PRODUCT INFORMATION

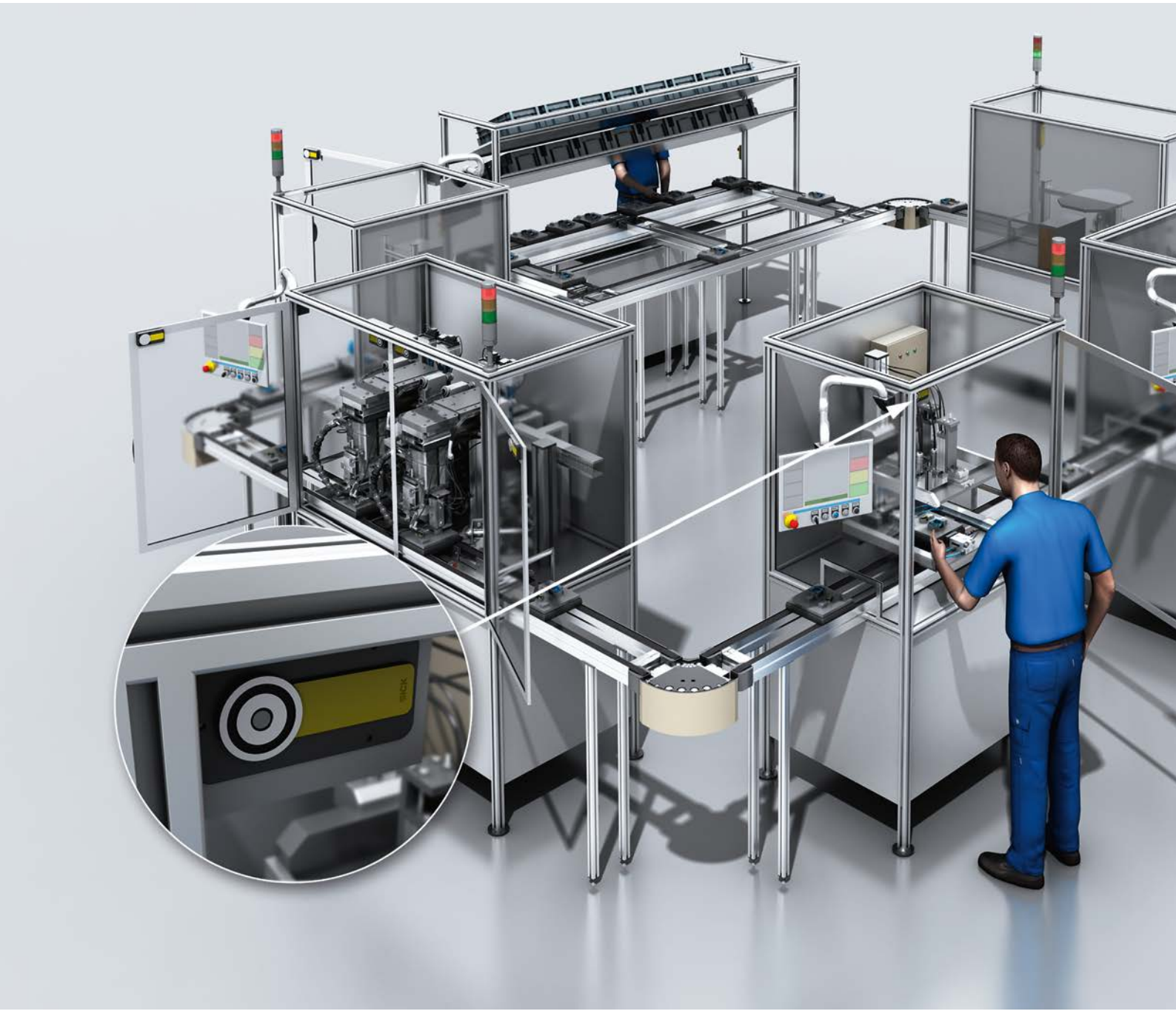
MLP1

MAGNETIC ATTRACTION FOR PROCESS PROTECTION

Safety switches

SICK
Sensor Intelligence.

SMOOTH PROCESSES WITH SAFETY



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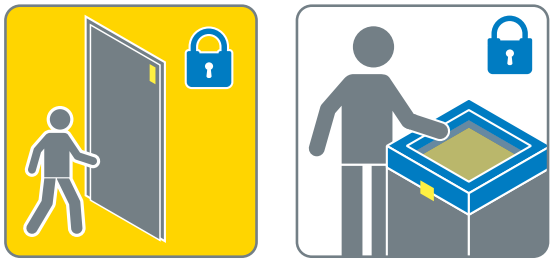

Interlocking of physical guards with temporary prevention of access or intervention.

THE SOLUTION FOR PROCESS PROTECTION

The MLP1 is a transponder safety switch with magnetic locking which ensures reliable process protection for partially or fully automated production systems. It works with non-contact actuators and is used to monitor movable physical guards. Thanks to reliable door monitoring (Performance Level e), the MLP1 ensures a high level of safety of machine systems without overrun movement, preventing unauthorized access and therefore unplanned process interruption.

EFFICIENT PROCESS PROTECTION WITH LOW WEAR

If production processes are interrupted, defective products and high costs can be the result. That is why modern process automation needs the right protection: At the right place and at the right time. For your safety and the safety of your machine.

The MLP1 does exactly this. The sensor unites a transponder safety switch and a magnetic locking function in one. The MLP1 ensures high machine availability since movable physical guards, e.g. maintenance doors, remain securely closed and work processes cannot be interrupted unintentionally or without authorization. The MLP1 considerably lowers the costs caused by material scrap, downtime and long restart delays after the machine goes into standstill. In addition, the MLP1 offers clear advantages when it comes to safety, mounting and effort spent on cabling.

Transponder safety switch | Electromagnet | MLP1

The benefits of the MLP1 at a glance

The MLP1 follows the safetyIQ concept: Intelligent switch construction for nearly invisible integration into the machine design and simple series connection.

- A high level of safety and reliable process protection due to Performance Level (PL) e in accordance with EN ISO 13849-1 for door monitoring with 500 N electromagnetic locking force and 25 N permanent retaining force
- Reliable functionality due to transponder technology with high door offset tolerance of 5 mm in all directions
- Long service life due to wear-free design
- Surface or flush mounting for integration into various machine designs
- Low amount of effort for cabling thanks to direct cascading without T-connectors
- Complete solution from a single source and a worldwide service network

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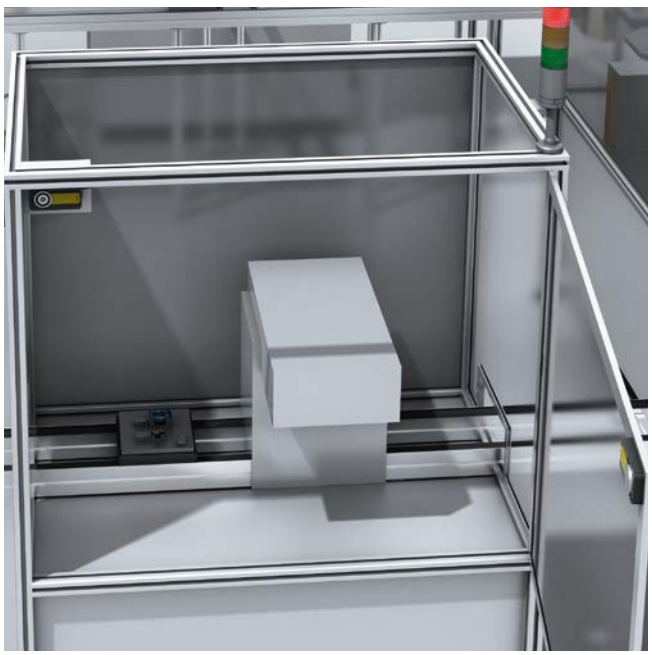

Thermal printing.

Ultrasound welding.

Soldering.

Variant detection.

UNOBTRUSIVE AND RELIABLE SAFETY

Flexible mounting, unobtrusive integration

Surface mounting and flush mounting.

The MLP1 can be integrated almost invisibly into the machine design.

The MLP1 can be mounted in two ways, allowing for flexibility when installing.

Surface mounting
The sensor is mounted on the fixed part of the protective device (e.g., door frame).

Flush mounting
Using a recess in the mounting surface, the sensor is installed directly into the fixed part of the protective device (e.g., door frame); integration into the machine design is therefore unobtrusive.

The MLP1, including the connections, is mounted on the machine. The complete sensor remains visible.

The MLP1, including the connections, can be hidden inside the machine for the most part. Only the surface of the sensor is visible.

Flexible mounting options without negatively affecting the machine design

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Non-contact switching and reliable locking even in case of misalignment

The MLP1 offers high tolerance to door offset with 5 mm in all directions.

When closing the movable physical guard, the actuator approaches the sensor. As soon as the sensor detects the actuator in the response range, it switches the self-monitoring semi-conductor outputs (OSSDs). Thanks to the combination of transponder technology and an electromagnet, the MLP1 offers a high tolerance to door offset, considerably increasing machine availability even if door guidance is not exact.

High level of machine availability due to large door offset tolerance

Connecting individually or in series

MLP1 variants for individual and series connection.

Thanks to the different variants, the MLP1 offers flexible connection possibilities without forfeiting safety. In addition to individual wiring of safety switches and series connections via

Simple and direct cascading without T-connector.

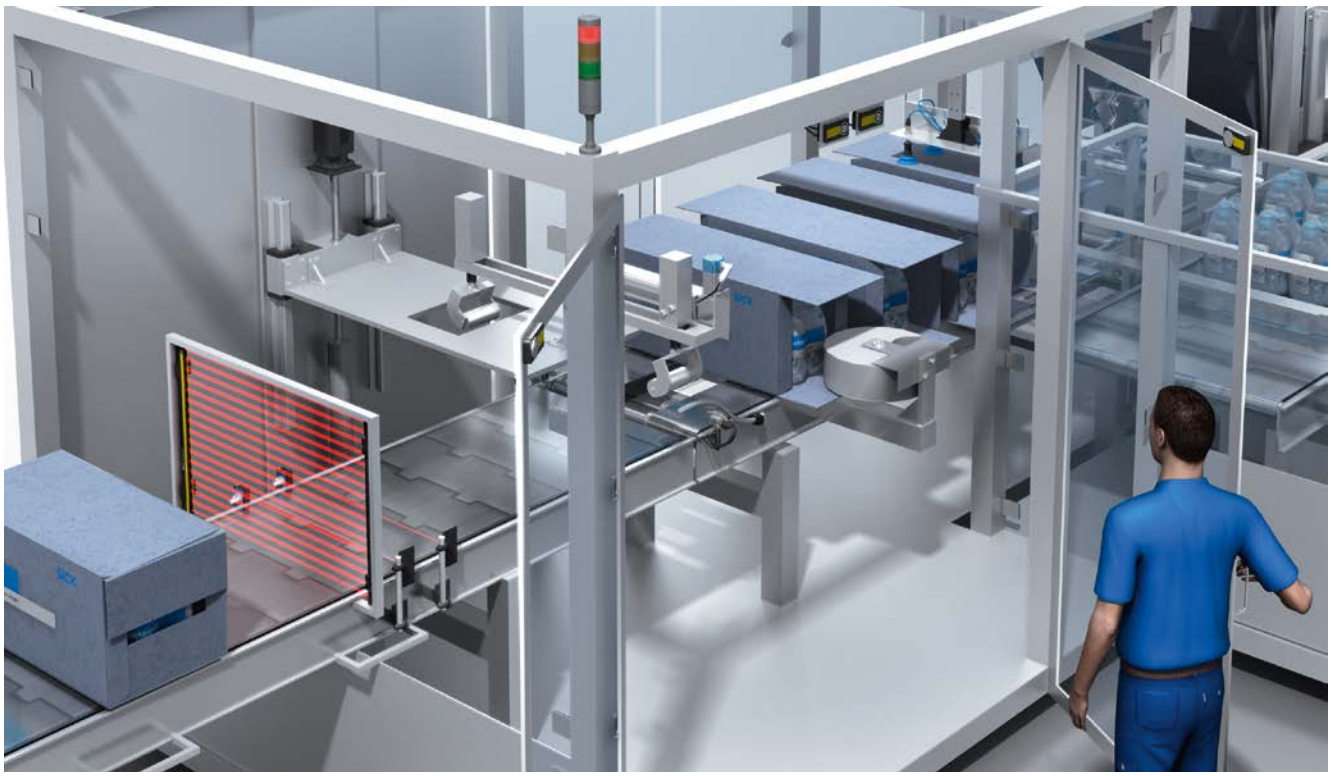
Flexi Loop, direct cascading via two M12 plug connectors is also possible.

Performance level (PL) e even when connected in a series

Lower costs and less effort for cabling due to simple and direct cascading

MANY CHALLENGES, ONE SOLUTION: THE MLP1

FIELD OF APPLICATION: THE PACKAGING INDUSTRY



Challenge

- When processes are interrupted, there is a risk that cartons could block the machine. In such a case, the machine can only be restarted after the manual intervention of the operator.
- When gluing cardboard flaps, defective packaging (scrap) and jams can occur if the machine stops
- Machine stops can lead to incorrect assembly of packaging units

Solution

The magnetic locking of the MLP1 prevents interruption of production processes.

Higher productivity through reduction of scrap and long restart delays

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FIELDS OF APPLICATION: ELECTRONICS AND SOLAR INDUSTRY, HANDLING AND ASSEMBLY

Challenge

- Interrupting assembly, soldering and welding processes considerably increases the percentage of scrap
- During final assembly, machines must be realigned after a stop before they can return to their normal function
- Interrupting automated quality processes often requires that the process is repeated in its entirety (e.g. in the case of optical inspection), meaning a lot of time is lost

Solution

The magnetic locking of the MLP1 prevents interruption of production processes.

- Higher productivity through reduction of scrap
- Increase in efficiency by preventing downtime and restart delays

SAFETY SWITCH WITH MAGNETIC LOCKING FUNCTION FOR PROCESS PROTECTION

Product description

The safety switch featuring a magnetic locking function is the efficient solution for applications that require process protection in addition to the safety function. The transponder safety switch uses self-monitored semiconductor outputs to guarantee maximum safety for door monitoring. What's more, a strong electromagnet ensures that the maintenance door stays closed and the production process is not interrupted. The combination of these two low-wear technologies provides high door offset tolerance and increases the availability of the machine. The innovative mounting concept and flat actuator enable optimum integration into the machine design.

At a glance

- 500 N magnetic locking force, 25 N retaining force
- PL e / Cat. 4 (EN ISO 13849), SIL3 (EN 61508) for door monitoring
- Offset tolerance of ± 5 mm
- Enclosure rating IP 67
- Standard or integrated mounting
- Variants with two M12 plug connectors for simple cascading

Your benefits

- Magnetic locking function prevents the protective door from being opened and therefore avoids unwanted interruption to the production process
- Maximum safety for door monitoring with two self-monitored semiconductor outputs (OSSDs)
- High level of machine availability due to large door offset tolerance
- Long product service life due to low-wear and low-maintenance configuration
- Discreet integration into the machine design thanks to innovative mounting option
- Quick connection and simple cascading via M12 plug connector reduce costs and the amount of wiring required
- Flat actuator without protruding parts minimizes risk of injury

Additional information

→ www.sick.com/MLP1

For more information, simply enter the link or scan the QR code and get direct access to technical data, CAD design models, operating instructions, software, application examples, and much more.

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Detailed technical data

More detailed data can be found in the operating instructions. Download ➜ www.sick.com/MLP1

Features

Sensor principle	Transponder
Locking force	500 N
Retaining force	25 N
Offset tolerance	≤ 5 mm
Safe switch off distance S_{ar}	45 mm
For process protection only	✔

Safety-related parameters

Safety integrity level	SIL3 (IEC 61508), SILCL3 (EN 62061)
Category	Category 4 (EN ISO 13849)
Performance level	PL e (EN ISO 13849) [1]
PFH_D (mean probability of a dangerous failure per hour)	1.5×10^{-8} (EN ISO 13849) [2]
T_M (mission time)	20 years (EN ISO 13849)
Type	Type 4 (EN ISO 14119)
Actuator coding level	Low coding level (EN ISO 14119)
Safe state in the event of a fault	At least one safety-related semiconductor output (OSSD) is in the OFF state.

[1] In a cascade, the performance level for the cascade as a whole depends on the number and type of devices in the cascade. PL e is only possible in cascades with a maximum of 6 devices.

[2] At 40 °C and 1000 m above sea level.

Functions

	MLP1-SMMA0AC	MLP1-SMMC0AC	MLP1-SMMF0AC
Cascading	–	✔ (directly cascadable)	✔ (cascadable with T-connector or Flexi Loop)

Interfaces

	MLP1-SMMA0AC	MLP1-SMMC0AC	MLP1-SMMF0AC
Connection type	Cable with plug M12, 5-pin	Cable with plug M12, 5-pin, Cable with female connector, M12, 5-pin	Cable with plug M12, 8-pin
Flexi-Loop-ready	–		✔
Cable length	150 mm		
Cable material	PVC		
Connecting cable length	≤ 140 m		≤ 100 m

Electrical data

Protection class	III (IEC 61140)
Contamination rating	3 (EN 60947-1)
Classification according to cULus	Class 2
Usage category	DC-13 (IEC 60947-5-1)
Rated insulation voltage U_i	32 V
Rated impulse withstand voltage U_{imp}	1,500 V
Supply voltage U_V when an individual safety switch is connected	
Sensor	24 V DC (19.2 V DC ... 28.8 V DC)
Magnet	24 V DC (19.2 V DC ... 28.8 V DC)
Supply voltage U_V when a cascade is connected	
Sensor	24 V DC (22.8 V DC ... 28.8 V DC)
Magnet	24 V DC (21.6 V DC ... 28.8 V DC)
Power consumption	
Locking active	350 mA
Locking deactivated	50 mA
Switching frequency	≤ 0.5 Hz
Type of output	Semiconductor (OSSD)
Output current (OSSDs)	≤ 100 mA
Diagnostic output	≤ 25 mA, short-circuit protected
Cable capacitance	400 nF (for OUT A and OUT B)
Response time	50 ms [1]
Enable time	100 ms [1]
Risk time	100 ms [1]
Switch-on time	2.5 s
Locking principle	Power to lock

[1] In a cascade, the value is multiplied by the number of safety switches in the cascade.

Mechanical data

Weight	
Switches	510 g
Actuator	210 g
Material	
Sensor housing	Anodized aluminum
Actuator housing	Fiber-glass-reinforced PVC
Anchor plate	Nickel-plated steel
Dimensions (W x H x D)	
Switches	120 mm x 60 mm x 38.5 mm
Actuator	120 mm x 60 mm x 20.5 mm
Offset tolerance	
Vertical	≤ 5 mm
Horizontal	≤ 5 mm
Aperture angle	≤ 3°

Ambient data

Enclosure rating	IP67 (EN 60529)
Ambient operating temperature	–20 °C ... +55 °C
Storage temperature	–25 °C ... +70 °C
Relative humidity	50 %, at 70 °C (IEC 60947-5-2)
Vibration resistance	10 Hz ... 55 Hz, 1 mm (IEC 60068-2-6)
Shock resistance	30 g, 11 ms (EN 60068-2-27)
EMC	EN IEC 61326-3-1, EN IEC 60947-5-2, EN IEC 60947-5-3

Ordering information

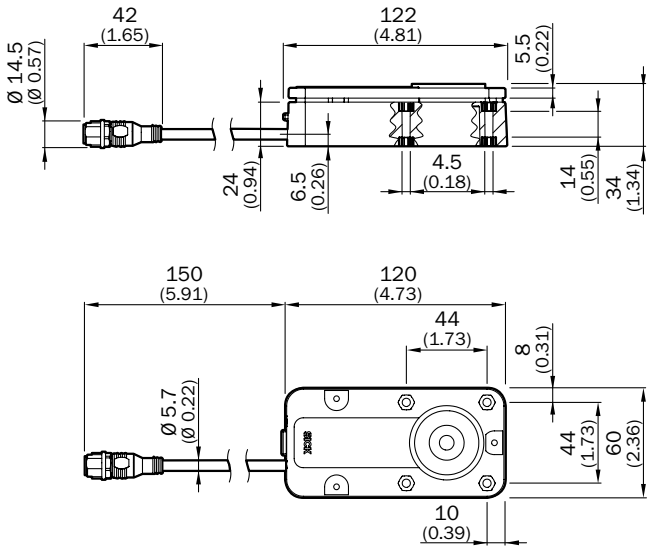
Items supplied MLP1:

- Safety switch
- Actuator
- 4 caps to cover the screw holes
- Safety instruction
- Mounting instructions
- Operating instructions for download ➜ **www.sick.com/MLP1**

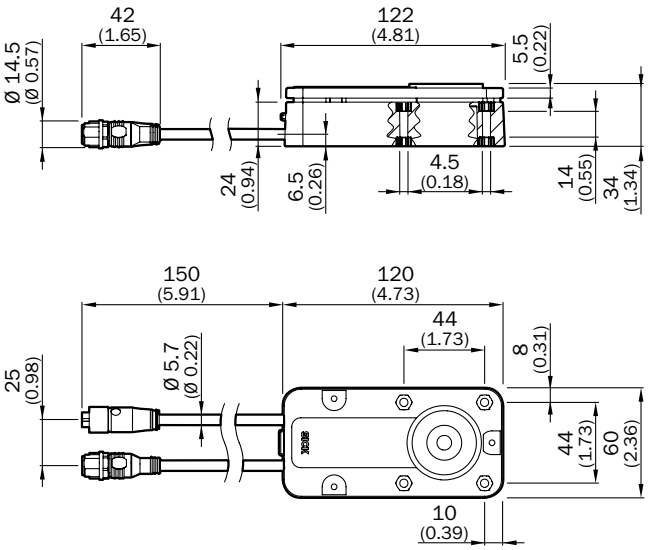
Connection type	Cascading	Type	Part no.
Cable with plug M12, 5-pin	–	MLP1-SMMA0AC	1077943
Cable with plug M12, 5-pin, Cable with female connector, M12, 5-pin	✔ (directly cascadable)	MLP1-SMMC0AC	1077942
Cable with plug M12, 8-pin	✔ (cascadable with T-connector or Flexi Loop)	MLP1-SMMF0AC	1080321

Dimensional drawings (Dimensions in mm (inch))

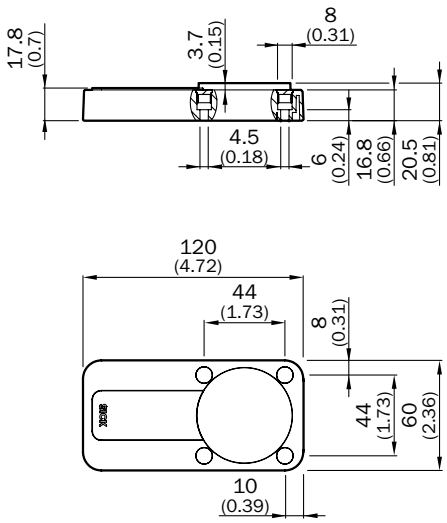
Sensor with M12 male connector



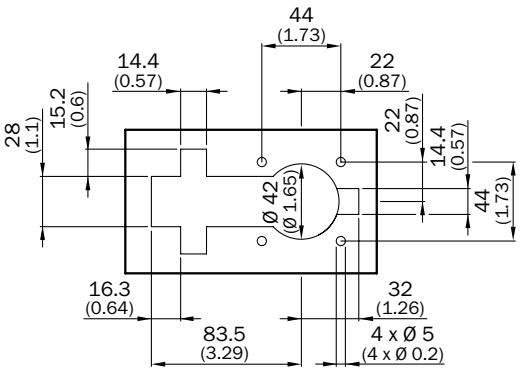
Sensor with M12 male connector and M12 socket



Actuator



Recess for flush mounting



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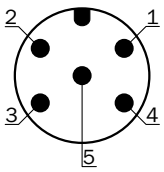
Pin assignment

Connection type: cable with plug M12, 5-pin

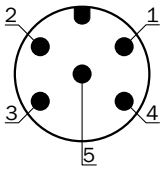
Plug



Pin	Designation	Description
1	+24 V DC	Safety switch voltage supply
2	OSSD 1	OSSD 1 output
3	0 V	0 V DC voltage supply
4	OSSD 2	OSSD 2 output
5	Magnet	Magnet control 24 V DC

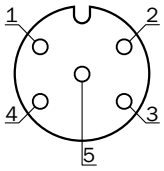
Connection type: cable with plug M12, 5-pin / cable with female connector, M12, 5-pin

Plug



Pin	Designation	Description
1	In +24 V DC	Safety switch voltage supply
2	OSSD 1	OSSD 1 output
3	0 V	0 V DC voltage supply
4	OSSD 2	OSSD 2 output
5	Magnet	Magnet control 24 V DC input

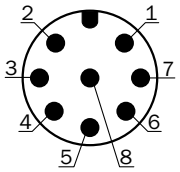
Female connector



Pin	Bezeichnung	Description
1	Out +24 V DC	Safety switch voltage supply
2	In 1	OSSD 1 input
3	0 V	0 V DC voltage supply
4	In 2	OSSD 2 input
5	Magnet	Magnet control 24 V DC output

Connection type: cable with plug M12, 8-pin

Plug

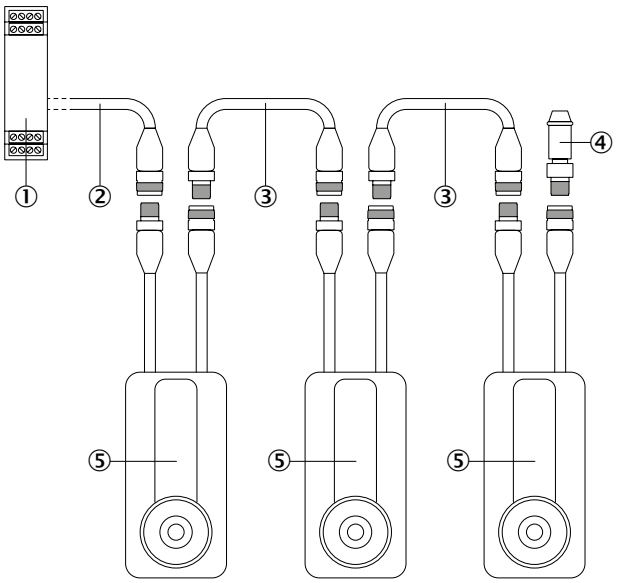


Pin	Designation	Description
1	AUX	Diagnostic output
2	+24 V DC	Safety switch voltage supply
3	Magnet	Magnet control 24 V DC
4	In 2	OSSD 2 input *)
5	OSSD 1	OSSD 1 output
6	OSSD 2	OSSD 2 output
7	0 V	0 V DC voltage supply
8	In 1	OSSD 1 input *)

*) When used as an individual safety switch or as the first safety switch in a cascade: Apply 24 V DC.

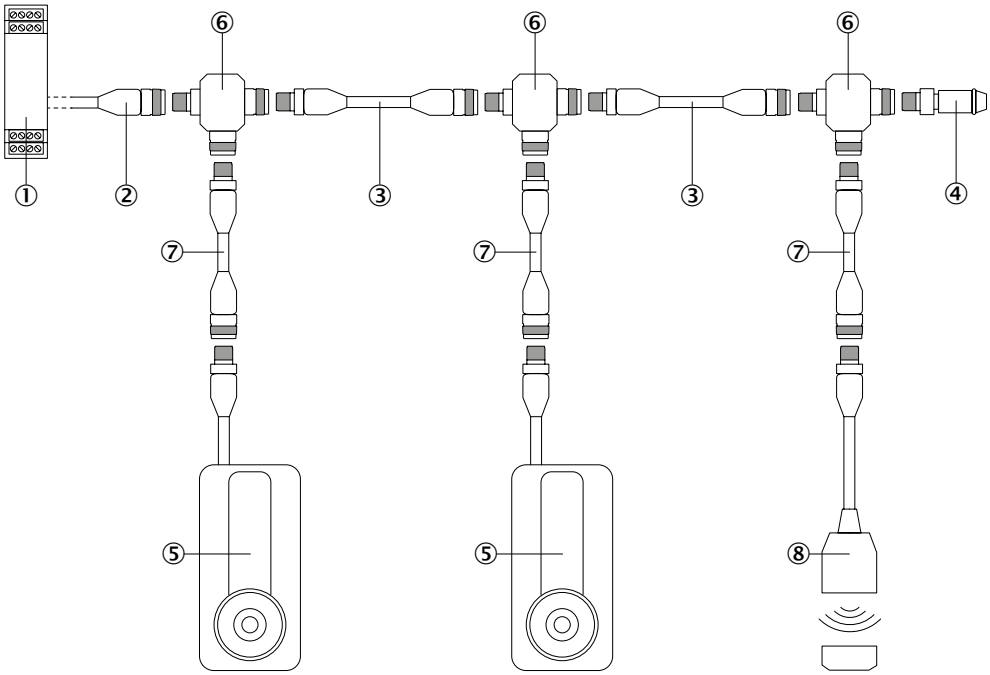
Series connection

Connecting directly connected safety switches



① Safe evaluation unit
② Connecting cable with 5-pin, M12 female connector and flying leads (e.g., YF2A15-xxxVB5XLEAX)
③ Connection cable with 5-pin, M12 male connector and 5-pin, M12 female connector (e.g., YF2A15-xxxUB5M2A15)
④ End plug
⑤ MLP1 safety switch (2 × M12, 5-pin)

Connecting safety switches connected with T-connectors



① Safe evaluation unit
② Connecting cable with 5-pin, M12 female connector and flying leads (e.g., YF2A15-xxxVB5XLEAX)
③ Connection cable with 5-pin, M12 male connector and 5-pin, M12 female connector (e.g., YF2A15-xxxUB5M2A15)
④ End plug
⑤ MLP1 safety switch (M12, 8-pin)
⑥ T-piece
⑦ Connection cable with 8-pin, M12 male connector and 8-pin, M12 female connector (e.g., YF2A18-xxxUA5M2A18)
⑧ Other safety switch, M12, 8-pin

Accessories required for commissioning

Description	Number	Items supplied	Further information
Connecting cable	1	–	→ Plug connectors and cables
Connection cable (only necessary for series connection)	1	–	→ Plug connectors and cables
End connector for series connection (only necessary for series connection)	1	–	→ Adapters and distributors
Safety screws M4 x 14	4	–	→ Nuts and screws
Operating instructions	1	✔	→ www.sick.com/MLP1

Accessories

Mounting systems

Nuts and screws

Screws

Figure	Packing unit	Type	Part no.
	10 pieces	Safety screws M4 x 14	5333570

Connection systems

Plug connectors and cables

Connecting cables with female connector

Figure	Connection type		Model	Conductor cross-section	Cable length	Type	Part no.
	Female connector, M12, 5-pin, straight	Open cable ends	PVC, unshielded	0.34 mm²	2 m	YF2A15-020VB5XLEAX	2096239
					5 m	YF2A15-050VB5XLEAX	2096240
					10 m	YF2A15-100VB5XLEAX	2096241
					15 m	YF2A15-150VB5XLEAX	2096242
	Female connector, M12, 8-pin, straight	Open cable ends	PUR, halogen-free, unshielded	0.25 mm²	2 m	YF2A18-020UA5XLEAX	2095652
					5 m	YF2A18-050UA5XLEAX	2095653
					10 m	YF2A18-100UA5XLEAX	2095654
					15 m	YF2A18-150UA5XLEAX	2095679
					20 m	YF2A18-200UA5XLEAX	2095680
					30 m	YF2A18-300UA5XLEAX	2095681

Connection cables with female connector and male connector

- **Model:** PUR, halogen-free, unshielded

Figure	Connection type		Conductor cross-section	Cable length	Type	Part no.
	Female connector, M12, 5-pin, straight	Male connector, M12, 5-pin, straight	0.34 mm²	0.6 m	YF2A15-C60UB5M2A15	2096006
				1 m	YF2A15-010UB5M2A15	2096007
				1.5 m	YF2A15-015UB5M2A15	2096008
				2 m	YF2A15-020UB5M2A15	2096009
				5 m	YF2A15-050UB5M2A15	2096010
				10 m	YF2A15-100UB5M2A15	2096011
				15 m	YF2A15-150UB5M2A15	2096171
				20 m	YF2A15-200UB5M2A15	2095844
				30 m	YF2A15-300UB5M2A15	2095845
	Female connector, M12, 8-pin, straight	Male connector, M12, 8-pin, straight	0.25 mm²	0.6 m	YF2A18-C60UA5M2A18	2096031
				1 m	YF2A18-010UA5M2A18	2096032
				1.5 m	YF2A18-015UA5M2A18	2096012
				2 m	YF2A18-020UA5M2A18	2096033
				5 m	YF2A18-050UA5M2A18	2096034
				10 m	YF2A18-100UA5M2A18	2096035

Adapters and distributors

T-junctions

Figure	Description	Type	Part no.
	T-connector for safe series connection	TR4-AK004C	5325889

Other adapters and distributors

Figure	Description	Type	Part no.
	Node for voltage supply	MLP1-XXN	1078202
	End connector for series connection	MLP1-XXT	1078201

Further accessories

Actuators

Figure	Description	Type	Part no.
	Replacement actuator	MLP1-XA	1078199

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Our comprehensive and versatile LifeTime Services are the perfect addition to the comprehensive range of products from SICK. The services range from product-independent consulting to traditional product services.

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Safe and professional

Product and system support
Reliable, fast, and on-site

Verification and optimization
Safe and regularly inspected

Upgrade and retrofits
Easy, safe, and economical

Training and education
Practical, focused, and professional

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SICK AT A GLANCE

SICK is a leading manufacturer of intelligent sensors and sensor solutions for industrial applications. With more than 8,000 employees and over 50 subsidiaries and equity investments as well as numerous agencies worldwide, we are always close to our customers. A unique range of products and services creates the perfect basis for controlling processes securely and efficiently, protecting individuals from accidents and preventing damage to the environment.

We have extensive experience in various industries and understand their processes and requirements. With intelligent sensors, we can deliver exactly what our customers need. In application centers in Europe, Asia and North America, system solutions are tested and optimized in accordance with customer specifications. All this makes us a reliable supplier and development partner.

Comprehensive services round out our offering: SICK LifeTime Services provide support throughout the machine life cycle and ensure safety and productivity.

For us, that is "Sensor Intelligence."

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Detailed addresses and further locations → www.sick.com

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