leuze.com/en/safexpert/)



## SAFETY ENGINEERING SOFTWARE

### Safexpert standards packages

|   |   |
|---|---|
| Standards package - Standard<br>(included in Professional software package) | 10 important standards in full text:<br>EN 349+A1:2008, EN 60204-1 +A1:2009, EN 602041/AC:2010, EN ISO 12100:2010, EN ISO 12100-1 +A1:2009, EN ISO 12100-2 +A1:2009, EN ISO 13849-1 +AC:2009, EN ISO 13850:2008, EN ISO 13855:2010, EN ISO 13857:2008, EN ISO 14121-1:2007  |
| Standards package - StandardPlus  | Over 50 important European standards in full text:<br>EN 547-1 +A1:2008, EN 547-2 +A1:2008, EN 547-3 +A1:2008, EN 574 +A1:2008, EN 614-1 +A1:2009, EN 614-2 +A1:2008, EN 626-1 +A1:2008, EN 626-2 +A1:2008, EN 842 +A1:2008, EN 894-1 +A1:2008, EN 894-2 +A1:2008, EN 894-3 +A1:2008, EN 953 +A1:2009, EN 981 +A1:2008, EN 1005-1 +A1:2008, EN 1005-2 +A1:2008, EN 1005-3 +A1:2008, EN 1005-4 +A1:2008, EN 1032 +A1:2008, EN 1037 +A1:2008, EN 1088 +A1+A2:2008, EN 1093-1:2008, EN 1093-3 +A1:2008, EN 1093-4 +A1:2008, EN 1093-6 +A1:2008, EN 1093-7 +A1:2008, EN 1093-8 +A1:2008, EN 1093-9 +A1:2008, EN 1093-11+ A1:2008, EN 1127-1:2007, EN 1127-1:2011, EN 1746:1998, EN 1760-1 +A1:2009, EN 1760-2 +A1:2009, EN 1760-3 +A1:2009, EN 1837 +A1:2009, EN 12198-1 +A1:2008, EN 12198-2 +A1:2008, EN 12198-3 +A1:2008, EN 12786:1999, EN 13478 +A1:2008, EN 13861:2011, EN 62061:2005 +Ber.1:2006 +IEC Corr.2:2008, EN 62061/AC:2010, EN ISO 4413:2010, EN ISO 4414:2010, EN ISO 7731:2008, EN ISO 13732-1:2008, EN ISO 13732-3:2008, EN ISO 13849-2:2008, EN ISO 14122-1+A1:2010, EN ISO 14122-2+A1:2010, EN ISO 14122-3+A1:2010, EN ISO 14122-4+A1:2010, EN ISO 14159:2008, EN ISO 14738:2008 |

### Ordering information for standards packages

| Part no.                  | Article | Description   |
|---------------------------|---------|---|
| <b>Standards packages</b> |         |   |
| 600141                    | SE-NPSD | Standards package – Standard, German  |
| 600142                    | SE-NPPD | Standards package – StandardPlus, German (only as supplement to Safexpert Professional)             |
| 600144                    | SE-NPSE | Standards package – Standard, English   |
| 600145                    | SE-NPPE | Standards package – StandardPlus, English (only as supplement to Safexpert Professional)            |
| 600143                    | SE-NPNS | Network license for standards package – Standard for 5 simultaneous users (annual subscription)     |
| 600140                    | SE-NPNP | Network license for standards package – StandardPlus for 5 simultaneous users (annual subscription) |

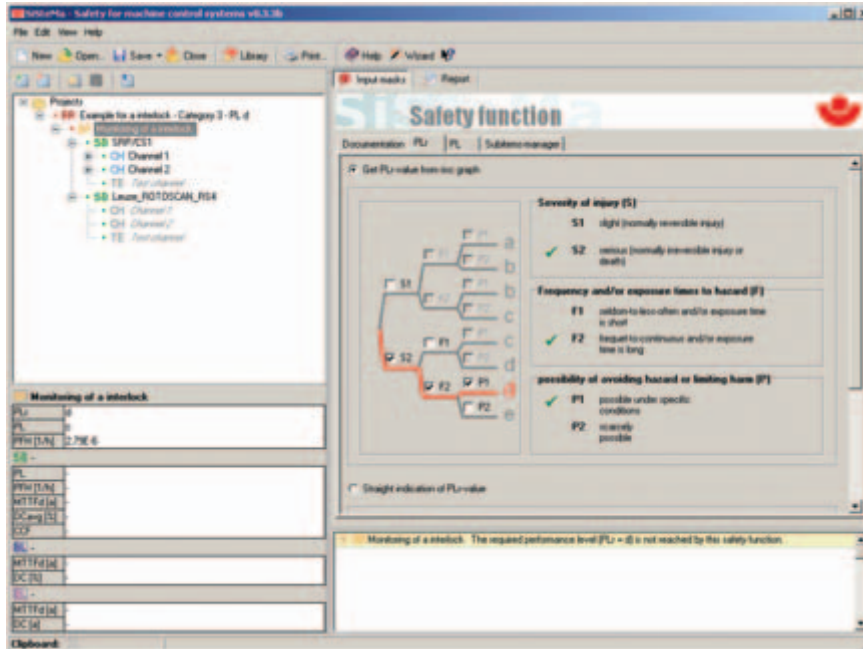
## Safexpert maintenance contracts, updates and upgrade packages

| Ordering information         |           |   |
|------------------------------|-----------|---|
| Part no.                     | Article   | Description   |
| <b>Maintenance contracts</b> |           |   |
| 600170                       | SE-MCB/F  | BASIC, first license  |
| 600171                       | SE-MCB/S  | BASIC, additional license   |
| 600172                       | SE-MCC/F  | COMPACT, first license  |
| 600173                       | SE-MCC/S  | COMPACT, additional license   |
| 600174                       | SE-MCP/F  | PROFESSIONAL, first license   |
| 600175                       | SE-MCP/S  | PROFESSIONAL, additional license  |
| 600176                       | SE-MCN    | StandardPlus standards packet, in addition to Safexpert maintenance contract                      |
| 600178                       | SE-MCD/MD | Data packet, German, for CE certification in accordance with machinery directive MRL              |
| 600179                       | SE-MCD/ED | Data packet, German, for CE certification in accordance with EMV-, ATEX-, NS-, DG-RL (directive)  |
| 600168                       | SE-MCD/ME | Data packet, English, for CE certification in accordance with machinery directive MRL             |
| 600169                       | SE-MCD/EE | Data packet, English, for CE certification in accordance with EMV-, ATEX-, NS-, DG-RL (directive) |
| <b>Updates</b>               |           |   |
| 600133                       | SE-UP-2/F | Safexpert update (BASIC or COMPACT) 7.1 -> 8.1, first license                                     |
| 600134                       | SE-UP-2/S | Safexpert update (BASIC or COMPACT) 7.1 -> 8.1, additional license                                |
| 600135                       | SE-UP-3/F | Safexpert update (COMPACT) 7.0 -> 8.1, first license  |
| 600136                       | SE-UP-3/S | Safexpert update (COMPACT) 7.0 -> 8.1, additional license   |
| 600137                       | SE-UP-4/F | Safexpert update (COMPACT) 6.0 -> 8.1, first license  |
| 600138                       | SE-UP-4/S | Safexpert update (COMPACT) 6.0 -> 8.1, additional license   |
| <b>Upgrade packages</b>      |           |   |
| 600121                       | SE-UG-BC  | Upgrade package from Basic to Compact   |
| 600122                       | SE-UG-BPD | Upgrade package from Basic to Professional; standards language: German                            |
| 600123                       | SE-UG-BPE | Upgrade package from Basic to Professional; standards language: English                           |
| 600124                       | SE-UG-CPD | Upgrade package from Compact to Professional; standards language: German                          |
| 600125                       | SE-UG-CPE | Upgrade package from Compact to Professional; standards language: English                         |

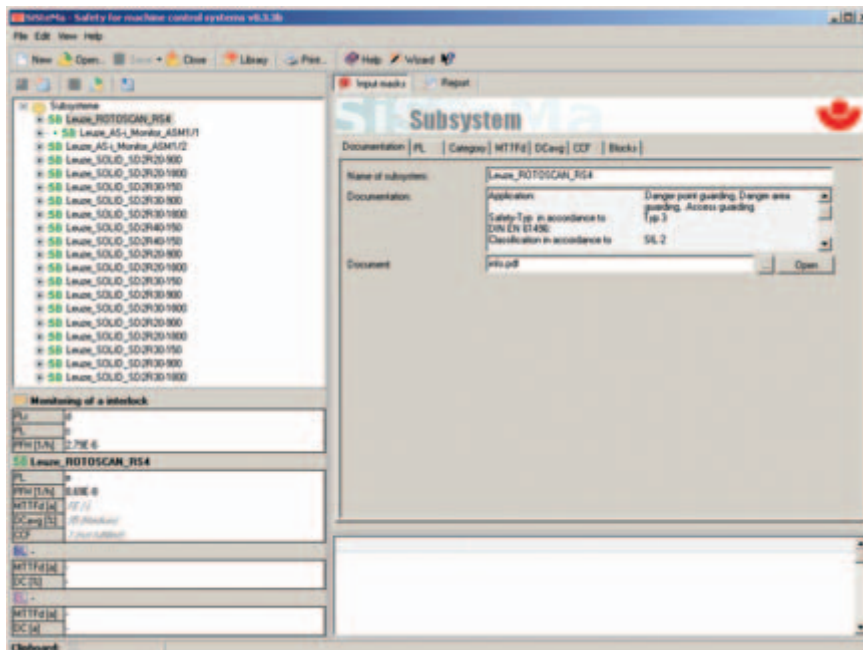
[www.leuze.com/en/safexpert/](http://www.leuze.com/en/safexpert/)

# SAFETY ENGINEERING SOFTWARE

## SISTEMA



The SISTEMA version that can be downloaded at [www.leuze.com/en/sistema](http://www.leuze.com/en/sistema) includes a Leuze electronic safety component database



SISTEMA provides a hierarchical project presentation with safety functions, sub-systems, channels, blocks and elements

SISTEMA is a PC software developed by the Institut für Arbeitsschutz (IFA) for calculating and evaluating the safety of a machine's safety-related control systems (SRP/CS) in accordance with EN ISO 13849-1. On the basis of the control system architectures provided for in section 6 of the standard, the tool provides an automated calculation of the characteristic safety values and the achieved performance level (PL). The user can consequently very quickly and easily verify whether or not the achieved performance level of the control component (PL) they have implemented corresponds with the required performance level (PL<sub>r</sub>) that the risk assessment determines necessary for this safety function. The program also transparently administers and structures complex projects. It allows creation of internal component libraries for element systems, block systems and sub-systems and their implementation in projects. An integrated wizard simplifies use of the software.

SISTEMA supports German, English, Italian, French and Finnish. The software is provided to the user as freeware, and can therefore be copied for free. Leuze electronic has supplemented the software with a database, which contains all of the safety-related parameters of selected Leuze electronic safety sensors and control system modules that SISTEMA requires. The SISTEMA version with integrated Leuze electronic database can be downloaded free at [www.leuze.com/en/sistema](http://www.leuze.com/en/sistema).

### Typical users

- Machine manufacturers
- System integrators
- Control system manufacturers
- Engineering offices for refitting or converting old machinery
- Test centers

**Important technical data, overview**

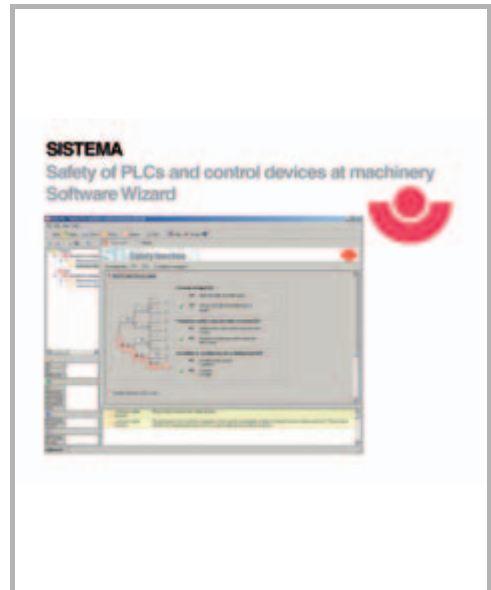
|                     |  |
|---------------------|--|
| Operating system    | Microsoft Windows 2000, Windows XP, Windows Vista or Windows 7   |
| System requirements | MS Internet Explorer 5.0 or higher, 50 MB free hard disk space, recommended screen resolution: 1024 x 768  |
| Installation        | Setup program  |
| Languages           | German, English, Italian, French, Finnish  |
| Helps               | Software wizard assists you in creating your own projects, side bar, navigation window with tree structure |

**Special advantages and features**

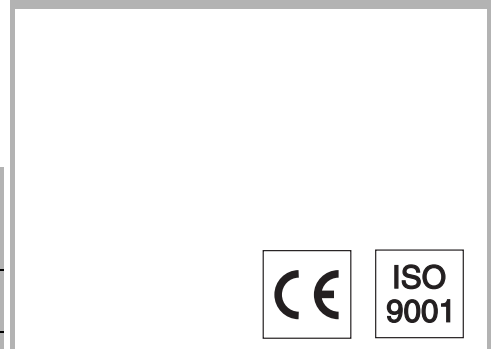
- **Standards-compliant safety evaluation of control system components in accordance with EN ISO 13849-1**
- **Time-saving with automatic calculation of the safety-related reliability**
- **Use of manufacturer-specific and internal component libraries**
- **Software wizard for user guidance through the program**
- **Print function for project documentation**
- **Online help with detailed explanation of terms**
- **Download of the SISTEMA software from the Leuze homepage with integrated Leuze electronic component library**
- **Freeware, free to use**

**Functions**

|   |
|---|
| Determining the required performance level of each safety function in accordance with EN ISO 13849-1  |
| Support of control system architectures in accordance with EN ISO 13849-1, section 6  |
| Calculation of the achieved performance level (PL)  |
| SISTEMA with integrated Leuze electronic component library, freeware download at <a href="http://www.leuze.com/en/sistema">www.leuze.com/en/sistema</a> |
| DC values library   |
| Calculation wizard for $MTTF_d$ and DC values   |
| Creation of manufacturer-specific databases at element system, block system, subsystem and project level  |
| Online help with detailed explanation of terms  |
| Print function for project documentation  |
| Software wizard for user guidance   |



**Features**



**Further information** **Page**

- |                        |    |
|------------------------|----|
| ● Ordering information | 66 |
|------------------------|----|

## SAFETY ENGINEERING SOFTWARE

### Ordering information

#### **SISTEMA**

A freeware tool, developed by the Institute for Occupational Safety and Health (IFA).

Freeware download at [www.leuze.com/en/sistema](http://www.leuze.com/en/sistema)

**Functions:** SISTEMA software wizard for calculating, evaluating and verifying the safety of control components on machines in accordance with EN ISO 13849-1.

#### **Please note:**

The SISTEMA program is freeware and may therefore be copied for free. Please be aware that SISTEMA makes use of other open source software, the use of which is covered by own licenses. Changes to these software components are only allowed in agreement with the respective license. A copy of the relevant licenses is provided in the application's "Licenses" sub-directory.

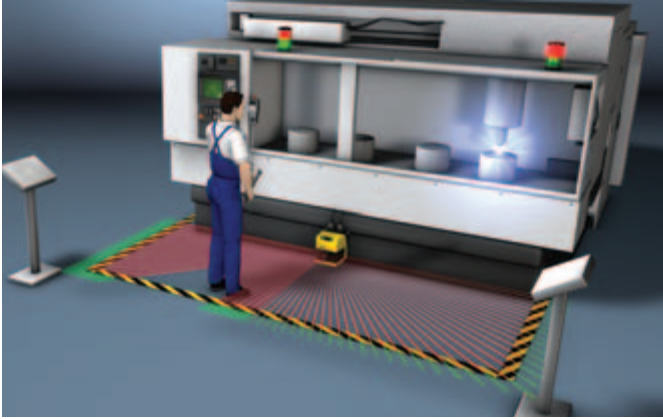
The software has been very attentively developed in accordance with the state-of-the-art of science and technology. It is provided to the user free of charge. The software is used at the user's risk. All forms of liability, regardless of legal basis, shall be excluded (where legally permissible). Liability shall not be accepted for quality defects and defects of title in particular, as well as the documentation and information connected with such, especially with regard to accuracy, correctness, freedom from intellectual property rights of third parties, actuality, completeness and/or usability - with the exception of intent or malice aforethought.

[www.leuze.com/en/sistema/](http://www.leuze.com/en/sistema/)

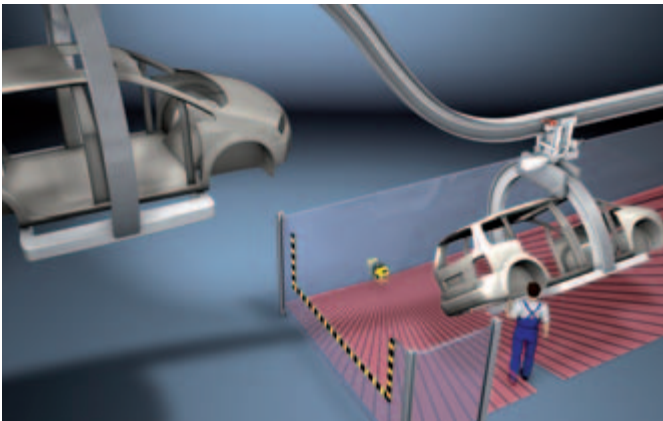


## SAFETY LASER SCANNERS

### Overview



*Danger zone guarding at stationary machinery: Switchover of process-dependent protective/warning field combinations for smooth production process*



*Large area danger zone guarding on overhead electric conveyor systems: Material flow-dependent field pair changeover and activation for efficient production cycles*

Safety Laser Scanners offer extremely flexible and universal workplace protection, which can be individually adjusted to any requirement and can be very easily integrated into every production process. With a compact construction, the provision of the safety function in just one device and with integrated interfaces for safety bus systems, complex customer requirements quickly become easily performed tasks. Whether it is hand protection, arm protection or full personnel protection, certified in accordance with IEC 61508-SIL 2 and EN ISO 13849-1 PL d, the ROTOSCAN RS4 Safety Laser Scanner is flexible and versatile in adapting to every situation.

Similar to a radar, the Safety Laser Scanners constantly scan the complete working area two-dimensionally in an angle range of 190° and a radius of several meters. Independent protective and warning fields can be programmed via PC software and can be switched over at any time during the operation. If a person enters the protective and warning fields, they are detected and a switch-off and alarm command is generated for the machine.

The immense flexibility of the RS4 Safety Laser Scanner is a result of the independent protective/warning field pairs, which can assume any field contours as well as the ability to change over between these pairs. Using a PC configuration software, the shape of the field contours is graphically adjusted to the local conditions and required safety distances. In the same way, all other parameters can also be quickly and effectively adjusted to the requirements of the production process.

Because of its compact construction, the ROTOSCAN RS4 Safety Laser Scanner enables a flexible installation position and use in mobile applications. In addition to the classic areas of application with danger zone guarding at stationary machines, the extended version ROTOSCAN RS4-4E also has the necessary approvals for vertical access and point of operation guarding. The ROTOSCAN RS4-4M is specially designed for transfer carriages. It uses the MotionMonitoring function to ensure safe vehicle movement sequences.

Selection table



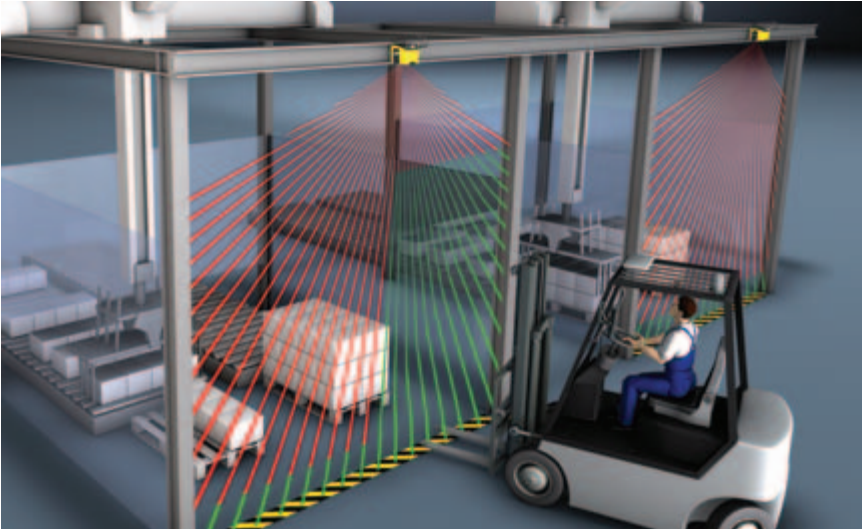
The RS4soft configuration and diagnostics software allows the Laser Scanner to be easily adjusted to local conditions – both direct and via the PROFIBUS DP

|   | Type in accordance with EN/IEC 61496 | SIL in accordance with IEC 61508 and SILCL in accordance with EN/IEC 62061 | Performance Level (PL) in accordance with EN ISO 13849-1 | Protective field range in m | Warning field range in m | Resolution | Resolution | Variable                     | Features, type-dependent                   |                          |                      |                             |                 |                 |                               |                             |                               |                  | Series | Page   |       |        |        |
|---|--------------------------------------|--|--|-----------------------------|--------------------------|------------|------------|------------------------------|--|--------------------------|----------------------|-----------------------------|-----------------|-----------------|-------------------------------|-----------------------------|-------------------------------|------------------|--------|--------|-------|--------|--------|
|   |                                      |  |  |                             |                          | 70 mm      | 150 mm     | resolution from 30 to 150 mm | Number of field pairs that can change over | Number of signal outputs | Danger zone guarding | Point of operation guarding | Access guarding | RES, selectable | Integr. AS-i Safety Interface | Integr. PROFIsafe Interface | Reliable distance measurement | MotionMonitoring |        |        |       |        |        |
| 3 | 2                                    | d  | 2.15   | 15                          | 15                       | ●          | ●          |                              | 4  | 2                        | ●                    | ●                           | ●               |                 |                               |                             |                               |                  | RS4-2E | 72     |       |        |        |
|   |                                      |  |  | 15                          | 15                       | ●          | ●          |                              | 8  | 2                        | ●                    | ●                           | ●               |                 | ●                             | ●                           |                               |                  |        | RS4-2M | 72    |        |        |
|   |                                      |  | 4  | 15                          |                          |            |            |                              |  | 4                        | 2                    | ●                           |                 |                 | ●                             | ●                           | ●                             |                  |        |        | RS4-4 | 72     |        |
|   |                                      |  |  | 15                          |                          | ●          |            | ●                            | ●  | 8                        | 2                    | ●                           | ●               | ●               | ●                             | ●                           | ●                             | ●                |        |        |       | RS4-4E | 72     |
|   |                                      |  | 15   |                             | ●                        |            | ●          | ●                            | 8  | 2                        | ●                    | ●                           | ●               | ●               | ●                             | ●                           | ●                             | ●                |        |        |       | RS4-4M | 72     |
|   |                                      |  | 6.25   | 15                          |                          | ●          |            | ●                            | ●  | 8                        | 2                    | ●                           | ●               | ●               | ●                             | ●                           | ●                             | ●                |        |        |       | RS4-6E | 72     |
|   |                                      |  |  | 15                          |                          | ●          |            | ●                            | ●  | 8                        | 2                    | ●                           | ●               | ●               | ●                             | ●                           | ●                             | ●                | ●      |        |       |        | RS4-6M |

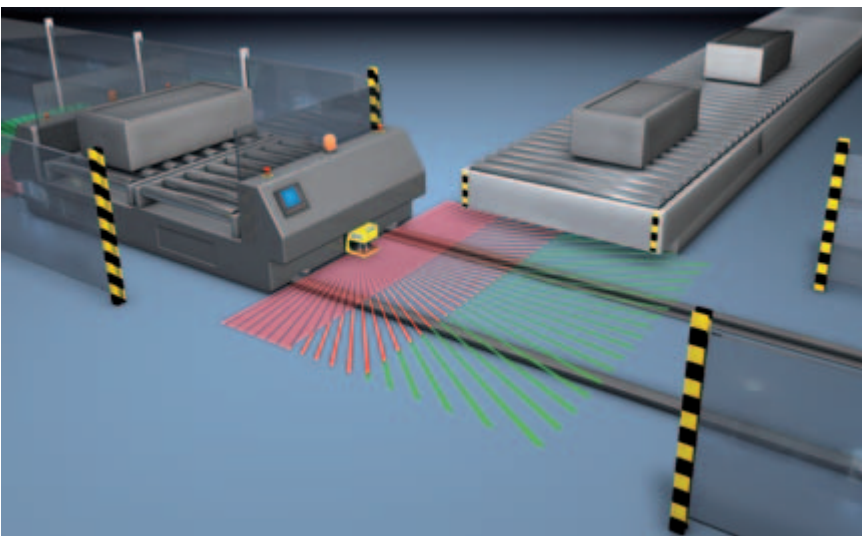
[www.leuze.com/en/rotoscan/](http://www.leuze.com/en/rotoscan/)

## SAFETY LASER SCANNERS

### ROTOSCAN RS4



*Fast material flow with field pair switchovers, for example with vertically mounted RS4 Safety Laser Scanners*



*Danger zone guarding on transfer carriages: Switchovers of status- and speed-dependent field pairs for rapidly adjusting the material transport with carriage movement monitoring using the MotionMonitoring function*

Point of operation and access guarding are classic application examples of Safety Light Curtains and Multiple Light Beam Safety Devices. If it is necessary to flexibly adjust protective fields to the danger zones, or if there are space, power supply or flexibility restrictions, the Safety Laser Scanner is the better alternative. Depending on the application, the resolution can be configured so that the device safely detects a person, an arm or a person's hand.

Safety Laser Scanners are a cost-effective and flexible protective devices alternative for danger zone guarding of large areas in the vicinity of these machines. Switching between any kind of monitoring areas is possible with up to 6.25 radius, process-conditional according to the application. All configuration data, such as the definition of the zones, the resolution or the response times, is defined with the RS4soft configuration and diagnostics software.

Compactness, protective/warning field combination and field changeover are the essential features of Safety Laser Scanners for guarding corridor supply vehicles. The protection area of the traveling direction and speed of the vehicle is adjusted using staggered protective fields and their situation-conditional activation.

The Safety Laser Scanner also offers very significant advantages for portal processing systems. On one hand the vehicle can be monitored during the movement, while on the other hand, in standstill the Laser Scanner assumes a danger zone guarding of the tools integrated in the portal.

#### Typical areas of application

- Obstruction-free zone guarding on machine and plant systems
- Flexible guarding of corridor supply vehicles
- Variable access guarding at processing centers
- Individual point of operation guarding on machinery

# ROTOSCAN RS4

## Important technical data, overview

|  |  |
|--|--|
| Type in accordance with EN/IEC 61496                                       | 3  |
| SIL in accordance with IEC 61508 and SILCL in accordance with EN/IEC 62061 | 2  |
| Performance Level (PL) in accordance with EN ISO 13849-1                   | d  |
| Category in accordance with EN ISO 13849                                   | 3  |
| Resolution (adjustable)  | 30 mm   40 mm   50 mm   70 mm   150 mm   |
| Dimensions (W x H x D)   | 140 mm x 155 mm x 135 mm   |
| Safety-related switching outputs (OSSDs)                                   | 2 pnp transistor outputs<br>AS-i Safety Interface,<br>PROFIsafe Interface                          |
| Connection system  | Sub-D15, Sub-D9 for configuration<br>M12 plug, IR interface for configuration (safety bus systems) |

| Functions                                     | Function package |          |                  |
|---|------------------|----------|------------------|
|   | Basic            | Extended | MotionMonitoring |
| Start/restart interlock (RES), selectable     | ●                | ●        | ●                |
| Monitored field pair changeover               | ●                | ●        | ●                |
| Warning field monitoring                      | ●                | ●        | ●                |
| Resolution, selectable                        | ●                | ●        | ●                |
| Horizontal danger zone guarding               | ●                | ●        | ●                |
| Vertical point of operation guarding          |                  | ●        | ●                |
| Vertical access guarding                      |                  | ●        | ●                |
| Reference boundary monitoring                 |                  | ●        | ●                |
| Transfer carriage movement monitoring         |                  |          | ●                |
| Reliable distance measurement for positioning |                  |          | ●                |
| Additional alarm output                       | ●                | ●        | ●                |
| Start test                                    | ●                | ●        | ●                |

| Function extension |              |     |     |        |                 |
|--------------------|--------------|-----|-----|--------|-----------------|
| With Safety Relay  | Relay output | RES | EDM | Muting | Further details |
| MSI-SR4            | ●            | *   | ●   |        | p. 428          |
| MSI-SR5            | ●            | *   | ●   |        | p. 434          |

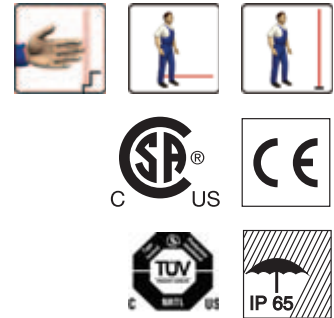
\*) Already included in the sensor

### Special features

- Automatic configuration with device exchange with intelligent ConfigPlug
- Guarding large danger zones
- Any kind of protective/warning field contours and configurations
- AS-i Safety at Work and PROFIsafe Laser Scanners



### Features



### Further information

### Page

- Ordering information 72
- Electrical connection 73
- Technical data 75
- Dimensional drawings 77
- Dimensional drawings: Accessories 78
- Accessories ordering information 79

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## SAFETY LASER SCANNERS

### Ordering information

#### ROTOSCAN RS4

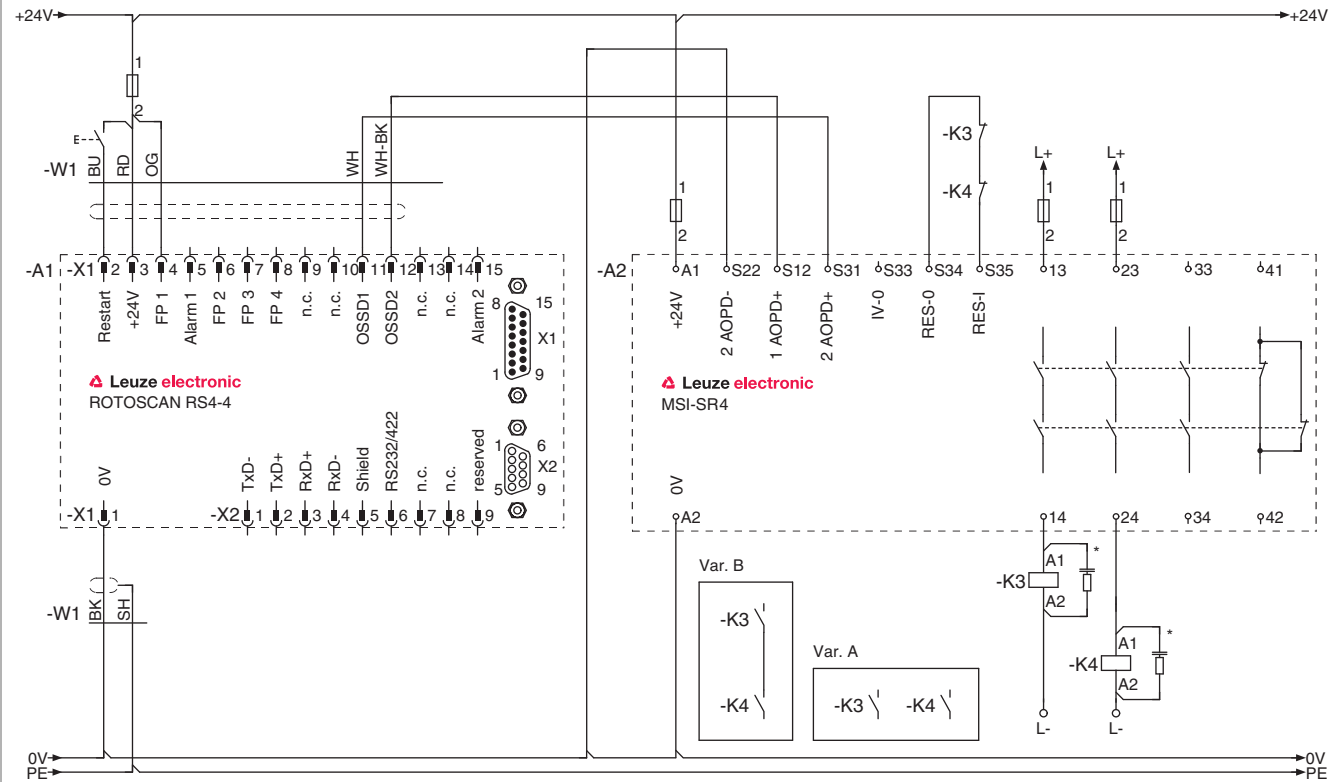
Included in delivery: RS4-MG-X1-Set and RS4-MG-X2-Set plugs, connecting and operating instructions (PDF file on CD-ROM), RS4soft configuration and diagnostics software.

**Functions:** Depending on function package – Basic, Ex-ended, MotionMonitoring

| Part no.   | Article   | Description   |   |
|--|-----------|---|---|
| <b>ROTOSCAN RS4</b>  |           |   |   |
| 520082   | RS4-2E    | ROTOSCAN RS4-2E Laser Scanner with Basic function package                     |   |
| 520098   | RS4-2M    | ROTOSCAN RS4-2M Laser Scanner with MotionMonitoring function package          |   |
| 50034195   | RS4-4     | ROTOSCAN RS4-4 Laser Scanner with Basic function package                      |   |
| 520085   | RS4-4E    | ROTOSCAN RS4-4E Laser Scanner with Extended function package                  |   |
| 520099   | RS4-4M    | ROTOSCAN RS4-4M Laser Scanner with MotionMonitoring function package          |   |
| 520044   | RS4-6E    | ROTOSCAN RS4-6E Laser Scanner with Extended function package                  |   |
| 520045   | RS4-6M    | ROTOSCAN RS4-6M Laser Scanner with MotionMonitoring function package          |   |
| Included in delivery: RS4soft and RS4-MG-X1-Set, RS4-MG-X2-Set plugs |           |   |   |
| <b>ROTOSCAN RS4/AS-i Safety</b>                                      |           |   | <b>Safety-related switching outputs (OSSDs)</b> |
| 580014   | RS4-4/A1  | ROTOSCAN RS4-4/AS-i Laser Scanner with Basic function package                 | Integrated AS-i Safety Interface                |
| 520086   | RS4-4E/A1 | ROTOSCAN RS4-4E/AS-i Laser Scanner with Extended function package             | Integrated AS-i Safety Interface                |
| 520042   | RS4-4M/A1 | ROTOSCAN RS4-4M/AS-i Laser Scanner with MotionMonitoring function package     | Integrated AS-i Safety Interface                |
| 520046   | RS4-6E/A1 | ROTOSCAN RS4-6E/AS-i Laser Scanner with Extended function package             | Integrated AS-i Safety Interface                |
| 520047   | RS4-6M/A1 | ROTOSCAN RS4-6M/AS-i Laser Scanner with MotionMonitoring function package     | Integrated AS-i Safety Interface                |
| <b>ROTOSCAN RS4/PROFIsafe</b>  |           |   |   |
| 580012   | RS4-4/P1  | ROTOSCAN RS4-4/PROFIBUS Laser Scanner with Basic function package             | Integrated PROFIBUS DP interface                |
| 520087   | RS4-4E/P1 | ROTOSCAN RS4-4E/PROFIBUS Laser Scanner with Extended function package         | Integrated PROFIBUS DP interface                |
| 520043   | RS4-4M/P1 | ROTOSCAN RS4-4M/PROFIBUS Laser Scanner with MotionMonitoring function package | Integrated PROFIBUS DP interface                |
| 520048   | RS4-6E/P1 | ROTOSCAN RS4-6E/PROFIBUS Laser Scanner with Extended function package         | Integrated PROFIBUS DP interface                |
| 520049   | RS4-6M/P1 | ROTOSCAN RS4-6M/PROFIBUS Laser Scanner with MotionMonitoring function package | Integrated PROFIBUS DP interface                |

**Electrical connection**

**ROTOSCAN RS4 connection example**



\*) Spark extinction circuit, supply suitable spark extinction

ROTOSCAN RS4 with MSI-SR4 Safety Relay

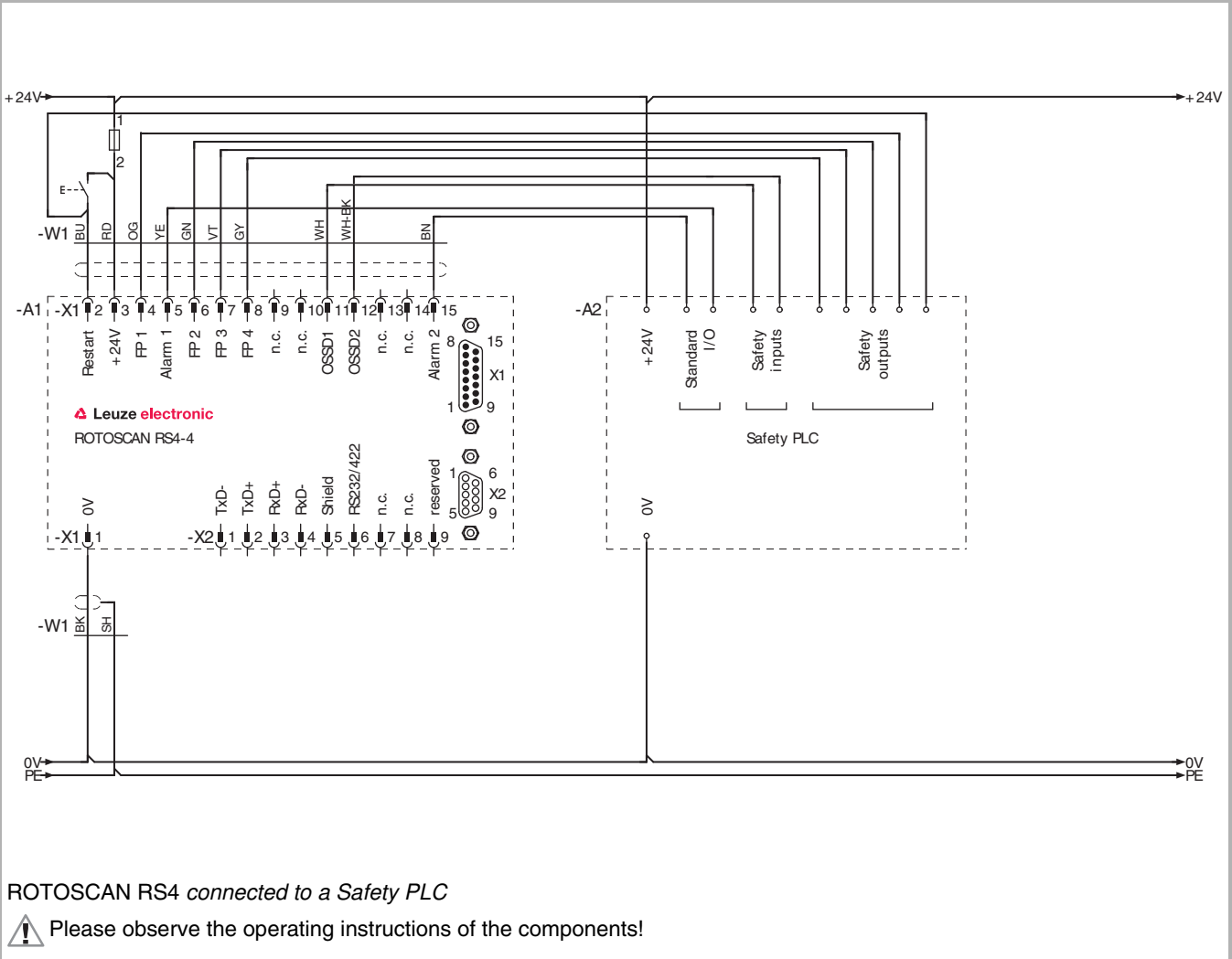
**!** Please observe the operating instructions of the components!



# SAFETY LASER SCANNERS

## Electrical connection

### ROTOSCAN RS4 connection example



## Technical data

| General system data  |  |        |        |        |        |
|--|--|--------|--------|--------|--------|
| Type in accordance with EN/IEC 61496                                       | 3  |        |        |        |        |
| SIL in accordance with IEC 61508 and SILCL in accordance with EN/IEC 62061 | 2  |        |        |        |        |
| Performance Level (PL) in accordance with EN ISO 13849-1                   | d  |        |        |        |        |
| Probability of a failure to danger per hour (PFH <sub>d</sub> )            | 1.50 x 10 <sup>-7</sup>  |        |        |        |        |
| Service life (T <sub>M</sub> ) in accordance with EN ISO 13849-1           | 20 years   |        |        |        |        |
| Category in accordance with EN ISO 13849                                   | 3  |        |        |        |        |
| Supply voltage   | 24 V DC, -30% to +20%<br>Supply in accordance with IEC 742; must be fused with 1.6 A, melting fuse |        |        |        |        |
| Current consumption  | Approx. 420 mA (use power supply with 2.5 A)   |        |        |        |        |
| Connection system  | Sub-D15, Sub-D9 for configuration  |        |        |        |        |
| Laser protection class in accordance with EN 60825                         | 1  |        |        |        |        |
| Wavelength   | 905 nm   |        |        |        |        |
| Protection rating  | IP 65  |        |        |        |        |
| Ambient temperature, operation   | 0...+50°C  |        |        |        |        |
| Ambient temperature, storage   | -20...+60°C  |        |        |        |        |
| Dimensions (W x H x D)   | 140 mm x 155 mm x 135 mm   |        |        |        |        |
| Weight   | Approx. 2.0 kg   |        |        |        |        |
| Protective field   |  |        |        |        |        |
| Resolution (adjustable)  | 30 mm  | 40 mm  | 50 mm  | 70 mm  | 150 mm |
| RS4-2E/RS4-2M range  |  |        |        | 2.15 m | 2.15 m |
| RS4-4 range  |  |        |        | 4.00 m | 4.00 m |
| RS4-4E/RS4-4M range  | 1.6 m  | 2.20 m | 2.80 m | 4.00 m | 4.00 m |
| RS4-6E/RS4-6M range  | 1.6 m  | 2.20 m | 2.80 m | 6.25 m | 6.25 m |
| Scanning angle   | Max. 190°  |        |        |        |        |
| Diffuse reflectance  | Min. 1.8%  |        |        |        |        |
| Response time  | Min. 80 ms, can be set up to 640 ms (16-piece multiscan)   |        |        |        |        |
| Number of protective fields  | 4/8 (can be switched via switch outputs)   |        |        |        |        |
| Safety-related switching outputs (OSSDs)                                   | 2 pnp transistor outputs (short circuit-proof, cross-circuit monitored)                            |        |        |        |        |
| Switching voltage high active  | U <sub>V</sub> -3.2 V  |        |        |        |        |
| Switching voltage low  | Max. +2.0 V  |        |        |        |        |
| Switching current  | Max. 250 mA  |        |        |        |        |

## SAFETY LASER SCANNERS

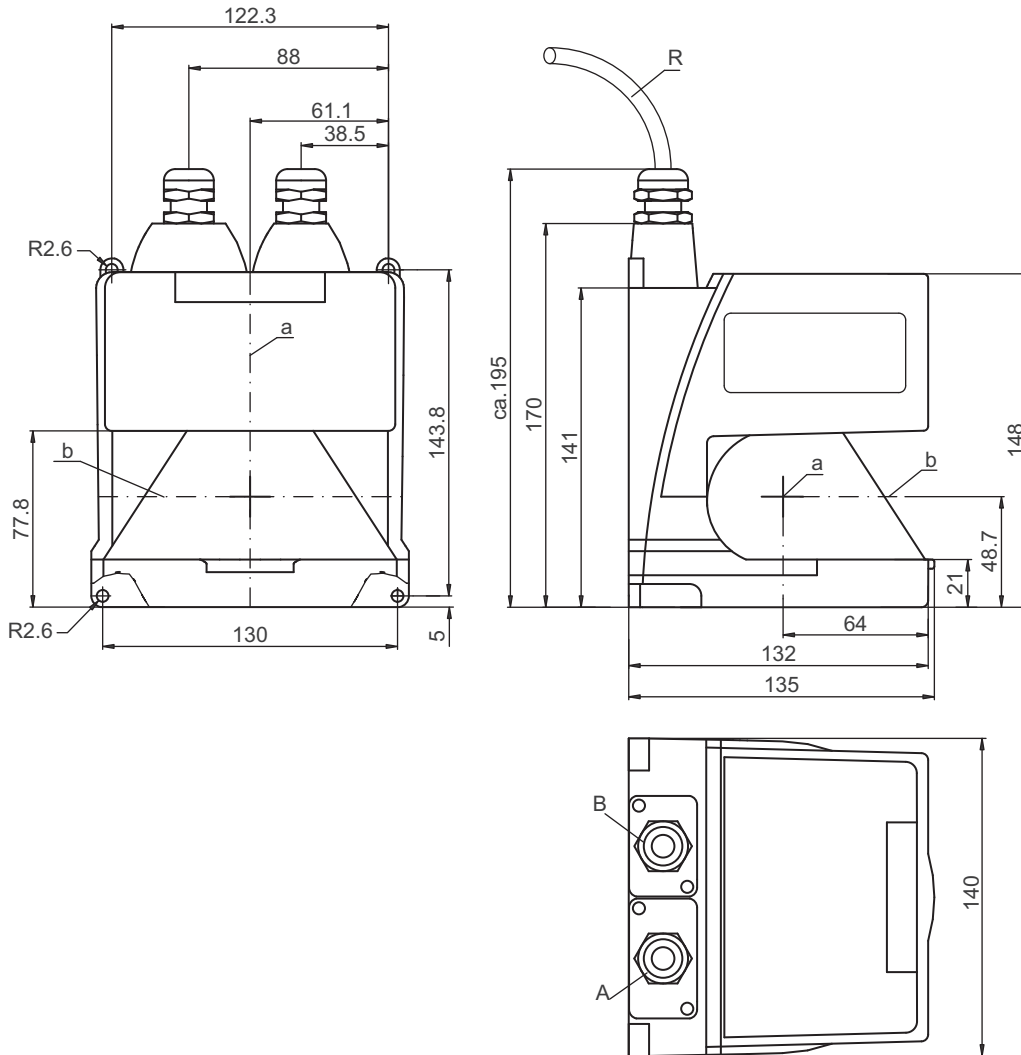
### Technical data

| <b>Warning field</b>     |   |
|--------------------------|---|
| Range                    | 0...15 m  |
| Scanning angle           | Max. 190°   |
| Angle resolution         | 0.36°   |
| Number of warning fields | 4/8 (can be switched via switch outputs)                        |
| Switching outputs        | 2 pnp transistor outputs, per 100 mA (warning field/dirt/fault) |
| <b>Measurement zone</b>  |   |
| Measurement range        | 0...50 m  |
| Radial resolution        | 5 mm  |
| Lateral resolution       | 0.36°   |
| Data output              | Serial interface, RS232 and RS422                               |

Please note the additional information in the RS4 connecting and operating instructions at [www.leuze.com/en/rotoscan](http://www.leuze.com/en/rotoscan).

**Dimensional drawings**

**ROTOSCAN RS4 Safety Laser Scanner**



R = Smallest bending radius = 50 mm  
 a = Rotating mirror axis  
 b = Scan level

A = Interface X1 with RS4 control cable with ConfigPlug  
 B = Interface X2 with protection cap

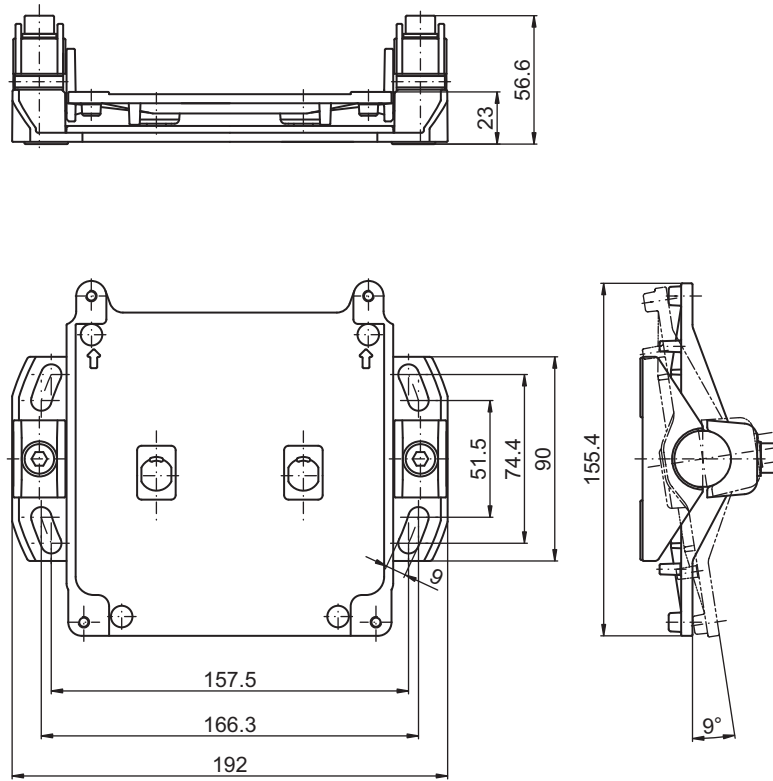
Dimensions in mm

[www.leuze.com/en/rotoscan/](http://www.leuze.com/en/rotoscan/)

## SAFETY LASER SCANNERS

### Dimensional drawings: Accessories

#### RS4 mounting system



Dimensions in mm

## Accessories ordering information

| Part no.                        | Article             | Description   | Length, design              |
|---------------------------------|---------------------|---|-----------------------------|
| <b>Installation accessories</b> |                     |   |                             |
| 50033346                        | RS4-MS              | RS4 mounting system   |                             |
| 50035814                        | RS4-Adap-P          | RS4 scanner adapter plate   |                             |
| <b>Start-up</b>                 |                     |   |                             |
| 97005003                        | RS4-COB-24          | RS4 configuration and test device, 24 V DC  |                             |
| <b>Connection system</b>        |                     |   |                             |
| 548520                          | CB-D15E-5000S-11GF  | RS4 connection cable with ConfigPlug, ready-made at scanner-side                                  | 5 m, straight/<br>open end  |
| 548521                          | CB-D15E-10000S-11GF | RS4 connection cable with ConfigPlug, ready-made at scanner-side                                  | 10 m, straight/<br>open end |
| 548522                          | CB-D15E-25000S-11GF | RS4 connection cable with ConfigPlug, ready-made at scanner-side                                  | 25 m, straight/<br>open end |
| 548523                          | CB-D15E-50000S-11GF | RS4 connection cable with ConfigPlug, ready-made at scanner-side                                  | 50 m, straight/<br>open end |
| 548530                          | CB-D15E-10000S-11WF | RS4 connection cable with ConfigPlug, ready-made at scanner-side                                  | 10 m, angled/<br>open end   |
| 50035863                        | CB-D9-3000-5GF/GM   | RS4 connecting cable, RS232, preformed at both sides  | 3 m                         |
| 50035865                        | CB-D9-5000-5GF/GM   | RS4 connecting cable, RS232, preformed at both sides  | 5 m                         |
| 50035867                        | CB-D9-10000-5GF/GM  | RS4 connecting cable, RS232, preformed at both sides  | 10 m                        |
| 520083                          | AC-D15E-GF          | ConfigPlug for all RS4, straight, without cable, for automatic configuration with device swap-out |                             |
| 50035735                        | RS4-MG-X1-Set       | RS4 plug, sock., 15 pins, for X1 interface  |                             |
| 50035768                        | RS4-MG-X2-Set       | RS4 plug, sock., 9 pins, for X2 interface   |                             |
| 426266                          | RS4-MGS-X1-Set      | RS4 plug, 15 pins, for X1 interface, cable routing to the rear                                    |                             |
| 426265                          | RS4-MGS-X2-Set      | RS4 plug, 9 pins, for X2 interface, cable routing to the rear                                     |                             |
| <b>Cleaning fluid</b>           |                     |   |                             |
| 430400                          | RS4-clean-Set1      | RS4 cleaning fluid for plastic, 250 ml, cleaning cloths, 25 pieces, soft, fuzz-free               |                             |
| 430410                          | RS4-clean-Set2      | RS4 cleaning fluid for plastic, 1,000 ml, cleaning cloths, 100 pieces, soft, fuzz-free            |                             |

[www.leuze.com/en/rotoSCAN/](http://www.leuze.com/en/rotoSCAN/)



## SAFETY LASER SCANNERS

### Accessories ordering information

#### ROTOSCAN RS4/AS-i accessories ordering information

| Part no. | Article            | Description  | Length, design |
|----------|--------------------|--|----------------|
| 580005   | AC-M12-15M         | M12 plug for protective field 1 activation, pins 1-5 bridged   |                |
| 580004   | AC-PDA1/A          | AS-i adapter for bus connection and power supply for COMPACT <i>plus</i> receiver/transceiver as well as ROTOSCAN RS4/A1, M12, 5-pin |                |
| 548361   | CB-M12-1000-5GF/GM | Connection cable, adapter device, plug and socket, 1:1, M12, 5-pin   | 1 m, straight  |
| 548362   | CB-M12-2000-5GF/GM | Connection cable, adapter device, plug and socket, 1:1, M12, 5-pin   | 2 m, straight  |
| 520072   | CB-PCO-3000        | Connecting cable, RS232 - IR adapter   | 3 m            |
| 548363   | CB-M12-2000-4GMB   | RS4 test operation connection cable  | 2 m            |

For more information see chapter AS-Interface Safety at Work, page 282

#### ROTOSCAN RS4/PROFIBUS accessories ordering information

| Part no. | Article              | Description   | Length, design |
|----------|----------------------|---|----------------|
| 147500   | AC-M12-PBT1          | PROFIBUS M12 terminal resistor                        |                |
| 548100   | CB-M12-25000S-4GF/GM | Connection cable for supply or reset button, shielded | 25 m, straight |
| 520072   | CB-PCO-3000          | Connecting cable, RS232 - IR adapter                  | 3 m            |

# ROTOSCAN RS4

Machine Safety

Machine Safety  
Services

Safety  
Engineering  
Software

Safety Laser  
Scanners

Safety Light  
Curtains

Multiple Light  
Beam Safety  
Devices

Light Beam  
Safety Device  
Sets

Single Light  
Beam Safety  
Devices

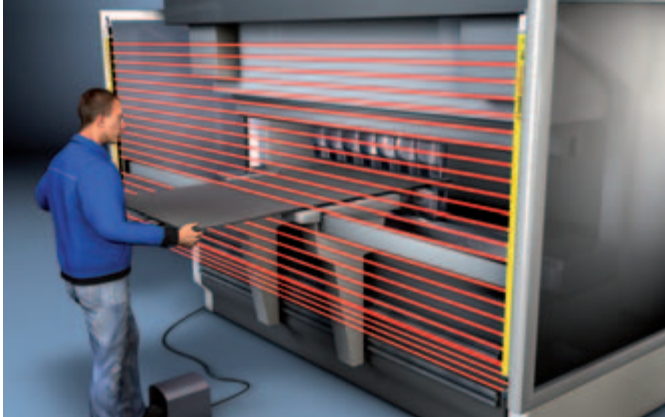
AS-Interface  
Safety at Work

Safety Proximity  
Sensors

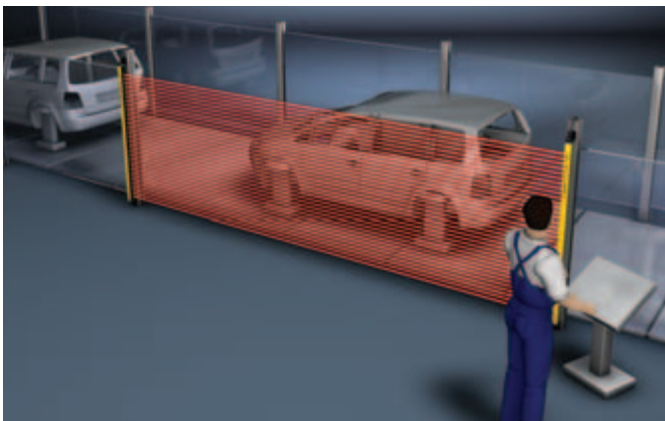
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# SAFETY LIGHT CURTAINS

## Overview



*Safety Light Curtains with resolutions that can be reduced guarantee protection and tolerate work equipment in the protective field*






*Access guarding on transport conveyors provided by Safety Light Curtain with integrated start/restart interlock*

People and machines work "hand-in-hand" as it were on many machines, such as presses or feed-in stations, for example. Reliable hand and finger protection is the highest priority here. This is the application area of Leuze electronic Safety Light Curtains. And when it comes to guarding machines in automatic operation on the most compact construction designs possible, Leuze electronic Safety Light Curtains are the very best solution.

The Safety Light Curtains comply with the universal standards EN/IEC 61496-1 and -2 and can be used both vertically as hand and finger protection or as access guarding and horizontally for person presence detection. They meet the highest requirements in this respect for integration capability, availability and cost effectiveness. On the whole this results in a high level of cost efficiency and investment security, even at the procurement stage.

### Resolution (mm) Range (m)

| Type in accordance with EN/IEC 61496 | Safety Integrity Level (SIL) in accordance with IEC 61508, SILCL in accordance with EN/IEC 62061 | Performance Level (PL) in accordance with EN ISO 13849-1 | W x D in mm | Resolution (mm)<br>Range (m) | Icons   |
|--------------------------------------|--|--|-------------|------------------------------|---|
| 4                                    | 3  | e  | 29 x 35     | 14<br>0-6                    |  |
| 2                                    | 1  | c  | 29 x 35     |                              |  |
| 4                                    | 3  | e  | 30 x 34     | 14<br>0.3-6                  |  |
| 2                                    | 2  | d  | 30 x 34     |                              |   |
| 4                                    | 3  | e  | 52 x 55     | 14<br>0-6                    |   |

MLC 500  
p. 84

MLC 300  
p. 100

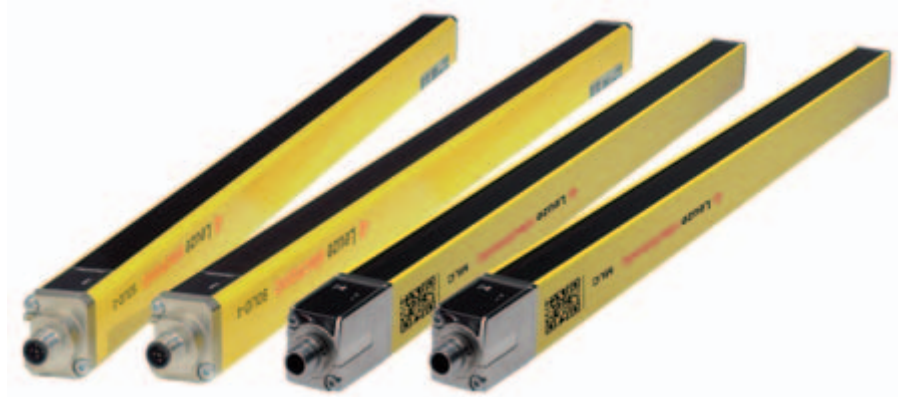
SOLID-4, SOLID-4E  
p. 108

SOLID-2, SOLID-2E  
p. 134

COMPACTplus  
p. 148

OVERVIEW

Overview of Safety Light Curtains



Safety Light Curtains are suitable according to their model for reliable point of operation, danger zone or access guarding

|  | Resolution (mm)<br>Range (m) |           |            |            |            | Features, type-dependent         |                 |                 |          |                    |        |               |                               |                             |  | Series | Page          |     |
|--|------------------------------|-----------|------------|------------|------------|----------------------------------|-----------------|-----------------|----------|--------------------|--------|---------------|-------------------------------|-----------------------------|--|--------|---------------|-----|
|  | 20<br>0-14                   | 30<br>0-9 | 40<br>0-20 | 50<br>0-18 | 90<br>0-20 | Transmission channel, selectable | RES, selectable | EDM, selectable | Blanking | Reduced resolution | Muting | Cascadability | Integr. AS-i Safety Interface | Integr. PROFIsafe Interface |  |        |               |     |
|  |                              |           |            |            |            | •                                | •               | •               | •        | •                  | •      |               |                               |                             |  |        | MLC 500       | 84  |
|  |                              |           |            |            |            | •                                | •               | •               | •        |                    |        |               |                               |                             |  |        | MLC 300       | 100 |
|  |                              |           |            |            |            |                                  | *               | *               |          |                    | **     |               |                               |                             |  |        | SOLID-4       | 113 |
|  |                              |           |            |            |            | •                                | •               | •               |          |                    | **     | •             |                               |                             |  |        | SOLID-4E      | 110 |
|  |                              |           |            |            |            | •                                | *               | *               |          |                    |        |               |                               |                             |  |        | SOLID-2       | 136 |
|  |                              |           |            |            |            | •                                | •               | •               |          |                    |        |               |                               |                             |  |        | SOLID-2E      | 136 |
|  |                              |           |            |            |            | •                                | •               | •               |          | •                  | •      | •             | •                             | •                           |  |        | COMPACTplus-m | 150 |
|  |                              |           |            |            |            | •                                | •               | •               | •        | •                  |        | •             | •                             | •                           |  |        | COMPACTplus-b | 168 |

\*) With MSI-SR4, p. 428  
 \*\*) With MSI 100/200, p. 482/488

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## SAFETY LIGHT CURTAINS

### MLC 500

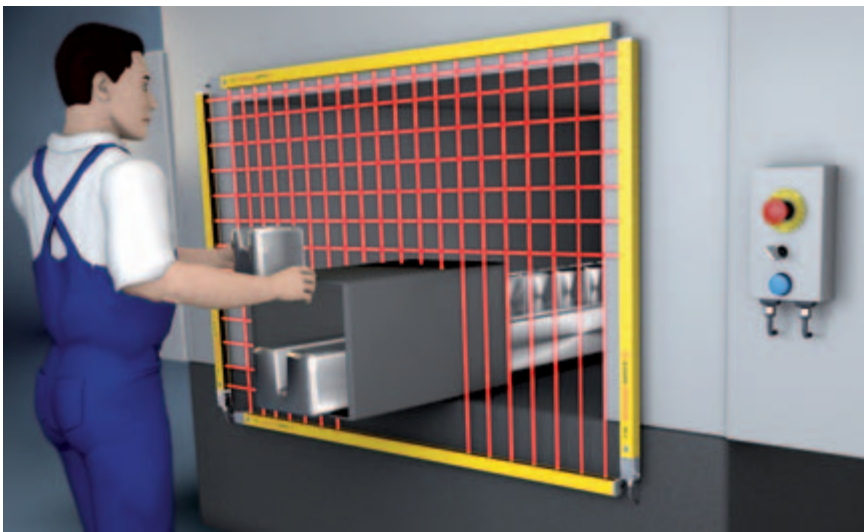


MLC 500 Safety Light Curtain for hand and finger protection

An increasing requirement for the Safety Light Curtains is to be deployable nearly anywhere and perform a wide variety of special tasks. For this reason, the MLC 500 series features various device models. These build upon the MLC 510 basic version with automatic start/restart and freely selectable transmission channels and offer users other important functions. For example, the MLC 520 Standard version features a start/restart interlock, contactor monitoring and a 7-segment display. Due to the option of selecting between 5 different operating modes, the MLC 530 extended version leaves almost no wish unfulfilled. This allows even complex application cases to be solved, which, for example, require sensor linkage, controllable blanking functions, reduced resolution or muting. The common timing controlled muting applications optional can also be realized partially (upper beam remains active) as an option.

#### Typical areas of application

- Point of operation guarding on presses, punching machines, insertion points
- Danger zone guarding in front of machines or on access points to production cells
- Access guarding of robot cells, palletizer systems with and without muting



Tool supply with guarding by MLC 500 Safety Light Curtains

**MLC 500**  
p. 84

MLC 300  
p. 100

SOLID-4, SOLID-4E  
p. 108

SOLID-2, SOLID-2E  
p. 134

COMPACTplus  
p. 148

**Important technical data, overview**

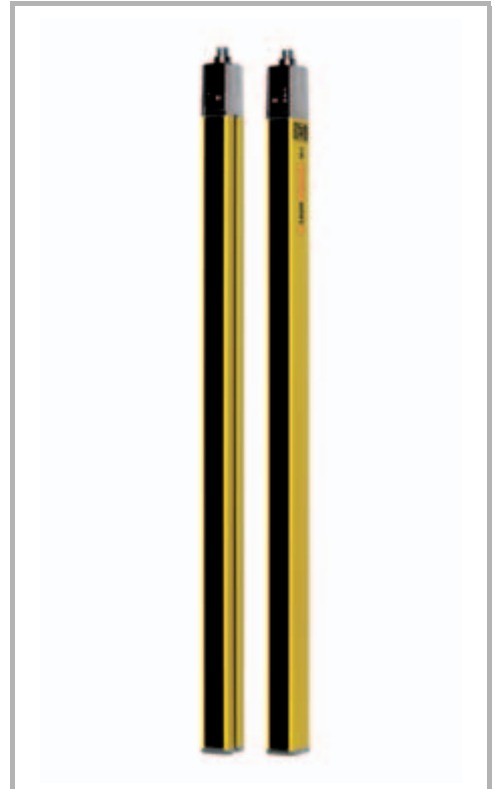
|  |                          |          |         |          |          |
|--|--------------------------|----------|---------|----------|----------|
| Type in accordance with EN/IEC 61496                                       | 4                        |          |         |          |          |
| SIL in accordance with IEC 61508 and SILCL in accordance with EN/IEC 62061 | 3                        |          |         |          |          |
| Performance Level (PL) in accordance with EN ISO 13849-1                   | e                        |          |         |          |          |
| Category in accordance with EN ISO 13849                                   | 4                        |          |         |          |          |
| Resolution   | 14 mm                    | 20 mm    | 30 mm   | 40 mm    | 90 mm    |
| Range  | 0...6 m                  | 0...14 m | 0...9 m | 0...20 m | 0...20 m |
| Protective field height (type-dependent)                                   | 150...3000 mm            |          |         |          |          |
| Profile cross-section  | 29 mm x 35 mm            |          |         |          |          |
| Safety-related switching outputs (OSSDs)                                   | 2 pnp transistor outputs |          |         |          |          |
| Connection system  | M12 plug                 |          |         |          |          |

**Functions**

|  | Transmitter | Receiver      |                  |                  |
|--|-------------|---------------|------------------|------------------|
|  | MLC 500     | Basic MLC 510 | Standard MLC 520 | Extended MLC 530 |
| Operating range adjustment                     | ●           |               |                  |                  |
| Automatic start/restart                        |             | ●             | ●                | ●                |
| Start/restart interlock (RES), selectable      |             |               | ●                | ●                |
| Dynamic contactor monitoring (EDM), selectable |             |               | ●                |                  |
| 2 transmission channels, selectable            | ●           | ●             | ●                | ●                |
| 7-segment display                              |             |               | ●                | ●                |
| Linkage  |             |               |                  | ●                |
| Blanking                                       |             |               |                  | ●                |
| Muting   |             |               |                  | ●                |

**Special features**

- **Configuration by wiring – automatic transfer by replacement device after device exchange**
- **Linkage with safety devices via contact or OSSD output saves effort in downstream evaluation circuit**
- **Versions with up to 3000 mm protective field height**
- **Range reduction and 2 optical beam codings (transmission channel) as well as multiple scanning and reduced resolution for operation which is immune to interference**
- **Integrated muting and blanking function can be activated during operation**



**Features**



**Further information**

**Page**

- Ordering information 86
- Electrical connection 92
- Technical data 94
- Dimensional drawings 95
- Dimensional drawings: Accessories 97
- Accessories ordering information 98

[www.leuze.com/en/mlc500/](http://www.leuze.com/en/mlc500/)



## SAFETY LIGHT CURTAINS

### Ordering information

**MLC 500**, consisting of transmitter and receiver  
Included in delivery: transmitter: BT-NC sliding blocks,  
receiver: 2 sliding blocks BT-NC, 1 set of connecting and  
operating instructions (PDF file on CD-ROM)

**Functions:** MLC 510: Basic function package, MLC 520:  
Standard function package, MLC 530: Extended function  
package, see page 85.

| Protective field height in mm | MLC 500   |                |             | Protective field height in mm | MLC 500   |                |             |
|-------------------------------|---|----------------|-------------|-------------------------------|---|----------------|-------------|
|                               | Part no.  | Article        | Description |                               | Part no.  | Article        | Description |
|                               | <b>Resolution: 14 mm</b><br><b>Range: 0...6 m</b> |                |             |                               | <b>Resolution: 14 mm</b><br><b>Range: 0...6 m</b> |                |             |
| 150                           | 68000101  | MLC500T14-150  | Transmitter | 1650                          | 68000116  | MLC500T14-1650 | Transmitter |
|                               | 68001101  | MLC510R14-150  | Receiver    |                               | 68001116  | MLC510R14-1650 | Receiver    |
|                               | 68002101  | MLC520R14-150  | Receiver    |                               | 68002116  | MLC520R14-1650 | Receiver    |
|                               | 68003101  | MLC530R14-150  | Receiver    |                               | 68003116  | MLC530R14-1650 | Receiver    |
| 300                           | 68000103  | MLC500T14-300  | Transmitter | 1800                          | 68000118  | MLC500T14-1800 | Transmitter |
|                               | 68001103  | MLC510R14-300  | Receiver    |                               | 68001118  | MLC510R14-1800 | Receiver    |
|                               | 68002103  | MLC520R14-300  | Receiver    |                               | 68002118  | MLC520R14-1800 | Receiver    |
|                               | 68003103  | MLC530R14-300  | Receiver    |                               | 68003118  | MLC530R14-1800 | Receiver    |
| 450                           | 68000104  | MLC500T14-450  | Transmitter | 1950                          | 68000119  | MLC500T14-1950 | Transmitter |
|                               | 68001104  | MLC510R14-450  | Receiver    |                               | 68001119  | MLC510R14-1950 | Receiver    |
|                               | 68002104  | MLC520R14-450  | Receiver    |                               | 68002119  | MLC520R14-1950 | Receiver    |
|                               | 68003104  | MLC530R14-450  | Receiver    |                               | 68003119  | MLC530R14-1950 | Receiver    |
| 600                           | 68000106  | MLC500T14-600  | Transmitter | 2100                          | 68000121  | MLC500T14-2100 | Transmitter |
|                               | 68001106  | MLC510R14-600  | Receiver    |                               | 68001121  | MLC510R14-2100 | Receiver    |
|                               | 68002106  | MLC520R14-600  | Receiver    |                               | 68002121  | MLC520R14-2100 | Receiver    |
|                               | 68003106  | MLC530R14-600  | Receiver    |                               | 68003121  | MLC530R14-2100 | Receiver    |
| 750                           | 68000107  | MLC500T14-750  | Transmitter | 2250                          | 68000122  | MLC500T14-2250 | Transmitter |
|                               | 68001107  | MLC510R14-750  | Receiver    |                               | 68001122  | MLC510R14-2250 | Receiver    |
|                               | 68002107  | MLC520R14-750  | Receiver    |                               | 68002122  | MLC520R14-2250 | Receiver    |
|                               | 68003107  | MLC530R14-750  | Receiver    |                               | 68003122  | MLC530R14-2250 | Receiver    |
| 900                           | 68000109  | MLC500T14-900  | Transmitter | 2400                          | 68000124  | MLC500T14-2400 | Transmitter |
|                               | 68001109  | MLC510R14-900  | Receiver    |                               | 68001124  | MLC510R14-2400 | Receiver    |
|                               | 68002109  | MLC520R14-900  | Receiver    |                               | 68002124  | MLC520R14-2400 | Receiver    |
|                               | 68003109  | MLC530R14-900  | Receiver    |                               | 68003124  | MLC530R14-2400 | Receiver    |
| 1050                          | 68000110  | MLC500T14-1050 | Transmitter | 2550                          | 68000125  | MLC500T14-2550 | Transmitter |
|                               | 68001110  | MLC510R14-1050 | Receiver    |                               | 68001125  | MLC510R14-2550 | Receiver    |
|                               | 68002110  | MLC520R14-1050 | Receiver    |                               | 68002125  | MLC520R14-2550 | Receiver    |
|                               | 68003110  | MLC530R14-1050 | Receiver    |                               | 68003125  | MLC530R14-2550 | Receiver    |
| 1200                          | 68000112  | MLC500T14-1200 | Transmitter | 2700                          | 68000127  | MLC500T14-2700 | Transmitter |
|                               | 68001112  | MLC510R14-1200 | Receiver    |                               | 68001127  | MLC510R14-2700 | Receiver    |
|                               | 68002112  | MLC520R14-1200 | Receiver    |                               | 68002127  | MLC520R14-2700 | Receiver    |
|                               | 68003112  | MLC530R14-1200 | Receiver    |                               | 68003127  | MLC530R14-2700 | Receiver    |
| 1350                          | 68000113  | MLC500T14-1350 | Transmitter | 2850                          | 68000128  | MLC500T14-2850 | Transmitter |
|                               | 68001113  | MLC510R14-1350 | Receiver    |                               | 68001128  | MLC510R14-2850 | Receiver    |
|                               | 68002113  | MLC520R14-1350 | Receiver    |                               | 68002128  | MLC520R14-2850 | Receiver    |
|                               | 68003113  | MLC530R14-1350 | Receiver    |                               | 68003128  | MLC530R14-2850 | Receiver    |
| 1500                          | 68000115  | MLC500T14-1500 | Transmitter | 3000                          | 68000130  | MLC500T14-3000 | Transmitter |
|                               | 68001115  | MLC510R14-1500 | Receiver    |                               | 68001130  | MLC510R14-3000 | Receiver    |
|                               | 68002115  | MLC520R14-1500 | Receiver    |                               | 68002130  | MLC520R14-3000 | Receiver    |
|                               | 68003115  | MLC530R14-1500 | Receiver    |                               | 68003130  | MLC530R14-3000 | Receiver    |

MLC 500  
p. 84

MLC 300  
p. 100

SOLID-4, SOLID-4E  
p. 108

SOLID-2, SOLID-2E  
p. 134

COMPACTplus  
p. 148

## Ordering information

**MLC 500**, consisting of transmitter and receiver  
 Included in delivery: transmitter: 2 BT-NC sliding blocks;  
 receiver: 2 sliding blocks BT-NC, 1 set of connecting and  
 operating instructions (PDF file on CD-ROM)

**Functions:** MLC 510: Basic function package, MLC 520:  
 Standard function package, MLC 530: Extended function  
 package, see page 85.

| Protective field height in mm | MLC 500  |                |             |
|-------------------------------|----------|----------------|-------------|
|                               | Part no. | Article        | Description |
| 150                           | 68000201 | MLC500T20-150  | Transmitter |
|                               | 68001201 | MLC510R20-150  | Receiver    |
|                               | 68002201 | MLC520R20-150  | Receiver    |
|                               | 68003201 | MLC530R20-150  | Receiver    |
| 225                           | 68000202 | MLC500T20-225  | Transmitter |
|                               | 68001202 | MLC510R20-225  | Receiver    |
|                               | 68002202 | MLC520R20-225  | Receiver    |
|                               | 68003202 | MLC530R20-225  | Receiver    |
| 300                           | 68000203 | MLC500T20-300  | Transmitter |
|                               | 68001203 | MLC510R20-300  | Receiver    |
|                               | 68002203 | MLC520R20-300  | Receiver    |
|                               | 68003203 | MLC530R20-300  | Receiver    |
| 450                           | 68000204 | MLC500T20-450  | Transmitter |
|                               | 68001204 | MLC510R20-450  | Receiver    |
|                               | 68002204 | MLC520R20-450  | Receiver    |
|                               | 68003204 | MLC530R20-450  | Receiver    |
| 600                           | 68000206 | MLC500T20-600  | Transmitter |
|                               | 68001206 | MLC510R20-600  | Receiver    |
|                               | 68002206 | MLC520R20-600  | Receiver    |
|                               | 68003206 | MLC530R20-600  | Receiver    |
| 750                           | 68000207 | MLC500T20-750  | Transmitter |
|                               | 68001207 | MLC510R20-750  | Receiver    |
|                               | 68002207 | MLC520R20-750  | Receiver    |
|                               | 68003207 | MLC530R20-750  | Receiver    |
| 900                           | 68000209 | MLC500T20-900  | Transmitter |
|                               | 68001209 | MLC510R20-900  | Receiver    |
|                               | 68002209 | MLC520R20-900  | Receiver    |
|                               | 68003209 | MLC530R20-900  | Receiver    |
| 1050                          | 68000210 | MLC500T20-1050 | Transmitter |
|                               | 68001210 | MLC510R20-1050 | Receiver    |
|                               | 68002210 | MLC520R20-1050 | Receiver    |
|                               | 68003210 | MLC530R20-1050 | Receiver    |
| 1200                          | 68000212 | MLC500T20-1200 | Transmitter |
|                               | 68001212 | MLC510R20-1200 | Receiver    |
|                               | 68002212 | MLC520R20-1200 | Receiver    |
|                               | 68003212 | MLC530R20-1200 | Receiver    |
| 1350                          | 68000213 | MLC500T20-1350 | Transmitter |
|                               | 68001213 | MLC510R20-1350 | Receiver    |
|                               | 68002213 | MLC520R20-1350 | Receiver    |
|                               | 68003213 | MLC530R20-1350 | Receiver    |
| 1500                          | 68000215 | MLC500T20-1500 | Transmitter |
|                               | 68001215 | MLC510R20-1500 | Receiver    |
|                               | 68002215 | MLC520R20-1500 | Receiver    |
|                               | 68003215 | MLC530R20-1500 | Receiver    |

| Protective field height in mm | MLC 500  |                |             |
|-------------------------------|----------|----------------|-------------|
|                               | Part no. | Article        | Description |
| 1650                          | 68000216 | MLC500T20-1650 | Transmitter |
|                               | 68001216 | MLC510R20-1650 | Receiver    |
|                               | 68002216 | MLC520R20-1650 | Receiver    |
|                               | 68003216 | MLC530R20-1650 | Receiver    |
| 1800                          | 68000218 | MLC500T20-1800 | Transmitter |
|                               | 68001218 | MLC510R20-1800 | Receiver    |
|                               | 68002218 | MLC520R20-1800 | Receiver    |
|                               | 68003218 | MLC530R20-1800 | Receiver    |
| 1950                          | 68000219 | MLC500T20-1950 | Transmitter |
|                               | 68001219 | MLC510R20-1950 | Receiver    |
|                               | 68002219 | MLC520R20-1950 | Receiver    |
|                               | 68003219 | MLC530R20-1950 | Receiver    |
| 2100                          | 68000221 | MLC500T20-2100 | Transmitter |
|                               | 68001221 | MLC510R20-2100 | Receiver    |
|                               | 68002221 | MLC520R20-2100 | Receiver    |
|                               | 68003221 | MLC530R20-2100 | Receiver    |
| 2250                          | 68000222 | MLC500T20-2250 | Transmitter |
|                               | 68001222 | MLC510R20-2250 | Receiver    |
|                               | 68002222 | MLC520R20-2250 | Receiver    |
|                               | 68003222 | MLC530R20-2250 | Receiver    |
| 2400                          | 68000224 | MLC500T20-2400 | Transmitter |
|                               | 68001224 | MLC510R20-2400 | Receiver    |
|                               | 68002224 | MLC520R20-2400 | Receiver    |
|                               | 68003224 | MLC530R20-2400 | Receiver    |
| 2550                          | 68000225 | MLC500T20-2550 | Transmitter |
|                               | 68001225 | MLC510R20-2550 | Receiver    |
|                               | 68002225 | MLC520R20-2550 | Receiver    |
|                               | 68003225 | MLC530R20-2550 | Receiver    |
| 2700                          | 68000227 | MLC500T20-2700 | Transmitter |
|                               | 68001227 | MLC510R20-2700 | Receiver    |
|                               | 68002227 | MLC520R20-2700 | Receiver    |
|                               | 68003227 | MLC530R20-2700 | Receiver    |
| 2850                          | 68000228 | MLC500T20-2850 | Transmitter |
|                               | 68001228 | MLC510R20-2850 | Receiver    |
|                               | 68002228 | MLC520R20-2850 | Receiver    |
|                               | 68003228 | MLC530R20-2850 | Receiver    |
| 3000                          | 68000230 | MLC500T20-3000 | Transmitter |
|                               | 68001230 | MLC510R20-3000 | Receiver    |
|                               | 68002230 | MLC520R20-3000 | Receiver    |
|                               | 68003230 | MLC530R20-3000 | Receiver    |

[www.leuze.com/en/mlc500/](http://www.leuze.com/en/mlc500/)

# SAFETY LIGHT CURTAINS

## Ordering information

**MLC 500**, consisting of transmitter and receiver  
 Included in delivery: transmitter: 2 BT-NC sliding blocks;  
 receiver: 2 sliding blocks BT-NC, 1 set of connecting and  
 operating instructions (PDF file on CD-ROM)

**Functions:** MLC 510: Basic function package, MLC 520:  
 Standard function package, MLC 530: Extended function  
 package, see page 85.

| Protective field height in mm | MLC 500  |                |             |
|-------------------------------|----------|----------------|-------------|
|                               | Part no. | Article        | Description |
| 150                           | 68000301 | MLC500T30-150  | Transmitter |
|                               | 68001301 | MLC510R30-150  | Receiver    |
|                               | 68002301 | MLC520R30-150  | Receiver    |
|                               | 68003301 | MLC530R30-150  | Receiver    |
| 225                           | 68000302 | MLC500T30-225  | Transmitter |
|                               | 68001302 | MLC510R30-225  | Receiver    |
|                               | 68002302 | MLC520R30-225  | Receiver    |
|                               | 68003302 | MLC530R30-225  | Receiver    |
| 300                           | 68000303 | MLC500T30-300  | Transmitter |
|                               | 68001303 | MLC510R30-300  | Receiver    |
|                               | 68002303 | MLC520R30-300  | Receiver    |
|                               | 68003303 | MLC530R30-300  | Receiver    |
| 450                           | 68000304 | MLC500T30-450  | Transmitter |
|                               | 68001304 | MLC510R30-450  | Receiver    |
|                               | 68002304 | MLC520R30-450  | Receiver    |
|                               | 68003304 | MLC530R30-450  | Receiver    |
| 600                           | 68000306 | MLC500T30-600  | Transmitter |
|                               | 68001306 | MLC510R30-600  | Receiver    |
|                               | 68002306 | MLC520R30-600  | Receiver    |
|                               | 68003306 | MLC530R30-600  | Receiver    |
| 750                           | 68000307 | MLC500T30-750  | Transmitter |
|                               | 68001307 | MLC510R30-750  | Receiver    |
|                               | 68002307 | MLC520R30-750  | Receiver    |
|                               | 68003307 | MLC530R30-750  | Receiver    |
| 900                           | 68000309 | MLC500T30-900  | Transmitter |
|                               | 68001309 | MLC510R30-900  | Receiver    |
|                               | 68002309 | MLC520R30-900  | Receiver    |
|                               | 68003309 | MLC530R30-900  | Receiver    |
| 1050                          | 68000310 | MLC500T30-1050 | Transmitter |
|                               | 68001310 | MLC510R30-1050 | Receiver    |
|                               | 68002310 | MLC520R30-1050 | Receiver    |
|                               | 68003310 | MLC530R30-1050 | Receiver    |
| 1200                          | 68000312 | MLC500T30-1200 | Transmitter |
|                               | 68001312 | MLC510R30-1200 | Receiver    |
|                               | 68002312 | MLC520R30-1200 | Receiver    |
|                               | 68003312 | MLC530R30-1200 | Receiver    |
| 1350                          | 68000313 | MLC500T30-1350 | Transmitter |
|                               | 68001313 | MLC510R30-1350 | Receiver    |
|                               | 68002313 | MLC520R30-1350 | Receiver    |
|                               | 68003313 | MLC530R30-1350 | Receiver    |
| 1500                          | 68000315 | MLC500T30-1500 | Transmitter |
|                               | 68001315 | MLC510R30-1500 | Receiver    |
|                               | 68002315 | MLC520R30-1500 | Receiver    |
|                               | 68003315 | MLC530R30-1500 | Receiver    |

| Protective field height in mm | MLC 500  |                |             |
|-------------------------------|----------|----------------|-------------|
|                               | Part no. | Article        | Description |
| 1650                          | 68000316 | MLC500T30-1650 | Transmitter |
|                               | 68001316 | MLC510R30-1650 | Receiver    |
|                               | 68002316 | MLC520R30-1650 | Receiver    |
|                               | 68003316 | MLC530R30-1650 | Receiver    |
| 1800                          | 68000318 | MLC500T30-1800 | Transmitter |
|                               | 68001318 | MLC510R30-1800 | Receiver    |
|                               | 68002318 | MLC520R30-1800 | Receiver    |
|                               | 68003318 | MLC530R30-1800 | Receiver    |
| 1950                          | 68000319 | MLC500T30-1950 | Transmitter |
|                               | 68001319 | MLC510R30-1950 | Receiver    |
|                               | 68002319 | MLC520R30-1950 | Receiver    |
|                               | 68003319 | MLC530R30-1950 | Receiver    |
| 2100                          | 68000321 | MLC500T30-2100 | Transmitter |
|                               | 68001321 | MLC510R30-2100 | Receiver    |
|                               | 68002321 | MLC520R30-2100 | Receiver    |
|                               | 68003321 | MLC530R30-2100 | Receiver    |
| 2250                          | 68000322 | MLC500T30-2250 | Transmitter |
|                               | 68001322 | MLC510R30-2250 | Receiver    |
|                               | 68002322 | MLC520R30-2250 | Receiver    |
|                               | 68003322 | MLC530R30-2250 | Receiver    |
| 2400                          | 68000324 | MLC500T30-2400 | Transmitter |
|                               | 68001324 | MLC510R30-2400 | Receiver    |
|                               | 68002324 | MLC520R30-2400 | Receiver    |
|                               | 68003324 | MLC530R30-2400 | Receiver    |
| 2550                          | 68000325 | MLC500T30-2550 | Transmitter |
|                               | 68001325 | MLC510R30-2550 | Receiver    |
|                               | 68002325 | MLC520R30-2550 | Receiver    |
|                               | 68003325 | MLC530R30-2550 | Receiver    |
| 2700                          | 68000327 | MLC500T30-2700 | Transmitter |
|                               | 68001327 | MLC510R30-2700 | Receiver    |
|                               | 68002327 | MLC520R30-2700 | Receiver    |
|                               | 68003327 | MLC530R30-2700 | Receiver    |
| 2850                          | 68000328 | MLC500T30-2850 | Transmitter |
|                               | 68001328 | MLC510R30-2850 | Receiver    |
|                               | 68002328 | MLC520R30-2850 | Receiver    |
|                               | 68003328 | MLC530R30-2850 | Receiver    |
| 3000                          | 68000330 | MLC500T30-3000 | Transmitter |
|                               | 68001330 | MLC510R30-3000 | Receiver    |
|                               | 68002330 | MLC520R30-3000 | Receiver    |
|                               | 68003330 | MLC530R30-3000 | Receiver    |

**MLC 500**  
p. 84

MLC 300  
p. 100

SOLID-4, SOLID-4E  
p. 108

SOLID-2, SOLID-2E  
p. 134

COMPACTplus  
p. 148

## Ordering information

**MLC 500**, consisting of transmitter and receiver  
 Included in delivery: transmitter: 2 BT-NC sliding blocks;  
 receiver: 2 sliding blocks BT-NC, 1 set of connecting and  
 operating instructions (PDF file on CD-ROM)

**Functions:** MLC 510: Basic function package, MLC 520:  
 Standard function package, MLC 530: Extended function  
 package, see page 85.

| Protective field height in mm | MLC 500  |                |             |
|-------------------------------|----------|----------------|-------------|
|                               | Part no. | Article        | Description |
| 150                           | 68000401 | MLC500T40-150  | Transmitter |
|                               | 68001401 | MLC510R40-150  | Receiver    |
|                               | 68002401 | MLC520R40-150  | Receiver    |
|                               | 68003401 | MLC530R40-150  | Receiver    |
| 225                           | 68000402 | MLC500T40-225  | Transmitter |
|                               | 68001402 | MLC510R40-225  | Receiver    |
|                               | 68002402 | MLC520R40-225  | Receiver    |
|                               | 68003402 | MLC530R40-225  | Receiver    |
| 300                           | 68000403 | MLC500T40-300  | Transmitter |
|                               | 68001403 | MLC510R40-300  | Receiver    |
|                               | 68002403 | MLC520R40-300  | Receiver    |
|                               | 68003403 | MLC530R40-300  | Receiver    |
| 450                           | 68000404 | MLC500T40-450  | Transmitter |
|                               | 68001404 | MLC510R40-450  | Receiver    |
|                               | 68002404 | MLC520R40-450  | Receiver    |
|                               | 68003404 | MLC530R40-450  | Receiver    |
| 600                           | 68000406 | MLC500T40-600  | Transmitter |
|                               | 68001406 | MLC510R40-600  | Receiver    |
|                               | 68002406 | MLC520R40-600  | Receiver    |
|                               | 68003406 | MLC530R40-600  | Receiver    |
| 750                           | 68000407 | MLC500T40-750  | Transmitter |
|                               | 68001407 | MLC510R40-750  | Receiver    |
|                               | 68002407 | MLC520R40-750  | Receiver    |
|                               | 68003407 | MLC530R40-750  | Receiver    |
| 900                           | 68000409 | MLC500T40-900  | Transmitter |
|                               | 68001409 | MLC510R40-900  | Receiver    |
|                               | 68002409 | MLC520R40-900  | Receiver    |
|                               | 68003409 | MLC530R40-900  | Receiver    |
| 1050                          | 68000410 | MLC500T40-1050 | Transmitter |
|                               | 68001410 | MLC510R40-1050 | Receiver    |
|                               | 68002410 | MLC520R40-1050 | Receiver    |
|                               | 68003410 | MLC530R40-1050 | Receiver    |
| 1200                          | 68000412 | MLC500T40-1200 | Transmitter |
|                               | 68001412 | MLC510R40-1200 | Receiver    |
|                               | 68002412 | MLC520R40-1200 | Receiver    |
|                               | 68003412 | MLC530R40-1200 | Receiver    |
| 1350                          | 68000413 | MLC500T40-1350 | Transmitter |
|                               | 68001413 | MLC510R40-1350 | Receiver    |
|                               | 68002413 | MLC520R40-1350 | Receiver    |
|                               | 68003413 | MLC530R40-1350 | Receiver    |
| 1500                          | 68000415 | MLC500T40-1500 | Transmitter |
|                               | 68001415 | MLC510R40-1500 | Receiver    |
|                               | 68002415 | MLC520R40-1500 | Receiver    |
|                               | 68003415 | MLC530R40-1500 | Receiver    |

| Protective field height in mm | MLC 500  |                |             |
|-------------------------------|----------|----------------|-------------|
|                               | Part no. | Article        | Description |
| 1650                          | 68000416 | MLC500T40-1650 | Transmitter |
|                               | 68001416 | MLC510R40-1650 | Receiver    |
|                               | 68002416 | MLC520R40-1650 | Receiver    |
|                               | 68003416 | MLC530R40-1650 | Receiver    |
| 1800                          | 68000418 | MLC500T40-1800 | Transmitter |
|                               | 68001418 | MLC510R40-1800 | Receiver    |
|                               | 68002418 | MLC520R40-1800 | Receiver    |
|                               | 68003418 | MLC530R40-1800 | Receiver    |
| 1950                          | 68000419 | MLC500T40-1950 | Transmitter |
|                               | 68001419 | MLC510R40-1950 | Receiver    |
|                               | 68002419 | MLC520R40-1950 | Receiver    |
|                               | 68003419 | MLC530R40-1950 | Receiver    |
| 2100                          | 68000421 | MLC500T40-2100 | Transmitter |
|                               | 68001421 | MLC510R40-2100 | Receiver    |
|                               | 68002421 | MLC520R40-2100 | Receiver    |
|                               | 68003421 | MLC530R40-2100 | Receiver    |
| 2250                          | 68000422 | MLC500T40-2250 | Transmitter |
|                               | 68001422 | MLC510R40-2250 | Receiver    |
|                               | 68002422 | MLC520R40-2250 | Receiver    |
|                               | 68003422 | MLC530R40-2250 | Receiver    |
| 2400                          | 68000424 | MLC500T40-2400 | Transmitter |
|                               | 68001424 | MLC510R40-2400 | Receiver    |
|                               | 68002424 | MLC520R40-2400 | Receiver    |
|                               | 68003424 | MLC530R40-2400 | Receiver    |
| 2550                          | 68000425 | MLC500T40-2550 | Transmitter |
|                               | 68001425 | MLC510R40-2550 | Receiver    |
|                               | 68002425 | MLC520R40-2550 | Receiver    |
|                               | 68003425 | MLC530R40-2550 | Receiver    |
| 2700                          | 68000427 | MLC500T40-2700 | Transmitter |
|                               | 68001427 | MLC510R40-2700 | Receiver    |
|                               | 68002427 | MLC520R40-2700 | Receiver    |
|                               | 68003427 | MLC530R40-2700 | Receiver    |
| 2850                          | 68000428 | MLC500T40-2850 | Transmitter |
|                               | 68001428 | MLC510R40-2850 | Receiver    |
|                               | 68002428 | MLC520R40-2850 | Receiver    |
|                               | 68003428 | MLC530R40-2850 | Receiver    |
| 3000                          | 68000430 | MLC500T40-3000 | Transmitter |
|                               | 68001430 | MLC510R40-3000 | Receiver    |
|                               | 68002430 | MLC520R40-3000 | Receiver    |
|                               | 68003430 | MLC530R40-3000 | Receiver    |

[www.leuze.com/en/mlc500/](http://www.leuze.com/en/mlc500/)



## SAFETY LIGHT CURTAINS

### Ordering information

**MLC 500**, consisting of transmitter and receiver  
 Included in delivery: transmitter: 2 BT-NC sliding blocks;  
 receiver: 2 sliding blocks BT-NC, 1 set of connecting and  
 operating instructions (PDF file on CD-ROM)

**Functions:** MLC 510: Basic function package, MLC 520:  
 Standard function package, MLC 530: Extended function  
 package, see page 85.

| Protective field height in mm | MLC 500  |                |             | Protective field height in mm | MLC 500  |                |             |
|-------------------------------|--|----------------|-------------|-------------------------------|--|----------------|-------------|
|                               | Part no.   | Article        | Description |                               | Part no.   | Article        | Description |
|                               | <b>Resolution: 90 mm</b><br><b>Range: 0...20 m</b> |                |             |                               | <b>Resolution: 90 mm</b><br><b>Range: 0...20 m</b> |                |             |
| 450                           | 68000904   | MLC500T90-450  | Transmitter | 1800                          | 68000918   | MLC500T90-1800 | Transmitter |
|                               | 68001904   | MLC510R90-450  | Receiver    |                               | 68001918   | MLC510R90-1800 | Receiver    |
|                               | 68002904   | MLC520R90-450  | Receiver    |                               | 68002918   | MLC520R90-1800 | Receiver    |
|                               | 68003904   | MLC530R90-450  | Receiver    |                               | 68003918   | MLC530R90-1800 | Receiver    |
| 600                           | 68000906   | MLC500T90-600  | Transmitter | 1950                          | 68000919   | MLC500T90-1950 | Transmitter |
|                               | 68001906   | MLC510R90-600  | Receiver    |                               | 68001919   | MLC510R90-1950 | Receiver    |
|                               | 68002906   | MLC520R90-600  | Receiver    |                               | 68002919   | MLC520R90-1950 | Receiver    |
|                               | 68003906   | MLC530R90-600  | Receiver    |                               | 68003919   | MLC530R90-1950 | Receiver    |
| 750                           | 68000907   | MLC500T90-750  | Transmitter | 2100                          | 68000921   | MLC500T90-2100 | Transmitter |
|                               | 68001907   | MLC510R90-750  | Receiver    |                               | 68001921   | MLC510R90-2100 | Receiver    |
|                               | 68002907   | MLC520R90-750  | Receiver    |                               | 68002921   | MLC520R90-2100 | Receiver    |
|                               | 68003907   | MLC530R90-750  | Receiver    |                               | 68003921   | MLC530R90-2100 | Receiver    |
| 900                           | 68000909   | MLC500T90-900  | Transmitter | 2250                          | 68000922   | MLC500T90-2250 | Transmitter |
|                               | 68001909   | MLC510R90-900  | Receiver    |                               | 68001922   | MLC510R90-2250 | Receiver    |
|                               | 68002909   | MLC520R90-900  | Receiver    |                               | 68002922   | MLC520R90-2250 | Receiver    |
|                               | 68003909   | MLC530R90-900  | Receiver    |                               | 68003922   | MLC530R90-2250 | Receiver    |
| 1050                          | 68000910   | MLC500T90-1050 | Transmitter | 2400                          | 68000924   | MLC500T90-2400 | Transmitter |
|                               | 68001910   | MLC510R90-1050 | Receiver    |                               | 68001924   | MLC510R90-2400 | Receiver    |
|                               | 68002910   | MLC520R90-1050 | Receiver    |                               | 68002924   | MLC520R90-2400 | Receiver    |
|                               | 68003910   | MLC530R90-1050 | Receiver    |                               | 68003924   | MLC530R90-2400 | Receiver    |
| 1200                          | 68000912   | MLC500T90-1200 | Transmitter | 2550                          | 68000925   | MLC500T90-2550 | Transmitter |
|                               | 68001912   | MLC510R90-1200 | Receiver    |                               | 68001925   | MLC510R90-2550 | Receiver    |
|                               | 68002912   | MLC520R90-1200 | Receiver    |                               | 68002925   | MLC520R90-2550 | Receiver    |
|                               | 68003912   | MLC530R90-1200 | Receiver    |                               | 68003925   | MLC530R90-2550 | Receiver    |
| 1350                          | 68000913   | MLC500T90-1350 | Transmitter | 2700                          | 68000927   | MLC500T90-2700 | Transmitter |
|                               | 68001913   | MLC510R90-1350 | Receiver    |                               | 68001927   | MLC510R90-2700 | Receiver    |
|                               | 68002913   | MLC520R90-1350 | Receiver    |                               | 68002927   | MLC520R90-2700 | Receiver    |
|                               | 68003913   | MLC530R90-1350 | Receiver    |                               | 68003927   | MLC530R90-2700 | Receiver    |
| 1500                          | 68000915   | MLC500T90-1500 | Transmitter | 2850                          | 68000928   | MLC500T90-2850 | Transmitter |
|                               | 68001915   | MLC510R90-1500 | Receiver    |                               | 68001928   | MLC510R90-2850 | Receiver    |
|                               | 68002915   | MLC520R90-1500 | Receiver    |                               | 68002928   | MLC520R90-2850 | Receiver    |
|                               | 68003915   | MLC530R90-1500 | Receiver    |                               | 68003928   | MLC530R90-2850 | Receiver    |
| 1650                          | 68000916   | MLC500T90-1650 | Transmitter | 3000                          | 68000930   | MLC500T90-3000 | Transmitter |
|                               | 68001916   | MLC510R90-1650 | Receiver    |                               | 68001930   | MLC510R90-3000 | Receiver    |
|                               | 68002916   | MLC520R90-1650 | Receiver    |                               | 68002930   | MLC520R90-3000 | Receiver    |
|                               | 68003916   | MLC530R90-1650 | Receiver    |                               | 68003930   | MLC530R90-3000 | Receiver    |

Part number code for MLC 500, MLC 300

Machine Safety Services

Safety Light Curtains of the MLC 500 and MLC 300 series

Safety Engineering Software

Safety Laser Scanners

Safety Light Curtains

Multiple Light Beam Safety Devices

Light Beam Safety Device Sets

Single Light Beam Safety Devices

AS-Interface Safety at Work

Safety Proximity Sensors

| Article     | Description                            |
|-------------|--|
| <b>MLC</b>  | <b>Safety Light Curtain</b>            |
| <b>X</b>    | <b>Series</b>                          |
| 3           | MLC 300                                |
| 5           | MLC 500                                |
| <b>yy</b>   | <b>Function</b>                        |
| 00          | Transmitter                            |
| 10          | Automatic restart                      |
| 20          | EDM/RES selectable                     |
| 30          | Muting/Blanking/Linkage (only MLC 530) |
| <b>z</b>    | <b>Device type</b>                     |
| T           | Transmitter                            |
| R           | Receiver                               |
| <b>a</b>    | <b>Resolution</b>                      |
| 14          | 14 mm / range 0 - 6 m (only MLC 500)   |
| 20          | 20 mm / range 0 - 14 m                 |
| 30          | 30 mm / range 0 - 9 m                  |
| 40          | 40 mm / range 0 - 20 m                 |
| 90          | 90 mm / range 0 - 20 m                 |
| <b>hhhh</b> | <b>Protective field height</b>         |
|             | 150...3000 mm                          |

**MLC X yy z a- hhhh**

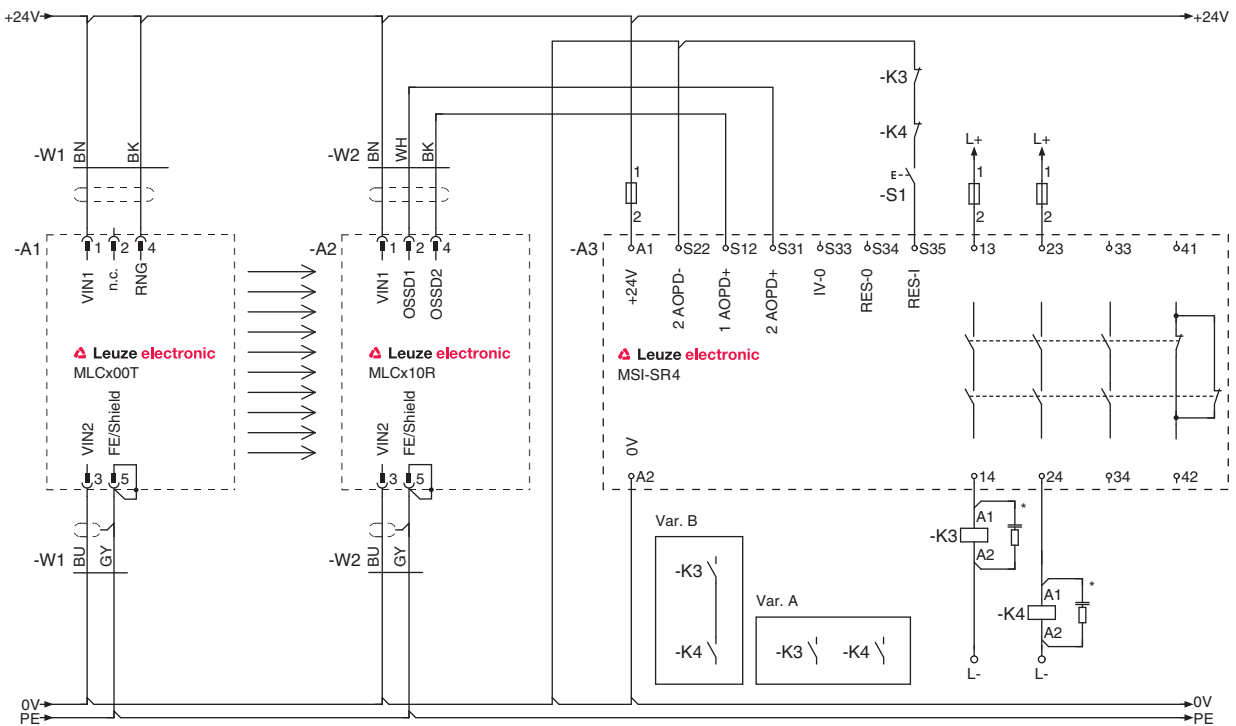
[www.leuze.com/en/mlc500/](http://www.leuze.com/en/mlc500/)



# SAFETY LIGHT CURTAINS

## Electrical connection

### MLC 500 connection example



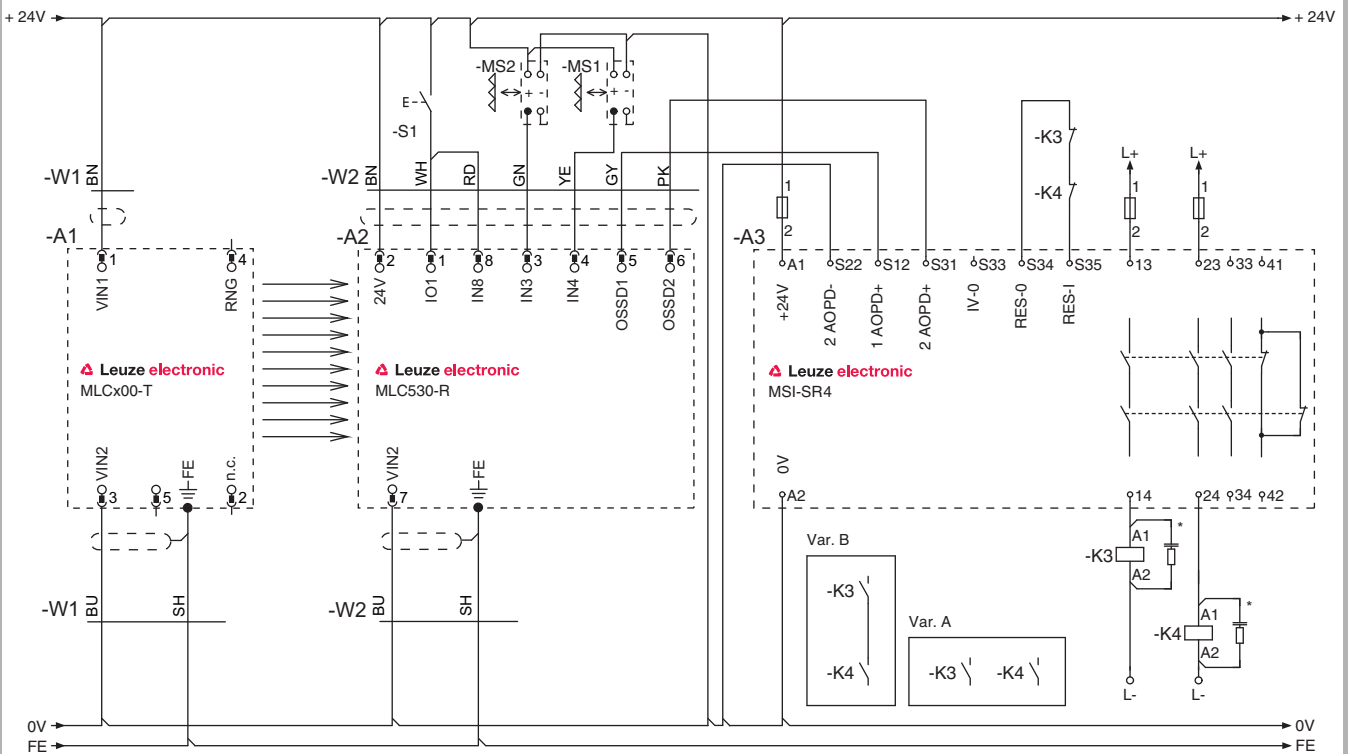
\*) Spark extinction circuit, supply suitable spark extinction

### MLC 510 with MSI-SR4 Safety Relay

Please observe the operating instructions of the components!

Electrical connection

MLC 500 connection example



\*) Spark extinction circuit, supply suitable spark extinction

MLC 530 with MSI-SR4 Safety Relay

Please observe the operating instructions of the components!

## SAFETY LIGHT CURTAINS

### Technical data

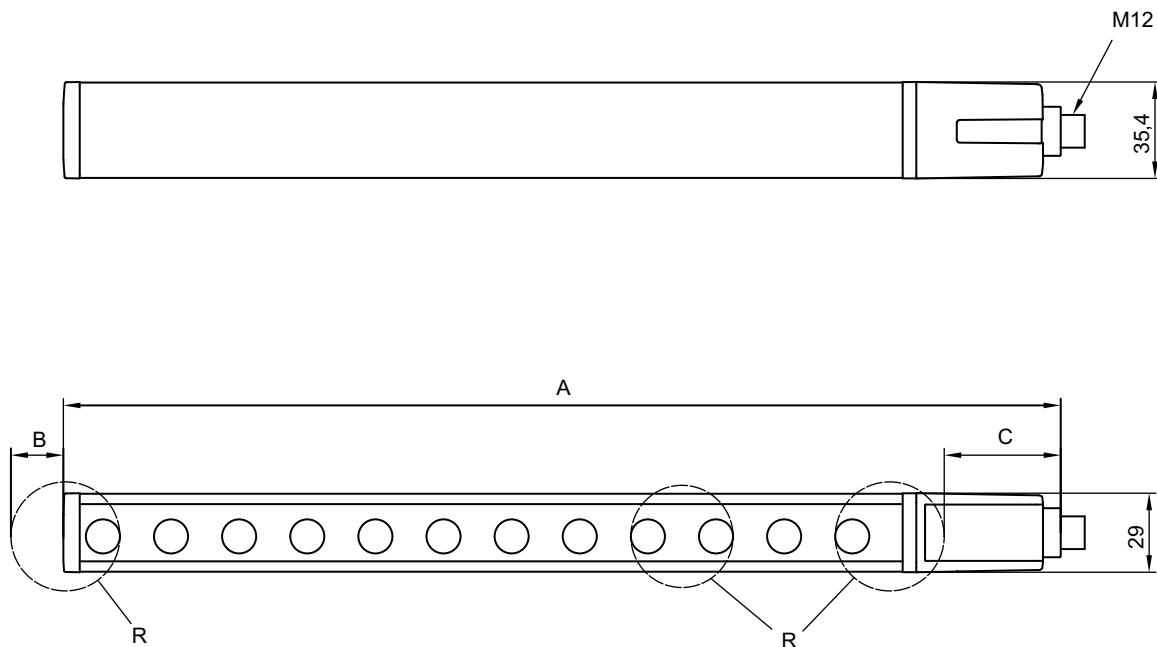
| General system data  |  |           |           |           |               |
|--|--|-----------|-----------|-----------|---------------|
| Type in accordance with EN/IEC 61496                                       | 4  |           |           |           |               |
| SIL in accordance with IEC 61508 or SILCL in accordance with EN/IEC 62061  | 3  |           |           |           |               |
| Performance Level (PL) in accordance with EN ISO 13849-1                   | e  |           |           |           |               |
| Probability of a failure to danger per hour (PFH <sub>d</sub> )            | 7.73 x 10 <sup>-9</sup>  |           |           |           |               |
| Service life (T <sub>M</sub> ) in accordance with EN ISO 13849-1           | 20 years   |           |           |           |               |
| Category in accordance with EN ISO 13849                                   | 4  |           |           |           |               |
| Resolution   | 14 mm  | 20 mm     | 30 mm     | 40 mm     | 90 mm         |
| Range  | 0...6 m  | 0...14 m  | 0...9 m   | 0...20 m  | 0...20 m      |
| Response time (depends on protective field height)                         | 5...64 ms  | 4...51 ms | 3...26 ms | 3...26 ms | 3...10 ms     |
| Protective field height  | 150...3000 mm  |           |           |           | 450...3000 mm |
| Synchronization  | Optical via transmitter and receiver   |           |           |           |               |
| Supply voltage   | 24 V DC, ±20%, compensation necessary for 20 ms voltage dip, min. 250 mA (+ OSSD - load) |           |           |           |               |
| Residual ripple of the supply voltage                                      | ±5% within the boundaries of U <sub>v</sub>  |           |           |           |               |
| Common value for ext. fuse in the supply line for transmitter and receiver | 2 A semi time-lag  |           |           |           |               |
| Connection cable length  | Max. 100 m with 0.25 mm <sup>2</sup>   |           |           |           |               |
| Safety class   | III  |           |           |           |               |
| Protection rating  | IP 65  |           |           |           |               |
| Ambient temperature, operation   | 0...55°C   |           |           |           |               |
| Ambient temperature, storage   | -25...70°C   |           |           |           |               |
| Relative humidity  | 0...95%  |           |           |           |               |
| Profile cross-section  | 29 mm x 35 mm  |           |           |           |               |
| Weight per device (length-dependent)                                       | 0.30...3.20 kg   |           |           |           |               |
| Transmitter  |  |           |           |           |               |
| Transmitter diodes, class in accordance with EN 60825                      | 1  |           |           |           |               |
| Wavelength   | 850 nm   |           |           |           |               |
| Current consumption  | 70 mA  |           |           |           |               |
| Connection system  | M12 plug, 5-pin  |           |           |           |               |

**Technical data**

| Receiver                                 |  |
|--|--|
| Current consumption                      | 150 mA without external load   |
| Safety-related switching outputs (OSSDs) | 2 safety-related pnp transistor outputs (short circuit-proof, cross-circuit monitored) |
| Connection system                        | M-12 plug, 5-pin/8-pin   |
| Switching voltage high active            | Min. $U_v - 1.5 V$   |
| Switching voltage low                    | Max. $+2.5 V$  |
| Switching current                        | Max. 250 mA  |

Please note the additional information in the MLC connecting and operating instructions at [www.leuze.com/en/mlc500/](http://www.leuze.com/en/mlc500/).

**Dimensional drawings**



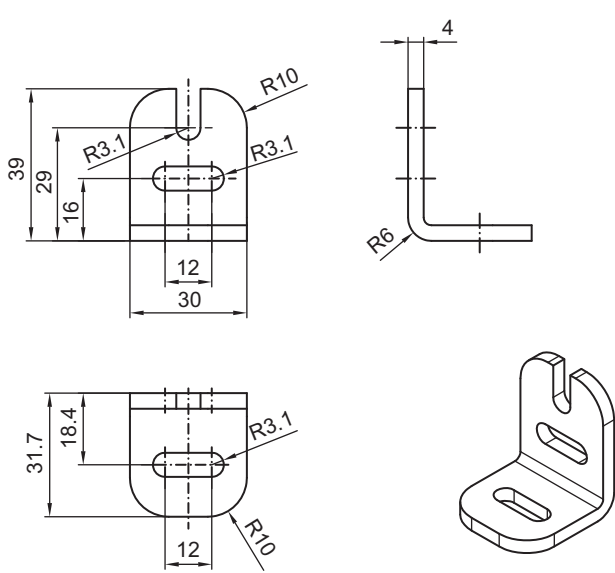
- A = Protective field height acc. to ordering information + 66.0 mm
- R = Resolution
- B, C = Additional dimensions for determining the effective protective field height acc. to connecting and operating instructions at [www.leuze.com/en/mlc500/](http://www.leuze.com/en/mlc500/)

MLC 500 Safety Light Curtain dimensional drawing

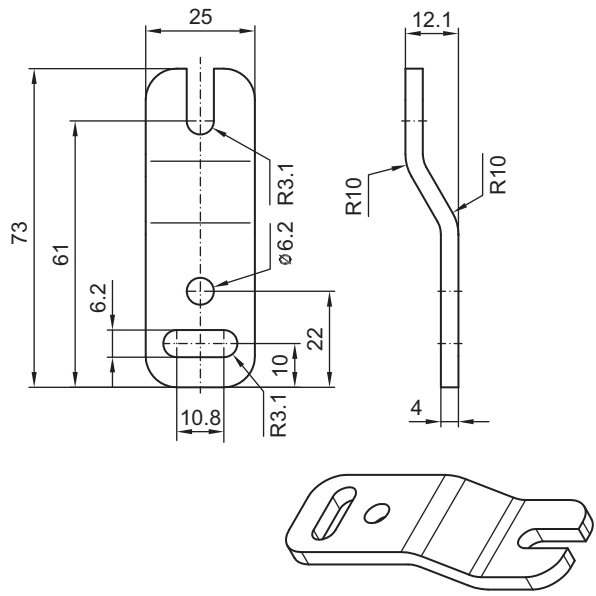
# SAFETY LIGHT CURTAINS

## Dimensional drawings: Accessories

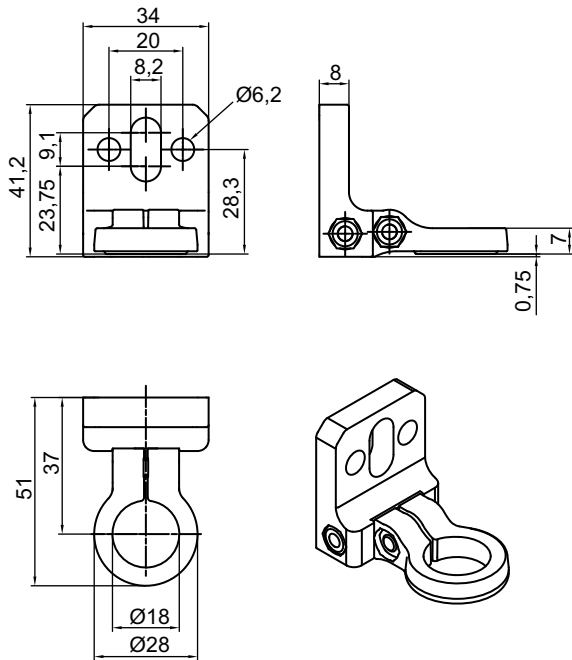
### Mounting brackets



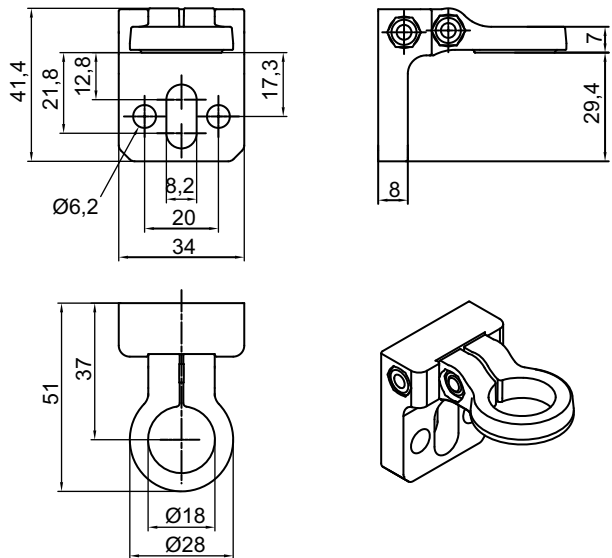
BT-L mounting bracket



BT-Z parallel bracket



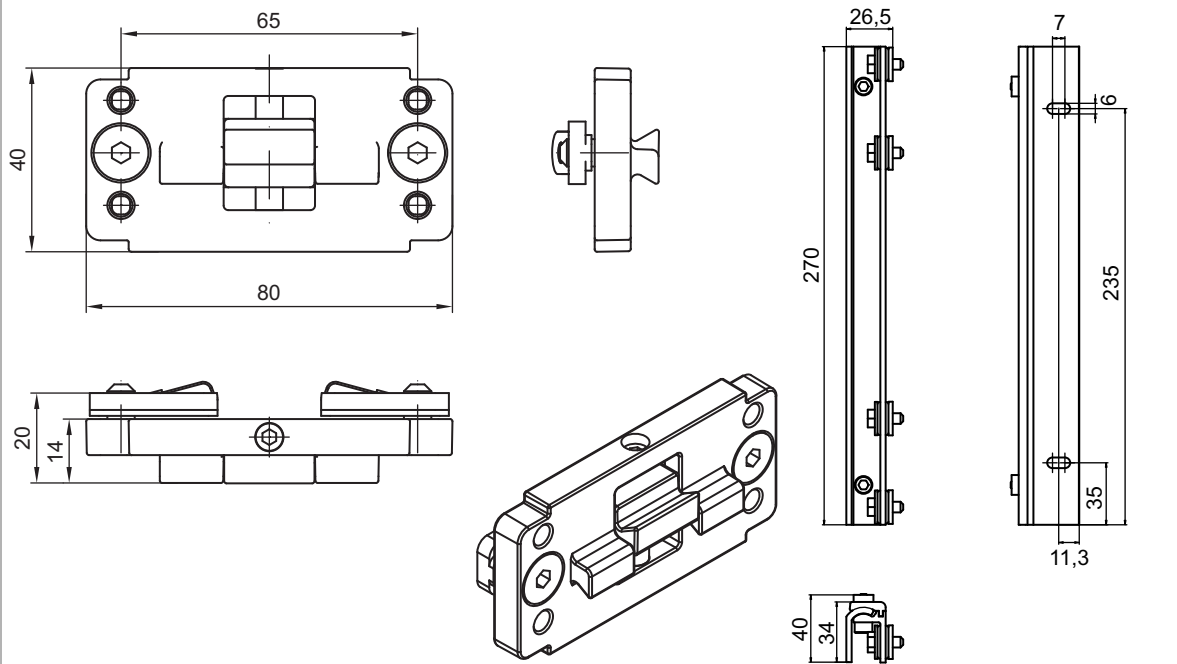
BT-R swivel mount



Dimensions in mm

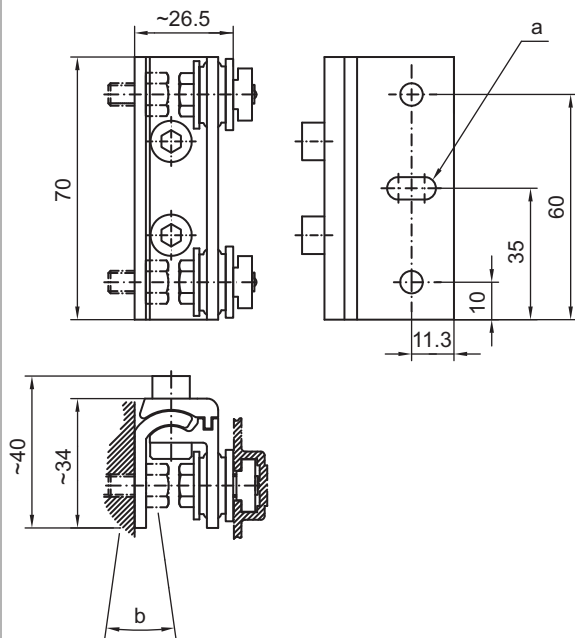
**Dimensional drawings: Accessories**

**Mounting brackets**



**BT-P40 clamp bracket**

**BT-SSD swiveling mounting bracket**



**BT-SSD-270 swiveling mounting bracket**

Dimensions in mm

[www.leuze.com/en/mlc500/](http://www.leuze.com/en/mlc500/)



## SAFETY LIGHT CURTAINS

### Accessories ordering information

| Part no.  | Article           | Description   | Length, design, number        |
|---|-------------------|---|-------------------------------|
| <b>Connection cables for MLC 500 transmitter and MLC 510 receiver</b> |                   |   |                               |
| 678055  | CB-M12-5000E-5GF  | Connection cable, shielded PUR, 5-pin                         | 5 m                           |
| 678056  | CB-M12-10000E-5GF | Connection cable, shielded PUR, 5-pin                         | 10 m                          |
| 678057  | CB-M12-15000E-5GF | Connection cable, shielded PUR, 5-pin                         | 15 m                          |
| 678058  | CB-M12-25000E-5GF | Connection cable, shielded PUR, 5-pin                         | 25 m                          |
| <b>Connection cables for MLC 520, MLC 530 receiver</b>                |                   |   |                               |
| 678060  | CB-M12-5000E-8GF  | Connection cable, shielded PUR, 8-pin                         | 5 m                           |
| 678061  | CB-M12-10000E-8GF | Connection cable, shielded PUR, 8-pin                         | 10 m                          |
| 678062  | CB-M12-15000E-8GF | Connection cable, shielded PUR, 8-pin                         | 15 m                          |
| 678063  | CB-M12-25000E-8GF | Connection cable, shielded PUR, 8-pin                         | 25 m                          |
| <b>Mounting technology</b>  |                   |   |                               |
| 429056  | BT-2L             | L-mounting bracket  | 2 pieces                      |
| 429057  | BT-2Z             | Z-mounting bracket  | 2 pieces                      |
| 429046  | BT-2R1            | 360° swivel mount   | 2 pieces incl. 1 MLC cylinder |
| 424417  | BT-2P40           | Clamp bracket for groove mounting                             | 2 pieces                      |
| 429058  | BT-2SSD           | Swivel mount with shock absorber, $\pm 8^\circ$ , 70 mm long  | 2 pieces                      |
| 429059  | BT-4SSD           |   | 4 pieces                      |
| 429049  | BT-2SSD-270       | Swivel mount with shock absorber, $\pm 8^\circ$ , 270 mm long | 2 pieces                      |
| 425740  | BT-10NC60         | Sliding block with M6 thread                                  | 10 pieces                     |
| 425741  | BT-10NC64         | Sliding block with M6 and M4 thread                           | 10 pieces                     |
| 425742  | BT-10NC65         | Sliding block with M6 and M5 thread                           | 10 pieces                     |
| <b>Test rods</b>  |                   |   |                               |
| 349945  | AC-TR14/30        | Test rod  | 14/30 mm                      |
| 349939  | AC-TR20/40        | Test rod  | 20/40 mm                      |

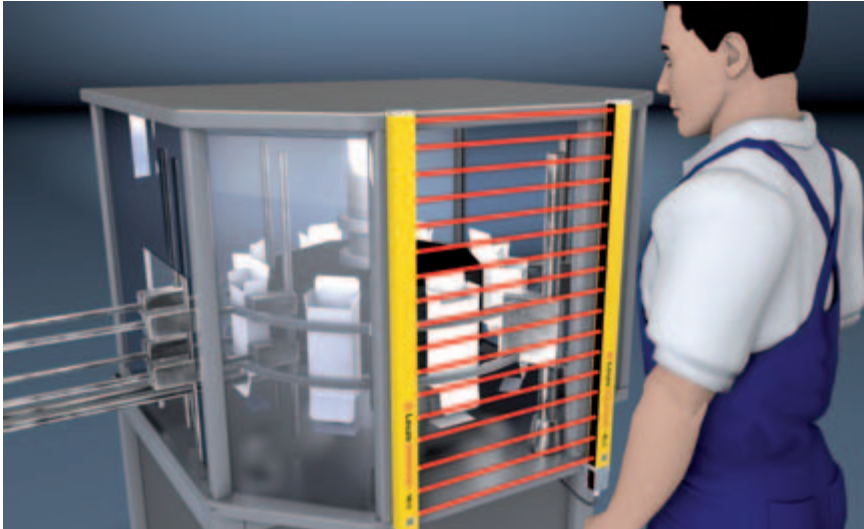
## Accessories ordering information for transmitter and receiver, Extended

| Part no.   | Article             | Description   | Length, design |
|--|---------------------|---|----------------|
| <b>Connection cables for transmitter</b>   |                     |   |                |
| 150668   | CB-M12-5000E-2GF/GM | Connection cable 2-wire, transmitter to AC-SCM8, pins 1 and 3 directly connected                                    | 5 m            |
| <b>Sensor cable, 3-wire, PUR, unshielded, socket and plug</b>  |                     |   |                |
| 548050   | CB-M12-1500X-3GF/WM | Crossed cable: straight socket, pin 2 - > angled plug, pin 4  | 1.5 m          |
| 548051   | CB-M12-1500X-3GF/GM | Crossed cable: straight socket, pin 2 - > plug straight, pin 4  | 1.5 m          |
| 150680   | CB-M12-1500-3GF/GM  | Socket straight, plug straight  | 1.5 m          |
| 150681   | CB-M12-1500-3GF/WM  | Socket straight, plug angled  | 1.5 m          |
| 150682   | CB-M12-5000-3GF/GM  | Socket straight, plug straight  | 5 m            |
| 150683   | CB-M12-5000-3GF/WM  | Socket straight, plug angled  | 5 m            |
| 150684   | CB-M12-15000-3GF/GM | Socket straight, plug straight  | 15 m           |
| 150685   | CB-M12-15000-3GF/WM | Socket straight, plug angled  | 15 m           |
| <b>Connection accessories</b>  |                     |   |                |
| 548361   | CB-M12-1000-5GF/GM  | Connection cable, 5-wire plug /socket straight  | 1 m            |
| 548362   | CB-M12-2000-5GF/GM  | Connection cable, 5-wire plug /socket straight  | 2 m            |
| 150717   | CB-M12-2000-5GM     | Connection cable, 5-pin plug, straight  | 2 m            |
| 150718   | CB-M12-5000-5GM     | Connection cable, 5-pin plug, straight  | 5 m            |
| 520038   | AC-SCM8             | Connection module for control and display units and operational controls with 4 M12x5 sockets and one M12x8 plug    | 0.5 m          |
| 520039   | AC-SCM8-BT          | Connection module for control and display units and operational controls incl. retaining plate and mounting devices | 0.5 m          |
| Additional accessories, e.g. muting indicator see page 534, accessories, laser alignment aid see page 538, accessories |                     |   |                |

For device columns, see page 500, for deflecting mirror columns, see page 510/514, for deflecting mirrors see page 512/517, for protective screens, see page 521.

## SAFETY LIGHT CURTAINS

### MLC 300



MLC 300 Safety Light Curtain guards the access point of a cartoning machine



MLC 300 Safety Light Curtain guarding an assembly cell with manual access

Like the MLC 500, this series, built upon the MLC 310 basic version with automatic start/restart and freely selectable transmission channels, also enables high flexibility for applications which required type 2, SIL 1 or PL c. For example, the MLC 320 standard version features a start/restart interlock, contactor monitoring and a 7-segment display.

#### Typical areas of application

- Packaging machinery
- Textile machinery
- Automatic loading systems
- Storage and conveyor systems

**Important technical data, overview**

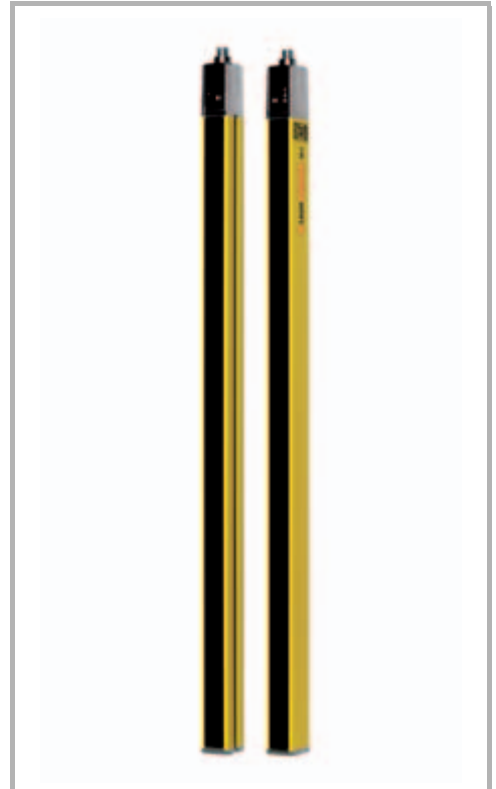
|  |                          |         |          |          |
|--|--------------------------|---------|----------|----------|
| Type in accordance with EN/IEC 61496                                       | 2                        |         |          |          |
| SIL in accordance with IEC 61508 and SILCL in accordance with EN/IEC 62061 | 1                        |         |          |          |
| Performance Level (PL) in accordance with EN ISO 13849-1                   | c                        |         |          |          |
| Category in accordance with EN ISO 13849                                   | 2                        |         |          |          |
| Resolution   | 20 mm                    | 30 mm   | 40 mm    | 90 mm    |
| Range  | 0...14 m                 | 0...9 m | 0...20 m | 0...20 m |
| Protective field height (type-dependent)                                   | 150...3000 mm            |         |          |          |
| Profile cross-section  | 29 mm x 35 mm            |         |          |          |
| Safety-related switching outputs (OSSDs)                                   | 2 pnp transistor outputs |         |          |          |
| Connection system  | M12 plug                 |         |          |          |

**Functions**

|  | Transmitter | Receiver      |                  |
|--|-------------|---------------|------------------|
|  | MLC 300     | Basic MLC 310 | Standard MLC 320 |
| Operating range adjustment                     | ●           |               |                  |
| Automatic start/restart                        |             | ●             | ●                |
| Start/restart interlock (RES), selectable      |             |               | ●                |
| Dynamic contactor monitoring (EDM), selectable |             |               | ●                |
| 2 transmission channels, selectable            | ●           | ●             | ●                |
| 7-segment display                              |             |               | ●                |

**Special features**

- **2 receiver versions (Basic, Standard), both with requirement-compliant equipment**
- **Configuration by wiring – automatic transfer by replacement device after device exchange**
- **Range reduction and 2 optical beam codings (transmission channel) for operation which is immune to interference**



**Features**



**Further information**

**Page**

- Ordering information 102
- Electrical connection 92
- Technical data 105
- Dimensional drawings 95
- Dimensional drawings: Accessories 97
- Accessories ordering information 98

# SAFETY LIGHT CURTAINS

## Ordering information

**MLC 300**, consisting of transmitter and receiver  
 Included in delivery: transmitter: 2 BT-NC sliding blocks;  
 receiver: 2 sliding blocks BT-NC, 1 set of connecting and  
 operating instructions (PDF file on CD-ROM)

**Functions:**  
 MLC 310: Basic function package, MLC 320: Standard  
 function package, see page 101

| Protective field height in mm | MLC 300                  |                |             | MLC 300                  |                |             |
|-------------------------------|--------------------------|----------------|-------------|--------------------------|----------------|-------------|
|                               | Part no.                 | Article        | Description | Part no.                 | Article        | Description |
|                               | <b>Resolution: 20 mm</b> |                |             | <b>Resolution: 30 mm</b> |                |             |
|                               | <b>Range: 0...15 m</b>   |                |             | <b>Range: 0...9 m</b>    |                |             |
| 150                           | 68090201                 | MLC300T20-150  | Transmitter | 68090301                 | MLC300T30-150  | Transmitter |
|                               | 68091201                 | MLC310R20-150  | Receiver    | 68091301                 | MLC310R30-150  | Receiver    |
|                               | 68092201                 | MLC320R20-150  | Receiver    | 68092301                 | MLC320R30-150  | Receiver    |
| 225                           | 68090202                 | MLC300T20-225  | Transmitter | 68090302                 | MLC300T30-225  | Transmitter |
|                               | 68091202                 | MLC310R20-225  | Receiver    | 68091302                 | MLC310R30-225  | Receiver    |
|                               | 68092202                 | MLC320R20-225  | Receiver    | 68092302                 | MLC320R30-225  | Receiver    |
| 300                           | 68090203                 | MLC300T20-300  | Transmitter | 68090303                 | MLC300T30-300  | Transmitter |
|                               | 68091203                 | MLC310R20-300  | Receiver    | 68091303                 | MLC310R30-300  | Receiver    |
|                               | 68092203                 | MLC320R20-300  | Receiver    | 68092303                 | MLC320R30-300  | Receiver    |
| 450                           | 68090204                 | MLC300T20-450  | Transmitter | 68090304                 | MLC300T30-450  | Transmitter |
|                               | 68091204                 | MLC310R20-450  | Receiver    | 68091304                 | MLC310R30-450  | Receiver    |
|                               | 68092204                 | MLC320R20-450  | Receiver    | 68092304                 | MLC320R30-450  | Receiver    |
| 600                           | 68090206                 | MLC300T20-600  | Transmitter | 68090306                 | MLC300T30-600  | Transmitter |
|                               | 68091206                 | MLC310R20-600  | Receiver    | 68091306                 | MLC310R30-600  | Receiver    |
|                               | 68092206                 | MLC320R20-600  | Receiver    | 68092306                 | MLC320R30-600  | Receiver    |
| 750                           | 68090207                 | MLC300T20-750  | Transmitter | 68090307                 | MLC300T30-750  | Transmitter |
|                               | 68091207                 | MLC310R20-750  | Receiver    | 68091307                 | MLC310R30-750  | Receiver    |
|                               | 68092207                 | MLC320R20-750  | Receiver    | 68092307                 | MLC320R30-750  | Receiver    |
| 900                           | 68090209                 | MLC300T20-900  | Transmitter | 68090309                 | MLC300T30-900  | Transmitter |
|                               | 68091209                 | MLC310R20-900  | Receiver    | 68091309                 | MLC310R30-900  | Receiver    |
|                               | 68092209                 | MLC320R20-900  | Receiver    | 68092309                 | MLC320R30-900  | Receiver    |
| 1050                          | 68090210                 | MLC300T20-1050 | Transmitter | 68090310                 | MLC300T30-1050 | Transmitter |
|                               | 68091210                 | MLC310R20-1050 | Receiver    | 68091310                 | MLC310R30-1050 | Receiver    |
|                               | 68092210                 | MLC320R20-1050 | Receiver    | 68092310                 | MLC320R30-1050 | Receiver    |
| 1200                          | 68090212                 | MLC300T20-1200 | Transmitter | 68090312                 | MLC300T30-1200 | Transmitter |
|                               | 68091212                 | MLC310R20-1200 | Receiver    | 68091312                 | MLC310R30-1200 | Receiver    |
|                               | 68092212                 | MLC320R20-1200 | Receiver    | 68092312                 | MLC320R30-1200 | Receiver    |
| 1350                          | 68090213                 | MLC300T20-1350 | Transmitter | 68090313                 | MLC300T30-1350 | Transmitter |
|                               | 68091213                 | MLC310R20-1350 | Receiver    | 68091313                 | MLC310R30-1350 | Receiver    |
|                               | 68092213                 | MLC320R20-1350 | Receiver    | 68092313                 | MLC320R30-1350 | Receiver    |
| 1500                          | 68090215                 | MLC300T20-1500 | Transmitter | 68090315                 | MLC300T30-1500 | Transmitter |
|                               | 68091215                 | MLC310R20-1500 | Receiver    | 68091315                 | MLC310R30-1500 | Receiver    |
|                               | 68092215                 | MLC320R20-1500 | Receiver    | 68092315                 | MLC320R30-1500 | Receiver    |
| 1650                          | 68090216                 | MLC300T20-1650 | Transmitter | 68090316                 | MLC300T30-1650 | Transmitter |
|                               | 68091216                 | MLC310R20-1650 | Receiver    | 68091316                 | MLC310R30-1650 | Receiver    |
|                               | 68092216                 | MLC320R20-1650 | Receiver    | 68092316                 | MLC320R30-1650 | Receiver    |
| 1800                          | 68090218                 | MLC300T20-1800 | Transmitter | 68090318                 | MLC300T30-1800 | Transmitter |
|                               | 68091218                 | MLC310R20-1800 | Receiver    | 68091318                 | MLC310R30-1800 | Receiver    |
|                               | 68092218                 | MLC320R20-1800 | Receiver    | 68092318                 | MLC320R30-1800 | Receiver    |

## Ordering information

**MLC 300**, consisting of transmitter and receiver  
 Included in delivery: transmitter: 2 BT-NC sliding blocks;  
 receiver: 2 sliding blocks BT-NC, 1 set of connecting and  
 operating instructions (PDF file on CD-ROM)

**Functions:**  
 MLC 310: Basic function package, MLC 320: Standard  
 function package, see page 101

| Protective field height in mm | MLC 300  |                |             |
|-------------------------------|----------|----------------|-------------|
|                               | Part no. | Article        | Description |
| 150                           | 68090401 | MLC300T40-150  | Transmitter |
|                               | 68091401 | MLC310R40-150  | Receiver    |
|                               | 68092401 | MLC320R40-150  | Receiver    |
| 225                           | 68090402 | MLC300T40-225  | Transmitter |
|                               | 68091402 | MLC310R40-225  | Receiver    |
|                               | 68092402 | MLC320R40-225  | Receiver    |
| 300                           | 68090403 | MLC300T40-300  | Transmitter |
|                               | 68091403 | MLC310R40-300  | Receiver    |
|                               | 68092403 | MLC320R40-300  | Receiver    |
| 450                           | 68090404 | MLC300T40-450  | Transmitter |
|                               | 68091404 | MLC310R40-450  | Receiver    |
|                               | 68092404 | MLC320R40-450  | Receiver    |
| 600                           | 68090406 | MLC300T40-600  | Transmitter |
|                               | 68091406 | MLC310R40-600  | Receiver    |
|                               | 68092406 | MLC320R40-600  | Receiver    |
| 750                           | 68090407 | MLC300T40-750  | Transmitter |
|                               | 68091407 | MLC310R40-750  | Receiver    |
|                               | 68092407 | MLC320R40-750  | Receiver    |
| 900                           | 68090409 | MLC300T40-900  | Transmitter |
|                               | 68091409 | MLC310R40-900  | Receiver    |
|                               | 68092409 | MLC320R40-900  | Receiver    |
| 1050                          | 68090410 | MLC300T40-1050 | Transmitter |
|                               | 68091410 | MLC310R40-1050 | Receiver    |
|                               | 68092410 | MLC320R40-1050 | Receiver    |
| 1200                          | 68090412 | MLC300T40-1200 | Transmitter |
|                               | 68091412 | MLC310R40-1200 | Receiver    |
|                               | 68092412 | MLC320R40-1200 | Receiver    |
| 1350                          | 68090413 | MLC300T40-1350 | Transmitter |
|                               | 68091413 | MLC310R40-1350 | Receiver    |
|                               | 68092413 | MLC320R40-1350 | Receiver    |
| 1500                          | 68090415 | MLC300T40-1500 | Transmitter |
|                               | 68091415 | MLC310R40-1500 | Receiver    |
|                               | 68092415 | MLC320R40-1500 | Receiver    |
| 1650                          | 68090416 | MLC300T40-1650 | Transmitter |
|                               | 68091416 | MLC310R40-1650 | Receiver    |
|                               | 68092416 | MLC320R40-1650 | Receiver    |
| 1800                          | 68090418 | MLC300T40-1800 | Transmitter |
|                               | 68091418 | MLC310R40-1800 | Receiver    |
|                               | 68092418 | MLC320R40-1800 | Receiver    |

| Protective field height in mm | MLC 300  |                |             |
|-------------------------------|----------|----------------|-------------|
|                               | Part no. | Article        | Description |
| 450                           | 68090904 | MLC300T90-450  | Transmitter |
|                               | 68091904 | MLC310R90-450  | Receiver    |
|                               | 68092904 | MLC320R90-450  | Receiver    |
| 600                           | 68090906 | MLC300T90-600  | Transmitter |
|                               | 68091906 | MLC310R90-600  | Receiver    |
|                               | 68092906 | MLC320R90-600  | Receiver    |
| 750                           | 68090907 | MLC300T90-750  | Transmitter |
|                               | 68091907 | MLC310R90-750  | Receiver    |
|                               | 68092907 | MLC320R90-750  | Receiver    |
| 900                           | 68090909 | MLC300T90-900  | Transmitter |
|                               | 68091909 | MLC310R90-900  | Receiver    |
|                               | 68092909 | MLC320R90-900  | Receiver    |
| 1050                          | 68090910 | MLC300T90-1050 | Transmitter |
|                               | 68091910 | MLC310R90-1050 | Receiver    |
|                               | 68092910 | MLC320R90-1050 | Receiver    |
| 1200                          | 68090912 | MLC300T90-1200 | Transmitter |
|                               | 68091912 | MLC310R90-1200 | Receiver    |
|                               | 68092912 | MLC320R90-1200 | Receiver    |
| 1350                          | 68090913 | MLC300T90-1350 | Transmitter |
|                               | 68091913 | MLC310R90-1350 | Receiver    |
|                               | 68092913 | MLC320R90-1350 | Receiver    |
| 1500                          | 68090915 | MLC300T90-1500 | Transmitter |
|                               | 68091915 | MLC310R90-1500 | Receiver    |
|                               | 68092915 | MLC320R90-1500 | Receiver    |
| 1650                          | 68090916 | MLC300T90-1650 | Transmitter |
|                               | 68091916 | MLC310R90-1650 | Receiver    |
|                               | 68092916 | MLC320R90-1650 | Receiver    |
| 1800                          | 68090918 | MLC300T90-1800 | Transmitter |
|                               | 68091918 | MLC310R90-1800 | Receiver    |
|                               | 68092918 | MLC320R90-1800 | Receiver    |



## SAFETY LIGHT CURTAINS

Part number code for MLC 500, MLC 300

Safety Light Curtains of the MLC 500 and MLC 300 series

| Article     | Description                            |
|-------------|--|
| <b>MLC</b>  | <b>Safety Light Curtain</b>            |
| <b>X</b>    | <b>Series</b>                          |
| 3           | MLC 300                                |
| 5           | MLC 500                                |
| <b>yy</b>   | <b>Function</b>                        |
| 00          | Transmitter                            |
| 10          | Automatic restart                      |
| 20          | EDM/RES selectable                     |
| 30          | Muting/Blanking/Linkage (only MLC 530) |
| <b>z</b>    | <b>Device type</b>                     |
| T           | Transmitter                            |
| R           | Receiver                               |
| <b>a</b>    | <b>Resolution</b>                      |
| 14          | 14 mm / range 0 - 6 m (only MLC 500)   |
| 20          | 20 mm / range 0 - 14 m                 |
| 30          | 30 mm / range 0 - 9 m                  |
| 40          | 40 mm / range 0 - 20 m                 |
| 90          | 90 mm / range 0 - 20 m                 |
| <b>hhhh</b> | <b>Protective field height</b>         |
|             | 150...3000 mm                          |

**MLC X yy z a- hhhh**

### Electrical connection

Connection examples see page 92, and 93

MLC 500  
p. 84

**MLC 300**  
**p. 100**

SOLID-4, SOLID-4E  
p. 108

SOLID-2, SOLID-2E  
p. 134

COMPACTplus  
p. 148

**Technical data**

| General system data  |  |           |               |               |
|--|--|-----------|---------------|---------------|
| Type in accordance with EN/IEC 61496                                       | 2  |           |               |               |
| SIL in accordance with IEC 61508 and SILCL in accordance with EN/IEC 62061 | 1  |           |               |               |
| Performance Level (PL) in accordance with EN ISO 13849-1                   | c  |           |               |               |
| Probability of a failure to danger per hour (PFH <sub>d</sub> )            | 5.06 x 10 <sup>-8</sup>  |           |               |               |
| Service life (T <sub>M</sub> ) in accordance with EN ISO 13849-1           | 20 years   |           |               |               |
| Category in accordance with EN ISO 13849                                   | 2  |           |               |               |
| Resolution   | 20 mm  | 30 mm     | 40 mm         | 90 mm         |
| Range  | 0...14 m   | 0...9 m   | 0...20 m      | 0...20 m      |
| Response time (depends on protective field height)                         | 4...51 ms  | 3...26 ms | 3...26 ms     | 3...10 ms     |
| Protective field height  | 150...1800 mm  |           | 150...3000 mm | 450...3000 mm |
| Synchronization  | Optical via transmitter and receiver   |           |               |               |
| Supply voltage   | 24 V DC, ±20%, compensation necessary for 20 ms voltage dip, min. 250 mA (+ OSSD - load) |           |               |               |
| Residual ripple of the supply voltage                                      | ±5% within the boundaries of U <sub>v</sub>  |           |               |               |
| Common value for ext. fuse in the supply line for transmitter and receiver | 2 A semi time-lag  |           |               |               |
| Connection cable length  | Max. 100 m with 0.25 mm <sup>2</sup>   |           |               |               |
| Safety class   | III  |           |               |               |
| Protection rating  | IP 65  |           |               |               |
| Ambient temperature, operation   | 0...55°C   |           |               |               |
| Ambient temperature, storage   | -25...70°C   |           |               |               |
| Relative humidity  | 0...95%  |           |               |               |
| Profile cross-section  | 29 mm x 35 mm  |           |               |               |
| Weight per device (length-dependent)                                       | 0.30...3.20 kg   |           |               |               |
| Transmitter  |  |           |               |               |
| Transmitter diodes, class in accordance with EN 60825                      | 1  |           |               |               |
| Wavelength   | 850 nm   |           |               |               |
| Current consumption  | 70 mA  |           |               |               |
| Connection system  | M12 plug, 5-pin  |           |               |               |

## SAFETY LIGHT CURTAINS

### Technical data

#### Receiver

|  |  |
|--|--|
| Current consumption                      | 150 mA without external load   |
| Safety-related switching outputs (OSSDs) | 2 safety-related pnp transistor outputs (short circuit-proof, cross-circuit monitored) |
| Connection system                        | M-12 plug, 5-pin/8-pin   |
| Switching voltage high active            | Min. U <sub>v</sub> - 1.7 V  |
| Switching voltage low                    | Max. +2.5 V  |
| Switching current                        | Max. 250 mA  |

Please note the additional information in the MLC connecting and operating instructions at [www.leuze.com/en/mlc300/](http://www.leuze.com/en/mlc300/).

### Dimensional drawings

Dimensional drawings, see page 95.

### Dimensional drawings: Accessories

Dimensional drawings of accessories, see page 97.

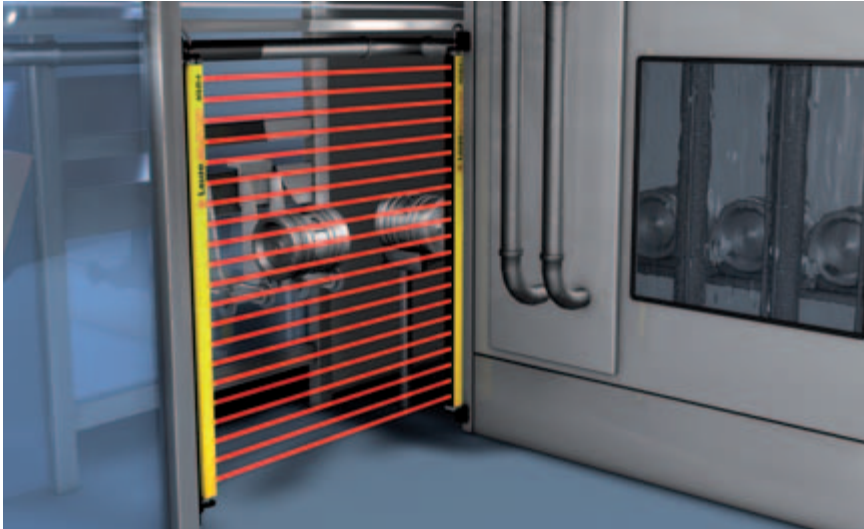
### Accessories ordering information

Accessories ordering information, see page 98.

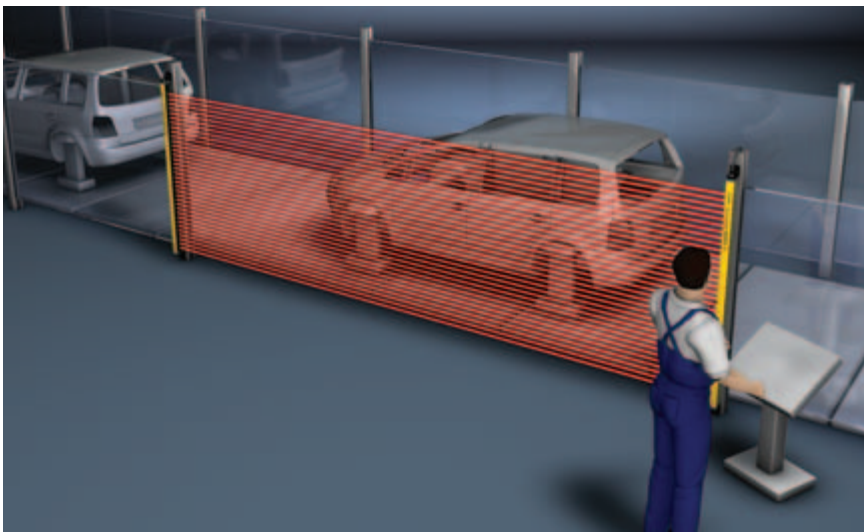
[www.leuze.com/en/mlc300/](http://www.leuze.com/en/mlc300/)

## SAFETY LIGHT CURTAINS

### SOLID-4, SOLID-4E



SOLID-4E with 40 mm resolution for access guarding in a keg washing system



SOLID-4E with integrated start/restart interlock for access guarding on transport conveyors

Rapid market changes require flexible production line adjustments. This demands long-life safety sensor technology that is versatile in its application. Whether it be hand protection or danger zone and access guarding, the type 4 Safety Light Curtains of the SOLID-4 series provide reliable protection and ensure the highest possible system availability with their robust and interference-immune design. Protected by a warp-resistant profile housing closed on four sides and with their uncomplicated M12 connection system, they withstand even the toughest industrial conditions. The restart interlock and contactor monitoring functions, and two different transmission channels for a fault-free operation of adjacent devices close to one another, are freely selectable. The versions in resolutions of 14, 20, 30, 40, 90 mm, the slender design and the versatile fixing options guarantee short mounting times. Device versions with cable-connected or fixed cascading as well as a standard variant without restart-disable and contactor monitoring enable flexible and cost-optimized solutions.

#### Typical areas of application

- Automotive industry and its suppliers
- Building material and glass machinery
- Print and paper processing
- Electrical and electronics manufacturers
- Industrial robots
- Shoe and leather industry
- Tobacco industry
- Packaging machinery
- Presses
- Woodworking machines

# SOLID-4, SOLID-4E

## Important technical data, overview

|  |                          |          |         |          |          |
|--|--------------------------|----------|---------|----------|----------|
| Type in accordance with EN/IEC 61496                                       | 4                        |          |         |          |          |
| SIL in accordance with IEC 61508 and SILCL in accordance with EN/IEC 62061 | 3                        |          |         |          |          |
| Performance Level (PL) in accordance with EN ISO 13849-1                   | e                        |          |         |          |          |
| Category in accordance with EN ISO 13849                                   | 4                        |          |         |          |          |
| Resolution   | 14 mm                    | 20 mm    | 30 mm   | 40 mm    | 90 mm    |
| Range (m)  | 0.3...6                  | 0.7...14 | 0.5...9 | 0.9...20 | 0.9...20 |
| Protective field height (type-dependent)                                   | 150...1800 mm            |          |         |          |          |
| Profile cross-section  | 30 mm x 34 mm            |          |         |          |          |
| Safety-related switching outputs (OSSDs)                                   | 2 pnp transistor outputs |          |         |          |          |
| Connection system  | M12 plug                 |          |         |          |          |

| Functions                                      | SOLID-4 | SOLID-4E |
|--|---------|----------|
| Automatic start/restart                        | ●       | ●        |
| Start/restart interlock (RES), selectable      |         | ●        |
| Dynamic contactor monitoring (EDM), selectable |         | ●        |
| 2 transmission channels, selectable            |         | ●        |
| LED display                                    | ●       | ●        |
| 7-segment display                              | ●       | ●        |

### Function extension

#### SOLID-4

| With Safety Relay | Relay output | RES | EDM | Muting | Further details |
|-------------------|--------------|-----|-----|--------|-----------------|
| MSI-SR4           | ●            | ●   | ●   |        | p. 428          |
| MSI-SR5           | ●            | ●   | ●   |        | p. 434          |
| MSI 100           |              | ●   | ●   | ●      | p. 482          |
| MSI 200           |              | ●   | ●   | ●      | p. 488          |

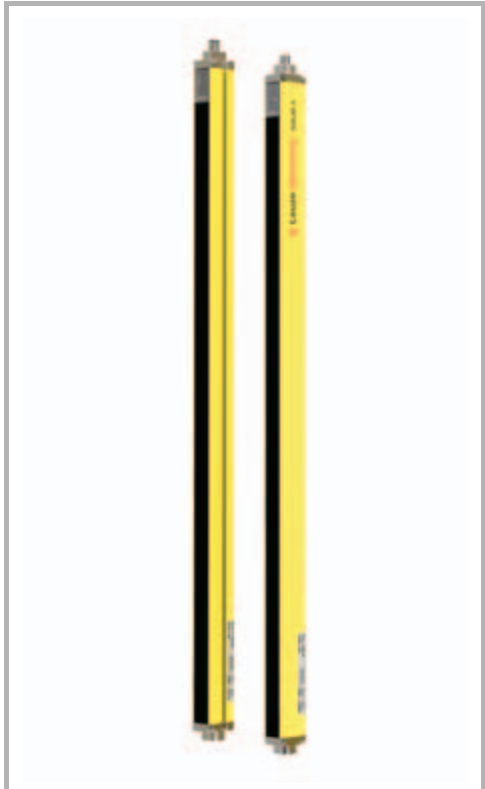
#### SOLID-4E

|         |   |   |   |  |        |
|---------|---|---|---|--|--------|
| MSI-RM2 | ● | * | * |  | p. 440 |
|---------|---|---|---|--|--------|

\*) Already included in the sensor

### Special features

- **Type 4 self-monitoring Safety Light Curtain in accordance with EN/IEC 61496**
- **Several devices can be cascaded (SOLID-4E)**
- **Slender and robust aluminum housing (30 mm x 34 mm)**
- **Fault-free operation of adjacent devices with selection of different transmission channels**
- **Simple function selection through external wiring**
- **Maintenance-free with safety transistor outputs (OSSDs)**



### Features



### Further information

### Page

- Ordering information 110
- Electrical connection 122
- Technical data 124
- Dimensional drawings 125
- Dimensional drawings: Accessories 129
- Accessories ordering information 131

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## SAFETY LIGHT CURTAINS

### Ordering information

**SOLID-4**, consisting of transmitter and receiver  
 Included in delivery: 2 BT-360-SET mounting bracket sets, 1 set of connecting and operating instructions (PDF file on CD-ROM)

**Function:** Automatic start/restart

| Protective field height in mm | <b>SOLID-4</b>           |             |             | <b>SOLID-4</b>           |             |             |
|-------------------------------|--------------------------|-------------|-------------|--------------------------|-------------|-------------|
|                               | Part no.                 | Article     | Description | Part no.                 | Article     | Description |
|                               | <b>Resolution: 14 mm</b> |             |             | <b>Resolution: 20 mm</b> |             |             |
|                               | <b>Range: 0.3 - 6 m</b>  |             |             | <b>Range: 0.7 - 14 m</b> |             |             |
| 150                           | 67843501                 | SD4T14-150  | Transmitter | 67841701                 | SD4T20-150  | Transmitter |
|                               | 67843201                 | SD4R14-150  | Receiver    | 67840201                 | SD4R20-150  | Receiver    |
| 225                           |                          |             |             | 67841702                 | SD4T20-225  | Transmitter |
|                               |                          |             |             | 67840202                 | SD4R20-225  | Receiver    |
| 300                           | 67843503                 | SD4T14-300  | Transmitter | 67841703                 | SD4T20-300  | Transmitter |
|                               | 67843203                 | SD4R14-300  | Receiver    | 67840203                 | SD4R20-300  | Receiver    |
| 450                           | 67843504                 | SD4T14-450  | Transmitter | 67841704                 | SD4T20-450  | Transmitter |
|                               | 67843204                 | SD4R14-450  | Receiver    | 67840204                 | SD4R20-450  | Receiver    |
| 600                           | 67843506                 | SD4T14-600  | Transmitter | 67841706                 | SD4T20-600  | Transmitter |
|                               | 67843206                 | SD4R14-600  | Receiver    | 67840206                 | SD4R20-600  | Receiver    |
| 750                           | 67843507                 | SD4T14-750  | Transmitter | 67841707                 | SD4T20-750  | Transmitter |
|                               | 67843207                 | SD4R14-750  | Receiver    | 67840207                 | SD4R20-750  | Receiver    |
| 900                           | 67843509                 | SD4T14-900  | Transmitter | 67841709                 | SD4T20-900  | Transmitter |
|                               | 67843209                 | SD4R14-900  | Receiver    | 67840209                 | SD4R20-900  | Receiver    |
| 1050                          | 67843510                 | SD4T14-1050 | Transmitter | 67841710                 | SD4T20-1050 | Transmitter |
|                               | 67843210                 | SD4R14-1050 | Receiver    | 67840210                 | SD4R20-1050 | Receiver    |
| 1200                          | 67843512                 | SD4T14-1200 | Transmitter | 67841712                 | SD4T20-1200 | Transmitter |
|                               | 67843212                 | SD4R14-1200 | Receiver    | 67840212                 | SD4R20-1200 | Receiver    |
| 1350                          | 67843513                 | SD4T14-1500 | Transmitter | 67841713                 | SD4T20-1350 | Transmitter |
|                               | 67843213                 | SD4R14-1350 | Receiver    | 67840213                 | SD4R20-1350 | Receiver    |
| 1500                          | 67843515                 | SD4T14-1500 | Transmitter | 67841715                 | SD4T20-1500 | Transmitter |
|                               | 67843215                 | SD4R14-1500 | Receiver    | 67840215                 | SD4R20-1500 | Receiver    |
| 1650                          | 67843516                 | SD4T14-1650 | Transmitter | 67841716                 | SD4T20-1650 | Transmitter |
|                               | 67843216                 | SD4R14-1650 | Receiver    | 67840216                 | SD4R20-1650 | Receiver    |
| 1800                          | 67843518                 | SD4T14-1800 | Transmitter | 67841718                 | SD4T20-1800 | Transmitter |
|                               | 67843218                 | SD4R14-1800 | Receiver    | 67840218                 | SD4R20-1800 | Receiver    |

Test rod included in scope of delivery

Test rod included in scope of delivery

MLC 500  
p. 84

MLC 300  
p. 100

**SOLID-4, SOLID-4E**  
p. 108

SOLID-2, SOLID-2E  
p. 134

COMPACTplus  
p. 148

## Ordering information

**SOLID-4**, consisting of transmitter and receiver  
 Included in delivery: 2 BT-360-SET mounting bracket sets, 1 set of connecting and operating instructions (PDF file on CD-ROM)

**Function:** Automatic start/restart

| Protective field height in mm | SOLID-4                  |             |             | SOLID-4                  |             |             |
|-------------------------------|--------------------------|-------------|-------------|--------------------------|-------------|-------------|
|                               | Part no.                 | Article     | Description | Part no.                 | Article     | Description |
|                               | <b>Resolution: 30 mm</b> |             |             | <b>Resolution: 40 mm</b> |             |             |
|                               | <b>Range: 0.5 - 9 m</b>  |             |             | <b>Range: 0.9 - 20 m</b> |             |             |
| 150                           | 67841801                 | SD4T30-150  | Transmitter | 67841901                 | SD4T40-150  | Transmitter |
|                               | 67840601                 | SD4R30-150  | Receiver    | 67841001                 | SD4R40-150  | Receiver    |
| 225                           | 67841802                 | SD4T30-225  | Transmitter | 67841902                 | SD4T40-225  | Transmitter |
|                               | 67840602                 | SD4R30-225  | Receiver    | 67841002                 | SD4R40-225  | Receiver    |
| 300                           | 67841803                 | SD4T30-300  | Transmitter | 67841903                 | SD4T40-300  | Transmitter |
|                               | 67840603                 | SD4R30-300  | Receiver    | 67841003                 | SD4R40-300  | Receiver    |
| 450                           | 67841804                 | SD4T30-450  | Transmitter | 67841904                 | SD4T40-450  | Transmitter |
|                               | 67840604                 | SD4R30-450  | Receiver    | 67841004                 | SD4R40-450  | Receiver    |
| 600                           | 67841806                 | SD4T30-600  | Transmitter | 67841906                 | SD4T40-600  | Transmitter |
|                               | 67840606                 | SD4R30-600  | Receiver    | 67841006                 | SD4R40-600  | Receiver    |
| 750                           | 67841807                 | SD4T30-750  | Transmitter | 67841907                 | SD4T40-750  | Transmitter |
|                               | 67840607                 | SD4R30-750  | Receiver    | 67841007                 | SD4R40-750  | Receiver    |
| 900                           | 67841809                 | SD4T30-900  | Transmitter | 67841909                 | SD4T40-900  | Transmitter |
|                               | 67840609                 | SD4R30-900  | Receiver    | 67841009                 | SD4R40-900  | Receiver    |
| 1050                          | 67841810                 | SD4T30-1050 | Transmitter | 67841910                 | SD4T40-1050 | Transmitter |
|                               | 67840610                 | SD4R30-1050 | Receiver    | 67841010                 | SD4R40-1050 | Receiver    |
| 1200                          | 67841812                 | SD4T30-1200 | Transmitter | 67841912                 | SD4T40-1200 | Transmitter |
|                               | 67840612                 | SD4R30-1200 | Receiver    | 67841012                 | SD4R40-1200 | Receiver    |
| 1350                          | 67841813                 | SD4T30-1350 | Transmitter | 67841913                 | SD4T40-1350 | Transmitter |
|                               | 67840613                 | SD4R30-1350 | Receiver    | 67841013                 | SD4R40-1350 | Receiver    |
| 1500                          | 67841815                 | SD4T30-1500 | Transmitter | 67841915                 | SD4T40-1500 | Transmitter |
|                               | 67840615                 | SD4R30-1500 | Receiver    | 67841015                 | SD4R40-1500 | Receiver    |
| 1650                          | 67841816                 | SD4T30-1650 | Transmitter | 67841916                 | SD4T40-1650 | Transmitter |
|                               | 67840616                 | SD4R30-1650 | Receiver    | 67841016                 | SD4R40-1650 | Receiver    |
| 1800                          | 67841818                 | SD4T30-1800 | Transmitter | 67841918                 | SD4T40-1800 | Transmitter |
|                               | 67840618                 | SD4R30-1800 | Receiver    | 67841018                 | SD4R40-1800 | Receiver    |

Test rod included in scope of delivery

Test rod included in scope of delivery

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## SAFETY LIGHT CURTAINS

### Ordering information

**SOLID-4**, consisting of transmitter and receiver  
 Included in delivery: 2 BT-360-SET mounting bracket sets, 1 set of  
 connecting and operating instructions (PDF file on CD-ROM)

**Function:** Automatic start/restart

| Protective field height in mm | <b>SOLID-4</b>                         |             |             |
|-------------------------------|--|-------------|-------------|
|                               | Resolution: 90 mm<br>Range: 0.9 - 20 m |             |             |
|                               | Part no.                               | Article     | Description |
| 600                           | 67842006                               | SD4T90-600  | Transmitter |
|                               | 67841406                               | SD4R90-600  | Receiver    |
| 750                           | 67842007                               | SD4T90-750  | Transmitter |
|                               | 67841407                               | SD4R90-750  | Receiver    |
| 900                           | 67842009                               | SD4T90-900  | Transmitter |
|                               | 67841409                               | SD4R90-900  | Receiver    |
| 1050                          | 67842010                               | SD4T90-1050 | Transmitter |
|                               | 67841410                               | SD4R90-1050 | Receiver    |
| 1200                          | 67842012                               | SD4T90-1200 | Transmitter |
|                               | 67841412                               | SD4R90-1200 | Receiver    |
| 1350                          | 67842013                               | SD4T90-1350 | Transmitter |
|                               | 67841413                               | SD4R90-1350 | Receiver    |
| 1500                          | 67842015                               | SD4T90-1500 | Transmitter |
|                               | 67841415                               | SD4R90-1500 | Receiver    |
| 1650                          | 67842016                               | SD4T90-1650 | Transmitter |
|                               | 67841416                               | SD4R90-1650 | Receiver    |
| 1800                          | 67842018                               | SD4T90-1800 | Transmitter |
|                               | 67841418                               | SD4R90-1800 | Receiver    |

# SOLID-4, SOLID-4E

## Ordering information

**SOLID-4E**, consisting of transmitter and receiver  
 Included in delivery: 2 BT-360-SET mounting bracket sets, 1 set of connecting and operating instructions(PDF file on CD-ROM)

**Functions:** Automatic start/restart, selectable start/restart interlock, dynamic contactor monitoring, selectable transmission channels

| Protective field height in mm | SOLID-4E                              |              |             |
|-------------------------------|---------------------------------------|--------------|-------------|
|                               | Part no.                              | Article      | Description |
|                               | Resolution: 14 mm<br>Range: 0.3 - 6 m |              |             |
| 150                           | 67843501                              | SD4T14-150   | Transmitter |
|                               | 67843401                              | SD4R14-150E  | Receiver    |
| 225                           |                                       |              |             |
|                               |                                       |              |             |
| 300                           | 67843503                              | SD4T14-300   | Transmitter |
|                               | 67843403                              | SD4R14-300E  | Receiver    |
| 450                           | 67843504                              | SD4T14-450   | Transmitter |
|                               | 67843404                              | SD4R14-450E  | Receiver    |
| 600                           | 67843506                              | SD4T14-600   | Transmitter |
|                               | 67843406                              | SD4R14-600E  | Receiver    |
| 750                           | 67843507                              | SD4T14-750   | Transmitter |
|                               | 67843407                              | SD4R14-750E  | Receiver    |
| 900                           | 67843509                              | SD4T14-900   | Transmitter |
|                               | 67843409                              | SD4R14-900E  | Receiver    |
| 1050                          | 67843510                              | SD4T14-1050  | Transmitter |
|                               | 67843410                              | SD4R14-1050E | Receiver    |
| 1200                          | 67843512                              | SD4T14-1200  | Transmitter |
|                               | 67843412                              | SD4R14-1200E | Receiver    |
| 1350                          | 67843513                              | SD4T14-1350  | Transmitter |
|                               | 67843413                              | SD4R14-1350E | Receiver    |
| 1500                          | 67843515                              | SD4T14-1500  | Transmitter |
|                               | 67843415                              | SD4R14-1500E | Receiver    |
| 1650                          | 67843516                              | SD4T14-1650  | Transmitter |
|                               | 67843416                              | SD4R14-1650E | Receiver    |
| 1800                          | 67843518                              | SD4T14-1800  | Transmitter |
|                               | 67843418                              | SD4R14-1800E | Receiver    |

Test rod included in scope of delivery

| Protective field height in mm | SOLID-4E                               |              |             |
|-------------------------------|--|--------------|-------------|
|                               | Part no.                               | Article      | Description |
|                               | Resolution: 20 mm<br>Range: 0.7 - 14 m |              |             |
| 150                           | 67841701                               | SD4T20-150   | Transmitter |
|                               | 67840401                               | SD4R20-150E  | Receiver    |
| 225                           | 67841702                               | SD4T20-225   | Transmitter |
|                               | 67840402                               | SD4R20-225E  | Receiver    |
| 300                           | 67841703                               | SD4T20-300   | Transmitter |
|                               | 67840403                               | SD4R20-300E  | Receiver    |
| 450                           | 67841704                               | SD4T20-450   | Transmitter |
|                               | 67840404                               | SD4R20-450E  | Receiver    |
| 600                           | 67841706                               | SD4T20-600   | Transmitter |
|                               | 67840406                               | SD4R20-600E  | Receiver    |
| 750                           | 67841707                               | SD4T20-750   | Transmitter |
|                               | 67840407                               | SD4R20-750E  | Receiver    |
| 900                           | 67841709                               | SD4T20-900   | Transmitter |
|                               | 67840409                               | SD4R20-900E  | Receiver    |
| 1050                          | 67841710                               | SD4T20-1050  | Transmitter |
|                               | 67840410                               | SD4R20-1050E | Receiver    |
| 1200                          | 67841712                               | SD4T20-1200  | Transmitter |
|                               | 67840412                               | SD4R20-1200E | Receiver    |
| 1350                          | 67841713                               | SD4T20-1350  | Transmitter |
|                               | 67840413                               | SD4R20-1350E | Receiver    |
| 1500                          | 67841715                               | SD4T20-1500  | Transmitter |
|                               | 67840415                               | SD4R20-1500E | Receiver    |
| 1650                          | 67841716                               | SD4T20-1650  | Transmitter |
|                               | 67840416                               | SD4R20-1650E | Receiver    |
| 1800                          | 67841718                               | SD4T20-1800  | Transmitter |
|                               | 67840418                               | SD4R20-1800E | Receiver    |

Test rod included in scope of delivery

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## SAFETY LIGHT CURTAINS

### Ordering information

**SOLID-4E**, consisting of transmitter and receiver  
 Included in delivery: 2 BT-360-SET mounting bracket sets, 1 set of connecting and operating instructions(PDF file on CD-ROM)

**Functions:** Automatic start/restart, selectable start/restart interlock, dynamic contactor monitoring, selectable transmission channels

| Protective field height in mm | <b>SOLID-4E</b>          |              |             | <b>SOLID-4E</b>          |              |             |
|-------------------------------|--------------------------|--------------|-------------|--------------------------|--------------|-------------|
|                               | Part no.                 | Article      | Description | Part no.                 | Article      | Description |
|                               | <b>Resolution: 30 mm</b> |              |             | <b>Resolution: 40 mm</b> |              |             |
|                               | <b>Range: 0.5 - 9 m</b>  |              |             | <b>Range: 0.9 - 20 m</b> |              |             |
| 150                           | 67841801                 | SD4T30-150   | Transmitter | 67841901                 | SD4T40-150   | Transmitter |
|                               | 67840801                 | SD4R30-150E  | Receiver    | 67841201                 | SD4R40-150E  | Receiver    |
| 225                           | 67841802                 | SD4T30-225   | Transmitter | 67841902                 | SD4T40-225   | Transmitter |
|                               | 67840802                 | SD4R30-225E  | Receiver    | 67841202                 | SD4R40-225E  | Receiver    |
| 300                           | 67841803                 | SD4T30-300   | Transmitter | 67841903                 | SD4T40-300   | Transmitter |
|                               | 67840803                 | SD4R30-300E  | Receiver    | 67841203                 | SD4R40-300E  | Receiver    |
| 450                           | 67841804                 | SD4T30-450   | Transmitter | 67841904                 | SD4T40-450   | Transmitter |
|                               | 67840804                 | SD4R30-450E  | Receiver    | 67841204                 | SD4R40-450E  | Receiver    |
| 600                           | 67841806                 | SD4T30-600   | Transmitter | 67841906                 | SD4T40-600   | Transmitter |
|                               | 67840806                 | SD4R30-600E  | Receiver    | 67841206                 | SD4R40-600E  | Receiver    |
| 750                           | 67841807                 | SD4T30-750   | Transmitter | 67841907                 | SD4T40-750   | Transmitter |
|                               | 67840807                 | SD4R30-750E  | Receiver    | 67841207                 | SD4R40-750E  | Receiver    |
| 900                           | 67841809                 | SD4T30-900   | Transmitter | 67841909                 | SD4T40-900   | Transmitter |
|                               | 67840809                 | SD4R30-900E  | Receiver    | 67841209                 | SD4R40-900E  | Receiver    |
| 1050                          | 67841810                 | SD4T30-1050  | Transmitter | 67841910                 | SD4T40-1050  | Transmitter |
|                               | 67840810                 | SD4R30-1050E | Receiver    | 67841210                 | SD4R40-1050E | Receiver    |
| 1200                          | 67841812                 | SD4T30-1200  | Transmitter | 67841912                 | SD4T40-1200  | Transmitter |
|                               | 67840812                 | SD4R30-1200E | Receiver    | 67841212                 | SD4R40-1200E | Receiver    |
| 1350                          | 67841813                 | SD4T30-1350  | Transmitter | 67841913                 | SD4T40-1350  | Transmitter |
|                               | 67840813                 | SD4R30-1350E | Receiver    | 67841213                 | SD4R40-1350E | Receiver    |
| 1500                          | 67841815                 | SD4T30-1500  | Transmitter | 67841915                 | SD4T40-1500  | Transmitter |
|                               | 67840815                 | SD4R30-1500E | Receiver    | 67841215                 | SD4R40-1500E | Receiver    |
| 1650                          | 67841816                 | SD4T30-1650  | Transmitter | 67841916                 | SD4T40-1650  | Transmitter |
|                               | 67840816                 | SD4R30-1650E | Receiver    | 67841216                 | SD4R40-1650E | Receiver    |
| 1800                          | 67841818                 | SD4T30-1800  | Transmitter | 67841918                 | SD4T40-1800  | Transmitter |
|                               | 67840818                 | SD4R30-1800E | Receiver    | 67841218                 | SD4R40-1800E | Receiver    |

Test rod included in scope of delivery

Test rod included in scope of delivery

MLC 500  
p. 84

MLC 300  
p. 100

**SOLID-4, SOLID-4E**  
p. 108

SOLID-2, SOLID-2E  
p. 134

COMPACTplus  
p. 148

## Ordering information

**SOLID-4E**, consisting of transmitter and receiver  
 Included in delivery: 2 BT-360-SET mounting bracket sets, 1 set of connecting and operating instructions(PDF file on CD-ROM)

**Functions:** Automatic start/restart, selectable start/restart interlock, dynamic contactor monitoring, selectable transmission channels

| Protective field height in mm | SOLID-4E                               |              |             |
|-------------------------------|--|--------------|-------------|
|                               | Resolution: 90 mm<br>Range: 0.9 - 20 m |              |             |
|                               | Part no.                               | Article      | Description |
| 600                           | 67842006                               | SD4T90-600   | Transmitter |
|                               | 67841606                               | SD4R90-600E  | Receiver    |
| 750                           | 67842007                               | SD4T90-750   | Transmitter |
|                               | 67841607                               | SD4R90-750E  | Receiver    |
| 900                           | 67842009                               | SD4T90-900   | Transmitter |
|                               | 67841609                               | SD4R90-900E  | Receiver    |
| 1050                          | 67842010                               | SD4T90-1050  | Transmitter |
|                               | 67841610                               | SD4R90-1050E | Receiver    |
| 1200                          | 67842012                               | SD4T90-1200  | Transmitter |
|                               | 67841612                               | SD4R90-1200E | Receiver    |
| 1350                          | 67842013                               | SD4T90-1350  | Transmitter |
|                               | 67841613                               | SD4R90-1350E | Receiver    |
| 1500                          | 67842015                               | SD4T90-1500  | Transmitter |
|                               | 67841615                               | SD4R90-1500E | Receiver    |
| 1650                          | 67842016                               | SD4T90-1650  | Transmitter |
|                               | 67841616                               | SD4R90-1650E | Receiver    |
| 1800                          | 67842018                               | SD4T90-1800  | Transmitter |
|                               | 67841618                               | SD4R90-1800E | Receiver    |

### Note

With cascaded devices, sliding blocks are supplied instead of BT-360 mounting brackets.

### Note

Examples of fixed SOLID cascading can be found on pages 127, 128.



# SAFETY LIGHT CURTAINS

## Ordering information

**SOLID-4E host/guest**, consisting of transmitter and receiver  
Included in delivery: Sliding blocks, 1 set of connecting and operating instructions (PDF file on CD-ROM)

**Function:** Automatic start/restart, selectable start/restart interlock, dynamic contactor monitoring, selectable transmission channels

| Protective field height in mm | SOLID-4 HOST                          |               |             | SOLID-4 GUEST                         |              |             |
|-------------------------------|---------------------------------------|---------------|-------------|---------------------------------------|--------------|-------------|
|                               | Part no.                              | Article       | Description | Part no.                              | Article      | Description |
|                               | Resolution: 14 mm<br>Range: 0.3 - 6 m |               |             | Resolution: 14 mm<br>Range: 0.3 - 6 m |              |             |
| 150                           |                                       |               |             | 67847001                              | SD4T14-150G  | Transmitter |
|                               |                                       |               |             | 67846001                              | SD4R14-150G  | Receiver    |
| 300                           | 67845003                              | SD4T14-300H   | Transmitter | 67847003                              | SD4T14-300G  | Transmitter |
|                               | 67844103                              | SD4R14-300EH  | Receiver    | 67846003                              | SD4R14-300G  | Receiver    |
| 450                           | 67845004                              | SD4R14-450H   | Transmitter | 67847004                              | SD4T14-450G  | Transmitter |
|                               | 67844104                              | SD4R14-450EH  | Receiver    | 67846004                              | SD4R14-450G  | Receiver    |
| 600                           | 67845006                              | SD4T14-600H   | Transmitter | 67847006                              | SD4T14-600G  | Transmitter |
|                               | 67844106                              | SD4R14-600EH  | Receiver    | 67846006                              | SD4R14-600G  | Receiver    |
| 750                           | 67845007                              | SD4T14-750H   | Transmitter | 67847007                              | SD4T14-750G  | Transmitter |
|                               | 67844107                              | SD4R14-750EH  | Receiver    | 67846007                              | SD4R14-750G  | Receiver    |
| 900                           | 67845009                              | SD4T14-900H   | Transmitter | 67847009                              | SD4T14-900G  | Transmitter |
|                               | 67844109                              | SD4R14-900EH  | Receiver    | 67846009                              | SD4R14-900G  | Receiver    |
| 1050                          | 67845010                              | SD4T14-1050H  | Transmitter | 67847010                              | SD4T14-1050G | Transmitter |
|                               | 67844110                              | SD4R14-1050EH | Receiver    | 67846010                              | SD4R14-1050G | Receiver    |
| 1200                          | 67845012                              | SD4T14-1200H  | Transmitter | 67847012                              | SD4T14-1200G | Transmitter |
|                               | 67844112                              | SD4R14-1200EH | Receiver    | 67846012                              | SD4R14-1200G | Receiver    |
| 1350                          | 67845013                              | SD4T14-1350H  | Transmitter | 67847013                              | SD4T14-1350G | Transmitter |
|                               | 67844113                              | SD4R14-1350EH | Receiver    | 67846013                              | SD4R14-1350G | Receiver    |
| 1500                          | 67845015                              | SD4T14-1500H  | Transmitter | 67847015                              | SD4T14-1500G | Transmitter |
|                               | 67844115                              | SD4R14-1500EH | Receiver    | 67846015                              | SD4R14-1500G | Receiver    |
| 1650                          | 67845016                              | SD4T14-1650H  | Transmitter | 67847016                              | SD4T14-1650G | Transmitter |
|                               | 67844116                              | SD4R14-1650EH | Receiver    | 67846016                              | SD4R14-1650G | Receiver    |
| 1800                          | 67845018                              | SD4T14-1800H  | Transmitter | 67847018                              | SD4T14-1800G | Transmitter |
|                               | 67844118                              | SD4R14-1800EH | Receiver    | 67846018                              | SD4R14-1800G | Receiver    |

### Note

With cascaded devices, sliding blocks are supplied instead of BT-360 mounting brackets.

### Note

Examples of fixed SOLID cascading can be found on pages 127, 128.

MLC 500  
p. 84

MLC 300  
p. 100

**SOLID-4, SOLID-4E**  
p. 108

SOLID-2, SOLID-2E  
p. 134

COMPACTplus  
p. 148

## Ordering information

**SOLID-4E host/guest**, consisting of transmitter and receiver  
Included in delivery: Sliding blocks, 1 set of connecting and operating instructions (PDF file on CD-ROM)

**Function:** Automatic start/restart, selectable start/restart interlock, dynamic contactor monitoring, selectable transmission channels

| Protective field height in mm | SOLID-4 HOST                           |               |             | SOLID-4 GUEST                          |              |             |
|-------------------------------|--|---------------|-------------|--|--------------|-------------|
|                               | Part no.                               | Article       | Description | Part no.                               | Article      | Description |
|                               | Resolution: 20 mm<br>Range: 0.7 - 14 m |               |             | Resolution: 20 mm<br>Range: 0.7 - 14 m |              |             |
| 150                           |  |               |             | 67847101                               | SD4T20-150G  | Transmitter |
|                               |  |               |             | 67846201                               | SD4R20-150G  | Receiver    |
| 225                           |  |               |             | 67847102                               | SD4T20-225G  | Transmitter |
|                               |  |               |             | 67846202                               | SD4R20-225G  | Receiver    |
| 300                           | 67845103                               | SD4T20-300H   | Transmitter | 67847103                               | SD4T20-300G  | Transmitter |
|                               | 67844303                               | SD4R20-300EH  | Receiver    | 67846203                               | SD4R20-300G  | Receiver    |
| 450                           | 67845104                               | SD4T20-450H   | Transmitter | 67847104                               | SD4T20-450G  | Transmitter |
|                               | 67844304                               | SD4R20-450EH  | Receiver    | 67846204                               | SD4R20-450G  | Receiver    |
| 600                           | 67845106                               | SD4T20-600H   | Transmitter | 67847106                               | SD4T20-600G  | Transmitter |
|                               | 67844306                               | SD4R20-600EH  | Receiver    | 67846206                               | SD4R20-600G  | Receiver    |
| 750                           | 67845107                               | SD4T20-750H   | Transmitter | 67847107                               | SD4T20-750G  | Transmitter |
|                               | 67844307                               | SD4R20-750EH  | Receiver    | 67846207                               | SD4R20-750G  | Receiver    |
| 900                           | 67845109                               | SD4T20-900H   | Transmitter | 67847109                               | SD4T20-900G  | Transmitter |
|                               | 67844309                               | SD4R20-900EH  | Receiver    | 67846209                               | SD4R20-900G  | Receiver    |
| 1050                          | 67845110                               | SD4T20-1050H  | Transmitter | 67847110                               | SD4T20-1050G | Transmitter |
|                               | 67844310                               | SD4R20-1050EH | Receiver    | 67846210                               | SD4R20-1050G | Receiver    |
| 1200                          | 67845112                               | SD4T20-1200H  | Transmitter | 67847112                               | SD4T20-1200G | Transmitter |
|                               | 67844312                               | SD4R20-1200EH | Receiver    | 67846212                               | SD4R20-1200G | Receiver    |
| 1350                          | 67845113                               | SD4T20-1350H  | Transmitter | 67847113                               | SD4T20-1350G | Transmitter |
|                               | 67844313                               | SD4R20-1350EH | Receiver    | 67846213                               | SD4R20-1350G | Receiver    |
| 1500                          | 67845115                               | SD4T20-1500H  | Transmitter | 67847115                               | SD4T20-1500G | Transmitter |
|                               | 67844315                               | SD4R20-1500EH | Receiver    | 67846215                               | SD4R20-1500G | Receiver    |
| 1650                          | 67845116                               | SD4T20-1650H  | Transmitter | 67847116                               | SD4T20-1650G | Transmitter |
|                               | 67844316                               | SD4R20-1650EH | Receiver    | 67846216                               | SD4R20-1650G | Receiver    |
| 1800                          | 67845118                               | SD4T20-1800H  | Transmitter | 67847118                               | SD4T20-1800G | Transmitter |
|                               | 67844318                               | SD4R20-1800EH | Receiver    | 67846218                               | SD4R20-1800G | Receiver    |

**Note**

With cascaded devices, sliding blocks are supplied instead of BT-360 mounting brackets.

**Note**

Examples of fixed SOLID cascading can be found on pages 127, 128.

[www.leuze.com/en/solid/](http://www.leuze.com/en/solid/)

# SAFETY LIGHT CURTAINS

## Ordering information

**SOLID-4E host/guest**, consisting of transmitter and receiver  
Included in delivery: Sliding blocks, 1 set of connecting and operating instructions (PDF file on CD-ROM)

**Function:** Automatic start/restart, selectable start/restart interlock, dynamic contactor monitoring, selectable transmission channels

| Protective field height in mm | SOLID-4 HOST                          |               |             | SOLID-4 GUEST                         |              |             |
|-------------------------------|---------------------------------------|---------------|-------------|---------------------------------------|--------------|-------------|
|                               | Part no.                              | Article       | Description | Part no.                              | Article      | Description |
|                               | Resolution: 30 mm<br>Range: 0.5 - 9 m |               |             | Resolution: 30 mm<br>Range: 0.5 - 9 m |              |             |
| 150                           |                                       |               |             | 67847201                              | SD4T30-150G  | Transmitter |
|                               |                                       |               |             | 67846401                              | SD4R30-150G  | Receiver    |
| 225                           |                                       |               |             | 67847202                              | SD4T30-225G  | Transmitter |
|                               |                                       |               |             | 67846402                              | SD4R30-225G  | Receiver    |
| 300                           | 67845203                              | SD4T30-300H   | Transmitter | 67847203                              | SD4T30-300G  | Transmitter |
|                               | 67844503                              | SD4R30-300EH  | Receiver    | 67846403                              | SD4R30-300G  | Receiver    |
| 450                           | 67845204                              | SD4T30-450H   | Transmitter | 67847204                              | SD4T30-450G  | Transmitter |
|                               | 67844504                              | SD4R30-450EH  | Receiver    | 67846404                              | SD4R30-450G  | Receiver    |
| 600                           | 67845206                              | SD4T30-600H   | Transmitter | 67847206                              | SD4T30-600G  | Transmitter |
|                               | 67844506                              | SD4R30-600EH  | Receiver    | 67846406                              | SD4R30-600G  | Receiver    |
| 750                           | 67845207                              | SD4T30-750H   | Transmitter | 67847207                              | SD4T30-750G  | Transmitter |
|                               | 67844507                              | SD4R30-750EH  | Receiver    | 67846407                              | SD4R30-750G  | Receiver    |
| 900                           | 67845209                              | SD4T30-900H   | Transmitter | 67847209                              | SD4T30-900G  | Transmitter |
|                               | 67844509                              | SD4R30-900EH  | Receiver    | 67846409                              | SD4R30-900G  | Receiver    |
| 1050                          | 67845210                              | SD4T30-1050H  | Transmitter | 67847210                              | SD4T30-1050G | Transmitter |
|                               | 67844510                              | SD4R30-1050EH | Receiver    | 67846410                              | SD4R30-1050G | Receiver    |
| 1200                          | 67845212                              | SD4T30-1200H  | Transmitter | 67847212                              | SD4T30-1200G | Transmitter |
|                               | 67844512                              | SD4R30-1200EH | Receiver    | 67846412                              | SD4R30-1200G | Receiver    |
| 1350                          | 67845213                              | SD4T30-1350H  | Transmitter | 67847213                              | SD4T30-1350G | Transmitter |
|                               | 67844513                              | SD4R30-1350EH | Receiver    | 67846413                              | SD4R30-1350G | Receiver    |
| 1500                          | 67845215                              | SD4T30-1500H  | Transmitter | 67847215                              | SD4T30-1500G | Transmitter |
|                               | 67844515                              | SD4R30-1500EH | Receiver    | 67846415                              | SD4R30-1500G | Receiver    |
| 1650                          | 67845216                              | SD4T30-1650H  | Transmitter | 67847216                              | SD4T30-1650G | Transmitter |
|                               | 67844516                              | SD4R30-1650EH | Receiver    | 67846416                              | SD4R30-1650G | Receiver    |
| 1800                          | 67845218                              | SD4T30-1800H  | Transmitter | 67847218                              | SD4T30-1800G | Transmitter |
|                               | 67844518                              | SD4R30-1800EH | Receiver    | 67846418                              | SD4R30-1800G | Receiver    |

**Note**

With cascaded devices, sliding blocks are supplied instead of BT-360 mounting brackets.

**Note**

Examples of fixed SOLID cascading can be found on pages 127, 128.

MLC 500  
p. 84

MLC 300  
p. 100

**SOLID-4, SOLID-4E**  
p. 108

SOLID-2, SOLID-2E  
p. 134

COMPACTplus  
p. 148

# SOLID-4, SOLID-4E

## Ordering information

**SOLID-4E host/guest**, consisting of transmitter and receiver  
Included in delivery: Sliding blocks, 1 set of connecting and operating instructions (PDF file on CD-ROM)

**Function:** Automatic start/restart, selectable start/restart interlock, dynamic contactor monitoring, selectable transmission channels

| Protective field height in mm | SOLID-4 HOST                           |               |             | SOLID-4 GUEST                          |              |             |
|-------------------------------|--|---------------|-------------|--|--------------|-------------|
|                               | Part no.                               | Article       | Description | Part no.                               | Article      | Description |
|                               | Resolution: 40 mm<br>Range: 0.9 - 20 m |               |             | Resolution: 40 mm<br>Range: 0.9 - 20 m |              |             |
| 150                           |  |               |             | 67847301                               | SD4T40-150G  | Transmitter |
|                               |  |               |             | 67846601                               | SD4R40-150G  | Receiver    |
| 225                           |  |               |             | 67847302                               | SD4T40-225G  | Transmitter |
|                               |  |               |             | 67846602                               | SD4R40-225G  | Receiver    |
| 300                           | 67845303                               | SD4T40-300H   | Transmitter | 67847303                               | SD4T40-300G  | Transmitter |
|                               | 67844703                               | SD4R40-300EH  | Receiver    | 67846603                               | SD4R40-300G  | Receiver    |
| 450                           | 67845304                               | SD4T40-450H   | Transmitter | 67847304                               | SD4T40-450G  | Transmitter |
|                               | 67844704                               | SD4R40-450EH  | Receiver    | 67846604                               | SD4R40-450G  | Receiver    |
| 600                           | 67845306                               | SD4T40-600H   | Transmitter | 67847306                               | SD4T40-600G  | Transmitter |
|                               | 67844706                               | SD4R40-600EH  | Receiver    | 67846606                               | SD4R40-600G  | Receiver    |
| 750                           | 67845307                               | SD4T40-750H   | Transmitter | 67847307                               | SD4T40-750G  | Transmitter |
|                               | 67844707                               | SD4R40-750EH  | Receiver    | 67846607                               | SD4R40-750G  | Receiver    |
| 900                           | 67845309                               | SD4T40-900H   | Transmitter | 67847309                               | SD4T40-900G  | Transmitter |
|                               | 67844709                               | SD4R40-900EH  | Receiver    | 67846609                               | SD4R40-900G  | Receiver    |
| 1050                          | 67845310                               | SD4T40-1050H  | Transmitter | 67847310                               | SD4T40-1050G | Transmitter |
|                               | 67844710                               | SD4R40-1050EH | Receiver    | 67846610                               | SD4R40-1050G | Receiver    |
| 1200                          | 67845312                               | SD4T40-1200H  | Transmitter | 67847312                               | SD4T40-1200G | Transmitter |
|                               | 67844712                               | SD4R40-1200EH | Receiver    | 67846612                               | SD4R40-1200G | Receiver    |
| 1350                          | 67845313                               | SD4T40-1350H  | Transmitter | 67847313                               | SD4T40-1350G | Transmitter |
|                               | 67844713                               | SD4R40-1350EH | Receiver    | 67846613                               | SD4R40-1350G | Receiver    |
| 1500                          | 67845315                               | SD4T40-1500H  | Transmitter | 67847315                               | SD4T40-1500G | Transmitter |
|                               | 67844715                               | SD4R40-1500EH | Receiver    | 67846615                               | SD4R40-1500G | Receiver    |
| 1650                          | 67845316                               | SD4T40-1650H  | Transmitter | 67847316                               | SD4T40-1650G | Transmitter |
|                               | 67844716                               | SD4R40-1650EH | Receiver    | 67846616                               | SD4R40-1650G | Receiver    |
| 1800                          | 67845318                               | SD4T40-1800H  | Transmitter | 67847318                               | SD4T40-1800G | Transmitter |
|                               | 67844718                               | SD4R40-1800EH | Receiver    | 67846618                               | SD4R40-1800G | Receiver    |

**Note**

With cascaded devices, sliding blocks are supplied instead of BT-360 mounting brackets.

**Note**

Examples of fixed SOLID cascading can be found on pages 127, 128.

[www.leuze.com/en/solid/](http://www.leuze.com/en/solid/)

# SAFETY LIGHT CURTAINS

## Ordering information

**SOLID-4E host/guest**, consisting of transmitter and receiver  
Included in delivery: Sliding blocks, 1 set of connecting and operating instructions (PDF file on CD-ROM)

**Function:** Automatic start/restart, selectable start/restart interlock, dynamic contactor monitoring, selectable transmission channels

| Protective field height in mm | SOLID-4 HOST                           |               |             | SOLID-4 GUEST                          |              |             |
|-------------------------------|--|---------------|-------------|--|--------------|-------------|
|                               | Part no.                               | Article       | Description | Part no.                               | Article      | Description |
|                               | Resolution: 90 mm<br>Range: 0.9 - 20 m |               |             | Resolution: 90 mm<br>Range: 0.9 - 20 m |              |             |
| 600                           | 67845406                               | SD4T90-600H   | Transmitter | 67847406                               | SD4T90-600G  | Transmitter |
|                               | 67844906                               | SD4R90-600EH  | Receiver    | 67846806                               | SD4R90-600G  | Receiver    |
| 750                           | 67845407                               | SD4T90-750H   | Transmitter | 67847407                               | SD4T90-750G  | Transmitter |
|                               | 67844907                               | SD4R90-750EH  | Receiver    | 67846807                               | SD4R90-750G  | Receiver    |
| 900                           | 67845409                               | SD4T90-900H   | Transmitter | 67847409                               | SD4T90-900G  | Transmitter |
|                               | 67844909                               | SD4R90-900EH  | Receiver    | 67846809                               | SD4R90-900G  | Receiver    |
| 1050                          | 67845410                               | SD4T90-1050H  | Transmitter | 67847410                               | SD4T90-1050G | Transmitter |
|                               | 67844910                               | SD4R90-1050EH | Receiver    | 67846810                               | SD4R90-1050G | Receiver    |
| 1200                          | 67845412                               | SD4T90-1200H  | Transmitter | 67847412                               | SD4T90-1200G | Transmitter |
|                               | 67844912                               | SD4R90-1200EH | Receiver    | 67846812                               | SD4R90-1200G | Receiver    |
| 1350                          | 67845413                               | SD4T90-1350H  | Transmitter | 67847413                               | SD4T90-1350G | Transmitter |
|                               | 67844913                               | SD4R90-1350EH | Receiver    | 67846813                               | SD4R90-1350G | Receiver    |
| 1500                          | 67845415                               | SD4T90-1500H  | Transmitter | 67847415                               | SD4T90-1500G | Transmitter |
|                               | 67844915                               | SD4R90-1500EH | Receiver    | 67846815                               | SD4R90-1500G | Receiver    |
| 1650                          | 67845416                               | SD4T90-1650H  | Transmitter | 67847416                               | SD4T90-1650G | Transmitter |
|                               | 67844916                               | SD4R90-1650EH | Receiver    | 67846816                               | SD4R90-1650G | Receiver    |
| 1800                          | 67845418                               | SD4T90-1800H  | Transmitter | 67847418                               | SD4T90-1800G | Transmitter |
|                               | 67844918                               | SD4R90-1800EH | Receiver    | 67846818                               | SD4R90-1800G | Receiver    |

**Note**

With cascaded devices, sliding blocks are supplied instead of BT-360 mounting brackets.

**Note**

Examples of fixed SOLID cascading can be found on pages 127, 128.

**Article list for SOLID-4**

**Safety Light Curtains of the SOLID-4 series**

| Article        | Description   |
|----------------|---|
| <b>SD4</b>     | <b>SOLID-4</b>  |
| <b>t</b>       | <b>Device type</b>  |
| <b>T</b>       | Transmitter   |
| <b>R</b>       | Receiver  |
| <b>rr</b>      | <b>Resolution/range</b>   |
| <b>14</b>      | 14 mm / range 0.3 - 6 m   |
| <b>20</b>      | 20 mm / range 0.7 - 14 m  |
| <b>30</b>      | 30 mm / range 0.5 - 9 m   |
| <b>40</b>      | 40 mm / range 0.9 - 20 m  |
| <b>90</b>      | 90 mm / range 0.9 - 20 m  |
| <b>hhhh</b>    | <b>Protective field height</b>  |
|                | 150...3000 mm   |
| <b>v</b>       | <b>Function package (receiver only)</b>   |
| <b>E</b>       | With selectable start/restart interlock, contactor monitoring and transmission channels |
| <b>k</b>       | <b>Design</b>   |
| <b>Without</b> | Standard design   |
| <b>H</b>       | Host  |
| <b>G</b>       | Guest   |
| <b>L</b>       | L-Shape   |
| <b>U</b>       | U-Shape   |
| <b>L1</b>      | L-Shape 45°   |

**Note**

The Host, L-Shape, U-Shape, L-Shape 45° models are available only in combination with the function package "E".

**Note**

Order numbers for L- and U-Shape device versions are available on request. L- and U-Shape device versions are only available with uniform resolution on all forks. With cascaded devices, sliding blocks are supplied instead of BT-360 mounting brackets.

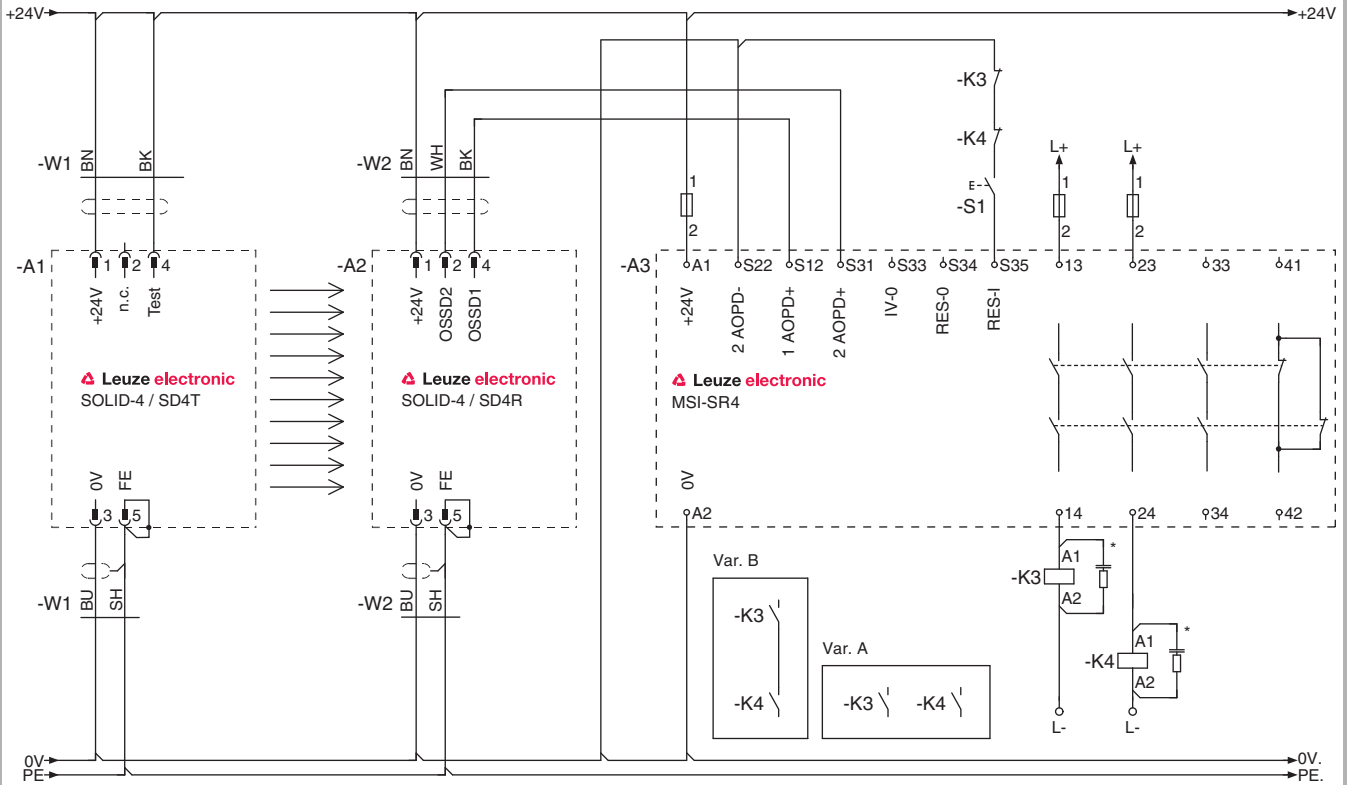
[www.leuze.com/en/solid/](http://www.leuze.com/en/solid/)



# SAFETY LIGHT CURTAINS

## Electrical connection

### SOLID-4 connection example



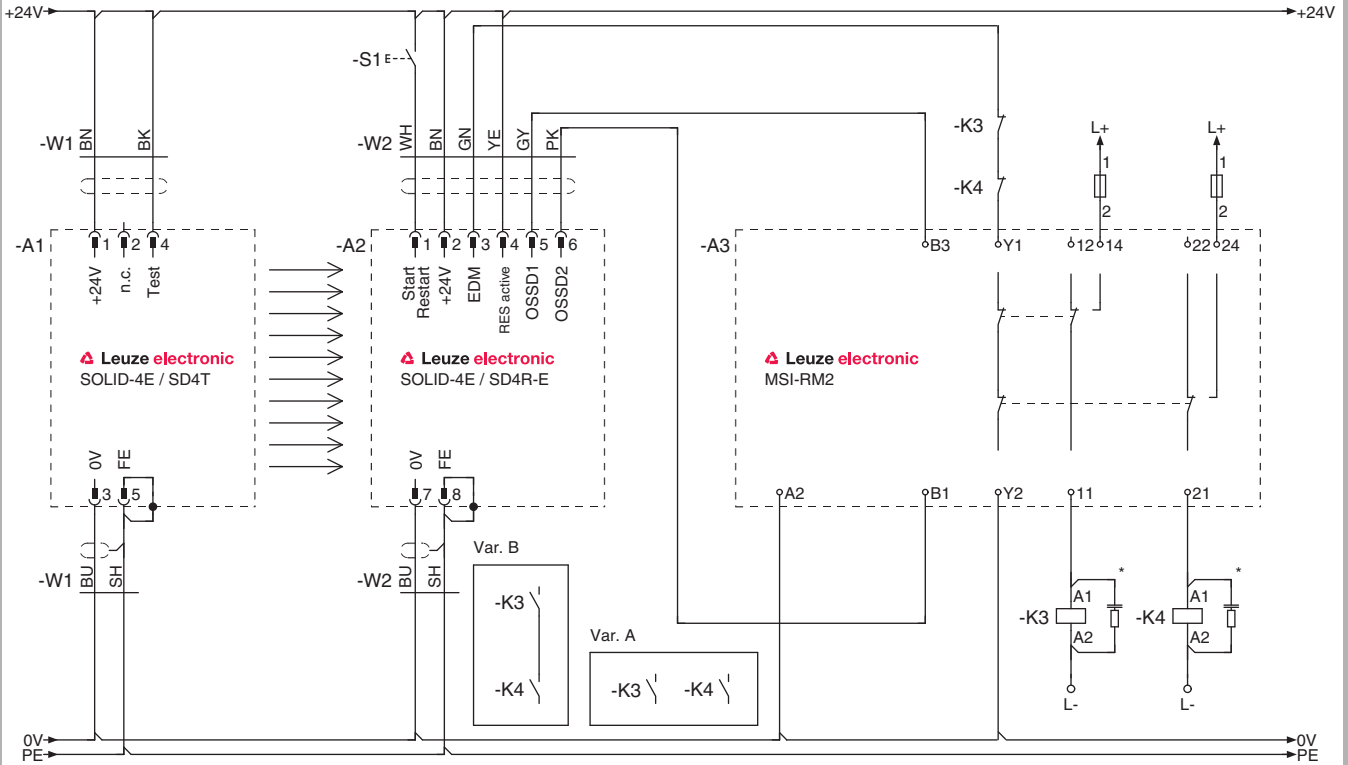
\*) Spark extinction circuit, supply suitable spark extinction

### SOLID-4 with MSI-SR4 Safety Relay

Please observe the operating instructions of the components!

**Electrical connection**

**SOLID-4E connection example**



\*) Spark extinction circuit, supply suitable spark extinction

SOLID-4E with MSI-RM2 Safety Relay

**⚠** Please observe the operating instructions of the components!

## SAFETY LIGHT CURTAINS

### Technical data

| General system data  |   |            |           |            |                         |
|--|---|------------|-----------|------------|-------------------------|
| Type in accordance with EN/IEC 61496                                       | 4   |            |           |            |                         |
| SIL in accordance with IEC 61508 and SILCL in accordance with EN/IEC 62061 | 3   |            |           |            |                         |
| Performance Level (PL) in accordance with EN ISO 13849-1                   | e   |            |           |            |                         |
| Probability of a failure to danger per hour (PFH <sub>d</sub> )            | For protective heights up to 900 mm, all resolutions                    |            |           |            | 6.00 x 10 <sup>-9</sup> |
|  | For protective heights up to 1800 mm, all resolutions                   |            |           |            | 7.30 x 10 <sup>-9</sup> |
|  | For protective heights up to 2850 mm                                    |            |           |            | 8.40 x 10 <sup>-9</sup> |
| Service life (T <sub>M</sub> ) in accordance with EN ISO 13849-1           | 20 years  |            |           |            |                         |
| Category in accordance with EN ISO 13849                                   | 4   |            |           |            |                         |
| Resolution   | 14 mm   | 20 mm      | 30 mm     | 40 mm      | 90 mm                   |
| Range  | 0.3...6 m   | 0.7...14 m | 0.5...9 m | 0.9...20 m | 0.9...20 m              |
| Response time (depends on protective field height)                         | 7...38 ms   | 11...31 ms | 6...16 ms | 6...16 ms  | 8...11 ms               |
| Protective field height  | 150...1800 mm   |            |           |            | 600...1800 mm           |
| Synchronization  | Optical via transmitter and receiver                                    |            |           |            |                         |
| Supply voltage   | 24 V DC, ±20%   |            |           |            |                         |
| Connection cable length  | Max. 100 m with 0.25 mm <sup>2</sup>                                    |            |           |            |                         |
| Safety class   | III   |            |           |            |                         |
| Protection rating  | IP 65   |            |           |            |                         |
| Ambient temperature, operation   | 0...+50 °C  |            |           |            |                         |
| Ambient temperature, storage   | -25...+70 °C  |            |           |            |                         |
| Relative humidity  | 15...95%  |            |           |            |                         |
| Profile cross-section  | 30 mm x 34 mm   |            |           |            |                         |
| Weight per device (length-dependent)                                       | 0.30...1.90 kg  |            |           |            |                         |
| Transmitter  |   |            |           |            |                         |
| Transmitter diodes, class in accordance with EN 60825                      | 1   |            |           |            |                         |
| Wavelength   | 950 nm  |            |           |            |                         |
| Current consumption  | 75 mA   |            |           |            |                         |
| Connection system  | M12 plug, 5-pin   |            |           |            |                         |
| External test input  | 24 V DC, max. 20 mA   |            |           |            |                         |
| Receiver   |   |            |           |            |                         |
| Current consumption  | 110 mA without external load  |            |           |            |                         |
| Safety-related switching outputs (OSSDs)                                   | 2 pnp transistor outputs (short circuit-proof, cross-circuit monitored) |            |           |            |                         |
| Switching voltage high active  | Min. U <sub>v</sub> -2.2 V  |            |           |            |                         |
| Switching voltage low  | Max. 2.8 V  |            |           |            |                         |
| Switching current  | Typical, 250 mA   |            |           |            |                         |
| SOLID-4 connection system  | M12 plug, 5-pin   |            |           |            |                         |
| SOLID-4E connection system   | M12 plug, 8-pin   |            |           |            |                         |

Please note the additional information in the SOLID-4 Connecting and Operating Instructions at [www.leuze.com/en/solid](http://www.leuze.com/en/solid).

MLC 500  
p. 84

MLC 300  
p. 100

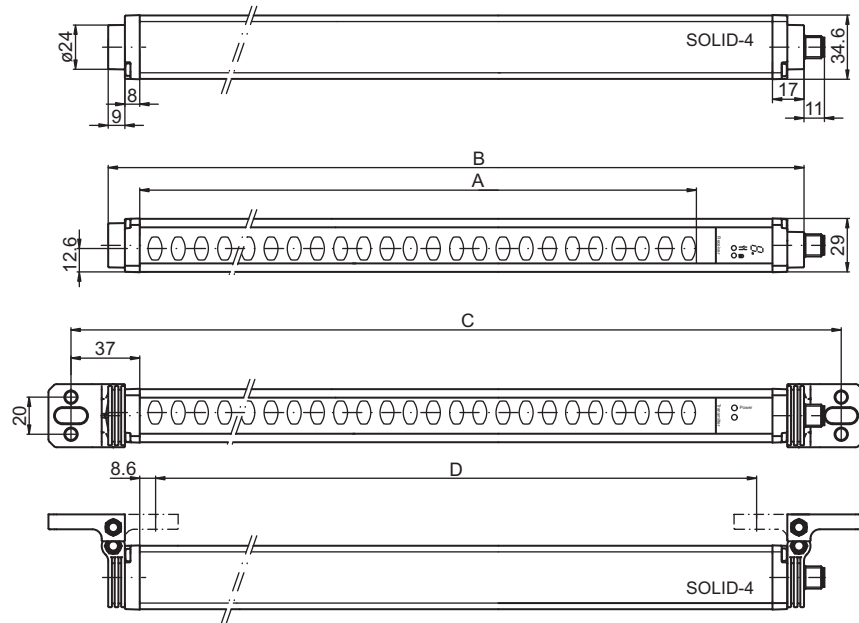
**SOLID-4, SOLID-4E**  
p. 108

SOLID-2, SOLID-2E  
p. 134

COMPACTplus  
p. 148

**Dimensional drawings**

**SOLID-4/SOLID-4E Safety Light Curtain**



- A = Protective field height according to ordering information
- B = A + 75.5 mm
- C = A + 115.5 mm
- D = A + 24.3 mm

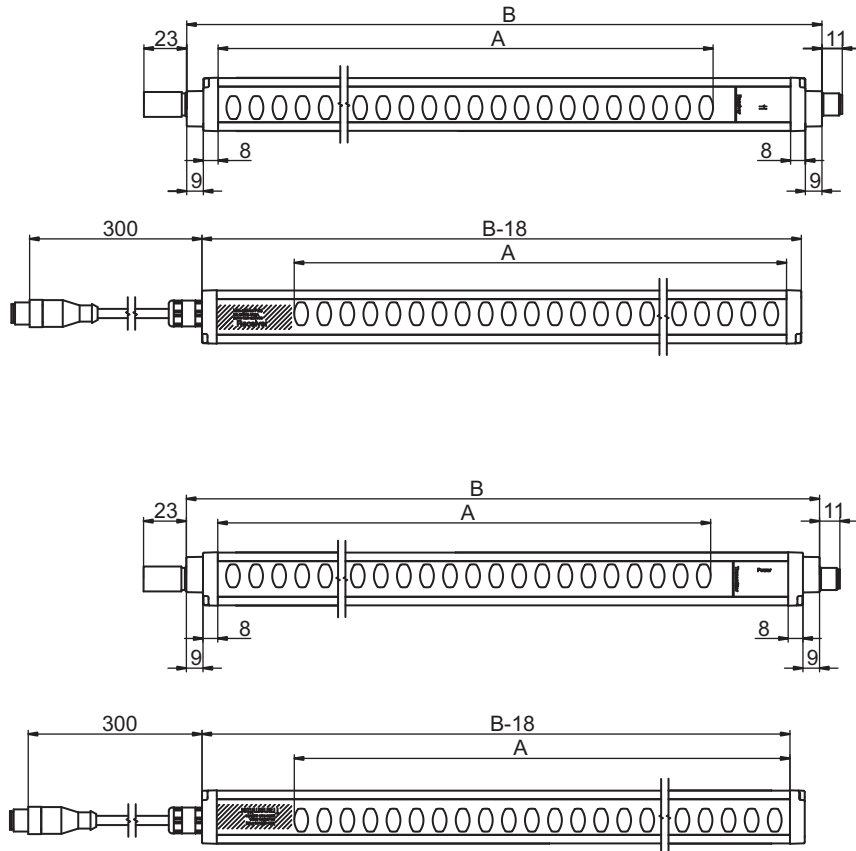
Dimensions in mm

[www.leuze.com/en/solid/](http://www.leuze.com/en/solid/)

# SAFETY LIGHT CURTAINS

## Dimensional drawings

### Version as cable-connected cascading host-guest



A = Protective field height according to ordering information  
 B = A + 75.5 mm

Dimensions in mm

**Note**

With cascaded devices, sliding blocks are supplied instead of BT-360 mounting brackets.

MLC 500  
p. 84

MLC 300  
p. 100

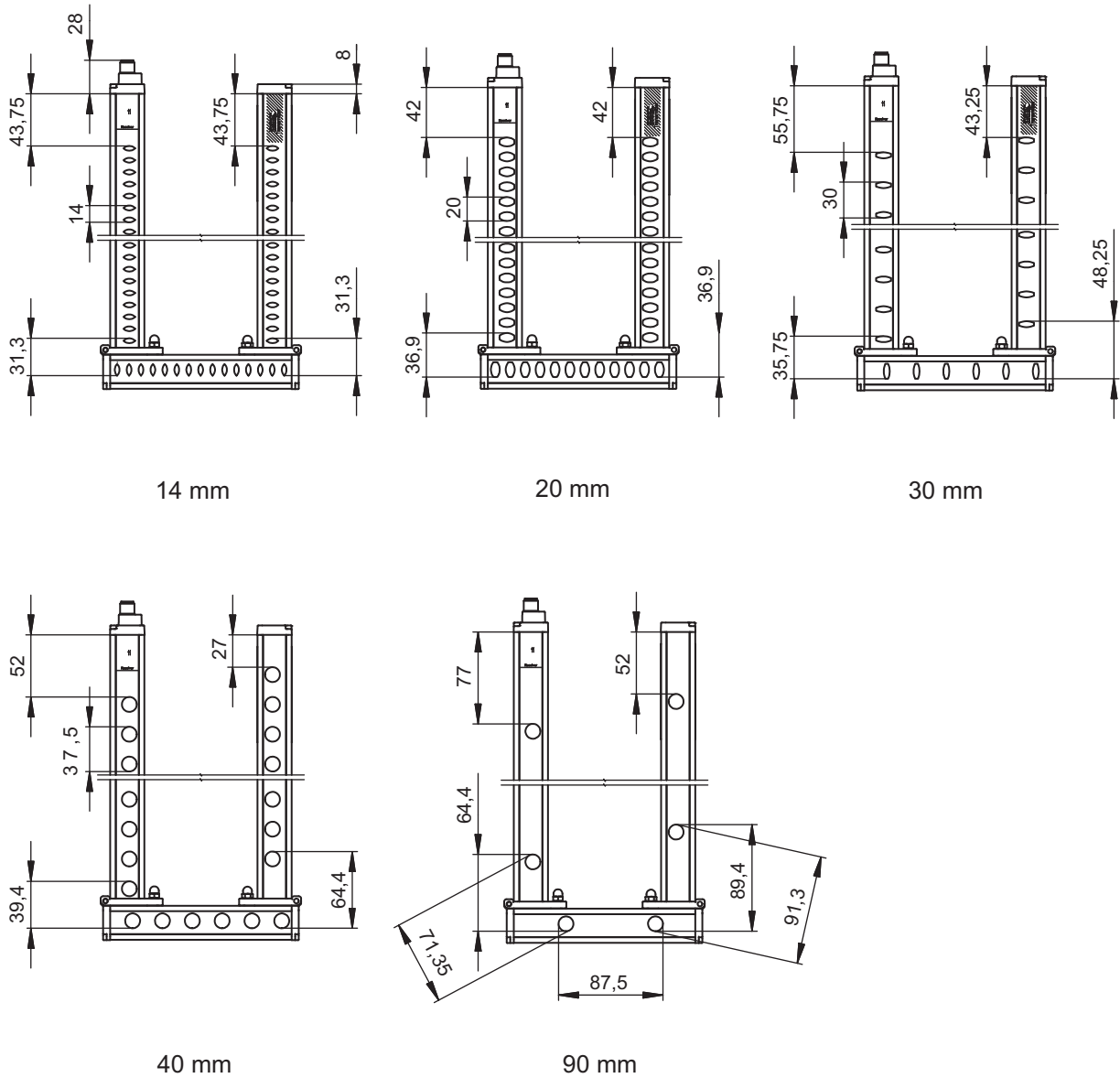
**SOLID-4, SOLID-4E**  
p. 108

SOLID-2, SOLID-2E  
p. 134

COMPACTplus  
p. 148

**Dimensional drawings**

**Version as fixed cascading L/U-Shape**



*Resolutions of the various L/U-Shape models*

Dimensions in mm

**Note**

Order numbers for L- and U-Shape device versions are available on request. L- and U-Shape device versions are only available with uniform resolution on all forks. With cascaded devices, sliding blocks are supplied instead of BT-360 mounting brackets.

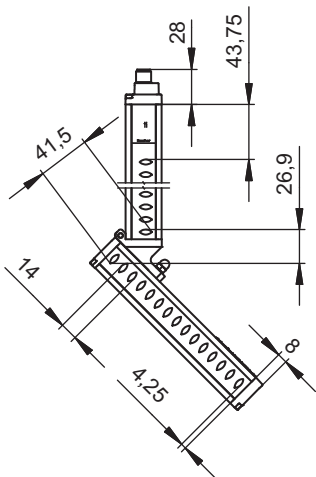
[www.leuze.com/en/solid/](http://www.leuze.com/en/solid/)



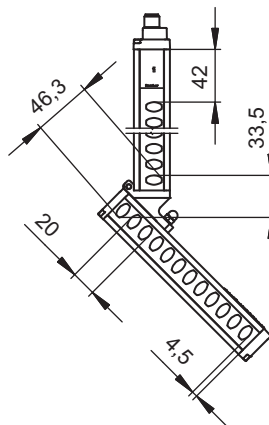
# SAFETY LIGHT CURTAINS

## Dimensional drawings

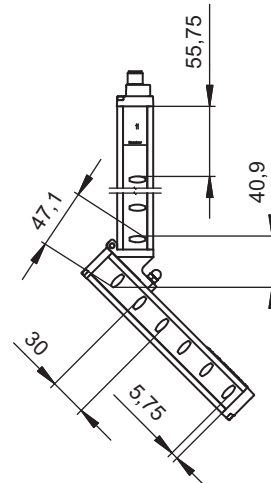
### Version as fixed cascading L1-Shape



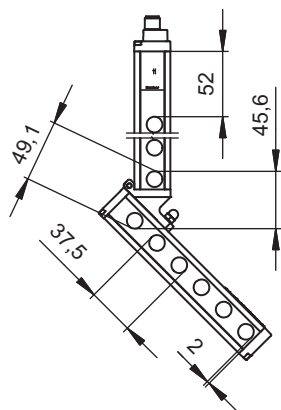
14 mm



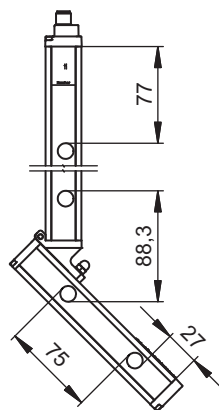
20 mm



30 mm



40 mm



90 mm

### Resolutions of the various L1-Shape models

Dimensions in mm

#### **Note**

Order numbers for L- and U-Shape device versions are available on request. L- and U-Shape device versions are only available with uniform resolution on all forks. With cascaded devices, sliding blocks are supplied instead of BT-360 mounting brackets.

MLC 500  
p. 84

MLC 300  
p. 100

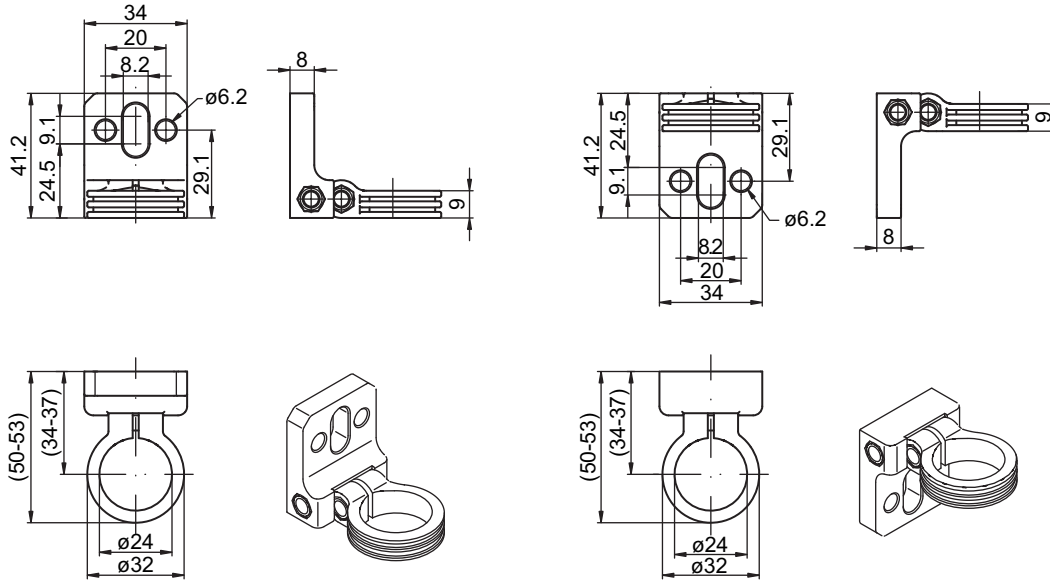
**SOLID-4, SOLID-4E**  
p. 108

SOLID-2, SOLID-2E  
p. 134

COMPACTplus  
p. 148

**Dimensional drawings: Accessories**

**Mounting brackets**



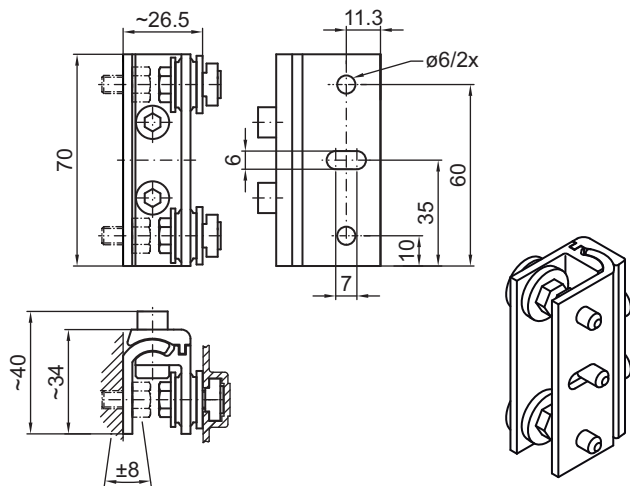
Mounting bracket, 360° rotation, BT-360

Dimensions in mm

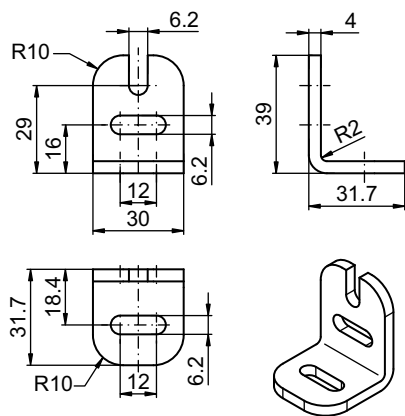
# SAFETY LIGHT CURTAINS

## Dimensional drawings: Accessories

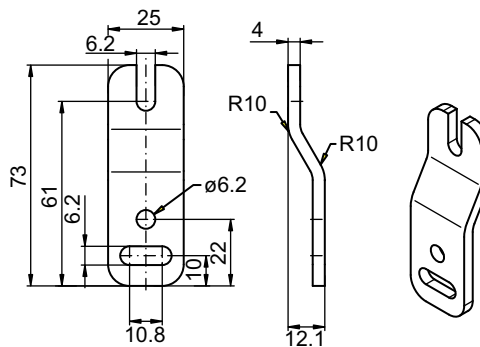
### Mounting brackets



Mounting bracket, swiveling with shock absorber, BT-SSD



L-mounting bracket, BT-L



Z-mounting bracket, BT-Z

Dimensions in mm

## Accessories ordering information

| Part no.   | Article           | Description   | Length, design          |
|--|-------------------|---|-------------------------|
| <b>Installation accessories</b>                                      |                   |   |                         |
| 429055   | BT-360-SET        | Mounting bracket set, consisting of 2 BT-360°   |                         |
| 429056   | BT-2L             | Mounting bracket set, consisting of 2 BT-L  |                         |
| 429057   | BT-2Z             | Mounting bracket set, consisting of 2 BT-Z  |                         |
| 429058   | BT-2SSD           | 2 x 70 mm long mounting brackets, swiveling with shock absorber, incl. 4 screws and 4 sliding blocks  |                         |
| 429059   | BT-4SSD           | 4 x 70 mm long mounting brackets, swiveling with shock absorber, incl. 8 screws and 8 sliding blocks  |                         |
| 429049   | BT-2SSD-270       | 2 x 270 mm long mounting brackets, swiveling with shock absorber, incl. 4 screws and 4 sliding blocks |                         |
| <b>Connection cables, 5-pin for SOLID-4 Transmitter and Receiver</b> |                   |   |                         |
| 429071   | CB-M12-5000S-5GF  | Connection cable shielded with M12 coupling, 5-pin  | 5 m, straight/open end  |
| 429072   | CB-M12-5000S-5WF  | Connection cable shielded with M12 coupling, 5-pin  | 5 m, angled/open end    |
| 429073   | CB-M12-10000S-5GF | Connection cable shielded with M12 coupling, 5-pin  | 10 m, straight/open end |
| 429074   | CB-M12-10000S-5WF | Connection cable shielded with M12 coupling, 5-pin  | 10 m, angled/open end   |
| 429075   | CB-M12-15000S-5GF | Connection cable shielded with M12 coupling, 5-pin  | 15 m, straight/open end |
| 429076   | CB-M12-15000S-5WF | Connection cable shielded with M12 coupling, 5-pin  | 15 m, angled/open end   |
| 429171   | CB-M12-25000S-5GF | Connection cable shielded with M12 coupling, 5-pin  | 25 m, straight/open end |
| 429172   | CB-M12-25000S-5WF | Connection cable shielded with M12 coupling, 5-pin  | 25 m, angled/open end   |

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## SAFETY LIGHT CURTAINS

### Accessories ordering information

| Part no.  | Article           | Description  | Length, design          |
|---|-------------------|--|-------------------------|
| <b>Connection cables, 8-pin for SOLID-4E Receiver</b> |                   |  |                         |
| 429081  | CB-M12-5000S-8GF  | Connection cable shielded with M12 coupling, 8-pin                               | 5 m, straight/open end  |
| 429082  | CB-M12-5000S-8WF  | Connection cable shielded with M12 coupling, 8-pin                               | 5 m, angled/open end    |
| 429083  | CB-M12-10000S-8GF | Connection cable shielded with M12 coupling, 8-pin                               | 10 m, straight/open end |
| 429084  | CB-M12-10000S-8WF | Connection cable shielded with M12 coupling, 8-pin                               | 10 m, angled/open end   |
| 429085  | CB-M12-15000S-8GF | Connection cable shielded with M12 coupling, 8-pin                               | 15 m, straight/open end |
| 429086  | CB-M12-15000S-8WF | Connection cable shielded with M12 coupling, 8-pin                               | 15 m, angled/open end   |
| 429181  | CB-M12-25000S-8GF | Connection cable shielded with M12 coupling, 8-pin                               | 25 m, straight/open end |
| 429182  | CB-M12-25000S-8WF | Connection cable shielded with M12 coupling, 8-pin                               | 25 m, angled/open end   |
| <b>Laser alignment aids</b>                           |                   |  |                         |
| 560020  | LA-78U            | Laser alignment aid for lateral mounting with use for COMPACT <i>plus</i> /SOLID |                         |
| <b>Power supplies</b>                                 |                   |  |                         |
| 520061  | LOGO! Power       | Power supply, 120/230 V AC<br>--> 24 V DC / 1.3 A, regulated                     |                         |
| <b>Test rods</b>                                      |                   |  |                         |
| 349939  | AC-TR20/40        | Test rod, 20 mm / 40 mm  |                         |
| 349945  | AC-TR14/30        | Test rod, 14 mm / 30 mm  |                         |
| <b>Protective screens, see accessories, page 520</b>  |                   |  |                         |

# SOLID-4, SOLID-4E

Machine Safety

Machine Safety  
Services

Safety  
Engineering  
Software

Safety Laser  
Scanners

Safety Light  
Curtains

Multiple Light  
Beam Safety  
Devices

Light Beam  
Safety Device  
Sets

Single Light  
Beam Safety  
Devices

AS-Interface  
Safety at Work

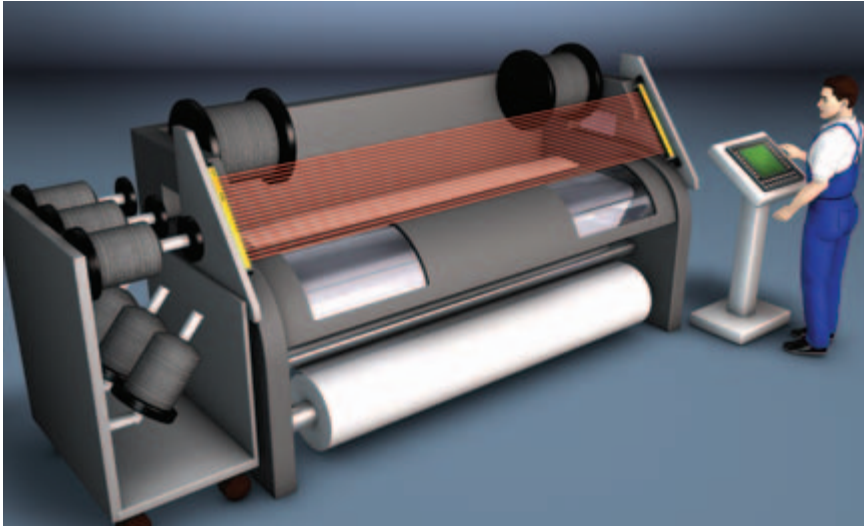
Safety Proximity  
Sensors

[www.leuze.com/en/solid/](http://www.leuze.com/en/solid/)



## SAFETY LIGHT CURTAINS

### SOLID-2, SOLID-2E

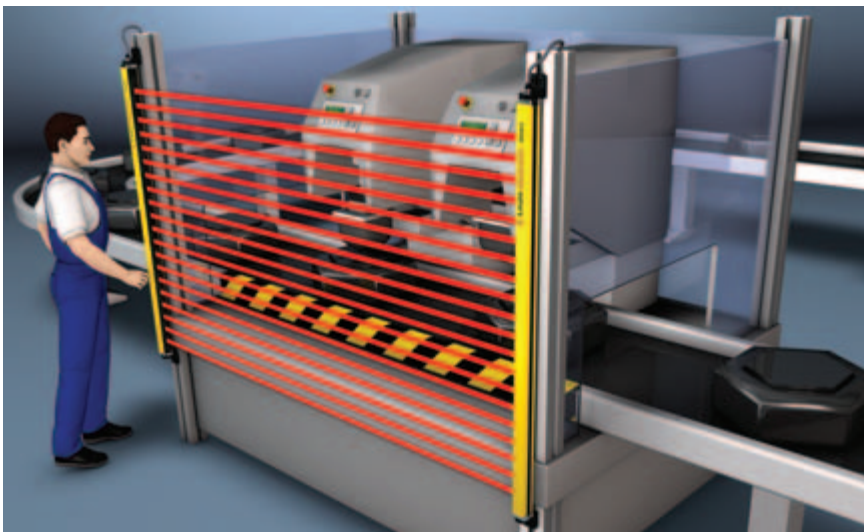


SOLID-2 with automatic restart on a textile machine

A reliable and interference-proof safety sensor system is a prerequisite for high system availability and achievement of production targets. At the same time the increasing costs pressure of global competition also requires an economical safety system. Satisfying these central requirements was the maxim with the development of the SOLID-2 type 2 Safety Light Curtains with integrated cyclical testing. These devices are characterized by their robust housing design and high interference immunity. Various resolutions and functionalities enable cost-optimized solutions with the most varied applications. SOLID-2 is predestined for hand and arm protection and for detecting the presence of people.

#### Typical areas of application

- Storage and conveyor systems
- Textile machinery
- Machinery in the timber and wood-processing industry
- Wafers
- Automatic loading systems
- Packaging machinery



SOLID-2E with integrated restart interlock on a pad printing machine

MLC 500  
p. 84

MLC 300  
p. 100

SOLID-4, SOLID-4E  
p. 108

**SOLID-2, SOLID-2E**  
**p. 134**

COMPACTplus  
p. 148

**SOLID-2, SOLID-2E**

**Important technical data, overview**

|  |                          |           |           |           |
|--|--------------------------|-----------|-----------|-----------|
| Type in accordance with EN/IEC 61496                                       | 2                        |           |           |           |
| SIL in accordance with IEC 61508 and SILCL in accordance with EN/IEC 62061 | 2                        |           |           |           |
| Performance Level (PL) in accordance with EN ISO 13849-1                   | d                        |           |           |           |
| Category in accordance with EN ISO 13849                                   | 2                        |           |           |           |
| Resolution   | 20 mm                    | 30 mm     | 40 mm     | 90 mm     |
| Range  | 0.5...15m                | 0.2...10m | 0.8...20m | 0.8...20m |
| Protective field height (type-dependent)                                   | 150...1800 mm            |           |           |           |
| Profile cross-section  | 30 mm x 34 mm            |           |           |           |
| Safety-related switching outputs (OSSDs)                                   | 2 pnp transistor outputs |           |           |           |
| Connection system  | M12 plug                 |           |           |           |

**Functions**

|  | SOLID-2 | SOLID-2E |
|--|---------|----------|
| Integrated cyclical testing                    | ●       | ●        |
| Automatic start/restart                        | ●       | ●        |
| Start/restart interlock (RES), selectable      |         | ●        |
| Dynamic contactor monitoring (EDM), selectable |         | ●        |
| 2 transmission channels, selectable            | ●       | ●        |

**Function extension**

**SOLID-2**

| With Safety Relays | Relay output | RES | EDM | Further details |
|--------------------|--------------|-----|-----|-----------------|
| MSI-SR4            | ●            | ●   | ●   | p. 428          |
| MSI-SR5            | ●            | ●   | ●   | p. 434          |

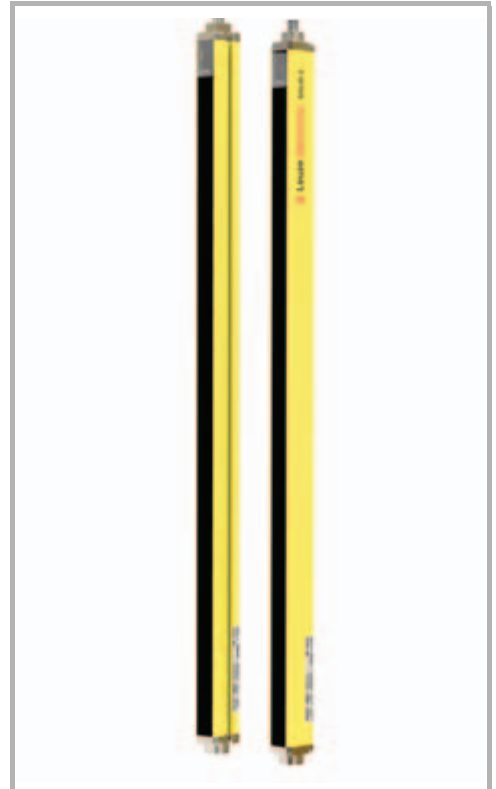
**SOLID-2E**

|         |   |   |   |        |
|---------|---|---|---|--------|
| MSI-RM2 | ● | * | * | p. 440 |
|---------|---|---|---|--------|

\*) Already included in the sensor

**Special features**

- **Type 2 self-testing Safety Light Curtain in accordance with EN/IEC 61496**
- **SIL 2 Safety Light Curtain in accordance with IEC 61508**
- **Slender and robust aluminum housing (30 mm x 34 mm)**
- **Fault-free operation of adjacent devices with selection of different transmission channels**
- **Simple function selection through external wiring**



**Features**

**Further information**

**Page**

- Ordering information 136
- Electrical connection 140
- Technical data 142
- SOLID-2 / SOLID-2E Safety Light Curtain dimensioned drawing 143
- Dimensional drawings: Accessories 144
- Accessories ordering information 146

[www.leuze.com/en/solid/](http://www.leuze.com/en/solid/)

Machine Safety

Machine Safety Services

Safety Engineering Software

Safety Laser Scanners

Safety Light Curtains

Multiple Light Beam Safety Devices

Light Beam Safety Device Sets

Single Light Beam Safety Devices

AS-Interface Safety at Work

Safety Proximity Sensors

## SAFETY LIGHT CURTAINS

### Ordering information

**SOLID-2**, consisting of transmitter and receiver  
 Included in delivery: 2 BT-360-SET mounting bracket sets, 1 set of connecting and operating instructions (PDF file on CD-ROM)

**Functions:** Integrated testing, automatic start/restart, selectable transmission channels

| Protective field height in mm | <b>SOLID-2</b>           |             |             | <b>SOLID-2</b>           |             |             |
|-------------------------------|--------------------------|-------------|-------------|--------------------------|-------------|-------------|
|                               | Part no.                 | Article     | Description | Part no.                 | Article     | Description |
|                               | <b>Resolution: 20 mm</b> |             |             | <b>Resolution: 30 mm</b> |             |             |
|                               | <b>Range: 0.5 - 15 m</b> |             |             | <b>Range: 0.2 - 10 m</b> |             |             |
| 150                           | 67821701                 | SD2T20-150  | Transmitter | 67821801                 | SD2T30-150  | Transmitter |
|                               | 67820201                 | SD2R20-150  | Receiver    | 67820601                 | SD2R30-150  | Receiver    |
| 225                           | 67821702                 | SD2T20-225  | Transmitter | 67821802                 | SD2T30-225  | Transmitter |
|                               | 67820202                 | SD2R20-225  | Receiver    | 67820602                 | SD2R30-225  | Receiver    |
| 300                           | 67821703                 | SD2T20-300  | Transmitter | 67821803                 | SD2T30-300  | Transmitter |
|                               | 67820203                 | SD2R20-300  | Receiver    | 67820603                 | SD2R30-300  | Receiver    |
| 450                           | 67821704                 | SD2T20-450  | Transmitter | 67821804                 | SD2T30-450  | Transmitter |
|                               | 67820204                 | SD2R20-450  | Receiver    | 67820604                 | SD2R30-450  | Receiver    |
| 600                           | 67821706                 | SD2T20-600  | Transmitter | 67821806                 | SD2T30-600  | Transmitter |
|                               | 67820206                 | SD2R20-600  | Receiver    | 67820606                 | SD2R30-600  | Receiver    |
| 750                           | 67821707                 | SD2T20-750  | Transmitter | 67821807                 | SD2T30-750  | Transmitter |
|                               | 67820207                 | SD2R20-750  | Receiver    | 67820607                 | SD2R30-750  | Receiver    |
| 900                           | 67821709                 | SD2T20-900  | Transmitter | 67821809                 | SD2T30-900  | Transmitter |
|                               | 67820209                 | SD2R20-900  | Receiver    | 67820609                 | SD2R30-900  | Receiver    |
| 1050                          | 67821710                 | SD2T20-1050 | Transmitter | 67821810                 | SD2T30-1050 | Transmitter |
|                               | 67820210                 | SD2R20-1050 | Receiver    | 67820610                 | SD2R30-1050 | Receiver    |
| 1200                          | 67821712                 | SD2T20-1200 | Transmitter | 67821812                 | SD2T30-1200 | Transmitter |
|                               | 67820212                 | SD2R20-1200 | Receiver    | 67820612                 | SD2R30-1200 | Receiver    |
| 1350                          | 67821713                 | SD2T20-1350 | Transmitter | 67821813                 | SD2T30-1350 | Transmitter |
|                               | 67820213                 | SD2R20-1350 | Receiver    | 67820613                 | SD2R30-1350 | Receiver    |
| 1500                          | 67821715                 | SD2T20-1500 | Transmitter | 67821815                 | SD2T30-1500 | Transmitter |
|                               | 67820215                 | SD2R20-1500 | Receiver    | 67820615                 | SD2R30-1500 | Receiver    |
| 1650                          | 67821716                 | SD2T20-1650 | Transmitter | 67821816                 | SD2T30-1650 | Transmitter |
|                               | 67820216                 | SD2R20-1650 | Receiver    | 67820616                 | SD2R30-1650 | Receiver    |
| 1800                          | 67821718                 | SD2T20-1800 | Transmitter | 67821818                 | SD2T30-1800 | Transmitter |
|                               | 67820218                 | SD2R20-1800 | Receiver    | 67820618                 | SD2R30-1800 | Receiver    |

## Ordering information

**SOLID-2**, consisting of transmitter and receiver  
 Included in delivery: 2 BT-360-SET mounting bracket sets, 1 set of connecting and operating instructions (PDF file on CD-ROM)

**Functions:** Integrated testing, automatic start/restart, selectable transmission channels

| Protective field height in mm | SOLID-2                                |             |             | SOLID-2                                |             |             |
|-------------------------------|--|-------------|-------------|--|-------------|-------------|
|                               | Part no.                               | Article     | Description | Part no.                               | Article     | Description |
|                               | Resolution: 40 mm<br>Range: 0.8 - 20 m |             |             | Resolution: 90 mm<br>Range: 0.8 - 20 m |             |             |
| 150                           | 67821901                               | SD2T40-150  | Transmitter |  |             |             |
|                               | 67821001                               | SD2R40-150  | Receiver    |  |             |             |
| 225                           | 67821902                               | SD2T40-225  | Transmitter |  |             |             |
|                               | 67821002                               | SD2R40-225  | Receiver    |  |             |             |
| 300                           | 67821903                               | SD2T40-300  | Transmitter |  |             |             |
|                               | 67821003                               | SD2R40-300  | Receiver    |  |             |             |
| 450                           | 67821904                               | SD2T40-450  | Transmitter |  |             |             |
|                               | 67821004                               | SD2R40-450  | Receiver    |  |             |             |
| 600                           | 67821906                               | SD2T40-600  | Transmitter | 67822006                               | SD2T90-600  | Transmitter |
|                               | 67821006                               | SD2R40-600  | Receiver    | 67821406                               | SD2R90-600  | Receiver    |
| 750                           | 67821907                               | SD2T40-750  | Transmitter | 67822007                               | SD2T90-750  | Transmitter |
|                               | 67821007                               | SD2R40-750  | Receiver    | 67821407                               | SD2R90-750  | Receiver    |
| 900                           | 67821909                               | SD2T40-900  | Transmitter | 67822009                               | SD2T90-900  | Transmitter |
|                               | 67821009                               | SD2R40-900  | Receiver    | 67821409                               | SD2R90-900  | Receiver    |
| 1050                          | 67821910                               | SD2T40-1050 | Transmitter | 67822010                               | SD2T90-1050 | Transmitter |
|                               | 67821010                               | SD2R40-1050 | Receiver    | 67821410                               | SD2R90-1050 | Receiver    |
| 1200                          | 67821912                               | SD2T40-1200 | Transmitter | 67822012                               | SD2T90-1200 | Transmitter |
|                               | 67821012                               | SD2R40-1200 | Receiver    | 67821412                               | SD2R90-1200 | Receiver    |
| 1350                          | 67821913                               | SD2T40-1350 | Transmitter | 67822013                               | SD2T90-1350 | Transmitter |
|                               | 67821013                               | SD2R40-1350 | Receiver    | 67821413                               | SD2R90-1350 | Receiver    |
| 1500                          | 67821915                               | SD2T40-1500 | Transmitter | 67822015                               | SD2T90-1500 | Transmitter |
|                               | 67821015                               | SD2R40-1500 | Receiver    | 67821415                               | SD2R90-1500 | Receiver    |
| 1650                          | 67821916                               | SD2T40-1650 | Transmitter | 67822016                               | SD2T90-1650 | Transmitter |
|                               | 67821016                               | SD2R40-1650 | Receiver    | 67821416                               | SD2R90-1650 | Receiver    |
| 1800                          | 67821918                               | SD2T40-1800 | Transmitter | 67822018                               | SD2T90-1800 | Transmitter |
|                               | 67821018                               | SD2R40-1800 | Receiver    | 67821418                               | SD2R90-1800 | Receiver    |

[www.leuze.com/en/solid/](http://www.leuze.com/en/solid/)

## SAFETY LIGHT CURTAINS

### Ordering information

**SOLID-2E**, consisting of transmitter and receiver  
Included in delivery: 2 BT-360-SET mounting bracket sets, 1 set of connecting and operating instructions (PDF file on CD-ROM)

**Functions:** Integrated testing, selectable transmission channels, selectable start/restart interlock, selectable dynamic contactor monitoring

| Protective field height in mm | SOLID-2E                 |              |             | SOLID-2E                 |              |             |
|-------------------------------|--------------------------|--------------|-------------|--------------------------|--------------|-------------|
|                               | Part no.                 | Article      | Description | Part no.                 | Article      | Description |
|                               | <b>Resolution: 20 mm</b> |              |             | <b>Resolution: 30 mm</b> |              |             |
|                               | <b>Range: 0.5 - 15 m</b> |              |             | <b>Range: 0.2 - 10 m</b> |              |             |
| 150                           | 67821701                 | SD2T20-150   | Transmitter | 67821801                 | SD2T30-150   | Transmitter |
|                               | 67820401                 | SD2R20-150E  | Receiver    | 67820801                 | SD2R30-150E  | Receiver    |
| 225                           | 67821702                 | SD2T20-225   | Transmitter | 67821802                 | SD2T30-225   | Transmitter |
|                               | 67820402                 | SD2R20-225E  | Receiver    | 67820802                 | SD2R30-225E  | Receiver    |
| 300                           | 67821703                 | SD2T20-300   | Transmitter | 67821803                 | SD2T30-300   | Transmitter |
|                               | 67820403                 | SD2R20-300E  | Receiver    | 67820803                 | SD2R30-300E  | Receiver    |
| 450                           | 67821704                 | SD2T20-450   | Transmitter | 67821804                 | SD2T30-450   | Transmitter |
|                               | 67820404                 | SD2R20-450E  | Receiver    | 67820804                 | SD2R30-450E  | Receiver    |
| 600                           | 67821706                 | SD2T20-600   | Transmitter | 67821806                 | SD2T30-600   | Transmitter |
|                               | 67820406                 | SD2R20-600E  | Receiver    | 67820806                 | SD2R30-600E  | Receiver    |
| 750                           | 67821707                 | SD2T20-750   | Transmitter | 67821807                 | SD2T30-750   | Transmitter |
|                               | 67820407                 | SD2R20-750E  | Receiver    | 67820807                 | SD2R30-750E  | Receiver    |
| 900                           | 67821709                 | SD2T20-900   | Transmitter | 67821809                 | SD2T30-900   | Transmitter |
|                               | 67820409                 | SD2R20-900E  | Receiver    | 67820809                 | SD2R30-900E  | Receiver    |
| 1050                          | 67821710                 | SD2T20-1050  | Transmitter | 67821810                 | SD2T30-1050  | Transmitter |
|                               | 67820410                 | SD2R20-1050E | Receiver    | 67820810                 | SD2R30-1050E | Receiver    |
| 1200                          | 67821712                 | SD2T20-1200  | Transmitter | 67821812                 | SD2T30-1200  | Transmitter |
|                               | 67820412                 | SD2R20-1200E | Receiver    | 67820812                 | SD2R30-1200E | Receiver    |
| 1350                          | 67821713                 | SD2T20-1350  | Transmitter | 67821813                 | SD2T30-1350  | Transmitter |
|                               | 67820413                 | SD2R20-1350E | Receiver    | 67820813                 | SD2R30-1350E | Receiver    |
| 1500                          | 67821715                 | SD2T20-1500  | Transmitter | 67821815                 | SD2T30-1500  | Transmitter |
|                               | 67820415                 | SD2R20-1500E | Receiver    | 67820815                 | SD2R30-1500E | Receiver    |
| 1650                          | 67821716                 | SD2T20-1650  | Transmitter | 67821816                 | SD2T30-1650  | Transmitter |
|                               | 67820416                 | SD2R20-1650E | Receiver    | 67820816                 | SD2R30-1650E | Receiver    |
| 1800                          | 67821718                 | SD2T20-1800  | Transmitter | 67821818                 | SD2T30-1800  | Transmitter |
|                               | 67820418                 | SD2R20-1800E | Receiver    | 67820818                 | SD2R30-1800E | Receiver    |

# SOLID-2, SOLID-2E

## Ordering information

**SOLID-2E**, consisting of transmitter and receiver  
Included in delivery: 2 BT-360-SET mounting bracket sets, 1 set of connecting and operating instructions (PDF file on CD-ROM)

**Functions:** Integrated testing, selectable transmission channels, selectable start/restart interlock, selectable dynamic contactor monitoring

| Protective field height in mm | SOLID-2E                               |              |             | SOLID-2E                               |              |             |
|-------------------------------|--|--------------|-------------|--|--------------|-------------|
|                               | Part no.                               | Article      | Description | Part no.                               | Article      | Description |
|                               | Resolution: 40 mm<br>Range: 0.8 - 20 m |              |             | Resolution: 90 mm<br>Range: 0.8 - 20 m |              |             |
| 150                           | 67821901                               | SD2T40-150   | Transmitter |  |              |             |
|                               | 67821201                               | SD2R40-150E  | Receiver    |  |              |             |
| 225                           | 67821902                               | SD2T40-225   | Transmitter |  |              |             |
|                               | 67821202                               | SD2R40-225E  | Receiver    |  |              |             |
| 300                           | 67821903                               | SD2T40-300   | Transmitter |  |              |             |
|                               | 67821203                               | SD2R40-300E  | Receiver    |  |              |             |
| 450                           | 67821904                               | SD2T40-450   | Transmitter |  |              |             |
|                               | 67821204                               | SD2R40-450E  | Receiver    |  |              |             |
| 600                           | 67821906                               | SD2T40-600   | Transmitter | 67822006                               | SD2T90-600   | Transmitter |
|                               | 67821206                               | SD2R40-600E  | Receiver    | 67821606                               | SD2R90-600E  | Receiver    |
| 750                           | 67821907                               | SD2T40-750   | Transmitter | 67822007                               | SD2T90-750   | Transmitter |
|                               | 67821207                               | SD2R40-750E  | Receiver    | 67821607                               | SD2R90-750E  | Receiver    |
| 900                           | 67821909                               | SD2T40-900   | Transmitter | 67822009                               | SD2T90-900   | Transmitter |
|                               | 67821209                               | SD2R40-900E  | Receiver    | 67821609                               | SD2R90-900E  | Receiver    |
| 1050                          | 67821910                               | SD2T40-1050  | Transmitter | 67822010                               | SD2T90-1050  | Transmitter |
|                               | 67821210                               | SD2R40-1050E | Receiver    | 67821610                               | SD2R90-1050E | Receiver    |
| 1200                          | 67821912                               | SD2T40-1200  | Transmitter | 67822012                               | SD2T90-1200  | Transmitter |
|                               | 67821212                               | SD2R40-1200E | Receiver    | 67821612                               | SD2R90-1200E | Receiver    |
| 1350                          | 67821913                               | SD2T40-1350  | Transmitter | 67822013                               | SD2T90-1350  | Transmitter |
|                               | 67821213                               | SD2R40-1350E | Receiver    | 67821613                               | SD2R90-1350E | Receiver    |
| 1500                          | 67821915                               | SD2T40-1500  | Transmitter | 67822015                               | SD2T90-1500  | Transmitter |
|                               | 67821215                               | SD2R40-1500E | Receiver    | 67821615                               | SD2R90-1500E | Receiver    |
| 1650                          | 67821916                               | SD2T40-1650  | Transmitter | 67822016                               | SD2T90-1650  | Transmitter |
|                               | 67821216                               | SD2R40-1650E | Receiver    | 67821616                               | SD2R90-1650E | Receiver    |
| 1800                          | 67821918                               | SD2T40-1800  | Transmitter | 67822018                               | SD2T90-1800  | Transmitter |
|                               | 67821218                               | SD2R40-1800E | Receiver    | 67821618                               | SD2R90-1800E | Receiver    |

### Part number code

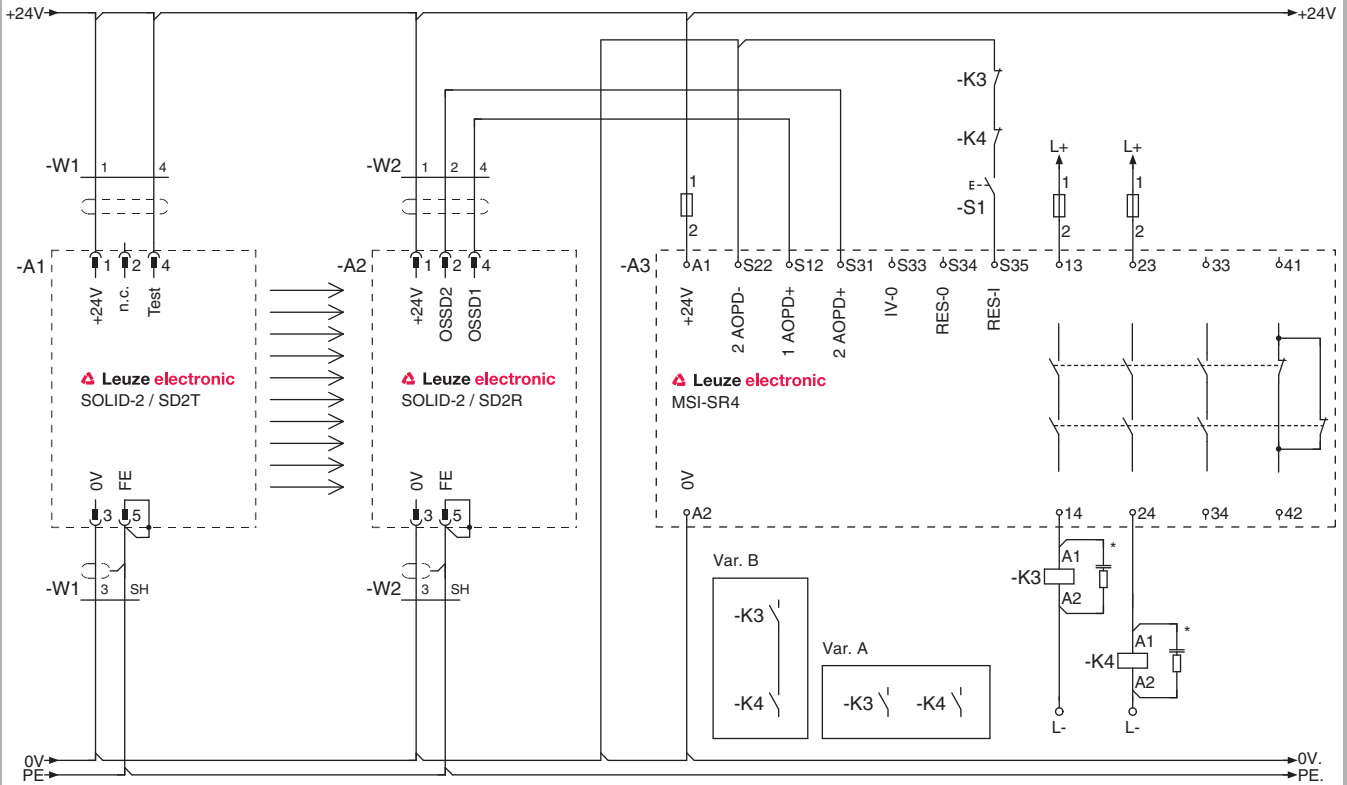
Part number code see page 121

[www.leuze.com/en/solid/](http://www.leuze.com/en/solid/)

# SAFETY LIGHT CURTAINS

## Electrical connection

### SOLID-2 connection example



\*) Spark extinction circuit, supply suitable spark extinction

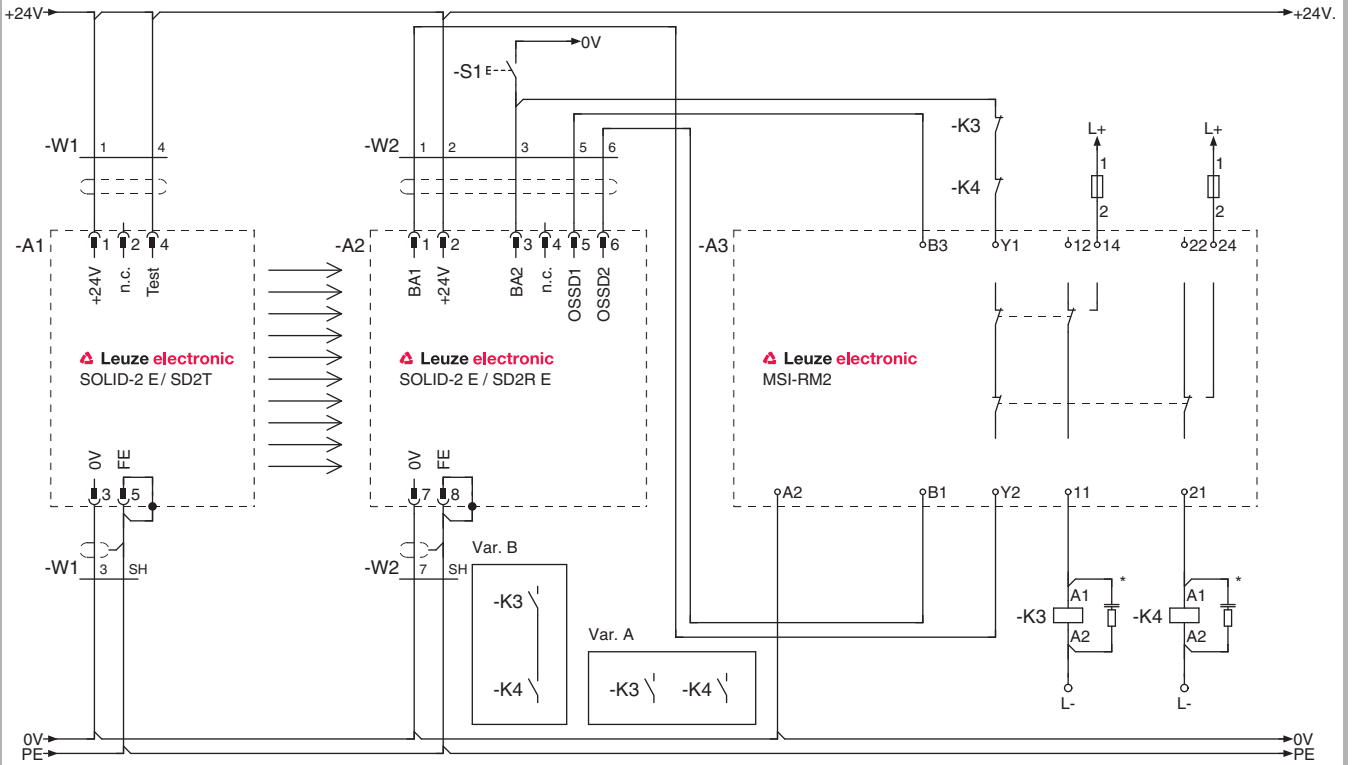
### SOLID-2 with MSI-SR4 Safety Relay

**!** Please observe the operating instructions of the components!



**Electrical connection**

**SOLID-2E connection example**



\*) Spark extinction circuit, supply suitable spark extinction

SOLID-2E with MSI-RM2 Safety Relay

**!** Please observe the operating instructions of the components!

## SAFETY LIGHT CURTAINS

### Technical data

| General system data  |   |                         |            |               |
|--|---|-------------------------|------------|---------------|
| Type in accordance with EN/IEC 61496                                       | 2   |                         |            |               |
| SIL in accordance with IEC 61508 and SILCL in accordance with EN/IEC 62061 | 2   |                         |            |               |
| Performance Level (PL) in accordance with EN ISO 13849-1                   | d   |                         |            |               |
| Probability of a failure to danger per hour (PFH <sub>d</sub> )            | For protective heights up to 900 mm, all resolutions  | 8.18 x 10 <sup>-8</sup> |            |               |
|  | For protective heights up to 1800 mm, all resolutions | 8.92 x 10 <sup>-8</sup> |            |               |
|  | For protective heights up to 2850 mm                  | On request              |            |               |
| Service life (T <sub>M</sub> ) in accordance with EN ISO 13849-1           | 20 years  |                         |            |               |
| Category in accordance with EN ISO 13849                                   | 2   |                         |            |               |
| Resolution   | 20 mm   | 30 mm                   | 40 mm      | 90 mm         |
| Range  | 0.5...15 m  | 0.2...10 m              | 0.8...20 m | 0.8...20 m    |
| Response time (depends on protective field height)                         | 9...60 ms   | 7...31 ms               | 7...31 ms  | 8...12 ms     |
| Protective field height  | 150...1800 mm   |                         |            | 600...1800 mm |
| Synchronization  | Optical via transmitter and receiver                  |                         |            |               |
| Supply voltage   | 24 V DC, ±20%   |                         |            |               |
| Test repetition time with internal testing                                 | 100 ms  |                         |            |               |
| Connection cable length  | Max. 100 m with 0.25 mm <sup>2</sup>                  |                         |            |               |
| Safety class   | III   |                         |            |               |
| Protection rating  | IP 65   |                         |            |               |
| Ambient temperature, operation   | 0...+50°C   |                         |            |               |
| Ambient temperature, storage   | -25...+70°C   |                         |            |               |
| Relative humidity  | 15...95%  |                         |            |               |
| Profile cross-section  | 30 mm x 34 mm   |                         |            |               |
| Weight per device (length-dependent)                                       | 0.30...1.90 kg  |                         |            |               |
| Transmitter  |   |                         |            |               |
| Transmitter diodes, class in accordance with EN 60825                      | 1   |                         |            |               |
| Wavelength   | 950 nm  |                         |            |               |
| Current consumption  | 45 mA   |                         |            |               |
| Connection system  | M12 plug, 5-pin                                       |                         |            |               |
| External test input  | 24 V DC, max. 20 mA                                   |                         |            |               |

MLC 500  
p. 84

MLC 300  
p. 100

SOLID-4, SOLID-4E  
p. 108

**SOLID-2, SOLID-2E**  
p. 134

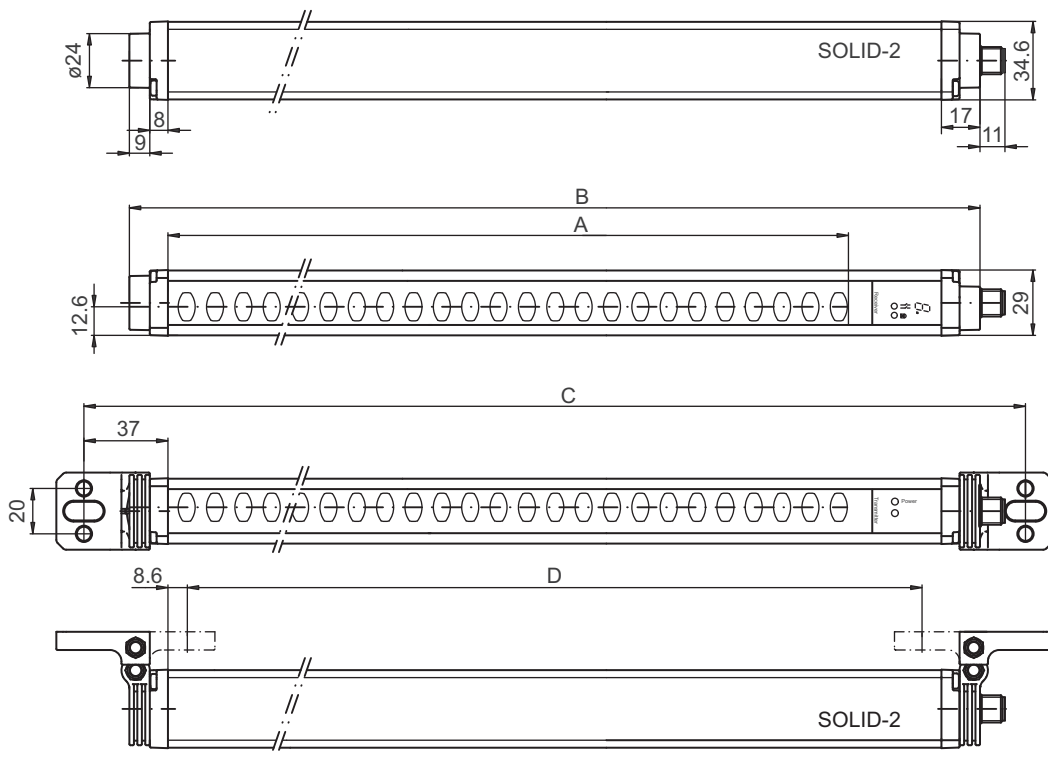
COMPACTplus  
p. 148

**Technical data**

| Receiver                                 |   |
|--|---|
| Current consumption                      | 140 mA without external load  |
| Safety-related switching outputs (OSSDs) | 2 pnp transistor outputs (short circuit-proof, cross-circuit monitored) |
| Switching voltage high active            | Min. $U_v - 1.9 V$  |
| Switching voltage low                    | Max. 1 V  |
| Switching current                        | Max. 250 mA   |
| SOLID-2 connection system                | M12 plug, 5-pin   |
| SOLID-2E connection system               | M12 plug, 8-pin   |
| SOLID-2E signal inputs on BA1 and BA2    | 24 V DC, max. 10 mA   |

Please note the additional information in the SOLID-2 Connecting and Operating Instructions at [www.leuze.com/en/solid](http://www.leuze.com/en/solid).

**SOLID-2 / SOLID-2E Safety Light Curtain dimensioned drawing**



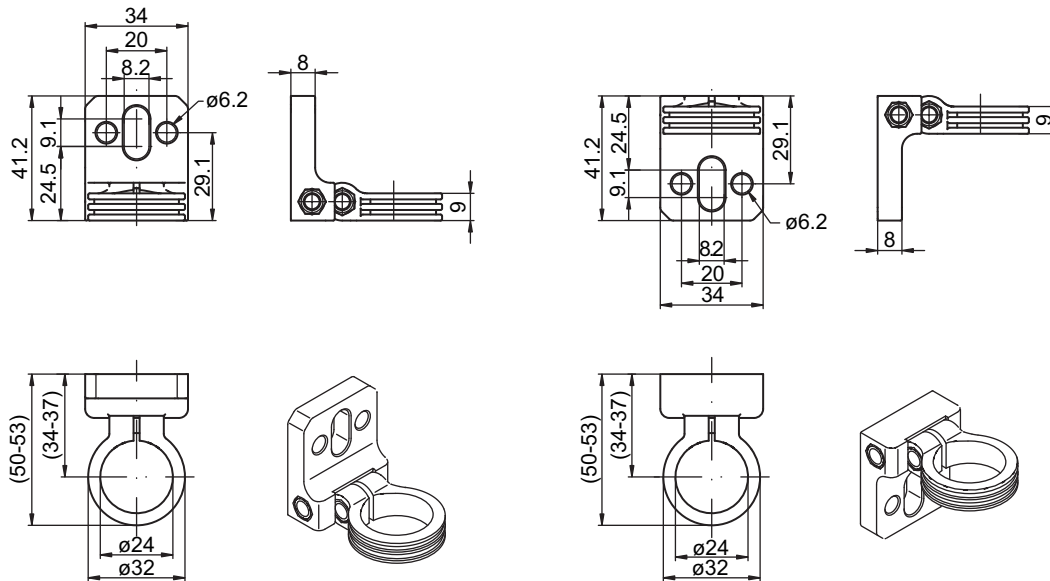
- A = Protective field height according to ordering information
- B = A + 75.5 mm
- C = A + 115.5 mm
- D = A + 24.3 mm

[www.leuze.com/en/solid/](http://www.leuze.com/en/solid/)

# SAFETY LIGHT CURTAINS

## Dimensional drawings: Accessories

### Mounting brackets

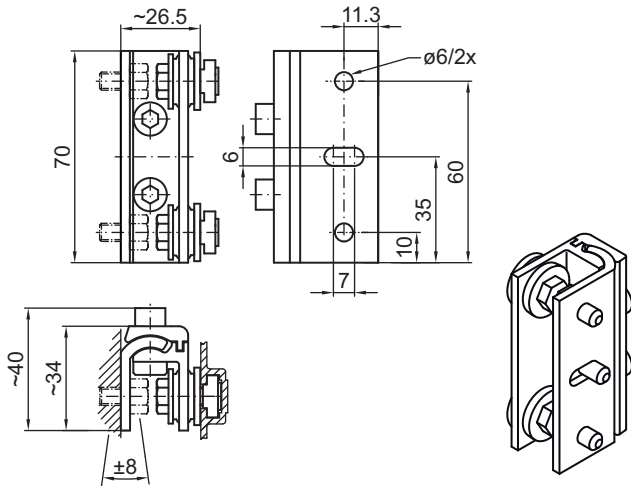


Mounting bracket, 360° rotation, BT-360

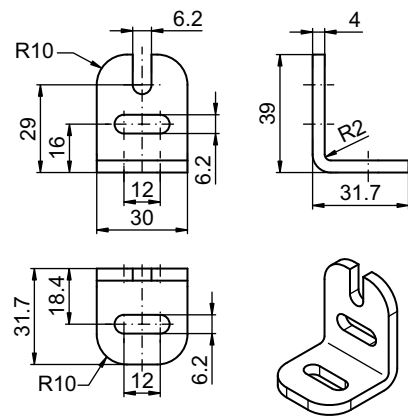
Dimensions in mm

**Dimensional drawings: Accessories**

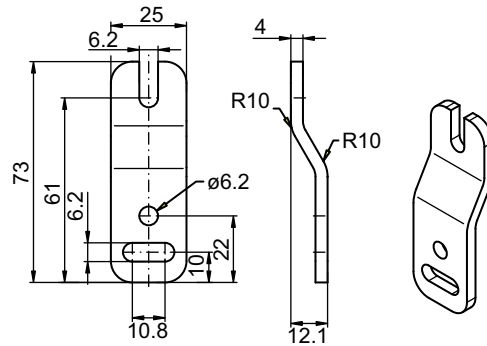
**Mounting brackets**



*Mounting bracket, swiveling with shock absorber, BT-SSD*



*L-mounting bracket, BT-L*



*Z-mounting bracket, BT-Z*

Dimensions in mm

## SAFETY LIGHT CURTAINS

### Accessories ordering information

| Part no.   | Article           | Description   | Length, design          |
|--|-------------------|---|-------------------------|
| <b>Installation accessories</b>  |                   |   |                         |
| 429055   | BT-360-SET        | Mounting bracket set, consisting of 2 BT-360°   |                         |
| 429056   | BT-2L             | Mounting bracket set, consisting of 2 BT-L  |                         |
| 429057   | BT-2Z             | Mounting bracket set, consisting of 2 BT-Z  |                         |
| 429058   | BT-2SSD           | 2 x 70 mm long mounting brackets, swiveling with shock absorber, incl. 4 screws and 4 sliding blocks  |                         |
| 429059   | BT-4SSD           | 4 x 70 mm long mounting brackets, swiveling with shock absorber, incl. 8 screws and 8 sliding blocks  |                         |
| 429049   | BT-2SSD-270       | 2 x 270 mm long mounting brackets, swiveling with shock absorber, incl. 4 screws and 4 sliding blocks |                         |
| <b>Connection cables, 5-pin for SOLID-2 Transmitter and SOLID-2 Receiver</b> |                   |   |                         |
| 429071   | CB-M12-5000S-5GF  | Connection cable shielded with M12 coupling, 5-pin  | 5 m, straight/open end  |
| 429072   | CB-M12-5000S-5WF  | Connection cable shielded with M12 coupling, 5-pin  | 5 m, angled/open end    |
| 429073   | CB-M12-10000S-5GF | Connection cable shielded with M12 coupling, 5-pin  | 10 m, straight/open end |
| 429074   | CB-M12-10000S-5WF | Connection cable shielded with M12 coupling, 5-pin  | 10 m, angled/open end   |
| 429075   | CB-M12-15000S-5GF | Connection cable shielded with M12 coupling, 5-pin  | 15 m, straight/open end |
| 429076   | CB-M12-15000S-5WF | Connection cable shielded with M12 coupling, 5-pin  | 15 m, angled/open end   |
| 429171   | CB-M12-25000S-5GF | Connection cable shielded with M12 coupling, 5-pin  | 25 m, straight/open end |
| 429172   | CB-M12-25000S-5WF | Connection cable shielded with M12 coupling, 5-pin  | 25 m, angled/open end   |

## Accessories ordering information

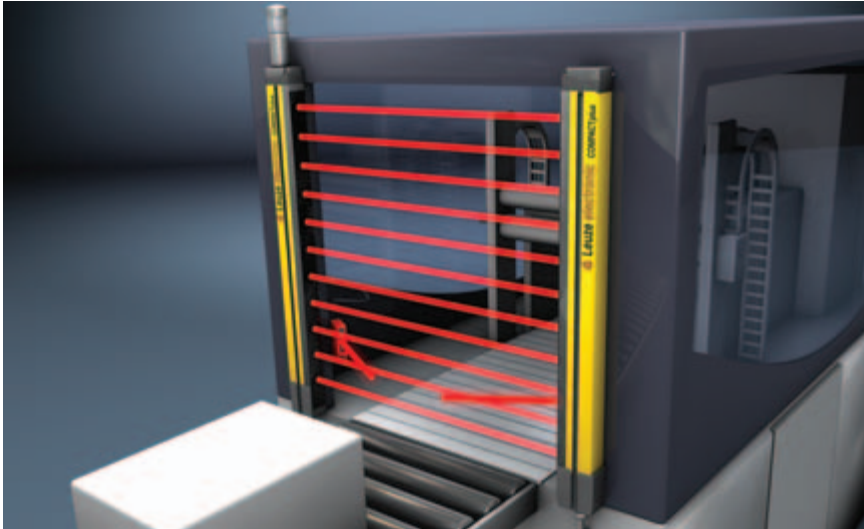
| Part no.  | Article           | Description  | Length, design          |
|---|-------------------|--|-------------------------|
| <b>Connection cables, 8-pin for SOLID-2E Receiver</b> |                   |  |                         |
| 429081  | CB-M12-5000S-8GF  | Connection cable shielded with M12 coupling, 8-pin                               | 5 m, straight/open end  |
| 429082  | CB-M12-5000S-8WF  | Connection cable shielded with M12 coupling, 8-pin                               | 5 m, angled/open end    |
| 429083  | CB-M12-10000S-8GF | Connection cable shielded with M12 coupling, 8-pin                               | 10 m, straight/open end |
| 429084  | CB-M12-10000S-8WF | Connection cable shielded with M12 coupling, 8-pin                               | 10 m, angled/open end   |
| 429085  | CB-M12-15000S-8GF | Connection cable shielded with M12 coupling, 8-pin                               | 15 m, straight/open end |
| 429086  | CB-M12-15000S-8WF | Connection cable shielded with M12 coupling, 8-pin                               | 15 m, angled/open end   |
| 429181  | CB-M12-25000S-8GF | Connection cable shielded with M12 coupling, 8-pin                               | 25 m, straight/open end |
| 429182  | CB-M12-25000S-8WF | Connection cable shielded with M12 coupling, 8-pin                               | 25 m, angled/open end   |
| <b>Laser alignment aids</b>                           |                   |  |                         |
| 560020  | LA-78U            | Laser alignment aid for lateral mounting with use for COMPACT <i>plus</i> /SOLID |                         |
| <b>Power supplies</b>                                 |                   |  |                         |
| 520061  | LOGO! Power       | Power supply, 120/230 V AC<br>--> 24 V DC / 1.3 A, regulated                     |                         |
| <b>Test rods</b>                                      |                   |  |                         |
| 349939  | AC-TR20/40        | Test rod, 20 mm / 40 mm  |                         |
| 349945  | AC-TR14/30        | Test rod, 14 mm / 30 mm  |                         |
| <b>Protective screens, see accessories, page 520</b>  |                   |  |                         |

[www.leuze.com/en/solid/](http://www.leuze.com/en/solid/)



## SAFETY LIGHT CURTAINS

### COMPACTplus-m



*Muting allows, for example, palettes or work pieces/equipment to pass by the electro-sensitive protective equipment, COMPACTplus-m, without any process interruption*

The proper, specification-compliant, time-restricted bridging of a protective device (muting) is required in numerous instances for a continuous, and therefore efficient production process, when conveyor vehicles, work pieces or palettes have to pass a protective field without interrupting the process, for example. The COMPACTplus-m type 4 Safety Light Curtains are predestined for this requirement in accordance with EN/IEC 61496. They feature integrated muting functions and, controlled by muting sensors, they can therefore be switched inactive. After the relevant objects have passed by the safety function is automatically activated again.

COMPACTplus Safety Light Curtains can be equipped with various functions to optimally perform specific tasks with regard to high functionality, more flexible integration and easy operability. The COMPACTplus series have a start/restart interlock, contactor monitoring and additional functions that can be easily activated with switches. External additional modules are therefore no longer required. Specific settings are made with the diagnostics and parametering software, SafetyLab. COMPACTplus can be connected to both conventional safety modules and to open safety bus systems via various interfaces (transistor/relay output, AS-Interface Safety at Work, PROFIsafe). These safety sensors can therefore be flexibly integrated into existing automation environments.



*Automatic driving out of chassises from the processing area with muting*

#### Typical areas of application

Access guarding:

- Robots
- Automatic processing centers
- Palletizers

MLC 500  
p. 84

MLC 300  
p. 100

SOLID-4, SOLID-4E  
p. 108

SOLID-2, SOLID-2E  
p. 134

**COMPACTplus**  
p. 148

# COMPACTplus-m

## Important technical data, overview

|  |   |         |         |         |
|--|---|---------|---------|---------|
| Type in accordance with EN/IEC 61496                                       | 4   |         |         |         |
| SIL in accordance with IEC 61508 and SILCL in accordance with EN/IEC 62061 | 3   |         |         |         |
| Performance Level (PL) in accordance with EN ISO 13849-1                   | e   |         |         |         |
| Category in accordance with EN ISO 13849                                   | 4   |         |         |         |
| Resolution   | 14 mm   | 30 mm   | 50 mm   | 90 mm   |
| Range  | 0...6m  | 0...18m | 0...18m | 0...18m |
| Protective field height (type-dependent)                                   | 150...3000 mm   |         |         |         |
| Profile cross-section  | 52 mm x 55 mm   |         |         |         |
| Safety-related switching outputs   | 2 pnp transistor outputs<br>2 relay outputs<br>AS-i Safety Interface<br>PROFIsafe Interface |         |         |         |
| Connection system  | Cable gland<br>Hirschmann plug<br>MIN-style plug<br>M12 plug                                |         |         |         |

## Functions

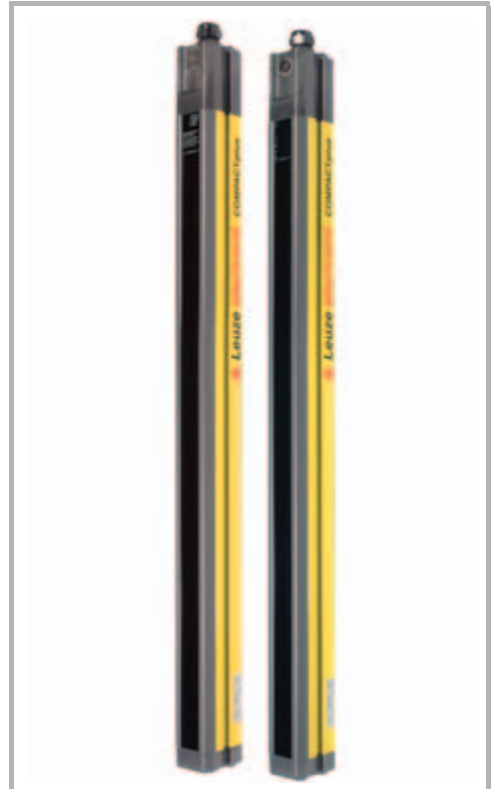
|  |
|--|
| Start/restart interlock (RES), selectable      |
| Dynamic contactor monitoring (EDM), selectable |
| 2 transmission channels, selectable            |
| timing controlled 2- or 4-sensor muting        |
| Muting restart override function               |
| Output for muting indicator                    |

## Functions extension with "SafetyLab" PC software (accessories)

|   |
|---|
| Infrared interface for parametering and diagnostics         |
| More muting types, configurable muting time limit           |
| Additional control signals for muting and muting timer      |
| Reduced resolution can be set                               |
| Partial muting can be configured                            |
| Muting indicator function can be configured                 |
| Beam signals for position and height measuring              |
| Additional 2-channel safety circuit, e.g. for door switches |

## Special features

- **Plug-in module with saved device parameters for fast device swap-out**
- **M12 local interface for connecting local sensors and signal devices**
- **Local connection box and Y-cable (accessories) simplify sensor wiring**



## Features



## Further information

## Page

|                                     |     |
|-------------------------------------|-----|
| ● Ordering information              | 150 |
| ● Electrical connection             | 155 |
| ● Technical data                    | 157 |
| ● Dimensional drawings              | 159 |
| ● Dimensional drawings: Accessories | 160 |
| ● Accessories ordering information  | 162 |

## SAFETY LIGHT CURTAINS

### Ordering information

**COMPACTplus-m**, consisting of transmitter and receiver  
Included in delivery: 4 sliding blocks, 2 BT-S mounting bracket sets, 1 SafetyKey, test rods, 1 set of connecting and operating instructions (PDF file on CD-ROM), 1 self-adhesive notice sign

**Functions:** Start/restart interlock, contactor monitoring, 2 transmission channels, sequence controlled 4-sensor muting, timing controlled 2-sensor muting, timing controlled 4-sensor muting, muting restart override function, output for muting indicator

| Protective field height in mm | COMPACTplus-m            |                 |             | COMPACTplus-m            |                 |             |
|-------------------------------|--------------------------|-----------------|-------------|--------------------------|-----------------|-------------|
|                               | Part no.                 | Article         | Description | Part no.                 | Article         | Description |
|                               | <b>Resolution: 14 mm</b> |                 |             | <b>Resolution: 30 mm</b> |                 |             |
|                               | <b>Range: 0 - 6 m</b>    |                 |             | <b>Range: 0 - 18 m</b>   |                 |             |
| 150                           | 68101000                 | CPT14-150/T1    | Transmitter | 68301000                 | CPT30-150/T1    | Transmitter |
|                               | 68101430                 | CPR14-150-m/T1  | Receiver    | 68301430                 | CPR30-150-m/T1  | Receiver    |
| 225                           | 68102000                 | CPT14-225/T1    | Transmitter | 68302000                 | CPT30-225/T1    | Transmitter |
|                               | 68102430                 | CPR14-225-m/T1  | Receiver    | 68302430                 | CPR30-225-m/T1  | Receiver    |
| 300                           | 68103000                 | CPT14-300/T1    | Transmitter | 68303000                 | CPT30-300/T1    | Transmitter |
|                               | 68103430                 | CPR14-300-m/T1  | Receiver    | 68303430                 | CPR30-300-m/T1  | Receiver    |
| 450                           | 68104000                 | CPT14-450/T1    | Transmitter | 68304000                 | CPT30-450/T1    | Transmitter |
|                               | 68104430                 | CPR14-450-m/T1  | Receiver    | 68304430                 | CPR30-450-m/T1  | Receiver    |
| 600                           | 68106000                 | CPT14-600/T1    | Transmitter | 68306000                 | CPT30-600/T1    | Transmitter |
|                               | 68106430                 | CPR14-600-m/T1  | Receiver    | 68306430                 | CPR30-600-m/T1  | Receiver    |
| 750                           | 68107000                 | CPT14-750/T1    | Transmitter | 68307000                 | CPT30-750/T1    | Transmitter |
|                               | 68107430                 | CPR14-750-m/T1  | Receiver    | 68307430                 | CPR30-750-m/T1  | Receiver    |
| 900                           | 68109000                 | CPT14-900/T1    | Transmitter | 68309000                 | CPT30-900/T1    | Transmitter |
|                               | 68109430                 | CPR14-900-m/T1  | Receiver    | 68309430                 | CPR30-900-m/T1  | Receiver    |
| 1050                          | 68110000                 | CPT14-1050/T1   | Transmitter | 68310000                 | CPT30-1050/T1   | Transmitter |
|                               | 68110430                 | CPR14-1050-m/T1 | Receiver    | 68310430                 | CPR30-1050-m/T1 | Receiver    |
| 1200                          | 68112000                 | CPT14-1200/T1   | Transmitter | 68312000                 | CPT30-1200/T1   | Transmitter |
|                               | 68112430                 | CPR14-1200-m/T1 | Receiver    | 68312430                 | CPR30-1200-m/T1 | Receiver    |
| 1350                          | 68113000                 | CPT14-1350/T1   | Transmitter | 68313000                 | CPT30-1350/T1   | Transmitter |
|                               | 68113430                 | CPR14-1350-m/T1 | Receiver    | 68313430                 | CPR30-1350-m/T1 | Receiver    |
| 1500                          | 68115000                 | CPT14-1500/T1   | Transmitter | 68315000                 | CPT30-1500/T1   | Transmitter |
|                               | 68115430                 | CPR14-1500-m/T1 | Receiver    | 68315430                 | CPR30-1500-m/T1 | Receiver    |
| 1650                          | 68116000                 | CPT14-1650/T1   | Transmitter | 68316000                 | CPT30-1650/T1   | Transmitter |
|                               | 68116430                 | CPR14-1650-m/T1 | Receiver    | 68316430                 | CPR30-1650-m/T1 | Receiver    |
| 1800                          | 68118000                 | CPT14-1800/T1   | Transmitter | 68318000                 | CPT30-1800/T1   | Transmitter |
|                               | 68118430                 | CPR14-1800-m/T1 | Receiver    | 68318430                 | CPR30-1800-m/T1 | Receiver    |

Standard model /T1 with metric cable gland (M20).

Test rod included in scope of delivery

Standard model /T1 with metric cable gland (M20).

Test rod included in scope of delivery

MLC 500  
p. 84

MLC 300  
p. 100

SOLID-4, SOLID-4E  
p. 108

SOLID-2, SOLID-2E  
p. 134

**COMPACTplus**  
p. 148

## Ordering information

**COMPACTplus-m**, consisting of transmitter and receiver  
 Included in delivery: 4 sliding blocks, 2 BT-S mounting bracket sets,  
 1 SafetyKey, 1 set of connecting and operating instructions (PDF  
 file on CD-ROM), 1 self-adhesive notice sign

**Functions:** Start/restart interlock, contactor monitoring,  
 2 transmission channels, sequence controlled 4-sensor  
 muting, timing controlled 2-sensor muting, timing con-  
 trolled 4-sensor muting, muting restart override function,  
 output for muting indicator

| Protective field height in mm | COMPACTplus-m |                 |             |
|-------------------------------|---------------|-----------------|-------------|
|                               | Part no.      | Article         | Description |
| 450                           | 68504000      | CPT50-450/T1    | Transmitter |
|                               | 68504430      | CPR50-450-m/T1  | Receiver    |
| 600                           | 68506000      | CPT50-600/T1t   | Transmitter |
|                               | 68506430      | CPR50-600-m/T1  | Receiver    |
| 750                           | 68507000      | CPT50-750/T1    | Transmitter |
|                               | 68507430      | CPR50-750-m/T1  | Receiver    |
| 900                           | 68509000      | CPT50-900/T1    | Transmitter |
|                               | 68509430      | CPR50-900-m/T1  | Receiver    |
| 1050                          | 68510000      | CPT50-1050/T1   | Transmitter |
|                               | 68510430      | CPR50-1050-m/T1 | Receiver    |
| 1200                          | 68512000      | CPT50-1200/T1   | Transmitter |
|                               | 68512430      | CPR50-1200-m/T1 | Receiver    |
| 1350                          | 68513000      | CPT50-1350/T1   | Transmitter |
|                               | 68513430      | CPR50-1350-m/T1 | Receiver    |
| 1500                          | 68515000      | CPT50-1500/T1   | Transmitter |
|                               | 68515430      | CPR50-1500-m/T1 | Receiver    |
| 1650                          | 68516000      | CPT50-1650/T1   | Transmitter |
|                               | 68516430      | CPR50-1650-m/T1 | Receiver    |
| 1800                          | 68518000      | CPT50-1800/T1   | Transmitter |
|                               | 68518430      | CPR50-1800-m/T1 | Receiver    |
| 2100                          | 68521000      | CPT50-2100/T1   | Transmitter |
|                               | 68521430      | CPR50-2100-m/T1 | Receiver    |
| 2400                          | 68524000      | CPT50-2400/T1   | Transmitter |
|                               | 68524430      | CPR50-2400-m/T1 | Receiver    |
| 2700                          | 68527000      | CPT50-2700/T1   | Transmitter |
|                               | 68527430      | CPR50-2700-m/T1 | Receiver    |
| 3000                          | 68530000      | CPT50-3000/T1   | Transmitter |
|                               | 68530430      | CPR50-3000-m/T1 | Receiver    |

Standard model /T1 with metric cable gland (M20).

| Protective field height in mm | COMPACTplus-m |                 |             |
|-------------------------------|---------------|-----------------|-------------|
|                               | Part no.      | Article         | Description |
| 450                           |               |                 |             |
|                               |               |                 |             |
| 600                           |               |                 |             |
|                               |               |                 |             |
| 750                           | 68907000      | CPT90-750/T1    | Transmitter |
|                               | 68907430      | CPR90-750-m/T1  | Receiver    |
| 900                           | 68909000      | CPT90-900/T1    | Transmitter |
|                               | 68909430      | CPR90-900-m/T1  | Receiver    |
| 1050                          | 68910000      | CPT90-1050/T1   | Transmitter |
|                               | 68910430      | CPR90-1050-m/T1 | Receiver    |
| 1200                          | 68912000      | CPT90-1200/T1   | Transmitter |
|                               | 68912430      | CPR90-1200-m/T1 | Receiver    |
| 1350                          | 68913000      | CPT90-1350/T1   | Transmitter |
|                               | 68913430      | CPR90-1350-m/T1 | Receiver    |
| 1500                          | 68915000      | CPT90-1500/T1   | Transmitter |
|                               | 68915430      | CPR90-1500-m/T1 | Receiver    |
| 1650                          | 68916000      | CPT90-1650/T1   | Transmitter |
|                               | 68916430      | CPR90-1650-m/T1 | Receiver    |
| 1800                          | 68918000      | CPT90-1800/T1   | Transmitter |
|                               | 68918430      | CPR90-1800-m/T1 | Receiver    |
| 2100                          | 68921000      | CPT90-2100/T1   | Transmitter |
|                               | 68921430      | CPR90-2100-m/T1 | Receiver    |
| 2400                          | 68924000      | CPT90-2400/T1   | Transmitter |
|                               | 68924430      | CPR90-2400-m/T1 | Receiver    |
| 2700                          | 68927000      | CPT90-2700/T1   | Transmitter |
|                               | 68927430      | CPR90-2700-m/T1 | Receiver    |
| 3000                          | 68930000      | CPT90-3000/T1   | Transmitter |
|                               | 68930430      | CPR90-3000-m/T1 | Receiver    |

Standard model /T1 with metric cable gland (M20).

[www.leuze.com/en/compactplus-m/](http://www.leuze.com/en/compactplus-m/)

Machine Safety  
 Machine Safety Services  
 Safety Engineering Software  
 Safety Laser Scanners  
 Safety Light Curtains  
 Multiple Light Beam Safety Devices  
 Light Beam Safety Device Sets  
 Single Light Beam Safety Devices  
 AS-Interface Safety at Work  
 Safety Proximity Sensors

## SAFETY LIGHT CURTAINS

### COMPACTplus-m – model varieties

| Article        | Description   | Safety-related switching outputs (OSSD), connection system |
|----------------|---|--|
| CPT...../T1    | Transmitter   | Cable gland (M20)  |
| CPR(T)...../T1 | Receiver  | Transistor output, cable gland (M20)                       |
| CPR(T)...../R1 | Receiver  | Relay output, cable gland (M25)                            |
| CPT...../T2    | Transmitter   | Hirschmann plug, 12-pin                                    |
| CPR(T)...../T2 | Receiver  | Transistor output, Hirschmann plug, 12-pin                 |
| CPR(T)...../R2 | Receiver  | Relay output, Hirschmann plug, 12-pin                      |
| CPT...../T3    | Transmitter   | MIN-style plug, 3-pin                                      |
| CPR(T)...../T3 | Receiver  | Transistor output, MIN-style plug, 7-pin                   |
| CPR(T)...../R3 | Receiver  | Relay output, MIN-style plug, 12-pin                       |
| CPT...../T4    | Transmitter   | M12 plug, 5-pin  |
| CPR(T)...../T4 | Receiver  | Transistor output, M12 plug, 8-pin                         |
| CPT...../AP    | Transmitter   | Integrated AS-Interface, M12 plug, 5 pin                   |
| CPR...../A1    | Receiver with AS-i Safety Interface                                 | Integrated AS-Interface, M12 plug, 5 pin                   |
| CPR...../P1    | Receiver with PROFIsafe interface                                   | Integrated PROFIBUS DP interface, M12 plug, 5 pin          |
| CPR.....m/cc   | Integrated LED muting indicator from 300 mm protective field height | For muting receiver  |

Delivery of devices with MIN-style plug only in the USA

**Article list for COMPACTplus-m**

**Type 4 Safety Light Curtains**

| Article           | Description   |
|-------------------|---|
| <b>CP</b>         | <b>COMPACTplus-m</b>  |
| <b>a</b>          | <b>Device type</b>  |
| <b>T</b>          | Transmitter   |
| <b>R</b>          | Receiver  |
| <b>rr</b>         | <b>Resolution/range</b>   |
| <b>14</b>         | 14 mm / range 0 - 6 m   |
| <b>30</b>         | 30 mm / range 0 - 18 m  |
| <b>50</b>         | 50 mm / range 0 - 18 m  |
| <b>90</b>         | 90 mm / range 0 - 18 m  |
| <b>hhh</b>        | <b>Protective field height</b>                                    |
| <b>150...1800</b> | 150...1800 mm for 14 mm resolution                                |
| <b>150...1800</b> | 150...1800 mm for 30 mm resolution                                |
| <b>450...3000</b> | 450...3000 mm for 50 mm resolution                                |
| <b>750...3000</b> | 750...3000 mm for 90 mm resolution                                |
| <b>f</b>          | <b>Function package (receiver only)</b>                           |
| <b>m</b>          | Muting  |
| <b>l</b>          | <b>Integrated LED muting indicator (receiver only)</b>            |
| <b>tt</b>         | <b>Safety-related switching outputs (OSSD), connection system</b> |
| <b>T1</b>         | Transistor output, cable gland                                    |
| <b>T2</b>         | Transistor output, Hirschmann plug (DIN 43651)                    |
| <b>T3</b>         | Transistor output, MIN-style plug (MIN series)                    |
| <b>T4</b>         | Transistor output, M12 plug                                       |
| <b>R1</b>         | Relay output, cable gland, receiver only                          |
| <b>R2</b>         | Relay output, Hirschmann plug (DIN 43651), receiver only          |
| <b>R3</b>         | Relay output, MIN-style plug (MIN series), receiver only          |
| <b>A1</b>         | Integrated AS-Interface, M12 plug, receiver only                  |
| <b>P1</b>         | Integrated PROFIBUS DP interface, M12 plug, receiver only         |
| <b>AP</b>         | M12 plug, transmitter only  |

**CP a rr -hhh -f l /tt**

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Machine Safety  
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Safety Proximity Sensors

## SAFETY LIGHT CURTAINS

Part number code for COMPACT*plus*-m

### Type 4 Safety Light Curtains

| Part no.  | Description  |           |         |
|-----------|--|-----------|---------|
| <b>68</b> | <b>COMPACT<i>plus</i>-m</b>                                      |           |         |
| <b>a</b>  | <b>Resolution</b>  |           |         |
| <b>1</b>  | 14 mm  |           |         |
| <b>3</b>  | 30 mm  |           |         |
| <b>5</b>  | 50 mm  |           |         |
| <b>9</b>  | 90 mm  |           |         |
| <b>bb</b> | <b>Protective field height</b>                                   |           |         |
| <b>01</b> | 150 mm   | <b>13</b> | 1350 mm |
| <b>02</b> | 225 mm   | <b>15</b> | 1500 mm |
| <b>03</b> | 300 mm   | <b>16</b> | 1650 mm |
| <b>04</b> | 450 mm   | <b>18</b> | 1800 mm |
| <b>06</b> | 600 mm   | <b>21</b> | 2100 mm |
| <b>07</b> | 750 mm   | <b>24</b> | 2400 mm |
| <b>09</b> | 900 mm   | <b>27</b> | 2700 mm |
| <b>10</b> | 1050 mm  | <b>30</b> | 3000 mm |
| <b>12</b> | 1200 mm  |           |         |
| <b>c</b>  | <b>Device type</b>   |           |         |
| <b>0</b>  | Basic transmitter device   |           |         |
| <b>4</b>  | Basic receiver device  |           |         |
| <b>8</b>  | Receiver with integrated LED muting indicator                    |           |         |
| <b>dd</b> | <b>Function package/safety-related switching outputs (OSSDs)</b> |           |         |
|           | <b>Transmitter</b>   |           |         |
| <b>00</b> | Transmitter /T1  |           |         |
| <b>01</b> | Transmitter /T2  |           |         |
| <b>02</b> | Transmitter /T3  |           |         |
| <b>03</b> | Transmitter /T4  |           |         |
| <b>50</b> | Transmitter /AP  |           |         |
|           | <b>Receiver</b>  |           |         |
| <b>30</b> | Muting /T1   |           |         |
| <b>31</b> | Muting /T2   |           |         |
| <b>32</b> | Muting /T3   |           |         |
| <b>33</b> | Muting /T4   |           |         |
| <b>39</b> | Muting /R1   |           |         |
| <b>38</b> | Muting /R2   |           |         |
| <b>37</b> | Muting /R3   |           |         |
| <b>80</b> | Muting /A1   |           |         |
| <b>81</b> | Muting /P1   |           |         |

68 a bb c dd

MLC 500  
p. 84

MLC 300  
p. 100

SOLID-4, SOLID-4E  
p. 108

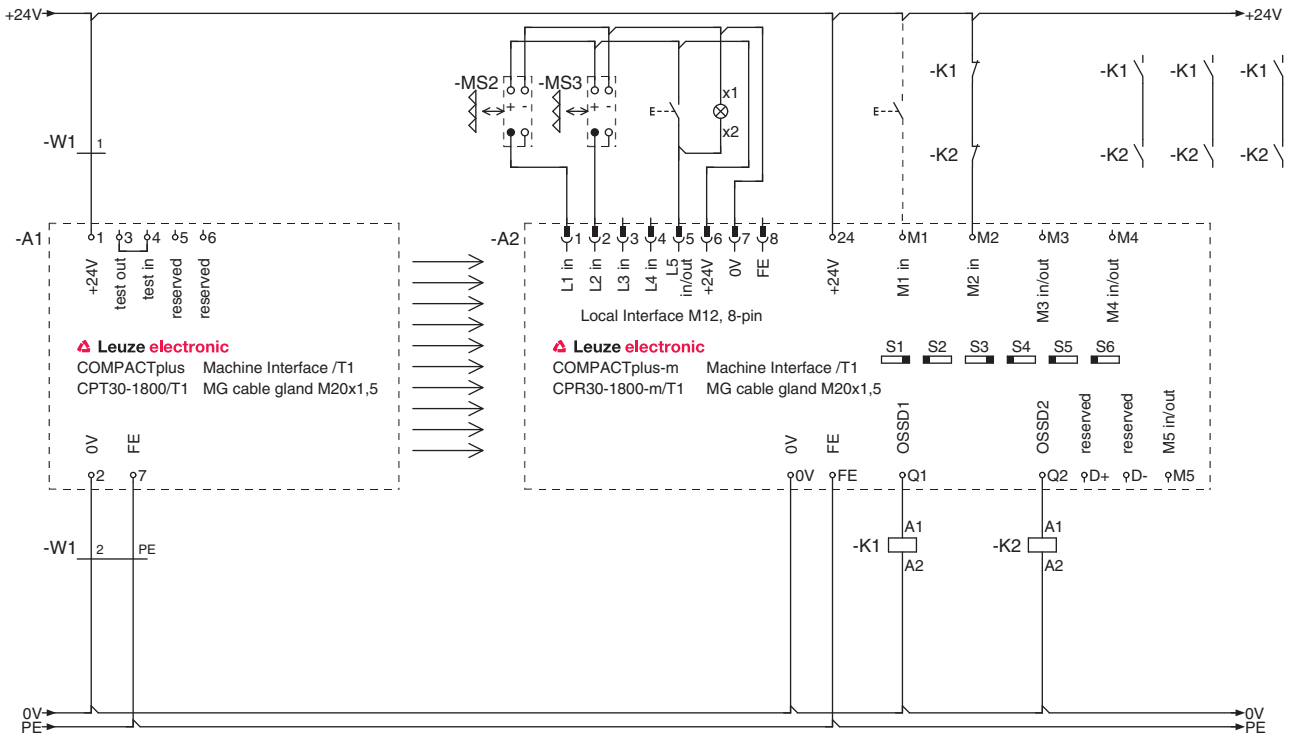
SOLID-2, SOLID-2E  
p. 134

**COMPACT*plus***  
p. 148



Electrical connection

COMPACTplus-m connection example



| Functions selection with DIP switches<br>(grey: DIP switch settings) |   | Position                             |         |
|--|---|--------------------------------------|---------|
|  |   | L (FS)                               | R       |
| S1   | Contactor monitoring (EDM) on M2          | Without                              | With    |
| S2   | Transmission channel (UK)                 | 1                                    | 2       |
| S3   | Start/restart interlock (RES) on L5 or M1 | Without                              | With    |
| S4   | L (FS): Automatic muting**                | R: timing controlled 4-sensor muting |         |
| S5   | Display direction                         | Down                                 | Up      |
| S6   | Muting time limit                         | 10 min                               | Without |

\*\*\*) Automatic muting: timing controlled 2-sensor muting

COMPACTplus-m connection system /T1 (cable gland)

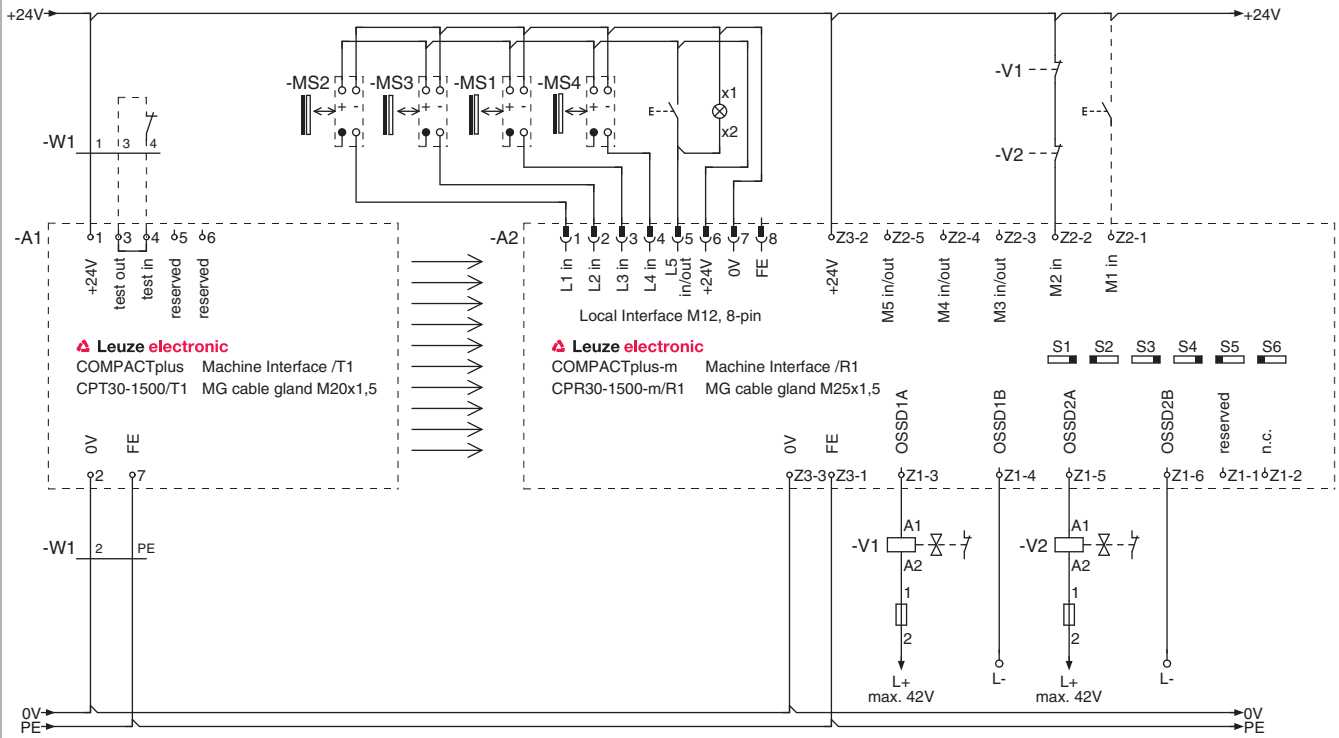
⚠ Please observe the operating instructions of the components!

For further connection examples see chapter COMPACTplus-b, page 177  
AS-Interface Safety at Work, page 288

# SAFETY LIGHT CURTAINS

## Electrical connection

### COMPACTplus-m connection example



| Functions selection with DIP switches<br>(grey: DIP switch settings) |   | Position                               |         |
|--|---|--|---------|
|  |   | L (FS)                                 | R       |
| S1   | Contactor monitoring (EDM) on M2          | Without                                | With    |
| S2   | Transmission channel (UK)                 | 1                                      | 2       |
| S3   | Start/restart interlock (RES) on L5 or M1 | Without                                | With    |
| S4   | L (FS): Automatic muting                  | R: timing controlled 4-sensor muting** |         |
| S5   | Display direction                         | Down                                   | Up      |
| S6   | Muting time limit                         | 10 min                                 | Without |

\*\*): timing controlled 4-sensor muting: simultaneity of MS2 and MS3, and of MS1 and MS4 required.

COMPACTplus-m connection system /R1 (cable gland), switching voltages up to 42 V AC/DC

**!** Please observe the operating instructions of the components!

For further connection examples see chapter  
 COMPACTplus-b, page 177  
 AS-Interface Safety at Work, page 288

## Technical data

| General system data  |   |                         |              |              |            |
|--|---|-------------------------|--------------|--------------|------------|
| Type in accordance with EN/IEC 61496   | 4   |                         |              |              |            |
| SIL in accordance with IEC 61508 and SILCL in accordance with EN/IEC 62061                 | 3   |                         |              |              |            |
| Performance Level (PL) in accordance with EN ISO 13849-1                                   | e   |                         |              |              |            |
| Probability of a failure to danger per hour (PFH <sub>d</sub> )                            | For protective heights up to 900 mm, all resolutions  | 2.26 x 10 <sup>-8</sup> |              |              |            |
|  | For protective heights up to 1800 mm, all resolutions | 2.67 x 10 <sup>-8</sup> |              |              |            |
|  | For protective heights up to 3000 mm                  | On request              |              |              |            |
| Service life (T <sub>M</sub> ) in accordance with EN ISO 13849-1                           | 20 years  |                         |              |              |            |
| Number of cycles until 10% of the components have a failure to danger.(B <sub>10d</sub> )* | With DC1 (ohmic load)                                 | On request              |              |              |            |
|  | With AC1 (ohmic load)                                 | On request              |              |              |            |
|  | With DC13 (inductive load)                            | 630,000 (5 A, 24 V)     |              |              |            |
|  | With AC15 (inductive load)                            | 1,480,000 (3 A, 230 V)  |              |              |            |
|  | Low load (20% nominal load)                           | On request              |              |              |            |
| Category in accordance with EN ISO 13849   | 4   |                         |              |              |            |
| Resolution   | 14 mm   | 30 mm                   | 50 mm        | 90 mm        |            |
| Range  | 0...6 m   | 0...18 m                | 0...18 m     | 0...18 m     |            |
| Response time  | Transistor output                                     | 5...41 ms               | 5...22 ms    | 7...18 ms    | 6...10 ms  |
|  | Relay output  | 20...56 ms              | 20...37 ms   | 22...33 ms   | 21...25 ms |
|  | AS-i Safety Interface                                 | 10...46 ms              | 10...27 ms   | 12...23 ms   | 11...15 ms |
|  | PROFIsafe interface                                   | 25...61 ms              | 25...42 ms   | 27...38 ms   | 26...30 ms |
| Protective field height  | 150...1800mm  | 150...1800**mm          | 450...3000mm | 750...3000mm |            |
| Supply voltage   | 24 V DC, ±20%   |                         |              |              |            |
| Connection cable length  | Max. 100 m with 1.0 mm <sup>2</sup>                   |                         |              |              |            |
| Safety class   | III and I (depending on model)                        |                         |              |              |            |
| Protection rating  | IP 65***  |                         |              |              |            |
| Ambient temperature, operation   | 0...+50°C   |                         |              |              |            |
| Ambient temperature, storage   | -25...+70°C   |                         |              |              |            |
| Relative humidity  | 15...95%  |                         |              |              |            |
| Profile cross-section  | 52 mm x 55 mm   |                         |              |              |            |
| Weight per device (length-dependent)   | 0.70...8.30 kg  |                         |              |              |            |

\*) For devices with relay output

\*\*) Installation length up to 3000 mm on request

\*\*\*) Without additional measures the devices are not suited for outdoor use

## SAFETY LIGHT CURTAINS

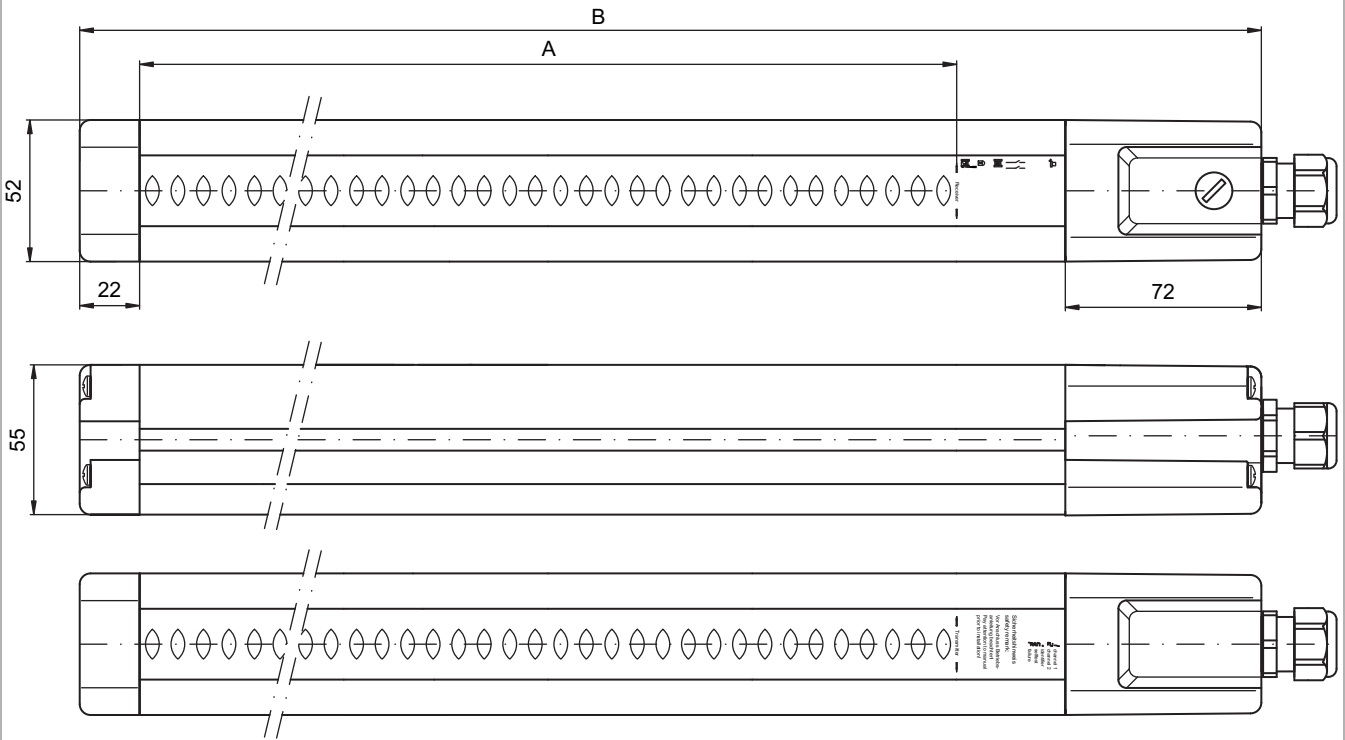
### Technical data

| <b>Transmitter</b>                                    |  |
|---|--|
| Transmitter diodes, class in accordance with EN 60825 | 1  |
| Wavelength  | 880 nm   |
| Current consumption                                   | 75 mA  |
| Connection system                                     | Cable gland (M20)<br>Hirschmann plug (DIN 43651), 12-pin<br>MIN-style plug (MIN series), 3-pin<br>M12 plug, 5-pin  |
| <b>Receiver</b>                                       |  |
| Current consumption                                   | 160 mA without external load and muting accessories  |
| Safety-related switching outputs                      | 2 npn transistor outputs<br>2 relay outputs (NO)<br>AS-i Safety Interface<br>PROFIsafe interface   |
| Switching voltage high active                         | Min. U <sub>v</sub> -1.0 V   |
| Switching voltage low                                 | Max. +2.5 V  |
| Switching current                                     | Typical, 500 mA  |
| Connection system                                     | Cable gland (T1: M20, R1: M25)<br>Hirschmann plug (DIN 43651), T2: 12-pin, R2: 12-pin<br>MIN-style plug (MIN series), T3: 7-pin, R3: 12-pin<br>M12 plug (safety bus systems), 5-pin, T4: 8-pin |

Please note the additional information in the COMPACT*plus*-m connecting and operating instructions at [www.leuze.com/en/compactplus-m](http://www.leuze.com/en/compactplus-m).

**Dimensional drawings**

**COMPACTplus-m Safety Light Curtain**



A = Protective field height according to ordering information  
 B = A + 134 mm

Dimensions in mm

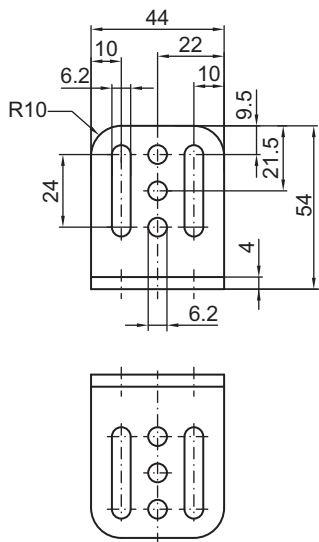
[www.leuze.com/en/compactplus-m/](http://www.leuze.com/en/compactplus-m/)

- Machine Safety
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- Light Beam Safety Device Sets
- Single Light Beam Safety Devices
- AS-Interface Safety at Work
- Safety Proximity Sensors

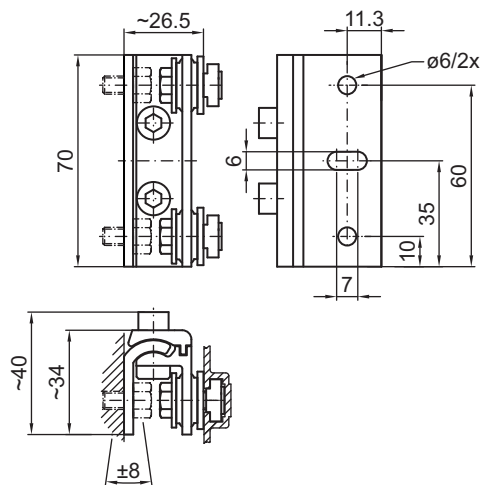
# SAFETY LIGHT CURTAINS

## Dimensional drawings: Accessories

### Mounting brackets



*L-mounting bracket*

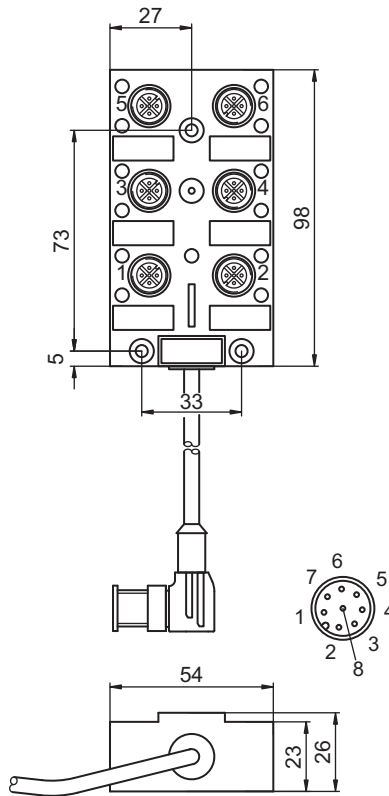


*Mounting bracket, swiveling with shock absorber, BT-SSD*

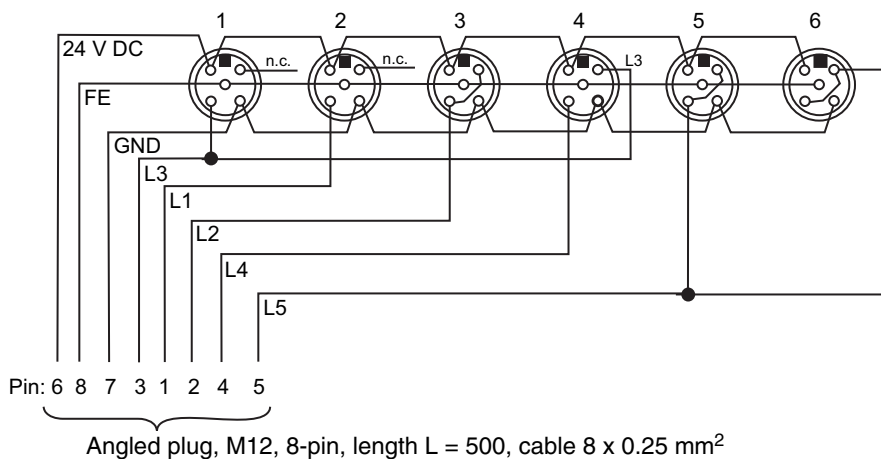
Dimensions in mm

**Dimensional drawings: Accessories**

**Local connection box, AC-SCM1**



**Internal circuit diagram**



Dimensions in mm

[www.leuze.com/en/compactplus-m/](http://www.leuze.com/en/compactplus-m/)



## SAFETY LIGHT CURTAINS

### Accessories ordering information

| Part no.                        | Article     | Description   | Length, design |
|---------------------------------|-------------|---|----------------|
| <b>Installation accessories</b> |             |   |                |
| 429058                          | BT-2SSD     | 2 x 70 mm long mounting brackets, swiveling with shock absorber, incl. 4 screws and 4 sliding blocks  |                |
| 429059                          | BT-4SSD     | 4 x 70 mm long mounting brackets, swiveling with shock absorber, incl. 8 screws and 8 sliding blocks  |                |
| 429049                          | BT-2SSD-270 | 2 x 270 mm long mounting brackets, swiveling with shock absorber, incl. 4 screws and 4 sliding blocks |                |
| 560120                          | BT-2S       | Mounting bracket set consisting of 2 L-type brackets incl. 2 screws                                   |                |
| 425740                          | BT-10NC60   | 10 sliding blocks with 2 bore holes, one with thread M6   |                |
| 425741                          | BT-10NC64   | 10 sliding blocks with 2 bore holes, with M4 and M6 thread  |                |
| 425742                          | BT-10NC65   | 10 sliding blocks with 2 bore holes, with M5 and M6 thread  |                |
| <b>Laser alignment aids</b>     |             |   |                |
| 560020                          | LA-78U      | Laser alignment aid for lateral mounting with use for COMPACT <i>plus</i> /SOLID                      |                |
| 520004                          | LA-78UDC    | Laser alignment aid for use with COMPACT <i>plus</i> with UDC device mounting column                  |                |
| <b>Test rods</b>                |             |   |                |
| 349945                          | AC-TR14/30  | Test rod, 14 mm / 30 mm   |                |
| 430428                          | AC-TRSET1   | Test rod set 14/24/33 mm  |                |
| <b>Parametering software</b>    |             |   |                |
| 520070                          | AC-SK1      | SafetyKey for teaching in   |                |
| 520072                          | CB-PCO-3000 | Connecting cable, RS232 - IR adapter  | 3 m            |
| 520073                          | SLAB-SWC    | SafetyLab parameterization and diagnostic software incl. PC cable, RS232 - IR-adapter                 |                |

## Accessories ordering information

| Part no.  | Article           | Description   | Length, design              |
|---|-------------------|---|-----------------------------|
| <b>COMPACTplus – Accessories for local and machine interfaces</b> |                   |   |                             |
| 150704  | CB-M12-3000-8WM   | Connection cable for local interface with M12 x 8 plug                            | 3 m, angled                 |
| 150699  | CB-M12-10000-8WM  | Connection cable for local interface with M12 x 8 plug                            | 10 m, angled                |
| 426046  | AC-LDH-12GF       | Hirschmann cable socket, encoded for CP/T2 or CP/R2, 12-pin, incl. crimp contacts | Straight                    |
| 426045  | AC-LDH-12WF       | Hirschmann cable socket, encoded for CP/T2 or CP/R2, 12-pin, incl. crimp contacts | Angled                      |
| 426042  | CB-LDH-10000-12GF | Connection cable, machine interface /T2, /R2, Hirschmann cable socket             | 10 m, straight              |
| 426044  | CB-LDH-25000-12GF | Connection cable, machine interface /T2, /R2, Hirschmann cable socket             | 25 m, straight              |
| 426043  | CB-LDH-50000-12GF | Connection cable, machine interface /T2, /R2, Hirschmann cable socket             | 50 m, straight              |
| <b>Connection cables, 5-pin for COMPACTplus/T4 transmitter</b>    |                   |   |                             |
| 429071  | CB-M12-5000S-5GF  | Connection cable shielded with M12 coupling, 5-pin                                | 5 m, straight/<br>open end  |
| 429072  | CB-M12-5000S-5WF  | Connection cable shielded with M12 coupling, 5-pin                                | 5 m, angled/<br>open end    |
| 429073  | CB-M12-10000S-5GF | Connection cable shielded with M12 coupling, 5-pin                                | 10 m, straight/<br>open end |
| 429074  | CB-M12-10000S-5WF | Connection cable shielded with M12 coupling, 5-pin                                | 10 m, angled/<br>open end   |
| 429075  | CB-M12-15000S-5GF | Connection cable shielded with M12 coupling, 5-pin                                | 15 m, straight/<br>open end |
| 429076  | CB-M12-15000S-5WF | Connection cable shielded with M12 coupling, 5-pin                                | 15 m, angled/<br>open end   |
| 429171  | CB-M12-25000S-5GF | Connection cable shielded with M12 coupling, 5-pin                                | 25 m, straight/<br>open end |
| 429172  | CB-M12-25000S-5WF | Connection cable shielded with M12 coupling, 5-pin                                | 25 m, angled/<br>open end   |

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## SAFETY LIGHT CURTAINS

### Accessories ordering information

| Part no.  | Article           | Description  | Length, design              |
|---|-------------------|--|-----------------------------|
| <b>Connection cables, 8-pin for COMPACTplus/T4 receiver</b> |                   |  |                             |
| 429081  | CB-M12-5000S-8GF  | Connection cable shielded with M12 coupling, 8-pin | 5 m, straight/<br>open end  |
| 429082  | CB-M12-5000S-8WF  | Connection cable shielded with M12 coupling, 8-pin | 5 m, angled/<br>open end    |
| 429083  | CB-M12-10000S-8GF | Connection cable shielded with M12 coupling, 8-pin | 10 m, straight/<br>open end |
| 429084  | CB-M12-10000S-8WF | Connection cable shielded with M12 coupling, 8-pin | 10 m, angled/<br>open end   |
| 429085  | CB-M12-15000S-8GF | Connection cable shielded with M12 coupling, 8-pin | 15 m, straight/<br>open end |
| 429086  | CB-M12-15000S-8WF | Connection cable shielded with M12 coupling, 8-pin | 15 m, angled/<br>open end   |
| 429181  | CB-M12-25000S-8GF | Connection cable shielded with M12 coupling, 8-pin | 25 m, straight/<br>open end |
| 429182  | CB-M12-25000S-8WF | Connection cable shielded with M12 coupling, 8-pin | 25 m, angled/<br>open end   |

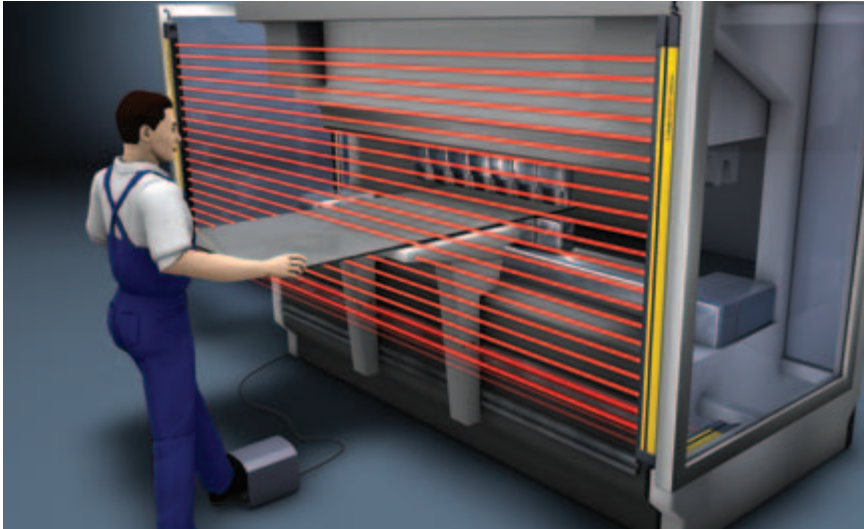
## Accessories ordering information

| Part no.  | Article     | Description  | Length, design      |
|---|-------------|--|---------------------|
| <b>COMPACTplus – muting accessories</b>   |             |  |                     |
| 520065  | AC-SCM1     | Local connection box with M12 plug, for connecting to local interface  | 0.5 m               |
| 520068  | AC-SCM1-BT  | Local connection box with mounting plate and with M12 plug, for connecting to local interface                        | 0.5 m               |
| 520066  | CB-M12-SCC2 | Distribution cable for the PRK.../44 series (pin 2 active), for connecting to local interface, M12/8-pin - 2 x 4-pin | (2 x 1.5 m) + 0.3 m |
| 150755  | CB-M12-SC22 | Distribution cable, 1 x plug and 2 x socket, M12, 4-pin, pin 2 active  | 2 x 1.5 m           |
| 150758  | CB-M12-SC24 | Distribution cable, 1 x plug and 2 x socket, M12, 4-pin, pin 2 active  | 2 m + 5 m           |
| 150766  | CB-M12-SC44 | Connection cable, 1x plug and 2 x socket, M12, 4-pin, pin 4 active with diode decoupling                             | 2 x 1.0 m           |
| 150756  | CB-M12-CC12 | Connection cable M12/8-pin - 4-pin, pin 1 and 2 active   | 0.3 m               |
| 150757  | CB-M12-CC15 | Connection cable M12/8-pin - 4-pin, pin 1 and 5 active   | 1.5 m               |
| 150769  | CB-M12-CC30 | Connection cable M12/8-pin - 4-pin, pin 1 and 5 active   | 3.0 m               |
| 426363  | AC-ABF-SL1  | Display and control unit for muting applications with clamping components for mounting on hard guards                |                     |
| 426290  | AC-ABF10    | Control unit with optional illuminated reset button for mounting on the hard guard                                   |                     |
| Muting accessories such as Muting Mounting Systems, connecting cables and lamps can be found in the sensor accessories chapter, muting accessories section. |             |  |                     |
| <b>Protective screens, see accessories, page 520</b>  |             |  |                     |

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## SAFETY LIGHT CURTAINS

### COMPACTplus-b



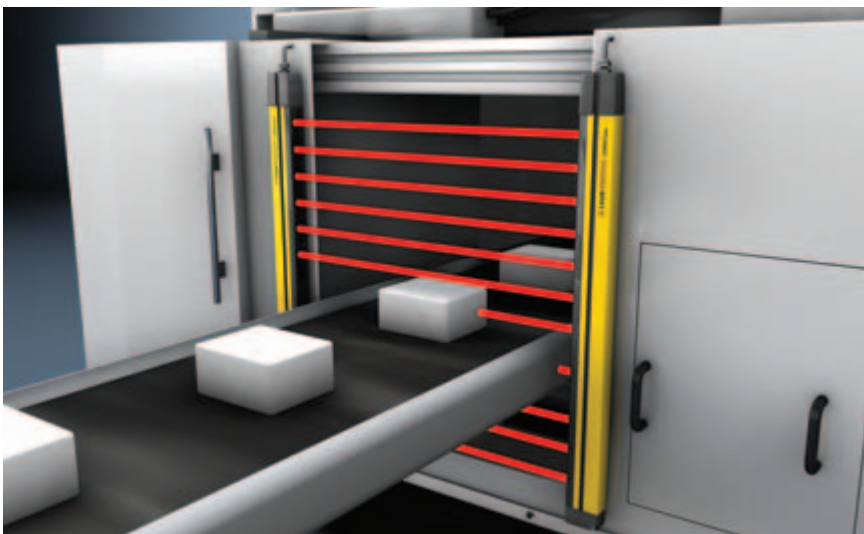
*Safety Light Curtains with resolutions that can be reduced guarantee protection and tolerate work equipment in the protective field*

With special task requirements in material conveyance, the blanking of individual beams may be required in order to ensure an efficient, continuous process while simultaneously guaranteeing safety. The COMPACTplus-b type 4 Safety Light Curtains in accordance with EN/IEC 61496 have been designed with these requirements in mind. They provide blanking functions for blanking any amount of beams and beam areas of varying sizes. Work pieces, for example, consequently pass through the protective field without interruption. By setting a reduced resolution, thin plates or tubes can also move through the protective field.

COMPACTplus-b sensors can be cascaded with devices of the COMPACT series (for ordering information, see page 172). Here COMPACTplus acts as Host and COMPACT as Guest. The functions are given by COMPACTplus Host.

COMPACTplus Safety Light Curtains can be equipped with various functions to optimally perform specific tasks with regard to high functionality, more flexible integration and easy operability.

The COMPACTplus series have a start/restart interlock, contactor monitoring and additional functions that can be easily activated with switches. External additional modules are therefore no longer required. Specific settings are made with the diagnostics and parametering software, SafetyLab. COMPACTplus can be connected to both conventional safety modules and to open safety bus systems via various interfaces (transistor/relay output, AS-Interface Safety at Work, PROFIsafe). These safety sensors can therefore be flexibly integrated into existing automation environments.



*The blanking of individual beams guarantees safety with simultaneous material flow*

### Typical areas of application

- Point of operation guarding with hand and finger protection, e.g. on hydraulic and mechanical presses or punching machines in the metals, leather and plastics industries
- Horizontal danger zone guarding, e.g. in robot entry areas

MLC 500  
p. 84

MLC 300  
p. 100

SOLID-4, SOLID-4E  
p. 108

SOLID-2, SOLID-2E  
p. 134

**COMPACTplus**  
p. 148

# COMPACTplus-b

## Important technical data, overview

|  |   |          |          |
|--|---|----------|----------|
| Type in accordance with EN/IEC 61496                                       | 4   |          |          |
| SIL in accordance with IEC 61508 and SILCL in accordance with EN/IEC 62061 | 3   |          |          |
| Performance Level (PL) in accordance with EN ISO 13849-1                   | e   |          |          |
| Category in accordance with EN ISO 13849                                   | 4   |          |          |
| Resolution   | 14 mm   | 30 mm    | 50 mm    |
| Range  | 0...6 m   | 0...18 m | 0...18 m |
| Protective field height (type-dependent)                                   | 150...3000 mm   |          |          |
| Profile cross-section  | 52 mm x 55 mm   |          |          |
| Safety-related switching outputs   | 2 pnp transistor outputs<br>2 relay outputs<br>AS-i Safety Interface<br>PROFIsafe interface |          |          |
| Connection system  | Cable gland<br>Hirschmann plug<br>MIN-style plug<br>M12 plug                                |          |          |

## Functions

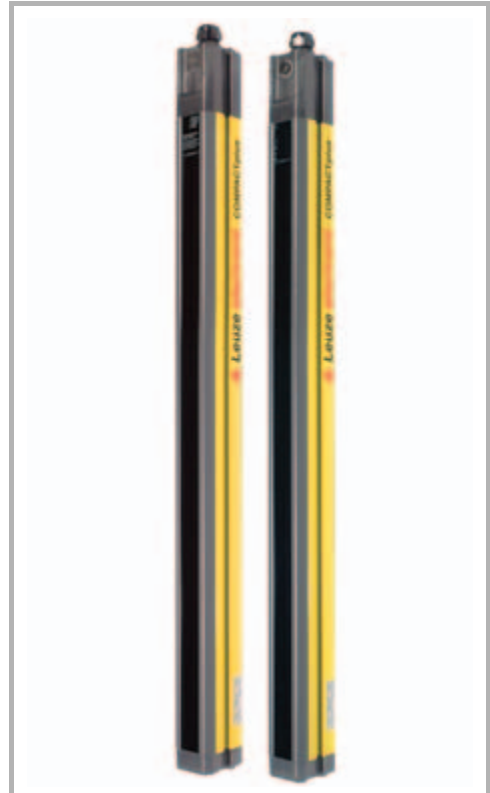
|  |
|--|
| Start/restart interlock (RES), selectable      |
| Dynamic contactor monitoring (EDM), selectable |
| 2 transmission channels, selectable            |
| Fixed blanking can be taught in                |
| Floating blanking can be taught in             |
| Single-beam or 2-beam reduced resolution       |
| Additional 2-channel blanking circuit          |

## Functions extension with "SafetyLab" PC software (accessories)

|   |
|---|
| Infrared interface for parametering and diagnostics |
| Teaching-in override function for floating blanking |
| Graphics-supported protective field editor          |
| Reduced resolutions in protective field sub-areas   |
| 3-beam reduced resolution                           |
| Beam signals for position and height measuring      |

## Special features

- **Plug-in module with saved device parameters for fast device swap-out**
- **M12 local interface for connecting local sensors and signal devices**



## Features



## Further information

## Page

|                                     |     |
|-------------------------------------|-----|
| ● Ordering information              | 168 |
| ● Electrical connection             | 177 |
| ● Technical data                    | 179 |
| ● Dimensional drawings              | 181 |
| ● Dimensional drawings: Accessories | 183 |
| ● Accessories ordering information  | 184 |

[www.leuze.com/en/compactplus-b/](http://www.leuze.com/en/compactplus-b/)

# SAFETY LIGHT CURTAINS

## Ordering information

**COMPACTplus-b**, consisting of transmitter and receiver  
 Included in delivery: 4 sliding blocks, 2 BT-S mounting bracket sets,  
 1 SafetyKey, test rods, 1 set of connecting and operating instruc-  
 tions (PDF file on CD-ROM), 1 self-adhesive notice sign

**Functions:** Start/restart interlock, contactor monitoring,  
 2 transmission channels, fixed blanking, floating blank-  
 ing, reduced resolution

| Protective field height in mm | COMPACTplus-b            |                 |             | COMPACTplus-b            |                 |             |
|-------------------------------|--------------------------|-----------------|-------------|--------------------------|-----------------|-------------|
|                               | Part no.                 | Article         | Description | Part no.                 | Article         | Description |
|                               | <b>Resolution: 14 mm</b> |                 |             | <b>Resolution: 30 mm</b> |                 |             |
|                               | <b>Range: 0 - 6 m</b>    |                 |             | <b>Range: 0 - 18 m</b>   |                 |             |
| 150                           | 68101000                 | CPT14-150/T1    | Transmitter | 68301000                 | CPT30-150/T1    | Transmitter |
|                               | 68101420                 | CPR14-150-b/T1  | Receiver    | 68301420                 | CPR30-150-b/T1  | Receiver    |
| 225                           | 68102000                 | CPT14-225/T1    | Transmitter | 68302000                 | CPT30-225/T1    | Transmitter |
|                               | 68102420                 | CPR14-225-b/T1  | Receiver    | 68302420                 | CPR30-225-b/T1  | Receiver    |
| 300                           | 68103000                 | CPT14-300/T1    | Transmitter | 68303000                 | CPT30-300/T1    | Transmitter |
|                               | 68103420                 | CPR14-300-b/T1  | Receiver    | 68303420                 | CPR30-300-b/T1  | Receiver    |
| 450                           | 68104000                 | CPT14-450/T1    | Transmitter | 68304000                 | CPT30-450/T1    | Transmitter |
|                               | 68104420                 | CPR14-450-b/T1  | Receiver    | 68304420                 | CPR30-450-b/T1  | Receiver    |
| 600                           | 68106000                 | CPT14-600/T1    | Transmitter | 68306000                 | CPT30-600/T1    | Transmitter |
|                               | 68106420                 | CPR14-600-b/T1  | Receiver    | 68306420                 | CPR30-600-b/T1  | Receiver    |
| 750                           | 68107000                 | CPT14-750/T1    | Transmitter | 68307000                 | CPT30-750/T1    | Transmitter |
|                               | 68107420                 | CPR14-750-b/T1  | Receiver    | 68307420                 | CPR30-750-b/T1  | Receiver    |
| 900                           | 68109000                 | CPT14-900/T1    | Transmitter | 68309000                 | CPT30-900/T1    | Transmitter |
|                               | 68109420                 | CPR14-900-b/T1  | Receiver    | 68309420                 | CPR30-900-b/T1  | Receiver    |
| 1050                          | 68110000                 | CPT14-1050/T1   | Transmitter | 68310000                 | CPT30-1050/T1   | Transmitter |
|                               | 68110420                 | CPR14-1050-b/T1 | Receiver    | 68310420                 | CPR30-1050-b/T1 | Receiver    |
| 1200                          | 68112000                 | CPT14-1200/T1   | Transmitter | 68312000                 | CPT30-1200/T1   | Transmitter |
|                               | 68112420                 | CPR14-1200-b/T1 | Receiver    | 68312420                 | CPR30-1200-b/T1 | Receiver    |
| 1350                          | 68113000                 | CPT14-1350/T1   | Transmitter | 68313000                 | CPT30-1350/T1   | Transmitter |
|                               | 68113420                 | CPR14-1350-b/T1 | Receiver    | 68313420                 | CPR30-1350-b/T1 | Receiver    |
| 1500                          | 68115000                 | CPT14-1500/T1   | Transmitter | 68315000                 | CPT30-1500/T1   | Transmitter |
|                               | 68115420                 | CPR14-1500-b/T1 | Receiver    | 68315420                 | CPR30-1500-b/T1 | Receiver    |
| 1650                          | 68116000                 | CPT14-1650/T1   | Transmitter | 68316000                 | CPT30-1650/T1   | Transmitter |
|                               | 68116420                 | CPR14-1650-b/T1 | Receiver    | 68316420                 | CPR30-1650-b/T1 | Receiver    |
| 1800                          | 68118000                 | CPT14-1800/T1   | Transmitter | 68318000                 | CPT30-1800/T1   | Transmitter |
|                               | 68118420                 | CPR14-1800-b/T1 | Receiver    | 68318420                 | CPR30-1800-b/T1 | Receiver    |

Standard model /T1 with metric cable gland (M20).

Test rod included in scope of delivery

Standard model /T1 with metric cable gland (M20).

Test rod included in scope of delivery



## Ordering information

**COMPACTplus-b**, consisting of transmitter and receiver  
 Included in delivery: 4 sliding blocks, 2 BT-S mounting bracket sets,  
 1 SafetyKey, 1 set of connecting and operating instructions (PDF  
 file on CD-ROM), 1 self-adhesive notice sign

**Functions:** Start/restart interlock, contactor monitoring,  
 2 transmission channels, fixed blanking, floating blanking,  
 reduced resolution

| Protective field height in mm | COMPACTplus-b                        |                 |             |
|-------------------------------|--------------------------------------|-----------------|-------------|
|                               | Resolution: 50 mm<br>Range: 0 - 18 m |                 |             |
|                               | Part no.                             | Article         | Description |
| 450                           | 68504000                             | CPT50-450/T1    | Transmitter |
|                               | 68504420                             | CPR50-450-b/T1  | Receiver    |
| 600                           | 68506000                             | CPT50-600/T1    | Transmitter |
|                               | 68506420                             | CPR50-600-b/T1  | Receiver    |
| 750                           | 68507000                             | CPT50-750/T1    | Transmitter |
|                               | 68507420                             | CPR50-750-b/T1  | Receiver    |
| 900                           | 68509000                             | CPT50-900/T1    | Transmitter |
|                               | 68509420                             | CPR50-900-b/T1  | Receiver    |
| 1050                          | 68510000                             | CPT50-1050/T1   | Transmitter |
|                               | 68510420                             | CPR50-1050-b/T1 | Receiver    |
| 1200                          | 68512000                             | CPT50-1200/T1   | Transmitter |
|                               | 68512420                             | CPR50-1200-b/T1 | Receiver    |
| 1350                          | 68513000                             | CPT50-1350/T1   | Transmitter |
|                               | 68513420                             | CPR50-1350-b/T1 | Receiver    |
| 1500                          | 68515000                             | CPT50-1500/T1   | Transmitter |
|                               | 68515420                             | CPR50-1500-b/T1 | Receiver    |
| 1650                          | 68516000                             | CPT50-1650/T1   | Transmitter |
|                               | 68516420                             | CPR50-1650-b/T1 | Receiver    |
| 1800                          | 68518000                             | CPT50-1800/T1   | Transmitter |
|                               | 68518420                             | CPR50-1800-b/T1 | Receiver    |
| 2100                          | 68521000                             | CPT50-2100/T1   | Transmitter |
|                               | 68521420                             | CPR50-2100-b/T1 | Receiver    |
| 2400                          | 68524000                             | CPT50-2400/T1   | Transmitter |
|                               | 68524420                             | CPR50-2400-b/T1 | Receiver    |
| 2700                          | 68527000                             | CPT50-2700/T1   | Transmitter |
|                               | 68527420                             | CPR50-2700-b/T1 | Receiver    |
| 3000                          | 68530000                             | CPT50-3000/T1   | Transmitter |
|                               | 68530420                             | CPR50-3000-b/T1 | Receiver    |

Standard model /T1 with metric cable gland (M20).

[www.leuze.com/en/compactplus-b/](http://www.leuze.com/en/compactplus-b/)

## SAFETY LIGHT CURTAINS

### Ordering information

**COMPACTplus-b Host**, consisting of transmitter and receiver  
Included in delivery: 4 sliding blocks, 2 BT-S mounting bracket sets,  
1 SafetyKey, 1 set of connecting and operating instructions (PDF  
file on CD-ROM), 1 self-adhesive notice sign

**Functions:** Start/restart interlock, contactor monitoring,  
2 transmission channels, fixed blanking, floating blanking,  
reduced resolution

| Protective field height in mm | COMPACTplus-b Host                  |                  |             | COMPACTplus-b Host                   |                  |             |
|-------------------------------|-------------------------------------|------------------|-------------|--------------------------------------|------------------|-------------|
|                               | Part no.                            | Article          | Description | Part no.                             | Article          | Description |
|                               | Resolution: 14 mm<br>Range: 0 - 6 m |                  |             | Resolution: 30 mm<br>Range: 0 - 18 m |                  |             |
| 225                           | 68102100                            | CPT14-225H/T1    | Transmitter |                                      |                  |             |
|                               | 68102620                            | CPR14-225H-b/T1  | Receiver    |                                      |                  |             |
| 300                           | 68103100                            | CPT14-300H/T1    | Transmitter | 68303100                             | CPT30-300H/T1    | Transmitter |
|                               | 68103620                            | CPR14-300H-b/T1  | Receiver    | 68303620                             | CPR30-300H-b/T1  | Receiver    |
| 450                           | 68104100                            | CPT14-450H/T1    | Transmitter | 68304100                             | CPT30-450H/T1    | Transmitter |
|                               | 68104620                            | CPR14-450H-b/T1  | Receiver    | 68304620                             | CPR30-450H-b/T1  | Receiver    |
| 600                           | 68106100                            | CPT14-600H/T1    | Transmitter | 68306100                             | CPT30-600H/T1    | Transmitter |
|                               | 68106620                            | CPR14-600H-b/T1  | Receiver    | 68306620                             | CPR30-600H-b/T1  | Receiver    |
| 750                           | 68107100                            | CPT14-750H/T1    | Transmitter | 68307100                             | CPT30-750H/T1    | Transmitter |
|                               | 68107620                            | CPR14-750H-b/T1  | Receiver    | 68307620                             | CPR30-750H-b/T1  | Receiver    |
| 900                           | 68109100                            | CPT14-900H/T1    | Transmitter | 68309100                             | CPT30-900H/T1    | Transmitter |
|                               | 68109620                            | CPR14-900H-b/T1  | Receiver    | 68309620                             | CPR30-900H-b/T1  | Receiver    |
| 1050                          | 68110100                            | CPT14-1050H/T1   | Transmitter | 68310100                             | CPT30-1050H/T1   | Transmitter |
|                               | 68110620                            | CPR14-1050H-b/T1 | Receiver    | 68310620                             | CPR30-1050H-b/T1 | Receiver    |
| 1200                          | 68112100                            | CPT14-1200H/T1   | Transmitter | 68312100                             | CPT30-1200H/T1   | Transmitter |
|                               | 68112620                            | CPR14-1200H-b/T1 | Receiver    | 68312620                             | CPR30-1200H-b/T1 | Receiver    |
| 1350                          | 68113100                            | CPT14-1350H/T1   | Transmitter | 68313100                             | CPT30-1350H/T1   | Transmitter |
|                               | 68113620                            | CPR14-1350H-b/T1 | Receiver    | 68313620                             | CPR30-1350H-b/T1 | Receiver    |
| 1500                          | 68115100                            | CPT14-1500H/T1   | Transmitter | 68315100                             | CPT30-1500H/T1   | Transmitter |
|                               | 68115620                            | CPR14-1500H-b/T1 | Receiver    | 68315620                             | CPR30-1500H-b/T1 | Receiver    |
| 1650                          | 68116100                            | CPT14-1650H/T1   | Transmitter | 68316100                             | CPT30-1650H/T1   | Transmitter |
|                               | 68116620                            | CPR14-1650H-b/T1 | Receiver    | 68316620                             | CPR30-1650H-b/T1 | Receiver    |
| 1800                          | 68118100                            | CPT14-1800H/T1   | Transmitter | 68318100                             | CPT30-1800H/T1   | Transmitter |
|                               | 68118620                            | CPR14-1800H-b/T1 | Receiver    | 68318620                             | CPR30-1800H-b/T1 | Receiver    |

MLC 500  
p. 84

MLC 300  
p. 100

SOLID-4, SOLID-4E  
p. 108

SOLID-2, SOLID-2E  
p. 134

**COMPACTplus**  
p. 148

## Ordering information

**COMPACTplus-b Host**, consisting of transmitter and receiver  
 Included in delivery: 4 sliding blocks, 2 BT-S mounting bracket sets,  
 1 SafetyKey, 1 set of connecting and operating instructions (PDF  
 file on CD-ROM), 1 self-adhesive notice sign

**Functions:** Start/restart interlock, contactor monitoring,  
 2 transmission channels, fixed blanking, floating blanking,  
 reduced resolution

| Protective field height in mm | COMPACTplus-b Host |                  |             |
|-------------------------------|--------------------|------------------|-------------|
|                               | Part no.           | Article          | Description |
|                               | Resolution: 50 mm  |                  |             |
|                               | Range: 0 - 18 m    |                  |             |
| 450                           | 68504100           | CPT50-450H/T1    | Transmitter |
|                               | 68504620           | CPR50-450H-b/T1  | Receiver    |
| 600                           | 68506100           | CPT50-600H/T1    | Transmitter |
|                               | 68506620           | CPR50-600H-b/T1  | Receiver    |
| 750                           | 68507100           | CPT50-750H/T1    | Transmitter |
|                               | 68507620           | CPR50-750H-b/T1  | Receiver    |
| 900                           | 68509100           | CPT50-900H/T1    | Transmitter |
|                               | 68509620           | CPR50-900H-b/T1  | Receiver    |
| 1050                          | 68510100           | CPT50-1050H/T1   | Transmitter |
|                               | 68510620           | CPR50-1050H-b/T1 | Receiver    |
| 1200                          | 68512100           | CPT50-1200H/T1   | Transmitter |
|                               | 68512620           | CPR50-1200H-b/T1 | Receiver    |
| 1350                          | 68513100           | CPT50-1350H/T1   | Transmitter |
|                               | 68513620           | CPR50-1350H-b/T1 | Receiver    |
| 1500                          | 68515100           | CPT50-1500H/T1   | Transmitter |
|                               | 68515620           | CPR50-1500H-b/T1 | Receiver    |
| 1650                          | 68516100           | CPT50-1650H/T1   | Transmitter |
|                               | 68516620           | CPR50-1650H-b/T1 | Receiver    |
| 1800                          | 68518100           | CPT50-1800H/T1   | Transmitter |
|                               | 68518620           | CPR50-1800H-b/T1 | Receiver    |
| 2100                          | 68521100           | CPT50-2100H/T1   | Transmitter |
|                               | 68521620           | CPR50-2100H-b/T1 | Receiver    |
| 2400                          | 68524100           | CPT50-2400H/T1   | Transmitter |
|                               | 68524620           | CPR50-2400H-b/T1 | Receiver    |
| 2700                          | 68527100           | CPT50-2700H/T1   | Transmitter |
|                               | 68527620           | CPR50-2700H-b/T1 | Receiver    |
| 3000                          | 68530100           | CPT50-3000H/T1   | Transmitter |
|                               | 68530620           | CPR50-3000H-b/T1 | Receiver    |

[www.leuze.com/en/compactplus-b/](http://www.leuze.com/en/compactplus-b/)

## SAFETY LIGHT CURTAINS

### Ordering information

**COMPACTplus Guest**, consisting of transmitter and receiver  
Included in delivery: 4 sliding blocks, 2 BT-S mounting bracket sets

**Functions:** For cascading with COMPACTplus-b host,  
functions specified by host

| Protective field height in mm | COMPACTplus Guest<br>Connection system: M12 plug<br>Resolution: 14 mm<br>Range: 0 - 6 m |            |             | COMPACTplus Guest<br>Connection system: M12 plug<br>Resolution: 30 mm<br>Range: 0 - 18 m |            |             |
|-------------------------------|---|------------|-------------|--|------------|-------------|
|                               | Part no.  | Article    | Description | Part no.   | Article    | Description |
| 150                           | 563101  | CT14-150S  | Transmitter | 563301   | CT30-150S  | Transmitter |
|                               | 566101  | CR14-150S  | Receiver    | 566301   | CR30-150S  | Receiver    |
| 225                           | 563102  | CT14-225S  | Transmitter | 563302   | CT30-225S  | Transmitter |
|                               | 566102  | CR14-225S  | Receiver    | 566302   | CR30-225S  | Receiver    |
| 300                           | 563103  | CT14-300S  | Transmitter | 563303   | CT30-300S  | Transmitter |
|                               | 566103  | CR14-300S  | Receiver    | 566303   | CR30-300S  | Receiver    |
| 450                           | 563104  | CT14-450S  | Transmitter | 563304   | CT30-450S  | Transmitter |
|                               | 566104  | CR14-450S  | Receiver    | 566304   | CR30-450S  | Receiver    |
| 600                           | 563106  | CT14-600S  | Transmitter | 563306   | CT30-600S  | Transmitter |
|                               | 566106  | CR14-600S  | Receiver    | 566306   | CR30-600S  | Receiver    |
| 750                           | 563107  | CT14-750S  | Transmitter | 563307   | CT30-750S  | Transmitter |
|                               | 566107  | CR14-750S  | Receiver    | 566307   | CR30-750S  | Receiver    |
| 900                           | 563109  | CT14-900S  | Transmitter | 563309   | CT30-900S  | Transmitter |
|                               | 566109  | CR14-900S  | Receiver    | 566309   | CR30-900S  | Receiver    |
| 1050                          | 563110  | CT14-1050S | Transmitter | 563310   | CT30-1050S | Transmitter |
|                               | 566110  | CR14-1050S | Receiver    | 566310   | CR30-1050S | Receiver    |
| 1200                          | 563112  | CT14-1200S | Transmitter | 563312   | CT30-1200S | Transmitter |
|                               | 566112  | CR14-1200S | Receiver    | 566312   | CR30-1200S | Receiver    |
| 1350                          | 563113  | CT14-1350S | Transmitter | 563313   | CT30-1350S | Transmitter |
|                               | 566113  | CR14-1350S | Receiver    | 566313   | CR30-1350S | Receiver    |
| 1500                          | 563115  | CT14-1500S | Transmitter | 563315   | CT30-1500S | Transmitter |
|                               | 566115  | CR14-1500S | Receiver    | 566315   | CR30-1500S | Receiver    |
| 1650                          | 563116  | CT14-1650S | Transmitter | 563316   | CT30-1650S | Transmitter |
|                               | 566116  | CR14-1650S | Receiver    | 566316   | CR30-1650S | Receiver    |
| 1800                          | 563118  | CT14-1800S | Transmitter | 563318   | CT30-1800S | Transmitter |
|                               | 566118  | CR14-1800S | Receiver    | 566318   | CR30-1800S | Receiver    |
| 2100                          | 563121  | CT14-2100S | Transmitter | 563321   | CT30-2100S | Transmitter |
|                               | 566121  | CR14-2100S | Receiver    | 566321   | CR30-2100S | Receiver    |

## Ordering information

**COMPACTplus Guest**, consisting of transmitter and receiver  
Included in delivery: 4 sliding blocks, 2 BT-S mounting bracket sets

**Functions:** For cascading with COMPACTplus-b host,  
functions specified by host

| Protective field height in mm | COMPACTplus Guest<br>Connection system: M12 plug<br>Resolution: 50 mm<br>Range: 0 - 18 m |            |             | COMPACTplus Guest<br>Connection system: M12 plug<br>Resolution: 90 mm<br>Range: 0 - 18 m |            |             |
|-------------------------------|--|------------|-------------|--|------------|-------------|
|                               | Part no.   | Article    | Description | Part no.   | Article    | Description |
| 450                           | 563504   | CT50-450S  | Transmitter |  |            |             |
|                               | 566504   | CR50-450S  | Receiver    |  |            |             |
| 600                           | 563506   | CT50-600S  | Transmitter |  |            |             |
|                               | 566506   | CR50-600S  | Receiver    |  |            |             |
| 750                           | 563507   | CT50-750S  | Transmitter | 563907   | CT90-750S  | Transmitter |
|                               | 566507   | CR50-750S  | Receiver    | 566907   | CR90-750S  | Receiver    |
| 900                           | 563509   | CT50-900S  | Transmitter | 563909   | CT90-900S  | Transmitter |
|                               | 566509   | CR50-900S  | Receiver    | 566909   | CR90-900S  | Receiver    |
| 1050                          | 563510   | CT50-1050S | Transmitter | 563910   | CT90-1050S | Transmitter |
|                               | 566510   | CR50-1050S | Receiver    | 566910   | CR90-1050S | Receiver    |
| 1200                          | 563512   | CT50-1200S | Transmitter | 563912   | CT90-1200S | Transmitter |
|                               | 566512   | CR50-1200S | Receiver    | 566912   | CR90-1200S | Receiver    |
| 1350                          | 563513   | CT50-1350S | Transmitter | 563913   | CT90-1350S | Transmitter |
|                               | 566513   | CR50-1350S | Receiver    | 566913   | CR90-1350S | Receiver    |
| 1500                          | 563515   | CT50-1500S | Transmitter | 563915   | CT90-1500S | Transmitter |
|                               | 566515   | CR50-1500S | Receiver    | 566915   | CR90-1500S | Receiver    |
| 1650                          | 563516   | CT50-1650S | Transmitter | 563916   | CT90-1650S | Transmitter |
|                               | 566516   | CR50-1650S | Receiver    | 566916   | CR90-1650S | Receiver    |
| 1800                          | 563518   | CT50-1800S | Transmitter | 563918   | CT90-1800S | Transmitter |
|                               | 566518   | CR50-1800S | Receiver    | 566918   | CR90-1800S | Receiver    |
| 2100                          | 563521   | CT50-2100S | Transmitter | 563921   | CT90-2100S | Transmitter |
|                               | 566521   | CR50-2100S | Receiver    | 566921   | CR90-2100S | Receiver    |
| 2400                          | 563524   | CT50-2400S | Transmitter | 563924   | CT90-2400S | Transmitter |
|                               | 566524   | CR50-2400S | Receiver    | 566924   | CR90-2400S | Receiver    |
| 2700                          | 563527   | CT50-2700S | Transmitter | 563927   | CT90-2700S | Transmitter |
|                               | 566527   | CR50-2700S | Receiver    | 566927   | CR90-2700S | Receiver    |
| 3000                          | 563530   | CT50-3000S | Transmitter | 563930   | CT90-3000S | Transmitter |
|                               | 566530   | CR50-3000S | Receiver    | 566930   | CR90-3000S | Receiver    |

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## SAFETY LIGHT CURTAINS

### COMPACTplus-b – model varieties

| Article        | Description                         | Safety-related switching outputs (OSSD), connection system |
|----------------|-------------------------------------|--|
| CPT...../T1    | Transmitter                         | Cable gland (M20)  |
| CPR...../T1    | Receiver                            | Transistor output, cable gland (M20)                       |
| CPR...../R1    | Receiver                            | Relay output, cable gland (M25)                            |
| CPT...../T2    | Transmitter                         | Hirschmann plug, 12-pin                                    |
| CPR...../T2    | Receiver                            | Transistor output, Hirschmann plug, 12-pin                 |
| CPR...../R2    | Receiver                            | Relay output, Hirschmann plug, 12-pin                      |
| CPT...../T3    | Transmitter                         | MIN-style plug, 3-pin                                      |
| CPR...../T3    | Receiver                            | Transistor output, MIN-style plug, 7-pin                   |
| CPR...../R3    | Receiver                            | Relay output, MIN-style plug, 12-pin                       |
| CPT...../T4    | Transmitter                         | M12 plug, 5-pin  |
| CPR...../T4    | Receiver                            | Transistor output, M12 plug, 8-pin                         |
| CPT...../AP    | Transmitter                         | Integrated AS-Interface, M12 plug, 5-pin                   |
| CPR...../A1    | Receiver with AS-i Safety Interface | Integrated AS-Interface, M12 plug, 5-pin                   |
| CPR...../P1    | Receiver with PROFIsafe interface   | Integrated PROFIBUS DP interface, M12 plug, 5 pin          |
| CPT...../H/... | Transmitter, cascable               | All  |
| CPR...../H-... | Receiver, cascable                  | All  |

Delivery of devices with MIN-style plug only in the USA

**Article list for COMPACTplus-b**

**Type 4 Safety Light Curtains**

| Article           | Description   |
|-------------------|---|
| <b>CP</b>         | <b>COMPACTplus-b</b>  |
| <b>a</b>          | <b>Device type</b>  |
| <b>T</b>          | Transmitter   |
| <b>R</b>          | Receiver  |
| <b>rr</b>         | <b>Resolution/range</b>   |
| <b>14</b>         | 14 mm / range 0 - 6 m   |
| <b>30</b>         | 30 mm / range 0 - 18 m  |
| <b>50</b>         | 50 mm / range 0 - 18 m  |
| <b>hhh</b>        | <b>Protective field height</b>                                    |
| <b>150...1800</b> | 150...1800 mm for 14 mm resolution                                |
| <b>150...1800</b> | 150...1800 mm for 30 mm resolution                                |
| <b>450...3000</b> | 450...3000 mm for 50 mm resolution                                |
| <b>k</b>          | <b>Cascading option</b>   |
| <b>H</b>          | Host (from 225 mm protective field height)                        |
| <b>f</b>          | <b>Function package (receiver only)</b>                           |
| <b>b</b>          | Blanking  |
| <b>tt</b>         | <b>Safety-related switching outputs (OSSD), connection system</b> |
| <b>T1</b>         | Transistor output, cable gland                                    |
| <b>T2</b>         | Transistor output, Hirschmann plug (DIN 43651)                    |
| <b>T3</b>         | Transistor output, MIN-style plug (MIN series)                    |
| <b>T4</b>         | Transistor output, M12 plug                                       |
| <b>R1</b>         | Relay output, cable gland, receiver only                          |
| <b>R2</b>         | Relay output, Hirschmann plug (DIN 43651), receiver only          |
| <b>R3</b>         | Relay output, MIN-style plug (MIN series), receiver only          |
| <b>A1</b>         | Integrated AS-Interface, M12 plug, receiver only                  |
| <b>P1</b>         | Integrated PROFIBUS DP interface, M12 plug, receiver only         |
| <b>AP</b>         | M12 plug, transmitter only  |

**CP a rr -hhh k -f /tt**

[www.leuze.com/en/compactplus-b/](http://www.leuze.com/en/compactplus-b/)

Machine Safety  
Machine Safety Services  
Safety Engineering Software  
Safety Laser Scanners  
Safety Light Curtains  
Multiple Light Beam Safety Devices  
Light Beam Safety Device Sets  
Single Light Beam Safety Devices  
AS-Interface Safety at Work  
Safety Proximity Sensors



## SAFETY LIGHT CURTAINS

Part number code for COMPACT*plus*-b

### Type 4 Safety Light Curtains

| Part no.           | Description  |
|--------------------|--|
| <b>68</b>          | <b>COMPACT<i>plus</i>-b</b>                                      |
| <b>a</b>           | <b>Resolution</b>  |
| <b>1</b>           | 14 mm  |
| <b>3</b>           | 30 mm  |
| <b>5</b>           | 50 mm  |
| <b>bb</b>          | <b>Protective field height</b>                                   |
| <b>01</b>          | 150 mm   |
| <b>02</b>          | 225 mm   |
| <b>03</b>          | 300 mm   |
| <b>04</b>          | 450 mm   |
| <b>06</b>          | 600 mm   |
| <b>07</b>          | 750 mm   |
| <b>09</b>          | 900 mm   |
| <b>10</b>          | 1050 mm  |
| <b>12</b>          | 1200 mm  |
| <b>13</b>          | 1350 mm  |
| <b>15</b>          | 1500 mm  |
| <b>16</b>          | 1650 mm  |
| <b>18</b>          | 1800 mm  |
| <b>21</b>          | 2100 mm  |
| <b>24</b>          | 2400 mm  |
| <b>27</b>          | 2700 mm  |
| <b>30</b>          | 3000 mm  |
| <b>c</b>           | <b>Device type</b>   |
| <b>0</b>           | Basic transmitter device   |
| <b>1</b>           | Transmitter Host (cascadable)                                    |
| <b>4</b>           | Basic receiver device  |
| <b>6</b>           | Receiver Host (cascadable)                                       |
| <b>dd</b>          | <b>Function package/safety-related switching outputs (OSSDs)</b> |
| <b>Transmitter</b> |  |
| <b>00</b>          | Transmitter /T1  |
| <b>01</b>          | Transmitter /T2  |
| <b>02</b>          | Transmitter /T3  |
| <b>03</b>          | Transmitter /T4  |
| <b>50</b>          | Transmitter /AP  |
| <b>Receiver</b>    |  |
| <b>20</b>          | Blanking /T1   |
| <b>21</b>          | Blanking /T2   |
| <b>22</b>          | Blanking /T3   |
| <b>23</b>          | Blanking /T4   |
| <b>29</b>          | Blanking /R1   |
| <b>28</b>          | Blanking /R2   |
| <b>27</b>          | Blanking /R3   |
| <b>70</b>          | Blanking /A1   |
| <b>71</b>          | Blanking /P1   |

**68 a bb c dd**

MLC 500  
p. 84

MLC 300  
p. 100

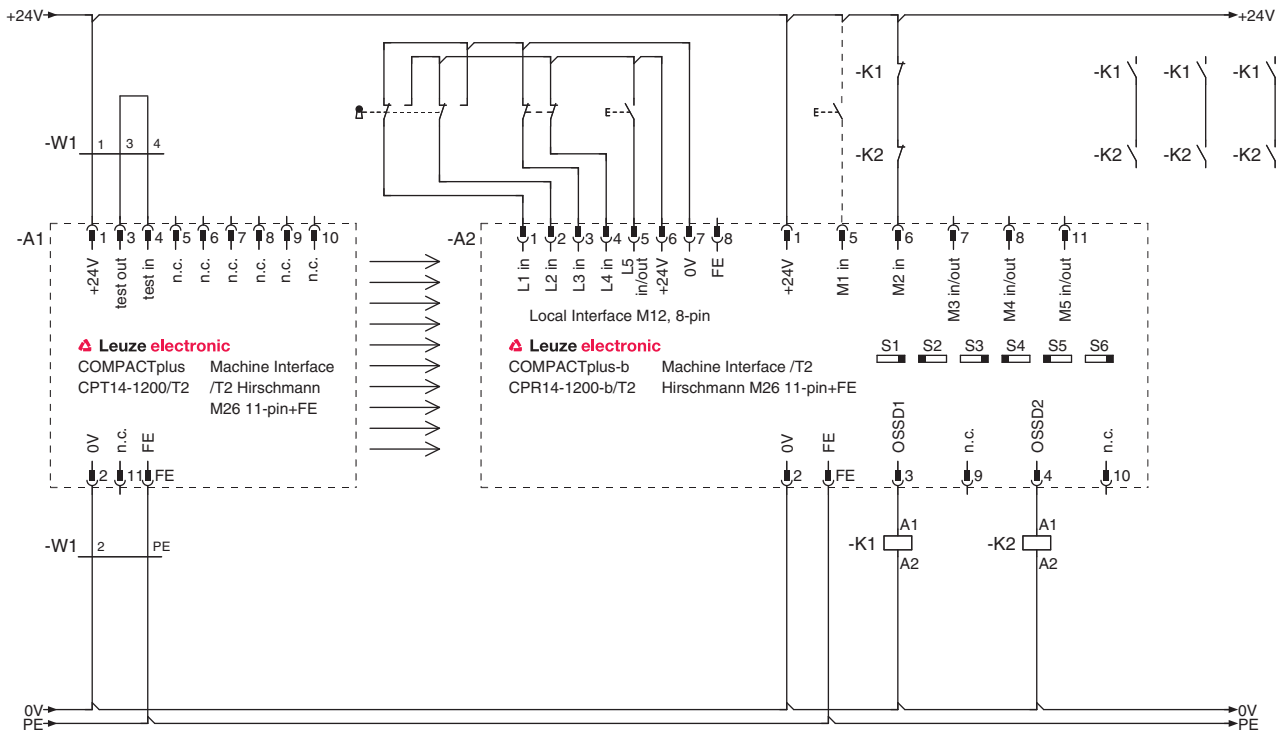
SOLID-4, SOLID-4E  
p. 108

SOLID-2, SOLID-2E  
p. 134

**COMPACT*plus***  
p. 148

Electrical connection

COMPACTplus-b connection example



| Functions selection with DIP switches<br>(grey: DIP switch settings) |   | Position                       |      |
|--|---|--------------------------------|------|
|  |   | L (FS)                         | R    |
| S1   | Contactor monitoring (EDM) on M2          | Without                        | With |
| S2   | Transmission channel (UK)                 | 1                              | 2    |
| S3   | Start/restart interlock (RES) on L5 or M1 | Without                        | With |
| S4/S5  | L/L (FS): Fixed blanking only             | R/L: Floating blanking         |      |
|  | L/R: 1-beam reduced resolution            | R/R: 2-beam reduced resolution |      |
| S6   | Optional safety circuit on L3 and L4      | Without                        | With |

COMPACTplus-b connection system /T2 (Hirschmann plug)

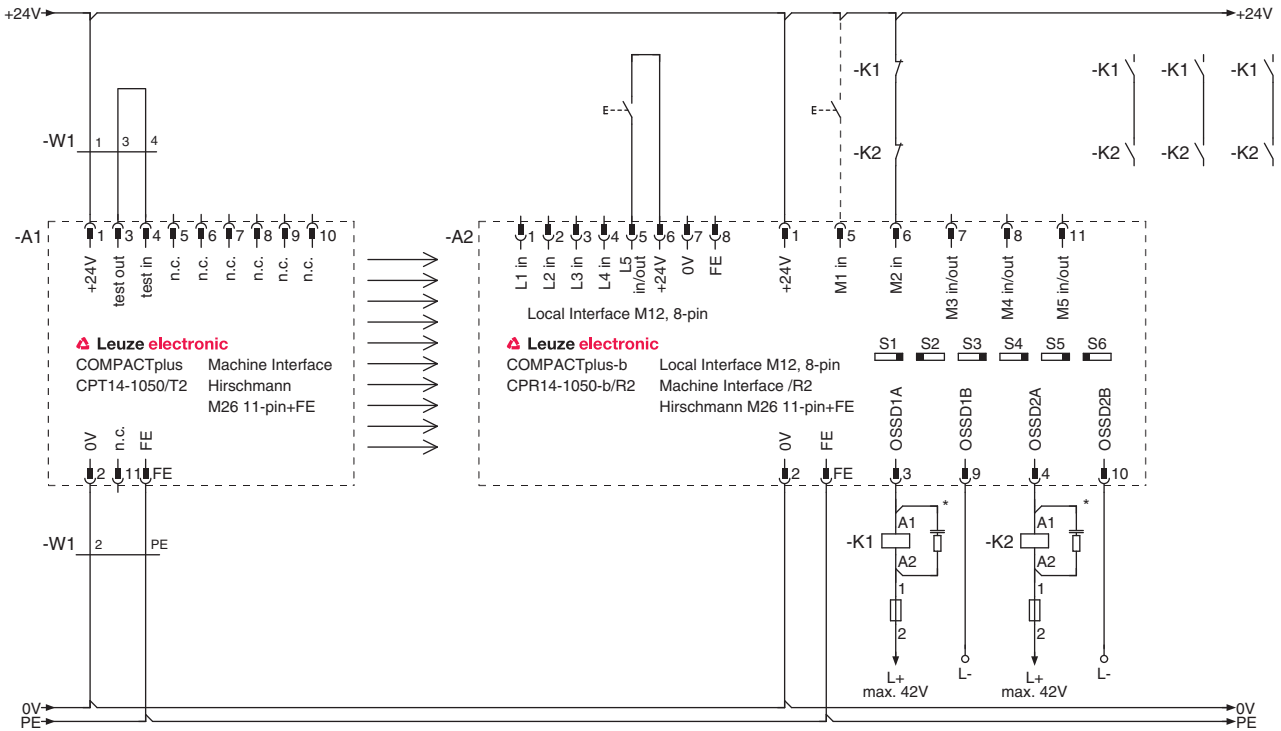
⚠ Please observe the operating instructions of the components!

For further connection examples see chapter COMPACTplus-m, page 155  
AS-Interface Safety at Work, page 288

# SAFETY LIGHT CURTAINS

## Electrical connection

### COMPACTplus-b connection example



| Functions selection with DIP switches<br>(grey: DIP switch settings) |   | Position                       |      |
|--|---|--------------------------------|------|
|  |   | L (FS)                         | R    |
| S1   | Contacting monitoring (EDM) on M2         | Without                        | With |
| S2   | Transmission channel (UK)                 | 1                              | 2    |
| S3   | Start/restart interlock (RES) on L5 or M1 | Without                        | With |
| S4/S5  | L/L (FS): Fixed blanking only             | R/L: Floating blanking         |      |
|  | L/R: 1-beam reduced resolution            | R/R: 2-beam reduced resolution |      |
| S6   | Optional safety circuit on L3 and L4      | Without                        | With |

\*) Spark extinction circuit, supply suitable spark extinction

### COMPACTplus-b connection system /R2 (Hirschmann plug)

**!** Please observe the operating instructions of the components!

For further connection examples see chapter  
 COMPACTplus-m, page 155  
 AS-Interface Safety at Work, page 288

## Technical data

| General system data   |   |                         |               |            |
|---|---|-------------------------|---------------|------------|
| Type in accordance with EN/IEC 61496  | 4   |                         |               |            |
| SIL in accordance with IEC 61508 and SILCL in accordance with EN/IEC 62061                              | 3   |                         |               |            |
| Performance Level (PL) in accordance with EN ISO 13849-1  | e   |                         |               |            |
| Probability of a failure to danger per hour (PFH <sub>d</sub> )   | For protective heights up to 900 mm, all resolutions  | 2.26 x 10 <sup>-8</sup> |               |            |
|   | For protective heights up to 1800 mm, all resolutions | 2.67 x 10 <sup>-8</sup> |               |            |
|   | For protective heights up to 3000 mm                  | On request              |               |            |
| Service life (T <sub>M</sub> ) in accordance with EN ISO 13849-1  | 20 years  |                         |               |            |
| Number of cycles until 10% of the components have a failure to danger. (B <sub>10d</sub> ) <sup>*</sup> | With DC1 (ohmic load)                                 | On request              |               |            |
|   | With AC1 (ohmic load)                                 | On request              |               |            |
|   | With DC13 (inductive load)                            | 630,000 (5 A, 24 V)     |               |            |
|   | With AC15 (inductive load)                            | 1,480,000 (3 A, 230 V)  |               |            |
|   | Low load (20% nominal load)                           | On request              |               |            |
| Category in accordance with EN ISO 13849  | 4   |                         |               |            |
| Resolution  | 14 mm   | 30 mm                   | 50 mm         |            |
| Range   | 0...6 m   | 0...18 m                | 0...18 m      |            |
| Response time   | Transistor output                                     | 5...41 ms               | 5...22 ms     | 7...18 ms  |
|   | Relay output  | 20...56 ms              | 20...37 ms    | 22...33 ms |
|   | AS-i Safety Interface                                 | 10...46 ms              | 10...27 ms    | 12...23 ms |
|   | PROFIsafe interface                                   | 25...61 ms              | 25...42 ms    | 27...38 ms |
| Protective field height   | 150...1800 mm   | 150...1800** mm         | 450...3000 mm |            |
| Supply voltage  | 24 V DC, ±20%   |                         |               |            |
| Connection cable length   | Max. 100 m with 1.0 mm <sup>2</sup>                   |                         |               |            |
| Safety class  | III and I (depending on model)                        |                         |               |            |
| Protection rating   | IP 65***  |                         |               |            |
| Ambient temperature, operation  | 0...+50 °C  |                         |               |            |
| Ambient temperature, storage  | -25...+70 °C  |                         |               |            |
| Relative humidity   | 15...95%  |                         |               |            |
| Profile cross-section   | 52 mm x 55 mm   |                         |               |            |
| Weight per device (length-dependent)  | 0.70...8.30 kg  |                         |               |            |

<sup>\*</sup>) For devices with relay output

<sup>\*\*</sup>) Installation length up to 3000 mm on request

<sup>\*\*\*</sup>) Without additional measures the devices are not suited for outdoor use

## SAFETY LIGHT CURTAINS

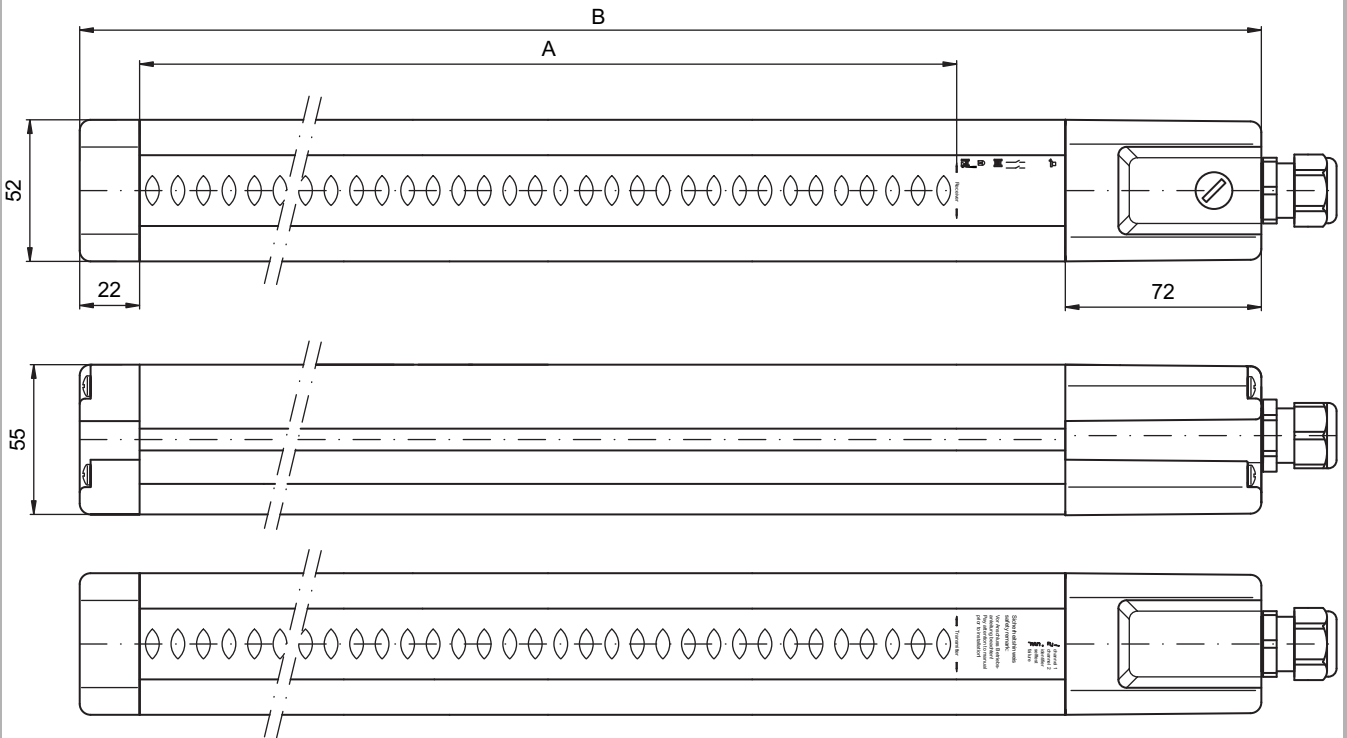
### Technical data

| <b>Transmitter</b>                                    |  |
|---|--|
| Transmitter diodes, class in accordance with EN 60825 | 1  |
| Wavelength  | 880 nm   |
| Current consumption                                   | 75 mA  |
| Connection system                                     | Cable gland (M20)<br>Hirschmann plug (DIN 43651), 12-pin<br>MIN-style plug (MIN series), 3-pin<br>M12 plug, 5-pin  |
| <b>Receiver</b>                                       |  |
| Current consumption                                   | 160 mA without external load   |
| Safety-related switching outputs                      | 2 pnp transistor outputs (short circuit-proof, cross-circuit monitored)<br>2 relay outputs (NO)<br>AS-i Safety Interface<br>PROFIsafe interface  |
| Switching voltage high active                         | Min. U <sub>v</sub> -1.0 V   |
| Switching voltage low                                 | Max. +2.5 V  |
| Switching current                                     | Typical, 500 mA  |
| Connection system                                     | Cable gland (T1: M20, R1: M25)<br>Hirschmann plug (DIN 43651), T2: 12-pin, R2: 12-pin<br>MIN-style plug (MIN series), T3: 7-pin, R3: 12-pin<br>M12 plug (safety bus systems), 5-pin, T4: 8-pin |

Please note the additional information in the COMPACT*plus*-b Connecting and Operating Instructions at [www.leuze.com/en/compactplus-b](http://www.leuze.com/en/compactplus-b).

**Dimensional drawings**

**COMPACTplus-b Safety Light Curtain**



A = Protective field height according to ordering information  
 B = A + 134 mm

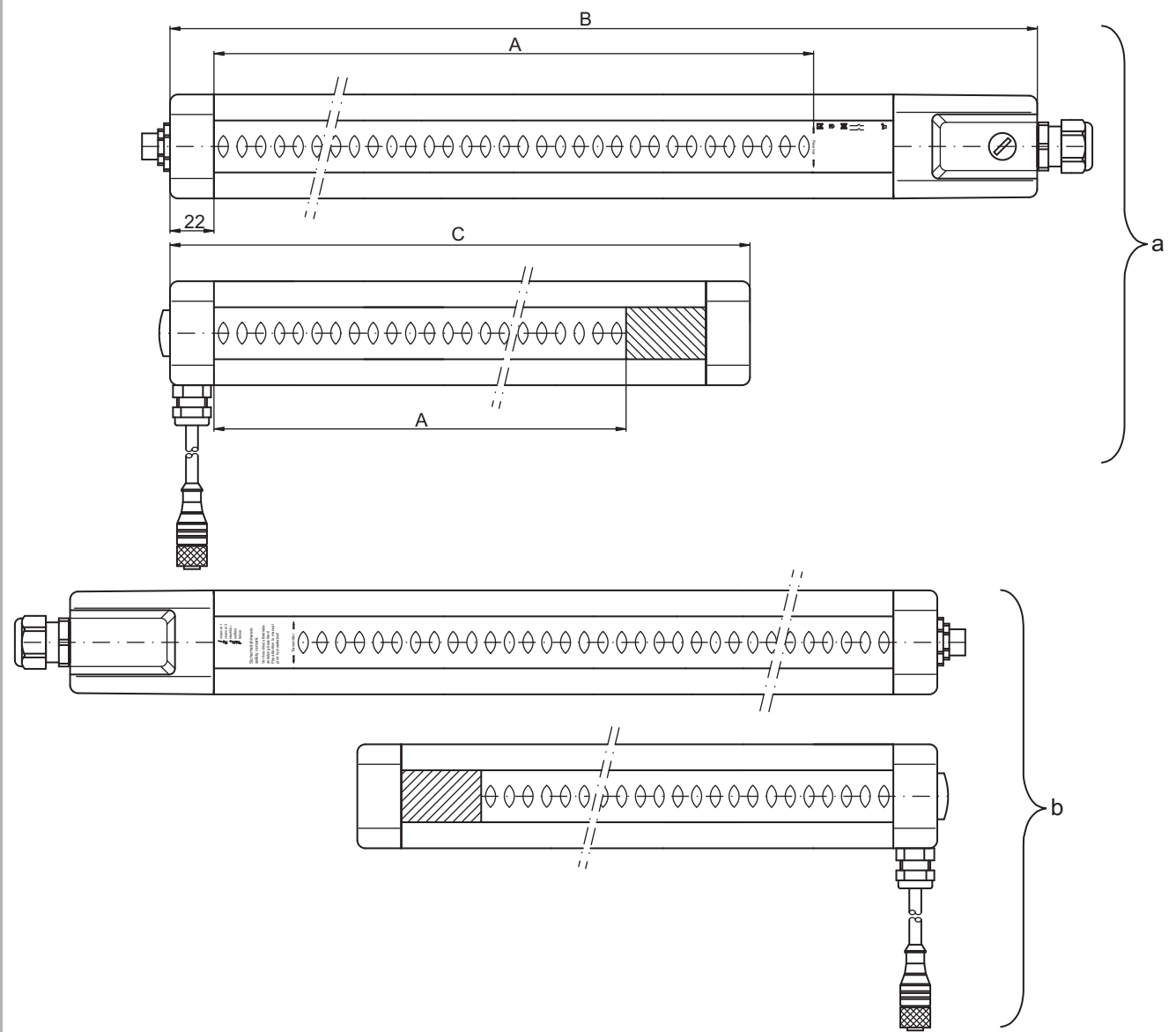
Dimensions in mm

[www.leuze.com/en/compactplus-b/](http://www.leuze.com/en/compactplus-b/)

# SAFETY LIGHT CURTAINS

## Dimensional drawings

### Host and guest dimensions



A = Protective field height according to ordering information  
 B = A + 134 mm  
 C = A + 84 mm

a = Receiver host and guest  
 b = Transmitter host and guest

Dimensions in mm

MLC 500  
p. 84

MLC 300  
p. 100

SOLID-4, SOLID-4E  
p. 108

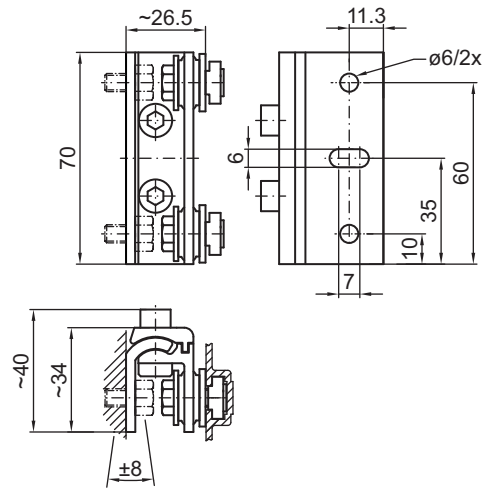
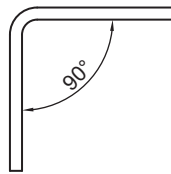
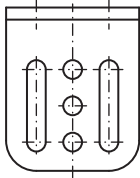
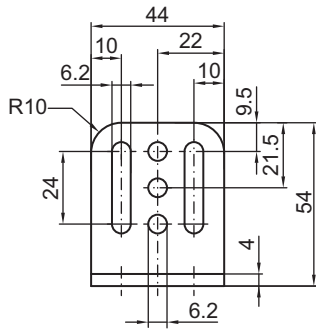
SOLID-2, SOLID-2E  
p. 134

**COMPACTplus**  
p. 148



**Dimensional drawings: Accessories**

**Mounting brackets**



*L-mounting bracket*

*Mounting bracket, swiveling with shock absorber, BT-SSD*

Dimensions in mm

[www.leuze.com/en/compactplus-b/](http://www.leuze.com/en/compactplus-b/)

## SAFETY LIGHT CURTAINS

### Accessories ordering information

| Part no.  | Article           | Description   | Length, design |
|---|-------------------|---|----------------|
| <b>Installation accessories</b>   |                   |   |                |
| 429058  | BT-2SSD           | 2 x 70 mm long mounting brackets, swiveling with shock absorber, incl. 4 screws and 4 sliding blocks  |                |
| 429059  | BT-4SSD           | 4 x 70 mm long mounting brackets, swiveling with shock absorber, incl. 8 screws and 8 sliding blocks  |                |
| 429049  | BT-2SSD-270       | 2 x 270 mm long mounting brackets, swiveling with shock absorber, incl. 4 screws and 4 sliding blocks |                |
| 560120  | BT-2S             | Mounting bracket set consisting of 2 L-type brackets incl. 2 screws                                   |                |
| 425740  | BT-10NC60         | 10 sliding blocks with 2 bore holes, one with thread M6   |                |
| 425741  | BT-10NC64         | 10 sliding blocks with 2 bore holes, with M4 and M6 thread  |                |
| 425742  | BT-10NC65         | 10 sliding blocks with 2 bore holes, with M5 and M6 thread  |                |
| <b>Laser alignment aids, see COMPACTplus-m ordering information, page 162</b>   |                   |   |                |
| <b>SafetyKey</b>  |                   |   |                |
| 520070  | AC-SK1            | SafetyKey for teaching in   |                |
| <b>Test rods</b>  |                   |   |                |
| 430430  | AC-TRSET2         | Test rod set 14/19/24/29/33 mm  |                |
| 430432  | AC-TRSET3         | Test rod set 14/30/38 mm  |                |
| <b>Configuration software, see COMPACTplus-m ordering information, page 162</b> |                   |   |                |
| <b>COMPACTplus – Accessories for local and machine interfaces</b>               |                   |   |                |
| 150704  | CB-M12-3000-8WM   | Connection cable for local interface with M12 x 8 plug  | 3 m, angled    |
| 150699  | CB-M12-10000-8WM  | Connection cable for local interface with M12 x 8 plug  | 10 m, angled   |
| 150677  | CB-M12-10000-5WM  | Connection cable for T1 Transmitter M12 x 5 plug, connection on receiver with sensor connection field | 10 m, angled   |
| 426046  | AC-LDH-12GF       | Hirschmann cable socket, encoded for CP/T2 or CP/R2, 12-pin, incl. crimp contacts                     | Straight       |
| 426045  | AC-LDH-12WF       | Hirschmann cable socket, encoded for CP/T2 or CP/R2, 12-pin, incl. crimp contacts                     | Angled         |
| 426042  | CB-LDH-10000-12GF | Connection cable, machine interface /T2, /R2, Hirschmann cable socket                                 | 10 m, straight |
| 426044  | CB-LDH-25000-12GF | Connection cable, machine interface /T2, /R2, Hirschmann cable socket                                 | 25 m, straight |
| 426043  | CB-LDH-50000-12GF | Connection cable, machine interface /T2, /R2, Hirschmann cable socket                                 | 50 m, straight |
| <b>Protective screens, see accessories, page 520</b>                            |                   |   |                |

MLC 500  
p. 84

MLC 300  
p. 100

SOLID-4, SOLID-4E  
p. 108

SOLID-2, SOLID-2E  
p. 134

**COMPACTplus**  
p. 148

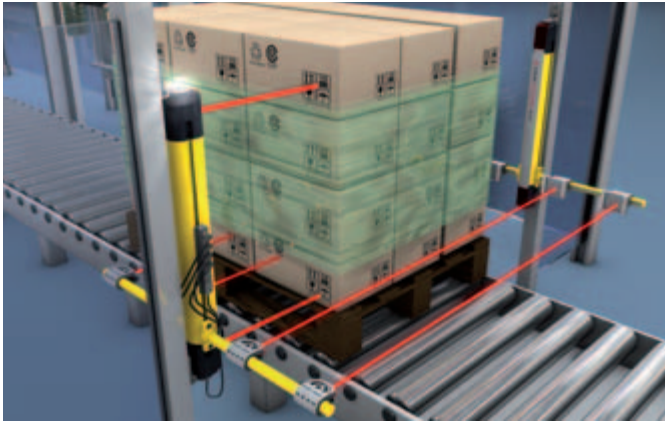
## Accessories ordering information

| Part no.   | Article           | Description  | Length, design              |
|--|-------------------|--|-----------------------------|
| <b>Connection cables, 5-pin for COMPACTplus/T4 transmitter</b> |                   |  |                             |
| 429071   | CB-M12-5000S-5GF  | Connection cable shielded with M12 coupling, 5-pin | 5 m, straight/<br>open end  |
| 429072   | CB-M12-5000S-5WF  | Connection cable shielded with M12 coupling, 5-pin | 5 m, angled/<br>open end    |
| 429073   | CB-M12-10000S-5GF | Connection cable shielded with M12 coupling, 5-pin | 10 m, straight/<br>open end |
| 429074   | CB-M12-10000S-5WF | Connection cable shielded with M12 coupling, 5-pin | 10 m, angled/<br>open end   |
| 429075   | CB-M12-15000S-5GF | Connection cable shielded with M12 coupling, 5-pin | 15 m, straight/<br>open end |
| 429076   | CB-M12-15000S-5WF | Connection cable shielded with M12 coupling, 5-pin | 15 m, angled/<br>open end   |
| 429171   | CB-M12-25000S-5GF | Connection cable shielded with M12 coupling, 5-pin | 25 m, straight/<br>open end |
| 429172   | CB-M12-25000S-5WF | Connection cable shielded with M12 coupling, 5-pin | 25 m, angled/<br>open end   |
| <b>Connection cables, 8-pin for COMPACTplus/T4 receiver</b>    |                   |  |                             |
| 429081   | CB-M12-5000S-8GF  | Connection cable shielded with M12 coupling, 8-pin | 5 m, straight/<br>open end  |
| 429082   | CB-M12-5000S-8WF  | Connection cable shielded with M12 coupling, 8-pin | 5 m, angled/<br>open end    |
| 429083   | CB-M12-10000S-8GF | Connection cable shielded with M12 coupling, 8-pin | 10 m, straight/<br>open end |
| 429084   | CB-M12-10000S-8WF | Connection cable shielded with M12 coupling, 8-pin | 10 m, angled/<br>open end   |
| 429085   | CB-M12-15000S-8GF | Connection cable shielded with M12 coupling, 8-pin | 15 m, straight/<br>open end |
| 429086   | CB-M12-15000S-8WF | Connection cable shielded with M12 coupling, 8-pin | 15 m, angled/<br>open end   |
| 429181   | CB-M12-25000S-8GF | Connection cable shielded with M12 coupling, 8-pin | 25 m, straight/<br>open end |
| 429182   | CB-M12-25000S-8WF | Connection cable shielded with M12 coupling, 8-pin | 25 m, angled/<br>open end   |

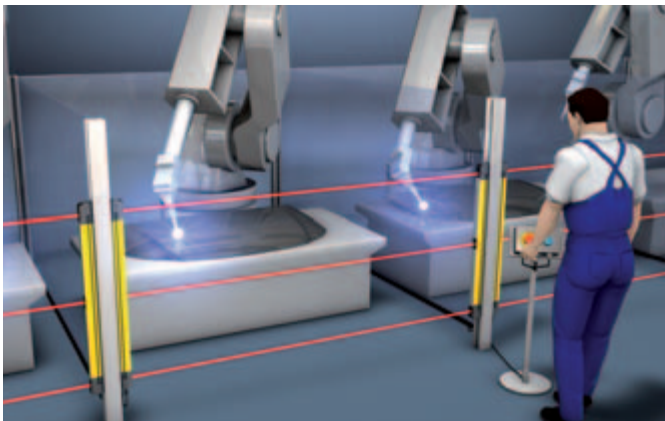
[www.leuze.com/en/compactplus-b/](http://www.leuze.com/en/compactplus-b/)

## MULTIPLE LIGHT BEAM SAFETY DEVICES

### Overview



*MLD 500 Multiple Light Beam Safety Device with integrated muting indicator in an application with sequential muting*



*With their integrated laser alignment aid, the series MLD 300 and MLD 500 enable the efficient and economic setup of type 2 and type 4 access guardings with and without muting*

In many production systems there is often the requirement of guarding the access to automatic production cells without obstructing the conveyor system and material feed in the process. The user is provided with a harmonized range of Multiple Light Beam Safety Devices for this requirement.

The individual features and performance data of the individual Light Beam Devices allow the most varied applications to be optimally implemented, and often without additional measures. The high ranges of the sensors also allow very spacious systems to be guarded. Integrated additional functions, such as integrated alignment lasers, support the speedy start-up.

ROTOSCAN RS4-4E Safety Laser Scanners can also be used with numerous advantages for complete guarding of access areas with bigger heights or contours that are not square.

MLD 500  
p. 188

MLD 300  
p. 216

Selection table



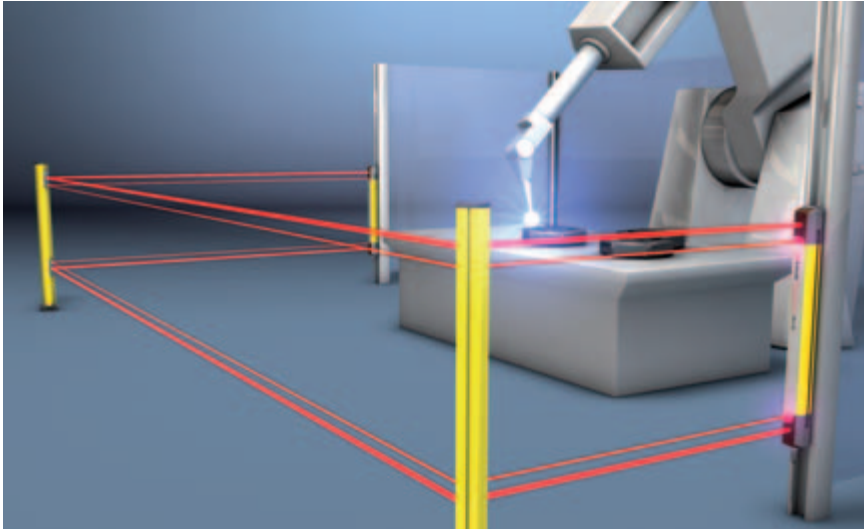
Countless varieties of MLD 500 or MLD 300 Multiple Light Beam Safety Devices are available for solving individual tasks

|                                      |   |  |             |                                    |                       | Features, type-dependent |                    |                       |                              |  |   |                       |                                  |         |                     |
|--------------------------------------|---|--|-------------|------------------------------------|-----------------------|--------------------------|--------------------|-----------------------|------------------------------|--|---|-----------------------|----------------------------------|---------|---------------------|
| Type in accordance with EN/IEC 61496 | SIL in accordance with IEC 61508 or SILCL in accordance with EN/IEC 62061 | Performance Level (PL) in accordance with EN ISO 13849-1 | W x D in mm | Beam distance (mm) Number of beams | Range in m            | Transmitter/receiver     | Transceiver system | RES / EDM, selectable | Muting functions, selectable | Integrated muting indicator (optional) | Integrated laser alignment aid (optional) | pnp transistor output | Integrated AS-i Safety interface | Series  | Page                |
| 4                                    | 3   | e  | 52 x 65     | 500/2<br>400/3<br>300/4            | 0.5 - 50 /<br>20 - 70 | ●                        |                    | ●                     | ●                            | ●                                      | ●   | ●                     | ●                                | MLD 500 | 190                 |
|                                      |   |  |             | 500/2<br>400/3                     | 0.5 - 8               |                          | ●                  | ●                     | ●                            | ●                                      | ●   | ●                     | ●                                | ●       | MLD 500 transceiver |
| 2                                    | 2   | d  | 52 x 65     | 500/2<br>400/3<br>300/4            | 0.5 - 50 /<br>20 - 70 | ●                        |                    | ●                     | ●                            | ●                                      | ●   | ●                     |                                  | MLD 300 | 218                 |
|                                      |   |  |             | 500/2<br>400/3                     | 0.5 - 8               |                          | ●                  | ●                     | ●                            | ●                                      | ●   | ●                     | ●                                |         | MLD 300 transceiver |

[www.leuze.com/en/msl/](http://www.leuze.com/en/msl/)

## MULTIPLE LIGHT BEAM SAFETY DEVICES

### MLD 500



*Easy setting up of an access guarding with integrated laser alignment aid*

It is advantageous from a cost effectiveness and optimum usability standpoint to use safety sensors that are characterized by functions that match the specific requirements of the given application as closely as possible. The Multiple Light Beam Safety Device MLD 500 (type 4, PLe) has been specially designed for this.

As for the MLD 300 series (type 2, PL d), the MLD 500 sensors are characterized by their individual function classes. A start/restart interlock and contactor monitoring can thereby be selected and, if necessary, various muting modes realized. The series can be used both as standard access guarding as well as for applications where sequential, parallel or partial muting is required. Additional muting devices are not required, thus simplifying construction and lowering costs during setup of the muting application.



*MLD 500 Multiple Light Beam Safety Device with integrated muting indicator in an application with sequential muting*

The series is predestined for wide-area perimeter guarding, which is realized with Deflecting Mirrors, enabling operation at ranges of up to 70 m. In addition to transmitter/receiver versions, 2- and 3-beam (patented) transceiver versions are also available. No PC is necessary for configuration, as the functions are set via the pin assignments at the connection. Operating temperatures as low as  $-30^{\circ}\text{C}$  are possible. Options such as the integrated laser alignment aid, an integrated muting indicator and the patented swivel mount for easy fastening and alignment round out the MLD product range.

#### Typical areas of application

- Access guardings with and without muting on robot cells, processing centers, production lines
- Packaging machinery, palletizers, wrapping machinery, plastic and rubber machinery, concrete and stoneware machinery, ...
- Rear zone guarding on pressure forming presses

**MLD 500**  
p. 188

MLD 300  
p. 216



**Important technical data, overview**

|  |   |        |        |
|--|---|--------|--------|
| Type in accordance with EN/IEC 61496                                       | 4   |        |        |
| SIL in accordance with IEC 61508 and SILCL in accordance with EN/IEC 62061 | 3   |        |        |
| Performance Level (PL) in accordance with EN ISO 13849-1                   | e   |        |        |
| Category in accordance with EN ISO 13849                                   | 4   |        |        |
| Number of beams*   | 2   | 3      | 4      |
| Beam distance  | 500 mm  | 400 mm | 300 mm |
| Range (transmitter-receiver systems, type-dependent)                       | MLDxyy-R /-T: 0.5...50 m<br>MLDxyy-xR /-xT: 20...70 m |        |        |
| Range (transceiver systems)  | 0.5 - 8 m   |        |        |
| Profile cross-section  | 52 mm x 65 mm   |        |        |
| Safety-related switching outputs   | 2 pnp transistor outputs, AS-i Safety Interface       |        |        |
| Connection system  | M12 plug  |        |        |

\*) Information on MLD Single Light Beam Safety Devices can be found on page 246.

**Functions**

|   | MLD 510 | MLD 520 | MLD 530 | MLD 535 |
|---|---------|---------|---------|---------|
| Automatic start/restart   | ●       | ●       |         |         |
| Start/restart interlock (RES)                                   |         | ●*      | ●       | ●       |
| Contacting monitoring (EDM)                                     |         | ●*      | ●*      | ●*      |
| 2-sensor muting (timing controlled, sequence controlled)        |         |         | ●       |         |
| 4-sensor muting (timing controlled)                             |         |         |         | ●       |
| Configurable operating modes                                    |         | ●       | ●       | ●       |
| Laser alignment aid (optional for transmitter-receiver systems) | ●       | ●       |         |         |


\*) selectable

**Special features**

- Version available as 3-beam transceiver
- Integrated muting function, no additional muting module is necessary
- The configuration is simply performed by means of wiring, i. e. no software, PC or DIP switch are necessary
- The use at ambient temperatures as low as -30°C is possible
- Options: integrated laser alignment aid, integrated muting indicator, 7-segment display, AS-i Safety interface.




**Features**




C US



C





| Further information                 | Page |
|-------------------------------------|------|
| ● Ordering information              | 190  |
| ● Electrical connection             | 203  |
| ● Technical data                    | 205  |
| ● Dimensional drawings              | 207  |
| ● Dimensional drawings: Accessories | 211  |
| ● Assembly drawings                 | 507  |
| ● Accessories ordering information  | 213  |



## MULTIPLE LIGHT BEAM SAFETY DEVICES

### Ordering information

**MLD 510**, consisting of transmitter and receiver  
 Included in delivery: 4 sliding blocks, 1 set of connecting and operating instructions (PDF file on CD-ROM)

**Functions:** Automatic restart, 2 OSSDs

| Beam distance/<br>number of beams | MLD 510           |            |             |   |
|-----------------------------------|-------------------|------------|-------------|---|
|                                   | Range: 0.5 - 50 m |            |             |   |
|                                   | Part no.          | Article    | Description | Option                                      |
| 500 mm / 2                        | 66501100          | MLD500-T2  | Transmitter |   |
|                                   | 66533100          | MLD510-R2  | Receiver    |   |
|                                   | 66502100          | MLD500-T2L | Transmitter | With integrated laser alignment aid         |
|                                   | 66536100          | MLD510-R2L | Receiver    | With reflex element for laser alignment aid |
| 400 mm / 3                        | 66501200          | MLD500-T3  | Transmitter |   |
|                                   | 66533200          | MLD510-R3  | Receiver    |   |
|                                   | 66502200          | MLD500-T3L | Transmitter | With integrated laser alignment aid         |
|                                   | 66536200          | MLD510-R3L | Receiver    | With reflex element for laser alignment aid |
| 300 mm / 4                        | 66501300          | MLD500-T4  | Transmitter |   |
|                                   | 66533300          | MLD510-R4  | Receiver    |   |
|                                   | 66502300          | MLD500-T4L | Transmitter | With integrated laser alignment aid         |
|                                   | 66536300          | MLD510-R4L | Receiver    | With reflex element for laser alignment aid |

**Ordering information**

**MLD 510**, consisting of transmitter and receiver or transceiver and Deflecting Mirror  
 Included in delivery: 4 sliding blocks, 1 set of connecting and operating instructions (PDF file on CD-ROM)

**Functions:** Automatic restart, 2 OSSDs

| Beam distance/<br>number of beams | <b>MLD 510</b>          |             |             |   |
|-----------------------------------|-------------------------|-------------|-------------|---|
|                                   | <b>Range: 20 - 70 m</b> |             |             |   |
|                                   | Part no.                | Article     | Description | Option                                      |
| 500 mm / 2                        | 66501500                | MLD500-XT2  | Transmitter |   |
|                                   | 66533500                | MLD510-XR2  | Receiver    |   |
|                                   | 66502500                | MLD500-XT2L | Transmitter | With integrated laser alignment aid         |
|                                   | 66536500                | MLD510-XR2L | Receiver    | With reflex element for laser alignment aid |
| 400 mm / 3                        | 66501600                | MLD500-XT3  | Transmitter |   |
|                                   | 66533600                | MLD510-XR3  | Receiver    |   |
|                                   | 66502600                | MLD500-XT3L | Transmitter | With integrated laser alignment aid         |
|                                   | 66536600                | MLD510-XR3L | Receiver    | With reflex element for laser alignment aid |
| 300 mm / 4                        | 66501700                | MLD500-XT4  | Transmitter |   |
|                                   | 66533700                | MLD510-XR4  | Receiver    |   |
|                                   | 66502700                | MLD500-XT4L | Transmitter | With integrated laser alignment aid         |
|                                   | 66536700                | MLD510-XR4L | Receiver    | With reflex element for laser alignment aid |

| Beam distance/<br>number of beams | <b>MLD 510 transceiver systems</b> |            |                   |        |
|-----------------------------------|------------------------------------|------------|-------------------|--------|
|                                   | <b>Range: 0.5 - 8 m</b>            |            |                   |        |
|                                   | Part no.                           | Article    | Description       | Option |
| 500 mm / 2                        | 66500100                           | MLD-M002   | Deflecting Mirror |        |
|                                   | 66537100                           | MLD510-RT2 | Transceiver       |        |
| 400 mm / 3                        | 66500201                           | MLD-XM03   | Deflecting Mirror |        |
|                                   | 66537200                           | MLD510-RT3 | Transceiver       |        |

| Beam distance/<br>number of beams | <b>MLD 510 transceiver systems</b> |            |                   |        |
|-----------------------------------|------------------------------------|------------|-------------------|--------|
|                                   | <b>Range: 0.5 - 6 m</b>            |            |                   |        |
|                                   | Part no.                           | Article    | Description       | Option |
| 400 mm / 3                        | 66500200                           | MLD-M003   | Deflecting Mirror |        |
|                                   | 66537200                           | MLD510-RT3 | Transceiver       |        |

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## MULTIPLE LIGHT BEAM SAFETY DEVICES

### Ordering information

**MLD 520**, consisting of transmitter and receiver  
Included in delivery: 4 sliding blocks, 1 set of connecting and operating instructions (PDF file on CD-ROM)

**Functions:** 2 OSSDs, start/restart interlock selectable, contactor monitoring selectable, automatic start/restart

| Beam distance/<br>number of beams | MLD 520           |             |             |   |
|-----------------------------------|-------------------|-------------|-------------|---|
|                                   | Range: 0.5 - 50 m |             |             |   |
|                                   | Part no.          | Article     | Description | Option  |
| 500 mm / 2                        | 66501100          | MLD500-T2   | Transmitter |   |
|                                   | 66553100          | MLD520-R2   | Receiver    |   |
|                                   | 66554100          | MLD520-R2M  | Receiver    | With integrated status indicator  |
|                                   | 66502100          | MLD500-T2L  | Transmitter | With integrated laser alignment aid   |
|                                   | 66556100          | MLD520-R2L  | Receiver    | With reflex element for laser alignment aid                                 |
|                                   | 66555100          | MLD520-R2LM | Receiver    | With reflex element for laser alignment aid and integrated status indicator |
| 400 mm / 3                        | 66501200          | MLD500-T3   | Transmitter |   |
|                                   | 66553200          | MLD520-R3   | Receiver    |   |
|                                   | 66554200          | MLD520-R3M  | Receiver    | With integrated status indicator  |
|                                   | 66502200          | MLD500-T3L  | Transmitter | With integrated laser alignment aid   |
|                                   | 66556200          | MLD520-R3L  | Receiver    | With reflex element for laser alignment aid                                 |
|                                   | 66555200          | MLD520-R3LM | Receiver    | With reflex element for laser alignment aid and integrated status indicator |
| 300 mm / 4                        | 66501300          | MLD500-T4   | Transmitter |   |
|                                   | 66553300          | MLD520-R4   | Receiver    |   |
|                                   | 66554300          | MLD520-R4M  | Receiver    | With integrated status indicator  |
|                                   | 66502300          | MLD500-T4L  | Transmitter | With integrated laser alignment aid   |
|                                   | 66556300          | MLD520-R4L  | Receiver    | With reflex element for laser alignment aid                                 |
|                                   | 66555300          | MLD520-R4LM | Receiver    | With reflex element for laser alignment aid and integrated status indicator |

## Ordering information

**MLD 520**, consisting of transmitter and receiver  
 Included in delivery: 4 sliding blocks, 1 set of connecting and operating instructions (PDF file on CD-ROM)

**Functions:** 2 OSSDs, start/restart interlock selectable, contactor monitoring selectable, automatic start/restart

| Beam distance/<br>number of beams | MLD 520          |              |             |   |
|-----------------------------------|------------------|--------------|-------------|---|
|                                   | Range: 20 - 70 m |              |             |   |
|                                   | Part no.         | Article      | Description | Option  |
| 500 mm / 2                        | 66501500         | MLD500-XT2   | Transmitter |   |
|                                   | 66553500         | MLD520-XR2   | Receiver    |   |
|                                   | 66554500         | MLD520-XR2M  | Receiver    | With integrated status indicator  |
|                                   | 66502500         | MLD500-XT2L  | Transmitter | With integrated laser alignment aid   |
|                                   | 66556500         | MLD520-XR2L  | Receiver    | With reflex element for laser alignment aid                                 |
|                                   | 66555500         | MLD520-XR2LM | Receiver    | With reflex element for laser alignment aid and integrated status indicator |
| 400 mm / 3                        | 66501600         | MLD500-XT3   | Transmitter |   |
|                                   | 66553600         | MLD520-XR3   | Receiver    |   |
|                                   | 66554600         | MLD520-XR3M  | Receiver    | With integrated status indicator  |
|                                   | 66502600         | MLD500-XT3L  | Transmitter | With integrated laser alignment aid   |
|                                   | 66556600         | MLD520-XR3L  | Receiver    | With reflex element for laser alignment aid                                 |
|                                   | 66555600         | MLD520-XR3LM | Receiver    | With reflex element for laser alignment aid and integrated status indicator |
| 300 mm / 4                        | 66501700         | MLD500-XT4   | Transmitter |   |
|                                   | 66553700         | MLD520-XR4   | Receiver    |   |
|                                   | 66554700         | MLD520-XR4M  | Receiver    | With integrated status indicator  |
|                                   | 66502700         | MLD500-XT4L  | Transmitter | With integrated laser alignment aid   |
|                                   | 66556700         | MLD520-XR4L  | Receiver    | With reflex element for laser alignment aid                                 |
|                                   | 66555700         | MLD520-XR4LM | Receiver    | With reflex element for laser alignment aid and integrated status indicator |

## MULTIPLE LIGHT BEAM SAFETY DEVICES

### Ordering information

**MLD 520**, consisting of transmitter and receiver or transceiver and Deflecting Mirror  
 Included in delivery: 4 sliding blocks, 1 set of connecting and operating instructions (PDF file on CD-ROM)

**Functions:** 2 OSSDs, start/restart interlock selectable, contactor monitoring selectable, automatic start/restart

| Beam distance/<br>number of beams | MLD 520 transceiver systems |             |                   |                                  |
|-----------------------------------|-----------------------------|-------------|-------------------|----------------------------------|
|                                   | Range: 0.5 - 6 m            |             |                   |                                  |
|                                   | Part no.                    | Article     | Description       | Option                           |
| 400 mm / 3                        | 66500200                    | MLD-M003    | Deflecting Mirror |                                  |
|                                   | 66557200                    | MLD520-RT3  | Transceiver       |                                  |
|                                   | 66558200                    | MLD520-RT3M | Transceiver       | With integrated status indicator |

| Beam distance/<br>number of beams | MLD 520 transceiver systems |             |                   |                                  |
|-----------------------------------|-----------------------------|-------------|-------------------|----------------------------------|
|                                   | Range: 0.5 - 8 m            |             |                   |                                  |
|                                   | Part no.                    | Article     | Description       | Option                           |
| 500 mm / 2                        | 66500100                    | MLD-M002    | Deflecting Mirror |                                  |
|                                   | 66557100                    | MLD520-RT2  | Transceiver       |                                  |
|                                   | 66558100                    | MLD520-RT2M | Transceiver       | With integrated status indicator |
| 400 mm / 3                        | 66500201                    | MLD-XM03    | Deflecting Mirror |                                  |
|                                   | 66557200                    | MLD520-RT3  | Transceiver       |                                  |
|                                   | 66558200                    | MLD520-RT3M | Transceiver       | With integrated status indicator |

## Ordering information

**MLD 530**, consisting of transmitter and receiver  
 Included in delivery: 4 sliding blocks, 1 set of connecting and operating instructions (PDF file on CD-ROM)

**Functions:** 2 OSSDs, start/restart interlock, contactor monitoring selectable, timing controlled 2-sensor muting, sequence controlled 2-sensor muting, muting-time-out extension, alternative connection for second muting signal, partial muting

| Beam distance/<br>number of beams | MLD 530           |             |             |  |
|-----------------------------------|-------------------|-------------|-------------|--|
|                                   | Range: 0.5 - 50 m |             |             |  |
|                                   | Part no.          | Article     | Description | Option   |
| 500 mm / 2                        | 66501100          | MLD500-T2   | Transmitter |  |
|                                   | 66563100          | MLD530-R2   | Receiver    |  |
|                                   | 66564100          | MLD530-R2M  | Receiver    | With integrated status and muting indicator  |
|                                   | 66502100          | MLD500-T2L  | Transmitter | With integrated laser alignment aid  |
|                                   | 66566100          | MLD530-R2L  | Receiver    | With reflex element for laser alignment aid  |
|                                   | 66565100          | MLD530-R2LM | Receiver    | With reflex element for laser alignment aid and integrated status and muting indicator |
| 400 mm / 3                        | 66501200          | MLD500-T3   | Transmitter |  |
|                                   | 66563200          | MLD530-R3   | Receiver    |  |
|                                   | 66564200          | MLD530-R3M  | Receiver    | With integrated status and muting indicator  |
|                                   | 66502200          | MLD500-T3L  | Transmitter | With integrated laser alignment aid  |
|                                   | 66566200          | MLD530-R3L  | Receiver    | With reflex element for laser alignment aid  |
|                                   | 66565200          | MLD530-R3LM | Receiver    | With reflex element for laser alignment aid and integrated status and muting indicator |
| 300 mm / 4                        | 66501300          | MLD500-T4   | Transmitter |  |
|                                   | 66563300          | MLD530-R4   | Receiver    |  |
|                                   | 66564300          | MLD530-R4M  | Receiver    | With integrated status and muting indicator  |
|                                   | 66502300          | MLD500-T4L  | Transmitter | With integrated laser alignment aid  |
|                                   | 66566300          | MLD530-R4L  | Receiver    | With reflex element for laser alignment aid  |
|                                   | 66565300          | MLD530-R4LM | Receiver    | With reflex element for laser alignment aid and integrated status and muting indicator |

## MULTIPLE LIGHT BEAM SAFETY DEVICES

### Ordering information

**MLD 530**, consisting of transmitter and receiver or transceiver and Deflecting Mirror  
 Included in delivery: 4 sliding blocks, 1 set of connecting and operating instructions (PDF file on CD-ROM)

**Functions:** 2 OSSDs, start/restart interlock, contactor monitoring selectable, timing controlled 2-sensor muting, sequence controlled 2-sensor muting, muting-time-out extension, alternative connection for second muting signal, partial muting

| Beam distance/<br>number of beams | <b>MLD 530</b>          |             |             |   |
|-----------------------------------|-------------------------|-------------|-------------|---|
|                                   | <b>Range: 20 - 70 m</b> |             |             |   |
|                                   | Part no.                | Article     | Description | Option                                      |
| 500 mm / 2                        | 66501500                | MLD500-XT2  | Transmitter |   |
|                                   | 66563500                | MLD530-XR2  | Receiver    |   |
|                                   | 66502500                | MLD500-XT2L | Transmitter | With integrated laser alignment aid         |
|                                   | 66566500                | MLD530-XR2L | Receiver    | With reflex element for laser alignment aid |
| 400 mm / 3                        | 66501600                | MLD500-XT3  | Transmitter |   |
|                                   | 66563600                | MLD530-XR3  | Receiver    |   |
|                                   | 66502600                | MLD500-XT3L | Transmitter | With integrated laser alignment aid         |
|                                   | 66566600                | MLD530-XR3L | Receiver    | With reflex element for laser alignment aid |
| 300 mm / 4                        | 66501700                | MLD500-XT4  | Transmitter |   |
|                                   | 66563700                | MLD530-XR4  | Receiver    |   |
|                                   | 66502700                | MLD500-XT4L | Transmitter | With integrated laser alignment aid         |
|                                   | 66566700                | MLD530-XR4L | Receiver    | With reflex element for laser alignment aid |

| Beam distance/<br>number of beams | <b>MLD 530 transceiver systems</b> |             |                   |   |
|-----------------------------------|------------------------------------|-------------|-------------------|---|
|                                   | <b>Range: 0.5 - 8 m</b>            |             |                   |   |
|                                   | Part no.                           | Article     | Description       | Option                                      |
| 500 mm / 2                        | 66500100                           | MLD-M002    | Deflecting Mirror |   |
|                                   | 66567100                           | MLD530-RT2  | Transceiver       |   |
|                                   | 66568100                           | MLD530-RT2M | Transceiver       | With integrated status and muting indicator |
| 400 mm / 3                        | 66500201                           | MLD-XM03    | Deflecting Mirror |   |
|                                   | 66567200                           | MLD530-RT3  | Transceiver       |   |
|                                   | 66568200                           | MLD530-RT3M | Transceiver       | With integrated status and muting indicator |

| Beam distance/<br>number of beams | <b>MLD 530 transceiver systems</b> |             |                   |   |
|-----------------------------------|------------------------------------|-------------|-------------------|---|
|                                   | <b>Range: 0.5 - 6 m</b>            |             |                   |   |
|                                   | Part no.                           | Article     | Description       | Option                                      |
| 400 mm / 3                        | 66500200                           | MLD-M003    | Deflecting Mirror |   |
|                                   | 66567200                           | MLD530-RT3  | Transceiver       |   |
|                                   | 66568200                           | MLD530-RT3M | Transceiver       | With integrated status and muting indicator |



## Ordering information

**MLD 535**, consisting of transmitter and receiver or transceiver and Deflecting Mirror  
 Included in delivery: 4 sliding blocks, 1 set of connecting and operating instructions (PDF file on CD-ROM)

**Functions:** 2 OSSDs, start/restart interlock, contactor monitoring selectable, timing controlled 2-sensor muting, sequence controlled 2-sensor muting, timing controlled 4-sensor muting, muting-timeout extension, alternative connection for second muting signal, muting enable function, partial muting

| Beam distance/<br>number of beams | MLD 535           |             |             |  |
|-----------------------------------|-------------------|-------------|-------------|--|
|                                   | Range: 0.5 - 50 m |             |             |  |
|                                   | Part no.          | Article     | Description | Option   |
| 500 mm / 2                        | 66501100          | MLD500-T2   | Transmitter |  |
|                                   | 66573100          | MLD535-R2   | Receiver    |  |
|                                   | 66574100          | MLD535-R2M  | Receiver    | With integrated status and muting indicator  |
|                                   | 66502100          | MLD500-T2L  | Transmitter | With integrated laser alignment aid  |
|                                   | 66576100          | MLD535-R2L  | Receiver    | With reflex element for laser alignment aid  |
|                                   | 66575100          | MLD535-R2LM | Receiver    | With reflex element for laser alignment aid and integrated status and muting indicator |
| 400 mm / 3                        | 66501200          | MLD500-T3   | Transmitter |  |
|                                   | 66573200          | MLD535-R3   | Receiver    |  |
|                                   | 66574200          | MLD535-R3M  | Receiver    | With integrated status and muting indicator  |
|                                   | 66502200          | MLD500-T3L  | Transmitter | With integrated laser alignment aid  |
|                                   | 66576200          | MLD535-R3L  | Receiver    | With reflex element for laser alignment aid  |
|                                   | 66575200          | MLD535-R3LM | Receiver    | With reflex element for laser alignment aid and integrated status and muting indicator |
| 300 mm / 4                        | 66501300          | MLD500-T4   | Transmitter |  |
|                                   | 66573300          | MLD535-R4   | Receiver    |  |
|                                   | 66574300          | MLD535-R4M  | Receiver    | With integrated status and muting indicator  |
|                                   | 66502300          | MLD500-T4L  | Transmitter | With integrated laser alignment aid  |
|                                   | 66576300          | MLD535-R4L  | Receiver    | With reflex element for laser alignment aid  |
|                                   | 66575300          | MLD535-R4LM | Receiver    | With reflex element for laser alignment aid and integrated status and muting indicator |

## MULTIPLE LIGHT BEAM SAFETY DEVICES

### Ordering information

**MLD 535**, consisting of transmitter and receiver or transceiver and Deflecting Mirror  
 Included in delivery: 4 sliding blocks, 1 set of connecting and operating instructions (PDF file on CD-ROM)

**Functions:** 2 OSSDs, start/restart interlock, contactor monitoring selectable, timing controlled 2-sensor muting, sequence controlled 2-sensor muting, timing controlled 4-sensor muting, muting-timeout extension, alternative connection for second muting signal, muting enable function, partial muting

| <b>MLD 535</b>                    |          |             |             |   |
|-----------------------------------|----------|-------------|-------------|---|
| <b>Range: 20 - 70 m</b>           |          |             |             |   |
| Beam distance/<br>number of beams | Part no. | Article     | Description | Option                                      |
| 500 mm / 2                        | 66501500 | MLD500-XT2  | Transmitter |   |
|                                   | 66573500 | MLD535-XR2  | Receiver    |   |
|                                   | 66502500 | MLD500-XT2L | Transmitter | With integrated laser alignment aid         |
|                                   | 66576500 | MLD535-XR2L | Receiver    | With reflex element for laser alignment aid |
| 400 mm / 3                        | 66501600 | MLD500-XT3  | Transmitter |   |
|                                   | 66573600 | MLD535-XR3  | Receiver    |   |
|                                   | 66502600 | MLD500-XT3L | Transmitter | With reflex element for laser alignment aid |
|                                   | 66576600 | MLD535-XR3L | Receiver    | With integrated laser alignment aid         |
| 300 mm / 4                        | 66501700 | MLD500-XT4  | Transmitter |   |
|                                   | 66573700 | MLD535-XR4  | Receiver    |   |
|                                   | 66502700 | MLD500-XT4L | Transmitter | With integrated laser alignment aid         |
|                                   | 66576700 | MLD535-XR4L | Receiver    | With reflex element for laser alignment aid |

| <b>MLD 535 transceiver systems</b> |          |             |                   |   |
|------------------------------------|----------|-------------|-------------------|---|
| <b>Range: 0.5 - 8 m</b>            |          |             |                   |   |
| Beam distance/<br>number of beams  | Part no. | Article     | Description       | Option                                      |
| 500 mm / 2                         | 66500100 | MLD-M002    | Deflecting Mirror |   |
|                                    | 66577100 | MLD535-RT2  | Transceiver       |   |
|                                    | 66578100 | MLD535-RT2M | Transceiver       | With integrated status and muting indicator |
| 400 mm / 3                         | 66500201 | MLD-XM03    | Deflecting Mirror |   |
|                                    | 66577200 | MLD535-RT3  | Transceiver       |   |
|                                    | 66578200 | MLD535-RT3M | Transceiver       | With integrated status and muting indicator |

| <b>MLD 535 transceiver systems</b> |          |             |                   |   |
|------------------------------------|----------|-------------|-------------------|---|
| <b>Range: 0.5 - 6 m</b>            |          |             |                   |   |
| Beam distance/<br>number of beams  | Part no. | Article     | Description       | Option                                      |
| 400 mm / 3                         | 66500200 | MLD-M003    | Deflecting Mirror |   |
|                                    | 66577200 | MLD535-RT3  | Transceiver       |   |
|                                    | 66578200 | MLD535-RT3M | Transceiver       | With integrated status and muting indicator |

**MLD 500**  
p. 188

MLD 300  
p. 216

## Ordering information

**MLD 510/AS-i**, consisting of transmitter and receiver or transceiver and Deflecting Mirror  
 Included in delivery: 4 sliding blocks, 1 set of connecting and operating instructions (PDF file on CD-ROM)

**Functions (in combination with ASM Safety Monitor):**  
 start/restart interlock selectable, contactor monitoring selectable, timing controlled 2-sensor muting, sequence controlled 2-sensor muting, timing controlled 4-sensor muting, muting-timeout extension

| Beam distance/<br>number of beams | MLD 510/AS-i      |               |             |   |
|-----------------------------------|-------------------|---------------|-------------|---|
|                                   | Range: 0.5 - 50 m |               |             |   |
|                                   | Part no.          | Article       | Description | Option  |
| 500 mm / 2                        | 66501101          | MLD500-T2/A   | Transmitter |   |
|                                   | 66533101          | MLD510-R2/A   | Receiver    |   |
|                                   | 66534101          | MLD510-R2M/A  | Receiver    | With integrated muting indicator  |
|                                   | 66533102          | MLD510-R2E/A  | Receiver    | With connection socket for external muting indicator  |
|                                   | 66502101          | MLD500-T2L/A  | Transmitter | With integrated laser alignment aid   |
|                                   | 66536101          | MLD510-R2L/A  | Receiver    | With reflex element for laser alignment aid   |
|                                   | 66535101          | MLD510-R2LM/A | Receiver    | With reflex element for laser alignment aid and integrated muting indicator                     |
| 400 mm / 3                        | 66501201          | MLD500-T3/A   | Transmitter |   |
|                                   | 66533201          | MLD510-R3/A   | Receiver    |   |
|                                   | 66534201          | MLD510-R3M/A  | Receiver    | With integrated muting indicator  |
|                                   | 66533202          | MLD510-R3E/A  | Receiver    | With connection socket for external muting indicator  |
|                                   | 66502201          | MLD500-T3L/A  | Transmitter | With integrated laser alignment aid   |
|                                   | 66536201          | MLD510-R3L/A  | Receiver    | With reflex element for laser alignment aid   |
|                                   | 66535201          | MLD510-R3LM/A | Receiver    | With reflex element for laser alignment aid and integrated muting indicator                     |
| 300 mm / 4                        | 66501301          | MLD500-T4/A   | Transmitter |   |
|                                   | 66533301          | MLD510-R4/A   | Receiver    |   |
|                                   | 66534301          | MLD510-R4M/A  | Receiver    | With integrated muting indicator  |
|                                   | 66533302          | MLD510-R4E/A  | Receiver    | With connection socket for external muting indicator  |
|                                   | 66502301          | MLD500-T4L/A  | Transmitter | With integrated laser alignment aid   |
|                                   | 66536301          | MLD510-R4L/A  | Receiver    | With reflex element for laser alignment aid   |
|                                   | 66535301          | MLD510-R4LM/A | Receiver    | With reflex element for laser alignment aid and integrated muting indicator                     |
|                                   | 66536302          | MLD510-R4LE/A | Receiver    | With reflex element for laser alignment aid and connection socket for external muting indicator |

## MULTIPLE LIGHT BEAM SAFETY DEVICES

### Ordering information

**MLD 510/AS-i**, consisting of transmitter and receiver or transceiver and Deflecting Mirror  
 Included in delivery: 4 sliding blocks, 1 set of connecting and operating instructions (PDF file on CD-ROM)

**Functions (in combination with ASM Safety Monitor):**  
 start/restart interlock selectable, contactor monitoring selectable, timing controlled 2-sensor muting, sequence controlled 2-sensor muting, timing controlled 4-sensor muting, muting-timeout extension

| Beam distance/<br>number of beams | MLD 510/AS-i     |                |             |   |
|-----------------------------------|------------------|----------------|-------------|---|
|                                   | Range: 20 - 70 m |                |             |   |
|                                   | Part no.         | Article        | Description | Option  |
| 500 mm / 2                        | 66501501         | MLD500-XT2/A   | Transmitter |   |
|                                   | 66533501         | MLD510-XR2/A   | Receiver    |   |
|                                   | 66502501         | MLD500-XT2L/A  | Transmitter | With integrated laser alignment aid   |
|                                   | 66536501         | MLD510-XR2L/A  | Receiver    | With reflex element for laser alignment aid   |
|                                   | 66533502         | MLD510-XR2E/A  | Receiver    | With connection socket for external muting indicator  |
|                                   | 66536502         | MLD510-XR2LE/A | Receiver    | With reflex element for laser alignment aid and connection socket for external muting indicator |
| 400 mm / 3                        | 66501601         | MLD500-XT3/A   | Transmitter |   |
|                                   | 66533601         | MLD510-XR3/A   | Receiver    |   |
|                                   | 66502601         | MLD500-XT3L/A  | Transmitter | With integrated laser alignment aid   |
|                                   | 66536601         | MLD510-XR3L/A  | Receiver    | With reflex element for laser alignment aid   |
|                                   | 66533602         | MLD510-XR3E/A  | Receiver    | With connection socket for external muting indicator  |
|                                   | 66536602         | MLD510-XR3LE/A | Receiver    | With reflex element for laser alignment aid and connection socket for external muting indicator |
| 300 mm / 4                        | 66501701         | MLD500-XT4/A   | Transmitter |   |
|                                   | 66533701         | MLD510-XR4/A   | Receiver    |   |
|                                   | 66502701         | MLD500-XT4L/A  | Transmitter | With integrated laser alignment aid   |
|                                   | 66536701         | MLD510-XR4L/A  | Receiver    | With reflex element for laser alignment aid   |
|                                   | 66533702         | MLD510-XR4E/A  | Receiver    | With connection socket for external muting indicator  |
|                                   | 66536702         | MLD510-XR4LE/A | Receiver    | With reflex element for laser alignment aid and connection socket for external muting indicator |

## Ordering information

**MLD 510/AS-i**, consisting of transmitter and receiver or transceiver and Deflecting Mirror  
 Included in delivery: 4 sliding blocks, 1 set of connecting and operating instructions (PDF file on CD-ROM)

**Functions (in combination with ASM Safety Monitor):**  
 start/restart interlock selectable, contactor monitoring selectable, timing controlled 2-sensor muting, sequence controlled 2-sensor muting, timing controlled 4-sensor muting, muting-timeout extension

| Beam distance/<br>number of beams | MLD 510/AS-i transceiver systems |               |                   |  |
|-----------------------------------|----------------------------------|---------------|-------------------|--|
|                                   | Range: 0.5 - 8 m                 |               |                   |  |
|                                   | Part no.                         | Article       | Description       | Option   |
| 500 mm / 2                        | 66500100                         | MLD-M002      | Deflecting Mirror |  |
|                                   | 66537101                         | MLD510-RT2/A  | Transceiver       |  |
|                                   | 66538101                         | MLD510-RT2M/A | Transceiver       | With integrated muting indicator                     |
|                                   | 66537102                         | MLD510-RT2E/A | Transceiver       | With connection socket for external muting indicator |
| 400 mm / 3                        | 66500201                         | MLD-XM03      | Deflecting Mirror |  |
|                                   | 66537201                         | MLD510-RT3/A  | Transceiver       |  |
|                                   | 66538201                         | MLD510-RT3M/A | Transceiver       | With integrated muting indicator                     |
|                                   | 66537202                         | MLD510-RT3E/A | Transceiver       | With connection socket for external muting indicator |

| Beam distance/<br>number of beams | MLD 510/AS-i transceiver systems |               |                   |  |
|-----------------------------------|----------------------------------|---------------|-------------------|--|
|                                   | Range: 0.5 - 6 m                 |               |                   |  |
|                                   | Part no.                         | Article       | Description       | Option   |
| 400 mm / 3                        | 66500200                         | MLD-M003      | Deflecting Mirror |  |
|                                   | 66537201                         | MLD510-RT3/A  | Transceiver       |  |
|                                   | 66538201                         | MLD510-RT3M/A | Transceiver       | With integrated muting indicator                     |
|                                   | 66537202                         | MLD510-RT3E/A | Transceiver       | With connection socket for external muting indicator |

## MULTIPLE LIGHT BEAM SAFETY DEVICES

Article list for MLD 500, MLD 300

| Article    | Description  |
|------------|--|
| <b>MLD</b> | <b>Multiple Light Beam Safety Device</b>                             |
| <b>X</b>   | <b>Series</b>  |
| 3          | MLD 300  |
| 5          | MLD 500  |
| <b>yy</b>  | <b>Function variant</b>  |
| 00         | Transmitter  |
| 10         | Automatic restart  |
| 12         | External testing   |
| 20         | Start/restart interlock selectable, contactor monitoring selectable  |
| 30         | 2-sensor muting (timing controlled, sequence controlled)             |
| 35         | Timing controlled 4-sensor muting                                    |
| <b>z</b>   | <b>Device type</b>   |
| T          | Transmitter  |
| R          | Receiver   |
| RT         | Transceiver  |
| xT         | Transmitter for high range   |
| xR         | Receiver for high range  |
| <b>a</b>   | <b>Number of beams</b>   |
| 2          | 2-beam   |
| 3          | 3-beam   |
| 4          | 4-beam   |
| <b>b</b>   | <b>Option</b>  |
| L          | Integrated laser alignment aid                                       |
| M          | Integrated indicator   |
| E          | Connection socket for external muting indicator (only AS-i variants) |
| <b>t</b>   | <b>Safety-related switching outputs (OSSD), connection system</b>    |
| -          | Transistor output, M12 plug  |
| A          | Integrated AS-Interface, M12 connector, (safety bus systems)         |

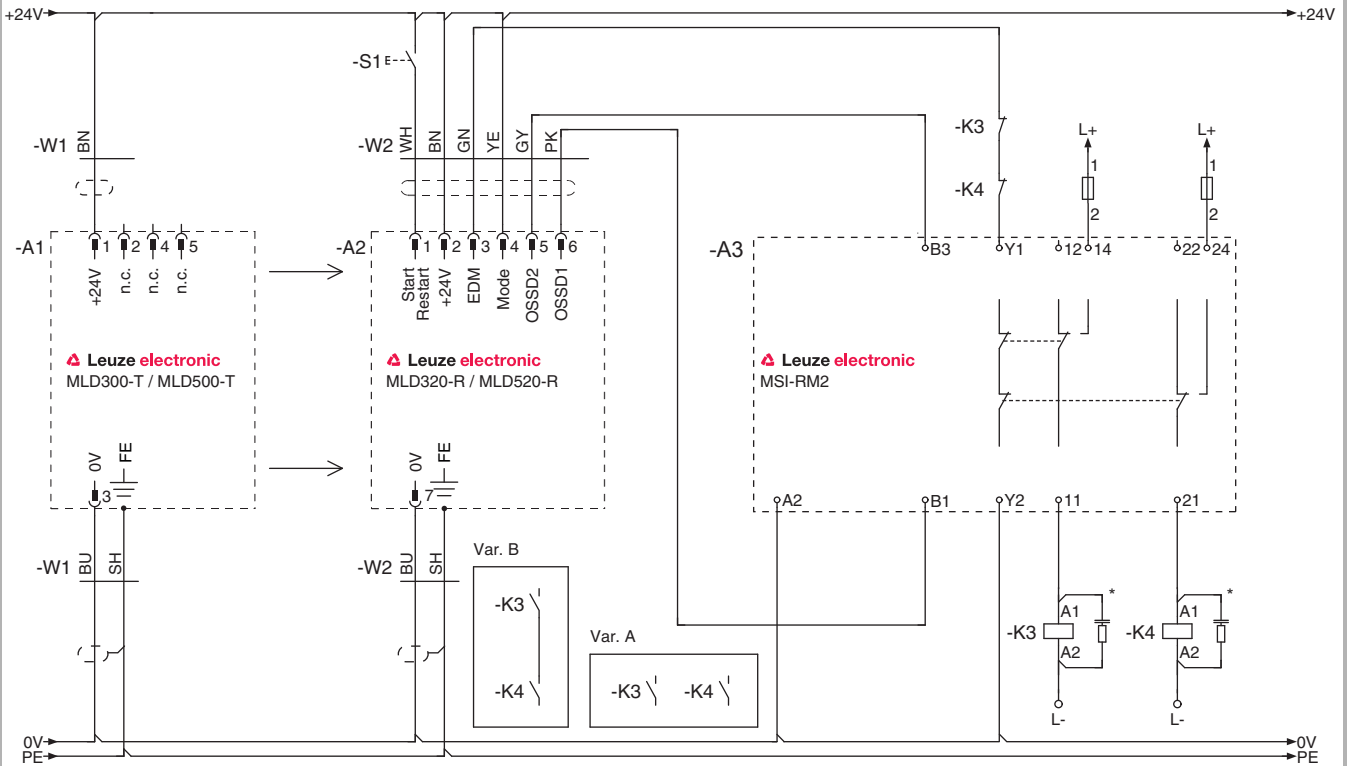
**MLD X yy z a b /t**

**MLD 500**  
p. 188

MLD 300  
p. 216

Electrical connection

MLD 500 connection example



\*) Spark extinction circuit, supply suitable spark extinction

MLD 500 Multiple Light Beam Safety Device (transmitter-receiver system) with MSI-RM2 Safety Relay (transceiver connected in an analogous manner)

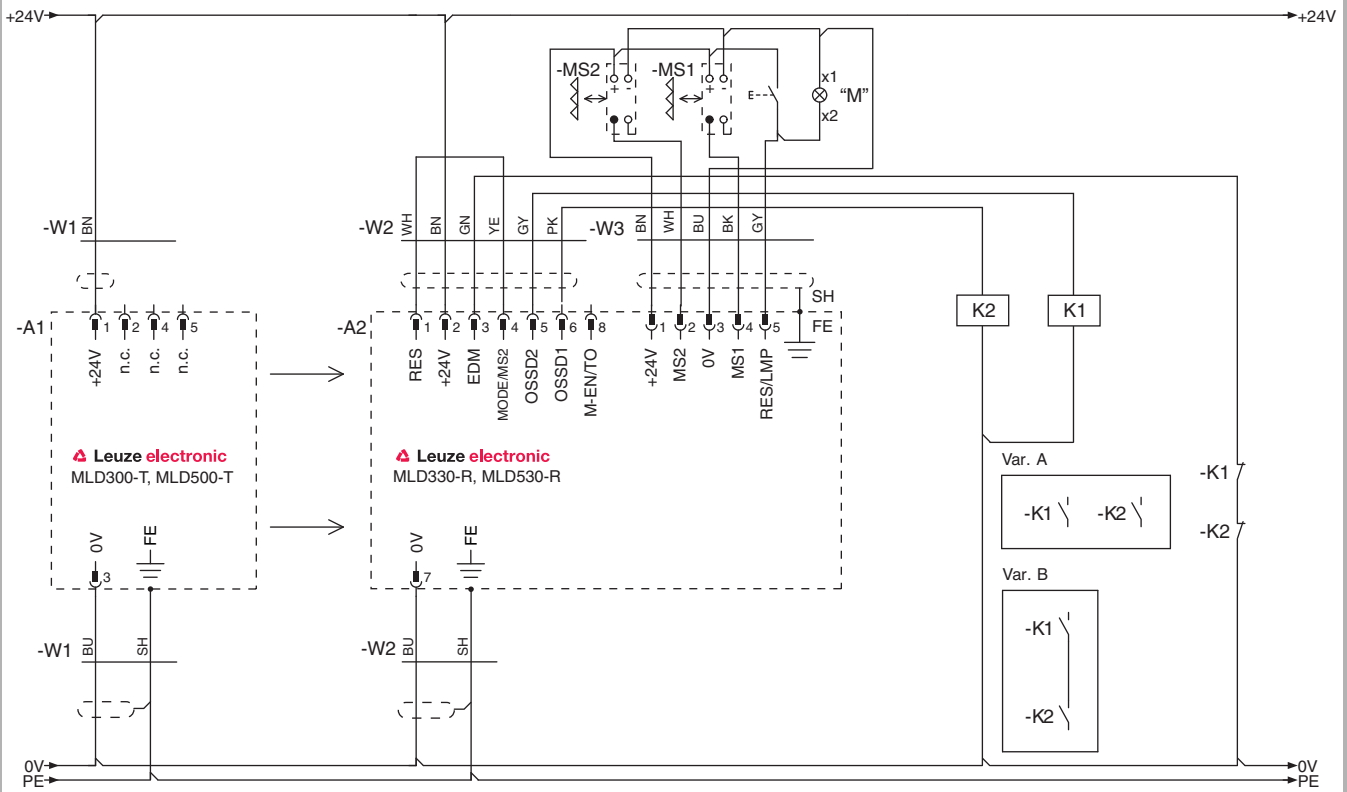
**!** Please observe the operating instructions of the components!



# MULTIPLE LIGHT BEAM SAFETY DEVICES

## Electrical connection

### MLD 500 connection example



2-sensor muting with MLD 530 Multiple Light Beam Safety Device (transmitter-receiver system), muting timeout 10 min (transceiver connected in an analogous manner)

**⚠ Please observe the operating instructions of the components!**

**Technical data**

| <b>General system data</b>   |   |        |        |
|--|---|--------|--------|
| Type in accordance with EN/IEC 61496                                       | 4   |        |        |
| SIL in accordance with IEC 61508 and SILCL in accordance with EN/IEC 62061 | 3   |        |        |
| Performance Level (PL) in accordance with EN ISO 13849-1                   | e   |        |        |
| Category in accordance with EN ISO 13849                                   | 4   |        |        |
| Number of beams  | 2   | 3      | 4      |
| Beam distance  | 500 mm  | 400 mm | 300 mm |
| Average probability of a failure to danger per hour (PFH <sub>d</sub> )    | 6.6 x 10 <sup>-9</sup>  |        |        |
| Mean time to dangerous failure (MTTF <sub>d</sub> )                        | 146 years   |        |        |
| Service life (T <sub>M</sub> ) in accordance with EN ISO 13849-1           | 20 years  |        |        |
| Range (transmitter-receiver systems, type-dependent)                       | MLDxyy-R /-T: 0.5...50 m<br>MLDxyy-xR /-xT: 20...70 m             |        |        |
| Range (transceiver systems)  | 0.5 - 8 m   |        |        |
| Response time  | 25 ms for MLD 510, MLD 520. 50 ms for MLD 530                     |        |        |
| Supply voltage   | +24 V, ±20%   |        |        |
| Connection cable length  | 100 m   |        |        |
| Safety class   | III   |        |        |
| Protection rating  | IP 67   |        |        |
| Ambient temperature, operation   | -30...+55 °C  |        |        |
| Ambient temperature, storage   | -40...+75 °C  |        |        |
| Relative humidity  | 0...95%   |        |        |
| Profile cross-section  | 52 mm x 65 mm   |        |        |
| Weight   | Type-dependent  |        |        |
| <b>Transmitter</b>   |   |        |        |
| Transmitter diodes, class in accordance with EN 60825                      | 1   |        |        |
| Wavelength   | 850 nm  |        |        |
| Current consumption  | 50 mA   |        |        |
| Connection system  | M12 plug, 5-pin   |        |        |
| <b>Receiver</b>  |   |        |        |
| Current consumption  | 150 mA without external load, muting sensors and muting indicator |        |        |
| Safety-related switching outputs   | 2 pnp transistor outputs, AS-i Safety Interface                   |        |        |
| Switching voltage high active  | Min. 18.2 V   |        |        |
| Switching voltage low  | Max. 2.5 V  |        |        |
| Switching current  | Typical, 300 mA   |        |        |
| Connection system  | M12 plug, 5-pin, 8-pin  |        |        |

## MULTIPLE LIGHT BEAM SAFETY DEVICES

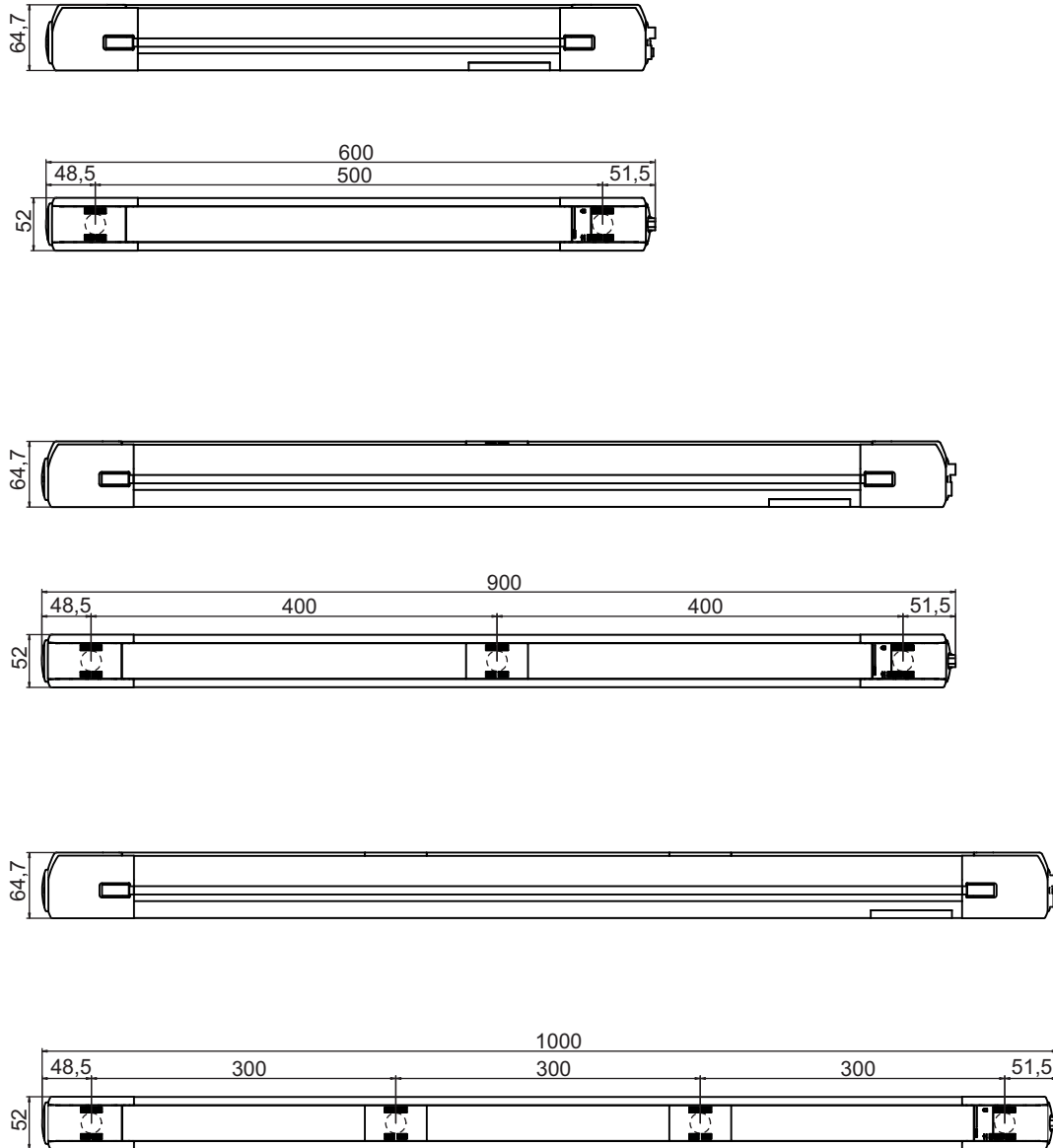
### Technical data

| Transceiver                              |   |
|--|---|
| Current consumption                      | 150 mA without external load, muting sensors and muting indicator |
| Safety-related switching outputs (OSSDs) | 2 pnp transistor outputs  |
| Switching voltage high active            | Min. 18.2 V   |
| Switching voltage low                    | Max. 2.5 V  |
| Switching current                        | Typical, 300 mA   |
| Connection system                        | M12 plug, 5-pin   |

Additional information can be found in the MLD Connecting and Operating Instructions at [www.leuze.com/en/mld](http://www.leuze.com/en/mld).

**Dimensional drawings**

**MLD 500 Multiple Light Beam Safety Device, transmitter, receiver**



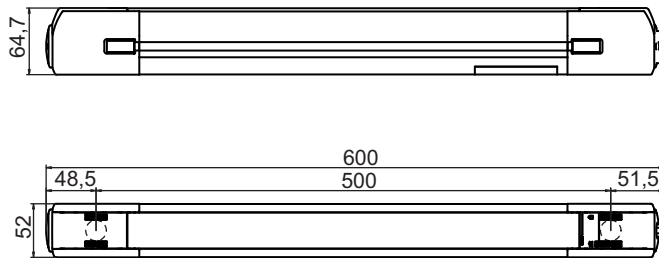
Dimensions in mm

[www.leuze.com/en/msl/](http://www.leuze.com/en/msl/)

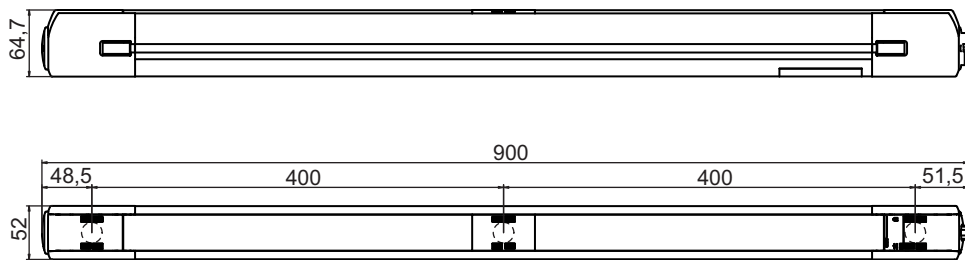
## MULTIPLE LIGHT BEAM SAFETY DEVICES

### Dimensional drawings

#### MLD 500 transceiver



#### 2-beam transceiver

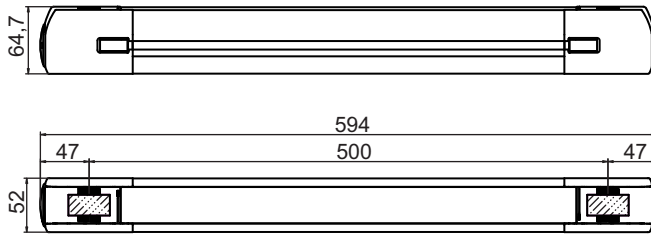


#### 3-beam transceiver

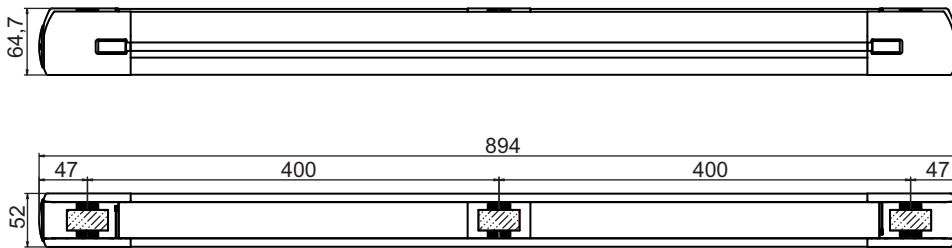
Dimensions in mm

**Dimensional drawings**

**MLD-M Deflecting Mirrors**



*2-beam Deflecting Mirror MLD-M002*



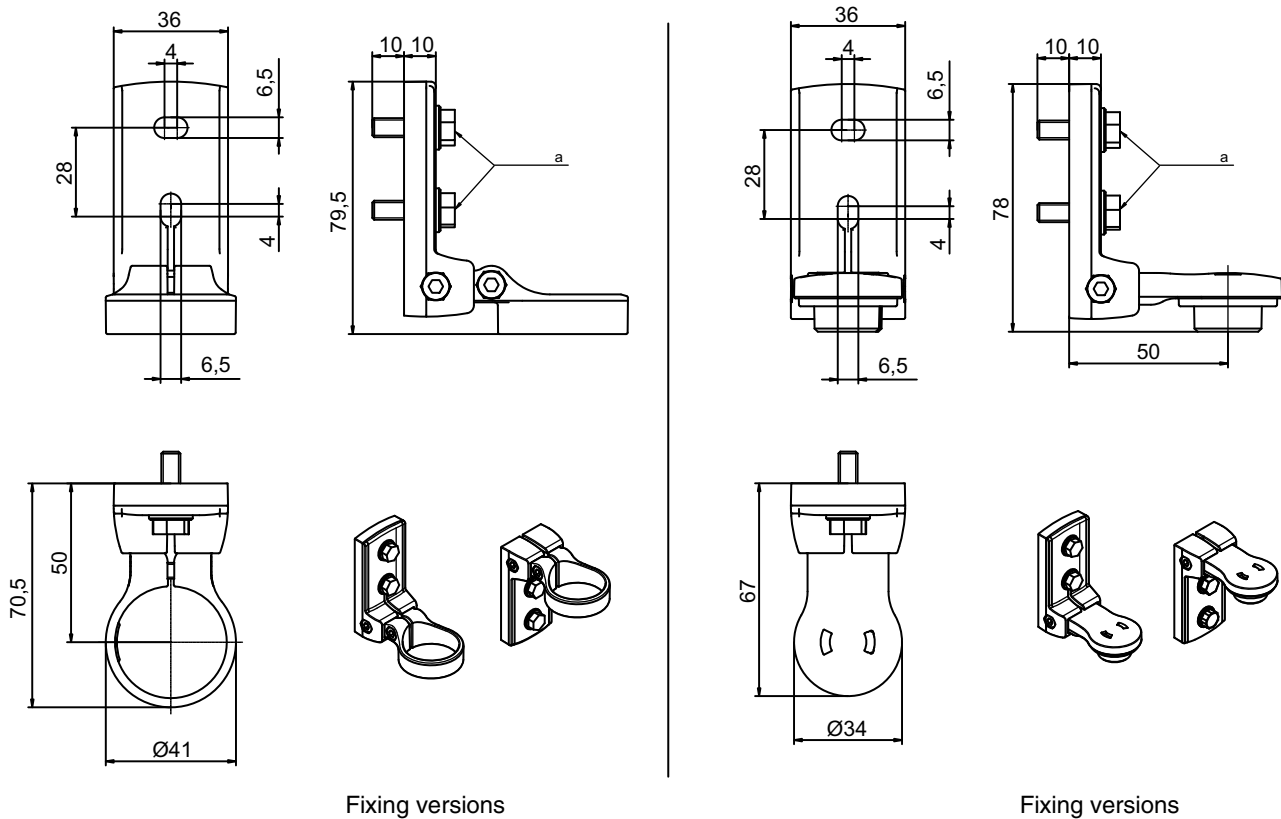
*3-beam Deflecting Mirror MLD-M003*

Dimensions in mm

## MULTIPLE LIGHT BEAM SAFETY DEVICES

### Dimensional drawings: Accessories

#### Mounting brackets



a = screw M6

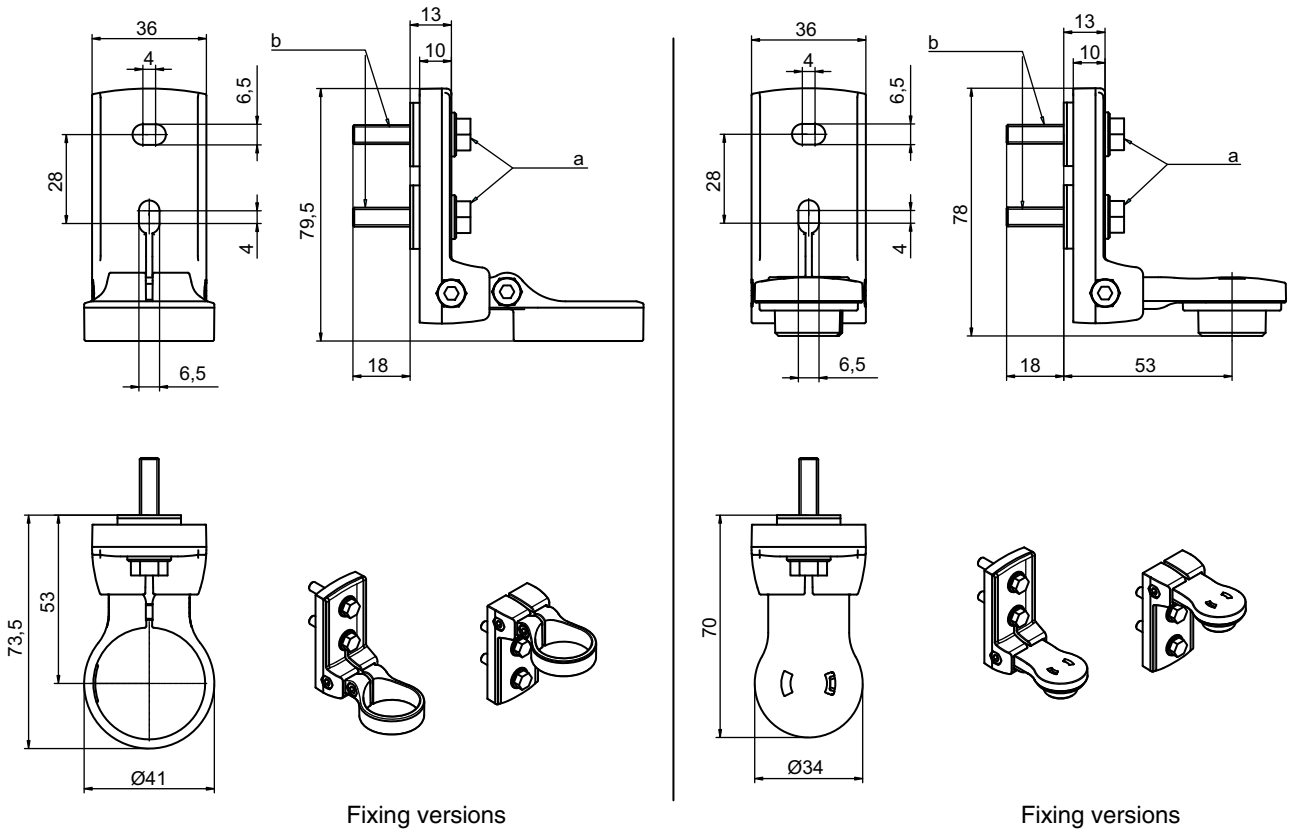
BT-SET-240BC mounting bracket set, consisting of BT-240B swivel mounts (right) and BT-240C (left), screws.  
 For all MLD 300/500 (but not for MLD-M00X; here, the BT-SET-240CC is to be selected)

Dimensions in mm



Dimensional drawings: Accessories

Mounting brackets



a = screw M6  
 b = shock absorber, thread M6

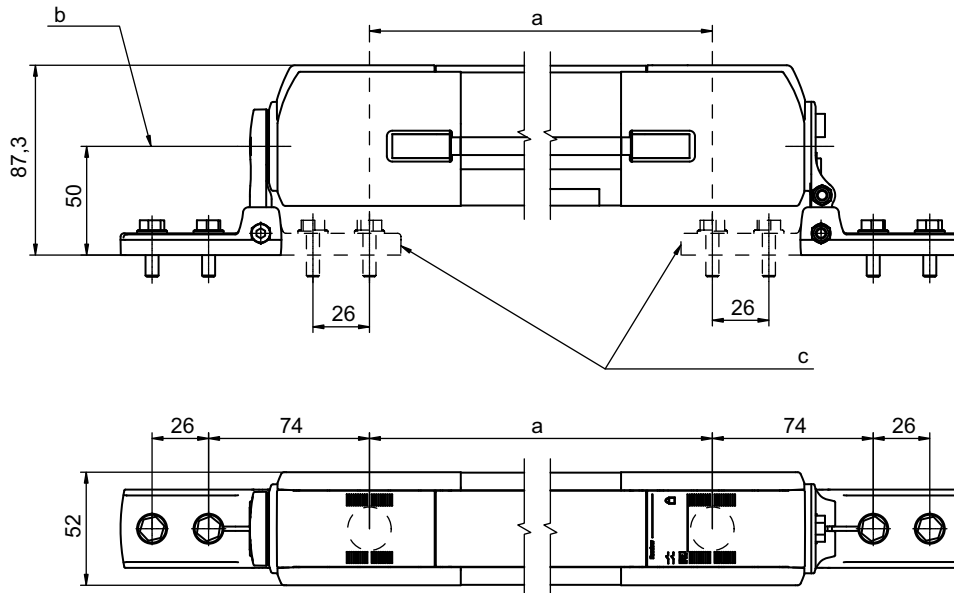
BT-SET-240BC mounting bracket set, consisting of BT-240B swivel mounts (right) and BT-240C (left), screws, shock absorber. For all MLD 300/500 (but not for MLD-M00X; here, the BT-SET-240CCS is to be selected)

Dimensions in mm

# MULTIPLE LIGHT BEAM SAFETY DEVICES

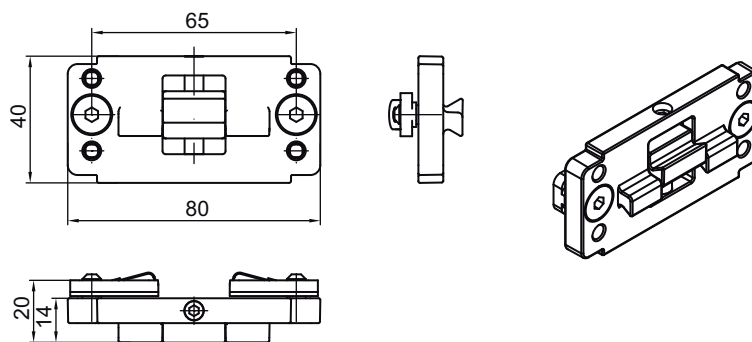
## Dimensional drawings: Accessories

### Mounting brackets



- a = beam distance
- b = swivel axis
- c = alternative fixing version

BT-240B and BT-240C swivel mount mounting dimensions



BT-P40 clamp bracket

Dimensions in mm

**Accessories ordering information**

| Part no.   | Article           | Description  | Length, design          |
|--|-------------------|--|-------------------------|
| <b>Connection cables for MLD 310, MLD 312, MLD 510 (machine interface), MLD 300 transmitter, MLD 500 transmitter</b> |                   |  |                         |
| 678055   | CB-M12-5000E-5GF  | Connection cable shielded with M12 coupling, 5-pin                           | 5 m, straight/open end  |
| 678056   | CB-M12-10000E-5GF | Connection cable shielded with M12 coupling, 5-pin                           | 10 m, straight/open end |
| 678057   | CB-M12-15000E-5GF | Connection cable shielded with M12 coupling, 5-pin                           | 15 m, straight/open end |
| 678058   | CB-M12-25000E-5GF | Connection cable shielded with M12 coupling, 5-pin                           | 25 m, straight/open end |
| 678059   | CB-M12-50000E-5GF | Connection cable shielded with M12 coupling, 5-pin                           | 50 m, straight/open end |
| <b>Connection cables for MLD 320, MLD 330, MLD 335, MLD 520, MLD 530, MLD 535 (machine interface)</b>                |                   |  |                         |
| 678060   | CB-M12-5000E-8GF  | Connection cable shielded with M12 coupling, 8-pin                           | 5 m, straight/open end  |
| 678061   | CB-M12-10000E-8GF | Connection cable shielded with M12 coupling, 8-pin                           | 10 m, straight/open end |
| 678062   | CB-M12-15000E-8GF | Connection cable shielded with M12 coupling, 8-pin                           | 15 m, straight/open end |
| 678063   | CB-M12-25000E-8GF | Connection cable shielded with M12 coupling, 8-pin                           | 25 m, straight/open end |
| 678064   | CB-M12-50000E-8GF | Connection cable shielded with M12 coupling, 8-pin                           | 50 m, straight/open end |
| <b>Connection cables for MLD 330, MLD 530 (local interface)</b>  |                   |  |                         |
| 678050   | CB-M12-5000E-5GM  | Connection cable shielded with M12 plug, 5-pin                               | 5 m, straight/open end  |
| 678051   | CB-M12-10000E-5GM | Connection cable shielded with M12 plug, 5-pin                               | 10 m, straight/open end |
| 678052   | CB-M12-15000E-5GM | Connection cable shielded with M12 plug, 5-pin                               | 15 m, straight/open end |
| 678053   | CB-M12-25000E-5GM | Connection cable shielded with M12 plug, 5-pin                               | 25 m, straight/open end |
| <b>Connection cables for MLD 335, MLD 535 (local interface)</b>  |                   |  |                         |
| 50110180   | KB M12/8-5000-SA  | Connection cables for MLD 335, MLD 535 (local interface), 8-pin, length 5 m  |                         |
| 50110181   | KB M12/8-10000-SA | Connection cables for MLD 335, MLD 535 (local interface), 8-pin, length 10 m |                         |
| 50110186   | KB M12/8-15000-SA | Connection cables for MLD 335, MLD 535 (local interface), 8-pin, length 15 m |                         |
| 50110188   | KB M12/8-25000-SA | Connection cables for MLD 335, MLD 535 (local interface), 8-pin, length 25 m |                         |
| <b>User-configurable cable connectors for machine interface (axial)</b>  |                   |  |                         |
| 429175   | CB-M12-5GF        | 5-pin screw connection (M12)   |                         |
| 429178   | CB-M12-8GF        | 8-pin screw connection (M12)   |                         |

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## MULTIPLE LIGHT BEAM SAFETY DEVICES

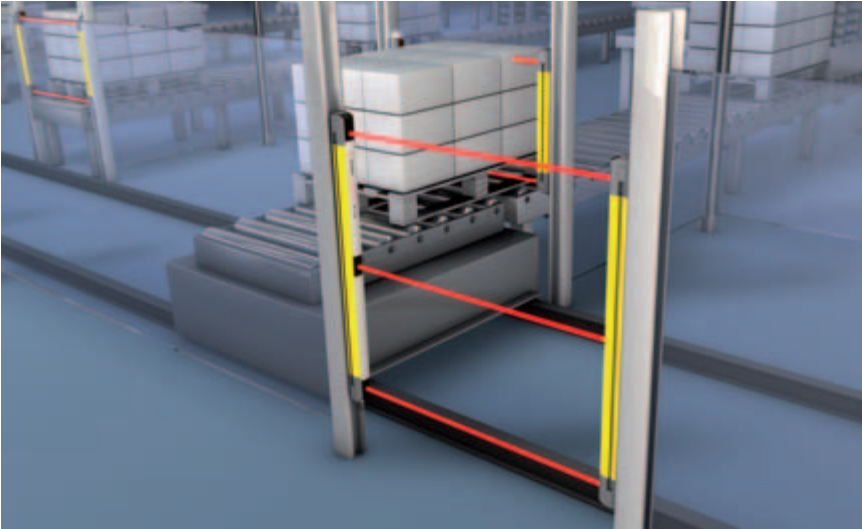
### Accessories ordering information

| Part no.   | Article       | Description  | Length, design |
|--|---------------|--|----------------|
| <b>Mounting brackets and mounting bracket sets</b> |               |  |                |
| 424416   | BT-P40        | Clamp bracket  |                |
| 560340   | BT-SET-240BC  | Consisting of BT-240B, BT-240C swivel mounts, screws   |                |
| 560341   | BT-SET-240CC  | Consisting of 2 x BT-240C swivel mounts, screws (for MLD-M002 or MLD-M003 deflecting mirror)   |                |
| 560342   | BT-SET-240BCS | Consisting of BT-240B, BT-240C swivel mounts, screws, shock absorber   |                |
| 560343   | BT-SET-240CCS | Consisting of 2 x BT-240C swivel mounts, screws, shock absorber (for MLD-M002 or MLD-M003 Deflecting Mirror)   |                |
| 560344   | BT-SET-240C   | Consisting of BT-240C swivel mount, screws   |                |
| 560345   | BT-SET-240CS  | Consisting of BT-240C swivel mount, screws, shock absorber   |                |
| 560346   | BT-SET-240BS  | Consisting of BT-240C swivel mount, screws, shock absorber   |                |
| 560347   | BT-SET-240B   | Consisting of BT-240 B standard swivel mount (swivel mount 240° rotation), screws  |                |
| <b>Accessories for muting</b>                      |               |  |                |
| 520062   | AC-SCM5       | Local connection box with M12-connection for connecting to 5-pin local interface (4 connections for 2 muting sensors, muting indicator, reset button)                      |                |
| 520063   | AC-SCM5-BT    | Local connection box with M12-connection for connecting to 5-pin local interface (4 connections for 2 muting sensors, muting indicator, reset button), with mounting plate |                |
| 520058   | AC-SCM6       | Local connection box with M12-connection for connecting to 8-pin local interface (6 connections for 4 muting sensors, muting indicator, reset button)                      |                |
| 520059   | AC-SCM6-BT    | Local connection box with M12-connection for connecting to 8-pin local interface (6 connections for 4 muting sensors, muting indicator, reset button), with mounting plate |                |
| <b>Muting Sensor Sets</b>                          |               |  |                |
| For accessories, see page 502.                     |               |  |                |
| <b>Accessories for laser alignment aid</b>         |               |  |                |
| 520071   | AC-MK1        | MagnetKey for activation of the laser alignment aid  |                |

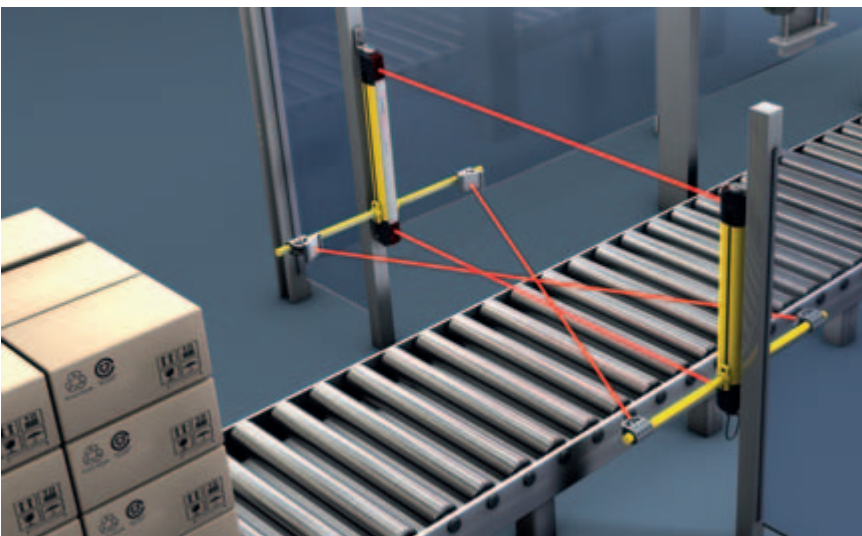


## MULTIPLE LIGHT BEAM SAFETY DEVICES

### MLD 300



Access guarding with 3-beam transceiver of the MLD 300 series for conveyor and storage systems



MLD 300 Multiple Light Beam Safety Device with integrated parallel muting at one conveyor line

#### Typical areas of application

- Print and paper machinery; Packaging machinery in accordance with EN 415
- Conveyor systems in accordance with prEN 620; continuous conveyors for piece goods in accordance with EN 619
- Woodworking machinery in accordance with EN 691, textile machinery, e.g. in accordance with ISO 11111
- Protective devices for storage and narrow passages in accordance with DIN 15185, Part 2
- Further areas of application: machinery and plant systems acc. to C-standards, in which category 2 safety devices are required

It is advantageous from a cost effectiveness and optimum usability standpoint to use safety sensors that are characterized by functions that match the specific requirements of the given application as closely as possible. The Multiple Light Beam Safety Device MLD 300 (type 2, PLd) has been specially designed for this.

As for the MLD 500 series (type 4, PL e), the MLD 300 sensors are characterized by their individual function classes. A start/restart interlock and contactor monitoring can thereby be selected and, if necessary, various muting modes realized. The series can be used both as standard access guarding as well as for applications where sequential, parallel or partial muting is required. Additional muting devices are not required, thus simplifying construction and lowering costs during setup of the muting application.

The series is predestined for wide-area perimeter guarding, which is realized with Deflecting Mirrors, enabling operation at ranges of up to 70 m. In addition to transmitter/receiver versions, 2- and 3-beam (patented) transceiver versions are also available. No PC is necessary for configuration, as the functions are set via the pin assignments at the connection. Operating temperatures as low as  $-30^{\circ}\text{C}$  are possible. Options such as the integrated laser alignment aid, an integrated muting indicator and the patented swivel mount for easy fastening and alignment round out the MLD product range.

Important technical data, overview

|  |   |        |        |
|--|---|--------|--------|
| Type in accordance with EN/IEC 61496                                       | 2   |        |        |
| SIL in accordance with IEC 61508 and SILCL in accordance with EN/IEC 62061 | 2   |        |        |
| Performance Level (PL) in accordance with EN ISO 13849-1                   | d   |        |        |
| Category in accordance with EN ISO 13849                                   | 3   |        |        |
| Number of beams  | 2   | 3      | 4      |
| Beam distance  | 500 mm  | 400 mm | 300 mm |
| Range (transmitter-receiver systems, type-dependent)                       | MLDxyy-R /-T: 0.5...50 m<br>MLDxyy-xR /-xT: 20...70 m |        |        |
| Range (transceiver systems)  | 0.5 - 8 m   |        |        |
| Profile cross-section  | 52 mm x 65 mm   |        |        |
| Safety-related switching outputs (OSSDs)                                   | 2 pnp transistor outputs                              |        |        |
| Connection system  | M12 plug  |        |        |

Functions

|   | MLD 310, MLD 312* | MLD 320 | MLD 330 | MLD 335 |
|---|-------------------|---------|---------|---------|
| Automatic start/restart   | ●                 | ●       |         |         |
| Start/restart interlock (RES)                                   |                   | ●**     | ●       | ●       |
| Contacting monitoring (EDM)                                     |                   | ●**     | ●**     | ●**     |
| 2-sensor muting (timing controlled, sequence controlled)        |                   |         | ●       |         |
| 4-sensor muting (timing controlled)                             |                   |         |         | ●       |
| Configurable operating modes                                    |                   | ●       | ●       | ●       |
| Laser alignment aid (optional for transmitter-receiver systems) | ●                 | ●       |         |         |


\*) MLD 312 with external test selectable  
 \*\*) MLD 312 with external test selectable

Special features


- Version available as 3-beam transceiver
- Integrated muting function, no additional muting module is necessary
- The configuration is simply performed by means of wiring, i. e. no software, PC or DIP switch are necessary
- The use at ambient temperatures as low as -30°C is possible
- Options: integrated laser alignment aid, integrated muting indicator, 7-segment display




Features




C US



C US





| Further information                 | Page |
|-------------------------------------|------|
| ● Ordering information              | 218  |
| ● Electrical connection             | 203  |
| ● Technical data                    | 230  |
| ● Dimensional drawings              | 207  |
| ● Dimensional drawings: Accessories | 210  |
| ● Accessories ordering information  | 213  |



## MULTIPLE LIGHT BEAM SAFETY DEVICES

### Ordering information

**MLD 310**, consisting of transmitter and receiver  
 Included in delivery: 4 sliding blocks, 1 set of connecting and operating instructions (PDF file on CD-ROM)

**Functions:** Automatic restart, 2 OSSDs

| <b>MLD 310 transmitter-receiver systems</b> |                 |                |                    |   |
|---|-----------------|----------------|--------------------|---|
| <b>Range: 0.5 - 50 m</b>                    |                 |                |                    |   |
| <b>Beam distance/<br/>number of beams</b>   | <b>Part no.</b> | <b>Article</b> | <b>Description</b> | <b>Option</b>                               |
| <b>500 mm / 2</b>                           | 66001100        | MLD300-T2      | Transmitter        |   |
|   | 66033100        | MLD310-R2      | Receiver           |   |
|   | 66002100        | MLD300-T2L     | Transmitter        | With integrated laser alignment aid         |
|   | 66036100        | MLD310-R2L     | Receiver           | With reflex element for laser alignment aid |
| <b>400 mm / 3</b>                           | 66001200        | MLD300-T3      | Transmitter        |   |
|   | 66033200        | MLD310-R3      | Receiver           |   |
|   | 66002200        | MLD300-T3L     | Transmitter        | With integrated laser alignment aid         |
|   | 66036200        | MLD310-R3L     | Receiver           | With reflex element for laser alignment aid |
| <b>300 mm / 4</b>                           | 66001300        | MLD300-T4      | Transmitter        |   |
|   | 66033300        | MLD310-R4      | Receiver           |   |
|   | 66002300        | MLD300-T4L     | Transmitter        | With integrated laser alignment aid         |
|   | 66036300        | MLD310-R4L     | Receiver           | With reflex element for laser alignment aid |

**Ordering information**

**MLD 310**, consisting of transmitter and receiver or transceiver and Deflecting Mirror  
 Included in delivery: 4 sliding blocks, 1 set of connecting and operating instructions (PDF file on CD-ROM)

**Functions:** Automatic restart, 2 OSSDs

| Beam distance/<br>number of beams | <b>MLD 310</b>          |             |             |   |
|-----------------------------------|-------------------------|-------------|-------------|---|
|                                   | <b>Range: 20 - 70 m</b> |             |             |   |
|                                   | Part no.                | Article     | Description | Option                                      |
| 500 mm / 2                        | 66001500                | MLD300-XT2  | Transmitter |   |
|                                   | 66033500                | MLD310-XR2  | Receiver    |   |
|                                   | 66002500                | MLD300-XT2L | Transmitter | With integrated laser alignment aid         |
|                                   | 66036500                | MLD310-XR2L | Receiver    | With reflex element for laser alignment aid |
| 400 mm / 3                        | 66001600                | MLD300-XT3  | Transmitter |   |
|                                   | 66033600                | MLD310-XR3  | Receiver    |   |
|                                   | 66002600                | MLD300-XT3L | Transmitter | With integrated laser alignment aid         |
|                                   | 66036600                | MLD310-XR3L | Receiver    | With reflex element for laser alignment aid |
| 300 mm / 4                        | 66001700                | MLD300-XT4  | Transmitter |   |
|                                   | 66033700                | MLD310-XR4  | Receiver    |   |
|                                   | 66002700                | MLD300-XT4L | Transmitter | With integrated laser alignment aid         |
|                                   | 66036700                | MLD310-XR4L | Receiver    | With reflex element for laser alignment aid |

| Beam distance/<br>number of beams | <b>MLD 310 transceiver systems</b> |            |                   |        |
|-----------------------------------|------------------------------------|------------|-------------------|--------|
|                                   | <b>Range: 0.5 - 8 m</b>            |            |                   |        |
|                                   | Part no.                           | Article    | Description       | Option |
| 500 mm / 2                        | 66500100                           | MLD-M002   | Deflecting Mirror |        |
|                                   | 66037100                           | MLD310-RT2 | Transceiver       |        |
| 400 mm / 3                        | 66500201                           | MLD-XM03   | Deflecting Mirror |        |
|                                   | 66037200                           | MLD310-RT3 | Transceiver       |        |

| Beam distance/<br>number of beams | <b>MLD 310 transceiver systems</b> |            |                   |        |
|-----------------------------------|------------------------------------|------------|-------------------|--------|
|                                   | <b>Range: 0.5 - 6 m</b>            |            |                   |        |
|                                   | Part no.                           | Article    | Description       | Option |
| 400 mm / 3                        | 66500200                           | MLD-M003   | Deflecting Mirror |        |
|                                   | 66037200                           | MLD310-RT3 | Transceiver       |        |

## MULTIPLE LIGHT BEAM SAFETY DEVICES

### Ordering information

**MLD 312**, consisting of transmitter and receiver or transceiver and Deflecting Mirror  
 Included in delivery: 4 sliding blocks, 1 set of connecting and operating instructions (PDF files on CD-ROM)

**Functions:** Automatic restart, 1 OSSD, 1 test input

| Beam distance/<br>number of beams | MLD 312           |            |             |   |
|-----------------------------------|-------------------|------------|-------------|---|
|                                   | Range: 0.5 - 50 m |            |             |   |
|                                   | Part no.          | Article    | Description | Option                                      |
| 500 mm / 2                        | 66001100          | MLD300-T2  | Transmitter |   |
|                                   | 66043100          | MLD312-R2  | Receiver    |   |
|                                   | 66002100          | MLD300-T2L | Transmitter | With integrated laser alignment aid         |
|                                   | 66046100          | MLD312-R2L | Receiver    | With reflex element for laser alignment aid |
| 400 mm / 3                        | 66001200          | MLD300-T3  | Transmitter |   |
|                                   | 66043200          | MLD312-R3  | Receiver    |   |
|                                   | 66002200          | MLD300-T3L | Transmitter | With integrated laser alignment aid         |
|                                   | 66046200          | MLD312-R3L | Receiver    | With reflex element for laser alignment aid |
| 300 mm / 4                        | 66001300          | MLD300-T4  | Transmitter |   |
|                                   | 66043300          | MLD312-R4  | Receiver    |   |
|                                   | 66002300          | MLD300-T4L | Transmitter | With integrated laser alignment aid         |
|                                   | 66046300          | MLD312-R4L | Receiver    | With reflex element for laser alignment aid |

## Ordering information

**MLD 312**, consisting of transmitter and receiver or transceiver and Deflecting Mirror  
 Included in delivery: 4 sliding blocks, 1 set of connecting and operating instructions (PDF files on CD-ROM)

**Functions:** Automatic restart, 1 OSSD, 1 test input

| Beam distance/<br>number of beams | MLD 312          |             |             |   |
|-----------------------------------|------------------|-------------|-------------|---|
|                                   | Range: 20 - 70 m |             |             |   |
|                                   | Part no.         | Article     | Description | Option                                      |
| 500 mm / 2                        | 66001500         | MLD300-XT2  | Transmitter |   |
|                                   | 66043500         | MLD312-XR2  | Receiver    |   |
|                                   | 66002500         | MLD300-XT2L | Transmitter | With integrated laser alignment aid         |
|                                   | 66046500         | MLD312-XR2L | Receiver    | With reflex element for laser alignment aid |
| 400 mm / 3                        | 66001600         | MLD300-XT3  | Transmitter |   |
|                                   | 66043600         | MLD312-XR3  | Receiver    |   |
|                                   | 66002600         | MLD300-XT3L | Transmitter | With integrated laser alignment aid         |
|                                   | 66046600         | MLD312-XR3L | Receiver    | With reflex element for laser alignment aid |
| 300 mm / 4                        | 66001700         | MLD300-XT4  | Transmitter |   |
|                                   | 66043700         | MLD312-XR4  | Receiver    |   |
|                                   | 66002700         | MLD300-XT4L | Transmitter | With integrated laser alignment aid         |
|                                   | 66046700         | MLD312-XR4L | Receiver    | With reflex element for laser alignment aid |

| Beam distance/<br>number of beams | MLD 312 transceiver systems |            |                   |        |
|-----------------------------------|-----------------------------|------------|-------------------|--------|
|                                   | Range: 0.5 - 8 m            |            |                   |        |
|                                   | Part no.                    | Article    | Description       | Option |
| 500 mm / 2                        | 66500100                    | MLD-M002   | Deflecting Mirror |        |
|                                   | 66047100                    | MLD312-RT2 | Transceiver       |        |
| 400 mm / 3                        | 66500201                    | MLD-XM03   | Deflecting Mirror |        |
|                                   | 66047200                    | MLD312-RT3 | Transceiver       |        |

| Beam distance/<br>number of beams | MLD 312 transceiver systems |            |                   |        |
|-----------------------------------|-----------------------------|------------|-------------------|--------|
|                                   | Range: 0.5 - 6 m            |            |                   |        |
|                                   | Part no.                    | Article    | Description       | Option |
| 400 mm / 3                        | 66500200                    | MLD-M003   | Deflecting Mirror |        |
|                                   | 66047200                    | MLD312-RT3 | Transceiver       |        |

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## MULTIPLE LIGHT BEAM SAFETY DEVICES

### Ordering information

**MLD 320**, consisting of transmitter and receiver  
 Included in delivery: 4 sliding blocks, 1 connecting and operating  
 instructions (PDF file on CD-ROM)

**Functions:** 2 OSSDs, start/restart interlock selectable,  
 contactor monitoring selectable

| Beam distance/<br>number of beams | MLD 320           |             |             |   |
|-----------------------------------|-------------------|-------------|-------------|---|
|                                   | Range: 0.5 - 50 m |             |             |   |
|                                   | Part no.          | Article     | Description | Option  |
| 500 mm / 2                        | 66001100          | MLD300-T2   | Transmitter |   |
|                                   | 66053100          | MLD320-R2   | Receiver    |   |
|                                   | 66054100          | MLD320-R2M  | Receiver    | With integrated status indicator  |
|                                   | 66002100          | MLD300-T2L  | Transmitter | With integrated laser alignment aid   |
|                                   | 66056100          | MLD320-R2L  | Receiver    | With reflex element for laser alignment aid                                 |
|                                   | 66055100          | MLD320-R2LM | Receiver    | With reflex element for laser alignment aid and integrated status indicator |
| 400 mm / 3                        | 66001200          | MLD300-T3   | Transmitter |   |
|                                   | 66053200          | MLD320-R3   | Receiver    |   |
|                                   | 66054200          | MLD320-R3M  | Receiver    | With integrated status indicator  |
|                                   | 66002200          | MLD300-T3L  | Transmitter | With integrated laser alignment aid   |
|                                   | 66056200          | MLD320-R3L  | Receiver    | With reflex element for laser alignment aid                                 |
|                                   | 66055200          | MLD320-R3LM | Receiver    | With reflex element for laser alignment aid and integrated status indicator |
| 300 mm / 4                        | 66001300          | MLD300-T4   | Transmitter |   |
|                                   | 66053300          | MLD320-R4   | Receiver    |   |
|                                   | 66054300          | MLD320-R4M  | Receiver    | With integrated status indicator  |
|                                   | 66002300          | MLD300-T4L  | Transmitter | With integrated laser alignment aid   |
|                                   | 66056300          | MLD320-R4L  | Receiver    | With reflex element for laser alignment aid                                 |
|                                   | 66055300          | MLD320-R4LM | Receiver    | With reflex element for laser alignment aid and integrated status indicator |

## Ordering information

**MLD 320**, consisting of transmitter and receiver or transceiver and Deflecting Mirror  
 Included in delivery: 4 sliding blocks, 1 set of connecting and operating instructions (PDF file on CD-ROM)

**Functions:** 2 OSSDs, start/restart interlock selectable, contactor monitoring selectable

| Beam distance/<br>number of beams | <b>MLD 320</b>          |              |             |   |
|-----------------------------------|-------------------------|--------------|-------------|---|
|                                   | <b>Range: 20 - 70 m</b> |              |             |   |
|                                   | Part no.                | Article      | Description | Option  |
| 500 mm / 2                        | 66001500                | MLD300-XT2   | Transmitter |   |
|                                   | 66053500                | MLD320-XR2   | Receiver    |   |
|                                   | 66054500                | MLD320-XR2M  | Receiver    | With integrated status indicator  |
|                                   | 66002500                | MLD300-XT2L  | Transmitter | With integrated laser alignment aid   |
|                                   | 66056500                | MLD320-XR2L  | Receiver    | With reflex element for laser alignment aid                                 |
|                                   | 66055500                | MLD320-XR2LM | Receiver    | With reflex element for laser alignment aid and integrated status indicator |
| 400 mm / 3                        | 66001600                | MLD300-XT3   | Transmitter |   |
|                                   | 66053600                | MLD320-XR3   | Receiver    |   |
|                                   | 66054600                | MLD320-XR3M  | Receiver    | With integrated status indicator  |
|                                   | 66002600                | MLD300-XT3L  | Transmitter | With integrated laser alignment aid   |
|                                   | 66056600                | MLD320-XR3L  | Receiver    | With reflex element for laser alignment aid                                 |
|                                   | 66055600                | MLD320-XR3LM | Receiver    | With reflex element for laser alignment aid and integrated status indicator |
| 300 mm / 4                        | 66001700                | MLD300-XT4   | Transmitter |   |
|                                   | 66053700                | MLD320-XR4   | Receiver    |   |
|                                   | 66054700                | MLD320-XR4M  | Receiver    | With integrated status indicator  |
|                                   | 66002700                | MLD300-XT4L  | Transmitter | With integrated laser alignment aid   |
|                                   | 66056700                | MLD320-XR4L  | Receiver    | With reflex element for laser alignment aid                                 |
|                                   | 66055700                | MLD320-XR4LM | Receiver    | With reflex element for laser alignment aid and integrated status indicator |

| Beam distance/<br>number of beams | <b>MLD 320 transceiver systems</b> |             |                   |                                  |
|-----------------------------------|------------------------------------|-------------|-------------------|----------------------------------|
|                                   | <b>Range: 0.5 - 8 m</b>            |             |                   |                                  |
|                                   | Part no.                           | Article     | Description       | Option                           |
| 500 mm / 2                        | 66500100                           | MLD-M002    | Deflecting Mirror |                                  |
|                                   | 66057100                           | MLD320-RT2  | Transceiver       |                                  |
|                                   | 66058100                           | MLD320-RT2M | Transceiver       | With integrated status indicator |
| 400 mm / 3                        | 66500201                           | MLD-XM03    | Deflecting Mirror |                                  |
|                                   | 66057200                           | MLD320-RT3  | Transceiver       |                                  |
|                                   | 66058200                           | MLD320-RT3M | Transceiver       | With integrated status indicator |

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## MULTIPLE LIGHT BEAM SAFETY DEVICES

### Ordering information

**MLD 320**, consisting of transmitter and receiver or transceiver and Deflecting Mirror  
 Included in delivery: 4 sliding blocks, 1 set of connecting and operating instructions (PDF file on CD-ROM)

**Functions:** 2 OSSDs, start/restart interlock selectable, contactor monitoring selectable

| Beam distance/<br>number of beams | MLD 320 transceiver systems |             |                   |                                  |
|-----------------------------------|-----------------------------|-------------|-------------------|----------------------------------|
|                                   | Range: 0.5 - 6 m            |             |                   |                                  |
|                                   | Part no.                    | Article     | Description       | Option                           |
| 400 mm / 3                        | 66500200                    | MLD-M003    | Deflecting Mirror |                                  |
|                                   | 66057200                    | MLD320-RT3  | Transceiver       |                                  |
|                                   | 66058200                    | MLD320-RT3M | Transceiver       | With integrated status indicator |



## Ordering information

**MLD 330**, consisting of transmitter and receiver  
 Included in delivery: 4 sliding blocks, 1 set of connecting and operating instructions (PDF file on CD-ROM)

**Functions:** 2 OSSDs, start/restart interlock, contactor monitoring selectable, timing controlled 2-sensor muting, sequence controlled 2-sensor muting, muting-time-out extension, alternative connection for second muting signal, partial muting

| Beam distance/<br>number of beams | MLD 330           |             |             |  |
|-----------------------------------|-------------------|-------------|-------------|--|
|                                   | Range: 0.5 - 50 m |             |             |  |
|                                   | Part no.          | Article     | Description | Option   |
| 500 mm / 2                        | 66001100          | MLD300-T2   | Transmitter |  |
|                                   | 66063100          | MLD330-R2   | Receiver    |  |
|                                   | 66064100          | MLD330-R2M  | Receiver    | With integrated status and muting indicator  |
|                                   | 66002100          | MLD300-T2L  | Transmitter | With integrated laser alignment aid  |
|                                   | 66066100          | MLD330-R2L  | Receiver    | With reflex element for laser alignment aid  |
|                                   | 66065100          | MLD330-R2LM | Receiver    | With reflex element for laser alignment aid and integrated status and muting indicator |
| 400 mm / 3                        | 66001200          | MLD300-T3   | Transmitter |  |
|                                   | 66063200          | MLD330-R3   | Receiver    |  |
|                                   | 66064200          | MLD330-R3M  | Receiver    | With integrated status and muting indicator  |
|                                   | 66002200          | MLD300-T3L  | Transmitter | With integrated laser alignment aid  |
|                                   | 66066200          | MLD330-R3L  | Receiver    | With reflex element for laser alignment aid  |
|                                   | 66065200          | MLD330-R3LM | Receiver    | With reflex element for laser alignment aid and integrated status and muting indicator |
| 300 mm / 4                        | 66001300          | MLD300-T4   | Transmitter |  |
|                                   | 66063300          | MLD330-R4   | Receiver    |  |
|                                   | 66064300          | MLD330-R4M  | Receiver    | With integrated status and muting indicator  |
|                                   | 66002300          | MLD300-T4L  | Transmitter | With integrated laser alignment aid  |
|                                   | 66066300          | MLD330-R4L  | Receiver    | With reflex element for laser alignment aid  |
|                                   | 66065300          | MLD330-R4LM | Receiver    | With reflex element for laser alignment aid and integrated status and muting indicator |

## MULTIPLE LIGHT BEAM SAFETY DEVICES

### Ordering information

**MLD 330**, consisting of transmitter and receiver or transceiver and Deflecting Mirror  
 Included in delivery: 4 sliding blocks, 1 set of connecting and operating instructions (PDF file on CD-ROM)

**Functions:** 2 OSSDs, start/restart interlock, contactor monitoring selectable, timing controlled 2-sensor muting, sequence controlled 2-sensor muting, muting-time-out extension, alternative connection for second muting signal, partial muting

| Beam distance/<br>number of beams | <b>MLD 330</b>          |             |             |   |
|-----------------------------------|-------------------------|-------------|-------------|---|
|                                   | <b>Range: 20 - 70 m</b> |             |             |   |
|                                   | Part no.                | Article     | Description | Option                                      |
| 500 mm / 2                        | 66001500                | MLD300-XT2  | Transmitter |   |
|                                   | 66063500                | MLD330-XR2  | Receiver    |   |
|                                   | 66002500                | MLD300-XT2L | Transmitter | With integrated laser alignment aid         |
|                                   | 66066500                | MLD330-XR2L | Receiver    | With reflex element for laser alignment aid |
| 400 mm / 3                        | 66001600                | MLD300-XT3  | Transmitter |   |
|                                   | 66063600                | MLD330-XR3  | Receiver    |   |
|                                   | 66002600                | MLD300-XT3L | Transmitter | With integrated laser alignment aid         |
|                                   | 66066600                | MLD330-XR3L | Receiver    | With reflex element for laser alignment aid |
| 300 mm / 4                        | 66001700                | MLD300-XT4  | Transmitter |   |
|                                   | 66063700                | MLD330-XR4  | Receiver    |   |
|                                   | 66002700                | MLD300-XT4L | Transmitter | With integrated laser alignment aid         |
|                                   | 66066700                | MLD330-XR4L | Receiver    | With reflex element for laser alignment aid |

| Beam distance/<br>number of beams | <b>MLD 330 transceiver systems</b> |             |                   |   |
|-----------------------------------|------------------------------------|-------------|-------------------|---|
|                                   | <b>Range: 0.5 - 8 m</b>            |             |                   |   |
|                                   | Part no.                           | Article     | Description       | Option                                      |
| 500 mm / 2                        | 66500100                           | MLD-M002    | Deflecting Mirror |   |
|                                   | 66067100                           | MLD330-RT2  | Transceiver       |   |
|                                   | 66068100                           | MLD330-RT2M | Transceiver       | With integrated status and muting indicator |
| 400 mm / 3                        | 66500201                           | MLD-XM03    | Deflecting Mirror |   |
|                                   | 66067200                           | MLD330-RT3  | Transceiver       |   |
|                                   | 66068200                           | MLD330-RT3M | Transceiver       | With integrated status and muting indicator |

| Beam distance/<br>number of beams | <b>MLD 330 transceiver systems</b> |             |                   |   |
|-----------------------------------|------------------------------------|-------------|-------------------|---|
|                                   | <b>Range: 0.5 - 6 m</b>            |             |                   |   |
|                                   | Part no.                           | Article     | Description       | Option                                      |
| 400 mm / 3                        | 66500200                           | MLD-M003    | Deflecting Mirror |   |
|                                   | 66067200                           | MLD330-RT3  | Transceiver       |   |
|                                   | 66068200                           | MLD330-RT3M | Transceiver       | With integrated status and muting indicator |

## Ordering information

**MLD 335**, consisting of transmitter and receiver or transceiver and Deflecting Mirror  
 Included in delivery: 4 sliding blocks, 1 set of connecting and operating instructions (PDF file on CD-ROM)

**Functions:** 2 OSSDs, start/restart interlock, contactor monitoring selectable, timing controlled 2-sensor muting, sequence controlled 2-sensor muting, timing controlled 4-sensor muting, muting-timeout extension, alternative connection for second muting signal, muting enable function, partial muting

| Beam distance/<br>number of beams | MLD 335           |             |             |  |
|-----------------------------------|-------------------|-------------|-------------|--|
|                                   | Range: 0.5 - 50 m |             |             |  |
|                                   | Part no.          | Article     | Description | Option   |
| 500 mm / 2                        | 66001100          | MLD300-T2   | Transmitter |  |
|                                   | 66073100          | MLD335-R2   | Receiver    |  |
|                                   | 66074100          | MLD335-R2M  | Receiver    | With integrated status and muting indicator  |
|                                   | 66002100          | MLD300-T2L  | Transmitter | With integrated laser alignment aid  |
|                                   | 66076100          | MLD335-R2L  | Receiver    | With reflex element for laser alignment aid  |
|                                   | 66075100          | MLD335-R2LM | Receiver    | With reflex element for laser alignment aid and integrated status and muting indicator |
| 400 mm / 3                        | 66001200          | MLD300-T3   | Transmitter |  |
|                                   | 66073200          | MLD335-R3   | Receiver    |  |
|                                   | 66074200          | MLD335-R3M  | Receiver    | With integrated status and muting indicator  |
|                                   | 66002200          | MLD300-T3L  | Transmitter | With integrated laser alignment aid  |
|                                   | 66076200          | MLD335-R3L  | Receiver    | With reflex element for laser alignment aid  |
|                                   | 66075200          | MLD335-R3LM | Receiver    | With reflex element for laser alignment aid and integrated status and muting indicator |
| 300 mm / 4                        | 66001300          | MLD300-T4   | Transmitter |  |
|                                   | 66073300          | MLD335-R4   | Receiver    |  |
|                                   | 66074300          | MLD335-R4M  | Receiver    | With integrated status and muting indicator  |
|                                   | 66002300          | MLD300-T4L  | Transmitter | With integrated laser alignment aid  |
|                                   | 66076300          | MLD335-R4L  | Receiver    | With reflex element for laser alignment aid  |
|                                   | 66075300          | MLD335-R4LM | Receiver    | With reflex element for laser alignment aid and integrated status and muting indicator |

## MULTIPLE LIGHT BEAM SAFETY DEVICES

### Ordering information

**MLD 335**, consisting of transmitter and receiver or transceiver and Deflecting Mirror  
 Included in delivery: 4 sliding blocks, 1 set of connecting and operating instructions (PDF file on CD-ROM)

**Functions:** 2 OSSDs, start/restart interlock, contactor monitoring selectable, timing controlled 2-sensor muting, sequence controlled 2-sensor muting, timing controlled 4-sensor muting, muting-timeout extension, alternative connection for second muting signal, muting enable function, partial muting

| <b>MLD 335</b>                    |          |             |             |   |
|-----------------------------------|----------|-------------|-------------|---|
| <b>Range: 20 - 70 m</b>           |          |             |             |   |
| Beam distance/<br>number of beams | Part no. | Article     | Description | Option                                      |
| 500 mm / 2                        | 66001500 | MLD300-XT2  | Transmitter |   |
|                                   | 66073500 | MLD335-XR2  | Receiver    |   |
|                                   | 66002500 | MLD300-XT2L | Transmitter | With integrated laser alignment aid         |
|                                   | 66076500 | MLD335-XR2L | Receiver    | With reflex element for laser alignment aid |
| 400 mm / 3                        | 66001600 | MLD300-XT3  | Transmitter |   |
|                                   | 66073600 | MLD335-XR3  | Receiver    |   |
|                                   | 66002600 | MLD300-XT3L | Transmitter | With reflex element for laser alignment aid |
|                                   | 66076600 | MLD335-XR3L | Receiver    | With integrated laser alignment aid         |
| 300 mm / 4                        | 66001700 | MLD300-XT4  | Transmitter |   |
|                                   | 66073700 | MLD335-XR4  | Receiver    |   |
|                                   | 66002700 | MLD300-XT4L | Transmitter | With integrated laser alignment aid         |
|                                   | 66076700 | MLD335-XR4L | Receiver    | With reflex element for laser alignment aid |

| <b>MLD 335 transceiver systems</b> |          |             |                   |   |
|------------------------------------|----------|-------------|-------------------|---|
| <b>Range: 0.5 - 8 m</b>            |          |             |                   |   |
| Beam distance/<br>number of beams  | Part no. | Article     | Description       | Option                                      |
| 500 mm / 2                         | 66500100 | MLD-M002    | Deflecting Mirror |   |
|                                    | 66077100 | MLD335-RT2  | Transceiver       |   |
|                                    | 66078100 | MLD335-RT2M | Transceiver       | With integrated status and muting indicator |
| 400 mm / 3                         | 66500201 | MLD-XM03    | Deflecting Mirror |   |
|                                    | 66077200 | MLD335-RT3  | Transceiver       |   |
|                                    | 66078200 | MLD335-RT3M | Transceiver       | With integrated status and muting indicator |

| <b>MLD 335 transceiver systems</b> |          |             |                   |   |
|------------------------------------|----------|-------------|-------------------|---|
| <b>Range: 0.5 - 6 m</b>            |          |             |                   |   |
| Beam distance/<br>number of beams  | Part no. | Article     | Description       | Option                                      |
| 400 mm / 3                         | 66500200 | MLD-M003    | Deflecting Mirror |   |
|                                    | 66077200 | MLD335-RT3  | Transceiver       |   |
|                                    | 66078200 | MLD335-RT3M | Transceiver       | With integrated status and muting indicator |

**Article list for MLD 500, MLD 300**

| Article    | Description   |
|------------|---|
| <b>MLD</b> | <b>Multiple Light Beam Safety Device</b>                            |
| <b>X</b>   | <b>Series</b>   |
| 3          | MLD 300   |
| 5          | MLD 500   |
| <b>yy</b>  | <b>Function variant</b>   |
| 00         | Transmitter   |
| 10         | Automatic restart   |
| 12         | External testing  |
| 20         | Start/restart interlock selectable, contactor monitoring selectable |
| 30         | 2-sensor muting (timing controlled, sequence controlled)            |
| 35         | Timing controlled 4-sensor muting                                   |
| <b>z</b>   | <b>Device type</b>  |
| T          | Transmitter   |
| R          | Receiver  |
| RT         | Transceiver   |
| xT         | Transmitter for high range  |
| xR         | Receiver for high range   |
| <b>a</b>   | <b>Number of beams</b>  |
| 2          | 2-beam  |
| 3          | 3-beam  |
| 4          | 4-beam  |
| <b>b</b>   | <b>Option</b>   |
| L          | Integrated laser alignment aid                                      |
| M          | Integrated indicator  |

**Electrical connection**

Connection examples see page 203, and 204

[www.leuze.com/en/msl/](http://www.leuze.com/en/msl/)

## MULTIPLE LIGHT BEAM SAFETY DEVICES

### Technical data

| General system data  |   |        |        |
|--|---|--------|--------|
| Type in accordance with EN/IEC 61496                                       | 2   |        |        |
| SIL in accordance with IEC 61508 and SILCL in accordance with EN/IEC 62061 | 2   |        |        |
| Performance Level (PL) in accordance with EN ISO 13849-1                   | d   |        |        |
| Category in accordance with EN ISO 13849                                   | 3   |        |        |
| Number of beams  | 2   | 3      | 4      |
| Beam distance  | 500 mm  | 400 mm | 300 mm |
| Average probability of a failure to danger per hour (PFH <sub>d</sub> )    | 1.2 x 10 <sup>-8</sup>  |        |        |
| Mean time to dangerous failure (MTTF <sub>d</sub> )                        | 146 years   |        |        |
| Service life (T <sub>M</sub> ) in accordance with EN ISO 13849-1           | 20 years  |        |        |
| Range (transmitter-receiver systems, type-dependent)                       | MLDxyy-R /-T: 0.5...50 m<br>MLDxyy-xR /-xT: 20...70 m             |        |        |
| Range (transceiver systems)  | 0.5 - 8 m   |        |        |
| Response time  | 25 ms for MLD 310, MLD 312, MLD 320. 50 ms for MLD 330            |        |        |
| Supply voltage   | +24 V, ±20%   |        |        |
| Connection cable length  | 100 m   |        |        |
| Safety class   | III   |        |        |
| Protection rating  | IP 67   |        |        |
| Ambient temperature, operation   | -30...+55 °C  |        |        |
| Ambient temperature, storage   | -40...+75 °C  |        |        |
| Relative humidity  | 0...95%   |        |        |
| Profile cross-section  | 52 mm x 65 mm   |        |        |
| Weight   | Type-dependent  |        |        |
| Transmitter  |   |        |        |
| Transmitter diodes, class in accordance with EN 60825                      | 1   |        |        |
| Wavelength   | 850 nm  |        |        |
| Current consumption  | 50 mA   |        |        |
| Connection system  | M12 plug, 5-pin   |        |        |
| Receiver   |   |        |        |
| Current consumption  | 150 mA without external load, muting sensors and muting indicator |        |        |
| Safety-related switching outputs (OSSDs)                                   | 2 pnp transistor outputs  |        |        |
| Switching voltage high active  | Min. 18.2 V   |        |        |
| Switching voltage low  | Max. 2.5 V  |        |        |
| Switching current  | Typical, 300 mA   |        |        |
| Connection system  | M12 plug, 5-pin, 8-pin  |        |        |

## Technical data

| Transceiver                              |   |
|--|---|
| Current consumption                      | 150 mA without external load, muting sensors and muting indicator |
| Safety-related switching outputs (OSSDs) | 2 pnp transistor outputs  |
| Switching voltage high active            | Min. 18.2 V   |
| Switching voltage low                    | Max. 2.5 V  |
| Switching current                        | Typical, 300 mA   |
| Connection system                        | M12 plug, 5-pin   |

Additional information can be found in the MLD Connecting and Operating Instructions at [www.leuze.com/en/mld](http://www.leuze.com/en/mld).

## Dimensional drawings

Dimensional drawings, see page 207.

## Dimensional drawings: Accessories

Dimensional drawings of accessories, see page 210.

## Accessories ordering information

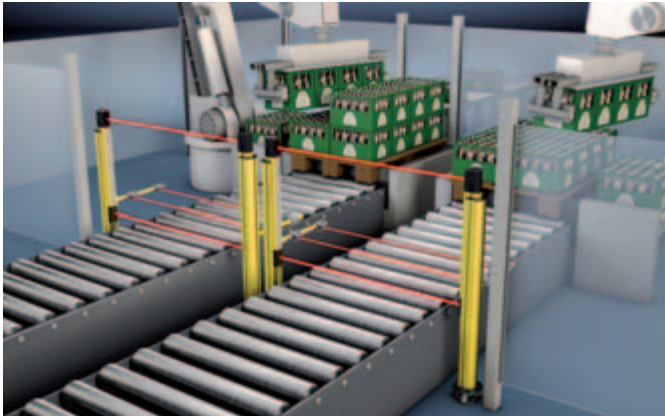
Accessories ordering information, see page 213.

[www.leuze.com/en/msl/](http://www.leuze.com/en/msl/)

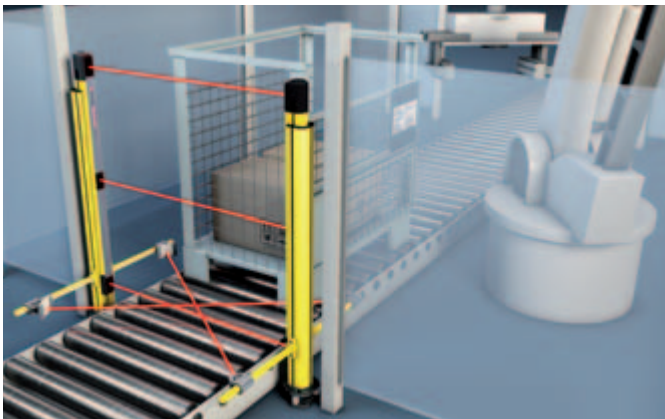


## LIGHT BEAM SAFETY DEVICE SETS

### Overview



*2-beam MLDSET with L-shape design (sequence controlled 2-sensor muting) for pallet exits from danger zones*



*MLDSET with T-shape design with 3-beam transceiver in a 1600 mm high Device Column in an application with timing controlled 2-sensor muting*

Access guarding with optical protective devices with muting function frequently consists of numerous components that must be electrically and mechanically harmonized with one another, to guarantee both safety and availability. While it can be difficult for the designer to select the right components during the planning phase, the amount of time required for commissioning at the installation site proves to be critical.

With the Light Beam Safety Device Sets, Leuze electronic provides well-thought-through solutions that incorporate these requirements. They include ready prepared components for the respective application cases.

With the MLDSET sets, muting applications can be implemented quicker, easier, and frequently more cost-effectively.

The MLD-UDC sets simplify the construction of single- and multiple-sided access guarding systems if the use of the MLDSET complete muting systems is not necessary. MLD 500 transceiver or transmitter-receiver systems with different numbers of beams and ranges which are pre-mounted in Device Columns facilitate the installation of the most diverse access guarding even in combination with deflecting mirror columns.

**Selection table**

*Preassembled Light Beam Safety Device Sets can be quickly and easily put into operation*



**Features**

| Safety system                       | Beam distance/<br>number of beams | Complete system with<br>Muting Sensor Set | Individual device in<br>Device Column | Series                     | Page       |
|-------------------------------------|-----------------------------------|---|---------------------------------------|----------------------------|------------|
|                                     |                                   |   |                                       | MLD 500 transceiver system | 500 mm / 2 |
| MLD-UDC                             | 242                               |   |                                       |                            |            |
| MLD 500 transmitter-receiver system | 400 mm / 3                        | ●   |                                       | MLDSET                     | 236        |
|                                     |                                   |   |                                       | MLD-UDC                    | 242        |
| MLD 500 transmitter-receiver system | 500 mm / 2                        |   | ●                                     | MLD-UDC                    | 242        |

In the table and on the following pages, you will find ready prepared Light Beam Safety Device Sets. Additional information on the modular system set is available on request!

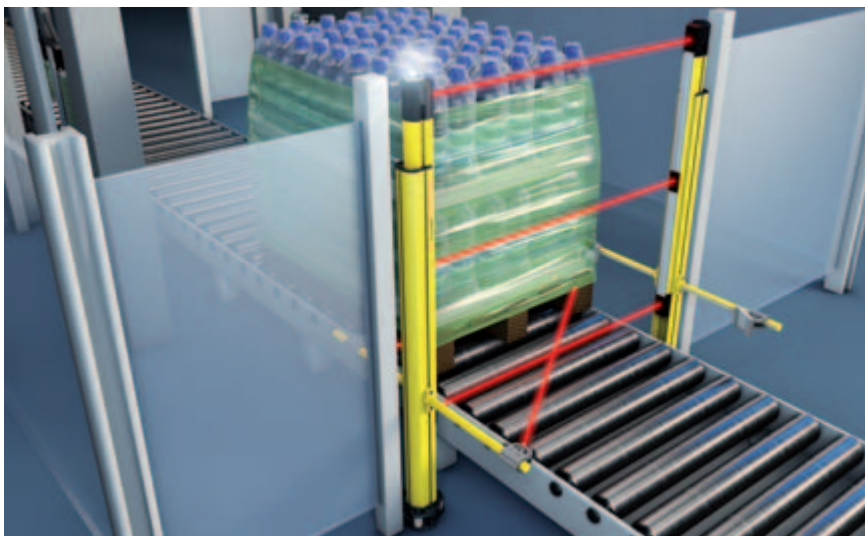
[www.leuze.com/en/light-beam-device-sets/](http://www.leuze.com/en/light-beam-device-sets/)

## LIGHT BEAM SAFETY DEVICE SETS

### MLDSET



*2-beam MLDSET with Device Column closed at the top in an application with timing controlled 2-sensor muting*



*Timing controlled 2-sensor muting on PET-bottle pallet wrapping machine*

MLDSET is a complete muting system for the access guarding of areas through which operational material must be transported. The various set variants differ in the number of beams of the safety sensors and in the height of the Device Column. Depending on the model, they enable timing controlled 2-sensor muting (T-shape design) as well as sequence controlled 2-sensor muting (L-shape design). In addition, systems for timing controlled 4-sensor-muting can also be created with the modular system sets.

In addition to the MLD 500 Multiple Light Beam Safety Device as optical protective device with integrated LED muting indicator, the sets include Device Columns in which the safety sensors are pre-mounted in such a way that they can be simply adjusted in height. The muting Light Beam Devices of the Leuze electronic 25B series are also pre-mounted and pre-aligned in the Muting Sensor Sets with 2 m connection cables. The connecting cable to the cabinet can be ordered separately in various lengths.

#### Typical areas of application

- Intralogistics
- Access guarding with muting in conveyor/storage systems
- Roller conveyor safeguarding, pallet transfer stations
- Palletizers, wrapping systems, robot cells, automatic processing centers

# MLDSET

## Important technical data, overview

|  |                                  |
|--|----------------------------------|
| Type in accordance with EN/IEC 61496                                       | 4                                |
| SIL in accordance with IEC 61508 and SILCL in accordance with EN/IEC 62061 | 3                                |
| Performance Level (PL) in accordance with EN ISO 13849-1                   | e                                |
| Category in accordance with EN ISO 13849                                   | 4                                |
| Average probability of a failure to danger per hour (PFH <sub>d</sub> )    | 6.6 x 10 <sup>-9</sup>           |
| Service life (T <sub>M</sub> ) in accordance with EN ISO 13849-1           | 20 years                         |
| Number of beams  | 2 or 3                           |
| Beam distance  | 500 mm (2-beam), 400 mm (3-beam) |
| Range  | 0.5...8 m                        |

### Functions

- Access guarding with muting function by means of Plug & Play
- Timing controlled 2-sensor-muting (T-shape design)
- Sequence controlled 2-sensor-muting (L-shape design)

### Special features

- Plug & Play complete solutions with plug-in connections
- Either 2- or 3-beam transceiver, each with integrated muting functions
- Complete muting set including Device Columns and accessories, customized and ready to use
- Optimally matched electrically and mechanically; pre-mounted and pre-aligned
- Device Column with complete mounting kit for exact floor alignment; automatic resetting after mechanical impacts thanks to special spring elements
- Efficient setup, quick start-up
- Innovative design for modern machine and system construction



### Features

| Further information                 | Page     |
|-------------------------------------|----------|
| ● Ordering information              | 236      |
| ● Electrical connection             | 204      |
| ● Technical data                    | 205      |
| ● Dimensional drawings              | 237      |
| ● Dimensional drawings: Accessories | 505, 499 |
| ● Accessories ordering information  | 213, 500 |

## LIGHT BEAM SAFETY DEVICE SETS

### Ordering information

#### MLDSET

consisting of muting transceiver, Deflecting Mirror, each pre-mounted in Device Column, muting sensor set and muting sensor connection box pre-mounted.

Included in delivery: mounting kit for floor operation, mounting instructions as well as set of connecting and operating instructions of the components, (PDF file on CD-ROM)

**Functions:** 2 OSSDs, start/restart interlock, contactor monitoring selectable, muting-timeout extension, alternative connection for second muting signal, muting enable function, depending on MLDSET timing controlled 2-sensor muting, sequence controlled 2-sensor muting, timing controlled 4-sensor muting

| Device Columns | Beam distance/number of beams: 500 mm / 2 |                  |                         |                                   |                                     |
|----------------|---|------------------|-------------------------|-----------------------------------|-------------------------------------|
|                | Range: 0.5 - 8 m                          |                  |                         |                                   |                                     |
|                | Part no.                                  | Article          | Devices in column       | Muting Sensor Set                 | Muting type                         |
| UDC-1300-S2    | 66900022                                  | MLDSET-M1-1300L  | MLD530-RT2M<br>MLD-M002 | SET-AC-MLX.2-2SA                  | Sequence controlled 2-sensor muting |
|                | 66900021                                  | MLDSET-M1-1300T  | MLD530-RT2M<br>MLD-M002 | SET-AC-MTX.2-2S                   | Timing controlled 2-sensor muting   |
| UDC-1600-S2    | 66900024                                  | MLDSET-M1-1600L  | MLD530-RT2M<br>MLD-M002 | SET-AC-MLX.2-2SA                  | Sequence controlled 2-sensor muting |
|                | 66900023                                  | MLDSET-M1-1600T  | MLD530-RT2M<br>MLD-M002 | SET-AC-MTX.2-2S                   | Timing controlled 2-sensor muting   |
|                | 66900012                                  | MLDSET-M1-1600T4 | MLD535-RT2M<br>MLD-M002 | Set-AC-MTX.2-4S<br>incl. AC-ABF10 | Timing controlled 4-sensor muting   |

| Device Columns | Beam distance/number of beams: 400 mm / 3 |                  |                         |                                   |                                     |
|----------------|---|------------------|-------------------------|-----------------------------------|-------------------------------------|
|                | Range: 0.5 - 6 m                          |                  |                         |                                   |                                     |
|                | Part no.                                  | Article          | Devices in column       | Muting Sensor Set                 | Muting type                         |
| UDC-1300-S2    | 66900026                                  | MLDSET-M2-1300L  | MLD530-RT3M<br>MLD-M003 | SET-AC-MLX.2-2SA                  | Sequence controlled 2-sensor muting |
|                | 66900025                                  | MLDSET-M2-1300T  | MLD530-RT3M<br>MLD-M003 | SET-AC-MTX.2-2S                   | Timing controlled 2-sensor muting   |
| UDC-1600-S2    | 66900028                                  | MLDSET-M2-1600L  | MLD530-RT3M<br>MLD-M003 | SET-AC-MLX.2-2SA                  | Sequence controlled 2-sensor muting |
|                | 66900027                                  | MLDSET-M2-1600T  | MLD530-RT3M<br>MLD-M003 | SET-AC-MTX.2-2S                   | Timing controlled 2-sensor muting   |
|                | 66900013                                  | MLDSET-M2-1600T4 | MLD535-RT3M<br>MLD-M003 | Set-AC-MTX.2-4S<br>incl. AC-ABF10 | Timing controlled 4-sensor muting   |

Connection cables (machine interface) are not included in delivery contents.  
Connection cables, see page 527

**MLDSET Light Beam Safety Device Sets**

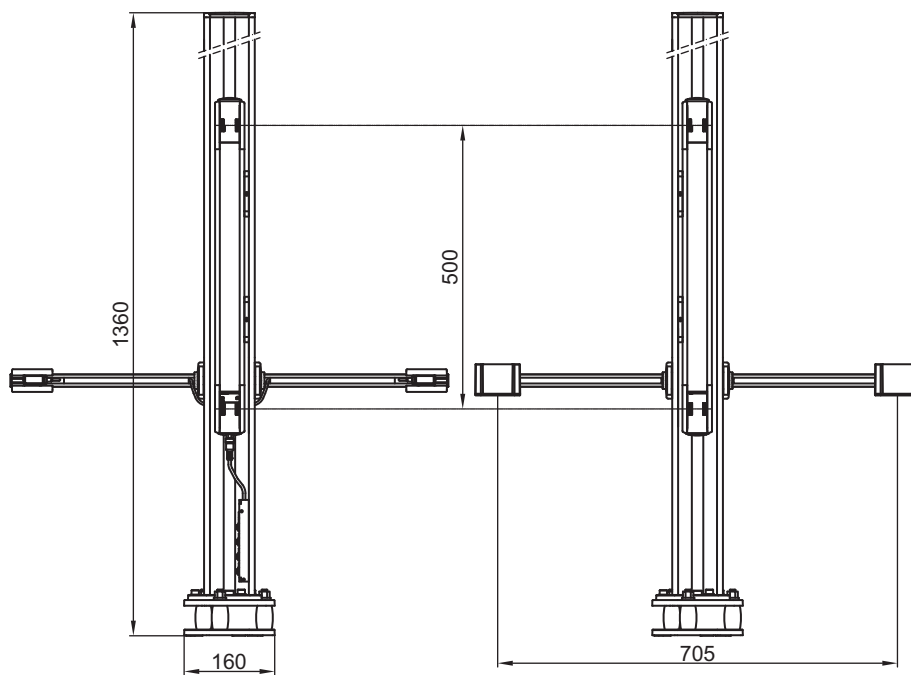
**Electrical connection**

Connection example, see page 204.

**Technical data**

Technical data, see page 205

**Dimensional drawings**



MLDSET-M1-1300T *dimensional drawing*

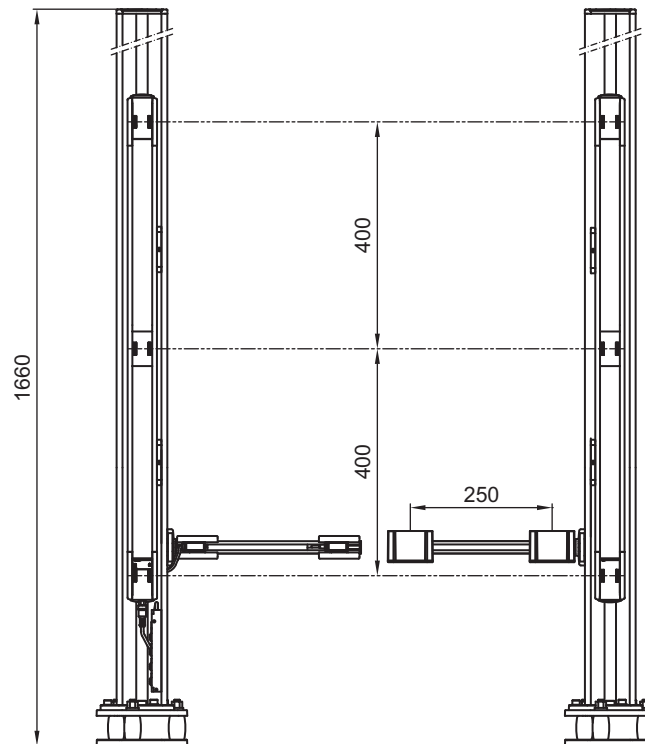
Dimensions in mm

[www.leuze.com/en/mldset/](http://www.leuze.com/en/mldset/)



## LIGHT BEAM SAFETY DEVICE SETS

### Dimensional drawings



MLDSET-M2-1600L *dimensional drawing*

Dimensions in mm

### Dimensional drawings: Accessories

UDC, DC Device Columns, see page 499

Set-AC Muting Sensor Set, see page 505

### Accessories ordering information

Protective screens, see page 520

Display and control units, see page 532

Connection cables, see page 527



# MLDSET

Machine Safety

Machine Safety  
Services

Safety Engineer-  
ing Software

Safety Laser  
Scanners

Safety Light  
Curtains

Multiple Light  
Beam Safety  
Devices

Light Beam  
Safety Device  
Sets

Single Light  
Beam Safety  
Devices

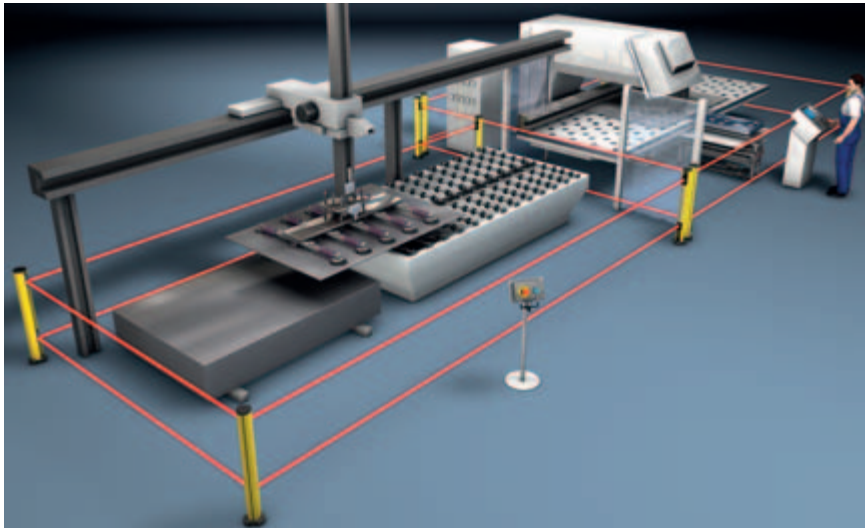
AS-Interface  
Safety at Work

Safety Proximity  
Sensors

[www.leuze.com/en/mldset/](http://www.leuze.com/en/mldset/)

## LIGHT BEAM SAFETY DEVICE SETS

### MLD-UDC



*Multiple side access guarding with Multiple Light Beam Safety Devices and beam deflection with Deflecting Mirror Columns*

The MLD-UDC sets are sub-systems for all types of access guarding. The different set varieties are available as transmitter-receiver systems and also as transceiver versions in different installation heights. In addition to the MLD 500 Multiple Light Beam Safety Device as optical protective device, the sets include Device Columns in which the safety sensors are pre-mounted in such a way that they can be simply adjusted in height.

The MLD-UDC Light Beam Safety Device Sets are supplemented by optimally matched accessories such as protective screens, deflecting mirror columns or the muting sensor sets.

#### Typical areas of application

- All types of access guarding
- Guarding with safety sensor in free-standing device column
- All-around guarding (with deflecting mirror columns)



*Easy setting up of an access guarding with integrated laser alignment aid*

**Important technical data, overview**

|  |  |
|--|--|
| Type in accordance with EN/IEC 61496                                       | 4  |
| SIL in accordance with IEC 61508 and SILCL in accordance with EN/IEC 62061 | 3  |
| Performance Level (PL) in accordance with EN ISO 13849-1                   | e  |
| Category in accordance with EN ISO 13849                                   | 4  |
| Average probability of a failure to danger per hour (PFH <sub>d</sub> )    | 6.6 x 10 <sup>-9</sup>   |
| Service life (T <sub>M</sub> ) in accordance with EN ISO 13849-1           | 20 years   |
| Number of beams  | 2  |
| Beam distance  | 500 mm   |
| Range  | 0.5...50 m (transmitter-receiver system) or 0.5...8 m (transmitter system) |

**Functions**

|   |
|---|
| Access guarding                           |
| Automatic start/restart                   |
| Start/restart interlock (RES), selectable |
| Contacting monitoring (EDM), selectable   |
| Integrated laser alignment aid            |

**Special features**

- **2-beam complete Plug & Play solutions, optionally as transceiver or transmitter-receiver system**
- **Set for access guarding, i.e. pre-mounted transmitter/receiver or transceiver/deflecting mirror in device column**
- **Optimally matched mechanically; pre-mounted and pre-aligned**
- **Device Column with complete mounting kit for exact floor alignment; automatic resetting after mechanical impacts thanks to special spring elements**
- **Innovative design for modern machine and system construction**



**Features**

| Further information                | Page |
|------------------------------------|------|
| ● Ordering information             | 242  |
| ● Dimensional drawings             | 243  |
| ● Accessories ordering information | 243  |

## LIGHT BEAM SAFETY DEVICE SETS

### Ordering information

#### MLD-UDC

consisting of transmitter and receiver or transceiver and deflecting mirror, each pre-mounted in Device Column.

Included in delivery: mounting kit for floor operation, mounting instructions as well as set of connecting and operating instructions of the components, (PDF file on CD-ROM)

**Functions:** 2 OSSDs, start/restart interlock selectable, automatic start/restart; contactor monitoring selectable; timing controlled or sequence controlled 2-sensor muting (MLD 530)

| Device Columns | Beam distance/number of beams: 400 mm / 3 |                        |                            |
|----------------|---|------------------------|----------------------------|
|                | Range: 0.5 - 6 m                          |                        |                            |
|                | Part no.                                  | Article                | Device in column           |
| UDC-1300-S2    | 426542                                    | MLD520-RT3-UDC-1300-S2 | MLD520-RT3 transceiver     |
|                | 905067                                    | MLD-M003-UDC-1300-S2   | MLD-M003 deflecting mirror |
| UDC-1600-S2    | 426536                                    | MLD520-RT3-UDC-1600-S2 | MLD520-RT3 transceiver     |
|                | 905068                                    | MLD-M003-UDC-1600-S2   | MLD-M003 deflecting mirror |

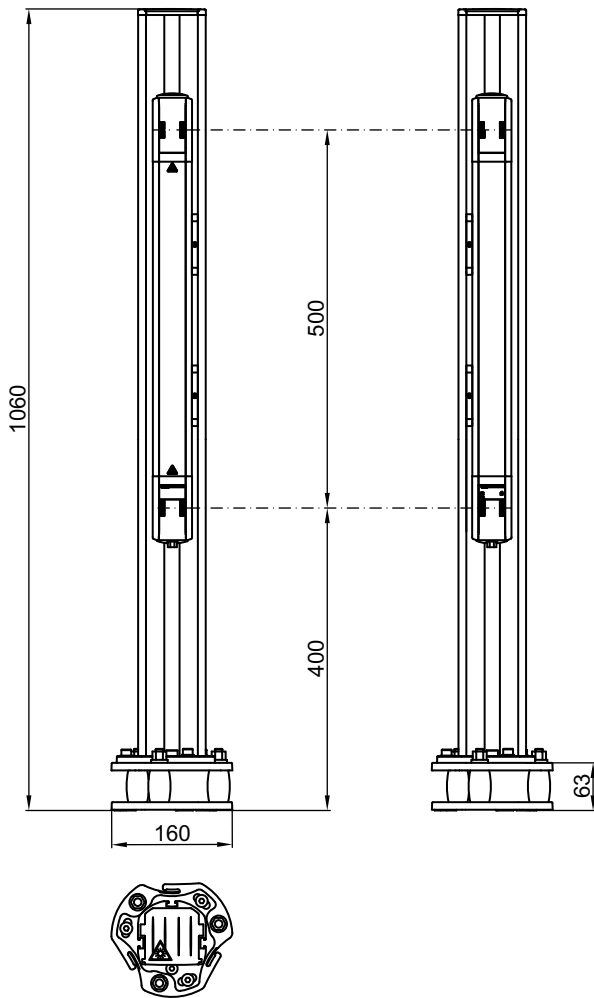
| Device Columns | Beam distance/number of beams: 500 mm / 2 |                         |                                     |
|----------------|---|-------------------------|-------------------------------------|
|                | Range: 0.5 - 8 m                          |                         |                                     |
|                | Part no.                                  | Article                 | Device in column                    |
| UDC-900-S2     | 426509                                    | MLD-M002-UDC-900-S2     | MLD-M002 deflecting mirror          |
|                | 426538                                    | MLD520-RT2-UDC-900-S2   | MLD520-RT2 transceiver              |
|                | 426540                                    | MLD530-RT2M-UDC-900-S2  | MLD530-RT2M transceiver with muting |
| UDC-1000-S2    | 426305                                    | MLD-M002-UDC-1000-S2    | MLD-M002 deflecting mirror          |
|                | 426304                                    | MLD520-RT2-UDC-1000-S2  | MLD520-RT2 transceiver              |
|                | 426535                                    | MLD530-RT2M-UDC-1000-S2 | MLD530-RT2M transceiver with muting |
| UDC-1300-S2    | 905065                                    | MLD-M002-UDC-1300-S2    | MLD-M002 deflecting mirror          |
|                | 426543                                    | MLD520-RT2-UDC-1300-S2  | MLD520-RT2 transceiver              |
| UDC-1600-S2    | 905066                                    | MLD-M002-UDC-1600-S2    | MLD-M002 deflecting mirror          |
|                | 426534                                    | MLD520-RT2-UDC-1600-S2  | MLD520-RT2 transceiver              |
| UDC-1900-S2    | 426314                                    | MLD-M002-UDC-1900-S2    | MLD-M002 deflecting mirror          |
|                | 426541                                    | MLD520-RT2-UDC-1900-S2  | MLD520-RT2 transceiver              |

| Device Columns | Beam distance/number of beams: 500 mm / 2 |                         |                                  |
|----------------|---|-------------------------|----------------------------------|
|                | Range: 0.5 - 50 m                         |                         |                                  |
|                | Part no.                                  | Article                 | Device in column                 |
| UDC-900-S2     | 426303                                    | MLD500-T2L-UDC-900-S2   | MLD500-T2L transmitter           |
|                | 426302                                    | MLD520-R2L-UDC-900-S2   | MLD520-R2L receiver              |
|                | 426539                                    | MLD530-R2LM-UDC-900-S2  | MLD530-R2LM receiver with muting |
| UDC-1000-S2    | 426306                                    | MLD500-T2L-UDC-1000-S2  | MLD500-T2L transmitter           |
|                | 426308                                    | MLD520-R2L-UDC-1000-S2  | MLD520-R2L receiver              |
|                | 426307                                    | MLD530-R2LM-UDC-1000-S2 | MLD530-R2LM receiver with muting |

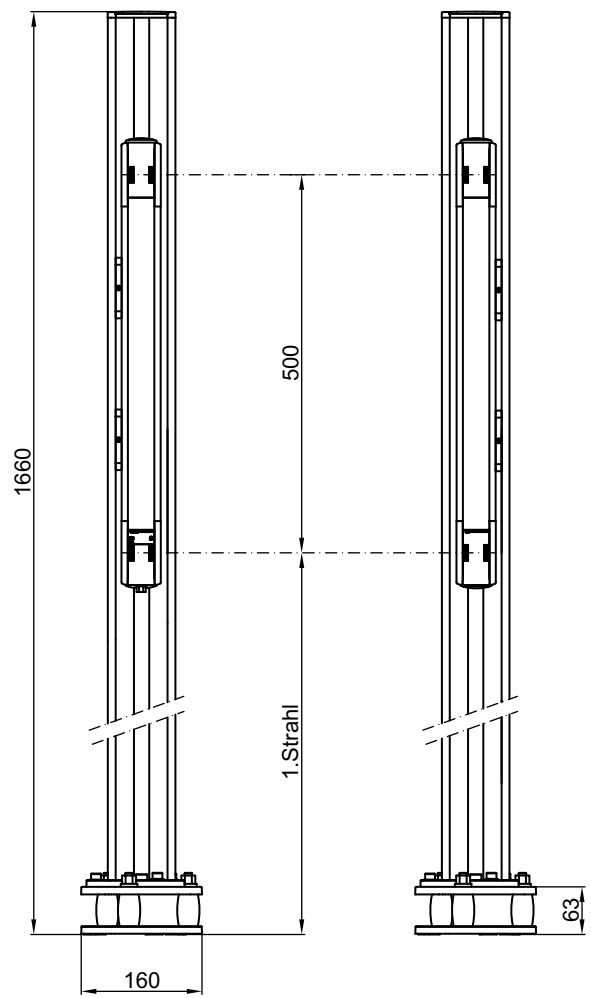
Connection cables (machine interface) are not included in delivery contents.  
Connection cables, see page 527

**Dimensional drawings**

**Dimensional drawings**



*Pre-mounted set MLD500-T2L-UDC1000-S2 (with transmitter MLD500-T2L in Device Column UDC1000-S2) and set MLD520-R2L-UDC1000-S2 (with receiver MLD520-R2L in Device Column UDC1000-S2)*



*Pre-mounted set MLD520-RT2-UDC1600-S2 (with transceiver MLD520-RT2 in Device Column UDC1600-S2) and set MLD-M002-UDC1600-S2 (with Device Column MLD-M002 in Device Column UDC1600-S2)*

Dimensions in mm

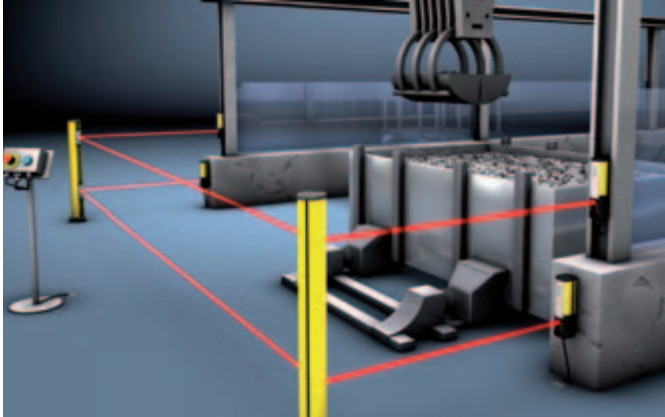
**Accessories ordering information**

Muting Sensor Sets, see accessories, page 502

[www.leuze.com/en/mldset/](http://www.leuze.com/en/mldset/)

# SINGLE LIGHT BEAM SAFETY DEVICES

## Overview



Access guarding of danger zones in conveyor/storage systems with the MLD 500 series.



Foot area guarding on mobile racking and shelving

Whether the application involves printing machines or packaging machines, whether it's in a conveyor/storage system or in other industries with safety-related automation, our Single Light Beam Safety Devices perform the most diverse detection, identification and protection tasks like lightning. The individual sensor series with their various housing construction forms and functionalities enable the designer to provide optimum integration into the existing machine concept.

### Features, type-dependent

| Type in accordance with EN/IEC 61496 | Range in m | Automatic start/restart | Start/restart interlock (RES) | Contact monitoring (EDM), selectable | 2-sensor muting (timing controlled, sequence controlled) | Integrated laser alignment aid (optional) * |
|--------------------------------------|------------|-------------------------|-------------------------------|--------------------------------------|--|---|
| 4                                    | 0.5 - 100  | ●                       |                               |                                      |  | ●   |
|                                      | 0.5 - 100  | ●                       | ●                             | ●                                    |  | ●   |
|                                      | 0.5 - 100  | ●                       | ●                             | ●                                    | ●  | ●   |
| 2                                    | 0.5 - 20   |                         |                               |                                      |  |   |
|                                      | 0 - 40     |                         |                               |                                      |  |   |
|                                      | 0 - 50     |                         |                               |                                      |  |   |
|                                      | 0 - 50     |                         |                               |                                      |  |   |
|                                      | 0 - 10     |                         |                               |                                      |  |   |

MLD 500  
p. 246

SLSR 25B  
p. 260

SLSR 46B  
p. 266

SLS 96  
p. 272

SLS 318  
p. 278



OVERVIEW

Selection table



Due to their dimensions, Single Light Beam Safety Devices are able to make full use of their advantages in certain installation situations

Features, type-dependent

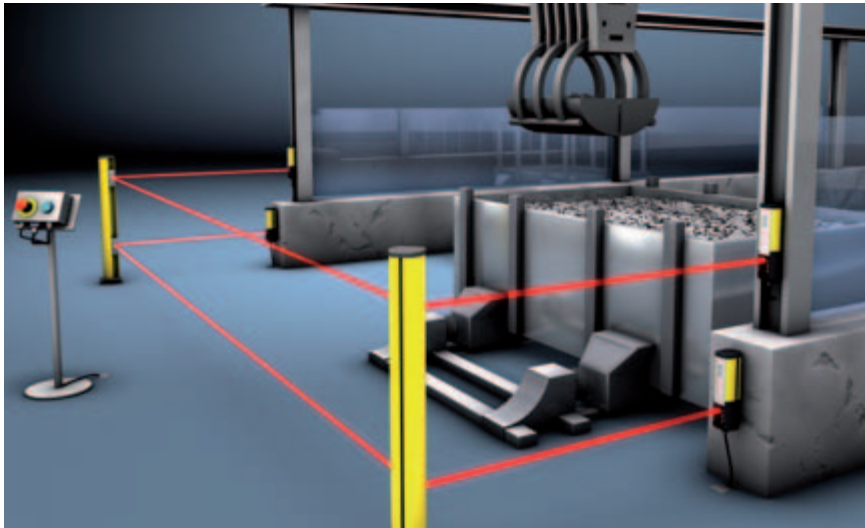
| Minimum object diameter in mm | Ambient light suppression | Variants for multi-axis operation | Light source: infrared light | Light source: red light | Light-on | Antivalent | pnp transistor output | Safety Relay Outputs (2 NO) | Round pin plug | Cable gland | Connection cable | Min. temp. - 25°C, integrated optics heating | Plastic housing | Metal housing | Stainless steel housing | Series     | Page |
|-------------------------------|---------------------------|-----------------------------------|------------------------------|-------------------------|----------|------------|-----------------------|-----------------------------|----------------|-------------|------------------|--|-----------------|---------------|-------------------------|------------|------|
|                               |                           |                                   | ●                            |                         | ●        |            | ●                     |                             | M12            |             |                  |  |                 | ●             |                         | MLD 510    | 248  |
|                               |                           |                                   | ●                            |                         | ●        |            | ●                     |                             | M12            |             |                  |  |                 | ●             |                         | MLD 520    | 249  |
|                               |                           |                                   | ●                            |                         | ●        |            | ●                     |                             | M12            |             |                  |  |                 | ●             |                         | MLD 530    | 250  |
| 14                            | ●                         |                                   |                              | ●                       |          | ●          | **                    |                             | M12            |             | ●                |  | ●               |               |                         | SLSR 25B   | 262  |
| 22                            | ●                         |                                   |                              | ●                       |          | ●          | **                    |                             | M12            |             | ●                |  | ●               |               |                         | SLSR 46B   | 268  |
| 28                            |                           |                                   | ●                            | ●                       | ●        |            | ●                     |                             | M12            | ●           |                  | ●  |                 | ●             |                         | SLS 96 M/P | 274  |
| 28                            |                           | ●                                 | ●                            | ●                       | ●        |            | ●                     |                             | M12            | ●           |                  |  | ●               |               |                         | SLS 96 K/P | 274  |
| 13                            |                           |                                   |                              | ●                       |          | ●          | ●                     |                             | M12            |             | ●                |  | ●               |               |                         | SLS 318    | 280  |

\*) up to 70 m  
\*\*) push-pull



## SINGLE LIGHT BEAM SAFETY DEVICES

### MLD 500



*Easy setting up of an access guarding with integrated laser alignment aid*

#### Typical areas of application

- Packaging machinery, palletizers, wrapping machinery, plastic and rubber machinery, concrete and stoneware machinery, ...
- Rear zone guarding on pressure forming presses

If there are no plane attachment areas on the machine that are suitable for the mounting of Multiple Light Beam Safety Devices or when variable beam distances are required, it is not possible to use Multiple Light Beam Devices in the standard profile. In these cases, the single light beam device versions of the MLD series may be used. Even in the case of edges in the attachment geometries, these devices do not give rise to unmonitored undercuts.

Like the multiple light beam MLD versions, the MLD Single Light Beam Safety Devices feature individual function classes. A start/restart interlock and contactor monitoring can thereby be selected and, if necessary, various muting modes realized.

The series is predestined for wide-area perimeter guarding implemented with Deflecting Mirrors. Ranges of up to 100 m and operating temperatures down to -30°C are possible.

Even for the MLD Single Light Beam Safety Devices, the optional integrated laser alignment aid can contribute significantly to a much simplified alignment in case of long ranges.

**Important technical data, overview**

|  |  |
|--|--|
| Type in accordance with EN/IEC 61496                                       | 4  |
| SIL in accordance with IEC 61508 and SILCL in accordance with EN/IEC 62061 | 3  |
| Performance Level (PL) in accordance with EN ISO 13849-1                   | e  |
| Category in accordance with EN ISO 13849                                   | 4  |
| Number of beams  | 1  |
| Range (type-dependent)   | MLD5yy-R /-T: 0.5...70 m<br>MLD5yy-xR /-xT: 20...100 m |
| Profile cross-section  | 52 mm x 65 mm  |
| Safety-related switching outputs   | 2 pnp transistor outputs, AS-i Safety Interface        |
| Connection system  | M12 plug   |

**Functions**

|  | MLD 510 | MLD 520 | MLD 530 |
|--|---------|---------|---------|
| Automatic start/restart                                  | ●       | ●       |         |
| Start/restart interlock (RES)                            |         | ●*      | ●       |
| Contactormonitoring (EDM), selectable                    |         | ●*      | ●*      |
| 2-sensor muting (timing controlled, sequence controlled) |         |         | ●       |
| Configurable operating modes                             |         | ●       | ●       |
| Laser alignment aid (optional)                           | ●       | ●       |         |

\*) selectable

**Special features**

- **The configuration is simply performed by means of wiring, i. e. no software, PC or DIP switch are necessary**
- **The use at ambient temperatures as low as -30°C is possible**
- **Options: integrated laser alignment aid, integrated muting indicator, 7-segment display**
- **Integrated muting function, no additional muting module is necessary**



**Features**



**Further information**

**Page**

|                                     |     |
|-------------------------------------|-----|
| ● Ordering information              | 248 |
| ● Electrical connection             | 203 |
| ● Technical data                    | 253 |
| ● Dimensional drawings              | 254 |
| ● Dimensional drawings: Accessories | 256 |
| ● Accessories ordering information  | 258 |

## SINGLE LIGHT BEAM SAFETY DEVICES

### Ordering information

**MLD 510**, consisting of transmitter and receiver  
 Included in delivery: 4 sliding blocks, 1 set of connecting and  
 operating instructions

**Functions:** Automatic restart, 2 OSSDs

#### MLD 510 transmitter-receiver systems

**Range: 0.5 - 70 m**

| Part no. | Article    | Description | Option                                      |
|----------|------------|-------------|---|
| 66501000 | MLD500-T1  | Transmitter |   |
| 66533000 | MLD510-R1  | Receiver    |   |
| 66502000 | MLD500-T1L | Transmitter | With integrated laser alignment aid         |
| 66536000 | MLD510-R1L | Receiver    | With reflex element for laser alignment aid |

#### MLD 510 transmitter-receiver systems

**Range: 20 - 100 m**

| Part no. | Article    | Description | Option |
|----------|------------|-------------|--------|
| 66501400 | MLD500-XT1 | Transmitter |        |
| 66533400 | MLD510-XR1 | Receiver    |        |

## Ordering information

**MLD 520**, consisting of transmitter and receiver  
Included in delivery: 4 sliding blocks, 1 set of connecting and operating instructions

**Functions:** 2 OSSDs, start/restart interlock selectable, contactor monitoring selectable

### MLD 520 transmitter-receiver systems

Range: 0.5 - 70 m

| Part no. | Article    | Description | Option                                      |
|----------|------------|-------------|---|
| 66501000 | MLD500-T1  | Transmitter |   |
| 66553000 | MLD520-R1  | Receiver    |   |
| 66502000 | MLD500-T1L | Transmitter | With integrated laser alignment aid         |
| 66556000 | MLD520-R1L | Receiver    | With reflex element for laser alignment aid |

### MLD 520 transmitter-receiver systems

Range: 20 - 100 m

| Part no. | Article    | Description | Option |
|----------|------------|-------------|--------|
| 66501400 | MLD500-XT1 | Transmitter |        |
| 66553400 | MLD520-XR1 | Receiver    |        |

[www.leuze.com/en/mld/](http://www.leuze.com/en/mld/)

## SINGLE LIGHT BEAM SAFETY DEVICES

### Ordering information

**MLD 530**, consisting of transmitter and receiver  
Included in delivery: 4 sliding blocks, 1 set of connecting and operating instructions

**Functions:** 2 OSSDs, start/restart interlock selectable, contactor monitoring selectable, timing controlled 2-sensor muting, sequence controlled 2-sensor muting, muting-timeout extension, alternative connection for second muting signal, muting enable function

#### MLD 530 transmitter-receiver systems

Range: 0.5 - 70 m

| Part no. | Article    | Description | Option                                      |
|----------|------------|-------------|---|
| 66501000 | MLD500-T1  | Transmitter |   |
| 66563000 | MLD530-R1  | Receiver    |   |
| 66502000 | MLD500-T1L | Transmitter | With integrated laser alignment aid         |
| 66566000 | MLD530-R1L | Receiver    | With reflex element for laser alignment aid |

#### MLD 530 transmitter-receiver systems

Range: 20 - 100 m

| Part no. | Article    | Description | Option |
|----------|------------|-------------|--------|
| 66501400 | MLD500-XT1 | Transmitter |        |
| 66563400 | MLD530-XR1 | Receiver    |        |

## Ordering information

**MLD 510/AS-i**, consisting of transmitter and receiver  
Included in delivery: 4 sliding blocks, 1 set of connecting and operating instructions

**Functions (in combination with ASM Safety Monitor):**  
start/restart interlock selectable, contactor monitoring selectable, timing controlled 2-sensor muting, sequence controlled 2-sensor muting, muting-timeout extension

### MLD 510/AS-i

**Range: 0.5 - 70 m**

| Part no. | Article       | Description | Option  |
|----------|---------------|-------------|---|
| 66501001 | MLD500-T1/A   | Transmitter |   |
| 66533001 | MLD510-R1/A   | Receiver    |   |
| 66502001 | MLD500-T1L/A  | Transmitter | With integrated laser alignment aid   |
| 66536001 | MLD510-R1L/A  | Receiver    | With reflex element for laser alignment aid   |
| 66533002 | MLD510-R1E/A  | Receiver    | With connection socket for external muting indicator  |
| 66536002 | MLD510-R1LE/A | Receiver    | With reflex element for laser alignment aid and connection socket for external muting indicator |

### MLD 510/AS-i

**Range: 20 - 100 m**

| Part no. | Article       | Description | Option   |
|----------|---------------|-------------|--|
| 66501401 | MLD500-XT1/A  | Transmitter |  |
| 66533401 | MLD510-XR1/A  | Receiver    |  |
| 66533402 | MLD510-XR1E/A | Receiver    | With connection socket for external muting indicator |

## SINGLE LIGHT BEAM SAFETY DEVICES

### Article list for MLD 500

| Article        | Description  |
|----------------|--|
| <b>MLD 500</b> | <b>Single Light Beam Safety Device</b>                               |
| <b>yy</b>      | <b>Function variant</b>  |
| 00             | Transmitter  |
| 10             | Automatic restart  |
| 20             | Start/restart interlock selectable, contactor monitoring selectable  |
| 30             | Muting   |
| <b>z</b>       | <b>Device type</b>   |
| T              | Transmitter  |
| R              | Receiver   |
| xT             | Transmitter for high range   |
| xR             | Receiver for high range  |
| <b>b</b>       | <b>Option</b>  |
| L              | Integrated laser alignment aid                                       |
| M              | Integrated indicator   |
| E              | Connection socket for external muting indicator (only AS-i variants) |
| <b>t</b>       | <b>Safety-related switching outputs (OSSD), connection system</b>    |
| -              | Transistor output, M12 plug  |
| A              | Integrated AS-Interface, M12 connector, (safety bus systems)         |

**MLD** **yy** **z** **b** **/t**

### Electrical connection

Connection example, see page 203.

**MLD 500**  
p. 246

SLSR 25B  
p. 260

SLSR 46B  
p. 266

SLS 96  
p. 272

SLS 318  
p. 278



**Technical data**

| <b>General system data</b>   |   |
|--|---|
| Type in accordance with EN/IEC 61496                                       | 4   |
| SIL in accordance with IEC 61508 and SILCL in accordance with EN/IEC 62061 | 3   |
| Performance Level (PL) in accordance with EN ISO 13849-1                   | e   |
| Category in accordance with EN ISO 13849                                   | 4   |
| Number of beams  | 1   |
| Average probability of a failure to danger per hour (PFH <sub>d</sub> )    | 6.6 x 10 <sup>-9</sup>  |
| Mean time to dangerous failure (MTTF <sub>d</sub> )                        | 146 years   |
| Service life (T <sub>M</sub> ) in accordance with EN ISO 13849-1           | 20 years  |
| Range (type-dependent)   | MLD5yy-R /-T: 0.5...70 m<br>MLD5yy-xR /-xT: 20...100 m            |
| Response time  | 25 ms, 50 ms for MLD 530, MLD 330                                 |
| Supply voltage   | +24 V, ±20%   |
| Connection cable length  | 100 m   |
| Safety class   | III   |
| Protection rating  | IP 67   |
| Ambient temperature, operation   | -30...+55 °C  |
| Ambient temperature, storage   | -40...+75 °C  |
| Relative humidity  | 0...95%   |
| Profile cross-section  | 52 mm x 65 mm   |
| Weight   | 1.4 kg  |
| <b>Transmitter</b>   |   |
| Transmitter diodes, class in accordance with EN 60825                      | 1   |
| Wavelength   | 850 nm  |
| Current consumption  | 50 mA   |
| Connection system  | M12 plug, 5-pin   |
| <b>Receiver</b>  |   |
| Current consumption  | 150 mA without external load, muting sensors and muting indicator |
| Safety-related switching outputs   | 2 pnp transistor outputs, AS-i Safety Interface                   |
| Switching voltage high active  | Min. 18.2 V   |
| Switching voltage low  | Max. 2.5 V  |
| Switching current  | Typical, 300 mA   |
| Connection system  | M12 plug, 5-pin, 8-pin  |

[www.leuze.com/en/mld/](http://www.leuze.com/en/mld/)

Machine Safety

Machine Safety Services

Safety Engineering Software

Safety Laser Scanners

Safety Light Curtains

Multiple Light Beam Safety Devices

Light Beam Safety Device Sets

Single Light Beam Safety Devices

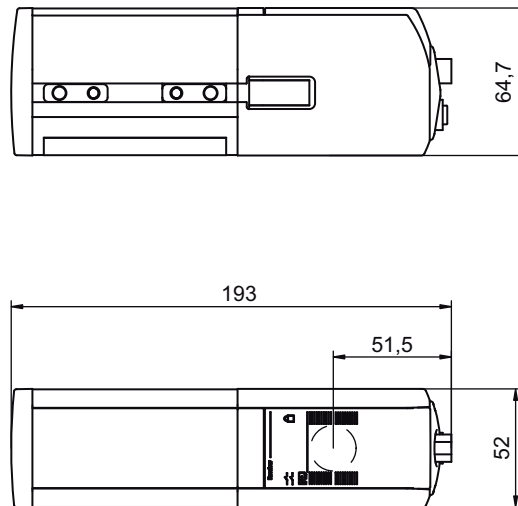
AS-Interface Safety at Work

Safety Proximity Sensors

## SINGLE LIGHT BEAM SAFETY DEVICES

### Dimensional drawings

#### MLD 500 Single Light Beam Safety Device, transmitter, receiver



Dimensions in mm

**MLD 500**  
p. 246

SLSR 25B  
p. 260

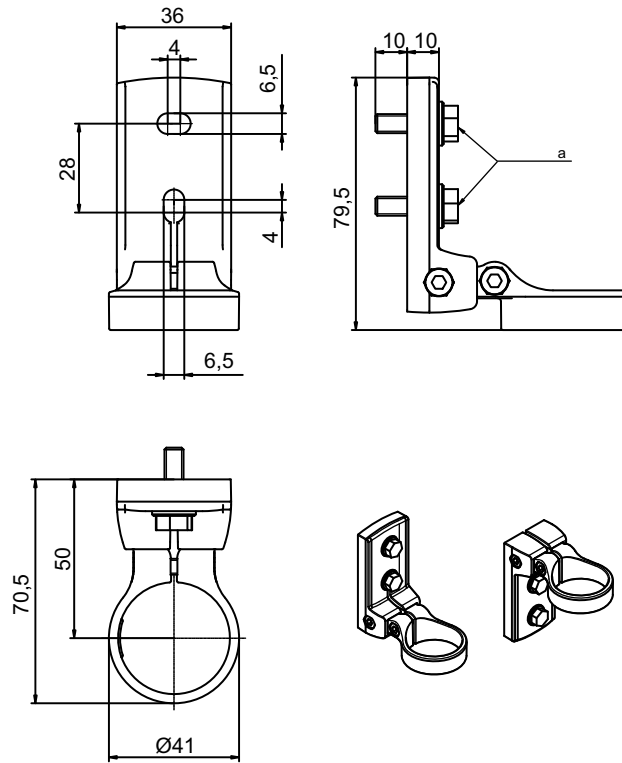
SLSR 46B  
p. 266

SLS 96  
p. 272

SLS 318  
p. 278

**Dimensional drawings: Accessories**

**Mounting brackets**



a = screw M6

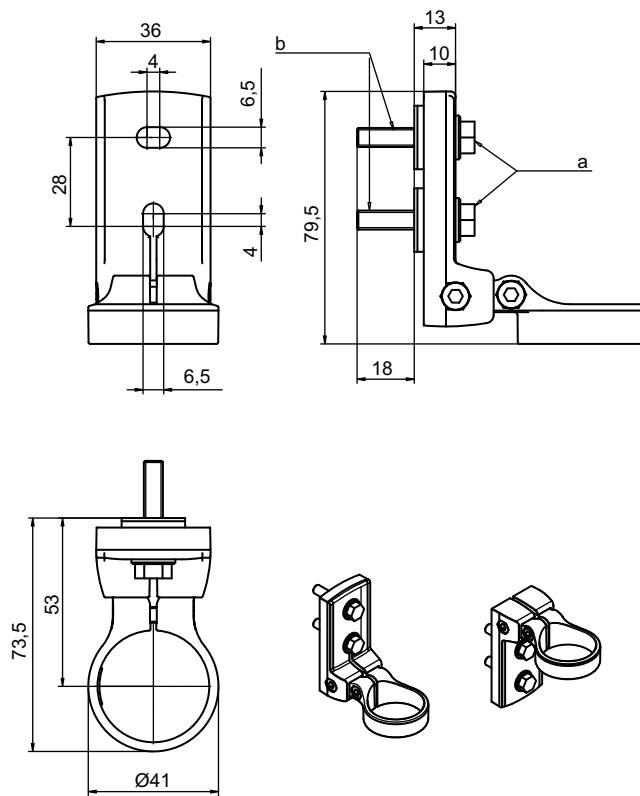
*BT-SET-240CS mounting bracket set, consisting of BT-240C swivel mount, screws, shock absorber*

Dimensions in mm

# SINGLE LIGHT BEAM SAFETY DEVICES

## Dimensional drawings: Accessories

### Mounting brackets



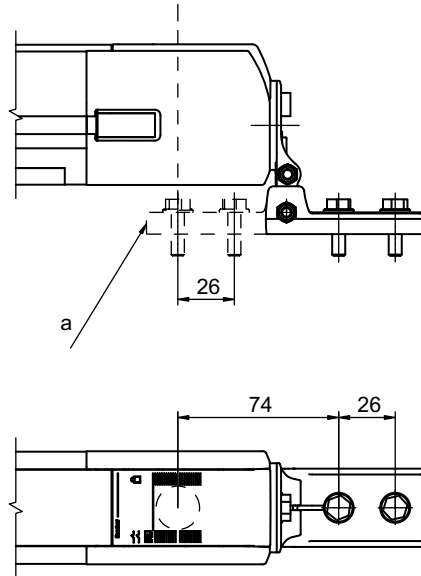
a = screw M6  
 b = shock absorber, thread M6

*BT-SET-240CS mounting bracket set, consisting of BT-240C swivel mount, screws, shock absorber*

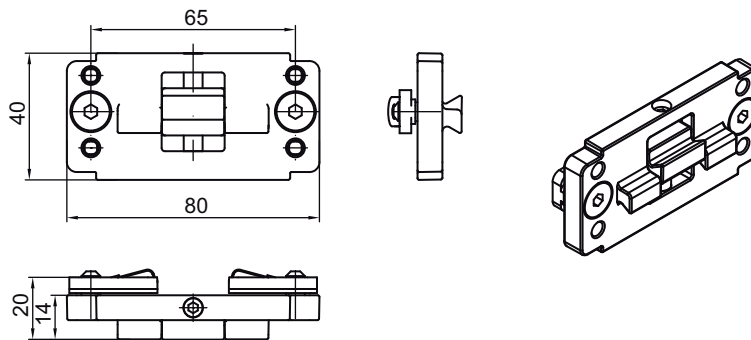
Dimensions in mm

Dimensional drawings: Accessories

Mounting brackets



a = alternative fixing version  
BT-240C swivel mount mounting dimensions



BT-P40 clamp bracket

Dimensions in mm

## SINGLE LIGHT BEAM SAFETY DEVICES

### Accessories ordering information

| Part no.   | Article           | Description  | Length, design           |
|--|-------------------|--|--------------------------|
| <b>Connection cables for MLD 510 (machine interface) and MLD 500 transmitter</b> |                   |  |                          |
| 678055   | CB-M12-5000E-5GF  | Connection cable shielded with M12 coupling, 5-pin | 5 m, straight/open end   |
| 678056   | CB-M12-10000E-5GF | Connection cable shielded with M12 coupling, 5-pin | 10 m, straight/open end  |
| 678057   | CB-M12-15000E-5GF | Connection cable shielded with M12 coupling, 5-pin | 15 m, straight/open end  |
| 678058   | CB-M12-25000E-5GF | Connection cable shielded with M12 coupling, 5-pin | 25 m, straight/open end  |
| 678059   | CB-M12-50000E-5GF | Connection cable shielded with M12 coupling, 5-pin | 50 m, straight, open end |
| <b>Connection cables for MLD 520, MLD 530 (machine interface)</b>                |                   |  |                          |
| 678060   | CB-M12-5000E-8GF  | Connection cable shielded with M12 coupling, 8-pin | 5 m, straight/open end   |
| 678061   | CB-M12-10000E-8GF | Connection cable shielded with M12 coupling, 8-pin | 10 m, straight/open end  |
| 678062   | CB-M12-15000E-8GF | Connection cable shielded with M12 coupling, 8-pin | 15 m, straight/open end  |
| 678063   | CB-M12-25000E-8GF | Connection cable shielded with M12 coupling, 8-pin | 25 m, straight/open end  |
| 678064   | CB-M12-50000E-8GF | Connection cable shielded with M12 coupling, 8-pin | 50 m, straight, open end |
| <b>Connection cables for MLD 530 (local interface)</b>                           |                   |  |                          |
| 678050   | CB-M12-5000E-5GM  | Connection cable shielded with M12 plug, 5-pin     | 5 m, straight/open end   |
| 678051   | CB-M12-10000E-5GM | Connection cable shielded with M12 plug, 5-pin     | 10 m, straight/open end  |
| 678052   | CB-M12-15000E-5GM | Connection cable shielded with M12 plug, 5-pin     | 15 m, straight/open end  |
| 678053   | CB-M12-25000E-5GM | Connection cable shielded with M12 plug, 5-pin     | 25 m, straight/open end  |

**Accessories ordering information**

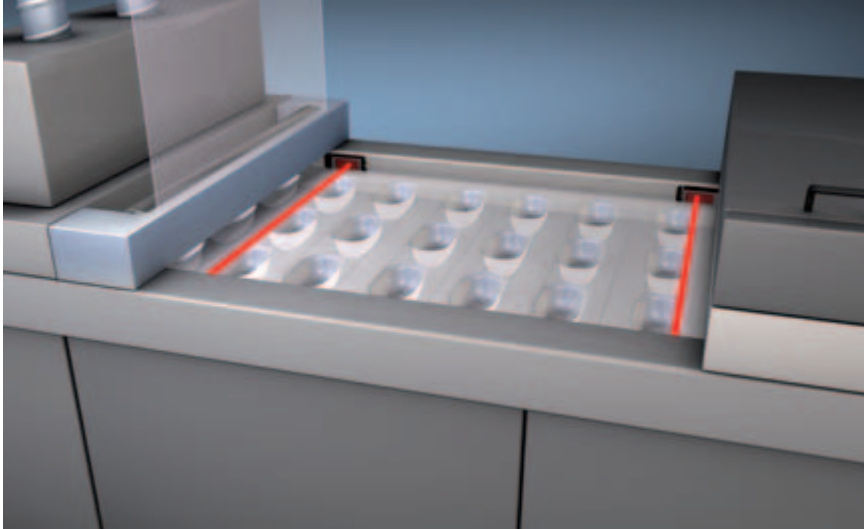
| Part no.   | Article      | Description   | Length, design |
|--|--------------|---|----------------|
| <b>Mounting brackets and mounting bracket sets</b> |              |   |                |
| 424416   | BT-P40       | Clamp bracket   |                |
| 560341   | BT-SET-240CC | Consisting of 2 x BT-240C swivel mounts, screws (for MLD-M002 or MLD-M003 deflecting mirror)  |                |
| 560344   | BT-SET-240C  | Consisting of BT-240C swivel mount, screws  |                |
| 560345   | BT-SET-240CS | Consisting of BT-240C swivel mount, screws, shock absorber  |                |
| <b>Muting Accessories</b>                          |              |   |                |
| 520062   | AC-SCM5      | Local connection box with M12-connection for connecting to local interface (4 connections for 2 muting sensors, muting indicator, reset button) |                |
| 520063   | AC-SCM5-BT   | Local connection box with mounting plate (with 2 M4x22 cheese head screws and 2 sliding blocks)   |                |
| <b>Accessories for laser alignment aid</b>         |              |   |                |
| 520071   | AC-MK1       | MagnetKey for activation of the laser alignment aid   |                |

[www.leuze.com/en/mld/](http://www.leuze.com/en/mld/)



## SINGLE LIGHT BEAM SAFETY DEVICES

### SLSR 25B



*SLSR 25B Single Light Beam Safety Devices are used when connecting, welding and separating, on plastic wrap packaging machines, for example*

The SLSR 25B Light Beam Safety Device enable ranges up to 20 m. It excels in particular because of its small dimensions for this performance class.

The visible red light makes aligning so much easier. The SAT-5 alignment aid also provides an innovative alignment tool, especially for big ranges. It uses the sensor beam for aligning. Together with a safety monitoring device, such as the MSI-T or a configurable MSI Safety Relay, the SLSR 25B forms a type 2 electro-sensitive protective equipment.

#### Typical areas of application

- Point of operation guarding on palletizer systems, wood processing and packaging machinery

**Important technical data, overview**

|  |   |
|--|---|
| Type in accordance with EN/IEC 61496     | 2 (in combination with a safety interface device or a safety monitoring device)                       |
| Category in accordance with EN ISO 13849 | 2   |
| Operating range                          | 0.5...20 m  |
| Operating voltage, U <sub>B</sub>        | 10...30 V DC (incl. residual ripple)  |
| Dimensions (WxHxD)                       | 15.0 x 51.3 x 28.8 mm   |
| Housing                                  | Plastic   |
| Switching output                         | 2 push-pull switching outputs<br>Pin 2: pnp dark-on, npn light-on<br>Pin 4: pnp light-on, npn dark-on |
| Connection system                        | Cable, 2 m,<br>M8 round pin plug, M12 round pin plug  |

**Functions**

- LED display
- Activation input for test and series connection
- Active ambient light suppression (A<sup>2</sup>LS)

**Function extension**

**SLSR 25B**

| With safety interface device | Relay output | RES | EDM | Muting | Further details |
|------------------------------|--------------|-----|-----|--------|-----------------|
| MSI-T                        | ●            | ●   | ●   |        | p. 476          |
| MSI 100,<br>MSI 200          |              | ●   | ●   | ●      | p. 481          |

**Special features**

- **Single Light Beam Safety Device with visible red light and high performance reserve**
- **Solid plastic housing with IP 67 protection rating for industrial use**
- **Wide voltage range from 10 to 30 V with pnp transistor output for PLC applications**
- **All common connection variants**



**Features**



**Further information**

|                                    | Page |
|------------------------------------|------|
| ● Ordering information             | 262  |
| ● Electrical connection            | 268  |
| ● Technical data                   | 262  |
| ● Dimensional drawings             | 264  |
| ● Accessories ordering information | 265  |

## SINGLE LIGHT BEAM SAFETY DEVICES

### Ordering information

**SLSR 25B**, consisting of transmitter and receiver

**Functions:** Activation input for testing and series connection

| Part no. | Article              | Description                     | Connection system         |
|----------|----------------------|---------------------------------|---------------------------|
| 50108489 | SLSSR 25B.8-S12      | Transmitter, plastic, red light | M12 round pin plug, 4-pin |
| 50108492 | SLSER 25B/66-S12     | Receiver, plastic, red light    | M12 round pin plug, 4-pin |
| 50108490 | SLSSR 25B.8-S8       | Transmitter, plastic, red light | M8 round pin plug, 4-pin  |
| 50108493 | SLSER 25B/66-S8      | Receiver, plastic, red light    | M8 round pin plug, 4-pin  |
| 50108491 | SLSSR 25B.8          | Transmitter, plastic, red light | Cable, 2 m                |
| 50108494 | SLSER 25B/66         | Receiver, plastic, red light    | Cable, 2 m                |
| 50110151 | SLSSR 25B.8.200-S12  | Transmitter, plastic, red light | Cable, M12 round pin plug |
| 50110152 | SLSER 25B/66.200-S12 | Receiver, plastic, red light    | Cable, M12 round pin plug |

### Electrical connection

See SLSR 46B connection example, page 268

### Technical data

#### General system data

|   |   |
|---|---|
| Type in accordance with EN/IEC 61496  | 2 (in combination with a configurable MSI Safety Relay or a safety monitoring device) |
| Service life ( $T_M$ ) in accordance with EN ISO 13849-1                      | 20 years  |
| Category in accordance with EN ISO 13849                                      | 2   |
| Mean time to dangerous failure ( $MTTF_d$ ) in accordance with EN ISO 13849-1 | 425 years   |
| Operating range   | 0.5...20 m  |
| Response time   | 5 ms  |
| Test reaction time  | 9 ms  |
| Operating voltage, $U_B$  | 10...30 V DC (incl. residual ripple)  |
| Safety class  | II  |
| Protection rating   | IP 67, IP 69K   |
| Ambient temperature, operation  | -30...+55 °C  |
| Ambient temperature, storage  | -30...+60 °C  |
| Dimensions (WxHxD)  | 15.0 x 51.3 x 28.8 mm   |
| Housing   | Plastic   |
| Weight (transmitter with receiver)  | 30 g (plug variant), 60 g (cable variant)   |

MLD 500  
p. 246

**SLSR 25B**  
p. 260

SLSR 46B  
p. 266

SLS 96  
p. 272

SLS 318  
p. 278

**Technical data**

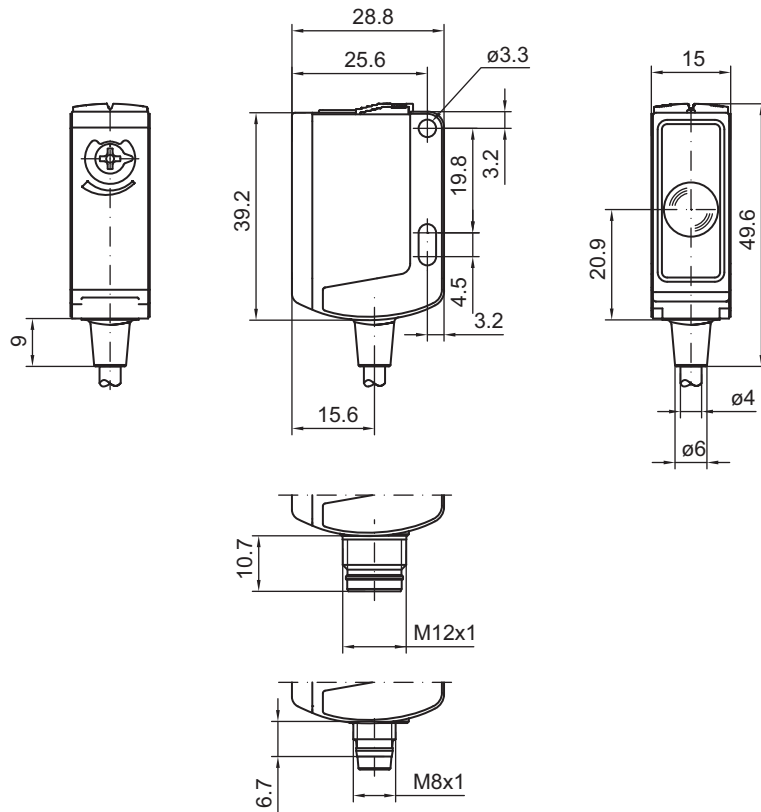
| <b>Transmitter</b>                                    |   |
|---|---|
| Current consumption                                   | 30 mA   |
| Transmitter diodes, class in accordance with EN 60825 | 1   |
| Light source  | Red light   |
| Wavelength  | 624 nm  |
| Activation input for test and series connection       | Active $\geq 8\text{ V}$<br>Inactive $\leq 2\text{ V}$  |
| Connection system                                     | Cable, 2 m,<br>M8 round pin plug, M12 round pin plug  |
| <b>Receiver</b>                                       |   |
| Current consumption                                   | 30 mA without external load   |
| Switching output                                      | 2 push-pull switching outputs<br>Pin 2: pnp dark-on, npn light-on<br>Pin 4: pnp light-on, npn dark-on |
| Switching voltage high active                         | Min. $U_v - 2\text{ V}$   |
| Switching voltage low                                 | Max. 2 V  |
| Output current  | Max. 100 mA   |
| Connection system                                     | Cable, 2 m,<br>M8 round pin plug, M12 round pin plug  |

Please note the additional information at [www.leuze.com/en/sls/](http://www.leuze.com/en/sls/).

# SINGLE LIGHT BEAM SAFETY DEVICES

## Dimensional drawings

### SLSR 25B Single Light Beam Safety Device



Dimensions in mm

MLD 500  
p. 246

**SLSR 25B**  
p. 260

SLSR 46B  
p. 266

SLS 96  
p. 272

SLS 318  
p. 278

## Accessories ordering information

| Part no.                               | Article            | Description                       | Length, design |
|--|--------------------|-----------------------------------|----------------|
| <b>Connection cables</b>               |                    |                                   |                |
| 50104545                               | K-D M12W-4P-5m-PVC | Connection cable, 5 m, M12, 4-pin | Angled, PVC    |
| 50104544                               | K-D M12A-4P-5m-PVC | Connection cable, 5 m, M12, 4-pin | Axial, PVC     |
| <b>Alignment aids, see page 271</b>    |                    |                                   |                |
| <b>Deflecting Mirror, see page 512</b> |                    |                                   |                |

[www.leuze.com/en/sls/](http://www.leuze.com/en/sls/)

## SINGLE LIGHT BEAM SAFETY DEVICES

### SLSR 46B



*Guarding at a wood processing machine with an SLSR 46B Single Light Beam Safety Device*

Many industrial applications require the use of safety sensors with high functional and performance reserves, to remain flexible with system-related conversions, for example. The SLS 46B Single Light Beam Safety Device offers sufficient functional reserves for numerous application variations, and with the particularly strong red light payload signal it can enable ranges of up to 40 m. The visible red light makes aligning so much easier. The SAT-5 alignment aid also provides an innovative alignment tool, especially for big ranges. It uses the sensor beam for aligning. With the solid plastic housing with IP 67 protection rating, it is highly recommended for a wide range of industrial applications as a flexible and economical solution. Together with a safety monitoring device, such as the MSI-T or a configurable MSI Safety Relay, the SLSR 46B forms a type 2 electro-sensitive protective equipment.

#### Typical areas of application

- Point of operation guarding on palletizer systems, wood processing and packaging machinery

**Important technical data, overview**

|  |   |
|--|---|
| Type in accordance with EN/IEC 61496     | 2 (in combination with a safety interface device or a safety monitoring device)                       |
| Category in accordance with EN ISO 13849 | 2   |
| Operating range                          | 0.5...40 m  |
| Operating voltage, U <sub>B</sub>        | 10...30 V DC (incl. residual ripple)  |
| Dimensions (WxHxD)                       | 18.5 mm x 77 mm x 43 mm   |
| Housing                                  | Plastic   |
| Switching output                         | 2 push-pull switching outputs<br>Pin 2: pnp dark-on, npn light-on<br>Pin 4: pnp light-on, npn dark-on |
| Connection system                        | Cable, 2 m<br>M12 round pin plug  |

**Functions**

|  |
|--|
| LED display  |
| Activation input for test and series connection      |
| Active ambient light suppression (A <sup>2</sup> LS) |

**Function extension**

| With safety interface device | Relay output | RES | EDM | Muting | Further details |
|------------------------------|--------------|-----|-----|--------|-----------------|
| MSI-T                        | ●            | ●   | ●   |        | p. 476          |
| MSI 100,<br>MSI 200          |              | ●   | ●   | ●      | p. 481          |

**Special features**

- **Single Light Beam Safety Device with visible red light and high performance reserve**
- **Solid plastic housing with IP 67 protection rating for industrial use**
- **Wide voltage range from 10 to 30 V with pnp transistor output for PLC applications**
- **Clearly visible alignment indicator in the front screen**



**Features**



**Further information**

|                                    | Page |
|------------------------------------|------|
| ● Ordering information             | 268  |
| ● Electrical connection            | 268  |
| ● Technical data                   | 269  |
| ● Dimensional drawings             | 270  |
| ● Accessories ordering information | 271  |



# SINGLE LIGHT BEAM SAFETY DEVICES

## Ordering information

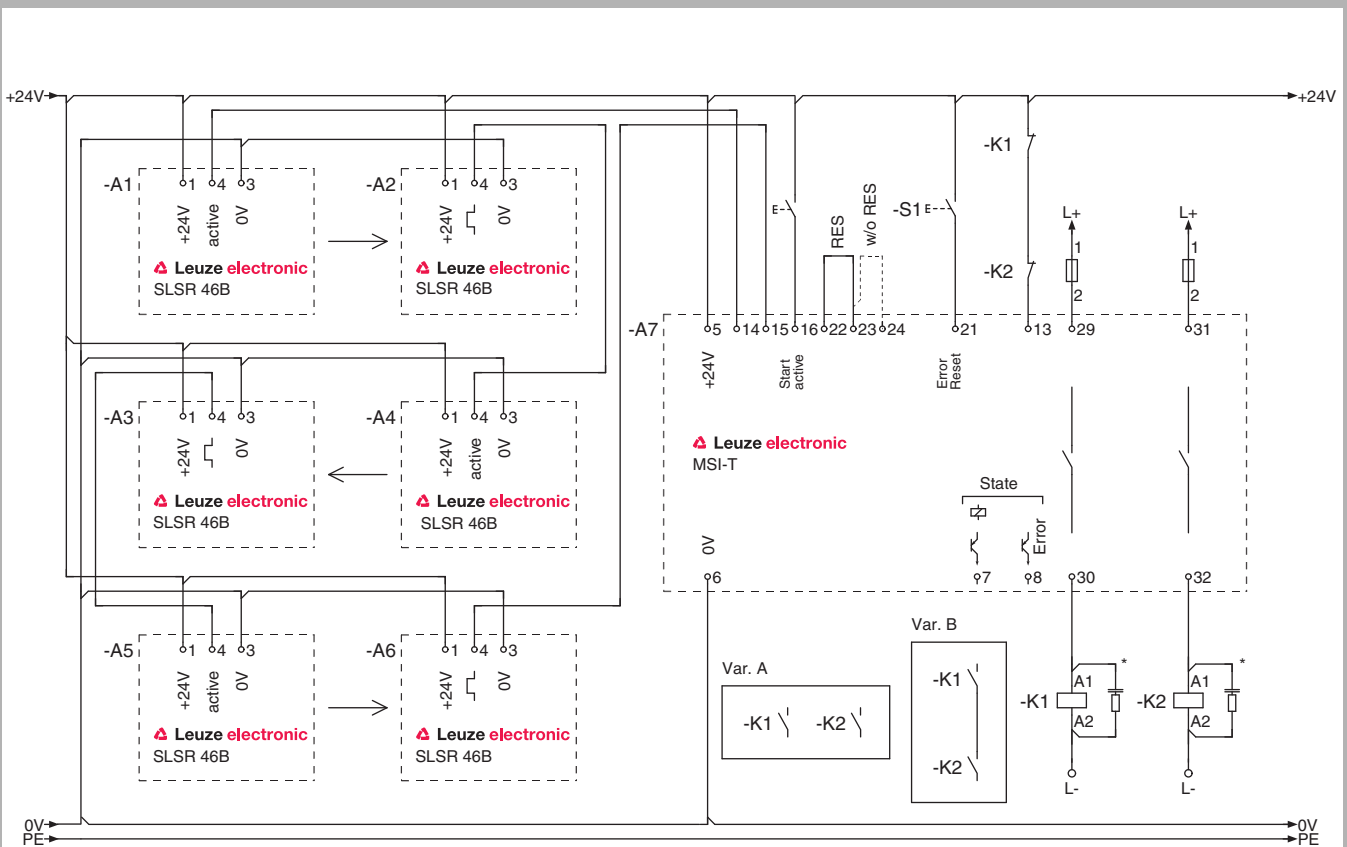
**SLSR 46B**, consisting of transmitter and receiver

**Functions:** Activation input for testing and series connection

| Part no. | Article          | Description                       | Connection system         |
|----------|------------------|-----------------------------------|---------------------------|
| 50108538 | SLSSR 46B.8-S12  | Transmitter with activation input | M12 round pin plug, 4-pin |
| 50108540 | SLSER 46B/66-S12 | Receiver                          | M12 round pin plug, 4-pin |
| 50108539 | SLSSR 46B.8      | Transmitter                       | Cable, 2 m                |
| 50108541 | SLSER 46B/66     | Receiver                          | Cable, 2 m                |

You will find further information and ordering info in the Leuze electronic Opto-Electronic Sensors Catalog.

## SLS 46B electrical connection



\*) Spark extinction circuit, supply suitable spark extinction

Series connection SLSR 46B with MSI-T safety monitoring device

**!** Please observe the operating instructions of the components!

|                   |                    |                           |                  |                   |
|-------------------|--------------------|---------------------------|------------------|-------------------|
| MLD 500<br>p. 246 | SLSR 25B<br>p. 260 | <b>SLSR 46B</b><br>p. 266 | SLS 96<br>p. 272 | SLS 318<br>p. 278 |
|-------------------|--------------------|---------------------------|------------------|-------------------|

**Technical data**

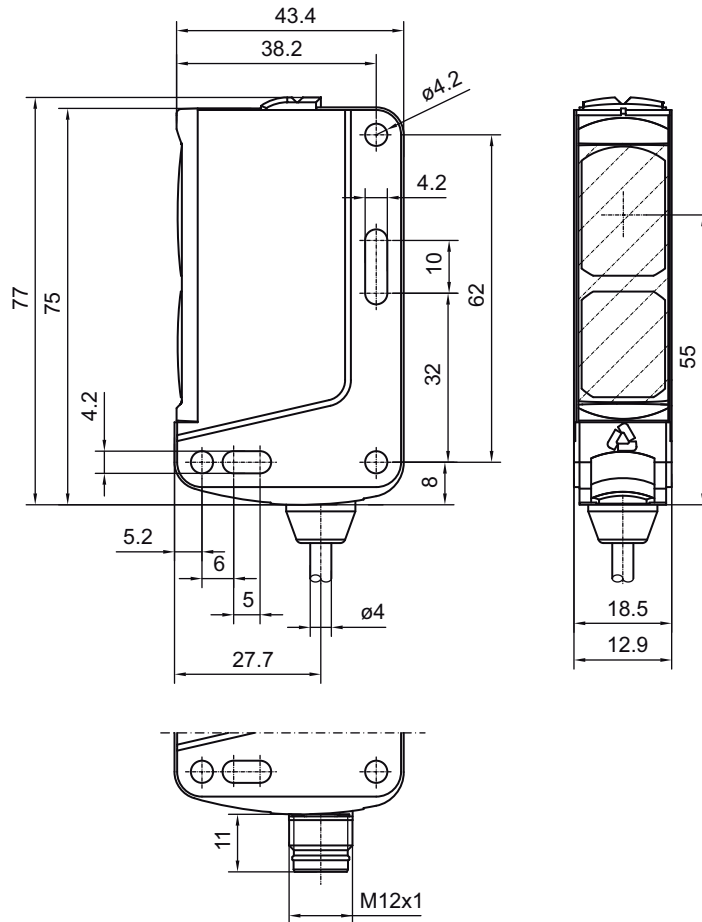
| General system data   |   |
|---|---|
| Type in accordance with EN/IEC 61496  | 2 (in combination with a configurable MSI Safety Relay or a safety monitoring device)                 |
| Service life ( $T_M$ ) in accordance with EN ISO 13849-1                      | 20 years  |
| Category in accordance with EN ISO 13849                                      | 2   |
| Mean time to dangerous failure ( $MTTF_d$ ) in accordance with EN ISO 13849-1 | 407 years   |
| Operating range   | 0.5...40 m  |
| Response time   | 4.5 ms  |
| Test reaction time  | 9 ms  |
| Operating voltage, $U_B$  | 10...30 V DC (incl. residual ripple)  |
| Safety class  | II  |
| Protection rating   | IP 67, IP 69K   |
| Ambient temperature, operation  | -30...+55°C   |
| Ambient temperature, storage  | -30...+60°C   |
| Dimensions (WxHxD)  | 18.5 mm x 77 mm x 43 mm   |
| Housing   | Plastic   |
| Weight (transmitter with receiver)  | 100 g (plug variant), 260 g (cable variant)   |
| Transmitter   |   |
| Current consumption   | 30 mA   |
| Transmitter diodes, class in accordance with EN 60825                         | 1   |
| Light source  | Red light   |
| Wavelength  | 624 nm  |
| Activation input for test and series connection                               | Active $\geq 8$ V<br>Inactive $\leq 2$ V  |
| Connection system   | Cable, 2 m<br>M12 round pin plug  |
| Receiver  |   |
| Current consumption   | 30 mA without external load   |
| Switching output  | 2 push-pull switching outputs<br>Pin 2: pnp dark-on, npn light-on<br>Pin 4: pnp light-on, npn dark-on |
| Switching voltage high active   | Min. $U_v - 2$ V  |
| Switching voltage low   | Max. 2 V  |
| Output current  | Max. 100 mA   |
| Connection system   | Cable, 2 m<br>M12 round pin plug, 4-pin   |

Please note the additional information at [www.leuze.com/en/sls/](http://www.leuze.com/en/sls/).

# SINGLE LIGHT BEAM SAFETY DEVICES

## Dimensional drawings

### SLSR 46B Single Light Beam Safety Device



Dimensions in mm

MLD 500  
p. 246

SLSR 25B  
p. 260

**SLSR 46B**  
**p. 266**

SLS 96  
p. 272

SLS 318  
p. 278

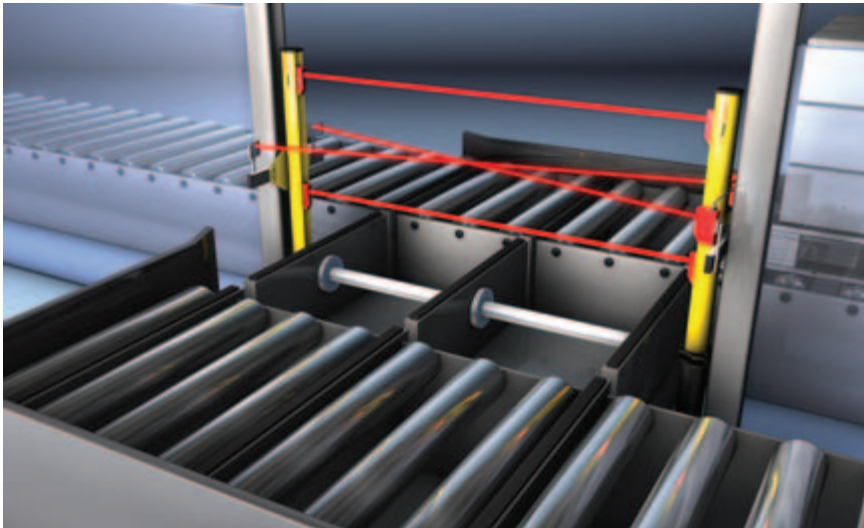
## Accessories ordering information

| Part no.                               | Article            | Description  | Length, design |
|--|--------------------|--|----------------|
| <b>Connection cables</b>               |                    |  |                |
| 50104545                               | K-D M12W-4P-5m-PVC | Connection cable, 5 m, M12, 4-pin  | Angled, PVC    |
| 50104544                               | K-D M12A-4P-5m-PVC | Connection cable, 5 m, M12, 4-pin  | Axial, PVC     |
| <b>Alignment aid</b>                   |                    |  |                |
| 50040739                               | ARH 46             | Alignment aid for SLSR 46B series sensors  |                |
| 50109545                               | SAT-5              | Spot Alignment Tool (alignment aid when using the transmitter beam for the SLSR 46B and SLSR 25B series) |                |
| <b>Deflecting Mirror, see page 512</b> |                    |  |                |

[www.leuze.com/en/sls/](http://www.leuze.com/en/sls/)

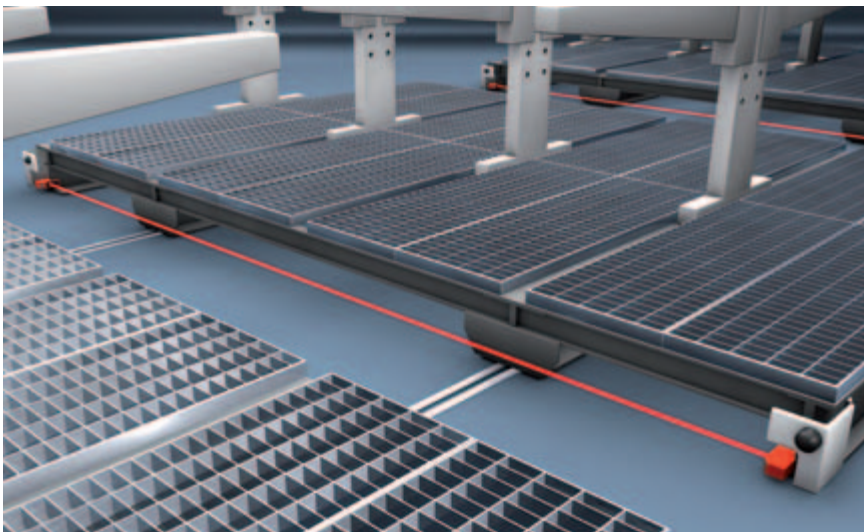
## SINGLE LIGHT BEAM SAFETY DEVICES

### SLS 96



*Palletizer guarding with SLS 96 Single Light Beam Safety Devices*

Single Light Beam Safety Devices that provide the most universal coverage possible for the most important requirements at point of operation and access guarding must combine the most diverse device features. The SLS 96 series was conceived to provide the design engineer with optimum integration and application in wide-ranging industrial use. The designer now has the choice between a robust metal housing with glass cover and a solid plastic housing, both with IP 67 protection rating. Furthermore they can also choose whether the connection is to be via M12 plug or via a terminal chamber. Red light and infrared light variants enable fault-free parallel operation of adjacent Light Beam Devices. The extensive range of accessories for this Light Beam Device rounds off the exceptional features of this series. Together with a safety monitoring device, such as the MSI-T or a configurable MSI Safety Relay, the SLS 96 forms a type 2 electro-sensitive protective equipment.



*Foot area guarding on mobile racking and shelving*

#### Typical areas of application

- Point of operation and access guarding in conveyor/storage systems, drinks industry and on packaging machinery

MLD 500  
p. 246

SLSR 25B  
p. 260

SLSR 46B  
p. 266

**SLS 96**  
**p. 272**

SLS 318  
p. 278

**Important technical data, overview**

|  |   |
|--|---|
| Type in accordance with EN/IEC 61496     | 2   |
| Category in accordance with EN ISO 13849 | 2   |
| Operating range                          | 0...50 m (infrared light)<br>0...30 m (red light) |
| Operating voltage, U <sub>B</sub>        | 10...30 V DC (incl. residual ripple)              |
| Dimensions (WxHxD)                       | 30 mm x 90 mm x 70 mm                             |
| Housing                                  | Metal<br>Plastic                                  |
| Switching output                         | pnp transistor output                             |
| Connection system                        | Cable gland<br>M12 round pin plug                 |

**Functions**

LED display

Activation input for test and series connection

**Function extension**

| With safety interface device | Relay output | RES | EDM | Muting | Further details |
|------------------------------|--------------|-----|-----|--------|-----------------|
| MSI-T                        | ●            | ●   | ●   |        | p. 476          |
| MSI 100,<br>MSI 200          |              | ●   | ●   | ●      | p. 481          |

**Special features**

- High functional reserve in the visible red light and infrared light range
- Wide voltage range from 10 to 30 V with pnp transistor output for PLC applications
- 2 displays on transmitter and receiver for status display with start-up and running operation
- Optics heating for use with low temperatures (SLS 96 M/P-1071)
- Variants for multiple operation (SLS 96 K/P-1207)



**Features**



**Further information**

**Page**

|                                    |     |
|------------------------------------|-----|
| ● Ordering information             | 274 |
| ● Electrical connection            | 268 |
| ● Technical data                   | 275 |
| ● Dimensional drawings             | 276 |
| ● Accessories ordering information | 277 |

## SINGLE LIGHT BEAM SAFETY DEVICES

### Ordering information

**SLS 96**, consisting of transmitter and receiver

**Functions:** Activation input for testing and series connection

| Part no. | Article               | Description   | Connection system         |
|----------|-----------------------|---|---------------------------|
| 50025215 | SLSS 96M-1080-T2-45   | Transmitter, metal, infrared light                              | M12 round pin plug, 4-pin |
| 50025193 | SLSE 96M/P-1070-T2-41 | Receiver, metal, infrared light                                 | M12 round pin plug, 4-pin |
| 50080478 | SLSS 96M-1090-T2-45   | Transmitter, metal, infrared light, low temperature model       | M12 round pin plug, 4-pin |
| 50080479 | SLSE 96M/P-1071-T2-41 | Receiver, metal, infrared light, low temperature model          | M12 round pin plug, 4-pin |
| 50025213 | SLSS 96M-1080-T2-24   | Transmitter, metal, infrared light                              | Terminals                 |
| 50025192 | SLSE 96M/P-1070-T2-21 | Receiver, metal, infrared light                                 | Terminals                 |
| 50029454 | SLSS 96M-1090-T2-24   | Transmitter, metal, infrared light, low temperature model       | Terminals                 |
| 50029455 | SLSE 96M/P-1071-T2-21 | Receiver, metal, infrared light, low temperature model          | Terminals                 |
| 50031249 | SLSS 96M-1210-T2-45   | Transmitter, metal, red light                                   | M12 round pin plug, 4-pin |
| 50031250 | SLSE 96M/P-1200-T2-41 | Receiver, metal, red light                                      | M12 round pin plug, 4-pin |
| 50025209 | SLSS 96M-1210-T2-24   | Transmitter, metal, red light                                   | Terminals                 |
| 50031562 | SLSE 96M/P-1200-T2-21 | Receiver, metal, red light                                      | Terminals                 |
| 50031559 | SLSS 96K-1080-T2-45   | Transmitter, plastic, infrared light                            | M12 round pin plug, 4-pin |
| 50031561 | SLSE 96K/P-1070-T2-41 | Receiver, plastic, infrared light                               | M12 round pin plug, 4-pin |
| 50028011 | SLSS 96K-1210-T2-45   | Transmitter, plastic, red light                                 | M12 round pin plug, 4-pin |
| 50028012 | SLSE 96K/P-1200-T2-41 | Receiver, plastic, red light                                    | M12 round pin plug, 4-pin |
| 50081292 | SLSS 96K-1080-T2-24   | Transmitter, plastic, infrared light                            | Terminals                 |
| 50081293 | SLSE 96K/P-1070-T2-21 | Receiver, plastic, infrared light                               | Terminals                 |
| 50028011 | SLSS 96K-1210-T2-45   | Transmitter, plastic, red light                                 | M12 round pin plug, 4-pin |
| 50041109 | SLSE 96K/P-1207-T2-41 | Receiver, plastic, red light with filter for multiple operation | M12 round pin plug, 4-pin |
| 50028009 | SLSS 96K-1210-T2-24   | Transmitter, plastic, red light                                 | Terminals                 |
| 50028010 | SLSE 96K/P-1200-T2-21 | Receiver, plastic, red light                                    | Terminals                 |
| 50028009 | SLSS 96K-1210-T2-24   | Transmitter, plastic, red light                                 | Terminals                 |
| 50035078 | SLSE 96K/P-1207-T2-21 | Receiver, plastic, red light with filter for multiple operation | Terminals                 |

You will find further information and ordering info in the Leuze electronic Opto-Electronic Sensors Catalog.

### Electrical connection

See SLSR 46B connection example, page 268

MLD 500  
p. 246

SLSR 25B  
p. 260

SLSR 46B  
p. 266

**SLS 96**  
**p. 272**

SLS 318  
p. 278



**Technical data**

| <b>General system data</b>  |   |
|---|---|
| Type in accordance with EN/IEC 61496  | 2   |
| Service life ( $T_M$ ) in accordance with EN ISO 13849-1                      | 20 years  |
| Category in accordance with EN ISO 13849                                      | 2   |
| Mean time to dangerous failure ( $MTTF_d$ ) in accordance with EN ISO 13849-1 | 445 years   |
| Operating range   | 0...50 m (infrared light)<br>0...30 m (red light)   |
| Response time   | 1 ms  |
| Test reaction time  | 2 ms  |
| Operating voltage, $U_B$  | 10...30 V DC (incl. residual ripple)                |
| Safety class  | II  |
| Protection rating   | IP 67   |
| Ambient temperature, operation  | -20...+60°C   |
| Ambient temperature, storage  | -40...+70°C   |
| Dimensions (WxHxD)  | 30 mm x 90 mm x 70 mm                               |
| Housing   | Metal<br>Plastic                                    |
| Weight (transmitter and receiver)   | 380 g (metal housing), 260 g (plastic housing)      |
| <b>Transmitter</b>  |   |
| Current consumption   | 50 mA   |
| Transmitter diodes, class in accordance with EN 60825                         | 1   |
| Light source  | Infrared light<br>Red light                         |
| Wavelength  | 880 nm (infrared light)<br>660 nm (red light)       |
| Activation input for test and series connection                               | 24 V DC<br>Active $\geq 8$ V<br>Inactive $\leq 2$ V |
| Connection system   | Cable gland<br>M12 round pin plug, 4-pin            |
| <b>Receiver</b>   |   |
| Current consumption   | 50 mA without external load                         |
| Switching output  | pnp transistor output                               |
| Switching voltage high active   | Min. $U_v - 2$ V                                    |
| Switching voltage low   | Max. 2 V  |
| Output current  | Max. 100 mA   |
| Connection system   | Cable gland<br>M12 round pin plug, 4-pin            |

Please note the additional information at [www.leuze.com/en/sls/](http://www.leuze.com/en/sls/).

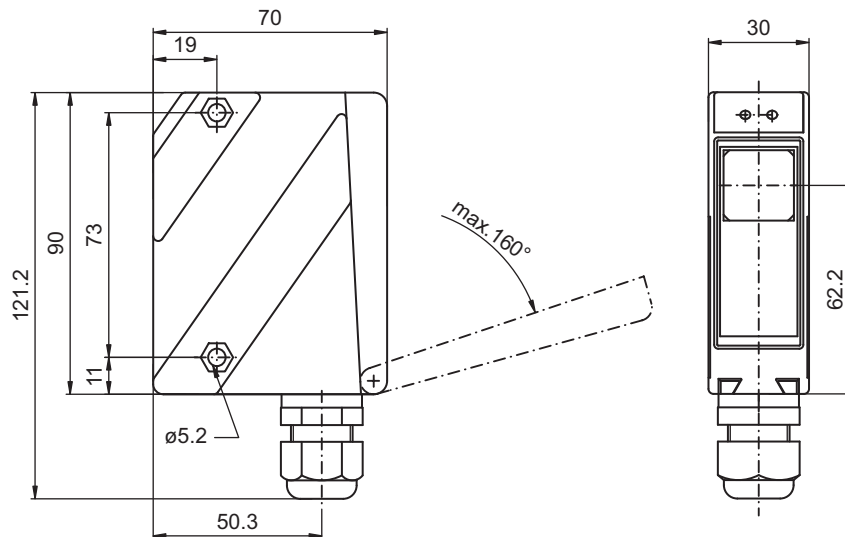
[www.leuze.com/en/sls/](http://www.leuze.com/en/sls/)



## SINGLE LIGHT BEAM SAFETY DEVICES

### Dimensional drawings

#### SLS 96 Single Light Beam Safety Device



Dimensions in mm

MLD 500  
p. 246

SLSR 25B  
p. 260

SLSR 46B  
p. 266

**SLS 96**  
**p. 272**

SLS 318  
p. 278

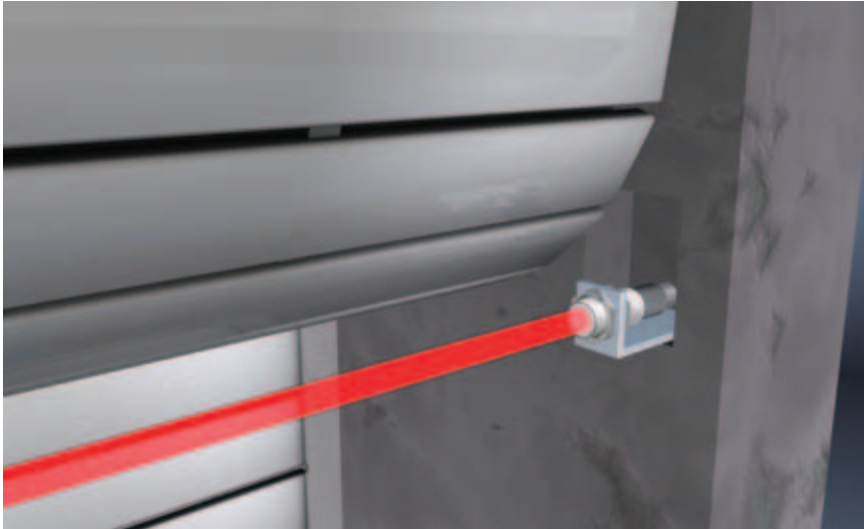
**Accessories ordering information**

| Part no.                 | Article            | Description   | Length, design |
|--------------------------|--------------------|---|----------------|
| <b>Connection cables</b> |                    |   |                |
| 50104545                 | K-D M12W-4P-5m-PVC | Connection cable, 5 m, M12, 4-pin                         | Angled, PVC    |
| 50104544                 | K-D M12A-4P-5m-PVC | Connection cable, 5 m, M12, 4-pin                         | Axial, PVC     |
| <b>Alignment aid</b>     |                    |   |                |
| 50080502                 | ARH 96             | Alignment aid for series 96 sensors                       |                |
| <b>Deflecting Mirror</b> |                    |   |                |
| 50000670                 | US 1               | Deflecting Mirror   |                |
| 50017434                 | US 2               | Deflection mirror on mounting plate, can be turned by 90° |                |

[www.leuze.com/en/sls/](http://www.leuze.com/en/sls/)

## SINGLE LIGHT BEAM SAFETY DEVICES

### SLS 318



*Roller shutter guarding with SLS 318 Single Light Beam Safety Device*

The case often arises in which Single Light Beam Safety Devices have to be integrated into very tight installation areas. In this instance, SLS 318 Light Beam Safety Devices are the preferred choice. Because of their slender cylindrical construction they can be mounted quickly and easily, even in areas where space is restricted. They are also to be recommended here on the basis of their IP 67 protection rating for demanding industrial applications, whereby the device model can be selected as either plastic or stainless steel. The SLS 318 Light Beam Safety Devices enable switching frequencies of 1000 Hz and together with a safety monitoring device, such as the MSI-T or a configurable MSI Safety Relay, they form type 2 electro-sensitive protective equipment.

#### Typical areas of application

- In difficult industrial conditions
- Wood processing and paper industry
- Print and packaging machinery

MLD 500  
p. 246

SLSR 25B  
p. 260

SLSR 46B  
p. 266

SLS 96  
p. 272

**SLS 318**  
**p. 278**

**Important technical data, overview**

|  |                                     |
|--|-------------------------------------|
| Type in accordance with EN/IEC 61496     | 2                                   |
| Category in accordance with EN ISO 13849 | 2                                   |
| Operating range                          | 0...10 m                            |
| Operating voltage, U <sub>B</sub>        | 10...30 V DC                        |
| Dimensions                               | Cylindrical construction, M18x1     |
| Housing                                  | Plastic<br>Metal housing on request |
| Switching output                         | pnp transistor output               |
| Connection system                        | Cable, 2 m<br>M12 round pin plug    |

**Functions**

LED display

Activation input for test and series connection

**Function extension**

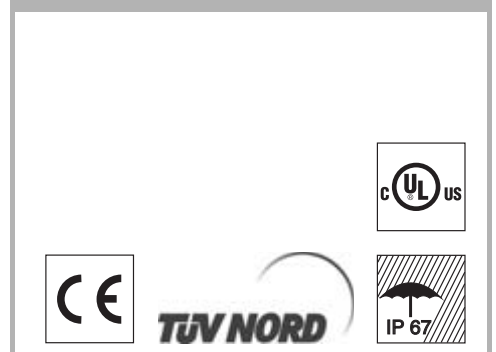
| With safety interface device | Relay output | RES | EDM | Muting | Further details |
|------------------------------|--------------|-----|-----|--------|-----------------|
| MSI-T                        | ●            | ●   | ●   |        | p. 476          |
| MSI 100,<br>MSI 200          |              | ●   | ●   | ●      | p. 481          |

**Special features**

- **Housing (plastic or stainless steel) in short cylindrical design, M18x1 in accordance with IP 67 protection rating**
- **2 antivalent switching outputs for light/dark switching and as control function**
- **Visible red light in straight optics**
- **Switching frequency, 1000 Hz**
- **LED display in transmitter and receiver**
- **Adjustable responsivity**



**Features**



**Further information**

**Page**

|                                    |     |
|------------------------------------|-----|
| ● Ordering information             | 280 |
| ● Electrical connection            | 268 |
| ● Technical data                   | 280 |
| ● Dimensional drawings             | 281 |
| ● Accessories ordering information | 281 |

## SINGLE LIGHT BEAM SAFETY DEVICES

### Ordering information

**SLS 318**, consisting of transmitter and receiver

**Functions:** Activation input for testing and series connection

| Part no. | Article         | Description                     | Connection system         |
|----------|-----------------|---------------------------------|---------------------------|
| 50083116 | SLSS 318K-S12   | Transmitter, plastic, red light | M12 round pin plug, 4-pin |
| 50083117 | SLSE 318K/P-S12 | Receiver, plastic, red light    | M12 round pin plug, 4-pin |
| 50083132 | SLSS 318K       | Transmitter, plastic, red light | Cable, 2 m                |
| 50083133 | SLSE 318K/P     | Receiver, plastic, red light    | Cable, 2 m                |

You will find further information and ordering info in the Leuze electronic Opto-Electronic Sensors Catalog.

### Electrical connection

See SLSR 46B connection example, page 268

### Technical data

#### General system data

|   |   |
|---|---|
| Type in accordance with EN/IEC 61496  | 2   |
| Service life ( $T_M$ ) in accordance with EN ISO 13849-1                      | 20 years  |
| Category in accordance with EN ISO 13849                                      | 2   |
| Mean time to dangerous failure ( $MTTF_d$ ) in accordance with EN ISO 13849-1 | 414 years   |
| Operating range   | 0...10 m  |
| Response time   | 0.5ms   |
| Test reaction time  | 1 ms  |
| Operating voltage, $U_B$  | 10...30 V DC  |
| Safety class  | II  |
| Protection rating   | IP 67   |
| Temperature range, operation/storage  | -25...+65 °C / -40...+70 °C   |
| Dimensions  | Cylindrical construction, M18x1   |
| Housing   | Metal, plastic  |
| Weight (transmitter and receiver)   | 15 g (plug variant, plastic housing), 85 g (cable variant, plastic housing), 35 g (plug variant, metal housing), 105 g (cable variant, metal housing) |
| <b>Transmitter</b>  |   |
| Current consumption   | 25 mA   |
| Transmitter diodes, class in accordance with EN 60825                         | 1   |
| Light source  | Red light   |
| Wavelength  | 660 nm  |

MLD 500  
p. 246

SLSR 25B  
p. 260

SLSR 46B  
p. 266

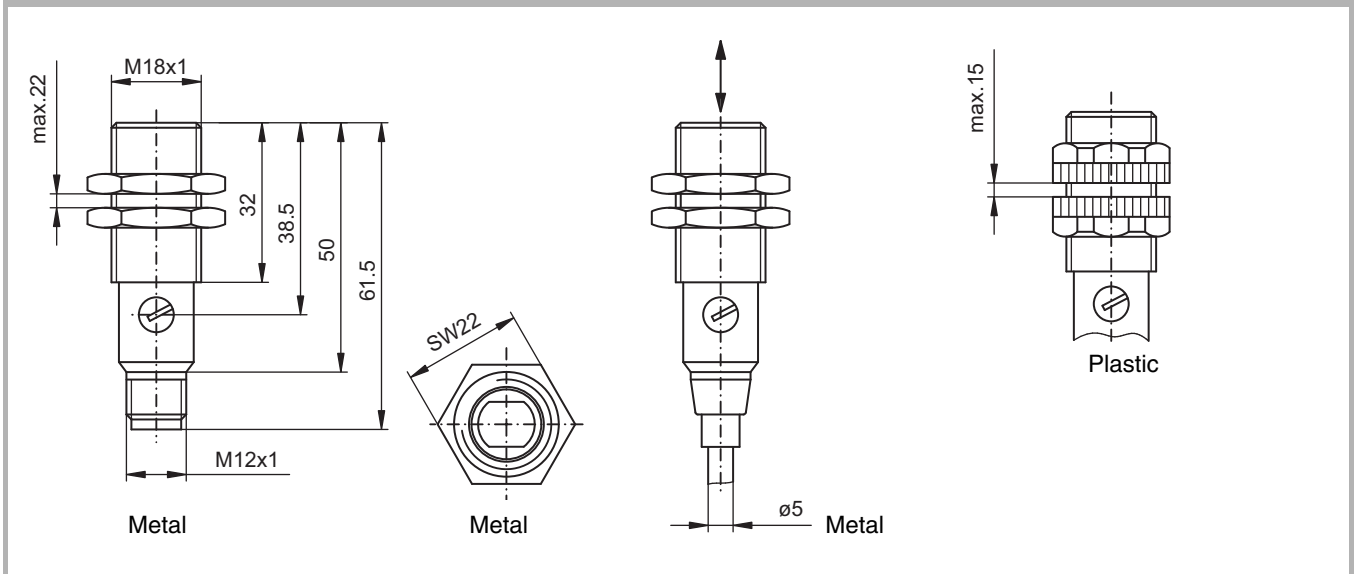
SLS 96  
p. 272

**SLS 318**  
**p. 278**

**Technical data**

|   |   |
|---|---|
| Activation input for test and series connection | Active $\geq 8\text{ V}$ / inactive $\leq 1.5\text{ V}$ |
| Connection system                               | Cable, 2 m<br>M12 round pin plug, 4-pin                 |
| <b>Receiver</b>                                 |   |
| Current consumption                             | 25 mA without external load                             |
| Switching output                                | pnp transistor output                                   |
| Switching voltage high active                   | Min. $U_v - 1.6\text{ V}$                               |
| Switching voltage low                           | Max. 1.6 V  |
| Output current                                  | Max. 100 mA   |
| Connection system                               | Cable, 2 m<br>M12 round pin plug, 4-pin                 |

**SLS 318 dimensional drawings**



Dimensions in mm

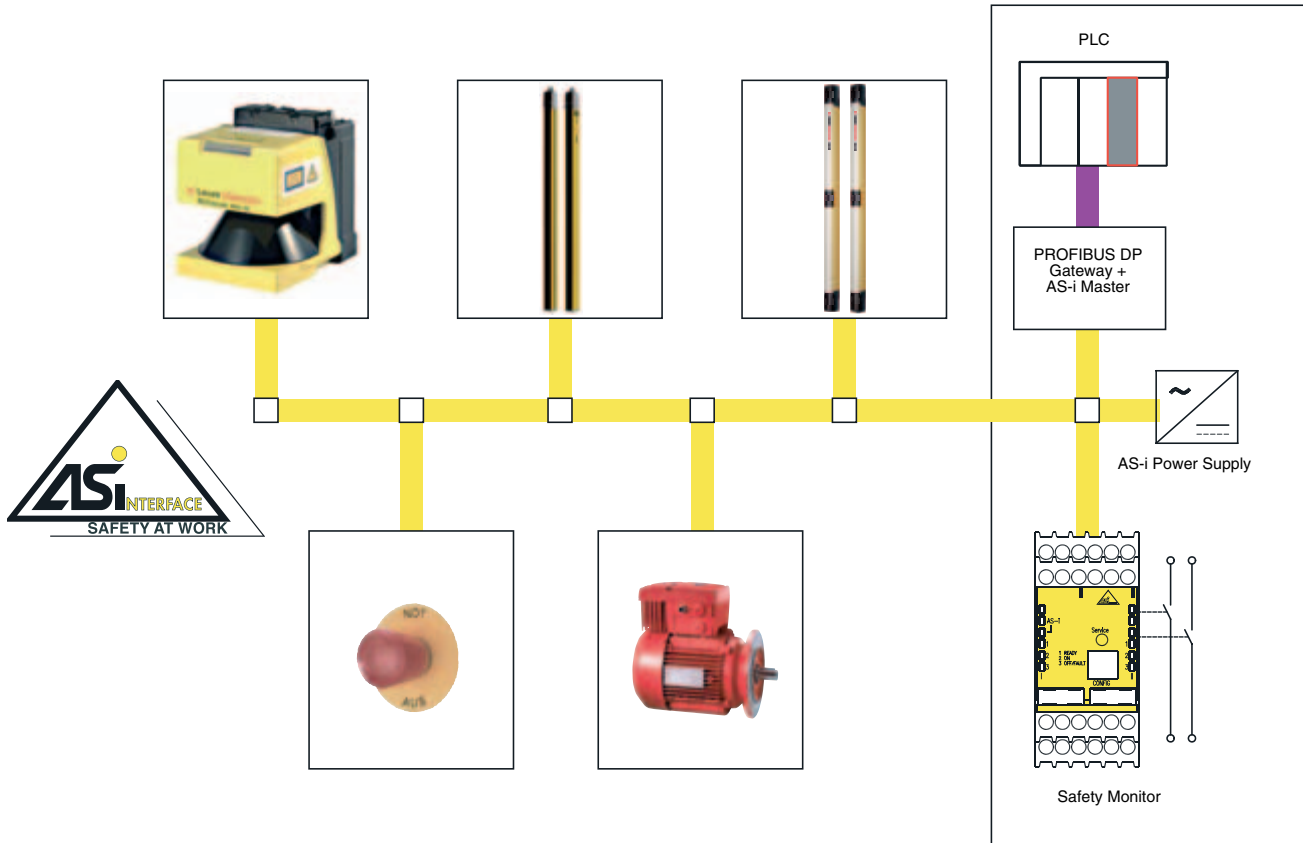
**Accessories ordering information**

| Part no.                 | Article            | Description                       | Length, design |
|--------------------------|--------------------|-----------------------------------|----------------|
| <b>Connection cables</b> |                    |                                   |                |
| 50104545                 | K-D M12W-4P-5m-PVC | Connection cable, 5 m, M12, 4-pin | Angled, PVC    |
| 50104544                 | K-D M12A-4P-5m-PVC | Connection cable, 5 m, M12, 4-pin | Axial, PVC     |

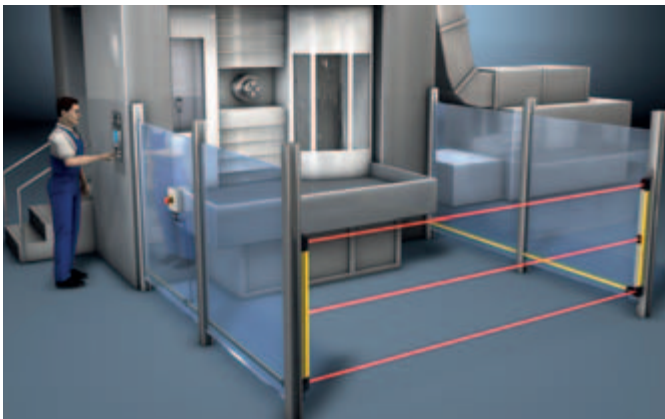
[www.leuze.com/en/sls/](http://www.leuze.com/en/sls/)

# AS-Interface Safety at Work

## Overview



Networking with AS-Interface at the sensor/actuator level and coupling to higher level field buses



MLD 500 Multiple Light Beam Safety Devices with integrated AS-Interface at a processing center

Flexibility and fast diagnostics are becoming increasingly more important for automation technology in modern production systems, which of course also applies to safety technology. At the same time, every automation level makes its own demands on communication. While Ethernet-based systems are increasingly used at the guidance, control and field level, AS-Interface (AS-i) has established itself at the sensor/actuator level.

When compared with conventional point-to-point wiring, AS-i pushes to the fore with its low installation, wiring and connection costs. Suitable gateways create connections to higher-level field bus systems.

ASM1, ASM1E  
p. 284

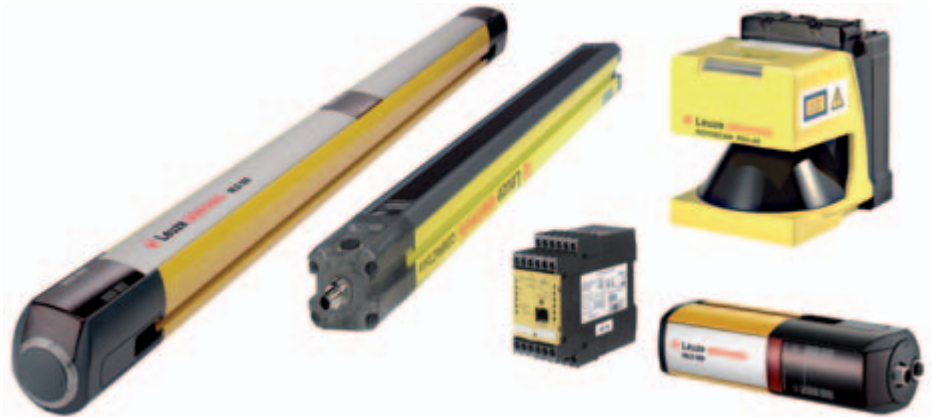
ASM2E  
p. 292

ROTOSCAN RS4/AS-i  
p. 300

COMPACTplus/AS-i  
p. 302

MLD 500/AS-i  
p. 304, 306

AS-Interface Safety at Work overview



Multiple Light Beam Safety Devices, Safety Light Curtains or Safety Laser Scanners can be connected directly to AS-i flat cable via integrated AS-Interfaces.  
 In the foreground: The AS-i Safety Monitor and the coupling module for connecting further components

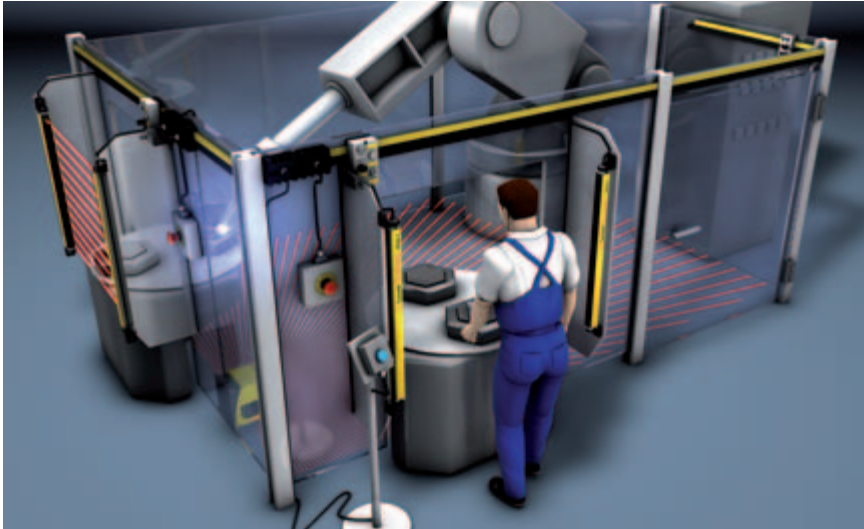
| Features                                 |  |  |  |  |                                       |   |   |   |  |   |                           |   |                                  | Series  | Page    |     |
|--|--|--|--|--|---------------------------------------|---|---|---|--|---|---------------------------|---|----------------------------------|---|---------|-----|
| Category in accordance with EN ISO 13849 | Performance Level (PL) in accordance with EN ISO 13849-1 | SIL in accordance with IEC 61508 and SILCL in accordance with EN/IEC 62061 | Number of safety-related switching outputs (OSSDs) | Number of safety-related switching outputs (OSSDs) together with AS-i switching signal switching | Number of safe AS-i switching signals | Number of configurable function modules | Monitoring modules with contact bounce filter | Number of programmable logic operators, OR (inputs) | Number of programmable logic operators, AND (inputs) | Programmable logic operators, FLIP-FLOP | Programmable muting logic | Programmable logic operators, switch on/off delay | Link with adjacent AS-i networks | Help signals for error unlocking and safe AS-i actuator restart |         |     |
| 4  | e  | 3  | 1  |  |                                       | 32                                      |   | 2   |  |   |                           |   |                                  |   | ASM1/1  | 284 |
|  |  |  | 2  |  |                                       | 32                                      |   | 2   |  |   |                           |   |                                  |   | ASM1/2  | 284 |
|  |  |  | 1  |  |                                       | 48                                      | ●   | 6   | 6  | ●                                       | ●                         | ●   |                                  |   | ASM1E/1 | 284 |
|  |  |  | 2  |  |                                       | 48                                      | ●   | 6   | 6  | ●                                       | ●                         | ●   |                                  |   | ASM1E/2 | 284 |
|  |  |  | 1  | 1  | 1                                     | 48                                      | ●   | 6   | 6  | ●                                       | ●                         | ●   | ●                                | ●   | ASM2E/1 | 292 |
|  |  |  | 2  | 1  | 1                                     | 48                                      | ●   | 6   | 6  | ●                                       | ●                         | ●   | ●                                | ●   | ASM2E/2 | 292 |

AS-i is therefore a particularly economic and flexibly integrated solution, which, with the Safety at Work functionality, also meets safety-related requirements. The user consequently has the option of integrating all binary switching safety-related components into their AS-Interface network.

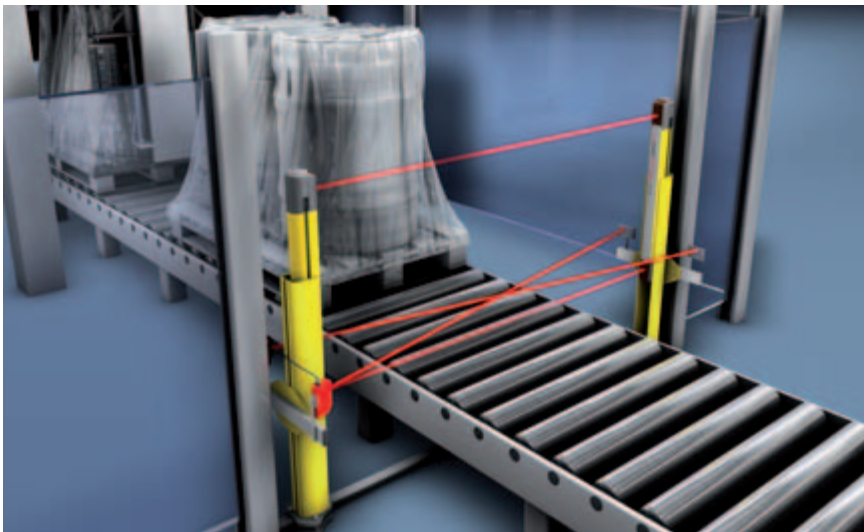


## AS-Interface Safety at Work

### Safety Monitors, ASM1, ASM1E



AS-Interface Safety at Work-based robot application with 2 release circuits



The ASM muting functionality enables pallets in a wrapping machine application, for example, to pass by the electro-sensitive protective equipment without any process interruption.

The AS-i Safety Monitor, the ASM1, is a core component of the AS-Interface Safety at Work system. Using configuration software it monitors the safety-related bus participants that are assigned to it, e.g. command devices, Multiple Light Beam Safety Devices and Safety Switches.

The Safety Monitor has an RS 232 diagnostics interface for the PC-supported configuration and diagnostics. Logical links can be easily created with the graphic user interface of the<sup>®</sup> based software. The user can combine safety sensors and command devices with a mouse click and assign different release circuits for switching

off the dangerous movement. Depending on the device type, two dependent or independent release circuits with configurable contactor monitoring are available.

With an extended scope of functions, the ASM1E device type provides even more convenience with the configuration and diagnostics of a safety application monitored via an AS-Interface. Besides additional logic and diagnostics functions, ASM1E also has an activation/deactivation mode for parameterized software modules. The machine manufacturer can therefore already prepare the configuration of the Safety Monitor in the preliminary stage for all safety sensors that could be used with an extension.

The ASM1E-m variants are additionally equipped with an integrated muting function package to enable a continuous material flow, e.g. for automated production cells or packaging stations, while maintaining the protective function. The muting sensors required for this are easily integrated via standard AS-Interface input slaves; a separate muting controller is no longer required.

#### Typical areas of application

- Automation networks based on AS-Interface Safety at Work in the lower field level
- Mixed operation of AS-i standard components and safety-related components
- Packaging systems, car manufacturing, conveyor and storage systems, machine tools, processing centers and production lines

**ASM1, ASM1E**  
p. 284, 298

ASM2E  
p. 292, 298

ROTOSCAN RS4/AS-i  
p. 300

COMPACT<sup>plus</sup>/AS-i  
p. 302

MLD 500/AS-i  
p. 304, 306

# SAFETY MONITORS, ASM1, ASM1E

## Important technical data, overview

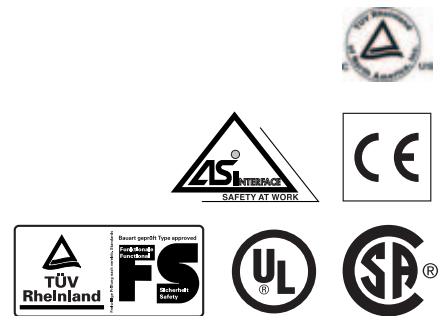
|  |   |
|--|---|
| SIL in accordance with IEC 61508 and SILCL in accordance with EN/IEC 62061 | 3   |
| Performance Level (PL) in accordance with EN ISO 13849-1                   | e   |
| Category in accordance with EN ISO 13849                                   | 4   |
| Stop category in accordance with EN/IEC 60204-1                            | STOP 0 and 1  |
| Supply voltage   | 24 V DC, ±15%   |
| System response time   | Max. 40 ms  |
| Protection rating  | IP 20   |
| Ambient temperature, operation   | -20...+60°C   |
| Dimensions (W x H x D)   | 45 mm x 105 mm x 120 mm   |
| Number of Safety Monitors per AS-Interface network                         | 4 (with maximum 31 integrated AS-i slaves)  |
| Safety-related switching outputs (OSSDs)                                   | Up to 2 potential-free safety-related switching outputs<br>(1 A DC-13, 24 V DC / 3 A AC-15, 230 V AC) |

## Special features

- Up to 31 safe AS-i slaves can be connected
- Freely selectable assignment (Drag & Drop) of the sensor to output-side release circuits with easy to operate asimon configuration and diagnostics software
- 48 link modules (e.g. OR, AND, FLIPFLOP) and turn on/off delays can be configured
- RS 232 interface for PC-supported system configuration, system diagnostics as well as configuration data transfer to replacement device
- Immediate switch-off STOP 0 and delayed switch-off STOP 1 of the release circuits can be parametered
- SERVICE button for teach-in with sensor swap-out
- Timing controlled 2-sensor muting or sequence controlled 4-sensor muting (ASM1E)
- Programmable muting logic (programmable with ASM1E-m/1 and ASM1E-m/2: muting time extension, muting timeout, muting sensor signal filter, close sequence, direction change, muting enable, muting override mode with buttons or key switches)



## Features



## Further information

|                                    | Page |
|------------------------------------|------|
| ● Ordering information             | 287  |
| ● Electrical connection            | 288  |
| ● Technical data                   | 289  |
| ● Dimensional drawings             | 290  |
| ● Accessories ordering information | 298  |

## AS-Interface Safety at Work

### Functions, ASM1, ASM1E

|   | ASM1/1 | ASM1/2 | ASM1E/1 | ASM1E/2 |
|---|--------|--------|---------|---------|
| Number of safety-related switching outputs (OSSDs)  | 1      | 2      | 1       | 2       |
| Number of configurable function modules   | 32     | 32     | 48      | 48      |
| PC configuration and diagnostics interface  | RS 232 | RS232  | RS232   | RS232   |
| Monitoring modules with contact bounce filter   |        |        | ●       | ●       |
| Service button for manual error unlocking and automatic device swap-out of the safe AS-i slaves           | ●      | ●      | ●       | ●       |
| Status LED display for AS-Interface communication, OSSD, start/restart interlock, protective mode, errors | ●      | ●      | ●       | ●       |
| System signal output  | ●      | ●      | ●       | ●       |
| <b>Further functions (can be configured with asimon configuration and diagnostics software)</b>           |        |        |         |         |
| Programmable logic operators, OR (inputs)   | 2      | 2      | 6       | 6       |
| Programmable logic operators, AND (inputs)  |        |        | 6       | 6       |
| Programmable logic operators, FLIP-FLOP   |        |        | ●       | ●       |
| Programmable logic operators, switch on/off delay   |        |        | ●       | ●       |
| Programmable logic operators, system statuses   | ●      | ●      | ●       | ●       |
| Programmable muting logic   |        |        | ●       | ●       |
| STOP 0 / STOP 1   | ●      | ●      | ●       | ●       |
| Start/restart interlock (RES), selectable   | ●      | ●      | ●       | ●       |
| Dynamic contactor monitoring (EDM), selectable  | ●      | ●      | ●       | ●       |
| Monitoring modules with contact-simultaneity monitoring   | ●      | ●      | ●       | ●       |
| Activation/deactivation of function modules   | ●      | ●      | ●       | ●       |
| Support of AS-Interface A/B technology  | ●      | ●      | ●       | ●       |
| Diagnostics data transfer via AS-Interface  | ●      | ●      | ●       | ●       |
| Error unlocking via AS-Interface  | ●      | ●      | ●       | ●       |

# SAFETY MONITORS, ASM1, ASM1E

## Ordering information

### ASM1 or ASM1E

Included in delivery: Device front screen for protection and sealing; connecting and operating instructions (short version)

**Functions:** Monitoring the AS-Interface Safety at Work bus participants, with selectable start/restart interlock, contactor monitoring, STOP 0/STOP 1, PC diagnostics interface

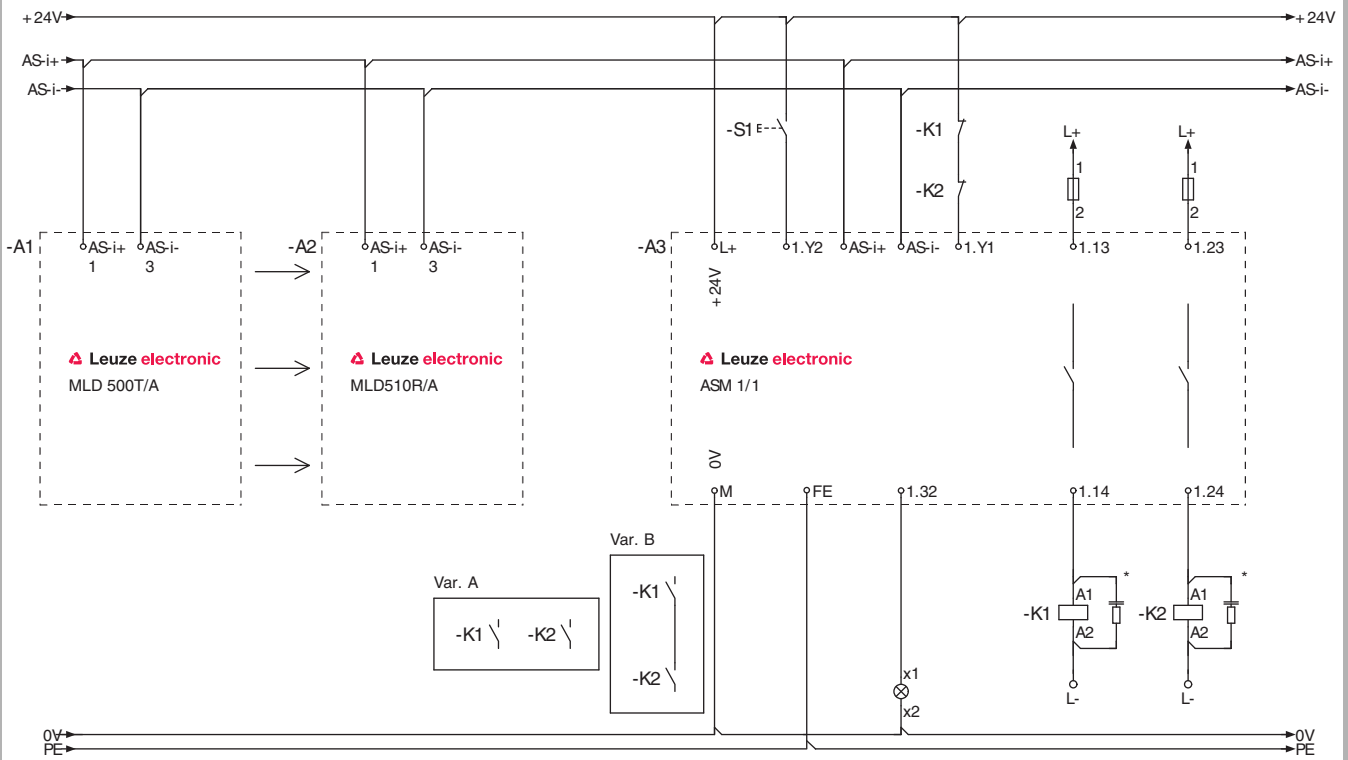
| Part no. | Article   | Description                           | Safety-related switching outputs (OSSDs) |
|----------|-----------|---------------------------------------|--|
| 580020   | ASM1/1    | AS-i Safety Monitor                   | 1 release circuit                        |
| 580024   | ASM1E/1   | AS-i Safety Monitor, extended         | 1 release circuit                        |
| 580021   | ASM1/2    | AS-i Safety Monitor                   | 2 release circuits                       |
| 580025   | ASM1E/2   | AS-i Safety Monitor, extended         | 2 release circuits                       |
| 580055   | ASM1E-m/1 | AS-i Safety Monitor, extended, muting | 1 release circuit                        |
| 580056   | ASM1E-m/2 | AS-i Safety Monitor, extended, muting | 2 release circuits                       |

[www.leuze.com/en/asi/](http://www.leuze.com/en/asi/)

## AS-Interface Safety at Work

### Electrical connection

#### ASM1 connection example



\*) Spark extinction circuit, supply suitable spark extinction

ASM1 Safety Monitor with COMPACTplus Safety Light Curtain with integrated AS-Interface

Please observe the operating instructions of the components!

# SAFETY MONITORS, ASM1, ASM1E

## Technical data

| General system data   |   |  |
|---|---|--|
| SIL in accordance with IEC 61508 and SILCL in accordance with EN/IEC 62061                | 3   |  |
| Performance Level (PL) in accordance with EN ISO 13849-1                                  | e   |  |
| Probability of a failure to danger per hour (PFH <sub>d</sub> )                           | 9.10 x 10 <sup>-9</sup>   |  |
| Service life (T <sub>M</sub> ) in accordance with EN ISO 13849-1                          | 20 years  |  |
| Number of cycles until 10% of the components have a failure to danger (B <sub>10d</sub> ) | With DC1 (ohmic load)   | On request   |
|   | With AC1 (ohmic load)   |  |
|   | With DC13 (inductive load)  | 10,000,000<br>(I ≤ 2 A, 24 V)  |
|   | With AC15 (inductive load)  | 100,000 (2 A, 230 V)<br>250,000 (1 A, 230 V)<br>540,000 (0.5 A, 230 V) |
|   | Low load (20% nominal load)   | On request   |
| Category in accordance with EN ISO 13849  | 4   |  |
| Stop category in accordance with EN/IEC 60204-1   | STOP 0 and 1  |  |
| Supply voltage  | 24 V DC, ±15%   |  |
| System response time (exclusive sensor response time)                                     | Max. 40 ms  |  |
| Readiness delay   | Max. 10 s   |  |
| Protection rating   | IP 20 (only suitable for use in electrical operating rooms/cabinets with IP 54 minimum protection rating)   |  |
| Ambient temperature, operation  | -20...+60°C   |  |
| Ambient temperature, storage  | -30...+70°C   |  |
| Dimensions (W x H x D)  | 45 mm x 105 mm x 120 mm   |  |
| Housing material  | Polyamide PA 66   |  |
| Mounting  | Snap-on fastening on DIN rails in accordance with EN 50022  |  |
| Connection system   | 1x 0.5 to 4.0 mm <sup>2</sup> and 2x 0.5 to 2.5 mm <sup>2</sup> (single-wired)<br>1x 0.5 to 2.5 mm <sup>2</sup> and 2x 0.5 to 1.5 mm <sup>2</sup> (multi-wire)<br>2x 20 to 14 (AWG) |  |
| Current consumption   | 150 mA (ASM1/1, ASM1E/1), 200 mA (ASM1/2, ASM1E/2)  |  |
| Number of Safety Monitors per AS-Interface network  | 4 (with maximum 31 integrated AS-Interface slaves)  |  |
| AS-i data   |   |  |
| AS-i profile  | Monitor 7.F   |  |
| AS-i voltage range  | 18.5...31.6 V   |  |
| AS-i current consumption  | < 45 mA   |  |
| Configuration interface   |   |  |
| RS 232  | 9600 baud, no parity, 1 start bit, 1 stop bit, 8 data bits  |  |

[www.leuze.com/en/asi/](http://www.leuze.com/en/asi/)

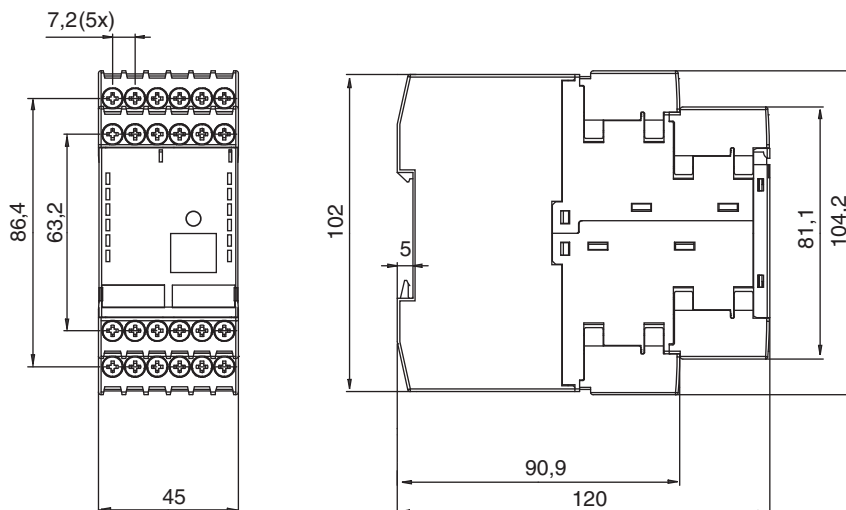
## AS-Interface Safety at Work

### Technical data

| Inputs and outputs                         |  |
|--|--|
| Input start                                | Opto-coupling input (high-active), input current approx. 10 mA with 24 V DC                                      |
| Input feedback circuit                     | Opto-coupling input (high-active), input current approx. 10 mA with 24 V DC                                      |
| Signal output ("Safety on" – OSSDs active) | pnp transistor output, 200 mA, short circuit and reverse-connect protection                                      |
| Safety-related switching outputs (OSSDs)   | Up to 2 potential-free safety-related switching outputs (max. contact load: 1 A with 24 V DC, 3 A with 230 V AC) |
| Fuse                                       | External with max. 4 A MT  |
| Overvoltage category                       | 3 (for rated operating voltage, 300 V AC in accordance with VDE 0110 Part 1)                                     |

Please note the additional information in the connecting and operating instructions at [www.leuze.com/en/asi](http://www.leuze.com/en/asi).

### AS-Interface Safety at Work ASM1, ASM1E dimensional drawings



Dimensions in mm

### Accessories ordering information

See page 298.

**ASM1, ASM1E**  
p. 284, 298

ASM2E  
p. 292, 298

ROTOSCAN RS4/AS-i  
p. 300

COMPACTplus/AS-i  
p. 302

MLD 500/AS-i  
p. 304, 306

# SAFETY MONITORS, ASM1, ASM1E

Machine Safety

Machine Safety  
Services

Safety Engineer-  
ing Software

Safety Laser  
Scanners

Safety Light  
Curtains

Multiple Light  
Beam Safety  
Devices

Light Beam  
Safety Device  
Sets

Single Light  
Beam Safety  
Devices

AS-Interface  
Safety at Work

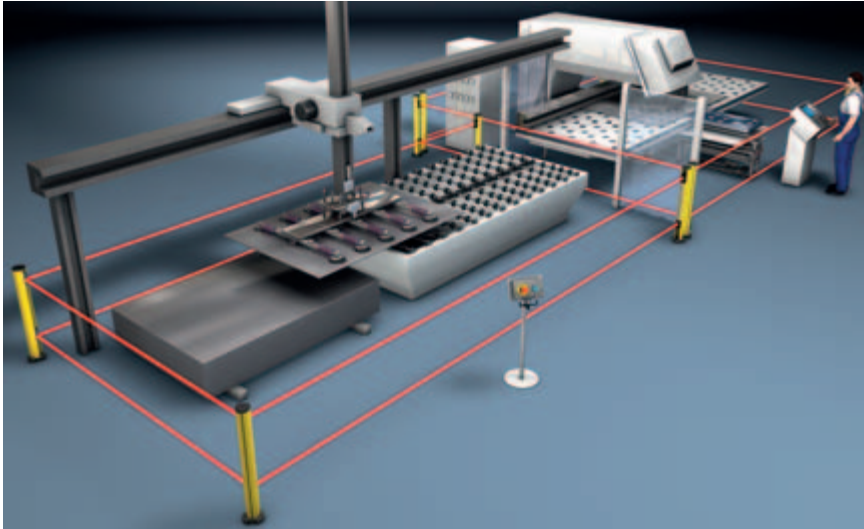
Safety Proximity  
Sensors

[www.leuze.com/en/asi/](http://www.leuze.com/en/asi/)



## AS-Interface Safety at Work

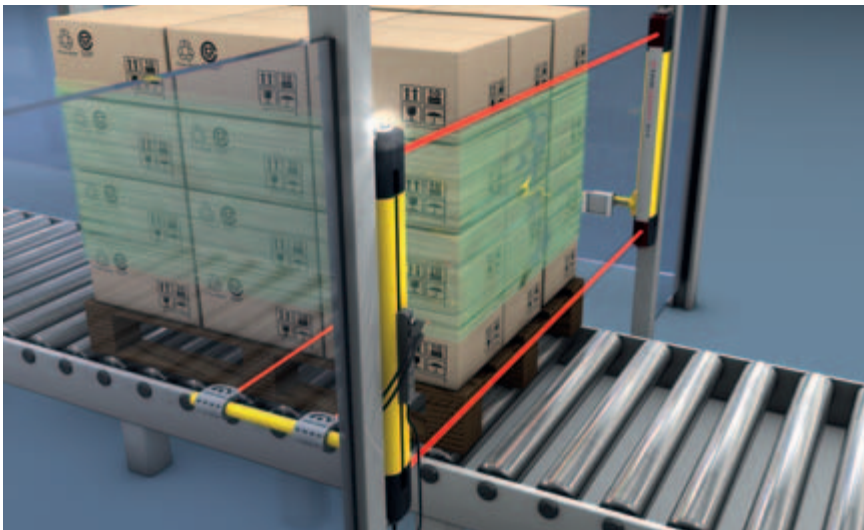
### Safety Monitor, ASM2E



*Coupling adjacent AS-i networks with the ASM2E Safety Monitor provides the option of a cross-network E-Stop connection and a global restart, especially with large and linked systems.*

The ASM2E Safety Monitor has all the functionalities and features of the ASM1E Safety Monitor. Several safety-related actuators, such as drives or valve modules, can be monitored and safely switched simultaneously with just one ASM2E Safety Monitor. This means, for example, that in one conveyor line all drives in an actuator group can be blocked or released at the same time. Adjacent AS-i networks can also be safety-related linked with the ASM2E Safety Monitor, so that, for example, if an E-Stop button is pressed in an AS-i network, the adjacent network also switches off immediately. And adjacent networks can also be released in the same way.

The status information of the safety and signal outputs can also be retrieved from the respective other network for diagnostics purposes. A PC is not required to swap out the monitor or an actuator slave. For the user this means an efficient and economic use of their existing AS-i infrastructure.



*The muting functionality enables palettes to pass by the electro-sensitive protective equipment without any process interruption with both the ASM1E and the ASM2E Safety Monitor*

#### Typical areas of application

- Coupling adjacent AS-i networks in linked systems
- Safe, simultaneous drive switch-off in conveyor systems
- Applications in packaging systems, car manufacturing, storage systems, machine tools, processing centers, big production systems

# SAFETY MONITOR, ASM2E

## Important technical data, overview

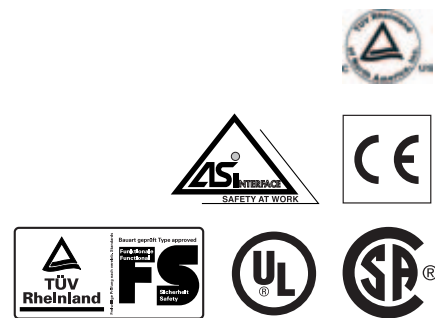
|  |  |                |
|--|--|----------------|
| SIL in accordance with IEC 61508 and SILCL in accordance with EN/IEC 62061       | 3  |                |
| Performance Level (PL) in accordance with EN ISO 13849-1                         | e  |                |
| Category in accordance with EN ISO 13849   | 4  |                |
| Stop category in accordance with EN/IEC 60204-1                                  | STOP 0 and 1                               |                |
| Supply voltage   | 24 V DC, ±15%                              |                |
| System response time (without sensor/actuator response time)                     | Max. 40 ms                                 |                |
| Protection rating  | IP 20                                      |                |
| Ambient temperature, operation   | -20...+60°C                                |                |
| Dimensions (W x H x D)   | 45 mm x 105 mm x 120 mm                    |                |
| Number of Safety Monitors per AS-Interface network                               | 4 (with maximum 31 integrated AS-i slaves) |                |
| Safety-related switching outputs   | <b>ASM2E/1</b>                             | <b>ASM2E/2</b> |
| Safety-related switching outputs (OSSDs)   | 1  | 2              |
| Safety-related switching outputs (OSSDs), synchronous with AS-i switching signal |  | 1              |
| Safe AS-i switching signal for safe actuators or coupling adjacent networks      | 1  | 1              |
| Safety-related switching outputs (OSSD), potential-free                          | 1 A, 24 V DC / 3 A, 230 V AC               |                |

### Special features

- **Safety-related control of safe AS-i actuators with same safe AS-i address**
- **Higher level start and E-Stop functions with safety-related coupling of adjacent AS-i networks**
- **Help signals for start/restart interlock status**
- **AS-i actuator error restart**
- **Furthermore: All ASM1E Safety Monitor functions and features are provided**



### Features



### Further information

|                                    | Page |
|------------------------------------|------|
| ● Ordering information             | 294  |
| ● Electrical connection            | 295  |
| ● Technical data                   | 296  |
| ● Dimensional drawings             | 297  |
| ● Accessories ordering information | 298  |

## AS-Interface Safety at Work

### Functions

|   | ASM2E/1 | ASM2E/2 |
|---|---------|---------|
| Number of safety-related switching outputs (OSSDs)  | 1       | 2       |
| Number of configurable function modules   | 48      | 48      |
| PC configuration and diagnostics interface  | RS 232  | RS232   |
| Monitoring modules with contact bounce filter   | ●       | ●       |
| Service button for manual error unlocking and automatic device swap-out of the safe AS-i slave            | ●       | ●       |
| Status LED display for AS-Interface communication, OSSD, start/restart interlock, protective mode, errors | ●       | ●       |
| System signal output  | ●       | ●       |
| <b>Selectable functions for AS-i actuator</b>   |         |         |
| AS-i actuator error unlocking   | ●       | ●       |
| Start/restart interlock (RES)   | ●       | ●       |
| Dynamic contactor monitoring (EDM)  | ●       | ●       |
| <b>Further functions (can be configured with asimon configuration and diagnostics software)</b>           |         |         |
| Functions as with ASM1E, see page 286   |         |         |

### Ordering information

#### ASM2E

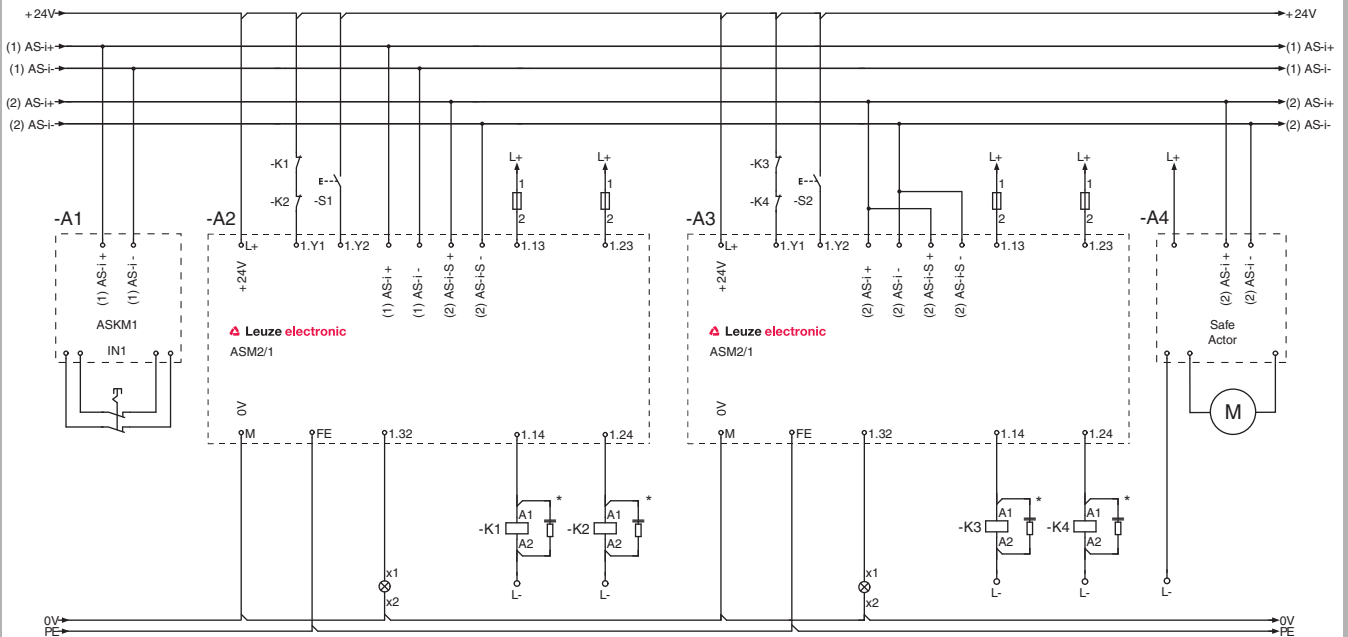
Included in delivery: Device front screen for protection and sealing; connecting and operating instructions (short version)

**Functions:** Monitoring the AS-i actuators, coupling AS-i networks, global E-STOP and restart, selectable start/restart interlock, contactor monitoring, STOP 0/STOP 1, PC diagnostics interface

| Part no. | Article   | Description                                | Safety-related switching outputs (OSSDs)                   |
|----------|-----------|--|--|
| 580028   | ASM2E/1   | AS-i Safety Monitor, extended, AS-i output | 1 release circuit, 1 AS-i switching signal                 |
| 580029   | ASM2E/2   | AS-i Safety Monitor, extended, AS-i output | 2 release circuits, 1 AS-i switching signal                |
| 580057   | ASM2E-m/1 | AS-i Safety Monitor, extended, muting      | 1 release circuit (relay output), 1 AS-i switching signal  |
| 580058   | ASM2E-m/2 | AS-i Safety Monitor, extended, muting      | 2 release circuits (relay output), 1 AS-i switching signal |

**Electrical connection**

**ASM2E connection example**



\*) Spark extinction circuit, supply suitable spark extinction

Higher level E-Stop switching of AS-i networks coupled via ASM2E

**!** Please observe the operating instructions of the components!

## AS-Interface Safety at Work

### Technical data

| General system data   |   |  |
|---|---|--|
| SIL in accordance with IEC 61508 and SILCL in accordance with EN/IEC 62061                | 3   |  |
| Performance Level (PL) in accordance with EN ISO 13849-1                                  | e   |  |
| Probability of a failure to danger per hour (PFH <sub>d</sub> )                           | 9.10 x 10 <sup>-9</sup>   |  |
| Service life (T <sub>M</sub> ) in accordance with EN ISO 13849-1                          | 20 years  |  |
| Number of cycles until 10% of the components have a failure to danger (B <sub>10d</sub> ) | With DC1 (ohmic load)   | On request   |
|   | With AC1 (ohmic load)   | On request   |
|   | With DC13 (inductive load)  | 10,000,000<br>(I ≤ 2 A, 24 V)  |
|   | With AC15 (inductive load)  | 100,000 (2 A, 230 V)<br>250,000 (1 A, 230 V)<br>540,000 (0.5 A, 230 V) |
|   | Low load (20% nominal load)   | On request   |
| Category in accordance with EN ISO 13849  | 4   |  |
| Stop category in accordance with EN/IEC 60204-1   | STOP 0 and 1  |  |
| Supply voltage  | 24 V DC, ±15%   |  |
| System response time (without sensor/actuator response time)                              | Max. 40 ms  |  |
| Readiness delay   | Max. 10 s   |  |
| Protection rating   | IP 20 (only suitable for use in electrical operating rooms/cabinets with IP 54 minimum protection rating)   |  |
| Ambient temperature, operation  | -20...+60°C   |  |
| Ambient temperature, storage  | -30...+70°C   |  |
| Dimensions (W x H x D)  | 45 mm x 105 mm x 120 mm   |  |
| Housing material  | Polyamide PA 66   |  |
| Mounting  | Snap-on fastening on DIN rails in accordance with EN 50022  |  |
| Connection system   | 1x 0.5 to 4.0 mm <sup>2</sup> and 2x 0.5 to 2.5 mm <sup>2</sup> (single-wired)<br>1x 0.5 to 2.5 mm <sup>2</sup> and 2x 0.5 to 1.5 mm <sup>2</sup> (multi-wire)<br>2x 20 to 14 (AWG) |  |
| Current consumption   | 150 mA (ASM2/1, ASM2E/1), 200 mA (ASM2/2, ASM2E/2)  |  |
| Number of Safety Monitors per AS-Interface network  | 4 (with maximum 31 AS-Interface slaves)   |  |
| AS-i data   |   |  |
| AS-i profile  | Monitor 7.F   |  |
| AS-i voltage range  | 18.5...31.6 V   |  |
| AS-i current consumption  | < 45 mA   |  |
| Configuration interface   |   |  |
| RS 232  | 9600 baud, no parity, 1 start bit, 1 stop bit, 8 data bits  |  |

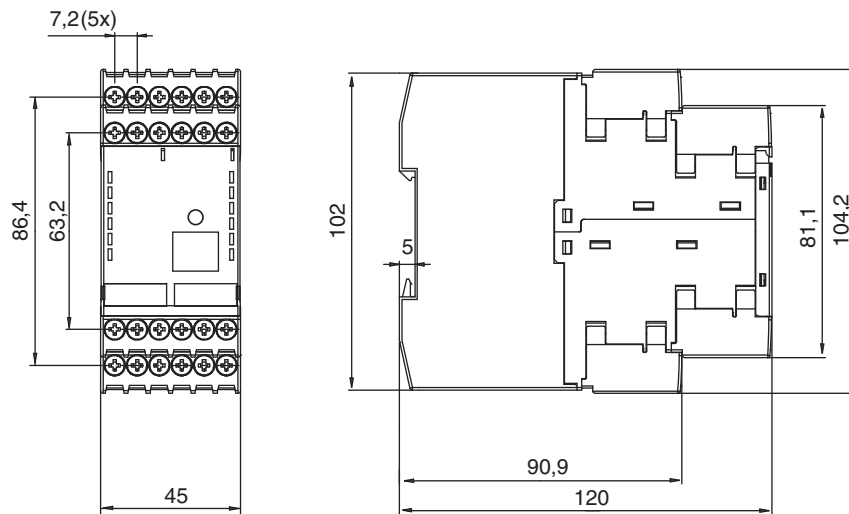
# SAFETY MONITOR, ASM2E

## Technical data

| Inputs and outputs   |  |                |
|--|--|----------------|
| Input start  | Opto-coupling input (high-active), input current approx. 10 mA with 24 V DC  |                |
| Input feedback circuit   | Opto-coupling input (high-active), input current approx. 10 mA with 24 V DC  |                |
| Signal output ("Safety on" – OSSDs active)                                       | pnp transistor output, 200 mA, short circuit and reverse-connect protection  |                |
| Safety-related switching outputs   | <b>ASM2E/1</b>   | <b>ASM2E/2</b> |
| Safety-related switching outputs (OSSDs)   | 1  | 1              |
| Safety-related switching outputs (OSSDs), synchronous with AS-i switching signal |  | 1              |
| Safe AS-i switching signal for safe actuators or coupling adjacent networks      | 1  | 1              |
| Safety-related switching outputs (OSSD), potential-free                          | 1 A, 24 V DC / 3 A, 230 V AC   |                |
| Fuse   | External with max. 4 A MT  |                |
| Overvoltage category   | 3 (for rated operating voltage, 300 V AC in accordance with VDE 0110 Part 1) |                |

Please note the additional information in the connecting and operating instructions at [www.leuze.com/en/asi](http://www.leuze.com/en/asi).

## AS-Interface Safety at Work ASM2E dimensional drawings



Dimensions in mm

[www.leuze.com/en/asi/](http://www.leuze.com/en/asi/)



## AS-Interface Safety at Work

### Accessories ordering information

#### ASM1, ASM1E, ASM2E accessories

| Part no. | Article    | Description   |
|----------|------------|---|
| 580032   | ASM-SWC    | ASM start-up set for ASM1, ASM1E and ASM2E includes: Configuration and diagnostics software, connecting and operating instructions and user's guide, software (PDF file on CD-ROM), programming cable, device swap-out data cable |
| 50104078 | CB-ASM-PK1 | ASM parametering cable  |
| 50104079 | CB-ASM-DK1 | ASM device swap-out data cable  |

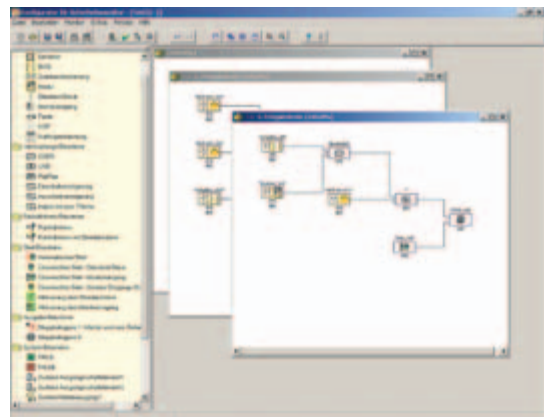
#### Safety Monitor start-up set, ASM-SWC

The complete ASM-SWC package with configuration and diagnostics software, PC cable set and detailed technical manual provides the user with everything that they require for the Safety Monitor start-up.



#### Configuration and diagnostics software

asimon is the user-friendly configuration and diagnostics software for the ASM Safety Monitors. asimon provides the user with the ability to easily configure Safety Monitors via an intuitive menu guide, and perform an efficient system diagnosis. The asimon software's multi-window system is one of its especially impressive features. Customer-specific user modules can be easily defined with asimon. Safety configurations can be visualized as circuit diagrams, and a graphic printout is possible at all times.



**ASM1, ASM1E**  
p. 284, 298

**ASM2E**  
p. 292, 298

ROTOSCAN RS4/AS-i  
p. 300

COMPACTplus/AS-i  
p. 302

MLD 500/AS-i  
p. 304, 306

# ASM1, ASM1E, ASM2E SAFETY MONITOR

## Accessories ordering information

| AS-i accessories |                      |   |                 |
|------------------|----------------------|---|-----------------|
| Part no.         | Article              | Description   | Length, design  |
| 580003           | APG-02               | Programming device for entering addresses with standard/A/B AS-i slaves   |                 |
| 50024346         | AM 06                | AS-i adapter for bus connection (AS-i flat cable), M12, 3-pin   |                 |
| 580004           | AC-PDA1/A            | AS-i adapter for bus connection and current supply for COMPACTplus receiver/transceiver as well as ROTOSCAN RS4, M12, 5-pin |                 |
| 548361           | CB-M12-1000-5GF/GM   | Connection cable, adapter device, plug and socket, 1:1, M12, 5-pin  | 1 m, straight   |
| 548362           | CB-M12-2000-5GF/GM   | Connection cable, adapter device, plug and socket, 1:1, M12, 5-pin  | 2 m, straight   |
| 678031           | CB-M12-1000S-5GF/GM  | Connecting cable, plug and socket, 1:1, M12, 5-pin, shielded  | 1 m, straight   |
| 678033           | CB-M12-2500S-5GF/GM  | Connecting cable, plug and socket, 1:1, M12, 5-pin, shielded  | 2.5 m, straight |
| 678035           | CB-M12-5000S-5GF/GM  | Connecting cable, plug and socket, 1:1, M12, 5-pin, shielded  | 5 m, straight   |
| 678040           | CB-M12-10000S-5GF/GM | Connecting cable, plug and socket, 1:1, M12, 5-pin, shielded  | 10 m, straight  |
| 678045           | CB-M12-15000S-5GF/GM | Connecting cable, plug and socket, 1:1, M12, 5-pin, shielded  | 15 m, straight  |
| 548502           | CB-M12-2000S-8GF/GM  | Connecting cable, plug and socket, 1:1, M12, 8-pin, shielded  | 2 m, straight   |
| 548505           | CB-M12-5000S-8GF/GM  | Connecting cable, plug and socket, 1:1, M12, 8-pin, shielded  | 5 m, straight   |
| 548510           | CB-M12-10000S-8GF/GM | Connecting cable, plug and socket, 1:1, M12, 8-pin, shielded  | 10 m, straight  |

### APG-02 programming device

The handy APG-02 device is used for entering the bus address for standard/A/B AS-i slaves.





## AS-Interface Safety at Work

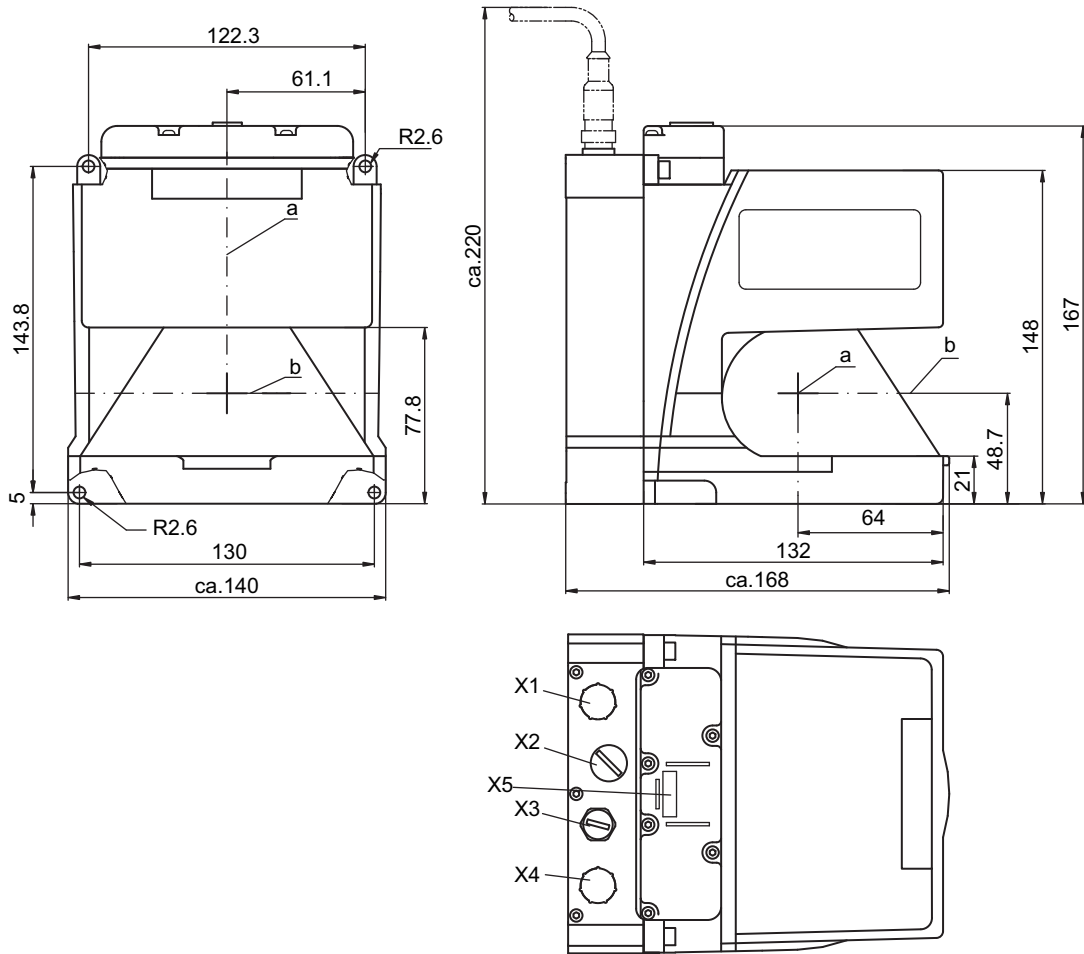
### ROTOSCAN RS4/AS-i Safety Laser Scanners

#### Electrical connection

Connection example, see page 288.

For more information go to [www.leuze.com/en/asi](http://www.leuze.com/en/asi).

#### Dimensional drawings



X1 = AS-i bus connection and 24-volt power supply  
 X2 = AS-i address programming device  
 X3 = Field pair changeover  
 X4 = Reset button  
 X5 = Optical PC interface

a = Rotating mirror axis  
 b = Scan level

Dimensions in mm

#### Ordering information

Ordering information, see page 72.

ASM1, ASM1E  
 p. 284, 298

ASM2E  
 p. 292, 298

**ROTOSCAN RS4/AS-i**  
 p. 300

COMPACTplus/AS-i  
 p. 302

MLD 500/AS-i  
 p. 304, 306

# ROTOSCAN RS4/AS-i

## Important technical data, overview

|  |  |
|--|--|
| Type in accordance with EN/IEC 61496                                       | 3  |
| SIL in accordance with IEC 61508 and SILCL in accordance with EN/IEC 62061 | 2  |
| Performance Level (PL) in accordance with EN ISO 13849-1                   | d  |
| Category in accordance with EN ISO 13849                                   | 3  |
| Resolution (adjustable)  | 30 mm   40 mm   50 mm   70 mm   150 mm   |
| Dimensions (W x H x D)   | 140 mm x 220 mm x 168 mm   |
| Safety-related switching outputs   | AS-i Safety Interface, 4-bit AS-i data   |
| Connection system  | M12 plug, IR interface for configuration   |
| AS-i profile   | Safe slave   |
| Slave address  | 1...31, programmable (factory setting = 0)   |
| Cycle time in accordance with AS-i specifications                          | 5 ms   |
| Current consumption from AS-i circuit                                      | 50 mA  |
| Sensor response time   | 2-piece evaluation, 85 ms (corresponds with 2 scans), up to 16 scans can be set (645 ms) |
| Restart delay time   | Min. 160 ms (after protective field release)   |

Please note the additional information in the connecting and operating instructions at [www.leuze.com/en/asi](http://www.leuze.com/en/asi).

### Function extension with ASM1/ASM1E Safety Monitor

|  | ASM1/1 | ASM1/2 | ASM1E/1 | ASM1E/2 |
|--|--------|--------|---------|---------|
| Start/restart interlock (RES), selectable      | ●      | ●      | ●       | ●       |
| Dynamic contactor monitoring (EDM), selectable | ●      | ●      | ●       | ●       |
| Diagnostics data transfer via AS-Interface     | ●      | ●      | ●       | ●       |

### Special features

- **Type 3 Safety Laser Scanner in accordance with EN/IEC 61496-1/-3**
- **Integrated interface for direct connection to the safe AS-Interface network via M12 device plug**
- **Bus addressing with AS-Interface addressing device directly via M12 device plug**
- **Safe data transfer of the output signal via AS-Interface**
- **Diagnostics data transfer and warning zone monitoring via AS-Interface bus**



### Features



### Further information

|  | Page |
|--|------|
| ● Functions, see ROTOSCAN RS4            | 71   |
| ● Electrical connection, see ASM1        | 288  |
| ● Dimensional drawings                   | 300  |
| ● Ordering information, see ROTOSCAN RS4 | 72   |

## AS-Interface Safety at Work

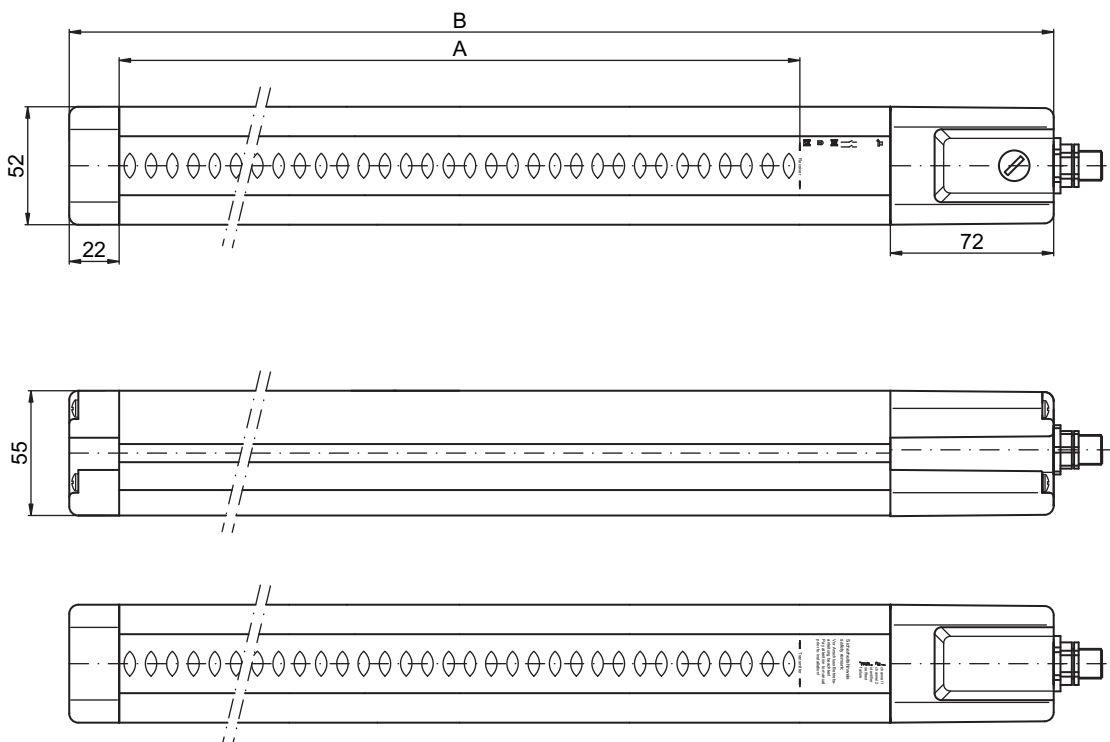
### COMPACTplus/AS-i Safety Light Curtains

#### Electrical connection

Connection example, see page 288.

For more information go to [www.leuze.com/en/compactplus-m](http://www.leuze.com/en/compactplus-m) and [www.leuze.com/en/compactplus-b](http://www.leuze.com/en/compactplus-b).

#### Dimensional drawings



A = Protective field height according to ordering information  
 B = A + 134 mm

Dimensions in mm

#### Ordering information

Ordering information, see Safety Light Curtains COMPACTplus, page 168.

ASM1, ASM1E  
p. 284, 298

ASM2E  
p. 292, 298

ROTOSCAN RS4/AS-i  
p. 300

**COMPACTplus/AS-i**  
**p. 302**

MLD 500/AS-i  
p. 304, 306

# COMPACTplus/AS-i

## Important technical data, overview

|  |  |          |          |          |
|--|--|----------|----------|----------|
| Type in accordance with EN/IEC 61496                                       | 4  |          |          |          |
| SIL in accordance with IEC 61508 and SILCL in accordance with EN/IEC 62061 | 3  |          |          |          |
| Performance Level (PL) in accordance with EN ISO 13849-1                   | e  |          |          |          |
| Category in accordance with EN ISO 13849                                   | 4  |          |          |          |
| Resolution (type-dependent)  | 14 mm  | 30 mm    | 50 mm    | 90 mm    |
| Range  | 0...6 m  | 0...18 m | 0...18 m | 0...18 m |
| Protective field height (type-dependent)                                   | 150...3000 mm  |          |          |          |
| Profile cross-section  | 52 mm x 55 mm  |          |          |          |
| Safety-related switching output  | AS-i Safety Interface  |          |          |          |
| Connection system  | M12 plug (AS-i Safety)   |          |          |          |
| AS-i profile   | S-7.B.1, safe slave  |          |          |          |
| Slave address  | 1...31, programmable (factory setting = 0)   |          |          |          |
| Cycle time in accordance with AS-i specifications                          | 5 ms   |          |          |          |
| Current consumption from AS-i circuit                                      | 50 mA  |          |          |          |
| Sensor response time   | 10 to 66 ms  |          |          |          |
| Restart delay time   | 20...5000 ms, can be set with SafetyLab software, presetting 100 ms (after protective field release) |          |          |          |

Please note the additional information in the connecting and operating instructions at [www.leuze.com/en/asi](http://www.leuze.com/en/asi).

For more information go to [www.leuze.com/en/compactplus-m](http://www.leuze.com/en/compactplus-m) and [www.leuze.com/en/compactplus-b](http://www.leuze.com/en/compactplus-b).

### Special features

- **Type 4 Safety Light Curtain in accordance with EN/IEC 61496-1/-2**
- **Integrated AS-Interface, bus connection via the AC-PDA1/A, adapter for AS-i data transfer and separate 24-volt power supply**
- **Safe data transfer of the OSSD signals via AS-Interface**
- **Device swap-out without PC via SERVICE function of the AS-i Safety Monitor**
- **Additional diagnostics information via AS-Interface, e.g. muting sensors status, muting or weak signal display**
- **Several devices can be cascaded (COMPACTplus-b)**
- **Direct connection of muting sensors, reset button or indicator directly on the device via sensor connection module (COMPACTplus-m)**



### Features



### Further information

| Further information                     | Page     |
|---|----------|
| ● Muting function package               | 149      |
| ● Blanking function package             | 167      |
| ● Electrical connection, see ASM1       | 288      |
| ● Dimensional drawings                  | 302      |
| ● Ordering information, see COMPACTplus | 150, 168 |

## AS-Interface Safety at Work

### MLD 500/AS-i Single Light Beam Safety Devices

#### Electrical connection

Connection example, see page 288.

#### Dimensional drawings

Dimensional drawings, see page 254.

#### Ordering information

Ordering information, see page 251.

**Important technical data, overview**

|  |  |
|--|--|
| Type in accordance with EN/IEC 61496                                       | 4  |
| SIL in accordance with IEC 61508 and SILCL in accordance with EN/IEC 62061 | 3  |
| Performance Level (PL) in accordance with EN ISO 13849-1                   | e  |
| Category in accordance with EN ISO 13849                                   | 4  |
| Range (type-dependent)   | MLD5yy-R /-T: 0.5...70 m<br>MLD5yy-xR /-xT: 20...100 m         |
| Profile cross-section  | 52 mm x 55 mm  |
| Safety-related switching output  | AS-i Safety Interface  |
| Connection system  | M12 plug (AS-i Safety)   |
| AS-i profile   | S-7.B.1, safe slave  |
| Slave address  | 1...31, programmable (factory setting = 0)                     |
| Cycle time in accordance with AS-i specifications                          | 5 ms   |
| Current consumption from AS-i circuit                                      | 50 mA (transmitter),<br>max. 140 mA (receiver, type-dependent) |
| Sensor response time   | 25 ms  |
| Restart delay time   | 100 ms or 500 ms   |

For more information go to [www.leuze.com/en/mld](http://www.leuze.com/en/mld).

**Special features**

- **Type 4 Single Light Beam Safety Device in accordance with EN/IEC 61496**
- **Integrated AS-Interface, bus connection via the M12-AS-i adapter**
- **Safe data transfer of the OSSD signals via AS-Interface**
- **Device swap-out without PC via SERVICE function of the AS-i Safety Monitor**



**Features**



**Further information**

|                                     | Page |
|-------------------------------------|------|
| ● Electrical connection, see ASM1   | 288  |
| ● Dimensional drawings, see MLD 500 | 254  |
| ● Ordering information, see MLD 500 | 251  |

## AS-Interface Safety at Work

### MLD 500/AS-i Multiple Light Beam Safety Devices

#### Electrical connection

Connection example, see page 288.

#### Dimensional drawings

Dimensional drawings, see page 207.

#### Ordering information

Ordering information, see page 199.

**Important technical data, overview**

|  |  |        |        |
|--|--|--------|--------|
| Type in accordance with EN/IEC 61496                                       | 4  |        |        |
| SIL in accordance with IEC 61508 and SILCL in accordance with EN/IEC 62061 | 3  |        |        |
| Performance Level (PL) in accordance with EN ISO 13849-1                   | e  |        |        |
| Category in accordance with EN ISO 13849                                   | 4  |        |        |
| Number of beams  | 2  | 3      | 4      |
| Beam distance  | 500 mm   | 400 mm | 300 mm |
| Range (type-dependent)   | MLDxyy-R/-T: 0.5...50m<br>MLDxyy-xR/-xT: 20...70m              |        |        |
| Range (transceiver systems)  | 0.5 - 8 m (2-beam)<br>0.5 - 6 m (3-beam)                       |        |        |
| Profile cross-section  | 52 mm x 55 mm  |        |        |
| Safety-related switching output  | AS-i Safety Interface  |        |        |
| Connection system  | M12 plug (AS-i Safety)   |        |        |
| AS-i profile   | S-7.B.1, safe slave  |        |        |
| Slave address  | 1...31, programmable (factory setting = 0)                     |        |        |
| Cycle time in accordance with AS-i specifications                          | 5 ms   |        |        |
| Current consumption from AS-i circuit                                      | 50 mA (transmitter),<br>max. 140 mA (receiver, type-dependent) |        |        |
| Sensor response time   | 25 ms  |        |        |
| Restart delay time   | 100 ms or 500 ms   |        |        |

For more information go to [www.leuze.com/en/mld](http://www.leuze.com/en/mld).

**Special features**

- **Type 4 Multiple Light Beam Safety Device in accordance with EN/IEC 61496**
- **Integrated AS-Interface, bus connection via the M12-AS-i adapter**
- **Safe data transfer of the OSSD signals via AS-Interface**
- **Device swap-out without PC via SERVICE function of the AS-i Safety Monitor**



**Features**

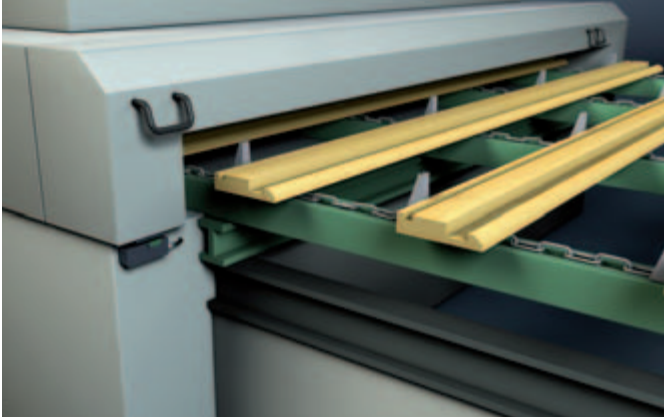
**Further information** **Page**

|                                     |     |
|-------------------------------------|-----|
| ● Electrical connection, see ASM1   | 288 |
| ● Dimensional drawings, see MLD 500 | 207 |
| ● Ordering information, see MLD 500 | 199 |

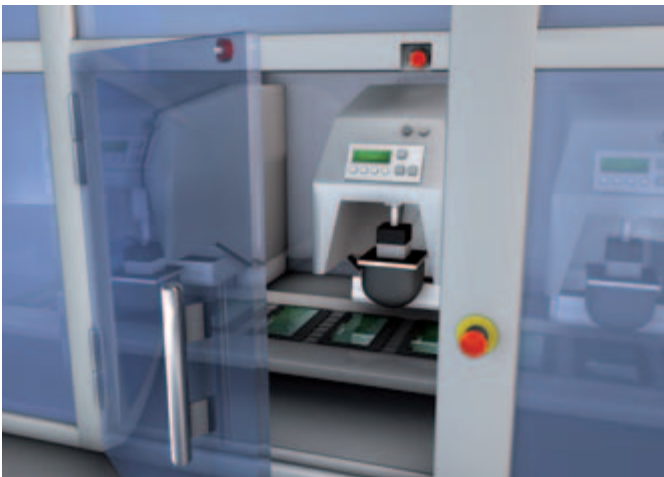


## SAFETY PROXIMITY SENSORS

### Overview



*Use of a safety transponder to guard a protective hood in the wood-processing industry*



*MC330 Cylindrical Magnetically Coded Sensor for safeguarding a pad printing machine.*

With (RFID) safety transponders as well as magnetically coded sensors and the corresponding MSI-MC3x safety relays, Leuze electronic provides special safety systems with closed design and high-strength plastic housing for challenging application cases or for guards. This is possible because neither technologies possess any open contacts or mechanisms. If, for example, a door is opened, the actuator mounted here is separated from the sensor, which is located on the stationary part of the guard, and a switching signal is triggered. As a result, risky machine movements can only be executed while the protective device is closed.

The magnetically coded safety system always consists of an MC3x sensor, the corresponding actuator and the MSI-MC3x Safety Relay or an MSI 100/200 Safety Controller. The sensor contains a special combination of reed contacts that are contactlessly activated by the coded magnetic field of the actuator. In contrast, the safety transponders work on the basis of the RFID technology. Due to the uniqueness of the code transmitted by the actuator, they enable higher protection against possible manipulation. In addition, they are not sensitive to shocks and vibrations. Up to 32 safety transponders can be connected in series up to safety category 4 and Performance Level PL e.

MC330  
p. 310

MC336  
p. 318

MC388  
p. 324

RD800  
p. 330

Selection table



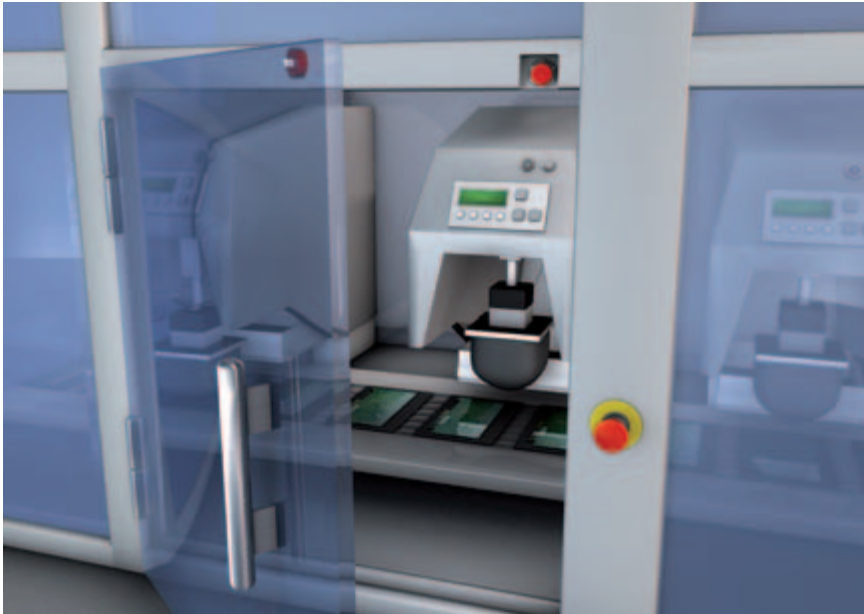
Selection of MC3x Magnetically Coded Sensors and RD800 Safety Transponders

| Category / Performance Level in accordance with EN ISO 13849 |                | Features, type-dependent |                               |                                | Actuator          |                   |                      |                                |      |
|--|----------------|--------------------------|-------------------------------|--------------------------------|-------------------|-------------------|----------------------|--------------------------------|------|
| Series connection  | Individual use | Diagnosis                | Assured cut-in distance (Sao) | Assured cut-out distance (Sar) | Unique assignment | Serial assignment | Flexible programming | *) Only individual application |      |
|  |                |                          |                               |                                |                   |                   |                      | Series                         | Page |
| up to 3 / PL e   | up to 4 / PL e |                          | < 6 mm                        | > 30 mm                        |                   | ●                 |                      | MC388                          | 326  |
|  |                |                          | < 3 mm                        | > 11 mm                        |                   | ●                 |                      | MC336                          | 320  |
|  |                |                          | < 6 mm                        | > 14 mm                        |                   | ●                 |                      | MC330                          | 312  |
| up to 4 / PL e   | up to 4 / PL e | ●                        | 10 mm                         | 16 mm                          | ●                 | ●                 |                      | RD800-S *)                     | 332  |
|  |                | ●                        | 10 mm                         | 16 mm                          | ●                 | ●                 |                      | RD800-M                        | 332  |
|  |                | ●                        | 10 mm                         | 16 mm                          | ●                 | ●                 | ●                    | RD800-MP                       | 332  |

[www.leuze.com/en/safetyproximitysensors/](http://www.leuze.com/en/safetyproximitysensors/)

## MAGNETICALLY CODED SENSOR

### MC330 Magnetically Coded Sensor



*Cylindrical Magnetically Coded Safety Sensor MC330 for safeguarding a pad printing machine.*

When a switching signal should be triggered in safety systems under demanding environmental conditions (dust, humidity and the like) in a manner virtually contactless and wear-free, the MC330 Magnetically Coded Sensor is used - optionally with large or small doors or flaps. It can be integrated in a particularly advantageous way with round bore holes, e.g. in aluminum profiles, since it can be screwed in recessed and then activated on the front.

#### Typical areas of application

- With critical ambient conditions
- Especially with dust, humidity and the like
- In the wood, pharmaceutical, food industry

**Important technical data, overview**

|   |  |
|---|--|
| Category in accordance with EN ISO 13849-1  | Up to 4 (depending on the number of connected sensors) |
| Performance Level (PL) in accordance with EN ISO 13849-1                            | Up to e (depending on the number of connected sensors) |
| Safe switching distances and off distance if markings are aligned:<br>Sao (on), Sar | < 6 mm, > 14 mm  |
| Switching tolerance (without ferromagnetic materials in immediate vicinity)         | ±1 mm  |
| Contact type  | Reed contacts (magnetically sensitive)                 |
| Contact equipment   | 1NO/1NC, 2NO   |
| Short circuit protection  | By means of MSI-MC3x Safety Relay                      |
| Approach speed of actuator towards sensor   | Min. 50 mm/s   |
| Response time   | 3 ms   |
| Ambient temperature, operation  | -20...+70 °C   |

**Functions**

- Interlock device without guard interlocking in accordance with EN 1088.
- Safety system in combination with an evaluation unit such as the MSI-MC3x Safety Relay or the MSI 100 or MSI 200 Safety Controller.
- Integration in control circuits up to category 4 in accordance with EN ISO 13849.

**Special features**

- **Not sensitive to dust, humidity and the like (dirt level 3 in accordance with EN 60947-1)**
- **Glass fiber reinforced plastic sensor and actuator**
- **Approach actuation directions lengthwise, high, deep**
- **Connection per M8 or M12 plug, PVC or PUR connection cable, each firmly integrated in the housing**
- **Integrated compact design**



**Features**



(in combination with MSI-MC3x)

**Further information Page**

|                                    |     |
|------------------------------------|-----|
| ● Ordering information             | 312 |
| ● Electrical connection            | 313 |
| ● Technical data                   | 315 |
| ● Dimensional drawings             | 317 |
| ● Accessories ordering information | 317 |
| ● MSI-MC310, MSI-MC311             | 458 |

# MAGNETICALLY CODED SENSOR

## Ordering information

### MC330

Included in delivery: 1 MC330-Sx-A actuator, 2 mounting rings, stainless steel mounting screw, application information (printed document)

**Notice:** the MSI-MC310 Safety Relay is required for certified evaluation! This must be ordered separately (see page 460).

**Functions:** Interlock device without guard interlocking in accordance with EN 1088, safety system in combination with MSI-MC3x Safety Relay (evaluation unit)

## MC330 Magnetically Coded Sensors

| Part no. | Article           | Description   |
|----------|-------------------|---|
| 63001100 | MC330-S1C2-A      | Sensor, 1NO/1NC, connection cable, 2 m, PVC                 |
| 63001101 | MC330-S1C5-A      | Sensor, 1NO/1NC, connection cable, 5 m, PVC                 |
| 63001102 | MC330-S1C10-A     | Sensor, 1NO/1NC, connection cable, 10 m, PVC                |
| 63001103 | MC330-S1R2-A      | Sensor, 1NO/1NC, connection cable, 2 m, PUR                 |
| 63001104 | MC330-S1R5-A      | Sensor, 1NO/1NC, connection cable, 5 m, PUR                 |
| 63001105 | MC330-S1R10-A     | Sensor, 1NO/1NC, connection cable, 10 m, PUR                |
| 63001106 | MC330-S1M8-A      | Sensor, 1NO/1NC, M8 plug, 4-pin                             |
| 63001107 | MC330-S1-C02M12-A | Sensor, 1NO/1NC, connection cable, with M12 plug 0.2 m, PVC |
| 63001120 | MC330-S2C2-A      | Sensor, 2NO/NC, connection cable, 2 m, PVC                  |
| 63001121 | MC330-S2C5-A      | Sensor, 2NO, connection cable 5 m, PVC                      |
| 63001126 | MC330-S2M8-A      | Sensor, 2NO, M8 plug 4-pin                                  |
| 63001127 | MC330-S2-C02M12-A | Sensor, 2NO, connection cable with M12 plug                 |

## Part number code for MC330

| Article                 | Description                                  |
|-------------------------|--|
| <b>MC330</b>            | <b>Magnetically Coded Sensors</b>            |
| <b>-S1, -S2</b>         | Sensor, 1NO/1NC, 2NO                         |
| <b>C02, C2, C5, C10</b> | PVC connection cable, length 0.2, 2, 5, 10 m |
| <b>R2, R5, R10</b>      | PUR connection cable, length 2, 5, 10 m      |
| <b>-M8, -M12</b>        | M8, M12 plug size                            |
| <b>-A</b>               | Standard version                             |

**MC330**

**MC330**  
p. 310

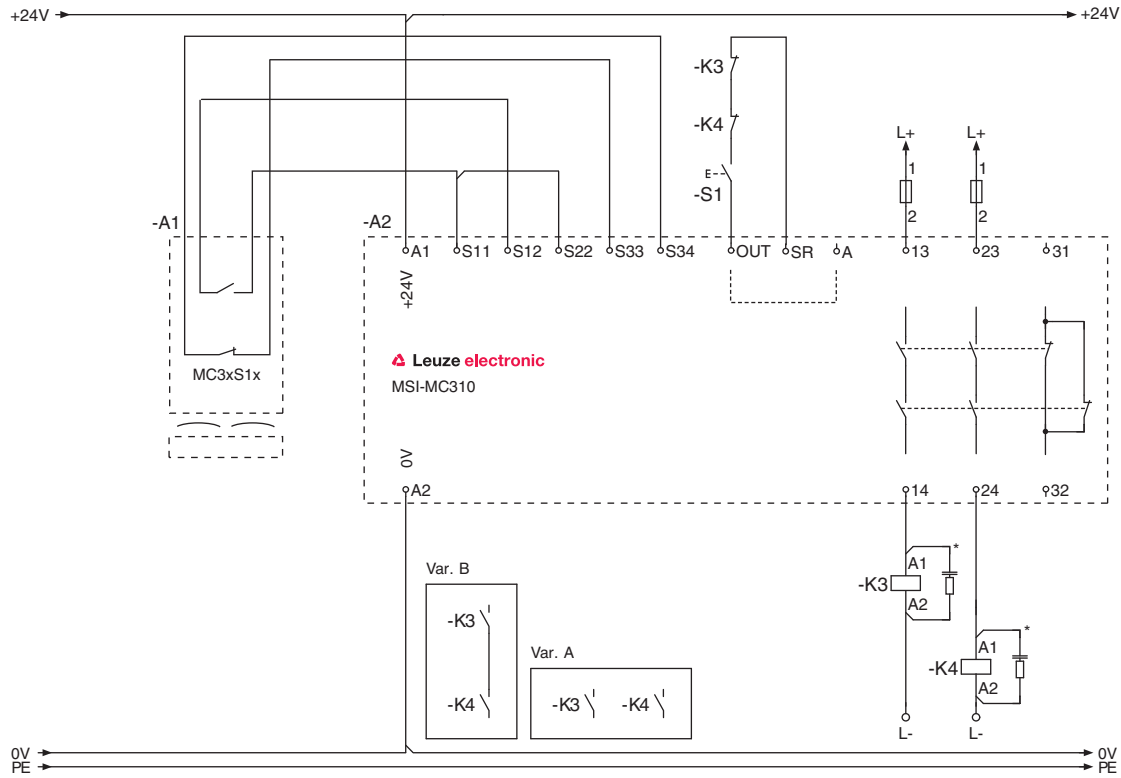
MC336  
p. 318

MC388  
p. 324

RD800  
p. 330

Electrical connection

MC330 connection example



\*) Spark extinction circuit, supply suitable spark extinction

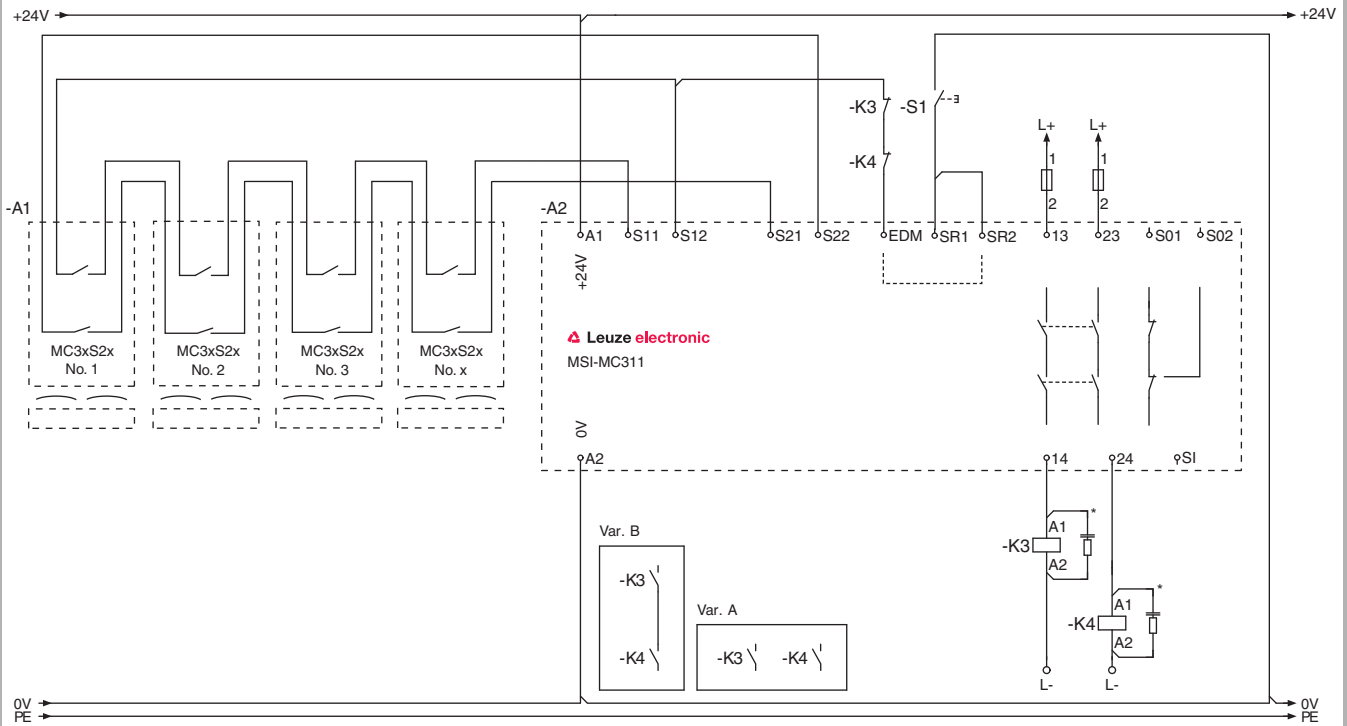
MC3xS1x *Magnetically Coded Sensors with MSI-MC310 Safety Relay*

⚠ Please observe the operating instructions of the components!

# MAGNETICALLY CODED SENSOR

## Electrical connection

### MC330 connection example



\*) Spark extinction circuit, supply suitable spark extinction

MC3xS2x *Magnetically Coded Sensors with MSI-MC311 Safety Relay*

Please observe the operating instructions of the components!

|                        |                 |                 |                 |
|------------------------|-----------------|-----------------|-----------------|
| <b>MC330</b><br>p. 310 | MC336<br>p. 318 | MC388<br>p. 324 | RD800<br>p. 330 |
|------------------------|-----------------|-----------------|-----------------|

**Technical data**

|   |  |  |
|---|--|--|
| Sensor type   | Interlock device without guard interlocking in accordance with EN 1088   |  |
| External actuator   | Coded magnetic, compatible with respective sensor series   |  |
| Category in accordance with EN ISO 13849-1  | Up to 4, depending on evaluation, 1 sensor connected   | Up to 3, depending on evaluation, more than 1 sensor connected |
| Service life ( $T_M$ ) in accordance with EN ISO 13849-1  | 20 years   |  |
| Number of switching cycles at which up to 10% of components have failed dangerously ( $B_{10d}$ ) | 20,000,000   |  |
| Assured cut-in distance ( $S_{ao}$ )<br>Assured cut-out distance ( $S_{ar}$ )                     | < 6 mm<br>> 14 mm  |  |
| Switching tolerance (without ferromagnetic materials in immediate vicinity)                       | $\pm 1$ mm   |  |
| Contact type  | Reed contacts (magnetically sensitive)   |  |
| Contact equipment   | 1NO/1NC, 2NO   |  |
| Mechanical life time  | $10 \times 10^7$ switching cycles  |  |
| Switching voltage   | max. 27 V AC/DC  |  |
| Switching current $I_e$ , max.  | 0.5 A  |  |
| Short circuit protection  | Via e.g. MSI-MC310, MSI-MC311, MSI 100, MSI 200  |  |
| Requirement on the voltage supply when used acc. to cULus (UL 508)                                | Class 2 Circuits   |  |
| Installation point  | Arbitrary, provided housing markings are aligned   |  |
| Distance to other magnetic sensors  | Min. 50 mm   |  |
| Approach actuation directions   | In longitudinal axis, left and right<br>In vertical axis, up and down<br>In depth, to and from sensor            |  |
| Approach speed of actuator towards sensor   | Min. 50 mm/s   |  |
| Response time   | 3 ms   |  |
| <b>Connection</b>   |  |  |
| Number of connection cable infeeds  | 1 (connection cable or M8 plug)  |  |
| Connection type   | Connection cable with wire-end sleeves<br>Connection cable with M12 plug<br>M8 plug screwed on/molded to housing |  |
| Cable cross-section (wire)  | 4 x 0.35 mm <sup>2</sup> (connection cable)  |  |
| <b>Environment</b>  |  |  |
| Ambient temperature, operation  | -20...+70°C  |  |
| Vibration, sensitivity acc. to  | EN 60947-5-3   |  |
| Shock, sensitivity acc. to  | EN 60947-5-3   |  |
| Dirt levels, external, in accordance with EN 60947-1  | 3  |  |
| EMC compliance  | EN 60947-5-3<br>EN 61000-6-3<br>EN 61000-6-2   |  |



## MAGNETICALLY CODED SENSOR

### Technical data

#### Housing

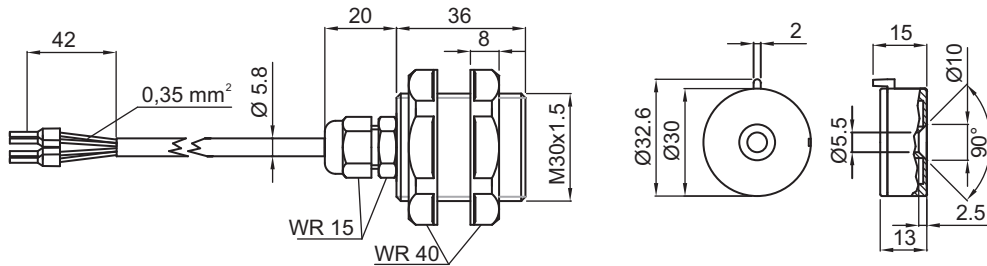
|                                    |                                       |
|------------------------------------|---------------------------------------|
| Sensor material                    | Plastic, glass fiber reinforced (PPS) |
| Actuator material                  | Plastic, glass fiber reinforced (PPS) |
| Dimensions                         | M30 x 36 mm                           |
| Protection rating acc. to EN 60529 | IP 67                                 |

These tables do not apply in combination with additional M12 plug or connection cable. except where these components are explicitly mentioned.

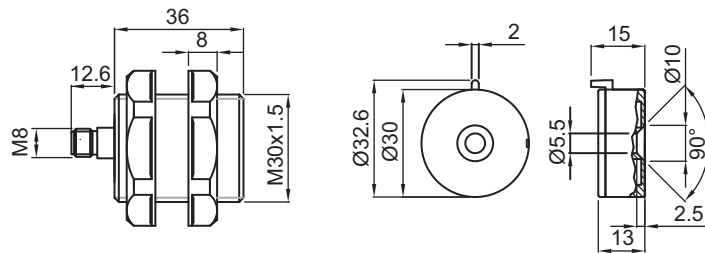
Please note the additional information in the connecting and operating instructions at [www.leuze.com/en/mc330/](http://www.leuze.com/en/mc330/).

Dimensional drawings

MC330 Magnetically Coded Sensor



MC330 Magnetically Coded Sensor with connection cable and MC330-Sx-A actuator (right)



MC330 Magnetically Coded Sensor with M8 plug and MC330-Sx-A actuator (right)

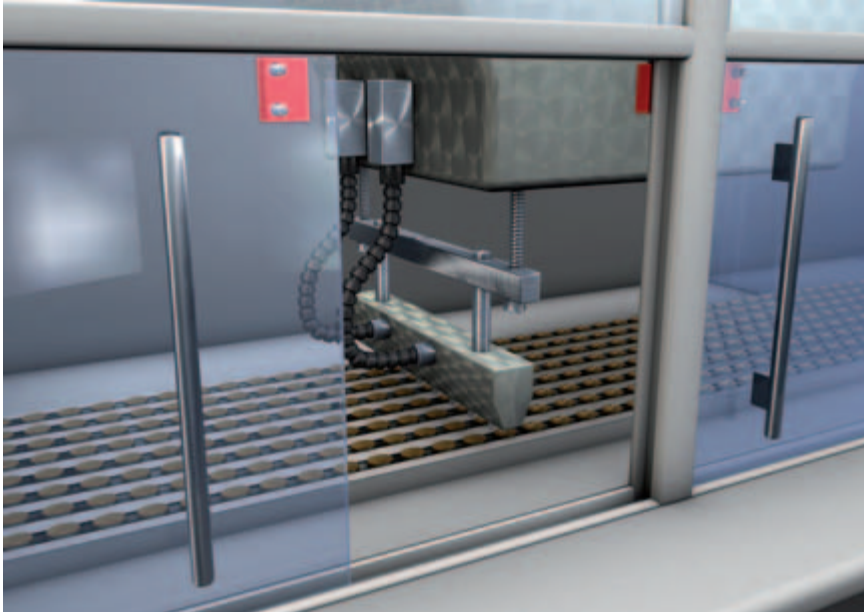
Dimensions in mm

Accessories ordering information

| Part no. | Article           | Description              | Length, design                       |
|----------|-------------------|--------------------------|--------------------------------------|
| 63001152 | MC330-S1-A        | Actuator                 | cylindrical                          |
| 63001157 | MC330-S2-A        | Actuator                 | cylindrical                          |
| 50104524 | K-D M8A-4P-2m-PVC | M8 connection cable, PVC | 2 m, connector, female, 4-pin, axial |
| 50104530 | K-D M8A-4P-2m-PUR | M8 connection cable, PUR | 2 m, connector, female, 4-pin, axial |

## MAGNETICALLY CODED SENSOR

### MC336 Magnetically Coded Sensor

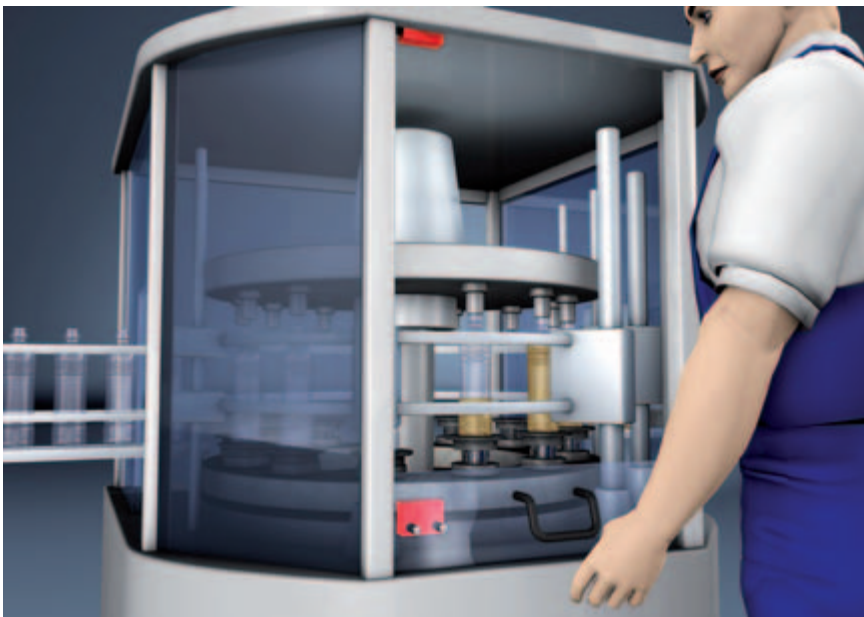


First and foremost, the MC336 Magnetically Coded Sensor is used for small guards, sliding gates or hoods to trigger switching signals in safety systems under demanding environmental conditions (dust, humidity and the like) in a manner virtually contactless and wear-free. Thanks to its small dimensions, it can be easily integrated even when space is restricted.

#### Typical areas of application

- With critical ambient conditions
- Especially with dust, humidity and the like
- In the wood, pharmaceutical, food industry

*Use of Magnetically Coded Sensors such as the MC336 is particularly advantageous in the food industry due to their robustness.*



*MC336 Magnetically Coded Sensor for safeguarding the sliding gate of a filling system.*

MC330  
p. 310

**MC336**  
**p. 318**

MC388  
p. 324

RD800  
p. 330

**Important technical data, overview**

|   |  |
|---|--|
| Category in accordance with EN ISO 13849-1  | Up to 4 (depending on the number of connected sensors) |
| Performance Level (PL) in accordance with EN ISO 13849-1                            | Up to e (depending on the number of connected sensors) |
| Safe switching distances and off distance if markings are aligned:<br>Sao (on), Sar | < 3 mm, > 11 mm  |
| Switching tolerance (without ferromagnetic materials in immediate vicinity)         | ±1 mm  |
| Contact type  | Reed contacts (magnetically sensitive)                 |
| Contact equipment   | 1NO/1NC, 2NO   |
| Short circuit protection  | By means of MSI-MC3x Safety Relay                      |
| Approach speed of actuator towards sensor   | Min. 50 mm/s   |
| Response time   | 3 ms   |
| Ambient temperature, operation  | -20...+70 °C   |

**Functions**

- Interlock device without guard interlocking in accordance with EN 1088.
- Safety system in combination with an evaluation unit such as the MSI-MC3x Safety Relay or the MSI 100 or MSI 200 Safety Controller.
- Integration in control circuits up to category 4 in accordance with EN ISO 13849.

**Special features**

- **Not sensitive to dust, humidity and the like (dirt level 3 in accordance with EN 60947-1)**
- **Glass fiber reinforced plastic sensor and actuator**
- **Approach actuation directions lengthwise, high, deep**
- **Connection per M8 or M12 plug, PVC or PUR connection cable, each firmly integrated in the housing**
- **Integrated compact design**



**Features**



(in combination with MSI-MC3x)

**Further information Page**

- |                                    |     |
|------------------------------------|-----|
| ● Ordering information             | 320 |
| ● Electrical connection            | 313 |
| ● Technical data                   | 321 |
| ● Dimensional drawings             | 323 |
| ● Accessories ordering information | 323 |
| ● MSI-MC310, MSI-MC311             | 458 |

# MAGNETICALLY CODED SENSOR

## Ordering information

### MC336

Included in delivery: 1 MC336-Sx-A actuator, 4 stainless steel mounting screws, application information (printed document)

**Notice:** the MSI-MC3x Safety Relay is required for certified evaluation! This must be ordered separately (see page 460).

**Functions:** Interlock device without guard interlocking in accordance with EN 1088, safety system in combination with MSI-MC3x Safety Relay (evaluation unit)

### MC336 Magnetically Coded Sensors

| Part no. | Article           | Description   |
|----------|-------------------|---|
| 63001050 | MC336-S1C2-A      | Sensor, 1NO/1NC, connection cable, 2 m, PVC                 |
| 63001051 | MC336-S1C5-A      | Sensor, 1NO/1NC, connection cable, 5 m, PVC                 |
| 63001052 | MC336-S1C10-A     | Sensor, 1NO/1NC, connection cable, 10 m, PVC                |
| 63001053 | MC336-S1R2-A      | Sensor, 1NO/1NC, connection cable, 2 m, PUR                 |
| 63001054 | MC336-S1R5-A      | Sensor, 1NO/1NC, connection cable, 5 m, PUR                 |
| 63001055 | MC336-S1R10-A     | Sensor, 1NO/1NC, connection cable, 10 m, PUR                |
| 63001056 | MC336-S1M8-A      | Sensor, 1NO/1NC, M8 plug, 4-pin                             |
| 63001057 | MC366-S1-C02M12-A | Sensor, 1NO/1NC, connection cable, with M12 plug 0.2 m, PVC |
| 63001070 | MC336-S2C2-A      | Sensor, 2NO/NC, connection cable, 2 m, PVC                  |
| 63001071 | MC336-S2C5-A      | Sensor, 2NO, connection cable 5 m, PVC                      |
| 63001076 | MC336-S2M8-A      | Sensor, 2NO, M8 plug 4-pin                                  |
| 63001077 | MC336-S2C02M12-A  | Sensor, 2NO, connection cable with M12 plug 0.2 m, PVC      |

### Part number code for MC336

| Article                 | Description                                  |
|-------------------------|--|
| <b>MC336</b>            | <b>Magnetically Coded Sensors</b>            |
| <b>-S1, -S2</b>         | Sensor, 1NO/1NC, 2NO                         |
| <b>C02, C2, C5, C10</b> | PVC connection cable, length 0.2, 2, 5, 10 m |
| <b>R2, R5, R10</b>      | PUR connection cable, length 2, 5, 10 m      |
| <b>-M8, -M12</b>        | M8, M12 plug size                            |
| <b>-A</b>               | Standard version                             |

MC336

### Electrical connection

See connection example MC330, page 313.

MC330  
p. 310

**MC336**  
**p. 318**

MC388  
p. 324

RD800  
p. 330

**Technical data**

|   |  |  |
|---|--|--|
| Sensor type   | Interlock device without guard interlocking in accordance with EN 1088   |  |
| External actuator   | Coded magnetic, compatible with respective sensor series   |  |
| Category in accordance with EN ISO 13849-1  | Up to 4, depending on evaluation, 1 sensor connected   | Up to 3, depending on evaluation, more than 1 sensor connected |
| Service life ( $T_M$ ) in accordance with EN ISO 13849-1  | 20 years   |  |
| Number of switching cycles at which up to 10% of components have failed dangerously ( $B_{10d}$ ) | 20,000,000   |  |
| Assured cut-in distance ( $S_{ao}$ )<br>Assured cut-out distance ( $S_{ar}$ )                     | < 3 mm<br>> 11 mm  |  |
| Switching tolerance (without ferromagnetic materials in immediate vicinity)                       | $\pm 1$ mm   |  |
| Contact type  | Reed contacts (magnetically sensitive)   |  |
| Contact equipment   | 1NO/1NC, 2NO   |  |
| Mechanical life time  | $10 \times 10^7$ switching cycles  |  |
| Switching voltage   | max. 27 V AC/DC  |  |
| Switching current $I_e$ max.  | 0.5 A  |  |
| Short circuit protection  | Via e.g. MSI-MC310, MSI-MC311, MSI 100, MSI 200  |  |
| Requirement on the voltage supply when used acc. to cULus (UL 508)                                | Class 2 Circuits   |  |
| Installation point  | Arbitrary, provided housing markings are aligned   |  |
| Distance to other magnetic sensors  | Min. 50 mm   |  |
| Approach actuation directions   | In longitudinal axis, left and right<br>In vertical axis, up and down<br>In depth, to and from sensor            |  |
| Approach speed of actuator towards sensor   | Min. 50 mm/s   |  |
| Response time   | 3 ms   |  |
| <b>Connection</b>   |  |  |
| Number of connection cable infeeds  | 1 (connection cable or M8 plug)  |  |
| Connection type   | Connection cable with wire-end sleeves<br>Connection cable with M12 plug<br>M8 plug screwed on/molded to housing |  |
| Cable cross-section (wire)  | 4 x 0.35 mm <sup>2</sup> (connection cable)  |  |
| <b>Environment</b>  |  |  |
| Ambient temperature, operation  | -20...+70°C  |  |
| Vibration, sensitivity acc. to  | EN 60947-5-3   |  |
| Shock, sensitivity acc. to  | EN 60947-5-3   |  |
| Dirt levels, external, in accordance with EN 60947-1  | 3  |  |
| EMC compliance  | EN 60947-5-3<br>EN 61000-6-3<br>EN 61000-6-2   |  |

## MAGNETICALLY CODED SENSOR

### Technical data

#### Housing

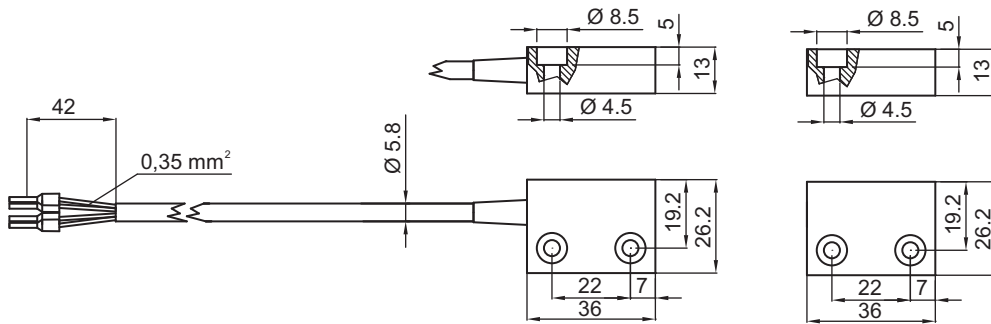
|                                    |                                       |
|------------------------------------|---------------------------------------|
| Sensor material                    | Plastic, glass fiber reinforced (PPS) |
| Actuator material                  | Plastic, glass fiber reinforced (PPS) |
| Dimensions (L x W x H)             | 36 mm x 26 mm x 13 mm                 |
| Protection rating acc. to EN 60529 | IP 67                                 |

These tables do not apply in combination with additional M12 plug or connection cable. except where these components are explicitly mentioned.

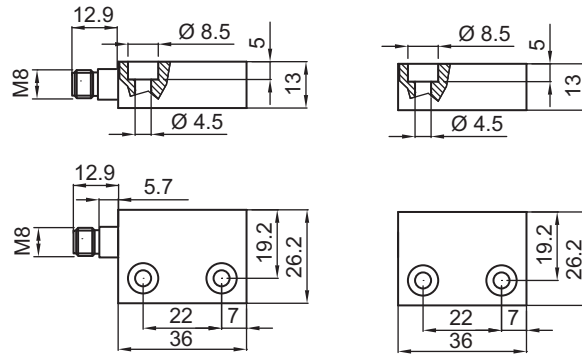
Please note the additional information in the connecting and operating instructions at [www.leuze.com/en/mc336/](http://www.leuze.com/en/mc336/).

Dimensional drawings

MC336 Magnetically Coded Sensor



MC336 Magnetically Coded Sensor with connection cable and MC336-Sx-A actuator (right)



MC336 Magnetically Coded Sensor with M8 plug and MC336-Sx-A actuator (right)

Dimensions in mm

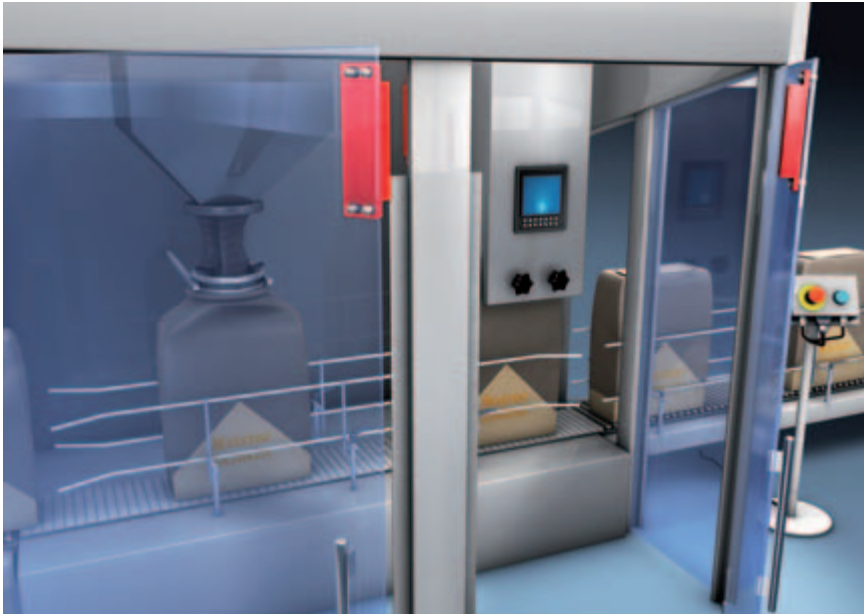
Accessories ordering information

| Part no. | Article           | Description              | Length, design                       |
|----------|-------------------|--------------------------|--------------------------------------|
| 63001151 | MC336-S1-A        | Actuator                 | cubic                                |
| 63001156 | MC336-S2-A        | Actuator                 | cubic                                |
| 50104524 | K-D M8A-4P-2m-PVC | M8 connection cable, PVC | 2 m, connector, female, 4-pin, axial |
| 50104530 | K-D M8A-4P-2m-PUR | M8 connection cable, PUR | 2 m, connector, female, 4-pin, axial |



## MAGNETICALLY CODED SENSORS

### MC388 Magnetically Coded Sensor



*Magnetically Coded Sensors such as the MC388 are not sensitive to stress caused by dust, for example when safeguarding accesses to filling systems.*

First and foremost, the MC388 Magnetically Coded Sensor is used for large guards and sliding gates to trigger switching signals in safety systems under demanding environmental conditions (dust, humidity and the like) in a manner virtually contactless and wear-free. Thanks to the large switching distances, covered mounting is also possible.

#### Typical areas of application

- With critical ambient conditions
- Especially with dust, humidity and the like
- In the wood, pharmaceutical, food industry

**Important technical data, overview**

|   |  |
|---|--|
| Category in accordance with EN ISO 13849-1  | Up to 4 (depending on the number of connected sensors) |
| Performance Level (PL) in accordance with EN ISO 13849-1                            | Up to e (depending on the number of connected sensors) |
| Safe switching distances and off distance if markings are aligned:<br>Sao (on), Sar | < 6 mm, > 30 mm  |
| Switching tolerance (without ferromagnetic materials in immediate vicinity)         | ±1 mm  |
| Contact type  | Reed contacts (magnetically sensitive)                 |
| Contact equipment   | 1NO/1NC, 2NO   |
| Short circuit protection  | By means of MSI-MC3x Safety Relay                      |
| Approach speed of actuator towards sensor   | Min. 50 mm/s   |
| Response time   | 3 ms   |
| Ambient temperature, operation  | -20...+70 °C   |

**Functions**

- Interlock device without guard interlocking in accordance with EN 1088.
- Safety system in combination with an evaluation unit such as the MSI-MC3x Safety Relay or the MSI 100 or MSI 200 Safety Controller.
- Integration in control circuits up to category 4 in accordance with EN ISO 13849.

**Special features**

- **Not sensitive to dust, humidity and the like (dirt level 3 in accordance with EN 60947-1)**
- **Glass fiber reinforced plastic sensor and actuator**
- **Approach actuation directions lengthwise, high, deep**
- **Connection per M8 or M12 plug, PVC or PUR connection cable, each firmly integrated in the housing**
- **Integrated compact design**



**Features**



(in combination with MSI-MC3x)

**Further information Page**

|                                    |     |
|------------------------------------|-----|
| ● Ordering information             | 326 |
| ● Electrical connection            | 313 |
| ● Technical data                   | 327 |
| ● Dimensional drawings             | 329 |
| ● Accessories ordering information | 329 |
| ● MSI-MC310, MSI-MC311             | 458 |

# MAGNETICALLY CODED SENSORS

## Ordering information

### MC388

Included in delivery: 1 MC388-Sx-A actuator, 4 stainless steel mounting screws, application information (printed document)

**Notice:** the MSI-MC3x Safety Relay is required for certified evaluation! This must be ordered separately (see page 460).

**Functions:** Interlock device without guard interlocking in accordance with EN 1088, safety system in combination with MSI-MC3x Safety Relay (evaluation unit)

### MC388 Magnetically Coded Sensors

| Part no. | Article           | Description   |
|----------|-------------------|---|
| 63001000 | MC388-S1C2-A      | Sensor, 1NO/1NC, connection cable, 2 m, PVC                 |
| 63001001 | MC388-S1C5-A      | Sensor, 1NO/1NC, connection cable, 5 m, PVC                 |
| 63001002 | MC388-S1C10-A     | Sensor, 1NO/1NC, connection cable, 10 m, PVC                |
| 63001003 | MC388-S1R2-A      | Sensor, 1NO/1NC, connection cable, 2 m, PUR                 |
| 63001004 | MC388-S1R5-A      | Sensor, 1NO/1NC, connection cable, 5 m, PUR                 |
| 63001005 | MC388-S1R10-A     | Sensor, 1NO/1NC, connection cable, 10 m, PUR                |
| 63001006 | MC388-S1M8-A      | Sensor, 1NO/1NC, M8 plug, 4-pin                             |
| 63001007 | MC388-S1C02M12-A  | Sensor, 1NO/1NC, connection cable, with M12 plug 0.2 m, PVC |
| 63001020 | MC388-S2C2-A      | Sensor, 2NO/NC, connection cable, 2 m, PVC                  |
| 63001021 | MC388-S2C5-A      | Sensor, 2NO, connection cable 5 m, PVC                      |
| 63001026 | MC388-S2M8-A      | Sensor, 2NO, M8 plug 4-pin                                  |
| 63001027 | MC388-S2-C02M12-A | Sensor, 2NO, connection cable with M12 plug 0.2 m, PVC      |

### Part number code for MC388

| Article                 | Description                                  |
|-------------------------|--|
| <b>MC388</b>            | <b>Magnetically Coded Sensors</b>            |
| <b>-S1, -S2</b>         | Sensor, 1NO/1NC, 2NO                         |
| <b>C02, C2, C5, C10</b> | PVC connection cable, length 0.2, 2, 5, 10 m |
| <b>R2, R5, R10</b>      | PUR connection cable, length 2, 5, 10 m      |
| <b>-M8, -M12</b>        | M8, M12 plug size                            |
| <b>-A</b>               | Standard version                             |

**MC388**

### Electrical connection

See connection example MC330, page 313.

MC330  
p. 310

MC336  
p. 318

**MC388**  
**p. 324**

RD800  
p. 330

## Technical data

|   |  |  |
|---|--|--|
| Sensor type   | Interlock device without guard interlocking in accordance with EN 1088   |  |
| External actuator   | Coded magnetic, compatible with respective sensor series   |  |
| Category in accordance with EN ISO 13849-1  | Up to 4, depending on evaluation, 1 sensor connected   | Up to 3, depending on evaluation, more than 1 sensor connected |
| Service life ( $T_M$ ) in accordance with EN ISO 13849-1  | 20 years   |  |
| Number of switching cycles at which up to 10% of components have failed dangerously ( $B_{10d}$ ) | 20,000,000   |  |
| Assured cut-in distance ( $S_{ao}$ )<br>Assured cut-out distance ( $S_{ar}$ )                     | < 6 mm<br>> 30 mm  |  |
| Switching tolerance (without ferromagnetic materials in immediate vicinity)                       | $\pm 1$ mm   |  |
| Contact type  | Reed contacts (magnetically sensitive)   |  |
| Contact equipment   | 1NO/1NC, 2NO   |  |
| Mechanical life time  | $10 \times 10^7$ switching cycles  |  |
| Switching voltage   | max. 27 V AC/DC  |  |
| Switching current $I_e$ max.  | 0.5 A  |  |
| Short circuit protection  | Via e.g. MSI-MC310, MSI-MC311, MSI 100, MSI 200  |  |
| Requirement on the voltage supply when used acc. to cULus (UL 508)                                | Class 2 Circuits   |  |
| Installation point  | Arbitrary, provided housing markings are aligned   |  |
| Distance to other magnetic sensors  | Min. 50 mm   |  |
| Approach actuation directions   | In longitudinal axis, left and right<br>In vertical axis, up and down<br>In depth, to and from sensor            |  |
| Approach speed of actuator towards sensor   | Min. 50 mm/s   |  |
| Response time   | 3 ms   |  |
| <b>Connection</b>   |  |  |
| Number of connection cable infeeds  | 1 (connection cable or M8 plug)  |  |
| Connection type   | Connection cable with wire-end sleeves<br>Connection cable with M12 plug<br>M8 plug screwed on/molded to housing |  |
| Cable cross-section (wire)  | 4 x 0.35 mm <sup>2</sup> (connection cable)  |  |
| <b>Environment</b>  |  |  |
| Ambient temperature, operation  | -20...+70°C  |  |
| Vibration, sensitivity acc. to  | EN 60947-5-3   |  |
| Shock, sensitivity acc. to  | EN 60947-5-3   |  |
| Dirt levels, external, in accordance with EN 60947-1  | 3  |  |
| EMC compliance  | EN 60947-5-3<br>EN 61000-6-3<br>EN 61000-6-2   |  |

## MAGNETICALLY CODED SENSORS

### Technical data

#### Housing

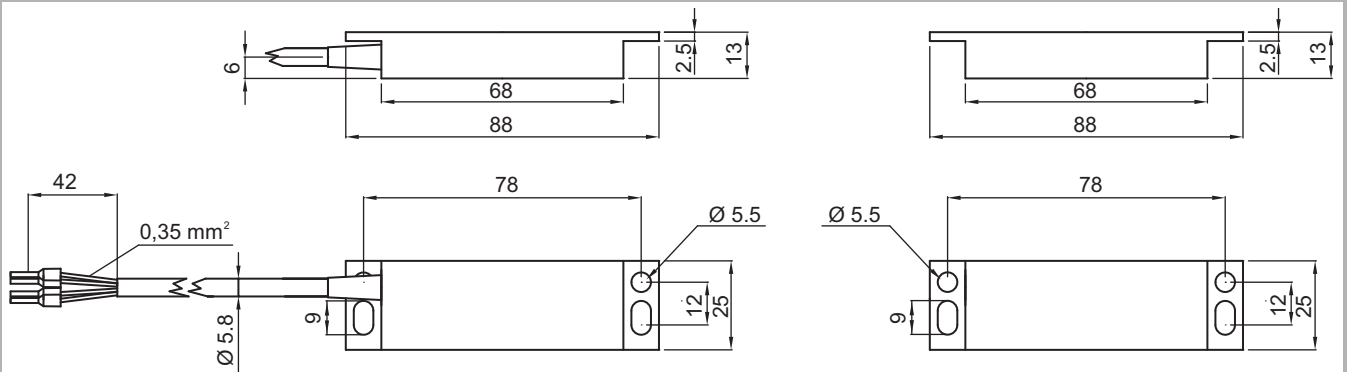
|                                    |                                       |
|------------------------------------|---------------------------------------|
| Sensor material                    | Plastic, glass fiber reinforced (PPS) |
| Actuator material                  | Plastic, glass fiber reinforced (PPS) |
| Dimensions (L x W x H)             | 88 mm x 25 mm x 13 mm                 |
| Protection rating acc. to EN 60529 | IP 67                                 |

These tables do not apply in combination with additional M12 plug or connection cable. except where these components are explicitly mentioned.

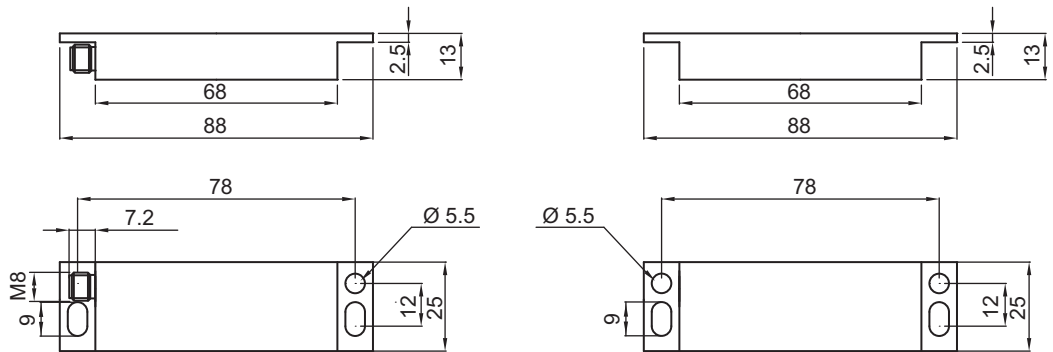
Please note the additional information in the connecting and operating instructions at [www.leuze.com/en/mc388/](http://www.leuze.com/en/mc388/).

Dimensional drawings

MC388 Magnetically Coded Sensor



MC388 Magnetically Coded Sensor with connection cable and MC388-Sx-A actuator (right)



MC388 Magnetically Coded Sensor with M8 plug and MC388-Sx-A actuator (right)

Dimensions in mm

Accessories ordering information

| Part no. | Article           | Description              | Length, design                       |
|----------|-------------------|--------------------------|--------------------------------------|
| 63001150 | MC388-S1-A        | Actuator                 | cubic                                |
| 63001155 | MC388-S2-A        | Actuator                 | cubic                                |
| 50104524 | K-D M8A-4P-2m-PVC | M8 connection cable, PVC | 2 m, connector, female, 4-pin, axial |
| 50104530 | K-D M8A-4P-2m-PUR | M8 connection cable, PUR | 2 m, connector, female, 4-pin, axial |

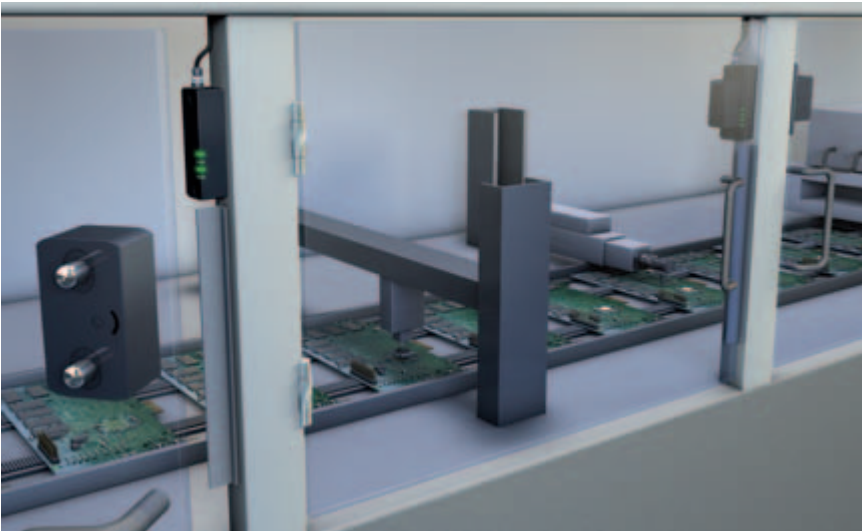
[www.leuze.com/en/mc388/](http://www.leuze.com/en/mc388/)

## SAFETY TRANSPONDER

### RD800 safety transponder



*Use of the RD800-S safety transponder as an individual application in the pharmaceutical sector, e.g. for guarding a cell for automated sample analysis*



*Use of the RD800-M safety transponder in series connection, for example on a production and assembly line for equipping circuit boards*

Applications with higher safety level and challenging environmental conditions require solutions such as the RD800 series. High protection ratings (IP 67, IP 67k) combined with standard or unique actuator evaluation including diagnostics function guarantee the highest availability and safety up to category 4 and Performance Level PL e. This is also valid for series connections in larger systems. Connection options both on the top and the bottom via M12 plug and teachable actuator code reduce the effort required for installation and warehousing.

#### Typical areas of application

- Safety-related and physically difficult applications
- Applications with dust, humidity, vibration and high risk of manipulation, e.g. in the pharmaceutical industry
- Wood products industry, food industry, conveyor/storage systems
- Applications with increased detection reliability



**Important technical data, overview**

|   |  |
|---|--|
| Sensor  | Classification in accordance with EN 60947-5-3 (PDF-M) |
| Performance Level (PL) in accordance with EN ISO 13849-1                      | e  |
| SIL in accordance with IEC 61508 and SILCL in accordance with EN/IEC 62061    | 3  |
| Category in accordance with EN ISO 13849-1                                    | 4  |
| Safe switching distances (Sao) and off distance (Sar) if markings are aligned | 10 mm, 16 mm   |
| Protection rating   | IP 67, IP 67k  |
| Safety-related switching outputs  | 2 pnp transistor outputs                               |
| Response time   | 7 ms   |
| Ambient temperature, operation  | -25...+70 °C   |

**Functions**

|   |
|---|
| Start/restart interlock, selectable     |
| Contacting monitoring (EDM), selectable |
| Additional control output               |
| Diagnosis via 4 multi-color LEDs        |

**Special features**

- **Compact housing with high protection class (IP 67, IP 67k)**
- **Short response time, large temperature range**
- **Easier, faster connection via M12 plug**
- **Standard or unique coding**
- **Pre-programmed or teach-in function**
- **Individual or multiple application (series connection)**
- **Extensive LED diagnostics**



**Features**



**Further information** **Page**

|   |     |
|---|-----|
| ● Ordering information                  | 332 |
| ● Electrical connection                 | 334 |
| ● Technical data                        | 335 |
| ● Dimensional drawings                  | 336 |
| ● Accessories RD8x ordering information | 336 |
| ● MSI-MC310, MSI-MC311                  | 458 |



## SAFETY TRANSPONDER

### Ordering information

#### RD800

Included in delivery: 1 actuator, washers (stainless steel), caps,  
1 set of connecting and operating instructions (printed document)

**Functions:** RES and EDM (selectable), diagnosis via  
4 multi-color LEDs, additional control output

#### RD8x safety transponder

| Part no. | Article         | Description  |
|----------|-----------------|--|
| 63002000 | RD800-SSCA-M12R | For individual applications, sensor and actuator with standard code, M12 plug on right side                  |
| 63002001 | RD800-SUCA-M12R | For individual applications, sensor and actuator with unique code, M12 plug on right side                    |
| 63002002 | RD800-SSCA-M12L | For individual applications, sensor and actuator with standard code, M12 plug on left side                   |
| 63002003 | RD800-SUCA-M12L | For individual applications, sensor and actuator with unique code, M12 plug on left side                     |
| 63002010 | RD800-MSCA-M12R | For individual and series applications, sensor and actuator with standard code, M12 plug on right side       |
| 63002011 | RD800-MUCA-M12R | For individual and series applications, sensor and actuator with unique code, M12 plug on right side         |
| 63002012 | RD800-MSCA-M12L | For individual and series applications, sensor and actuator with standard code, M12 plug on left side        |
| 63002013 | RD800-MUCA-M12L | For individual and series applications, sensor and actuator with unique code, M12 plug on left side          |
| 63002020 | RD800-MP-M12R   | For individual and series applications, can be flexibly programmed on RD8x-SA or -UA, M12 plug on right side |
| 63002021 | RD800-MP-M12L   | For individual and series applications, can be flexibly programmed on RD8x-SA or -UA, M12 plug on left side  |

**Part number code for safety transponder**

**RD8x safety transponder**

| Article      | Description   |
|--------------|---|
| <b>RD800</b> | <b>Safety transponder</b>                                       |
| -S           | Individual use  |
| -M           | Multiple application (series connection)                        |
| -MP          | Multiple application (series connection), code can be taught in |
| ...SCA       | Standard code, actuator included                                |
| ...UCA       | Unique code, actuator included                                  |
| -M12R        | Connection via M12 plug, right side                             |
| -M12L        | Connection via M12 plug, left side                              |

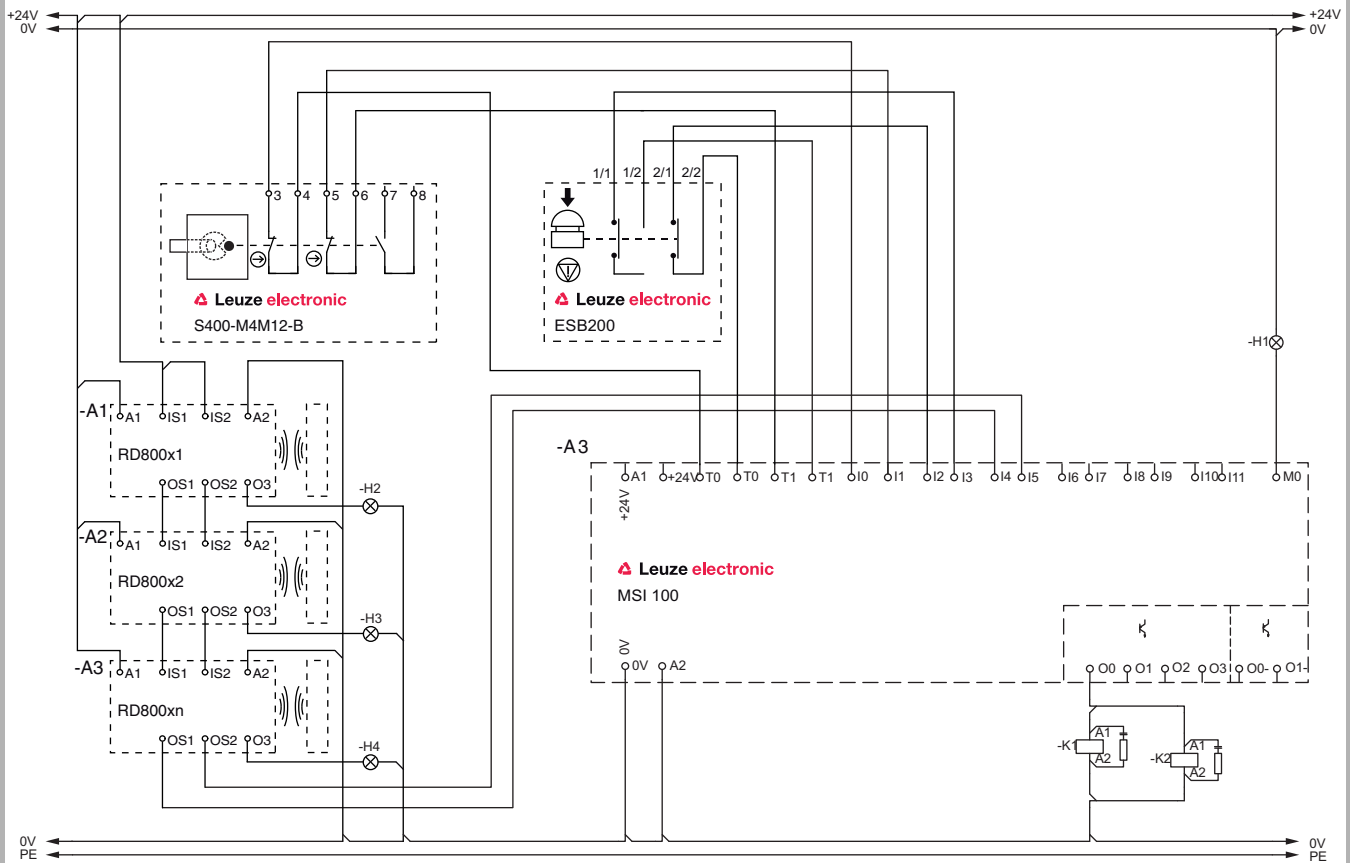
**RD800**

[www.leuze.com/en/transponders/](http://www.leuze.com/en/transponders/)

# SAFETY TRANSPONDER

## Electrical connection

### RD800 connection example



\*) Spark extinction circuit, supply suitable spark extinction

RD 800 safety transponder with S400 Safety Hinge Switch, ESB 200 E-Stop button and MSI 100 programmable Safety Controller

**!** Please observe the operating instructions of the components!

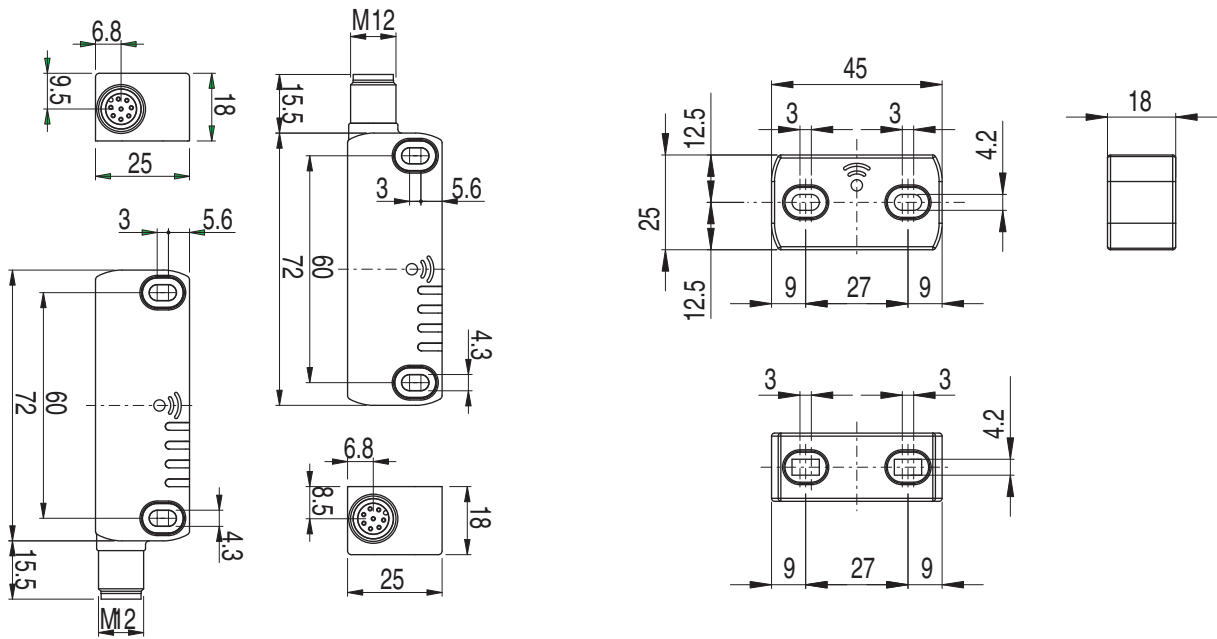
**Technical data**

| <b>General system data</b>   |  |
|--|--|
| Sensor   | Classification in accordance with EN 60947-5-3 (PDF-M) |
| Performance Level (PL) in accordance with EN ISO 13849-1                   | e  |
| SIL in accordance with IEC 61508 and SILCL in accordance with EN/IEC 62061 | 3  |
| Category in accordance with EN ISO 13849-1                                 | 4  |
| Service life ( $T_M$ ) in accordance with EN ISO 13849-1                   | 20 years   |
| Average probability of a failure to danger per hour ( $PFH_d$ )            | $1.46 \times 10^{-9}$                                  |
| Mean time to dangerous failure ( $MTTF_d$ )                                | 4077 years (individual application)                    |
| Safety-related switching outputs   | 2 pnp transistor outputs                               |
| External actuator  | Standard code, unique code                             |
| Assured cut-in distance ( $S_{ao}$ )                                       | 10 mm  |
| Cut-out distance   | 14 mm  |
| Assured cut-out distance ( $S_{ar}$ )                                      | 16 mm  |
| Number of sensors in series connection                                     | max. 32  |
| Supply voltage   | 24 V DC, - 15%...+10%                                  |
| Ie switching current   | Max. 0.25 A  |
| Installation point   | Arbitrary  |
| Distance to other sensors  | Min. 50 mm   |
| Approach actuation directions  | Arbitrary  |
| Response time  | 7 ms (typical), 12 ms (max.)                           |
| <b>Connection</b>  |  |
| Connection type  | M12 plug, 8-pin  |
| Connection side  | Left, right  |
| <b>Environment</b>   |  |
| Ambient temperature, operation   | -25...+70°C  |
| Vibration resistance acc. to EN 60068-2-6                                  | 10 gn (10...55 Hz)                                     |
| Shock sensitivity acc. to EN 60068-2-27                                    | 30 gn, 11 ms   |
| Dirt levels, external, in accordance with EN 60947-1                       | 3  |
| <b>Housing</b>   |  |
| Sensor, actuator material  | PA 66  |
| Sensor dimensions  | 87.5 mm x 25 mm x 18 mm                                |
| Actuator dimensions  | 45.0 mm x 25 mm x 18 mm                                |
| Protection rating acc. to EN 60529   | IP 67, IP 67k  |

# SAFETY TRANSPONDER

## Dimensional drawings

### RD800 safety transponder



Sensor

Actuator

Dimensions in mm

### Accessories RD8x ordering information

| Part no. | Article     | Description | Length, design          |
|----------|-------------|-------------|-------------------------|
| 63002100 | RD800-x-SCA | Actuator    | For RD8x, standard code |
| 63002101 | RD800-x-UCA | Actuator    | For RD8x, unique code   |

MC330  
p. 310

MC336  
p. 318

MC388  
p. 324

**RD800**  
p. 330

[www.leuze.com/en/transponders/](http://www.leuze.com/en/transponders/)

## SAFETY SWITCHES

### Overview



*Safety Switch for guarding the sliding door on a pick-and-place machine*

Safety Switches are used for the position monitoring of moving protective devices, such as protective doors or flaps. Safety Switches without guard interlocking can always be used when the dangerous movement stops before the entering person can reach the point of operation. The Leuze electronic Safety Switches portfolio also includes Safety Position Switches (S300) and Safety Hinge Switches (S400) and therefore provides the perfect solution for many different applications.



*Safety Position Switch on machine with a protective device and swivel joints – a typical application, e.g. in automated parts processing*

S20  
p. 340

S200  
p. 350

S300  
p. 360

S400, S410  
p. 368

OVERVIEW

Selection table

Selection of Leuze electronic Safety Switches from left to right: S20 Normal-Duty Safety Switch, S300 Safety Position Switch, S200 Heavy-Duty Safety Switch, S400 Safety Hinge Switch



Safety Locking Devices

Safety Command Devices

Safety Relays

Programmable Safety Controllers

Accessories

Glossary

Product Finder

Features, type-dependent

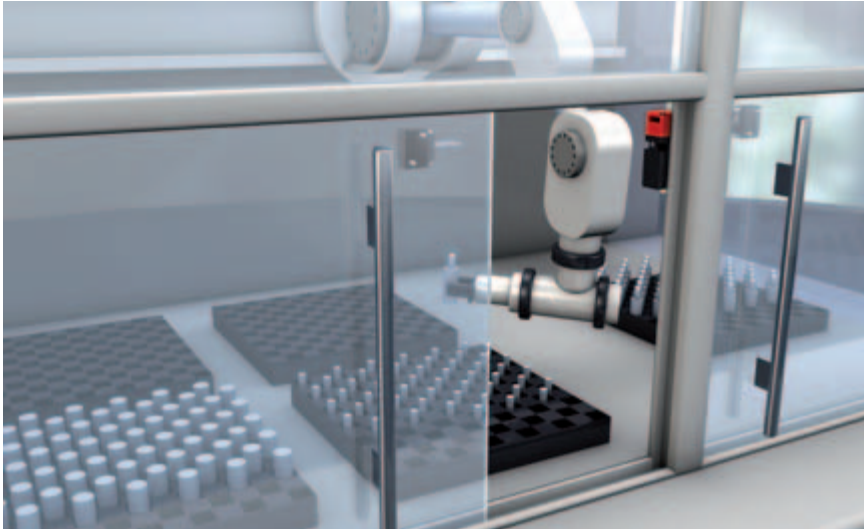
| Description                          | Plastic housing | Metal housing | Screw terminal | Integrated cable | M12 plug | Safety Switches contact set | NC = NC contact for safety circuit | NO = NO contact for signal circuit | Series                                   | Page |
|--------------------------------------|-----------------|---------------|----------------|------------------|----------|-----------------------------|------------------------------------|------------------------------------|--|------|
|                                      |                 |               |                |                  |          |                             |                                    |                                    |  |      |
| Safety Switch with separate actuator | ●               |               | ●              |                  |          | 2NC ⊕                       |                                    |                                    | S20-P3...                                | 342  |
|                                      | ●               |               | ●              |                  |          | 1NC ⊕ + 1NO                 |                                    |                                    | S20-P1...                                | 342  |
|                                      | ●               |               | ●              |                  |          | 2NC ⊕ + 1NO                 |                                    |                                    | S20-P4... **                             | 342  |
|                                      | ●               |               |                |                  | ●        | 2NC ⊕ + 1NO                 |                                    |                                    | S20-P4C1-M12...                          | 342  |
|                                      |                 | ●             | ●              |                  |          | 2NC ⊕                       |                                    |                                    | S200-M3...                               | 352  |
|                                      |                 | ●             | ●              |                  |          | 1NC ⊕ + 1NO                 |                                    |                                    | S200-M1...                               | 352  |
|                                      |                 | ●             | ●              |                  |          | 2NC ⊕ + 1NO                 |                                    |                                    | S200-M4...                               | 352  |
| Safety Position Switch               |                 | ●             |                |                  | ●        | 2NC ⊕ + 1NO                 |                                    |                                    | S200-M4C1-M12...                         | 352  |
|                                      |                 | ●             |                |                  |          | 1NC* ⊕ + 1NO                |                                    |                                    | S300-M0...                               | 362  |
|                                      |                 | ●             |                |                  |          | 2NC ⊕ + 1NO                 |                                    |                                    | S300-M13...                              | 362  |
|                                      | ●               |               |                |                  | ●        | 1NC* ⊕ + 1NO                |                                    |                                    | S300-P13...                              | 362  |
|                                      | ●               |               | ●              |                  |          | 2NC ⊕ + 1NO                 |                                    |                                    | S300-P13C1-M12-...                       | 362  |
| Safety Hinge Switches                |                 | ●             |                | ●                |          | 2NC ⊕ + 1NO                 |                                    |                                    | S400-... S410-...                        | 370  |
|                                      |                 | ●             |                | ●                | ●        | 2NC ⊕ + 1NO                 |                                    |                                    | S400-...M12-..., S410-...M12-...         | 370  |
|                                      |                 | ●             |                | ●                | ●        | 2NC ⊕ + 1NO                 |                                    |                                    | S400-...CB02M12-..., S410-...CB02M12-... | 370  |

\* With step function against contact bounces  
 \*\*) Second hinge available separately



## SAFETY SWITCHES

### S20 Safety Switch



*S20 Safety Switch for guarding the sliding door on a pick-and-place machine*

The S20 is a Safety Switch without guard interlocking, which can always be used when the dangerous movement stops before the entering person can reach the point of operation. This is the case, for example, with machines and systems where the operator is protected from the point of operation with cages/grids or sliding doors, and a process or production interruption is essentially possible and may be required. The S20 series Safety Switches have a housing made of fiber-glass-reinforced plastic in accordance with protection rating IP 67. The models equipped with various contact sets and connection systems (screw terminals, M12 plugs) enable integration in control circuits up to category 4 in accordance with EN ISO 13849. The swivel deflecting head and numerous actuators enable universal use of this Safety Switch.

#### Typical areas of application

- Monitoring of rotating, swiveling or sliding protective doors in "normal duty" applications
- Lateral monitoring of sliding protective grids or sliding doors

**Important technical data, overview**

|                               |  |         |          |
|-------------------------------|--|---------|----------|
| Switch type                   | Interlock device without guard interlocking in accordance with EN 1088 |         |          |
| Housing material              | Fiberglass-reinforced, thermo-plastic plastic, self-extinguishing      |         |          |
| Actuation force (pull-out)    | 10 N or 30 N   |         |          |
| Contact equipment             | 2NC ⊖<br>1NC ⊖ + 1NO 2NC ⊖ + 1NO                                       |         |          |
| Switching principle           | Creep contact  |         |          |
| External actuator             | AC-ANxx series: straight, angled, resilient, alignable                 |         |          |
| Approach actuation directions | 1 x above, 4 x side (90°)  |         |          |
| Approach speed                | Max. 0.5 m/s   |         |          |
| Connection system             | Number of cable entries  | 1, 3    | 1        |
|                               | Type of cable entries  | M20x1.5 | M12 plug |
| Protection rating             | IP 67  |         |          |

**Functions**

Interlock device without guard interlocking in accordance with EN 1088  
 Integration in control circuits up to category 4 in accordance with EN ISO 13849.

**Special features**

- Contact sets for integration up to category 4 acc. to EN ISO 13849
- Easy mounting with standard construction
- Universal use with 5 actuator approach directions
- 8 different actuators for different installation conditions and applications
- Self-centering through funnel-shaped insertion opening
- Protective insulation, tough non-flammable plastic



**Features**



**Further information**

**Page**

- |                                    |     |
|------------------------------------|-----|
| ● Ordering information             | 342 |
| ● Electrical connection            | 343 |
| ● Technical data                   | 344 |
| ● Dimensional drawings             | 345 |
| ● Accessories ordering information | 348 |

## SAFETY SWITCHES

### Ordering information

**S20**

Included in delivery: Application information (print document)

**Functions:** Interlock device without guard interlocking in accordance with EN 1088

### S20 Safety Switches, Normal Duty

| Part no. | Article           | Description                          | Contact equipment            |
|----------|-------------------|--------------------------------------|------------------------------|
| 63000100 | S20-P3C1-M20-FH   | Safety Switches                      | (2NC ⊖) creep contacts       |
| 63000101 | S20-P1C1-M20-FH   | Safety Switches                      | (1NC ⊖ + 1NO) creep contacts |
| 63000102 | S20-P1C3-M20-LH   | Safety Switches                      | (1NC ⊖ + 1NO) creep contacts |
| 63000103 | S20-P4C1-M20-FH   | Safety Switches                      | (2NC ⊖ + 1NO) creep contacts |
| 63000104 | S20-P4C3-M20-LH   | Safety Switches                      | (2NC ⊖ + 1NO) creep contacts |
| 63000105 | S20-P4C1-M20-FH30 | Safety Switch, 30 N withdrawal force | (2NC ⊖ + 1NO) creep contacts |
| 63000106 | S20-P4C1-M12-FH   | Safety Switch, M12 plug              | (2NC ⊖ + 1NO) creep contacts |

Actuators must be ordered separately, see page 348.

### Article list for S20

| Article        | Description              |
|----------------|--------------------------|
| <b>S20</b>     | <b>Safety Switches</b>   |
| <b>-P</b>      | Plastic housing          |
| <b>1, 3, 4</b> | Contact set              |
| <b>C1, C3</b>  | Number of cable bushings |
| <b>-M20</b>    | Metric thread            |
| <b>-M12</b>    | M12 plug                 |
| <b>-FH</b>     | Non-removable head       |
| <b>-LH</b>     | Removable head           |

**S 20**
**S20**  
p. 340

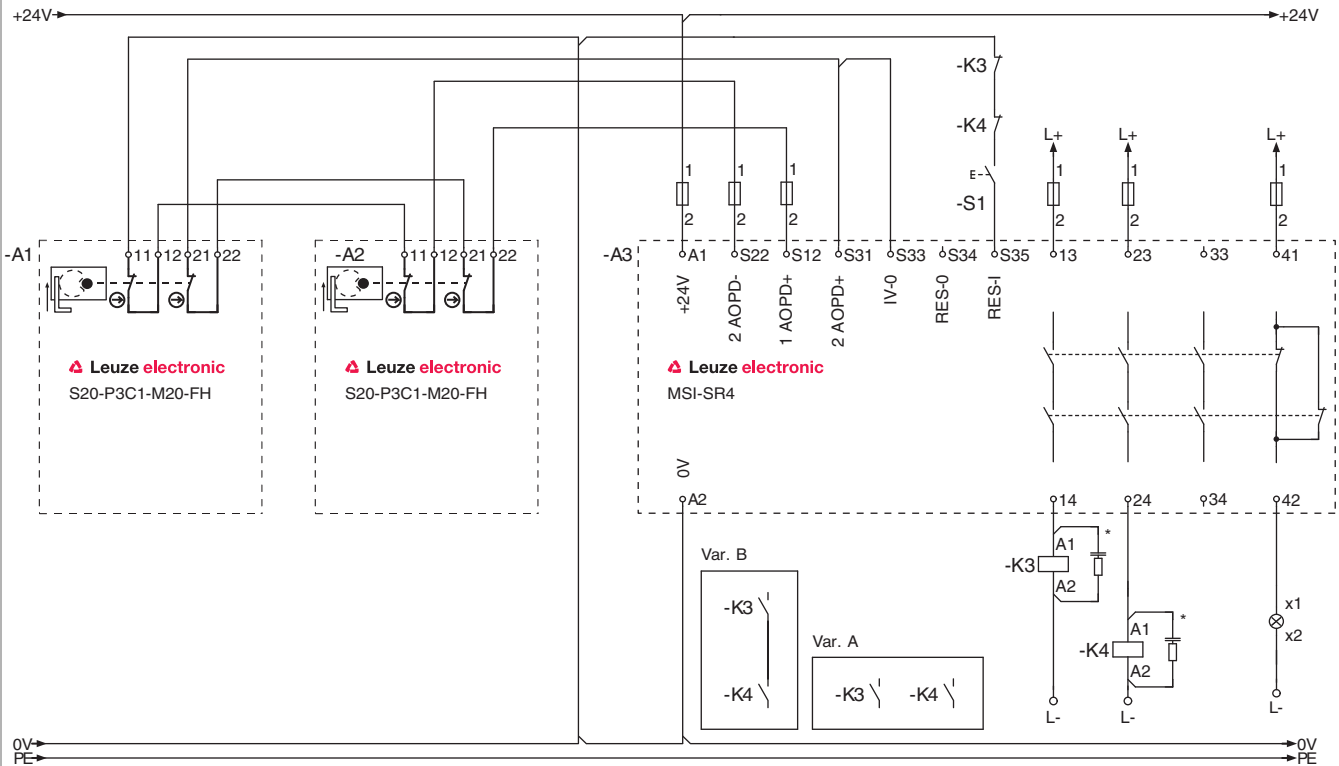
 S200  
p. 350

 S300  
p. 360

 S400, S410  
p. 368

Electrical connection

S20 connection example



\*) Spark extinction circuit, supply suitable spark extinction

S20 Safety Switch with MSI-SR4 Safety Relay

⚠ Please observe the operating instructions of the components!

Safety Locking Devices

Safety Command Devices

Safety Relays

Programmable Safety Controllers

Accessories

Glossary

Product Finder

## SAFETY SWITCHES

### Technical data

|   |   |  |
|---|---|--|
| Switch type   | Interlock device without guard interlocking in accordance with EN 1088  |  |
| Service life ( $T_M$ ) in accordance with EN ISO 13849-1                            | 20 years  |  |
| Number of cycles until 10% of the components have a failure to danger ( $B_{10d}$ ) | 2,000,000   |  |
| Ambient temperature, operation  | -25...+80°C   |  |
| Dirt levels, external, in accordance with EN 60947-1                                | 3   |  |
| Housing material  | Fiberglass-reinforced, thermo-plastic plastic, self-extinguishing   |  |
| External actuator   | AC-ANxx series: straight, angled, resilient, alignable  |  |
| Dimensions  | See dimensional drawing   |  |
| Protection rating   | IP 67   |  |
| Contact protection  | Protective insulation O   |  |
| Approach actuation directions   | 1 x above, 4 x lateral (90°)  |  |
| Mechanical life time in accordance with IEC 60947-5-1                               | 1 x 10 <sup>6</sup> actuation cycles  |  |
| Actuation frequency according to IEC 60947-5-1                                      | Max. 3600 per hour  |  |
| Approach speed  | Max. 0.5 m/s  |  |
| Actuation force (pull-out)  | 10 N / 30 N (S20-P4C1-M20-FH30)   |  |
| Actuating path with forced separation   | Min. 9.0 mm<br>Min. 7.2 mm<br>Min. 7.8 mm   | S20-P3...<br>S20-P1...<br>S20-P4...                |
| Recoil tolerance  | 4.5 mm  |  |
| Contact equipment   | 2NC ⊕<br>1NC ⊕ + 1NO 2NC<br>⊕ + 1NO   | S20-P3...<br>S20-P1...<br>S20-P4...                |
| Switching principle   | Creep contact   |  |
| Contact opening   | Force-fit   |  |
| Contact material  | Silver alloy  |  |
| Usage category in accordance with EN 60947-5-1 with screw terminal connection       | AC 15: U <sub>e</sub> / I <sub>e</sub> : 250 V / 6 A, 400 V / 4 A, 500 V / 1 A<br>DC 13: U <sub>e</sub> / I <sub>e</sub> : 24 V / 6 A, 125 V / 1.1 A, 250 V / 0.4 A |  |
| Usage category in accordance with EN 60947-5-1 with M12 plug connection             | AC15: U <sub>e</sub> / I <sub>e</sub> : 24 V / 2 A<br>DC13: U <sub>e</sub> / I <sub>e</sub> : 24 V / 2 A  |  |
| Rated insulation voltage  | 400 V AC, 600 V DC (screw terminal connection)<br>30 V AC, 36 V DC (M12-plug connection)  |  |
| Conventional thermal current  | Max. 10 A (screw terminal connection)<br>Max. 2 A (M12-plug connection)   |  |
| Short-circuit protection according to IEC 60269-1                                   | 500 V, 10 A, type aM (screw terminal connection)<br>500 V, 2 A, type gG (M12-plug connection)   |  |
| Connection system   | M12 plug  | 1 (S20-...M12...)                                  |
|   | Number of cable entries   | 1 (S20-...C1...)<br>3 (S20-...C3...)               |
|   | Type of cable entries   | M20x1.5  |
|   | Conductor cross-section (stranded) with screw terminal connection   | 1 x 0.5 mm <sup>2</sup> to 2 x 2.5 mm <sup>2</sup> |

Please note the additional information in the connecting and operating instructions at [www.leuze.com/en/s20](http://www.leuze.com/en/s20).

**S20**  
p. 340

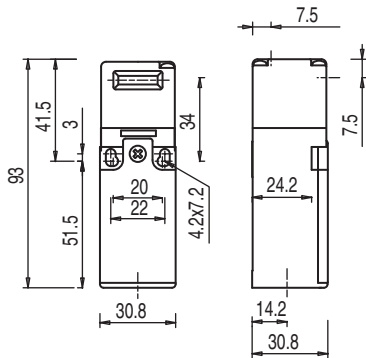
S200  
p. 350

S300  
p. 360

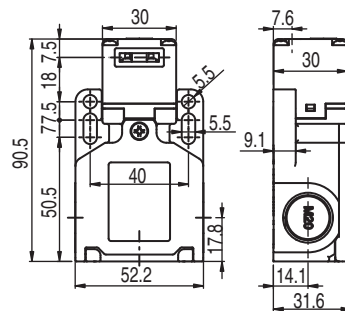
S400, S410  
p. 368

Dimensional drawings

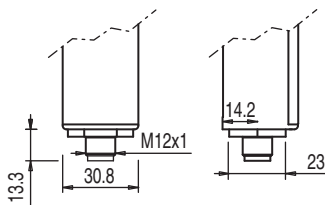
S20 Safety Switch



Safety switches S20-P3C1-M20-FH, S20-P4C1-M20-FH, S20-P1C1-M20-FH, S20-P4C1-M20-FH30



Safety Switches S20-P1C3-M20-LH, S20-P4C3-M20-LH



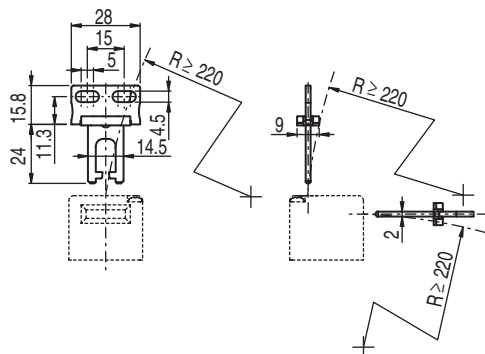
Safety Switch S20-P4C1-M12-FH (dimensions of M12 plug)

Dimensions in mm

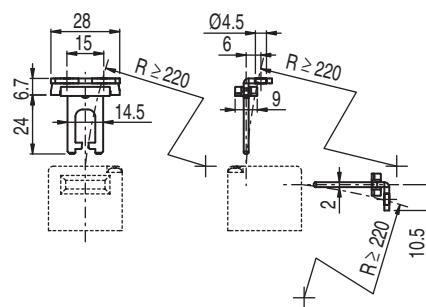
# SAFETY SWITCHES

## Dimensional drawings: Accessories

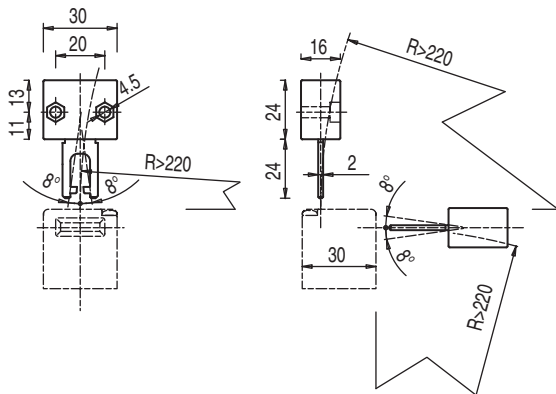
### AC-AN actuator...



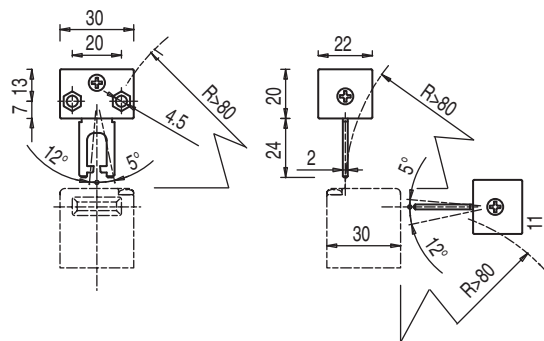
Actuator AC-AN-S



Actuator AC-AN-A



Actuator AC-AN-F4



Actuator AC-AN-F2J2

Dimensions in mm

**S20**  
p. 340

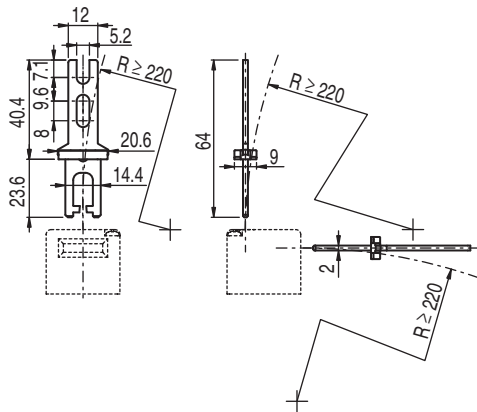
S200  
p. 350

S300  
p. 360

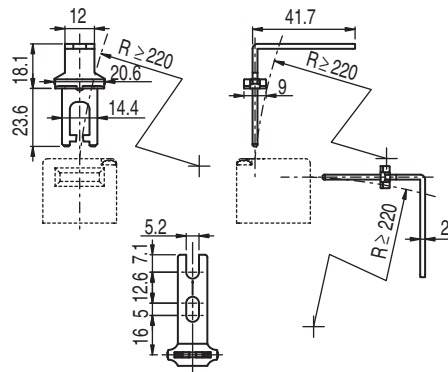
S400, S410  
p. 368

Dimensional drawings: Accessories

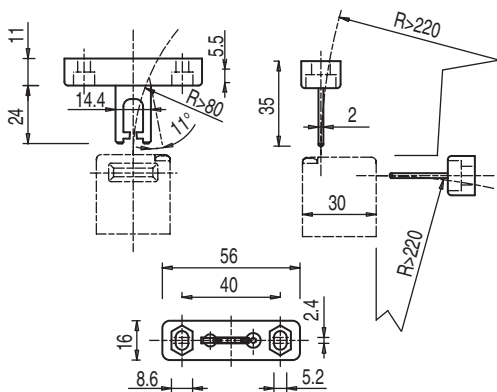
AC-AN- actuator...



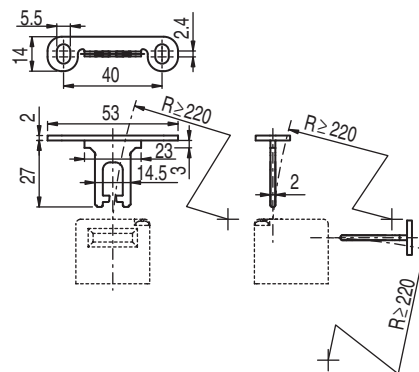
Actuator AC-AN-SL



Actuator AC-AN-AL



Actuator AC-AN-F1J2



Actuator AC-AN-ASH

Dimensions in mm



## SAFETY SWITCHES

### Accessories ordering information

#### S20 Normal Duty accessories

| Part no.          | Article           | Description  | Design   |
|-------------------|-------------------|--|--|
| 63000700          | AC-AN-S           | Actuator   | Straight   |
| 63000701          | AC-AN-A           | Actuator   | Angled   |
| 63000702          | AC-AN-F4          | Actuator   | Straight, flexible, 4 directions                         |
| 63000703          | AC-AN-F2J2        | Actuator   | Straight, flexible, 2 directions, alignable 2 directions |
| 63000704          | AC-AN-SL          | Actuator   | Straight, long   |
| 63000705          | AC-AN-AL          | Actuator   | Angled, long   |
| 63000706          | AC-AN-F1J2        | Actuator   | Straight, flexible, 1 direction, alignable 2 directions  |
| 63000707          | AC-AN-ASH         | Actuator   | Angled, short  |
| 63000843          | AC-A-M20-12NPT    | Adapter  | M20 x 1.5 on 1/2 NPT                                     |
| 63000844          | AC-PLP-8          | Built-in plug                                      | M12, plastic, with internal 8-pin connection cable       |
| Connection cables |                   |  |  |
| 678055            | CB-M12-5000E-5GF  | Connection cable shielded with M12 coupling, 5-pin | 5 m, straight/open end                                   |
| 678056            | CB-M12-10000E-5GF | Connection cable shielded with M12 coupling, 5-pin | 10 m, straight/open end                                  |
| 678057            | CB-M12-15000E-5GF | Connection cable shielded with M12 coupling, 5-pin | 15 m, straight/open end                                  |
| 678058            | CB-M12-25000E-5GF | Connection cable shielded with M12 coupling, 5-pin | 25 m, straight/open end                                  |
| 678060            | CB-M12-5000E-8GF  | Connection cable shielded with M12 coupling, 8-pin | 5 m, straight/open end                                   |
| 678061            | CB-M12-10000E-8GF | Connection cable shielded with M12 coupling, 8-pin | 10 m, straight/open end                                  |
| 678062            | CB-M12-15000E-8GF | Connection cable shielded with M12 coupling, 8-pin | 15 m, straight/open end                                  |
| 678063            | CB-M12-25000E-8GF | Connection cable shielded with M12 coupling, 8-pin | 25 m, straight/open end                                  |

**S20**  
p. 340

S200  
p. 350

S300  
p. 360

S400, S410  
p. 368

Article list for S20 accessories

| Article       | Description                   |
|---------------|-------------------------------|
| <b>AC</b>     | <b>Accessories</b>            |
| <b>-AN</b>    | Actuator, Normal Duty         |
| <b>-S</b>     | Straight                      |
| <b>-A</b>     | Angled                        |
| <b>-F2</b>    | Flexible in 2 directions      |
| <b>-F4</b>    | Flexible in 4 directions      |
| <b>J2</b>     | Alignable in 2 directions     |
| <b>-SL</b>    | Straight and long             |
| <b>-AL</b>    | Angled and long               |
| <b>-ASH</b>   | Angled and short              |
| <b>-PLP-8</b> | Built-in plug, 8-pin, plastic |
| <b>-M12</b>   | M12 plug                      |

AC

Safety Locking Devices

Safety Command Devices

Safety Relays

Programmable Safety Controllers

Accessories

Glossary

Product Finder

## SAFETY SWITCHES

### S200 Safety Switch



*S200 Safety Switch on the door of a plastic film wrapping station*

The S200 is a Safety Switch without guard interlocking, which can always be used when the dangerous movement stops before the entering person can reach the point of operation. It is used, for example, with heavy doors or shutter doors in tough environments, i.e. it is preferred with "heavy duty" applications in which a process or production interruption is possible or may be required. The S200 series Safety Switches have a housing made of metal in accordance with protection rating IP 67. The models equipped with various contact sets and connection systems (screw terminals, M12 connectors) enable integration in control circuits up to category 4 in accordance with EN ISO 13849. The standard construction in combination with six different "heavy duty" actuators enables easy mounting in the most diverse mechanical conditions.

#### Typical areas of application

- Monitoring heavy sliding doors and large protective doors and shutter gates
- Use in tough environments

**Important technical data, overview**

|                               |  |           |          |
|-------------------------------|--|-----------|----------|
| Switch type                   | Interlock device without guard interlocking in accordance with EN 1088 |           |          |
| Housing material              | Metal  |           |          |
| Actuation force (pull-out)    | 10 N   |           |          |
| Contact equipment             | 2NC ⊖<br>1NC ⊖ + 1NO<br>2NC ⊖ + 1NO                                    |           |          |
| Switching principle           | Creep contact  |           |          |
| External actuator             | AC-AHxx, series, straight, angled, resilient, alignable                |           |          |
| Approach actuation directions | 1 x above, 4 x side (90°)  |           |          |
| Approach speed                | Max. 0.5 m/s   |           |          |
| Connection system             | Number of cable entries  | 1         | 1        |
|                               | Type of cable entries  | M20 x 1.5 | M12 plug |
| Protection rating             | IP 67  |           |          |

**Functions**

Interlock device without guard interlocking in accordance with EN 1088  
 Integration in control circuits up to category 4 in accordance with EN ISO 13849

**Special features**

- Metal housing for use in tough environments
- Easy mounting with standard construction
- Contact sets for integration up to category 4 acc. to EN ISO 13849
- Large double-bridge contacts for long service life
- Universal use with 5 actuator approach directions
- Self-centering through funnel-shaped insertion opening
- 6 different "heavy duty" AC-AHxx series actuators for the most diverse installation conditions and applications



**Features**



| Further information                 | Page |
|-------------------------------------|------|
| ● Ordering information              | 352  |
| ● Electrical connection             | 353  |
| ● Technical data                    | 354  |
| ● Dimensional drawings              | 355  |
| ● Dimensional drawings: Accessories | 356  |
| ● Accessories ordering information  | 358  |

## SAFETY SWITCHES

### Ordering information

**S200**

Included in delivery: Application information (print document)

**Functions:** Interlock device without guard interlocking in accordance with EN 1088

### S200 Safety Switches, Heavy Duty

| Part no. | Article       | Description             | Contact equipment            |
|----------|---------------|-------------------------|------------------------------|
| 63000200 | S200-M3C1-M20 | Safety Switches         | (2NC ⊖) creep contacts       |
| 63000201 | S200-M1C1-M20 | Safety Switches         | (1NC ⊖ + 1NO) creep contacts |
| 63000202 | S200-M4C1-M20 | Safety Switches         | (2NC ⊖ + 1NO) creep contacts |
| 63000203 | S200-M4C1-M12 | Safety Switch, M12 plug | (2NC ⊖ + 1NO) creep contacts |

Actuators must be ordered separately, see page 358.

### Article list for S200

| Article        | Description              |
|----------------|--------------------------|
| <b>S200</b>    | <b>Safety Switches</b>   |
| <b>-M</b>      | Metal housing            |
| <b>1, 3, 4</b> | Contact set              |
| <b>C1</b>      | Number of cable bushings |
| <b>-M20</b>    | Metric thread            |
| <b>-M12</b>    | M12 plug                 |

**S 200**

 S20  
p. 340

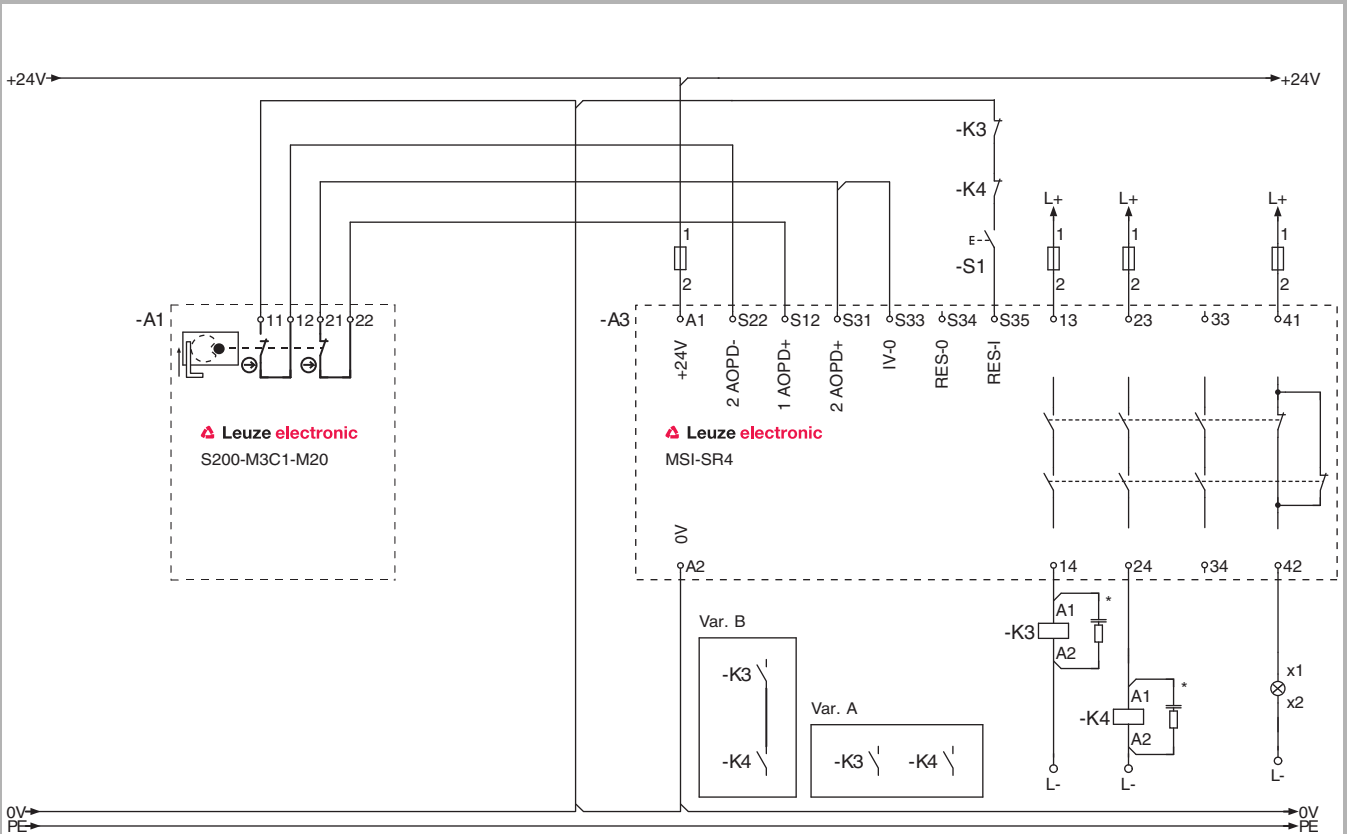
**S200**  
**p. 350**

 S300  
p. 360

 S400, S410  
p. 368

Electrical connection

S200 connection example



\*) Spark extinction circuit, supply suitable spark extinction

S200 Safety Switch with MSI-SR4 Safety Relay

Please observe the operating instructions of the components!

Safety Locking Devices

Safety Command Devices

Safety Relays

Programmable Safety Controllers

Accessories

Glossary

Product Finder

## SAFETY SWITCHES

### Technical data

|   |  |   |
|---|--|---|
| Switch type   | Interlock device without guard interlocking in accordance with EN 1088 |   |
| Service life ( $T_M$ ) in accordance with EN ISO 13849-1                            | 20 years   |   |
| Number of cycles until 10% of the components have a failure to danger ( $B_{10d}$ ) | 2,000,000  |   |
| Ambient temperature, operation  | -25...+80°C  |   |
| Dirt levels, external, in accordance with EN 60947-1                                | 3  |   |
| Housing material  | Metal  |   |
| External actuator   | AC-AHxx series, straight, angled, resilient, alignable                 |   |
| Dimensions  | See dimensional drawing  |   |
| Protection rating   | IP 67  |   |
| Contact protection  | Earthing   |   |
| Approach actuation directions   | 1 x above, 4 x lateral (90°)   |   |
| Mechanical life time in accordance with IEC 6047-5-1                                | 1 x 10 <sup>6</sup> actuation cycles                                   |   |
| Actuation frequency in accordance with IEC 6047-5-1                                 | Max. 3600 per hour   |   |
| Approach speed  | Max. 0.5 m/s   |   |
| Actuation force (pull-out)  | 10 N   |   |
| Actuating path with forced separation   | Min. 10.2 mm<br>Min. 8.6 mm<br>Min. 8.8 mm                             | S200-M3C1-M20<br>S200-M1C1-M20<br>S200-M4C1-M20 / S200-M4C1-M12 |
| Recoil tolerance  | 5 mm   |   |
| Contact equipment   | 2NC ⊕<br>1NC ⊕ + 1NO<br>2NC ⊕ + 1NO                                    | S200-M3...<br>S200-M1...<br>S200-M4...                          |
| Switching principle   | Creep contact  |   |
| Contact opening   | Force-fit  |   |
| Contact material  | Silver alloy   |   |

S20  
p. 340

**S200**  
**p. 350**

S300  
p. 360

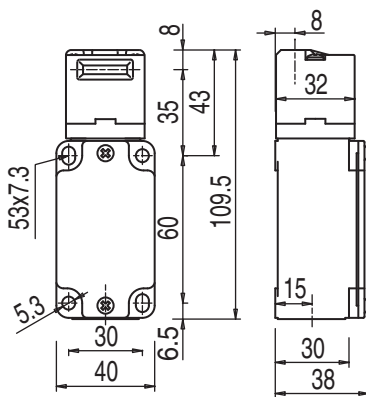
S400, S410  
p. 368

Technical data

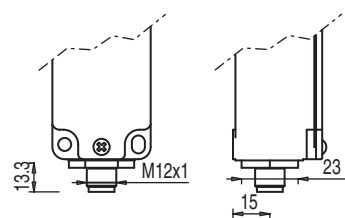
| General system data   |   |
|---|---|
| Usage category in accordance with EN 60947-5-1 with screw terminal connection | AC 15: Ue / Ie: 250 V / 6 A, 400 V / 4 A, 500 V / 1 A<br>DC 13: Ue / Ie: 24 V / 6 A, 125 V / 1.1 A, 250 V / 0.4 A |
| Usage category in accordance with EN 60947-5-1 with M12 plug connection       | AC15: Ue / Ie: 24 V / 2 A<br>DC13: Ue / Ie: 24 V / 2 A  |
| Rated insulation voltage  | 400 V AC, 600 V DC (screw terminal connection)<br>30 V AC, 36 V DC (M12-plug connection)                          |
| Conventional thermal current  | Max. 10 A (screw terminal connection)<br>Max. 2 A (M12-plug connection)   |
| Short-circuit protection according to IEC 60269-1                             | 500 V, 10 A, type aM (screw terminal connection)<br>500 V, 2 A, type gG (M12-plug connection)                     |
| Connection system   | M12 plug  |
|   | Number of cable entries   |
|   | Type of cable entries   |
|   | Conductor cross-section (stranded) with screw terminal connection   |
|   | 1 (S200-...M12...)  |
|   | 1   |
|   | M20 x 1.5   |
|   | 1 x 0.5 mm <sup>2</sup> to 2 x 2.5 mm <sup>2</sup>  |

Please note the additional information in the connecting and operating instructions at [www.leuze.com/en/s200](http://www.leuze.com/en/s200).

S200 dimensional drawings



Safety Switches S200-M3C1-M20, S200-M1C1-M20, S200-M4C1-M20



Safety Switch S200-M4C1-M12 (dimensions of M12 plug)

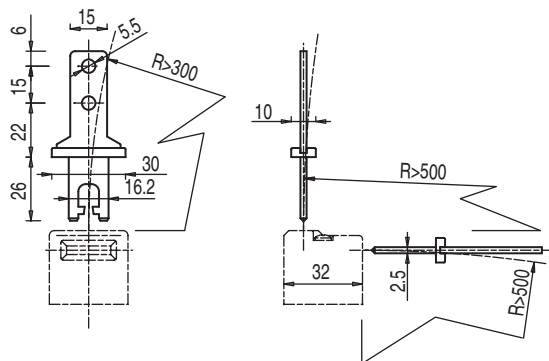
Dimensions in mm



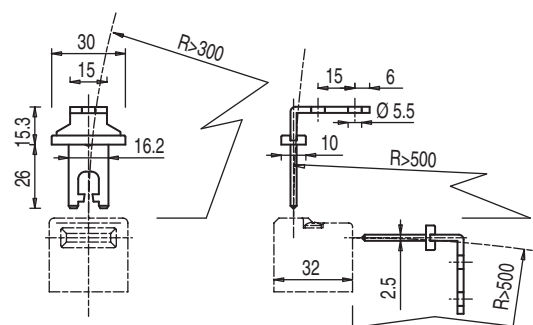
# SAFETY SWITCHES

## Dimensional drawings: Accessories

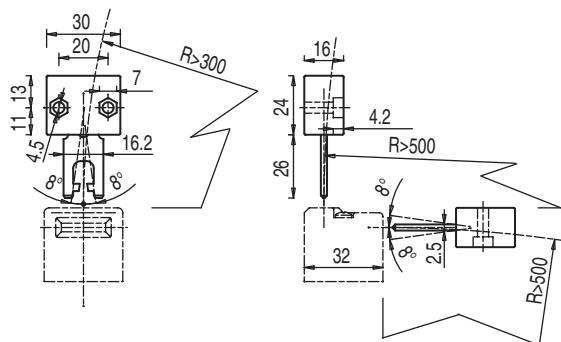
### AC-AH- actuator...



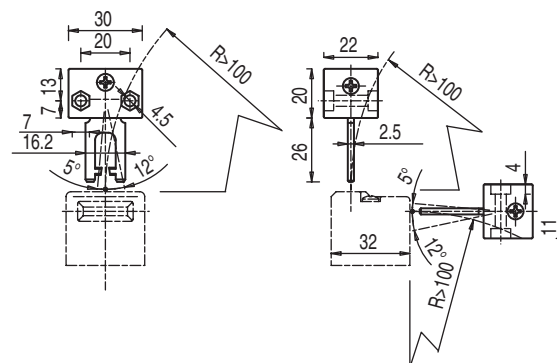
Actuator AC-AH-S



Actuator AC-AH-A



Actuator AC-AH-F4



Actuator AC-AH-F2J2

Dimensions in mm

S20  
p. 340

**S20**  
**p. 350**

S300  
p. 360

S400, S410  
p. 368



## SAFETY SWITCHES

### Accessories ordering information

#### S200 Heavy Duty accessories

| Part no. | Article        | Description                                   | Design   |
|----------|----------------|---|--|
| 63000720 | AC-AH-S        | Actuator                                      | Straight   |
| 63000721 | AC-AH-A        | Actuator                                      | Angled   |
| 63000722 | AC-AH-F4       | Actuator                                      | Straight, flexible, 4 directions   |
| 63000723 | AC-AH-F2J2     | Actuator                                      | Straight, flexible, 2 directions, alignable 2 directions                 |
| 63000724 | AC-AH-F1J2     | Actuator                                      | Straight, flexible, 1 direction, alignable 2 directions                  |
| 63000725 | AC-AH-F4J2-TK  | Actuator                                      | Straight, flexible, 4 directions, alignable 2 directions, rotatable head |
| 63000843 | AC-A-M20-12NPT | Adapter                                       | M20 x 1.5 on 1/2 NPT   |
| 63000845 | AC-PLM-8       | Built-in plug                                 | M12, metal, with internal 8-pin connection cable                         |
| 63000846 | AC-KL-AH       | KeyLock for locking the actuator introduction |  |

"Connection cables": see S20 Safety Switch, page 348

#### Article list for S200 accessories

| Article       | Description                          |
|---------------|--------------------------------------|
| <b>AC</b>     | <b>Accessories</b>                   |
| <b>-AH</b>    | Actuator, Heavy Duty                 |
| <b>-S</b>     | Straight                             |
| <b>-A</b>     | Angled                               |
| <b>-F1</b>    | Flexible in 1 directions             |
| <b>-F2</b>    | Flexible in 2 directions             |
| <b>-F4</b>    | Flexible in 4 directions             |
| <b>J2</b>     | Alignable in 2 directions            |
| <b>-TK</b>    | Actuator key, turns                  |
| <b>-PLM-8</b> | Built-in plug, 8-pin, metal          |
| <b>-KL</b>    | Locking of the actuator introduction |
| <b>-M12</b>   | M12 plug                             |

**AC**

S20  
p. 340

**S200**  
**p. 350**

S300  
p. 360

S400, S410  
p. 368

# S200

Safety Locking  
Devices

Safety Command  
Devices

Safety Relays

Programmable  
Safety Controllers

Accessories

Glossary

Product Finder

[www.leuze.com/en/s200/](http://www.leuze.com/en/s200/)

## SAFETY SWITCHES

### S300 Safety Position Switch



*Safety Position Switch on machine with a protective device and swivel joints – a typical application, e.g. in automated parts processing*

This Safety Switch is also used when the dangerous movement stops before the entering person can reach the point of operation, i.e. with machines with very short stopping times. Because of its construction design, the S300 Safety Position Switch is also mounted on flaps as an alternative to hinge switches – always with the prerequisite that appropriate actuation tappets or notches can actuate the switch when friction closed. The S300 Safety Position Switches have a metal housing in accordance with protection rating IP 67. The models equipped with various contact sets enable integration in control circuits up to category 4 in accordance with EN ISO 13849. In addition, variants are available with various actuators and holders and connection options. Thus, the S300 series covers a number of mechanical and electrical applications.

#### Typical areas of application

- Covers and sliding doors with force-fit actuation
- Cover flaps with forced actuation
- Machine-actuated additional switch-off in combination with S200 Safety Switches, for example

**Important technical data, overview**

|                               |   |         |          |
|-------------------------------|---|---------|----------|
| Switch type                   | Interlock device without guard interlocking in accordance with EN 1088              |         |          |
| Housing material              | Metal, plastic (glass fiber reinforced, self-extinguishing)                         |         |          |
| Contact equipment             | 1NC ⊖ + 1NO 2NC ⊖ + 1NO   |         |          |
| Switching principle           | Snap-action contact, creep contact  |         |          |
| Actuator                      | Tappet actuator, various roller levers with roll, porcelain lever                   |         |          |
| Approach actuation directions | 1 x above + 4 x lateral (90°), 360° + 4 x side (90°)                                |         |          |
| Switching direction           | Left-right one side, both sides   |         |          |
| Approach speed                | Min. 0.04 mm/s up to max. 1.0 m/s (depending on angle of approach and product type) |         |          |
| Connection system             | Number of cable entries   | 1, 3    | 1        |
|                               | Type of cable entries   | M20x1.5 | M12 plug |
| Protection rating             | IP 67   |         |          |

**Functions**

- Interlock device without guard interlocking in accordance with EN 1088
- Integration in control circuits up to category 4 in accordance with EN ISO 13849
- Stop command with automatic or manual forced actuation

**Special features**

- Metal housing for "heavy duty" applications
- Contact sets for integration up to category 4 acc. to EN ISO 13849
- Switching direction selectable
- Universal use with individually set actuator approach directions and angles
- Actuator with extremely long life/robust



**Features**



**Further information** **Page**

- Ordering information 362
- Electrical connection 363
- Technical data 364
- Dimensional drawings 365
- Accessories ordering information 367

## SAFETY SWITCHES

### Ordering information

#### S300

Included in delivery: Application information (print document)

**Functions:** Interlock device without guard interlocking in accordance with EN 1088

### S300 Safety Position Switches, Heavy Duty

| Part no. | Article           | Description   | Contact equipment              |
|----------|-------------------|---|--------------------------------|
| 63000300 | S300-M0C3-M20-15  | Safety Position Switch with roller plunger, metal design                | (1NC ⊕ + 1NO) step contacts    |
| 63000301 | S300-M13C3-M20-15 | Safety Position Switch with roller plunger, metal design                | (2NC ⊕ + 1NO) creep contacts   |
| 63000302 | S300-M0C3-M20-31  | Safety Position Switch with roller lever, metal design                  | (1NC ⊕ + 1NO) step contacts    |
| 63000303 | S300-M13C3-M20-31 | Safety Position Switch with roller lever, metal design                  | (2NC ⊕ + 1NO) creep contacts   |
| 63000304 | S300M13C3-M20-CB  | Safety Position Switch, short actuator holder, metal design             | (2NC ⊕ + 1NO) creep contacts   |
| 63000305 | S300M13C1-M20-SB  | Safety Position Switch, long actuator holder, metal design              | (2NC ⊕ + 1NO) creep contacts   |
| 63000306 | S300P13C1-M20-CB  | Safety Position Switch, short actuator holder, plastic design           | (2NC ⊕ + 1NO) creep contacts   |
| 63000307 | S300P13C1-M12-CB  | Safety Position Switch, short actuator holder, plastic design, M12 plug | (2NC ⊕ + 1NO) creep contacts   |
| 63000308 | S300P13C1-M20-SB  | Safety Position Switch, long actuator holder, plastic design            | (2NC ⊕ + 1NO) creep contacts   |
| 63000309 | S300P13C1-M12-SB  | Safety Position Switch, long actuator holder, plastic design, M12 plug  | (2NC ⊕ + 1NO) creep contacts   |
| 63000310 | S300-P0C1-M20-CB  | Safety Position Switch, short actuator mount, plastic version           | 1NC + 1NO snap-action contacts |

#### Note

Variants 63000304 to 63000309 can be combined with various actuators, see page 367.

S20  
p. 340

S200  
p. 350

**S300**  
p. 360

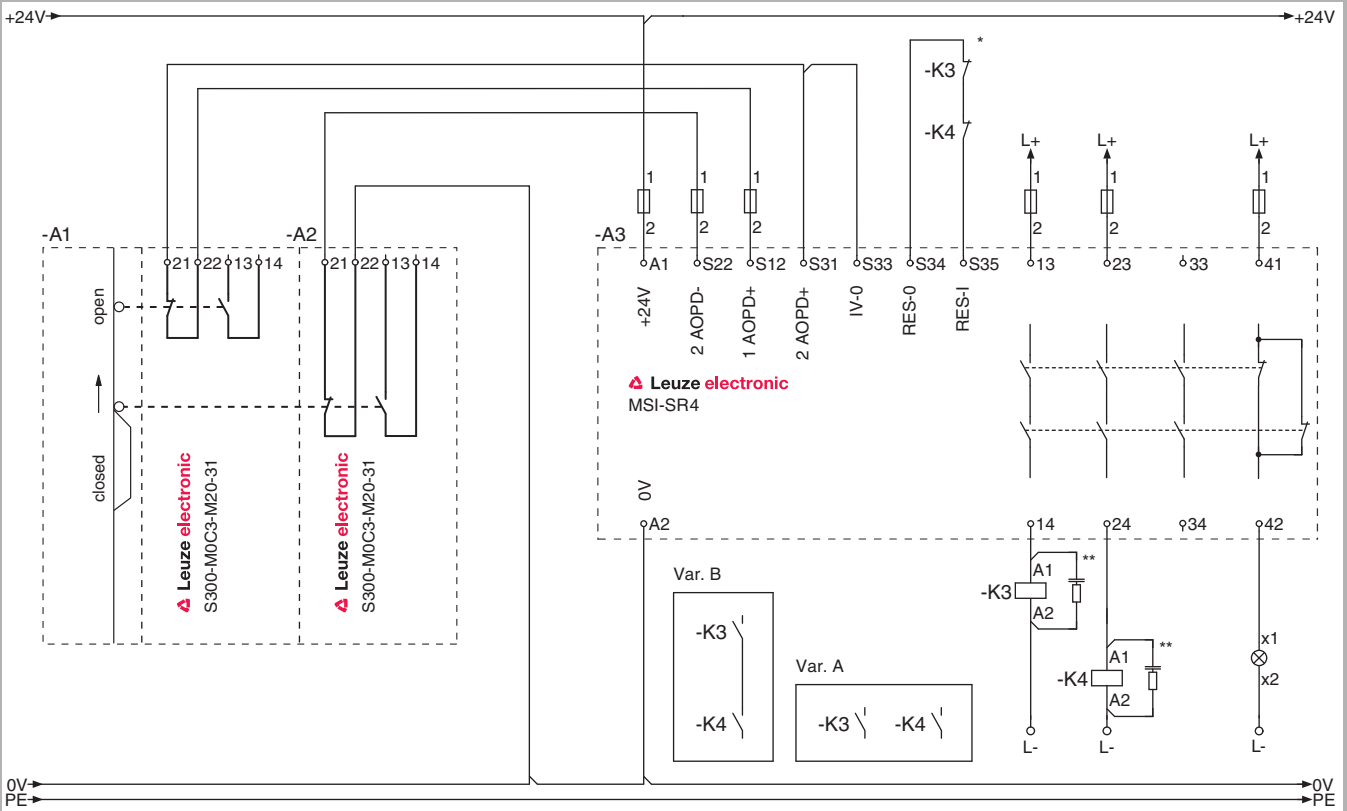
S400, S410  
p. 368

Article list for S300

| Article | Description              |
|---------|--------------------------|
| S300    | Safety Position Switch   |
| -M      | Metal housing            |
| -P      | Plastic housing          |
| 0, 13   | Contact set              |
| C1, C3  | Number of cable bushings |
| -M12    | M12 plug                 |
| -M20    | Metric thread            |
| -15, 31 | Actuator model           |
| CB      | Short actuator mount     |
| SB      | Long actuator mount      |

S 300

S300 electrical connection



\*) Automatic start! It must not be possible to reach or walk behind the interlock device!  
 \*\*) Spark extinction circuit, supply suitable spark extinction

S300 Safety Position Switch with MSI-SR4 Safety Relay

⚠ Please observe the operating instructions of the components!



## SAFETY SWITCHES

### Technical data

|   |  |  |
|---|--|--|
| Switch type   | Interlock device without guard interlocking in accordance with EN 1088             |  |
| Service life ( $T_M$ ) in accordance with EN ISO 13849-1                            | 20 years   |  |
| Number of cycles until 10% of the components have a failure to danger ( $B_{10d}$ ) | 40,000,000   |  |
| Ambient temperature, operation  | -25...+80°C  |  |
| Dirt levels, external, in accordance with EN 60947-1                                | 3  |  |
| Housing material  | S300-M...: metal<br>S300-P...: plastic, glass fiber reinforced, self-extinguishing |  |
| Actuator  | Tappet actuator, roller lever with roll, porcelain lever                           |  |
| Dimensions  | See dimensional drawing  |  |
| Protection rating   | IP 67  |  |
| Approach actuation directions   | 1 x above, 4 x side (90°)  | S300 with roller plunger                 |
|   | 360° + 4 x side (90°)  | S300 with roller lever                   |
| Switching direction   | Left-right one side, both sides  |  |
| Mechanical life time in accordance with IEC 6047-5-1                                | 20 x 10 <sup>6</sup> actuation cycles  |  |
| Actuation frequency according to IEC 6047-5-1                                       | Max. 3600 per hour   |  |
| Contact equipment   | 1NC ⊕ + 1NO  | S300-M0...                               |
|   | 2NC ⊕ + 1NO  | S300-M13..., S300-P13...                 |
| Switching principle   | Snap-action contact  | S300-M0...                               |
|   | Creep contact  | S300-M13..., S300-P13...                 |
| Contact opening   | Force-fit  |  |
| Contact material  | Silver alloy   |  |
| Usage category in accordance with EN 60947-5-1 with screw terminal connection       | AC 15: $U_e / I_e$ : 250 V / 6 A, 400 V / 4 A, 500 V / 1 A                         |  |
|   | DC 13: $U_e / I_e$ : 24 V / 6 A, 125 V / 1.1 A, 250 V / 0.4 A                      |  |
| Usage category in accordance with EN 60947-5-1 with M12 plug connection             | AC15: $U_e / I_e$ : 24 V / 2 A   |  |
|   | DC13: $U_e / I_e$ : 24 V / 2 A   |  |
| Rated insulation voltage  | 500 V AC, 600 V DC (screw terminal connection)                                     |  |
|   | 30 V AC, 36 V DC (M12-plug connection)   |  |
| Conventional thermal current  | Max. 10 A (screw terminal connection)  |  |
|   | Max. 2 A (M12-plug connection)   |  |
| Short-circuit protection according to IEC 60269-1                                   | 500 V, 10 A, type aM (screw terminal connection)                                   |  |
|   | 500 V, 2 A, type gG (M12-plug connection)  |  |
| Connection system   | Number of cable entries  | 1 (S300-P...C1...)<br>3 (S300-M...C3...) |
|   | Type of cable entries  | M20 x 1.5                                |

Please note the additional information in the connecting and operating instructions at [www.leuze.com/en/s300](http://www.leuze.com/en/s300).

S20  
p. 340

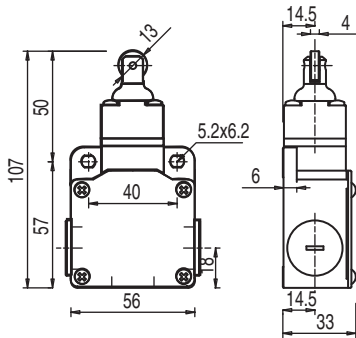
S200  
p. 350

**S300**  
**p. 360**

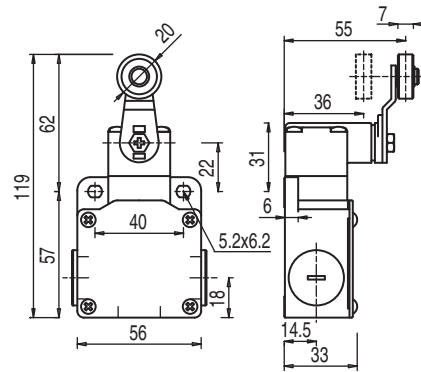
S400, S410  
p. 368

Dimensional drawings

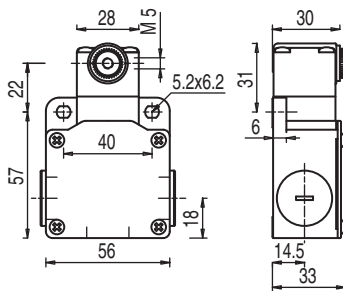
S300 Safety Position Switch



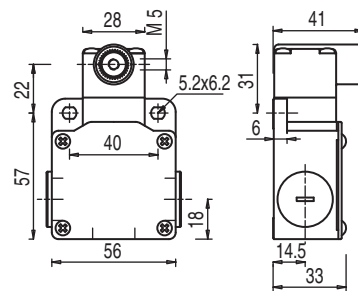
Safety Position Switches  
S300-M0C3-M20-15, S300-M13C3-M20-15



Safety Position Switches  
S300-M0C3-M20-31, S300-M13C3-M20-31



Safety Position Switch S300-M13C3-M20-CB



Safety Position Switch S300-M13C3-M20-SB

Dimensions in mm

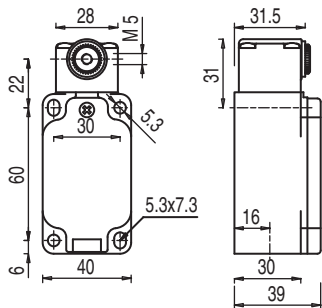
**Note**

The pictured models can be combined with various actuators, see page 367.

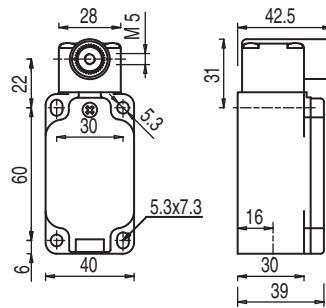
## SAFETY SWITCHES

### Dimensional drawings

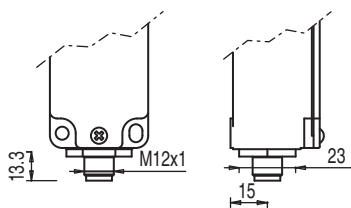
#### S300 Safety Position Switch



Safety Position Switch  
S300-P13C1-M20-CB, S300-P13C1-M12-CB



Safety Position Switch  
S300-P13C1-M20-SB, S300-P13C1-M12-SB



Safety Position Switch S300-P13C1-M12-... (dimensions of M12 plug)

Dimensions in mm

#### **Note**

The pictured models can be combined with various actuators, see page 367.

S20  
p. 340

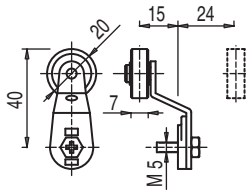
S200  
p. 350

**S300**  
**p. 360**

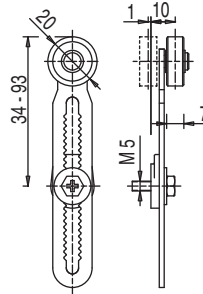
S400, S410  
p. 368

Dimensional drawings: Accessories

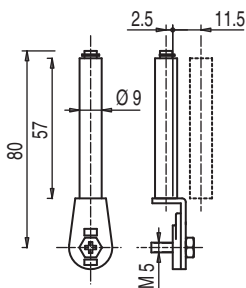
AC- actuator...



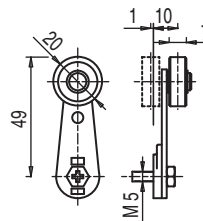
AC-AL-R actuator



AC-LL-R actuator



AC-PL actuator



AC-SL-R actuator

Dimensions in mm

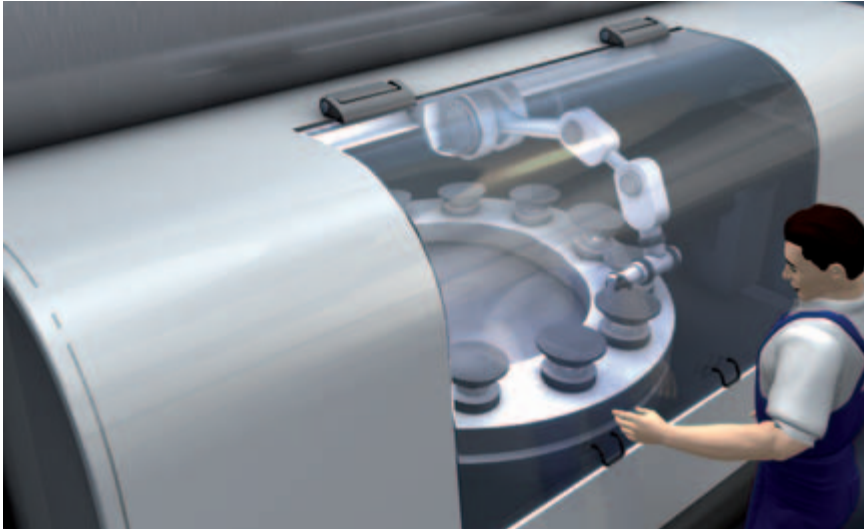
AS300 accessories ordering information

| Part no. | Article        | Description   | Design   |
|----------|----------------|---------------|--|
| 63000843 | AC-A-M20-12NPT | Adapter       | M20 x 1.5 on 1/2 NPT                             |
| 63000845 | AC-PLM-8       | Built-in plug | M12, metal, with internal 8-pin connection cable |
| 63000880 | AC-SL-R        | Actuator      | Roller lever with roll, straight                 |
| 63000881 | AC-AL-R        | Actuator      | Roller lever with roll, angled                   |
| 63000882 | AC-LL-R        | Actuator      | Roller lever with roll, long                     |
| 63000883 | AC-PL          | Actuator      | Porcelain lever, straight                        |

"Connection cables": see S20 Safety Switch, page 348

## SAFETY SWITCHES

### S400, S410 Safety Hinge Switches



*Safety Hinge Switch on a semi-automatic test system with protective hood*

S400 series Safety Hinge Switches are used for position monitoring of hard guards that can rotate (e.g. protective hoods) with a monitoring switch (without guard interlocking) integrated into the hinge. The S400 Safety Hinge Switches unite the Safety Switch and door hinge functions in one component. This Safety Switch is used with machines with small stopping times, depending on the distance to the point of operation. As external actuators are not required with this Switch, it can also be used problem-free in environments with high dust concentration levels or with heavy particle loads. The Switch is extremely compact, but robust at the same time, and therefore predestined for numerous applications. It also boasts a simple switching angle alignment. If, for example, doors are to be moved or aligned later on, re-alignment is no problem. The covered screws of the S400 Safety Hinge Switch ensure that it is highly tamperproof. Depending on the version, the electrical connection is made via a cable or an M12 plug - available with cable entry from above, below or wall side (mounting side). This flexibility enables the monitoring of a wide range of doors, hoods, flaps, etc.

#### Typical areas of application

- Monitoring of rotating or swiveling protective doors
- Hand protection with flap and hood position monitoring

S20  
p. 340

S200  
p. 350

S300  
p. 360

**S400, S410**  
**p. 368**

# S400, S410

## Important technical data, overview

|                     |  |
|---------------------|--|
| Switch type         | Interlock device without guard interlocking in accordance with EN 1088 |
| Housing material    | Metal  |
| Loads/stresses      | 1500 Nm (axial), 1000 Nm (radial), 25 Nm (torsional)                   |
| Contact equipment   | 2NC ⊖ + 1NO  |
| Switching principle | Creep contact, snap-action contact                                     |
| Internal actuator   | Safety Switch in hinge, encapsulated                                   |
| Actuation angle     | Max. 180°  |
| Connection system   | Cable, M12 plug  |
| Cable entry         | Bottom, top, at wall side  |
| Protection rating   | IP 67, IP 69K  |

### Functions

- Interlock device without guard interlocking in accordance with EN 1088
- Integration in control circuits up to category 4 in accordance with EN ISO 13849
- Mechanical hinge with integrated Safety Switch

### Special features

- Contact sets for integration up to category 4 acc. to EN ISO 13849
- 180° maximum opening angle of the protective device
- Repeatable setting (switching angle alignment) with skewed or misaligned doors
- Protection rating IP 67
- Compact, rounded-off construction design in robust metal version
- Encapsulated, internal actuator guarantees proper functioning, even under difficult environmental conditions
- Extremely tamperproof with covered screws (unobtrusive sturdy design with rear-side mounting)



### Features



| Further information                 | Page |
|-------------------------------------|------|
| ● Ordering information              | 370  |
| ● S400 electrical connection        | 371  |
| ● Technical data                    | 372  |
| ● Dimensional drawings              | 373  |
| ● Dimensional drawings: Accessories | 375  |
| ● Accessories ordering information  | 376  |

Safety Locking Devices

Safety Command Devices

Safety Relays

Programmable Safety Controllers

Accessories

Glossary

Product Finder

## SAFETY SWITCHES

### Ordering information

#### S400, S410

Included in delivery: Application information (print document)

**Functions:** Interlock device without guard interlocking in accordance with EN 1088, mechanical hinge with integrated Safety Switch, integrated encapsulated actuator, switching angle can be aligned again and again

| S400, S410 Safety Hinge Switches |                   |  |                            |
|----------------------------------|-------------------|--|----------------------------|
| Part no.                         | Article           | Description  | Contact sets               |
| 63000400                         | S400-M4CB2-B      | Safety Hinge Switch, 2 m cable, cable entry on bottom                        | 2NC ⊖ + 1NO, creep contact |
| 63000401                         | S400-M4M12-B      | Safety Hinge Switch, M12 plug, 8-pin, cable entry on bottom                  | 2NC ⊖ + 1NO, creep contact |
| 63000402                         | S400-M4CB2-T      | Safety Hinge Switch, 2 m cable, cable entry on top                           | 2NC ⊖ + 1NO, creep contact |
| 63000403                         | S400-M4M12-T      | Safety Hinge Switch, M12 plug, 8-pin, cable entry on top                     | 2NC ⊖ + 1NO, creep contact |
| 63000406                         | S400-M4-CB02M12-W | Safety Hinge Switch, 0.2 m cable, M12 plug (8-pin), cable entry at wall side | 2NC ⊖ + 1NO, creep contact |
| 63000407                         | S400-M1-CB02M12-W | Safety Hinge Switch, 0.2 m cable, M12 plug (8-pin), cable entry at wall side | 2NC ⊖ + 1NO, creep contact |
| 63000411                         | S400-M4-CB2PUR-W  | Safety Hinge Switch, 2 m PUR cable, cable entry at wall side                 | 2NC ⊖ + 1NO, creep contact |
| 63000404                         | S410-M1CB2-B      | Safety Hinge Switch, 2 m cable, cable entry on bottom                        | 2NC ⊖ + 1NO, creep contact |
| 63000405                         | S410-M1M12-B      | Safety Hinge Switch, M12 plug, 8-pin, cable entry on bottom                  | 2NC ⊖ + 1NO, creep contact |
| 63000408                         | S410-M1-CB2-T     | Safety Hinge Switch, 2 m cable, cable entry on top                           | 2NC ⊖ + 1NO, creep contact |
| 63000409                         | S410-M1M12-T      | Safety Hinge Switch, M12 plug (8-pin), cable entry on top                    | 2NC ⊖ + 1NO, creep contact |
| 63000410                         | S410-M4-CB02M12-W | Safety Hinge Switch, 0.2 m cable, M12 plug (8-pin), cable entry at wall side | 2NC ⊖ + 1NO, creep contact |
| 63000412                         | S410-M4-CB2PUR-W  | Safety Hinge Switch, 2 m PUR cable, cable entry at wall side                 | 2NC ⊖ + 1NO, creep contact |

Article list for S400, S410

| Article     | Description                                   |
|-------------|---|
| S400 , S410 | Safety Hinge Switches                         |
| -M          | Metal housing                                 |
| 1, 4        | Contact set                                   |
| CB02        | Cable, 0.2 m long                             |
| CB2         | Cable, 2 m long                               |
| M12         | M12 plug                                      |
| -PUR        | PUR cable                                     |
| -B          | Cable entry from below with left installation |
| -T          | Cable entry from above with left installation |
| -W          | Cable entry at wall side                      |

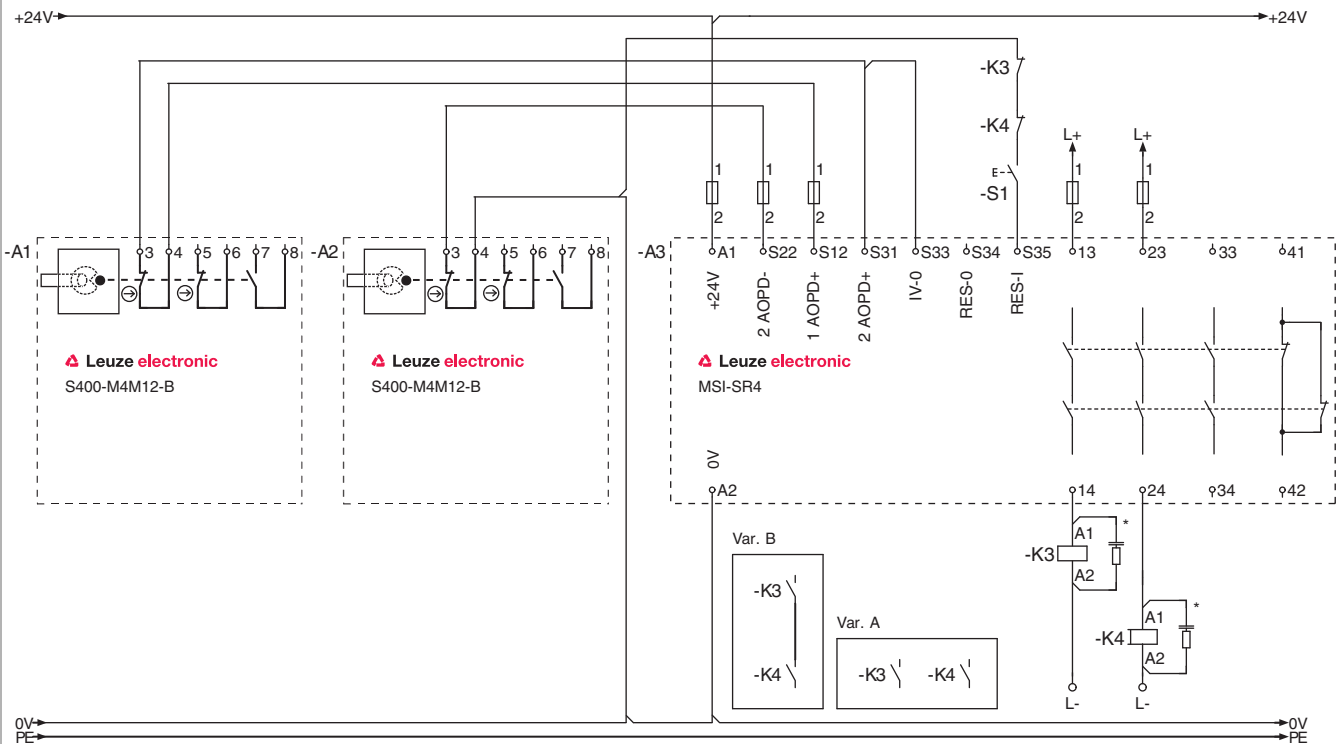
S400 , S410

Safety Locking Devices

Safety Command Devices

Safety Relays

S400 electrical connection



\*) Spark extinction circuit, supply suitable spark extinction

S400 Safety Hinge Switch with MSI-SR4 Safety Relay

⚠ Please observe the operating instructions of the components!

Programmable Safety Controllers

Accessories

Glossary

Product Finder



## SAFETY SWITCHES

### Technical data

|   |  |   |
|---|--|---|
| Switch type   | Interlock device without guard interlocking in accordance with EN 1088   |   |
| Service life ( $T_M$ ) in accordance with EN ISO 13849-1                            | 20 years   |   |
| Number of cycles until 10% of the components have a failure to danger ( $B_{10g}$ ) | 5,000,000  |   |
| Ambient temperature, operation  | -25...+80 °C   |   |
| Dirt levels, external, in accordance with EN 60947-1                                | 3  |   |
| Housing material  | Metal  |   |
| Internal actuator   | Safety Switch in hinge, encapsulated   |   |
| Dimensions  | See dimensional drawing  |   |
| Protection rating   | IP 67, IP 69K  |   |
| Actuation angle   | Max. 180°  |   |
| Mechanical life time in accordance with IEC 6047-5-1                                | 1 x 10 <sup>6</sup> actuation cycles   |   |
| Actuation frequency according to IEC 6047-5-1                                       | Max. 1200 per hour   |   |
| Actuating path with forced separation   | Min. +4° (from switching point)  |   |
| Loads/stresses  | S400: max. 1500 Nm (axial), max. 1000 Nm (radial), max. 25 Nm (torsional)<br>S410: max. 750 Nm (axial), max. 500 Nm (radial), max. 12 Nm (torsional) |   |
| Contact equipment   | 2NC $\ominus$ + 1NO  |   |
| Switching principle   | Creep contact  | S400-M4..., S410-M4...  |
|   | Snap-action contact  | S400-M1..., S410-M1...  |
| Contact opening   | Force-fit  |   |
| Contact material  | Silver alloy, solid  |   |
| Usage category in accordance with EN 60947-5-1                                      | AC 15 / DC 13: Ue 24 V, Ie 2 A   |   |
| Rated insulation voltage  | 30 V AC, 36 V DC   |   |
| Conventional thermal current  | Max. 2 A   |   |
| Short-circuit protection according to IEC 60269-1                                   | 500 V, 2 A, type gG  |   |
| Connection system   | Number of cable bushings   | 1   |
|   | Cable routing side   | from below with left installation: (S400-...-B, S410-...-B)<br>from above with left installation: (S400-...-T, S410-...-T)<br>Wall-side installation: (S400-...-W, S410-...-W)  |
|   | Connection type  | Cable: (S400-M4CB2-..., S410-M1CB2-...)<br>PUR cable: (S400-M4-CB2PUR-W, S410-M4-CB2PUR-W)<br>0.2 m cable with M12 plug:<br>(S400-M4-CB02M12-W, S400-M1-CB02M12-W, S410-M4-CB02M12-W)<br>M12 plug: (S400-M4M12-B, S400-M4M12-T, S410-M1M12-B, S410-M1M12-T) |
|   | Conductor cross-section (stranded) with screw terminal connection  | 7 x 0.5 mm <sup>2</sup><br>(S400-...CB2..., S410-...CB2...)   |

Please note the additional information in the connecting and operating instructions at [www.leuze.com/en/s400](http://www.leuze.com/en/s400).

S20  
p. 340

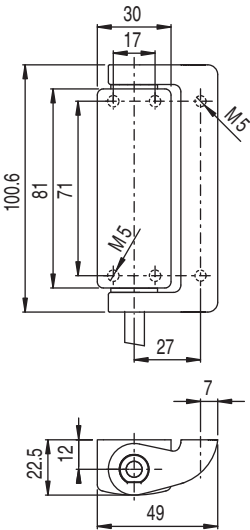
S200  
p. 350

S300  
p. 360

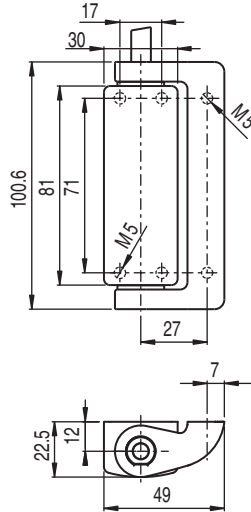
**S400, S410**  
**p. 368**

Dimensional drawings

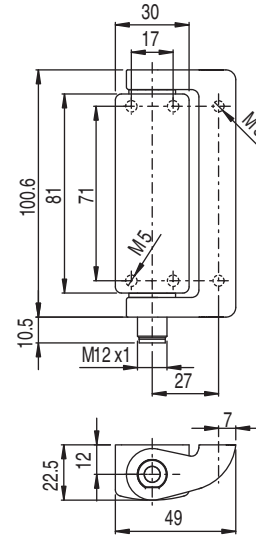
S400 Safety Hinge Switches



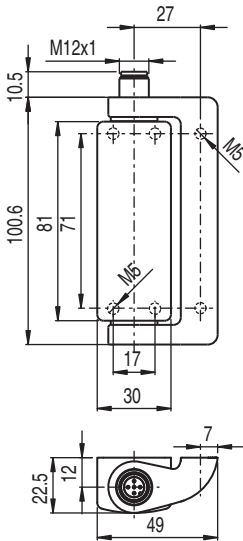
Drilling dimensions Safety Hinge Switch S400-M4CB2-B



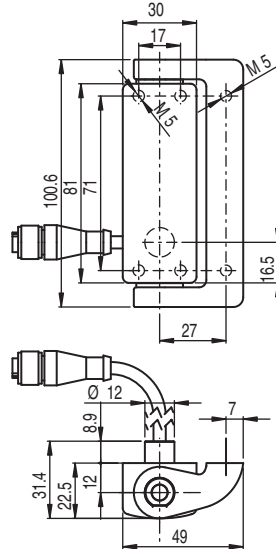
Drilling dimensions Safety Hinge Switch S400-M4CB2-T



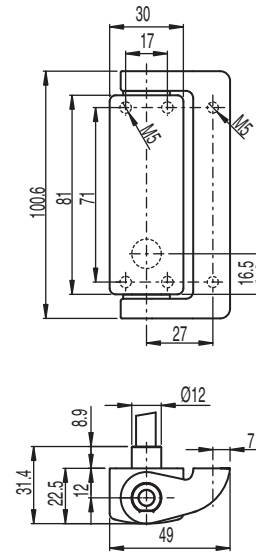
Drilling dimensions Safety Hinge Switch S400-M4M12-B



Drilling dimensions Safety Hinge Switch S400-M4M12-T



Drilling dimensions Safety Hinge Switch S400-M...-CB02M12-W



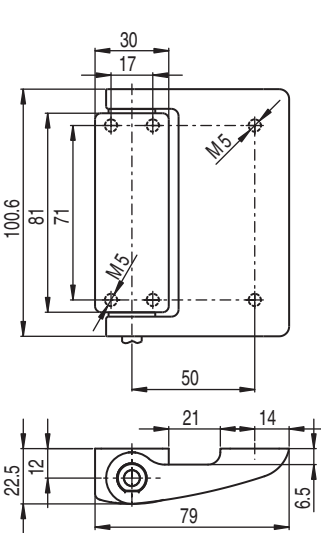
Drilling dimensions Safety Hinge Switch S400-M4-CB2PUR-W

Dimensions in mm

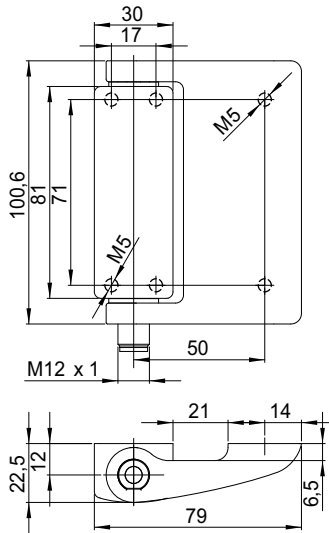
# SAFETY SWITCHES

## Dimensional drawings

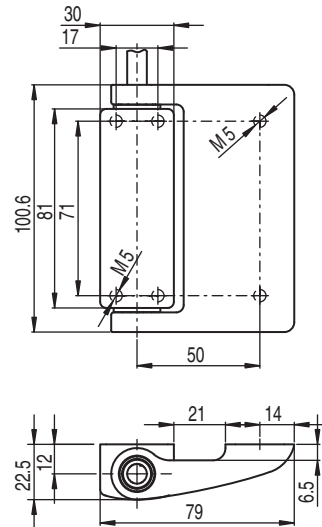
### S410 Safety Hinge Switches



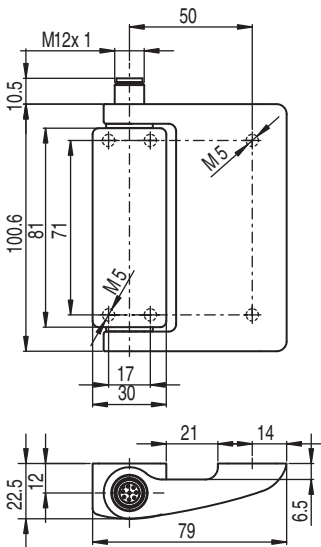
Drilling dimensions Safety Hinge Switch S410-M1CB2-B



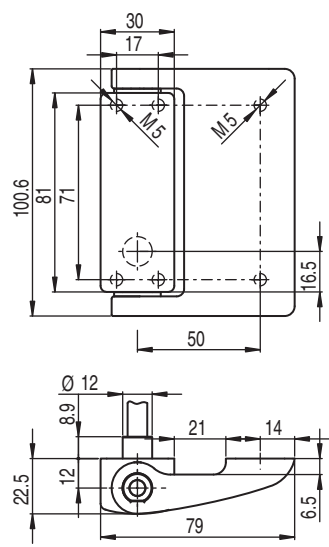
Drilling dimensions Safety Hinge Switch S410-M1M12-B



Drilling dimensions Safety Hinge Switch S410-M1CB2-T



Drilling dimensions Safety Hinge Switch S410-M1M12-T



Drilling dimensions Safety Hinge Switch S410-M4-CB2PUR-W (also: S410-M4-CB02M12-W)

Dimensions in mm

S20  
p. 340

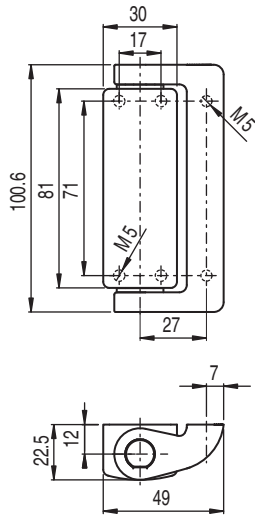
S200  
p. 350

S300  
p. 360

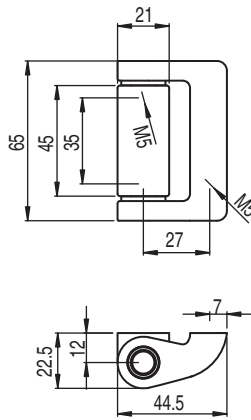
**S400, S410**  
p. 368

Dimensional drawings: Accessories

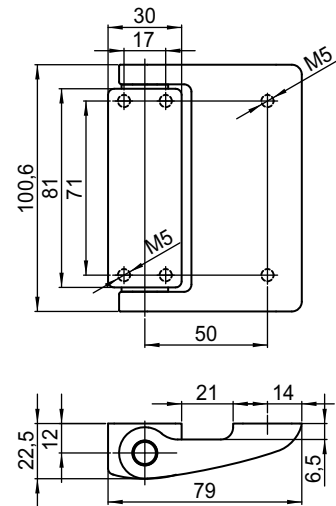
Additional hinges AC-H-...



Additional hinge AC-H-S400



Additional hinge, small, AC-H-S400-S



Additional hinge AC-H-S410

Dimensions in mm

## SAFETY SWITCHES

### Accessories ordering information

#### S400, S410 accessories

| Part no. | Article      | Description   |
|----------|--------------|---|
| 63000770 | AC-H-S400    | Additional hinge for S400 Safety Hinge Switch                       |
| 63000775 | AC-H-S400-S  | Additional hinge, small for the S400 Safety Hinge Switch            |
| 63000771 | AC-MP3-S400  | Mounting plates, flat, long version, for Safety Hinge Switch S400   |
| 63000772 | AC-MP1-S400  | Mounting plates, angled, long version, for Safety Hinge Switch S400 |
| 63000773 | AC-H-S410    | Additional hinge for S410 Safety Hinge Switch                       |
| 63000774 | AC-SEPL-S4xx | Safety plug for Safety Hinge Switch S4xx                            |

"Connection cables": see S20 Safety Switch, page 348

#### Article list for S400, S410 accessories

| Article | Description |
|---------|-------------|
| AC      | Accessories |

|              |                         |
|--------------|-------------------------|
| <b>-H</b>    | Additional hinge        |
| <b>-MP1</b>  | Mounting plate angled   |
| <b>-MP3</b>  | Mounting plate flat     |
| <b>-SEPL</b> | Replacement safety plug |

**AC**

S20  
p. 340

S200  
p. 350

S300  
p. 360

**S400, S410**  
**p. 368**

# S400, S410

Safety Locking  
Devices

Safety Command  
Devices

Safety Relays

Programmable  
Safety Controllers

Accessories

Glossary

Product Finder

[www.leuze.com/en/s400/](http://www.leuze.com/en/s400/)

## SAFETY LOCKING DEVICES

### Overview



*Safety Locking Device as access guarding*

Safety Locking Devices keep the protective door locked and therefore prevent inadmissible access by people. The access to the danger zone is only released by an electric signal when either the dangerous movement has stopped (personnel protection) or an uninterruptible work process has been finished (machine protection). All Leuze electronic Safety Switches and Locking Devices are configured with their robust design for use in tough industrial applications and prove their value under the most demanding operational conditions.



*Safety Locking Device on a metal processing center with stopping times*

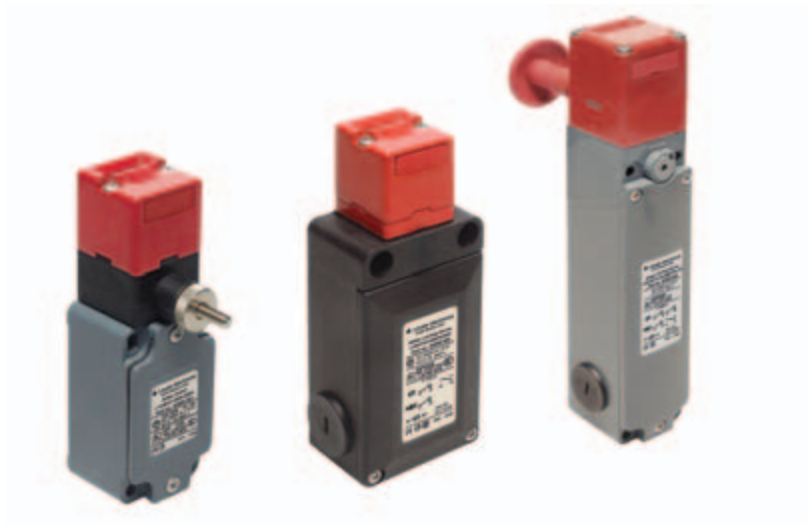
L10  
p. 380

L100  
p. 388

L200  
p. 396

**Selection table**

The Leuze electronic Safety Locking Devices completely cover the entire spectrum from normal to very high requirements (from left to right): L10, L100, L200



**Features, type-dependent**

| Plastic housing | Metal housing | Manual operation (knurled nut) | Manual operation (key) | Spring force-actuated guard interlocking * | Auxiliary unlocking, manual | Magnet-actuated guard interlocking ** | Contact set magnet | NC = NC contact for safety circuit | NO = NO contact for signal circuit | Contact set actuator/mechanical | NC = NC contact for safety circuit | NO = NO contact for signal circuit | Series              | Page |
|-----------------|---------------|--------------------------------|------------------------|--|-----------------------------|---------------------------------------|--------------------|------------------------------------|------------------------------------|---------------------------------|------------------------------------|------------------------------------|---------------------|------|
| ●               |               | ●                              |                        |  |                             |                                       |                    |                                    |                                    | 2NC ⊕                           |                                    |                                    | L10-P2...           | 382  |
|                 | ●             | ●                              |                        |  |                             |                                       |                    |                                    |                                    | 2NC ⊕                           |                                    |                                    | L10-M2...           | 382  |
| ●               |               |                                | ●                      |  |                             |                                       |                    |                                    |                                    | 2NC ⊕ + 1NO                     |                                    |                                    | L10-P3... ***       | 382  |
|                 | ●             |                                | ●                      |  |                             |                                       |                    |                                    |                                    | 2NC ⊕ + 1NO                     |                                    |                                    | L10-M3...           | 382  |
| ●               |               |                                |                        | ●  | ●                           |                                       | 1NC ⊕ + 1NO        | 1NC ⊕                              |                                    | 1NC ⊕                           |                                    |                                    | L100-P3C3-M20-SLM24 | 390  |
| ●               |               |                                |                        |  |                             | ●                                     | 1NC ⊕ + 1NO        | 1NC ⊕                              |                                    | 1NC ⊕                           |                                    |                                    | L100-P3C3-M20-MLM24 | 390  |
| ●               |               |                                |                        | ●  | ●                           |                                       | 2NC ⊕              | 1NC ⊕                              |                                    | 1NC ⊕                           |                                    |                                    | L100-P4C3-M20-SLM24 | 390  |
|                 | ●             |                                |                        | ●  | ●                           |                                       | 2NC ⊕              | 1NC ⊕ + 1NO                        |                                    | 1NC ⊕ + 1NO                     |                                    |                                    | L200-M1C3-SLM24-... | 398  |
|                 | ●             |                                |                        |  |                             | ●                                     | 2NC ⊕              | 1NC ⊕ + 1NO                        |                                    | 1NC ⊕ + 1NO                     |                                    |                                    | L200-M1C3-MLM24-L2G | 398  |

\*) Closed current principle, equipment and personnel protection  
 \*\*) Closed current principle, equipment and personnel protection  
 \*\*\*) Variants with 10 s delay available



## SAFETY LOCKING DEVICES

### L10



*Economical solution: L10 Safety Locking Device on a door to the store area without control signal for the guard interlocking (manual locking and unlocking)*

The small and economical L10 Safety Locking Device uses its locking function to prevent protective doors from opening. Its compact structure also makes the L10 series suitable for use on thin doors or with tight installation situations. The locking/unlocking delay occurs manually via either a knurled nut or a key. The patented guard interlocking is used in particular in systems where the activation of a locking magnet is no longer required. The available variants allow a range of mechanical and time requirements to be met. The series enables extremely economical solutions and significantly reduces wiring and cabling costs. Typical applications of this guard interlocking with manual locking and unlocking are remote door and gate guarding and applications on doors that only have to be actuated relatively seldom. The L10 series is used for guarding machinery and systems with stopping times. The contact set enables safety-related integration up to category 4 in accordance with EN ISO 13849.

#### Typical areas of application

- Remote doors or gates (without control signals for guard interlocking)
- Tough ambient conditions, rarely occurring access situations
- Access guarding on machines with run-on dangerous movements

**Important technical data, overview**

|                               |   |           |
|-------------------------------|---|-----------|
| Switch type                   | Interlock device with guard interlocking in accordance with EN 1088         |           |
| Housing material              | Metal or fiberglass-reinforced, thermo-plastic plastic, self-extinguishing  |           |
| Interlocking force            | Max. 1000 N   |           |
| Contact equipment             | 2NC ⊕<br>2NC ⊕ + 1NO  |           |
| Switching principle           | Creep contact   |           |
| External actuator             | AC-AHxx, series, straight, angled, resilient, alignable                     |           |
| Locking actuation             | Manual  |           |
| Delayed actuator release      | Type-dependent, approx. 10 s or 20 s, manual by means of knurled nut or key |           |
| Locking type                  | Mechanical  |           |
| Approach actuation directions | 1 x above, 4 x side (90°)   |           |
| Connection system             | Number of cable entries   | 1         |
|                               | Type of cable entries   | M20 x 1.5 |
| Protection rating             | IP 67   |           |

**Functions**

- Interlock device with guard interlocking in accordance with EN 1088
- Integration in control circuits up to category 4 in accordance with EN ISO 13849
- Mechanical guard interlocking with manual locking and unlocking

**Special features**

- Contact sets for integration up to category 4 acc. to EN ISO 13849
- Universal use with 5 actuator approach directions
- 6 different "heavy duty" AC-AHxx series actuators for the most diverse installation conditions
- Self-centering through funnel-shaped insertion opening
- Reduced wiring through manual locking and releasing
- Economical locking device with small design



Safety Locking Devices

Safety Command Devices

Safety Relays

Programmable Safety Controllers

**Features**



Accessories

Glossary

| Further information                 | Page |
|-------------------------------------|------|
| ● Ordering information              | 382  |
| ● Electrical connection             | 391  |
| ● Technical data                    | 384  |
| ● Dimensional drawings              | 385  |
| ● Dimensional drawings: Accessories | 385  |
| ● Accessories ordering information  | 386  |

Product Finder

## SAFETY LOCKING DEVICES

### Ordering information

**L10**

Included in delivery: 2 keys (L10-...-KO), application information (print document)

**Functions:** Interlock device with guard interlocking in accordance with EN 1088

### L10 Safety Locking Devices

| Part no. | Article           | Description  | Contact equipment            |
|----------|-------------------|--|------------------------------|
| 63000550 | L10-P2C1-M20-SB20 | Safety Locking Device, plastic, manual locking/unlocking, approx. 20 s delay | (2NC ⊕) creep contacts       |
| 63000551 | L10-M2C1-M20-SB20 | Safety Locking Device, metal, manual locking/unlocking, approx. 20 s delay   | (2NC ⊕) creep contacts       |
| 63000552 | L10-P3C1-M20-SB20 | Safety Locking Device, plastic, manual locking/unlocking, approx. 20 s delay | (2NC ⊕ + 1NO) creep contacts |
| 63000553 | L10-M3C1-M20-SB20 | Safety Locking Device, metal, manual locking/unlocking, approx. 20 s delay   | (2NC ⊕ + 1NO) creep contacts |
| 63000554 | L10-P3C1-M20-LB10 | Safety Locking Device, plastic, manual locking/unlocking, approx. 10 s delay | (2NC ⊕ + 1NO) creep contacts |
| 63000555 | L10-P3C1-M20-LB20 | Safety Locking Device, plastic, manual locking/unlocking, approx. 20 s delay | (2NC ⊕ + 1NO) creep contacts |
| 63000558 | L10-P3C1-M20-KO   | Safety Locking Device, plastic, manual locking/unlocking via key operation   | (2NC ⊕ + 1NO) creep contacts |
| 63000559 | L10-M3C1-M20-KO   | Safety Locking Device, metal, manual locking/unlocking via key operation     | (2NC ⊕ + 1NO) creep contacts |

Actuators must be ordered separately, see page 386.

Article list for L10

| Article      | Description   |
|--------------|---|
| <b>L10</b>   | <b>Safety Locking Device</b>                                    |
| <b>-P</b>    | Plastic housing   |
| <b>-M</b>    | Metal housing   |
| <b>2</b>     | Contact set, 2NC ⊖, creep contact                               |
| <b>3</b>     | Contact set, 2NC ⊖ + 1NO, creep contact                         |
| <b>C1</b>    | Number of cable bushings  |
| <b>-M20</b>  | Metric thread   |
| <b>-SB20</b> | Manual time delay, approx. 20 seconds, short actuation distance |
| <b>-LB10</b> | Manual time delay, approx. 10 seconds, long actuation distance  |
| <b>-LB20</b> | Manual time delay, approx. 20 seconds, long actuation distance  |
| <b>-KO</b>   | Actuation by key  |

L10

Safety Locking Devices

Safety Command Devices

Safety Relays

Electrical connection

See L100 connection example, page 391.

Programmable Safety Controllers

Accessories

Glossary

Product Finder

## SAFETY LOCKING DEVICES

### Technical data

|   |   |  |
|---|---|--|
| Switch type   | Interlock device with guard interlocking in accordance with EN 1088   |  |
| Service life ( $T_M$ ) in accordance with EN ISO 13849-1                            | 20 years  |  |
| Number of cycles until 10% of the components have a failure to danger ( $B_{10d}$ ) | 2,000,000   |  |
| Locking type  | Mechanical  |  |
| Locking actuation   | Manual by means of knurled nut or key   |  |
| Ambient temperature, operation  | -25...+80°C   |  |
| Dirt levels, external, in accordance with EN 60947-1                                | 3   |  |
| Housing material  | Fiberglass-reinforced, thermo-plastic plastic, self-extinguishing   | L10-P...   |
|   | Metal   | L10-M...   |
| External actuator   | AC-AHxx, series, straight, angled, resilient, alignable   |  |
| Dimensions  | See dimensional drawings  |  |
| Protection rating   | IP 67   |  |
| Contact protection  | Protective insulation O (L10-P...)<br>Grounding (L10-M...)  |  |
| Approach actuation directions   | 1 x above, 4 x side (90°)   |  |
| Mechanical life time in accordance with IEC 6047-5-1                                | 0.5 x 10 <sup>6</sup> actuation cycles  |  |
| Actuation frequency in accordance with IEC 6047-5-1                                 | Max. 360 per hour   |  |
| Approach speed  | Max. 0.5 m/s  |  |
| Actuation force (pull-out)  | 10 N (L10-...-SB20, L10-...-LB10, L10-...-LB20)<br>30 N (L10...-KO)   |  |
| Recoil tolerance  | 4.5 mm  |  |
| Interlocking force  | Max. 1000 N   |  |
| Contact equipment   | 2NC ⊖<br>2NC ⊖ + 1NO  | L10-P2..., L10-M2...<br>L10-P3..., L10-M3...       |
| Switching principle   | Creep contact   |  |
| Contact opening   | Force-fit   |  |
| Contact material  | Silver alloy  |  |
| Usage category in accordance with EN 60947-5-1                                      | AC 15: $U_e / I_e$ : 250 V / 6 A, 400 V / 4 A, 500 V / 1 A<br>DC 13: $U_e / I_e$ : 24 V / 6 A, 125 V / 1.1 A, 250 V / 0.4 A |  |
| Rated insulation voltage  | 500 V AC, 600 V DC  |  |
| Conventional thermal current  | Max. 10 A   |  |
| Short-circuit protection according to IEC 60269-1                                   | 500 V, 10 A, type aM  |  |
| Connection system   | Number of cable entries   | 1  |
|   | Type of cable entries   | M20 x 1.5  |
|   | Cable cross-section (wire)  | 1 x 0.5 mm <sup>2</sup> to 2 x 2.5 mm <sup>2</sup> |
| Delayed actuator release  | Approx. 20 s or 10 s (L10-P3C1-M20-LB10)  |  |

Please note the additional information in the connecting and operating instructions at [www.leuze.com/en/l10](http://www.leuze.com/en/l10).

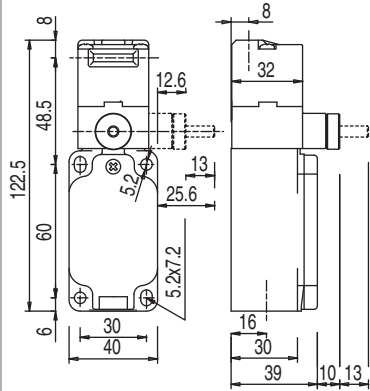
**L10**  
p. 380

L100  
p. 388

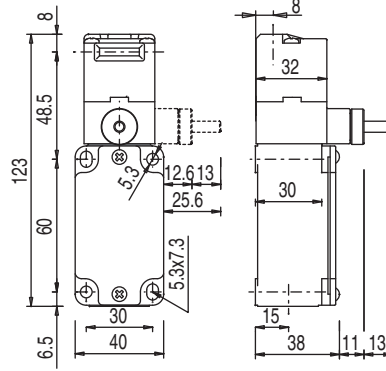
L200  
p. 396

Dimensional drawings

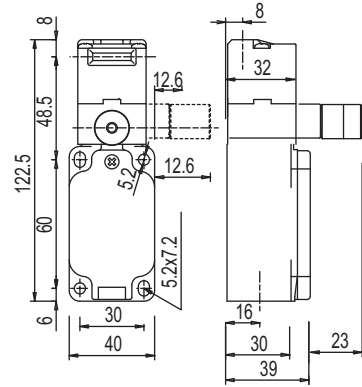
L10 Safety Locking Device



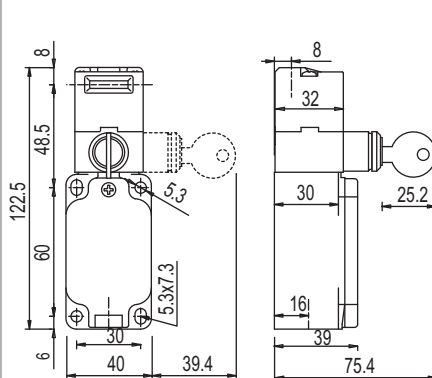
Safety Locking Device  
L10-P2C1-M20-SB20,  
L10-P3C1-M20-SB20



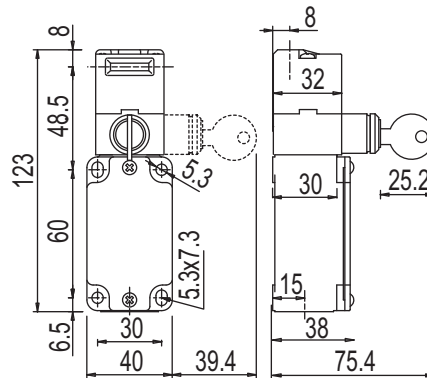
Safety Locking Device  
L10-M2C1-M20-SB20,  
L10-M3C1-M20-SB20



Safety Locking Device  
L10-P3C1-M20-LB10,  
L10-P3C1-M20-LB20



Safety Locking Device  
L10-P3C1-M20-KO



Safety Locking Device  
L10-M3C1-M20-KO

Dimensions in mm

Dimensional drawings: Accessories

See accessories, S200 all actuators, page 356.

## SAFETY LOCKING DEVICES

### Accessories ordering information

#### L10 accessories

| Part no. | Article        | Description                                   | Design   |
|----------|----------------|---|--|
| 63000720 | AC-AH-S        | Actuator                                      | Straight   |
| 63000721 | AC-AH-A        | Actuator                                      | Angled   |
| 63000722 | AC-AH-F4       | Actuator                                      | Straight, flexible, 4 directions   |
| 63000723 | AC-AH-F2J2     | Actuator                                      | Straight, flexible, 2 directions, alignable 2 directions                 |
| 63000724 | AC-AH-F1J2     | Actuator                                      | Straight, flexible, 1 direction, alignable 2 directions                  |
| 63000725 | AC-AH-F4J2-TK  | Actuator                                      | Straight, flexible, 4 directions, alignable 2 directions, rotatable head |
| 63000843 | AC-A-M20-12NPT | Signal-color adapter                          | M20 x 1.5 on 1/2 NPT   |
| 63000844 | AC-PLP-8       | Built-in plug                                 | M12, plastic, with internal 8-pin connection cable                       |
| 63000845 | AC-PLM-8       | Built-in plug                                 | M12, metal, with internal 8-pin connection cable                         |
| 63000846 | AC-KL-AH       | KeyLock for locking the actuator introduction |  |

#### Article list for L10 accessories

| Article       | Description                          |
|---------------|--------------------------------------|
| <b>AC</b>     | <b>Accessories</b>                   |
| <b>-AH</b>    | Actuator, Heavy Duty                 |
| <b>-S</b>     | Straight                             |
| <b>-A</b>     | Angled                               |
| <b>-RM</b>    | Rubber-mounted                       |
| <b>-F4</b>    | Flexible in 4 directions             |
| <b>J2</b>     | Alignable in 2 directions            |
| <b>-TK</b>    | Actuator key, turns                  |
| <b>-PLP-8</b> | Built-in plug, 8-pin, plastic        |
| <b>-PLM-8</b> | Built-in plug, 8-pin, metal          |
| <b>-KL</b>    | Locking of the actuator introduction |

AC

L10  
p. 380

L100  
p. 388

L200  
p. 396





## SAFETY LOCKING DEVICES

### L100



*Safety Locking Device on a metal processing center with stopping times*

The versatile in use L100 Safety Locking Device uses its locking function to prevent protective doors of machines and systems from opening. It is used for both personnel safety and for machine protection depending on requirements, with appropriate guard interlocking types (spring-force or magnet-actuated locking). It is used for guarding machines and systems with stopping times. Due to the adjustable switch-on current reduction, it is also optimally suitable for systems with very high access options and guard interlocking applications. The contact set enables safety-related integration up to category 4 in accordance with EN ISO 13849.

#### Typical areas of application

- Access guarding on machines with run-on dangerous movements
- Guard interlocking of protective doors in production processes where the prevention of undefined interruptions is required
- Systems with numerous access options

**Important technical data, overview**

|                               |   |                      |
|-------------------------------|---|----------------------|
| Switch type                   | Interlock device with guard interlocking in accordance with EN 1088 |                      |
| Housing material              | Fiberglass-reinforced, thermo-plastic plastic, self-extinguishing   |                      |
| Interlocking force            | Max. 1100 N   |                      |
| Contact equipment             | Magnet:   | 1NC ⊖ + 1NO<br>2NC ⊖ |
|                               | Actuator:   | 1NC ⊖                |
| Switching principle           | Creep contact   |                      |
| External actuator             | AC-AHxx, series, straight, angled, resilient, alignable             |                      |
| Locking type                  | Mechanically, electro-magnetically                                  |                      |
| Locking actuation             | Spring, magnet  |                      |
| Approach actuation directions | 1 x above, 4 x side (90°)   |                      |
| Connection system             | Number of cable entries   | 3                    |
|                               | Type of cable entries   | M20 x 1.5            |
| Protection rating             | IP 66   |                      |

**Functions**

|  |
|--|
| Interlock device with guard interlocking in accordance with EN 1088              |
| Integration in control circuits up to category 4 in accordance with EN ISO 13849 |
| Mechanical guard interlocking (spring-force)                                     |
| Electro-magnetic guard interlocking (magnet-force)                               |
| Switch-on current reduction, adjustable  |
| Auxiliary unlocking (-SLM24)   |

**Special features**

- **Universal use with 5 actuator approach directions**
- **6 different "heavy duty" actuators for the most diverse installation conditions**
- **Self-centering through funnel-shaped insertion opening**
- **Switch-on current reduction, adjustable**



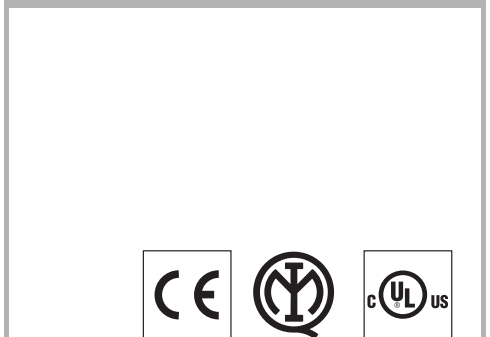
Safety Locking Devices

Safety Command Devices

Safety Relays

Programmable Safety Controllers

**Features**



Accessories

Glossary

| Further information                 | Page |
|-------------------------------------|------|
| ● Ordering information              | 390  |
| ● Electrical connection             | 391  |
| ● Technical data                    | 392  |
| ● Dimensional drawings              | 394  |
| ● Dimensional drawings: Accessories | 394  |
| ● Accessories ordering information  | 395  |

Product Finder

## SAFETY LOCKING DEVICES

### Ordering information

**L100**

Included in delivery: Application information (print document)

**Functions:** Interlock device with guard interlocking in accordance with EN 1088, auxiliary release (-SLM24, switch-on current reduction, adjustable)

### L100 Safety Locking Devices

| Part no. | Article             | Description  | Contact equipment         |
|----------|---------------------|--|---------------------------|
| 63000600 | L100-P3C3-M20-SLM24 | Safety Locking Device, plastic, mechanically locked, magnet 24 V         | M:(1NC ⊕ + 1NO) A:(1NC ⊕) |
| 63000601 | L100-P3C3-M20-MLM24 | Safety Locking Device, plastic, electro-magnetically locked, magnet 24 V | M:(1NC ⊕ + 1NO) A:(1NC ⊕) |
| 63000602 | L100-P4C3-M20-SLM24 | Safety Locking Device, plastic, mechanically locked, magnet 24 V         | M:(2NC ⊕) A:(1NC ⊕)       |

Actuators must be ordered separately, see page 395.

### Article list for L100

| Article       | Description                               |
|---------------|---|
| <b>L100</b>   | <b>Safety Locking Device</b>              |
| <b>-P</b>     | Plastic housing                           |
| <b>3, 4</b>   | Contact set                               |
| <b>C3</b>     | Number of cable bushings                  |
| <b>-M20</b>   | Metric thread                             |
| <b>-SLM24</b> | Mechanically locked, magnet voltage, 24 V |
| <b>-MLM24</b> | Electrically locked, magnet voltage, 24 V |

**L100**

 L10  
p. 380

**L100**  
**p. 388**

 L200  
p. 396



## SAFETY LOCKING DEVICES

### Technical data

|   |   |  |
|---|---|--|
| Switch type   | Interlock device with guard interlocking in accordance with EN 1088   |  |
| Service life ( $T_M$ ) in accordance with EN ISO 13849-1                            | 20 years  |  |
| Number of cycles until 10% of the components have a failure to danger ( $B_{10d}$ ) | 5,000,000   |  |
| Locking type  | Mechanical (L100-P...SLM24)<br>Electromagnetic (L100-P...MLM24)   |  |
| Locking actuation   | Spring (L100-P...SLM24)<br>Magnet (L100-P...MLM24)  |  |
| Ambient temperature, operation  | -25...+60°C   |  |
| Dirt levels, external, in accordance with EN 60947-1                                | 3   |  |
| Housing material  | Fiberglass-reinforced, thermo-plastic plastic, self-extinguishing   |  |
| External actuator   | AC-AHxx, series, straight, angled, resilient, alignable   |  |
| Dimensions  | See dimensional drawing   |  |
| Protection rating   | IP 66   |  |
| Contact protection  | Protective insulation O   |  |
| Approach actuation directions   | 1 x above, 4 x side (90°)   |  |
| Mechanical life time in accordance with IEC 6047-5-1                                | 0.8 x 10 <sup>6</sup> actuation cycles  |  |
| Actuation frequency according to IEC 6047-5-1                                       | Max. 600 per hour   |  |
| Approach speed  | Max. 0.5 m/s  |  |
| Actuation force (pull-out)  | 30 N  |  |
| Recoil tolerance  | 4.5 mm  |  |
| Interlocking force  | Max. 1100 N   |  |
| Contact equipment   | Magnet:   | 1NC ⊕ + 1NO L100-P3...<br>2NC ⊕ L100-P4... |
|   | Actuator:   | 1NC ⊕ L100-P3...<br>L100-P4...             |
| Switching principle   | Creep contact   |  |
| Contact opening   | Force-fit   |  |
| Contact material  | Silver alloy  |  |
| Magnet operating voltage and tolerance  | 24 V DC (-10% to +25%)  |  |
| Duty cycle  | 100%  |  |
| Power consumption   | Average, 20 VA  |  |
| Switch-on current limitation, adjustable  | 4-way   |  |
| Usage category in accordance with EN 60947-5-1                                      | AC 15: $U_e / I_e$ : 250 V / 6 A, 400 V / 4 A, 500 V / 1 A<br>DC 13: $U_e / I_e$ : 24 V / 6 A, 125 V / 1.1 A, 250 V / 0.4 A |  |

L10  
p. 380

**L100**  
**p. 388**

L200  
p. 396

**Technical data**

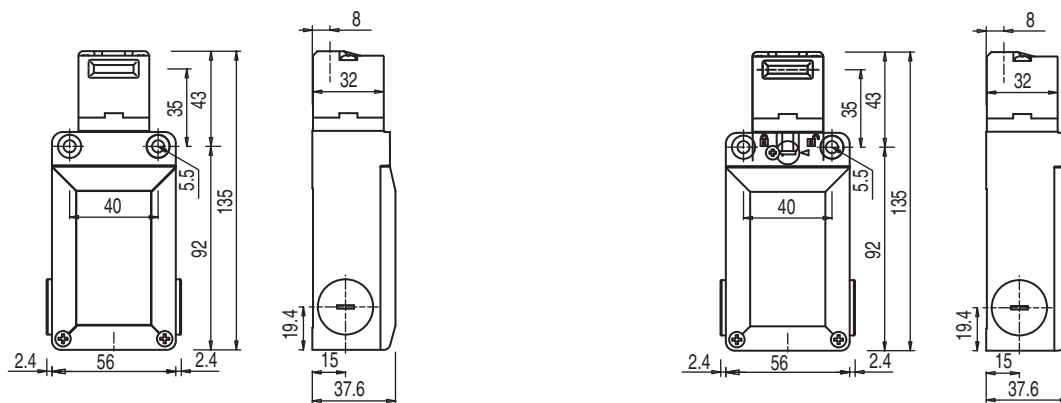
|   |                            |   |
|---|----------------------------|---|
| Rated insulation voltage                          | 400 V AC                   |   |
| Conventional thermal current                      | Max. 10 A                  |   |
| Short-circuit protection according to IEC 60269-1 | Magnet                     | 24 V, 1.0 A, type aM                                |
|   | Safety circuit             | 500 V, 10 A, type aM                                |
| Connection system                                 | Number of cable entries    | 3   |
|   | Type of cable entries      | M20 x 1.5   |
|   | Cable cross-section (wire) | 1 x 0.34 mm <sup>2</sup> to 2 x 1.5 mm <sup>2</sup> |

Please note the additional information in the connecting and operating instructions at [www.leuze.com/en/l100](http://www.leuze.com/en/l100).

## SAFETY LOCKING DEVICES

### Dimensional drawings

#### L100 Safety Locking Device



*Safety Locking Device L100-P3C3-M20-SLM24,  
L100-P4C3-M20-SLM24*

*Safety Locking Device L100-P3C3-M20-MLM24*

Dimensions in mm

#### Dimensional drawings: Accessories

See accessories, S200 all actuators, page 356.

**Accessories ordering information**
**L100 accessories**

| Part no. | Article        | Description                                   | Design   |
|----------|----------------|---|--|
| 63000720 | AC-AH-S        | Actuator                                      | Straight   |
| 63000721 | AC-AH-A        | Actuator                                      | Angled   |
| 63000722 | AC-AH-F4       | Actuator                                      | Straight, flexible, 4 directions   |
| 63000723 | AC-AH-F2J2     | Actuator                                      | Straight, flexible, 2 directions, alignable 2 directions                 |
| 63000724 | AC-AH-F1J2     | Actuator                                      | Straight, flexible, 1 direction, alignable 2 directions                  |
| 63000725 | AC-AH-F4J2-TK  | Actuator                                      | Straight, flexible, 4 directions, alignable 2 directions, rotatable head |
| 63000843 | AC-A-M20-12NPT | Adapter                                       | M20 x 1.5 on 1/2 NPT   |
| 63000844 | AC-PLP-8       | Built-in plug                                 | M12, plastic, with internal 8-pin connection cable                       |
| 63000846 | AC-KL-AH       | KeyLock for locking the actuator introduction |  |

**Article list for L100 accessories**

| Article       | Description                          |
|---------------|--------------------------------------|
| <b>AC</b>     | <b>Accessories</b>                   |
| <b>-AH</b>    | Actuator, Heavy Duty                 |
| <b>-S</b>     | Straight                             |
| <b>-A</b>     | Angled                               |
| <b>-RM</b>    | Rubber-mounted                       |
| <b>-F1</b>    | Flexible in 1 directions             |
| <b>-F2</b>    | Flexible in 2 directions             |
| <b>-F4</b>    | Flexible in 4 directions             |
| <b>J2</b>     | Alignable in 2 directions            |
| <b>-TK</b>    | Actuator key, turns                  |
| <b>-PLP-8</b> | Built-in plug, 8-pin, plastic        |
| <b>-KL</b>    | Locking of the actuator introduction |

**AC**



## SAFETY LOCKING DEVICES

### L200



*Heavy-Duty L200 Safety Locking Device on a very large gate in a logistics operation with forklift traffic*

The L200 Safety Locking Device designed for highly demanding applications is predestined for guarding large protective doors and sliding gates, in logistics operations, for example, or with very big machinery, and under harsh conditions. It is insensitive here to high recoil forces, such as when massive, heavy doors and gates slam. The guard interlocking is especially impressive due to its slender but very robust structure. It is used according to requirements with appropriate locking types (spring-force or magnet-actuated locking). The contact set enables safety-related integration up to category 4 in accordance with EN ISO 13849. If an escape route is planned, then when using the PB variant, the locking device can be quickly unlocked by pressing the ergonomically optimized unlocking button installed in the danger zone. The available extensions for the emergency release button make it easy to adapt to local conditions on site.

#### Typical areas of application

- Use with harsh ambient conditions and high mechanical demand
- Access guarding on big machinery and systems with dangerous movements that run-on
- Guard interlocking of heavy protective doors or sliding gates where the prevention of undefined interruptions is required

**Important technical data, overview**

|                               |   |                |
|-------------------------------|---|----------------|
| Switch type                   | Interlock device with guard interlocking in accordance with EN 1088 |                |
| Housing material              | Metal   |                |
| Interlocking force            | Max. 2500 N   |                |
| Contact equipment             | Magnet:   | M: 2NC ⊕       |
|                               | Actuator:   | A: 1NC ⊕ + 1NO |
| Switching principle           | Creep contact   |                |
| External actuator             | AC-AHLxx series, straight, angled, resilient, alignable             |                |
| Locking type                  | Mechanically, electro-magnetically                                  |                |
| Locking actuation             | Spring, magnet  |                |
| Approach actuation directions | 1 x above, 4 x side (90°)   |                |
| Connection system             | Number of cable entries   | 3              |
|                               | Type of cable entries   | M20 x 1.5      |
| Protection rating             | IP 67   |                |

**Functions**

|  |
|--|
| Interlock device with guard interlocking in accordance with EN 1088              |
| Integration in control circuits up to category 4 in accordance with EN ISO 13849 |
| Mechanical guard interlocking (spring-force)                                     |
| Electro-magnetic guard interlocking (magnet-force)                               |
| Emergency unlock (-PB)   |
| Illuminated displays for magnet activation                                       |
| Auxiliary unlocking (-SLM24, -PB)  |

**Special features**

- "Heavy duty" use, including under tough, harsh ambient conditions and external mechanical stresses
- Universal use with 5 actuator approach directions
- 4 different "heavy duty" actuators for the most diverse installation applications
- Self-centering through funnel-shaped insertion opening
- Ergonomically optimized emergency unlocking button (Panic Button version), position selectable
- Compact, slender, extremely robust



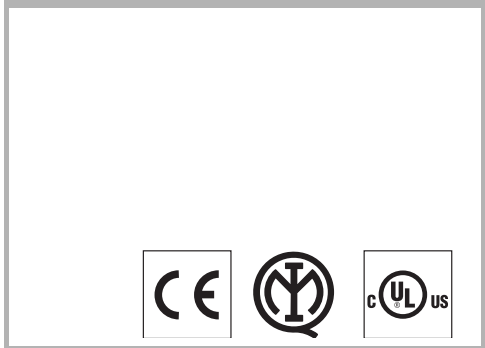
Safety Locking Devices

Safety Command Devices

Safety Relays

Programmable Safety Controllers

**Features**



Accessories

Glossary

| Further information                 | Page |
|-------------------------------------|------|
| ● Ordering information              | 398  |
| ● Electrical connection             | 399  |
| ● Technical data                    | 400  |
| ● Dimensional drawings              | 401  |
| ● Dimensional drawings: Accessories | 402  |
| ● Accessories ordering information  | 404  |

Product Finder

## SAFETY LOCKING DEVICES

### Ordering information

#### L200

Included in delivery: Application information (print document)

**Functions:** Interlock device with guard interlocking in accordance with EN 1088, emergency unlocking button (-PB), illuminated displays, auxiliary release (-SLM24, -PB)

### L200 Safety Locking Devices

| Part no. | Article                | Description  | Contact equipment         |
|----------|------------------------|--|---------------------------|
| 63000650 | L200-M1C3-SLM24-L2G    | Safety Locking Device, metal, mechanically locked, magnet 24 V, 2 green LEDs                             | M:(2NC ⊕) A:(1NC ⊕ + 1NO) |
| 63000651 | L200-M1C3-MLM24-L2G    | Safety Locking Device, metal, electro-magnetically locked, magnet 24 V, 2 green LEDs                     | M:(2NC ⊕) A:(1NC ⊕ + 1NO) |
| 63000652 | L200-M1C3-SLM24-PB-L2G | Safety Locking Device, metal, mechanically locked, magnet 24 V, emergency unlocking button, 2 green LEDs | M:(2NC ⊕) A:(1NC ⊕ + 1NO) |

Actuators must be ordered separately, see page 404.

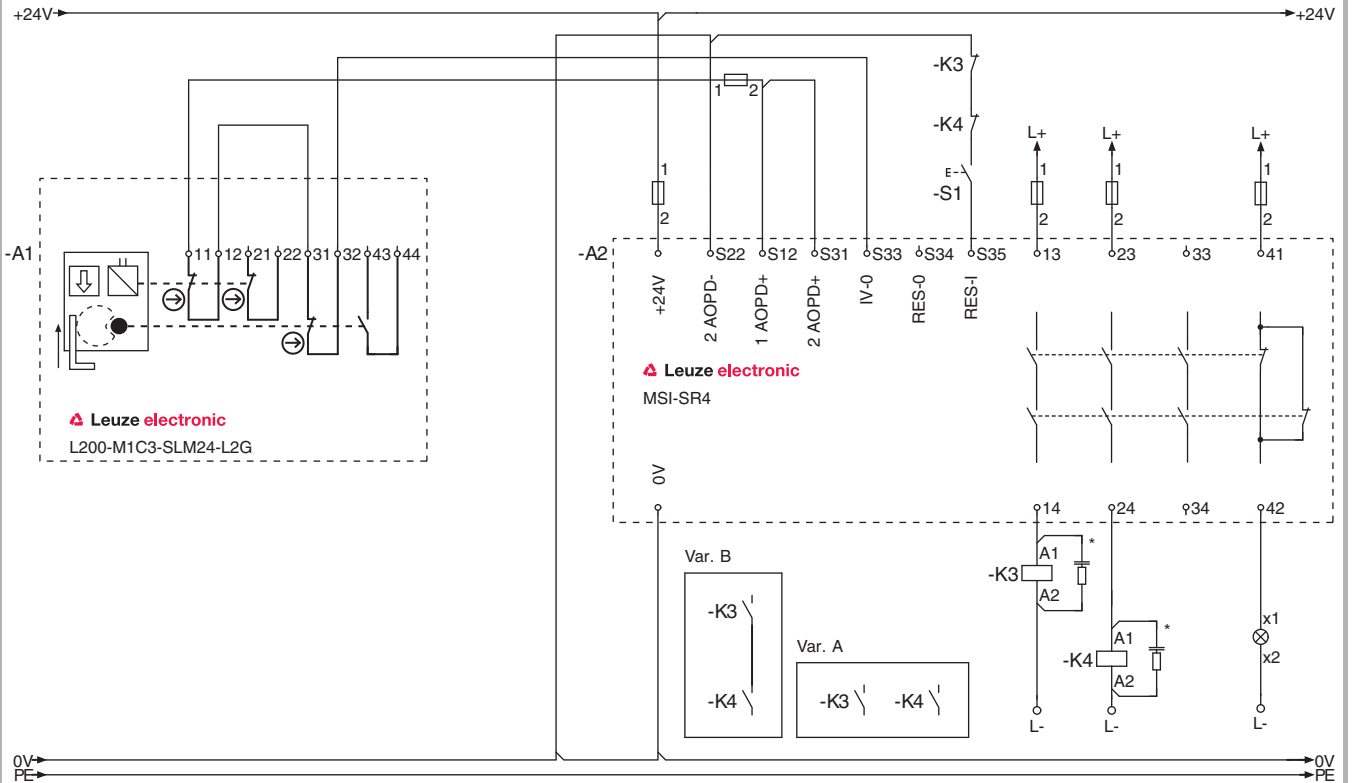
### Article list for L200

| Article       | Description                               |
|---------------|---|
| <b>L200</b>   | <b>Safety Locking Device</b>              |
| <b>-M</b>     | Metal housing                             |
| <b>1</b>      | Contact set                               |
| <b>C3</b>     | Number of cable bushings                  |
| <b>-SLM24</b> | Mechanically locked, magnet voltage, 24 V |
| <b>-MLM24</b> | Electrically locked, magnet voltage, 24 V |
| <b>-L2G</b>   | 2 green signal LEDs                       |
| <b>-PB</b>    | Emergency unlock button                   |

**L 200**

Electrical connection

L200 connection example



\*) Spark extinction circuit, supply suitable spark extinction

L200 Safety Locking Device with MSI-SR4 Safety Relay

Please observe the operating instructions of the components!

## SAFETY LOCKING DEVICES

### Technical data

|   |  |   |  |
|---|--|---|--|
| Switch type   | Interlock device with guard interlocking in accordance with EN 1088  |   |  |
| Service life (T <sub>M</sub> ) in accordance with EN ISO 13849-1                          | 20 years   |   |  |
| Number of cycles until 10% of the components have a failure to danger (B <sub>10d</sub> ) | 5,000,000  |   |  |
| Locking type  | Mechanically (L200-M1C3-SLM24-L2G, L200-M1C3-SLM24-PB-L2G)<br>Electro-magnetically (L200-M1C3-MLM24-L2G)                             |   |  |
| Locking actuation   | Spring (L200-M1C3-SLM24-L2G, L200-M1C3-SLM24-PB-L2G)<br>Magnet (L200-M1C3-MLM24-L2G)   |   |  |
| Ambient temperature, operation  | -25...+60 °C   |   |  |
| Dirt levels, external, in accordance with EN 60947-1                                      | 3  |   |  |
| Housing material  | Metal  |   |  |
| External actuator   | AC-AHLxx series, straight, angled, resilient, alignable  |   |  |
| Dimensions  | See dimensional drawing  |   |  |
| Protection rating   | IP 67  |   |  |
| Contact protection  | Earthing   |   |  |
| Approach actuation directions   | 1 x above, 4 x side (90°)  |   |  |
| Mechanical life time in accordance with IEC 6047-5-1                                      | 1 x 10 <sup>6</sup> actuation cycles   |   |  |
| Actuation frequency according to IEC 6047-5-1   | Max. 600 per hour  |   |  |
| Approach speed  | Max. 0.5 m/s   |   |  |
| Actuation force (pull-out)  | 30 N   |   |  |
| Recoil tolerance  | 4.5 mm   |   |  |
| Interlocking force  | Max. 2500 N  |   |  |
| Contact equipment   | Magnet:  | 2NC ⊖   |  |
|   | Actuator:  | 1NC ⊖ + 1NO   |  |
| Switching principle   | Creep contact  |   |  |
| Contact opening   | Force-fit  |   |  |
| Contact material  | Silver alloy   |   |  |
| Magnet operating voltage and tolerance  | 24 V DC (-10% to +25%)   |   |  |
| Duty cycle  | 100%   |   |  |
| Power consumption   | Average, 9 VA  |   |  |
| Usage category in accordance with EN 60947-5-1  | AC 15: U <sub>e</sub> 250 V, I <sub>e</sub> 5 A<br>DC 13: U <sub>e</sub> / I <sub>e</sub> : 24 V / 6 A, 125 V / 1.1 A, 250 V / 0.4 A |   |  |
| Rated insulation voltage  | 250 V AC, 300 V DC   |   |  |
| Conventional thermal current  | Max. 10 A  |   |  |
| Short-circuit protection according to IEC 60269-1   | Magnet   | 0.5 A, 24 V, type gG                                |  |
|   | Safety circuit   | 500 V, 10 A, type gG                                |  |
| Connection system   | Number of cable entries  | 3   |  |
|   | Type of cable entries  | M20 x 1.5   |  |
|   | Cable cross-section (wire)   | 1 x 0.34 mm <sup>2</sup> to 2 x 1.5 mm <sup>2</sup> |  |

Please note the additional information in the connecting and operating instructions at [www.leuze.com/en/l200](http://www.leuze.com/en/l200).

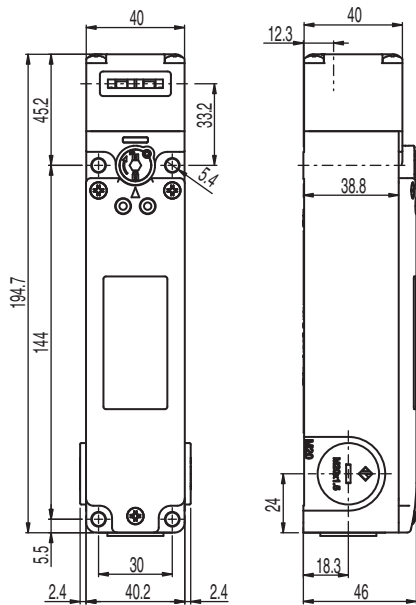
L10  
p. 380

L100  
p. 388

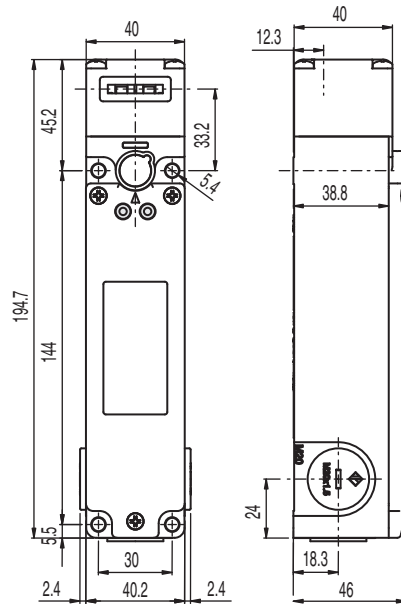
**L200**  
**p. 396**

Dimensional drawings

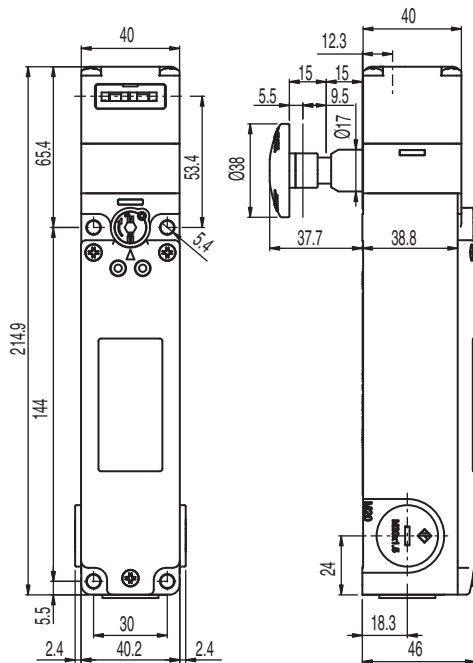
L200 Safety Locking Device



Safety Locking Device L200-M1C3-SLM24-L2G



Safety Locking Device L200-M1C3-MLM24-L2G



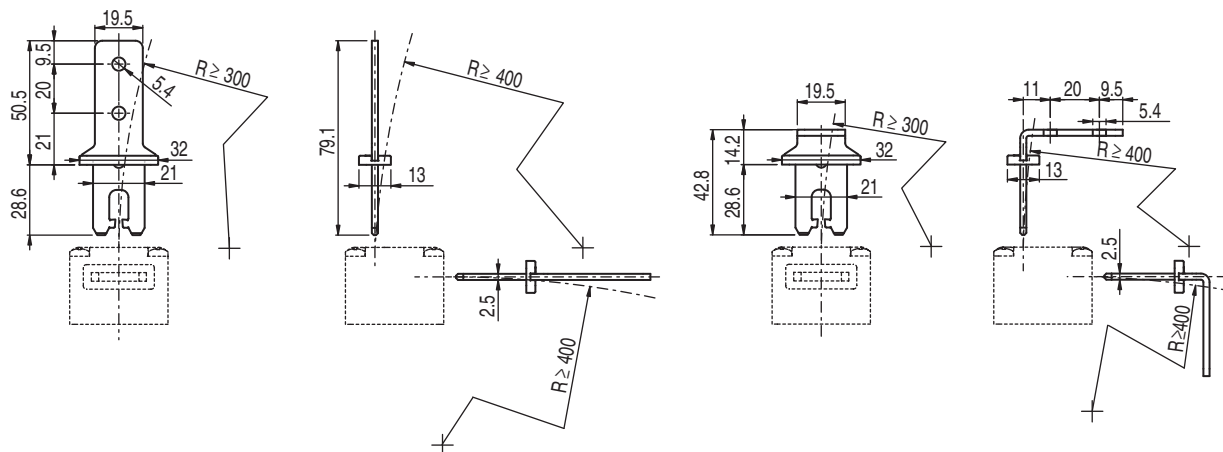
Safety Locking Device L200-M1C3-SLM24-PB-L2G

Dimensions in mm

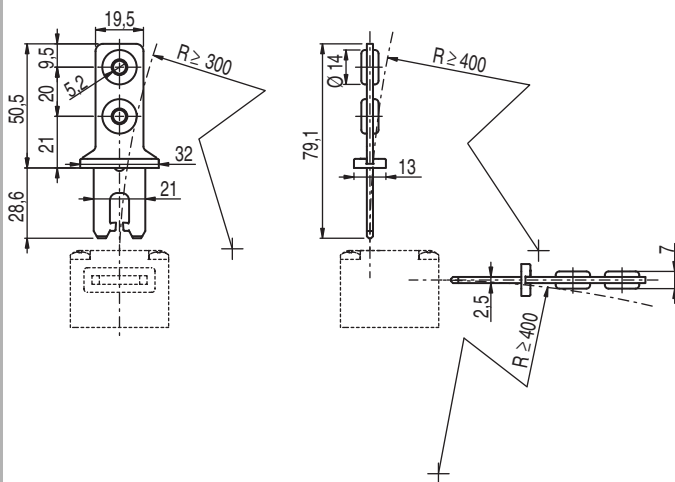
# SAFETY LOCKING DEVICES

## Dimensional drawings: Accessories

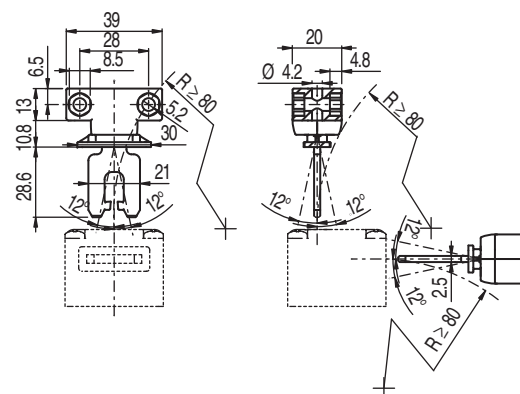
### Actuator AC-AHL...



### Actuator AC-AHL-S



### Actuator AC-AHL-A



### Actuator AC-AHL-RM

### Actuator AC-AHL-F4J2-TK

Dimensions in mm

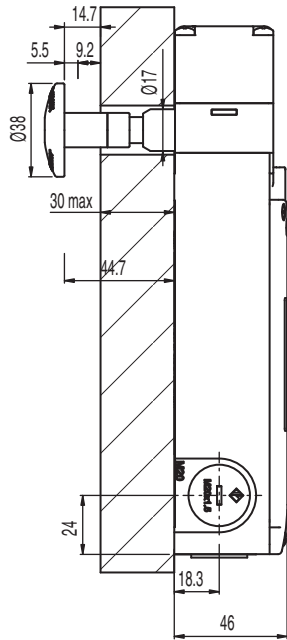
L10  
p. 380

L100  
p. 388

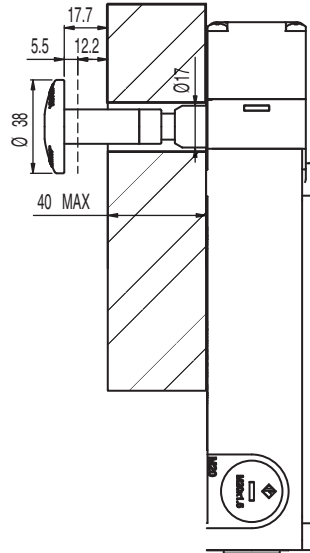
L200  
p. 396

Dimensional drawings: Accessories

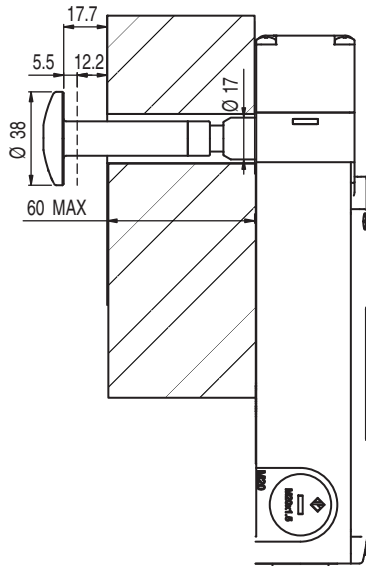
Actuator AC-PB...



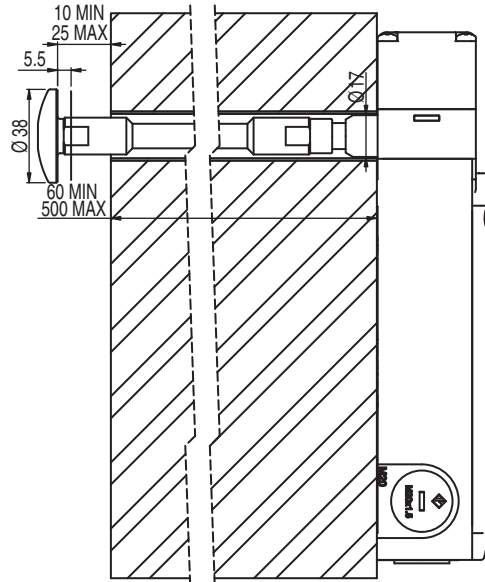
AC-PB30-L200 actuator



AC-PB40-L200 actuator



AC-PB60-L200 actuator



AC-PB500-L200 actuator

Dimensions in mm

[www.leuze.com/en/l200/](http://www.leuze.com/en/l200/)



## SAFETY LOCKING DEVICES

### Accessories ordering information

#### L200 Heavy Duty accessories

| Part no. | Article        | Description                                   | Design   |
|----------|----------------|---|--|
| 63000740 | AC-AHL-S       | Actuator                                      | Straight   |
| 63000741 | AC-AHL-A       | Actuator                                      | Angled   |
| 63000742 | AC-AHL-RM      | Actuator                                      | Straight, rubber-mounted fixing  |
| 63000743 | AC-AHL-F4J2-TK | Actuator                                      | Straight, flexible, 4 directions, alignable 2 directions, rotatable head |
| 63000843 | AC-A-M20-12NPT | Adapter                                       | M20 x 1.5 on 1/2 NPT   |
| 63000845 | AC-PLM-8       | Built-in plug                                 | M12, metal, with internal 8-pin connection cable                         |
| 63000847 | AC-KL-AHL      | KeyLock for locking the actuator introduction |  |
| 63000749 | AC-Exit-PB     | "Push To Exit" signal-color stick-on label    |  |
| 63000750 | AC-PB15-L200   | Extension for the emergency release button    | 15 mm long, with screws  |
| 63000751 | AC-PB30-L200   | Extension for the emergency release button    | 30 mm long, with screws  |
| 63000752 | AC-PB40-L200   | Extension for the emergency release button    | 40 mm long, with screws  |
| 63000753 | AC-PB60-L200   | Extension for the emergency release button    | 60 mm long, with screws  |
| 63000754 | AC-PB500-L200  | Extension for the emergency release button    | 60 mm to 500 mm long, with screws and 2 mounting brackets                |

#### Article list for L200 accessories

| Article       | Description                          |
|---------------|--------------------------------------|
| <b>AC</b>     | <b>Accessories</b>                   |
| <b>-AHL</b>   | UltraHeavyDuty actuator              |
| <b>-S</b>     | Straight                             |
| <b>-A</b>     | Angled                               |
| <b>-RM</b>    | Rubber-mounted                       |
| <b>-F4</b>    | Flexible in 4 directions             |
| <b>J2</b>     | Alignable in 2 directions            |
| <b>-TK</b>    | Actuator key, turns                  |
| <b>-PLM-8</b> | Built-in plug, 8-pin, metal          |
| <b>-KL</b>    | Locking of the actuator introduction |

AC

L10  
p. 380

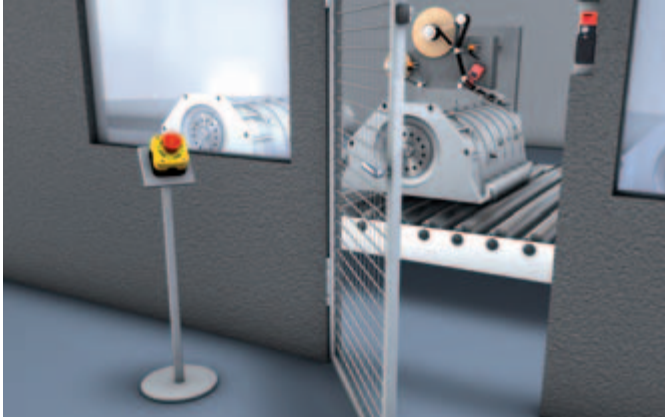
L100  
p. 388

**L200**  
**p. 396**



## SAFETY COMMAND DEVICES

### Overview



*The ESB200 E-Stop button is a Safety Command Device for outputting the stop command in the event of dangerous machine movements*



*The ERS200 E-Stop Rope Switch is used as a Safety Command Device in expansive hazard locations*

For stopping in emergencies EN ISO 12100 stipulates protective devices and supplementary measures, such as E-Stop buttons or emergency rope switches, for example. The E-Stop function may not be used here as a substitute for protective devices or other safety functions. The ESB200 (E-Stop button) and ERS200 (E-Stop Rope Switch) series are used exclusively for outputting the E-Stop signal. All variants within this series were developed and optimized with respect to safety and ergonomics acc. to EN/IEC 60204-1, EN 60547-5-1/5 and EN ISO 13850.

Selection table



A wide variety of Safety Command Devices, consisting of E-Stop buttons and E-Stop Rope Switches, offers solutions for nearly all applications requiring the output of a stop command

| Type of command device | Type of actuation |      | Design                      |                                    |                                 |        | Unlocking            |            |                         | Connection system |          | Series             | Page |
|------------------------|-------------------|------|-----------------------------|------------------------------------|---------------------------------|--------|----------------------|------------|-------------------------|-------------------|----------|--------------------|------|
|                        | E-Stop button     | Rope | With housing (for mounting) | Without housing (for installation) | Straight (in longitudinal axis) | Angled | E-Stop button (turn) | Key (turn) | Indicator button (pull) | Screw terminal    | M12 plug |                    |      |
| E-Stop button          | ●                 |      | ●                           |                                    |                                 |        | ●                    |            |                         | ●                 |          | ESB200-4TR...-C    | 410  |
|                        | ●                 |      | ●                           |                                    |                                 |        |                      | ●          |                         | ●                 |          | ESB200-4KR...-C    | 410  |
|                        | ●                 |      | ●                           |                                    |                                 |        | ●                    |            |                         |                   | ●        | ESB200-4TR...-M12p | 410  |
|                        | ●                 |      | ●                           |                                    |                                 |        |                      | ●          |                         |                   | ●        | ESB200-4KR...-M12p | 410  |
|                        | ●                 |      |                             | ●                                  |                                 |        | ●                    |            |                         | ●                 |          | ESB210-4TR         | 410  |
|                        | ●                 |      |                             | ●                                  |                                 |        |                      | ●          |                         | ●                 |          | ESB210-4KR         | 410  |
| E-Stop Rope Switch     |                   | ●    | ●                           |                                    | ●                               |        |                      |            | ●                       | ●                 |          | ERS200-...-M20-HLR | 416  |
|                        |                   | ●    | ●                           |                                    | ●                               |        |                      |            | ●                       |                   | ●        | ERS200-...-M12-HLR | 416  |
|                        |                   | ●    | ●                           |                                    |                                 | ●      |                      |            | ●                       | ●                 |          | ERS200-...-M20-HAR | 416  |
|                        |                   | ●    | ●                           |                                    |                                 | ●      |                      |            | ●                       | ●                 |          | ERS200-...-M20-HAL | 416  |

## SAFETY COMMAND DEVICES

### ESB200, ESB210 E-Stop button

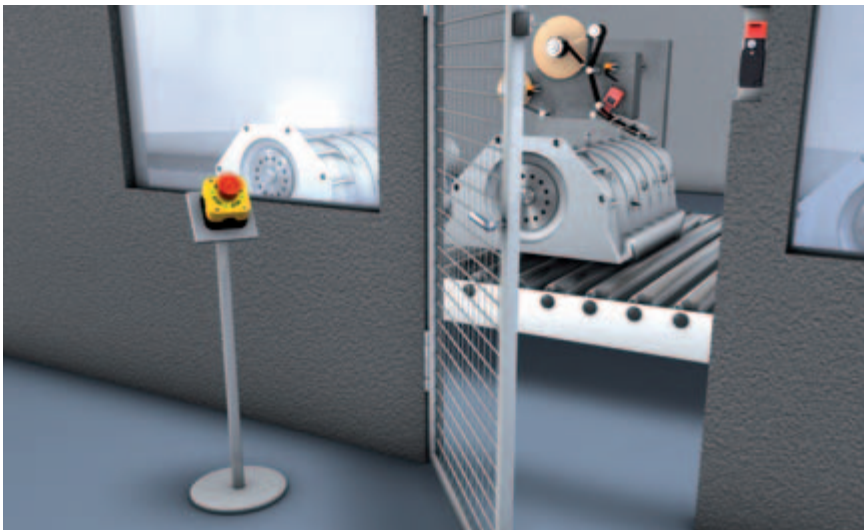


*Installation variant of the ESB200 Safety Command Device (without housing), e.g., in control panels on handling or tool machines for stopping dangerous machine movements*

E-Stop buttons of the ESB2xx series are used at points of operation at which stop command output at a local or specific location is useful, e.g., if the points of operation are not very expansive or broad and the operator can easily access the buttons at any time. The variety of the series enables both mounting, e.g., on profiles, as well as the installation in control panels, etc. For time-saving connection, the mounting variants are also available with M12 plug. Depending on requirements, the button can be enabled by turning the red E-Stop button or by turning a key. When used with the 2NC contact set, all ESB200 or ESB210 variants can be integrated in control circuits up to category 4 in accordance with EN ISO 13849. Moreover, the 1NO contact allows identification and signaling tasks to be performed.

#### Typical areas of application

- Mounting in the vicinity of the operator on machines and plants where there is good accessibility
- In control panels (installation variants without housing)



*Mounted Safety Command Device with housing on a control console for outputting the stop command*

# ESB200, ESB210

## Important technical data, overview

|                     |  |
|---------------------|--|
| Type                | E-Stop command device in accordance with EN 60947-5-5 and EN ISO 13850 |
| Housing material    | Fiberglass-reinforced plastic, self-extinguishing                      |
| Contact equipment   | 2NC ⊖ + 1NO  |
| Switching principle | Creep contact  |
| Actuator            | Button 40 mm, red, self-locking  |
| Connection system   | M20 x 1.5 (3-way), M16 x 1.5 (2-way), M12 plug, screw terminals        |
| Protection rating   | IP 67, IP 69K  |

## Functions

|  |
|--|
| E-Stop command device in accordance with EN 60947-5-5 and EN ISO 13850           |
| Integration in control circuits up to category 4 in accordance with EN ISO 13849 |
| Position-dependent E-Stop command output   |
| Reset function (via rotary knob or key)  |

## Special features

- Contact sets for integration up to category 4 acc. to EN ISO 13849
- 2 safety circuits, 1 signal circuit
- Either screw terminals or M12 connection
- Ergonomically optimized
- Version for mounting or installation
- Protection rating IP 67 and IP 69K



## Features



| Further information     | Page |
|-------------------------|------|
| ● Ordering information  | 410  |
| ● Electrical connection | 411  |
| ● Technical data        | 412  |
| ● Dimensional drawings  | 413  |

# SAFETY COMMAND DEVICES

## Ordering information

### ESB200, ESB210

Included in delivery: connecting and operating instructions as well as (depending on variant) mounting screws, 1 "STOP" ring, 2 keys

**Functions:** E-Stop command device in accordance with EN 60947-5-5 and EN ISO 13850, E-Stop button for position-dependent E-Stop command output, with reset function (via rotary knob or key), suitable for mounting or installation

### ESB200, ESB210 E-Stop button

| Part no. | Article         | Description                      |   |
|----------|-----------------|----------------------------------|---|
| 63000000 | ESB200-4TR-C    | With housing for mounting        | For separate mounting, rotary release, creep contacts (2NC ⊕ + 1NO) with screw terminals  |
| 63000002 | ESB200-4KR-C    | With housing for mounting        | For separate mounting, unlocking with key (2 keys included in delivery contents), creep contacts (2NC ⊕ + 1NO) with screw terminals     |
| 63000004 | ESB200-4TR-M12p | With housing for mounting        | For separate mounting, rotary release, connection via M12 plug, creep contacts (2NC ⊕ + 1NO)  |
| 63000006 | ESB200-4KR-M12p | With housing for mounting        | For separate mounting, unlocking with key (2 keys included in delivery contents), connection via M12 plug, creep contacts (2NC ⊕ + 1NO) |
| 63000008 | ESB210-4TR      | Without housing for installation | For panel mounting, rotary release, creep contacts (2NC ⊕ + 1NO) with screw terminals   |
| 63000010 | ESB210-4KR      | Without housing for installation | For panel mounting, unlocking with key (2 keys), creep contacts (2NC ⊕ + 1NO) with screw terminals                                      |

### Part number code for ESB200, ESB210

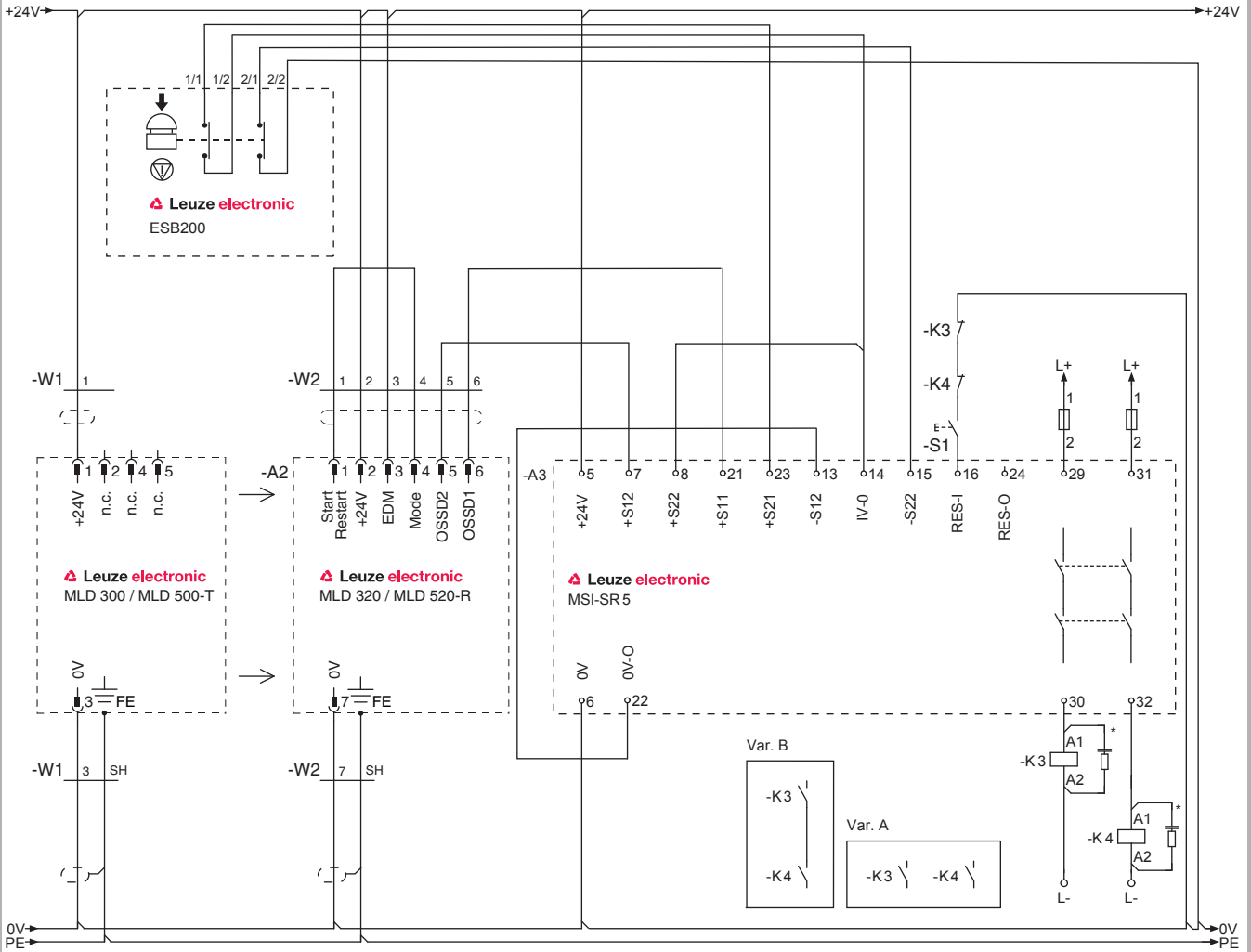
| Article     | Description                      |
|-------------|----------------------------------|
| <b>ESB</b>  |                                  |
| <b>200</b>  | With housing for mounting        |
| <b>210</b>  | Without housing for installation |
| <b>-4</b>   | 2NC ⊕ + 1NO contact set          |
| <b>TR</b>   | Enable by turning the button     |
| <b>KR</b>   | Enable by turning the key        |
| <b>-C</b>   | Mounting screws located inside   |
| <b>M12p</b> | M12 plug                         |

**ESB 200**



Electrical connection

ESB200 connection example



ESB200 Safety Command Device with MLD Multiple Light Beam Safety Device and MSI-SR5 Safety Relay

⚠ Please observe the operating instructions of the components!



## SAFETY COMMAND DEVICES

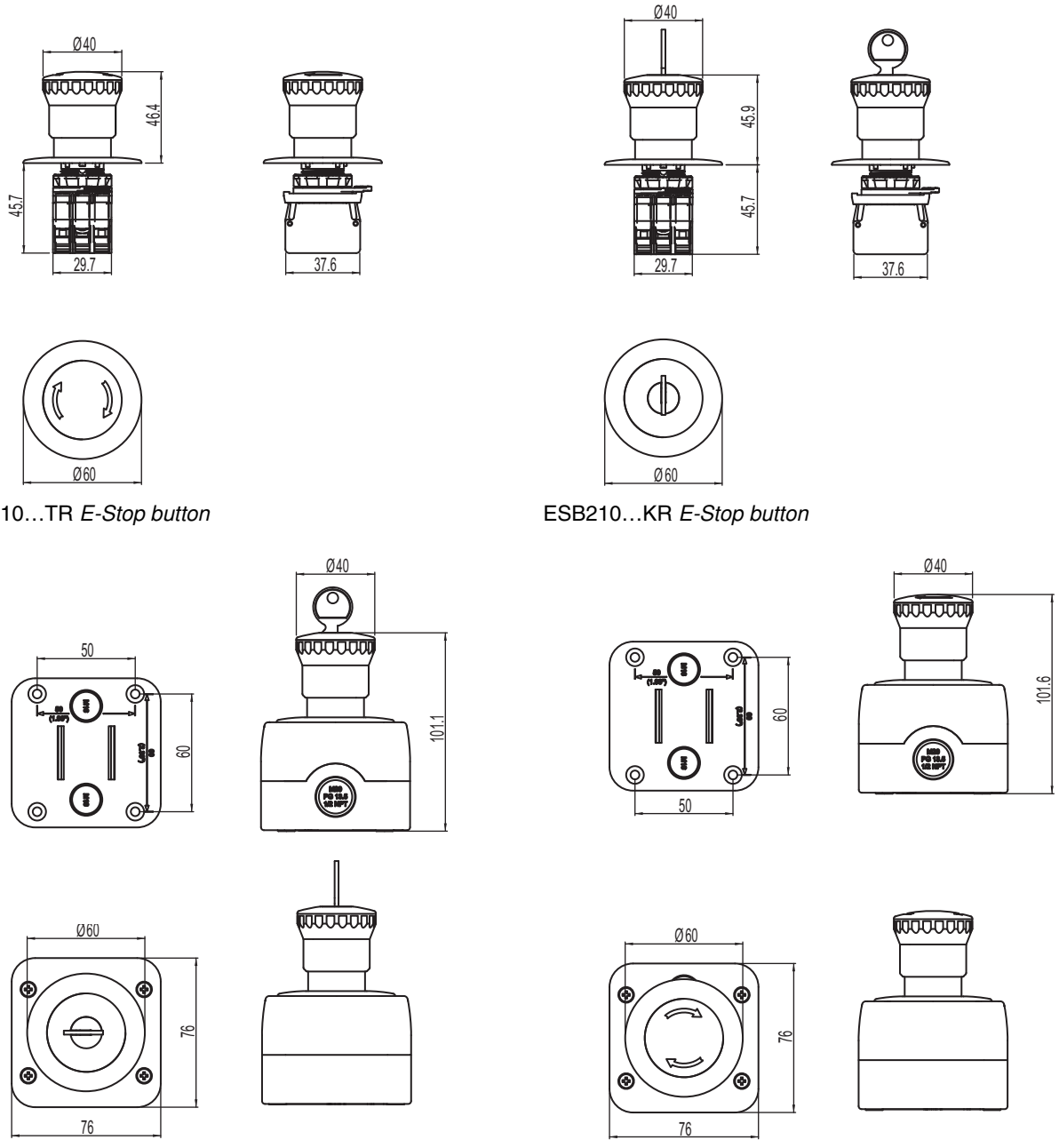
### Technical data

|   |   |  |
|---|---|--|
| Type  | E-Stop command device in accordance with EN 60947-5-5 and EN ISO 13850  |  |
| Service life ( $T_M$ ) in accordance with EN ISO 13849-1                            | 20 years  |  |
| Number of cycles until 10% of the components have a failure to danger ( $B_{10d}$ ) | 600,000   |  |
| Installation point  | Arbitrary   |  |
| Ambient temperature, operation  | -25...+80°C   |  |
| Dirt levels, external, in accordance with EN 60947-1                                | 3   |  |
| Housing material (ESB200)   | Fiberglass-reinforced plastic, self-extinguishing   |  |
| Actuator  | Button 40 mm, red, self-locking   |  |
| Dimensions  | See dimensional drawing   |  |
| Protection rating   | IP 67, IP 69K   |  |
| Mechanical life time in accordance with IEC 60947-5-1                               | 300,000   |  |
| Actuation frequency according to IEC 60947-5-1                                      | Max. 3600 per hour  |  |
| Contact equipment   | 2NC $\ominus$ + 1NO   |  |
| Switching principle   | Creep contact   |  |
| Contact opening   | Force-fit   |  |
| Contact material  | Silver alloy  |  |
| Usage category in accordance with EN 60947-5-1                                      | AC 15: $U_e / I_e$ : 24 V / 6 A, 48 V / 6 A, 120 V / 6 A, 250 V / 6 A, 400 V / 3 A or I 24 V / 2 A (ESB200...-M12p)<br>DC 13: $U_e / I_e$ : 24 V / 2.5 A, 48 V / 1.3 A, 125 V / 0.6 A, 250 V / 0.3 A or I 24 V / 2 A (ESB200...-M12p) |  |
| Rated insulation voltage  | 600 V AC/DC or 30 V AC / 36 V DC (ESB...-M12p)  |  |
| Conventional thermal current  | 10 A or 2 A (ESB200...-M12p)  |  |
| Short-circuit protection according to IEC 60269-1                                   | 500 V, 10 A, type gG or 500 V, 2 A, type gG (ESB200...-M12p)  |  |
| Connection system   | Number of cable entries   | To 5   |
|   | Type of cable entries   | M12 plug, M20 x 1.5, M16 x 1.5                     |
|   | Cable cross-section (wire)  | 1 x 0.5 mm <sup>2</sup> to 2 x 2.5 mm <sup>2</sup> |

Please note the additional information in the connecting and operating instructions at [www.leuze.com/en/esb200](http://www.leuze.com/en/esb200).

**Dimensional drawings**

**ESB200, ESB210 E-Stop button**



ESB210...TR E-Stop button

ESB210...KR E-Stop button

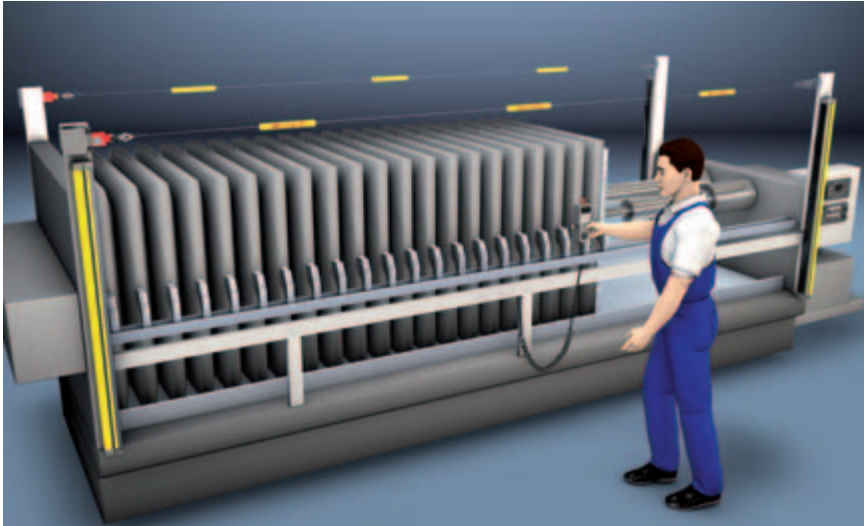
ESB200...TR E-Stop button

ESB200...KR E-Stop button

Dimensions in mm

## SAFETY COMMAND DEVICES

### ERS200 E-Stop Rope Switch



ERS200 E-STOP Rope Switch as Safety Command Device on a filter press

The ERS200 E-Stop Rope Switch series is used with preference with expansive points of operation. Its simple operation ensures fast stop command output along the point of operation. The switch's alignment indicator ensures that it is easy to set. The ERS 200 variants enable integration in control circuits up to category 4 in accordance with EN ISO 13849.

#### Typical areas of application

- Machinery and systems with expansive points of operation
- Large machines and systems, in which command input by pulling a rope is beneficial



ERS200 E-STOP Rope Switch as Safety Command Device in the wood-processing industry

**Important technical data, overview**

|   |  |
|---|--|
| Type  | E-Stop command device in accordance with EN 60947-5-5 and EN ISO 13850 |
| Housing material                                  | Metal  |
| Contact equipment                                 | 1NC ⊖ + 1NO 2NC ⊖ + 1NO 2NC ⊖  |
| Switching principle                               | Creep contact  |
| Actuator  | Stainless steel bolts, signal red, coated steel rope                   |
| Actuation force (pull-out)                        | 83 N, 235 N  |
| Actuation force (slacken)                         | 63 N, 147 N  |
| Actuation force (pull-out with forced separation) | 90 N, 250 N  |
| Connection system                                 | M20 x 1.5 (3-way)  |
| Protection rating                                 | IP 67  |

**Functions**

|  |
|--|
| E-Stop command device in accordance with EN 60947-5-5 and EN ISO 13850           |
| Integration in control circuits up to category 4 in accordance with EN ISO 13849 |
| Position-independent E-Stop command input  |
| Reset function (reset button with indicator)                                     |
| Rope head with alignment indicator   |

**Special features**

- Contact sets for integration up to category 4 acc. to EN ISO 13849
- Pulling the rope or rope fracture safely stops the machine
- Easy rope adjustment with switching point indicator
- Clicks in on both sides with friction-locking contacts
- Compact metal housing
- Use even under difficult environmental conditions
- Protection rating IP 67



**Features**



| Further information                 | Page |
|-------------------------------------|------|
| ● Ordering information              | 416  |
| ● Electrical connection             | 418  |
| ● Technical data                    | 419  |
| ● Dimensional drawings              | 421  |
| ● Dimensional drawings: Accessories | 423  |
| ● Accessories ordering information  | 424  |

## SAFETY COMMAND DEVICES

### Ordering information

**ERS200**

Included in delivery: Application information (print document)

**Functions:** command device in accordance with EN 60947-5-5 and EN ISO 13850, Rope Switch with reset function and alignment indicator

### ERS200 E-Stop Rope Switch, Heavy Duty

| Part no. | Article             | Description   | Contact equipment  |
|----------|---------------------|---|--|
| 63000500 | ERS200-M0C3-M20-HLR | E-Stop Rope Switch with reset function and alignment indicator, actuation direction in longitudinal axis, 3 cable entries         | (1NC ⊖ + 1NO) creep contacts                             |
| 63000501 | ERS200-M1C3-M20-HLR | E-Stop Rope Switch with reset function and alignment indicator, actuation direction in longitudinal axis, 3 cable entries         | (2NC ⊖) creep contacts                                   |
| 63000502 | ERS200-M4C3-M20-HLR | E-Stop Rope Switch with reset function and alignment indicator, actuation direction in longitudinal axis, 3 cable entries         | (2NC ⊖ + 1NO) creep contacts                             |
| 63000503 | ERS200-M4C1-M20-HLR | E-Stop Rope Switch with reset function and alignment indicator, actuation direction in longitudinal axis, 1 cable entry           | (2NC ⊖ + 1NO) creep contacts                             |
| 63000504 | ERS200-M4C1-M12-HLR | E-Stop Rope Switch with reset function and alignment indicator, actuation direction in longitudinal axis, M12 plug, 1 cable entry | (2NC ⊖ + 1NO) creep contacts                             |
| 63000520 | ERS200-M4C3-M20-HAR | E-Stop Rope Switch with reset function and alignment indicator, actuation direction to the right, 3 cable entries                 | (2NC ⊖ + 1NO) creep contacts                             |
| 63000522 | ERS200-M0C3-M20-HAR | E-Stop Rope Switch with reset function and alignment indicator, actuation direction to the right, 3 cable entries                 | (1NC ⊖ + 1NO) creep contacts                             |
| 63000523 | ERS200-M1C1-M20-HAR | E-Stop Rope Switch with reset function and alignment indicator, actuation direction to the right, 1 cable entry                   | (2NC ) creep contacts                                    |
| 63000521 | ERS200-M4C3-M20-HAL | E-Stop Rope Switch with reset function and alignment indicator, actuation direction to the left, 3 cable entries                  | (2NC ⊖ + 1NO) creep contacts                             |
| 63000524 | ERS200-M0C3-M20-HAL | E-Stop Rope Switch with reset function and alignment indicator, actuation direction to the left, 3 cable entries                  | (1NC + 1NO) creep contacts, 3 cable entries, to the left |
| 63000525 | ERS200-M1C1-M20-HAL | E-Stop Rope Switch with reset function and alignment indicator, actuation direction to the left, 1 cable entry                    | (2NC ) creep contacts                                    |

Steel rope, rope clamps and other accessories must be ordered separately, see page 424.

**Article list for ERS200**

| Article        | Description                              |
|----------------|--|
| <b>ERS200</b>  |  |
| <b>-M</b>      | Metal housing                            |
| <b>0, 1, 4</b> | Contact set                              |
| <b>C3</b>      | Number of cable bushings                 |
| <b>-M20</b>    | Metric thread                            |
| <b>-HLR</b>    | Rope pull direction in longitudinal axis |
| <b>-HAR</b>    | Rope pull direction, right angled        |
| <b>-HAL</b>    | Rope pull direction, left angled         |

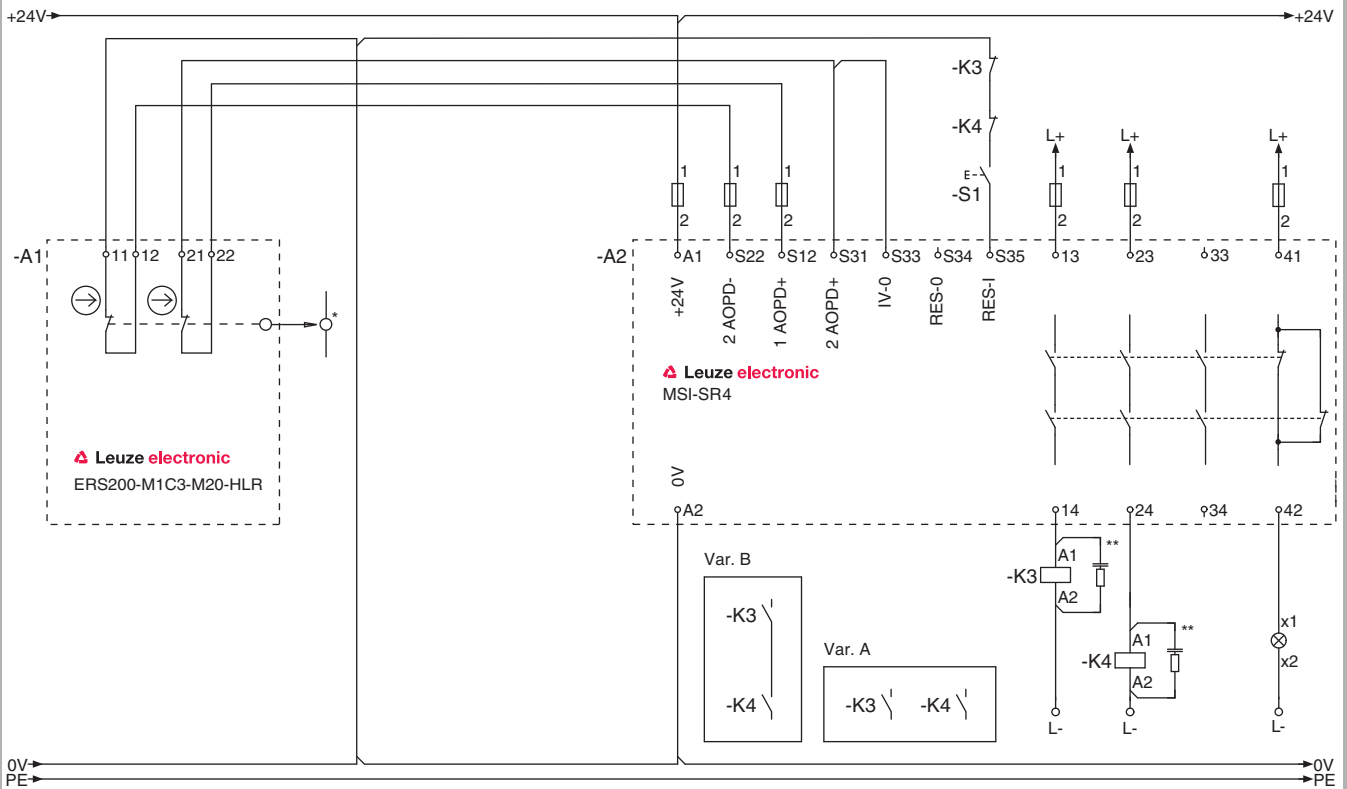
**ERS200**

[www.leuze.com/en/ers200/](http://www.leuze.com/en/ers200/)

# SAFETY COMMAND DEVICES

## Electrical connection

### ERS200 connection example



\*) Rope  
 \*\*) Spark extinction circuit, supply suitable spark extinction

ERS200 E-Stop Rope Switch with MSI-SR4 Safety Relay

**!** Please observe the operating instructions of the components!

## Technical data

|   |  |                                      |
|---|--|--------------------------------------|
| Type  | E-Stop command device in accordance with EN 60947-5-5 and EN ISO 13850 |                                      |
| Service life ( $T_M$ ) in accordance with EN ISO 13849-1                            | 20 years   |                                      |
| Number of cycles until 10% of the components have a failure to danger ( $B_{10d}$ ) | 2,000,000  |                                      |
| Installation point  | On rope pull axis  | ERS200-M...-HLR                      |
|   | On rope pull axis, to the right  | ERS200-M4...-HAR                     |
|   | On rope pull axis, to the left   | ERS200-M4...-HAL                     |
| Ambient temperature, operation  | -25...+80°C  |                                      |
| Dirt levels, external, in accordance with EN 60947-1                                | 3  |                                      |
| Housing material  | Metal  |                                      |
| Actuator  | Stainless steel bolts, signal red, coated steel rope                   |                                      |
| Dimensions  | See dimensional drawing  |                                      |
| Protection rating   | IP 67  |                                      |
| Actuation directions  | In longitudinal axis of the rope head                                  |                                      |
| Mechanical life time in accordance with IEC 60947-5-1                               | 1 x 10 <sup>6</sup> actuation cycles                                   |                                      |
| Actuation frequency according to IEC 60947-5-1                                      | Max. 600 per hour  |                                      |
| Actuation force (pull-out)  | 83 N   | ERS200-M...-HLR                      |
|   | 235 N  | ERS200-M4...-HAR<br>ERS200-M4...-HAL |
| Actuation force (slacken)   | 63 N   | ERS200-M...-HLR                      |
|   | 147 N  | ERS200-M4...-HAR<br>ERS200-M4...-HAL |
| Actuation force (pull-out with forced separation)                                   | 90 N   | ERS200-M...-HLR                      |
|   | 250 N  | ERS200-M4...-HAR<br>ERS200-M4...-HAL |
| Actuating path with forced separation   | Min. 8 mm  | ERS200-M...-HLR                      |
|   | Min. 14 mm   | ERS200-M4...-HAR<br>ERS200-M4...-HAL |
| Contact equipment   | 1NC ⊕ + 1NO  | ERS200-M0...                         |
|   | 2NC ⊕ + 1NO  | ERS200-M4...                         |
|   | 2NC ⊕  | ERS200-M1...                         |
| Switching principle   | Creep contact  |                                      |
| Contact opening   | Force-fit  |                                      |
| Contact material  | Silver alloy   |                                      |



## SAFETY COMMAND DEVICES

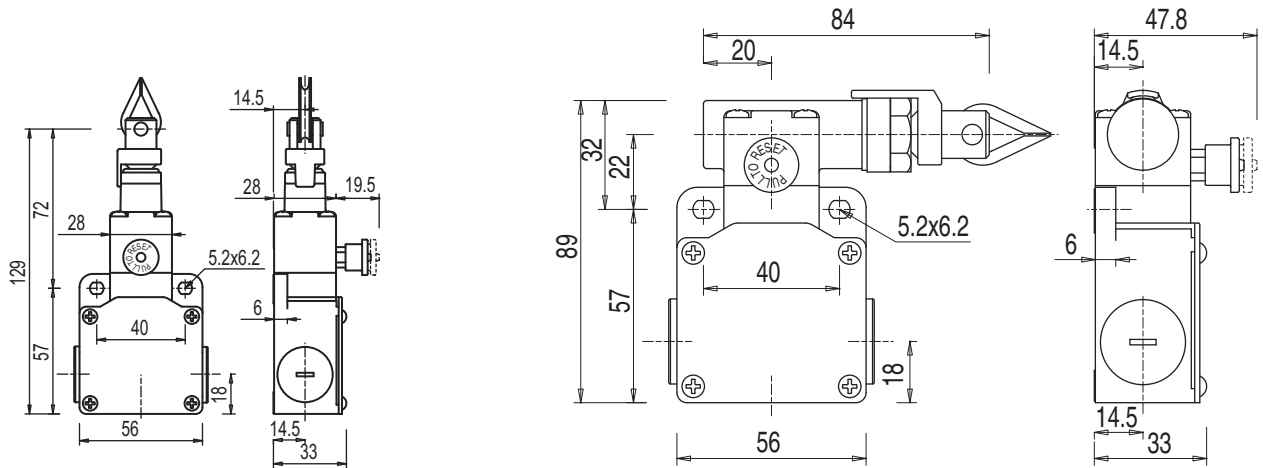
### Technical data

| General system data                                  |   |  |
|--|---|--|
| Usage category in accordance with EN 60947-5-1       | AC 15: U <sub>e</sub> / I <sub>e</sub> : 250 V / 6 A, 400 V / 4 A, 500 V / 1 A<br>DC 13: U <sub>e</sub> / I <sub>e</sub> : 24 V / 6 A, 125 V / 1.1 A, 250 V / 0.4 A |  |
| Rated insulation voltage                             | 500 V AC, 600 V DC  |  |
| Conventional thermal current                         | Max. 10 A   |  |
| Short-circuit protection according to IEC 60269-1    | 500 V, 10 A, type aM  |  |
| Connection system                                    | Number of cable entries   | 3, 1   |
|  | Type of cable entries   | M12 plug, M20 x 1.5                                |
|  | Cable cross-section (wire)  | 1 x 0.5 mm <sup>2</sup> to 2 x 2.5 mm <sup>2</sup> |
| Actuator: Rope length at 20°C temperature difference | Max. 24 m   | ERS200-M...-HLR                                    |
|  | Max. 70 m   | ERS200-M...-HAR<br>ERS200-M...-HAL                 |

Please note the additional information in the connecting and operating instructions at [www.leuze.com/en/ers200](http://www.leuze.com/en/ers200).

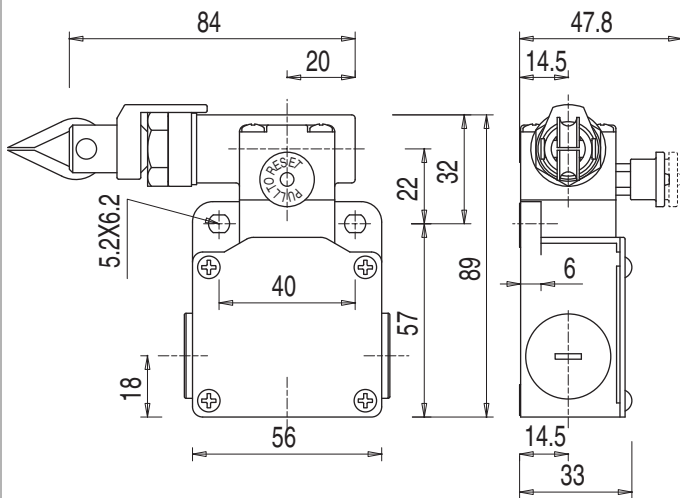
Dimensional drawings

ERS200 E-Stop Rope Switch



ERS200-M...C3...-HLR E-Stop Rope Switch

ERS200-M...C3...-HAR



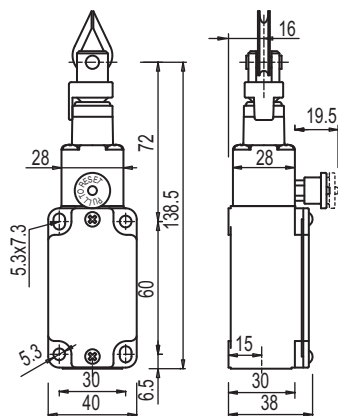
ERS200-M...C3...-HAL

Dimensions in mm

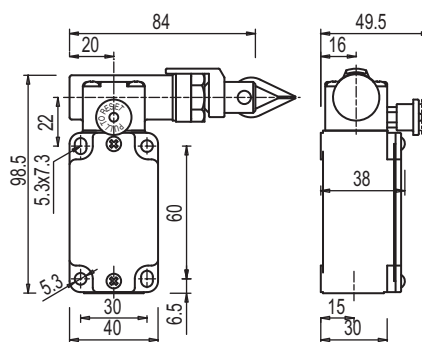
## SAFETY COMMAND DEVICES

### Dimensional drawings

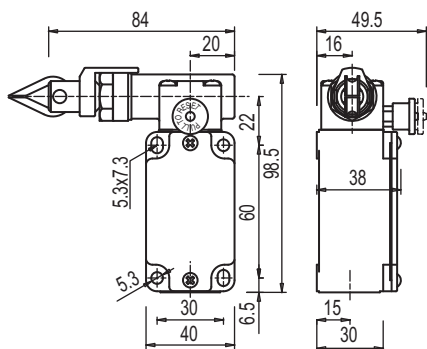
#### ERS200 E-Stop Rope Switch



ERS200-M...C1-...-HLR



ERS200-M...C1-...-HAR

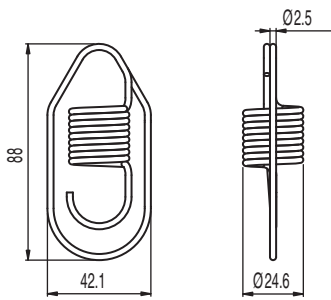


ERS200-M...C1-...-HAL

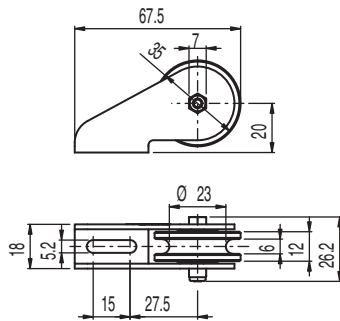
Dimensions in mm

Dimensional drawings: Accessories

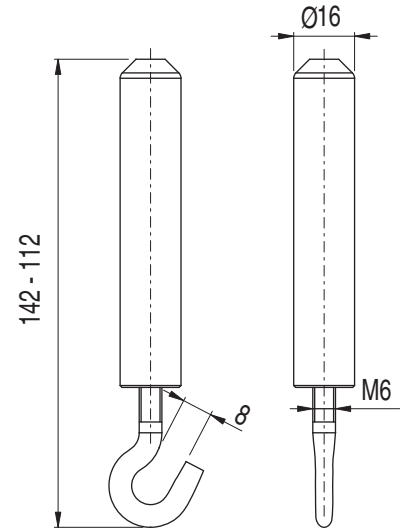
Safety spiral spring



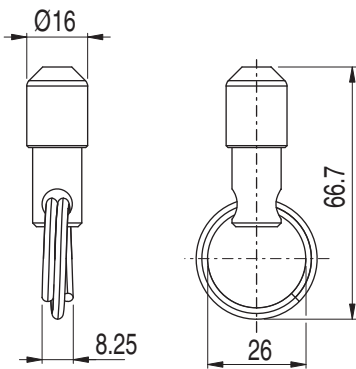
Safety spiral spring AC-SL-ERS



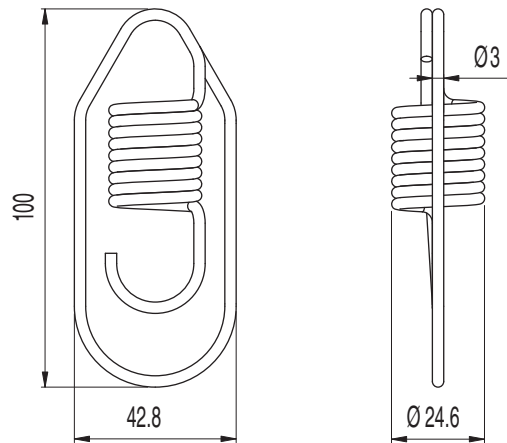
Corner pulley AC-AP-ERS



Stud bolts, adjustable AC-SBO-ERS



End ring with fixing AC-ENCLF-ERS



Safety spiral spring AC-SA-ERS

Dimensions in mm

## SAFETY COMMAND DEVICES

### Accessories ordering information

#### Accessories for ERS200

| Part no. | Article         | Description          | Length, design  |
|----------|-----------------|----------------------|---|
| 63000790 | AC-KT10-ERS     | Accessories set      | Consisting of rope clamps and 10 m steel rope                         |
| 63000791 | AC-KT20-ERS     | Accessories set      | Consisting of rope clamps and 20 m steel rope                         |
| 63000792 | AC-SL-ERS       | Safety spiral spring | For ERS200-M0C3-M20-HLR<br>ERS200-M1C3-M20-HLR<br>ERS200-M4C3-M20-HLR |
| 63000793 | AC-AP-ERS       | Corner pulley        |   |
| 63000794 | AC-STOP-ERS     | Rope label, <STOP>   | For rope diameter 5 mm max.   |
| 63000795 | AC-STRO-35-ERS  | Steel rope           | 35 m long   |
| 63000796 | AC-STRO-100-ERS | Steel rope           | 100 m long  |
| 63000797 | AC-SBO-ERS      | Stud bolts           | Adjustable  |
| 63000798 | AC-ENCLF-ERS    | End ring             | With fixing   |
| 63000799 | AC-SA-ERS       | Safety spiral spring | for ERS200-M4C3-M20-HAR,<br>ERS200-M4C3-M20-HAL                       |
| 63000800 | AC-P-ERS        | Deflection roller    |   |

#### Article list for ERS200 accessories

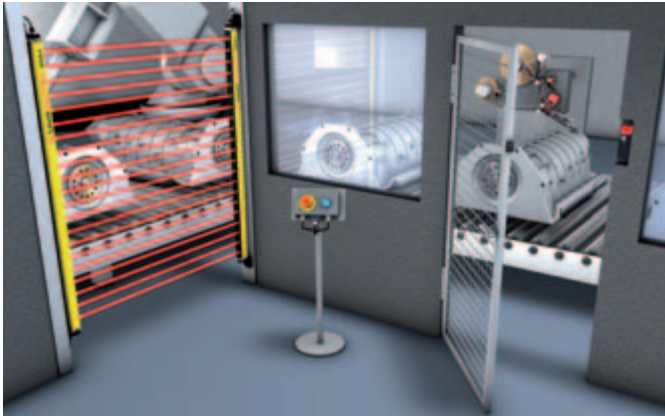
| Article          | Description                         |
|------------------|-------------------------------------|
| <b>AC</b>        | <b>Accessories</b>                  |
| <b>-KT10, 20</b> | Kit with rope, 10, 20 m long        |
| <b>-SL</b>       | Safety spiral spring for -HLR       |
| <b>-SA</b>       | Safety spiral spring for -HAL, -HAR |
| <b>-AP</b>       | Corner pulley for rope pull         |
| <b>-P</b>        | Deflection roller                   |
| <b>STRO</b>      | Steel rope                          |
| <b>SBO</b>       | Stud bolts                          |
| <b>ENCLF</b>     | End ring with fixing                |

AC



## SAFETY RELAYS

### Overview



*Safeguarding an assembly station and a service door with the MSI-SR5 Safety Relay*



*Safety Light Curtain with an MSI-SR4 Safety Relay as danger zone guarding with start/restart interlock on a robot cell*

With Safety Relays of the MSI series, depending on the application, opto-electronic safety sensors or Safety Switches can be connected to the safety circuit of the machine control system. The interfaces must be right here. In addition to high reliability and service life, small construction dimensions are often also required. The MSI Safety Relays take these requirements into account with their mechanical and electrical design in an ideal way, and also enable an economical integration into many kinds of safety-related faulty connection situations.

| Safety type/category in accordance with EN ISO 13849               | Performance Level (PL) in accordance with EN ISO 13849-1 |  |
|--|--|--|
| Up to category 4 in accordance with EN ISO 13849 <sup>1)</sup>     | e  |  |
| Up to category 4 in accordance with EN ISO 13849 <sup>1)</sup>     | e  |  |
| Depending on the safety type of the upstream AOPD                  | Depending on the safety type of the upstream AOPD        |  |
|  |  |  |
| Up to category 4 in accordance with EN ISO 13849                   | Up to e  |  |
| Safety type: Type III C<br>In accordance with EN 574 <sup>1)</sup> | e  |  |
| 2  | Up to d  |  |

MSI-SR4  
p. 428

MSI-SR5  
p. 434

MSI-RM2  
p. 440

MSI-CM  
p. 446

MSI-DT  
p. 452

MSI-MC310,  
MSI-MC311  
p. 458

MSI-2H  
p. 468

MSI-T  
p. 474

Selection table



Space-saving and reliable: a selection of the MSI Safety Relay family: MSI-SR5, MSI-2H, MSI-SR4, MSI-RM2

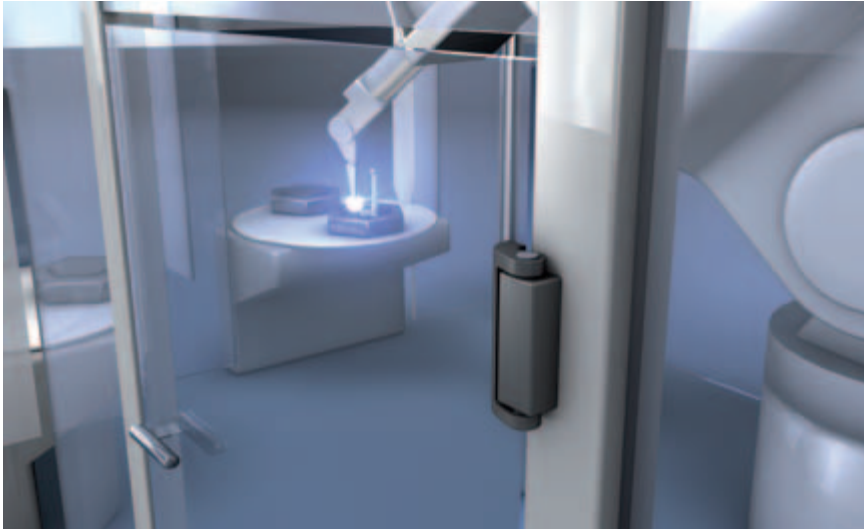
|  | Connectable safety components   | Features                 |                          |                               |                          |              |               |                                  |               | Series   | Page |
|--|---|--------------------------|--------------------------|-------------------------------|--------------------------|--------------|---------------|----------------------------------|---------------|----------|------|
|  |   | OSSDs, relay, 3 NO, 1 NC | OSSDs, relay, 2 NO, 1 NC | OSSDs, relay, 2 make contacts | OSSDs, relay, 5 NO, 2 NC | RES, dynamic | RES, via AOPD | EDM, static in the reset circuit | EDM, via AOPD |          |      |
|  | Safety Light Curtains, Single and Multiple Light Beam Safety Devices, type 3 Safety Laser Scanners, Safety Switches, E-Stop command devices | ●                        |                          |                               |                          | ●            |               | ●                                |               | MSI-SR4  | 430  |
|  | Safety Light Curtains, Single and Multiple Light Beam Safety Devices, type 3 Safety Laser Scanners, Safety Switches, E-Stop command devices |                          |                          | ●                             |                          | ●            |               | ●                                |               | MSI-SR5  | 436  |
|  | Type 4 or type 2 AOPD with 2 safety transistor outputs, RES and internal dynamic EDM  |                          |                          | ●                             |                          |              | ●             |                                  | ●             | MSI-RM2  | 442  |
|  | E-Stop relay, two-hand controls   |                          |                          |                               | ●                        |              | ●             |                                  | ●             | MSI-CM   | 448  |
|  | AOPDs, E-Stop button, protective door guards  |                          |                          | ●                             |                          |              | ●             |                                  | ●             | MSI-DT   | 452  |
|  | Magnetically Coded Sensors (1NC/1NO or 2NO)   |                          | ● <sup>3)</sup>          | ● <sup>2)</sup>               |                          | ●            |               | ●                                |               | MSI-MC3x | 460  |
|  | Two-hand switching device   |                          | ●                        |                               |                          |              |               |                                  |               | MSI-2H   | 470  |
|  | AOPDs   |                          |                          | ●                             |                          | ●            |               | ●                                |               | MSI-T    | 476  |

1) depending on the category of the upstream protective device  
 2) MSI-MC311  
 3) MSI-MC310



## SAFETY RELAYS

### MSI-SR4



*Guarding a robot area with S400 Safety Switch and MSI-SR4 Safety Relay*

If Safety Switches or optoelectronic protective devices are used for guarding danger zones, as the standard link the MSI-SR4 Safety Relay establishes the connection to the machine control system. The relay acts as an E-Stop relay or protective door monitor in accordance with EN/IEC 60204-1, STOP-0. The MSI-SR4 equipment includes the evaluation of input signals using relay or transistor outputs as well as three safety-related switching outputs and a signal output. A wide range of applications can therefore be covered. The short response time of only 10 ms is especially advantageous. A very compact construction of the machines is therefore possible with hand and finger protection in particular. The MSI-SR4 is easy to connect because of the unambiguous assignment of the functions – this guarantees time-saving installation.

#### Typical areas of application

- Two-channel E-Stop circuit
- MSI-SR4 is the preferred option as two-channel protective door monitoring
- MSI-SR4 is the preferred option as sequential circuit for Safety Light Devices, type 4, with relay or transistor outputs

**MSI-SR4**  
p. 428

MSI-SR5  
p. 434

MSI-RM2  
p. 440

MSI-CM  
p. 446

MSI-DT  
p. 452

MSI-MC310,  
MSI-MC311  
p. 458

MSI-2H  
p. 468

MSI-T  
p. 474

**Important technical data, overview**

|  |   |
|--|---|
| SIL in accordance with IEC 61508 and SILCL in accordance with EN/IEC 62061 | 3   |
| Performance Level (PL) in accordance with EN ISO 13849-1                   | e   |
| Category in accordance with EN ISO 13849                                   | 4 (depending on the category of the upstream protective device) |
| Stop category in accordance with EN/IEC 60204-1                            | STOP 0  |
| Supply voltage   | 24 V AC/DC ±20%   |
| Safety-related switching outputs (OSSDs)                                   | 3 relay outputs (NO)  |
| Signal output  | 1 relay output (NC)   |
| Response time  | 10 ms   |
| Restart delay time (automatic start)                                       | 300 ms  |
| Ambient temperature, operation   | 0...+55°C   |
| Ambient temperature, storage   | -25...+70°C   |
| Dimensions (W x H x D)   | 22.5 mm x 99 mm x 113.6 mm                                      |

**Functions**

|  |
|--|
| Automatic start/restart                                |
| Start/restart interlock (RES), optionally with/without |
| Static contactor monitoring (EDM)                      |
| Cross circuit monitoring                               |

**Special features**

- **Housing width 22.5 mm**
- **Very short response time**
- **Monitored reset button**
- **3 release circuits, 1 NC contact as signal circuit**
- **Potential-free safety-related switching outputs**
- **LED displays: K1, K2, supply voltage, RES**



**Features**



**Further information** **Page**

|                         |     |
|-------------------------|-----|
| ● Ordering information  | 430 |
| ● Electrical connection | 430 |
| ● Technical data        | 432 |
| ● Dimensional drawings  | 433 |

# SAFETY RELAYS

## Ordering information

### MSI-SR4

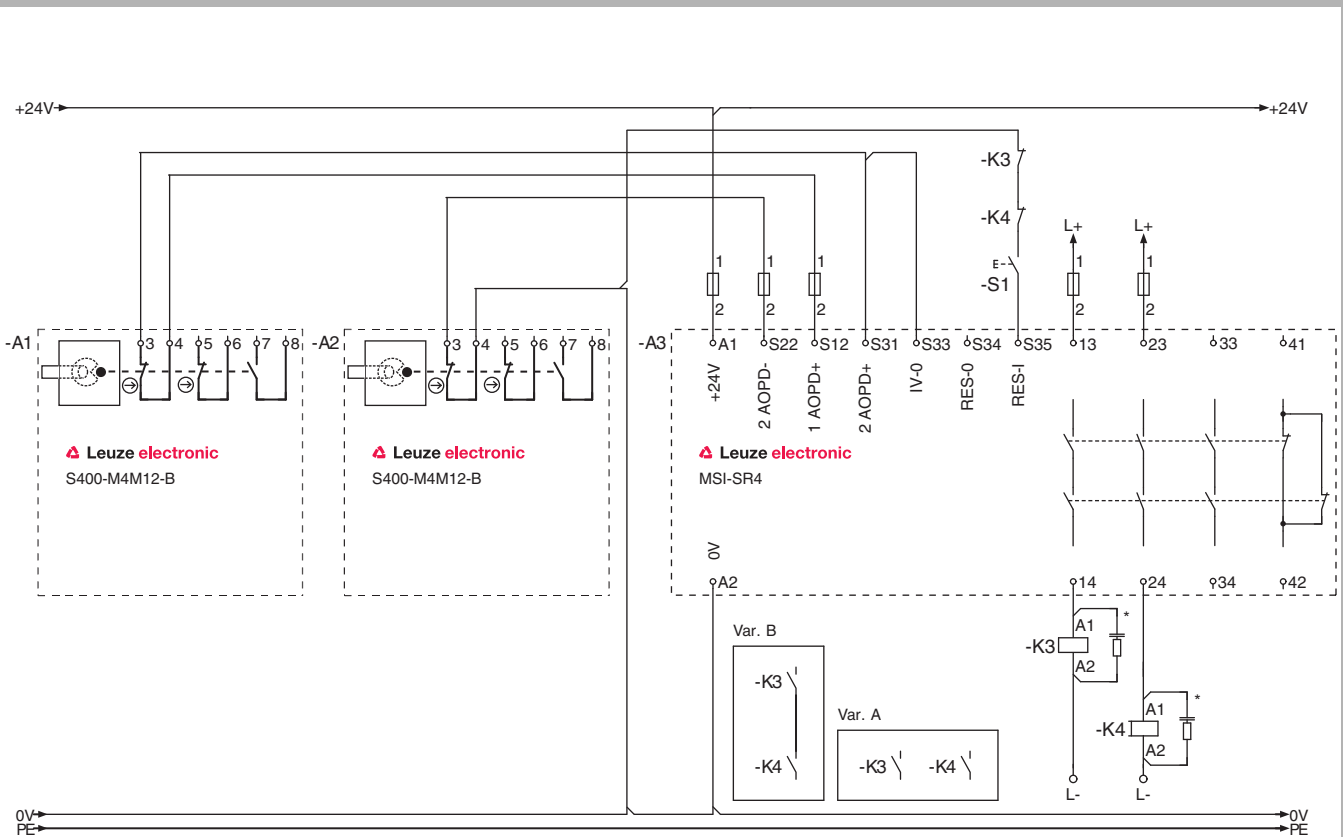
Included in delivery: 1 set of connecting and operating instructions (PDF file on CD-ROM)

**Functions:** E-Stop relay and protective door monitor in accordance with EN/IEC 60204-1 stop category STOP 0, EN 13849-1 category 4, PL e

### MSI-SR4 Safety Relay, category 4

| Part no. | Article | Description  |
|----------|---------|--------------|
| 549986   | MSI-SR4 | E-Stop relay |

### Electrical connection, MSI-SR4 connection example



\*) Spark extinction circuit, supply suitable spark extinction

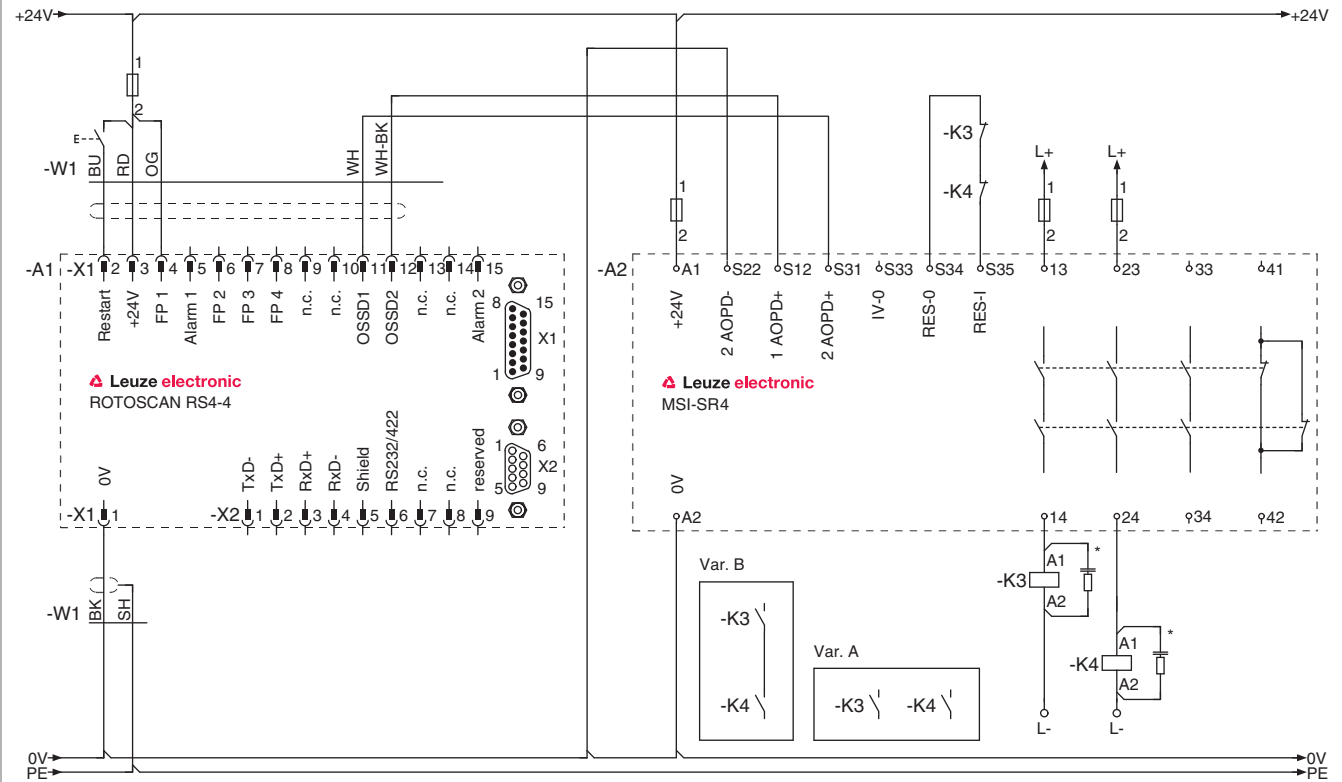
MSI-SR4 as link between S400 Safety Hinge Switches and machine control system

**!** Please observe the operating instructions of the components!

|                          |                   |                   |                  |                  |                                   |                  |                 |
|--------------------------|-------------------|-------------------|------------------|------------------|-----------------------------------|------------------|-----------------|
| <b>MSI-SR4</b><br>p. 428 | MSI-SR5<br>p. 434 | MSI-RM2<br>p. 440 | MSI-CM<br>p. 446 | MSI-DT<br>p. 452 | MSI-MC310,<br>MSI-MC311<br>p. 458 | MSI-2H<br>p. 468 | MSI-T<br>p. 474 |
|--------------------------|-------------------|-------------------|------------------|------------------|-----------------------------------|------------------|-----------------|

Electrical connection

MSI-SR4 connection example



\*) Spark extinction circuit, supply suitable spark extinction

MSI-SR4 as link between ROTOSCAN RS4 Laser Scanners and the machine control system

**!** Please observe the operating instructions of the components!

## SAFETY RELAYS

### Technical data

| General system data  |   |                        |
|--|---|------------------------|
| SIL in accordance with IEC 61508 and SILCL in accordance with EN/IEC 62061   | 3   |                        |
| Performance Level (PL) in accordance with EN ISO 13849-1   | e   |                        |
| Service life ( $T_M$ ) in accordance with EN ISO 13849-1   | 20 years  |                        |
| Probability of a failure to danger per hour ( $PFH_d$ ) in accordance with the average number of annual $n_{op}$ activations (for the calculation formula, see EN ISO 13849-1:2008, chapter C.4.2 and C.4.3) | $n_{op} = 4,800$  | $1.4 \times 10^{-9}$   |
|  | $n_{op} = 28,800$   | $4.5 \times 10^{-9}$   |
|  | $n_{op} = 86,400$   | $1.5 \times 10^{-8}$   |
| Number of cycles until 10% of the components have a failure to danger ( $B_{10d}$ )  | With DC1 (ohmic load)   | 1,000,000 (3 A, 24 V)  |
|  | With AC1 (ohmic load)   | 1,400,000 (5 A, 230 V) |
|  | With DC13 (inductive load)                                      | 1,000,000 (3 A, 24 V)  |
|  | With AC15 (inductive load)                                      | 1,400,000 (5 A, 230 V) |
|  | Low load (20% nominal load)                                     | On request             |
| Category in accordance with EN ISO 13849   | 4 (depending on the category of the upstream protective device) |                        |
| Stop category in accordance with EN/IEC 60204-1  | STOP 0  |                        |
| Supply voltage   | 24 V AC/DC $\pm 20\%$   |                        |
| Power consumption  | 3 W   |                        |
| Safety-related switching outputs (OSSDs)   | 3 relay outputs (NO)  |                        |
| Signal output  | 1 relay output (NC)   |                        |
| Continuous current per current path  | Max. 3 A  |                        |
| Response time  | 10 ms   |                        |
| Restart delay time (manual start)  | 30 ms   |                        |
| Restart delay time (automatic start)   | 300 ms  |                        |
| Input current  | Max. 100 mA   |                        |
| Admissible input line resistance   | <70 $\Omega$  |                        |
| Ambient temperature, operation   | 0...+55°C   |                        |
| Ambient temperature, storage   | -25...+70°C   |                        |
| Protection rating  | IP 20   |                        |
| Connection system  | Screw terminals   |                        |
| Dimensions (W x H x D)   | 22.5 mm x 99 mm x 113.6 mm                                      |                        |
| Mounting   | On 35 mm DIN rail   |                        |

Please note the additional information in the connecting and operating instructions and at [www.leuze.com/en/relays](http://www.leuze.com/en/relays).

**MSI-SR4**  
p. 428

MSI-SR5  
p. 434

MSI-RM2  
p. 440

MSI-CM  
p. 446

MSI-DT  
p. 452

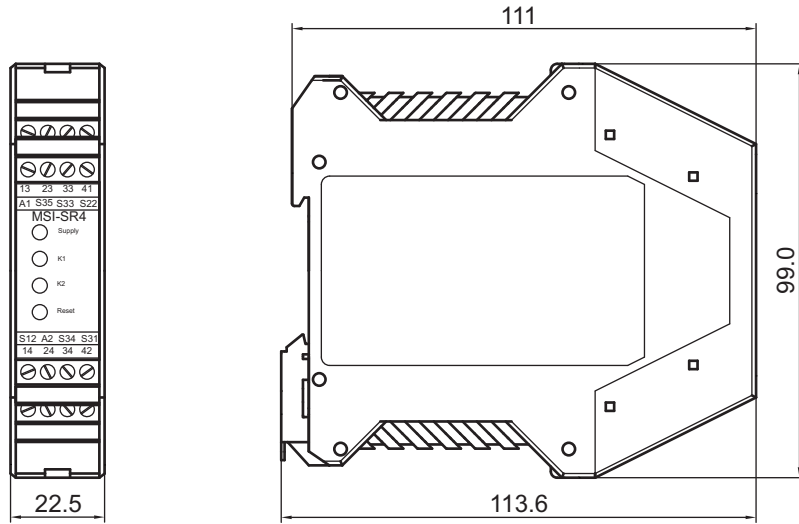
MSI-MC310,  
MSI-MC311  
p. 458

MSI-2H  
p. 468

MSI-T  
p. 474

**Dimensional drawings**

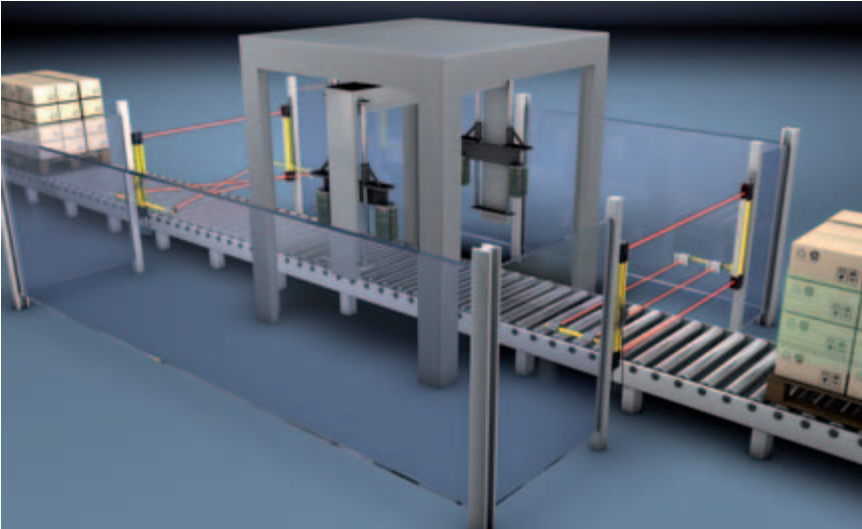
**MSI-SR4 Safety Relay**



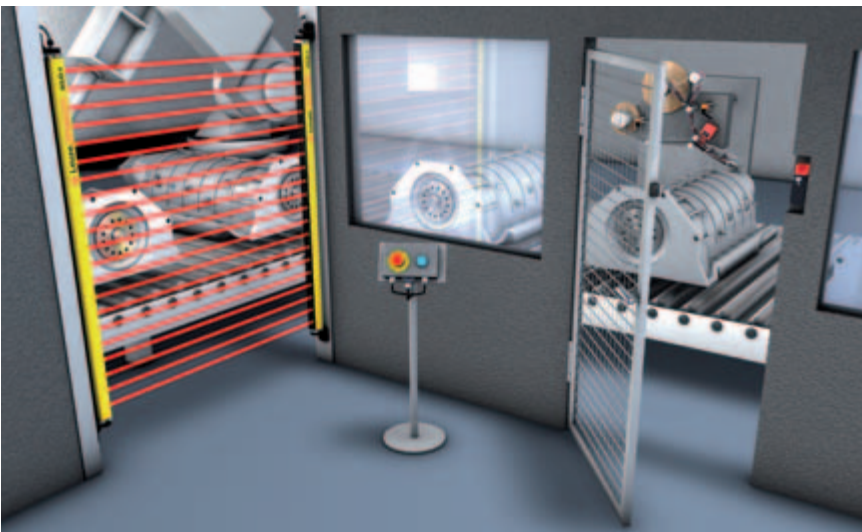
Dimensions in mm

## SAFETY RELAYS

### MSI-SR5



*Safeguarding the entry and exit on a muting system*



*Safeguarding an assembly station and a service door*

Only rarely are safety sensors used individually. Usually, several sensors that act together on a single switch-off circuit are used, e.g. access guarding with a Multiple Light Beam Safety Device and a protective door to the danger zone. Or if a Multiple Light Beam Safety Device is used at both the entry and the exit of a robot cell for safeguarding. In the case of point of operation guarding with a Safety Light Curtain and a Multiple Light Beam Safety Device for rear zone guarding of a press, the sensors must likewise be connected to a common switch-off circuit. The MSI-SR5 Safety Relay can perform these tasks economically. Here, two devices can be connected at the entries, either with two transistor OSSDs or by designing as a two-channel contact circuit. Furthermore, the start/restart interlock and contactor monitoring functions are available. The compact construction and function selection by means of wiring make possible simple, space-saving and economical applications.

#### Typical areas of application

- Connection of two pieces of electro-sensitive protective equipment with integrated muting function in the entry and exit of muting systems.
- Combined connection of one piece of electro-sensitive protective equipment and one safety-oriented switch, e.g. access safeguarding and service door.
- Combined connection of two safety-oriented switches on moveable guards.
- Combined connection of two or more E-Stop command devices.

MSI-SR4  
p. 428

**MSI-SR5**  
**p. 434**

MSI-RM2  
p. 440

MSI-CM  
p. 446

MSI-DT  
p. 452

MSI-MC310,  
MSI-MC311  
p. 458

MSI-2H  
p. 468

MSI-T  
p. 474



**Important technical data, overview**

|  |   |
|--|---|
| SIL in accordance with IEC 61508 and SILCL in accordance with EN/IEC 62061 | 3   |
| Performance Level (PL) in accordance with EN ISO 13849-1                   | e   |
| Category in accordance with EN ISO 13849                                   | 4 (depending on the category of the upstream protective device) |
| Stop category in accordance with EN/IEC 60204-1                            | STOP 0  |
| Supply voltage   | 24 V AC/DC ±20%   |
| Safety-related switching outputs (OSSDs)                                   | 2 relay outputs (NO)  |
| Response time  | 10 ms   |
| Restart delay time (automatic start)                                       | 350 ms  |
| Ambient temperature, operation   | 0...+55°C   |
| Ambient temperature, storage   | -25...+70°C   |
| Dimensions (W x H x D)   | 22.5 mm x 99 mm x 113.6 mm                                      |

**Functions**

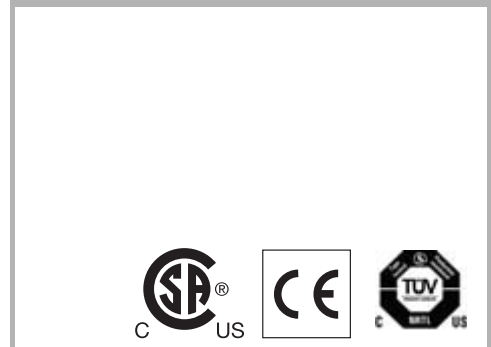
|  |
|--|
| Monitoring of two sensors                              |
| Start/restart interlock (RES), optionally with/without |
| Static contactor monitoring (EDM)                      |
| Cross circuit monitoring                               |

**Special features**

- **Very short response time**
- **Monitored reset button**
- **Evaluation of two (possibly different) sensors**
- **LED displays: K1, K2, supply voltage, RES**
- **Housing width 22.5 mm**
- **Potential-free safety-related switching outputs**



**Features**



**Further information** **Page**

|                         |     |
|-------------------------|-----|
| ● Ordering information  | 436 |
| ● Electrical connection | 436 |
| ● Technical data        | 438 |
| ● Dimensional drawings  | 439 |



# SAFETY RELAYS

## Ordering information

### MSI-SR5

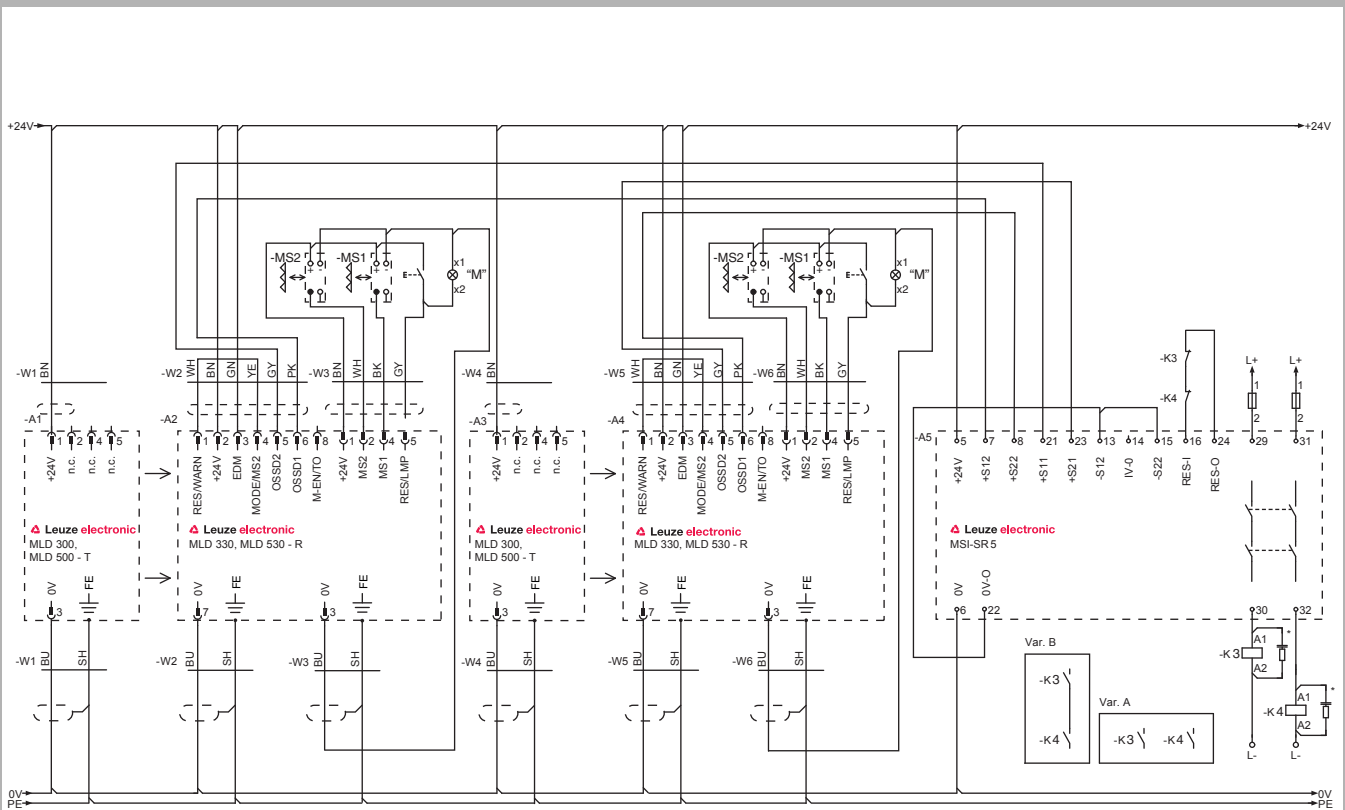
Included in delivery: 1 set of connecting and operating instructions (PDF file on CD-ROM)

**Functions:** E-Stop relay and protective door monitor in accordance with EN/IEC 60204-1 stop category STOP 0, EN 13849-1 category 4, PL e

### MSI-SR5 Safety Relays

| Part no. | Article | Description  |
|----------|---------|--|
| 549991   | MSI-SR5 | E-Stop relay with separate monitoring of two sensors |

### Electrical connection, MSI-SR5 connection example



\*) Spark extinction circuit, supply suitable spark extinction

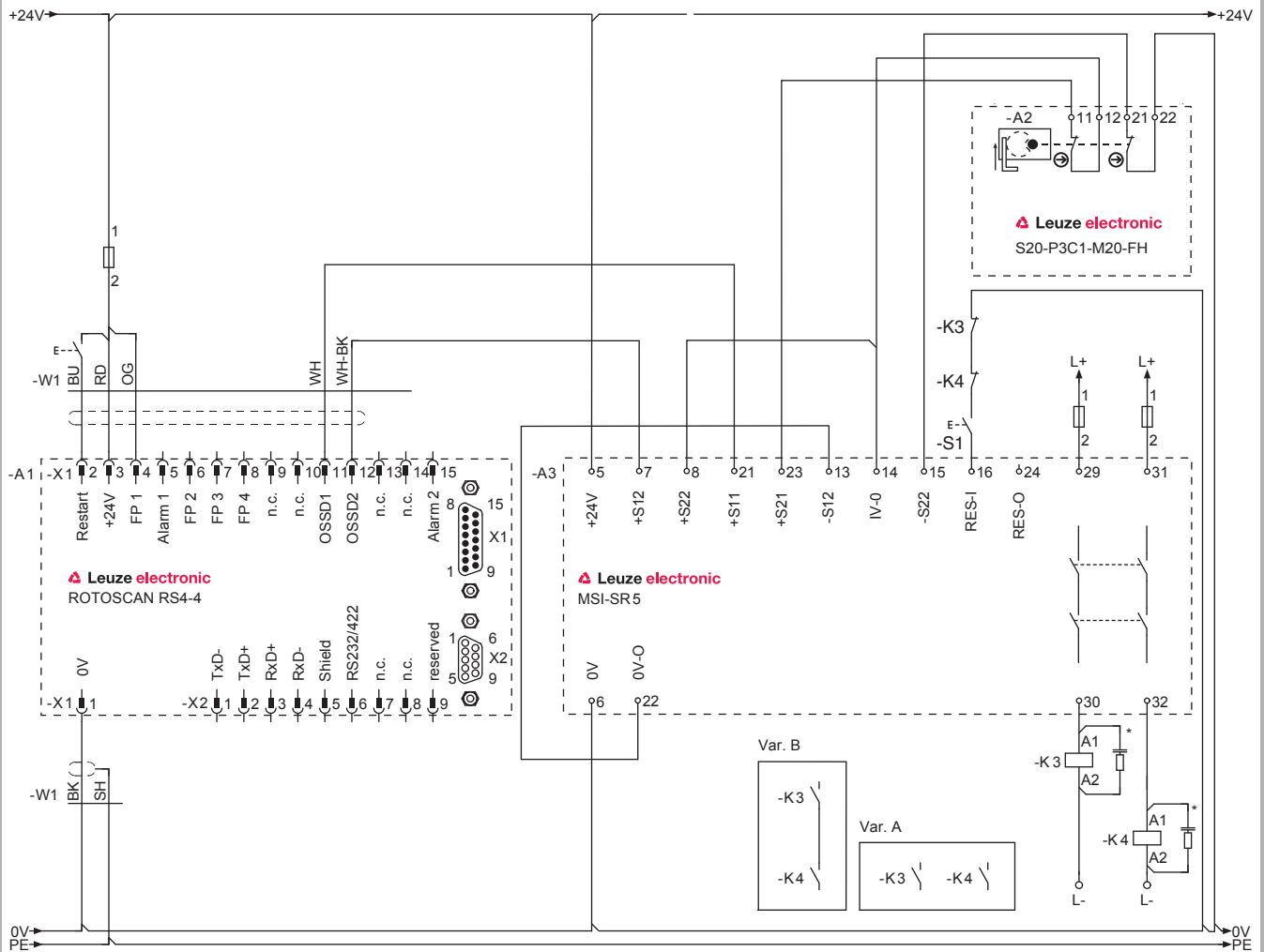
MSI-SR5 with two MLD 330 or MLD 530 Multiple Light Beam Safety Devices

**!** Please observe the operating instructions of the components!

|                   |                          |                   |                  |                  |                                   |                  |                 |
|-------------------|--------------------------|-------------------|------------------|------------------|-----------------------------------|------------------|-----------------|
| MSI-SR4<br>p. 428 | <b>MSI-SR5</b><br>p. 434 | MSI-RM2<br>p. 440 | MSI-CM<br>p. 446 | MSI-DT<br>p. 452 | MSI-MC310,<br>MSI-MC311<br>p. 458 | MSI-2H<br>p. 468 | MSI-T<br>p. 474 |
|-------------------|--------------------------|-------------------|------------------|------------------|-----------------------------------|------------------|-----------------|

Electrical connection

MSI-SR5 connection example



\*) Spark extinction circuit, supply suitable spark extinction

MSI-SR5 with ROTOSCAN RS4 Safety Laser Scanner and S20 Safety Switch

**!** Please observe the operating instructions of the components!

## SAFETY RELAYS

### Technical data

| General system data  |   |                    |
|--|---|--------------------|
| SIL in accordance with IEC 61508 and SILCL in accordance with EN/IEC 62061   | 3   |                    |
| Performance Level (PL) in accordance with EN ISO 13849-1   | e   |                    |
| Service life ( $T_M$ ) in accordance with EN ISO 13849-1   | 20 years  |                    |
| Probability of a failure to danger per hour ( $PFH_d$ ) in accordance with the average number of annual $n_{op}$ activations (for the calculation formula, see EN ISO 13849-1:2008, chapter C.4.2 and C.4.3) | $n_{op} = 4,800$  | $1 \times 10^{-8}$ |
|  | $n_{op} = 28,800$   | $2 \times 10^{-8}$ |
|  | $n_{op} = 86,400$   | $5 \times 10^{-8}$ |
| Number of cycles until 10% of the components have a failure to danger ( $B_{10d}$ )  | With DC1 (ohmic load)   | 400,000            |
|  | With AC1 (ohmic load)   |                    |
|  | With DC13 (inductive load)                                      |                    |
|  | With AC15 (inductive load)                                      |                    |
|  | Low load (20% nominal load)                                     | 2,500,000          |
| Category in accordance with EN ISO 13849   | 4 (depending on the category of the upstream protective device) |                    |
| Mean time to dangerous failure ( $MTTF_d$ ) in accordance with EN ISO 13849-1  | 73 years  |                    |
| Stop category in accordance with EN/IEC 60204-1  | STOP 0  |                    |
| Supply voltage in accordance with IEC 60742  | 24 V AC/DC $\pm$ 20%  |                    |
| Power consumption  | 4.8 W   |                    |
| Safety-related switching outputs (OSSDs)   | 2 relay outputs (NO)  |                    |
| Continuous current per current path  | Max. 3 A  |                    |
| Response time  | 10 ms   |                    |
| Restart delay time (manual start)  | 50 ms   |                    |
| Restart delay time (automatic start)   | 350 ms  |                    |
| Current consumption (without external load)  | Max. 150 mA   |                    |
| Admissible input line resistance   | <30 $\Omega$  |                    |
| Ambient temperature, operation   | 0...+55°C   |                    |
| Ambient temperature, storage   | -25...+70°C   |                    |
| Protection rating  | IP 20   |                    |
| Connection system  | Screw terminals   |                    |
| Dimensions (W x H x D)   | 22.5 mm x 99 mm x 113.6 mm                                      |                    |
| Mounting   | On 35 mm DIN rail   |                    |

Please note the additional information in the connecting and operating instructions and at [www.leuze.com/en/relays](http://www.leuze.com/en/relays).

MSI-SR4  
p. 428

**MSI-SR5**  
p. 434

MSI-RM2  
p. 440

MSI-CM  
p. 446

MSI-DT  
p. 452

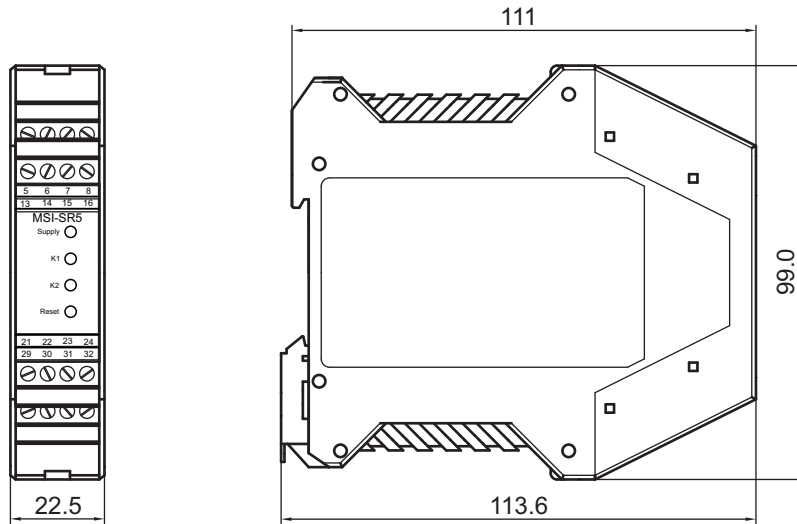
MSI-MC310,  
MSI-MC311  
p. 458

MSI-2H  
p. 468

MSI-T  
p. 474

**Dimensional drawings**

**MSI-SR5 Safety Relay**



Dimensions in mm

## SAFETY RELAYS

### MSI-RM2



*Guarding a paternoster shelf with SOLID-2E Safety Light Curtain and MSI-RM2 relay module*

Optoelectronic protective devices today frequently have electronic switching outputs and integrated additional functions such as contactor monitoring (EDM) and start/restart interlock. However the requirement for the protective device to transmit the switching signals, not electronically, but rather contact-based to the machine control system often exists. With the new MSI-RM2 relay module the user is provided with a compact and at the same time cost-effective solution for connecting safety sensors. The relay module, only 17.5 mm wide, has two potential-free make contact circuits with a response time of only 10 ms and LED displays for the switching status. As its switching behavior is monitored by the EDM function of the safety sensor, an additional electronic monitoring system in the relay module is not required. The MSI-RM2 conforms to standard EN/IEC 60204-1.

#### Typical areas of application

- Connection of electro-sensitive protective equipment with electronic outputs, integrated contactor monitoring (EDM) and start/restart interlock (RES) on machine control systems.

MSI-SR4  
p. 428

MSI-SR5  
p. 434

**MSI-RM2**  
**p. 440**

MSI-CM  
p. 446

MSI-DT  
p. 452

MSI-RM2  
p. 458

MSI-2H  
p. 468

MSI-T  
p. 474

**MSI-RM2**

**Important technical data, overview**

|  |   |
|--|---|
| Category in accordance with EN ISO 13849 | Up to 4 (depending on the category of the upstream protective device) |
| Supply voltage                           | 24 V DC, ±20% (via AOPD)  |
| Safety-related switching outputs (OSSDs) | 2 relay outputs (changeover)  |
| Signal output                            | Relay output (NC)   |
| Response time                            | 10 ms   |
| Ambient temperature, operation           | 0...+50°C   |
| Ambient temperature, storage             | -25...+70°C   |
| Dimensions (W x H x D)                   | 17.5 mm x 99 mm x 113.6 mm  |

**Functions**

Signal conversion of electronic outputs of electro-sensitive protective equipment on potential-free relay contacts  
 Monitoring external contactors in the signal circuit with the upstream protective device

**Special features**

- Suitable up to category 4 (depending on the category of the upstream protective device)
- 2 release circuits, 1 break contact as signal circuit for device monitoring (EDM)
- LED displays, K1 and K2
- Supply voltage through upstream protective device
- Housing width, 17.5 mm



**Features**



**Further information**

**Page**

|                         |     |
|-------------------------|-----|
| ● Ordering information  | 442 |
| ● Electrical connection | 442 |
| ● Technical data        | 443 |
| ● Dimensional drawings  | 444 |

# SAFETY RELAYS

## Ordering information

### MSI-RM2

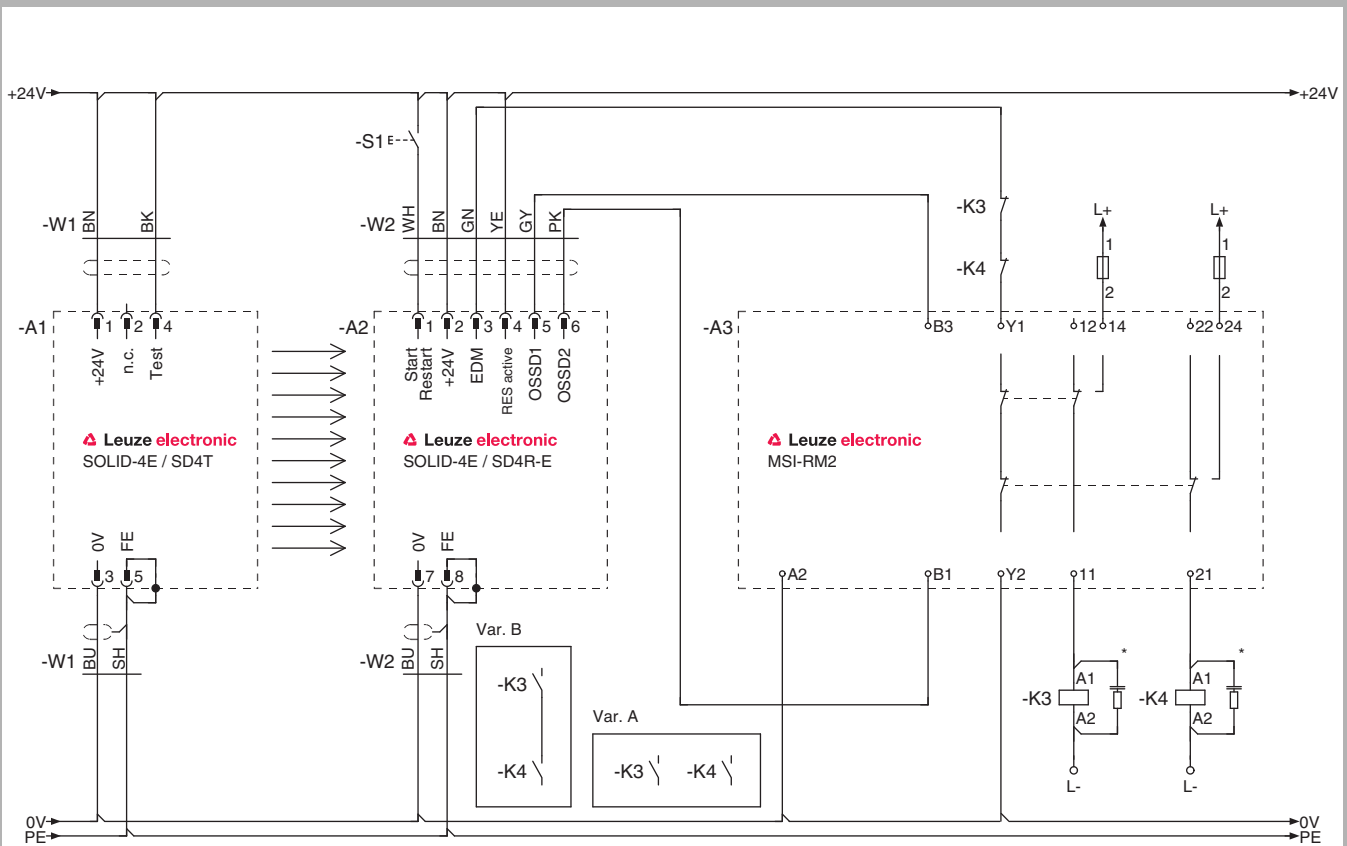
Included in delivery: 1 set of connecting and operating instructions (PDF file on CD-ROM)

**Functions:** Relay module for optoelectronic protective devices in accordance with EN/IEC 60204-1, EN 50205, EN/IEC 60255, IEC 60664-1

### MSI-RM2 Safety Relay

| Part no. | Article | Description   |
|----------|---------|---|
| 549918   | MSI-RM2 | Relay module, two-channel, for AOPDs with 2 OSSDs and EDM |

### Electrical connection, MSI-RM2 connection example



\*) Spark extinction circuit, supply suitable spark extinction

MSI-RM2 with SOLID-4E Safety Light Curtain

**!** Please observe the operating instructions of the components!

|                   |                   |                          |                  |                  |                   |                  |                 |
|-------------------|-------------------|--------------------------|------------------|------------------|-------------------|------------------|-----------------|
| MSI-SR4<br>p. 428 | MSI-SR5<br>p. 434 | <b>MSI-RM2</b><br>p. 440 | MSI-CM<br>p. 446 | MSI-DT<br>p. 452 | MSI-RM2<br>p. 458 | MSI-2H<br>p. 468 | MSI-T<br>p. 474 |
|-------------------|-------------------|--------------------------|------------------|------------------|-------------------|------------------|-----------------|

**Technical data**

| <b>General system data</b>  |   |  |
|---|---|--|
| Category in accordance with EN ISO 13849  | Up to 4 (depending on the category of the upstream protective device) |  |
| Service life ( $T_M$ ) in accordance with EN ISO 13849-1                            | 20 years  |  |
| Number of cycles until 10% of the components have a failure to danger ( $B_{10d}$ ) | With DC1 (ohmic load)   | 10,000,000 (2 A, 24 V)   |
|   | With AC1 (ohmic load)   | 100,000 (2 A, 230 V)<br>600,000 (1 A, 230 V)<br>1,300,000 (0.5 A, 230 V) |
|   | With DC13 (inductive load)  | 10,000,000 (2 A, 24 V)   |
|   | With AC15 (inductive load)  | 100,000 (2 A, 230 V)<br>600,000 (1 A, 230 V)<br>1,300,000 (0.5 A, 230 V) |
|   | Low load (20% nominal load)   | 1,860,000  |
| Supply voltage  | 24 V DC $\pm 20\%$ (via OSSDs of the connected AOPD)                  |  |
| Power consumption   | 1.5 W (supply via AOPD)   |  |
| Safety-related switching outputs (OSSDs)  | 2 relay outputs (changeover)  |  |
| Signal output   | Relay output (NC)   |  |
| Continuous current per current path   | Max. 3 A  |  |
| Response time   | 10 ms   |  |
| Restart delay time  | 20 ms   |  |
| Current consumption (inputs B1 and B3)  | 32 mA each  |  |
| Admissible input line resistance  | 50 $\Omega$   |  |
| Ambient temperature, operation  | 0...+50°C   |  |
| Ambient temperature, storage  | -25...+70°C   |  |
| Safety class  | II  |  |
| Protection rating   | IP 20   |  |
| Connection system   | Screw terminals   |  |
| Dimensions (W x H x D)  | 17.5 mm x 99 mm x 113.6 mm  |  |
| Mounting  | On 35 mm DIN rail   |  |

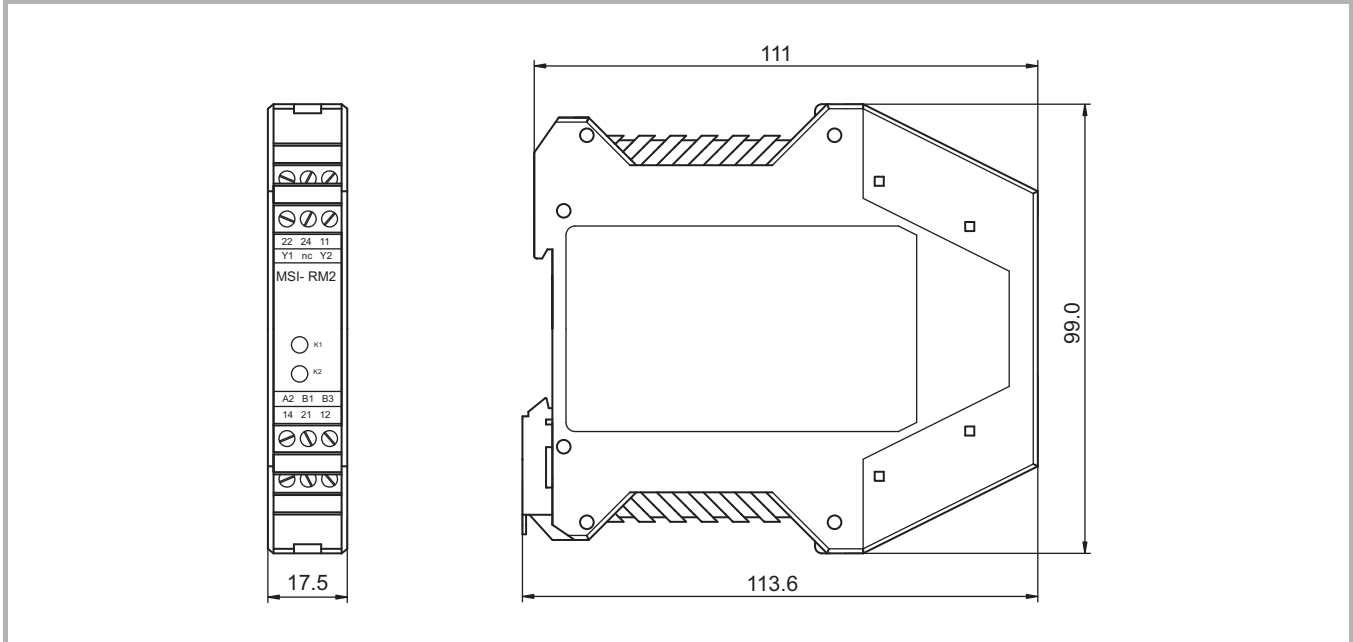
Please note the additional information in the connecting and operating instructions and at [www.leuze.com/en/relays](http://www.leuze.com/en/relays).



## SAFETY RELAYS

### Dimensional drawings

#### MSI-RM2 Safety Relay



Dimensions in mm

MSI-SR4  
p. 428

MSI-SR5  
p. 434

**MSI-RM2**  
**p. 440**

MSI-CM  
p. 446

MSI-DT  
p. 452

MSI-RM2  
p. 458

MSI-2H  
p. 468

MSI-T  
p. 474



## SAFETY RELAYS

### MSI-CM

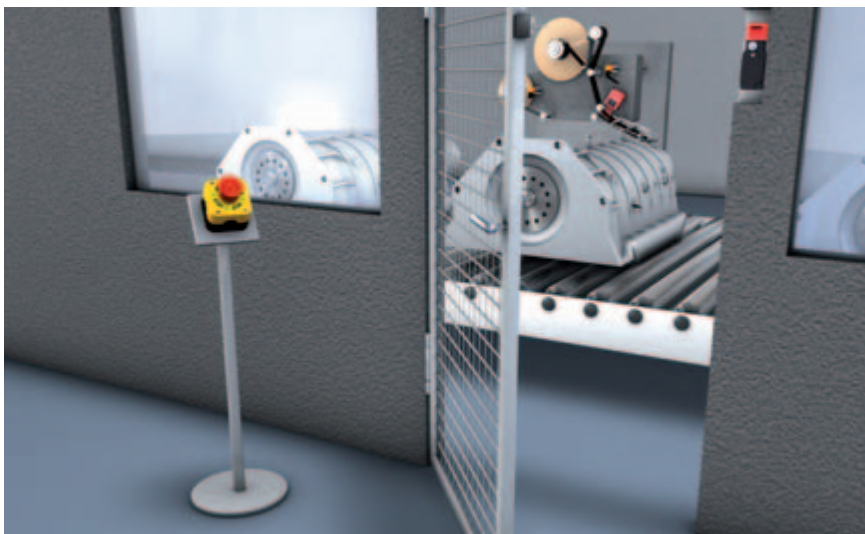


*Integrating a two-hand control unit in the safety circuit via the MSI-CM contact extension module*

The MSI-CM Safety Relay is used as a contact extension module in accordance with DIN EN 60204-1/VDE 0113 Part 1 for contact extension for E-Stop relays and two-hand control units. It has five release current paths, one signaling current path and one feedback path. The contacts release undelayed in accordance with stop category 0. Depending on the wiring and proper integration of the feedback path, a Performance Level PL e in accordance with EN ISO 13849-1 is achieved.

#### Typical areas of application

- Contact extension for E-Stop relays
- Contact extension for two-hand control units



*With the MSI-CM contact extension module, multiple relay outputs are available, e.g. for contact extension for E-Stop Safety Relays*

MSI-SR4  
p. 428

MSI-SR5  
p. 434

MSI-RM2  
p. 440

**MSI-CM**  
**p. 446**

MSI-DT  
p. 452

MSI-MC310,  
MSI-MC311  
p. 458

MSI-2H  
p. 468

MSI-T  
p. 474

**Important technical data, overview**

|  |  |
|--|--|
| SIL in accordance with IEC 61508 and SILCL in accordance with EN/IEC 62061 | 3  |
| Performance Level (PL) in accordance with EN ISO 13849-1                   | e  |
| Category in accordance with EN ISO 13849                                   | 4 (depending on external wiring)           |
| Stop category in accordance with EN/IEC 60204-1                            | STOP 0                                     |
| Supply voltage   | 24 V AC/DC -20% to +10%                    |
| Safety-related switching outputs (OSSDs)                                   | 5 relay outputs (NO), 2 relay outputs (NC) |
| Response time  | 20 ms                                      |
| Ambient temperature, operation   | -20...+55 °C                               |
| Ambient temperature, storage   | -40...+70 °C                               |

**Functions**

Contact extension module with extension block in accordance with DIN EN 60204-1/VDE 0113 Part 1 for contact extension for E-Stop relays and two-hand control units

**Special features**

- 1- or 2-channel wiring
- Designs with screw terminals as well as with spring-cage terminals
- Basic insulation
- 5 release contacts, 1 signal contact, 1 feedback contact



**Features**



**Further information**

**Page**

|                         |     |
|-------------------------|-----|
| ● Ordering information  | 448 |
| ● Electrical connection | 448 |
| ● Technical data        | 450 |
| ● Dimensional drawings  | 451 |

# SAFETY RELAYS

## Ordering information

### MSI-CM

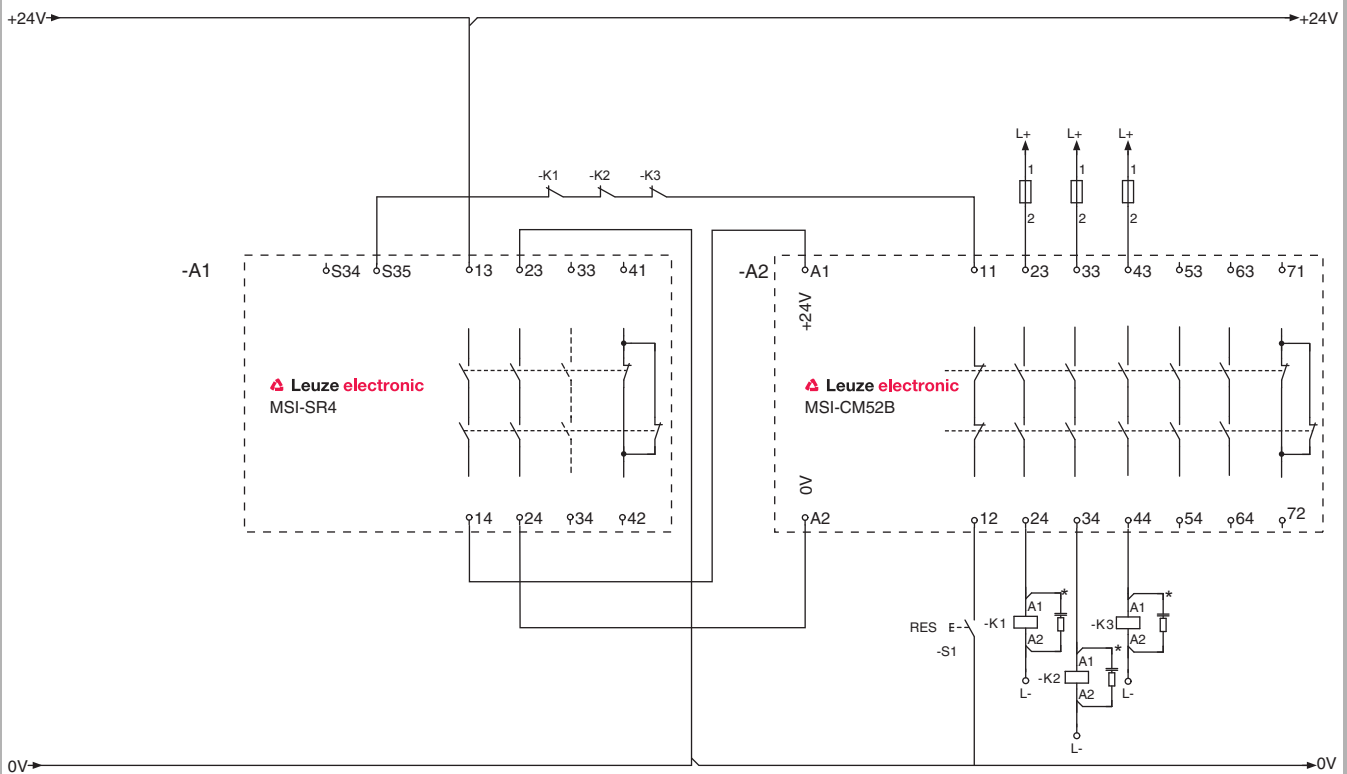
Included in delivery: 1 set of connecting and operating instructions (package insert)

**Functions:** contact extension for E-Stop relays and two-hand control units

### MSI-CM Safety Relays

| Part no. | Article      | Description                             |
|----------|--------------|---|
| 547933   | MSI-CM52B-01 | Safety Relay with screw terminals       |
| 547934   | MSI-CM52B-02 | Safety Relay with spring-cage terminals |

### Electrical connection, MSI-CM connection example



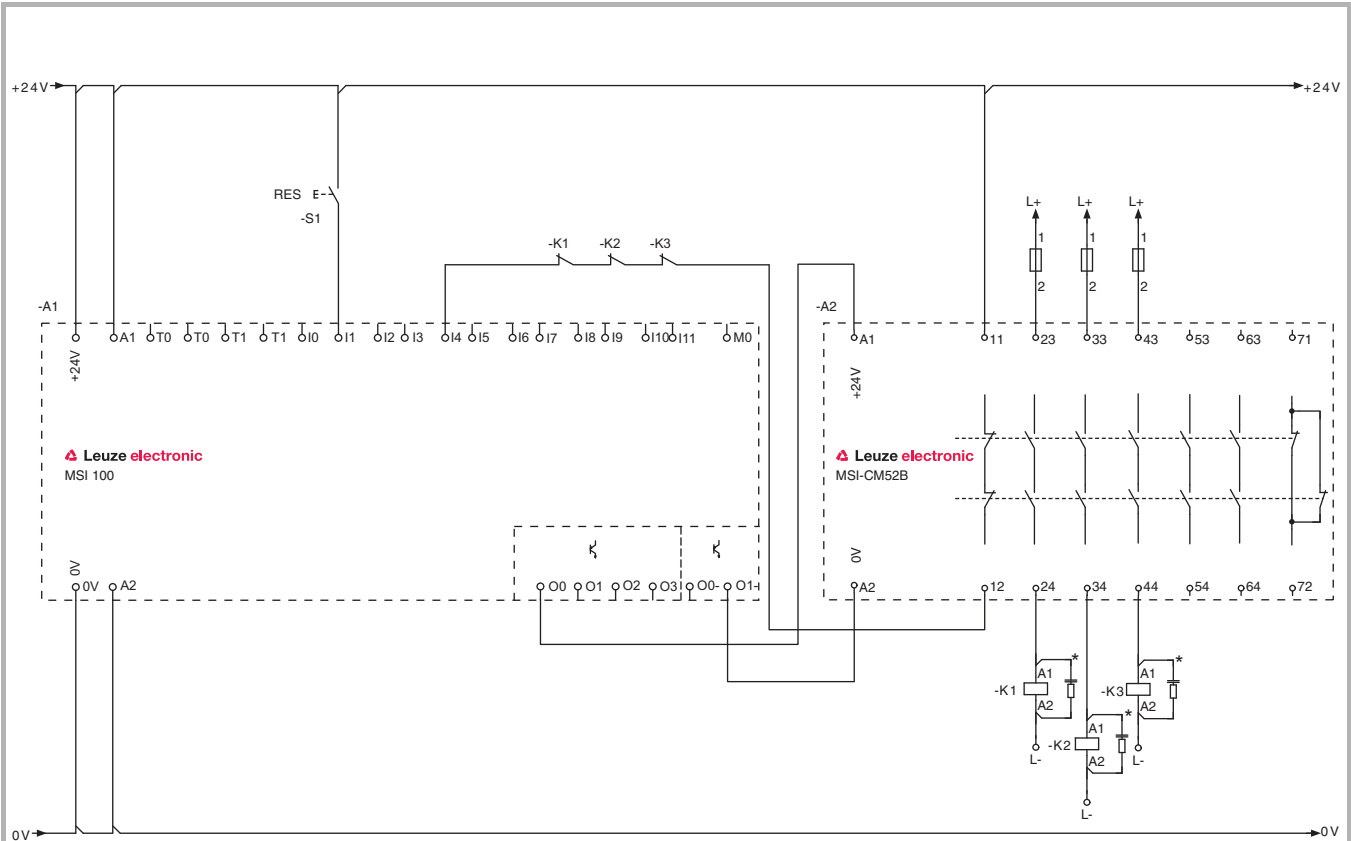
\*) Spark extinction circuit, supply suitable spark extinction

Two-channel connection of the MSI-CM52B contact extension with integration of the feedback path (11/12) in the MSI-SR4 base device, suitable up to PL e (safety category 4) according to EN ISO 13849-1.

**!** Please observe the operating instructions of the components!

|                   |                   |                   |                         |                  |                                   |                  |                 |
|-------------------|-------------------|-------------------|-------------------------|------------------|-----------------------------------|------------------|-----------------|
| MSI-SR4<br>p. 428 | MSI-SR5<br>p. 434 | MSI-RM2<br>p. 440 | <b>MSI-CM</b><br>p. 446 | MSI-DT<br>p. 452 | MSI-MC310,<br>MSI-MC311<br>p. 458 | MSI-2H<br>p. 468 | MSI-T<br>p. 474 |
|-------------------|-------------------|-------------------|-------------------------|------------------|-----------------------------------|------------------|-----------------|

Electrical connection, MSI-CM connection example



\*) Spark extinction circuit, supply suitable spark extinction

Two-channel connection of the MSI-CM52B contact extension with integration of the feedback path and of the manual start/restart interlock in the MSI 100 base device, suitable up to PL e (safety category 4) according to EN ISO 13849-1.

⚠ Please observe the operating instructions of the components!

## SAFETY RELAYS

### Technical data

| General system data   |  |  |
|---|--|--|
| SIL in accordance with IEC 61508 and SILCL in accordance with EN/IEC 62061    | 3  |  |
| Performance Level (PL) in accordance with EN ISO 13849-1                      | e  |  |
| Service life ( $T_M$ ) in accordance with EN ISO 13849-1                      | 20 years                                       |  |
| Probability of a failure to danger per hour ( $PFH_d$ )                       | $1.02 \times 10^{-10}$                         |  |
| Category in accordance with EN ISO 13849                                      | 4  |  |
| Stop category in accordance with EN/IEC 60204-1                               | STOP 0   |  |
| Mean time to dangerous failure ( $MTTF_d$ ) in accordance with EN ISO 13849-1 | 262 years                                      |  |
| Protection rating   | Housing  | IP 20  |
|   | Connection terminals                           | IP 40  |
| Ambient temperature, operation  | -20...+55°C                                    |  |
| Ambient temperature, storage  | -40...+70°C                                    |  |
| Dimensions (W x H x D)  | Screw connection                               | 22.5 mm x 114.5 mm x 99 mm   |
|   | Spring-cage connection                         | 22.5 mm x 114.5 mm x 112 mm  |
| Housing material  | Unreinforced polyamide PA                      |  |
| Mounting  | On 35 mm DIN rail                              |  |
| Connection system   | Plug in screw terminals, spring-cage terminals |  |
| Connection cross-sections   | Screw connection                               | 0.2 - 2.5 mm <sup>2</sup> , single-wired<br>0.2 - 2.5 mm <sup>2</sup> , fine-wired |
|   | Spring-cage connection                         | 0.2 - 1.5 mm <sup>2</sup> , single-wired<br>0.2 - 1.5 mm <sup>2</sup> , fine-wired |
| Input data  |  |  |
| Nominal input voltage $U_N$   | 24 V AC/DC, -20% to +10%                       |  |
| Typ. current consumption at $U_N$   | 92 mA  |  |
| Typ. response time (K1, K2) at $U_N$  | 20 ms  |  |
| Typ. release time (K1, K2) at $U_N$   | 20 ms  |  |
| Output data   |  |  |
| Release circuits  | 5  |  |
| Signal outputs  | 1  |  |
| Feedback circuits   | 1  |  |
| Max. switching voltage  | 250 V AC/DC                                    |  |
| Min. switching voltage  | 15 V AC/DC                                     |  |
| Limiting continuous current   | 6 A (NO), 3 A (NC)                             |  |
| Min. switching current  | 25 mA  |  |
| Min. switching power  | 0.4 W  |  |
| Mechanical life time  | 100,000,000 switching cycles                   |  |

Please note the additional information in the connecting and operating instructions and at [www.leuze.com/en/relays](http://www.leuze.com/en/relays).

MSI-SR4  
p. 428

MSI-SR5  
p. 434

MSI-RM2  
p. 440

**MSI-CM**  
**p. 446**

MSI-DT  
p. 452

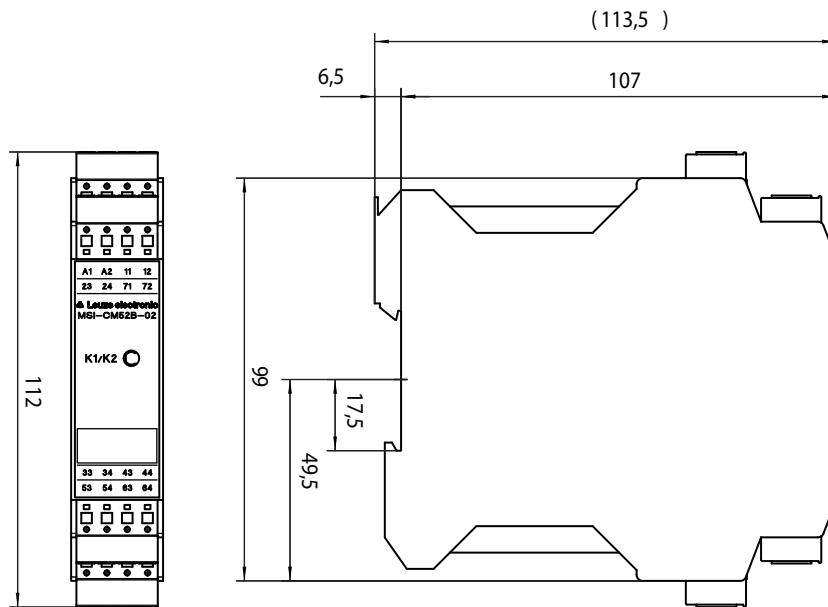
MSI-MC310,  
MSI-MC311  
p. 458

MSI-2H  
p. 468

MSI-T  
p. 474

**Dimensional drawings**

**MSI-CM52B-02 Safety Relay**



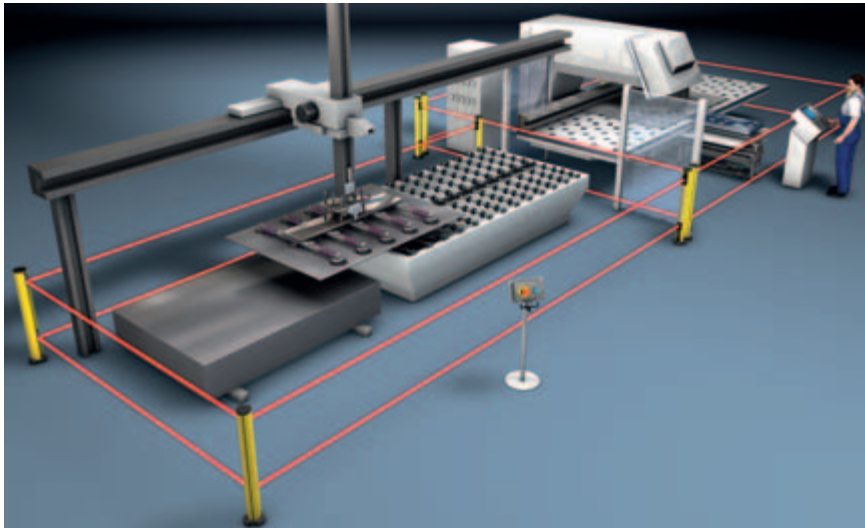
Dimensions in mm

[www.leuze.com/en/msi-relays/](http://www.leuze.com/en/msi-relays/)



## SAFETY RELAYS

### MSI-DT



*The MSI-DT Safety Relay with adjustable delay time is suitable for monitoring AOPDs and E-Stop buttons where it is necessary to bring the machine drive to a standstill for a specific period of time (STOP 1 according to EN/IEC 60204-1)*

This Safety Relay with adjustable delay time can be used for E-Stop and protective-door monitoring or AOPD monitoring in safety circuits in accordance with DIN EN 60204-1/VDE 0113-1. With the aid of this relay, circuits are interrupted in a safe manner. Activation occurs in one or two channels, either with automatic or manual start circuit. A connected reset button is monitored. The Safety Relay is equipped with two release current paths which release undelayed in accordance with stop category 0. Two additional release current paths release in accordance with stop category 1.

#### Typical areas of application

- Monitoring of E-Stop buttons, protective doors, Safety Light Curtains and Light Beam Safety Devices
- Monitoring of safety circuits in accordance with DIN EN 60204-1/VDE 0113-1

**Important technical data, overview**

|  |  |
|--|--|
| SIL in accordance with IEC 61508 and SILCL in accordance with EN/IEC 62061 | 3  |
| Performance Level (PL) in accordance with EN ISO 13849-1                   | e  |
| Category in accordance with EN ISO 13849                                   | 4 (depending on external wiring)                         |
| Stop category in accordance with EN/IEC 60204-1                            | STOP 0, STOP 1 (depending on release current path)       |
| Supply voltage   | 24 V AC/DC –15% to +10%                                  |
| Safety-related switching outputs (OSSDs)                                   | 2 relay outputs (NC, slow-release), 2 relay outputs (NC) |
| Response time  | 150 ms   |
| Ambient temperature, operation   | -20...+55 °C   |
| Ambient temperature, storage   | -40...+70 °C   |

**Functions**

|  |
|--|
| Adjustable delay time (can be steplessly preset from 0.1...30 s)           |
| Monitoring of E-Stop buttons, protective doors, AOPDs                      |
| Monitoring of safety circuits in accordance with DIN EN 60204-1/VDE 0113-1 |

**Special features**

- 1- or 2-channel wiring with cross connection recognition
- Designs with screw terminals as well as with spring-cage terminals
- Two undelayed and two slow-release release contacts
- Automatic and manual start circuit



**Features**



**Further information**

|                         | <b>Page</b> |
|-------------------------|-------------|
| ● Ordering information  | 454         |
| ● Electrical connection | 454         |
| ● Technical data        | 455         |
| ● Dimensional drawings  | 456         |

# SAFETY RELAYS

## Ordering information

### MSI-DT

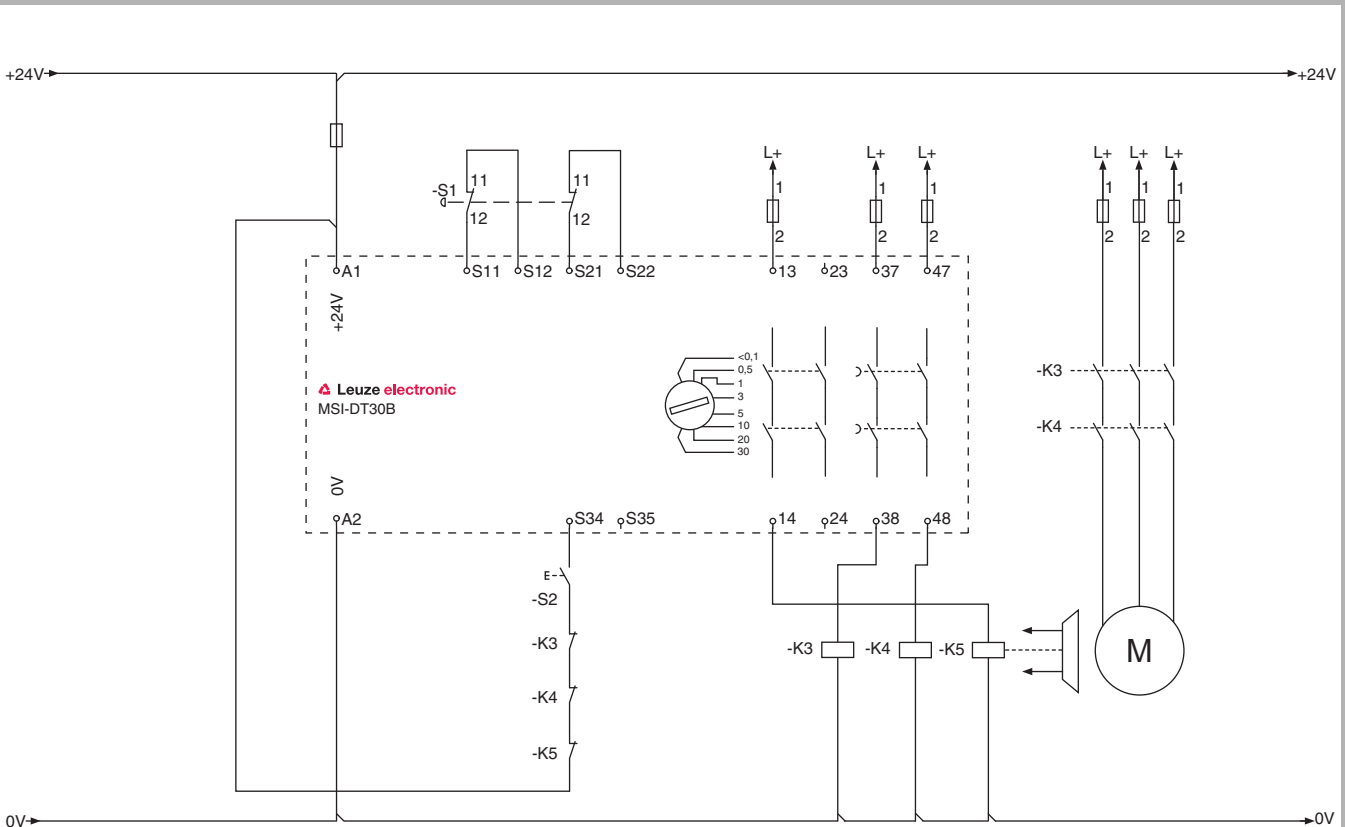
Included in delivery: 1 set of connecting and operating instructions (package insert)

**Functions:** electro-mechanical, positive-guided relay with adjustable delay time (can be steplessly preset from 0.1...30 s)

### MSI-DT Safety Relays

| Part no. | Article      | Description                             |
|----------|--------------|---|
| 547935   | MSI-DT30B-01 | Safety Relay with screw terminals       |
| 547936   | MSI-DT30B-02 | Safety Relay with spring-cage terminals |

### Electrical connection, MSI-DT connection example



Two-channel E-Stop command device monitoring with mechanical restart interlock for PL e (safety category 4) according to EN ISO 13849-1 and for controlled machine stoppage in accordance with stop category STOP 1 according to EN ISO 13850-4.

**!** Please observe the operating instructions of the components!

|                   |                   |                   |                  |                         |                                   |                  |                 |
|-------------------|-------------------|-------------------|------------------|-------------------------|-----------------------------------|------------------|-----------------|
| MSI-SR4<br>p. 428 | MSI-SR5<br>p. 434 | MSI-RM2<br>p. 440 | MSI-CM<br>p. 446 | <b>MSI-DT</b><br>p. 452 | MSI-MC310,<br>MSI-MC311<br>p. 458 | MSI-2H<br>p. 468 | MSI-T<br>p. 474 |
|-------------------|-------------------|-------------------|------------------|-------------------------|-----------------------------------|------------------|-----------------|

**Technical data**

| General system data   |  |  |
|---|--|--|
| SIL in accordance with IEC 61508 and SILCL in accordance with EN/IEC 62061            | 3  |  |
| Performance Level (PL) in accordance with EN ISO 13849-1                              | e  |  |
| Service life ( $T_M$ ) in accordance with EN ISO 13849-1                              | 20 years                                       |  |
| Probability of a failure to danger per hour (PFH <sub>d</sub> )                       | 1.8x10 <sup>-9</sup>                           |  |
| Category in accordance with EN ISO 13849  | 4  |  |
| Stop category in accordance with EN/IEC 60204-1                                       | STOP 0, 1                                      |  |
| Mean time to dangerous failure (MTTF <sub>d</sub> ) in accordance with EN ISO 13849-1 | 124 years                                      |  |
| Protection rating   | Housing  | IP 20  |
|   | Connection terminals                           | IP 40  |
| Ambient temperature, operation  | -20...+55°C                                    |  |
| Ambient temperature, storage  | -40...+70°C                                    |  |
| Dimensions (W x H x D)  | Screw connection                               | 22.5 mm x 114.5 mm x 99 mm   |
|   | Spring-cage connection                         | 22.5 mm x 114.5 mm x 112 mm  |
| Housing material  | Unreinforced polyamide PA                      |  |
| Mounting  | On 35 mm DIN rail                              |  |
| Connection system   | Plug in screw terminals, spring-cage terminals |  |
| Connection cross-sections   | Screw connection                               | 0.2 - 2.5 mm <sup>2</sup> , single-wired<br>0.2 - 2.5 mm <sup>2</sup> , fine-wired |
|   | Spring-cage connection                         | 0.2 - 1.5 mm <sup>2</sup> , single-wired<br>0.2 - 1.5 mm <sup>2</sup> , fine-wired |
| Input data  |  |  |
| Nominal input voltage $U_N$   | 24 V AC/DC, -15% to +10%                       |  |
| Typ. current consumption at $U_N$   | 75 mA  |  |
| Typ. response time (K1, K2) at $U_N$  | 150 ms (monitored/manual and auto start)       |  |
| Delay time K3, K4 adjustable  | 0.1 s...30 s ±40%                              |  |
| Recovery time   | 330 ms (restart)                               |  |
| Output data   |  |  |
| Release circuits, undelayed   | 2  |  |
| Release circuits, delayed   | 2  |  |
| Max. switching voltage  | 250 V AC/DC                                    |  |
| Min. switching voltage  | 15 V AC/DC                                     |  |
| Limiting continuous current   | 6 A (NO)                                       |  |
| Switching current   | 25 mA...6 A                                    |  |
| Min. switching power  | 0.4 W  |  |
| Mechanical life time  | 100,000,000 switching cycles                   |  |

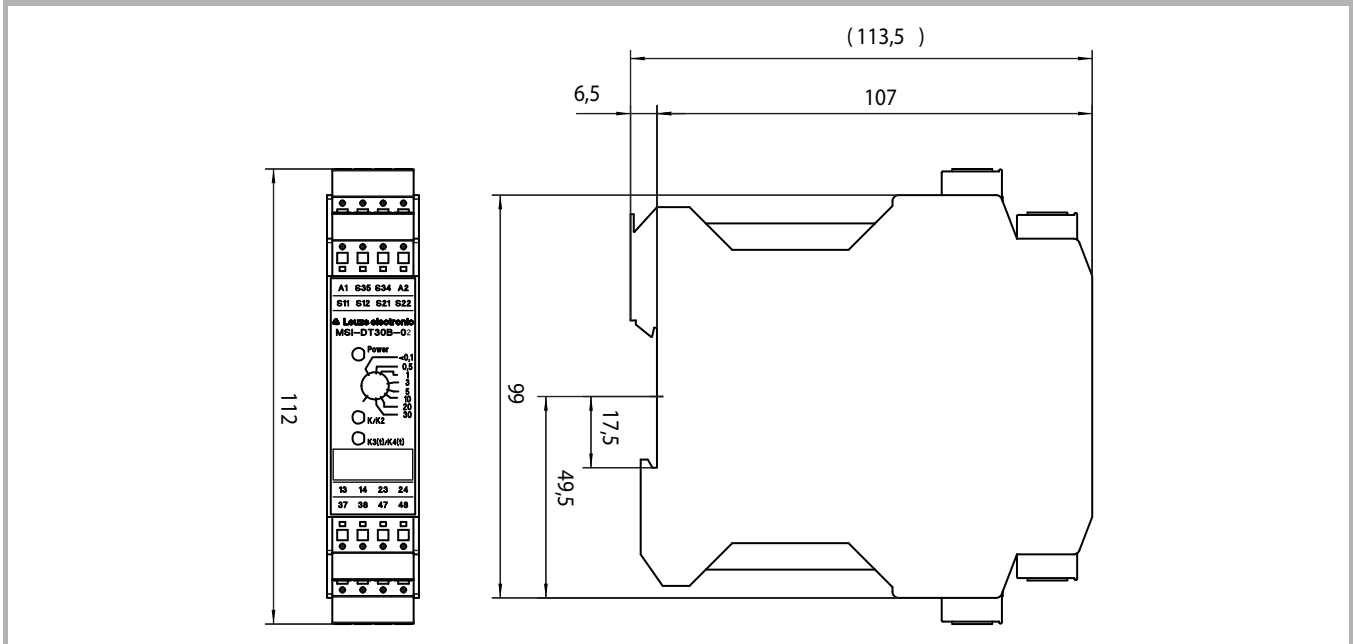
Please note the additional information in the connecting and operating instructions and at [www.leuze.com/en/relays](http://www.leuze.com/en/relays).

[www.leuze.com/en/relays/](http://www.leuze.com/en/relays/)

## SAFETY RELAYS

### Dimensional drawings

#### MSI-DT30B-02 Safety Relay



Dimensions in mm

MSI-SR4  
p. 428

MSI-SR5  
p. 434

MSI-RM2  
p. 440

MSI-CM  
p. 446

**MSI-DT**  
**p. 452**

MSI-MC310,  
MSI-MC311  
p. 458

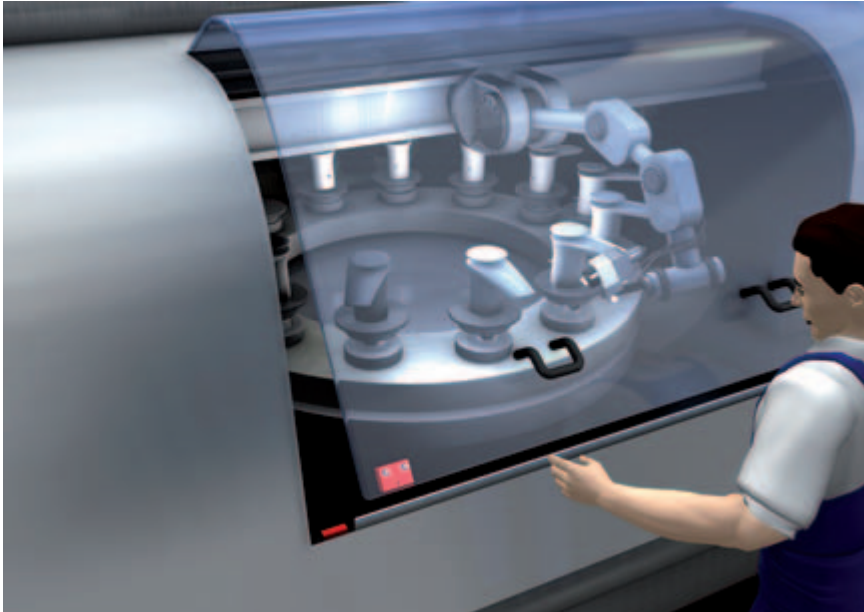
MSI-2H  
p. 468

MSI-T  
p. 474



## SAFETY RELAYS

### MSI-MC310, MSI-MC311

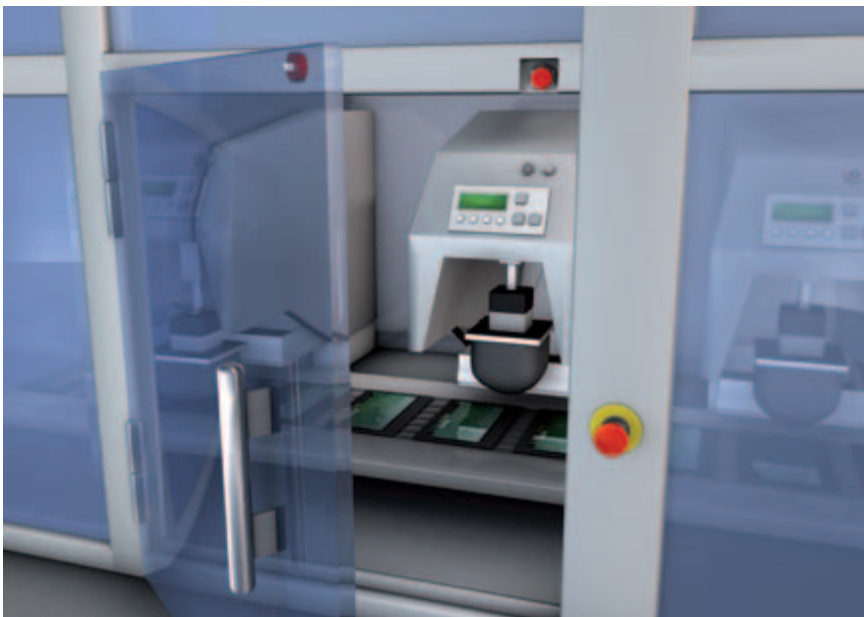


Together with the MSI-MC310 Safety Relay, which is located in the control area of the machine, the MC336 Magnetically Coded Sensor safeguards a painting robot.

The MSI-MC310 and MSI-MC311 Safety Relays (MSI-MC3x series) serve as evaluation units for the application of Magnetically Coded Sensors. In combination with these devices, the MC3x Magnetically Coded Sensors are suitable for the integration in control circuits up to category 4 and Performance Level PL e in accordance with EN ISO 13849-1. These kinds of magnetically coded safety systems are used, for example, in the food, pharmaceutical and wood industry to monitor moveable guards such as protective doors, sliding grips or flaps. Opening the protective devices triggers an E-Stop command. For guards that are accessible from behind, a reset button can be connected to the MSI-MC3x Safety Relays for manual starting. Depending whether sensors with the 1NO/1NC or 2NO contact set are used, the safety-related evaluation is performed with the MSI-MC310 or MSI-MC311 device. In both cases, they are certified acc. to EN 60947-5-3, PDF-M.

#### Typical areas of application

- Application in combination with MC3x Magnetically Coded Sensors
- Construction of a safety system up to category 4 in accordance with EN ISO 13849



MC330 Cylindrical Magnetically Coded Sensor for safeguarding a pad printing machine. The associated MSI-MC310 Safety Relay is located in the cabinet.

MSI-SR4  
p. 428

MSI-SR5  
p. 434

MSI-RM2  
p. 440

MSI-CM  
p. 446

MSI-DT  
p. 452

**MSI-MC310,  
MSI-MC311  
p. 458**

MSI-2H  
p. 468

MSI-T  
p. 474

## MSI-MC310, MSI-MC311

### Important technical data, overview

|  |  |
|--|--|
| Performance Level (PL) in accordance with EN ISO 13849-1             | Up to e (depending on the number of connected sensors)   |
| Category in accordance with EN ISO 13849-1                           | Up to 4 (depending on the number of connected sensors)   |
| Stop category in accordance with EN/IEC 60204-1, EN 13850            | STOP 0   |
| Supply voltage   | 24 V AC/DC, ±10%, SELV   |
| Output contacts, OSSDs<br>OSSD protective circuit                    | 2 normally open contacts (NO), 1 normally closed contact (NC) (MC310),<br>2 normally open contacts (NO) (MSI-MC311);<br>Provide suitable spark extinction (via relays, contactors) |
| Regression delay, response time                                      | 20 ms  |
| Ambient temperature, operation<br>Relative humidity (non-condensing) | 0...+55°C<br>4%...100%   |
| Ambient temperature, storage<br>Relative humidity (non-condensing)   | -25...+70°C<br>5%...95%  |
| Dimensions (W x H x D)   | 22.5 mm x 99 mm x 113.6 mm   |

### Functions

|   |
|---|
| Evaluation unit for the construction of a safety system in combination with MC3x Magnetically Coded Sensors |
| Up to 30 sensors can be connected in serial combination   |
| Stop function   |
| Start/restart interlock /RES  |
| Contact monitoring (EDM) in start circuit   |

### Special features

- **Compact housing**
- **All Magnetically Coded Sensors (1NC/1NO and 2NO) from Leuze electronic are connectable**
- **Automatic and start/restart operation**
- **Up to category 4 and Performance Level PL e in accordance with EN ISO 13849**



### Features



### Further information

|                         | Page |
|-------------------------|------|
| ● Ordering information  | 460  |
| ● Electrical connection | 461  |
| ● Technical data        | 464  |
| ● Dimensional drawings  | 467  |



## SAFETY RELAYS

### Ordering information

#### MSI-MC310, MSI-MC311

Included in delivery: 1 set of connecting and operating instructions (PDF-file on CD-ROM)

Notice:

for certified evaluation of MC3x Magnetically Coded Sensors, the MSI-MC3x Safety Relays are required!

**Functions:** Evaluation unit for the construction of a safety system in combination with MC3x Magnetically Coded Sensors (max. 30 sensors connectable in series), automatic and start/restart operation

#### MSI-MC310 Safety Relay

| Part no. | Article   | Description                     |
|----------|-----------|---------------------------------|
| 549941   | MSI-MC310 | Safety Relay for MC3x (1NC/1NO) |

#### MSI-MC311 Safety Relay

| Part no. | Article   | Description                 |
|----------|-----------|-----------------------------|
| 549942   | MSI-MC311 | Safety Relay for MC3x (2NO) |

MSI-SR4  
p. 428

MSI-SR5  
p. 434

MSI-RM2  
p. 440

MSI-CM  
p. 446

MSI-DT  
p. 452

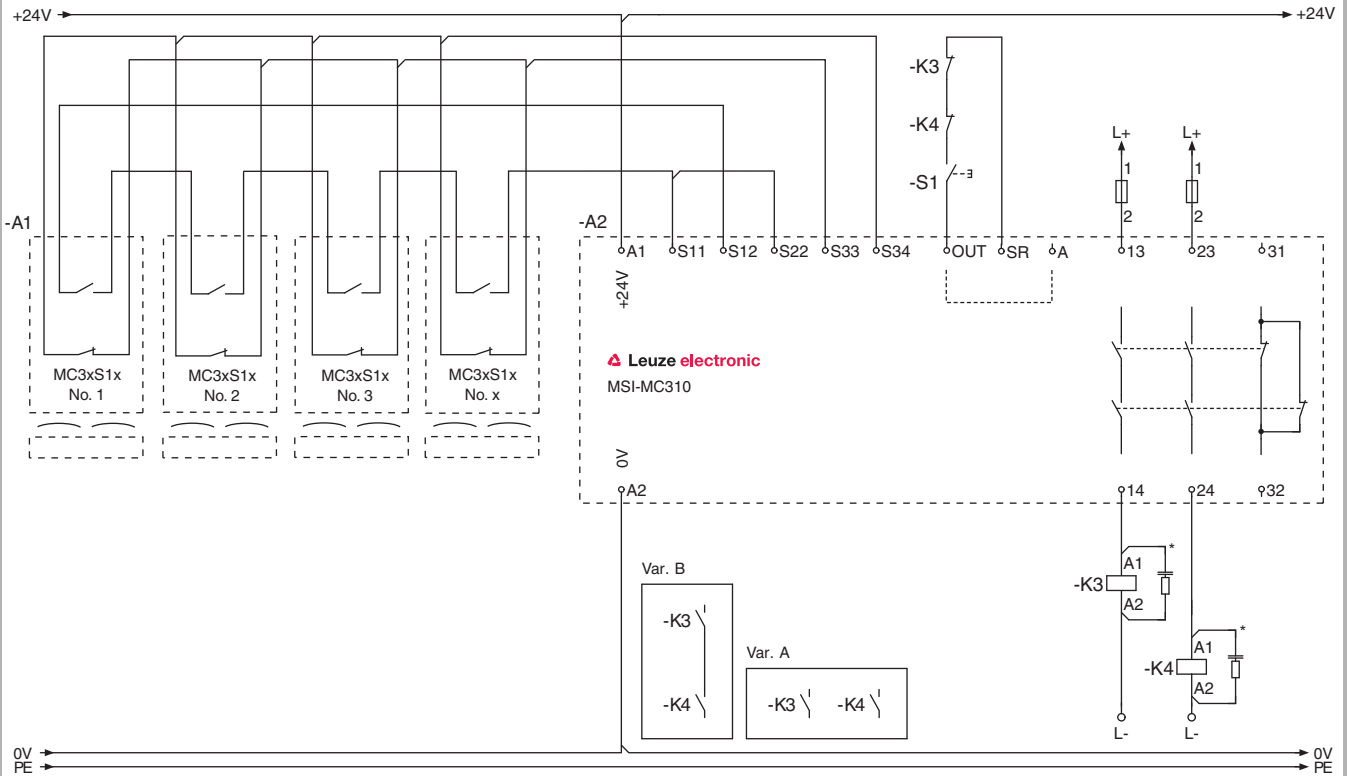
**MSI-MC310,  
MSI-MC311  
p. 458**

MSI-2H  
p. 468

MSI-T  
p. 474

**Electrical connection**

**MSI-MC310 connection example**



\*) Spark extinction circuit, supply suitable spark extinction

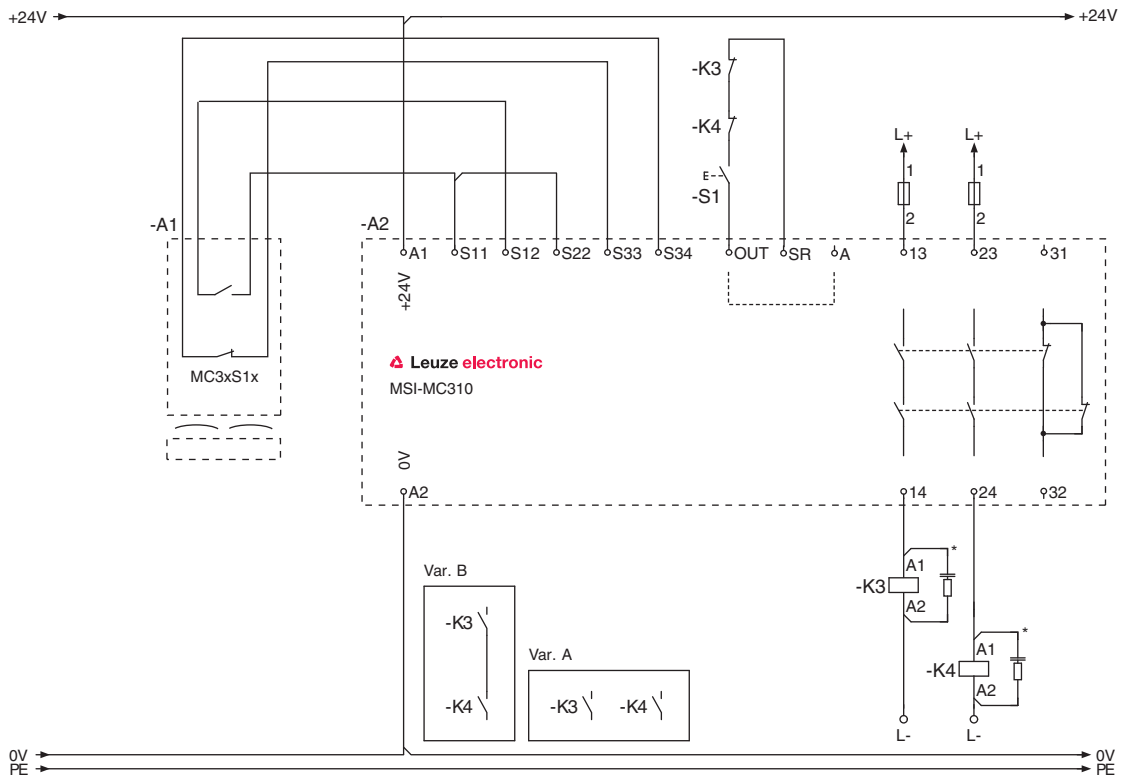
*Magnetically Coded Sensors with MSI-MC310 Safety Relay, category 3, Performance Level PL e*

**!** Please observe the operating instructions of the components!

# SAFETY RELAYS


## Electrical connection

### MSI-MC310 connection example



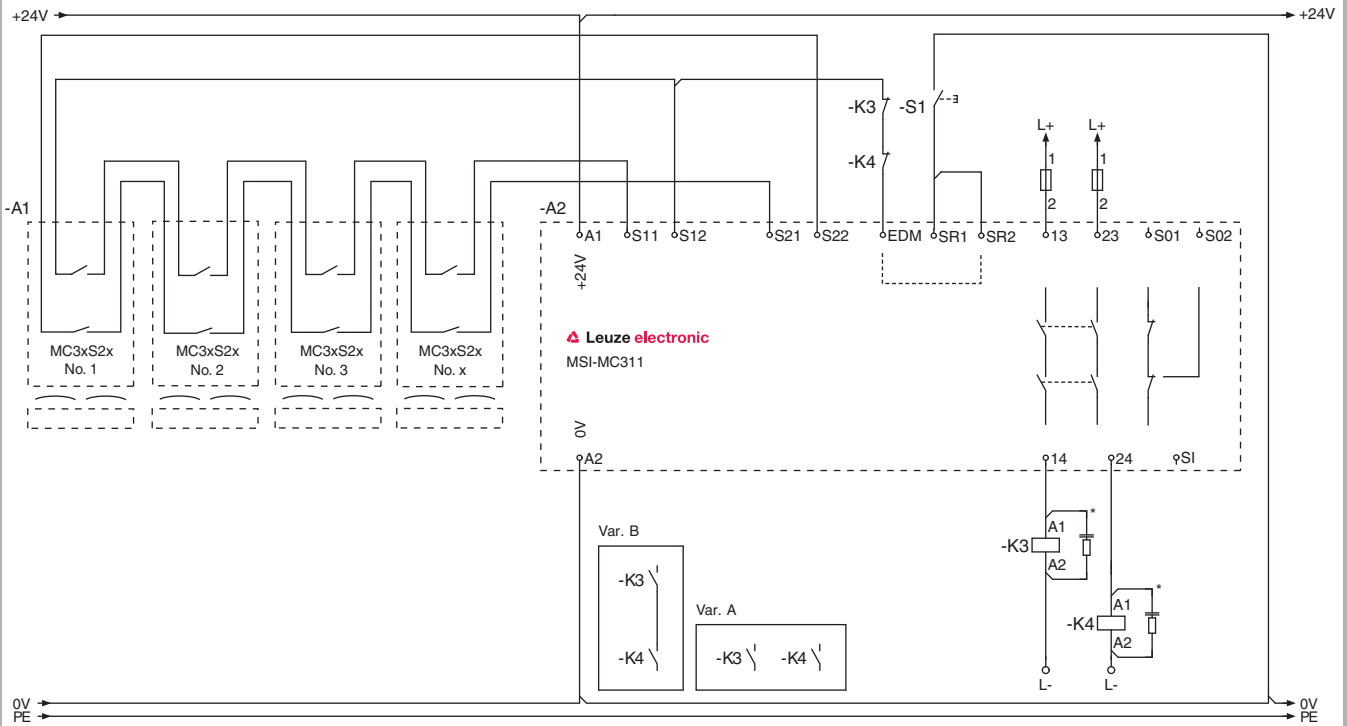
\*) Spark extinction circuit, supply suitable spark extinction

Magnetically Coded Sensor with MSI-MC310 Safety Relay, category 4, Performance Level PL e

 Please observe the operating instructions of the components!

**Electrical connection**

**MSI-MC311 connection example**



\*) Spark extinction circuit, supply suitable spark extinction

*Magnetically Coded Sensor with MSI-MC311 Safety Relay, category 4, Performance Level PL e*

**!** Please observe the operating instructions of the components!

## SAFETY RELAYS

### Technical data

| <b>MSI-MC310 safety-related technical data</b>  |  |  |                       |
|---|--|--|-----------------------|
| Performance Level (PL) in accordance with EN ISO 13849-1  | e  | e  | d                     |
| Category in accordance with EN ISO 13849-1  | Up to 4, depending on evaluation, 1 sensor connected | Up to 4, depending on evaluation, more than 1 sensor connected |                       |
| Service life ( $T_M$ ) in accordance with EN ISO 13849-1  | 20 years   |  |                       |
| Average probability of a dangerous failure per hour (PFH <sub>d</sub> ) with a mean annual number of switching cycles performed by the relay ( $n_{op}$ ) | $2.47 \times 10^{-8}$                                | $4.29 \times 10^{-8}$  | $1.03 \times 10^{-7}$ |
| AC-15 I = 0.9 A   | 29500  | 29500  | 65000                 |
| DC-13 I = 0.1 A   | 97000  | 97000  | 261000                |
| I = 1 A   | 75000  | 75000  | 128000                |
| I = 1.5 A   | 18000  | 18000  | 31500                 |
| Mean time to dangerous failure (MTTF <sub>d</sub> in years)   | 100  | 100  | 56                    |
| <b>MSI-MC311 safety-related technical data</b>  |  |  |                       |
| Performance Level (PL) in accordance with EN ISO 13849-1  | e  | e  | d                     |
| Category in accordance with EN ISO 13849-1  | Up to 4, depending on evaluation, 1 sensor connected | Up to 4, depending on evaluation, more than 1 sensor connected |                       |
| Service life ( $T_M$ ) in accordance with EN ISO 13849-1  | 20 years   |  |                       |
| Average probability of a dangerous failure per hour (PFH <sub>d</sub> ) with a mean annual number of switching cycles performed by the relay ( $n_{op}$ ) | $2.47 \times 10^{-8}$                                | $4.29 \times 10^{-8}$  | $1.03 \times 10^{-7}$ |
| AC-15 I = 0.9 A   | 28500  | 28500  | 47500                 |
| DC-13 I = 0.1 A   | 3800000  | 3800000  | 6300000               |
| I = 1 A   | 115000   | 115000   | 195000                |
| I = 1.5 A   | 57000  | 57000  | 95000                 |
| Mean time to dangerous failure (MTTF <sub>d</sub> in years)   | 100  | 100  | 56                    |
| <b>General system data, MSI-MC310 and MSI-MC311</b>   |  |  |                       |
| Stop category in accordance with EN/IEC 60204-1, EN 13850   | STOP 0   |  |                       |
| Control input SR for start/restart interlock (reset)  | Potential-free NO contact (RES-button or key switch) |  |                       |
| Connectable sensors   | MC388, MC336, MC330 Magnetically Coded Sensor        |  |                       |
| Contact type of the sensors   | 1NC/1NO (MSI-MC310), 2NO (MSI-MC311)                 |  |                       |
| Max. number of sensors  | 30, serial   |  |                       |
| Cable length, sensors   | 30 m   |  |                       |
| Pickup delay manual start   | 600 ms (MSI-MC310), 150 ms (MSI-MC311)               |  |                       |
| Pickup delay automatic start  | 400 ms (MSI-MC310), 30 ms (MSI-MC311)                |  |                       |
| Regression delay, response time   | 20 ms  |  |                       |

MSI-SR4  
p. 428

MSI-SR5  
p. 434

MSI-RM2  
p. 440

MSI-CM  
p. 446

MSI-DT  
p. 452

**MSI-MC310,  
MSI-MC311  
p. 458**

MSI-2H  
p. 468

MSI-T  
p. 474

## Technical data

|  |  |
|--|--|
| Supply voltage   | 24 V AC/DC, ±10%, SELV   |
| Max. input current at 24V DC/AC                                      | 10 mA to 110 mA /<br>30 mA to 150 mA   |
| Max. switching current, AC-1   | 3 A  |
| Min. switching current   | 10 mA  |
| Max. switching power   | 720 W  |
| Rated insulation voltage   | 250 V AC   |
| Mechanical life time   | 1×10 <sup>7</sup> switching cycles   |
| Requirement on the voltage supply when used acc. to cULus (UL 508)   | Class 2 Circuits   |
| Overvoltage category   | II   |
| Output contacts, OSSDs<br>OSSD protective circuit                    | 2 normally open contacts, 1 normally closed contact (MSI-MC310),<br>2 normally open contacts (MSI-MC311);<br>Provide suitable spark extinction (via relays, contactors)  |
| OSSD switching capacity in accordance with EN 60947-5-1              | AC-15                    240 V / 0.9 A (MSI-MC310) or<br>(U <sub>e</sub> / I <sub>e</sub> ):                240 V / 1.4 A (MSI-MC311)  |
|  | DC-13 (U <sub>e</sub> / I <sub>e</sub> ):        24 V / 1.5 A (MSI-MC310) or<br>24 V / 1.0 A (MSI-MC311)   |
| Internal safeguarding of U <sub>b</sub>                              | 750 mA per PTC Multifuse   |
| External contact fuse protection in accordance with EN 60269-1       | 4A gG  |
| <b>Connection</b>  |  |
| Protection rating acc. to EN 60529                                   | Housing IP 40, terminals IP 20 for installation in cabinet or housing with protection rating of at least IP 54 required<br>Finger-safe acc. to DIN VDE 0106 part 100,<br>maximum stripped length of the connection cables 8 mm   |
| Connection cross-section (GS-ET-20: 2009)                            | 1 x 0.2 to 2.5 mm <sup>2</sup> , fine-wired or<br>1 x 0.25 to 2.5 mm <sup>2</sup> , fine-wired with wire-end sleeves<br>2 x 0.5 to 1.5 mm <sup>2</sup> , fine-wired with twin wire-end sleeves<br>1 x 0.2 to 2.5 mm <sup>2</sup> , single-wired or<br>2 x 0.25 to 1.0 mm <sup>2</sup> , fine-wired with wire-end sleeves<br>2 x 0.2 to 1.5 mm <sup>2</sup> , fine-wired<br>2 x 0.2 to 1.0 mm <sup>2</sup> , single-wired |
| <b>Environment</b>   |  |
| Ambient temperature, operation<br>Relative humidity (non-condensing) | 0...+55°C<br>4%...100%   |
| Ambient temperature, storage<br>Relative humidity (non-condensing)   | -25...+70°C<br>5%...95%  |
| Vibration resistance   | EN 60947-5-3   |
| Dirt levels, external, in accordance with EN 60947-1                 | 2  |
| EMC compliance   | EN 60947-5-3<br>EN 61000-6-3<br>EN 61000-6-2<br>EN 55011   |

## SAFETY RELAYS

### Technical data

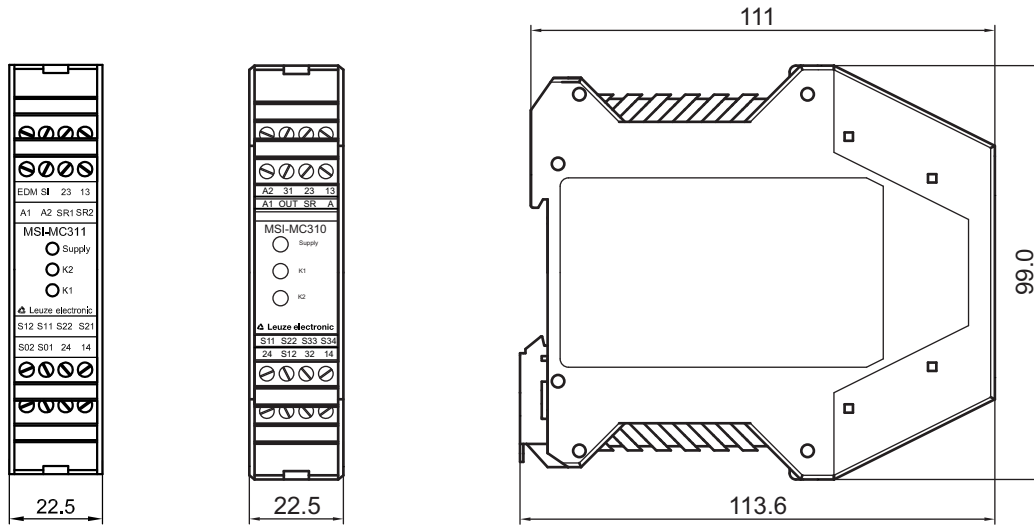
| Housing                |   |
|------------------------|---|
| Material               | Plastic (PA)  |
| Dimensions (W x H x D) | 22.5 mm x 99 mm x 113.6 mm  |
| Installation point     | Arbitrary, on 35 mm DIN top-hat supporting rail in accordance with DIN EN 50022 |

These tables do not apply in combination with additional M12 plug or connection cable. except where these components are explicitly mentioned.

Please note the additional information in the connecting and operating instructions and at [www.leuze.com/en/relays](http://www.leuze.com/en/relays).

**Dimensional drawings**

**MSI-MC310, MSI-MC311 Safety Relay**



Dimensions in mm

[www.leuze.com/en/msi-relays/](http://www.leuze.com/en/msi-relays/)



## SAFETY RELAYS

### MSI-2H



*Guarding a feeding-in area with two-hand control station and two-hand control relay MSI-2H*

With manually fed presses, after placing in the work piece the operator must press two hand-activated buttons outside the danger zone with both hands at almost the exact same time to start the next machine production step. This guarantees that both hands are outside the danger zone and the existing safety requirements are satisfied. The MSI-2H Safety Relay is the link between these activation elements and the machine control system; it acts as two-hand relay in accordance with EN 574 type III C. The device checks the simultaneous activation of the buttons and ensures a controlled process start. The module is used everywhere that feeding-in is not automatic, but rather has to be performed manually by people. These kinds of situations frequently arise in electronics production and in plate metal processing. The use of protective door monitors in accordance with EN/IEC 60204-1 STOP 0 is also possible.

#### Typical areas of application

- Two-hand control units (e.g. on presses, pick-and-place machines) in accordance with EN 574, type III C
- Two-channel protective door monitoring

**Important technical data, overview**

|  |   |
|--|---|
| Performance Level (PL) in accordance with EN ISO 13849-1 | e   |
| Category in accordance with EN ISO 13849                 | Up to 4 (depending on the category of the upstream protective device) |
| Stop category in accordance with EN/IEC 60204-1          | STOP 0  |
| Supply voltage   | 24 V AC/DC -15% to +10%   |
| Safety-related switching outputs (OSSDs)                 | 2 relay outputs (NO)  |
| Signal output  | Relay output (NC)   |
| Response time  | 20 ms   |
| Ambient temperature, operation                           | -25...+55°C   |
| Dimensions (W x H x D)                                   | 22.5 mm x 99 mm x 113.6 mm  |

**Functions**

|   |
|---|
| Two-hand relay in accordance with EN 574 Type III C |
| Automatic start/restart                             |
| Static contactor monitoring (EDM)                   |
| Simultaneity monitoring of the two-hand buttons     |
| Cross circuit monitoring                            |

**Special features**

- **Controlled start by checking the feedback circuit and button contacts**
- **Two-channel control with cross circuit monitoring**
- **Simultaneity monitoring, 0.5 s**
- **2 release circuits, 1 NC contact as signal circuit**
- **Potential-free safety-related switching outputs**
- **LED displays: K1, K2, supply voltage**
- **Housing width 22.5 mm**



**Features**



**Further information** **Page**

|                         |     |
|-------------------------|-----|
| ● Ordering information  | 470 |
| ● Electrical connection | 470 |
| ● Technical data        | 471 |
| ● Dimensional drawings  | 472 |

# SAFETY RELAYS

## Ordering information

### MSI-2H

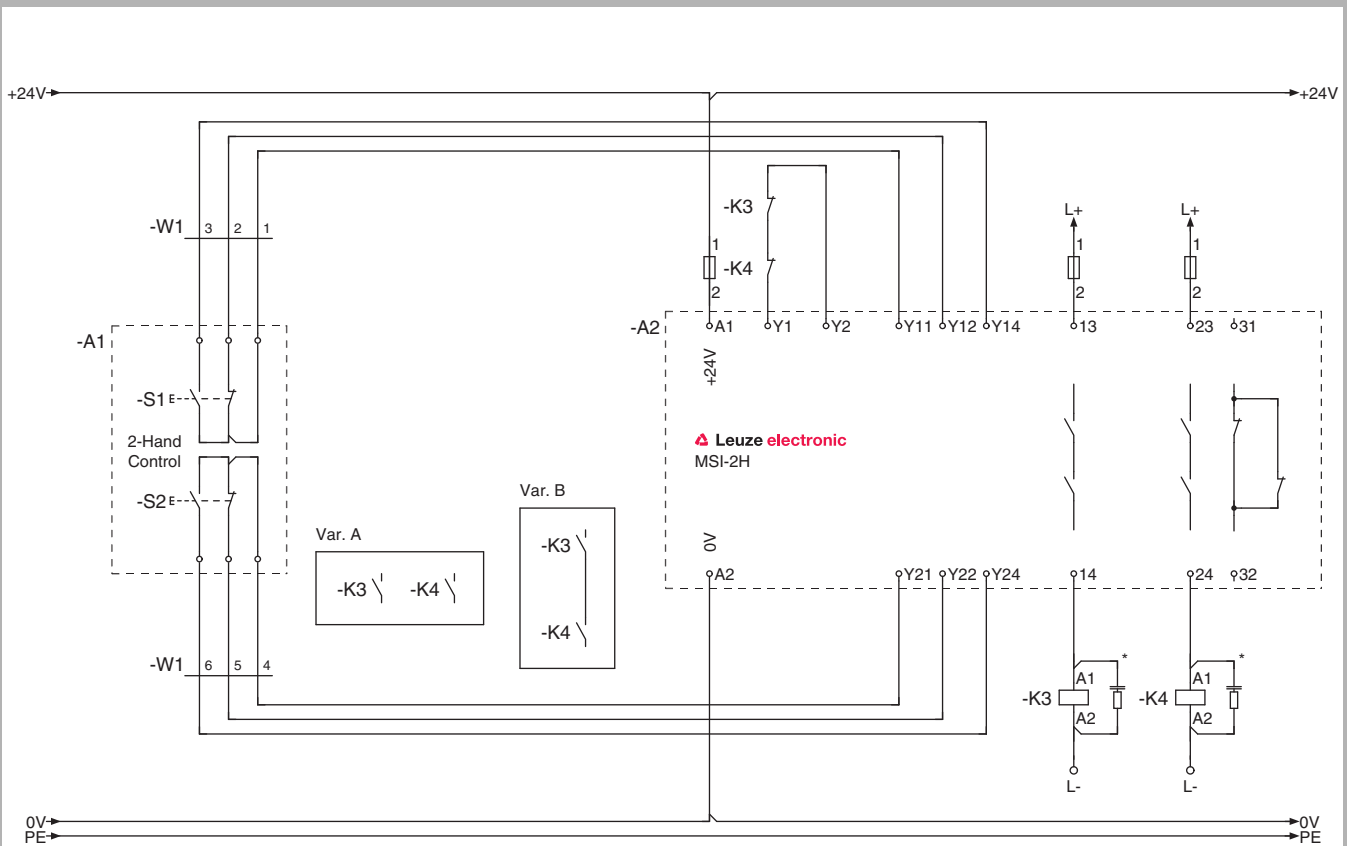
Included in delivery: Connecting and operating instructions (PDF file on CD-ROM)

**Functions:** Two-hand control relay in accordance with EN 574 type III C and protective door monitors in accordance with EN/IEC 60204-1 stop category STOP 0

### MSI-2H Safety Relay, category 4

| Part no. | Article | Description   |
|----------|---------|---|
| 549912   | MSI-2H  | E-Stop relay, category 4, for connecting two-hand control devices |

## Electrical connection



\*) Spark extinction circuit, supply suitable spark extinction

MSI-2H as two-hand control unit in accordance with EN 574 type III C

**!** Please observe the operating instructions of the components!

|                   |                   |                   |                  |                  |                                   |                          |                 |
|-------------------|-------------------|-------------------|------------------|------------------|-----------------------------------|--------------------------|-----------------|
| MSI-SR4<br>p. 428 | MSI-SR5<br>p. 434 | MSI-RM2<br>p. 440 | MSI-CM<br>p. 446 | MSI-DT<br>p. 452 | MSI-MC310,<br>MSI-MC311<br>p. 458 | <b>MSI-2H<br/>p. 468</b> | MSI-T<br>p. 474 |
|-------------------|-------------------|-------------------|------------------|------------------|-----------------------------------|--------------------------|-----------------|

**Technical data**

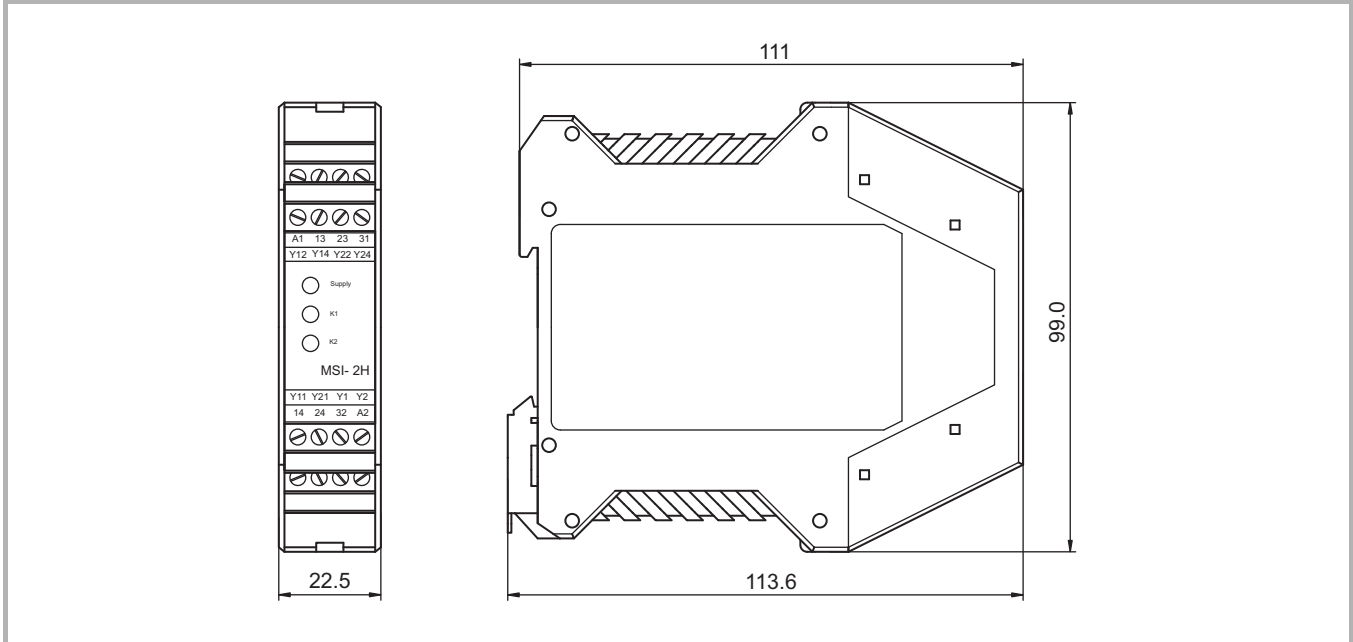
| General system data   |   |            |
|---|---|------------|
| Performance Level (PL) in accordance with EN ISO 13849-1                            | e   |            |
| Category in accordance with EN ISO 13849  | Up to 4 (depending on the category of the upstream protective device) |            |
| Service life ( $T_M$ ) in accordance with EN ISO 13849-1                            | 20 years  |            |
| Probability of a failure to danger per hour ( $PFH_d$ )                             | $3.80 \times 10^{-8}$   |            |
| Number of cycles until 10% of the components have a failure to danger ( $B_{10d}$ ) | With DC1 (ohmic load)   | 400,000    |
|   | With AC1 (ohmic load)   |            |
|   | With DC13 (inductive load)  |            |
|   | With AC15 (inductive load)  |            |
|   | Low load (20% nominal load)   | 20,000,000 |
| Mean time to dangerous failure ( $MTTF_d$ ) in accordance with EN ISO 13849-1       | 70 years  |            |
| Stop category in accordance with EN/IEC 60204-1                                     | STOP 0  |            |
| Supply voltage  | 24 V AC/DC -15% to +10%   |            |
| Power consumption   | 2.1 W (AC) / 1.9 W (DC)   |            |
| Safety-related switching outputs (OSSDs)  | 2 relay outputs (NO)  |            |
| Signal output   | Relay output (NC)   |            |
| Continuous current per current path   | Max. 3 A  |            |
| Response time   | 20 ms   |            |
| Restart delay time  | 50 ms   |            |
| Time window for simultaneity monitoring   | Max. 0.5 s  |            |
| Admissible input line resistance  | <70 $\Omega$  |            |
| Ambient temperature, operation  | -25...+55°C   |            |
| Protection rating   | IP 20   |            |
| Connection system   | Screw terminals   |            |
| Dimensions (W x H x D)  | 22.5 mm x 99 mm x 113.6 mm  |            |
| Mounting  | On 35 mm DIN rail   |            |

Please note the additional information in the connecting and operating instructions and at [www.leuze.com/en/relays](http://www.leuze.com/en/relays).

## SAFETY RELAYS

### Dimensional drawings

#### MSI-2H Safety Relay



Dimensions in mm

MSI-SR4  
p. 428

MSI-SR5  
p. 434

MSI-RM2  
p. 440

MSI-CM  
p. 446

MSI-DT  
p. 452

MSI-MC310,  
MSI-MC311  
p. 458

**MSI-2H**  
**p. 468**

MSI-T  
p. 474



## SAFETY RELAYS

### MSI-T



*Guarding a wood processing center with SLSR 46B Single Light Beam Safety Devices and MSI-T safety monitoring device*

MSI-T is a safety monitoring device for the periodic testing of "testable" optoelectronic protective devices. The two components, both the safety sensor as well as the MSI-T relay, together form an AOPD acc. to EN/IEC 61496-1, -2. Up to 6 type 2 sensors can be connected to the MSI-T via a series connection. In addition to testable Leuze electronic type 2 Single Light Beam Safety Devices, type 2 Multiple Light Beam Safety Devices of the MLD 300 series can also be connected to the relay. The machine's functional sequence remains unimpaired by the periodic internal function tests.

#### Typical areas of application

- Print and paper processing machinery in accordance with EN 1010
- Power-operated windows, doors and gates in accordance with ZH 1/494
- Storage installations in accordance with ZH 1/482 and DIN 15185/2
- Textile machinery in accordance with VGB 76 or DIN ISO 11111
- Packaging machinery in accordance with VBG 76 or prEN 415-2, 3 and 4
- Meat processing machinery in accordance with VBG 79
- Machinery used in the chemicals, rubber and plastics industries in accordance with VBG 22
- Wood processing machinery in accordance with ZH 3.1 to 3.19 and ZH 1/56a

MSI-SR4  
p. 428

MSI-SR5  
p. 434

MSI-RM2  
p. 440

MSI-CM  
p. 446

MSI-DT  
p. 452

MSI-MC310,  
MSI-MC311  
p. 458

MSI-2H  
p. 468

**MSI-T**  
**p. 474**

**Important technical data, overview**

|  |                            |
|--|----------------------------|
| Type in accordance with EN/IEC 61496                           | 2                          |
| Performance Level (PL) in accordance with EN ISO 13849-1: 2008 | Up to d                    |
| Category in accordance with EN ISO 13849-1                     | 2                          |
| Supply voltage   | 24 V DC ±20%               |
| Response time  | <20 ms                     |
| Start-up delay   | Approx. 2 s                |
| Ambient temperature, operation                                 | -20...+60°C                |
| Dimensions (W x H x D)   | 22.5 mm x 99 mm x 113.6 mm |

**Functions**

|   |
|---|
| Safety monitoring device for periodic testing of up to 6 type 2 sensors |
| Multiple monitoring of type 2 sensors with series connection            |
| Start/restart interlock (RES), optionally with/without                  |
| Static contactor monitoring (EDM), with/without optional                |
| "Safety on" signal output   |
| "Error" signal output   |

**Special features**

- **Constant cyclical testing every 2 s without process interruption of the machine function during the test**
- **2 safety relay outputs with internal monitoring**
- **Filter time 130 ms (MSI-TR2)**
- **STOP1 function (MSI-TS)**
- **LED indicators for all important functions and operating states.**
- **Low space-requirement in the cabinet with compact construction**



**Features**



**Further information** **Page**

|                         |     |
|-------------------------|-----|
| ● Ordering information  | 476 |
| ● Electrical connection | 476 |
| ● Technical data        | 477 |
| ● Dimensional drawings  | 478 |



# SAFETY RELAYS

## Ordering information

### MSI-T

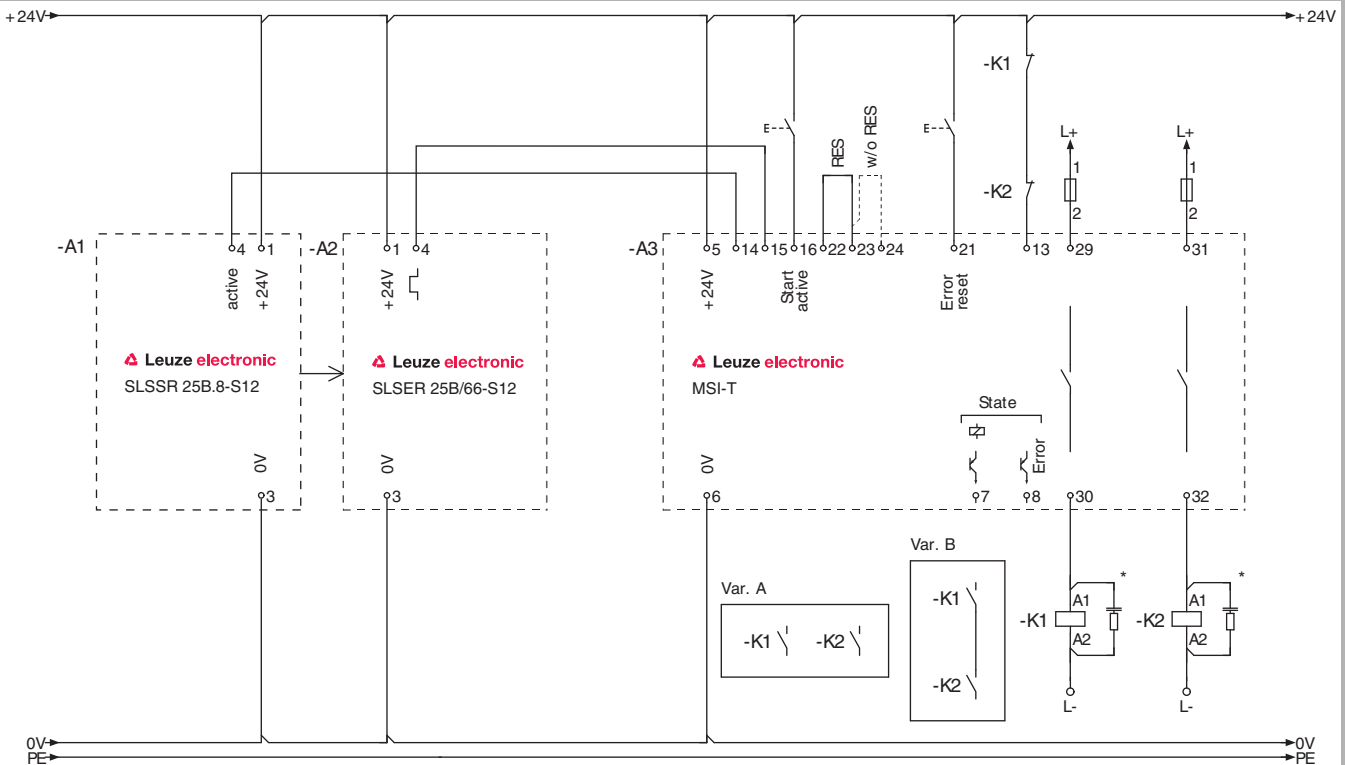
Included in delivery: 1 set of connecting and operating instructions, (PDF file on CD-ROM)

**Functions:** Periodic function test, start/restart interlock selectable, contactor monitoring (EDM) selectable, "Error" signal output, "Safety ON" signal output (MSI-TR1 and MSI-TR2 only), "STOP1" signal output (MSI-TS only)

### MSI-T Safety Relays

| Part no. | Article | Description   |
|----------|---------|---|
| 549988   | MSI-TR1 | Safety Relay for periodic testing of type 2 sensors                         |
| 549990   | MSI-TR2 | Safety Relay for periodic testing of type 2 sensors with filter time 130 ms |
| 549989   | MSI-TS  | Safety Relay for periodic testing of type 2 sensors with STOP1 function     |

## Electrical connection



\*) Spark extinction circuit, supply suitable spark extinction

MSI-T Safety Relay with type 2 SLSR 25B Single Light Beam Safety Device

**!** Please observe the operating instructions of the components!

|                   |                   |                   |                  |                  |                                   |                  |                        |
|-------------------|-------------------|-------------------|------------------|------------------|-----------------------------------|------------------|------------------------|
| MSI-SR4<br>p. 428 | MSI-SR5<br>p. 434 | MSI-RM2<br>p. 440 | MSI-CM<br>p. 446 | MSI-DT<br>p. 452 | MSI-MC310,<br>MSI-MC311<br>p. 458 | MSI-2H<br>p. 468 | <b>MSI-T</b><br>p. 474 |
|-------------------|-------------------|-------------------|------------------|------------------|-----------------------------------|------------------|------------------------|

**Technical data**

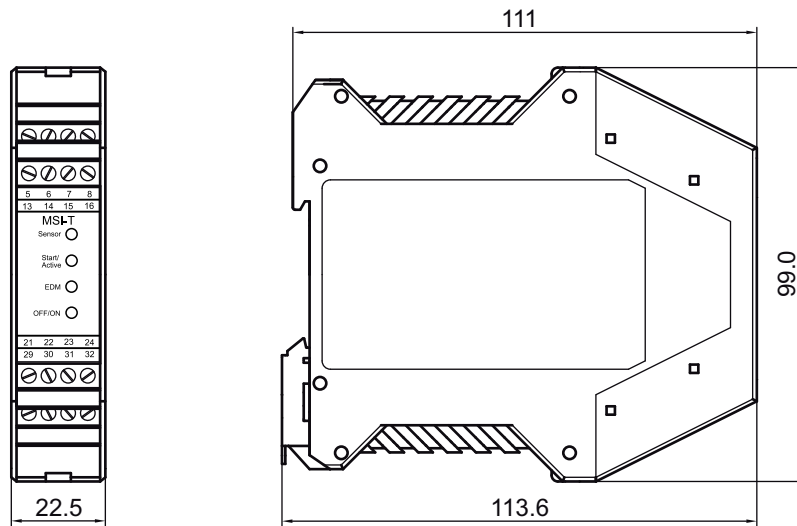
| General system data  |  |
|--|--|
| Type in accordance with EN/IEC 61496                           | 2  |
| Performance Level (PL) in accordance with EN ISO 13849-1: 2008 | Up to d  |
| Service life ( $T_M$ ) in accordance with EN ISO 13849-1       | 20 years   |
| Probability of a failure to danger per hour ( $PFH_d$ )        | $8.8 \times 10^{-8}$   |
| Category in accordance with EN ISO 13849-1                     | 2  |
| Mean time to dangerous failure ( $MTTF_d$ )                    | 75 years   |
| Supply voltage   | +24 V DC $\pm 20\%$  |
| Current consumption  | Approx. 200 mA   |
| Response time  | <20 ms   |
| Start-up delay   | Approx. 2 s  |
| Safety class   | II   |
| Protection rating  | IP 20 (only suitable for use in operating rooms/cabinets with IP 54 minimum protection rating) |
| Ambient temperature, operation                                 | -20...+60°C  |
| Ambient temperature, storage                                   | -30...+70°C  |
| Relative humidity (non-condensing)                             | 0...95%  |
| Dimensions (W x H x D)   | 22.5 mm x 99 mm x 113.6 mm   |
| Weight   | Approx. 200 g  |
| Transmitter activation   | PNP (high active)  |
| Receiver input   | Input current approx. 5 mA   |
| Start input  | Input current approx. 5 mA   |
| Reset input  | Input current approx. 5 mA   |
| Contacting monitoring (EDM)                                    | Input current approx. 5 mA   |
| "Safety ON" signal output                                      | PNP transistor output, 100 mA, short-circuit and polarity reversal protection                  |
| "Error" signal output  | PNP transistor output, 100 mA, short-circuit and polarity reversal protection                  |
| Safety output  | Potential-free make contacts, max. switching voltage 250 V AC, max. current load 2 A           |
| Fuse   | External with max. 4 A MT  |
| Overvoltage category   | 2 for rating voltage 300 V AC in accordance with VDE 0110 part 1                               |

Please note the additional information in the connecting and operating instructions and at [www.leuze.com/en/relays](http://www.leuze.com/en/relays).

## SAFETY RELAYS

### Dimensional drawings

#### MSI-T Safety Relay



Dimensions in mm

MSI-SR4  
p. 428

MSI-SR5  
p. 434

MSI-RM2  
p. 440

MSI-CM  
p. 446

MSI-DT  
p. 452

MSI-MC310,  
MSI-MC311  
p. 458

MSI-2H  
p. 468

**MSI-T**  
**p. 474**



## PROGRAMMABLE SAFETY CONTROLLERS

### Overview



*Control of individual safety components with programmable Safety Controllers.*



*When creating safety circuits with the MSI 100 and MSI 200 Safety Controllers, the MSIsafesoft software facilitates menu-driven and trouble-free configuration.*

For small- to medium-size machines, compact safety controls are used increasingly for monitoring the safety circuit. A simple and quickly realized safety system independent of standard controls is preferred by the user. With their simple handling during start-up, flexible configuration options and broad, on-board functionality, the MSI 100 and MSI 200 programmable Safety Controllers offer an optimum system solution for small- to medium-size machines.

Based on the MSIsafesoft programming software, the MSI 100 and MSI 200 Safety Controllers facilitate the efficient integration, communication and coordination of a machine's safety elements through the use of function modules and logic blocks. Depending on machine type, the advantage of the modularity of these safety controls becomes apparent in the simple expandability of the safety system through I/O modules and through the connection of communication modules for integration in the fieldbus level.

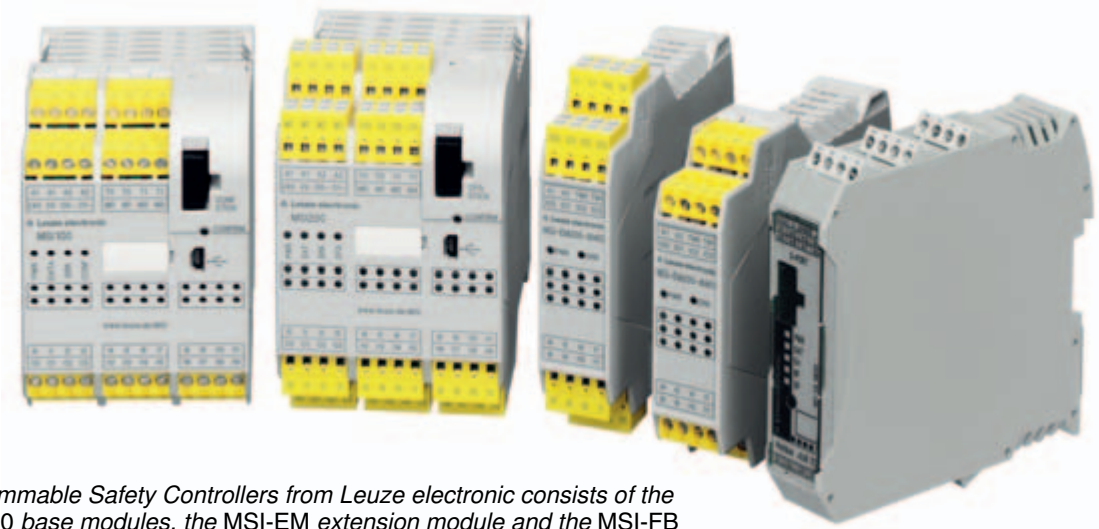
MSI 100  
p. 482

MSI 200  
p. 488

MSI-EM  
p. 494

MSI-FB-PB  
p. 496

**Selection table**



The family of programmable Safety Controllers from Leuze electronic consists of the MSI 100 and MSI 200 base modules, the MSI-EM extension module and the MSI-FB fieldbus module.

| Category in accordance with EN ISO 13849 | SIL in accordance with IEC 61508 and SILCL in accordance with EN/IEC 62061 | Performance Level (PL) in accordance with EN ISO 13849-1 | Base module | Base module, expandable with MSI-EM | Additional module | Dimensions (W x H x D)      | Features, type-dependent |               |                |                      | Series  | Page     |     |
|--|--|--|-------------|-------------------------------------|-------------------|-----------------------------|--------------------------|---------------|----------------|----------------------|---------|----------|-----|
|  |  |  |             |                                     |                   |                             | Inputs/outputs (OSSDs)   | Bus interface | Screw terminal | Spring-cage terminal |         |          |     |
| 4  | 3  | e  | ●           |                                     |                   | 67.5 mm x 114.5 mm x 99 mm  | 20/4                     | With MSI-FB   | ●              | ●                    | MSI 100 | 482      |     |
|  |  |  | ●           | ●                                   |                   | 67.5 mm x 114.5 mm x 112 mm | 20/4                     | With MSI-FB   | ●              | ●                    | MSI 200 | 488      |     |
|  |  |  |             |                                     | ●                 | 22 mm x 114.5 mm x 99 mm    | 8/4*                     |               |                | ●                    | ●       | MSI-EM   | 494 |
|  |  |  |             |                                     | ●                 | 22 mm x 114.5 mm x 99 mm    |                          | PROFIBUS      |                | ●                    |         | MSI-FB** | 496 |

\*) configurable channels for input/output selectable  
 \*\*) connectable to all MSI 100 and MSI 200 base modules

## PROGRAMMABLE SAFETY CONTROLLERS

### MSI 100 Safety Controller



*Programmable Safety Controllers, such as the stand-alone MSI 100 base module, control safety within automated production processes.*

In automated systems, sensors and actuators must interact with one another functionally and safely. The necessary coordination is performed by the MSI 100 programmable Safety Controller. The controller monitors all safety functions, e.g. of E-Stop buttons, two-hand controls, protective doors, AOPDs and similar, in machines and systems in extremely compact form. With an overall width of just 67.5 mm, the device makes 20 safe inputs and 4 safe outputs available to the user. Additional clock- and ground-switching outputs increase the safety of the monitoring circuits. Message outputs are available for diagnostics. The programming for defining the device function can be quickly and easily performed with the MSIsafesoft software. The software's certified function blocks, which can be integrated using drag & drop functionality, facilitate menu-driven and trouble-free configuration of every safety circuit application.



*As stand-alone base module, the MSI 100 Safety Controller monitors safety components at 20 safe inputs, e.g. L100 Safety Locking Devices in a blister machine.*

#### Typical areas of application

- Robot cells
- Automatic processing centers
- Packaging machinery
- Tool manufacturing

**MSI 100**  
p. 482

MSI 200  
p. 488

MSI-EM  
p. 494

MSI-FB-PB  
p. 496



**Important technical data, overview**

|  |  |
|--|--|
| SIL in accordance with IEC 61508 and SILCL in accordance with EN/IEC 62061 | 3  |
| Performance Level (PL) in accordance with EN ISO 13849-1                   | e  |
| Category in accordance with EN ISO 13849                                   | 4  |
| Supply voltage   | 24 V DC  |
| Reaction time  | <30 ms   |
| Ambient temperature, operation   | -20...+55 °C                                   |
| Protection rating  | IP 20  |
| Dimensions (W x H x D)   | 67.5 mm x 114.5 mm x 99 mm                     |
| Connection system  | Plug in screw terminals, spring-cage terminals |
| Number of safe inputs  | 20 (up to SIL 3 / EN/IEC 62061)                |
| Safety-related switching outputs (OSSDs)                                   | 4 (cat. 4 / EN 13849-1 / EN 954)               |
| Interfaces   | USB, TBUS DIN rail for bus coupler             |

**Functions**

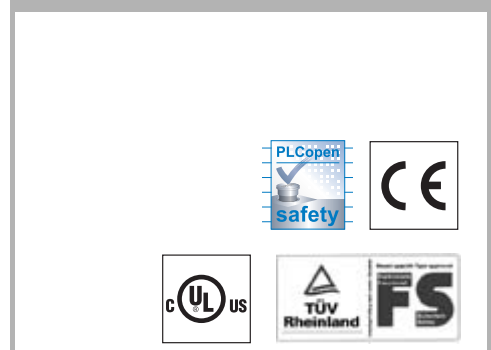
|   |
|---|
| Freely configurable safety base module                        |
| Monitoring of all safe functions in machines and systems      |
| Transfers diagnostic data via MSI-FB fieldbus module (option) |

**Special features**

- 20 safe inputs, 4 safe switching outputs (OSSDs)
- 4 message outputs, 2 clock switching outputs, 2 ground-switching outputs
- Free configuration with MSIsafesoft software
- Extensive device library with certified function blocks
- Data stick with configuration memory
- Designs with screw terminals as well as with spring-cage terminals
- Start-up set for quickly getting up to speed



**Features**



**Further information**

**Page**

|                                    |     |
|------------------------------------|-----|
| ● Ordering information             | 484 |
| ● Electrical connection            | 484 |
| ● Technical data                   | 485 |
| ● Dimensional drawings             | 486 |
| ● Accessories ordering information | 487 |



# PROGRAMMABLE SAFETY CONTROLLERS

## Ordering information

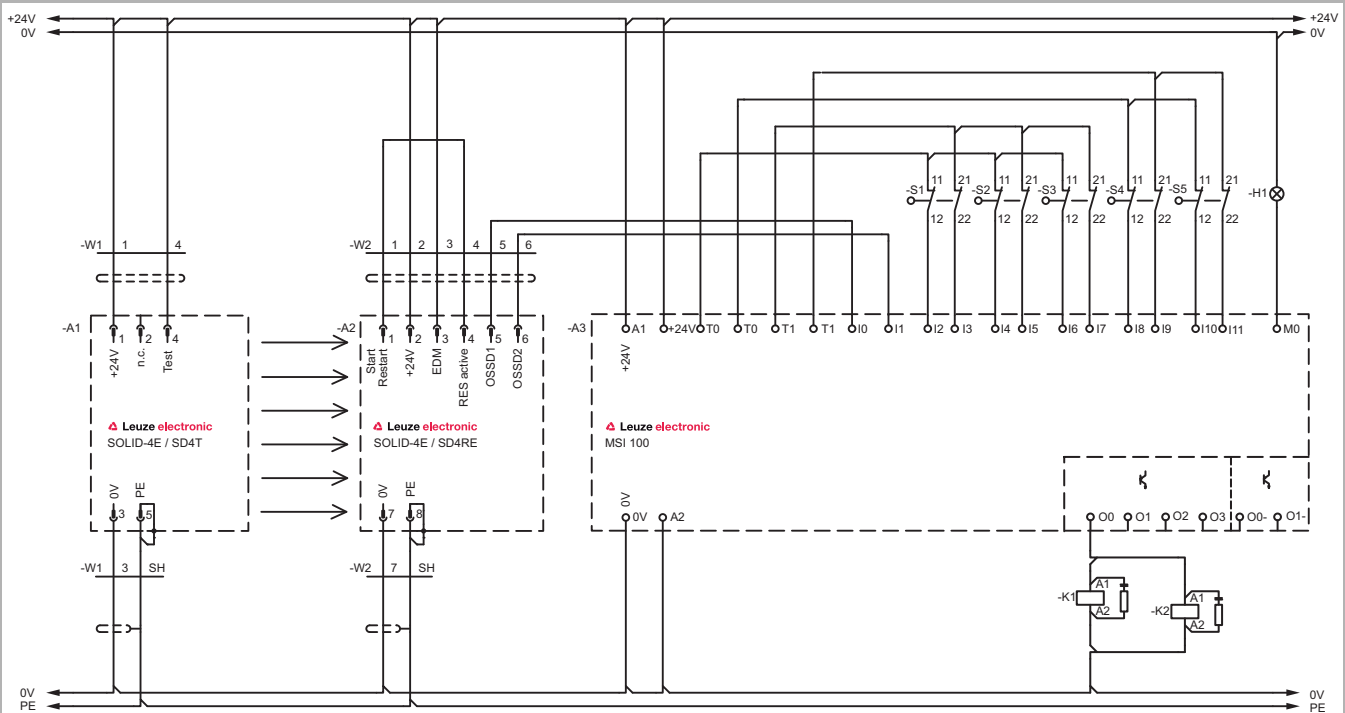
### MSI 100

Included in delivery: connecting and operating instructions, 1 terminal set, 1 data memory module, 1 TBUS Safety connection plug. Start-up set can be ordered separately.

**Functions:** Freely configurable safety base module, monitoring of all safety-oriented functions in machines and systems

| MSI 100  |         |  |  |
|----------|---------|--|--|
| Part no. | Article | Description  | Safe inputs / safety-related switching outputs (OSSDs) |
| 547802   | MSI101  | Programmable MSI Safety Controller, screw terminal       | 20 safe inputs, 4 transistor outputs                   |
| 547812   | MSI102  | Programmable MSI Safety Controller, spring-cage terminal | 20 safe inputs, 4 transistor outputs                   |

### Electrical connection, MSI 100 connection example



MSI 100 with SOLID-4E Safety Light Curtain and several S200 Safety Switches

**⚠** Please observe the operating instructions of the components!

**MSI 100**  
p. 482

MSI 200  
p. 488

MSI-EM  
p. 494

MSI-FB-PB  
p. 496

**Technical data**

| General system data   |  |                           |
|---|--|---------------------------|
| SIL in accordance with IEC 61508 and SILCL in accordance with EN/IEC 62061    | 3  |                           |
| Performance Level (PL) in accordance with EN ISO 13849-1                      | e  |                           |
| Service life ( $T_M$ ) in accordance with EN ISO 13849-1                      | 20 years                                       |                           |
| Probability of a failure to danger per hour ( $PFH_d$ )                       | $1.37 \times 10^{-8}$                          |                           |
| Category in accordance with EN ISO 13849                                      | 4  |                           |
| Mean time to dangerous failure ( $MTTF_d$ ) in accordance with EN ISO 13849-1 | 8324 years                                     |                           |
| Supply voltage  | 24 V DC  |                           |
| Current consumption   | Approx. 200 mA without external load           |                           |
| Maximum reaction time   | <30 ms   |                           |
| Restart recovery time   | <5 ms  |                           |
| Readiness delay   | 4 s  |                           |
| Protection rating   | Housing  | IP 20                     |
|   | Connection terminals                           | IP 20                     |
| Ambient temperature, operation  | -20...+55°C                                    |                           |
| Ambient temperature, storage  | -20...+70°C                                    |                           |
| Dimensions (W x H x D)  | 67.5 mm x 114.5 mm x 99 mm                     |                           |
| Conductor cross-section   | Screw connection                               | 0.2...2.5 mm <sup>2</sup> |
|   | Spring-cage connection                         | 0.2...1.5 mm <sup>2</sup> |
| Housing material  | Unreinforced polyamide PA                      |                           |
| Mounting  | On 35 mm DIN rail                              |                           |
| Connection system   | Plug in screw terminals, spring-cage terminals |                           |
| Interfaces  | USB, TBUS DIN rail for bus coupler             |                           |
| Input data logic  |  |                           |
| Nominal input voltage $U_N$   | 24 V DC, -15% to +10%                          |                           |
| Typ. current consumption at $U_N$   | 200 mA   |                           |
| Inputs  |  |                           |
| Number of safe inputs   | 20 (up to SIL 3 / EN/IEC 62061)                |                           |
| Nominal voltage $U_N$   | 24 V DC (to ground A2)                         |                           |
| Typ. current consumption at $U_N$   | 4 mA   |                           |

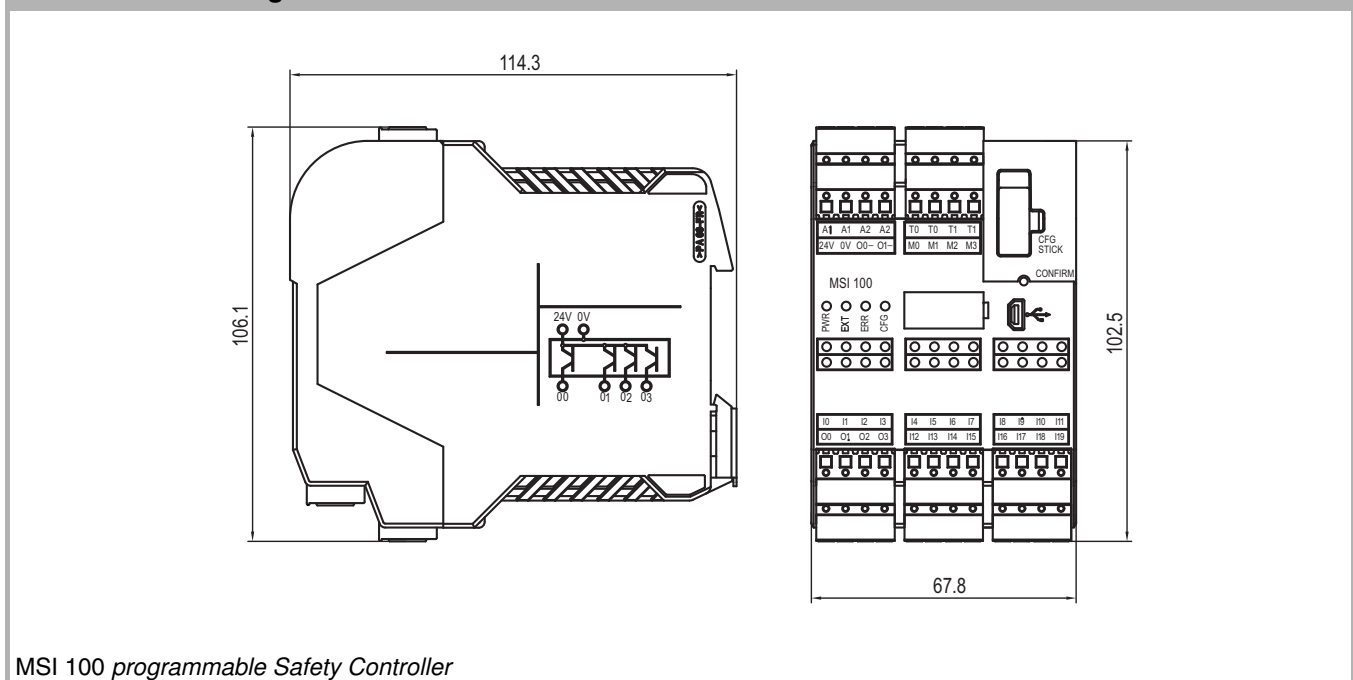
# PROGRAMMABLE SAFETY CONTROLLERS

## Technical data

| Outputs  |  |
|--|--|
| Safety-related switching outputs (OSSDs)   | 4 (cat. 4 / EN 13849-1 / EN 954)                 |
| Ground-switching outputs   | 2  |
| Nominal voltage  | 24 V DC, -15% to +10%                            |
| Limiting continuous current for devices at A1 and A2 terminals (wired-through current paths A1/A1 and A2/A2) | 6 A  |
| Limiting continuous current via TBUS (when supplying external modules via TBUS)                              | 4 A  |
| Clock outputs  | 2, limiting continuous current 100 mA at 24 V DC |
| Signal outputs   | 4, limiting continuous current 100 mA at 24 V DC |

Please note the additional information in the connecting and operating instructions and at [www.leuze.com/en/controllers/](http://www.leuze.com/en/controllers/).

## Dimensional drawings



MSI 100 programmable Safety Controller

Dimensions in mm

**MSI 100**  
p. 482

MSI 200  
p. 488

MSI-EM  
p. 494

MSI-FB-PB  
p. 496

**Accessories ordering information**

| Part no.      | Article      | Description  |
|---------------|--------------|--|
| 547820        | AC-MSI-CFG1  | 10x plug-in data memory modules  |
| 547821        | AC-MSI-TCS   | 10x MSI TBUS safety connection plugs   |
| 547822        | AC-MSI-USB   | MSI USB cable MSI-PC, 2 m  |
| 547823        | AC-MSI-TC    | 10x MSI TBUS standard connection plugs (for fieldbus gateways)                 |
| 547825        | MSI-SWC1     | MSI start-up set (includes: CD with MSIsafesoft, USB cable, Quick Start Guide) |
| <b>MSI-FB</b> |              |  |
| 547806        | MSI-FB-PB101 | PROFIBUS module, screw terminal  |

**Start-up set for MSI 100, MSI 200**

The start-up set offers everything for fast realization of the application. It includes:

- MSIsafesoft configuration software
- USB cable for connecting the Safety Controller to a PC (not included in delivery)
- Quick Start Guide for a quick introduction to the topic: First Steps.



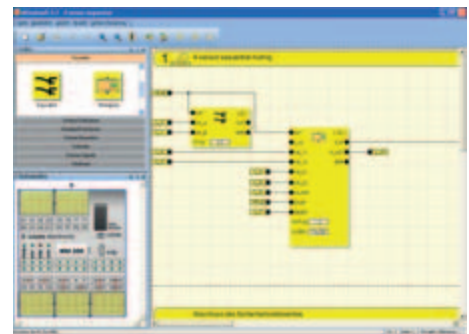
**MSIsafesoft configuration software for simple device configuration**

The MSIsafesoft configuration software helps the user avoid systematic errors. The software supports the user with certified function modules, automatic logic testing, practical wiring inspection and extensive simulation.

With the software, users easily configure the functions of MSI modules through drag & drop functionality.

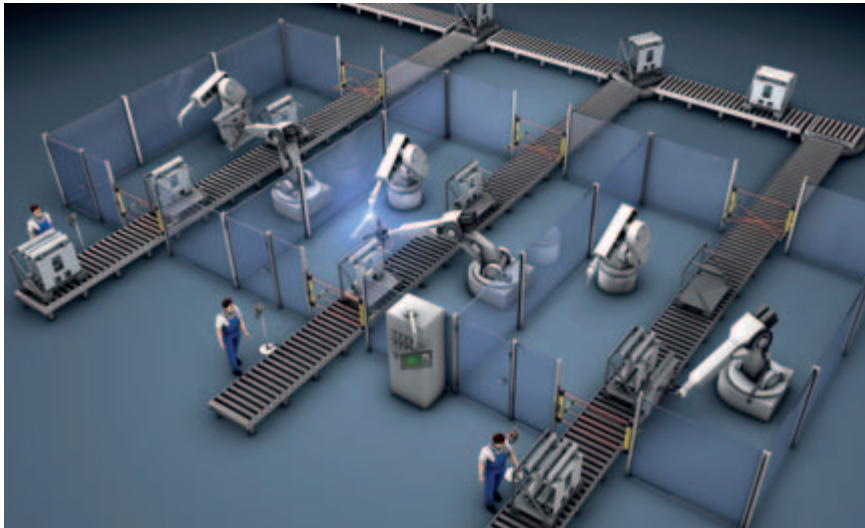
1. Select and configure safety functions.
2. Connect inputs and outputs of the module to the safety functions.
3. Test the safety functions and save—finished.

The integrated simulation mode and automatic logic testing provide safety even during creation. Configured with the click of a mouse, the device simultaneously reduces wiring and minimizes sources of error. Thanks to the simple configuration, new protective devices can be integrated quickly and safely at any time.



## PROGRAMMABLE SAFETY CONTROLLERS

### MSI 200 Safety Controller, expandable



In automated systems, sensors and actuators must interact with one another functionally and safely. The necessary coordination is performed by the MSI 200 programmable Safety Controller. Unlike the MSI 100 controller, the MSI 200 facilitates the coupling of extension modules (safe I/O modules are available as accessories).

#### Typical areas of application

- Robot cells
- Automatic processing centers
- Packaging machinery
- Tool manufacturing

*Programmable Safety Controllers, such as the modularly expandable MSI 200 base module, control a range of safety components within complex, automatic production processes thanks to the numerous safe inputs.*



*In systems with many safety sensors, the modularly expandable MSI 200 Safety Controller has advantages, since the number of safe inputs can be significantly increased with additional MSI-EM extension modules.*

MSI 100  
p. 482

**MSI 200**  
**p. 488**

MSI-EM  
p. 494

MSI-FB-PB  
p. 496

**Important technical data, overview**

|  |  |
|--|--|
| SIL in accordance with IEC 61508 and SILCL in accordance with EN/IEC 62061 | 3  |
| Performance Level (PL) in accordance with EN ISO 13849-1                   | e  |
| Category in accordance with EN ISO 13849                                   | 4  |
| Supply voltage   | 24 V DC  |
| Reaction time  | <30 ms   |
| Ambient temperature, operation   | -20...+55 °C   |
| Protection rating  | IP 20  |
| Dimensions (W x H x D)   | 67.5 mm x 114.5 mm x 112 mm                                |
| Connection system  | Plug in screw terminals, spring-cage terminals             |
| Number of safe inputs  | 20 (up to SIL 3 / EN/IEC 62061)                            |
| Safety-related switching outputs (OSSDs)                                   | 4 (cat. 4 / EN 13849-1 / EN 954)                           |
| Interfaces   | USB, TBUS DIN rails for extension modules and bus couplers |

**Functions**

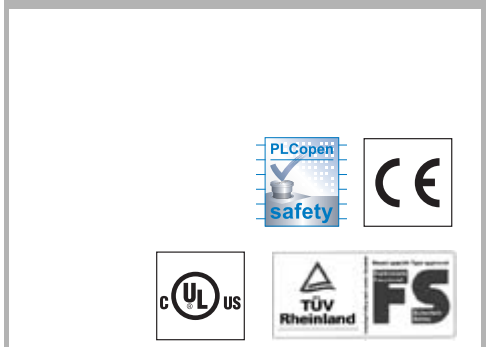
|  |
|--|
| Freely configurable safety base module                             |
| Monitoring of all safe functions in machines and systems           |
| Safety-oriented expandability with additional input/output modules |
| Transfers diagnostic data via MSI-FB fieldbus module (option)      |

**Special features**

- **20 safe inputs, 4 safe switching outputs (OSSDs)**
- **Extension modules with additional input/output modules available for MSI 200**
- **4 message outputs, 2 clock switching outputs, 2 ground-switching outputs**
- **Free configuration with MSIsafesoft software**
- **Extensive device library with certified function blocks**
- **Data stick with configuration memory**
- **Designs with screw terminals as well as with spring-cage terminals**
- **Start-up set for quickly getting up to speed**



**Features**



**Further information** **Page**

|                                    |     |
|------------------------------------|-----|
| ● Ordering information             | 490 |
| ● Electrical connection            | 490 |
| ● Technical data                   | 491 |
| ● Dimensional drawings             | 492 |
| ● Accessories ordering information | 493 |

# PROGRAMMABLE SAFETY CONTROLLERS

## Ordering information

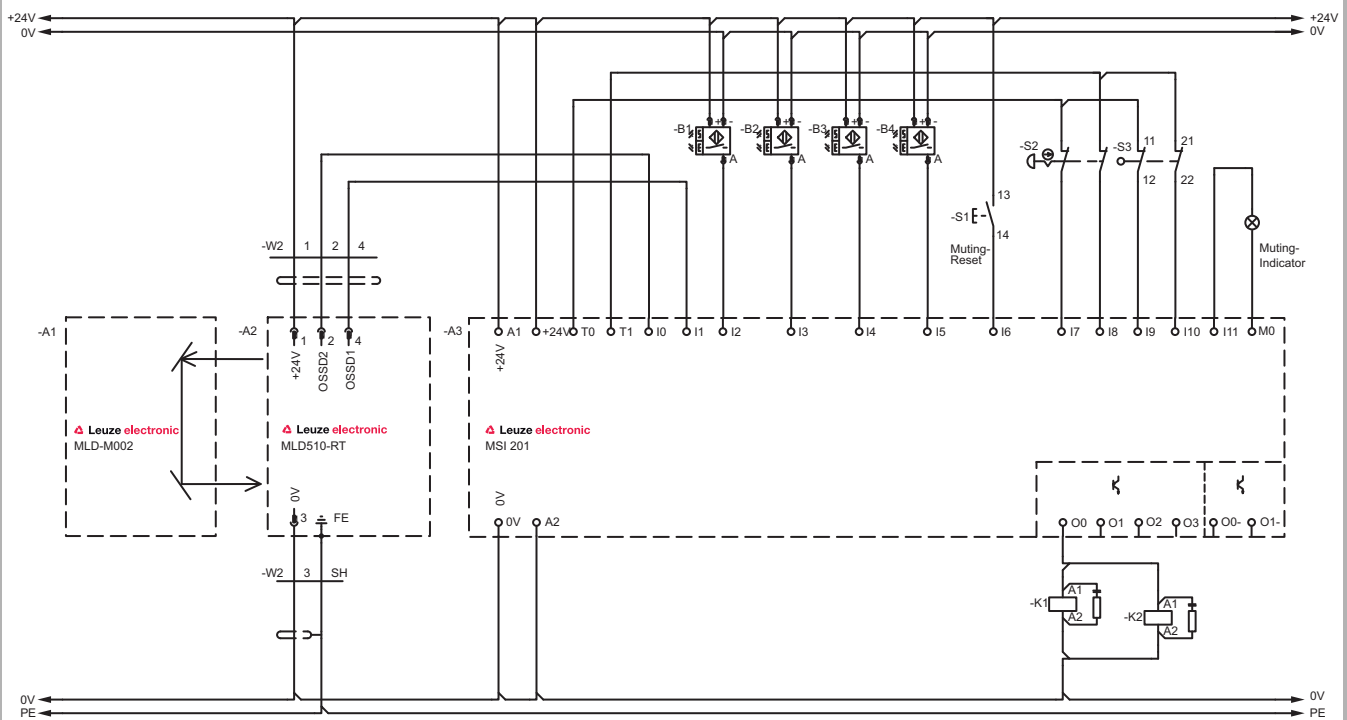
### MSI 200

Included in delivery: connecting and operating instructions, 1 terminal set, 1 data memory module, 2 TBUS Safety connection plugs. Start-up set can be ordered separately.

**Functions:** Freely configurable safety base module, monitoring of all safety-oriented functions in machines and systems, safety-oriented expandability with additional input/output modules

| Part no.       | Article | Description  | Safe inputs / safety-related switching outputs (OSSDs) |
|----------------|---------|--|--|
| <b>MSI 200</b> |         |  |  |
| 547803         | MSI201  | Programmable MSI Safety Controller, expandable, screw terminal       | 20 safe inputs, 4 transistor outputs                   |
| 547813         | MSI202  | Programmable MSI Safety Controller, expandable, spring-cage terminal | 20 safe inputs, 4 transistor outputs                   |

## Electrical connection, MSI 200 connection example



MSI 200 with E-Stop button and MLD Multiple Light Beam Safety Device for timing controlled 4-sensor-muting

**⚠** Please observe the operating instructions of the components!



**Technical data**

| General system data   |  |                           |
|---|--|---------------------------|
| SIL in accordance with IEC 61508 and SILCL in accordance with EN/IEC 62061    | 3  |                           |
| Performance Level (PL) in accordance with EN ISO 13849-1                      | e  |                           |
| Service life ( $T_M$ ) in accordance with EN ISO 13849-1                      | 20 years   |                           |
| Probability of a failure to danger per hour ( $PFH_d$ )                       | $1.37 \times 10^{-8}$                                      |                           |
| Category in accordance with EN ISO 13849                                      | 4  |                           |
| Mean time to dangerous failure ( $MTTF_d$ ) in accordance with EN ISO 13849-1 | 8324 years   |                           |
| Supply voltage  | 24 V DC  |                           |
| Current consumption   | Approx. 200 mA without external load                       |                           |
| Maximum reaction time   | <30 ms   |                           |
| Restart recovery time   | <5 ms  |                           |
| Readiness delay   | 4 s  |                           |
| Protection rating   | Housing  | IP 20                     |
|   | Connection terminals                                       | IP 20                     |
| Ambient temperature, operation  | -20...+55°C  |                           |
| Ambient temperature, storage  | -20...+70°C  |                           |
| Dimensions (W x H x D)  | 67.5 mm x 114.5 mm x 112 mm                                |                           |
| Conductor cross-section   | Screw connection   | 0.2...2.5 mm <sup>2</sup> |
|   | Spring-cage connection                                     | 0.2...1.5 mm <sup>2</sup> |
| Housing material  | Unreinforced polyamide PA                                  |                           |
| Mounting  | On 35 mm DIN rail  |                           |
| Number of possible safe extension modules                                     | 10   |                           |
| Connection system   | Plug in screw terminals, spring-cage terminals             |                           |
| Interfaces  | USB, TBUS DIN rails for extension modules and bus couplers |                           |
| Input data logic  |  |                           |
| Nominal input voltage $U_N$   | 24 V DC, -15% to +10%                                      |                           |
| Typ. current consumption at $U_N$   | 200 mA   |                           |
| Inputs  |  |                           |
| Number of safe inputs   | 20 (up to SIL 3 / EN/IEC 62061)                            |                           |
| Nominal voltage $U_N$   | 24 V DC (to ground A2)                                     |                           |
| Typ. current consumption at $U_N$   | 4 mA   |                           |



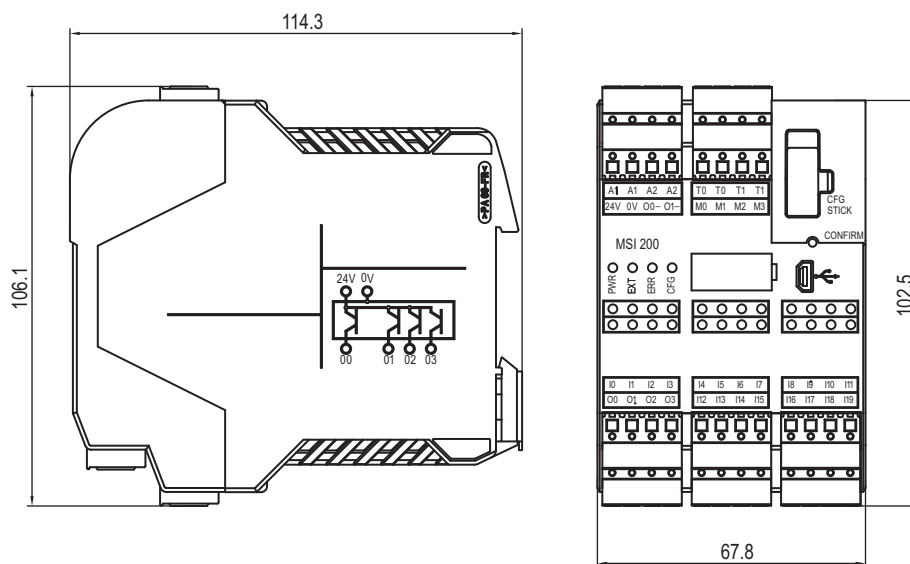
# PROGRAMMABLE SAFETY CONTROLLERS

## Technical data

| Outputs  |  |
|--|--|
| Safety-related switching outputs (OSSDs)   | 4 (cat. 4 / EN 13849-1 / EN 954)                 |
| Ground-switching outputs   | 2  |
| Nominal voltage  | 24 V DC, -15% to +10%                            |
| Limiting continuous current for devices at A1 and A2 terminals (wired-through current paths A1/A1 and A2/A2) | 6 A  |
| Limiting continuous current via TBUS (when supplying external modules via TBUS)                              | 4 A  |
| Clock outputs  | 2, limiting continuous current 100 mA at 24 V DC |
| Signal outputs   | 4, limiting continuous current 100 mA at 24 V DC |

Please note the additional information in the connecting and operating instructions and at [www.leuze.com/en/controllers/](http://www.leuze.com/en/controllers/).

## Dimensional drawings



MSI 200 programmable Safety Controller

Dimensions in mm

MSI 100  
p. 482

**MSI 200**  
**p. 488**

MSI-EM  
p. 494

MSI-FB-PB  
p. 496

**Accessories ordering information**

| Part no.      | Article         | Description  |
|---------------|-----------------|--|
| 547820        | AC-MSI-CFG1     | 10x plug-in data memory modules  |
| 547821        | AC-MSI-TCS      | 10x MSI TBUS safety connection plugs   |
| 547822        | AC-MSI-USB      | MSI USB cable MSI-PC, 2 m  |
| 547823        | AC-MSI-TC       | 10x MSI TBUS standard connection plugs (for fieldbus gateways)                         |
| 547825        | MSI-SWC1        | MSI start-up set (includes: CD with <i>MSIsafesoft</i> , USB cable, Quick Start Guide) |
| <b>MSI-EM</b> |                 |  |
| 547804        | MSI-EM201-8I4IO | Digital extension module, screw terminal   |
| 547814        | MSI-EM202-8I4IO | Digital extension module, spring-cage terminal   |
| <b>MSI-FB</b> |                 |  |
| 547806        | MSI-FB-PB101    | PROFIBUS module, screw terminal  |

**Start-up set**

See start-up set for MSI 100, MSI 200, page 487

**Configuration software**

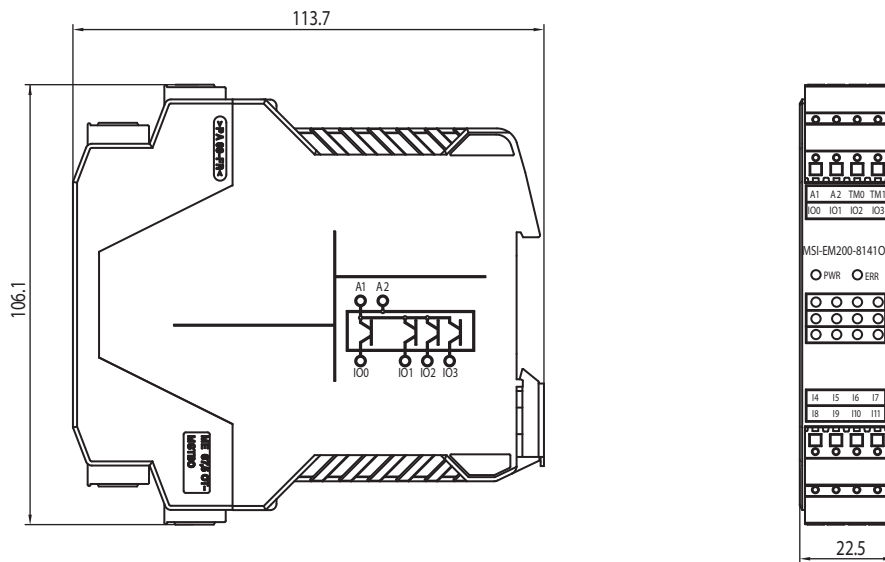
See *MSIsafesoft* configuration software for simple device configuration, page 487

[www.leuze.com/en/msi-controllers/](http://www.leuze.com/en/msi-controllers/)

## PROGRAMMABLE SAFETY CONTROLLERS

### MSI-EM extension modules (I/O extension)

#### Dimensional drawings



Dimensions in mm

#### Ordering information

##### MSI-EM

Included in delivery: 1 TBUS safety connection plug.

**Functions:** Extension module for the MSI 200 programmable Safety Controller, extension with 8 safe inputs and 4 safe, freely configurable channels-either safe inputs or outputs (OSSDs)

| Part no. | Article         | Description                                    |
|----------|-----------------|--|
| 547804   | MSI-EM201-8I4IO | Digital extension module, screw terminal       |
| 547814   | MSI-EM202-8I4IO | Digital extension module, spring-cage terminal |

**Important technical data, overview**

|  |   |
|--|---|
| Category in accordance with EN ISO 13849 | 4   |
| Dimensions (W x H x D)                   | 22.5 mm x 114.5 mm x 99 mm                            |
| Connection system                        | Plug in screw terminals, spring-cage terminals        |
| Number of safe inputs                    | 12, 4 of which are configurable as input or output    |
| Safety-related switching outputs (OSSDs) | 4 if using the configurable inputs/outputs as outputs |
| Interfaces                               | TBUS DIN rails for extension modules and bus coupler  |

Please note the additional information in the connecting and operating instructions at [www.leuze.com/en/controllers/](http://www.leuze.com/en/controllers/).

**Functions**

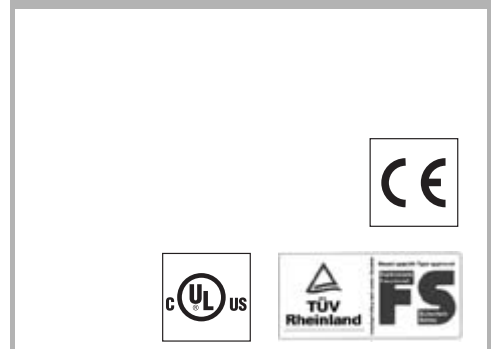
Extension module for the MSI 200 programmable Safety Controller  
 Extension with 8 safe inputs and 4 safe, freely configurable channels-either as safe inputs or outputs (OSSDs)

**Special features**

- Simple connection via DIN rail connector
- Designs with screw terminals as well as with spring-cage terminals
- Compact housing width 22 mm
- 4 freely configurable safety outputs (OSSDs)



**Features**



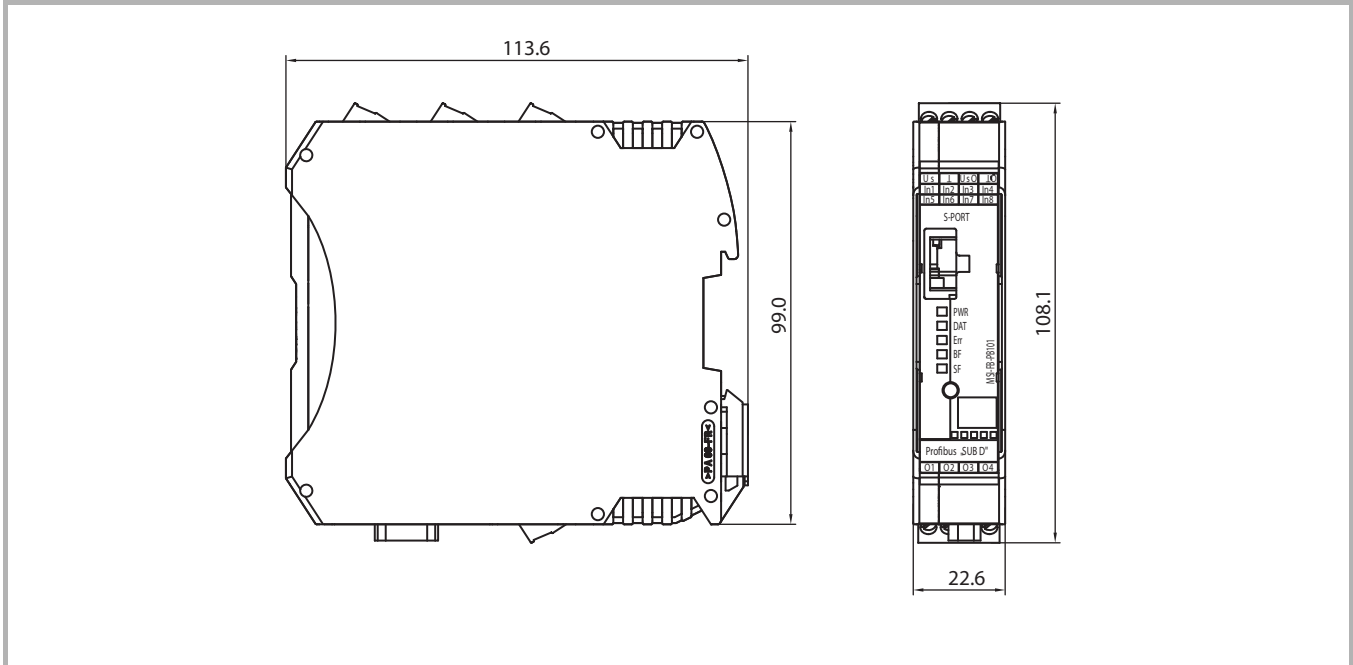
**Further information** **Page**

- |                        |     |
|------------------------|-----|
| ● Ordering information | 494 |
| ● Dimensional drawings | 494 |

## PROGRAMMABLE SAFETY CONTROLLERS

### MSI-FB-PB fieldbus modules (Profibus)

#### Dimensional drawings



Dimensions in mm

#### Ordering information

##### MSI-FB

Included in delivery: 1 TBUS safety connection plug.

**Functions:** Fieldbus module for the MSI 100 and MSI 200 programmable Safety Controllers for connecting to PROFIBUS

| Part no. | Article      | Description                     |
|----------|--------------|---------------------------------|
| 547806   | MSI-FB-PB101 | PROFIBUS module, screw terminal |

MSI 100  
p. 482

MSI 200  
p. 488

MSI-EM  
p. 494

**MSI-FB-PB**  
**p. 496**

## MSI-FB-PB

### Important technical data, overview

|                             |                            |
|-----------------------------|----------------------------|
| Supply voltage              | 24 V DC                    |
| Protection rating           | IP 20                      |
| Dimensions (W x H x D)      | 22.5 mm x 114.5 mm x 99 mm |
| Connection system           | Plug-in screw terminals    |
| Number of inputs            | 4                          |
| Number of switching outputs | 4                          |
| Interface 1                 | MSI interface, TBUS        |
| Interface 2                 | PROFIBUS-DP, D-SUB-9       |

Please note the additional information in the connecting and operating instructions at [www.leuze.com/en/controllers/](http://www.leuze.com/en/controllers/).

### Functions

Fieldbus module for connecting the MSI 100 and MSI 200 programmable Safety Controllers to PROFIBUS

### Special features

- Certified in accordance with DPV1 specification (EN 50170)
- Simple connection via DIN rail connector
- Compact housing width 22 mm



### Features



| Further information    | Page |
|------------------------|------|
| ● Ordering information | 496  |
| ● Dimensional drawings | 496  |

## ACCESSORIES

### UDC, DC Device Columns



*Device Columns enable free-standing floor mounting for Multiple Light Beam Safety Devices and Safety Light Curtains*

Free-standing optoelectronic protective devices are subject to special requirements with regard to mounting, alignment quality and long-term stability of the installation. The UDC/DC device mounting columns are optimized for these requirements and are especially well-suited for the mounting of Leuze electronic Multiple Light Beam Safety Devices and Safety Light Curtains. A precise vertical and axial alignment of the safety sensors in the columns is an easy option despite the all-round protection.

DC Device Columns without base can be used on exactly level system parts.

When installed free-standing on any type of floor, the UDC Device Columns really show their strengths. Firmly anchored in the floor, they reliably protect the sensors against damage with their robust construction. Spring elements in the base of the device columns ensure easy alignment and automatic resetting to the initial position after mechanical impacts (blows, knocks).

**UDC, DC  
Device Columns**  
p. 498

Muting Sensor Sets  
p. 502

UMC deflecting mirror  
columns  
p. 510, 514

US Deflecting Mirrors  
p. 512

UM60 Deflecting  
Mirrors  
p. 516

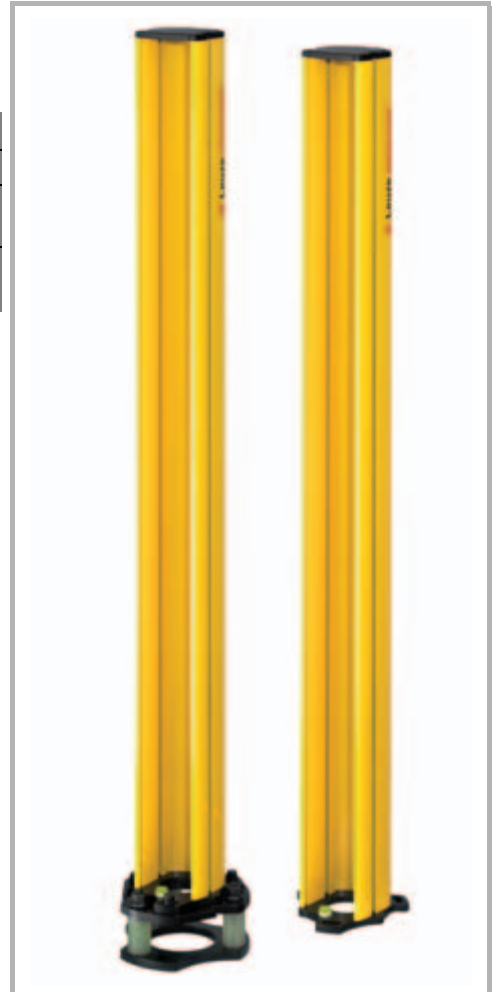
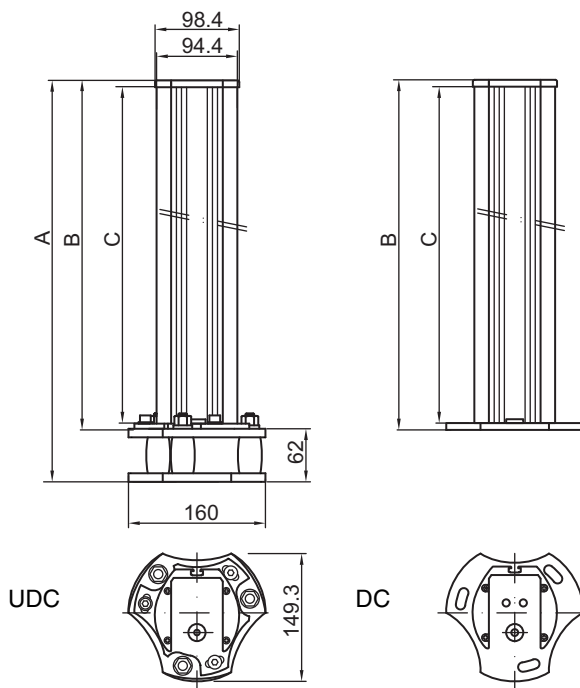
# UDC, DC DEVICE COLUMNS

## Features

- Easy vertical and axial adjustment of the safety sensors in the column
- Easy height adjustment of the built-in sensor with a supplied mounting set
- Additional protection of the front side with easily insertable PSC protective screens
- Automatic resetting after mechanical impacts with special spring elements in the base of the UDC Device Column

Please note the additional information at [www.leuze.com/en/sensor-accessories](http://www.leuze.com/en/sensor-accessories)

## Dimensional drawings



| Further information    | Page |
|------------------------|------|
| ● Ordering information | 500  |
| ● UMC mirror columns   | 510  |

## Dimensions table

| Article        | Dim. A | Dim. B | Dimension C |
|----------------|--------|--------|-------------|
| UDC/DC-900-S2  | 900    | 840    | 820         |
| UDC/DC-1000-S2 | 1060   | 1000   | 980         |
| UDC/DC-1300-S2 | 1360   | 1300   | 1280        |

Dimensions in mm

| Article        | Dim. A | Dim. B | Dimension C |
|----------------|--------|--------|-------------|
| UDC/DC-1600-S2 | 1660   | 1600   | 1580        |
| UDC/DC-1900-S2 | 1960   | 1900   | 1880        |
| UDC/DC-2500-S2 | 2560   | 2500   | 2480        |

[www.leuze.com/en/sensor-accessories/](http://www.leuze.com/en/sensor-accessories/)



## ACCESSORIES

### Ordering information

| Part no.   | Article       | Description  | Suitable for sensors with complete installation |
|--|---------------|--|---|
| <b>UDC Device Columns - clamp brackets for device installation, mounting kit for floor assembly included</b> |               |  |   |
| 549855   | UDC-900-S2    | Device Column with automatic resetting                 | up to total length of 740 mm                    |
| 549856   | UDC-1000-S2   | Device Column with automatic resetting                 | up to total length of 900 mm                    |
| 549852   | UDC-1300-S2   | Device Column with automatic resetting                 | up to total length of 1200 mm                   |
| 549853   | UDC-1600-S2   | Device Column with automatic resetting                 | up to total length of 1500 mm                   |
| 549854   | UDC-1900-S2   | Device Column with automatic resetting                 | up to total length of 1800 mm                   |
| 549857   | UDC-2500-S2   | Device Column with automatic resetting                 | up to total length of 2400 mm                   |
| <b>DC Device Column - clamp brackets for device installation included</b>                                    |               |  |   |
| 549620   | DC-900-S2     | Device Column with fixed mounting plate                | up to total length of 740 mm                    |
| 549621   | DC-1000-S2    | Device Column with fixed mounting plate                | up to total length of 900 mm                    |
| 549622   | DC-1300-S2    | Device Column with fixed mounting plate                | up to total length of 1200 mm                   |
| 549623   | DC-1600-S2    | Device Column with fixed mounting plate                | up to total length of 1500 mm                   |
| 549624   | DC-1900-S2    | Device Column with fixed mounting plate                | up to total length of 1800 mm                   |
| 549625   | DC-2500-S2    | Device Column with fixed mounting plate                | up to total length of 2400 mm                   |
| <b>Accessories</b>   |               |  |   |
| 426196   | MS-UDC/UMC-S2 | Replacement column base with spring elements           |   |
| 424417   | BT-2P40       | 2 clamp brackets for device installation in the column | incl. screws and sliding blocks                 |
| 426185   | PSC-900-S2    | 2 protective screens for UDC/DC-900-S2 Device Column   | Length: 820 mm                                  |
| 426186   | PSC-1000-S2   | 2 protective screens for UDC-/DC1000-S2 Device Column  | Length: 980 mm                                  |
| 426187   | PSC-1300-S2   | 2 protective screens for UDC/DC-1300-S2 Device Column  | Length: 1280 mm                                 |
| 426188   | PSC-1600-S2   | 2 protective screens for UDC/DC-1600-S2 Device Column  | Length: 1580 mm                                 |
| 426189   | PSC-1900-S2   | 2 protective screens for UDC/DC-1900-S2 Device Column  | Length: 1880 mm                                 |
| 426190   | PSC-2500-S2   | 2 protective screens for UDC/DC-2500-S2 Device Column  | Length: 2480 mm                                 |

\*) Please note that the range of the safety sensor is reduced by approx. 10% per screen with the use of protective screens.

# UDC, DC DEVICE COLUMNS

Safety Switches

Safety Locking  
Devices

Safety Command  
Devices

Safety Relays

Programmable  
Safety Controllers

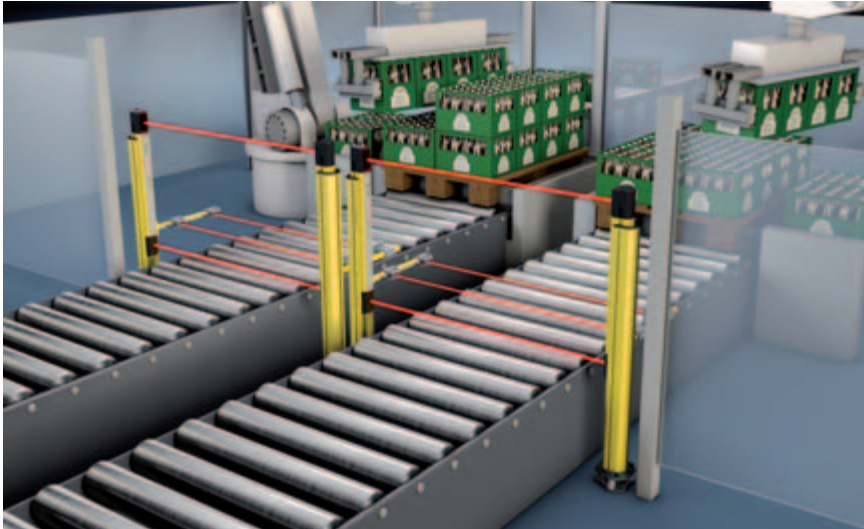
**Accessories**

Glossary

Product Finder

## ACCESSORIES

### Muting Sensor Sets



*Pre-adjusted Muting Sensor Sets installed on Device Columns for guarding a transport material exit area*

Access guarding with optical protective devices with a muting function frequently consists of numerous components that must be electrically and mechanically well-harmonized with one another, to guarantee both safety and availability. Muting Sensor Sets fulfill this requirement and also greatly reduce installation and start-up times. Completely pre-mounted for 2-sensor and 4-sensor muting applications, they can be connected directly to the MLD Multiple Light Beam Safety Devices via a terminal box and are immediately ready to use.

## MUTING SENSOR SETS

### Features

Pre-mounted complete sets for 2-sensor and 4-sensor muting applications based on reflection light beam devices

Optimized for 2- or 3-beam transceiver systems by passive reflectors on each side

Easy installation, quick vertical height adjustment and horizontal alignment in just a few steps

Mounting directly on MLD Multiple Light Beam Safety Devices or UDC/DC Device Columns

Please note the additional information at [www.leuze.com/en/sensor-accessories](http://www.leuze.com/en/sensor-accessories).



| Further information    | Page |
|------------------------|------|
| ● Ordering information | 504  |
| ● Dimensional drawings | 505  |
| ● DC/UDC               | 498  |

## ACCESSORIES

### Ordering information

| Construction | Slot mounting for MLD device |               |  |                                     |
|--------------|------------------------------|---------------|--|-------------------------------------|
|              | Range of muting sensors: 4 m |               |  |                                     |
|              | Part no.                     | Article       | Description  | Muting type                         |
| L-shape A    | 426490                       | Set-AC-ML-2SA | Muting Sensor Set, pre-mounted with 2 reflection light beam devices and 2 reflectors | Sequence controlled 2-sensor muting |
| L-shape B    | 426491                       | Set-AC-ML-2SB | Muting Sensor Set, pre-mounted with 2 reflection light beam devices and 2 reflectors | Sequence controlled 2-sensor muting |
| T-shape      | 426494                       | Set-AC-MT-2S  | Muting Sensor Set, pre-mounted with 2 reflection light beam devices and 2 reflectors | Timing controlled 2-sensor muting   |
|              | 426492                       | Set-AC-MT-4S  | Muting Sensor Set, pre-mounted with 4 reflection light beam devices and 4 reflectors | Timing controlled 4-sensor muting   |

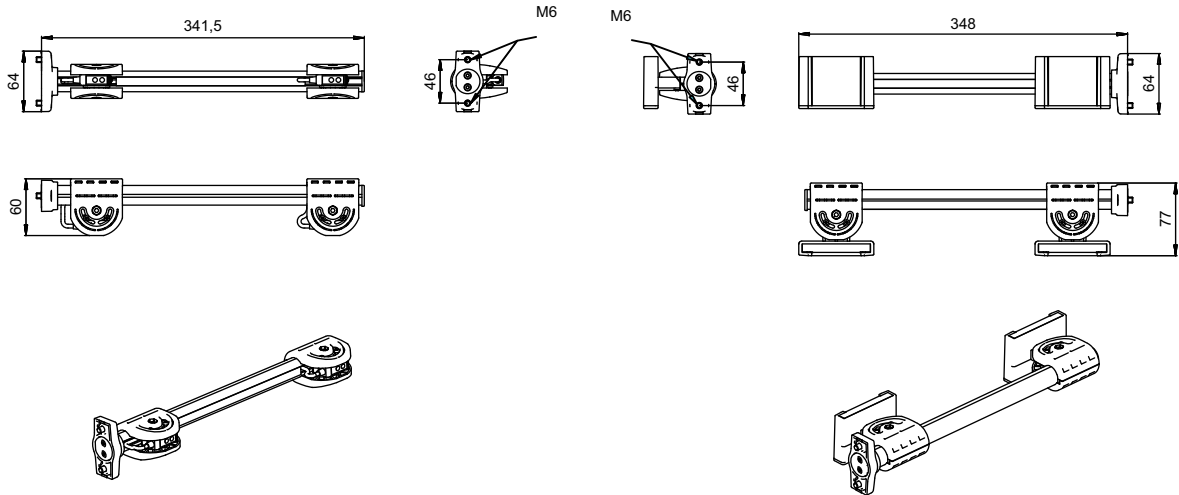
| Construction | Slot mounting for MLD and MLC devices |                |  |                                     |
|--------------|---------------------------------------|----------------|--|-------------------------------------|
|              | Range of muting sensors: 8 m          |                |  |                                     |
|              | Part no.                              | Article        | Description  | Muting type                         |
| L-shape A    | 426520                                | Set-AC-MLX-2SA | Muting Sensor Set, pre-mounted with 2 reflection light beam devices and 2 reflectors | Sequence controlled 2-sensor muting |
| L-shape B    | 426521                                | Set-AC-MLX-2SB | Muting Sensor Set, pre-mounted with 2 reflection light beam devices and 2 reflectors | Sequence controlled 2-sensor muting |
| T-shape      | 426524                                | Set-AC-MTX-2S  | Muting Sensor Set, pre-mounted with 2 reflection light beam devices and 2 reflectors | Timing controlled 2-sensor muting   |
|              | 426522                                | Set-AC-MTX-4S  | Muting Sensor Set, pre-mounted with 4 reflection light beam devices and 4 reflectors | Timing controlled 4-sensor muting   |

| Construction | Device Column mounting for MLD and MLC, sensor connecting cable: 2 m |                  |  |                                     |
|--------------|--|------------------|--|-------------------------------------|
|              | Range of muting sensors: 8 m   |                  |  |                                     |
|              | Part no.   | Article          | Description  | Muting type                         |
| L-shape A    | 426526   | Set-AC-MLX.2-2SA | Muting Sensor Set, pre-mounted with 2 reflection light beam devices and 2 reflectors | Sequence controlled 2-sensor muting |
| L-shape B    | 426527   | Set-AC-MLX.2-2SB | Muting Sensor Set, pre-mounted with 2 reflection light beam devices and 2 reflectors | Sequence controlled 2-sensor muting |
| T-shape      | 426529   | Set-AC-MTX.2-2S  | Muting Sensor Set, pre-mounted with 2 reflection light beam devices and 2 reflectors | Timing controlled 2-sensor muting   |
|              | 426528   | Set-AC-MTX.2-4S  | Muting Sensor Set, pre-mounted with 4 reflection light beam devices and 4 reflectors | Timing controlled 4-sensor muting   |

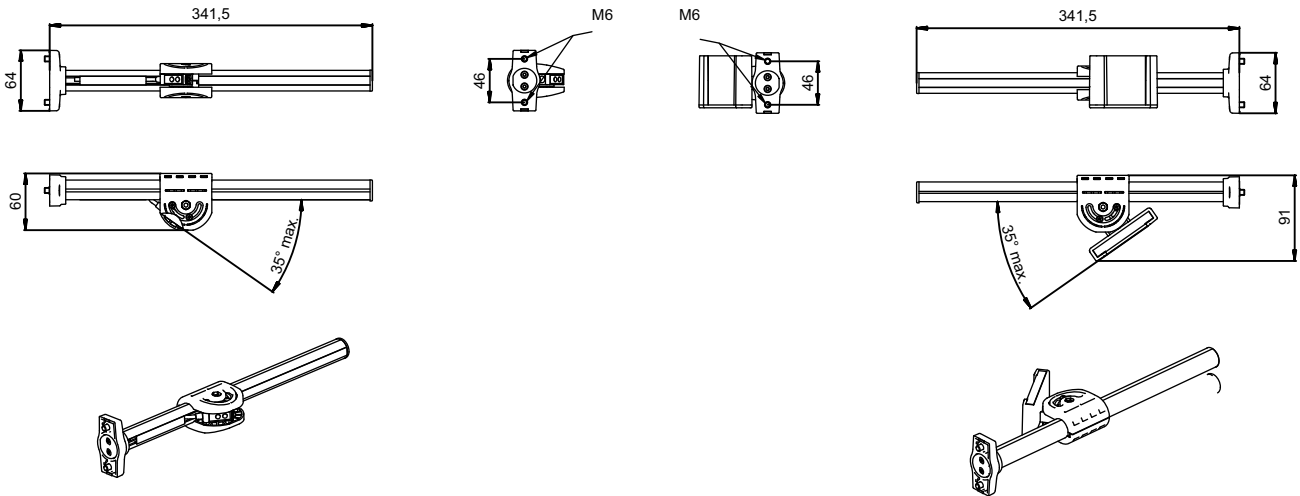
| Part no.                             | Article    | Description  | Mounting                            |
|--------------------------------------|------------|--|-------------------------------------|
| <b>Additional muting accessories</b> |            |  |                                     |
| 426371                               | MSSU-H46   | Muting Sensor Set incl. mounting bracket and reflection light scanner, includes MMS-A-350 Muting Mounting System with 2 HRT 46 diffuse reflection light scanners, Y distributors for electrical parallel connection of both light scanners | Mounting on Device Column           |
| 430305                               | MMS-A-2N55 | Muting Mounting System for slot mounting for 2 sensors, with angled rods, 60x130x12 mm for Light Beam Device mounting systems  | Mounting on device or Device Column |

**Dimensional drawings**

**Muting Sensor Sets**



*Muting Sensor Set for timing controlled 4-sensor muting with PRK 3B (range 4 m) or PRK 25B (range 8 m) muting sensors*



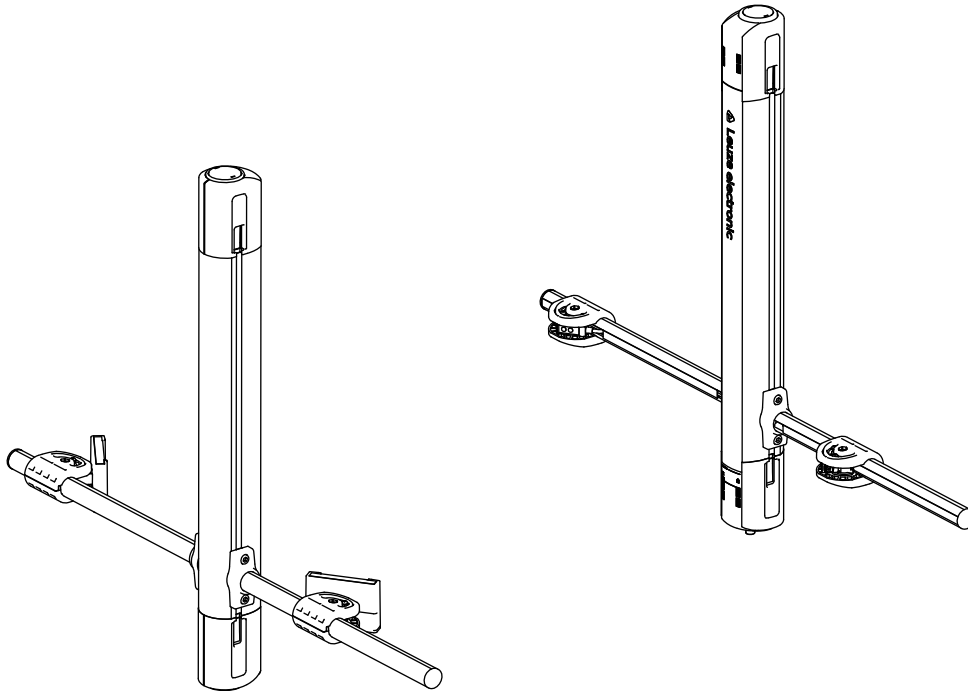
*Muting Sensor Set for timing controlled 2-sensor muting with PRK 3B (range 4 m) or PRK 25B (range 8 m) muting sensors*

Dimensions in mm

## ACCESSORIES

### Assembly drawings

#### Muting Sensor Set, mounted on safety sensor



Set-AC-MT-2S mounted on MLD 500 Multiple Light Beam Safety Device

UDC, DC  
Device Columns  
p. 498

**Muting Sensor Sets**  
p. 502

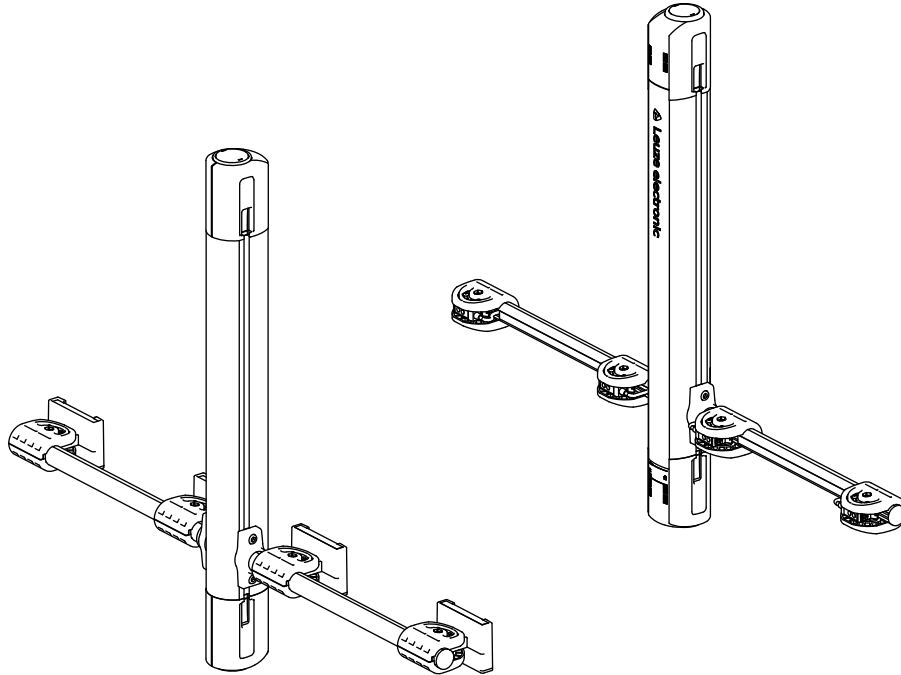
UMC deflecting mirror  
columns  
p. 510, 514

US Deflecting Mirrors  
p. 512

UM60 Deflecting  
Mirrors  
p. 516

## Assembly drawings

### Muting Sensor Set



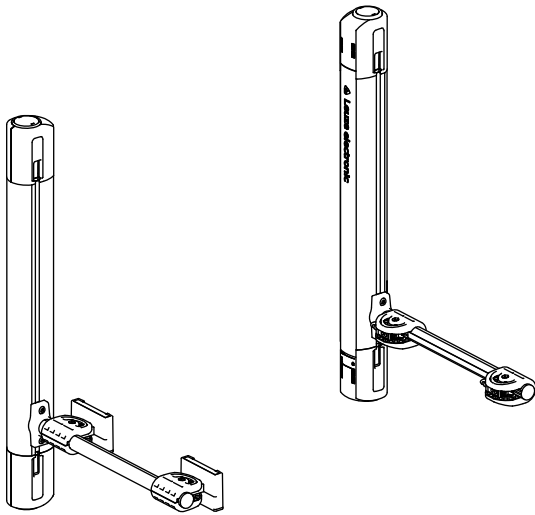
Set-AC-MT-4S (with PRK 3B muting sensors, range 4 m) or Set-AC-MTX-4S (with PRK 25B muting sensors, range 8 m), installed on MLD 500 Multiple Light Beam Safety Device



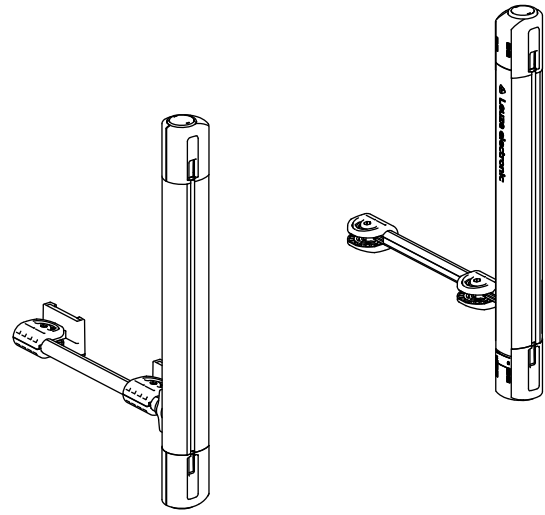
## ACCESSORIES

### Assembly drawings

#### Muting Sensor Set



L-shape A, e.g. Set-AC-ML-2SA  
(transceiver/receiver right)

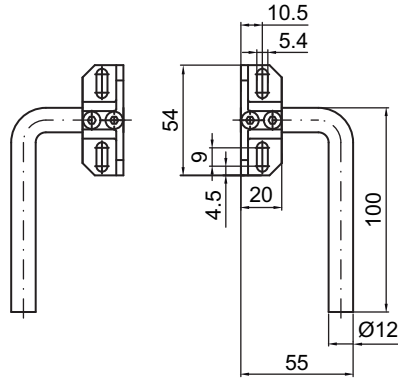


L-shape B, e.g. Set-AC-ML-2SB  
(transceiver/receiver right)

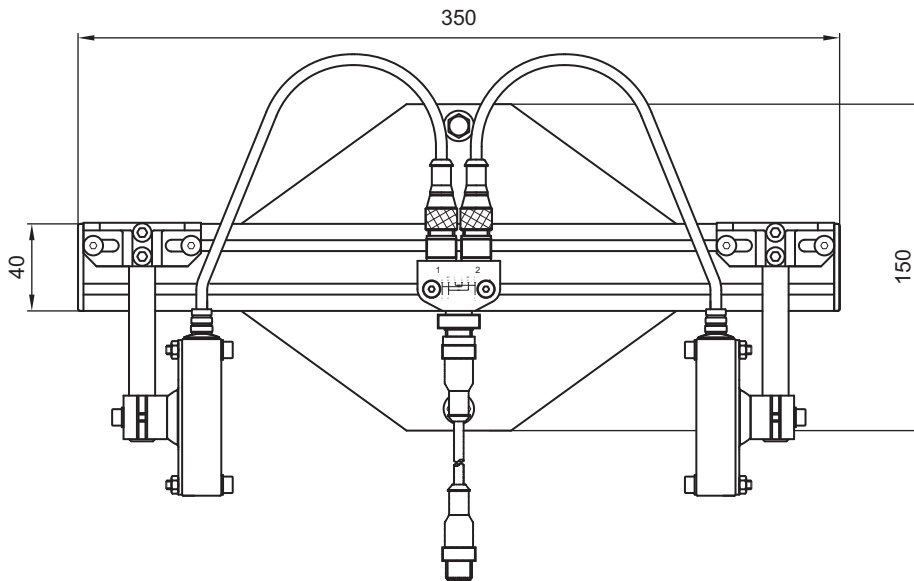
*Set-AC-ML mounted on MLD 500 Multiple Light Beam Safety Device; depending on the alignment of the Muting Sensor Set, either Set-AC-ML(X)-2SA or Set-AC-ML(X)-2SB is used*

**Dimensional drawings**

**MMS-A-2N55 Muting Mounting System**



**MSSU-H46 Muting Mounting System**

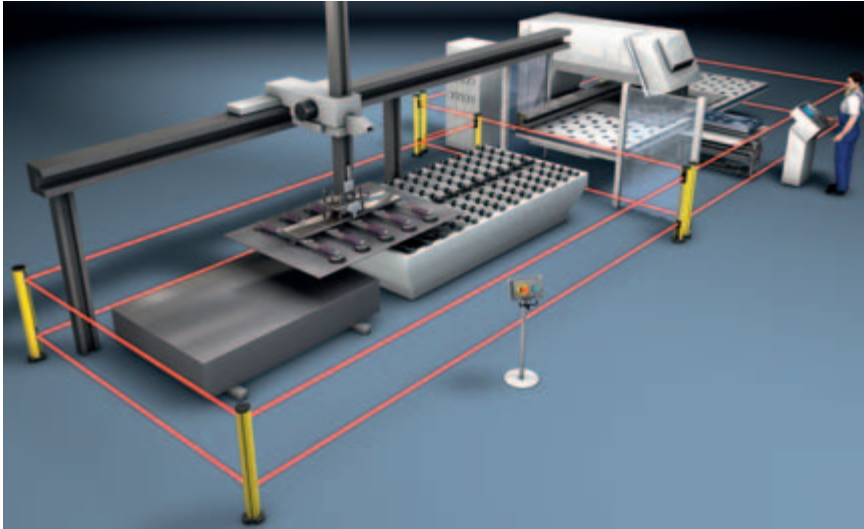


Dimensions in mm

[www.leuze.com/en/sensor-accessories/](http://www.leuze.com/en/sensor-accessories/)

## ACCESSORIES

### UMC Deflecting Mirror Columns / Individual Mirrors



Multiple side access guarding with Multiple Light Beam Safety Devices and beam deflection with Deflecting Mirror Columns

The use of UMC Deflecting Mirror Columns enables cost-effective Light Beam Device solutions for multiple side danger zone guarding. The beam deflecting units are equipped with 2, 3 or 4 mirror units that each deflect the individual light beams of Multiple Light Beam Safety Devices. They enable precise vertical and axial alignment of the individual mirrors in the direction of the next deflecting mirror column or light beam receiver. Spring elements in the base of the mirror columns ensure automatic resetting to the initial position after mechanical impacts (blows, knocks).

#### Ordering information

| Part no.   | Article       | Description  | Suitable for Multiple Light Beam Safety Devices |
|--|---------------|--|---|
| <b>UMC mirror columns with automatic reset function - floor anchor and mounting bracket included</b> |               |  |   |
| 549790   | UMC-902-S2    | Mirror column with 2 individual mirrors for Multiple Light Beam Safety Devices | with beam distance: 500 mm;<br>2-beam           |
| 549791   | UMC-1002-S2   | Mirror column with 2 individual mirrors for Multiple Light Beam Safety Devices | with beam distance: 500 mm;<br>2-beam           |
| 549792   | UMC-1303-S2   | Mirror column with 3 individual mirrors for Multiple Light Beam Safety Devices | with beam distance: 400 mm;<br>3-beam           |
| 549793   | UMC-1304-S2   | Mirror column with 4 individual mirrors for Multiple Light Beam Safety Devices | with beam distance: 300 mm;<br>4-beam           |
| 549796   | UMC-1603-S2   | Mirror column with 3 individual mirrors for Multiple Light Beam Safety Devices | with beam distance: 400 mm;<br>3-beam           |
| <b>Accessories</b>   |               |  |   |
| 426195   | UMC-Mirror-S2 | Replacement mirror unit for mirror columns with individual mirrors             |   |
| 426196   | MS-UDC/UMC-S2 | Replacement column base with spring elements for automatic resetting           |   |

UDC, DC  
Device Columns  
p. 498

Muting Sensor Sets  
p. 502

**UMC deflecting mirror  
columns  
p. 510, 514**

US Deflecting Mirrors  
p. 512

UM60 Deflecting  
Mirrors  
p. 516

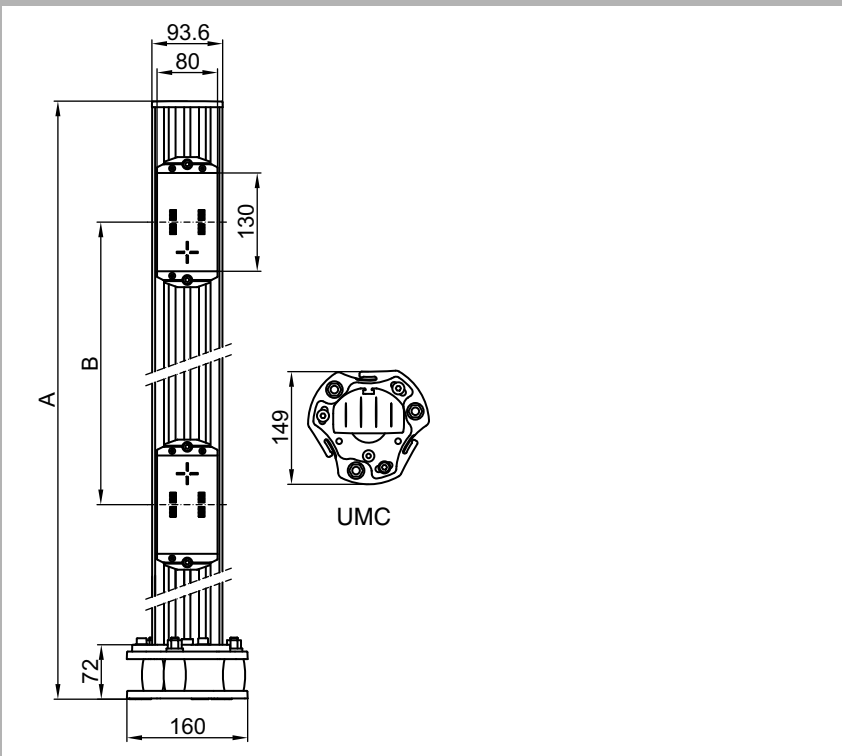
# UMC DEFLECTING MIRROR COLUMNS/INDIVIDUAL MIRRORS

## Features

- Individual mirrors can be separately exchanged, aligned and adjusted in height
- Easy installation, quick vertical and axial alignment in just a few steps
- Protection of the individual mirror thanks to robust profile construction in high quality design
- Automatic resetting after mechanical impacts with special spring elements in base

Please note the additional information at [www.leuze.com/en/sensor-accessories](http://www.leuze.com/en/sensor-accessories).

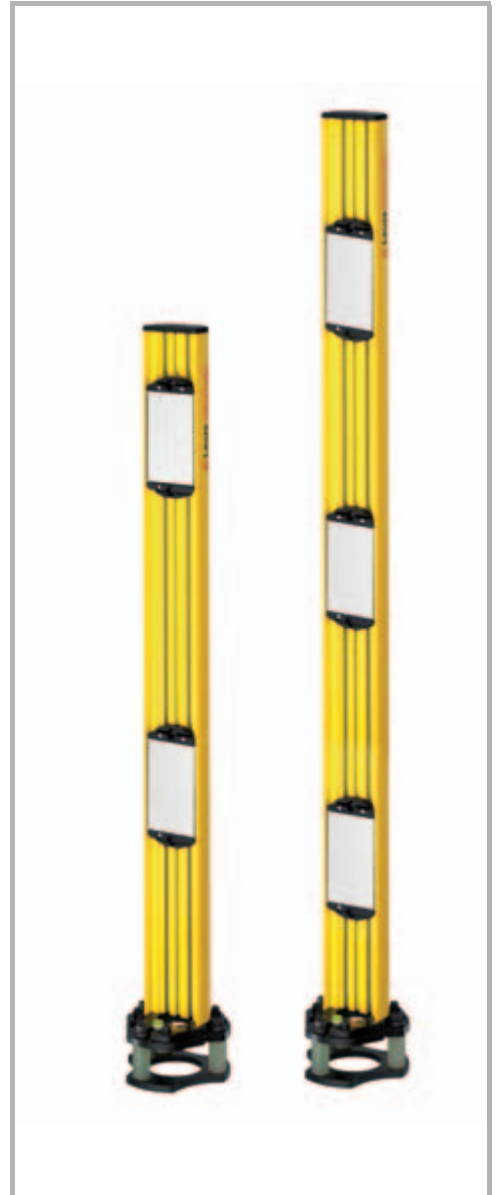
## Dimensional drawings



### UMC dimensions table

| Article     | Dim. A | Dim. B |
|-------------|--------|--------|
| UMC-902-S2  | 960    | 500    |
| UMC-1002-S2 | 1060   | 500    |
| UMC-1303-S2 | 1360   | 400    |
| UMC-1304-S2 | 1360   | 300    |
| UMC-1603-S2 | 1660   | 400    |

Dimensions in mm

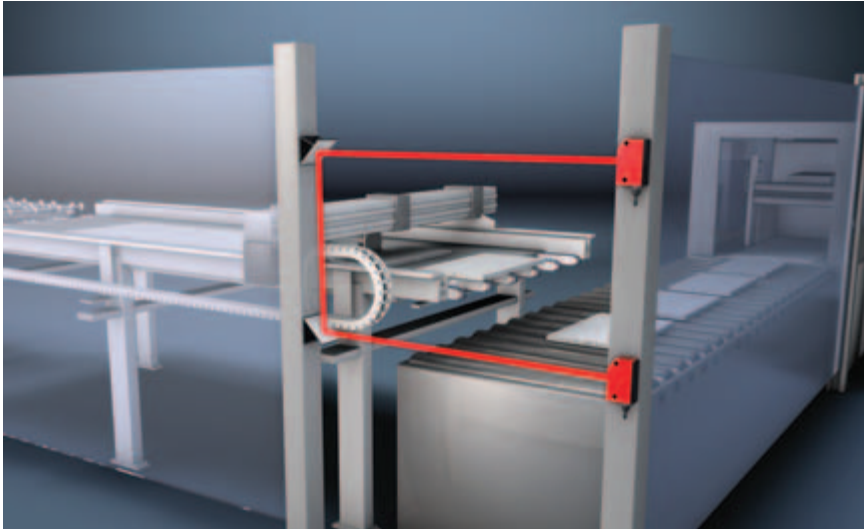


### Further information

- |                        | Page |
|------------------------|------|
| ● Ordering information | 510  |
| ● UDC, DC              | 498  |
| ● Laser alignment aids | 538  |

## ACCESSORIES

### US Deflecting Mirrors



L-shape and 2-beam guardings can be implemented with the US Deflecting Mirror series in combination with Single Light Beam Safety Devices with a 90° beam deflection. This enables a reduction in the number of Light Beam Devices and therefore the wiring expenditure. The stepless 3-axis alignment of the mirror carrier enables a fast and precise alignment of the mirror in the 3 axes.

*Access guarding with Single Light Beam Safety Devices and US Deflecting Mirrors*

### Ordering information

| Part no. | Article | Description   |
|----------|---------|---|
| 50000670 | US 1    | Deflecting Mirror for tube mounting                 |
| 50017434 | US 2    | Deflecting Mirror, rotates for profile mounting     |
| 50019628 | US 2.1  | Deflecting Mirror, for profile mounting             |
| 50023174 | US 2.2  | Deflecting Mirror, with straps for profile mounting |

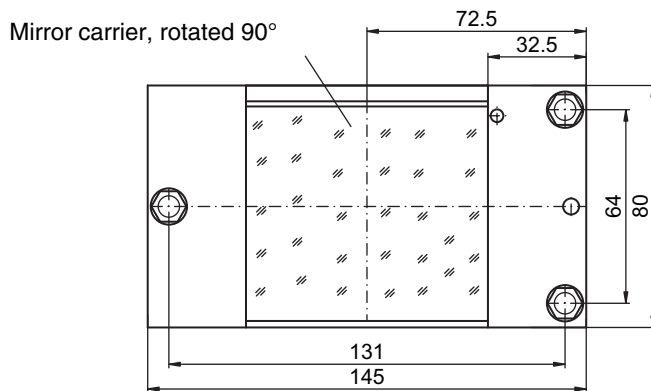
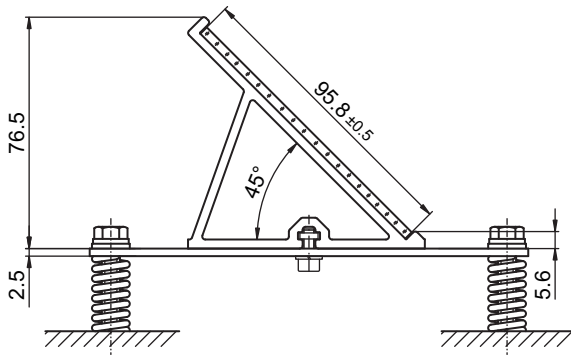
# US DEFLECTING MIRRORS

## Features

|  | US 2 | US 2.1 | US 2.2 |
|--|------|--------|--------|
| Precise alignment in all 3 axes                | ●    |        |        |
| Glass mirror in extruded aluminum profile      | ●    | ●      | ●      |
| Mirror carrier on mounting plate, 90° rotation | ●    |        |        |

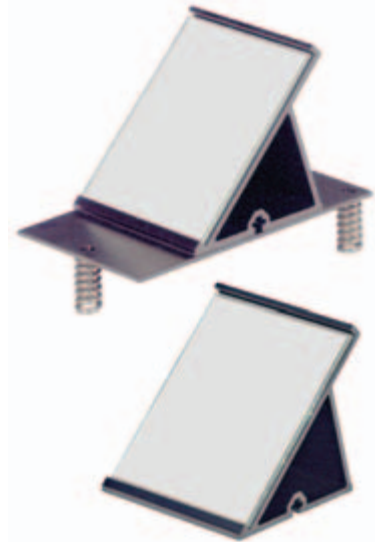
Please note the additional information at [www.leuze.com/en/sensor-accessories](http://www.leuze.com/en/sensor-accessories).

## Dimensional drawings



US 2 Deflecting Mirror

Dimensions in mm

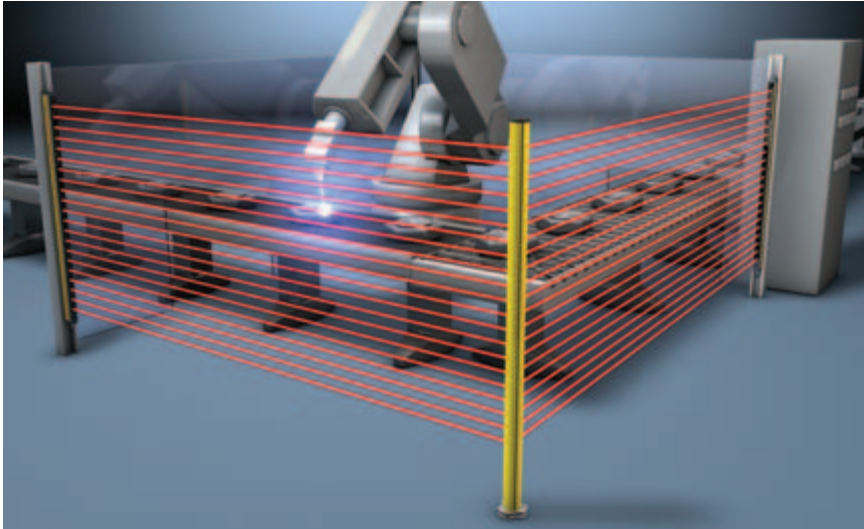


## Further information

- |                                    | Page |
|------------------------------------|------|
| ● Ordering information             | 512  |
| ● Single Light Beam Safety Devices | 244  |

## ACCESSORIES

### UMC Deflecting Mirror Columns/continuous mirror



Multiple side access guarding with Safety Light Curtain and beam deflection with mirror columns

The UMC deflecting mirror columns feature a continuous plane mirror for beam deflection along the entire column height. In combination with Safety Light Curtains, cost-effective multiple side point of operation and access guardings can be implemented. The mirror columns enable precise vertical and axial mirror alignment. Spring elements in the base of the deflecting mirror columns ensure automatic resetting to the initial position after mechanical impacts (blows, knocks).

| Ordering information   |               |  |  |
|--|---------------|--|--|
| Part no.   | Article       | Description  | Suitable for Safety Light Curtains           |
| <b>UMC mirror columns with automatic reset function - floor anchor and mounting bracket included</b> |               |  |  |
| 549780   | UMC-1000-S2   | Mirror columns for Safety Light Curtains with continuous mirror      | with a protective field height up to 900 mm  |
| 549781   | UMC-1300-S2   | Mirror columns for Safety Light Curtains with continuous mirror      | with a protective field height up to 1200 mm |
| 549782   | UMC-1600-S2   | Mirror columns for Safety Light Curtains with continuous mirror      | with a protective field height up to 1500 mm |
| 549783   | UMC-1900-S2   | Mirror columns for Safety Light Curtains with continuous mirror      | with a protective field height up to 1800 mm |
| <b>Accessories</b>   |               |  |  |
| 426196   | MS-UDC/UMC-S2 | Replacement column base with spring elements for automatic resetting |  |

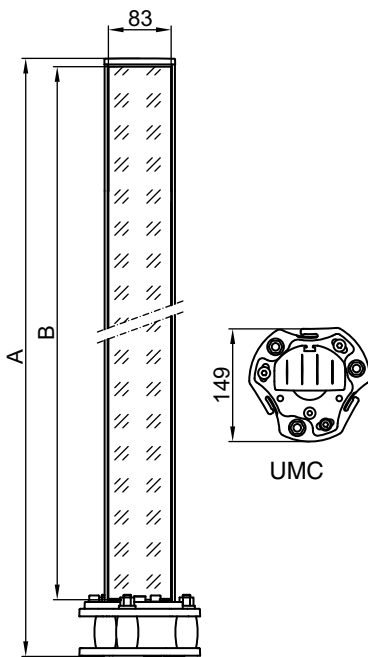
# UMC WITH CONTINUOUS MIRROR

## Features

- Continuous flat mirror surface for beam deflection of Safety Light Curtains
- Robust profile construction in high quality design
- Easy installation, quick vertical and axial alignment in just a few steps
- Automatic resetting after mechanical impacts with special spring elements in base

Please note the additional information at [www.leuze.com/en/sensor-accessories](http://www.leuze.com/en/sensor-accessories).

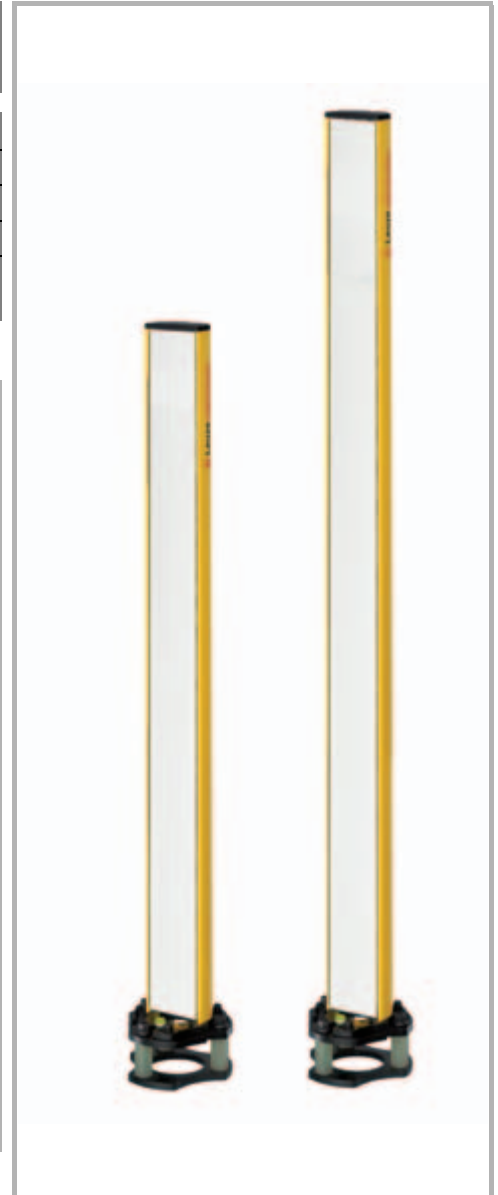
## Dimensional drawings



### UMC dimensions table

| Article  | Dim. A | Dim. B |
|----------|--------|--------|
| UMC-1000 | 1060   | 974    |
| UMC-1300 | 1360   | 1274   |
| UMC-1600 | 1660   | 1574   |
| UMC-1900 | 1960   | 1874   |

Dimensions in mm



### Further information

| Further information    | Page |
|------------------------|------|
| ● Ordering information | 514  |
| ● UDC, DC              | 498  |
| ● Laser alignment aids | 538  |



## ACCESSORIES

### UM60 Deflecting Mirrors



The combination of Safety Light Curtains and UM60 Deflecting Mirrors enables cost-effective, multiple side danger zone guarding, e.g. at manual feed-in areas on machinery. The UM60 Deflecting Mirrors feature a very slender mirror carrier. A very precise and easy mounting is possible with sliding blocks or swivel mounting brackets (accessories).

*Multiple side point of operation guarding on a press with Safety Light Curtains and beam deflection with Deflecting Mirrors*

#### Ordering information

| Deflecting Mirror |           | Suitable for Safety Light Curtains           |
|-------------------|-----------|--|
| Part no.          | Article   |  |
| 529601            | UM60-150  | with a protective field height up to 150 mm  |
| 529602            | UM60-225  | with a protective field height up to 225 mm  |
| 529603            | UM60-300  | with a protective field height up to 300 mm  |
| 529604            | UM60-450  | with a protective field height up to 450 mm  |
| 529606            | UM60-600  | with a protective field height up to 600 mm  |
| 529607            | UM60-750  | with a protective field height up to 750 mm  |
| 529609            | UM60-900  | with a protective field height up to 900 mm  |
| 529610            | UM60-1050 | with a protective field height up to 1050 mm |
| 529612            | UM60-1200 | with a protective field height up to 1200 mm |
| 529613            | UM60-1350 | with a protective field height up to 1350 mm |
| 529615            | UM60-1500 | with a protective field height up to 1500 mm |
| 529616            | UM60-1650 | with a protective field height up to 1650 mm |
| 529618            | UM60-1800 | with a protective field height up to 1800 mm |

UDC, DC  
Device Columns  
p. 498

Muting Sensor Sets  
p. 502

UMC deflecting mirror  
columns  
p. 510, 514

US Deflecting Mirrors  
p. 512

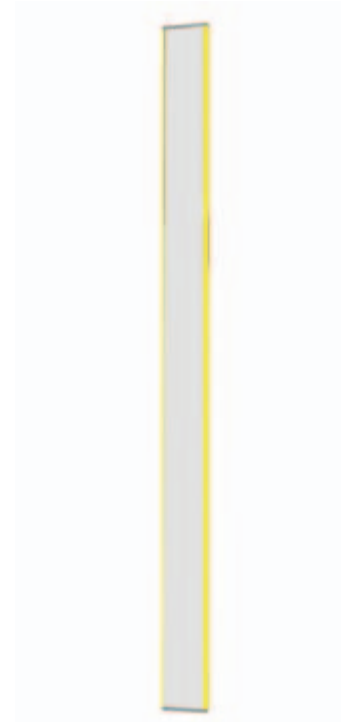
**UM60 Deflecting  
Mirrors  
p. 516**

## UM60 DEFLECTING MIRRORS

### Areas of application and ordering information

#### Features

|   |
|---|
| Continuous mirror surface for beam deflection of Safety Light Curtains  |
| Robust aluminum profile housing   |
| Slender and flat construction, 60 mm wide   |
| Easy mounting, fast alignment with mounting angles (in the preferred angles, 0°, 45° and 90°, as well as swiveling) |



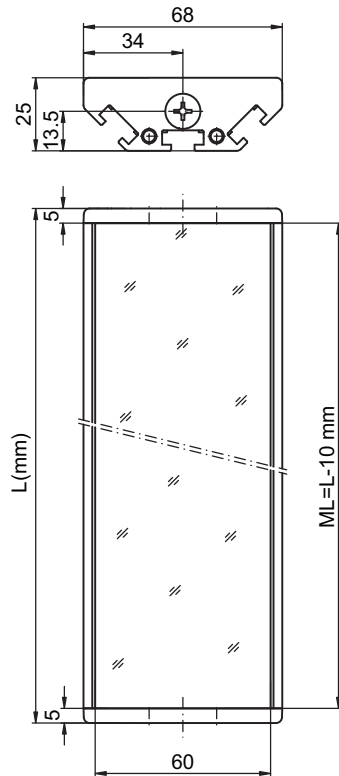
#### Further information

|  | Page  |
|--|-------|
| ● Ordering information                                   | ● 516 |
| ● Laser alignment aids                                   | ● 538 |
| ● Dimensional drawings: Accessories, see BT-L and BT-SSD | ● 183 |

## ACCESSORIES

### Areas of application and ordering information

#### Dimensional drawings



#### Dimensions table

| Article   | Mirror length, ML | Total length, L |
|-----------|-------------------|-----------------|
| UM60-150  | 210               | 220             |
| UM60-225  | 285               | 295             |
| UM60-300  | 360               | 370             |
| UM60-450  | 510               | 520             |
| UM60-600  | 660               | 670             |
| UM60-750  | 810               | 820             |
| UM60-900  | 960               | 970             |
| UM60-1050 | 1110              | 1120            |
| UM60-1200 | 1260              | 1270            |
| UM60-1350 | 1410              | 1420            |
| UM60-1500 | 1560              | 1570            |
| UM60-1650 | 1710              | 1720            |
| UM60-1800 | 1860              | 1870            |

Dimensions in mm

#### UM60 – Accessories

| Part no. | Article     | Description   |
|----------|-------------|---|
| 429058   | BT-2SSD     | Mounting bracket set, consisting of 2 BT-SSD mounting brackets, swiveling with shock absorber   |
| 429049   | BT-2SSD-270 | Mounting bracket set, consisting of 2 BT-SSD-270 mounting brackets, swiveling with shock absorber (recommended from a mirror length of 1500 mm) |
| 560120   | BT-2S       | Mounting bracket set consisting of 2 L-type brackets incl. 2 screws   |
| 430105   | BT-2UM60    | Mounting bracket set consisting of 2 UM60 brackets incl. screws   |

# UM60 DEFLECTING MIRRORS

Safety Switches

Safety Locking  
Devices

Safety Command  
Devices

Safety Relays

Programmable  
Safety Controllers

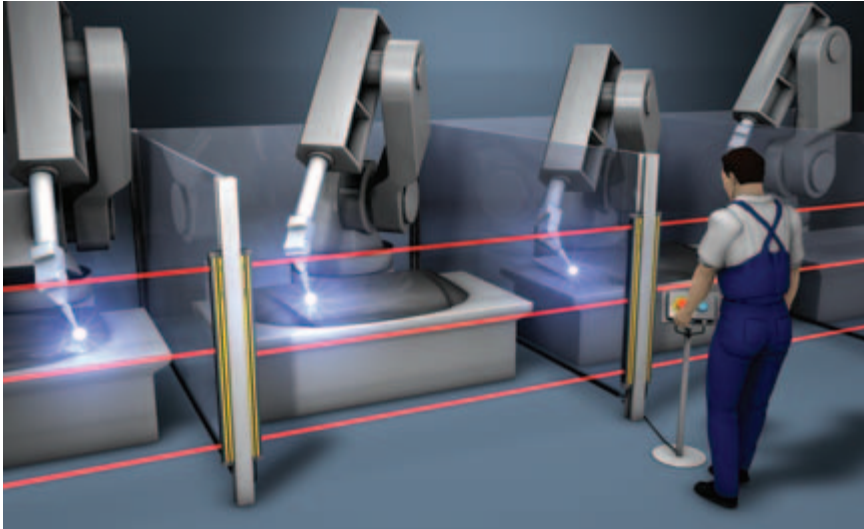
**Accessories**

Glossary

Product Finder

# ACCESSORIES

## Protective Screens



Protective screens reliably protect safety sensors from welding sparks, near welding lines, for example

Protective screens mounted on Safety Light Curtains and Multiple Light Beam Safety Devices prevent the device's front screen from being damaged. These optional protective screens provide investment security, as the screens provide simple, flexible, cost-effective and efficient protection for sensors throughout their lifespan. The protective screens can be easily exchanged as required.

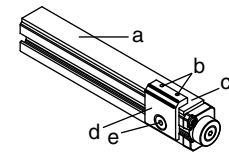
### Features

- **Protective window material: PMMA, clear**
- **Effective protection, easy to install, robust**
- **Cost-effective standard accessories**
- **Damaged screens are easy to swap out**
- **Protective screen lengths ranging from 300 mm to 1800 mm**
- **Strong and sturdy installation with two or three supports**

### Areas of application and ordering information

| Protective Screens |            |         | for Safety Light Curtains | Support  |
|--------------------|------------|---------|---------------------------|--|
| Part no.           | Article    | Length  | MLC 500, MLC 300          |  |
| 347070             | MLC-PS150  | 148 mm  | 150 mm                    | 429038<br>MLC-2PSF set,<br>consisting of<br>two supports |
| 347071             | MLC-PS225  | 223 mm  | 225 mm                    |  |
| 347072             | MLC-PS300  | 298 mm  | 300 mm                    |  |
| 347073             | MLC-PS450  | 448 mm  | 450 mm                    |  |
| 347074             | MLC-PS600  | 598 mm  | 600 mm                    |  |
| 347075             | MLC-PS750  | 748 mm  | 750 mm                    |  |
| 347076             | MLC-PS900  | 898 mm  | 900 mm                    |  |
| 347077             | MLC-PS1050 | 1048 mm | 1050 mm                   |  |
| 347078             | MLC-PS1200 | 1198 mm | 1200 mm                   |  |
| 347079             | MLC-PS1350 | 1348 mm | 1350 mm                   |  |
| 347080             | MLC-PS1500 | 1498 mm | 1500 mm                   |  |
| 347081             | MLC-PS1650 | 1648 mm | 1650 mm                   |  |
| 347082             | MLC-PS1800 | 1798 mm | 1800 mm                   |  |

### Assembly drawing



- a = Protective screen
- b = Grub screw, M4x8
- c = Transmitter or receiver
- d = Disk clamp
- e = Countersunk screw M6x10 and sliding block

# PROTECTIVE SCREENS

## Areas of application and ordering information

| Protective Screens |              |         | for Safety Light Curtains |  | Support   |
|--------------------|--------------|---------|---------------------------|--|---|
| Part no.           | Article      | Length  | COMPACTplus               |  |   |
| 346503             | PS-C-CP-300  | 340 mm  | 300 mm                    |  | 429044<br>AC-PS-MB-C-CP-1<br>Set consisting of two supports   |
| 346504             | PS-C-CP-450  | 490 mm  | 450 mm                    |  |   |
| 346506             | PS-C-CP-600  | 640 mm  | 600 mm                    |  |   |
| 346507             | PS-C-CP-750  | 790 mm  | 750 mm                    |  |   |
| 346509             | PS-C-CP-900  | 940 mm  | 900 mm                    |  |   |
| 346510             | PS-C-CP-1050 | 1090 mm | 1050 mm                   |  |   |
| 346512             | PS-C-CP-1200 | 1240 mm | 1200 mm                   |  | 429045<br>AC-PS-MB-C-CP-2<br>Set consisting of three supports |
| 346513             | PS-C-CP-1350 | 1390 mm | 1350 mm                   |  |   |
| 346515             | PS-C-CP-1500 | 1540 mm | 1500 mm                   |  |   |
| 346516             | PS-C-CP-1650 | 1690 mm | 1650 mm                   |  |   |
| 346518             | PS-C-CP-1800 | 1840 mm | 1800 mm                   |  |   |

\*) Not used for models with integrated sensor connection field

| Protective Screens |            |           | for Safety Light Curtains |                  | Support   |
|--------------------|------------|-----------|---------------------------|------------------|---|
| Part no.           | Article    | Length    | SOLID-2/SOLID-2E          | SOLID-4/SOLID-4E |   |
| 346803             | PS-SD-300  | 341.5 mm  | 300 mm                    | 300 mm           | 429042<br>AC-PS-MB-SD-1<br>Set consisting of two supports   |
| 346804             | PS-SD-450  | 491.5 mm  | 450 mm                    | 450 mm           |   |
| 346806             | PS-SD-600  | 641.5 mm  | 600 mm                    | 600 mm           |   |
| 346807             | PS-SD-750  | 791.5 mm  | 750 mm                    | 750 mm           |   |
| 346809             | PS-SD-900  | 941.5 mm  | 900 mm                    | 900 mm           |   |
| 346810             | PS-SD-1050 | 1091.5 mm | 1050 mm                   | 1050 mm          |   |
| 346812             | PS-SD-1200 | 1241.5 mm | 1200 mm                   | 1200 mm          | 429043<br>AC-PS-MB-SD-2<br>Set consisting of three supports |
| 346813             | PS-SD-1350 | 1391.5 mm | 1350 mm                   | 1350 mm          |   |
| 346815             | PS-SD-1500 | 1541.5 mm | 1500 mm                   | 1500 mm          |   |
| 346816             | PS-SD-1650 | 1691.5 mm | 1650 mm                   | 1650 mm          |   |
| 346818             | PS-SD-1800 | 1841.5 mm | 1800 mm                   | 1800 mm          |   |

**i** Please note that the range of the Safety Light Curtain is reduced by approx. 10% per screen with the use of protective screens. If, for example, transmitters and receivers are protected by one protective screen each with a SOLID-4E with 40 mm resolution and a standard range of 20 m, the resulting maximum range for the entire system is 16 m.

## ACCESSORIES

### Connection cables – Areas of application and ordering information

Here you will find connection cables specifically for our sensors for quick and easy start-up



| Part no.   | Article              | Description          |       |                      | Suitable for        |
|--|----------------------|----------------------|-------|----------------------|---------------------|
| Device connection cables                         |                      | Socket               | Cable | Plug                 |                     |
| <b>Connection cables for AS-i Safety sensors</b> |                      |                      |       |                      |                     |
| 548361   | CB-M12-1000-5GF/GM   | M12, straight, 5-pin | 1 m   | M12, straight, 5-pin | AS-i Safety sensors |
| 548362   | CB-M12-2000-5GF/GM   | M12, straight, 5-pin | 2 m   | M12, straight, 5-pin | AS-i Safety sensors |
| 678031   | CB-M12-1000S-5GF/GM  | M12, straight, 5-pin | 1 m   | M12, straight, 5-pin | AS-i Safety sensors |
| 678033   | CB-M12-2500S-5GF/GM  | M12, straight, 5-pin | 2.5 m | M12, straight, 5-pin | AS-i Safety sensors |
| 678035   | CB-M12-5000S-5GF/GM  | M12, straight, 5-pin | 5 m   | M12, straight, 5-pin | AS-i Safety sensors |
| 678040   | CB-M12-10000S-5GF/GM | M12, straight, 5-pin | 10 m  | M12, straight, 5-pin | AS-i Safety sensors |
| 678045   | CB-M12-15000S-5GF/GM | M12, straight, 5-pin | 15 m  | M12, straight, 5-pin | AS-i Safety sensors |
| 548502   | CB-M12-2000S-8GF/GM  | M12, straight, 8-pin | 2 m   | M12, straight, 8-pin | AS-i Safety sensors |
| 548505   | CB-M12-5000S-8GF/GM  | M12, straight, 8-pin | 5 m   | M12, straight, 8-pin | AS-i Safety sensors |
| 548510   | CB-M12-10000S-8GF/GM | M12, straight, 8-pin | 10 m  | M12, straight, 8-pin | AS-i Safety sensors |

# CONNECTION CABLES

## Connection cables – Areas of application and ordering information

| Part no.   | Article           | Description          |       |          | Suitable for              |
|--|-------------------|----------------------|-------|----------|---------------------------|
| Device connection cables   |                   | Socket               | Cable | Plug     |                           |
| <b>Connection cables for MLC 300, MLC 500 transmitters and MLC 510 receivers, shielded</b> |                   |                      |       |          |                           |
| 678055   | CB-M12-5000E-5GF  | M12, straight, 5-pin | 5 m   | Open end | MLC 300, MLC 500, MLC 510 |
| 678056   | CB-M12-10000E-5GF | M12, straight, 5-pin | 10 m  | Open end | MLC 300, MLC 500, MLC 510 |
| 678057   | CB-M12-15000E-5GF | M12, straight, 5-pin | 15 m  | Open end | MLC 300, MLC 500, MLC 510 |
| 678058   | CB-M12-25000E-5GF | M12, straight, 5-pin | 25 m  | Open end | MLC 300, MLC 500, MLC 510 |
| <b>Connection cables for MLC 320, MLC 520 and MLC 530 receivers, shielded</b>              |                   |                      |       |          |                           |
| 678060   | CB-M12-5000E-8GF  | M12, straight, 8-pin | 5 m   | Open end | MLC 320, MLC 520, MLC 530 |
| 678061   | CB-M12-10000E-8GF | M12, straight, 8-pin | 10 m  | Open end | MLC 320, MLC 520, MLC 530 |
| 678062   | CB-M12-15000E-8GF | M12, straight, 8-pin | 15 m  | Open end | MLC 320, MLC 520, MLC 530 |
| 678063   | CB-M12-25000E-8GF | M12, straight, 8-pin | 25 m  | Open end | MLC 320, MLC 520, MLC 530 |



## ACCESSORIES

### Connection cables – Areas of application and ordering information

| Part no.   | Article             | Description          |                                   |                      | Suitable for |
|--|---------------------|----------------------|-----------------------------------|----------------------|--------------|
| Device connection cables   |                     | Socket               | Cable                             | Plug                 |              |
| <b>Sensor connection cable, 3-wire, PUR, unshielded, socket and plug</b> |                     |                      |                                   |                      |              |
| 548050   | CB-M12-1500X-3GF/WM | M12, straight, 3-pin | 1.5 m, crossed cable, pin 2/pin 4 | M12, angled, 3-pin   | MLC 530      |
| 548051   | CB-M12-1500X-3GF/GM | M12, straight, 3-pin | 1.5 m                             | M12, straight, 3-pin | MLC 530      |
| 150680   | CB-M12-1500-3GF/GM  | M12, straight, 3-pin | 1.5 m                             | M12, straight, 3-pin | MLC 530      |
| 150681   | CB-M12-1500-3GF/WM  | M12, straight, 3-pin | 1.5 m                             | M12, angled, 3-pin   | MLC 530      |
| 150682   | CB-M12-5000-3GF/GM  | M12, straight, 3-pin | 5 m                               | M12, straight, 3-pin | MLC 530      |
| 150683   | CB-M12-5000-3GF/WM  | M12, straight, 3-pin | 5 m                               | M12, angled, 3-pin   | MLC 530      |
| 150684   | CB-M12-15000-3GF/GM | M12, straight, 3-pin | 15 m                              | M12, straight, 3-pin | MLC 530      |
| <b>Connection accessories</b>  |                     |                      |                                   |                      |              |
| 548361   | CB-M12-1000-5GF/GM  | M12, straight, 5-pin | 1 m                               | M12, straight, 5-pin | MLC 530      |
| 548362   | CB-M12-2000-5GF/GM  | M12, straight, 5-pin | 2 m                               | M12, straight, 5-pin | MLC 530      |
| 150717   | CB-M12-2000-5GM     | M12, straight, 5-pin | 2 m                               | Open end             | MLC 530      |
| 150718   | CB-M12-5000-5GM     | M12, straight, 5-pin | 5 m                               | Open end             | MLC 530      |

## Connection cables – Areas of application and ordering information

| Part no.  | Article           | Description                  | Suitable for            |               |                       |
|---|-------------------|------------------------------|-------------------------|---------------|-----------------------|
| Device connection cables                        |                   | Socket                       | Cable                   | Plug          |                       |
| <b>Connection cables for SOLID, COMPACTplus</b> |                   |                              |                         |               |                       |
| 426042  | CB-LDH-10000-12GF | Hirschmann, straight, 12-pin | 10 m, PVC               | Open, 12-wire | COMPACTplus/T2, /R2   |
| 426044  | CB-LDH-25000-12GF | Hirschmann, straight, 12-pin | 25 m, PVC               | Open, 12-wire | COMPACTplus/T2, /R2   |
| 426043  | CB-LDH-50000-12GF | Hirschmann, straight, 12-pin | 50 m, PVC               | Open, 12-wire | COMPACTplus/T2, /R2   |
| 429071  | CB-M12-5000S-5GF  | M12, straight, 5-pin         | 5 m, PUR, UL, shielded  | Open, 5-wire  | SOLID, COMPACTplus/T4 |
| 429072  | CB-M12-5000S-5WF  | M12, angled, 5-pin           | 5 m, PUR, UL, shielded  | Open, 5-wire  | SOLID, COMPACTplus/T4 |
| 429081  | CB-M12-5000S-8GF  | M12, straight, 8-pin         | 5 m, PUR, UL, shielded  | Open, 8-wire  | SOLID, COMPACTplus/T4 |
| 429082  | CB-M12-5000S-8WF  | M12, angled, 8-pin           | 5 m, PUR, UL, shielded  | Open, 8-wire  | SOLID, COMPACTplus/T4 |
| 429073  | CB-M12-10000S-5GF | M12, straight, 5-pin         | 10 m, PUR, UL, shielded | Open, 5-wire  | SOLID, COMPACTplus/T4 |
| 429074  | CB-M12-10000S-5WF | M12, angled, 5-pin           | 10 m, PUR, UL, shielded | Open, 5-wire  | SOLID, COMPACTplus/T4 |
| 429083  | CB-M12-10000S-8GF | M12, straight, 8-pin         | 10 m, PUR, UL, shielded | Open, 8-wire  | SOLID, COMPACTplus/T4 |
| 429084  | CB-M12-10000S-8WF | M12, angled, 8-pin           | 10 m, PUR, UL, shielded | Open, 8-wire  | SOLID, COMPACTplus/T4 |
| 429075  | CB-M12-15000S-5GF | M12, straight, 5-pin         | 15 m, PUR, UL, shielded | Open, 5-wire  | SOLID, COMPACTplus/T4 |
| 429076  | CB-M12-15000S-5WF | M12, angled, 5-pin           | 15 m, PUR, UL, shielded | Open, 5-wire  | SOLID, COMPACTplus/T4 |
| 429085  | CB-M12-15000S-8GF | M12, straight, 8-pin         | 15 m, PUR, UL, shielded | Open, 8-wire  | SOLID, COMPACTplus/T4 |
| 429086  | CB-M12-15000S-8WF | M12, angled, 8-pin           | 15 m, PUR, UL, shielded | Open, 8-wire  | SOLID, COMPACTplus/T4 |

[www.leuze.com/en/sensor-accessories/](http://www.leuze.com/en/sensor-accessories/)

## ACCESSORIES

### Connection cables – Areas of application and ordering information

| Part no.  | Article              | Description          |                         |                                       | Suitable for          |
|---|----------------------|----------------------|-------------------------|---------------------------------------|-----------------------|
|   |                      | Socket               | Cable                   | Plug                                  |                       |
| <b>Connection cables for SOLID, COMPACTplus</b> |                      |                      |                         |                                       |                       |
| 429171  | CB-M12-25000S-5GF    | M12, straight, 5-pin | 25 m, PUR, UL, shielded | Open, 5-wire                          | SOLID, COMPACTplus/T4 |
| 429172  | CB-M12-25000S-5WF    | M12, angled, 5-pin   | 25 m, PUR, UL, shielded | Open, 5-wire                          | SOLID, COMPACTplus/T4 |
| 429181  | CB-M12-25000S-8GF    | M12, straight, 8-pin | 25 m, PUR, UL, shielded | Open, 8-wire                          | SOLID, COMPACTplus/T4 |
| 429182  | CB-M12-25000S-8WF    | M12, angled, 8-pin   | 25 m, PUR, UL, shielded | Open, 8-wire                          | SOLID, COMPACTplus/T4 |
| <b>Connection cables for RS4</b>                |                      |                      |                         |                                       |                       |
| 548520  | CB-D15E-5000S-11GF   | SUB-D, 15-pin        | 5 m, PUR, UL, shielded  | Open, 11-wire                         | RS4                   |
| 548521  | CB-D15E-10000S-11GF  | SUB-D, 15-pin        | 10 m, PUR, UL, shielded | Open, 11-wire                         | RS4                   |
| 548522  | CB-D15E-25000S-11GF  | SUB-D, 15-pin        | 20 m, PUR, UL, shielded | Open, 11-wire                         | RS4                   |
| 548523  | CB-D15E-50000S-11GF  | SUB-D, 15-pin        | 35 m, PUR, UL, shielded | Open, 11-wire                         | RS4                   |
| 548530  | CB-D15E-10000S-11WF  | SUB-D, 15-pin        | 50 m, PUR, UL, shielded | Open, 11-wire                         | RS4                   |
| 548100  | CB-M12-25000S-4GF/GM | M12, straight, 4-pin | 25 m, shielded          | M12, straight, 4-pin                  | RS4/P1                |
| 548363  | CB-M12-2000-4GMB     | M12, straight, 4-pin | 2 m, PUR, UL            | Open, 4-wire, jumper between 1-4, 2-3 | RS4/A1, RS4/P1        |

## Connection cables – Areas of application and ordering information

| Part no.  | Article           | Description                   | Suitable for |             |                  |
|---|-------------------|-------------------------------|--------------|-------------|------------------|
| <b>Device connection cables</b>                                 |                   | <b>Socket</b>                 | <b>Cable</b> | <b>Plug</b> |                  |
| <b>Connection cables for MLD 300, MLD 500, MLDSET, MLD-UDC</b>  |                   |                               |              |             |                  |
| 678050  | CB-M12-5000E-5GM  | M12 plug, straight, 5-pin     | 5 m          | Open end    | MLD 300, MLD 500 |
| 678051  | CB-M12-10000E-5GM | M12 plug, straight, 5-pin     | 10 m         | Open end    | MLD 300, MLD 500 |
| 678052  | CB-M12-15000E-5GM | M12 plug, straight, 5-pin     | 15 m         | Open end    | MLD 300, MLD 500 |
| 678053  | CB-M12-25000E-5GM | M12 plug, straight, 5-pin     | 25 m         | Open end    | MLD 300, MLD 500 |
| 678055  | CB-M12-5000E-5GF  | M12 coupling, straight, 5-pin | 5 m          | Open end    | MLD 300, MLD 500 |
| 678056  | CB-M12-10000E-5GF | M12 coupling, straight, 5-pin | 10 m         | Open end    | MLD 300, MLD 500 |
| 678057  | CB-M12-15000E-5GF | M12 coupling, straight, 5-pin | 15 m         | Open end    | MLD 300, MLD 500 |
| 678058  | CB-M12-25000E-5GF | M12 coupling, straight, 5-pin | 25 m         | Open end    | MLD 300, MLD 500 |
| 678059  | CB-M12-50000E-5GF | M12 coupling, straight, 5-pin | 50 m         | Open end    | MLD 300, MLD 500 |
| 678060  | CB-M12-5000E-8GF  | M12 coupling, straight, 8-pin | 5 m          | Open end    | MLD 300, MLD 500 |
| 678061  | CB-M12-10000E-8GF | M12 coupling, straight, 8-pin | 10 m         | Open end    | MLD 300, MLD 500 |
| 678062  | CB-M12-15000E-8GF | M12 coupling, straight, 8-pin | 15 m         | Open end    | MLD 300, MLD 500 |
| 678063  | CB-M12-25000E-8GF | M12 coupling, straight, 8-pin | 25 m         | Open end    | MLD 300, MLD 500 |
| 678064  | CB-M12-50000E-8GF | M12 coupling, straight, 8-pin | 50 m         | Open end    | MLD 300, MLD 500 |
| <b>Connection cables for MLD 335, MLD 535 (local interface)</b> |                   |                               |              |             |                  |
| 50110180  | KB M12/8-5000-SA  |                               |              |             |                  |
| 50110181  | KB M12/8-10000-SA |                               |              |             |                  |
| 50110186  | KB M12/8-15000-SA |                               |              |             |                  |
| 50110188  | KB M12/8-25000-SA |                               |              |             |                  |

## ACCESSORIES

### Connection cables – Areas of application and ordering information

| Part no.   | Article           | Description  |       |          | Suitable for                                |
|--|-------------------|--|-------|----------|---|
| Device connection cables   |                   | Socket   | Cable | Plug     |   |
| <b>Connection cables for S20, S200, S300 S400, L10, L100, L200</b> |                   |  |       |          |   |
| 678055   | CB-M12-5000E-5GF  | M12 coupling, straight, 5-pin  | 5 m   | Open end | S20, S200, S300<br>S400, L10, L100,<br>L200 |
| 678056   | CB-M12-10000E-5GF | M12 coupling, straight, 5-pin  | 10 m  | Open end | S20, S200, S300<br>S400, L10, L100,<br>L200 |
| 678057   | CB-M12-15000E-5GF | M12 coupling, straight, 5-pin  | 15 m  | Open end | S20, S200, S300<br>S400, L10, L100,<br>L200 |
| 678058   | CB-M12-25000E-5GF | M12 coupling, straight, 5-pin  | 25 m  | Open end | S20, S200, S300<br>S400, L10, L100,<br>L200 |
| 678060   | CB-M12-5000E-8GF  | M12 coupling, straight, 8-pin  | 5 m   | Open end | S20, S200, S300<br>S400, L10, L100,<br>L200 |
| 678061   | CB-M12-10000E-8GF | M12 coupling, straight, 8-pin  | 10 m  | Open end | S20, S200, S300<br>S400, L10, L100,<br>L200 |
| 678062   | CB-M12-15000E-8GF | M12 coupling, straight, 8-pin  | 15 m  | Open end | S20, S200, S300<br>S400, L10, L100,<br>L200 |
| 678063   | CB-M12-25000E-8GF | M12 coupling, straight, 8-pin  | 25 m  | Open end | S20, S200, S300<br>S400, L10, L100,<br>L200 |
| <b>Muting Accessories</b>  |                   |  |       |          |   |
| 520058   | AC-SCM6           | Local connection box with M12-connection for connecting to local interface (6 connections for 4 muting sensors, muting indicator, reset button)                      |       |          |   |
| 520059   | AC-SCM6-BT        | Local connection box with M12-connection for connecting to local interface (6 connections for 4 muting sensors, muting indicator, reset button), with mounting plate |       |          |   |

## Connection cables – Areas of application and ordering information

| Part no.   | Article            | Description              |                   |                      | Suitable for                     |
|--|--------------------|--------------------------|-------------------|----------------------|----------------------------------|
| <b>Connection cable /T1 Transmitter to sensor socket M12/5</b>         |                    |                          |                   |                      |                                  |
| 150677   | CB-M12-10000-5WM   | Open, 5-wire             | 10 m, PUR, UL     | M12, angled, 5-pin   | COMPACTplus                      |
| 50104545   | K-D M12W-4P-5m-PVC | M12, angled, 4-pin       | 5 m, PVC          | M12, angled, 4-pin   | Single Light Beam Safety Devices |
| 50104544   | K-D M12A-4P-5m-PVC | M12, straight, 4-pin     | 5 m, PVC          | M12, straight, 4-pin | Single Light Beam Safety Devices |
| <b>Local connection cables</b>   |                    | <b>Socket</b>            | <b>Cable</b>      | <b>Plug</b>          |                                  |
| 520066   | CB-M12-SCC2        | 2 x M12, straight, 3-pin | 2 x 1.5 m + 0.3 m | M12, angled, 8-pin   | COMPACTplus                      |
| 150755   | CB-M12-SC22        | 2 x M12, 4-pin           | 2 x 1.5 m         | M12, 4-pin           | COMPACTplus, MLD 300, MLD 500    |
| 150756   | CB-M12-CC12        | M12, 4-pin               | 0.3 m             | M12, 8-pin           | COMPACTplus                      |
| 150757   | CB-M12-CC15        | M12, 4-pin               | 1.5 m             | M12, 8-pin           | COMPACTplus                      |
| 150769   | CB-M12-CC30        | M12, 4-pin               | 3 m               | M12, 8-pin           | COMPACTplus                      |
| 150758   | CB-M12-SC24        | 2 x M12, 4-pin           | 2 m or 5 m        | M12, 4-pin           | COMPACTplus, MLD 300, MLD 500    |
| 150766   | CB-M12-SC44        | 2x M12, 4-pin            | 2 x 1.0 m         | M12, 4-pin           | COMPACTplus, MLD 300, MLD 500    |
| 150704   | CB-M12-3000-8WM    | Open, 8-wire             | 3 m, PUR, UL      | M12, angled, 8-pin   | COMPACTplus                      |
| 150699   | CB-M12-10000-8WM   | Open, 8-wire             | 10 m, PUR, UL     | M12, angled, 8-pin   | COMPACTplus                      |
| <b>Connection muting sensors, indicators, display and control unit</b> |                    |                          |                   |                      |                                  |
| 150680   | CB-M12-1500-3GF/GM | M12, straight, 3-pin     | 1.5 m, PUR        | M12, straight, 3-pin | COMPACTplus, MLD 300, MLD 500    |
| 150681   | CB-M12-1500-3GF/WM | M12, straight, 3-pin     | 1.5 m, PUR        | M12, angled, 3-pin   | COMPACTplus, MLD 300, MLD 500    |
| 150682   | CB-M12-5000-3GF/GM | M12, straight, 3-pin     | 5 m, PUR          | M12, straight, 3-pin | COMPACTplus, MLD 300, MLD 500    |
| 150683   | CB-M12-5000-3GF/WM | M12, straight, 3-pin     | 5 m, PUR          | M12, angled, 3-pin   | COMPACTplus, MLD 300, MLD 500    |

## ACCESSORIES

### Connection cables – Areas of application and ordering information

| Part no.   | Article              | Description              |   |                      | Suitable for                               |
|--|----------------------|--------------------------|---|----------------------|--|
| <b>Connection muting sensors, indicators, display and control unit</b> |                      |                          |   |                      |  |
| 150684   | CB-M12-15000-3GF/GM  | M12, straight, 3-pin     | 15 m, PUR, UL                                     | M12, straight, 3-pin | COMPACT <sup>plus</sup> , MLD 300, MLD 500 |
| 150685   | CB-M12-15000-3GF/WM  | M12, straight, 3-pin     | 15 m, PUR   | M12, angled, 3-pin   | COMPACT <sup>plus</sup> , MLD 300, MLD 500 |
| 548050   | CB-M12-1500X-3GF/WM  | M12, straight, 3-pin     | 1.5 m, PUR, UL, crossed socket, pin2 -> plug-pin4 | M12, angled, 3-pin   | COMPACT <sup>plus</sup> , MLD 300, MLD 500 |
| 548051   | CB-M12-1500X-3GF/GM  | M12, straight, 3-pin     | 1.5 m, PUR, UL, crossed socket, pin2 -> plug-pin4 | M12, straight, 3-pin | COMPACT <sup>plus</sup> , MLD 300, MLD 500 |
| 548052   | CB-M12-1500X-3WF/WM  | M12, angled, 3-pin       | 1.5 m, PUR, UL, crossed socket, pin2 -> plug-pin4 | M12, angled, 3-pin   | COMPACT <sup>plus</sup> , MLD 300, MLD 500 |
| 150717   | CB-M12-2000-5GM      | Open, 5-wire             | 2 m, PUR, UL                                      | M12, straight, 5-pin | COMPACT <sup>plus</sup>                    |
| 150718   | CB-M12-5000-5GM      | Open, 5-wire             | 5 m   | M12, straight, 5-pin | COMPACT <sup>plus</sup>                    |
| 548510   | CB-M12-10000S-8GF/GM | M12, straight, 8-pin     | 10 m  | M12, straight, 8-pin | COMPACT <sup>plus</sup>                    |
| <b>Signal distributor</b>  |                      | <b>Socket</b>            | <b>Cable</b>                                      | <b>Plug</b>          |  |
| 520069   | CB-M12-ACT4/1        | 2 x M12, straight, 4-pin | -   | M12, straight, 4-pin | All with M12 connection system             |
| 548040   | CB-M12-ACY3/1        | 2 x M12, straight, 3-pin | -   | M12, straight, 3-pin | All with M12 connection system             |

## CONNECTION CABLES

### Connection cables – Areas of application and ordering information

| Part no.                                     | Article            | Description      | Suitable for   |                  |                                      |
|--|--------------------|------------------|----------------|------------------|--------------------------------------|
| <b>PC cable</b>                              |                    |                  |                |                  |                                      |
| 50104078                                     | CB-ASM-PK1         | SUB-D, 9-pin     | 2.5 m, PVC     | RJ45, 8-pin      | AS-i                                 |
| 520072                                       | CB-PCO-3000        | SUB-D, 9-pin     | 3 m            | Infrared adapter | COMPACT <i>plus</i> , RS4/A1, RS4/P1 |
| 50035863                                     | CB-D9-3000-5GF/GM  | SUB-D, 9-pin     | 3 m, shielded  | SUB-D, 9-pin     | RS4                                  |
| 50035865                                     | CB-D9-5000-5GF/GM  | SUB-D, 9-pin     | 5 m, shielded  | SUB-D, 9-pin     | RS4                                  |
| 50035867                                     | CB-D9-10000-5GF/GM | SUB-D, 9-pin     | 10 m, shielded | SUB-D, 9-pin     | RS4                                  |
| <b>Copier cable for AS-i monitor program</b> |                    |                  |                |                  |                                      |
| 50104079                                     | CB-ASM-DK1         | RJ45 plug, 8-pin | 0.3 m          | RJ45, 8-pin      | ASM1, ASM1E                          |



## ACCESSORIES

### Display and control units





Display and control units supplement the Leuze electronic muting accessories. They consist of a plastic box with reset button for start/restart interlock and for override after a muting error (muting restart/override). The devices include an additional LED indicator, depending on the type. All display and control units are prepared for direct mounting on hard guards. They are used with access guarding with or without muting. They are especially impressive here due to their easy integration into the

protective device. As a fixed component of some CPSET safety sensor sets, they make a significant contribution to being able to quickly achieve and efficiently operate muting solutions. All devices are intended for connection to the COMPACT*plus* safety sensors. In addition, the AC-ABF-SL1, AC-ABF10 and AC-ABF50 display and control units are also suitable for connection to devices in the MLD and MSI series.

### Typical areas of application

- Muting applications in conveyor and storage systems

### Ordering information

| Figure  | Part no. | Article    | Description                                      | Features  |
|---|----------|------------|--|---|
|   | 426363   | AC-ABF-SL1 | Display and control unit for muting applications | <ul style="list-style-type: none"> <li>– LED muting indicator</li> <li>– Connection via terminal box to COMPACT<i>plus</i>, MLC 300, MLC 500, MLD 330, MLD 530</li> </ul>                                       |
|  | 426290   | AC-ABF10   | Control unit                                     | <ul style="list-style-type: none"> <li>– With reset button</li> <li>– Connection via terminal box to COMPACT<i>plus</i>, MLC 300, MLC 500, MLD 300, MLD 500 and MSI</li> </ul>                                  |
|  | 426292   | AC-ABF50   | Control unit                                     | <ul style="list-style-type: none"> <li>– Connection via terminal box to MLD 330, MLD 530, length of connection cables 3 x 5 m</li> </ul>  |
|  | 426296   | AC-ABF70   | Control unit                                     | <ul style="list-style-type: none"> <li>– With reset button</li> <li>– direct connection to MLD 300, MLD 500, MLC 300, MLC 500</li> <li>– OSSD status signalling and illumination of the start button</li> </ul> |

## DISPLAY AND CONTROL UNITS

### Important technical data, overview

|                                |                 |
|--------------------------------|-----------------|
| VDE Safety Class               | III             |
| Housing                        | Plastic         |
| Clamping plate                 | Stainless steel |
| Supply voltage                 | 24 V DC         |
| Switching current via button   | 1...1000 mA     |
| Ambient temperature, operation | -25...+60°C     |
| Ambient temperature, storage   | -30...+70°C     |

### Functions

Display and control function for muting applications

Commit and override via button

### Special features

- Easy mounting on hard guards with clamping plate










### Features



| Further information      | Page |
|--------------------------|------|
| ● COMPACT <i>plus</i> -m | 148  |
| ● Ordering information   | 532  |
| ● MLD 500                | 188  |
| ● MLD 300                | 216  |
| ● MLC 500                | 84   |
| ● MLC 300                | 100  |

## ACCESSORIES

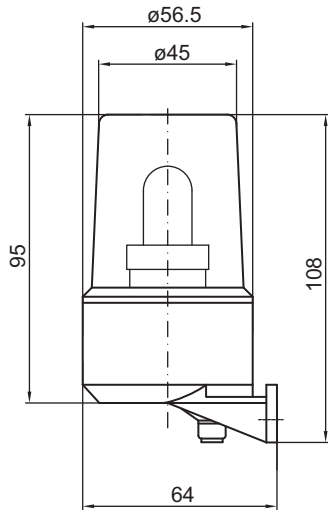
### Muting indicators

| Ordering information  |                       |          |   | Features  |                                    |                                   |                   |   |
|---|-----------------------|----------|---|---|------------------------------------|-----------------------------------|-------------------|---|
|   | Article               | Part no. | Description   | <br><br> | Impact-resistant polyamide housing | Fast mounting with bayonet system | Protection rating | LED signal elements with long life time (up to 100,000 hrs) |
|    | MS851                 | 548000   | Muting indicator, clear, with bulb, E14 4W / 24 V, with mounting  | ●   | ●                                  |                                   | IP 54             |   |
|   | MS70/2                | 660600   | Muting indicator with 2 continuous light elements, clear, bulb BA15d / 24 V, with mounting bracket                | ●   | ●                                  | ●                                 | IP 65             |   |
|  | MS70/LED              | 660610   | LED muting indicator, yellow, 24 V, without mounting element  | ●   | ●                                  | ●                                 | IP 65             | ●   |
|  | MS70/LED-M12-2000-4GM | 660611   | LED muting indicator, yellow, 24 V, with mounting bracket and mounted connection cable, M12, 4 pin, straight, 2 m | ●   | ●                                  | ●                                 | IP 65             | ●   |

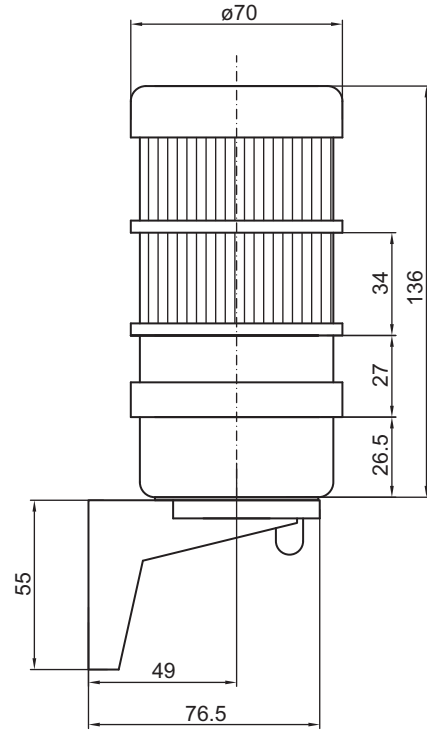
Please note the additional information at [www.leuze.com/en/sensor-accessories](http://www.leuze.com/en/sensor-accessories).

**Dimensional drawings**

**Muting indicators**



MS851



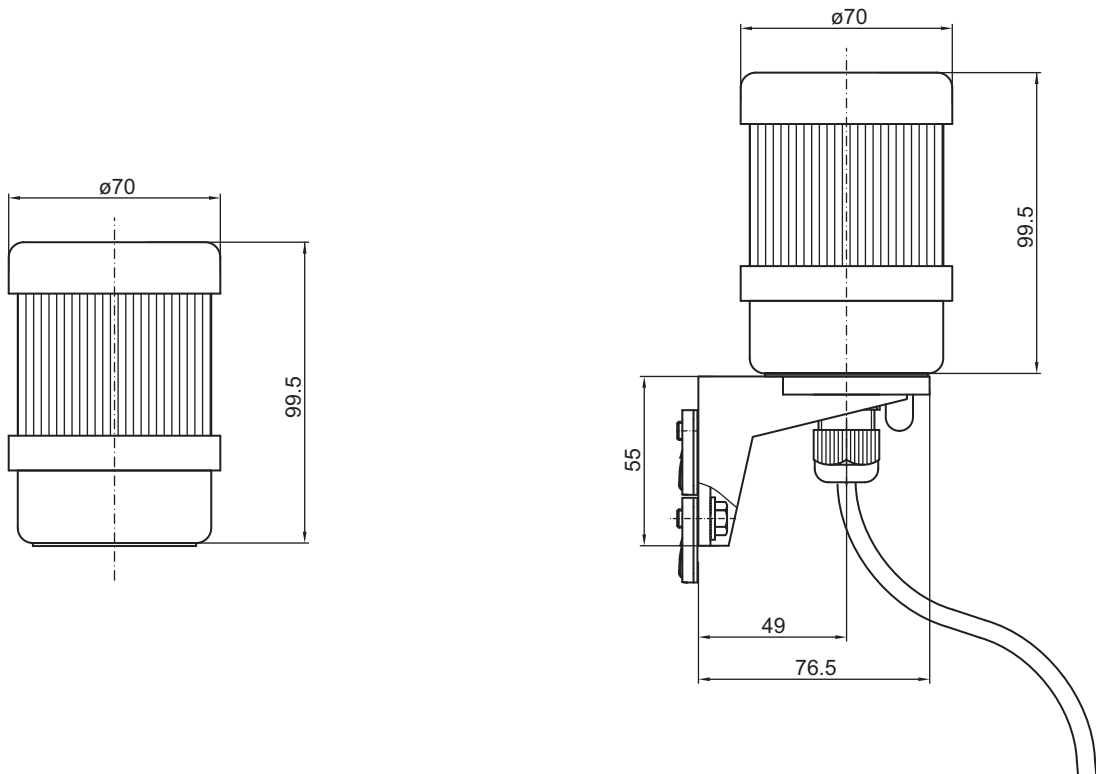
MS70/2

Dimensions in mm

## ACCESSORIES

### Dimensional drawings

#### Muting indicators



MS70/LED

MS70/LED-M12-2000-4GM

Dimensions in mm

# MUTING INDICATORS

Safety Switches

Safety Locking  
Devices

Safety Command  
Devices

Safety Relays

Programmable  
Safety Controllers

**Accessories**

Glossary

Product Finder

## ACCESSORIES

### Laser alignment aids

Opto-electronic safety sensors mostly work with infrared, therefore invisible light. The alignment of these sensors and the Deflecting Mirrors is generally relatively time-consuming, especially with multiple side guarding with Deflecting Mirrors. By contrast, the LA 78 series laser alignment aids make alignment easy and convenient. They are mounted directly on the

sensor housing and visibly mark the target point of the sensor beams with a red light laser. Complex arrangements can consequently be set up by just one person, while also saving time in the process.

### Areas of application, ordering information and dimensional drawings

- Battery-operated red light lasers for quick and easy alignment of Leuze electronic opto sensors and Deflecting Mirrors.

### Special features

|  | LA-78 | LA-78U | LA-78UDC | LA-78M | LA-78M-UDC |
|--|-------|--------|----------|--------|------------|
| Red light laser, laser class 2                 | ●     | ●      | ●        | ●      | ●          |
| Robust aluminum housing                        | ●     | ●      | ●        | ●      | ●          |
| Battery-operated                               | ●     | ●      | ●        | ●      | ●          |
| For special use in the DC or UDC floor columns |       |        | ●        |        | ●          |

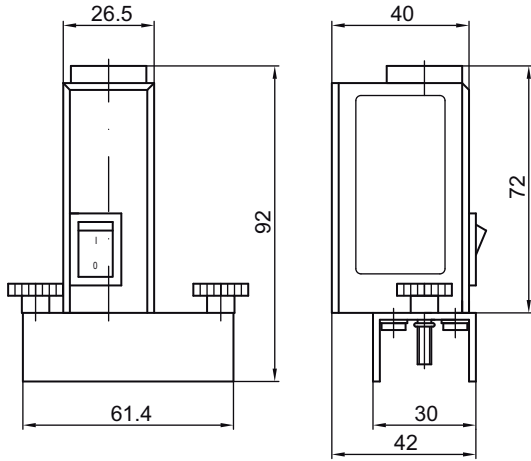
| Accessories         |            | Suitable for sensors |             |                    |                                   |                                 |                |
|---------------------|------------|----------------------|-------------|--------------------|-----------------------------------|---------------------------------|----------------|
| Laser alignment aid |            | Safety Light Curtain |             |                    | Multiple Light Beam Safety Device | Single Light Beam Safety Device | Laser scanners |
| Part no.            | Article    | MLC 500<br>MLC 300   | COMPACTplus | SOLID-2<br>SOLID-4 | MLD                               | SLS 78/R                        | RS4            |
| 549000              | LA-78      |                      |             |                    | *)                                | ●                               | ●              |
| 560020              | LA-78U     | ●                    | ●           | ●                  | *)                                |                                 |                |
| 520004              | LA-78UDC   | ●                    | ●           | ●                  | *)                                |                                 |                |
| 520023              | LA-78M     |                      |             |                    | ●                                 |                                 |                |
| 520024              | LA-78M-UDC |                      |             |                    | ●                                 |                                 |                |

\*) when using with BT-LA-78M mounting brackets (part no. 520021) or BT-LA-78M-UDC (part no. 520022)

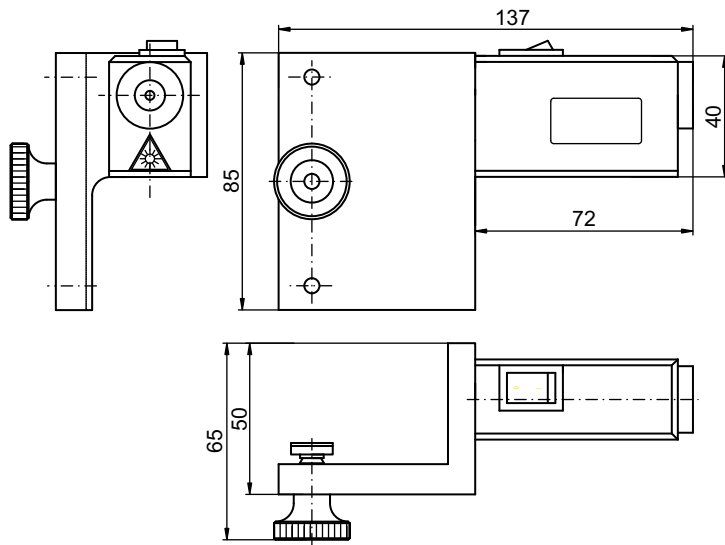
Please note the additional information at [www.leuze.com/en/sensor-accessories](http://www.leuze.com/en/sensor-accessories).

**Dimensional drawings**

**LA-78, LA-78U dimensional drawings**



LA-78



LA-78U

Dimensions in mm



**Features**



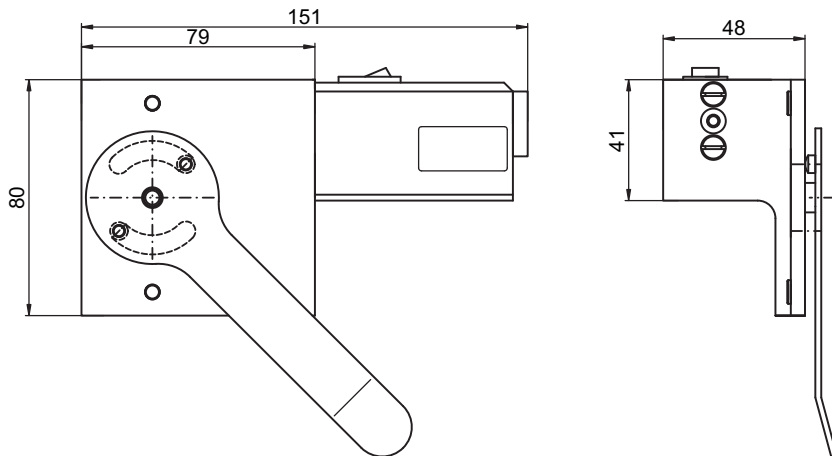
| Further information    | Page |
|------------------------|------|
| ● Ordering information | 538  |



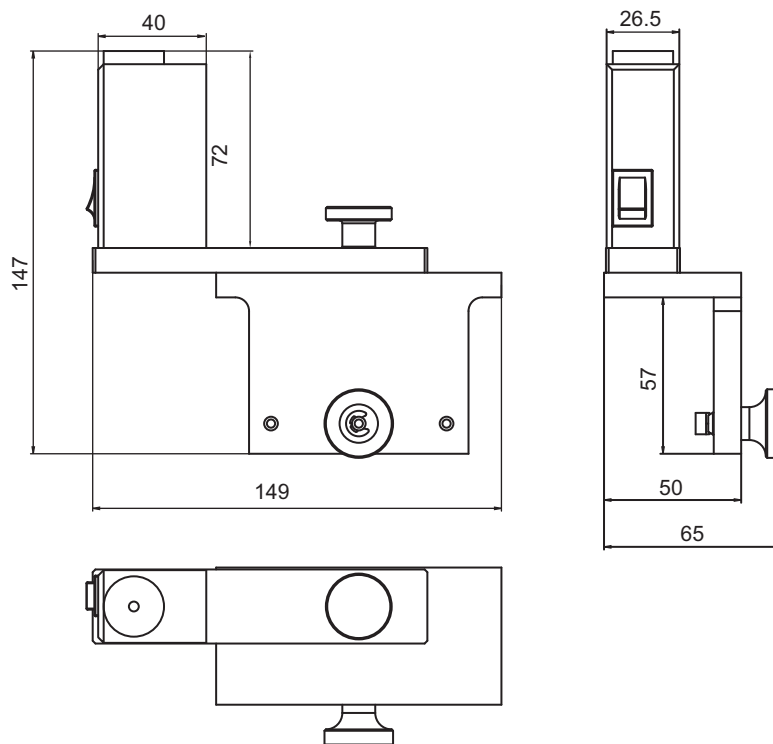
## ACCESSORIES

### Dimensional drawings

#### LA-78UDC, LA-78M dimensional drawings



#### LA-78UDC



#### LA-78M

Dimensions in mm

Protective Screens  
p. 520

Connection cables  
p. 522

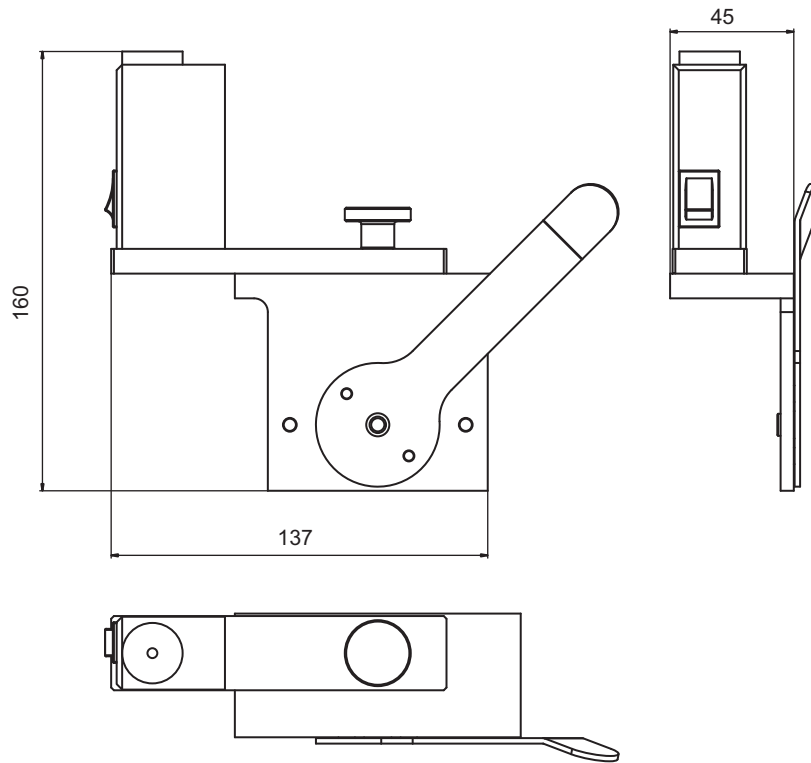
Display and control  
units  
p. 532

Muting indicators  
p. 534

**Laser alignment aids  
p. 538**

**Dimensional drawings**











**LA-78M-UDC dimensional drawing**



LA-78M-UDC

Dimensions in mm

# GLOSSARY

| Features   |   |   |
|--|---|---|
| <b>Point of operation guarding:<br/>Light Curtain with finger resolution</b> |    | Applies for resolution $d = 14$ mm, is selected when working is required close to the point of operation and/or where space is restricted.  |
| <b>Point of operation guarding:<br/>Light Curtain with hand resolution</b>   |    | Applies for resolutions $d$ between 14 mm and 40 mm<br>Additional "C" required with calculation of the safety distance.   |
| <b>Danger zone guarding:<br/>Light Curtain</b>                               |    | Required resolution according to height above the floor, from 50 mm (on the floor) up to 116 mm (with 1 m height); additional "C" required with calculation of the safety distance.   |
| <b>Access guarding: Light Curtain</b>  |    | Is selected where space is restricted. Additional "C" required with calculation of the safety distance when the resolution is greater than 14 mm. Start/restart interlock obligatory.   |
| <b>Access guarding: Multiple Light Beam Safety Device</b>                    |  | Access guarding or perimeter guarding at danger zones. Additional "C" = 850 mm, start/restart interlock obligatory.   |
| <b>Danger zone guarding:<br/>Laser scanner</b>                               |  | Is selected in the preliminary stage for stationary machines or industrial conveyor trucks/transfer carriages. Protective and warning fields can be changed over.   |
| <b>Passage guarding:<br/>Laser Scanner</b>                                   |  | Is selected for changeable protective fields or when optical components cannot be mounted on a door frame. Floor, door frame as reference plane. additional "C" required with calculation of the safety distance.                   |
| <b>Point of operation guarding:<br/>Laser scanner</b>                        |  | Changeable overlapping protective fields with hand resolution can be implemented in the Laser Scanner's close range. Reference frames around the access window and additional "C" required with calculation of the safety distance. |
| <b>Safety Locking Device</b>   |  | Safety Locking Devices keep moveable guards in a closed position. Use with long machine stopping times.   |
| <b>Safety Switches (without guard interlocking)</b>                          |  | Position monitoring of protective doors. Opening the hard guard generates a stop command. Calculation of the safety distance required.  |

## Abbreviations and technical terms

|                                    |   |
|------------------------------------|---|
| <b>Response time</b>               | Time between penetration/entry into the active protective field and the actual switching off of the OSSDs.  |
| <b>AOPD</b>                        | Active optoelectronic protective device<br>Active optoelectronic protective device  |
| <b>AOPDDR</b>                      | Active optoelectronic protective device based on diffuse reflection<br>Active optoelectronic protective device responsive to diffuse reflection   |
| <b>AS-Interface Safety at Work</b> | Extension of an AS-Interface sensor/actuator network with safety-related sensors and actuators.   |
| <b>Blanking</b>                    | A function with which one or more areas of the protective field of an ESPE is/are made ineffective so that work pieces in the ESPE's protective field do not cause the protective device to switch off. Blanking can be stationary or floating. |
| <b>BWS</b>                         | Berührungslos wirkende Schutzeinrichtung (English: ESPE)  |
| <b>EDM</b>                         | External Device Monitoring  |
| <b>ESPE</b>                        | Electro Sensitive Protective Equipment (German: BWS)  |
| <b>Muting</b>                      | Temporary safety-related automatic suspension of the ESPE's protective function during the material transport through the ESPE (see also IEC TS 62046).   |
| <b>Muting override</b>             | Manual activation of the muting function by activating a command device for moving material out of the muting area (at least one muting sensor must be activated for this, see also IEC TS 62046).  |
| <b>OSSD1<br/>OSSD2</b>             | Safety-related switching output<br>Output Signal Switching Device   |
| <b>PROFIsafe</b>                   | Profile for safety-related data transfer via PROFIBUS DP.   |
| <b>Range</b>                       | Distance between transmitter and receiver, and with reflex systems between sensor and reflector (with Light Curtains also called protective field width).   |
| <b>RES</b>                         | Start/restart interlock, prevents the automatic restarting of the machine after addressing a safety sensor, after switching on the supply voltage or changing the machine's operating or actuation mode.  |
| <b>Protective field</b>            | The area in which the defined test object is detected by the ESPE.  |
| <b>Protective field height</b>     | Height of the active protective field with Light Curtains.  |
| <b>Contact monitoring (EDM)</b>    | The contactor monitoring monitors the NC contacts of downstream positive-guided contactors and relays.  |

## PRODUCT FINDER

|                  |                              |   |
|------------------|------------------------------|---|
| <b>A</b>         |                              | BT-360... .. 131, 146   |
| AC-...-ERS ..... | 424                          | BT-4S... .. 98, 131, 146  |
| AC-A-... ..      | 348, 358, 367, 386, 395, 404 | BT-P40 .....  |
| AC-ABF... ..     | 165, 532                     | BT-SET-... .. 214   |
| AC-AH-... ..     | 358, 386, 395                | BT-UM .....   |
| AC-AHL... ..     | 404                          |   |
| AC-AN... ..      | 348                          | <b>C</b>  |
| AC-D15E-... ..   | 79                           | CB-ASM-... .. 298, 531  |
| AC-Exit-... ..   | 404                          | CB-D15E-... .. 79, 526, 527, 528  |
| AC-H-... ..      | 376                          | CB-D9-... .. 79, 530, 531   |
| AC-KL-... ..     | 358, 386, 395, 404           | CB-LDG-... .. 162   |
| AC-LDH-... ..    | 162, 184                     | CB-LDH-... .. 184, 525  |
| AC-M12-... ..    | 80                           | CB-M12-...-2GF/GM .....   |
| AC-MP... ..      | 376                          | CB-M12-...-3GF/GM .....   |
| AC-MSI-... ..    | 487                          | CB-M12-...-3GF/WM .....   |
| AC-PDA1/A .....  | 80, 299                      | CB-M12-...-3WF/WM .....   |
| AC-PL... ..      | 348, 358, 367, 386, 395, 404 | CB-M12-...-4GF/GM .....   |
| AC-SCM1 .....    | 165                          | CB-M12-...-4GMB .....   |
| AC-SCM1-BT ..... | 165                          | CB-M12-...-5GF . 98, 131, 146, 163, 185, 213, 258, 525, 527, 528        |
| AC-SCM5 .....    | 214, 259                     | CB-M12-...-5GF/GM .....   |
| AC-SCM5-BT ..... | 214, 259                     | CB-M12-...-5GF/WM .....   |
| AC-SCM8 .....    | 99                           | CB-M12-...-5GM .....  |
| AC-SCM8-BT ..... | 99                           | CB-M12-...-5WF .....  |
| AC-SEPL-... ..   | 376                          | CB-M12-...-5WM .....  |
| AC-SK1 .....     | 184                          | CB-M12-...-8GF . 98, 132, 147, 163, 164, 185, 213, 258, 525, 527, ..... |
| AC-TR... ..      | 132, 147, 162, 184           | CB-M12-...-8GF/GM .....   |
| AKB 01 .....     | 299                          | CB-M12-...-8WF .....  |
| AM 06 .....      | 299                          | CB-M12-...-8WM .....  |
| APG-02 .....     | 299                          | CB-M12-...-GM .....   |
| ARH 46 .....     | 271                          | CB-M12-CC... .. 165   |
| ARH 96 .....     | 277                          | CB-M12-SC... .. 165   |
| ASM1... ..       | 287                          | CB-MSI/D9... .. 487, 493, 530   |
| ASM2... ..       | 294                          | CB-PCO-3000 .....   |
| ASM-SWC .....    | 298                          | CPR14-...-b .....   |
|                  |                              | CPR14-...-m .....   |
| <b>B</b>         |                              | CPR30-...-b .....   |
| BT-10N .....     | 98, 162, 184                 | CPR30-...-m .....   |
| BT-2L .....      | 98, 131, 146                 | CPR50-...-b .....   |
| BT-2P40 .....    | 98, 500                      | CPR50-...-m .....   |
| BT-2R1 .....     | 98                           | CPR90-...-m .....   |
| BT-2S .....      | 162, 184                     | CPT14-... .. 150, 168   |
| BT-2S... ..      | 98, 131, 146                 | CPT30-... .. 150, 168   |
| BT-2Z... ..      | 98, 131, 146                 |   |

|                                      |  |
|--------------------------------------|--|
| CPT50-... ..151, 169, 170, 171       | MLD 510/AS-i .....304, 306                               |
| CPT90-... ..151                      | MLD...UDC .....242                                       |
| CR...S .....172, 173                 | MLD300-... ..218, 219, 220, 221, 222, 223, 225, 226      |
| CT...S .....172, 173                 | MLD310-... ..218, 219                                    |
| <b>D</b>                             | MLD312-... ..220, 221                                    |
| DC-... .....500                      | MLD320-... ..222, 223                                    |
| <b>E</b>                             | MLD330-... ..225, 226                                    |
| ERS200-... ..416                     | MLD500-... ..190, 191, 192, 193, 195, 196, 248           |
| ESB200-... ..410                     | MLD510-... ..190, 191, 248                               |
| ESB210-... ..410                     | MLD520-... ..192, 193                                    |
| <b>K</b>                             | MLD530-... ..195, 196                                    |
| KB-Y-SRK... ..530                    | MLD535-... ..197, 198                                    |
| K-D M12... ..265, 271, 277, 281, 529 | MLD-M... ..191, 194, 196, 219, 221, 223, 226             |
| K-D M8A... ..317, 323, 329           | MLDSET .....236  |
| <b>L</b>                             | MMS-A-... .....504                                       |
| L10-... ..382, 390, 398              | MMS-AP-... .....504                                      |
| L100-... ..382, 390, 398             | MMS-P-... .....504                                       |
| L200-... ..382, 390, 398             | MS... .....534   |
| LA-78 .....538                       | MSI 100 .....484   |
| LA-78U .....132, 147, 162, 538       | MSI 200 .....490   |
| LA-78UDC .....162, 538               | MSI-2H .....470  |
| LOGO! Power .....132, 147, 487, 493  | MSI-CM .....448  |
| <b>M</b>                             | MSI-DT .....454  |
| MC330-... ..312                      | MSI-EM .....493, 494                                     |
| MC330-S... ..317                     | MSI-FB .....487, 493, 496                                |
| MC336-... ..320                      | MSI-MC3... ..460   |
| MC336-S... ..323                     | MSI-MC310 .....460                                       |
| MC388-... ..326                      | MSI-RM2 .....312, 320, 326, 436, 442, 448, 454, 460, 476 |
| MC388-S... ..329                     | MSI-SR4 .....430   |
| MLC300 .....102, 103                 | MSI-SR5 .....436   |
| MLC310 .....102, 103                 | MSI-SWC .....487, 493                                    |
| MLC320 .....102, 103                 | MSI-T .....476   |
| MLC500-... ..86                      | MSSU-H46 .....504  |
| MLC510-... ..86                      | MS-UDC/UMC .....500, 510, 514                            |
| MLC520-... ..86                      | <b>P</b>   |
| MLC530-... ..86                      | PS-... .....521  |
| MLC-PS... ..520                      | PSC-... .....500   |
| MLD 500/AS-i .....304, 306           | <b>R</b>   |
|                                      | RD800-... .....332                                       |
|                                      | RD800-x-... .....336                                     |
|                                      | RS4-... .....79, 80                                      |

## PRODUCT FINDER

|          |    |          |          |
|----------|----|----------|----------|
| RS4-2... | 72 | UM60-... | 516      |
| RS4-4... | 72 | UMC-...  | 510, 514 |
| RS4-6... | 72 | US...    | 277, 512 |

### S

|              |                                   |
|--------------|-----------------------------------|
| S20-...      | 342                               |
| S200-...     | 352                               |
| S300-...     | 362                               |
| S400-...     | 370                               |
| SAT-5        | 271                               |
| SD2R20-...   | 136, 138                          |
| SD2R30-...   | 136, 138                          |
| SD2R40-...   | 137, 139                          |
| SD2R90-...   | 137, 139                          |
| SD2T20-...   | 136, 138                          |
| SD2T30-...   | 136, 138                          |
| SD2T40-...   | 137, 139                          |
| SD2T90-...   | 137, 139                          |
| SD4R14-...   | 110, 113                          |
| SD4R20-...   | 110, 113, 116, 117, 118, 119, 120 |
| SD4R30-...   | 111, 114                          |
| SD4R40-...   | 111, 114                          |
| SD4R90-...   | 112, 115                          |
| SD4T14-...   | 110, 113                          |
| SD4T20-...   | 110, 113, 116, 117, 118, 119, 120 |
| SD4T30-...   | 111, 114                          |
| SD4T40-...   | 111, 114                          |
| SD4T90-...   | 112, 115                          |
| SE-A...      | 61                                |
| SE-B...      | 61                                |
| SE-M...      | 63                                |
| SE-NP...     | 62                                |
| Set-AC...    | 504                               |
| SE-UG...     | 63                                |
| SE-UP...     | 63                                |
| SLAB-SWC     | 162                               |
| SLS...25...  | 262                               |
| SLS...318... | 280                               |
| SLS...46...  | 268                               |
| SLS...96...  | 274                               |

### U

|         |     |
|---------|-----|
| UDC-... | 500 |
|---------|-----|







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## **Optoelectronic Sensors**

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