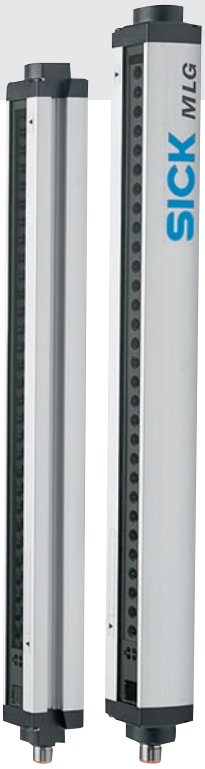
OPERATING INSTRUCTIONS

MLG/XLG

Modular Light Grid



EN

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1 General information

1.1 Information on the operating instructions

These operating instructions provide important information on handling MLG and XLG modular light grids by SICK AG. A prerequisite for their safe operation is that all safety notes and handling instructions stated in this manual are observed.

In addition, any local work safety regulations and general safety specifications applicable for use of the light grids must be complied with.

Ensure you read through these operating instructions carefully before starting to work with the light grids. It constitutes an integral part of the product and should be stored in the direct vicinity of the light grid so it remains accessible for personnel at all times.

Should the light grid be passed on to a third party, these operating instructions should be handed over with it.

NOTE!

These operating instructions describe the “Inputs and outputs, data interface” feature for all modular MLG and XLG light grids in their F, E, I, T, A and N variants.

→ See page 14, chapter 3.2.1 “Type code”.

1.2 Explanation of symbols

Warnings

Warnings in these operating instructions are indicated by symbols. The warnings are introduced by signal words that indicate the extent of the danger.

These warnings must be observed at all times and care must be taken to avoid accidents, injuries to personnel and damage to objects.

DANGER!

... indicates a situation of imminent danger, which will lead to a fatality or serious injuries if not prevented.

WARNING!

... indicates a potentially dangerous situation, which may lead to a fatality or serious injuries if not prevented.

CAUTION!

... indicates a potentially dangerous situation, which may lead to minor/slight injuries if not prevented.

NOTICE!

... indicates a potentially damaging situation, which may lead to damage to equipment or objects if not prevented.

Tips and recommendations

NOTE!

... highlights useful tips and recommendations as well as information for efficient and trouble-free operation.

1.3 Limitation of liability

Applicable standards and regulations, the latest state of technological development and many years of knowledge and experience have all been taken into account when assembling the data and information contained in these operating instructions.

The manufacturer accepts no liability for damage caused by:

- failing to observe the operating instructions
- incorrect use
- use by untrained personnel
- unauthorized alterations
- technical modifications
- use of unauthorized spare parts/consumable parts.

With special variants, where optional extras have been ordered or owing to the latest technical changes, the actual delivery may vary from the features and illustrations shown here.

1.4 Delivery

The following are included in the delivery:

- MLG S or XLG S sender
- MLG E or XLG E receiver
- Optional: Accessories (→ page 87, chapter 14).

Documentation enclosed for each light grid:

- Quickstart

1.5 Customer service

Do not hesitate to contact our customer service should you require any technical information.

For your representative, see the rear of these operating instructions.

NOTE!

Before calling, make a note of all type label data such as type code, serial number etc. to ensure faster processing.

1.6 EC Declaration of Conformity

→ The EC Declaration of Conformity can be downloaded via the Internet from “www.mysick.com”.

1.7 Environmental protection

NOTICE!

Danger to the environment due to improper disposal of the light grid!

Disposing of light grids improperly may cause damage to the environment.

For this reason:

– Always observe the valid regulations on environmental protection.
– Following appropriate assembly, send any disassembled components for recycling.
– Separate the materials according to their type and place them in recycling containers.

2 Safety

2.1 Correct use

MLG and XLG light grids are opto-electronic sensors consisting of a sender (MLG S/XLG S) and a receiver (MLG E/XLG S).

The light grids are solely intended for the optical and non-contact detection of objects, animals and people.

SICK assumes no liability for losses or damage arising from the use of the product, either directly or indirectly. This applies in particular to incorrect use of the product that does not conform to its intended purpose and is neither described nor mentioned in this documentation.

2.2 Improper use

MLG and XLG light grids do not constitute safety components in accordance with the EC Machinery Directive (2006/42/EC).

MLG and XLG light grids may not be used for personal protection applications.

MLG and XLG light grids are not safety light grids. MLG light grids may not be used as a safety device to prevent access for persons, their hands or other bodily parts to hazardous areas for safety purposes.

MLG and XLG light grids may not be used in potentially explosive atmospheres.

Any other uses not described under correct use are prohibited.

Never install/connect accessories whose quantity and composition are not expressly specified or that are not approved by SICK AG.

WARNING!

Danger due to improper use!

All improper usage can lead to dangerous situations.

For this reason:

– Light grids should be used according to their intended use only.
– All information in the operating instructions must be strictly complied with.

2.3 Modifications and conversions

Modifications and conversions to the light grid and/or the installation may lead to unforeseeable dangers.

Technical modifications and enhancements to the light grid in particular require the written approval of the manufacturer.

2.4 Requirements for skilled persons and operating personnel

WARNING!

Danger of injury due to insufficient training!

Improper handling may lead to considerable damage to persons and equipment.

For this reason:

– All activities should always be performed by designated persons only.

Training requirements for the various activity areas in these operating instructions are as follows:

- **Instructed personnel**
  Such persons have been instructed during training by the operator about tasks they have been allotted and about possible dangers in case of improper behavior.
- **Skilled persons**
  Such persons are able, due to their specialist training, knowledge and experience as well as their knowledge of the pertinent regulations, to perform tasks delegated to them and detect any possible dangers on their own initiative.
- **Electricians**
  Such persons are able, due to their specialist training, knowledge and experience as well as their knowledge of pertinent regulations, to perform work on electrical systems and detect any possible dangers on their own initiative.
  In Germany, electricians must meet the specifications of the BGV A3 Work Safety Regulations (e.g. Master Electrician). Other relevant regulations applicable in other countries must be observed.

3 Identification

3.1 Type label

Each sender and receiver is fitted with a type label.

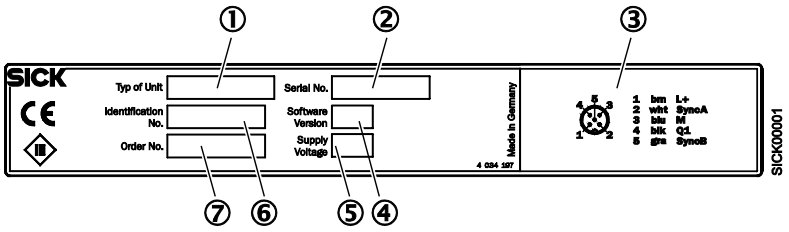


Fig. 1: Type label

1 *Type code, →see page 13, chapter 3.2*
2 *Serial number (DAT code)*
3 *Example connection diagram*
4 *Software version*
5 *Supply voltage*
6 *Identification number*
7 *Order no.*

3.2 Type code

The high-end automation light grids range from SICK AG comprises the MLG and XLG product families.

MLG and XLG light grids differ in their aperture angle and their insensitivity to glare.

Type of unit

NOTE!

During installation, commissioning and configuration, you will need to know the exact type of your light grid. For this, see the type of unit specified on the type label and note the last four characters. These final four characters contain information about inputs and outputs, data interface, range, parameter settings and beam type. →See also page 14 ff.

Example of type of unit

Type of Unit: MLGE1-0290F812

→ Short designation in the operating instructions: F812

3.2.1 Type code MLG Modular Light Grid

M	L	G	E	1	–	0	2	9	0	F	8	1	2	
1	2	3	4	5		6	7	8	9	10	11	12	13	14

Position	Description
1–3	**Product family** **MLG**
4	E Receiver S Sender
5	**Beam spacing** 0 Special variant 1 10 mm 2 20 mm 3 30 mm 5 50 mm 7 25 mm
6–9	**Detection height** [1] 0000 Special variant 0100 100 mm ... 3140 3,140 mm
10	**Inputs and outputs, data interface** F PNP outputs E NPN outputs I PNP output, 1 RS-485 T NPN output, 1 RS-485 C CANopen P PROFIBUS D IO-Link, switching H IO-Link, measuring A Analog, PNP outputs N Analog, NPN outputs
11	**Connection type** 0 Special variant 1 Cable gland 2 Terminal chamber 4 M12 plug, 12-pin 5 M12 plug, 5-pin 8 M12 plug, 8-pin
12	**Range, optical property, aperture angle** 0 Special variant 1 5 m, infrared, ± 3.6° 2 8.5 m, infrared, ± 3.6° 3 20 m, infrared, ± 3.6° (on request) 4 5 m, infrared, ± 5° 5 8.5 m, infrared, ± 5° 6 5 m, infrared, ± 1.8° (on request)
13	**Parameter settings, beam type** 0 Special variant 1 Standard 2 Configuration interface 3 Triple crossover beam 4 Quintuple crossover beam (on request) L Triple crossover beam, Q output inverted
14	**Special device variants** S Special M Sample F Private label K Customer-specific

1) Possible detection heights depend on the beam spacing. Detection heights are graduated in stages of 150 mm as standard. A maximum of 240 beams are possible for each light grid. → For possible monitoring heights, see page 82, chapter 13.2.

3.2.2 Combinations of inputs and outputs and connection type

The connection type determines the number of switching outputs and the number of inputs.

The following combinations are available for MLG light grids:

Positions 10 and 11 in the type code	Inputs and outputs, data interface	Connection type
F2	6 outputs, PNP, 2 inputs	Terminal connection, 12-pin
F4	6 outputs, PNP, 2 inputs	M12 plug, 12-pin
F5	1 PNP output	M12 plug, 5-pin
F8	3 outputs, PNP, 1 input	M12 plug, 8-pin
E2	6 outputs, NPN, 2 inputs	Terminal connection, 12-pin
E4	6 outputs, NPN, 2 inputs	M12 plug, 12-pin
E5	1 NPN output	M12 plug, 5-pin
E8	3 NPN outputs, 1 input	M12 plug, 8-pin
I2	4 PNP outputs, 2 inputs, RS-485	Terminal connection, 12-pin
I4	4 PNP outputs, 2 inputs, RS-485	M12 plug, 12-pin
I8	1 PNP output, 1 input, RS-485	M12 plug, 8-pin
T2	4 NPN outputs, 2 inputs, RS-485	Terminal connection, 12-pin
T4	4 NPN outputs, 2 inputs, RS-485	M12 plug, 12-pin
T8	1 NPN output, 1 input, RS-485	M12 plug, 8-pin
C8	1 PNP output, 1 input, CAN	M12 plug, 8-pin
P8	1 PNP output, 1 input, PROFIBUS	M12 plug, 8-pin
D5	1 PNP output, switching, IO-Link	M12 plug, 5-pin
H5	1 PNP output, measuring, IO-Link	M12 plug, 5-pin
A2	4 PNP outputs, 2 inputs, 2 analog outputs	Terminal connection, 12-pin
A4	4 PNP outputs, 2 inputs, 2 analog outputs	M12 plug, 12-pin
A8	1 PNP output, 1 input, 2 analog outputs	M12 plug, 8-pin
N2	4 NPN outputs, 2 inputs, 2 analog outputs	Terminal connection, 12-pin
N4	4 NPN outputs, 2 inputs, 2 analog outputs	M12 plug, 12-pin
N8	1 NPN output, 1 input, 2 analog outputs	M12 plug, 8-pin

Table 1: Combinations of inputs and outputs and connection type, number of inputs and outputs

3.2.3 Type code XLG Light Resistant Light Grid

X	L	G	E	1	–	0	2	9	0	F	8	1	2	
1	2	3	4	5		6	7	8	9	10	11	12	13	14

Position	Description
1–3	**Product family** **XLG**
4	E Receiver S Sender
5	**Beam spacing** 0 Special variant 1 10 mm (the first beam can not be used) 2 20 mm 3 30 mm 5 50 mm
6–9	**Detection height** [1)] 0000 Special variant 0100 150 mm ... 2000 2,000 mm
10	**Inputs and outputs, data interface** F PNP outputs E NPN outputs I PNP output, 1 RS-485 T NPN output, 1 RS-485
11	**Connection type** 0 Special variant 1 Cable gland 2 Terminal chamber 4 M12 plug, 12-pin (on request) 5 M12 plug, 5-pin (on request) 8 M12 plug, 8-pin
12	**Range, optical property, aperture angle** 0 Special variant 1 5 m, infrared, ± 1.8°
13	**Parameter settings, beam type** 0 Special variant 1 Standard 2 Configuration interface
14	**Special device variants** S Special M Sample F Private label K Customer-specific

1) Possible detection heights depend on the beam spacing. Detection heights are graduated in stages of 150 mm as standard. A maximum of 150 beams are possible for each light grid. *→ For possible monitoring heights, see page 82, chapter 13.2.*

3.2.4 Combinations of inputs and outputs and connection type

The connection type determines the number of switching outputs and the number of inputs.

The following combinations are available for XLG light grids with a 30 mm or 50 mm beam spacing:

Positions 10 and 11 in the type code	Inputs and outputs, data interface	Connection type
F2	6 PNP outputs, 2 inputs	Terminal connection, 12-pin
F5	1 PNP output	M12 plug, 5-pin
F8	3 PNP outputs, 1 input	M12 plug, 8-pin
E2	6 NPN outputs, 2 inputs	Terminal connection, 12-pin
E5	1 NPN output	M12 plug, 5-pin
E8	3 NPN outputs, 1 input	M12 plug, 8-pin
I2	4 PNP outputs, 2 inputs, RS-485	Terminal connection, 12-pin
I8	1 PNP output, 1 input, RS-485	M12 plug, 8-pin
T2	4 NPN outputs, 2 inputs, RS-485	Terminal connection, 12-pin
T8	1 NPN output, 1 input, RS-485	M12 plug, 8-pin

Table 2: Combinations of inputs and outputs and connection type, number of inputs and outputs

The following combinations are available for XLG light grids with a beam spacing of 10 mm:

Positions 10 and 11 in the type code	Inputs and outputs, data interface	Connection type
F2	6 PNP outputs, 2 inputs	Terminal connection, 12-pin
F5	1 PNP output	M12 plug, 5-pin
F8	3 PNP outputs, 1 input	M12 plug, 8-pin
I2	4 PNP outputs, 2 inputs, RS-485	Terminal connection, 12-pin
I8	1 PNP output, 1 input, RS-485	M12 plug, 8-pin

Table 3: Combinations of inputs and outputs and connection type, number of inputs and outputs

4 Structure and function

4.1 Setup

**MLG/XLG –
without programming interface**

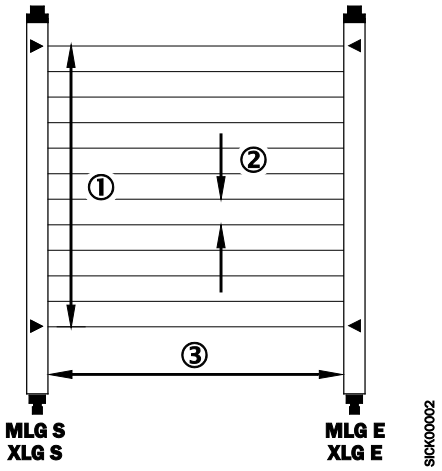


Fig. 2: MLG/XLG modular light grid setup

MLG S/XLG S: Sender
MLG E/XLG E: Receiver

1 Monitoring height
2 Beam spacing
3 Range: Distance between sender and receiver

**MLG/XLG –
with programming interface**

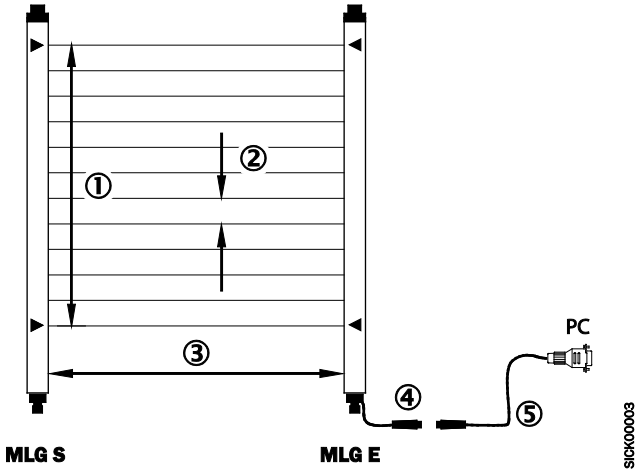


Fig. 3: Setup "MLG/XLG Programmable/ XLG Programmable modular light grids"

MLG S/XLG S: Sender
MLG E/XLG E: Receiver

1 Monitoring height
2 Beam spacing
3 Range: Distance between sender and receiver
4 RS-232 programming interface
5 Optional connection cable from light grid to PC

4.2 Function

MLG and XLG light grids are compact, optical and modular light grids comprising a sender (MLG S/XLG S) and a receiver (MLG E/XLG E).

The sender consists of sender optics, several sending elements (LEDs) and actuation electronics. The receiver consists of receiver optics, several sending elements (photodiodes) and actuation electronics. One sender element and a receiver element each situated opposite one another constitute a channel. Providing no object is located between the sender and receiver elements, the light beams from the sending elements will hit the receiving elements. If an object is located between the sender and receiver elements, the light beams will be blocked depending on the size of the object.

The receiver on MLG Programmable and XLG Programmable modular light grids is equipped with an RS-232 programmable interface. Via this interface and the MLGsetup configuration program, you can configure the light grid and its inputs and outputs according to the specific application. → See page 53, chapter 9.

Modular light grids are preparameterized in the factory using a standard configuration. → See page 48, chapter 7.5.

4.3 Detection area

The detection area is determined by the beam spacing, monitoring height, number of beams and range of the light grid. The range of the light grid is the distance between sender and receiver.

4.4 MDO (Minimum Detectable Object)

The minimum detectable object is the minimum size an object needs to be for it to be detected by the light grid. The minimum detectable object is known as the MDO for short.

The minimum detectable object depends on the beam spacing, range type and beam function of the light grid.

The less the beam spacing and the lower the range type, the smaller the object that can be detected by the light grid will be. Smaller objects can be detected with the crossover beam function than with the parallel beam function.

4.5 Beam function

With the beam function, we distinguish between the parallel beam function and crossover beam function.

Factory setting

→ For a detailed overview of the beam function according to type, see page 48, chapter 7.5.

The following beam functions are parameterized in the factory for the various light grids:

- MLG with the Standard beam type: Parallel beam function parameter settings cannot be modified.
- MLG with the “Crossover beam” beam type: Crossover beam function
  Parameter settings cannot be modified.
- XLG Programmable/MLG Programmable with the “Configuration interface” beam type: Parallel beam function
  You can modify the beam function using the MLGsetup configuration program. → See page 75, Table 28.

Parallel beam function

With the parallel beam function, each light beam is received only by the receiver element situated directly opposite.

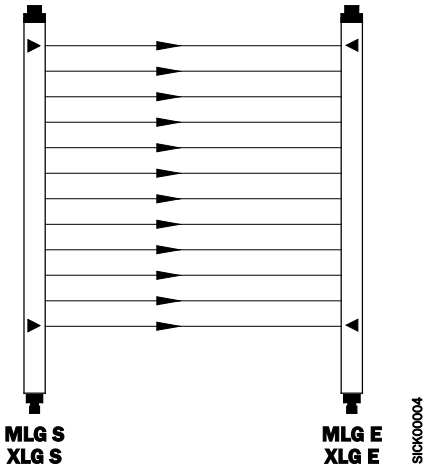


Fig. 4: Parallel beam function

Minimum detectable object (MDO) with parallel beam function – 5 m range type

The following table shows the minimum detectable object (MDO) for the 5 m range type depending on beam spacing. → See page 13 ff, MLG and XLG type code, item 5 “Beam spacing” and item 12 “Range”.

Type	Beam spacing	MDO
1x ... xx1x 1x ... xx4x 1x ... xx6x	10 mm	15 mm
2x ... xx1x 2x ... xx4x 2x ... xx6x	20 mm	25 mm
7x ... xx4x	25 mm	30 mm
3x ... xx1x 3x ... xx4x 3x ... xx6x	30 mm	35 mm
5x ... xx1x 5x ... xx4x 5x ... xx6x	50 mm	55 mm

Table 4: MDO with parallel beam function – 5m range type

Minimum detectable object (MDO) for the parallel beam function – 8.5 m range type

The following table shows the minimum detectable object (MDO) for the 8.5 m range type depending on beam spacing.
→ See page 13 ff, MLG and XLG type code, item 5 “Beam spacing” and item 12 “Range”.

Type	Beam spacing	MDO
1x ... xx2x 1x ... xx5x	10 mm	20 mm
2x ... xx2x 2x ... xx5x	20 mm	30 mm
3x ... xx2x 3x ... xx5x	30 mm	40 mm
5x ... xx2x 5x ... xx5x	50 mm	60 mm

Table 5: MDO with parallel beam function – 8.5 m range type

Crossover beam function

With the crossover beam function, a light beam emitted by a sender element is received alternately by a receiver element located directly opposite and by receiver elements located above and beneath this.

The crossover beam function increases the resolution and enables detection of smaller objects (MDO).

The response time is longer compared to the parallel beam function.
→ See page 83, chapter 13.4.

With the crossover beam function, a minimum distance needs to be observed between sender and receiver. The minimum distance depends on the aperture angle of the light grid.

Minimum detectable object (MDO) with the crossover beam function

The minimum detectable object (MDO) is specified for the following areas:

- Area a: close to the sender and receiver
- Area b: in the central area between sender and receiver.

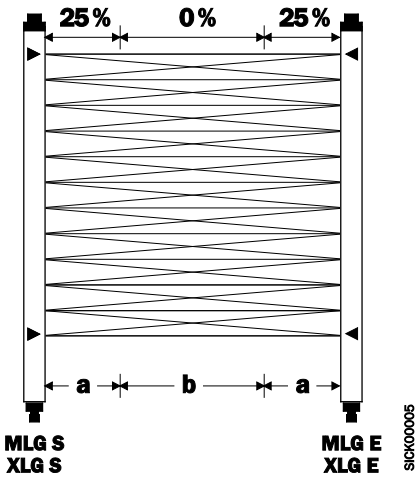


Fig. 5: Crossover beam function

Minimum detectable object (MDO) with the crossover beam function – 5 m range type, aperture angle ± 3.6° and ± 5°

The following table shows the minimum detectable object (MDO) for the 5 m range type depending on beam spacing and aperture angle.
→ See page 13 ff, MLG and XLG type code, item 5 “Beam spacing” and item 12 “Range.”

Type	Beam spacing	Minimum distance [1]	MDO	
			Area a	Area b
1x ... xx1x	10 mm	350 mm	15 mm	> 10 mm
1x ... xx4x		180 mm		
2x ... xx1x	20 mm	650 mm	25 mm	> 15 mm
2x ... xx4x		320 mm		
7x ... xx4x	25 mm	400 mm	30 mm	> 18 mm
3x ... xx1x	30 mm	900 mm	35 mm	> 20 mm
3x ... xx4x		470 mm		
5x ... xx1x	50 mm	1500 mm	55 mm	> 30 mm
5x ... xx4x		750 mm		

1) *With the crossover beam function, a minimum distance needs to be observed between sender and receiver. The minimum distance depends on the aperture angle of the light grid.*

Table 6: MDO with crossover beam function – 5 m range type

Minimum detectable object (MDO) with the crossover beam function – 8.5 m range type, aperture angle ± 3.6° and ± 5°

The following table shows the minimum detectable object (MDO) for the 8.5 m range type depending on beam spacing and aperture angle.
→ See page 13 ff, MLG and XLG type code, item 5 “Beam spacing” and item 12 “Range”.

Type	Beam spacing	Minimum distance [1]	MDO	
			Area a	Area b
1x ... xx2x	10 mm	350 mm	20 mm	> 15 mm
1x ... xx5x		180 mm		
2x ... xx2x	20 mm	650 mm	30 mm	> 20 mm
2x ... xx5x		320 mm		
3x ... xx2x	30 mm	900 mm	40 mm	> 25 mm
3x ... xx5x		470 mm		
5x ... xx2x	50 mm	1500 mm	60 mm	> 35 mm
5x ... xx5x		750 mm		

1) *With the crossover beam function, a minimum distance needs to be observed between sender and receiver. The minimum distance depends on the aperture angle of the light grid.*

Table 7: MDO with crossover beam function – 8.5 m range type

4.6 Example applications

4.6.1 MLG/XLG

Typical applications for MLG/XLG light grids include checking for projections, access control, ejection control and start and end recognition.

Fig. 6: Checking for projections

Fig. 7: Access control

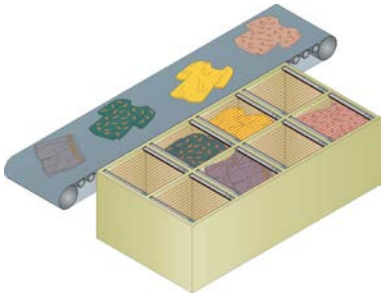


Fig. 8: Ejection control

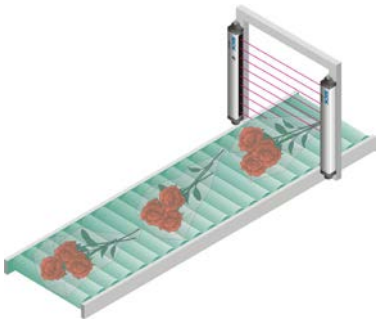


Fig. 9: Start and end recognition

4.6.2 MLG Programmable/XLG Programmable

The MLG Programmable light grid and XLG Programmable light grid are suitable for complex applications such as height measurement, hole detection, slack regulation, traffic applications, profile detection and operator guidance.

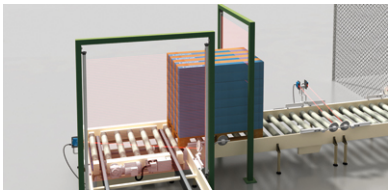


Fig. 10: Height measurement

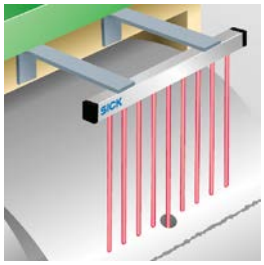


Fig. 11: Hole detection

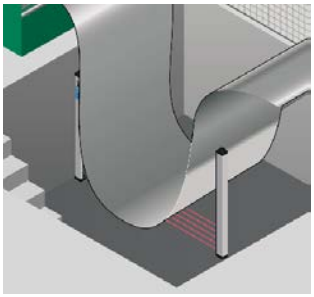


Fig. 12: Slack regulation

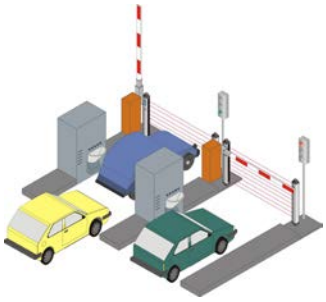


Fig. 13: Traffic applications

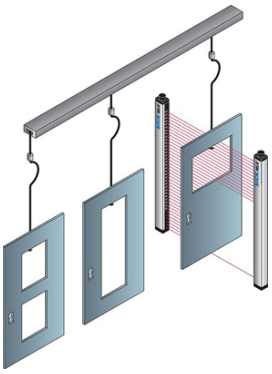


Fig. 14: Profile detection

Fig. 15: Operator guidance

4.7 Status indicators

4.7.1 MLG S/XLG S sender

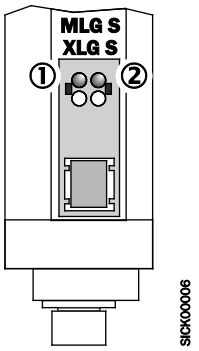


Fig. 16: Sender status indicators

1 red LED
2 green LED

Sender – LEDs

LED	Description
Green LED	Supply voltage on.
Red LED	Sender defective → See page 77, chapter 11.

Table 8: Sender – LEDs

4.7.2 MLG E/XLG E receiver

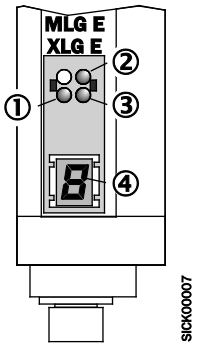


Fig. 17: Receiver status indicators

1 LED yellow
2 LED red
3 LED green
4 7-segment display

Receiver – LEDs

LED	Description
Green LED	Supply voltage on.
Yellow LED illuminates permanently	Sender and receiver are correctly aligned to one another and the light path is not blocked.
Yellow LED flashes	■ Sender and receiver are not correctly aligned to one another. ■ Contamination found. ■ Permissible range exceeded.
Yellow LED off	■ Light path blocked. ■ Sender and receiver are not correctly aligned to one another.
Red LED	Malfunction → See page 77, chapter 11.

Table 9: Receiver – LEDs

Receiver – 7-segment display

Display	Description
H	Blocked Beams Hold (BBH) is active. → See page 70, chapter 9.9.1.
L	Sensitivity teach-in is active. → See page 51, chapter 8.1.
P	Parameterization mode is active.
S	Stand-by is active.
E1, E2, E9	Malfunction → See page 77, chapter 11.

Table 10: Receiver – 7-segment display

5 Transport and storage

5.1 Transport

Improper transport

NOTICE!

Damage of light grid due to improper transport

Considerable damage may occur to the light grid during improper transport.

For this reason:

- Light grids should only be transported by trained specialist staff.
- Utmost care and attention is required at all times during unloading and transportation on company premises.
- Note the symbols on the packaging.
- Note the dimensions of the light grid.
- Do not remove packaging until immediately prior to starting mounting.

5.2 Transport inspection

On receipt of delivery, please check for completeness and for any damage that may have occurred during transportation.

In case damage from transportation that is visible externally, proceed as follows:

- Do not accept the delivery or else do so only conditionally.
- Note the scope of damage on the transport documents or on the transport company's delivery note.
- Initiate a complaint process.

NOTE!

Submit a complaint about all defects as soon as these are detected. Claims for replacement due to damage are only valid before the applicable complaint deadlines.

5.3 Storage

The following should be observed for storage of light grids:

- Do not store light grids outdoors.
- Store them in a dry area that is protected from dust.
- Do not expose the light grid to any aggressive substances.
- Protect light grids from sunlight.
- Avoid mechanical shocks.
- Storage temperature: –40 to +70 °C
- Max. relative air humidity: 95 %, non-condensing
- In case of storage periods longer than 3 months, the general condition of all components and the packaging should be checked on a regular basis.

NOTE!

Other storage conditions may apply for special equipment. → See separate operating instructions for special equipment.

6 Mounting

6.1 Mounting procedure

1. When determining a storage location, always consider the mounting instructions for the sender and receiver.
   → See this page, chapter 6.2.
2. Mount the receiver in a fixed position.
   → See page 37, chapter 6.3.
3. Mount sender such that it can be rotated left and right in its bracket.
4. Establish an electrical connection.
   → See page 40, chapter 7.
5. Align the sender to the receiver. When aligned correctly, the yellow LED on the receiver illuminates permanently.
6. Mount the sender in a fixed position.

6.1.1 Aligning the sender and receiver

NOTE!

The sender must always be aligned to the receiver.

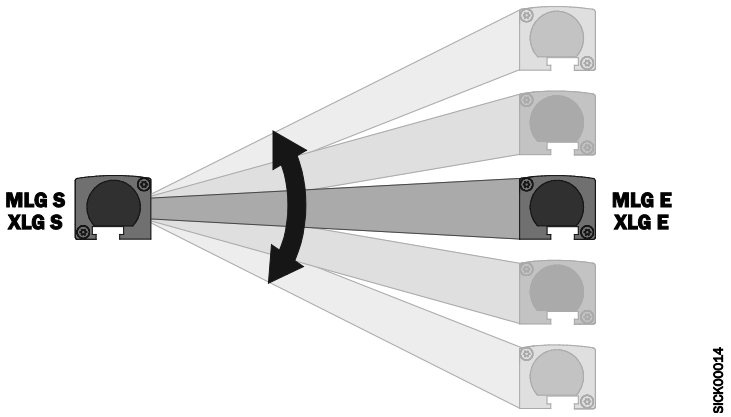


Fig. 18: Aligning the sender to the receiver, view from above

6.2 Mounting instructions

To ensure trouble-free operation, the following mounting instructions should be observed:

- Technical specifications such as maximum scanning range etc. must be complied with.
  → See page 80, chapter 13.
- Only use the light grid outdoors with an additional weather hood.
- In temperatures below the minimum permissible temperature for light grids, use a heater with an IP-67 housing.
  → See page 85, chapter 13.10.
- MLG light grids: Protect the receiver from direct sunlight.
- To prevent condensation water, avoid exposing the light grid to rapid changes in temperature.
- Maintain a minimum distance to reflective surfaces.
  → See page 36, chapter 6.2.6.
- Maintain a sufficient distance to other light grid systems.
  → See page 33, chapter 6.2.4 and page 35, chapter 6.2.5.
- Maintain a sufficient distance to opto-electronic devices such as photoelectric sensors.
  → See page 36, chapter 6.2.6.

6.2.1 Mounting position

The following points should be observed with regard to the mounting position:

- Mount the receiver and sender using the same orientation. Electrical connections must point in the same direction.
- Mount the receiver and sender at the same height.

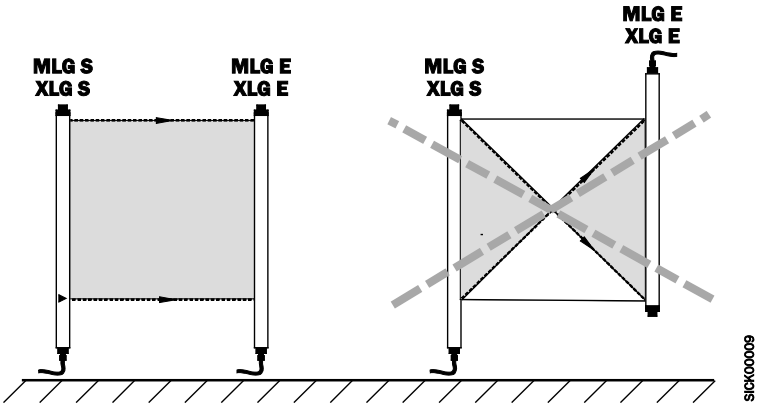


Fig. 19: Mounting position

6.2.2 Mounting offset

Mounting offset is the distance between the first light beam and the object mount or reference level. The first light beam is indicated on both the sender and receiver by an arrow.

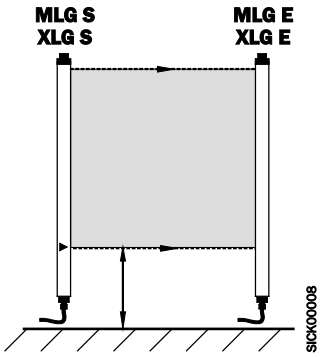


Fig. 20: Mounting offset

6.2.3 Minimum distance from reflective surfaces

Reflective surfaces between the sending and receiving beam path may lead to disruptive reflections and beams being deflected and hence failure to detect objects.

In case of reflective surfaces, a minimum distance must be observed between the reflective surface and the first light beam to ensure reliable operation of the light grid.

This minimum distance depends on the distance between sender and receiver.

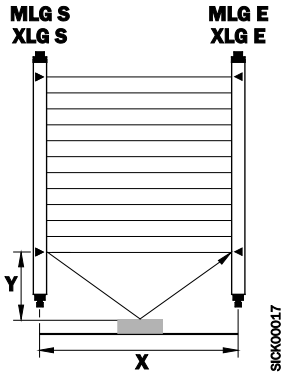


Fig. 21: Distance to reflective surfaces

X Distance between sender and receiver
Y Minimum distance of reflective surfaces to first light beam.

→ See page 33, Fig. 23.

6.2.4 Placement of several light grids

Should you wish to mount several light grids, you will need to observe a minimum distance between the light grids when mounting. This minimum distance will increase as the operating range of the light grids increases.

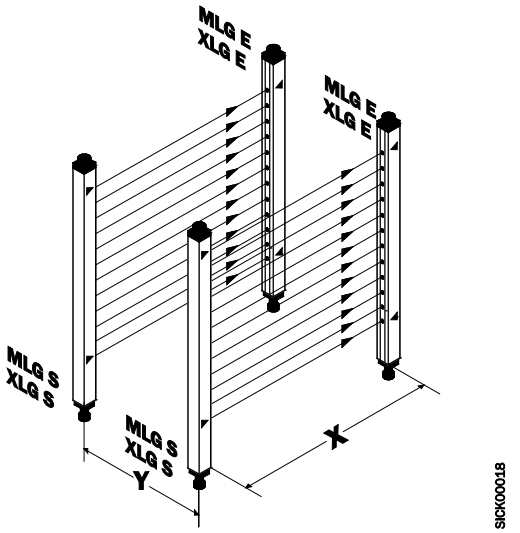


Fig. 22: Placement of two light grids with parallel beam function in the same direction

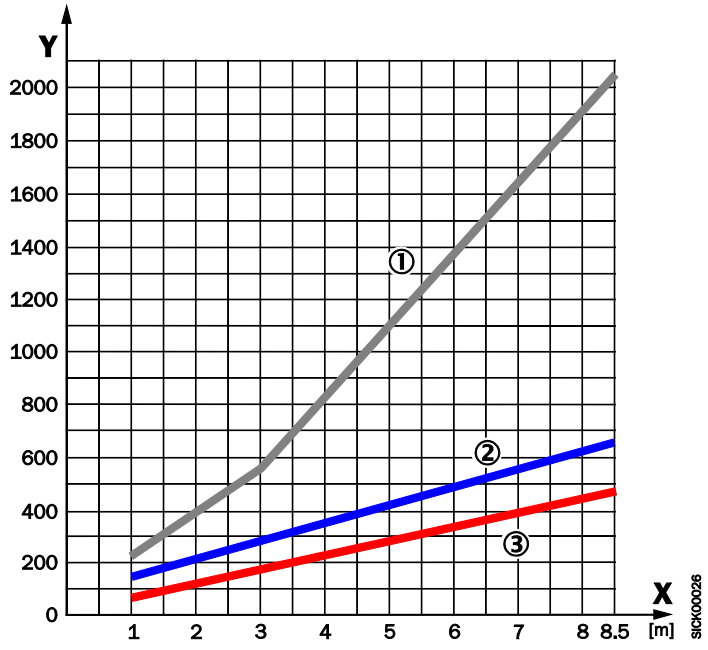


Fig. 23 Minimum distance Y depending on operating range X

X Operating range
Y Minimum distance of light grids
1 MLG with an aperture angle of ± 5 °
2 MLG with an aperture angle of ± 3.6 °
3 XLG with an aperture angle of ± 1.8 °

Alternative placements

Should it not be possible to maintain the minimum distance of light grids from one another, light grids can alternatively be placed as follows:

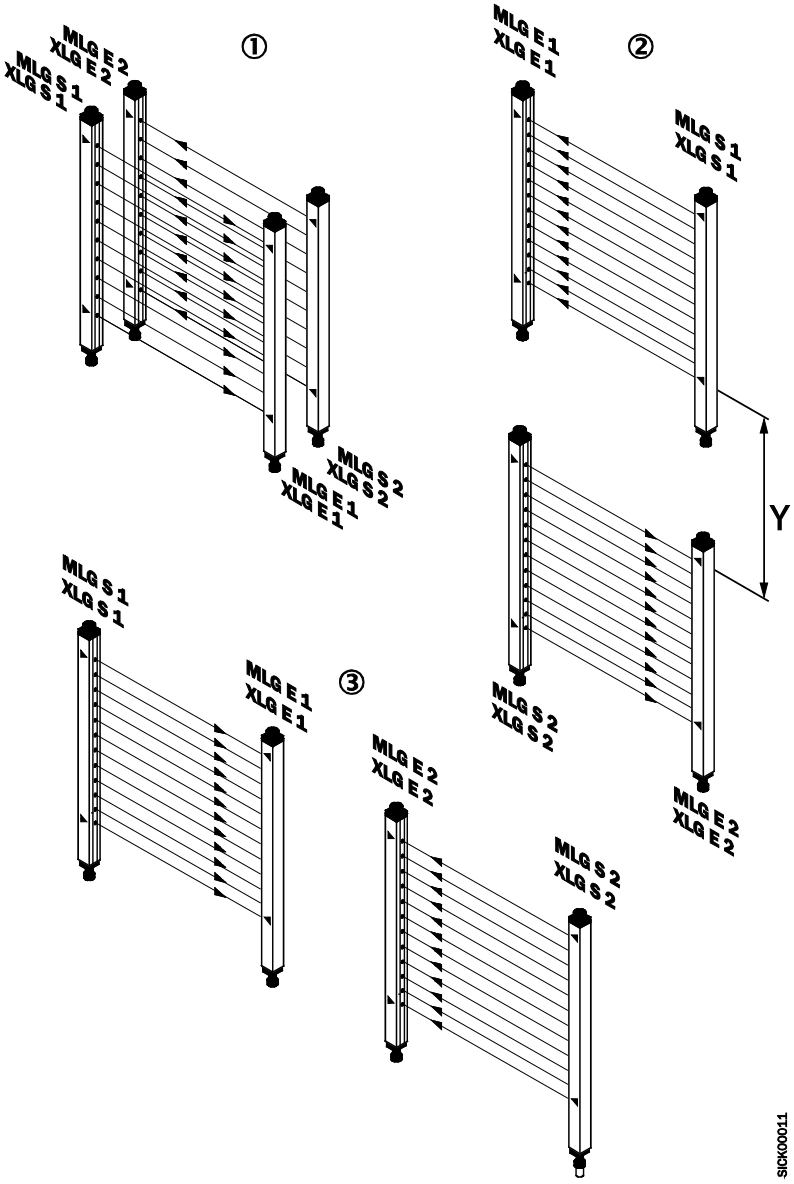


Fig. 24: Alternative placement for several light grids with parallel beam function

1 Placements with light in opposite directions
2 Placement on top of one another
3 Placement in a row

NOTE!

When two light grids are placed opposite one another and beam their light in opposite directions, reflections may occur from sender S 1 to receiver S 2 with the scanning object.

6.2.5 Placement of two light grids at right angles

NOTE!

This chapter is only relevant for the MLG Programmable and XLG Programmable light grids.

Light grids are placed at right angles for volume detection or operator guidance for instance.

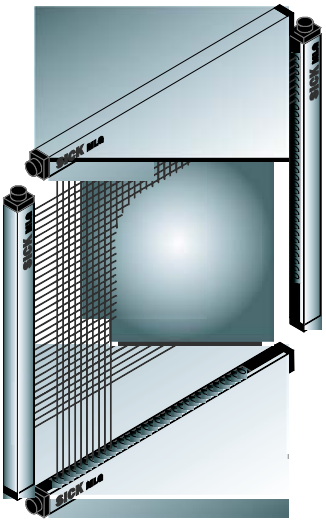


Fig. 25: Placement at a right angle

Mounting

You can suppress mutual interference either by how the light grids are mounted or via the control.

Mount light grids at a distance of ≥ 10 mm from one another.

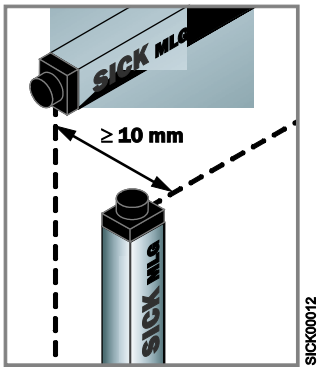


Fig. 26: Light grids at a right angle arranged at a distance

Control

- For both light grids, choose the “Stand-by” input function. You should only ever activate one light grid at the same time via the relevant inputs. → See page 69, chapter 9.9.
- Alternatively, you can activate the test inputs of both senders alternately.

6.2.6 Placement of light grids to adjacent photoelectric sensors

NOTE!

Since opto-electronic devices with a large beam path in the direct environment of a light grid can cause the light grid to malfunction, we recommend using laser photoelectric sensors or photoelectric sensors with a small beam path in the direct vicinity.

Mount the light grid as follows:

- The light path of the photoelectric sensor and the light path of the light grid must run parallel to one another but in opposite directions.

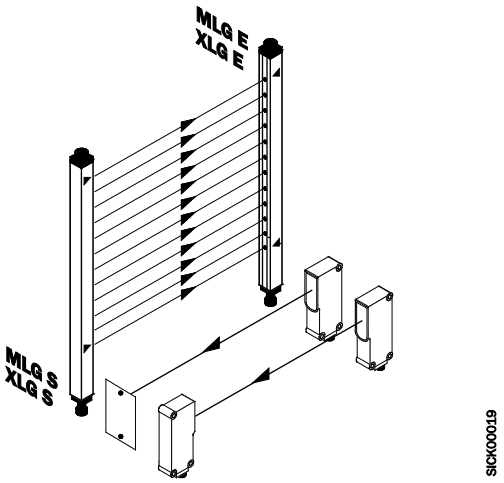


Fig. 27: Placement of light grid with adjacent photoelectric sensors

6.3 Mounting light grids

The following optional accessories are available for mounting:

- Swivel bracket
- T-nuts with sliding nuts
- Metal mounting bracket.

6.3.1 Mounting light grids with a swivel bracket

→ For dimensions and part number, see page 94, Fig. 67.

NOTE!

Mounting with a swivel bracket is only possible for light grids with a monitoring height of up to 1600 mm.

Note the following points:

- Mounting instructions: → See page 31; chapter 6.2.
- For final assembly, both hexagon socket screws must be accessible.

1. Mount the bracket the receiver using an M8 screw.
2. Place the receiver in the bracket and align.
3. Tighten the bracket's two hexagon socket screws.
4. Mount the sender as per steps 1 to 3.

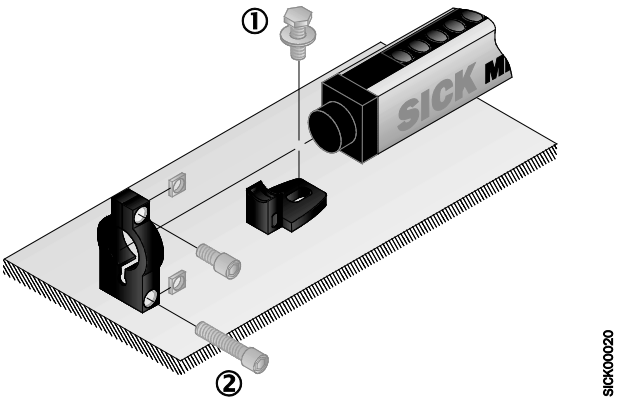


Fig. 28: Mounting light grids with the optional swivel bracket

1 M8 fixing screw
2 Hexagon socket screws (x2)

6.3.2 Mounting light grids with T-nuts and sliding nuts

→ For dimensions and part number, see page 94, Fig. 68.

Note the following points:

- Mounting instructions: → See page 31; chapter 6.2.
- For final assembly, the two clamping screws must be accessible.

1. At a suitable distance, mount two wall-mounting brackets onto a wall for the receiver.
2. Mount two sliding nuts onto the receiver at suitable distances.
3. Slide the receiver into the two wall-mounting brackets from above using the two sliding nuts.
4. Tighten the clamping screws.
5. Mount the sender as per steps 1 to 4.

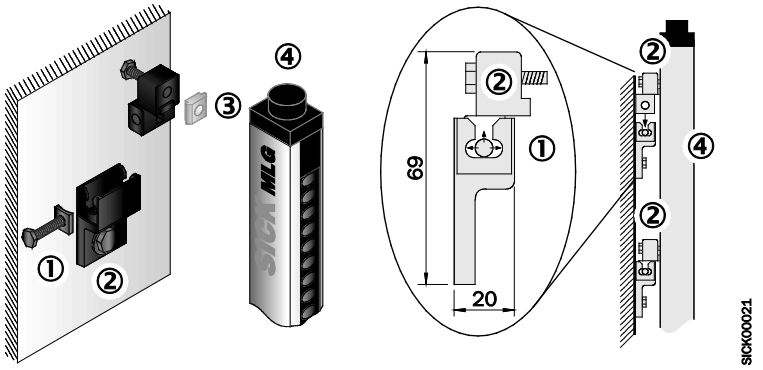


Fig. 29: Mounting light grids with optional T-nuts and sliding nuts

1 Clamping screw for fixing
2 Wall-mounting bracket
3 Sliding nut
4 Sender or receiver

6.3.3 Mounting light grids with a metal mounting bracket

→ For dimensions and part number, see page 95, Fig. 69.

NOTE!

A mounting bracket set comprises four mounting brackets, two for upper mounting and two for lower mounting.

Note the installation instructions. → See page 31; chapter 6.2.

1. Mount the lower mounting bracket for the receiver.
2. Place the receiver into the mounting bracket.
3. Holding the receiver steady, mount the upper mounting bracket.
4. Mount the sender as per steps 1 to 3.

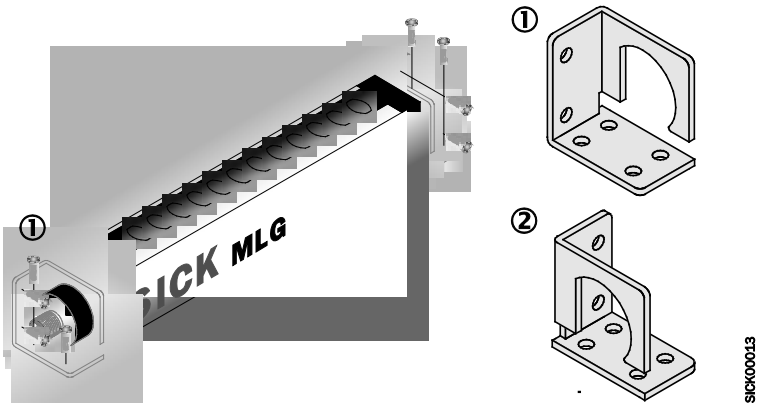


Fig. 30: Mounting light grids with the optional metal mounting bracket

1 Mounting bracket left
2 Mounting bracket right

7 Electrical connections

7.1 Safety

Incorrect supply voltage

NOTICE!

Equipment damage due to incorrect supply voltage!

An incorrect supply voltage can lead to damage to the equipment.

For this reason:

– Only operate the light grid using a protected low voltage and safe electrical insulation as per Protection Class III.

Working with live parts

NOTICE!

Damage to equipment or unpredictable operation due to working with live parts!

Working with live parts may lead to unpredictable operation.

For this reason:

– Only carry out wiring work with the light grid de-energized.

– Only connect and disconnect cable connections in a de-energized state.

7.2 Wiring instructions for trouble-free operation

The following instructions should be observed for wiring:

- Do not lay cables parallel to other cables, especially not parallel to devices with a high level of electromagnetic interference such as a frequency converter.
- In case of cable lengths greater than 15 m or interference in the environment, we recommend a T-distributor. → See page 41, Fig. 31 and page 87, chapter 14.
- Should a direct connection between sender and receiver not be possible, we recommended using shielded and/or twisted pair cables. The shield must be attached on one side.

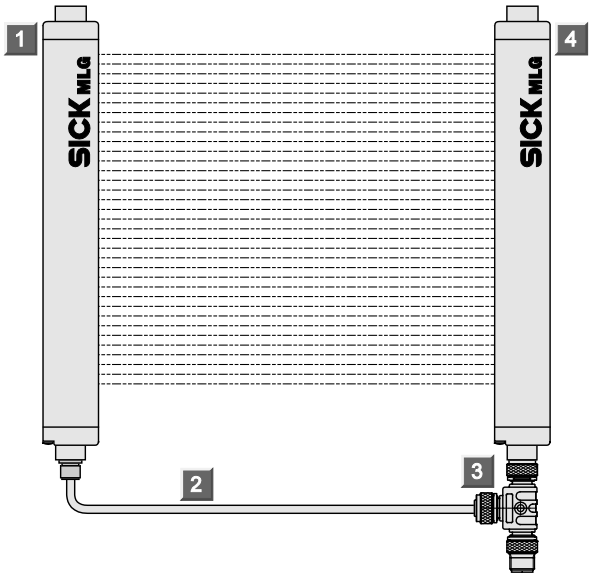


Fig. 31: Connecting sender and receiver via a T-distributor

1 Sender
2 Connection cable (DSL), optional
3 T-distributor (SBO), optional
4 Receiver

7.3 Connecting the light grid electrically

NOTE!

A label with a connection example and details of the inputs and outputs can be found on the sender and the receiver.

1. Ensure the light grid is de-energized.
2. Wire the sender and receiver according to the connection example.
   - Connect the sender's “Sync A” connection to the “Sync A” connection on the receiver.
   - Connect the sender's “Sync B” connection to the “Sync B” connection on the receiver.

7.4 Connection examples

7.4.1 MLG/XLG with standard parameter settings

F5x1, E5x1

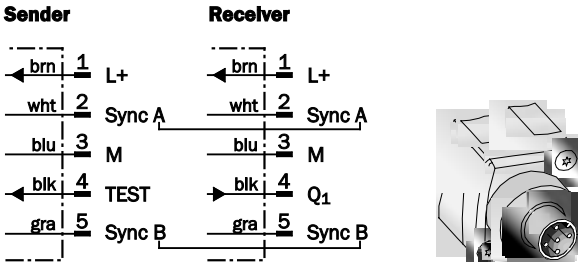


Fig. 32: Connection example, M12 plug, 5-pin

F8x1, E8x1

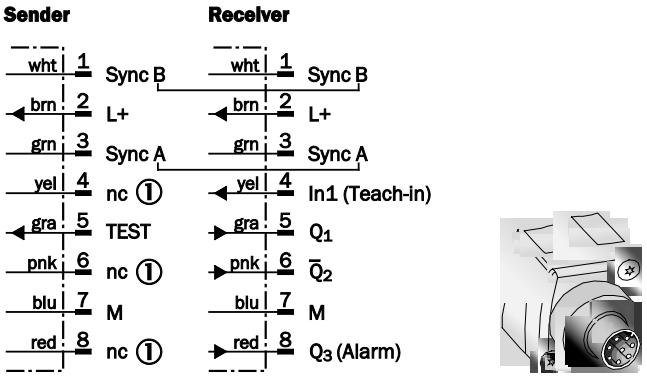


Fig. 33: Connection example, M12 plug, 8-pin

1 not assigned

7.4.2 MLG with crossover beam parameter settings

F5x3, E5x3

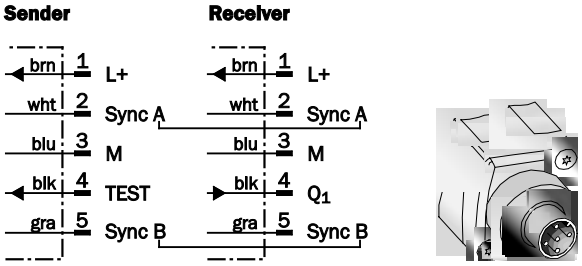


Fig. 34: Connection example, M12 plug, 5-pin

F5xL, E5xL

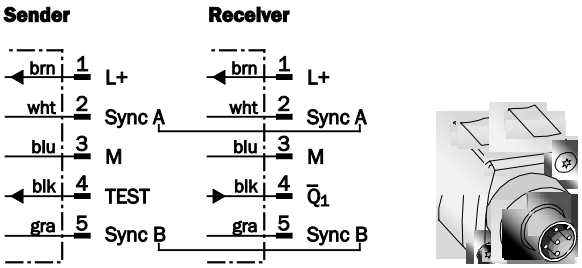


Fig. 35: Connection example, M12 plug, 5-pin

7.4.3 Programmable MLG/XLG

F2x2,E2x2

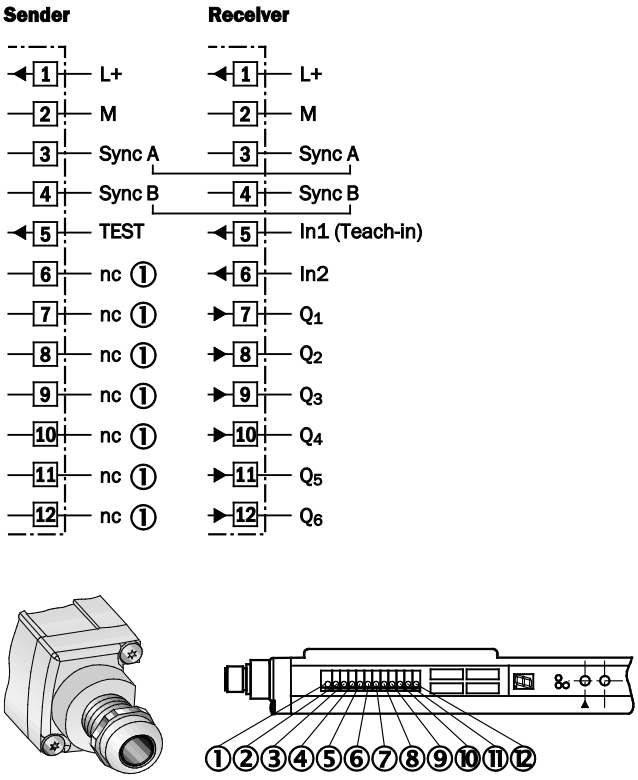


Fig. 36: Connection example, terminal connection, 12-pin

1 not assigned

F4x2, E4x2

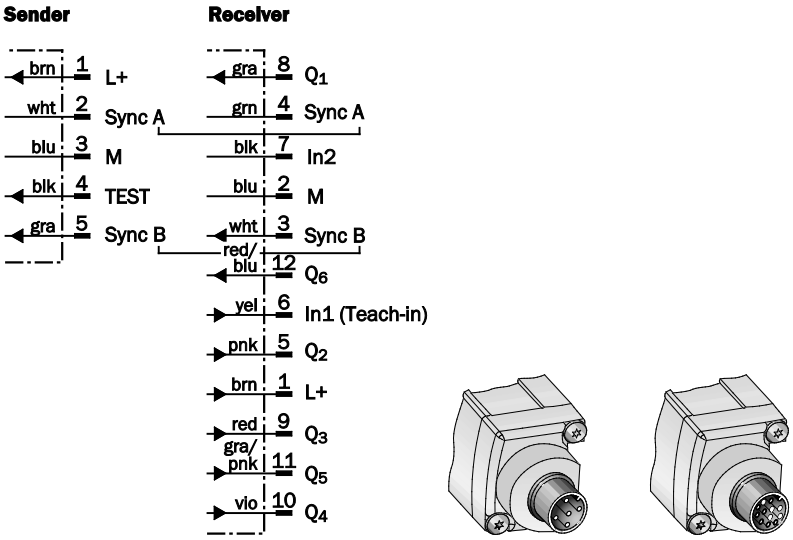


Fig. 37: Connection example, M12 plug, 5-pin/12-pin

F8x2, E8x2

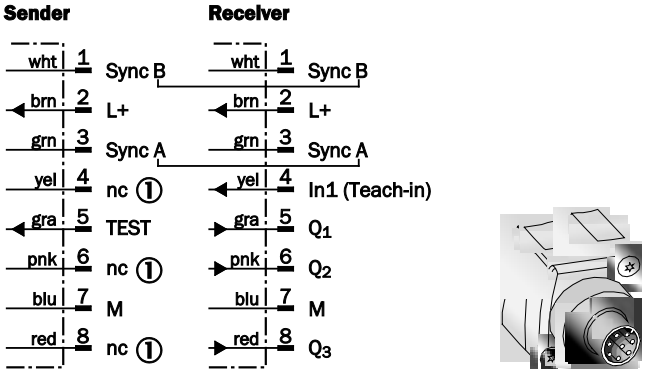


Fig. 38: Connection example, M12 plug, 8-pin

1 not assigned

7.4.4 MLG/XLG Programmable with RS-485 data interface

I2x2,T2x2

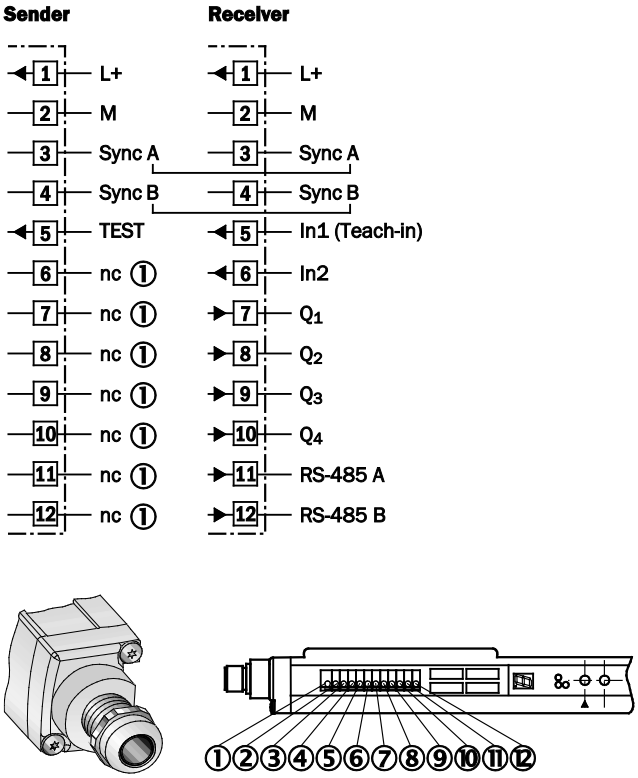


Fig. 39: Connection example, terminal connection, 12-pin

1 not assigned

I4x2, T4x2

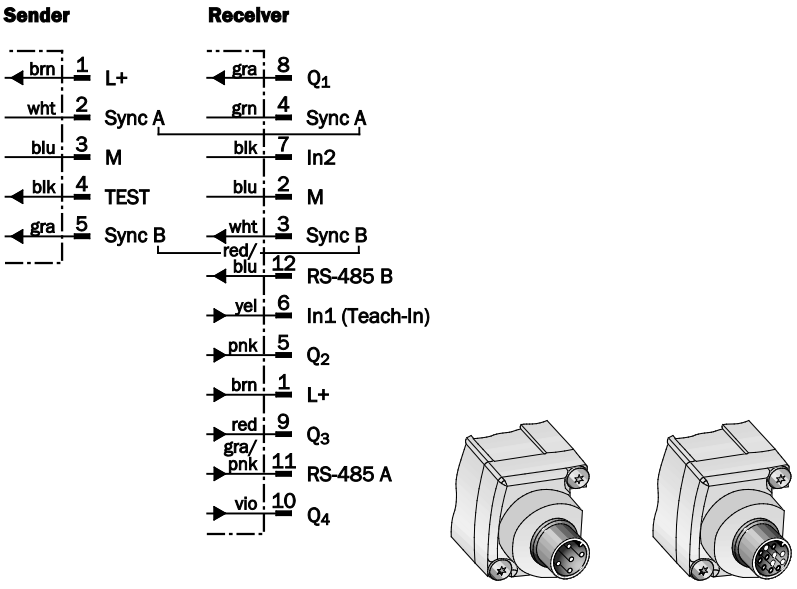


Fig. 40: Connection example, M12 plug, 5-pin/12-pin

I8x2, T8x2

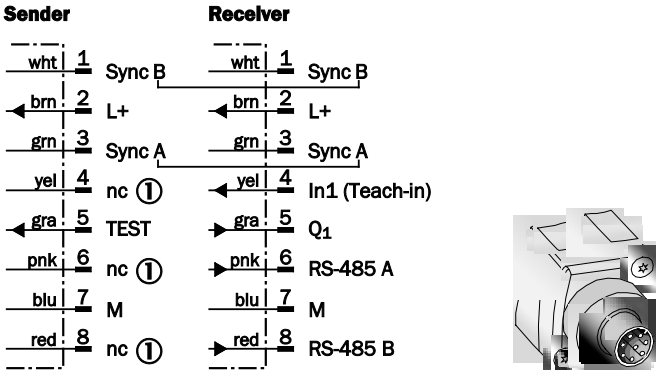


Fig. 41: Connection example, M12 plug, 8-pin

1 not assigned

7.4.5 MLG/XLG Programmable with analog output

A2x2,N2x2

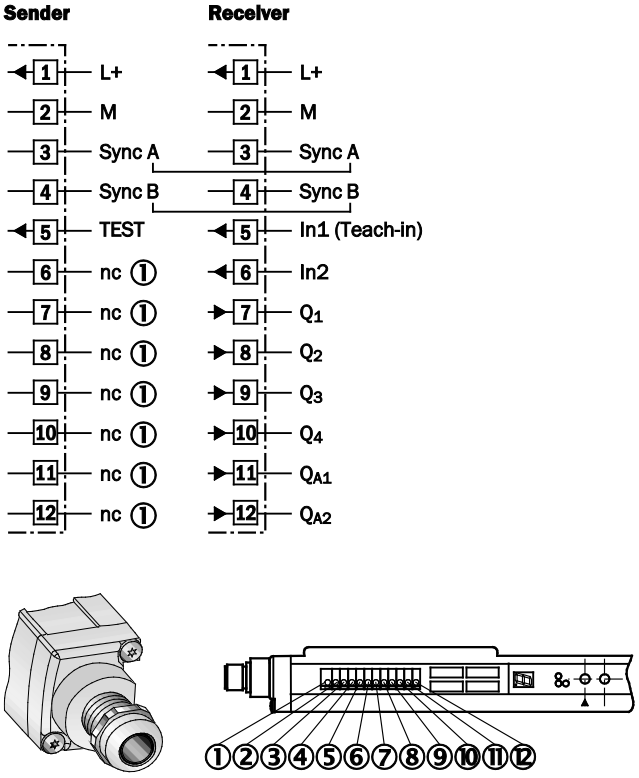


Fig. 42: Connection example, terminal connection, 12-pin

A4x2, N4x2

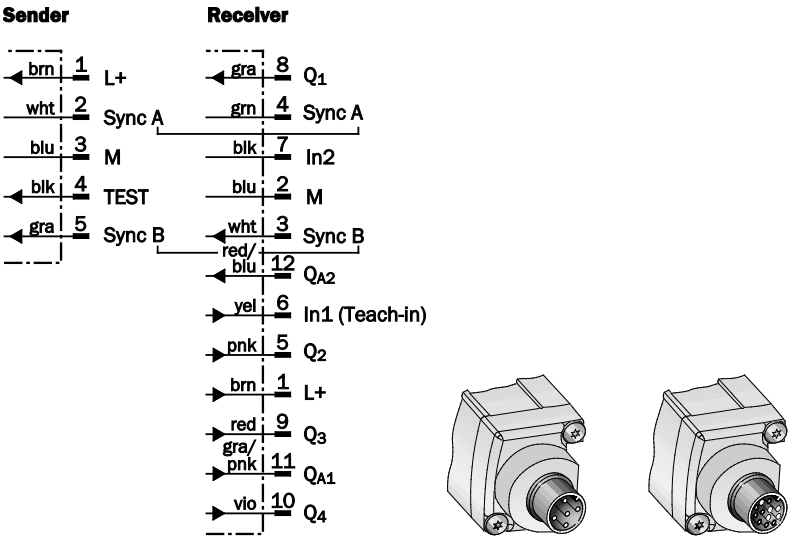


Fig. 43: Connection example, M12 plug, 5-pin/12-pin

A8x2, A8x2

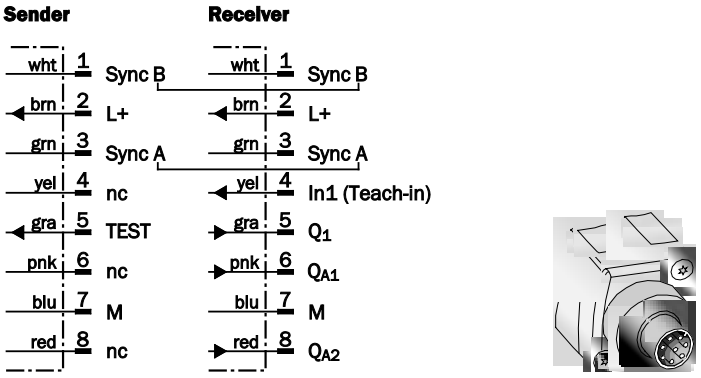


Fig. 44: Connection example, M12 plug, 8-pin

7.5 Assignment of inputs and outputs

Assignment of inputs and outputs depends on the relevant type.
→ See page 13; chapter 3.2 and page 15, chapter 3.2.2.

7.5.1 MLG/XLG with standard parameter settings

MLG/XLG light grids with “Standard” parameter settings are parameterized in the factory with the Parallel beam function. No modifications may be made to the beam function or the input and output functions.

Type	Outputs			Input
	Q1	Q2	Q3	In1
	1)	2)	Alarm 3)	Teach-in
F5x1	PNP	–	–	–
E5x1	NPN	–	–	–
F8x1	PNP	PNP	PNP	yes
E8x1	NPN	NPN	NPN	yes

1) *The output switches on when at least one beam is blocked.*
2) *The output switches off when at least one beam is blocked.*
3) *Output weak signal (VMA)*

Table 11: MLG light grid with standard parameter settings

7.5.2 MLG with crossover beam parameter settings

MLG light grids with crossover beam parameter settings are parameterized in the factory with the crossover beam function. No modifications may be made to the beam function or the input and output functions.

Type	Output	
	Q1	Q1
	1)	2)
F5x3	PNP	–
E5x3	NPN	–
F5xL	–	PNP
E5xL	–	NPN

1) *The output switches on when at least one beam is blocked.*
2) *The output switches off when at least one beam is blocked.*

Table 12: MLG light grid with crossover beam parameter settings

7.5.3 MLG/XLG Programmable

MLG/XLG Programmable light grids are parameterized with the parallel beam function in the factory. You can modify the functions of the inputs and outputs via the MLGsetup configuration program.

Type	Outputs						Inputs	
	Q1	Q2	Q3	Q4	Q5	Q6	In1	In2
	1)	2)	Alarm 3)	free 4)	free 4)	free 4)	Teach-in	free 5)
F2x2	PNP	PNP	PNP	PNP	PNP	PNP	yes	yes
F4x2	PNP	PNP	PNP	PNP	PNP	PNP	yes	yes
F8x2	PNP	PNP	PNP	–	–	–	yes	–
E2x2	NPN	NPN	NPN	NPN	NPN	NPN	yes	yes
E4x2	NPN	NPN	NPN	NPN	NPN	NPN	yes	yes
E8x2	NPN	NPN	NPN	–	–	–	yes	–

1) *The output switches on when at least one beam is blocked.*
2) *The output switches off when at least one beam is blocked.*
3) *Output weak signal (VMA)*
4) *Not assigned to any basic function*
5) *Not assigned to any input function*

Table 13: Output and inputs assignments – MLG/XLG Programmable light grids

7.5.4 MLG/XLG Programmable with RS-485 data interface

MLG/XLG Programmable light grids with RS-485 data interface are parameterized in the factory with the parallel beam function. You can modify the functions of the inputs and outputs via the MLGsetup configuration program.

Type	Outputs				Inputs		Data interface RS-485
	Q1	Q2	Q3	Q4	In1	In2	
	1)	2)	Alarm 3)	free 4)	Teach-in	free 5)	
I2x2	PNP	PNP	PNP	PNP	yes	yes	yes
I4x2	PNP	PNP	PNP	PNP	yes	yes	yes
I8x2	PNP	–	–	–	yes	–	yes
T2x2	NPN	NPN	NPN	NPN	yes	yes	yes
T4x2	NPN	NPN	NPN	NPN	yes	yes	yes
T8x2	NPN	–	–	–	yes	–	yes

1) *The output switches on when at least one beam is blocked.*
2) *The output switches off when at least one beam is blocked.*
3) *Output weak signal (VMA)*
4) *Not assigned to any basic function*
5) *Not assigned to any input function*

Table 14: Output and inputs assignments – MLG/XLG Programmable light grids with RS-485 data interface

7.5.5 MLG/XLG Programmable with analog outputs

MLG/XLG Programmable light grids with analog outputs are parameterized with the parallel beam function in the factory. You can modify the functions of the inputs and outputs via the MLGsetup configuration program.

Type	Outputs				Inputs		Analog output 4 – 20 mA
	Q1	Q2	Q3	Q4	In1	In2	
	1)	2)	Alarm 3)	free 4)	Teach-in	free 5)	
A2x2	PNP	PNP	PNP	PNP	yes	yes	yes
A4x2	PNP	PNP	PNP	PNP	yes	yes	yes
A8x2	PNP	–	–	–	yes	–	yes
N2x2	NPN	NPN	NPN	NPN	yes	yes	yes
N4x2	NPN	NPN	NPN	NPN	yes	yes	yes
N8x2	NPN	–	–	–	yes	–	yes

1) The output switches on when at least one beam is blocked.
2) The output switches off when at least one beam is blocked.
3) Output weak signal (VMA)
4) Not assigned to any basic function
5) Not assigned to any input function

Table 15: Output and inputs assignments – MLG/XLG Programmable light grids with analog output

8 Commissioning

8.1 Teaching in sensitivity

During commissioning and at regular intervals, as necessary, the optimum sensitivity must be taught in for each receiving beam path on the light grid. This procedure is called teach-in.

8.1.1 MLG with “Standard” or “Crossover beam” parameter settings

On MLG light grids with standard or crossover beam parameter settings that do not have an input, sensitivity is taught in as soon as the light grid is energized.

Types xxx1, xxx3, xxxL

1. No objects should be between the sender and the receiver. The light path must be clear.
2. Switch on the supply voltage for the light grid. The green LEDs on the receiver and the sender should illuminate.
3. The receiver starts with the teach-in process automatically. The 7-segment display shows “L” for “learning”.
4. The teach-in process is quit automatically. The “L” in the display ceases to be lit.
5. The yellow LED on the receiver illuminates. The light grid is operational.

NOTE!

If the yellow LED on the receiver flashes or remains unlit, sender and receiver are not correctly aligned to one another.

Behavior following voltage failure or after switching the light grid on again:

- The previous setting for sensitivity is only overwritten if the receiver signal has significantly changed.
- In case of a beam or several beams being completely blocked, the previous setting is retained.
- If all beams are blocked, the maximum sensitivity is set.

8.1.2 MLG/XLG with teach-in input

With this procedure, you start teaching in sensitivity via a signal at the “In1 (Teach-in)” input.

1. No objects should be between the sender and the receiver. The light path must be clear.
2. Switch on the supply voltage for the light grid. The green LEDs on the receiver and the sender should illuminate.
3. Activate the teach-in process via input “In1 (Teach-in)”.
   - Models with a PNP switching output: In1 ⇒ V_S (PNP)
   - Models with an NPN switching output: In1 ⇒ M (NPN)
4. The 7-segment display shows “L” for “learning”.
5. After a few milliseconds, deactivate the signal at input “In1 (Teach-in)”. The signal must be present for at least 20 ms. As soon as the signal is no longer present, the display will go out.
6. The yellow LED on the receiver illuminates. The light grid is operational.

NOTE!

If the yellow LED on the receiver flashes or remains unlit, sender and receiver are not correctly aligned to one another.

8.1.3 MLG/XLG Programmable

Types xxx2

With MLG Programmable and XLG Programmable light grids, you can also set the sensitivity using the MLGsetup configuration program.
→ See page 72, chapter 9.

9 MLGsetup configuration program

NOTE!

This chapter is only relevant for the MLG Programmable and XLG Programmable light grids.

You can use the MLGsetup configuration program, among other things, to carry out the following steps for MLG Programmable light grids and XLG Programmable light grids:

- To create a configuration and load this into the light grid.
- To teach in the sensitivity of the receiver channels.
- To simulate the reaction of the light grid in case of an object.
- To view the inputs and output statuses.
- To store configurations as project documentation or *.mlg/*.txt files.

You can configure the following functions:

- Selection of the parallel beam or crossover beam function.
- Definition of inputs and outputs.
- Hiding of beams.
- Grouping of beams.
- Definition of input functions such as trigger, stand-by etc.
- Parameterization of the output weak signal.
- Definition of stopping time for PNP and NPN outputs.
- Configuration of the RS-485 data interface.
- Configuration of analog outputs.

NOTE!

You can download the MLGsetup configuration program via the Internet from “www.mysick.com”.

9.1 Setup requirements

9.1.1 Hardware prerequisites

The following hardware is required:

- MLG Programmable or XLG Programmable light grid
- PC with RS-232 interface
- MLG/XLG Programmable – PC connection cable.
  → See page 93, Fig. 66.

NOTE!

Should your PC not be equipped with an RS-232 interface, you will require a USB to RS-232 converter and a corresponding driver. To enable MLGsetup to function correctly with the light grid, we recommend using the USB to RS-232 converter accessory.
→ See page 96, chapter 14.3.

9.1.2 System prerequisites

The following system prerequisites are necessary:

- Operating system: Windows 95®, Windows 98®, Windows NT®, Windows NT®, Windows ME®, Windows XP®, Windows 2000®, Windows 7®
- Adobe Acrobat® Reader.

9.2 Installing MLGsetup

1. You can download the MLGsetup configuration program via the Internet from “www.mysick.com”.
2. Unpack the file.
3. Double-click to start the “Setup” file (InstallShield).
4. Carry out the instructions on the screen step-by-step.
5. Click the “Finish” button. The configuration program is installed.

NOTE!

Should you have an older version of MLGsetup installed on your PC, you will need to uninstall this version beforehand.

9.3 Starting MLGsetup

1. Connect the MLG E or XLG E receiver with the RS-232 interface of your PC via the connection cable.
2. Start MLGsetup as follows:
   - Via the menu: Start → All Programs → SICK → MLGsetup

   or
   - Click the “MLGsetup” button.

3. Select another language if required.
4. You will see the following screen:

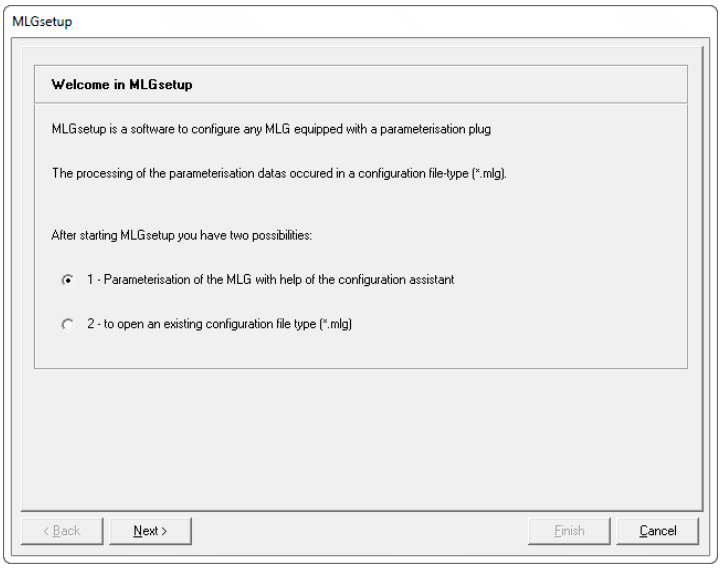


Fig. 45: “MLGsetup – Welcome in MLGsetup” screen

5. Select between the following options:
   - Configure MLG using the configuration and application assistant

   or
   - Open an existing configuration file (*.mlg).

9.4 Configuring the light grid

1. The “MLGsetup – Welcome in MLGsetup” screen will appear.
→ See page 55, Fig. 45.
2. Choose the option “Configure MLG/XLG using the configuration and application assistant”.
3. Click the “Next” button. You will see the following screen:

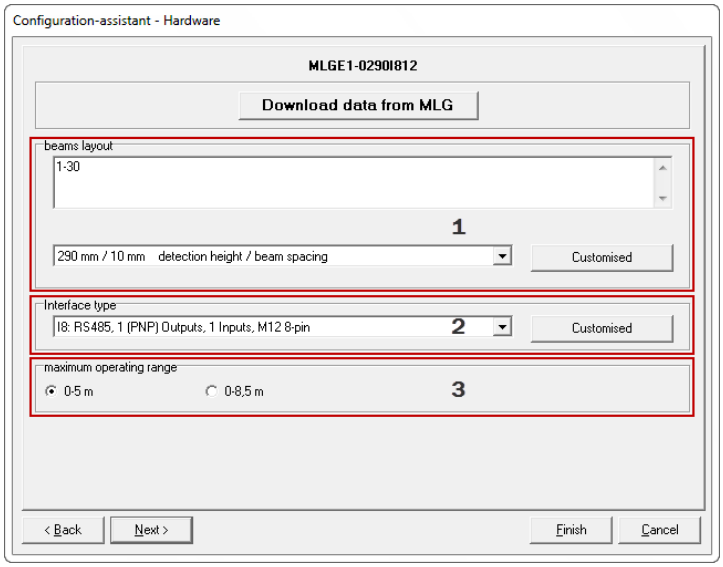


Fig. 46: “Configuration-assistant – Hardware” screen

1 Beams layout: Beams to be detected and displayed, detection height, beam spacing
2 Interface type: Number and type of inputs and outputs.
3 Maximum operating range (maximum possible distance between sender and receiver)

NOTE!

If you click the “Download data from MLG” button, all relevant data will automatically be loaded by the light grid. To do this, the light grid must be connected to the PC, be supplied with voltage and the receiver and sender must be connected up to one another.

4. Click the “Download data from MLG” button.

5. Click the “Next” button. You will see the following screen:

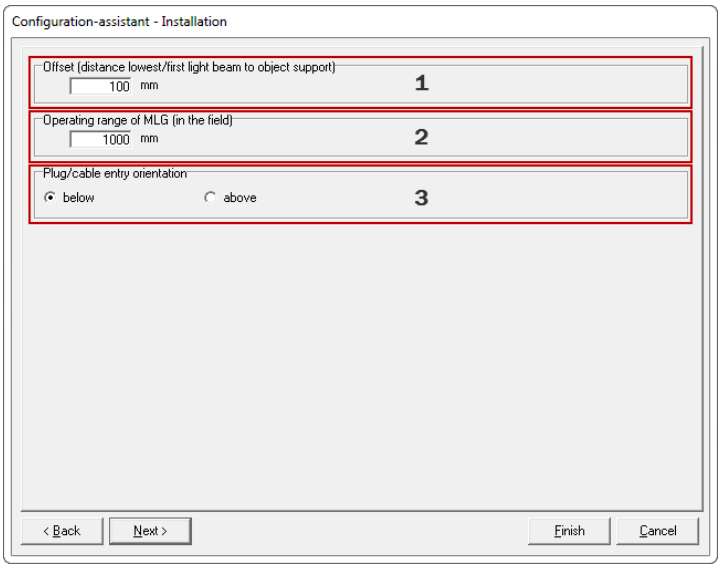


Fig. 47: “Configuration-assistant – Installation” screen

1 Offset: Distance between the lower light beam and the object's contact position, →see page 32, chapter 6.2.2.
2 Distance between sender and receiver
3 Position of plug or cable entry, →see page 31, chapter 6.2.1.

6. Carry out any required modifications.

7. Click the “Next” button. You will see the following screen:

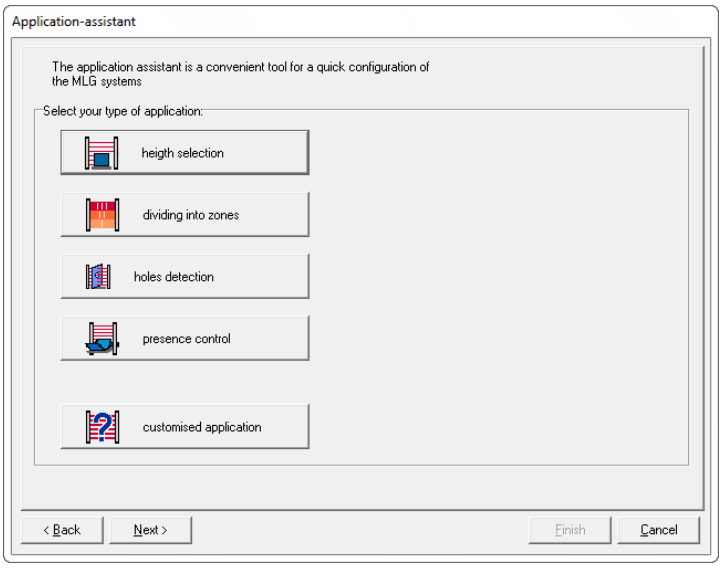


Fig. 48: “Application-assistant” screen

NOTE!

With the “Height selection”, “Dividing into zones”, “Holes detection” and “Presence control” applications, the key settings for the relevant task will already be predefined. With the “Customised application”, you will need to make all the settings yourself.
→ See page 59, Table 16.

8. Click the button with the desired application.
9. Carry out the instructions step-by-step.

Application

→ For the basic functions, see page 67, chapter 9.8.

Application	Menu guidance/basic function
Height selection	**Menu-driven configuration** ■ → Object height and output assignment → Accept application-specific data → Beams **Basic function set** ■ LBB (Last Beam Blocked)
Dividing into zones	**Menu-driven configuration** ■ → Dividing into zones and output assignment → Accept application-specific data → Beams **Basic function set** ■ ZMIN (Inferior zonal border) ■ ZMAX (Upper zonal border)
Holes detection	**Menu-driven configuration** ■ → Holes detection and output assignment → Accept application-specific data → Beams **Basic function set** ■ NBM (Number of Beams Made)
Presence control	**Menu-driven configuration** ■ → Presence control and output assignment → Accept application-specific data → Beams **Basic function set** ■ NBB (Number of Beams Blocked)
Customised application	**Menus** ■ Outputs (switching outputs): → See 60, chapter 9.5 ■ Data interface for light grids with RS-485 data interface: → See 61, chapter 9.6 ■ Analog outputs for light grids with analog outputs: → See 65, chapter 9.7 ■ Output properties: Set stopping time and hysteresis ■ Beams: Blanking, activate/deactivate crossover beam function, teach in sensitivity (→ page 72, chapter 8.1), weak signal output alarm (VMA) ■ Inputs: → See 69, chapter 9.9. ■ Info: Enter comments

Table 16: Application

9.5 Configuring switching outputs

You configure switching outputs on the “Outputs” screen.

Go to this screen as follows:

- via the Configuration and Application-assistant

or

- via the “Parameters dialog” button under the menu bar.

You can assign a function or two functions to outputs that are logically interconnected. A function is defined by the basic function, an operator and the beam number. → For a description of the basic function, see page 67, chapter 9.8.

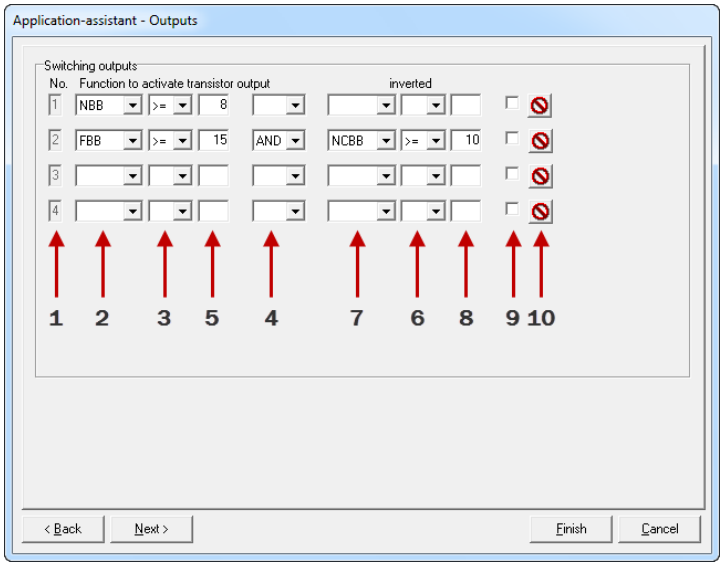


Fig. 49: “Application-assistant – Outputs” screen

1 Switching output no.
2 1st basic function
3 Operator
4 Beam number, counted starting from the connection side
5 Link between 1st and 2nd basic function
6 2nd basic function
7 Operator
8 Beam number, counted starting from the connection side
9 Invert output
10 Reset setting for the output

NOTE!

The beam number is always counted starting from the connection side. “1” is therefore the beam located nearest to the connection.

Example 1

Output no. 1: NBB >= 8

Output no. 1 switches:

- if the number of total beams blocked is greater than or equal to 8.

→ NBB (Number of Beams Blocked), see page 67, chapter 9.8.

Example 2

Output no. 2: FBB >= 15 AND NCBB >= 10

Output no. 2 switches:

- if the first beam blocked is either the 15th beam or higher

and

- at least 10 beams arranged consecutively are blocked simultaneously.

→ FBB (First Beam Blocked) and NCBB (Number of Consecutive Beams Blocked), see page 67, chapter 9.8.

9.6 Configuring the RS-485 data interface

NOTE!

This chapter is only relevant for MLG Programmable and XLG Programmable light grids with an RS-485 data interface.

Data can be transmitted by the light grid to the control via the serial data interface or via an RS-485 transducer to a PC or PLC.

The transfer format set for the control or PC must be suitable for the light grid.

You can make settings for the transfer protocol on the “Data interface” screen.

Go to this screen as follows:

- via the Configuration and Application-assistant

or

- via the “Parameters dialog” button under the menu bar.

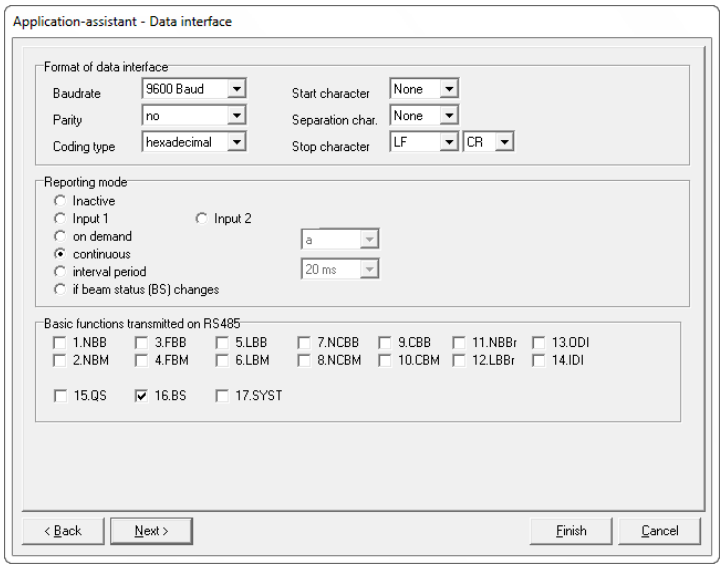


Fig. 50: "Application-assistant – Data Interface" screen

Data interface format

You can set the transfer speed and make settings for the transfer protocol via the "Format of data interface" field.

Setting	Possible values	Factory setting
Baud rate	1200 to 115200 baud	9600 baud
Parity	none, odd, even	none
Coding type	HEX, DEZ, BIN	HEX
Start character	All ASCII characters	none
Separation char.	All ASCII characters	none
Stop character	All ASCII characters	LF, CR

Table 17: "Format of data interface" field

Reporting mode

Using the “Reporting mode” field, you can specify when the data is to be forwarded to a higher-level system.

Setting	Description
Inactive	Sets the RS-485 data interface to inactive
Input 1/ Input 2	Input 1 or input 2 are used as external triggers for the data output. As long as Inx is active, data is transferred.
On demand	The light grid responds with a data string if the selected character is received. **Selection** ■ a ... z
Continuous	Sends the data continuously
Interval period	Sends the data using the specified interval. **Selection** ■ 20 ms, 40 ms, 100 ms, 240 ms, 500 ms, 1 s, 2 s or 4 s
Beam status (BS) changes	Sends the data only when the beam status is modified.

Table 18: “Reporting mode” field

Basic functions transferred

The selected basic functions are transferred in order according to their numbers.

→ For a description of the basic function, see page 67, chapter 9.8.

9.6.1 Transfer protocol

Use the “Basic functions transferred to RS-485” field to select the basic functions to be transferred.

The BS (beam status) function is activated as standard i.e. with the transfer protocol, the statuses of all beams are transferred. 8 beams are merged into one binary block in each case. To separate the blocks, you can specify a separator.

If you select other basic functions, the data record will be extended. The transfer will take longer for each basic function added.

Transfer protocol

Select start character, separator, stop character 1 and stop character 2 in the “Format of data interface” field. → See page 64, Table 20.

The transfer protocol is composed as follows:
<Start indicator> <Statuses of 1. 8 beams> <separator> <Statuses of 2. 8 beams> <separator> <Statuses of n. 8 beams> <Stop character 1> <Stop character 2>

Table 19: Transfer protocol

Format – Statuses of beams

The statuses of each of the 8 beams are merged into one binary block. If you have chosen the BIN format, the statuses will not be coded. If you have chosen the HEX or DEZ format, the binary data will be converted and ASCII-coded.

Regardless of which format you choose and the coding, the statuses of a beam will be output as follows:

- Beam made: 0
- Beam blocked: 1

The following table applies for a block with eight beams.

Selection	Description
HEX	■ 2 characters from 00 to FF ■ ASCII-coded
DEZ	■ 3 characters from 000 to 255 ■ ASCII-coded
BIN	■ 8 bits, each 0 or 1 ■ not ASCII-coded

Table 20: “Format” setting

9.6.2 RS-485 data interface

The data frame is structured as follows:

	Start bit	8 data bits								Parity bit (optional)	Stop bit
Bit no.	**0**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**(9)**	**10**
	0	D	d	d	d	d	d	d	d	1/0	1

Table 21: Characters format for RS-485 data frame

9.6.3 Outputting the system status

If the SYST basic function is activated, the current system status for the light grid is transferred.

The SYST system status is binary encoded as follows:

Bit	7	6	5	4	3	2	1	0
Code	E1	E2	E9	VMA	TA	PMA	PDINV	–

Table 22: Structure of SYST basic function

System status – Code

The current system status is also shown on the sender's 7-segment display. → See page 77, chapter 11.

Code	7-segment display	Description
E1	E1	Synchronization error on sending
E2	E2	Signal too weak on teach-in
E9	E9	General hardware error
VMA	[1]	Contamination found
TA	L	Teach-in active
PMA	P	ParamMode is active (light grid is being configured)
PDINV	–	Process data is invalid

1) Yellow LED flashes on receiver.

Table 23: System statuses

9.7 Configuring analog outputs

NOTE!

This chapter is only relevant for MLG Programmable and XLG Programmable light grids with analog outputs.

On the “Analog outputs” screen, you specify the basic function and output signal for each analog output.

→ For a description of the basic function, see page 67, chapter 9.8.

You can select between the following output signals:

- 4 ... 20 mA
- 20 ... 4 mA
- 0 ... 10 V
- 10 ... 0 V

With the following beam statuses, the following values will be displayed depending on the selected output signal:

	4 ... 20 mA	20 ... 4 mA	0 ... 10 V	10 ... 0 V
No beams blocked	4 mA	20 mA	0 V	10 V
Half of the beams are blocked	12 mA	12 mA	5 V	5 V
All beams blocked	20 mA	4 mA	10 V	0 V

Table 24: Output signal depending on beam status

Go to this screen as follows:

- via the Configuration and Application-assistant

or

- via the “Parameters dialog” button under the menu bar.

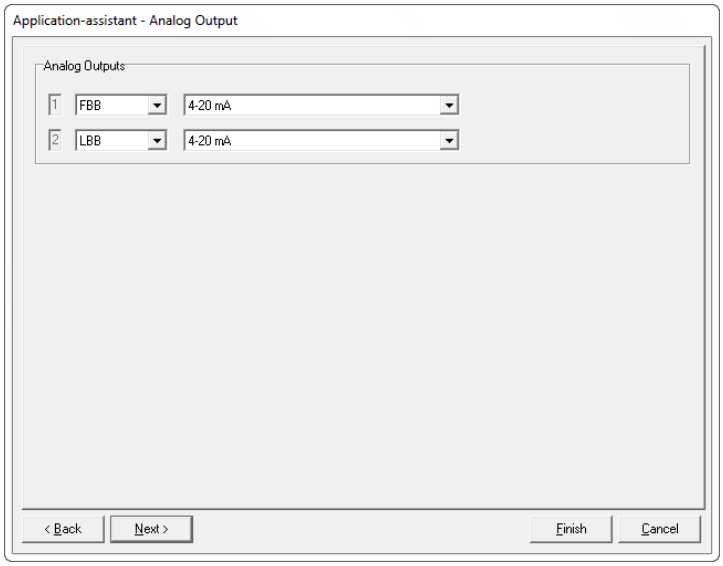


Fig. 51: “Application-assistant – Analog output” screen

9.8 Basic functions

Depending on their type, light grids are equipped with switching outputs, analog outputs or an RS-485 interface. → See page 14, chapter 3.2.1.

Name	Function	Description	Special features of analog output	Special features of RS-485 data interface
NBB	Number of Beams Blocked	Total beams blocked	–	–
NBBr	Number of Beams Blocked real	Total beams currently blocked	If the BBH input function is not chosen, the NBBr function will be the NBB function.	If the BBH input function is not chosen, the NBBr function will be the NBB function.
NBM	Number of Beams Made	Total beams made	–	–
FBB	First Beam Blocked	Beam number of first blocked beam [1]	[2]	[4]
FBM	First Beam Made	Beam number of first beam made [1]	[3]	[5]
LBM	Last Beam Made	Beam number of last beam made [1]	[3]	[5]
LBB	Last Beam Blocked	Beam number of last beam blocked [1]	[2]	[4]
LBBr	Last Beam Blocked real	Beam number of last currently blocked beam [1]	If the BBH input function is not selected, the LBBr function will be the LBB function.	If the BBH input function is not selected, the LBBr function will be the LBB function.
NCBB [6]	Number of Consecutive Beams Blocked	With several areas, the number of beams for the largest area is output.	–	–
NCBM [6]	Number of Consecutive Beams Made	With several areas, the number of beams for the largest area is output	–	–
CBB [6]	Central Beam Blocked	Beam number of central blocked beam in a group [1]	[2]	[4]
CBM [6]	Central Beam Made	Beam number of central beam in a group of interconnected made beams [1]	[3]	[5]
QS	–	–	–	Status of switching outputs

→ *For an explanation of the footnotes, see page 68.*

Name	Function	Description	Special features of analog output	Special features of RS-485 data interface
BS [7]	Beam Status	Beam number n is evaluated as blocked. [1]	–	For the crossover beam function, the status of the parallel beams only and not the beams crossed over is output.
BNB [6], [8]	Beam n Blocked	Beam number n is evaluated as blocked. [1]	–	–
BNM [6], [8]	Beam n Made	Number of beams made	–	–
ZMIN [8]	Inferior zonal border	–	–	–
ZMAX [8]	Upper zonal border	–	–	–
ODI	Outside Dimension	Outputs the external dimensions of an object.	[2]	–
IDI	Inside Dimension	Outputs the interior dimensions of an object	[2]	–
SYST	System Status	Outputs the present system status e.g. error state, contamination etc.	–	–

1) *The beam number is always counted starting from the connection side. “1” is therefore the beam located nearest to the connection.*
2) *If no beams are blocked, 4 mA or 0 V is output depending on the configuration.*
3) *If no beams are made, 4 mA or 0 V is output depending on the configuration.*
4) *If no beams are blocked, the following is output with HEX: FF, with DEZ: 255 and with BIN: 1111 1111.*
5) *If no beams are made, the following is output with HEX: FF, with DEZ: 255 and with BIN: 1111 1111.*
6) *With several groups, the largest group is always looked at ($NCBB_{MAX}$, $NCBM_{MAX}$, CBB_{MAX}, CBM_{MAX}). With an even number of beams, the beam with the higher value is evaluated.*
7) *Function is only available for the RS-485 data interface.*
8) *Function is not transferred via RS-485 data interfaces.*

Table 25: Basic functions

9.9 Configuring inputs

You can assign an input function to each input on the “Inputs” screen.

Go to this screen as follows:

- via the Configuration and Application-assistant

or

- via the “Parameters dialog” button under the menu bar.

You can select between the following input signals:

Input function	Input status	Function	7-segment display
No input function	–	–	–
Enable output	Input active	Normal function	–
	Input inactive	All outputs change to inactive state.	–
Stand-by	Input active	The “Stand-by” input function sets the light grid to a passive state. All outputs remain in their current state. All beams are switched off on the sender. This input function is suitable with two light grids arranged at a right angle for instance. → See page 35, chapter 6.2.5.	S
	Input inactive	Normal function	–
Blocked beams hold	Input active	The Blocked Beams Hold input function holds all beams. This input function is suitable for height measurement. → See page 70, chapter 9.9.1.	H
	Input inactive	Normal function	–
Teach-in	Input active:	Teach in sensitivity. → See page 51, chapter 8.1 and page 72, chapter 9.10.	L
	Input inactive	Normal function	–

Table 26: Input functions

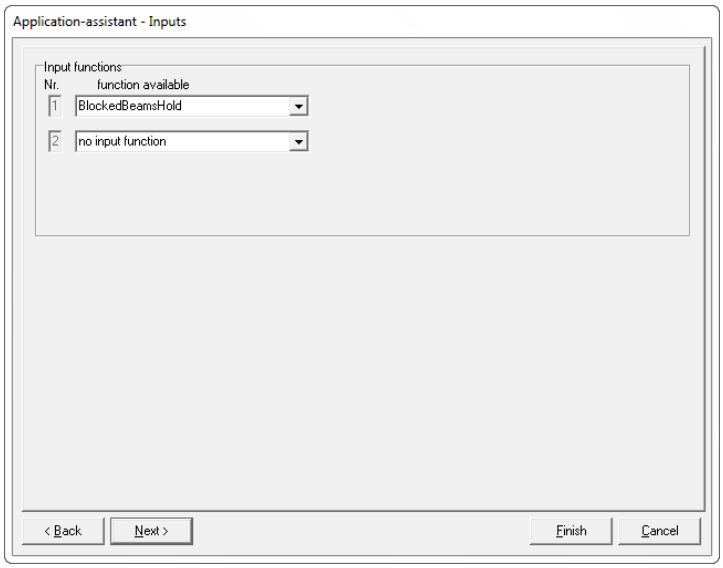


Fig. 52: "Application-assistant – Inputs" screen

9.9.1 BBH (Blocked Beams Hold) input function

The BBH (Blocked Beams Hold) input function is suitable for height measurements. With this function, all beams blocked during measuring e.g. by a passing object are stored. The measuring result can be fetched by the light grid after measuring.

Starting the measuring process

You can start the measuring process as follows:

- by setting control input BBH or
- by sending the RS-485 command.

As long as the "BBH" function is active, an H will be visible on the receiver's display.

The RS-485 commands for the "BBH" function are as follows:

Command	Code	Description
BBH	90h	Blocked beams are held.
Reset	80h	The "BBH" function is quit.

Table 27: RS-485 command for "BBH" function

Example

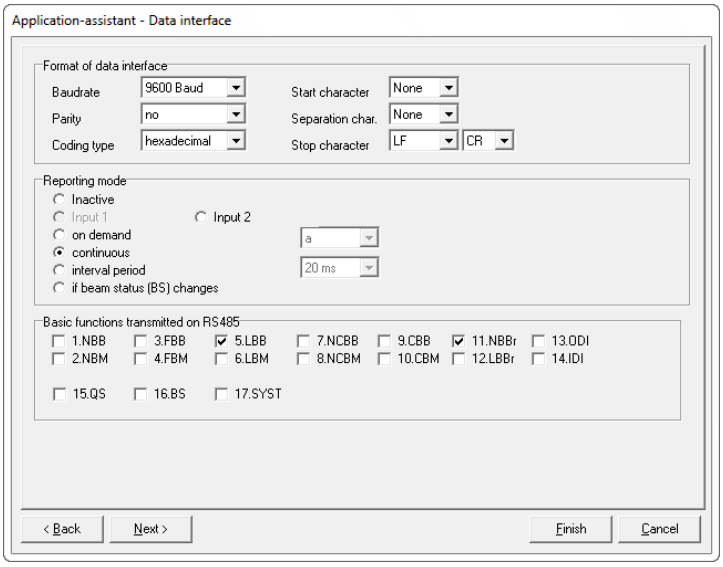


Fig. 53: "Application-assistant – Data interface" screen.

- Reporting mode: on request with character "a":
  Shortly before resetting the BBH function, the measuring results will be fetched by the light grid when requested via character "a".
- LBB basic function (Last Beam Blocked): Output of the stored measured value
- NBBr basic function (Number Beams Blocked real): In addition to the measured value stored, the current measured value can also be transferred.

9.10 Teach in sensitivity

During commissioning and at regular intervals, as necessary, the optimum sensitivity must be taught in for each receiving beam path on the light grid. This procedure is called teach-in.

You configure the teach-in procedure using the “Beams” screen.

Go to this screen as follows:

- via the Configuration and Application-assistant

or

- via the “Parameters dialog” button under the menu bar.

The following prerequisites must be met:

- The light grid is supplied with voltage via the MLG E/XLG E receiver.
- Receiver and sender are connected with one another.
- Receiver and sender are aligned with one another.
- The receiver is connected to the PC.
- No objects should be between the sender and the receiver.

1. The “Application-assistant – Beams” screen will appear.

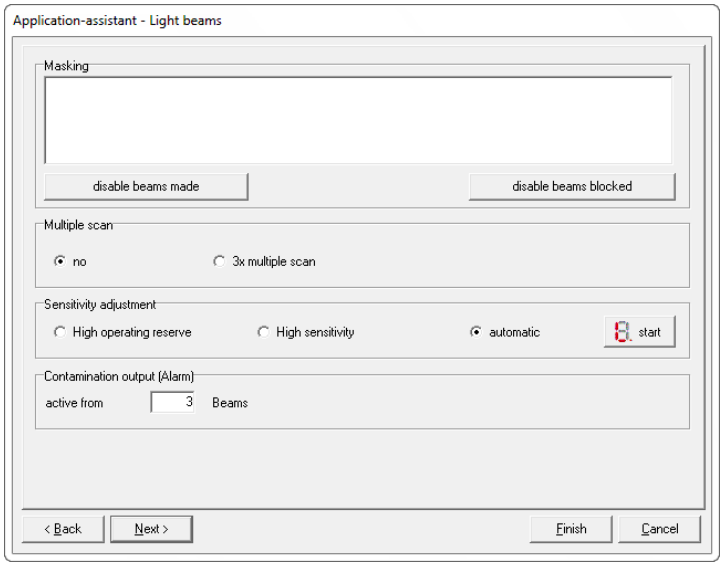


Fig. 54: “Application-assistant – Light beams” screen

2. Select one of the options in the “Teach in sensitivity” field.
3. Click the “Start” button.
4. The “Limit successfully taught” message will appear.

"Automatic" option

The “Automatic” option is suitable for most applications and provides a safe operational state.

“High sensitivity” option

With the “High sensitivity” option, objects that are semi-transparent can also be detected. With a higher sensitivity however, the system is more sensitive to contamination, misalignment, vibrations or strong temperature fluctuations.

The output weak signal (alarm) is deactivated.

The following prerequisites must be met:

- The distance between receiver and sender must be at least 600 mm.
- Receiver and sender must be exactly aligned with one another.
- Receiver and sender elements must be kept clean at all times.

NOTE!

To ensure trouble-free operation, we recommend repeating the “Sensitivity adjustment” procedure at regular intervals if “High sensitivity” is selected.

"High operating reserve” option

The “High operating reserve” setting provides a safe operational state even where contamination occurs. The setting is only suitable objects impenetrable by IR (i.e. opaque).

9.11 Viewing area with status window

Once you have configured your light grid, you will be automatically led to the viewing area with status window.

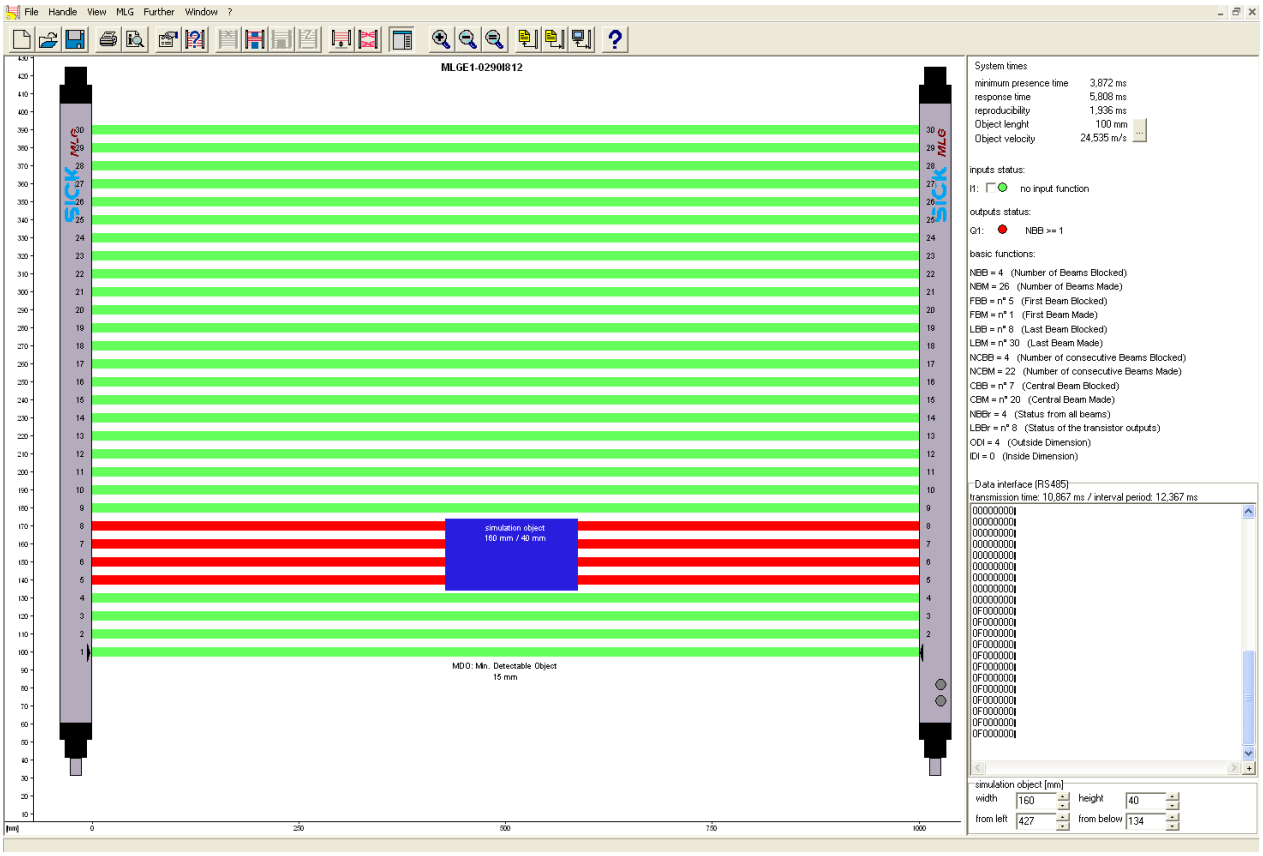


Fig. 55: Viewing area with status window

Viewing window

In the viewing window you can:

- view the light grid's current status
- simulate the light grid's behavior with an object
- configure beams. → See page 75, Table 28.

Status window

You can view the following information in the status window:

- system times
- statuses of inputs and outputs
- statuses of basic functions
- RS-485 transfer protocol for light grids with RS-485 data interface.

In addition, you can change the size and position of the object simulated.

Configure beams buttons

The buttons under the menu bar have the following functions:

Button	Description
	Insert mounting offset.
	Switch marked beams on/off.
	Hide a blocked beam or several blocked beams.
	Define marked beams as a zone. Assign zones to digital outputs.
	Define height selection.
	Activate and deactivate crossover beam setting.

Table 28: Configure beams buttons

10 Cleaning and maintenance

10.1 Cleaning

NOTICE!

Equipment damage due to improper cleaning!

Improper cleaning can lead to damage to equipment.

For this reason:

– Never use cleaning agents containing aggressive substances.
– Never use pointed objects for cleaning.

Remove the front screens at regular intervals and clean with a lint-free cloth and plastic cleaning agent.

The cleaning interval essentially depends on the ambient conditions.

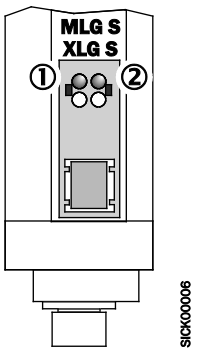
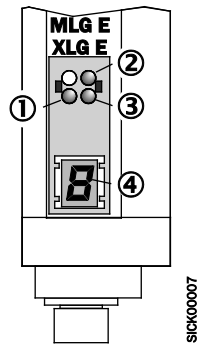
10.2 Maintenance

No maintenance work is required for MLG and XLG light grids.

11 Fault rectification

Possible malfunctions and rectification measures are described in the table below.

In case of malfunctions that cannot be rectified using the information below, please contact the manufacturer. For your representative, see the rear of these operating instructions.

MLG/XLG	Display	Possible causes	Rectification of faults
Sender  *1 LED red* *2 LED green*	Red LED illuminates.	Sender defective	Return sender and receiver to your SICK representative.
Receiver  *1 LED yellow* *2 LED red* *3 LED green* *4 7-segment display*	Yellow LED flashes.	Front screens dirty.	■ Clean front screens. → See page 76; chapter 10.1. ■ Teach in sensitivity. → See page 51, chapter 8.1.
		Permissible range exceeded.	Mount sender and receiver within permissible range.
		Sender and receiver are no longer correctly aligned to each other.	Align sender to receiver. → See page 30; chapter 6.1.1. Teach in sensitivity. → See page 51, chapter 8.1.
	Red LED illuminates. “E1” appears on the display.	Synchronization error between sender and receiver.	Check wiring.
	Red LED illuminates. “E2” appears on the display.	During sensitivity teach-in, the input signal is too weak on the receiver.	Align sender to receiver. → See page 30; chapter 6.1.1. Teach in sensitivity. → See page 51, chapter 8.1.
	Red LED illuminates. “E9” appears on the display.	Hardware fault	Return sender and receiver to your SICK representative.

MLG/XLG	Display	Possible causes	Rectification of faults
Receiver unit (continued)	Green LED illuminates. “P” appears on the display.	The light grid is not operational. Parameterization mode active.	Carry out parameter settings and quit this mode.
		The light grid is not operational. Parameterization mode has ended. There is a malfunction.	Check wiring.
	Green LED illuminates. “L” appears on the display.	Teach-in mode active.	Depending on the procedure, teach-in mode will be exited automatically or else must be actively quit. → See page 51, chapter 8.1.
	Green LED illuminates. “H” appears on the display.	BBH (Blocked Beams Hold) input function active.	Deactivate BBH input function. → See page 70, chapter 9.9.1.
	Green LED illuminates. “S” appears on the display.	"Stand-by” input function is active.	Deactivate “stand-by” input function. → See page 70, chapter 9.9.1.

Table 29: Rectification of faults

11.1 Returning the light grid

To enable efficient processing and the cause to be determined quickly, please include the following when returning the light grid:

- details of a contact person
- a description of the application
- a description of the error that has occurred.

11.2 Disposal

The following points should be observed when disposing of the light grid:

- Do no dispose of the light grid as household waste.
- Dispose of the light grid according to the pertinent regulations in your country.

12 Repairs

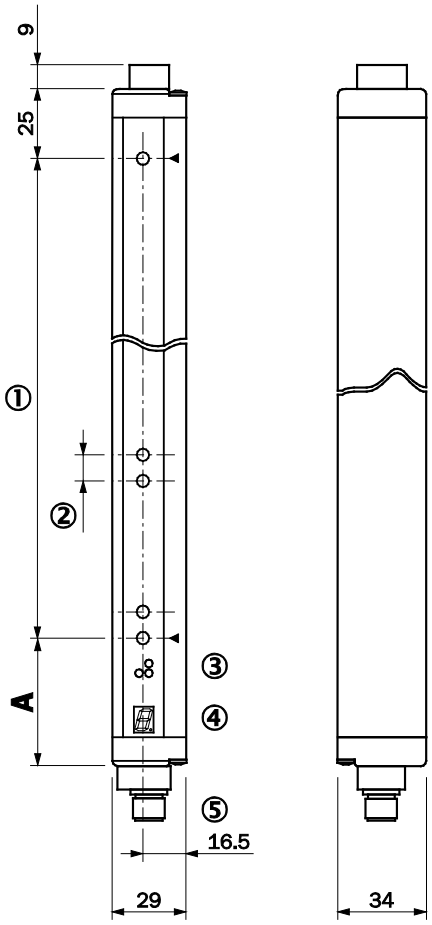
Repairs may only be carried out by the manufacturer. Any manipulation or modification of device will invalidate the manufacturer warranty.

13 Technical specifications

NOTE!

You can also download, store and print the relevant online data sheet with technical data, dimensions and connection diagrams via the web at "www.mysick.com".

13.1 Dimensions



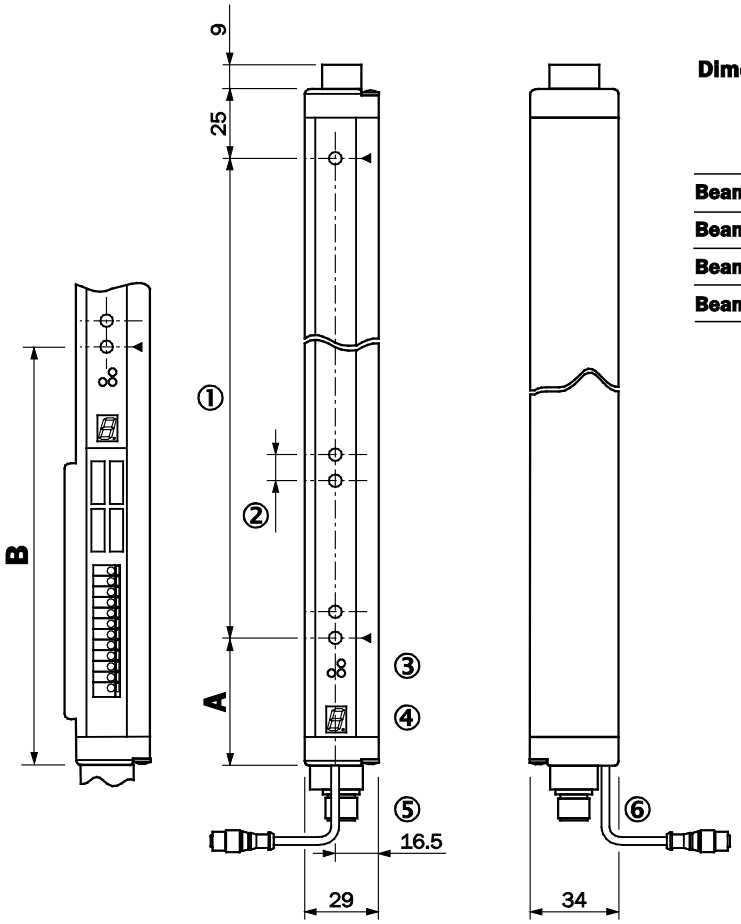
Dimensions in mm

	A Distance: Light grid edge – first beam
Beam spacing 10 mm	49
Beam spacing 20 mm	49 / 59
Beam spacing 30 mm	69
Beam spacing 50 mm	89

All dimensions in mm

Fig. 56: Dimensions of MLG/XLG Standard, MLG Crossover beam light grids

1 *Monitoring height*
2 *Beam spacing*
3 *LED status indicator:*
4 *7-segment display*
5 *M12 plug/PG screw fixing*



Dimensions in mm

	A Distance: Light grid edge – first beam	B
Beam spacing 10 mm	49	160
Beam spacing 20 mm	49 /59	170
Beam spacing 30 mm	69	180
Beam spacing 50 mm	89	200

All dimensions in mm

Fig. 57: MLG/XLG Programmable light grid dimensions

1 *Monitoring height*
2 *Beam spacing*
3 *LED status indicator:*
4 *7-segment display*
5 *M12 plug/PG screw fixing*
6 *RS-232 programming interface*

Distance from housing – first beam

Type	Beam spacing	Dimension A Connection, M12 plug	Dimension B Terminal connection
1-x ...	10 mm	49	160
2-x ...	20 mm	■ 49 1) ■ 59 2)	170
7-x ...	25 mm	64	175
3-x ...	30 mm	69	180
5-x ...	50 mm	89	200
1) with even number of beams, 2) with odd number of beams			

Table 30: Distance from housing – first beam

13.2 Monitoring height and number of beams

Monitoring height [mm] / number of beams				
x1-x ... **Beam spacing 10 mm**	**x2-x ...** **Beam spacing 20 mm**	**x-7x ...** **Beam spacing 25 mm**	**x-3x ...** **Beam spacing 30 mm**	**x-5x ...** **Beam spacing 50 mm**
140 / 15	140 / 8	125 / 6	120 / 5	100 / 3
290 / 30	280 / 15	275 / 12	270 / 10	250 / 6
440 / 45	440 / 23	425 / 18	420 / 15	400 / 9
590 / 60	580 / 30	575 / 24	570 / 20	550 / 12
740 / 75	740 / 38	725 / 30	720 / 25	700 / 15
890 / 90	880 / 45	875 / 36	870 / 30	850 / 18
1040 / 105	1040 / 53	1025 / 42	1020 / 35	1000 / 21
1190 / 120	1180 / 60	1175 / 48	1170 / 40	1150 / 24
1340 / 135	1340 / 68	1325 / 54	1320 / 45	1300 / 27
1490 / 150	1480 / 75	1475 / 60	1470 / 50	1450 / 30
1640 / 165	1640 / 83	1625 / 66	1620 / 55	1600 / 33
1790 / 180	1780 / 90	1775 / 72	1770 / 60	1750 / 36
1940 / 195	1940 / 98	1925 / 78	1920 / 65	1900 / 39
2090 / 210	2080 / 105	2075 / 84	2070 / 70	2050 / 42
2240 / 225	2240 / 113	2225 / 90	2220 / 75	2200 / 45
2390 / 240	2380 / 120	2375 / 96	2370 / 80	2350 / 48
	2540 / 128	2525 / 102	2520 / 85	2500 / 51
	2680 / 135	2675 / 108	2670 / 90	2650 / 54
	2840 / 143	2825 / 114	2820 / 95	2800 / 57
	2980 / 150	2975 / 120	2970 / 100	2950 / 60
	3140 / 158	3125 / 126	3120 / 105	3100 / 63

Table 31: Monitoring height and number of beams

13.3 Type

Minimum detectable object (MDO)	■ Parallel beam function: 15 ... 60 mm ■ Crossover beam function: Area a: 15 ... 60 mm / Area b: 10 ... 35 mm → See page 20 ff, chapter 4.5.
Beam spacing	10 mm / 20 mm / 25 mm / 30 mm / 50 mm
Number of beams	3 ... 240 → See page 82, chapter 13.2.
Monitoring height	100 ... 3,140 mm in 150 mm stages → See page 82, chapter 13.2.
Wave length	880 nm
Synchronization between sender and receiver	Via cable, connections “Sync A” and “Sync B“

Table 32: Type

13.4 Performance data

Limiting scanning distance (maximum scanning range)	7 m or 12 m depending on light grid type No reserves for environmental influence and aging of diodes
Operating range	5 m and 8.5 m depending on light grid type
Maximum range	■ Parallel beam function: 0 m ■ Crossover beam function: 200 ... 840 mm
Initialization period after switching on voltage	< 1 s
Response time	■ Parallel beam function: 150 µs per beam + 1 ms ■ Triple crossover beam function: 3 x (150 µs per beam + 1 ms) ■ Quintuple crossover beam function: 5 x (150 µs per beam + 1 ms) Response time depends on the beam function and the selected basic function.

Table 33: Performance data

13.5 Supply

Supply voltage V_S	18 ... 30 V DC
Protective circuit	■ Reverse polarity protected connections ■ Interference pulse suppression
Sender current consumption at 24 V DC without load	< 140 mA + 2 mA/beam
Receiver current consumption at 24 V DC without load	< 100 mA + 3 mA/beam
Residual ripple	< 5 V_{ss}

Table 34: Supply

13.6 Inputs

Inputs	■ MLG Standard: Up to 1 input ■ MLG/XLG Programmable: up to 2 inputs, can be freely selected using MLGsetup → See page 48, chapter 7.5.
Response time input	■ Input functions at the receiver unit: < 20 ms ■ Test input at sender: < 80 ms

Table 35: Inputs

13.7 Outputs

Outputs	Up to 6 outputs → See page 48, chapter 7.5.
Protective circuits	■ Short-circuit protected outputs ■ Interference pulse suppression
Maximum output current	■ 100 mA ■ Total: 550 mA
Output load	■ Capacitive: 100 nF ■ Inductive: 1 H
Load resistance	for light grid with analog output ■ Output signal 4 ... 20 mA: R_L = < 600 ohms ■ Output signal 0 ... 10 V: R_L = > 1 kiloohm

Table 36: Outputs

13.8 RS-232 programming interface

Configuration plug	With MLG/XLG Programmable, 4-pin M8 plug on receiver, RS-232

Table 37: RS-232 programming interface

13.9 RS-485 data interface

RS-485 data interface	For MLG with RS-485 data interface → See page 61, chapter 9.6.
Baud rate	1200 to 115200 baud

Table 38: RS-485 data interface

13.10 Ambient condition

Protection class	III
Electromagnetic compatibility	EN 60947-5-2
Ambient temperature range	–25 ... +55 °C
Storage temperature range	–40 ... +70 °C
Ambient condition	Do not use light grid outdoors unless protected (condensation water will form)
Enclosure rating	IP 65
MLG: Insensitivity to ambient light	■ Direct: 12500 lx ■ Indirect: 50000 lx [1)]
XLG: Insensitivity to ambient light	■ Direct: 150000 lx ■ Indirect: ≥ 200000 lx [1)]
Vibration resistance	10 ... 100 Hz: 10 g as per IEC 68-2-6
Shock resistance	25 g/11 ms as per IEC 68-2-27

1) Constant light stability

Table 39: Ambient condition

13.11 Design

Dimensions	→ See page 80, chapter 13.1 and page 82, chapter 13.2.
Weight	■ approx. 1480 g for a sender or receiver with a monitoring height of 1200 mm ■ per extension of monitoring height by 150 mm: +160 g
Materials	■ Housing: Aluminum, anodized ■ Front screen: PMMA
Display	7-segment display, LEDs

Table 40: Design

14 Accessories

14.1 Connection systems

14.1.1 M12 connection, 5 pin

Cable socket, straight

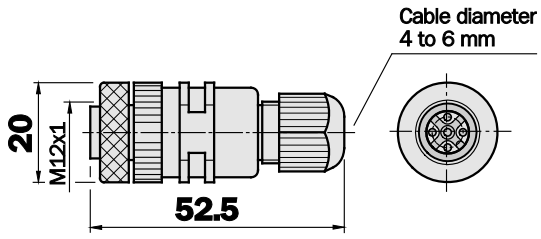


Fig. 58: Cable socket, straight

Description	Type	Part no.	MLG Standard	MLG Pro-grammable	MLG Analog	XLG Pro-grammable
Cable socket, straight, without cable, A-coded	DOS-1205-G	6009719	x	x	–	–

Cable socket, angled

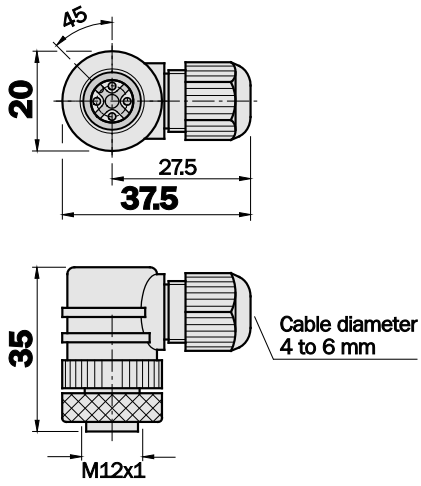


Fig. 59: Cable socket, angled

Description	Type	Part no.	MLG Standard	MLG Pro-grammable	MLG Analog	XLG Pro-grammable
Cable socket, angled, without cable, A-coded	DOS-1205-W	6009720	x	–	–	–

Cable socket, straight with connection cable

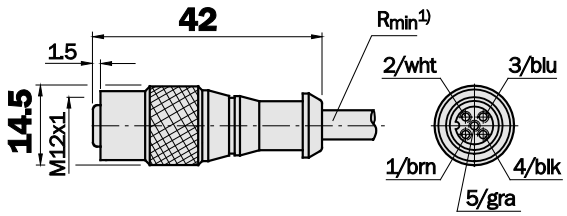


Fig. 60: Cable socket, straight, with connection cable

Description	Type	Part no.	MLG Standard	MLG Pro-grammable	MLG Analog	XLG Pro-grammable
Cable socket, straight, PVC, A-coded, 2 m	DOL-1205-G02M	6008899	x	–	–	–
Cable socket, straight, PVC, orange, A-coded, 5 m	DOL-1205-G05M	6009868	x	–	–	–
Cable socket, straight, PVC, orange, A-coded, 10 m	DOL-1205-G10M	6010544	x	–	–	–
Cable socket, straight, PVC, orange, A-coded, 15 m	DOL-1205-G15M	6029215	x	–	–	–

Cable socket, angled with connection cable

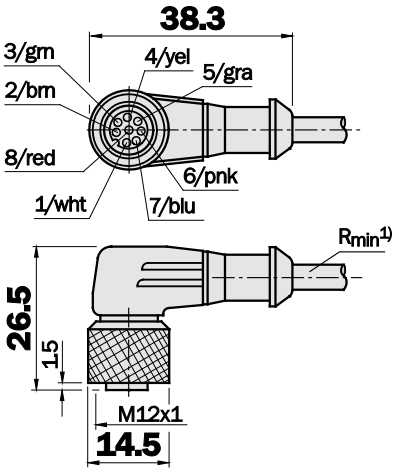


Fig. 61: Cable socket, angled, with connection cable

Description	Type	Part no.	MLG Standard	MLG Pro-grammable	MLG Analog	XLG Pro-grammable
Cable socket, angled, PVC, orange, A-coded, 2 m	DOL-1205W02M	6008900	x	–	–	–
Cable socket, angled, PVC, orange, A-coded, 5 m	DOL-1205W05M	6009869	x	–	–	–
Cable socket, angled, PVC, orange, A-coded, 10 m	DOL-1205W10M	6010542	x	–	–	–

T-distributor

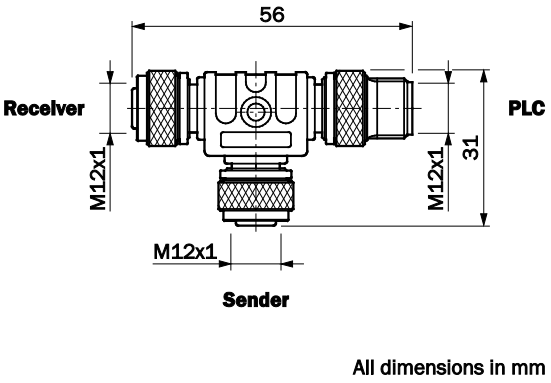


Fig. 62: T-distributor

Description	Type	Part no.	MLG Standard	MLG Pro-grammable	MLG Analog	XLG Pro-grammable
T-distributor, 1 x M12 plug, 5-pin and 2x M12 sockets, 5-pin	SBO-02G12-SM	6029305	x	–	–	–

Other M12 connection systems, 5-pin

Description	Type	Part no.	MLG Standard	MLG Pro-grammable	MLG Analog	XLG Pro-grammable
Cable plug, M12, 5-pin, straight	STE-1205-G	6022083	x	x	–	–
Cable plug (knurl), straight, without cable, shield, A-coded	STE-1205-GA	6027533	x	x	–	–
Cable socket, straight, PUR halo-gen-free, black, A-coded, 2 m	DOL-1205-G02MC	6025906	x	x	–	–
Cable socket, straight, PUR halo-gen-free, black, A-coded, 5 m	DOL-1205-G05MC	6025907	x	x	–	–
Cable socket, straight, PUR hal-ogen-free, black, A-coded	DOL-1205-G10MC	6025908	x	x	–	–
Cable socket, straight, PVC, orange, A-coded, 2 m	DOL-1205-G02MN	6028140	x	x	–	–
Cable socket, straight, PVC, orange, A-coded, 5 m	DOL-1205-G05MN	6028141	x	x	–	–
Cable socket, straight, PVC, orange, A-coded, 10 m	DOL-1205-G10MN	6028142	x	x	–	–
Cable socket, straight with shield, PUR halogen-free, black, A-coded (drop cable)	DOL-1205-G06MK	6028326	–	x	–	–
1:1 connection cable, M12/M12, PUR halogen-free, black, A-coded, 1 m	DSL-1205-G01MC	6029280	x	x	–	–
1:1 connection cable, M12/M12, PUR halogen-free, black, A-coded, 2 m	DSL-1205-G02MC	6025931	x	x	–	–
1:1 connection cable, M12/M12, PUR halogen-free, black, A-coded, 5 m	DSL-1205-G05MC	6029282	x	x	–	–
1:1 connection cable, M12/M12, PUR halogen-free, black, A-coded, 10 m	DSL-1205-G10MC	6038954	x	x	–	–
1:1 connection cable, M12/M12, PUR halogen-free, black, A-coded	DSL-1205-G1M5C	6029281	x	x	–	–

14.1.2 M12 connection, 8-pin

Cable socket, straight with connection cable

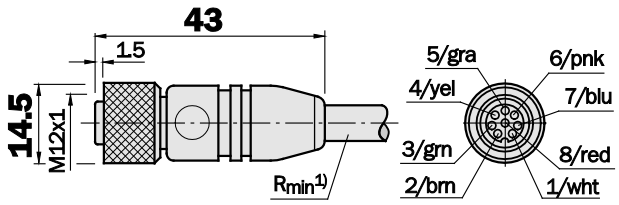


Fig. 63: Cable socket, straight, with connection cable

Description	Type	Part no.	MLG Standard	MLG Programmable	MLG Analog	XLG Programmable
Cable socket, straight with shield, PVC, 2 m	DOL-1208-G02MA	6020633	–	x	x	x
Cable socket, straight with shield, PVC, black, 5 m	DOL-1208-G05MA	6020993	–	x	x	x
Cable socket, straight with shield, PVC, black, 10 m	DOL-1208-G10MA	6022152	–	x	x	x
Cable socket, straight with shield, PVC, black, 15 m	DOL-1208-G15MA	6022153	–	x	x	x

Cable socket, angled with connection cable

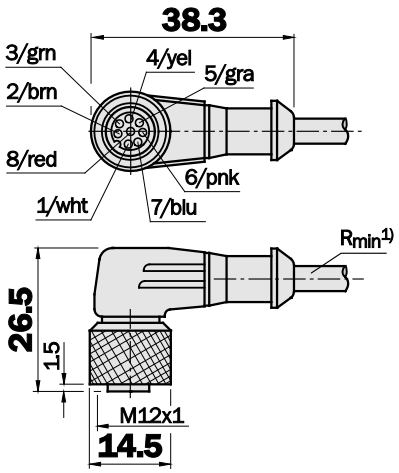


Fig. 64: Cable socket, angled, with connection cable

Description	Type	Part no.	MLG Standard	MLG Programmable	MLG Analog	XLG Programmable
Cable socket, angled with shield also on knurled nut, PUR halogen-free, black, 2 m	DOL-1208-W02MA	6020992	–	x	x	x
Cable socket, angled with shield also on knurled nut, PUR halogen-free, black	DOL-1208-W05MA	6021033	–	x	x	x

T-distributor

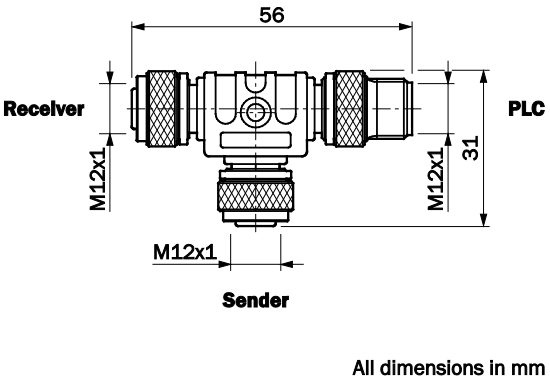


Fig. 65: T-distributor

Description	Type	Part no.	MLG Standard	MLG Programmable	MLG Analog	XLG Programmable
T-distributor, 1 x M12 plug, 8-pin and 2x M12 sockets, 8-pin	SBO-02F12-SM	6029306	–	x	x	x

Other M12 connection systems, 8-pin

Description	Type	Part no.	MLG Standard	MLG Programmable	MLG Analog	XLG Programmable
Cable plug (knurl), straight, without cable, shield	STE-1208-GA (2)	6028370	–	x	x	x
Cable socket, straight with shield also on knurled nut, PUR halogen-free, black, 5 m	DOL-1208-G05MACR	6037517	–	x	x	x
Cable socket, straight with shield, PUR halogen-free, black, 10 m	DOL-1208-G10MAC	6038832	–	x	x	x
Cable socket, straight with shield, PUR halogen-free, black, 10 m	DOL-1208-W10MAC	6037726	–	x	x	x
Cable socket, straight, without cable, shield	DOS-1208-GA	6028369	–	x	x	x
Cable socket, angled, without cable, shield	DOS-1208-WA	6043358	–	x	x	x
1:1 connection cable, M12/M12, with shield on knurled nut, PUR halogen-free, A-coded, 1 m	DSL-1208-G01MAC	6026625	–	x	–	–
1:1 connection cable, M12/M12, with shield on knurled nut, PUR halogen-free, A-coded, 2 m	DSL-1208-G02MAC	6030121	–	x	–	–
1:1 connection cable, M12/M12, with shield on knurled nut, PUR halogen-free, A-coded, 5 m	DSL-1208-G05MAC	6032325	–	x	–	–
1:1 connection cable, M12/M12, with shield on knurled nut, PUR halogen-free, A-coded, 10 m	DSL-1208-G10MAC	6034901	–	–	–	–

14.1.3 MLG/XLG Programmable connection cable – PCA

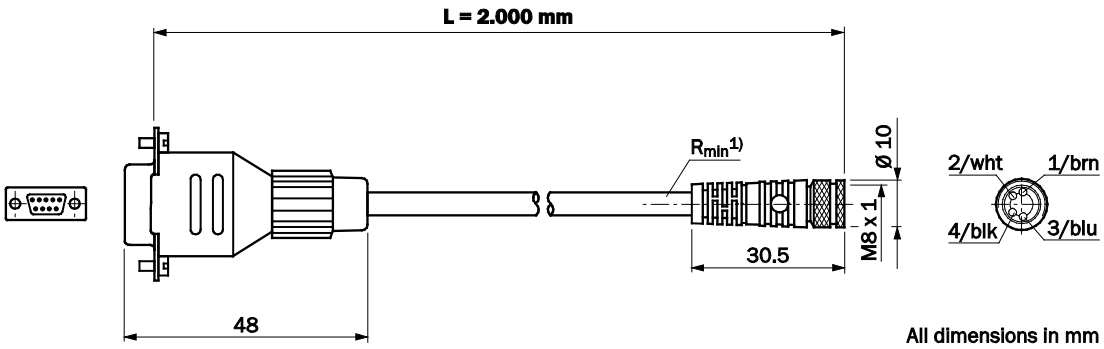


Fig. 66: MLG/XLG Programmable – PC connection cable

Description	Type	Part no.	MLG Standard	MLG Pro-grammable	MLG Analog	XLG Pro-grammable
M8 parameter cable (socket) MLG E > SUB-D PC (RS-232), PVC, orange, 2 m	DSL-8D04-G02M	2023695	–	–	x	x

14.1.4 M12 connection, 12-pin

Description	Type	Part no.	MLG Standard	MLG Pro-grammable	MLG Analog	XLG Pro-grammable
Cable socket, straight, with shield, 2 m	DOL-1212-G02MA	6034604	–	x	x	–
Cable socket, straight, with shield, 5 m	DOL-1212-G05MA	6034605	–	x	x	–

14.2 Mounting systems

Swivel mount

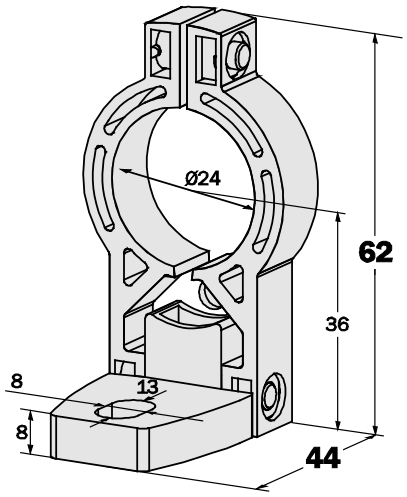


Fig. 67: Swivel mount

Description	Type	Part no.	MLG Standard	MLG/XLG Program-mable	MLG Analog	XLG Pro-grammable
Swivel mount (x4), monitoring height up to 1600 mm	BEF-2SMKEAKU4	2019649	x	x	x	x

T-nuts with sliding nuts

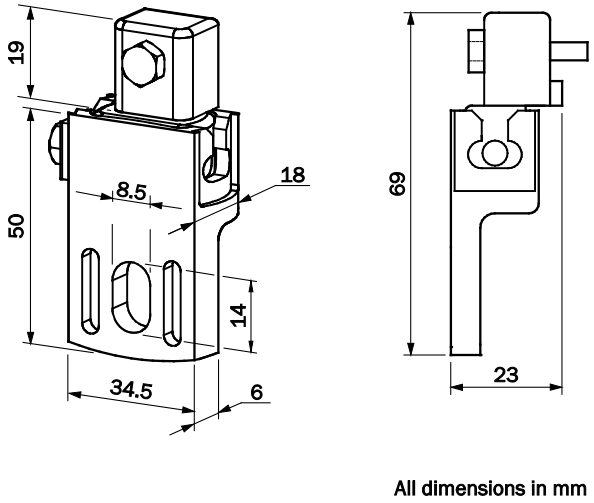


Fig. 68: T-nuts with sliding nuts

Description	Type	Part no.	MLG Standard	MLG/XLG Program-mable	MLG Analog	XLG Pro-grammable
Bracket with sliding nuts (x4 M5)	BEF-NUT-MLG	2023696	x	x	x	x

Metal mounting bracket (compact)

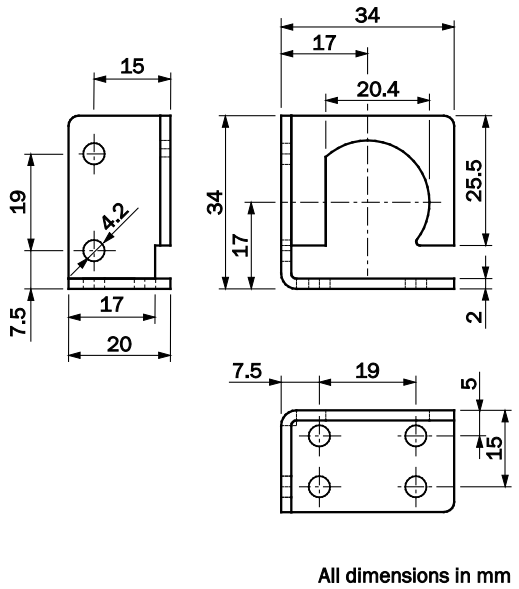


Fig. 69: Metal mounting bracket

Description	Type	Part no.	MLG Standard	MLG/XLG Program-mable	MLG Analog	XLG Pro-grammable
Mounting set (x4), without M4 fixing screws	BEF-WK-XLG	2029100	x	x	x	x

Other mounting systems

Description	Type	Part no.	MLG Standard	MLG/XLG Program-mable	MLG Analog	XLG Pro-grammable
Swivel mounting bracket, undamped	BEF-1SHABAAL4	2017751	x	x	x	x
Bracket without sliding nuts, rotatable, side bracket	BEF-1SHABAZN4	2019506	x	x	x	x
Mounting bracket, rotatable, vibration-damped and impact-resistant	BEF-1SHADAAL2	2018742	x	x	x	x
Rotatable mounting bracket, vibration-damped	BEF-1SHADAAL4	2017752	x	x	x	x
Swivel mount, 24 mm, omega bracket, mounting kit for device columns	BEF-2SMKEAAL2	2045884	x	x	x	x
Swivel bracket, 24 mm	BEF-2SMKEAAL4	2044848	x	x	x	x
Stainless steel rotatable bracket	BEF-2SMKEAES4	2030288	x	x	x	x
Mounting bracket, fixed (large)	BEF-3WNGBAST4	7021352	x	x	x	x
Mounting bracket, fixed (small)	BEF-3WNKBAST4	2044068	x	x	x	x
Universal bracket (plate without thread) for attachment of bars (BEF-MSxx)	BEF-KHS-G01	2022464	x	x	x	x
Clip/tapered (without fastening plate) for attachment of bars (BEF-MSxx)	BEF-KHS-KH1	2022726	x	x	x	x

Description	Type	Part no.	MLG Standard	MLG/XLG Programmable	MLG Analog	XLG Programmable
Mounting bar, straight, 300 mm	BEF-MS12G-B	4056055	x	x	x	x
Mounting bar, straight, 200 mm	BEF-MS12G-NA	4058914	x	x	x	x
Mounting bar, straight, 300 mm	BEF-MS12G-NB	4058915	x	x	x	x
Mounting bar, L-shaped, 150 mm x 150 mm	BEF-MS12L-A	4056052	x	x	x	x
Mounting bar, L-shaped, 250 mm x 250 mm	BEF-MS12L-B	4056053	x	x	x	x
Mounting bar, L-shaped, 150 mm x 150 mm	BEF-MS12L-NA	4058912	x	x	x	x
Mounting bar, L-shaped, 250 mm x 250 mm	BEF-MS12L-NB	4058913	x	x	x	x
Mounting bar, Z-shaped, 150 mm x 70 mm x 150 mm	BEF-MS12Z-A	4056056	x	x	x	x
Mounting bar, Z-shaped, 150 mm x 70 mm x 250 mm	BEF-MS12Z-B	4056057	x	x	x	x
Mounting bar, Z-shaped, 100 mm x 150 mm x 200 mm	BEF-MS12Z-C	4064563	x	x	x	x
Mounting bar, Z-shaped, 150 mm x 70 mm x 150 mm	BEF-MS12Z-NA	4058916	x	x	x	x
Mounting bar, Z-shaped, 150 mm x 70 mm x 250 mm	BEF-MS12Z-NB	4058917	x	x	x	x
Bar clip for 12 mm cylindrical bar(s)	BEF-RMC-D12	5321878	x	x	x	x
Nuts set with T-nuts and sliding nuts	–	2017550	x	x	x	x

14.3 Other accessories

Description	Type	Part no.	MLG Standard	MLG/XLG Programmable	MLG Analog	XLG Programmable
Anti-static plastic cleaner	–	5600006	x	x	x	x
Lens cloth	–	4003353	x	x	x	x
AR60 alignment aid	–	1015741	x	x	x	x
Anti-static plastic cleaner	–	4032462	x	x	x	x
RS-232 plug, USB with 0.35 m cable	–	6035396	–	x	–	x

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