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OPERATING INSTRUCTIONS

DL100 Pro – EtherNet/IP

Distance measuring device

EN

SICK
Sensor Intelligence.

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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_pro".

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_pro ».

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.

1 General

1.1 Information on the operating instructions

These operating instructions offer important notes on handling of the distance measuring devices DL100 Pro 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.

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.

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 Pro
- Optional: Accessories (→ page 97, 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_pro".

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.

2 Safety

2.1 Intended use

The distance measuring device DL100 Pro is a measuring device consisting of an opto-electronic sensor and 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 Pro 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:

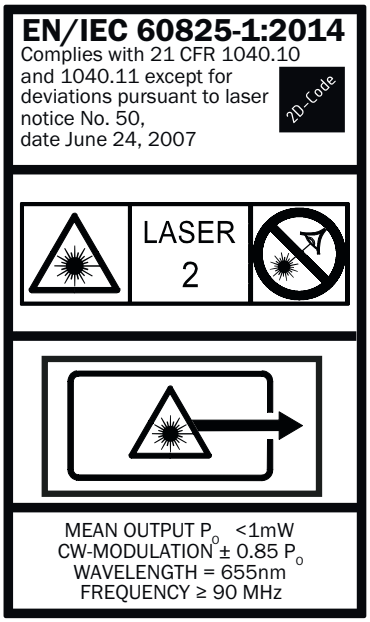
- **Instructed persons**
  were instructed in the tasks assigned to them and possible dangers in case of improper conduct in the scope of instruction by the operator.
- **Skilled persons**
  are able to perform the tasks assigned to them based on their technical training, knowledge and experience, as 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.

2.6 Warning at the device

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



Complies with 21CFR1040.10 and 1040.11 except for deviations pursuant to laser notice No. 50, date June 24, 2007

Laser radiation - Do not look into the laser beam - Laser class 2 (EN/IEC 60825-1:2014)

Laser aperture

Fig. 1: Warning at the device: Laser category 2 (EN/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.

3 Identification

3.1 Type label

The type label is located on the measuring device.

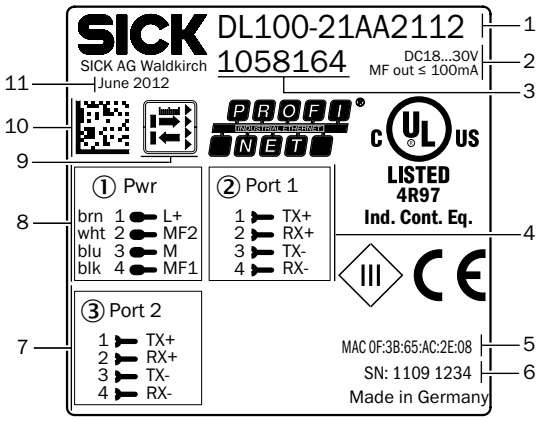


Fig. 2: Type Label

1 *Type code → See page 96, chapter 14.10.*
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

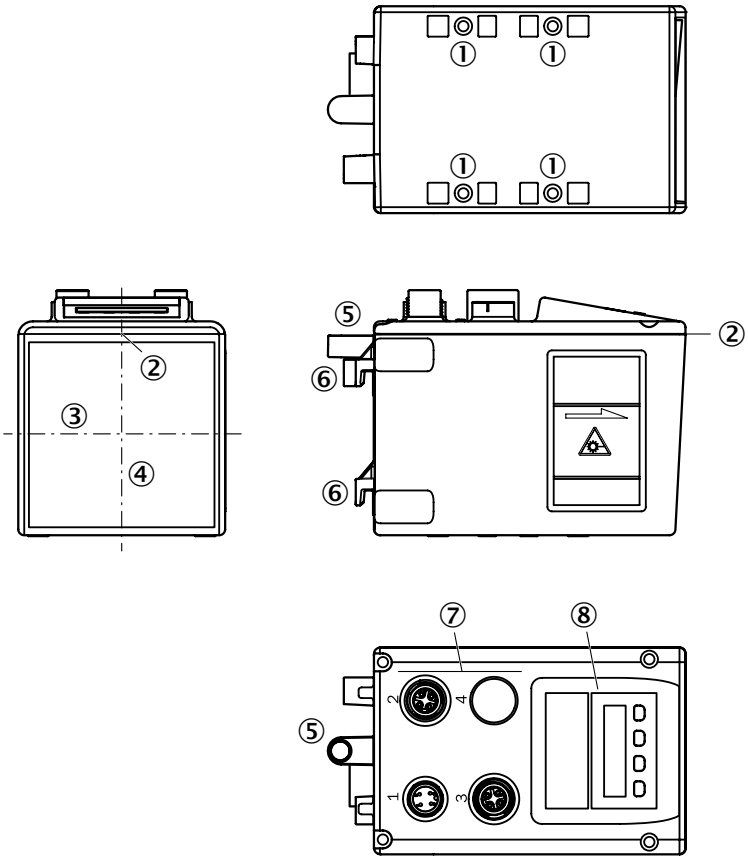


Fig. 3: Setup "distance measuring device DL100 Pro"

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*

4.2 Function

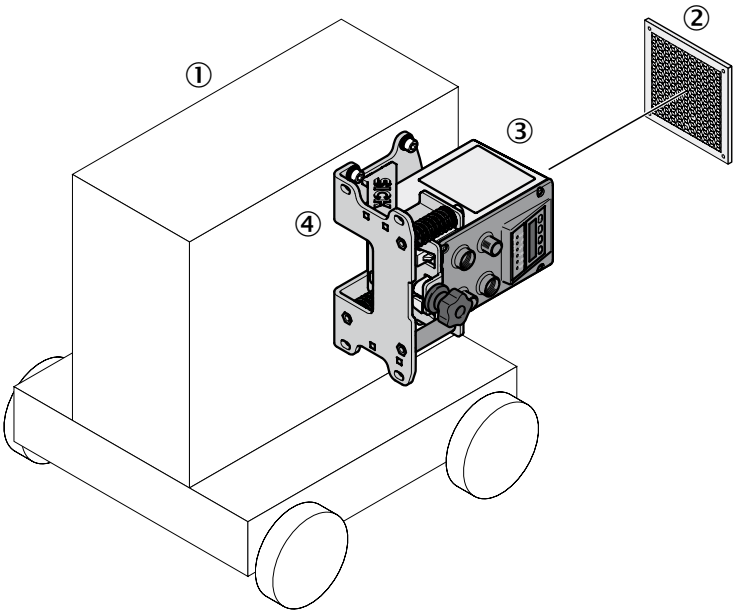


Fig. 4: Function "distance measuring device DL100 Pro"

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

The distance measuring device DL100 Pro 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 Pro 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

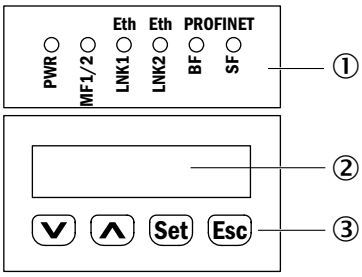


Fig. 5: Display and operating elements

1 LEDs

2 Display

3 Keys

LEDs

LED	Description
PWR	Display of operating status • 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 87, chapter 12.
MF1/2	The status for multi-function input/output MF1 and multi-function output MF2 is presented via an LED. → See page 20, Table 2.
LNK1	Ethernet • LED off: No Ethernet present • LED green: Ethernet present • LED orange flashing: Data transmission
LNK2	Ethernet • 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

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 → Troubleshoting, see page 88, 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
(V)	• Select menu, parameters or options. • Reduce value.
(^)	• Select menu, parameters or options. • Increase value.
Set	• Switch to the next lower menu level. • Save parameter change. • Confirm selection.
Esc	• 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:

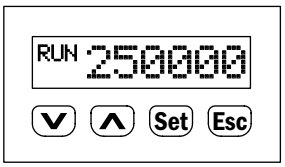


Fig. 6: Measured value display

Menu display

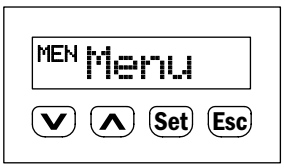


Fig. 7: Menu display

NOTE!

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

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.

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 29, chapter 6.7.
3. Perform electrical connection
   → See page 33, chapter 7.
4. Align distance measuring device and reflector against each other.
   → See page 28, chapter 6.6
5. Align distance measuring device with the reflector using the alignment bracket fine adjustment. → See page 31, chapter 6.8.
6. Fasten alignment of the distance measuring device.
   → See page 31, 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 93, chapter 14.3.
- 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 101, 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 24, chapter 6.2.
- Keep sufficient distance to other distance measuring devices.
  → See page 26, chapter 6.4.
- Keep sufficient distance to data transmission photoelectric switches.
  → See page 27, chapter 6.5.

6.3 Choose and mount reflector

NOTE!

→ For suitable reflectors and suitable reflective tape, see page 97, 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.

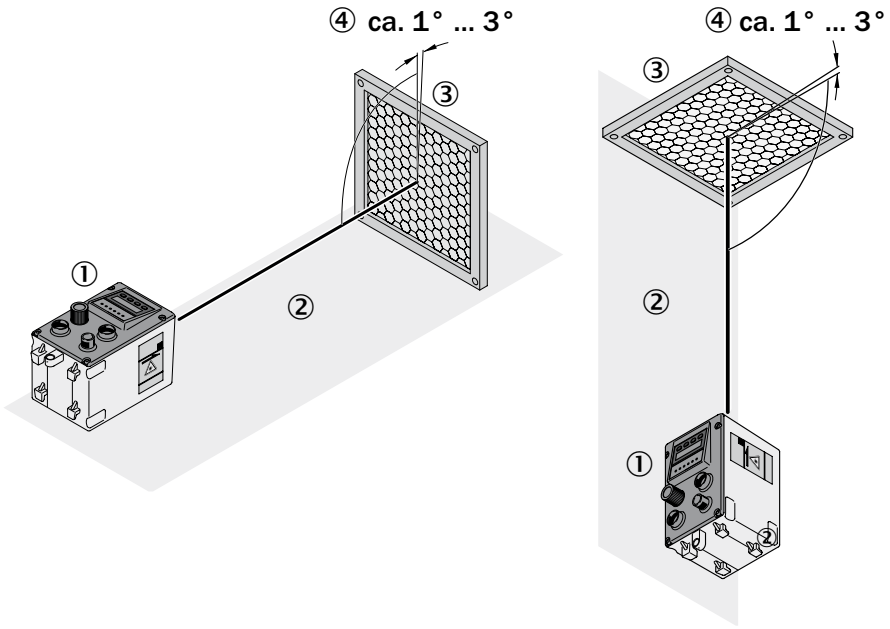


Fig. 8: Installing the reflector on highly reflective surfaces
Left: Installed in driving axis, installed at the right in the lifting axis

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