

DL100 – PROFINET IO

Distance measuring device



EN



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Important safety notes



NFPA79 applications only.

UL-listed adapters providing field wiring leads are available.

Refer to the product information.

→ See "www.sick.com/dl100".



CAUTION!

Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.

Importantes consignes de sécurité



À utiliser pour les applications NFPA79 uniquement.

Des adaptateurs homologués fournissant des fils de câblage client sont disponibles.

Se reporter aux informations du produit.

→ Voir « www.sick.com/dl100 ».



ATTENTION!

Tout usage de commandes, réglages ou toute application de procédures autres que ceux décrits dans ce document peut entraîner une exposition dangereuse au rayonnement.

General

1 General

1.1 Information on the operating instructions

These operating instructions offer important notes on handling of the distance measuring devices DL100 of SICK AG. A prerequisite for safe work is compliance with all indicated safety notes and instructions.

Furthermore, the local work safety regulations and general safety provisions applicable for the application of the distance measuring device must be complied with.

The operating instructions must be read carefully before taking up any work! They are part of the product and must be kept in direct proximity of the distance measuring device, accessible for the staff at all times.

When passing on the distance measuring device to third parties, the operating instructions must be passed on as well.



NOTE!

These operating instructions describe all distance measuring devices DL100 with a PROFINET IO interface.

1.2 Explanation of symbols

Warnings

Warnings are marked by icons in the operating instructions. The notes are initiated by signal words that express the degree of danger.

Always comply with the notes and act carefully to avoid accidents, injury and property damage.



DANGER!

... indicates a directly dangerous situation that will lead to death or severe injury if not avoided.



WARNING!

... indicates a possibly dangerous situation that may lead to death or severe injury if not avoided.



CAUTION!

... indicates a potentially dangerous situation that may lead to minor or light injury if not avoided.



ATTENTION!

... indicates a potentially harmful situation that may lead to property damage if not avoided.

Advice and recommendations



NOTE!

... emphasizes useful advice and recommendations, as well as information for efficient and trouble-free operation.

General

1.3 Limitations of liability

All notes and information in these instructions were collected under consideration of the applicable standards and regulations, the state of the art and our long-term experience and insights.

The manufacturer does not assume any liability for damage due to:

- Non-observation of the operating instructions
- Non-intended use
- Use of untrained staff
- Unauthorized conversions
- Technical changes
- Use of unapproved wear and tear parts

The actual delivery may deviate from the features and presentations described here for special designs, when additional order options are used or due to the latest technical changes.

1.4 Delivery

The following is included in the delivery:

- Distance measuring device DL100
- Optional: Accessories (→ page 106, chapter 15).

Included documentation per distance measuring device:

- Quickstart

1.5 Customer service

Our customer service is available for technical information.

You can find your local office on the reverse.



NOTE!

For quick processing of the call, keep the data of the type label, such as type code, serial number, etc. ready.

1.6 EC Declaration of Conformity

→ The EC Declaration of Conformity can be downloaded from "www.sick.com/dl100".

1.7 Environmental protection



ATTENTION!

Danger for the environment from improper disposal of the distance measuring device!

Improper disposal of the distance measuring device may cause damage for the environment.

Therefore:

- Always observe the applicable environmental protection provisions.
 - Upon proper disassembly, send the disassembled components to recycling.
 - Separate the materials by type and recycle them.
-

Safety

2 Safety

2.1 Intended use

The distance measuring device DL100 is a measuring device consisting of an opto-electronic sensor and integrated assessment electronics. The measuring device is only intended for non-contact recording of distances from linearly moved system parts. Distance measurement is performed by a reflector.

SICK AG assumes no liability for direct or indirect loss or damage resulting from use of the product. This in particular applies for any differing use of the product that does not meet the intended purpose and that is not described or mentioned in this documentation.

2.2 Non-Intended use

The distance measuring device DL100 is no safety component according to the EC Machinery Directive (2006/42/EC).

The distance measuring devices must not be used in explosion-hazardous areas.

All uses not described in intended use are prohibited.

No accessories must be connected or installed that are not expressly specified in amount and characteristics and approved by SICK AG.



WARNING!

Danger from non-intended use!

Any non-intended use may cause dangerous situations.

Therefore:

- Only use the distance measuring device according to its intended use.
 - All information in the operating instructions must be strictly complied with.
-

2.3 Changes and conversions

Changes and conversions at the distance measuring device or the installation may cause unexpected dangers.

The manufacturer's written approval is required before any technical changes and expansions of the distance measuring device.

2.4 Requirements to skilled persons and operating staff



WARNING!

Danger of injury in case of insufficient qualification!

Improper use may cause considerable injury and property damage.

Therefore:

- Any work must be performed by the designated persons only.

The following qualification requirements for the different areas of activity are described in the operating instructions:

- **Instructed persons**
were instructed in the tasks assigned to them and possible dangers in case of improper conduct in the scope of instruction by the operator.
- **Skilled persons**
are able to perform the tasks assigned to them based on their technical training, knowledge and experience, as well as knowledge of the relevant provisions, and to independently recognize possible danger.
- **Electricians**
are able to perform work at electrical systems based on their technical training, knowledge and experience, as well as knowledge of the relevant standards and provisions, and to independently recognize possible dangers.
In Germany, the electrician must meet the provisions of the accident prevention provisions BGV A3 (e.g. Elektroinstallateur-Meister). Other countries are subject to corresponding regulations that must be observed.

2.5 Work safety and special danger

Observe the safety notes listed here and the warnings in the other chapters of these instructions to reduce dangers to health and avoid dangerous situations.

Safety

2.6 Warning at the device

The distance measuring device DL100 has a category 2 laser installed. The measuring device is marked with a warning.



Complies with 21 CFR 1040.10 and 1040.11 except for conformance with IEC 60825-1 Ed. 3, as described in Laser Notice No. 56 dated 8 May 2019.

Laser radiation – Never look into the light beam – Class 2 Laser Product (EN 60825-1:2014+A11:2021; IEC 60825-1:2014)

Laser output aperture

Fig. 1: Warning at the device: Laser category 2 (EN 60825-1:2014+A11:2021; IEC 60825-1:2014)
Identical laser class for issue EN/IEC 60825-1:2007

2.7 Danger notes and operational safety

Laser irradiation

The following notes must be observed and complied with for your own safety:



CAUTION!

Optical radiation: Laser class 2

The human eye is not at risk when briefly exposed to the radiation for up to 0.25 seconds. Exposure to the laser beam for longer periods of time may cause damage to the retina. The laser radiation is harmless to human skin.

- Do not look into the laser beam intentionally.
- Never point the laser beam at people's eyes.
- If it is not possible to avoid looking directly into the laser beam, e.g., during commissioning and maintenance work, suitable eye protection must be worn.
- Avoid laser beam reflections caused by reflective surfaces. Be particularly careful during mounting and alignment work.
- Do not open the housing. Opening the housing will not switch off the laser. Opening the housing may increase the level of risk.
- Current national regulations regarding laser protection must be observed.

Identification

3 Identification

3.1 Type label

The type label is located on the measuring device.

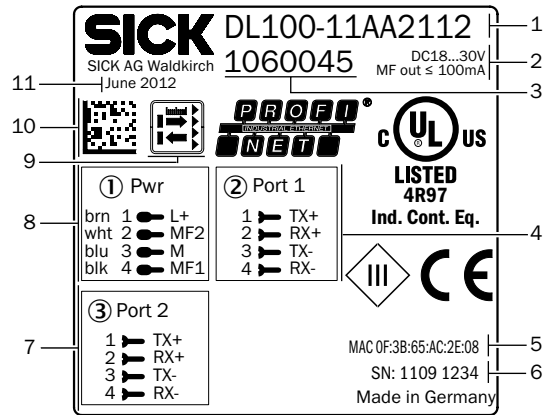


Fig. 2: Type Label

- 1 Type code → See page 102, chapter 14.2.
- 2 Supply voltage, multifunction output current
- 3 Device number
- 4 Assignment for female connector Port 1
- 5 MAC address
- 6 Serial number
- 7 Assignment for female connector Port 2
- 8 Assignment for supply voltage plug
- 9 Icon: Distance sensor reflector mode
- 10 Barcode
- 11 Production year and month

4 Setup and function

4.1 Setup

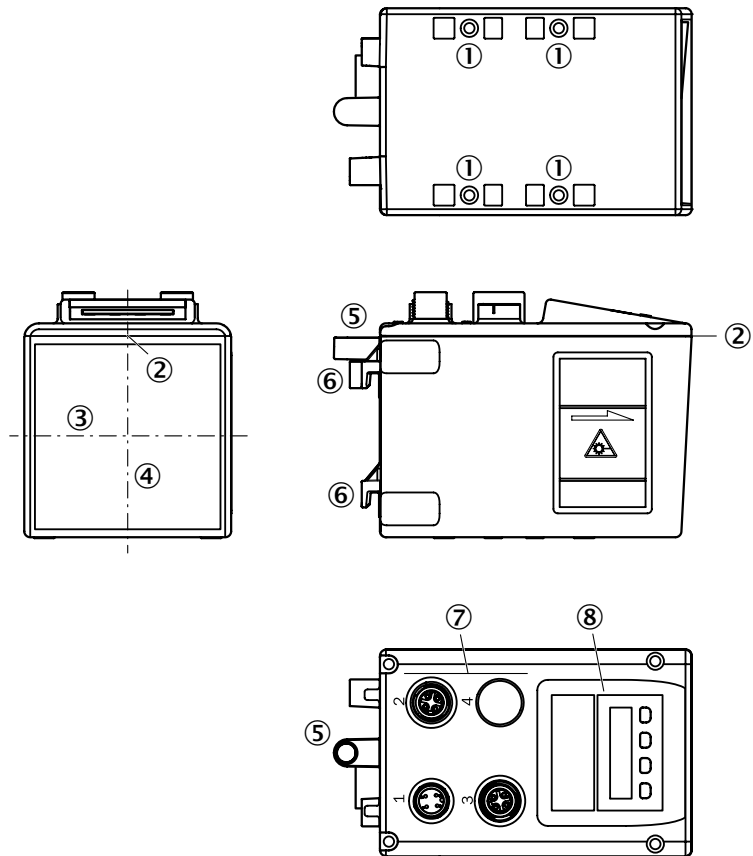


Fig. 3: Setup "distance measuring device DL100"

- 1 Threaded mounting hole M5
- 2 Device zero point
- 3 Optical axis sender
- 4 Optical axis receiver
- 5 Bore for knurled screw of the optional alignment bracket
- 6 Holder for optional alignment bracket
- 7 Electrical connection
- 8 Display and operating unit

Setup and function

4.2 Function

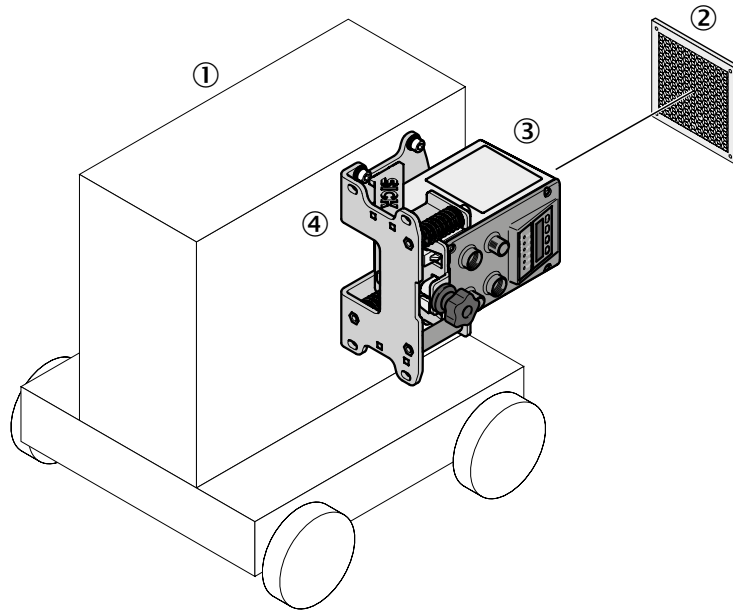


Fig. 4: Function "distance measuring device DL100"

- 1 Vehicle
- 2 Reflector
- 3 Distance measuring device DL100
- 4 Alignment bracket

The distance measuring device DL100 comprises optics, a sender/receiver unit and an evaluation unit. The sender emits the laser beam. The receiver receives light reflected by the reflector. The evaluation electrical unit determines the distance between sensor and reflector by time of flight measurement.

For measurement, either the reflector or the measuring device may move linearly along the laser beam.

The distance measuring device DL100 is equipped with two Ethernet interfaces. They serve communication via PROFINET IO and diagnosis and parameterization via SOPAS ET. The two interfaces have equal priorities and are internally connected to one switch.

The measured distance is transferred via the "PROFINET IO" interface and may be used, e.g. for the control unit or a position-control circuit.

4.3 Display and operating elements

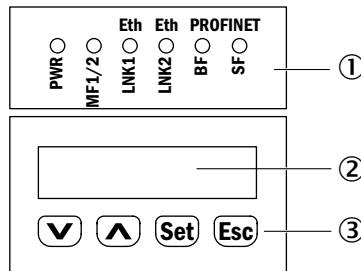


Fig. 5: Display and operating elements

- 1 LEDs
- 2 Display
- 3 Keys

LEDs

LED	Description
PWR	Display of operating status <ul style="list-style-type: none"> • LED off: No operation • LED green: Trouble-free operation • LED orange flashing: Warning (see warning status, upper level menu) • LED red flashing: Interference (see error status, menu on the top level) → Troubleshooting, see page 96, chapter 12.
MF1/2	The status for multi-function input/output MF1 and multi-function output MF2 is presented via an LED. → See page 22, Table 2.
LNK1	Ethernet <ul style="list-style-type: none"> • LED off: No Ethernet present • LED green: Ethernet present • LED orange flashing: Data transmission
LNK2	Ethernet <ul style="list-style-type: none"> • LED off: No Ethernet present • LED green: Ethernet present • LED orange flashing: Data transmission
BF	Interface PROFINET IO → See following table "LEDs BF and SF".
SF	Bus status → See following table "LEDs BF and SF".

Table 1: LEDs

Setup and function

LED MF1/2

LED MF1/2	MF1	MF2
Off	OFF	OFF
Blue	ON	OFF
Yellow	OFF	ON
White	ON	ON

Table 2: LED MF1/2

LEDs BF und SF

BF	SF	Beschreibung
Off	OFF	Connection OK.
Red	Red	Status after switching on. Bus interrupted Master (PLC) cannot be reached.
Flashing red	Red	Bus error → Troubleshooting, see page 96, chapter 12.1.

Table 3: LEDs BF and SF

Symbols for operating modes

The distance measuring device differentiates between the two operating modes "measured value display" and "menu operation".

Icon	Description
RUN	The icon RUN is displayed in the operating mode "measured value display". If there is an error and no measurement value can be determined, the icon RUN disappears.
MEN	The icon MEN is displayed in the operating mode "menu operation". The icon is also displayed when there is an error and no measurement value can be determined.

Table 4: Symbols for operating modes

Keys





Key	Description
	<ul style="list-style-type: none"> Select menu, parameters or options. Reduce value.
	<ul style="list-style-type: none"> Select menu, parameters or options. Increase value.
	<ul style="list-style-type: none"> Switch to the next lower menu level. Save parameter change. Confirm selection.
	<ul style="list-style-type: none"> Leave parameter without saving. Switch to the next higher menu level.

Table 5: Keys

4.4 Display

Measured value display

The measurement value is displayed by default:

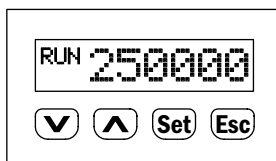


Fig. 6: Measured value display

Menu display

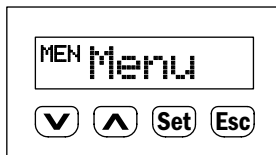


Fig. 7: Menu display



NOTE!

If a value or display has more than six characters, the characters are automatically displayed in sequence.

Transport and storage

5 Transport and storage

5.1 Transport

Improper transport

**ATTENTION!****Damage to the distance measuring device by improper transport!**

Improper transport may cause considerable property damage.

Therefore:

- Only have transport performed by trained workers.
 - When unloading and during internal transport, always proceed with the greatest care and caution.
 - Observe icons on the packaging.
 - Only remove packaging right before commencement of installation.
-

5.2 Transport inspection

Improper transport

Inspect the delivery for completeness and transport damage without delay upon receipt.

If there is any externally visible transport damage, proceed as follows:

- Do not accept the delivery, or only under reservation.
 - Note the scope of the damage on the transport documents or the delivery receipt of the transporter.
 - Initiate complaints.
-

**NOTE!**

Report every defect as soon as you recognize it. Damages claims can only be asserted within the applicable complaint periods.

5.3 Storage

Store the distance measuring device under the following conditions:

- Do not leave it outside.
- Store dry and dust-free.
- Do not expose to any aggressive media.
- Protect from solar irradiation.
- Avoid mechanical vibrations.
- Storage temperature: –40 to 75 °C
- Relative humidity: max. 95 %, non-condensing
- At storage exceeding 3 months, regularly inspect the general condition of all components and the packaging.

Mounting

6 Mounting

6.1 Mounting process

1. Determine mounting site under consideration of the mounting notes.
→ See following chapter.
2. Mount alignment bracket and distance measuring device.
→ See page 32, chapter 6.7.
3. Perform electrical connection
→ See page 35, chapter 7.
4. Align distance measuring device and reflector against each other.
→ See page 31, chapter 6.6
5. Align distance measuring device with the reflector using the alignment bracket fine adjustment. → See page 33, chapter 6.8.
6. Fasten alignment of the distance measuring device.
→ See page 33, chapter 6.8.

6.2 Mounting notes

Observe the following mounting notes for trouble-free operation:

- Comply with technical specifications like the measurement range.
→ See page 103, chapter 14.4.
- Use distance measuring device with optional heating in low ambient temperatures, e.g. in deep freeze storage.
- At higher temperatures, use the distance measuring device with optional cooling casing. → See page 112, chapter 15.4.
- Protect the distance measuring device from solar irradiation.
- To avoid condensation, do not expose the distance measuring device to any quick temperature changes.
- Observe the assembly notes for the reflector.
→ See page 26, chapter 6.2.
- Keep sufficient distance to other distance measuring devices.
→ See page 28, chapter 6.4.
- Keep sufficient distance to data transmission photoelectric switches.
→ See page 30, chapter 6.5.

6.3 Choose and mount reflector



NOTE!

→ For suitable reflectors and suitable reflective tape, see page 106, chapter 15.1

Reflector size

- Select the reflector size so that the light spot does still meet the reflector in case of vibrations.
- If the reflector is installed at a vehicle, a smaller reflector is typically sufficient.

Requirements

- Highly reflective surfaces close to the reflector can cause beam deflections or stray light and thus lead to incorrect measurements. Highly reflective surfaces may be, among others, shelf profiles, palettes wrapped with stretch foil and running rails.
- When mounting the distance measuring device in the horizontal axis of stacker crane, incline the reflector towards the ceiling, away from the rail (approx. 1° to 3°). → See following figure.
- When mounting in the vertical axis, incline away from the stacker crane's mast (approx. 1° to 3°). → See following figure.

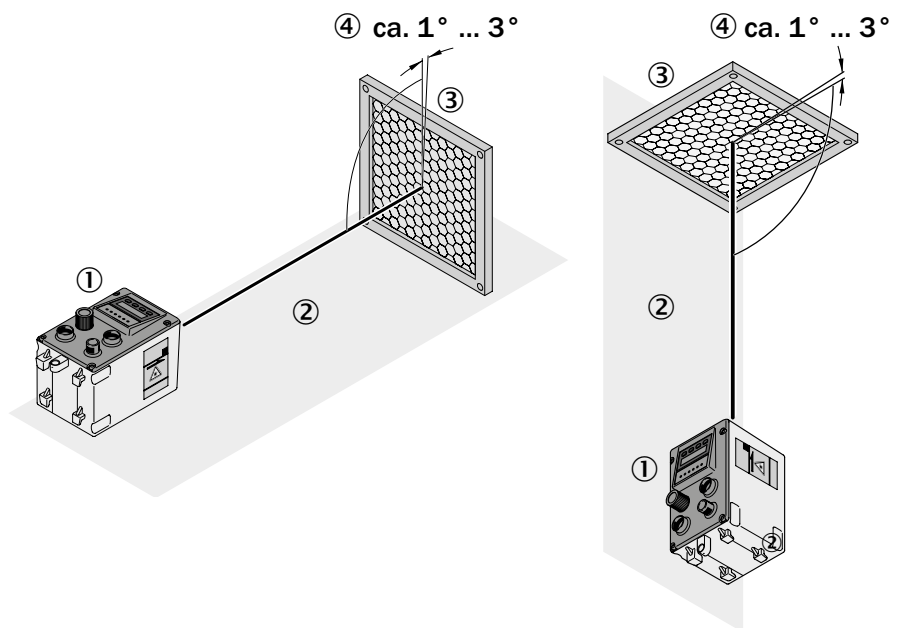


Fig. 8: Installing the reflector on highly reflective surfaces
Left: Installed in driving axis, installed at the right in the lifting axis

- 1 Distance measuring device
- 2 Highly reflective surface
- 3 Reflector
- 4 Inclination of approx. 1° to 3°

Mounting

6.4 Placement of multiple distance measuring device

Multiple distance measuring device If you want to mount several distance measuring devices, you have to consider a minimum distance between the distance measuring devices when mounting them. The minimum distance increases with the maximum scanning range of the distance measuring device.

Formula $a \geq 100 \text{ mm} + 0.01 \times s_{\text{max}} \text{ [mm]}$

- Example**
- Distance measuring device DL100-21xxx01
 - Measuring range: 0.15 ... 100 m
 - Maximum measuring distance 60 m
 - $s_{\text{max}} = 60 \text{ m}$

Calculation

$$a \geq 100 \text{ mm} + 0.01 \times 60000 \text{ mm} \rightarrow 100 \text{ mm} + 600 \text{ mm} \rightarrow 700 \text{ mm}$$

Result

$$a \geq 700 \text{ mm}$$

Light beams in the same direction

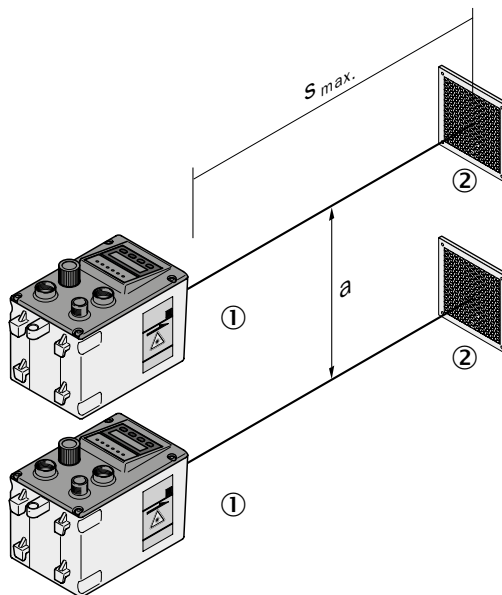


Fig. 9: Placement of two distance measuring devices with light beams in the same light direction.

- 1 Distance measuring device DL100
- 2 Reflector
- a Minimum distance
- s_{max} Maximum scanning range

Light beams in the opposite direction

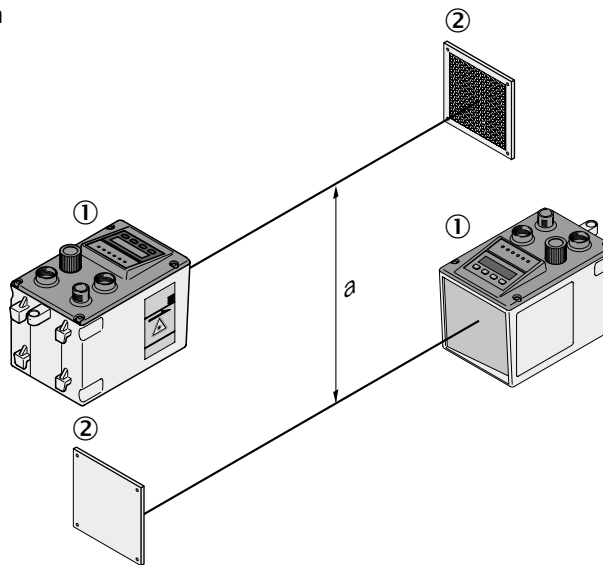


Fig. 10: Placement of two distance measuring devices with light beams in the opposite direction.

- 1 Distance measuring device DL100
- 2 Reflector
- a Minimum distance

Mounting

6.5 Place the distance measuring device towards the adjacent data transmission photoelectric switch

When mounting with a data transmission photoelectric switch of the ISD300, ISD400-1xxx and ISD400-6xxx series, a beam separation of at least 100 mm must be complied with at all times. The maximum scanning range does not influence the minimum distance. For devices of the ISD400-7xxx (ISD400 Pro) serie other minimum distances apply. Refer to operating instructions "ISD400 Pro".

Formula

$$a \geq 100 \text{ mm}$$

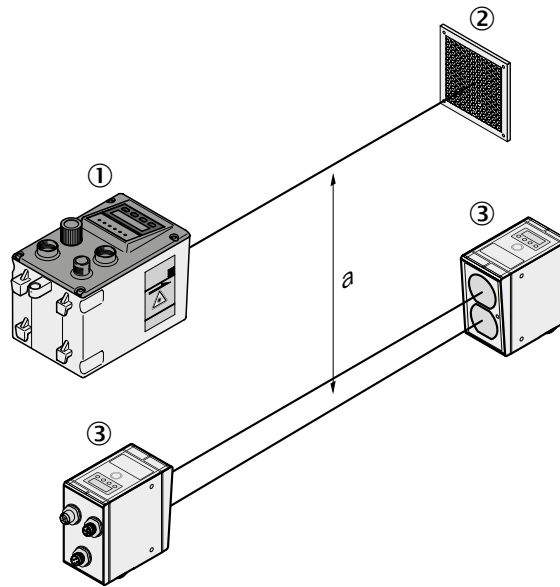


Fig. 11: Placement of the distance measuring device to the data transmission photoelectric switch ISD

- 1 Distance measuring device DL100
- 2 Reflector
- 3 Data transmission photoelectric switch ISD300, ISD400-1xxx or ISD400-6xxx
- a Minimum distance

6.6 Align distance measuring device and reflector against each other

1. Move the distance measuring device and reflector close together.
2. Align the distance measuring device so that the light spot of the sensor hits the center of the reflector.
3. Increase the distance between the distance measuring device and the reflector. The sensor light spot must continue to hit the center of the reflector.
4. Check damping. The damping value must not exceed the value in the table.

Damping value

The following table shows the required damping values depending on the distance between the distance measuring device and the reflector. The values in the "rated level" column should not be undercut. When the measured damping value undercuts the value in the column "warning threshold", a warning is issued.

Distance [m]	Rated level [dB]	Warning threshold [dB]
<10	-30	-42
10	-30	-42
20	-42	-54
35	-54	-66
70	-66	-78
150 ¹⁾	-78	-90
300 ²⁾	-90	-102

1) For distance measuring devices with a measurement range of 0.15 ... 200 m or 0.15 ... 300 m

2) For distance measuring devices with a measurement range of 0.15 ...300 m

Table 6: Damping values

Mounting

6.7 Mount alignment bracket and distance measuring device

The distance measuring device is mounted by the optional alignment bracket.

→ For dimensions and item number, see page 101, chapter 14.1.

Observe the following items:

- Mounting notes: → see page 26, chapter 6.2.
- The operation must be accessible.

1. Mount alignment bracket across the four oblong holes. The alignment bracket is suitable for mounting to horizontal and vertical levels.

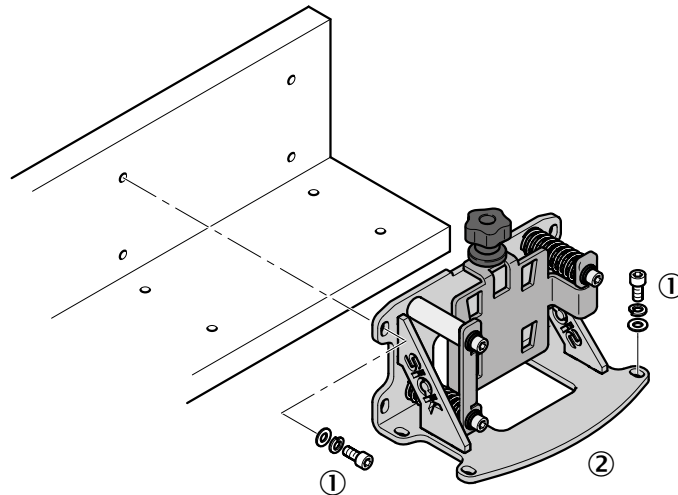


Fig. 12: Mount alignment bracket

- 1 Mounting screw M5
- 2 Alignment bracket

2. Turn out knurled screw until the distance measuring device can be inserted.
3. Move distance measuring device into the alignment bracket.

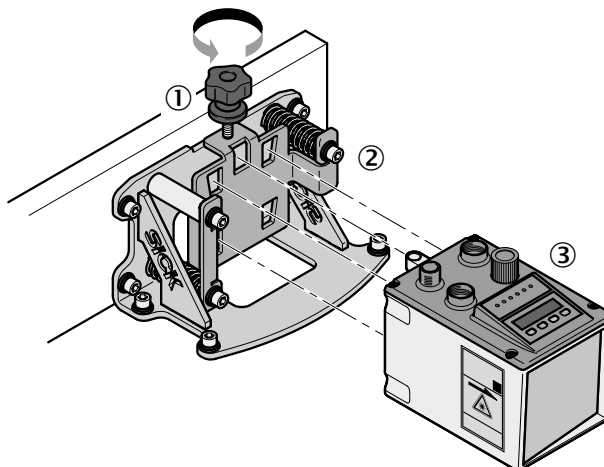


Fig. 13: Mount distance measuring device

- 1 Knurled screw
- 2 Alignment bracket
- 3 Distance measuring device

4. Attach distance measuring device via the knurled screw.

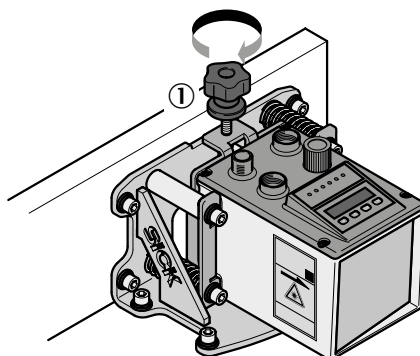


Fig. 14: Attach distance measuring device with the knurled screw

- 1 Knurled screw

6.8 Distance measuring device above alignment bracket

Align the distance measuring device with the alignment bracket according to the following figures. The sensor light spot must hit the center of the reflector.

Mounting

Alignment in X-direction

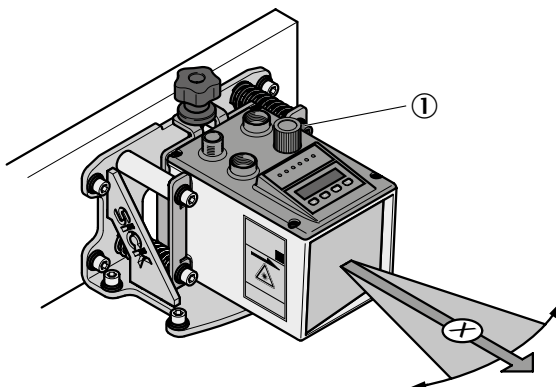


Fig. 15: Align distance measuring device in X-direction using the alignment bracket

- 1 Set screw to align the distance measuring device in X-direction

Alignment in Y-direction

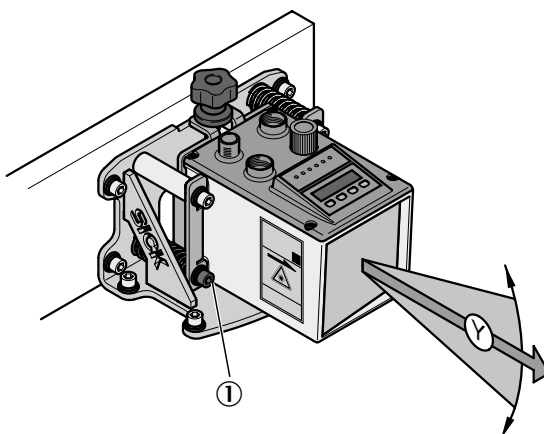


Fig. 16: Align distance measuring device in Y-direction using the alignment bracket

- 1 Set screw to align the distance measuring device in Y-direction

7 Electrical connection

7.1 Safety

Wrong supply voltage



ATTENTION!

Device damage from wrong supply voltage!

Incorrect supply voltage may cause damage to the device.

Therefore:

- Only operate the distance measuring device with a protected low voltage and secure electrical insulation of protection class III.

Work under voltage



ATTENTION!

Device damage or unintended operation by work under voltage!

Working under voltage may cause unintended operation.

Therefore:

- Only perform wiring work in the powered down condition.
- Line connections must only be established and disconnected with the supply voltage switched off.

7.2 Wiring Notes



ATTENTION!

Fault from improper wiring!

Improper wiring may cause malfunctions in operation.

Therefore:

- Only use shielded cables with twisted pair wires.
- Observe wiring notes.

Electrical connection



WARNING!

Risk of damage to the device resulting from a non-grounded supply voltage or equipotential bonding currents!

- A non-grounded supply voltage or potential differences between the supply voltage GND and the distance measuring device housing may result in the device sustaining damage.
- For this reason:
- Only operate with a grounded supply voltage.
- Ensure low-impedance and current-carrying equipotential bonding.



NOTE!

→ Ready-made cables, see page 109, chapter 15.2.

All electrical connections of the distance measuring device DL100 are M12 round plugs.

The connection plugs of the distance measuring device are compatible to the SpeedCon™-quick connections and standard-M12 screw connections.

The PROFINET IO cable shields are connected to each other via the PROFINET IO plugs.

Protection class IP65 is only achieved with screwed plug connectors or cover caps.

Observe the following notes for wiring:

- A proper and complete shielding concept is required for interference-free function.
- The cable shield must be applied on either side in the control cabinet and the measuring device. The cable shield of the ready-made cables is connected to the knurled nut and thus the measuring device casing.
- Connect the cable shield in the control cabinet with the operating ground on a large cross-section.
- Potential balancing currents through the cable shield must be prevented by suitable measures.
- Do not install the cable in parallel to the other lines, in particular not devices with a high electromagnetic interference, such as frequency converters.

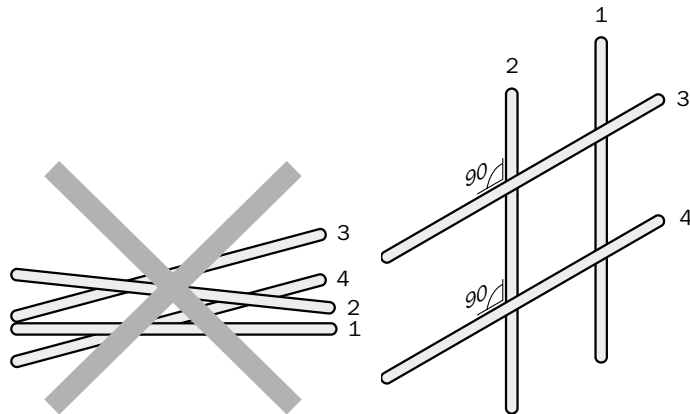


Fig. 17: Cross lines at a right angle

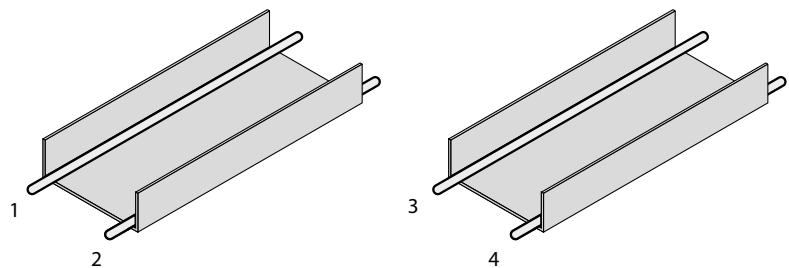


Fig. 18: Ideal placement –
Place lines in different cable channels

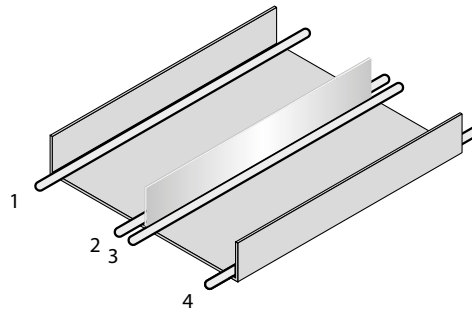


Fig. 19: Alternative installation – separate lines by metallic separation

- 1 Cables very sensitive to interference like analog measuring lines
- 2 Cables sensitive to interference, such as sensor cables, communication signals, bus signals
- 3 Cables that are sources of interference, such as control cables for inductive loads, motor brakes
- 4 Cables that are strong sources of interference, such as frequency converter output cables, supply to welding plants; power cables

Electrical connection

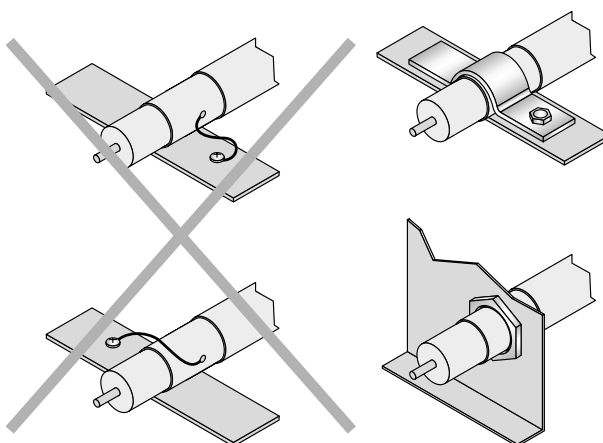


Fig. 20: Briefly connect shield with a large area - earth both sides

7.3 Electrically connect distance measuring device



NOTE!

The distance measuring device has the connection diagram and information on the inputs and outputs on the type sign.

1. Ensure that there is no voltage applied.
2. Connect the measuring device according to the connection diagram.
 - Connection 1 "Supply voltage"
 - Connection 2 "Ethernet Port 1"
 - Connection 3 "Ethernet Port 2"

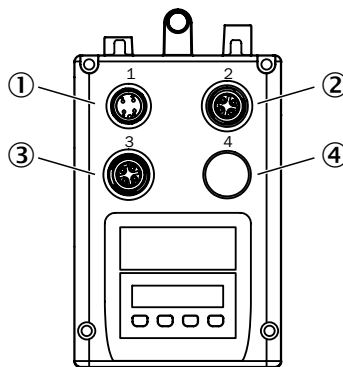


Fig. 21: Position of the electrical connections

- 1 Plug for the supply voltage
- 2 Female connector for Ethernet Port 1
- 3 Female connector for Ethernet Port 2
- 4 not connected

Electrical connection

7.4 Connection diagrams

7.4.1 Connection diagram supply voltage

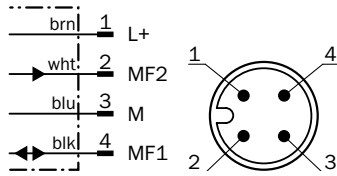


Fig. 22: Connection diagram supply voltage, plug M12, 4-pin, A-coded

Contact	Marking	Wire color	Description
1	L+	brown	Supply voltage: +18 ... +30 V DC
2	MF2	white	Multifunction output MF2
3	M	blue	Supply voltage: 0 V
4	MF1	black	Multifunctional input and output MF1

Table 7: Description plug supply voltage

7.4.2 Connection diagram Port 1 and Port 2 (Ethernet/PROFINET IO)

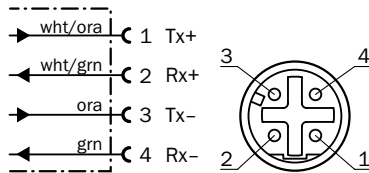


Fig. 23: Connection diagram Port 1 and Port 2, plug M12, 4-pin, D-coded

Contact	Marking	Wire color	Description
1	Tx+	white/orange	Send data signal, not inverted
2	Rx+	white/green	Receive data signal, not inverted
3	Tx-	orange	Send data signal, inverted
4	Rx-	green	Receive data signal, inverted

Table 8: Description socket Port 1 and Port 2

8 Operation at the measuring device

Damage to operation



ATTENTION!

Damage to the buttons by incorrect handling!

Incorrect handling of the keys may damage the keys. Operation is made difficult or impossible by this.

Therefore:

- Only operate keys with your fingers or a pointer.
- Do not operate buttons with pointed or hard objects.



NOTE!

Once the device is integrated into a PROFINET network, the parameters entered in the measuring device are overwritten.

8.1 Measured value display

Once the measuring device is supplied with voltage, the display will indicate the current measurement value.

8.2 Choose parameter

Choose a menu, a parameter or an option using the keys **Set** and **▼**. The menu path is indicated in the respective chapter.

→ For the entire menu structure, see page 113, chapter 16.

8.3 Choose option

1. Use the keys **Set** and **▼** to select the desired parameter.
2. Use the key **▼** or **▲** to select the desired option.
3. Perform one of the following steps:
 - Push the key **Set** to save the changes.
 - Push the key **Esc** to cancel the process. The parameter name is displayed again.
4. Perform one of the following steps to return to the measured value display:
 - Push the key **Esc** until the measured value is displayed again.
 - Wait for approx. 2 minutes. The display automatically switches back to measured value display without operation of a key. Any settings made are also saved.

Operation at the measuring device

8.4 Change value

1. Use the keys **Set** and **▼** to select the desired parameter.
2. Push the key **Set**. The current value of the parameter is displayed. The first figure on the left flashes.
3. Push the key **▲** to increase the figure. Push the key **▼** to reduce the figure.
4. Push the key **Set** to save the figure entered. The next figure flashes. Push the key **Esc** to cancel the process.
5. Repeat the steps 3 and 4 until the last figure is saved. The parameter name is displayed.
6. Push the key **Esc** until the measured value is displayed again. Alternatively, you may also wait for a few minutes. The display automatically switches back to measured value display without operation of a key.

8.5 Parameter description

8.5.1 Main menu

The measurement value is displayed by default:

Use the **▼**-key to get from the measured value display to the display "Level Bargraph". Use the keys **▼** and **▲** to browse within the main menu.

Push the **Set**-key for at least 2 seconds to get to the "Menu".

Display	Description
Measurement value	Measurement value display in mm
Level Bargraph	Level display (damping value) as bargraph
Level numeric	Level display (damping value) as numeric value → Also see page 31, Table 6.
Temperature	Display of indoor temperature of the measuring device
Operating hours counter	Operating hours display
Warnings	Display of the pending warnings. When a warning is pending, the LED PWR flashes orange. When no warnings are pending, no warnings are displayed. → Also see page 97, chapter 12.2, list of possible warnings.
Error	Display of the pending warnings. When an error is pending, the LED PWR flashes red. When no errors are pending, no errors are displayed. → Also see page 97, chapter 12.3, list of possible errors.

Table 9: Main menu

8.5.2 Menu "SwVers"

The menu "SwVers" shows all information on the software.

You can get to the menu "SwVers" via the menu path:

Main menu → **Set** → Menu → **▼** → SwVers

Push the **Set**-key so that the parameter "App-uC" is displayed.

Use the keys **▼** and **▲** to browse within the menu. Push the **Set**-key to display the respective parameter value.

Parameter	Description
App-uC	Display of the version of the application processor
FPGA	Display of the version of the Field Programmable Gate Array
Com-uC	Display of the version of the communication processor

Table 10: Menu "SwVers"

8.5.3 Menu "HwVers"

The menu "HwVers" shows all information on the hardware.

You can get to the menu "HwVers" via the menu path:

Main menu → **Set** → Menu → **▼** → SwVers → **▼** → HwVers

Push the **Set**-key so that the parameter "HwVers" is displayed.

Parameter	Description
HwVers	Version number display

Table 11: Menu "HwVers"

Operation at the measuring device

8.5.4 Menu "Profin"

Use the menu "Profin" to set the bus address.

You can get to the menu "Profin" via the menu path:

Main menu → **Set** → Menu → **Set** → Profin

Push the **Set**-key so that the parameter "StName" is displayed.

Use the keys **▼** and **▲** to browse within the menu. Push the **Set**-key to display the respective parameter value.

Parameter	Description
StName	Display station name Factory setting • dl100
ResDst	Choose resolution for the output value "Distance" via the digital data interface. The measurement value is multiplied with the resolution. The parameter does not influence the measurement value displayed. Prerequisite The parameter is only displayed if the option "Yes" is selected for the parameter "more". Options • 0.1 • 0.125 • 1.0 • 10.0 • 100.0 Factory setting • 0.1 mm

Menu "Profin" (continued)

Options	Description
ResSpd	Choose resolution for the output value "Speed" via the digital data interface. The measurement value is multiplied with the resolution. The parameter does not influence the measurement value displayed. Prerequisite • The parameter is only displayed if the option "Yes" is selected for the parameter "more". Options • 0.1 • 1.0 • 10.0 • 100.0 Factory setting • 0.1 mm/s

Table 12: Menu "Profin"

8.5.5 Menu "more"

Use the menu "More" to activate and deactivate the expanded menu view.

You can get to the menu "More" via the menu path:

Main menu → **Set** → Menu → **Set** → Profin → **▼** → more

Push the **Set**-key. The currently set option is displayed here.

Options	Description
Yes / No	Activate and deactivate expanded menu view. Options <ul style="list-style-type: none"> • Yes • No Factory setting <ul style="list-style-type: none"> • No

Table 13: Menu "More"

8.5.6 Menu "MFx On"

Use this menu to activate and deactivate the multifunction input/output MF1 and the multifunction output MF2.

You can get to the menu "MFx On" via the menu path:

Main menu → **Set** → Menu → **Set** → Profin → **▼** → more → **▼** → MFx On.

Push the **Set**-key. The currently set option is displayed here.

Requirements for the display

- Menu "more": Option "Yes"

Options	Description
Enable / Disable	Activate or deactivate multifunction input/output MF1 and multifunction output MF2 Options <ul style="list-style-type: none"> • Enable: Multifunction input/output MF1 and multifunction output MF2 are activated. • Disable: Multifunction input/output MF1 and multifunction output MF2 are deactivated. Factory setting <ul style="list-style-type: none"> • Enable

Table 14: Menu "MFx On"

Operation at the measuring device

8.5.7 Menu "MF1"

This menu and the associated submenus can be used to set parameters for the multifunction input/output MF1.

You can get to the menu "MF1" via the menu path:

Main menu → **Set** → Menu → **Set** → Profin → **▼** → more → **▼** → MFx On → **▼** → MF1.

Push the **Set**-key so that the parameter "ActSta" is displayed.

Use the keys **▼** and **▲** to browse within the menu. Push the **Set**-key to display the respective parameter value.

Requirements for the display

- Menu "more": Option "Yes"
- Menu "MFx On": Option "Enable"

Parameter	Description
ActSta	Select level or flank of the multifunction input/output MF1. Options <ul style="list-style-type: none"> • ActLow: LOW-level at active output (normally closed/NC) or activation of the input at dropping flank • ActHi: HIGH-level at active output (normally open/NO) or activation of the input at rising flank Factory setting <ul style="list-style-type: none"> • ActLow
Functn	Select function for the multifunction input/output. Depending on the selection, the corresponding submenu is displayed. Options <ul style="list-style-type: none"> • Dist: MF1 is used as distance switching output. • Speed: MF1 is used as speed switching output. • Srvce: MF1 is used as service output. • LsrOff: MF1 is used as input to deactivate the laser. • Preset: MF1 is used as input for activation of the preset (overwriting the offset). Offset = Preset value - current measured value. Factory setting <ul style="list-style-type: none"> • Dist
Dist / Speed Srvce / LsrOff / Preset	Depending on the selection for the parameter "Functn", the corresponding submenu is displayed. For parameter description, see the respective table. No further submenu is displayed for the option "LsrOff". When the multifunction input MF1 is active, the laser is switched off.
Count	Counts the switching events of the multifunction input/output. The counter is reset by deactivation and activation of the distance measuring device.

Table 15: Menu "MF1"

8.5.8 Submenu "MF1 – Dist"

This submenu is used to parameterize the multifunction output MF1 as distance switching output.

You can get to the menu "Dist" via the menu path:

Main menu → **Set** → Menu → **Set** → Profin → **▼** → more → **▼** → MFx On → **▼** → MF1 → **Set** → Actsta → **▼** → Functn → **▼** → Dist

Requirements for the display

- Menu "more": Option "Yes"
- Menu "MFx On": Option "Enable"
- Parameter "Functn": Option "Dist"

Parameter	Description
Limit	Set distance-dependent switching threshold
Hysteresis	Set Hysteresis for the switching threshold

Table 16: Submenu "MF1 – Dist"

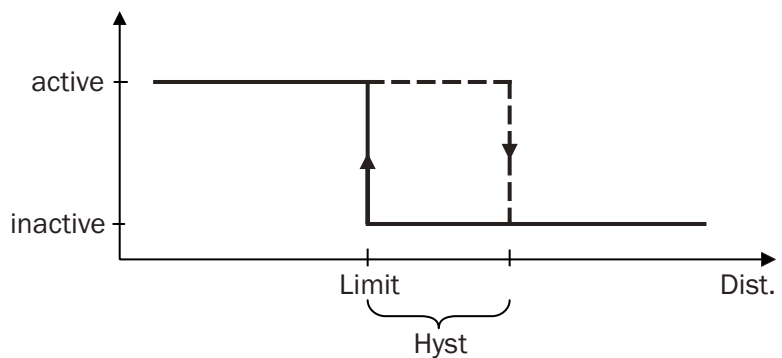


Fig. 24: Displaying the function "Dist."

Limit: Distance-dependent switching threshold

Hyst: Switching threshold hysteresis

Dist: Measured distance

Operation at the measuring device

8.5.9 Submenu "MF1 – Speed"

This submenu is used to parameterize the multifunction output MF1 as speed output.

You can get to the menu "Speed" via the menu path:

Main menu → → Menu → → Profin → → more → → MFx On → → MF1 → → Actsta → → Functn → → Speed

Requirements for the display

- Menu "more": Option "Yes"
- Menu "MFx On": Option "Enable"
- Parameter "Functn": Option "Speed"

Parameter	Description
Limit	<p>Set speed for the switching threshold The switching output is activated when the current speed exceeds the set speed. The switching hysteresis is set firmly to $\pm 0.1\text{m/s}$.</p> <p>Adjustment range</p> <p>Range 0.0 ... 9.9 m/s</p> <p>Factory setting</p> <ul style="list-style-type: none"> • 0 [mm]
Sign	<p>Choose the travel direction to be monitored.</p> <p>Options</p> <ul style="list-style-type: none"> • + / -: Once the set speed is exceeded in one direction, the switching output is activated. • +: Once the set speed is exceeded with increasing distance, the switching output is activated. • -: Once the set speed is exceeded with decreasing distance, the switching output is activated. <p>Factory setting</p> <ul style="list-style-type: none"> • + / -

Table 17: Submenu "MF1 – Speed"

8.5.10 Submenu "MF1 – Srvce"

This submenu is used to parameterize the multifunction output MF1 as service output. You may activate (on) or deactivate (off) several options.

You can get to the menu "Srvce" via the menu path:

Main menu → **Set** → Menu → **Set** → Profin → **▼** → more → **▼** → MFx On → **▼** → MF1 → **Set** → Actsta → **▼** → Functn → **▼** → Srvce

Requirements for the display

- Menu "more": Option "Yes"
- Menu "MFx On": Option "Enable"
- Parameter "Functn": Option "Srvce"

Parameter	Description
WrnLsr	<p>Activating and deactivating warning messages when the measuring device must be replaced soon because the laser ages.</p> <p>Options</p> <ul style="list-style-type: none"> • On • Off <p>Factory setting</p> <ul style="list-style-type: none"> • On
WrnLvl	<p>Activate or deactivate warning messages when the damping value is undercut, e.g. at contamination.</p> <p>Options</p> <ul style="list-style-type: none"> • On • Off <p>Factory setting</p> <ul style="list-style-type: none"> • On
WrnTemp	<p>Activate or deactivate warning message when the inner temperature of the measuring device is outside of the permissible thresholds.</p> <p>Options</p> <ul style="list-style-type: none"> • On • Off <p>Factory setting</p> <ul style="list-style-type: none"> • On
WrnPib	<p>Activate or deactivate warning when the measurement value is not plausible. Possible reasons may be incorrect measurements, interruption of the light beam, optical interferences or electrical interferences.</p> <p>Options</p> <ul style="list-style-type: none"> • On • Off <p>Factory setting</p> <ul style="list-style-type: none"> • On

Operation at the measuring device

Submenu "MF1 – Srvce" (continued)

Parameter	Description
NotRdy	<p>Activate or deactivate warning when the laser is not ready for operation. Possible causes may be hardware faults or the laser being switched off. This warning message is also output during initialization.</p> <p>Options</p> <ul style="list-style-type: none"> • On • Off <p>Factory setting</p> <ul style="list-style-type: none"> • On
Heat	<p>Activate or deactivate warning when the heating is switched on. This parameter is only displayed for measuring devices with the option "Heating".</p> <p>Options</p> <ul style="list-style-type: none"> • On • Off <p>Factory setting</p> <ul style="list-style-type: none"> • On

Table 18: Submenu "MF1 – Srvce"

8.5.11 Submenu "Preset" – move to initialization position

Desription

The function "Preset" permits automation of initialization of shelf supply devices and other rail-bound vehicles during maintenance, commissioning or exchange.

During initialization, the desired output value is set in a defined position (initialization position) (Preset).

This submenu is used to parameterize the multifunction input MF1 as "Preset function".



NOTE!

When activating the "Preset", the measured value output of the distance measuring device is not available for a short time. We recommend performing the "Preset" in standstill or at very low speeds. The maximum activation time is typically at 10000 cycles.

Submenu “MF1 – Preset”

Main menu → **Set** → Menu → **Set** → Profin → **▼** → more → **▼** → MFx On → **▼** → MF1 → **Set** → Actsta → **▼** → Functn → **▼** → Preset

Requirements for the display

- Menu "More" Option "On"
- Menu "MFx On": Option "Enable"
- Parameter "Functn": Option "Preset"

Parameter	Description
sPreset	<p>The preset serves as initialization value. When the multifunction input MF1 is activated, the preset is used.</p> <p>Adjustment range</p> <ul style="list-style-type: none"> • -300000 ... + 300000 Since the display only has six digits, you may only enter negative values up to "-99999" in the display. <p>Factory setting</p> <ul style="list-style-type: none"> • 10

Table 19: Submenu "MF1 – Preset"

Set Preset

1. Select the function "Preset" for the multifunction input MF1
2. Enter the parameter "Preset" for the desired initialization value.
3. Move the vehicle to the initialization position.
4. Activate the multifunction input MF1, e.g. via a proximity initiator, photoelectric sensor or switch.
5. The output value of the distance measuring device corresponds to the value set for "Preset" at the initialization position.

Operation at the measuring device

8.5.12 Menu "MF2"

This menu and the associated submenus can be used to set parameters for the multifunction output MF2.

You can get to the menu "MF2" via the menu path:

Main menu → **Set** → Menu → **Set** → Profib → **▼** → more → **▼** → MFx On → **▼** → MF1 → **▼** → MF2

Push the **Set** key so that the parameter "ActSta" is displayed.

Use the keys **▼** and **▲** to browse within the menu. Push the **Set** key to display the respective parameter value.

Requirements for the display

- Menu "more": Option "Yes"
- Menu "MFx On": Option "Enable"

Parameter	Description
ActSta	Select multifunction output level MF2. Options <ul style="list-style-type: none"> • ActLow: LOW-level at active output (opener/NC) • ActHi: HIGH-level at active output (closer/NO) Factory setting <ul style="list-style-type: none"> • ActLow
Functn	Select function for the multifunction output. Depending on the selection, the corresponding submenu is displayed. Options <ul style="list-style-type: none"> • Dist • Srvce • Speed Factory setting <ul style="list-style-type: none"> • Srvce
Dist / Srvce / Speed	Depending on the selection for the parameter "Functn", the corresponding submenu is displayed. For parameter description, see the respective table.
Count	No further submenu is displayed for the option "LsrOff". When the multifunction input MF1 is active, the laser is switched off.

Table 20: Menu "MF2"

Submenu "MF2 – Srvce"

This submenu corresponds to the submenu "Srvce" in the menu "MF1".
→ Also see page 50, Table 18.

Submenu "MF2 – Dist"

This submenu corresponds to the submenu "Dist" in the menu "MF1".
→ Also see page 47, Table 16.

Submenu "MF2 – Speed"

This submenu corresponds to the submenu "Speed" in the menu "MF1".
→ Also see page 48, Table 17.

8.5.13 Menu "Offset"

Set an offset via this menu.

You can get to the menu "Offset" via the menu path:

Main menu → **Set** → Menu → **Set** → Profib → **▼** → more → **▼** → MFx On → **▼** → (MF1 → **▼** → MF2 → **▼** →) Offset

Push the **Set** key. The currently set offset is displayed here.

Requirements for the display

- Menu "more": Option "Yes"

Value	Description
Offset	<p>Specify offset. The offset is added to the internally determined measurement value. The offset affects all outputs and the display indication.</p> <p>When the "Preset" function is activated, the offset is overwritten by triggering of the preset input.</p> <p>Adjustment range</p> <ul style="list-style-type: none"> • -300000 ... +300.000 mm <p>Factory setting</p> <ul style="list-style-type: none"> • 0 [mm]

Table 21: Menu "Offset"

8.5.14 Menu "SpecFu"

Set special functions via this menu.

You can get to the menu "SpecFu" via the menu path:

Main menu → **Set** → Menu → **Set** → Profin → **▼** → more → **▼** → MFx On → **▼** → (MF1 → **▼** → MF2 → **▼** →) Offset → **▼** → SpecFu

Push the **Set** key so that the parameter "AvgDst" is displayed.

Use the keys **▼** and **▲** to browse within the menu.

Requirements for the display

- Menu "more": Option "Yes"

Parameter	Description
AvgDst	<p>Select filter depth for the distance values.</p> <p>Options</p> <ul style="list-style-type: none"> • Medium • Slow • Fast <p>Factory setting</p> <ul style="list-style-type: none"> • Medium <p><i>Note: Medium and Slow use the same averaging depth.</i></p>

Operation at the measuring device

Menu "SpecFu" (continued)

Parameter	Description
AvgSpd	<p>Select filter depth for the speed values.</p> <p>Options</p> <ul style="list-style-type: none"> • Medium • Slow • Fast <p>Factory setting</p> <ul style="list-style-type: none"> • Medium <p><i>Note: Medium and Slow use the same averaging depth.</i></p>
ErrRej	<p>Select time for error suppression. During this time, the old measurement value is output. When there still is no valid measurement value after the time selected for the parameter "ErrRej", the value "0" is output.</p> <p>Options</p> <ul style="list-style-type: none"> • 200ms: Error/warning is indicated when the error is present for longer than 200 ms. • 50ms: Error/warning is indicated when the error is present for longer than 50 ms. • Off Error/warning is indicated at once, without delay. <p>Factory setting</p> <ul style="list-style-type: none"> • 200ms
Heat	<p>Requirements for the display</p> <ul style="list-style-type: none"> • Only for versions with heating DL100-xxHxxxxx <p>This menu is used to set the temperature at which the heating is to activate. The hysteresis is set firmly to 2 K.</p> <p>Adjustment range</p> <ul style="list-style-type: none"> • -10 ... +40 °C <p>Factory setting</p> <ul style="list-style-type: none"> • -10 °C
Reset	Perform reset → see page 54, chapter 8.6.

Table 22: Menu "SpecFu"

8.6 Perform reset

1. Select the parameter "Reset" in the menu "SpecFu".
→ See page 53, chapter
2. Push the key **Set**.
3. The safety request "Sure?" is displayed.
4. Push the button **Set** to reset the measuring device to the delivery state.
Push the key **Esc** to cancel the process.

9 Operation via Ethernet (Ethernet interface)

The distance measuring device DL100 is equipped with two Ethernet interfaces. They serve communication via PROFINET IO and diagnosis and parameterization via SOPAS ET. The two interfaces have equal priorities and are internally connected to one switch.



NOTE!

The configuration program SOPAS ET can be downloaded from "www.sick.com".



NOTE!

Parameters configured by Ethernet (SOPAS ET) are overwritten with the PROFINET IO parameters once the device is integrated into a PROFINET network.

9.1 IP-network configuration

IP-network configuration – delivery configuration

The distance measuring device is delivered with the following IP-network configuration:

- IP address: 192.168.100.236
- IP network mask: 255.255.255.0
- Standard gateway: 0.0.0.0

Invalid IP network configuration

If the system detects an invalid IP network configuration then the delivery-state configuration is used instead.

9.2 Ethernet parameter list

9.2.1 Device information

Field "Device information"

Parameter	Description
Device type	Display of the device type Read/Write access • Read only
Serial number	Display of the device's serial number Read/Write access • Read only

Table 23: Page "Device information" – field "Device information"

Operation via Ethernet (Ethernet interface)

Field "Product code"

Parameter	Description
Product code	Display of the product code Read/Write access <ul style="list-style-type: none"> • Read only

Table 24: Page "Device information" – field "Product code"

Field "Software Versions"

Parameter	Description
Application controller	Display of the version of the application processor Read/Write access <ul style="list-style-type: none"> • Read only
Communications controller	Indication of the version of the communication processor Read/Write access <ul style="list-style-type: none"> • Read only
FPGA	Display of the version of the Field Programmable Gate Array Read/Write access <ul style="list-style-type: none"> • Read only

Table 25: Page "Device information" – field "Software version"

Field "Hardware Version"

Parameter	Description
Hardware Version	Displaying the hardware version Read/Write access <ul style="list-style-type: none"> • Read only

Table 26: Page "Device information" – field "Hardware version"

9.2.2 User information



NOTE!

Changes on the page "User information" only take permanent effect if they are stored via the button "Storage" in the field "Store user information".

Field "Device name"

Parameter	Description
Name	Enter optional device name for device identification. Read/Write access <ul style="list-style-type: none"> • Read and write Factory setting <ul style="list-style-type: none"> • Empty

Table 27: Page "User information" – field "Device name"

Operation via Ethernet (Ethernet interface)

Field "User information"

Parameter	Description
User information 1	Enter optional user information Read/Write access • Read and write Factory setting • Empty
User information 2	→ See parameter "User input 1".
User information 2	→ See parameter "User input 1".

Table 28: Page "Device information" – field "User information"

Field "Store user information"

Parameter	Description
Storage	You may only enter user information at the user level "Maintenance". This requires the password "esick". Read/Write access • Write only

Table 29: Page "User information" – field "Store user information"

9.2.3 Measurement values

Field "Distance value"

Parameter	Description
X-Scale	Enter X-axis for graphic display of the distance value. Read/Write access • Read and write Unit • s
Y min / Y max	Enter minimum and maximum value for the Y-axis. Read/Write access • Read and write Unit • m
Auto-Scale Y	Click the button "Auto-Scale Y" to adjust the display to the current measurement values. Read/Write access • Read and write Unit • m

Table 30: Page "Measured data" – field "Distance value"

Operation via Ethernet (Ethernet interface)

Field "Measurement values"

Parameter	Description
Distance	Measurement value "Distance" after filter, corrections and offset Read/Write access • Read only Unit • m
Velocity	Measurement value "Speed" Read/Write access • Read only Unit • m/s
Acceleration	Measurement value "Acceleration" Read/Write access • Read only Unit • m/s ²

Table 31: Page "Measured data" – field "Measurement values"

9.2.4 Diagnostic data

Field	Description
Device state	Display device status: ready for operation, warning(s) active, error active, laser activated, MF1 active and MF2 active Read/Write access • Read only
Device warning	Display of current warnings: Laser, temperature, level and plausibility Read/Write access • Read only
Device error	Display of current errors: Laser, temperature, level and plausibility Read/Write access • Read only
Level	Display of the current reception level (damping value) Read/Write access • Read only

Operation via Ethernet (Ethernet interface)

Page “Measurement values” (continued)

Field	Description
Temperature	Display of current internal device temperature Read/Write access <ul style="list-style-type: none"> • Read only Unit <ul style="list-style-type: none"> • °C
Operating hours	Display of current operating hours Read/Write access <ul style="list-style-type: none"> • Read only Unit <ul style="list-style-type: none"> • h

Table 32: Page “Diagnostic data”

9.2.5 Parameter settings



NOTE!

Parameter changes only enter into permanent effect if they are saved via the button "Storage".

Field "General settings"

Parameter	Description
Distance offset	Specify offset value for the distance measurement value. Read/Write access <ul style="list-style-type: none"> • Read and write Input value <ul style="list-style-type: none"> • -300000 ... 300000 Unit <ul style="list-style-type: none"> • mm Factory setting <ul style="list-style-type: none"> • 0
Preset	Specify present value for the distance measurement value. Read/Write access <ul style="list-style-type: none"> • Read and write Input value <ul style="list-style-type: none"> • -300000 ... 300000 Unit <ul style="list-style-type: none"> • mm Factory setting <ul style="list-style-type: none"> • 0

Table 33: Page "Parameter settings" – field "General settings"

Operation via Ethernet (Ethernet interface)

Field "Measurement value resolution"

Parameter	Description
Distance resolution	<p>Choose resolution for the output value "Distance". The measurement value is multiplied with the resolution. The parameter does not influence the measurement value displayed.</p> <p>Read/Write access</p> <ul style="list-style-type: none"> • Read and write <p>Input value</p> <ul style="list-style-type: none"> • 0: 0.1 / 1: 0.125 / 2: 1.0 / 3: 10.0 / 4: 100.0 <p>Factory setting</p> <ul style="list-style-type: none"> • 0.1 mm
Resolution speed	<p>Choose resolution for the output value "Speed". The measurement value is multiplied with the resolution. The parameter does not influence the measurement value displayed.</p> <p>Read/Write access</p> <ul style="list-style-type: none"> • Read and write <p>Input value</p> <ul style="list-style-type: none"> • 0: 0.1 / 1: 1.0 / 2: 10.0 / 3: 100.0 <p>Factory setting</p> <ul style="list-style-type: none"> • 1 mm/s

Table 34: Page "Parameter settings" – field "Measured value resolution"

Field "PROFINET IO configuration"

Parameter	Description
StName	<p>Display station name</p> <p>Read/Write access</p> <ul style="list-style-type: none"> • Read only <p>Factory setting</p> <ul style="list-style-type: none"> • dl100

Table 35: Page "Parameter settings" – field "PROFINET IO configuration"

Field "MF1/MF2 activation"

Parameter	Description
MF activation	<p>Activate and deactivate multifunction input and output MF1 and multifunction output MF2.</p> <p>Read/Write access</p> <ul style="list-style-type: none"> • Read and write <p>Input value</p> <ul style="list-style-type: none"> • 0: off / 1: on <p>Factory setting</p> <ul style="list-style-type: none"> • On

Table 36: Page "Parameter settings" – field "MF1/MF2 activation"

Field "MF1 Function configuration"

Requirements for the display

- Parameter "MF1 activation": Option "Enable"

Parameter	Description
Function	<p>Select function for multifunction input and output MF1.</p> <p>Read/Write access</p> <ul style="list-style-type: none"> • Read and write <p>Input value</p> <ul style="list-style-type: none"> • 0: Distance: → See page 62, field "MF1, Threshold distance underflow" • 1: Velocity: → See page 63, field "MF1, Threshold velocity exceeded" • 2: Service: → See page 63, field "MF1, Service configuration" • 3: Laser • 4: Preset <p>Factory setting</p> <ul style="list-style-type: none"> • Distance
Active condition	<p>Select level for the active condition for the multifunction input and output MF1.</p> <p>Read/Write access</p> <ul style="list-style-type: none"> • Read and write <p>Input value</p> <ul style="list-style-type: none"> • 0: high / 1: low <p>Factory setting</p> <ul style="list-style-type: none"> • Low

Table 37: Page "Parameter settings" – field "MF1 Function configuration"

Operation via Ethernet (Ethernet interface)

Field "MF1, Threshold distance underflow"

Requirements for the display

- Parameter "MF1 activation": Option "Enable"
- Parameter "Function": Option "Distance"

Parameter	Description
Threshold distance	Enter switching threshold for the multifunction output MF1. Read/Write access <ul style="list-style-type: none"> • Read and write Input value <ul style="list-style-type: none"> • -300000 ... 300000 Unit <ul style="list-style-type: none"> • mm Factory setting <ul style="list-style-type: none"> • 1990
Hysteresis distance	Enter hysteresis for switching threshold for the multifunction output MF1. Read/Write access <ul style="list-style-type: none"> • Read and write Input value <ul style="list-style-type: none"> • 1 ... 300000 Unit <ul style="list-style-type: none"> • mm Factory setting <ul style="list-style-type: none"> • 10

Table 38: Page "Parameter settings" – field "MF1, Threshold distance underflow"

Field "MF1, Threshold velocity exceeded"

Requirements for the display

- Parameter "MF1 activation": Option "Enable"
- Parameter "Function": Option "Velocity"

Parameter	Description
Threshold velocity	Enter switching threshold for the multifunction output MF1. Read/Write access <ul style="list-style-type: none"> • Read and write Input value <ul style="list-style-type: none"> • 0 ... 15000 Unit <ul style="list-style-type: none"> • mm/s Factory setting <ul style="list-style-type: none"> • 5000

Operation via Ethernet (Ethernet interface)

Field "MF1, Threshold velocity exceeded" (continued)

Parameter	Description
Distance change	<p>Choose the travel direction to be monitored.</p> <p>Read/Write access</p> <ul style="list-style-type: none"> • Read and write <p>Input value</p> <ul style="list-style-type: none"> • 0: Increasing (positive values) / 1: decreasing (negative values) / 2: increasing and decreasing <p>Factory setting</p> <ul style="list-style-type: none"> • increasing and decreasing

Table 39: Page "Parameter settings" – field "MF1, Threshold velocity exceeded"

Field "MF1, Service configuration"

Requirements for the display

- Parameter "MF1 activation": Option "Enable"
- Parameter "Function": Option "Service"

Parameter	Description
Configuration device monitoring	<p>Activating and deactivating warning messages. When the event for the warning message occurs, the multifunction switching output MF1 switches.</p> <p>Read/Write access</p> <ul style="list-style-type: none"> • Read and write <p>Input value</p> <p>You may activate several warning messages at once.</p> <ul style="list-style-type: none"> • Warning measurement stability • Warning level • Warning laser • Warning temperature • Device not ready • Heater state (for device model with heating) <p>Factory setting</p> <ul style="list-style-type: none"> • The warning messages "Measurement stability", "Level", "Laser", "Temperature" and "Device not ready" are activated. The message "Heater state" is deactivated.

Table 40: Page "Parameter settings" – field "MF1, Service configuration"

Operation via Ethernet (Ethernet interface)

Field "MF2 Function configuration" Requirements for the display

- Parameter "MF2 activation": Option "Enable"

Parameter	Description
Function	Select function for the multifunction MF2 output. Read/Write access <ul style="list-style-type: none"> Read and write Input value <ul style="list-style-type: none"> 0: Distance / 1: Velocity / 2: Service Factory setting <ul style="list-style-type: none"> Service
Active state	Select level for the active condition for the multifunction output MF2. Read/Write access <ul style="list-style-type: none"> Read and write Input value <ul style="list-style-type: none"> 0: high / 1: low Factory setting <ul style="list-style-type: none"> Low

Table 41: Page "Parameter settings" – field "MF2 Function configuration"

Field "MF2, Threshold distance underflow"

→ See page 62, Table 38, "MF1, Threshold distance underflow"

Field "MF2, Threshold exceeded exceeded"

→ See page 63, Table 39, "MF1, Threshold velocity exceeded"

Field "MF2, Service configuration"

→ See page 63, Table 40, "MF1, Service configuration"

Field "Number of MF activation"

Parameter	Description
MF1	Counts the switching events of the multifunction input and output MF1. You may reset the counters via the button "Reset MF1". Read/Write access <ul style="list-style-type: none"> Read and write Input value <ul style="list-style-type: none"> -2147483648 ... 2147483647
M2	Counts the switching events of the multifunction output MF2. You may reset the counters via the button "Reset MF2". Read/Write access <ul style="list-style-type: none"> Read and write Input value <ul style="list-style-type: none"> -2147483648 ... 2147483647

Table 42: Page "Parameter settings" – field "Number MF activation"

Operation via Ethernet (Ethernet interface)

Field "Advanced device functions"

Parameter	Description
Average filter distance	Select filter depth for the distance values. Read/Write access • Read and write Input value • 0: fast / 1: medium / 2: slow Factory setting • Medium
Average filter velocity	Select filter depth for the speed values. Read/Write access • Read and write Input value • 0: fast / 1: medium / 2: slow Factory setting • Medium
Error rejection	Select time for error suppression. If there is an error, the measurement value is indicated as "0". Read/Write access • Read and write Input value • 0: off / 1: 50 ms / 2: 200 ms Factory setting • 200 ms

Table 43: Page "Parameter settings" – field "Advanced device function"

Field "Heater"

Requirements for the display

- Devices with the option "Heating" (DL100-xxHxxxxx)

Parameter	Description
Heater threshold	Enter power up threshold for heating. Read/Write access • Read and write Input value • -10 ... +40 Unit • °C Factory setting • -10

Table 44: Page "Parameter settings" – field "Heater"

Operation via Ethernet (Ethernet interface)

Field "Store parameter"

Parameter	Description
Storage	Parameter changes only enter into permanent effect if they are saved via the button "Storage". Read/Write access <ul style="list-style-type: none"> • Write only

Table 45: Page "Parameter settings" – field "Store parameter"

Field "Set parameters to default values"

Parameter	Description
Parameter Reset	Click the button "Parameter Reset" to reset the parameters to factory settings. Read/Write access <ul style="list-style-type: none"> • Write only

Table 46: Page "Parameter settings" – field "Set parameters to default values"

9.2.6 Methods

Field	Description
Device reboot	<ul style="list-style-type: none"> • Click the button "Reboot" to cause the device to restart. Read/Write access <ul style="list-style-type: none"> • Write only
Laser control	Switch the laser on and off as follows: <ul style="list-style-type: none"> • Use the selection button to select the desired option. • Click the button to perform the option. Read/Write access <ul style="list-style-type: none"> • Write only Input value <ul style="list-style-type: none"> • 0: off / 1: on Factory setting <ul style="list-style-type: none"> • Off
Heating control	Control the heating as follows: <ul style="list-style-type: none"> • Use the selection button to select the desired option. • Click the button to perform the option. Read/Write access <ul style="list-style-type: none"> • Write only Input value <ul style="list-style-type: none"> • 0: Off / 1: On / 2: Auto Factory setting <ul style="list-style-type: none"> • Auto

Table 47: Page "Methods"

10 PROFINET IO-interface

The distance measuring device DL100 PROFINET IO supports Ethernet networks with a transmission rate of 100 Mbit/s and PROFINET RT, Conformance Class B according to specification PROFINET V2.2.

Furthermore, the functions of auto negotiation, auto cross over and full duplex are implemented. The DL100 has an integrated dual port switch and can be used in star or line topology. The following functions are supported by the device amongst others: Media Redundancy (MRP), Topology Detection (LLDP), Device Replacement without exchangeable medium/PG function and MIB/SNMP.

I&M functions (Identification & Maintenance Function)

The following I&M functions are supported:

- IM0: Device identification
- IM1: User may enter plant and location mark (AKZ and OKZ)
- IM2: Installationsdatum
- IM3: Installation date
- IM4: Signature (config-CRC)

The software version in the I&M function IM0 describes the version of the PROFINET interface and is not identical with the version number of the sensor firmware.

10.1 Device configuration

The distance measuring devices DL100 have a PROFINET IO-interface. The devices are configured by device description file (GSD).



NOTE!

The GSD file for the distance measuring device DL100 can be downloaded from “www.sick.com/dl100”.

The GSD file defines modules with which the different control tasks can be adjusted flexibly.

→ Also see page 69, chapter 10.2 “Modules for cyclic data transmission” and page 74, chapter 10.3 “Module description”.

PROFINET IO-interface

10.1.1 Device description file (GSD)

A device description file (GSD) contains the description of the properties of a PROFIBUS IO-device, e.g. the data transfer speed the device supports or the digital information sent to the PLC from the device in what format. The GSD files also include Bitmap files. Using these files, the PROFIBUS IO device status is illustrated.

The device description file and the corresponding bitmaps are required for projecting of a PROFIBUS IO network. Every device receives an ID number by the PROFIBUS IO user organization (PNO).

Name of device	ID-No.	GSD ¹⁾	Bitmaps
DL100-1x/2x PROFINET IO	6002 (hex)	GSDML_V2.25-SICK-DL100- <Datum>.xml	GSDML_0101_1_ DL100.bmp

1) Example: For a file published on 16 April 2012, the file name is GSDML_V2.25-SICK-DL100-20120416.xml

Table 48: Device description file distance measuring device DL100-1x/2x



NOTE!

The GSD file for the distance measuring device DL100 can be downloaded from „www.sick.com/dl100“.

10.1.2 Import device description file (GSD)

Before you can configure PROFINET IO for the DL100 PROFINET IO for the first time, you need to import the device master file of the DL100 into the hardware catalog of the network engineering tool (e.g. SIMATIC-Manager by Siemens).

1. Download the GSD file from the website “www.sick.com/dl100”.
2. Follow the instructions in the online help or user manual of the network engineering tool to import the device description file.

The hardware catalog is displayed in the network engineering tool.

You may use a PROFINET IO network engineering tool to configure the distance measuring device for your application. You need the device description file (GSD) for this.

10.1.3 Configure participants

MAC-Adresse

Each PROFINET IO field device has its own MAC address. The MAC address of the DL100 PROFINET IO is written on the type label (e.g. 00:06:77:02:00:A7 → See page 18, chapter 3.1 „Type label“).

Name, IP address assigned automatically

Additionally, a PROFINET IO field device requires a unique, plant-specific device name.

The IP address is determined as follows:

- Assume the device name assigned for the DL100 PROFINET IO by the network engineering tool or you configure a unique plant-specific device name using the network engineering tool.
- The IO controller assigns the IP address based on the device name.

Name, IP-address determined manually

Manually determine the name and IP address of the distance measuring device DL100 PROFINET IO:

1. Double-click the icon of the DL100 PROFINET IO in the network engineering tool. The dialogue Properties appears.
2. Select the tab “General”.
3. Enter the device name of the DL100 PROFINET IO.
4. Assign a new IP address.

10.2 Modules for cyclic data transmission

The distance measuring device is a so-called modular PROFINET IO slave. The sent and received data structure of a modular slave is variable and comprises several individual modules.

The modules can be selected user-defined under consideration of the following conditions:

- Maximum number of modules: 16
- Maximum total length of the process data: 48 input bytes and 32 output bytes

The distance measuring device can be adjusted flexibly to the different control tasks with the modules. The different modules are described with their respective characteristics in the GSD file.

PROFINET IO-interface

10.2.1 Module types and module designation

Module types

The distance measuring device offers the following transmission speeds.

Module type	Description
Input modules	Input modules transfer process data to the master. Optionally, input modules may contain configuration data.
Input and output modules	Input and output modules can transfer values to the master and receive values.
Setup modules	Setup modules contain only configuration data. Setup modules cannot transfer any process data to the master or receive them from the master.

Table 49: Module types

Designation chart of the modules

<module number>-<description>/<signature>,<description>/<signature>, ...

Component	Description
<Description>	The module descriptions are read from the left to the right and indicate the values transported by the module without any gap. A value farther to the left is transferred before a value farther to the right. Input and output values apply independently from each other.
<Signature>	The signature indicates whether the value is an input or output value and how many words or bytes the value comprises. The signature is constructed as follows: <direction><number><unit> <direction> <ul style="list-style-type: none"> • i: for an input value to the master • o: for an output value from the master to the device <Unit> <ul style="list-style-type: none"> • b: Bytes • w: Word

Table 50: Description chart description

Example

5-Distance/i2w, Preset Dyn/o2w

Module 5 comprises two values:

- Distance/i2w
Input value to the master, comprising 2 words with the code "Distance"
- Preset Dyn/o2w
Output value from the master to the device, comprising 2 words with the code "Preset Dn"

Example
13-Temp/i1b, Level/i2b, Hrs/i2b

Module 13 comprises three values:

- Distance/i1b
Input value to the master, comprising 1 byte with the code "Temp"
- Distance/i2b
Input value to the master, comprising 2 bytes with the code "Level"
- Distance/i2c
Input value to the master, comprising 2 bytes with the code "Hrs"

Nomenclature

- A byte is an 8-bit value.
- A word is an 16-bit value.
- Consistency means that all values within a module are updated at the same time.
- An input value is cyclically transmitted from device to master (PLC).
- An output value is cyclically transmitted from master (PLC) to device.
- A configuration value is only transferred once by the master to the device when switching on the PROFINET IO device.

Relative address indications

Relative addresses are indicated in the following form:

- <Offset in byte>
- <Offset in byte>.<Bit position within the entry> or
- <Offset in byte>.<Start bit position... end bit position within an entry>.

10.2.2 Module overview

Module category “01_Measured values”

Module number	Overall size	Module type	Content		
			Code	Type	Size
1	2 words	Input module	Distance	Input	2 words
			Resolution of the distance value	Configuration	0.1 ... 100 mm
2	1 word	Input module	Distance	Input	1 word
			Resolution of the value	Configuration	0.1 ... 100 mm
3	2 words	Input module	Speed	Input	2 words
			Resolution of the value	Configuration	0.1 ... 100 mm/s
4	4 words	Input module	Distance	Input	2 words
			Speed	Input	2 words
			Resolution of the distance value	Configuration	0.1 ... 100 mm
			Resolution of the speed value	Configuration	0.1 ... 100 mm/s

PROFINET IO-interface

Module number	Overall size	Module type	Content		
			Code	Type	Size
5	2 words	Input and output modules	Distance	Input	2 words
			Preset dynamic	Output	bit 0 ... 29
			Delete preset	Output	bit 30 ...
			Activate preset	Output	bit 31 ...
			Resolution of the distance and present value	Configuration	0.1 ... 100 mm
6	6 words	Input module	Timestamp	Input	4 words
			Distance	Input	2 words
			Resolution of the distance value	Configuration	0.1 ... 100 mm
7	8 words	Input module	Timestamp	Input	4 words
			Distance	Input	2 words
			Speed	Input	2 words
			Resolution of the distance value	Configuration	0.1 ... 100 mm
			Resolution of the speed value	Configuration	0.1 ... 100 mm/s

Table 51: Module overview – “01_Measured values”

Module category “02_Device state”

Module number	Overall size	Module type	Content		
			Code	Type	Size
10	2 bytes	Input and output modules	Status	Input	16 bit
			Control (Laser Off)	Output	16 bit
13	5 bytes	Input module	Temperature [°C]	Input	1 byte
			Signal level [dB]	Input	2 bytes
			Service hours [10h]	Input	2 bytes

Table 52: Module overview – “02_Device state”

Module category “03_Device settings”

Module number	Overall size	Module type	Content		
			Code	Type	Size
20	Empty	Parameter module	MFx	Parameter	enable / disable
			Function MF1	Parameter	See page 84, module parameter “MF1”
			[MF1] Active State	Parameter	High or low
			[MF1 Distance] Threshold [mm]	Parameter	-300000 ... 300000
			[MF1 Distance] Hysteresis [mm]	Parameter	1 ... 300000
			[MF1 Distance] Threshold [mm]	Parameter	0 ... 15000
			[MF1 Speed] Mode	Parameter	[+], [-], [+/-]
			[MF1 Service] Laser Warning	Parameter	Off / on
			[MF1 Service] Level Warning	Parameter	Off / on
			[MF1 Service] Temp. Warning	Parameter	Off / on
			[MF1 Service] Not Ready	Parameter	Off / on
			[MF1 Service] Heating Status	Parameter	Off / on
			Function MF2	Parameter	See page 87, module parameter “MF2”.
			[MF2] Active State	Parameter	High or low
			[MF2 Distance] Threshold [mm]	Parameter	-300000 ... 300000
			[MF2 Distance] Hysteresis [mm]	Parameter	1 ... 300000
			[MF2 Speed] Threshold [mm/s]	Parameter	0 ... 15000
			[MF2 Speed] Mode	Parameter	[+], [-], [+/-]
			[MF2 Service] Laser Warning	Parameter	Off / on
			[MF2 Service] Level Warning	Parameter	Off / on
			[MF2 Service] Temp. Warning	Parameter	Off / on
[MF2 Service] Not Ready	Parameter	Off / on			
[MF2 Service] Heating Status	Parameter	Off / on			
22	Empty	Parameter module	Preset Static [mm]	Parameter	-300000 ... 300000
23	Empty	Parameter module	Offset [mm]	Parameter	-300000 ... 300000

PROFINET IO-interface

Module number	Overall size	Module type	Content		
			Code	Type	Size
25	Empty	Parameter module	Average filter distance	Parameter	Fast, medium or slow
			Average filter speed	Parameter	Fast, medium or slow
			Error Rejection	Parameter	Off, 50 ms, 200 ms
			Heating temperature threshold [degC]	Parameter	-10 ... 40
			Frequency mode	Parameter	Mode 0, Mode 1 Mode 2, Mode 3
30	8 bytes	Input module	Serial No	Input	8 characters

Table 53: Module category "03_Device settings"

Module category „04_Device information“

Module number	Overall size	Module type	Content		
			Code	Type	Size
31	10 words	Input module	Product code	Input	12 characters
			Reserved	Input	8 bytes
32	8 bytes	Input module	Version HW	Input	8 characters
33	10 words	Input module	Version FPGA	Input	12 characters
			Reserved	Input	8 byte
34	10 words	Input module	Version uC	Input	12 characters
			Reserved	Input	8 bytes
35	10 words	Input module	Version uC2	Input	12 characters
			Reserved	Input	8 bytes

Table 54: Module overview – 04_Device information“

10.3 Module description

10.3.1 Module 1: "Distance /i2w"

Type Input module, 2 words, consistent

Description This module reads the current distance value according to the settings of offset and resolution.

Note If a device error, missing reflector or contamination led to no valid measurement value being present, the value "0" is output for distance and the corresponding bits are set in the status bytes.

Input values

Rel. Adr.	Description
0	<p>Current distance in the current resolution under consideration of offset. Depending on resolution, one digit corresponds to 0.1 to 100 mm.</p> <p>Type</p> <ul style="list-style-type: none"> • Prefix-applied 32 bit digit in a complement of two

Module parameter

Name	Description
Resolution	<p>Determines the distance value resolution. 1 digit may correspond to 0.1 mm, 0.125 mm, 1 mm, 10 mm or 100 mm.</p> <p>Value range</p> <ul style="list-style-type: none"> • 0.1 mm • 0.125 mm • 1 mm • 10 mm • 100 mm <p>Standard value</p> <ul style="list-style-type: none"> • 0.1 mm

10.3.2 Module 2: "Distance/i1w"

Type

Input module, 1 word, consistent

Description

This module reads the current distance value according to the settings of offset and resolution. In contrast to module 1, this module is only present as a 16 bit figure.

Note

When the permissible value range of 16 bit is exceeded by the distance value, the following cut values are output as error value:

- Value below -32767: -32768 (Hex 0x8000) is output.
- Value above 32766: 32767 (Hex 0x7FFF) is output.

If a device error, missing reflector or contamination led to no valid measurement value being present, the value "0" is output for distance and the corresponding bits are set in the status bytes.

Input values

Rel. Adr.	Description
0	<p>Current distance in the current resolution under consideration of offset. Depending on resolution, one digit corresponds to 0.1 to 100 mm.</p> <p>Type</p> <ul style="list-style-type: none"> • Prefix-applied 16 bit digit in a complement of two (cut if applicable)

PROFINET IO-interface

Module parameter

Name	Description
Resolution	<p>Determines the distance value resolution. 1 digit may correspond to 0.1 mm, 0.125 mm, 1 mm, 10 mm or 100 mm.</p> <p>Value range</p> <ul style="list-style-type: none"> • 0.1 mm • 0.125 mm • 1 mm • 10 mm • 100 mm <p>Standard value</p> <ul style="list-style-type: none"> • 0.1 mm

10.3.3 Module 3: "Speed/i2w"

Type Input module, 2 words, consistent

Description This module reads the currently determined speed according to the selected resolution.

Note If a device error, missing reflector or contamination led to no valid measurement value being present, the value "0" is output for distance and the corresponding bits are set in the status bytes.

Input values

Rel. Adr.	Description
0	<p>Current speed in selected resolution. Depending on resolution, one digit corresponds to 0.1m/s to 100 mm/s.</p> <p>Type</p> <ul style="list-style-type: none"> • Prefix-applied 32 bit digit in a complement of two

Module parameter

Name	Description
Resolution	<p>Determines the speed value resolution. 1 digit may correspond to 0.1 mm/s, 1 mm/s, 10 mm/s or 100 mm/s.</p> <p>Value range</p> <ul style="list-style-type: none"> • 0.1 mm/s • 1 mm/s • 10 mm/s • 100 mm/s <p>Standard value</p> <ul style="list-style-type: none"> • 1 mm/s

10.3.4 Module 4: "Distance/i2w, Speed/i2w"

Type Input module, 4 words, consistent

Description This module selects both the current distance and the currently determined speed according to the selected resolution and offset.

Note If a device error, missing reflector or contamination led to no valid measurement value being present, the value "0" is output for distance and the corresponding bits are set in the status bytes.

Input values

Rel. Adr.	Description
0	Current distance in the current resolution under consideration of offset. Depending on resolution, one digit corresponds to 0.1 to 100 mm. Type • Prefix-applied 32 bit digit in a complement of two
4	Current speed in selected resolution. Depending on resolution, one digit corresponds to 0.1m/s to 100 mm/s. Type • Prefix-applied 32 bit digit in a complement of two

Module parameter

Name	Description
Distance resolution	Determines the distance value resolution; 1 digit may correspond to 0.1 mm, 0.125 mm, 1 mm, 10 mm or 100 mm. Value range • 0.1 mm • 0.125 mm • 1 mm • 10 mm • 100 mm Standard value • 0.1 mm
Speed resolution	Determines the speed value resolution; 1 digit may correspond to 0.1 mm/s, 1 mm/s, 10 mm/s or 100 mm/s. Value range • 0.1 mm/s • 1 mm/s • 10 mm/s • 100 mm/s Standard value • 1 mm/s

PROFINET IO-interface

10.3.5 Module 5: "Distance/i2w, Preset Dyn./o2w"

Type Input and output module, 2 words, consistent

Description This module reads the current distance value according to the settings of offset and resolution. The preset Preset-value is changed when the module is written. When the highest value bit (Bit 31) has been set, the preset function can be called to calculate a new offset. Setting Bit 30 resets the present and offset values.

Notes A preset or offset value changed by this module is always permanently assumed and will not be lost when the device is switched off. Since all changed and unchanged parameters are written into the flash memory, the measurement value output is not available for a short time.

Setting bit 30 resets the preset and offset values to "0". When Bit 30 is set, the setting of Bit 31 is ignored.

If a device error, missing reflector or contamination led to no valid measurement value being present, the value "0" is output for distance and the corresponding bits are set in the status bytes.

Input values

Rel. Adr.	Description
0	Current distance in the current resolution under consideration of offset. Depending on resolution selected, one digit corresponds to 0.1 to 100 mm. Type • Prefix-applied 32 bit digit in a complement of two

Output values

Rel. Adr.	Description
0.0 ... 0.29	New preset distance in selected resolution. Depending on the resolution selected, one digit corresponds to 0.1 to 100 mm. Type • Prefix-applied 32 bit digit in a complement of two
0.30	<ul style="list-style-type: none"> • Bit 30 is not set (0): The offset and preset values are left at the original settings. • Bit 31 is set (1): The offset and preset values are reset to "0". Type • Bit: 0 or 1

**Output values
(continued)**

Rel. Adr.	Description
0.31	<ul style="list-style-type: none"> • Bit 31 is not set (0): The value in the Bits 0 ... 29 is assumed as new preset value but the offset is not re-calculated. The distance value output is not influenced. • Bit 31 is set (1): The value in the bits 0...29 is assumed as new present value. Additionally, the preset function is called. This function calculates a new offset so that the current distance is now also output as the distance with the newly calculated offset value. All parameters are written in the flash memory. <p>When Bit 30 is set, the Bit 31 is ignored.</p> <p>Type</p> <ul style="list-style-type: none"> • Bit: 0 or 1

Module parameter

Name	Description
Resolution	<p>Determines the distance value resolution; 1 digit may correspond to 0.1 mm, 0.125 mm, 1 mm, 10 mm or 100 mm.</p> <p>Value range</p> <ul style="list-style-type: none"> • 0.1 mm • 0.125 mm • 1 mm • 10 mm • 100 mm <p>Standard value</p> <ul style="list-style-type: none"> • 0.1 mm

10.3.6 Module 6: "Time/i4w, Distance/i2w"

Type Input module, 6 words, consistent

Description This module reads the current distance value according to the settings of offset and resolution. Additionally, the module receives the time stamp for the time at which the measurement value was recorded.

Notes If a device error, missing reflector or contamination led to no valid measurement value being present, the value "0" is output for distance and the corresponding bits are set in the status bytes.

Input values

Rel. Adr.	Description
0	<p>Time stamp for the time of measured value recording.</p> <p>Type</p> <ul style="list-style-type: none"> • Time stamp, 32 Bit seconds
4	<p>Time stamp for the time of measured value recording.</p> <p>Type</p> <ul style="list-style-type: none"> • Time stamp, 32 Bit fractions of a second (1/2³²)

PROFINET IO-interface

Input values (continued)

Rel. Adr.	Description
8	<p>Current distance in the current resolution under consideration of offset. Depending on resolution selected, one digit corresponds to 0.1 to 100 mm.</p> <p>Type</p> <ul style="list-style-type: none"> • Prefix-applied 32 bit digit in a complement of two

Module parameter

Name	Description
Resolution	<p>Determines the distance value resolution; 1 digit may correspond to 0.1 mm, 0.125 mm, 1 mm, 10 mm or 100 mm.</p> <p>Value range</p> <ul style="list-style-type: none"> • 0.1 mm • 0.125 mm • 1 mm • 10 mm • 100 mm <p>Standard value</p> <ul style="list-style-type: none"> • 0.1 mm

10.3.7 Module 7: "Time/i4w, Distance/i2w/Speed/i2w"

Type

Input module, 8 words, consistent

Description

This module reads the current distance and speed. The distance is read according to the settings of offset and resolution. The speed is read according to the settings of offset and resolution. Additionally, the module receives the time stamp for the time at which the measurement value was recorded.

Notes

If a device error, missing reflector or contamination led to no valid measurement value being present, the value "0" is output for distance and speed, and the corresponding bits are set in the status bytes.

Input values

Rel. Adr.	Description
0	<p>Time stamp for the time of measured value recording.</p> <p>Type</p> <ul style="list-style-type: none"> • Time stamp, 32 Bit seconds
4	<p>Time stamp for the time of measured value recording.</p> <p>Type</p> <ul style="list-style-type: none"> • Time stamp, 32 Bit fractions of a second ($1/2^{32}$)

**Input values
(continued)**

Rel. Adr.	Description
8	Current distance in the current resolution under consideration of offset. Depending on resolution selected, one digit corresponds to 0.1 to 100 mm. Type • Prefix-applied 32 bit digit in a complement of two
12	Current speed in the current resolution under consideration of offset. Depending on the selected resolution, one digit corresponds to 0.1m/s to 100 mm/s. Type • Prefix-applied 32 bit digit in a complement of two

Module parameter

Name	Description
Distance resolution	Determines the distance value resolution; 1 digit may correspond to 0.1 mm, 0.125 mm, 1 mm, 10 mm or 100 mm. Value range • 0.1 mm • 0.125 mm • 1 mm • 10 mm • 100 mm Standard value • 0.1 mm
Speed resolution	Determines the speed value resolution; 1 digit may correspond to 0.1 mm/s, 1 mm/s, 10 mm/s or 100 mm/s. Value range • 0.1 mm/s • 1 mm/s • 10 mm/s • 100 mm/s Standard value • 1 mm/s

10.3.8 Module 10: "Status/i2b, Control/o2b"

Type Input and output module, 2 bytes

Description This module reads the status bytes of the device and writes the control bytes into the device.

PROFINET IO-interface

Input values

Rel. Adr.	Description
0.0	Bit = 1: Plausibility warning Measured values are impaired. Occurrence of an error is likely. Type • 1 bit
0.1	Bit = 1: Temperature warning The ambient temperature is only just within the permissible range. Occurrence of an error is likely. Type • 1 bit
0.2	Bit = 1: Signal level warning The measured signal level is close to the permissible range. Occurrence of an error is likely. Type • 1 bit
0.3	Bit = 1: Laser warning The laser has reached its service life. Occurrence of an error is likely. Type • 1 bit
0.4	Bit = 1: Plausibility error No valid measurement value can be calculated. Type • 1 bit
0.5	Bit = 1: Temperature errors The device is also operated outside of the specified temperature range. Type • 1 bit
0.6	Bit = 1: Signal level error The measured signal level is too low. Type • 1 bit
0.7	Bit = 1: Laser error The laser may have reached the end of its service life. → see page 84, chapter 10.3.9, operating hours Type • 1 bit
1.0	Bit = 1: Laser off • 1 bit
1.1	Bit = 1: Heating on Type • 1 bit
1.2	Bit = 1: MF1 is active. Type • 1 bit

**Input values
(continued)**

Rel. Adr.	Description
1.3	Bit = 1: MF2 is active. Type • 1 bit
1.4 ... 1.6	Reserved Type • 1 bit
1.7	• Bit = 1: No distance or speed measurement value can be read. • Bit = 0: Current measurement value is valid. Type • 1 bit

Output values

Rel. Adr.	Description
0.1 ... 0.7	Reserved Type • 1 bit
1.0	• Bit = 1: Deactivate laser • Bit = 0: Activate laser Type • 1 bit
1.1 ... 1.7	Reserved Type • 1 bit

10.3.9 Module 13: "13-Temp/i1b, Level/i2b, Hrs/i2b"

Type Input module, 5 bytes , consistent

Description In this module, diagnosis data can be read from the device.

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Input values

Rel. Adr.	Description
0	Device temperature [°C] Type • Prefix-applied 8 bit digit in a complement of two
1	Device-specific value for the signal reception quality. Type • Prefix-applied 16 bit digit in a complement of two
3	Operating hours in 10 hour units. Type • Prefix-applied 16 bit digit in a complement of two

10.3.10 Module 20: "MFx"

Type

Configuration module, no input and output data

Description

This module determines the ratio between the switchable input and output MF1.

Module parameter "MFx"

Name	Description
MFx	Activate or deactivate switching inputs or switching output. Value range • enable • disable Standard value • Enable

Module parameter "MF1"

Name	Description
MF1 Function	Select function for input and output MF1. Value range • [Output] Distance Threshold: Output switches when the distance from module parameter "[MF1 Distance] Threshold" was undercut. • [Output] Speed Threshold: Output switches when the speed from module parameter "[MF1 Distance] Speed" was exceeded. The direction is determined in the module parameter "[MF1 Speed] mode". • [Output] Service: The output switches when at least one of the service bits activated was set. • [Input] Laser Off: The measurement laser is deactivated via the input. • [Input] Preset Static: "Preset Static" function is activated via the input. Standard value • [Output] Distance Threshold:

Module parameter "MF1"

Name	Description
[MF1] Active State	Select switching level for input and output MF1. Value range <ul style="list-style-type: none"> • Low • High Standard value <ul style="list-style-type: none"> • Low
[MF1 Distance] threshold [mm]	Enter value of the distance threshold in "mm". Value range <ul style="list-style-type: none"> • -300,000 ... 300,000 mm Standard value <ul style="list-style-type: none"> • 1,990 mm
[MF1 Distance] Hysteresis [mm]	Enter hysteresis of the distance threshold in "mm". Value range <ul style="list-style-type: none"> • 1 ... 300,000 mm Standard value <ul style="list-style-type: none"> • 10 mm
[MF1 Speed] Threshold	Enter speed threshold. Value range <ul style="list-style-type: none"> • 0 ... 15,000 mm/s Standard value <ul style="list-style-type: none"> • 5,000 mm/s
[MF1 Speed] Mode	Select direction for detection in which the speed is exceeded. Value range <ul style="list-style-type: none"> • Negative direction [-] • Positive direction [+] • Both directions [+/-] Standard value <ul style="list-style-type: none"> • Both directions [+/-]
[MF1 Service] Laser Warning	The output switches when the laser module emits a warning. Value range <ul style="list-style-type: none"> • Off • On Standard value <ul style="list-style-type: none"> • On

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Module parameter "MF1" (continued)

Name	Description
[MF1 Service] Level Warning	<p>The output switches when the level is just within the permissible range.</p> <p>Value range</p> <ul style="list-style-type: none"> • Off • On <p>Standard value</p> <ul style="list-style-type: none"> • On
[MF1 Service] Temp. Warning	<p>The output switches when the device temperature is within the threshold range.</p> <p>Value range</p> <ul style="list-style-type: none"> • Off • On <p>Standard value</p> <ul style="list-style-type: none"> • On
[MF1 Service] Plausib. Warning	<p>The output switches when the probability is high that the measured value is not plausible.</p> <p>Value range</p> <ul style="list-style-type: none"> • Off • On <p>Standard value</p> <ul style="list-style-type: none"> • On
[MF1 Service] Not Ready	<p>The output switches when the device is not ready.</p> <p>Value range</p> <ul style="list-style-type: none"> • Off • On <p>Standard value</p> <ul style="list-style-type: none"> • On
[MF1 Service] Heating Status	<p>The output switches when the device heating is on.</p> <p>Value range</p> <ul style="list-style-type: none"> • Off • On <p>Standard value</p> <ul style="list-style-type: none"> • Off

Module parameter "MF2"

Name	Description
MF2 Function	<p>Select function for the output MF2.</p> <p>Value range</p> <ul style="list-style-type: none"> • [Output] Distance Threshold: Output switches when the distance from module parameter "[MF2 Distance] Threshold" was undercut. • [Output] Speed Threshold: Output switches when the speed from module parameter "[MF2 Distance] Speed" was exceeded. The direction is determined in the module parameter "[MF2 Speed] mode". • [Output] Service: The output switches when at least one of the service bits activated was set. <p>Standard value</p> <ul style="list-style-type: none"> • [Output] Service
[MF2] Active State	<p>Select switching level for input and output MF2.</p> <p>Value range</p> <ul style="list-style-type: none"> • Low • High <p>Standard value</p> <ul style="list-style-type: none"> • Low
[MF2 Distance] Threshold [mm]	<p>Enter value of the distance threshold in "mm".</p> <p>Value range</p> <ul style="list-style-type: none"> • -300,000 ... 300,000 mm <p>Standard value</p> <ul style="list-style-type: none"> • 1,990 mm
[MF2 Distance] Hysteresis [mm]	<p>Enter hysteresis of the distance threshold in "mm".</p> <p>Value range</p> <ul style="list-style-type: none"> • 1 ... 300,000 mm <p>Standard value</p> <ul style="list-style-type: none"> • 10 mm
[MF2 Speed] Threshold	<p>Enter speed threshold.</p> <p>Value range</p> <ul style="list-style-type: none"> • 0 ... 15,000 mm/s <p>Standard value</p> <ul style="list-style-type: none"> • 5,000 mm/s
[MF2 Speed] Mode	<p>Select direction for detection in which the speed is exceeded.</p> <p>Value range</p> <ul style="list-style-type: none"> • Negative direction [-] • Positive direction [+] • Both directions [+/-] <p>Standard value</p> <ul style="list-style-type: none"> • Both directions [+/-]

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Module parameter "MF2" (continued)

Name	Description
[MF2 Service] Laser Warning	The output switches when the laser module emits a warning. Value range <ul style="list-style-type: none"> • Off • On Standard value <ul style="list-style-type: none"> • On
[MF2 Service] Level Warning	The output switches when the level is just within the permissible range. Value range <ul style="list-style-type: none"> • Off • On Standard value <ul style="list-style-type: none"> • On
[MF1 Service] Temp. Warning	The output switches when the device temperature is within the threshold range. Value range <ul style="list-style-type: none"> • Off • On Standard value <ul style="list-style-type: none"> • On
[MF1 Service] Plausib. Warning	The output switches when the probability is high that the measured value is not plausible. Value range <ul style="list-style-type: none"> • Off • On Standard value <ul style="list-style-type: none"> • On
[MF1 Service] Not Ready	The output switches when the device is not ready. Value range <ul style="list-style-type: none"> • Off • On Standard value <ul style="list-style-type: none"> • On
[MF2 Service] Heating Status	The output switches when the device heating is on. Value range <ul style="list-style-type: none"> • Off • On Standard value <ul style="list-style-type: none"> • On

10.3.11 Module 22: "Setup Preset Static"

Type Configuration module, no input and output data

Description This module is used to pre-set the static preset value.

Notes When module 5 is also active, the preset value is overwritten at once by the input data of module 5.

Module parameter

Name	Description
Distance Preset Static [mm]	Determine distance Preset value. Value range • -300000 ... 300000 Standard value • 0

10.3.12 Module 23: "Setup Offset"

Type Configuration module, no input and output data

Description This module is used to set the initial offset.

Notes When module 5 is also active, the offset value is overwritten by the calculated offset when the reset function is triggered. The same applies for a switching process by MF1.

Module parameter

Name	Description
Distance Offset [mm]	Determine initial distance offset value. Value range • -300000 ... 300000 Standard value • 0

10.3.13 Module 25: "Special Functions"

Type Configuration module, no input and output data

Description This module can be used to influence the conduct of the measuring algorithm, temperature stability by setting of the temperature threshold for activation of the heating and the frequency mode.

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Module parameter

Name	Description
Average Filter Distance	<p>Select filter strength for the distance measurements.</p> <p>Value range</p> <ul style="list-style-type: none"> • Almost The distance value is output nearly unfiltered • Medium: Short error measurements are filtered. • Slow error measurements are mainly smoothed. <p>Standard value</p> <ul style="list-style-type: none"> • Medium:
Average Filter Speed	<p>Select filter strength speed measurement value.</p> <p>Value range</p> <ul style="list-style-type: none"> • Almost The speed value is output nearly unfiltered • Medium: Short error measurements are filtered. • Slow error measurements are mainly smoothed. <p>Standard value</p> <ul style="list-style-type: none"> • Medium:
Error Rejection	<p>Determine time for error suppression. During this time, the old measurement value is output. If there still is no valid measurement after the set time, the value "0" is output.</p> <p>Value range</p> <ul style="list-style-type: none"> • Off • 50ms • 200ms <p>Standard value</p> <ul style="list-style-type: none"> • 200ms
Heating Threshold [degC]	<p>Switching threshold in degrees Celsius, under which the heating is activated</p> <p>Value range</p> <ul style="list-style-type: none"> • -10 ... 40 °C <p>Standard value</p> <ul style="list-style-type: none"> • -10 °C
Frequency Mode	<p>The area "Frequency Mode" only applies for versions with frequency conversion (DL100-2xxBxxxx).</p> <p>Changing the laser transmission frequency to avoid impairment from interference with adjacent devices</p> <p>Value range</p> <ul style="list-style-type: none"> • Mode 0 • Mode 1 • Mode 2 • Mode 3 <p>Standard value</p> <ul style="list-style-type: none"> • Mode 0

10.3.14 Module 30: "Serial No/i8b"

Type Input module, 8 bytes

Description This module can be used to request the device serial number.

Input values

Rel. Adr.	Description
0	Display of serial number, Unused characters at the end of the character chain are filled up by zero bytes (0x00). Type <ul style="list-style-type: none"> • 8 ASCII characters

10.3.15 Module 31: "Product Code/i9w"

Type Input module, 18 bytes

Description This module can be used to request the device product code.

Input values

Rel. Adr.	Description
0	Display of the product code, e.g. DL100-XXXX. Unused characters at the end of the character chain are filled up by zero bytes (0x00). Type <ul style="list-style-type: none"> • 18 ASCII characters

10.3.16 Module 32: "Version HW/i8b"

Type Input module, 8 bytes

Description This module can be used to request the device hardware serial number.

Note If the value is not present in the device, a zero byte (0x00) is transferred for every character.

Input values

Rel. Adr.	Description
0	Display version number of the device hardware as character chain in the form of "YYYYWWnnnn" "nnnn" is a serial number. Type <ul style="list-style-type: none"> • 8 ASCII characters

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10.3.17 Module 33: "Version FPGA/i10w"

Type Input module, 10 words

Description This module can be used to request the version number of the device's FPGA firmware.

Note If the value is not present in the device, a zero byte (0x00) is transferred for every character.

Input values

Rel. Adr.	Description
0	Display version number of the device hardware as character chain in the form of "V00.000.000." Type • 12 ASCII characters
12	Reserved Type • 8 Byte

10.3.18 Module 34: "Version uC/i10w"

Type Input module, 10 words

Description This module can be used to request the version number of the device's main controller firmware.

Note If the value is not present in the device, a zero byte (0x00) is transferred for every character.

Input values

Rel. Adr.	Description
0	Display version number of the device's main controller firmware as character chain in the form of "V00.000.000." Type • 12 ASCII characters
12	Reserved Type • 8 Byte

10.3.19 Module 35: "Version uC2/i10w"

Type Input module, 10 words

Description This module can be used to request the version number of the device's second controller firmware.

Note If the value is not present in the device, a zero byte (0x00) is transferred for every character.

Input values

Rel. Adr.	Description
0	Display version number of the device's second controller firmware as character chain in the form of "V00.000.000." Type • 12 ASCII characters
12	Reserved Type • 8 Byte

10.4 "Preset" – move to initialization position

The function "Preset" permits automation of initialization of shelf supply devices and other rail-bound vehicles during maintenance, commissioning or exchange.

During initialization, the desired output value is set in a defined position (initialization position) (Preset).



NOTE!

When activating the "Preset", the measured value output of the distance measuring device is not available for a short time. We recommend performing the "Preset" in standstill or at very low speeds. The maximum activation time is typically at 10000 cycles.

After restart, the offset value determined in the preset is maintained.

You may perform static or dynamic preset. The static preset is triggered by the multifunction input MF1. The dynamic preset is triggered via the PROFINET IO interface.

PROFINET IO-interface

Static preset

For performance of a static preset, you will need the modules "20 Setup MFx" and "22 Setup Preset Static".

1. Select "[Input] Preset Static" for the parameter in module 20.
2. Enter the desired initialization values in module 22. The preset value unit corresponds to the settings of the parameter "Resolution".
3. Move the vehicle to the initialization position.
4. Activate the multifunction input MF1, e.g. via a proximity initiator, photoelectric sensor or switch.
5. The output value of the distance measuring device corresponds to the value set for "Preset" at the initialization position.

Dynamic preset

For performance of a dynamic preset, you will need the module "5 Distance/i2w, Preset Dyn/o2w".

1. Send the desired initialization value to the distance measuring device via the bits 0 to 29 of the output data. The preset value unit corresponds to the settings of the parameter "Resolution".
2. Move the vehicle to the initialization position.
3. Trigger the function "Preset" via the bit 31 of the output data. Bit 31 can be set, e.g. by a proximity initiator, a photoelectric sensor, a switch or the control unit.
4. The output value of the distance measuring device corresponds to the value set for "Preset" at the initialization position.

11 Cleaning and maintenance

11.1 Cleaning



ATTENTION!

Damage to the device from improper cleaning!

Improper cleaning may cause damage to the device.

Therefore:

- Do not use any cleaning agents with aggressive contents.
- Do not use any pointed objects for cleaning.

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

The cleaning interval mainly depends on the ambient conditions.

11.2 Maintenance

The distance measuring device DL100 requires the following maintenance work at regular intervals:

Interval	Maintenance work	To be performed by
Cleaning intervals depending on ambience conditions and climate	Cleaning housing	Skilled person
Every 6 months	Check screw and plug connections at regular intervals.	Skilled person

Table 55: Maintenance plan

Troubleshooting

12 Troubleshooting

The following table describes possible interferences and measures for removal.

Contact the manufacturer for interferences that cannot be removed based on the following description. You can find your local office on the reverse.

General interferences, warnings and errors

The distance measuring device differentiates between general interferences, warnings and errors. General interferences are not displayed. When a warning is pending, the LED **PWR** flashes orange. A measurement value is output. When an error is pending, the LED **PWR** flashes red. The measurement value "0" is output.

12.1 LED status indicators

Display	Possible causes	Troubleshooting
The display shows the value "0000".	The measuring device's light spot does not hit the reflector.	Correct alignment between measuring device and reflector.
	The obstacle is in the light path.	Remove obstacle from the light path.
	Distance between distance measuring device and reflector exceeds the maximum scanning range indicated in the technical data. → see page 103, chapter 14.4.	<ul style="list-style-type: none"> Decrease the distance between the distance measuring device and the reflector. Select a distance measuring device with a larger maximum scanning range.
LED PWR is not lit. Display is lit.	Measuring device defective.	Send in device for repair.
LED PWR flashes orange.	A warning is pending.	→ For possible causes and their removal, see page 97, chapter 12.2.
LED PWR flashes red.	An error is pending.	→ For possible causes and their removal, see page 97, chapter 12.3.
LED BF and SF are not lit red.	Connection OK	–
LED BF and SF are lit red.	Status after switching on. Bus interrupted Master (PLC) cannot be reached. No data are exchanged.	<ul style="list-style-type: none"> Wait for a few minutes. Check wiring.
LED BF flashes red. LED SF is lit red.	Device (slave) is not configured or not configured correctly. No data are exchanged.	<ul style="list-style-type: none"> Configure device. Check configuration.

Table 56: LED status display

12.2 Warning messages

Display	Meaning / possible causes	Troubleshooting
NoWrn	No warnings	–
wPIb	Measured value not plausible. Light path between measuring device and reflector interrupted.	Observe light spot on the reflector. The light spot must not move from the reflector. If required, re-align measuring device and reflector or use a larger reflector. → For alignment and mounting, see page 26, chapter 6.
	Optical interferences	<ul style="list-style-type: none"> • Remove optical interferences. • Re-align distance measuring device and reflector. → For alignment and mounting, see page 26, chapter 6.
wLaser	The measurement laser is still operational but at the end of its service life.	Keep replacement device ready.
wLevel	Current damping value is below the recommended damping value. The recommended damping value depends on the distance between measuring device and reflector. → For recommended damping values, see page 31, Table 6.	<ul style="list-style-type: none"> • Clean external lens surfaces like the reflector and the lens • Decrease the distance between the measuring device and the reflector. • Use a distance measuring device with a higherrange. → See page 102, chapter 14.2.
wTemp	Internal device temperature is close to the permissible range. → For the permissible ambient temperature, see page 104, chapter 14.9.	<ul style="list-style-type: none"> • Check ambience temperature, improve ventilation if applicable. • Shield against radiation heat, e.g. share the measuring device in case of direct solar irradiation. • Use device with heating at low ambient temperatures. • Use cooling housings for high ambient temperatures.

Table 57: Warning messages

12.3 Error messages

Display	Meaning / possible causes	Troubleshooting
NoErr	No error	–
ePIb	Measured value not plausible. Light path between measuring device and reflector interrupted.	Observe light spot on the reflector. The light spot must not move from the reflector. If required, re-align measuring device and reflector or use a larger reflector. → For alignment and mounting, see page 26, chapter 6.
	Optical interferences	<ul style="list-style-type: none"> • Remove optical interferences. • Re-align distance measuring device and reflector. → For alignment and mounting, see page 26, chapter 6.
eLaser	The service life of a measurement laser is exceeded.	Interchange measuring device.

Troubleshooting

Display	Meaning / possible causes	Troubleshooting
eLevel	Current damping value is below the warning threshold. The warning threshold depends on the distance between measuring device and reflector. → For recommended damping values, see page 31, Table 6.	<ul style="list-style-type: none"> • Clean external lens surfaces like the reflector and the lens. • Decrease the distance between the measuring device and the reflector. • Use a distance measuring device with a higher range. → see page 102, chapter 14.2.
eTemp	The internal devicetemperature is outside of the permissible range. → For the permissible ambient temperature, see page 104, chapter 14.9.	<ul style="list-style-type: none"> • Check ambience temperature, improve ventilation if applicable. • Shield against radiation heat, e.g. shade the measuring device in case of direct solar irradiation. • Use device with heating at low ambient temperatures. • Use cooling housings for high ambient temperatures.

Table 58: Error messages

12.4 PROFINET IO error messages

Display	Meaning / possible causes	Troubleshooting
Device error	Hardware	<ul style="list-style-type: none"> • Check supply voltage and wiring. → For electrical connection, see page 35, chapter 7. • Switch supply voltage on and off. • Send in measuring device for repair.
	The internal devicetemperature is outside of the permissible range. → For the permissible ambient temperature, see page 104, chapter 14.9.	<ul style="list-style-type: none"> • Wait for warm-up phase of the measuring device. Let the measuring device cool down. • Check ambience temperature, improve ventilation if applicable. • Shield against radiation heat, e.g. shade the measuring device in case of direct solar irradiation. • Use device with heating at low ambient temperatures. • Use cooling housings for high ambient temperatures.
Measuring error	Light path between measuring device and reflector interrupted.	Keep replacement device ready.
	Current damping value is below the recommended damping value. The recommended damping value depends on the distance between measuring device and reflector. → For recommended damping values, see page 31, Table 6.	Clean external lens surfaces like the reflector and the lens
	Lens or reflector contaminated.	Clean external lens surfaces like the reflector and the lens
	Movement too fast.	Check maximum movement speed.

Display	Meaning / possible causes	Troubleshooting
Pre-failure recognition	The measurement laser is still operational but at the end of its service life.	Keep replacement device ready.
	Current damping value is below the recommended damping value. The recommended damping value depends on the distance between measuring device and reflector. → For recommended damping values, see page 29, table 5.	Clean external lens surfaces like the reflector and the lens
	Lens or reflector contaminated.	Clean external lens surfaces like the reflector and the lens
	The internal device temperature is within the threshold range. → For the permissible ambient temperature, see page 106, chapter 14.8.	Check ambient temperature.

Table 59: PROFINET IO error messages

12.5 Return

For efficient processing and quick determination of causes, include the following in your return:

- Information on a contact
- A description of the application
- A description of the error that occurred

12.6 Disposal

Observe the following items for disposal:

- The distance measuring device must not be disposed of in the household waste.
- Dispose of the distance measuring device according to the respective country-specific provisions.

13 Repair

Repairs must only be performed by the manufacturer. The manufacturer's warranty will lapse in case of interruptions and changes to the device.

Technical data

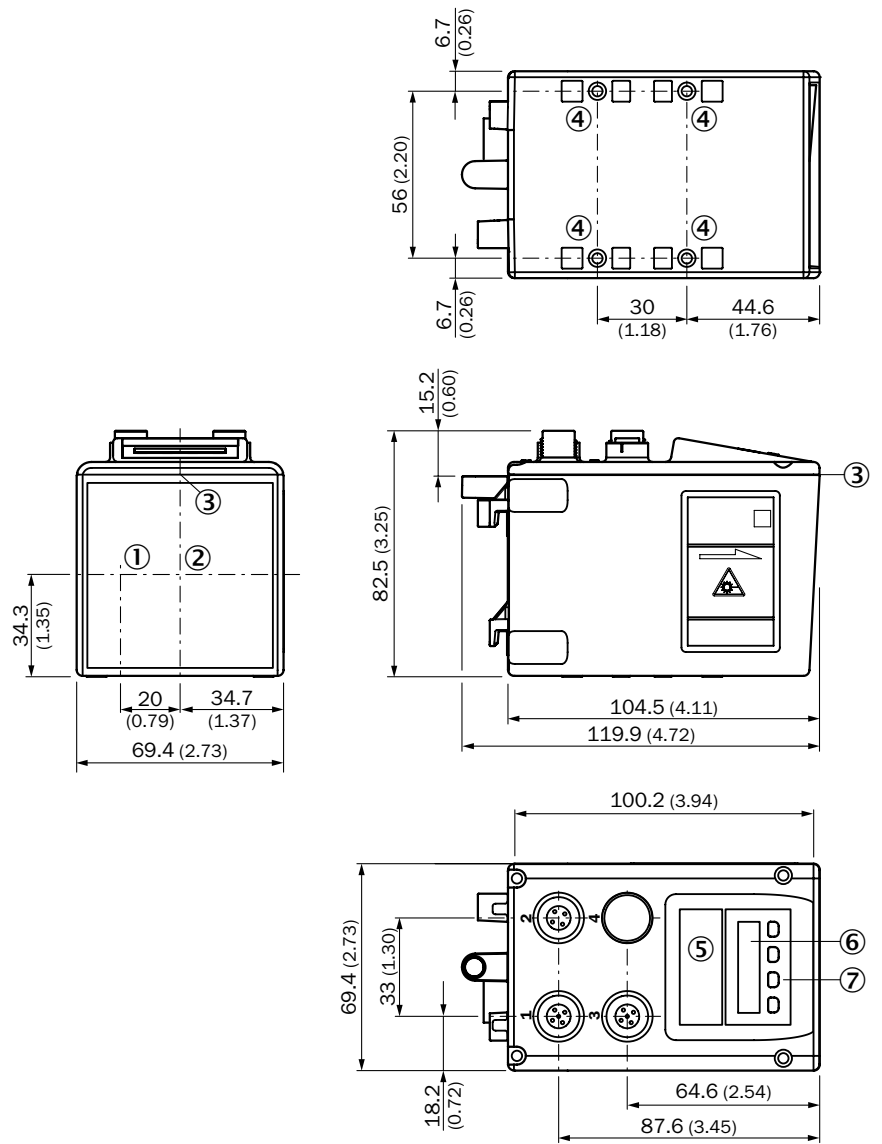
14 Technical data



NOTE!

You may download, save and print the online datasheet with technical data, dimensions and connection diagrams for your distance measuring device online at "www.sick.com/dl100".

14.1 Dimensions



All dimensions in mm (inch)

Fig. 25: Dimensions distance measuring device DL100

- 1 Optical axis sender
- 2 Optical axis receiver
- 3 Device zero point
- 4 Threaded mounting hole M5
- 5 LED "Status"
- 6 Display
- 7 Operating elements

Technical data

14.2 Device selection PROFINET interface

Ambient temperature	Power consumption at 24 V DC	Measuring range	Accuracy	Operating mode	Repeatability ¹⁾	Dead time	Order no.	Type code
[°C]	[mA]	[m]	[mm]		[mm]			
-20 ... +55 -20 ... +75 (with TPCC cooling case 6048328) ²⁾	<250	0.15 ... 100	± 2.0	Fast/Medium	1.5	10	1060045	DL100-11AA2112
				Slow	0.75	30		
		0.15 ... 200	± 2.5	Fast/Medium	2.0	10	1060047	DL100-12AA2112
				Slow	1.0	30		
		0.15 ... 300	± 3,0	Fast/Medium	2.5.	10	1060049	DL100-13AA2112
				Slow	1.25	30		
-40 ... +55 (with integrated heating) -40 ... +75 (with TPCC cooling case 6048328)	<1000	0.15 ... 100	± 2.0	Fast/Medium	1.5	10	1060046	DL100-11HA2112
				Slow	0.75	30		
		0.15 ... 200	± 2.5	Fast/Medium	2.0	10	1060048	DL100-12HA2112
				Slow	1.0	30		
		0.15 ... 300	± 3,0	Fast/Medium	2.5.	10	1060050	DL100-13HA2112
				Slow	1.25	30		

1) Statistic error 1 σ, in function of operating mode

2) For temperatures below -10 °C, a start-up time of typically 7 minutes is required.

Table 60: Device selection



NOTE!

→ For additional information about the variants of other interfaces, please see "www.sick.com/dl100".

14.3 Laser/optics

Light source	Laser diode, red light
Laser protection class	2 pursuant to EN 60825-1:2014+A11:2021 /CDRH
CW modulation	± 0.85 Po sine-shape modulated
Maximum output	≤ 1.9 mW
Pulse duration	6.8 ns
Wave length	655 nm
Frequency	≥ 90 MHz
Light spot dimensions	Typical 5 mm + (2 mm x distance [m])
Average service life	Typically 100 000 h at +25 °C

Table 61: Laser/Optics

14.4 Performance

Measurement ranges	<ul style="list-style-type: none"> DL100-11XXXXXX: 0.15 m ... 60 m DL100-12XXXXXX: 0.15 m ... 130 m DL100-13XXXXXX: 0.15 m ... 220 m
Measuring accuracy	See type specific data → See page 102, chapter 14.2
Repeatability	See type specific data → See page 102, chapter 14.2
Initialization time	<ul style="list-style-type: none"> Typical 1.5 s After reflector loss: < 40 ms
Reaction time/dead time	See type specific data → See page 102, chapter 14.2
Resolution	Adjustable: 0.1 mm / 0.125 mm / 1.0 mm / 10 mm / 100 mm
Output rate	Synchronous to PLC request

Table 62: Performance data

14.5 Supply

Supply voltage V_s	18 V DC ... 30 V DC
Current consumption	<ul style="list-style-type: none"> Without heating: < 250 mA at 24 V DC With heating : < 1.000 mA at 24 V DC
Residual ripple	< 5 V_{ss} within the permissible supply voltage U_v

Table 63: Supply

14.6 Inputs

Inputs	<p>Multifunction input MF1, adjustable</p> <ul style="list-style-type: none"> Hi > 12 V Lo < 3 V <p>→ See page 46, Table 15, parameter "ActSta".</p>
Protective circuit	No, not reverse polarity protected

Table 64: Inputs

Technical data

14.7 Outputs

Outputs	Multifunction outputs MF1 and MF2, type: B (push/pull), adjustable <ul style="list-style-type: none"> • Hi > UV – 3 V • Lo < 2 V → See page 46, Table 15 and page 52, Table 20, parameter “ActSta2.”
Maximum output current	Max. 100 mA
Output load	<ul style="list-style-type: none"> • Capacity: 100 nF • Inductive 20 mH

Table 65: Outputs

14.8 Interfaces

Data interface	PROFINET IO / RT, Conformance Class B, PN specification V2.25, Process data interface, access via SOPAS ET
Data transmission rate	100 Mbit/s full duplex

Table 66: Interfaces

14.9 Ambient conditions

Protection class	III Suitable for operation in PELV systems (Protective Extra Low Voltage - safety extra-low voltage) with secure separation.
Electromagnetic compatibility ¹⁾	EN 61000-6-2, EN 55011, category A
Ambient temperature range	See type-specific data
Storage temperature range	-40 °C ... +75 °C
Enclosure rating	IP65
Air pressure influence	0.3 ppm/hPa
Temperature influence	1 ppm/K
Temperature drift	Typical 0.1 mm/K
Maximum movement speed	10 m/s
Maximum acceleration change	10 m/s ²
Vibration resistance (sine)	EN60068-2-6
Noise	EN60068-2-64
Shock resistance	EN 60086-2-27

1) When used in the household area, the device may cause interferences.

Table 67: Ambient conditions

14.10 Constructive setup

Dimensions	→ See page 101, chapter 14.1.
Weight	<ul style="list-style-type: none"> • Distance measuring device: 800 g • Alignment bracket (optional): 800 g
Materials	<ul style="list-style-type: none"> • Casing: Cast aluminium GD-AlSi12Cu1 (3.2982.05) • Front screen: PMMA
Connections	M12, SpeedCon™
Display	<ul style="list-style-type: none"> • 6 points with a 5 x 7 point matrix • Overflow is displayed with the maximum value that can be displayed, -99999 bzw. 999999.

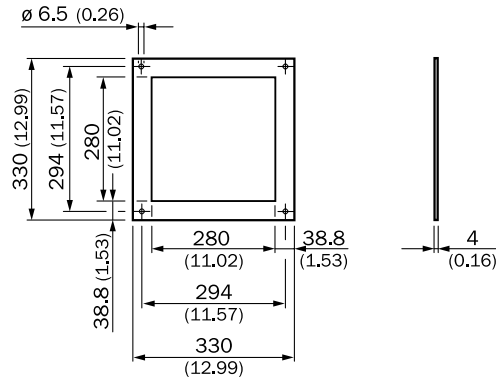
Table 68: Constructive setup

Accessories

15 Accessories

15.1 Reflectors and reflective tape

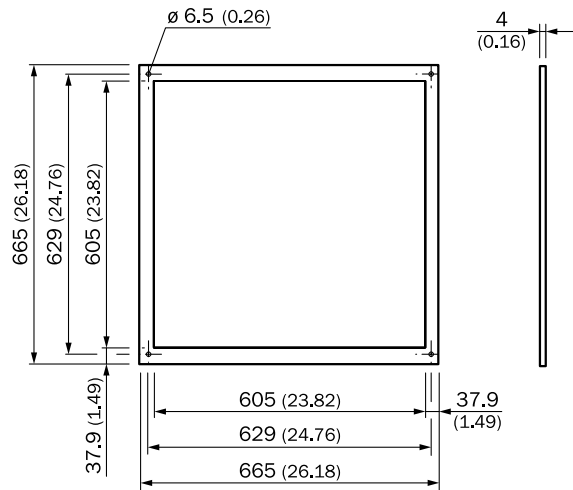
15.1.1 Reflectors



All dimensions in mm (inch)

Fig. 26: Reflector 0.3 x 0.3 m² Diamond Grade, mounted

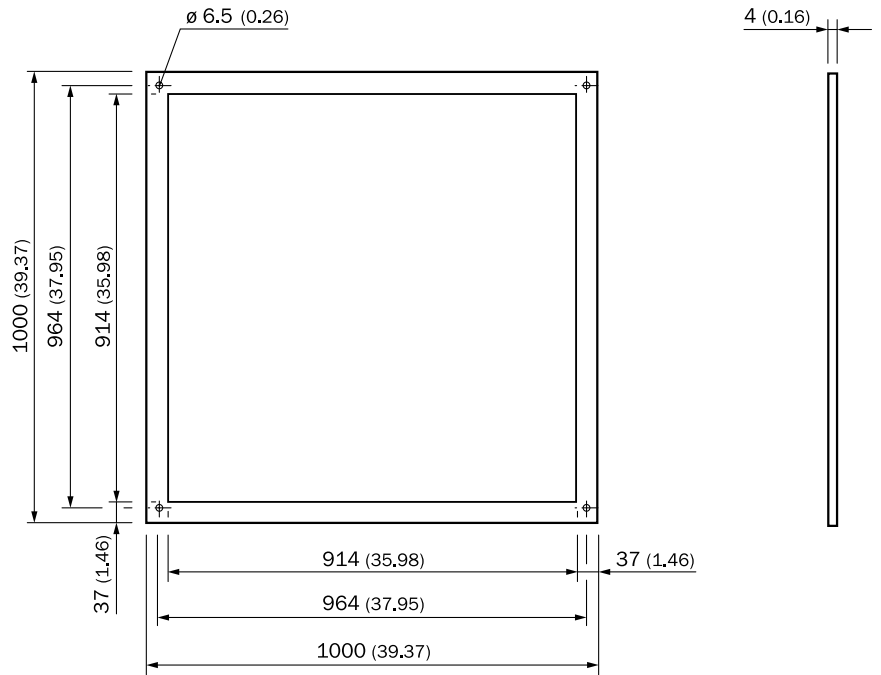
Description	Reflector 0.3 x 0.3 m ² Diamond Grade, mounted on base plate ALMG3
Type	PL240DG
Part no.	1017910



All dimensions in mm (inch)

Fig. 27: Reflector 0.6 x 0.6 m² Diamond Grade, mounted

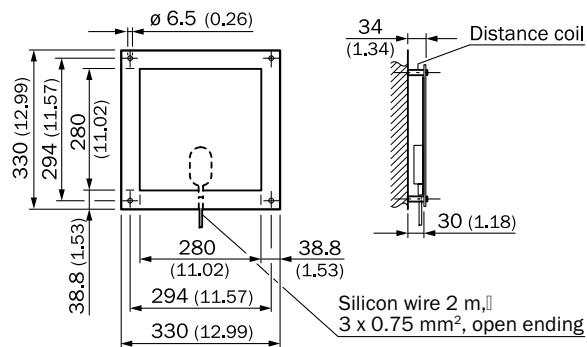
Description	Reflector 0.6 x 0.6 m ² Diamond Grade, mounted on base plate ALMG3
Type	PL560DG
Part no.	1016806



All dimensions in mm (inch)

Fig. 28: Reflector 1.0 x 1.0 m² Diamond Grade, mounted

Description	Reflector 1.0 x 1.0 m ² Diamond Grade, mounted on base plate ALMG3
Type	PL880DG
Part no.	1018975



All dimensions in mm (inch)

Fig. 29: Reflector 0.3 x 0.3 m² Diamond Grade, mounted, including heating

Description	Reflector 0.3 x 0.3 m ² Diamond Grade, mounted, on base plate ALMG3, including controlled heating +20 °C, 230 V AC, 200 W, IP 64
Type	PL240DG-H
Part no.	1022926

Accessories

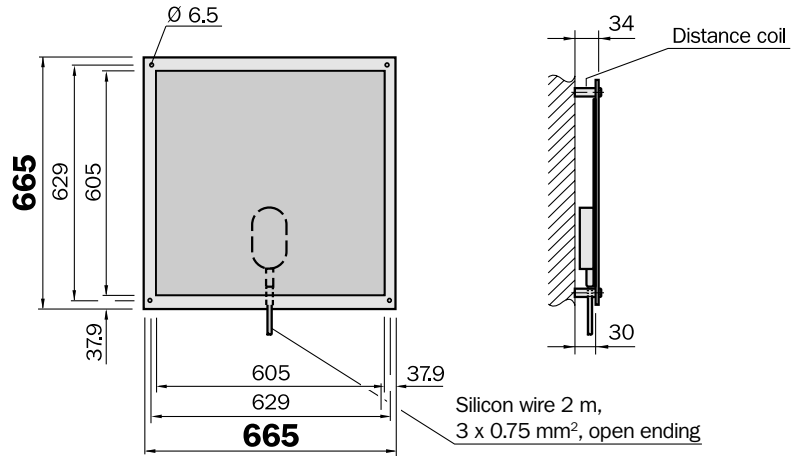


Fig. 30: Reflector 0.6 x 0.6 m² Diamond Grade, mounted, including heating

Description	Reflector 0.6 x 0.6 m ² Diamond Grade, mounted, on base plate ALMG3, including controlled heating +20 °C, 230 V AC, 200 W, IP 64
Type	PL560DG-H
Part no.	1023888

15.1.2 Reflective tape



Fig. 31: "Diamond grade" reflective tape

Description	"Diamond grade" reflective tape, size customizable
Type	REF-DG
Part no.	4019634
Description	"Diamond grade" reflective tape, curve 749 x 914 mm ²
Type	REF-DG
Part no.	5320565

15.2 Connection systems

15.2.1 Connection cables with M12-connector, straight on M12-connector, straight

Description	Type	Order-No.
Connection cable, Ethernet-Patch-Kabel, 2 m, connector M12, straight 4-pin, D-coded on connector M12, straight	SSL-1204-G02MZ90	6048241
Connection cable, Ethernet-Patch-Kabel, 5 m, connector M12, straight 4-pin, D-coded on connector M12, straight	SSL-1204-G05MZ90	6048242
Connection cable, Ethernet-Patch-Kabel, 10 m, connector M12, straight 4-pin, D-coded on connector M12, straight	SSL-1204-G10MZ90	6048243

15.2.2 Connection cables with M12-connector, angled on M12-connector, straight

Description	Type	Order-No.
Connection cable, Ethernet-Patch-Kabel, 2 m, connector M12, angled 4-pin, D-coded on connector M12, straight	SSL-1204-F02MZ90	6048250
Connection cable, Ethernet-Patch-Kabel, 5 m, connector M12, angled 4-pin, D-coded on connector M12, straight	SSL-1204-F05MZ90	6048251
Connection cable, Ethernet-Patch-Kabel, 10 m, connector M12, angled 4-pin, D-coded on connector M12, straight	SSL-1204-F10MZ90	6048252

15.2.3 Connection cables with M12-connector, straight on RJ45-connector, straight

Description	Type	Order-No.
Connection cable, Ethernet-Patch-Kabel, 2 m, connector M12, straight 4-pin, D-coded on connector RJ45, straight	SSL-2J04-G02MZ90	6048244
Connection cable, Ethernet-Patch-Kabel, 5 m, connector M12, straight 4-pin, D-coded on connector RJ45, straight	SSL-2J04-G05MZ90	6048245
Connection cable, Ethernet-Patch-Kabel, 10 m, connector M12, straight 4-pin, D-coded on connector RJ45, straight	SSL-2J04-G10MZ90	6048246

15.2.4 Connection cables with M12-connector, angled on RJ45-connector

Description	Type	Order-No.
Connection cable, Ethernet-Patch-Kabel, 2 m, connector M12, angled 4-pin, D-coded on connector RJ45	SSL-2J04-F02MZ90	6048253
Connection cable, Ethernet-Patch-Kabel, 5 m, connector M12, angled 4-pin, D-coded on connector RJ45	SSL-2J04-F05MZ90	6048254
Connection cable, Ethernet-Patch-Kabel, 10 m, connector M12, angled 4-pin, D-coded on connector RJ45	SSL-2J04-F10MZ90	6048255

Accessories

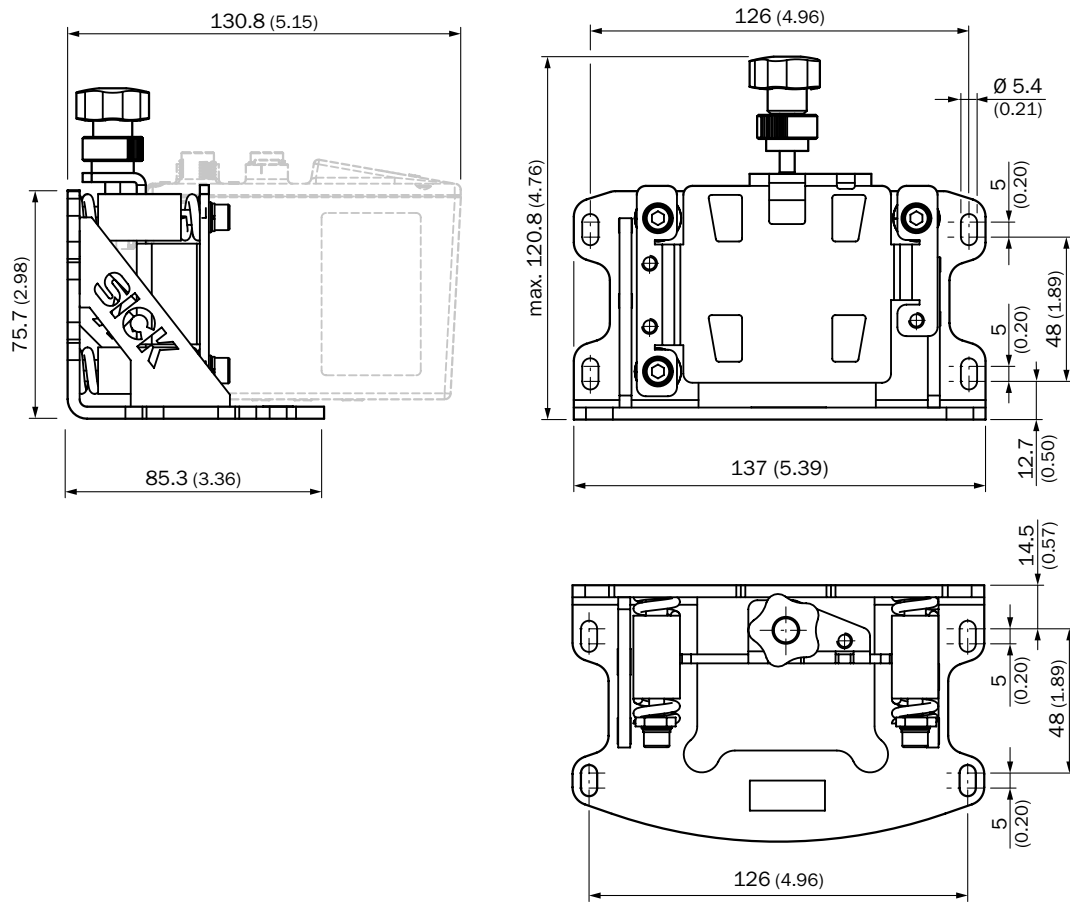
15.2.5 M12-connector, straight with cable on open end

Description	Type	Order-No.
M12, connector, straight, 4-pin, D-coded, cable 2 m on open end	STL-1204-G02MZ90	6048247
M12, connector, straight, 4-pin, D-coded, cable 5 m on open end	STL-1205-G05MZ90	6048248
M12, connector, straight, 4-pin, D-coded, cable 10 m on open end	STL-1210-G10MZ90	6048249

15.2.6 M12-connector, angled with cable on open end

Description	Type	Order-No.
M12, connector, angled, 4-pin, D-coded, cable 2 m on open end	STL-1204-W02MZ90	6048256
M12, connector, angled, 4-pin, D-coded, cable 5 m on open end	STL-1204-W05MZ90	6048257
M12, connector, angled, 4-pin, D-coded, cable 10 m on open end	STL-1204-W10MZ90	6048258
M12, connector, angled, 4-pin, D-coded, cable 25 m on open end	STL-1204-W25MZ90	6048259

15.3 Mounting systems



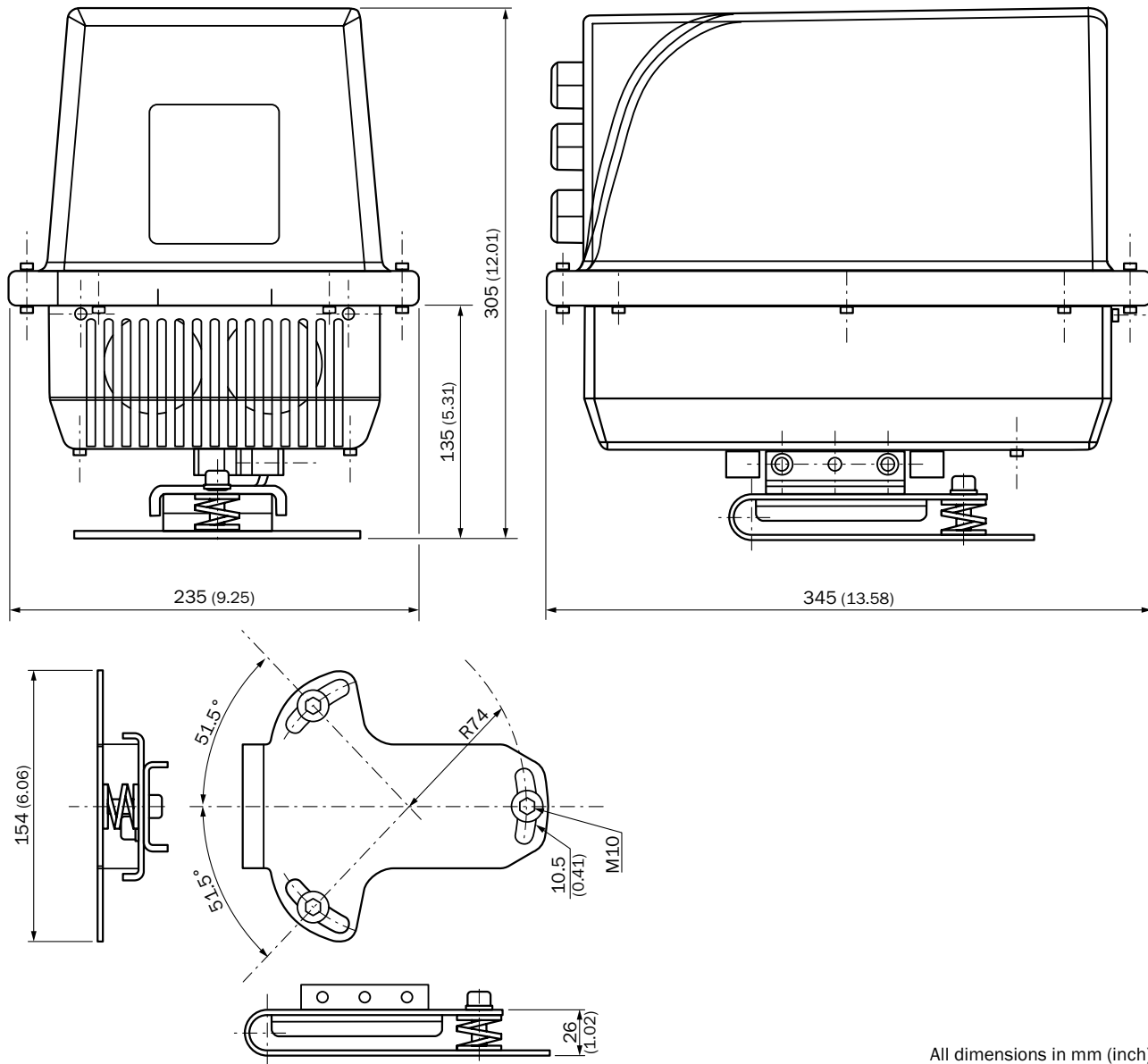
All dimensions in mm (inch)

Fig. 32: Alignment bracket

Description	Alignment bracket
Type	BEF-AH-DX100
Part no.	2058653
Material:	Zinc-plated steel sheet

Accessories

15.4 Other accessories

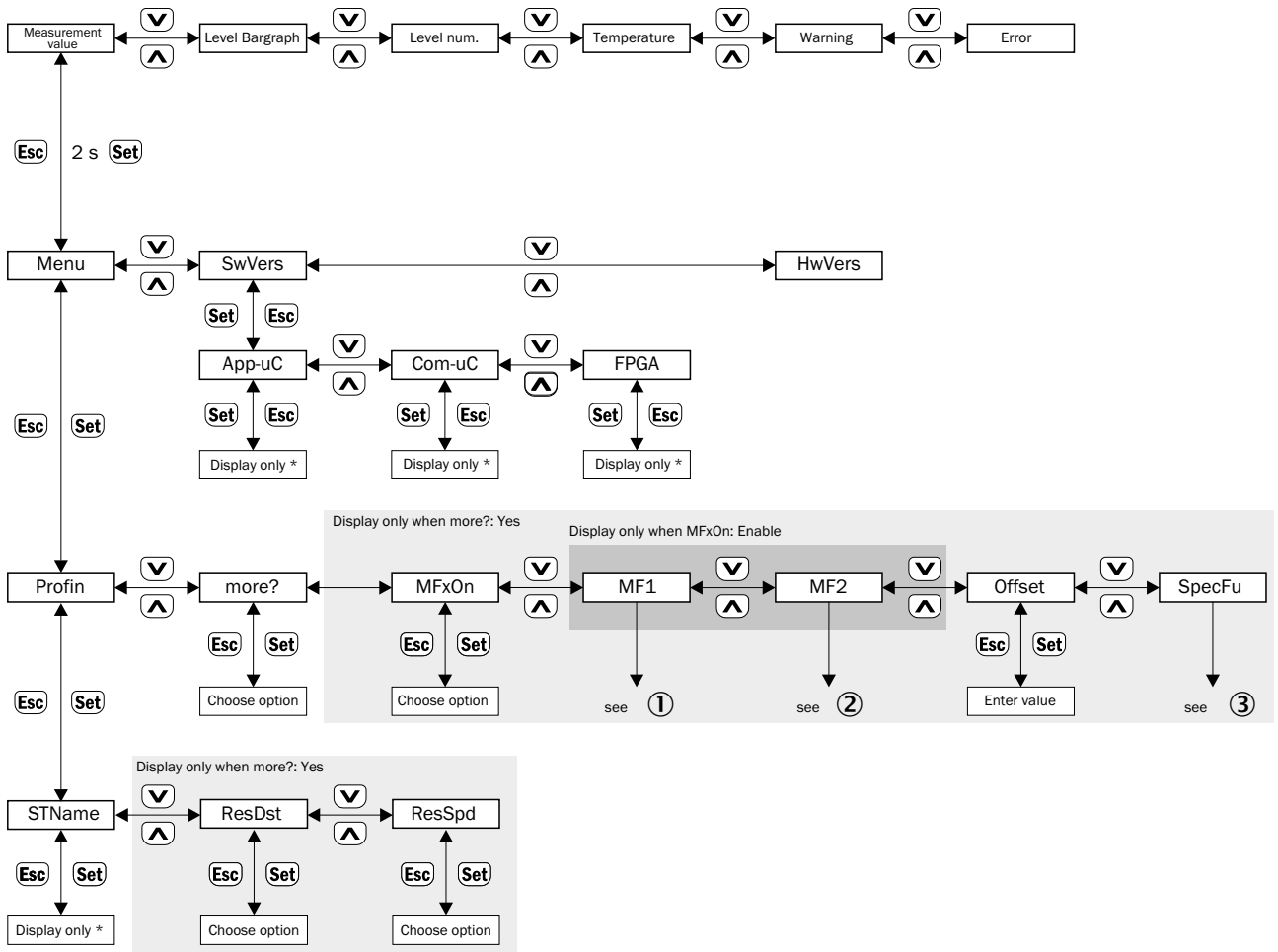


All dimensions in mm (inch)

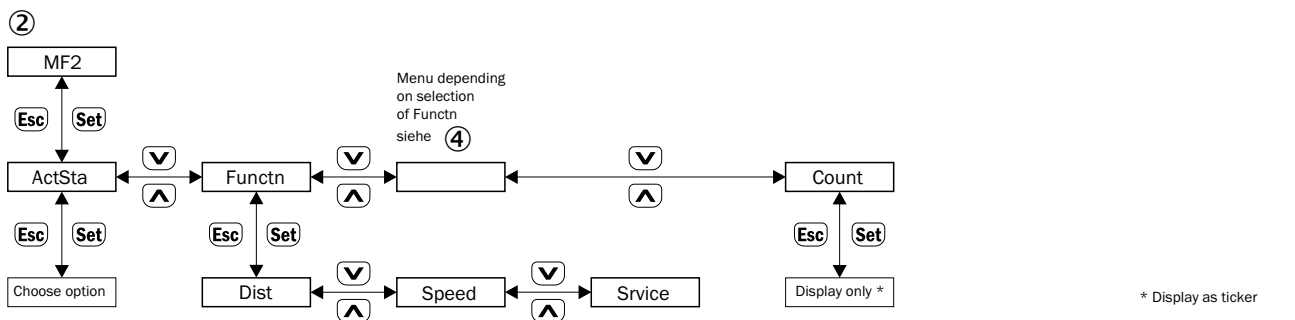
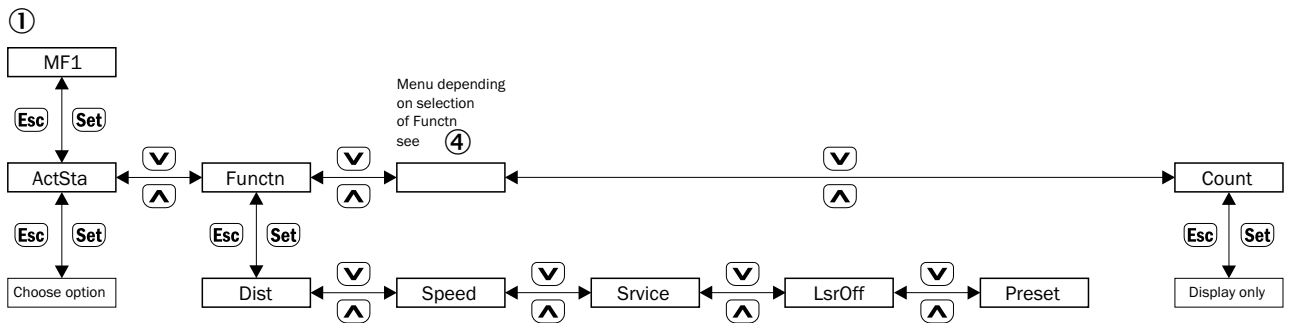
Fig. 33: Cooling Casing

Description	Cooling Casing
Type	TPCC-Dx100
Part no.	6048328
Material	Glass-fiber reinforced plastic (GFK)
Operating ambience temperature	-20 ... +75 °C (short-term +80 °C)
Supply voltage	24 V DC ± 20 %
Current consumption	15 A at 24 V DC
Enclosure rating	IP 54

16 Menu structure

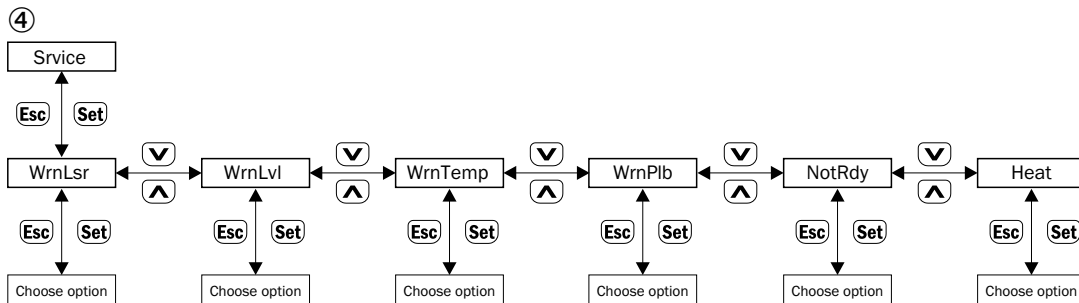
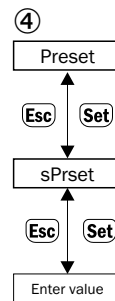
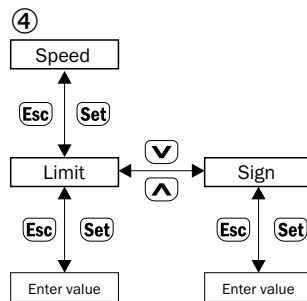
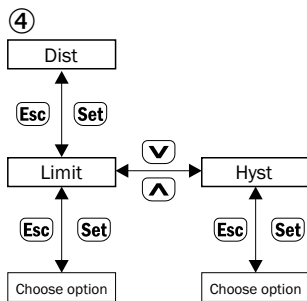
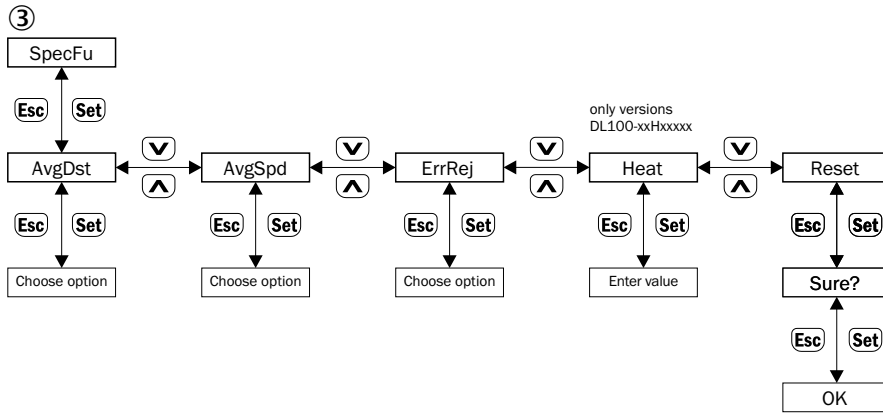


* Display as ticker



* Display as ticker

Menu structure



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