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:

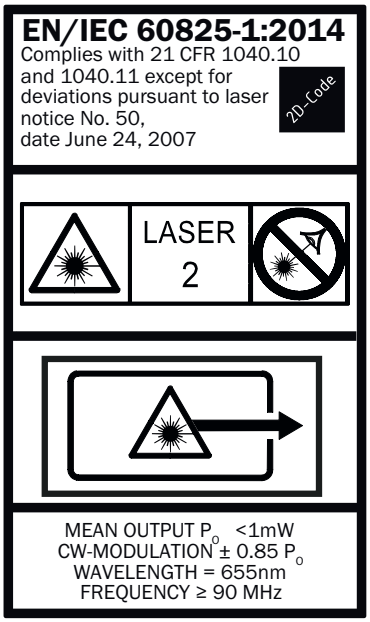
- **Instructed persons**
  were instructed in the tasks assigned to them and possible dangers in case of improper conduct in the scope of instruction by the operator.
- **Skilled persons**
  are able to perform the tasks assigned to them based on their technical training, knowledge and experience, as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

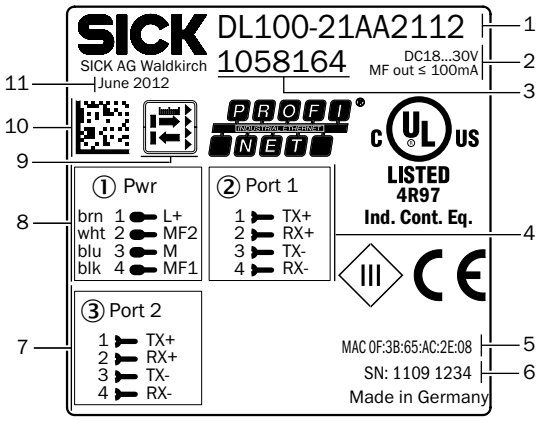


Fig. 2: Type Label

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

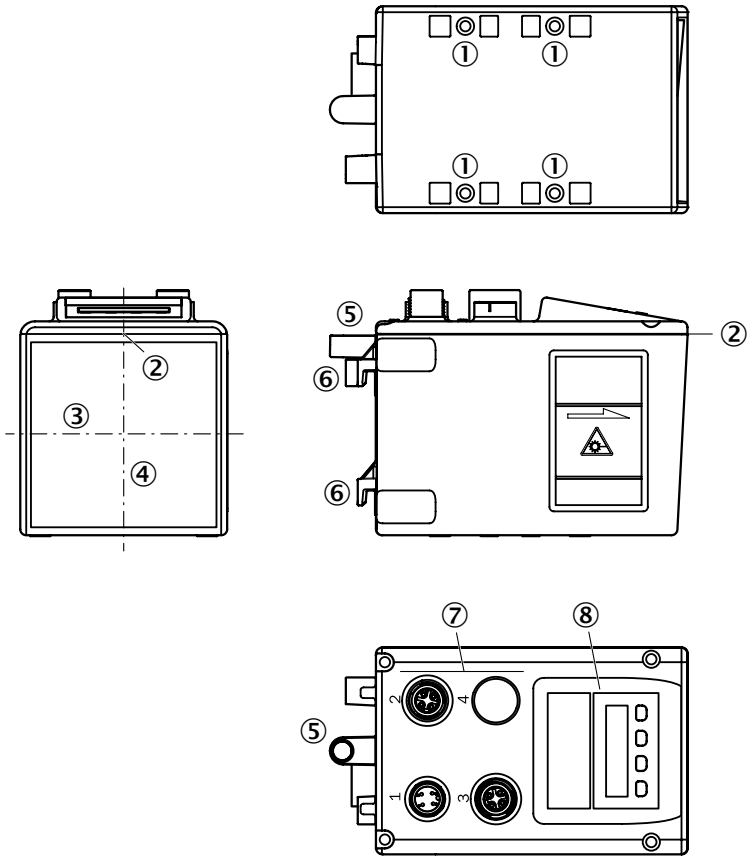


Fig. 3: Setup "distance measuring device DL100 Pro"

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

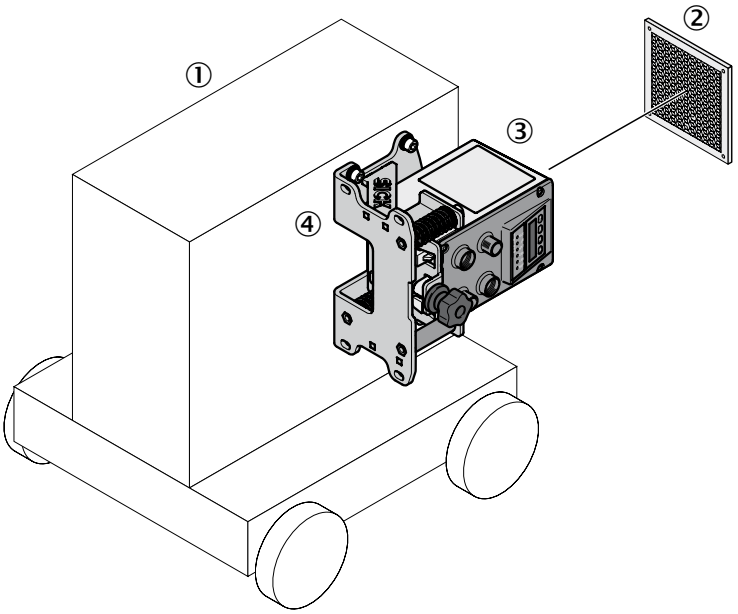


Fig. 4: Function "distance measuring device DL100 Pro"

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

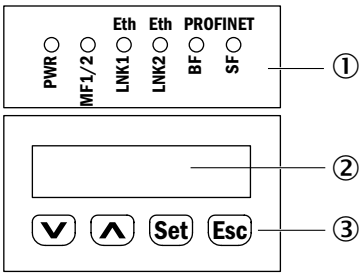


Fig. 5: Display and operating elements

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:

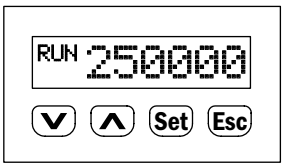


Fig. 6: Measured value display

Menu display

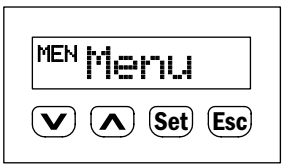


Fig. 7: Menu display

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.

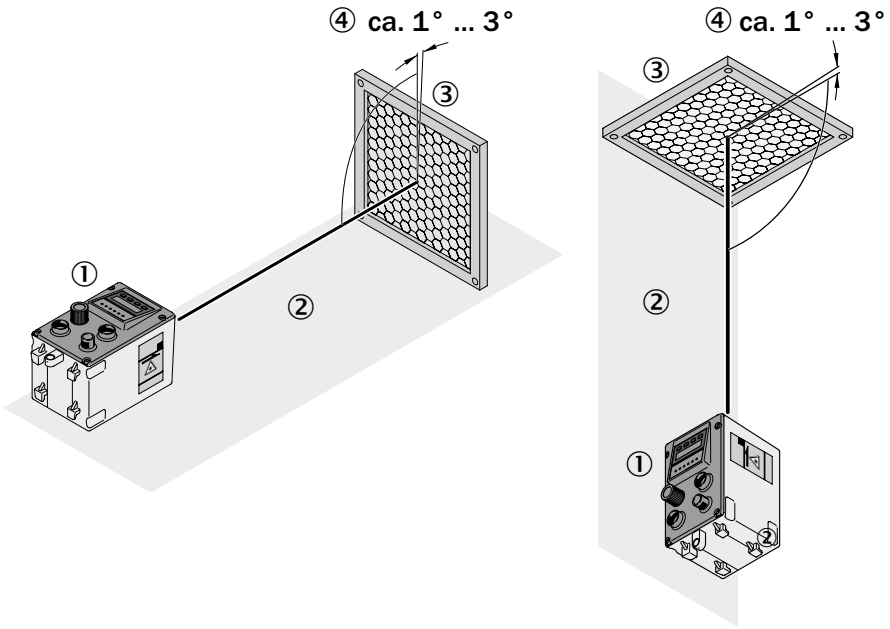


Fig. 8: Installing the reflector on highly reflective surfaces
Left: Installed in driving axis, installed at the right in the lifting axis

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

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

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

Example

- Distance measuring device DL100–21xxxx01
- Measuring range: 0.15 ... 100 m
- Maximum measuring distance 60 m
- $s_{max} = 60\ m$

Calculation

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

Result

$a \geq 700\ mm$

Light beams in the same direction

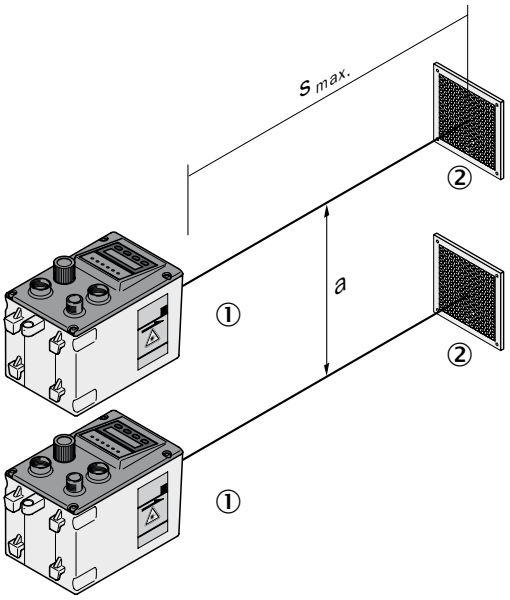


Fig. 9: Placement of two distance measuring devices with light beams in the same light direction.

1 Distance measuring device DL100 Pro

2 Reflector

a Minimum distance

s_{max} Maximum scanning range

Light beams in the opposite direction

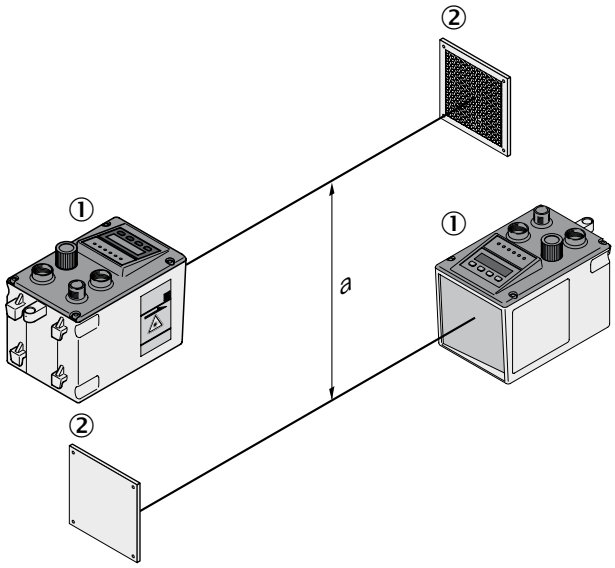


Fig. 10: Placement of two distance measuring devices with light beams in the opposite direction.

1 Distance measuring device DL100 Pro

2 Reflector

a Minimum distance

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

$a \geq 100$ mm

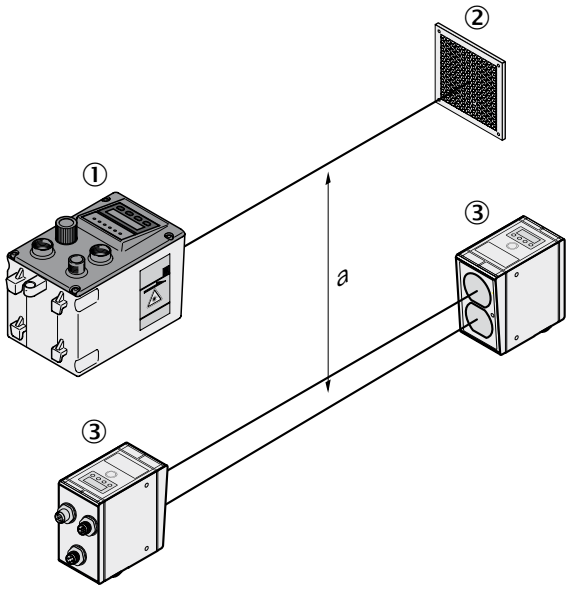


Fig. 11: Placement of the distance measuring device to the data transmission photoelectric switch ISD

1 Distance measuring device DL100 Pro

2 Reflector

3 Data transmission photoelectric switch ISD

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

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 92, chapter 14.1.

Observe the following items:

- Mounting notes: → see page 24, 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.

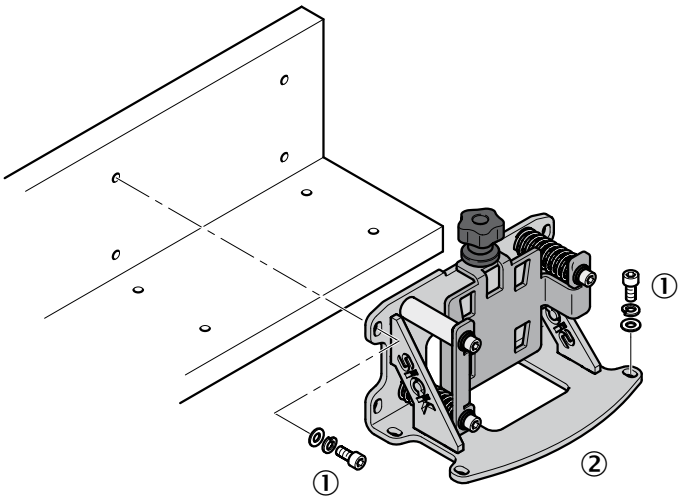


Fig. 12: Mount alignment bracket

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.

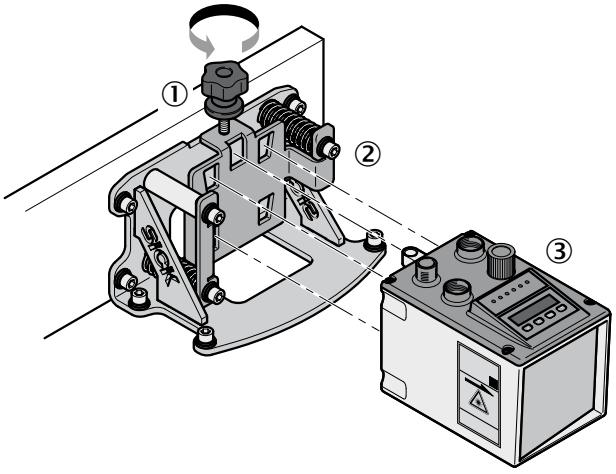


Fig. 13: Mount distance measuring device

1 Knurled screw

2 Alignment bracket

3 Distance measuring device

4. Attach distance measuring device via the knurled screw.

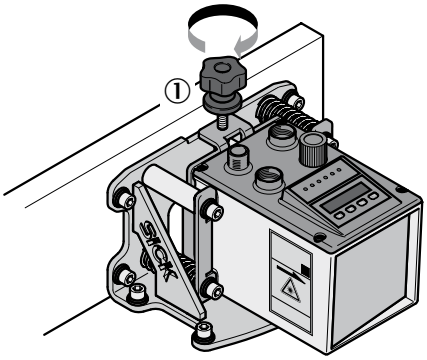


Fig. 14: Attach distance measuring device with the knurled screw

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.

Alignment in X-direction

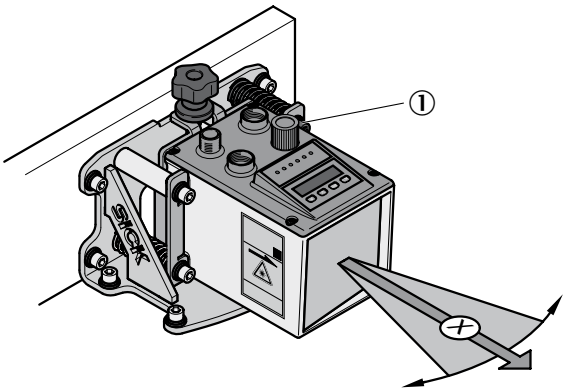


Fig. 15: Align distance measuring device in X-direction using the alignment bracket

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

Alignment in Y-direction

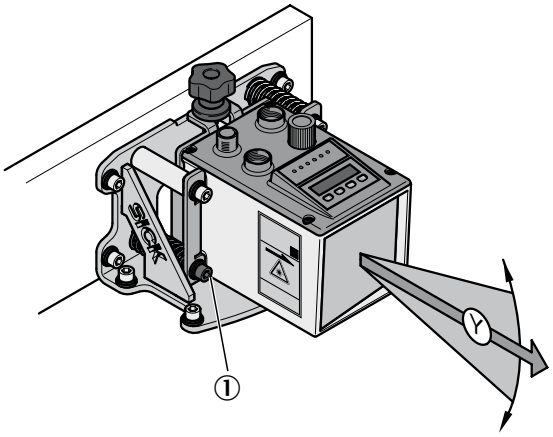


Fig. 16: Align distance measuring device in Y-direction using the alignment bracket

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.

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 99, chapter 15.2.*

All electrical connections of the distance measuring device DL100 Pro 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.

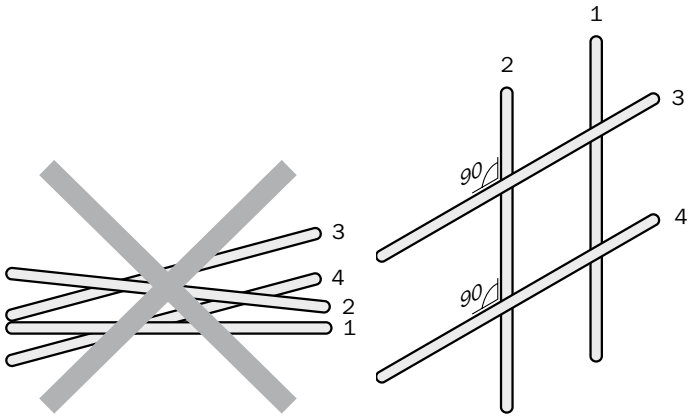


Fig. 17: Cross lines at a right angle

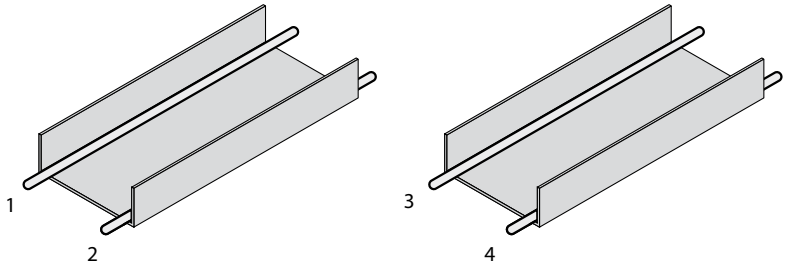


Fig. 18: Ideal placement –
Place lines in different cable channels

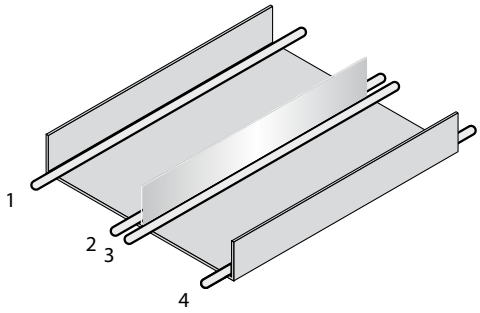


Fig. 19: Alternative installation – separate lines by metallic separation

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

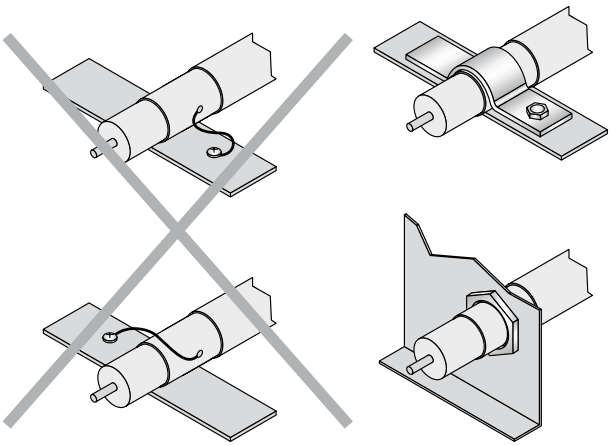


Fig. 20: Briefly connect shield with a large area - earth both sides

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“

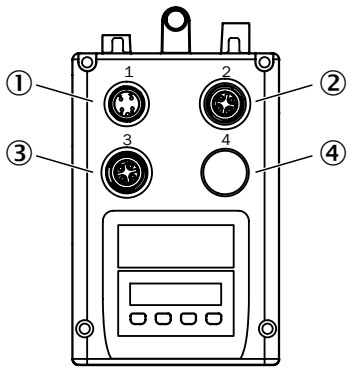


Fig. 21: Position of the electrical connections

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

7.4 Connection diagrams

7.4.1 Connection diagram supply voltage

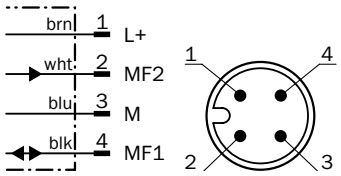


Fig. 22: Connection diagram supply voltage, plug M12, 4-pin, A-coded

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)

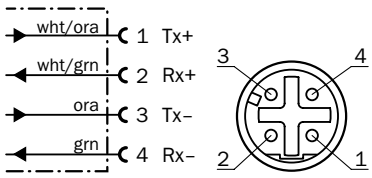


Fig. 23: Connection diagram Port 1 and Port 2, plug M12, 4-pin, D-coded

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 102, 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.

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 29, 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 88, 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 89, 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"

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** • Yes • No **Factory setting** • 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** • Enable: Multifunction input/output MF1 and multifunction output MF2 are activated. • Disable: Multifunction input/output MF1 and multifunction output MF2 are deactivated. **Factory setting** • Enable

Table 14: Menu "MFx On"

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** • 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** • ActLow
Functn	Select function for the multifunction input/output. Depending on the selection, the corresponding submenu is displayed. **Options** • Dist: MF1 is used as distance switching output. • Speed: MF1 is used as speed switching output. • Srvice: 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** • Dist
Dist / Speed Srvice / 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"

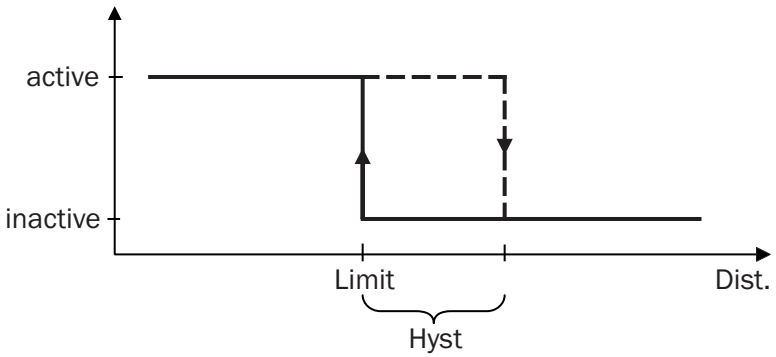


Fig. 24: Displaying the function "Dist."

Limit Distance-dependent switching threshold

Hyst: Switching threshold hysteresis

Dist: Measured distance

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 → Set → Menu → Set → Profin → ▽ → more → ▽ → MFx On → ▽ → MF1 → Set → Actsta → ▽ → Functn → ▽ → Speed

Requirements for the display

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

Parameter	Description
Limit	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 ± 0.1m/s. **Adjustment range** Range 0.0 ... 9.9 m/s **Factory setting** • 0 [mm]
Sign	Choose the travel direction to be monitored. **Options** • + / –: 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. **Factory setting** • + / –

Table 17: Submenu "MF1 – Speed"

8.5.10 Submenu "MF1 – Srvice"

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 "Srvice" via the menu path:
Main menu → Set → Menu → Set → Profin → ▽ → more → ▽ → MFx On → ▽ → MF1 → Set → Actsta → ▽ → Functn → ▽ → Srvice

Requirements for the display

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

Parameter	Description
WrnLsr	Activating and deactivating warning messages when the measuring device must be replaced soon because the laser ages. **Options** • On • Off **Factory setting** • On
WrnLvl	Activate or deactivate warning messages when the damping value is undercut, e.g. at contamination. **Options** • On • Off **Factory setting** • On
WrnTemp	Activate or deactivate warning message when the inner temperature of the measuring device is outside of the permissible thresholds. **Options** • On • Off **Factory setting** • On
WrnPlb	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. **Options** • On • Off **Factory setting** • On

Submenu "MF1 – Srvice" (continued)

Parameter	Description
NotRdy	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. **Options** • On • Off **Factory setting** • On
Heat	Activate or deactivate warning when the heating is switched on. This parameter is only displayed for measuring devices with the option "Heating". **Options** • On • Off **Factory setting** • On

Table 18: Submenu "MF1 – Srvice"

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
sPrset	The preset serves as initialization value. When the multifunction input MF1 is activated, the preset is used. **Adjustment range** • –300000 ... + 300000 Since the display only has six digits, you may only enter negative values up to "–99999" in the display. **Factory setting** • 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.

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** • ActLow: LOW-level at active output (opener/NC) • ActHi: HIGH-level at active output (closer/NO) **Factory setting** • ActLow
Functn	Select function for the multifunction output. Depending on the selection, the corresponding submenu is displayed. **Options** • Dist • Srvice • Speed **Factory setting** • Dist
Dist / Srvice / 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 – Srvice"

This submenu corresponds to the submenu "Srvice" in the menu "MF1".

→ Also see page 48, Table 18.

Submenu "MF2 – Dist"

This submenu corresponds to the submenu "Dist" in the menu "MF1".

→ Also see page 45, Table 16.

Submenu "MF2 – Speed"

This submenu corresponds to the submenu "Speed" in the menu "MF1".

→ Also see page 46, 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	Specify offset. The offset is added to the internally determined measurement value. The offset affects all outputs and the display indication. When the "Preset" function is activated, the offset is over-written by triggering of the preset input. **Adjustment range** • -300000 ... +300.000 mm **Factory setting** • 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	Select filter depth for the distance values. **Options** • Medium • Slow • Fast **Factory setting** • Medium

Menu “SpecFu” (continued)

Parameter	Description
AvgSpd	Select filter depth for the speed values. **Options** • Medium • Slow • Fast **Factory setting** • Medium
ErrRej	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. **Options** • 200ms: Error/warning is indicted when the error is present for longer than 200 ms. • 50ms: Error/warning is indicted when the error is present for longer than 50 ms. • Off Error/warning is indicated at once, without delay. **Factory setting** • 200ms
Heat	**Requirements for the display** • Only for versions with heating DL100-xxHxxxxx This menu is used to set the temperature at which the heating is to activate. The hysteresis is set firmly to 2 K. **Adjustment range** • -10 ... +40 °C **Factory setting** • -10 °C
FMode	**Requirements for the display** • Only for versions with frequency switching DL100-xxxBxxxx Select frequency range Frequency switching may be required at parallel placement of several distance measuring devices. → also see page 26, chapter 6.4. **Options** • Mode 1 • Mode 2 • Mode 3 • Mode 4 **Factory setting** • Mode 1
Reset	Perform reset → see page 53, chapter 8.6.

Table 22: Menu “SpecFu”

8.6 Perform reset

1. Select the parameter "Reset" in the menu "SpecFu".
   → See page 51, 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 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.

NOTE!

The configuration program SOPAS ET can be downloaded from "www.sick.com/dl100_pro".

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"

Field "Product code"

Parameter	Description
Product code	Display of the product code **Read/Write access** • 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** • Read only
Communica-tions controller	Indication of the version of the communication processor **Read/Write access** • Read only
FPGA	Display of the version of the Field Programmable Gate Array **Read/Write access** • Read only

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

Field "Hardware Version"

Parameter	Description
Hardware Version	Displaying the hardware version **Read/Write access** • 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** • Read and write **Factory setting** • Empty

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

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"

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

Page “Measurement values” (continued)

Field	Description
Temperature	Display of current internal device temperature **Read/Write access** • Read only **Unit** • °C
Operating hours	Display of current operating hours **Read/Write access** • Read only **Unit** • h

Table 32: Page “Diagnosic 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** • Read and write **Input value** • –300000 ... 300000 **Unit** • mm **Factory setting** • 0
Preset	Specify present value for the distance measurement value. **Read/Write access** • Read and write **Input value** • –300000 ... 300000 **Unit** • mm **Factory setting** • 0

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

Field "Measurement value resolution"

Parameter	Description
Distance resolution	Choose resolution for the output value "Distance". The measurement value is multiplied with the resolution. The parameter does not influence the measurement value displayed. **Read/Write access** • Read and write **Input value** • 0: 0.1 / 1: 0.125 / 2: 1.0 / 3: 10.0 / 4: 100.0 **Factory setting** • 0.1 mm
Resolution speed	Choose resolution for the output value "Speed". The measurement value is multiplied with the resolution. The parameter does not influence the measurement value displayed. **Read/Write access** • Read and write **Input value** • 0: 0.1 / 1: 1.0 / 2: 10.0 / 3: 100.0 **Factory setting** • 1 mm/s

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

Field "PROFINET IO configuration"

Parameter	Description
StName	Display station name **Read/Write access** • Read only **Factory setting** • dl100

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

Field "MF1/MF2 activation"

Parameter	Description
MF activation	Activate and deactivate multifunction input and output MF1 and multifunction output MF2. **Read/Write access** • Read and write **Input value** • 0: off / 1: on **Factory setting** • 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	Select function for multifunction input and output MF1. **Read/Write access** • Read and write **Input value** • 0: Distance: → See page 61, field "MF1, Threshold distance underflow" • 1: Velocity: → See page 62, field "MF1, Threshold velocity exceeded" • 2: Service: → See page 62, field "MF1, Service configuration" • 3: Laser • 4: Preset **Factory setting** • Distance
Active condition	Select level for the active condition for the multifunction input and output MF1. **Read/Write access** • Read and write **Input value** • 0: high / 1: low **Factory setting** • Low

Table 37: Page “Parameter settings” – field “MF1 Function configuration”

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** • Read and write **Input value** • –300000 ... 300000 **Unit** • mm **Factory setting** • 1990
Hysteresis distance	Enter hysteresis for switching threshold for the multifunction output MF1. **Read/Write access** • Read and write **Input value** • 1 ... 300000 **Unit** • mm **Factory setting** • 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** • Read and write **Input value** • 0 ... 15000 **Unit** • mm/s **Factory setting** • 5000

Field "MF1, Threshold velocity exceeded" (continued)

Parameter	Description
Distance change	Choose the travel direction to be monitored. **Read/Write access** • Read and write **Input value** • 0: Increasing (positive values) / 1: decreasing (negative values) / 2: increasing and decreasing **Factory setting** • 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	Activating and deactivating warning messages. When the event for the warning message occurs, the multifunction switching output MF1 switches. **Read/Write access** • Read and write **Input value** You may activate several warning messages at once. • Warning measurement stability • Warning level • Warning laser • Warning temperature • Device not ready • Heater state (for device model with heating) **Factory setting** • 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"

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** • Read and write **Input value** • 0: Distance / 1: Velocity / 2: Service **Factory setting** • Service
Active state	Select level for the active condition for the multifunction output MF2. **Read/Write access** • Read and write **Input value** • 0: high / 1: low **Factory setting** • Low

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

Field "MF2, Threshold distance underflow"

→ See page 61, Table 38, "MF1, Threshold distance underflow"

Field "MF2, Threshold exceeded exceeded"

→ See page 62, Table 39, "MF1, Threshold velocity exceeded"

Field "MF2, Service configuration"

→ See page 62, 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** • Read and write **Input value** • –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** • Read and write **Input value** • –2147483648 ... 2147483647

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

9.2.6 Methods

Field	Description
Device reboot	• Click the button "Reboot" to cause the device to restart. **Read/Write access** • Write only
Laser control	Switch the laser on and off as follows: • Use the selection button to select the desired option. • Click the button to perform the option. **Read/Write access** • Write only **Input value** • 0: off / 1: on **Factory setting** • Off
Heating control	Control the heating as follows: • Use the selection button to select the desired option. • Click the button to perform the option. **Read/Write access** • Write only **Input value** • 0: Off / 1: On / 2: Auto **Factory setting** • Auto

Table 43: Page "Methods"

EtherNet/IP interface

Contents

1. Interface Description

1.1. Fieldbus Interface Capabilities

- IO Connection 1 exclusive owner, up to 2 listen only
- IO Connection type Cyclic, minimum 2 ms
- Explicit Messages
  - Get_Attribute,
  - Set_Attribute
- UCMM supported
- Predefined standard objects
  - Identity Object
  - Message Route Object
  - Assembly Object
  - Connection Manager
  - Ethernet Link Object
  - TCP/IP Object
  - DLR Object
  - QoS Object
- Additional objects
  - Position Sensor Object (0x23)
- DHCP and BOOTP supported
- Baud rates 10 and 100 MBit/s
- Data transport layer Ethernet II, IEEE 802.3
- ACD supported
- DLR (ring topology) supported
- Integrated switch supported
- Reset services supported

1.2. Position Sensor Object

The device implements the Position Sensor Object (Class Code: 0x23) as specified within “The CIP Networks Library Vol.1”. In addition to the mandatory attributes defined by the Position Sensor Object, vendor specific attributes (ID >= 100) are offered to unlock all device capabilities (see Table 1).

	AttributeID	Name	Type	Size	Get	Set
Mandatory and CIP defined Attributes	9	Auto Zero	BOOL	1		x
	10	Position Value Signed	DINT	4	x	
	11	Position Sensor Type	UINT	2	x	
	12	Direction Counting Toggle	BOOL	1		x
	15	Position Format	ENGUINT	2		x
	19	Preset Value	DINT	4		x
	24	Velocity Value	DINT	4	x	
	25	Velocity Format	ENGUINT	2		x
	26	Velocity Resolution	UDINT	4		x
	41	Operating Status	BYTE	1	x	
	44	Alarms	WORD	2	x	
	45	Supported Alarms	WORD	2	x	
	46	Alarm Flag	BOOL	1	x	
	47	Warnings	WORD	2	x	
	48	Supported Warnings	WORD	2	x	
	49	Warning Flag	BOOL	1	x	
	51	Offset Value	DINT	4	x	
Device Status	100	Level	WORD	2	X	
	101	Temperature	SINT	1	X	
	102	Operating Hours	WORD	2	X	
	103	Status, Warnings and Alarm Flags	UDINT	4	X	
	104	Laser Control	BOOL	1		X
	105	Dynamic Preset Value	DINT	4		X
	106	Reset Preset / Offset	BOOL	1		X
	107	Position Resolution	UDINT	4		X
Device Setup MF1	120	MF1 Active level	BOOL	1		X
	121	MF1 Function	USINT	1		X
	122	MF1 Service – Plausib. WE	BOOL	1		X
	123	MF1 Service – Temp. WE	BOOL	1		X
	124	MF1 Service – Level WE	BOOL	1		X
	125	MF1 Service – Laser WE	BOOL	1		X
	126	MF1 Service – Not Ready	BOOL	1		X
	127	MF1 Service – Heater act.	BOOL	1		X
	128	MF1 Output – Threshold Pos.	DINT	4		X
	129	MF1 Output – Hyst. Pos.	UDINT	4		X
	130	MF1 Output – Threshold Velo.	INT	2		X
	131	MF1 Output – Velocity Sign	USINT	1		X
	132	MF1 Input – Preset	DINT	4		X
Device Setup MF2	133	MF2 Active level	BOOL	1		X
	134	MF2 Function	USINT	1		X
	135	MF2 Service - Plausib. WE	BOOL	1		X
	136	MF2 Service - Temp. WE	BOOL	1		X
	137	MF2 Service - Level WE	BOOL	1		X
	138	MF2 Service - Laser WE	BOOL	1		X
	139	MF2 Service - Not Ready	BOOL	1		X
	140	MF2 Service - Heater act.	BOOL	1		X

	AttributeID	Name	Type	Size	Get	Set
	141	MF2 Output - Threshold Pos.	DINT	4		X
	142	MF2 Output - Hysteresis	UDINT	4		X
	143	MF2 Output - Threshold Velo.	INT	2		X
	144	MF2 Output - Velocity Sign	USINT	1		X
Device Setup Special Functions	150	Avg. Filter Distance	USINT	1		X
	151	Avg. Filter Velocity	USINT	1		X
	152	Error Rejection	USINT	1		X
	153	Heating Threshold	SINT	1		X
	154	Frequency Mode	USINT	1		X
Device Identification	160	Serial Number	SHORT_ STRING		X	
	161	Product Code	SHORT_ STRING		X	
	162	HW Version	SHORT_ STRING		X	
	163	FPGA Version	SHORT_ STRING		X	
	164	uC1 Version	SHORT_ STRING		X	
	165	uC2 Version	SHORT_ STRING		X	

Table 1 Position Sensor Object

1.2.1. Position Sensor Object in Detail

<table>
<tr><th colspan="4">Attributes defined by CIP</th></tr>
<tr><th>Attribute</th><th>Name</th><th>Type</th><th>Description</th></tr>
<tr><td>9</td><td>Auto Zero</td><td>BOOL</td><td>A 0-1 transition will compute an offset that forces attribute 10 (Position Value Signed) to zero. This offset will be stored permanent.</td></tr>
<tr><td>10</td><td>Position Value Signed</td><td>DINT</td><td>Distance measured by DL100.
The distance format is determined by attribute 15/107.
Multiplication by -1 can be applied on this attribute by setting attribute 12 to 1.</td></tr>
<tr><td>11</td><td>Position Sensor Type</td><td>UINT</td><td>Constant value 0x0008 for absolute linear encoder.</td></tr>
<tr><td>12</td><td>Direction Counting Toggle</td><td>BOOL</td><td>Depending on the value of this attribute, attribute 10 is multiplied by -1.

Possible values:
0 = forward (default)
1 = backward</td></tr>
<tr><td>15</td><td>Position Format</td><td>ENGUNIT</td><td>Position Format, default value: 0x1001 (counts)
Possible values::
0x1001 (counts),
0x0801 (0.1 mm),
0x2203 (1 mm),
0x2202 (10 mm),
0x0805 (100 mm)
0x0806 (0.1 inch)
0x0807 (0.01 inch)
0x0808 (Attribute 107)

<u>Example 1:</u> When attribute 15 is set to 0x0801, one count within attribute 10 equals 0,1mm.

<u>Example 2:</u> When attribute 15 is set to 0x0808, the user scale, defined within attribute 107, is applied on attribute 10. The user scale in attribute 107 is set in um. Thus, when attribute 15 is set to 0x0808 and attribute 107 is set to 100, the value in attribute 10 is scaled to 0,1mm.</td></tr>
<tr><td>19</td><td>Preset Value</td><td>DINT</td><td>Preset value that will be applied immediately. It is assumed that the format of this value equals attribute 15. Thus, if attribute 15 is set to 0x0801 (1/10mm), a value of 10 equals a preset to 1mm.</td></tr>
<tr><td>24</td><td>Velocity Value</td><td>DINT</td><td>Velocity measured by DL100. The velocity format is determined by attribute 25/26.</td></tr>
<tr><td>25</td><td>Velocity Format</td><td>ENGUNIT</td><td>Velocity Format
default value: 0x1F04 (counts /s)
range:
0x1F04 counts/s),
0x0816 (0.1 mm/s),
0x0810 (1 mm/s),
0x2B01 (10 mm/s),
0x0811 (100 mm/s)
0x2B07 (1 inch / s)
0x0812 (Attribute 26)</td></tr>
<tr><td>26</td><td>Velocity Resolution</td><td>DINT</td><td>Smallest change of the velocity value attribute (default 1)

Velocity Resolution in um /s when attribute 25 is set to free resolution (max. 65536).</td></tr>
<tr><td>41</td><td>Operating Status</td><td>Byte</td><td>Operating status of the device.
<table>
<tr><th>Bit</th><th>Name</th><th>Description</th><th>Supported</th></tr>
<tr><td>0</td><td>Direction</td><td>increasing (0)
decreasing (1)</td><td>Yes</td></tr>
<tr><td>1</td><td>Scaling</td><td>off (0)</td><td>Yes</td></tr>
</table></td></tr>
</table>

					on (1)	
			2..4	Reserved by CIP Always 0		-
			5..7	Vendor specific		No
44/45	Alarms	Word	Alarms (44) and Supported Alarms (45) of the device.			
			Bit	Name	Description	Supported
			0	Position Error	Plausib. Error	Yes
			1	Diagnostic error	off (0) on (1)	No
			2..11	Reserved by CIP Always 0		-
			12	Vendor Specific	-	No
			13	Vendor Specific	Laser Error	Yes
			14	Vendor Specific	Level Error	Yes
			15	Vendor specific	Temperature Error	Yes
46	Alarm Flag	BOOL	Logical OR over all Alarms			
47/48	Warnings	Word	Warnings (47) and Supported Warnings (48) of the device.			
			Bit	Name	Description	Supported
			0..10	Defined by CIP		No
			11..12	Reserved by CIP		-
			13	Vendor Specific	Laser Warning	Yes
			14	Vendor Specific	Level Warning	Yes
			15	Vendor specific	Temperature Warning	Yes
49	Warning Flag	BOOL	Logical OR over all Warnings			
51	Offset Value	DINT	Offset value (read only)			
Vendor specific extension of the Position Sensor Object						
Attribute	Name	Type	Description			
100	Level	WORD	Signal strength in dB			
101	Temperature	SINT	Temperature in °C			
102	Op. Hours	WORD	Operating hours			
103	Status, Warning and Alarm Flags	Word	Status, Warning and Alarm Flags			
			Bit	Name	Description	Supported
			0	Laser Warning		
			1	Temp. Warning		
			2	Level Warning		
			3	Plausib. Warning		
			4	Laser Error		
			5	Temp. Error		
			6	Level Error		
			7	Plausib. Error		
			8	MF1 active	1 = active	
			9	MF2 active	1 = active	
			10	Laser	**1 = Laser on** 0 = Laser off	
			11	Heater	**0 = Heater off** 1 = Heater on	
104	Laser Cntrl.	ENUM	Switch laser on / off. LASER_ON (0, default) LASER_OFF(1)			
105	Dynamic Preset	DINT	Dynamic Preset, referenced by output assembly 0x80. Writing 0x800000A presets the distance value to 10. In case attribute 15 is set to 0x0801 (1/10mm), a value of 10 equals a preset to 1mm. Writing 0x4xxxxxx will reset a previously applied preset.			

			Bit / Name / Description
			31 – Activate – A 0-1 transition will apply the preset value contained in bit 29-0
			30 – Reset – A 0-1 transition will reset the previously applied preset.
			29..0 – Preset – Preset value in two's complement. It is assumed that the value is scaled to attribute 15.
106	Reset Preset	BOOL	A 0-1 transition will reset the previously applied preset.
107	Position Resolution	UDINT	Scale in um (1-100000). When attribute 15 is set to 0x0808, the user scale, defined within attribute 107, is applied on attribute 10. The user scale in attribute 107 is set in um. Thus, when attribute 15 is set to 0x0808 and attribute 107 is set to 100, the value in attribute 10 is scaled to 0,1mm.
MF1 Configuration			
Attribute	Name	Type	Description
120	MF1 Setup Active Level	ENUM	Active level of MF1. Can either be HIGH (0) or LOW (1).
121	MF1 Setup Function	ENUM	Function of MF1. Can be one of: OUTPUT_DISTANCE_THRESHOLD (0) MF1 is an output and is toggled when attribute 10 exceeds/falls under attribute 128/129. OUTPUT_VELOCITY_THRESHOLD (1) MF1 is an output and is toggled when attribute 24 exceeds/falls under attribute 130/131. OUTPUT_SERVICE (2) MF1 is an output and is toggled by a logical OR over all active service attributes 122-127. INPUT_LASER_OFF (3) MF1 is an input and can be used to switch the laser on/off. INPUT_PRESET_STATIC (4) MF1 is an input and can be to apply a preset value (attribute 132).
122	MF1 Setup Service	BOOL	Plausibility Warning and Error Disabled (0, default), Enabled (1): If disabled, Error and Warning bits are not considered when attribute 121 is set to OUTPUT_SERVICE.
123	MF1 Setup Service	BOOL	Level Warning and Error Disabled (0, default), Enabled (1): If disabled, Error and Warning bits are not considered when attribute 121 is set to OUTPUT_SERVICE.
124	MF1 Setup Service	BOOL	Laser Warning and Error Disabled (0, default), Enabled (1): If disabled, Error and Warning bits are not considered when attribute 121 is set to OUTPUT_SERVICE.
125	MF1 Setup Service	BOOL	Temperature Warning and Error Disabled (0, default), Enabled (1): If disabled, Error and Warning bits are not considered when attribute 121 is set to OUTPUT_SERVICE.
126	MF1 Setup Service	BOOL	Device not ready Disabled (0, default), Enabled (1): If disabled, bit is not considered when attribute 121 is set to OUTPUT_SERVICE.
127	MF1 Setup Service	BOOL	Heater active Disabled (0, default), Enabled (1): If disabled, bit is not considered when attribute 121 is set to OUTPUT_SERVICE.
128	MF1 Setup Threshold	DINT	Range: -300 – 300m

	Position		
129	MF1 Setup Hysteresis	UDINT	Range: 1mm – 300m
130	MF1 Setup Threshold Velocity	DINT	Range: 50mm/s – ...mm/s
131	MF1 Setup Velocity Sign	USINT	Threshold velocity can be exceeded in one or both directions. - (0) + (1) +/- (2, default)
132	MF1 Setup Static Preset	DINT	Preset value that will be applied if attribute 121 is set to INPUT_PRESET_STATIC. Range: -300 – 300m
MF2 Configuration			
Attribute	Name	Type	Description
133	MF2 Setup Active Level	ENUM	Active level of MF2. Can either be HIGH (0) or LOW (1).
134	MF3 Setup Function	ENUM	Function of MF2. Can be one of: OUTPUT_DISTANCE_THRESHOLD (0) MF2 is an output and is toggled when attribute 10 exceeds/falls under attribute 141/142. OUTPUT_VELOCITY_THRESHOLD (1) MF2 is an output and is toggled when attribute 24 exceeds/falls under attribute 143/144. OUTPUT_SERVICE (2) MF2 is an output and is toggled by a logical OR over all active service attributes 135-140.
135	MF2 Setup Service	BOOL	Plausibility Warning and Error Disabled (0, default), Enabled (1): If disabled, Error and Warning bits are not considered when attribute 134 is set to OUTPUT_SERVICE.
136	MF2 Setup Service	BOOL	Level Warning and Error Disabled (0, default), Enabled (1): If disabled, Error and Warning bits are not considered when attribute 134 is set to OUTPUT_SERVICE.
137	MF2 Setup Service	BOOL	Laser Warning and Error Disabled (0, default), Enabled (1): If disabled, Error and Warning bits are not considered when attribute 134 is set to OUTPUT_SERVICE.
138	MF2 Setup Service	BOOL	Temperature Warning and Error Disabled (0, default), Enabled (1): If disabled, Error and Warning bits are not considered when attribute 134 is set to OUTPUT_SERVICE.
139	MF2 Setup Service	BOOL	Device not ready Disabled (0, default), Enabled (1): If disabled, bit is not considered when attribute 134 is set to OUTPUT_SERVICE.
140	MF2 Setup Service	BOOL	Heater active Disabled (0, default), Enabled (1): If disabled, bit is not considered when attribute 134 is set to OUTPUT_SERVICE.
141	MF2 Setup Threshold Position	DINT	Range: -300 – 300m
142	MF2 Setup Hysteresis	UDINT	Range: 1mm – 300m
143	MF2 Setup Threshold Velocity	DINT	Range: 50mm/s – ...mm/s
144	MF2 Setup Velocity Sign	USINT	Threshold velocity can be exceeded in one or both directions. - (0)

			+ (1) +/- (2, default)
150	Avg. Filter Distance	USINT	Average Filter applied on attribute 10. Can be one of: FAST (0) no filter MEDIUM (1) Filter depth ~8ms SLOW (2) Filter depth ~32ms
151	Avg. Filter Velocity	USINT	Average Filter applied on attribute 24. Can be one of: FAST (0) no filter MEDIUM (1) Filter depth ~8ms SLOW (2) Filter depth ~32ms
152	Error Rejection	USINT	The device can suppress errors for a certain amount of time. Can be one of: OFF (0) no suppression 50_MS (1) 50ms 200_MS (2, default) 200ms
153	Heating Threshold	SINT	Defines when the device will switch its heat on. This only possible with devices of type DL100-xxHxxxxx. Range: -10 °C - 40 °C, default -10 °C
154	Frequency Mode		Switches the operating frequency of the device to allow simultaneous operation of two devices that influence each other. This only possible with devices of type DL100-xxxBxxxx. Can be one of: MODE_0 (0,default) MODE_1 MODE_2 MODE_3
Device Identification			
Attribute	Name	Type	Description
160	Serial Number	Short_String [9]	Serial Number of the device (e.g. 1058164). First byte encodes the length of the string.
161	Product Code	Short_String [19]	Product Code of the device (e.g. DL100-xxxxxxxx). First byte encodes the length of the string.
162	HW Version	Short_String [9]	Hardware Revision of the device (e.g. 12344321). First byte encodes the length of the string.
163	FPGA Version	Short_String [13]	Software version of the FPGA (e.g. V000.000.000). First byte encodes the length of the string.
164	uC1 Version	Short_String [13]	Software version of microprocessor 1 (e.g. V000.000.000). First byte encodes the length of the string.
165	uC2 Version	Short_String [13]	Software version of microprocessor 2 (e.g. V000.000.000). First byte encodes the length of the string.

1.3. Explicit Messaging

Explicit messaging can be used for configuration and monitoring of the device over TCP.

1.4. Implicit Messaging

Implicit messaging is used for cyclic data exchange between an EtherNet/IP Scanner and a Slave over UDP (Unicast and Multicast are supported). The device supports one I/O Connection. The data transferred between scanner and slave is structured within an input, an output and a configuration assembly. Each assembly is formed by attributes defined by the position sensor object.

Input Assembly: Data sent from slave to scanner

Output Assembly: Data sent from scanner to slave

Configuration Assembly: Slave Configuration

1.4.1. Input Assemblies

Instance-ID	Name	Size	Attribute-ID	Name	Type	Size
0x01	Position	4	10	Position Value Signed	DINT	4
0x03	Position, Velocity	8	10 24	Position Value Signed Velocity Value	DINT DINT	4 4
0x64	Velocity	4	24	Velocity Value	DINT	4
0x65	Extended	20	10	Position Value Signed	DINT	4
			24	Velocity Value	DINT	4
			103	Status, Warnings and Alarm Flags	WORD	2
			100	Level	WORD	2
			101	Temperature	SINT	1
			102	Operating Hours	UDINT	4
				Reserved	BYTE	3

1.4.2. Output Assemblies

Instance-ID	Bezeichnung	Size	Attribute-ID	Name	Datentyp	Größe
0x80	Dyn. Preset	4	105	Dyn. Preset Value	DINT	4

1.4.3. Configuration Assemblies

Instance-ID	Bezeichnung	Size	Attribute-ID	Name	Datentyp	Größe
0x99	Configure	64	9	Auto Zero	BOOL	1
			12	Direction Counting Toggle	BOOL	1
			15	Position Format	ENGUINT	2
			107	Position Resolution	UDINT	4
			25	Velocity Format	ENGUINT	2
			26	Velocity Resolution	UDINT	4
			106	Reset Preset / Offset	BOOL	1
			120	MF1 Active level	BOOL	1
			121	MF1 Function	USINT	1
			122	MF1 Service – Plausib. WE	BOOL	1
			123	MF1 Service – Temp. WE	BOOL	1
			124	MF1 Service – Level WE	BOOL	1
			125	MF1 Service – Laser WE	BOOL	1
			126	MF1 Service – Not Ready	BOOL	1
			127	MF1 Service – Heater act.	BOOL	1
			128	MF1 Output – Threshold Pos.	DINT	4
			129	MF1 Output – Hyst. Pos.	UDINT	4
			130	MF1 Output – Threshold Velo.	INT	2
			131	MF1 Output – Velocity Sign	USINT	1
			132	MF1 Input - Preset	DINT	4
			133	MF2 Active level	BOOL	1

			134	MF2 Function	USINT	1
			135	MF2 Service - Plausib. WE	BOOL	1
			136	MF2 Service - Temp. WE	BOOL	1
			137	MF2 Service - Level WE	BOOL	1
			138	MF2 Service - Laser WE	BOOL	1
			139	MF2 Service - Not Ready	BOOL	1
			140	MF2 Service - Heater act.	BOOL	1
			141	MF2 Output - Threshold Pos.	DINT	4
			142	MF2 Output - Hysteresis	UDINT	4
			143	MF2 Output - Threshold Velo.	INT	2
			144	MF2 Output - Velocity Sign	USINT	1
			150	Avg. Filter Distance	USINT	1
			151	Avg. Filter Velocity	USINT	1
			152	Error Rejection	USINT	1
			153	Heating Threshold	SINT	1
			154	Frequency Mode	SINT	1
				Reserved	BYTE	2

2. Examples

2.1. Molex EtherNet/IP Tool

The Molex EtherNet/IP Tool can be downloaded free of charge from:

http://www.deutsch.molex.com/molex/common/staticLoader.jsp?fileName=/mx_upload/superfamily/iccc/EtherNet_IPTool.html

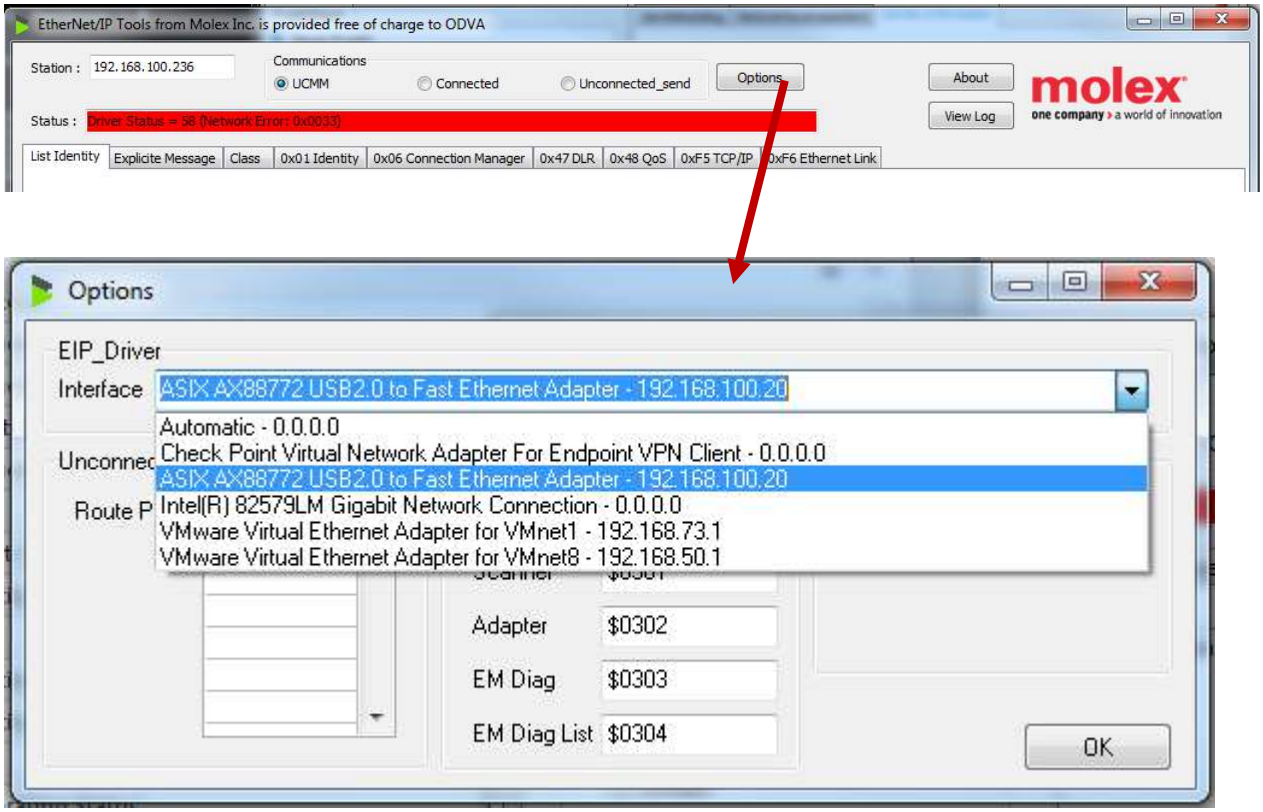
Note: *Under Windows 7 you must run the program as administrator.*

2.1.1. Tool configuration

Click on “Options” and select the Ethernet Adapter that is connected to a DL100. The default network configuration of the device is:

IP: 192.168.100.236

Subnet: 255.255.255.0



You can always reset the device to factory defaults using the display.

1. Go to menu “SpecFu”

   You can get to the menu “SpecFu” via the menu path:
   Main menu → Set → Menu → Set → Profin → ▽ → more → ▽ →
   MFx On → ▽ → (MF1 → ▽ → MF2 → ▽ →) Offset → ▽ → SpecFu

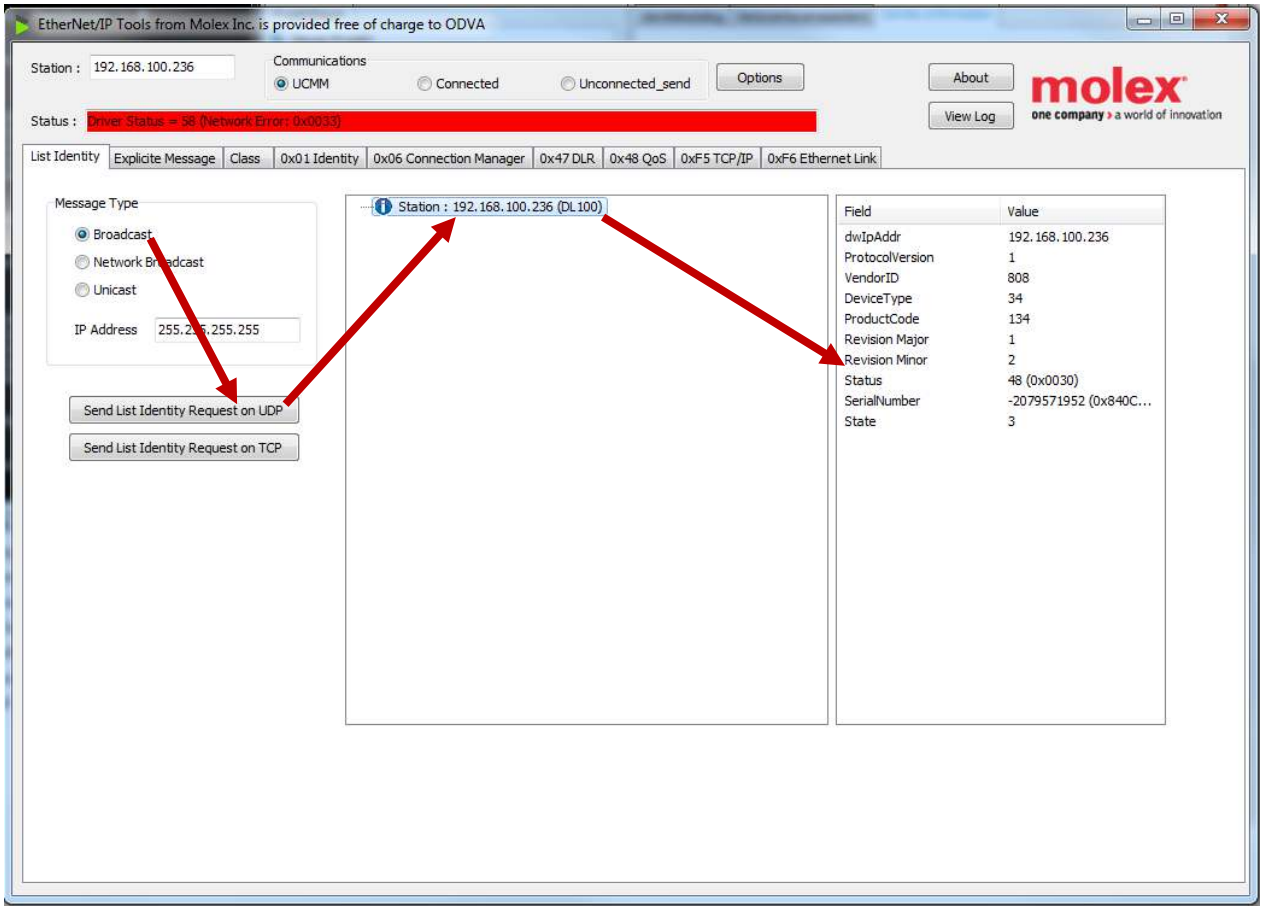
2. Apply reset

1. Select the parameter "Reset" in the menu "SpecFu".
   → See page 51, 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.

3. Leave the menu by pressing Esc a couple of times.

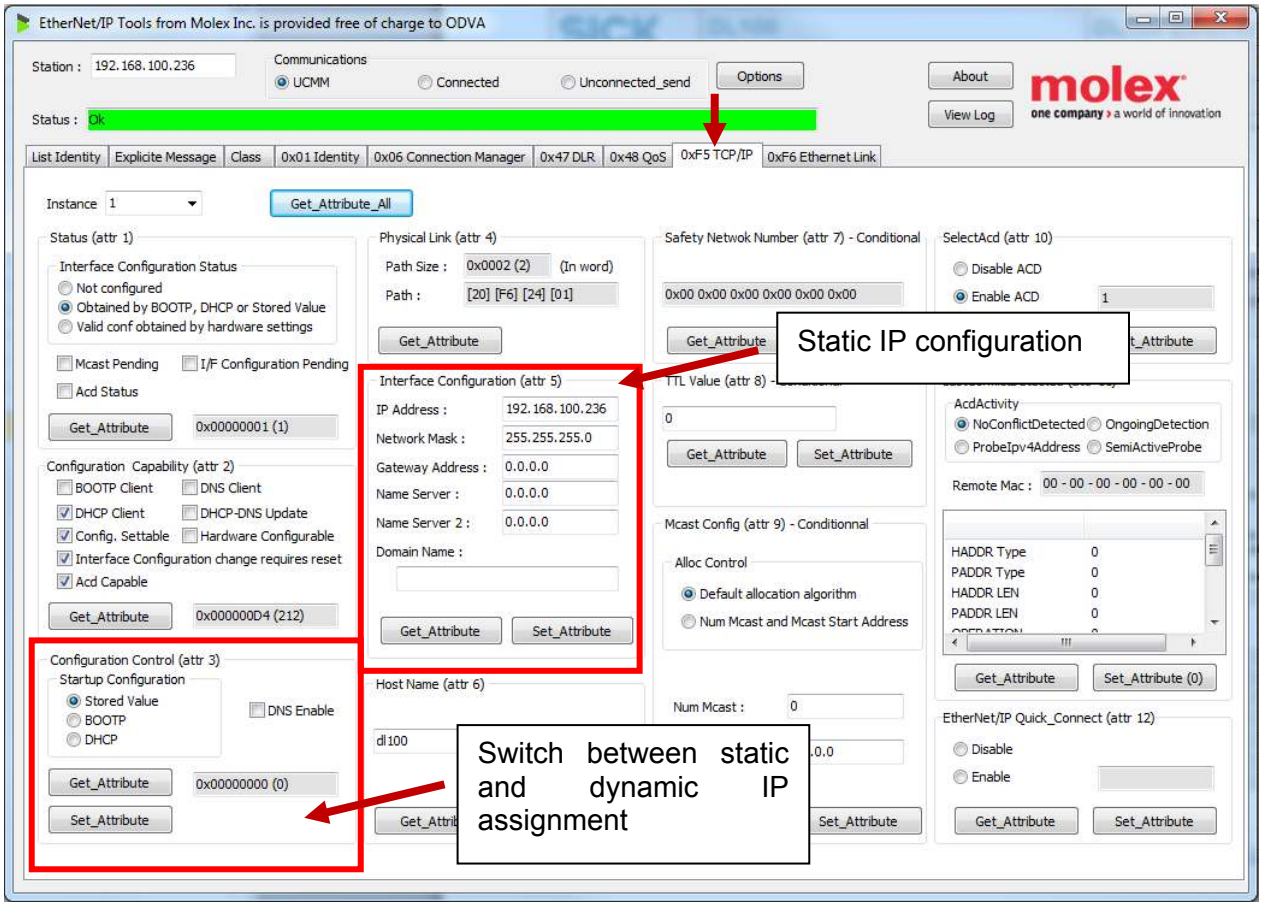
2.1.2. Scan for EtherNet/IP Slaves

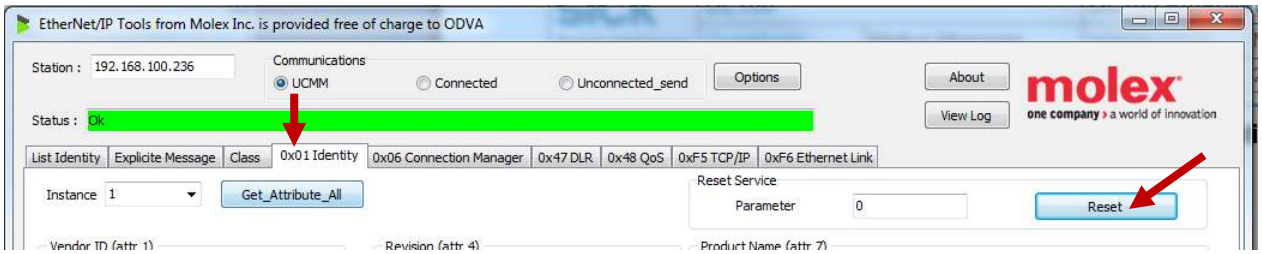
- Go to tab “List Identity”
- Choose “Broadcast”
- Click “Send List….over UDP”
- Device will show up
- Mark the device to display more information



2.1.3. Configure the device for DHCP / BootP or static IP

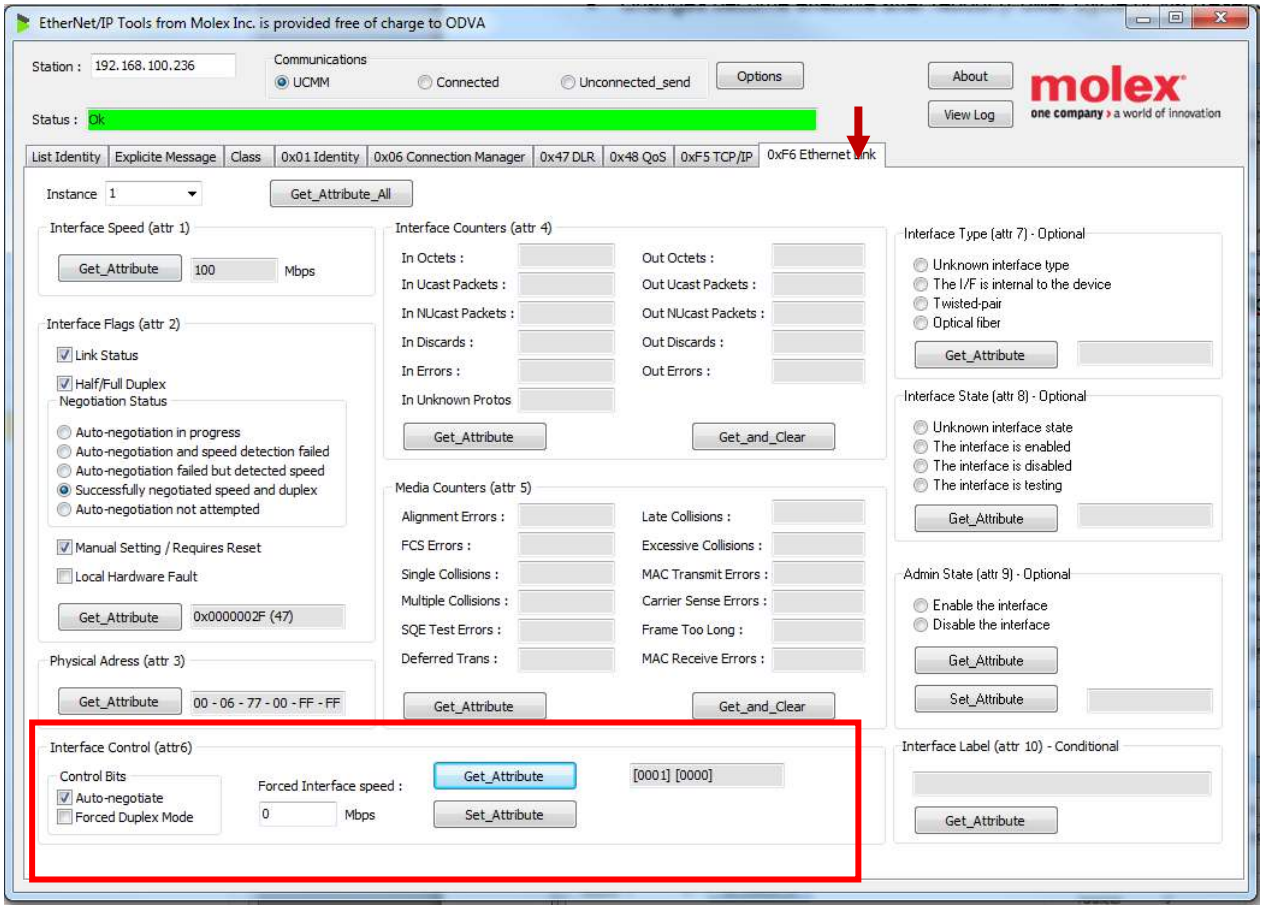
- Go to the TCP/IP tab
- Click “Get_Attribute_ALL”
- Apply changes to ….
- Changes become effective after reboot (Power Cycle or via Reset Service)





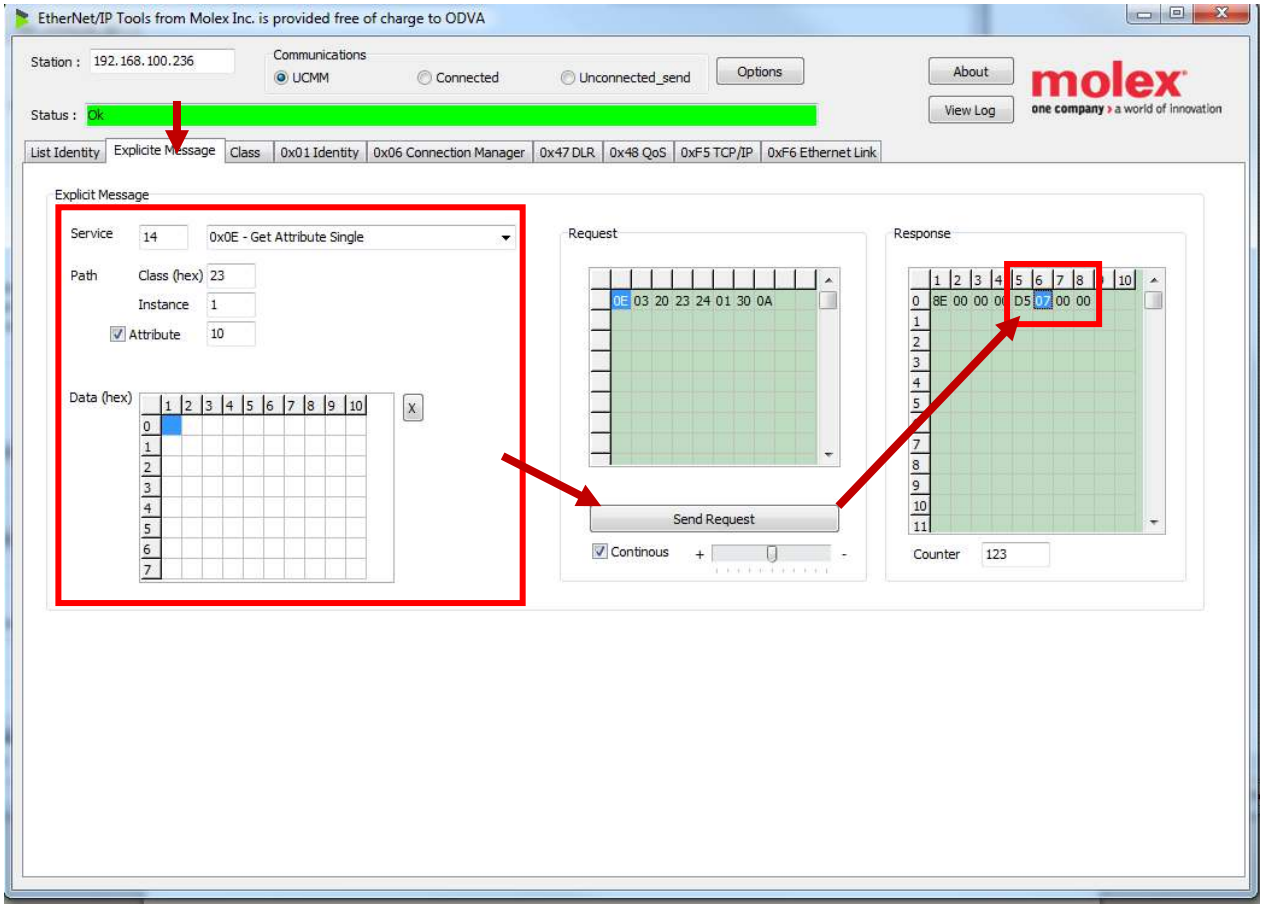
2.1.4. Physical layer configuration

- Go to the Ethernet Link tab
- Read attribute 6 (Interface control) by clicking “Get_Attribute”
    - If auto-negotiate is turned on the device will ignore all other parameters within attribute 6.
    - Forced Duplex Mode 0 => half duplex, 1=> full duplex
    - Forced Interface Speed can be set 10 and 100.



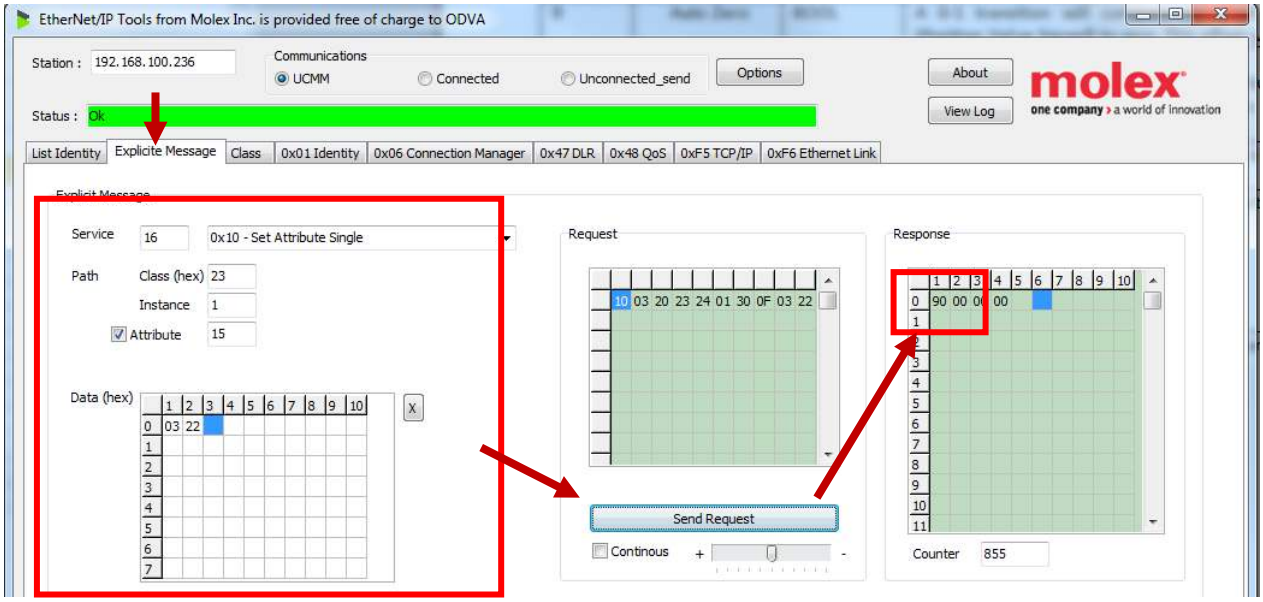
2.1.5. Explicit read of an attribute within the position sensor object

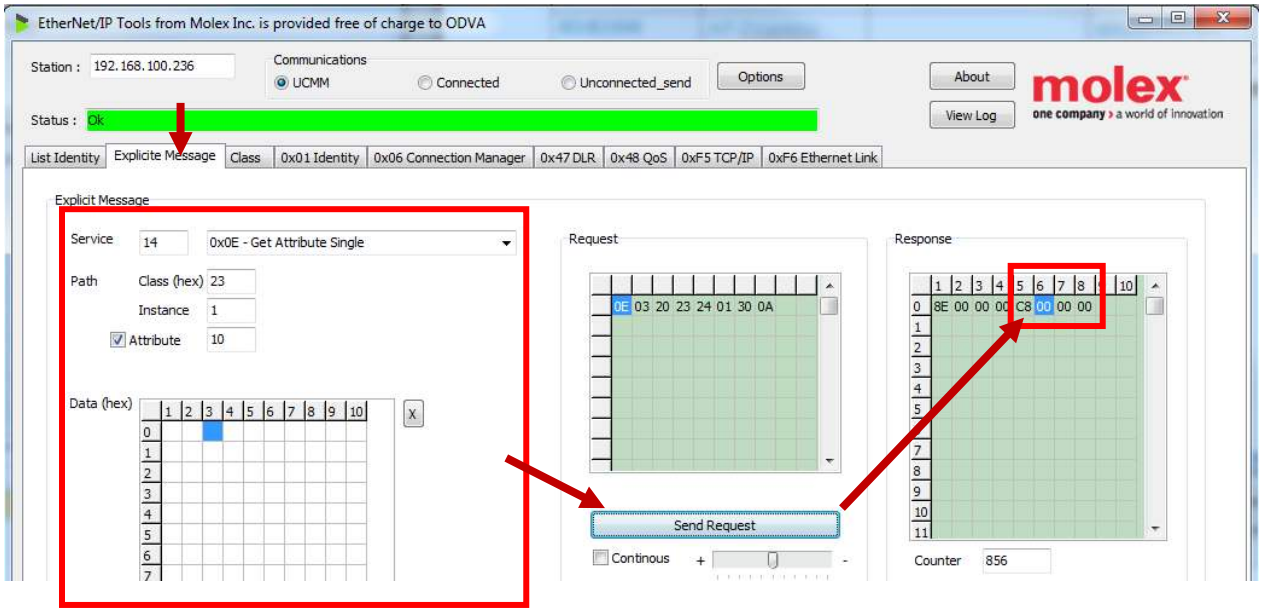
- Go to the Explicite Message tab
- Choose service “Get Attribute Single”
- Class 0x23, Instance 1
- Choose for instance attribute 10 (Position Value Signed)
- Send Request
- Position value is stored within the last four bytes of the reply (change endianess!)
- 0xD5070000 => 0x000007d5 => 2005



2.1.6. Explicit write of an attribute within the position sensor object

- Choose service “Set Attribute Single”
- Class 0x23, Instance 1
- Choose for instance attribute 15 (Position Resolution)
- Change resolution to 1mm => 0x2203
- Change endianes => 0x0322
- Send Request
- First byte 0x90 => success
- Go to the previous section an observe that the position value changed to 0xC8 => 200. This is expected as the resolution was changed from 1/10mm to 1mm.



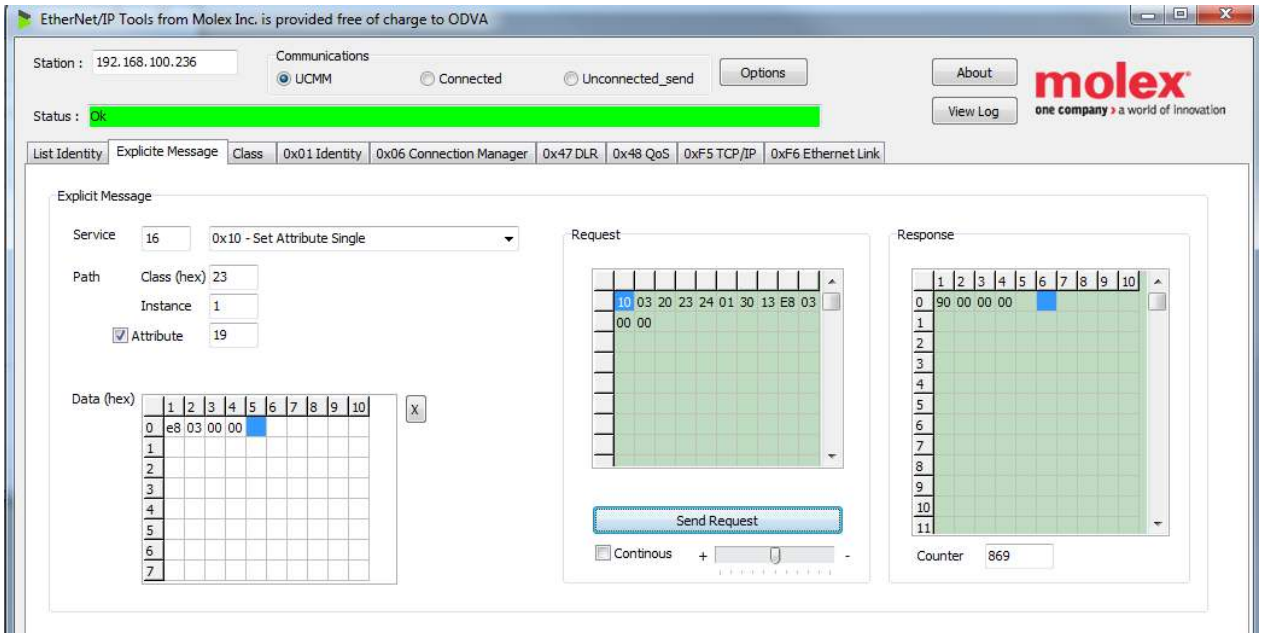


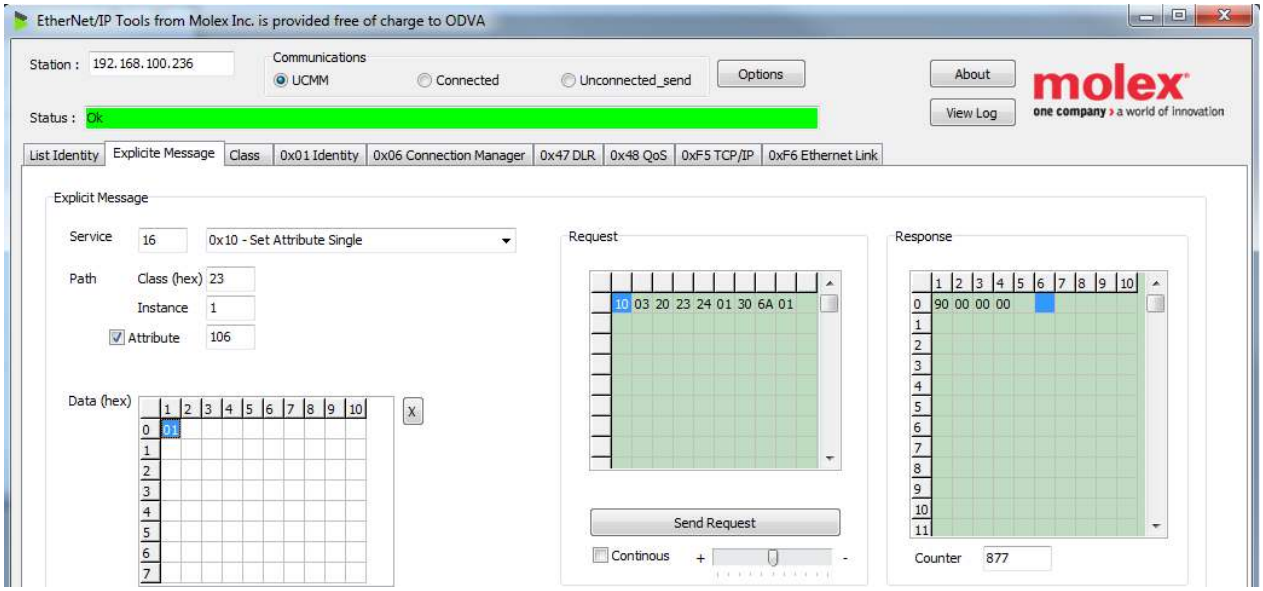
2.1.1. Apply a static preset

Note: Attribute 105 can only be written using implicit messaging

- As implicit messaging is not supported by the tool we will write attribute 19 via explicit messaging.
- Set the data field to 0xe8030000 to apply a preset to 1000 (still using mm resolution)
- Observe that the display will show 1000mm
- Write 0x01 to attribute 106 to reset this preset

Note: Attribute 106 monitors 0-1 transitions. Thus, you might need to write 0x00 in case you have previously written 0x01.



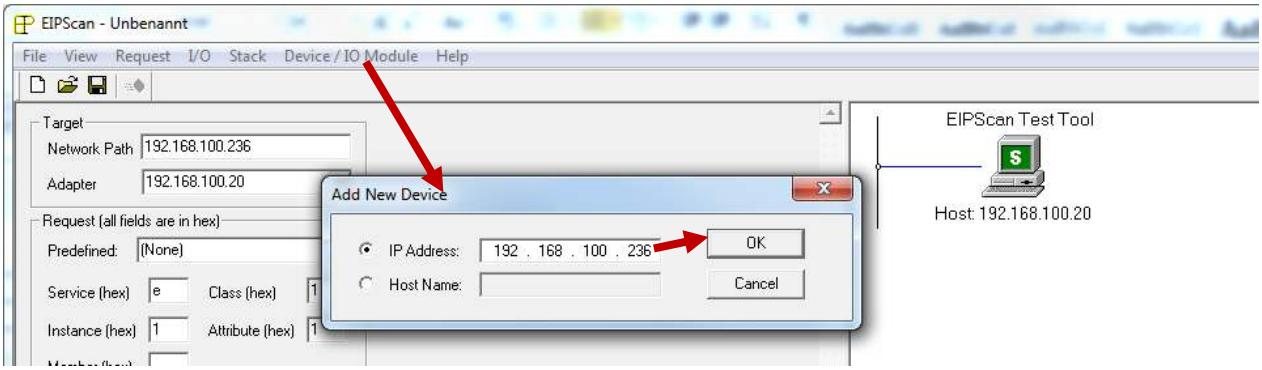


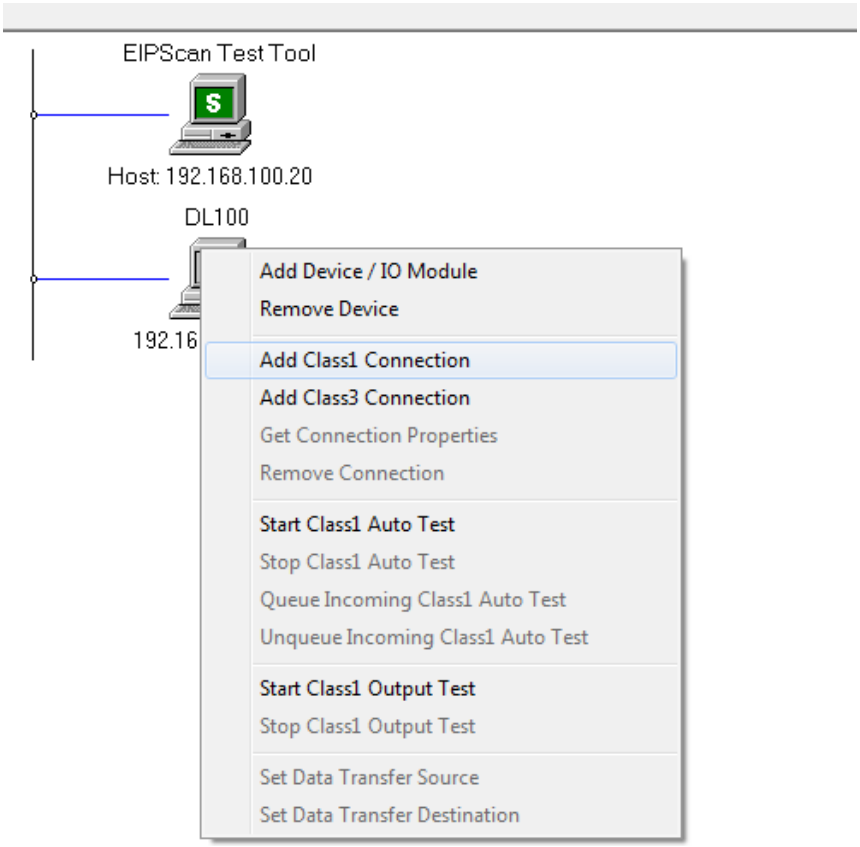
2.2. EIPScan

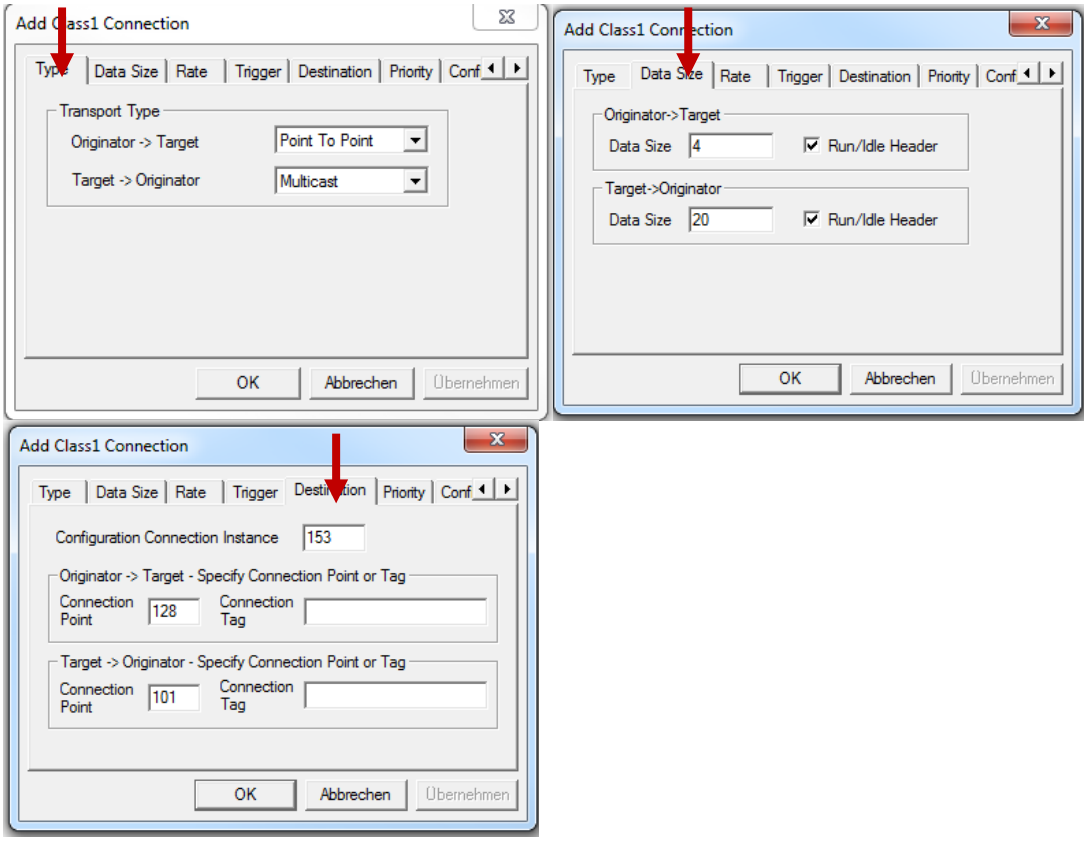
EIPScan simulates an EtherNet/IP scanner. This software can be purchased from IXXAT.
http://www.ixxat.de/eipscan_de.html

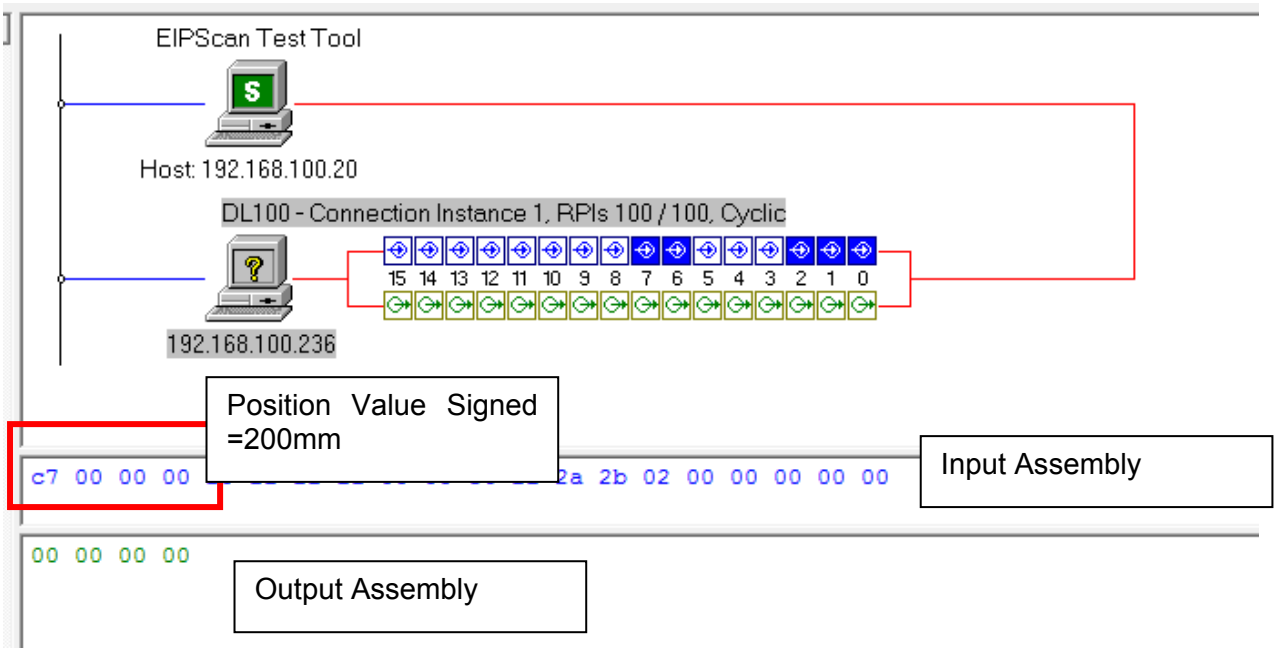
2.2.1. Explicit Messaging and dynamic preset

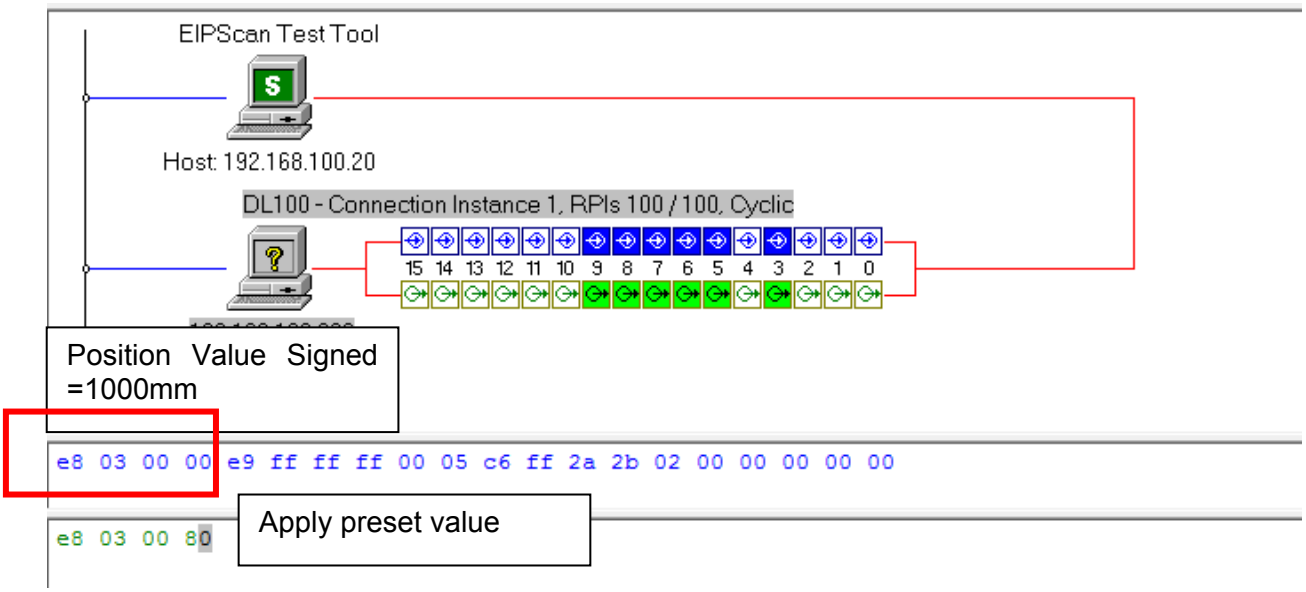
- Click “Add new device” within the “Device / IO Module” menu
- Add Class 1 connection, configure it and click “OK”

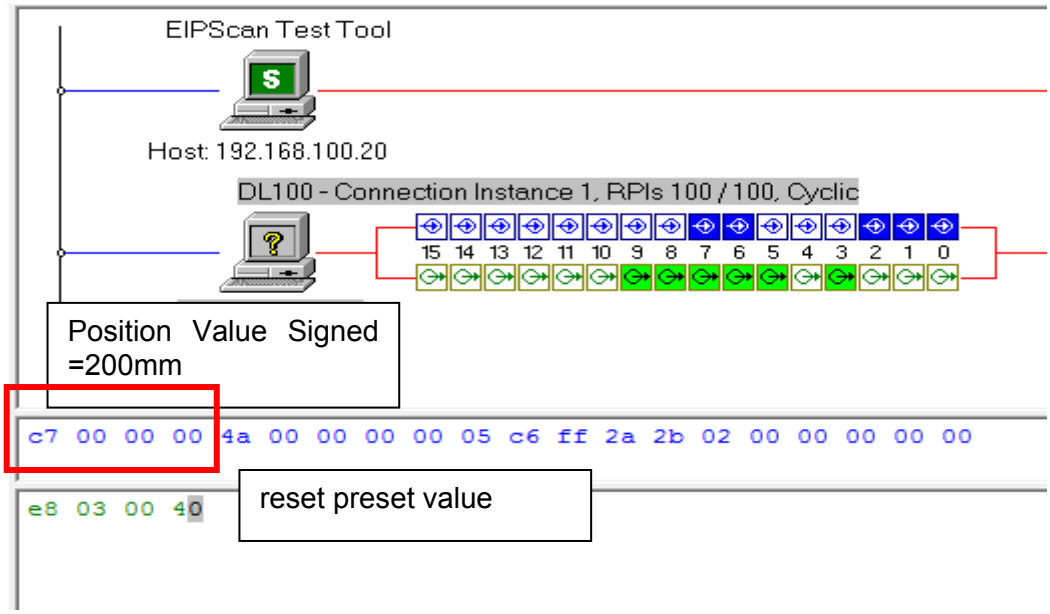





Add Class1 Connection
Type
Data Size
Rate
Trigger
Destination
Priority
Transport Type
Originator -> Target
Point To Point
Target -> Originator
Multicast
OK
Abbrechen
Übernehmen
Originator->Target
Data Size
4
Run/Idle Header
Target->Originator
20
Configuration Connection Instance
153
Originator -> Target - Specify Connection Point or Tag
Connection Point
128
Connection Tag
Target -> Originator - Specify Connection Point or Tag
101


EIPScan Test Tool
Host: 192.168.100.20
DL100 - Connection Instance 1, RPIs 100 / 100, Cyclic
15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0
192.168.100.236
Position Value Signed =200mm
c7 00 00 00
2a 2b 02 00 00 00 00 00
Input Assembly
00 00 00 00
Output Assembly

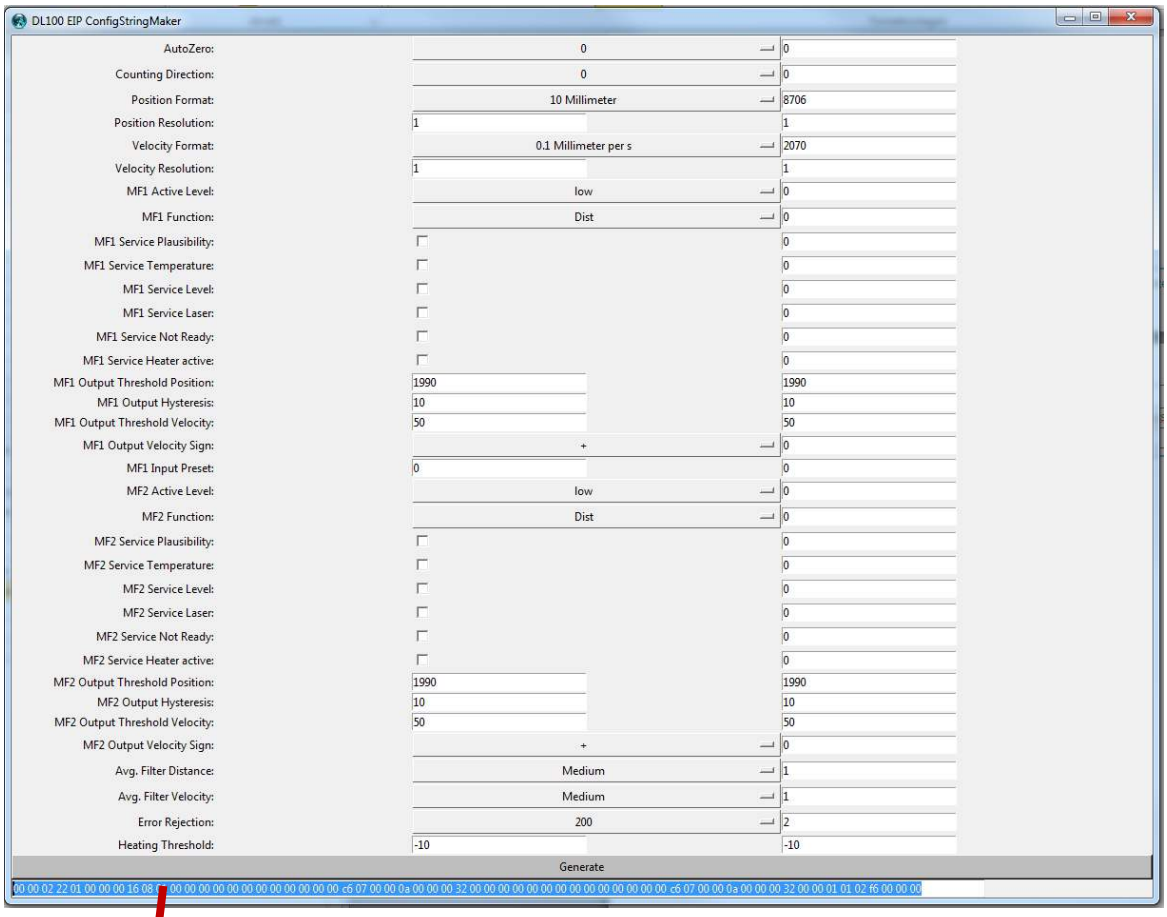

EIPScan Test Tool
Host: 192.168.100.20
DL100 - Connection Instance 1, RPIs 100 / 100, Cyclic
15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0
Position Value Signed =1000mm
e8 03 00 00 e9 ff ff ff 00 05 c6 ff 2a 2b 02 00 00 00 00 00
e8 03 00 80
Apply preset value

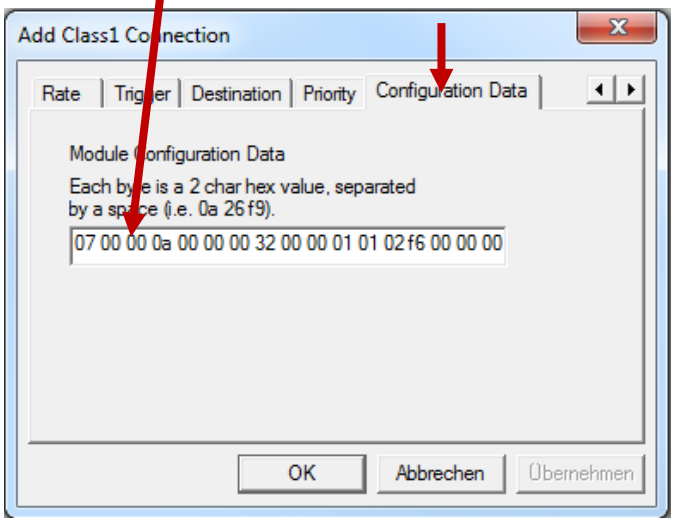

EIPScan Test Tool
Host: 192.168.100.20
DL100 - Connection Instance 1, RPIs 100 / 100, Cyclic
15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0
Position Value Signed =200mm
c7 00 00 00 4a 00 00 00 00 05 c6 ff 2a 2b 02 00 00 00 00 00
e8 03 00 40
reset preset value

2.2.1. Explicit Messaging – Configuration Assembly

We wrote a little helper tool to generate a configuration string using a GUI. The tool is available upon request (uwe.kuehnle@sick.de). Simply select the configuration options and click on “Generate”. The resulting string can be copied and pasted to EIPScan.

Note: The tool does not comply with SICK software standards. It is a rudimentary tool that was written to help us debugging the device.





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 Pro 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 44: Maintenance plan

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 93, chapter 14.3.	• 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 88, chapter 12.2.
LED **PWR** flashes red.	An error is pending.	→ For possible causes and their removal, see page 89, 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.	• 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.	• Configure device. • Check configuration.

Table 45: LED status display

12.2 Warning messages

Display	Meaning / possible causes	Troubleshooting
NoWrn	No warnings	–
wPlb	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 24, chapter 6.
	Optical interferences	• Remove optical interferences. • Re-align distance measuring device and reflector. → For alignment and mounting, see page 24, 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 29, Table 6.	• 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 96, chapter 14.10.

Display	Meaning / possible causes	Troubleshooting
wTemp	Internal device temperature is close to the permissible range. → For the permissible ambient temperature, see page 95, chapter 14.8.	• 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 46: 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 24, chapter 6.
	Optical interferences	• Remove optical interferences. • Re-align distance measuring device and reflector. → For alignment and mounting, see page 24, chapter 6.
eLaser	The service life of a measurement laser is exceeded.	Interchange measuring device.
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 29, Table 6.	• 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 96, chapter 14.10.
eTemp	The internal devicetemperature is outside of the permissible range. → For the permissible ambient temperature, see page 95, chapter 14.8.	• 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 47: Error messages

12.4 PROFINET IO error messages

Display	Meaning / possible causes	Troubleshooting
Device error	Hardware	• Check supply voltage and wiring. → For electrical connection, see page 33, 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 95, chapter 14.8.	• 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 29, 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.
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 devicetemperature is within the threshold range. → For the permissible ambient temperature, see page 106, chapter 14.8.	Check ambient temperature.

Table 48: 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

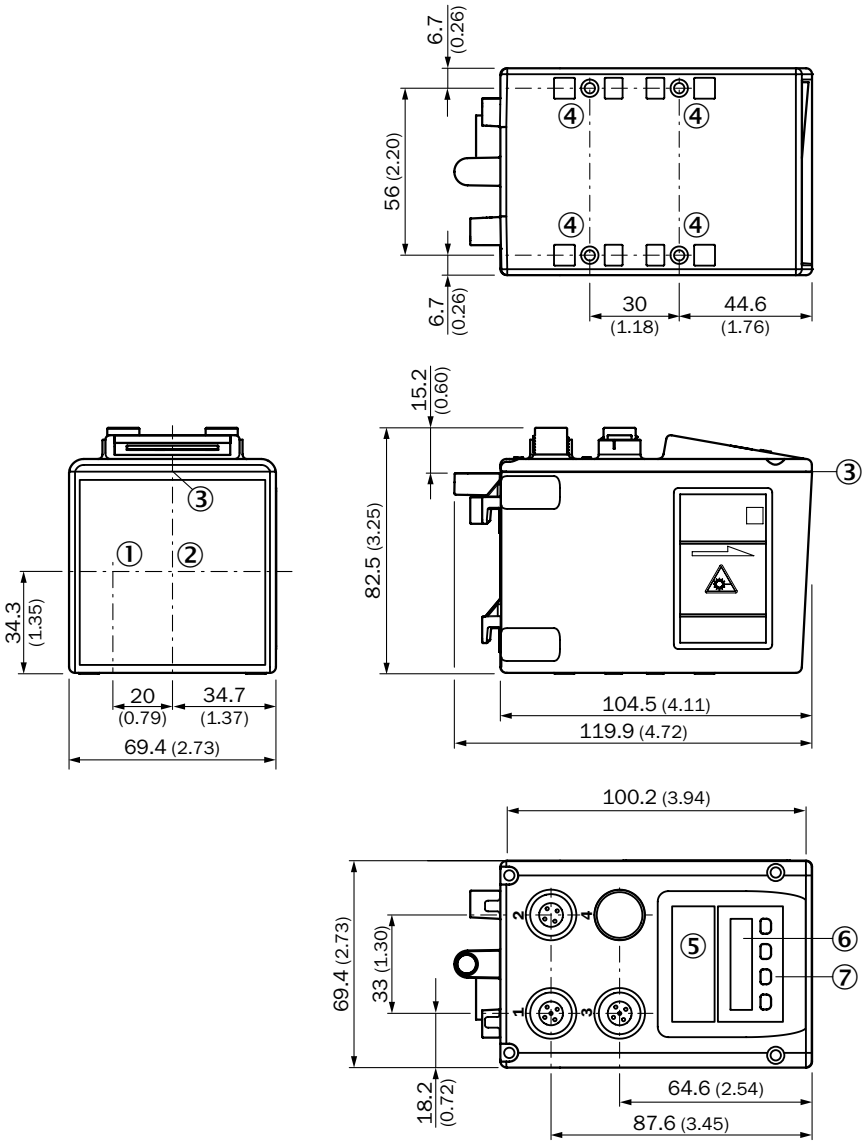
Repairs must only be performed by the manufacturer. The manufacturer's warranty will lapse in case of interruptions and changes to the device.

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_pro".

14.1 Dimensions



All dimensions in mm (inch)

Fig. 25: Dimensions distance measuring device DL100 Pro

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*

14.2 Laser/optics

Light source	Laser diode, red light
Laser protection class	2 pursuant to EN 60825-1 /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])

Table 49: Laser/Optics

14.3 Performance

Measurement ranges	• DL100–21XXXXXX: 0.15 m ... 100 m • DL100–22XXXXXX: 0.15 m ... 200 m • DL100–23XXXXXX: 0.15 m ... 300 m
Measuring accuracy	• Measuring range 0.15 m ... 100 m: ± 2.0 mm • Measuring range 0.15 m ... 200 m: ± 2.5 mm • Measuring range 0.15 m ... 300 m: ± 3.0 mm
Repeatability	• Measuring range 0.15 m ... 100 m: ± 0.50 mm • Measuring range 0.15 m ... 200 m: ± 1.00 mm • Measuring range 0.15 m ... 300 m: ± 2.00 mm
Initialization time	• Typical 1.5 s • After reflector loss: < 40 ms
Resolution	Adjustable: 0.1 mm / 0.125 mm / 1.0 mm / 10 mm / 100 mm

Table 50: Performance data

14.4 Supply

Supply voltage V_S	18 V DC ... 30 V DC
Current consumption	• 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 51: Supply

14.5 Inputs

Inputs	Multifunction input MF1, adjustable • Hi > 12 V • Lo < 3 V → See page 44, Table 15, parameter “ActSta”.
Protective circuit	No, not reverse polarity protected

Table 52: Inputs

14.6 Outputs

Outputs	Multifunction outputs MF1 and MF2, type: B (push/pull), adjustable • Hi > UV – 3 V • Lo < 2 V → See page 44, Table 15 and page 50, Table 20, parameter “ActSta2.
Maximum output current	Max. 100 mA
Output load	• Capacity: 100 nF • Inductive 20 mH

Table 53: Outputs

14.7 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 fullduplex

Table 54: Interfaces

14.8 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	15 m/s
Maximum acceleration	15 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 55: Ambient conditions

14.9 Constructive setup

Dimensions	→ See page 92, chapter 14.1.
Weight	• Distance measuring device: 800 g • Alignment bracket (optional): 800 g
Materials	• Casing: Cast aluminium GD-AlSi12Cu1 (3.2982.05) • Front screen: PMMA
Connections	M12, SpeedCon™
Display	• 6 points with a 5 x 7 point matrix • Overflow is displayed with the maximum value that can be displayed, –99999 bzw. 999999.

Table 56: Constructive setup

14.10 Device selection for EtherNET/IP interface

Ambient temperature)	Power consumption at 24 V DC	Measuring range	Accuracy	Repeatability [1]	Order no.	Type code
[°C]	[mA]	[m]	[mm]	[mm]		
–20 ... +55 [2]	<250	0.15 ... 100	± 2.0	± 0.5	1066427	DL100-21AA2110
		0.15 ... 200	± 2.5	± 1.0	1066428	DL100-22AA2110
		0.15 ... 300	± 3.0	± 2.0	1066429	DL100-23AA2110
–40 ... +55	<1000	0.15 ... 100	± 2.0	± 0.5	1066423	DL100-21HA2110
		0.15 ... 200	± 2.5	± 1.0	1066425	DL100-22HA2110
		0.15 ... 300	± 3.0	± 2.0	1066429	DL100-23HA2110

1) Statistic error 1 σ

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

Table 57: Device selection

NOTE!

→ For more information on the versions of the other interfaces, see "www.sick.com/dl100_pro".

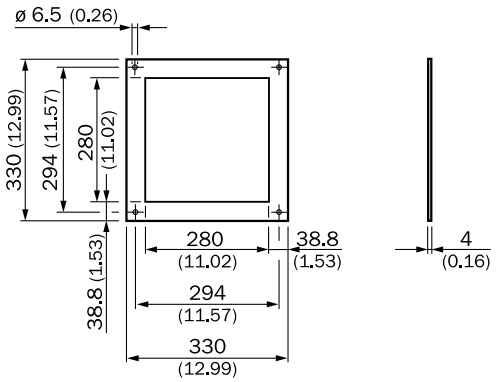
15 Accessories

Note!

Only some of the available accessories are shown here. Complete details on all accessories are available at www.sick.com/dl100_pro.

15.1 Reflectors and reflective tape

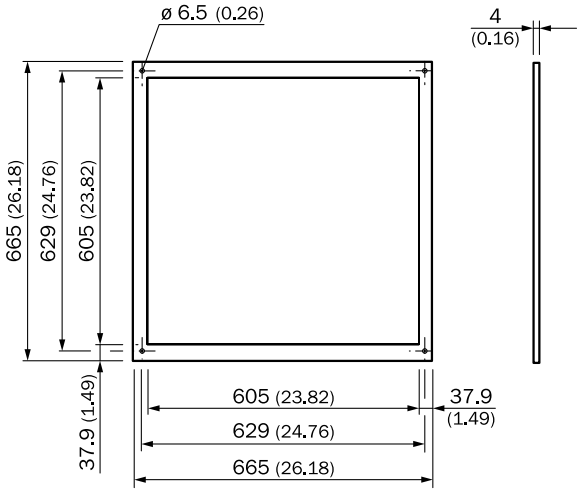
15.1.1 Reflectors



All dimensions in mm (inch)

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

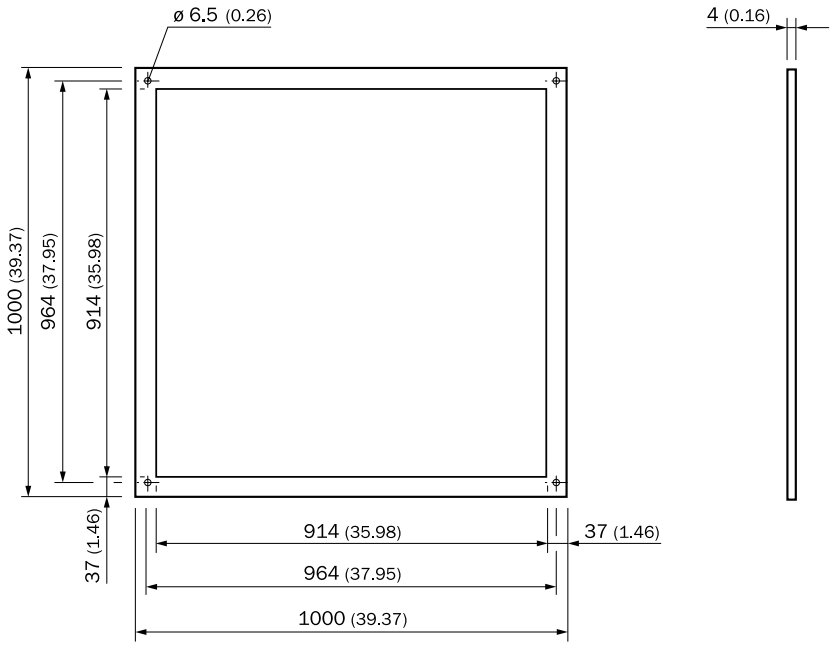
Description	Reflector 0.3 x 0.3 m² Diamond Grade, mounted on base plate ALMG3
Type	PL240DG
Part no.	1017910



All dimensions in mm (inch)

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

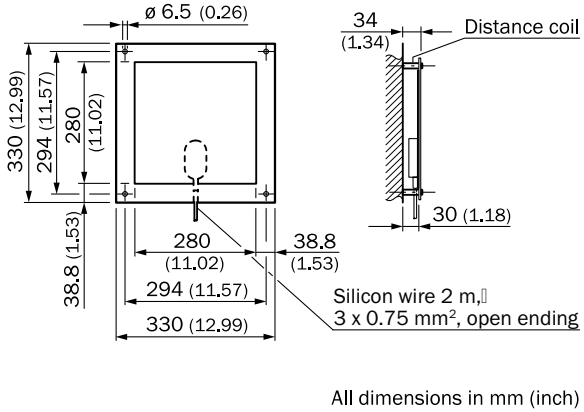
Description	Reflector 0.6 x 0.6 m² Diamond Grade, mounted on base plate ALMG3
Type	PL560DG
Part no.	1016806



All dimensions in mm (inch)

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

Description	Reflector 1.0 x 1.0 m² 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 m² 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

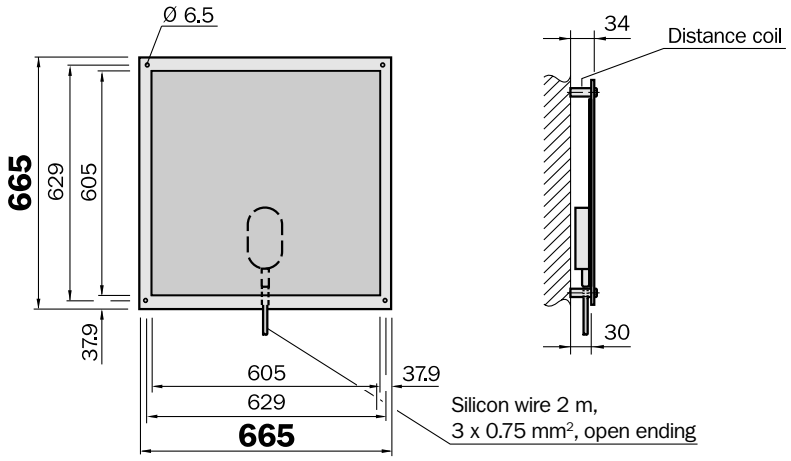


Fig. 30: Reflector 0.6 x 0.6 m² Diamond Grade, mounted, including heating

Description	Reflector 0.6 x 0.6 m² 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 Reflevtive tape

Fig. 31: "Diamond grade" reflective tape

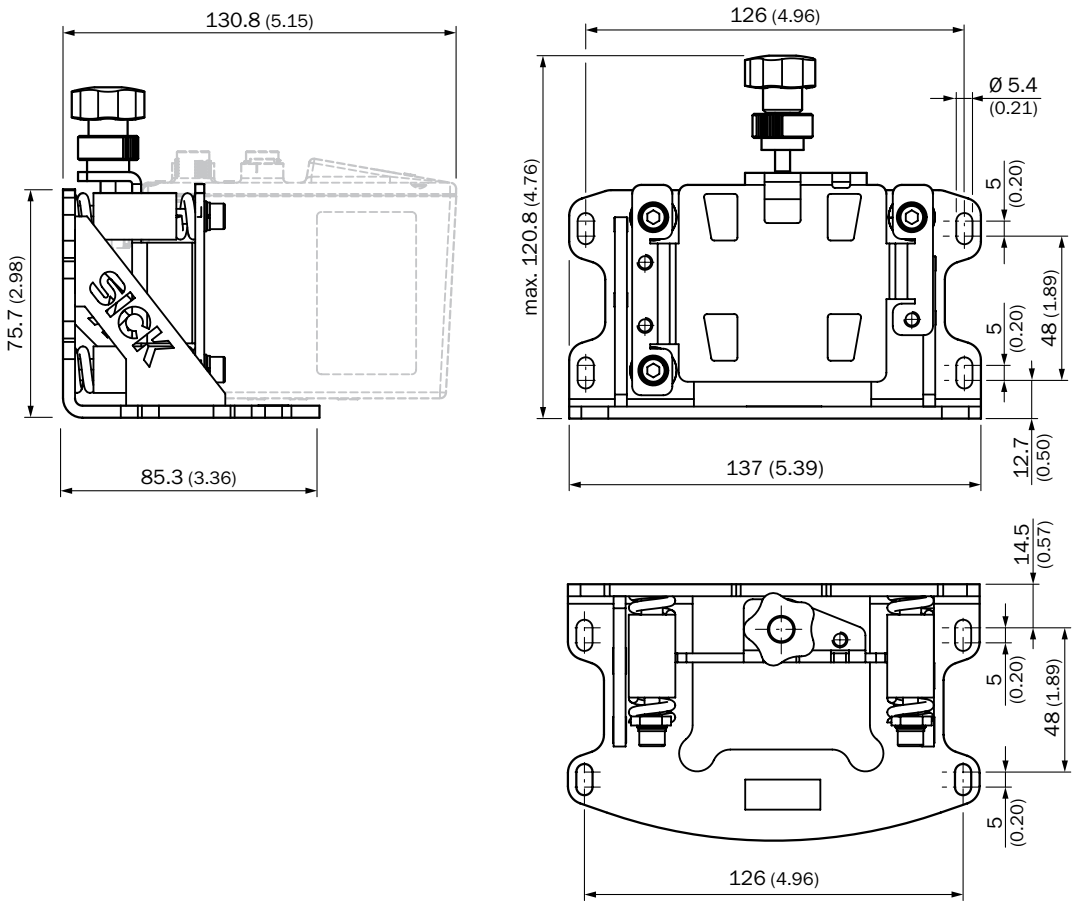
Description	"Diamond grade" reflective tape, size customizable
Type	REF-DG
Part no.	4019634
Description	"Diamond grade" reflective tape, curve 749 x 914 mm²
Type	REF-DG
Part no.	5320565

15.2 Connection systems

Note!

Complete details on all accessories are available at www.sick.com/dl100_pro.

15.3 Mounting systems

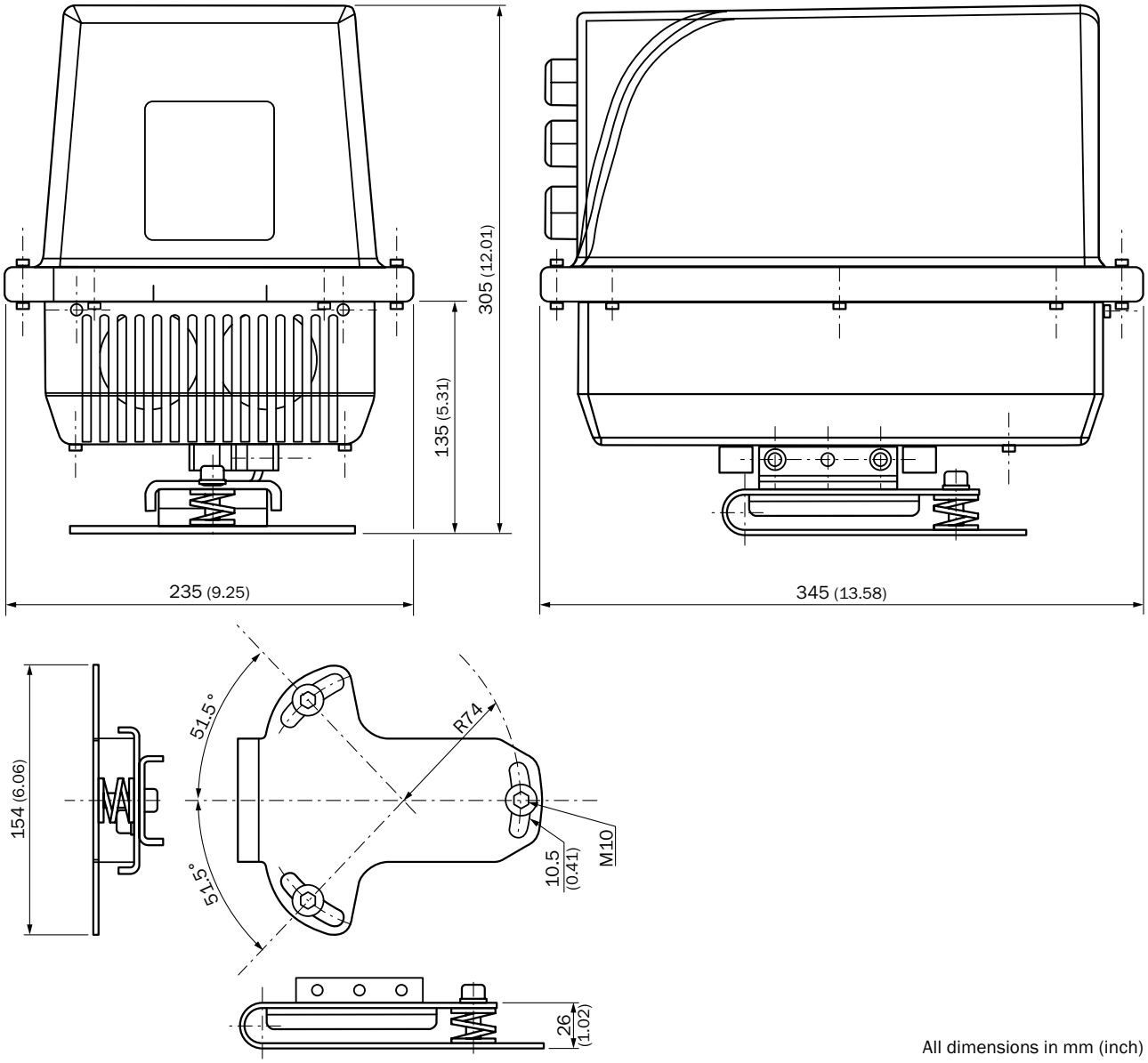


All dimensions in mm (inch)

Fig. 32: Alignment bracket

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

15.4 Other accessories

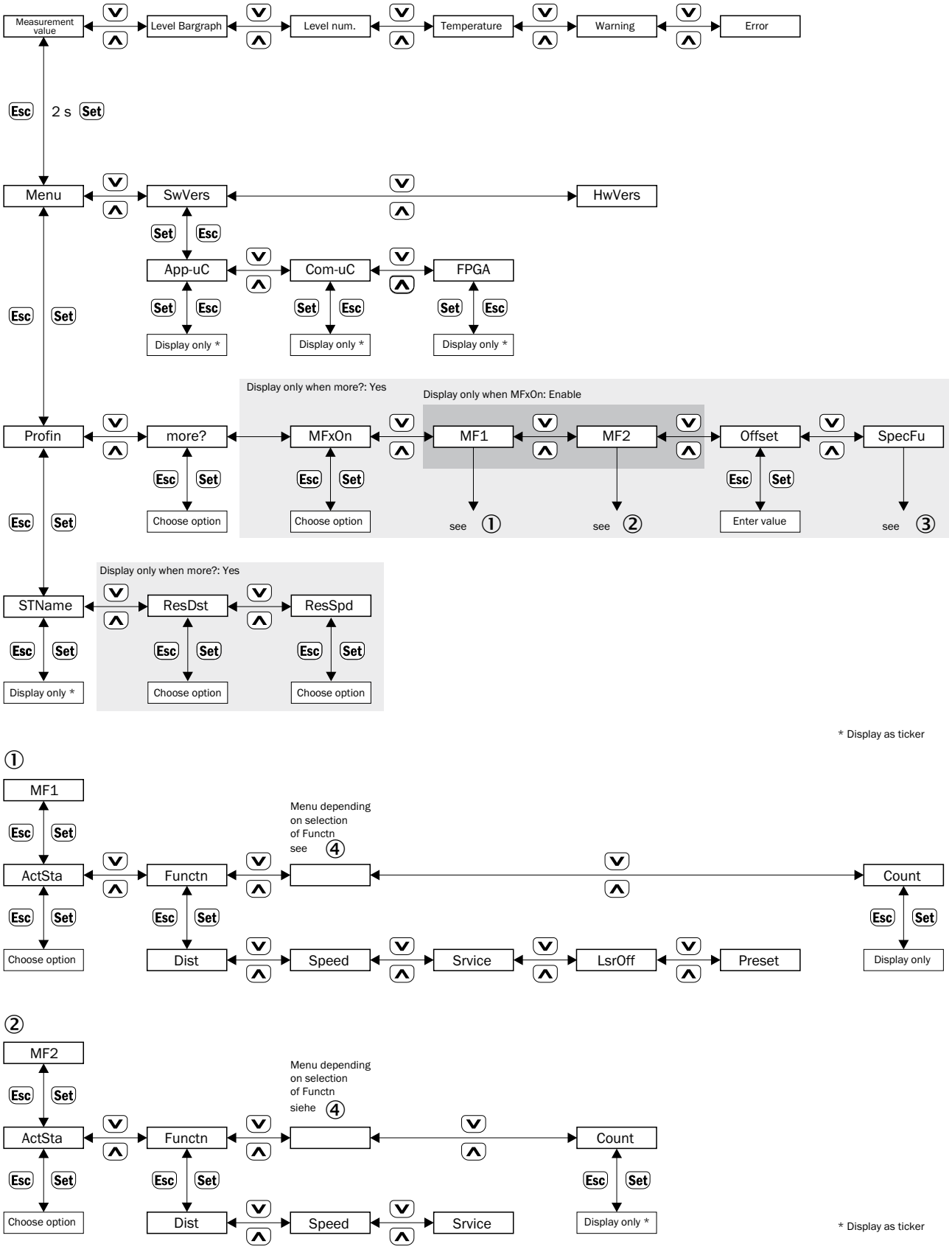


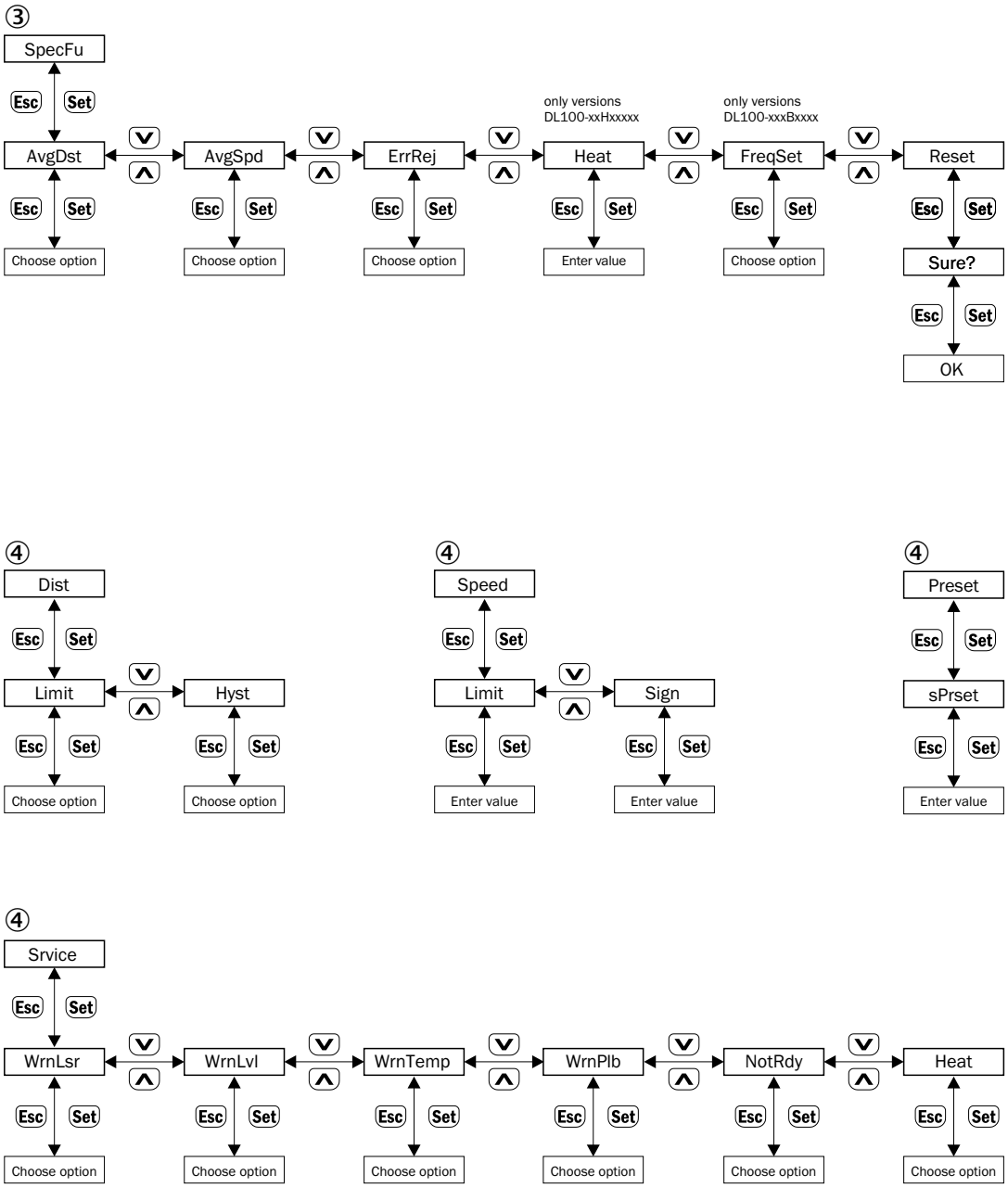
All dimensions in mm (inch)

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




③
SpecFu
Esc
Set
AvgDst
AvgSpd
ErrRej
only versions DL100-xxHxxxxx
Heat
only versions DL100-xxxBxxxx
FreqSet
Reset
Choose option
Enter value
Sure?
OK
④
Dist
Limit
Hyst
Speed
Sign
Preset
sPrset
Srvice
WrnLsr
WrnLvl
WrnTemp
WrnPlb
NotRdy

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