

ISD400 Pro

OPTICAL DATA TRANSMISSION SYSTEM



Described product

ISD400 Pro

Manufacturer

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Original document

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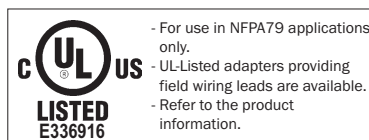


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1 General information

1.1 Information regarding the operating instructions

These operating instructions supplement the Quick start guide and contain additional information and detailed descriptions for using the ISD400 Pro optical data transmission system from SICK AG. These operating instructions are intended for skilled persons and electricians.

1.2 Explanation of symbols

Warnings

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

These warnings must be observed at all times and care must be taken to avoid accidents, personal injury, and material damage.



DANGER

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



WARNING

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



CAUTION

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



NOTICE

... indicates a potentially harmful situation, which may lead to material damage if not prevented.

Tips and recommendations**NOTE**

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

1.3 Limitation of liability

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

The manufacturer accepts no liability for damage caused by:

- Failing to observe the operating instructions
- Incorrect use
- Use by untrained personnel
- Unauthorized conversions
- Technical modifications
- Use of unauthorized spare parts/consumable parts.

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

1.4 Scope of delivery

The scope of delivery includes the following:

- ISD400 Pro optical data transmission system
- Optional: Accessories (→ Page 47, Chapter 12).

Supplied documentation:

- Quick start guide

1.5 Customer service

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

A list of representatives can be found on the back page.

**NOTE**

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

1.6 EC declaration of conformity

→ You can download the EC declaration of conformity online from "www.sick.com/isd400_pro".

2 Safety

2.1 Correct use

The ISD400 Pro data transmission system consists of two optically aligned devices, one of which functions as a sender and the other as a receiver. The devices communicate over long distances and support wireless data transmission.

Setting up a data transmission line requires a pair of devices, where one device, F1 (ISD400-7xx1), has a red sender and another device, F2 (ISD400-7xx2), has an infrared sender.

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

2.2 Incorrect use

The ISD400 Pro optical data transmission system does not constitute a safety component according to the EC Machinery Directive (2006/42/EC).

The ISD400 Pro optical data transmission system must not be used in explosion areas.

Any other use that is not described as correct use is prohibited.

Never install or connect accessories if their quantity and composition are not clearly specified, or if they have not been approved by SICK AG.

2.3 Requirements for skilled persons and operating personnel



WARNING

Risk of injury due to insufficient training.

Improper handling may result in considerable personal injury and material damage.

For this reason:

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

These operating instructions list the training requirements for the various fields of activity, as follows:

- **Skilled personnel**

Due to their specialist training, skills, and experience, as well as their knowledge of the relevant regulations, such persons are able to perform tasks delegated to them and detect any potential dangers independently.

- **Electricians**

Due to their specialist training, skills, and experience, as well as their knowledge of the relevant standards and provisions, such persons are able to perform work on electrical systems and detect any potential dangers independently.

In Germany, electricians must meet the specifications of the BGV A3 Work Safety Regulations (e.g. Master Electrician). Other relevant regulations applicable in other countries must be observed.

2.4 Operational safety and particular hazards

Please observe the safety notes and the warnings listed here and in other chapters of these operating instructions to reduce the possibility of risks to health and avoid dangerous situations.

2.5 Warning symbol on the device

A class 1M laser is installed in the ISD400 Pro data transmission system. The device is labeled with a warning.



Fig. 1: Warning symbol on the device
LASER RADIATION Do not view directly with optical instruments.
Class 1M laser product

	ISD400-7xx1, red	ISD400-73x1, rot	ISD400-7xx2, infrared
Max. power	≤27 mW	≤28 mW	≤32 mW
Wavelength	660 nm	660 nm	785 nm
Max. pulse width	32 ns	32 ns	32 ns

Table 1: ISD400 Pro laser data type overview

2.6 Hazard warnings and operational safety

Laser beam

For your own safety, please read and observe the following notes:



WARNING

Risk of injury from laser radiation!

The accessible radiation of the ISD400 Pro sender is harmless under reasonably foreseeable conditions, as long as the beam cross-section is not made smaller by optical instruments such as telescopes or monoculars.

The use of controls or adjusting devices or the carrying out of work other than specified here can result in dangerous radiation exposure.

- Do not look into the laser beam with an optical device.
- Comply with the latest version of the applicable provisions on laser protection.
- Only carry out work as described here.



CAUTION

Class 1M FSOCS sender element

This is a class 1M FSOCS sender element (FSOCS: Free-space optical communication system). It can be installed in locations with unrestricted, restricted, or controlled access in accordance with IEC 60825-12:2004.

When the device is installed in an area with unrestricted access, please note the following:

- Monoculars or binoculars must not be used to view the transmission beam within a range of < 6 m.
- At distances > 6 m, the limit values for laser class 1 are not exceeded even when using monoculars with an aperture angle of any size for viewing purposes.

**NOTE**

The integrated optical alignment aid features a beam attenuator which ensures that the limit values for laser class 1 are not exceeded.

2.7 Cybersecurity

Protection against cybersecurity threats requires a comprehensive and holistic cybersecurity concept that must be continuously monitored and maintained. Such a concept consists of organizational, technical, process-related, electronic and physical defense levels and sets up appropriate measures for the different types of risk. SICK's products and solutions must be regarded as an integral part of this concept.

Information on Cybersecurity can be found at: "www.sick.com/psirt".

3 Product description

3.1 Identification

3.1.1 Type label

The device includes the following type label:

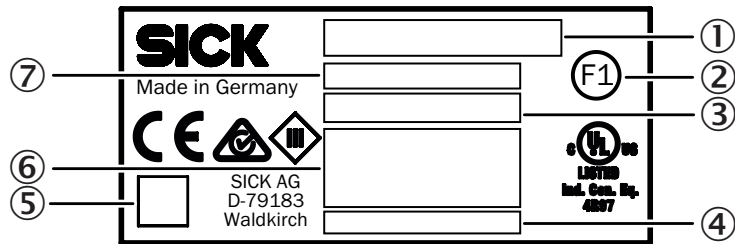


Fig. 2: ISD400 Pro type label

- ① Type designation
- ② Device type F1 or F2, see Page 15, Chapter 3.1.2
- ③ Serial number
- ④ Month and year of manufacture
- ⑤ 2D code with material and serial number
- ⑥ Information about output and supply voltage
- ⑦ Part number

3.1.2 Type overview

Operating temperature	Transmission range	Device	Model name	Part no.
-20...+55 °C	0,2 150 m	F1	ISD400-7211	1065100
	0,2 150 m	F2	ISD400-7212	1065101
	0,2 200 m	F1	ISD400-7311	1071522
	0,2 200 m	F2	ISD400-7312	1071579
-40...+55 °C	0,2 150 m	F1	ISD400-7221	1065102
	0,2 150 m	F2	ISD400-7222	1065103
	0,2 200 m	F1	ISD400-7321	1071580
	0,2 200 m	F2	ISD400-7322	1071581

Table 2: ISD400 Pro optical data transmission system type overview

Product description

3.2 Structure and function

3.2.1 Structure and status indicators

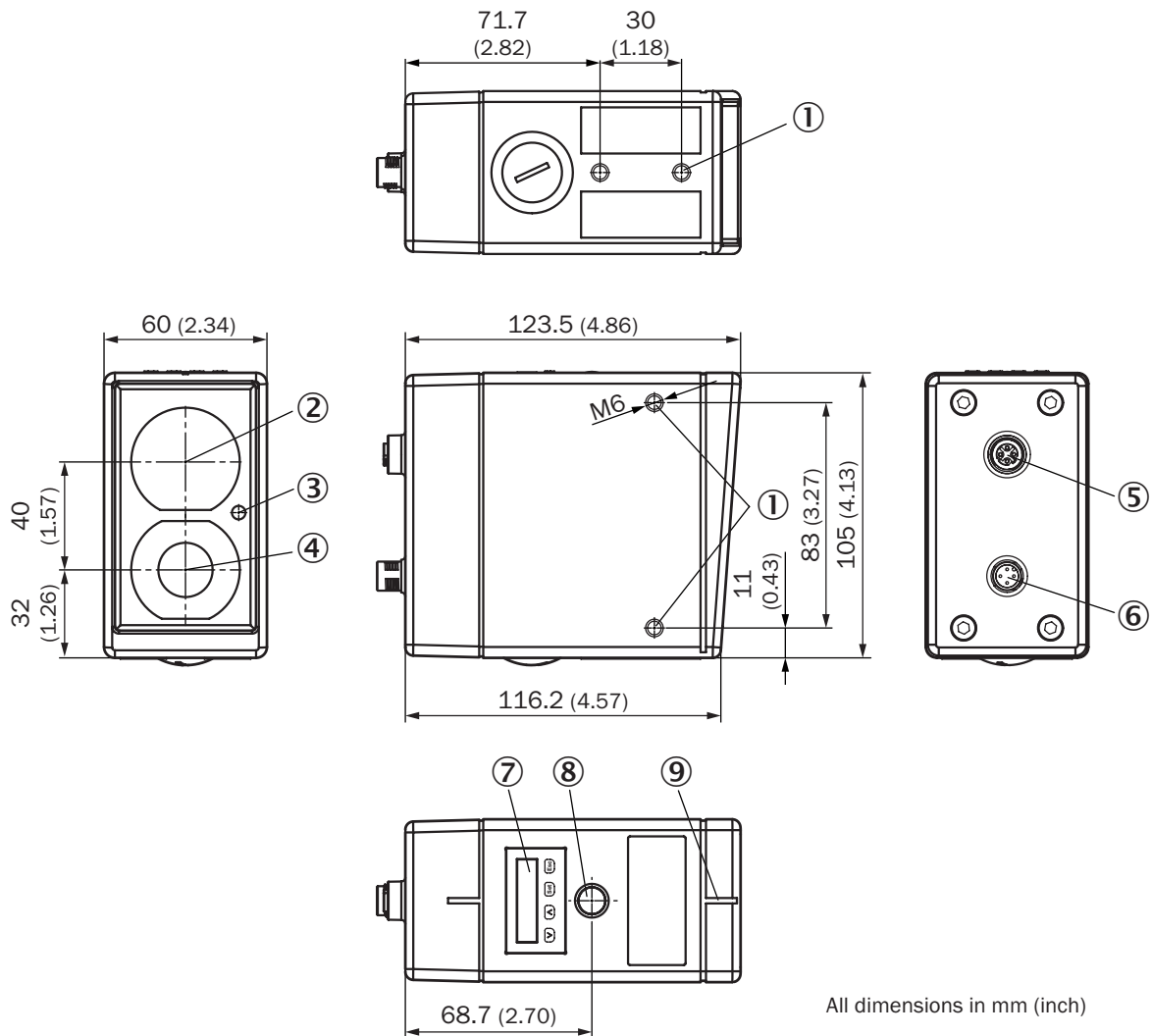


Fig. 3: ISD400 Pro structure

- ① Threaded mounting hole M6
- ② Center of optical axis, sender
- ③ Receive indicator
- ④ Center of optical axis, receiver
- ⑤ Ethernet female connector, M12, 4-pin, D-coded
- ⑥ Power supply male connector, M12, 4-pin, A-coded
- ⑦ Control element
- ⑧ Optical alignment aid
- ⑨ Alignment sight

Status indicator

Receive indicator status (green LED)	Control element status (display)	Description
Permanently on	Permanently on	Connection available; the receiver is able to receive a strong optical signal.
Permanently on	Flashing slowly	There is a warning pending, see Page 42, Chapter 10.1.
Permanently on	Flashing rapidly	There is an error pending, see Page 42, Chapter 10.2.
Flashing slowly	Flashing slowly	Warning: The receiver is only able to receive a weak optical signal.
Flashing rapidly	Flashing rapidly	Error: The receiver is not able to receive an optical signal.

Table 3: Status indicator

Control element



Fig. 4: Control element

- ① Operating mode indicator: RUN/MEN/SET
- ② Receive level indicator with max. 6 bars
- ③ 4 operating buttons



NOTE

If a value or a piece of information in menu mode consists of more than six characters, the characters are automatically shown successively in the display.

Symbols

The ISD400 Pro has two distinct modes: operating mode and menu mode.

Symbol	Description
RUN	The RUN symbol is displayed in operating mode: <ul style="list-style-type: none"> • RUN is lit: Device is ready for operation, Ethernet link is active, data transmission is not active • RUN is flashing: Device is operating and data transmission is active • RUN is off: Device is not ready for operation (a fault has occurred or no Ethernet cable is connected)
MEN	The MEN symbol is displayed in menu mode. This symbol is also displayed when there is an error and no data can be transmitted.
SET	The SET symbol is displayed if the laser for alignment is switched off by pressing the key combination (press and hold down and at the same time).

Table 4: Symbols for operating mode and menu mode

Product description

Pushbuttons





Pushbutton	Description
	<ul style="list-style-type: none"> Select menu, parameter, or option. Reduce value.
	<ul style="list-style-type: none"> Select menu, parameter, or option. Increase value.
	<ul style="list-style-type: none"> Switch to the next-lowest menu level. Save parameter change. Confirm selection.
	<ul style="list-style-type: none"> Exit parameters without saving. Switch to the next-highest menu level.

Table 5: Pushbuttons

3.2.2 Function

The ISD400 Pro data transmission system consists of two optically aligned devices, one of which functions as a sender and the other as a receiver. The devices communicate over long distances and support wireless data transmission.

Setting up a data transmission path requires a pair of devices, where one device has frequency F1 (ISD400-7xx1) and the other device has frequency F2 (ISD400-7xx2).

Both devices monitor the received signal level which can be displayed on a level indicator. If the received level drops below a certain value, e.g. due to increasing contamination of the optics, a warning is issued via switching output. All work on the device (mounting, connecting, aligning, configuration) can be easily performed from above.

The ISD400 Pro is suitable for the following areas of application:

- Automated high-bay warehouses
- Stationary data transmission between buildings
- Anywhere, where data transmission to and from stationary or moving objects (visual contact) over relatively long distances (up to 200 m) is required.

A wide variety of Ethernet protocols can be used in protocol-free transmission (e.g., PROFINET IO RT, PROFI-safe, EtherNet/IP, EtherCAT, TCP/IP, etc.). The use of Ethernet protocols with stringent requirements on delay times and jitter tolerances must be checked by the customer. The signal delay per transmission line comprises a constant and a variable, distance-dependent component: constant: 1 µs, variable: 150 m: 0.5 µs, 200 m: 0.66 µs



NOTE

The ISD400 Pro supports auto negotiation and auto crossover. As a result, the Ethernet connection does not have to be configured separately.

4 Transport and storage

4.1 Transport

Improper transport



NOTICE

Improperly transporting the data transmission system may damage it.

Considerable material damage may occur in the event of improper transport.

For this reason:

- Transport should be performed by trained specialist staff only.
 - The utmost care and attention is required at all times during unloading and transportation on company premises.
 - Note the symbols on the packaging.
 - Do not remove packaging until immediately before you start mounting.
-

4.2 Transport inspection

Improper transport

Upon receipt, please check the delivery for completeness and for any damage that may have occurred in transit.

In the case of transit damage that is visible externally, proceed as follows:

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



NOTE

Complaints regarding defects should be filed as soon as these are detected. Damage claims are only valid before the applicable complaint deadlines.

4.3 Storage

Please consider the following conditions when storing the ISD400 Pro:

- Do not store outdoors.
- Store in a dry area that is protected from dust.
- Do not expose to any aggressive substances.
- Protect from sunlight.
- Avoid mechanical shocks.
- Storage temperature: between -40 and $+75$ °C
- Relative humidity: max. 95 %, non-condensing
- For storage periods of longer than 3 months, check the general condition of all components and packaging on a regular basis.

5 Mounting

5.1 Mounting procedure

1. Choose a mounting site, bearing in mind the mounting instructions.
→ See the following chapter.
2. Mount the alignment bracket and data transmission system.
→ See Page 24, Chapter 5.4.
3. Make the electrical connection.
→ See Page 27, Chapter 6.
4. Align the devices of the data transmission system with one another.
→ See Page 32, Chapter 7.1.

5.2 Mounting instructions

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

- Comply with technical data such as the measuring range.
→ See Page 45, Chapter 11.2.
- At low ambient temperatures – e.g. in deep-freeze warehouses – the data transmission system should have integrated heating.
- Protect the data transmission system from direct sunlight.
- To prevent condensation water, avoid exposing the data transmission system to rapid changes in temperature.
- Make sure the system is a sufficient distance from other optical measuring devices and data transmission systems. → See Page 22, Chapter 5.3.

5.3 Arranging multiple optical devices

In some applications, multiple optical devices must be operated side by side. In these cases, minimum mounting distances must be observed.

Mounting multiple ISD400 Pro

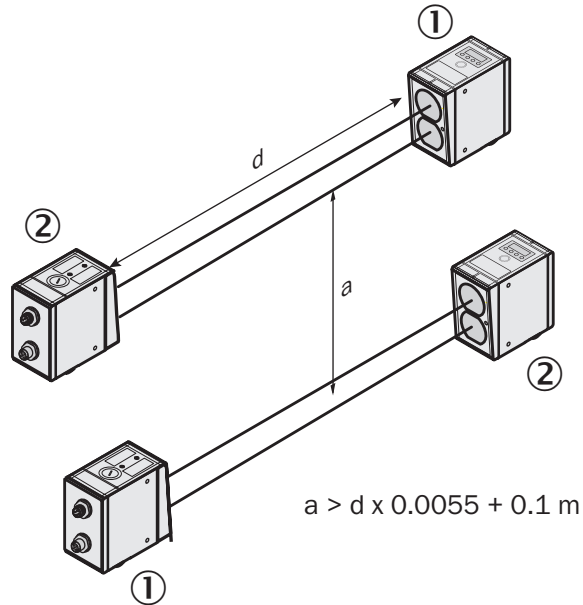


Fig. 5: Arranging multiple ISD400 Pro

- ① ISD400-7xx1, red
- ② ISD400-7xx2, infrared
- a Minimum distance



NOTE

Mount devices ① and ② of the device pair at an angle of 180° relative to one another.

Formula

$$a > d \times 0.0055 + 0.1 \text{ m}$$

Example

- Measuring range: 0 ... 200 m
- d (measuring distance): 100 m

Calculation

$$a > 100 \text{ m} \times 0.0055 + 0.1 \text{ m}$$

Minimum distance result

$$a > 0.65 \text{ m}$$

Mounting the ISD400 Pro and other optical devices

For arrangement and the travel distance from the DL100-2xxAxxxx distance sensor (or the DL100-2xxBxxxx up to serial number 1925xxxx) without integrated spectral to the ISD400-7xxx data transmission system, the following applies:

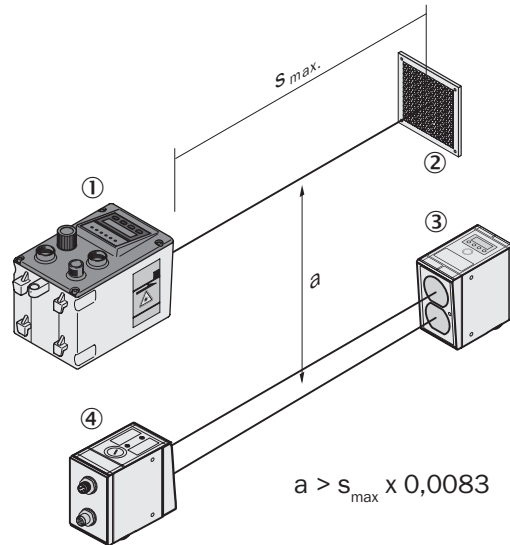


Fig. 6: Arranging the ISD400 Pro and a DL100-2xxAxxxx distance sensor

- ① DL100-2xxAxxxx distance sensor
- ② Reflector
- ③ ISD400-7xx1, red
- ④ ISD400-7xx2, infrared
- a Minimum distance
- s_{max} Maximum travel distance



NOTE

Mount devices ③ and ④ of the device pair at an angle of 180° relative to one another.

Formula

$$a \geq s_{max} \times 0.0083$$

Example

- Measuring range: 0 ... 200 m
- s_{max} (Maximum travel distance): 60 m

Calculation

$$a \geq 60 \text{ m} \times 0.0083$$

Minimum distance result

$$a \geq 0.5 \text{ m}$$

Mounting

Dx100-2xxBxxxx

No minimum distance is required for the arrangement of a distance sensor with integrated spectral filter (Dx100-2xxBxxxx from serial number 1926xxxx) to an ISD400-7xxx optical data transmission system. The following arrangement is required when doing so:

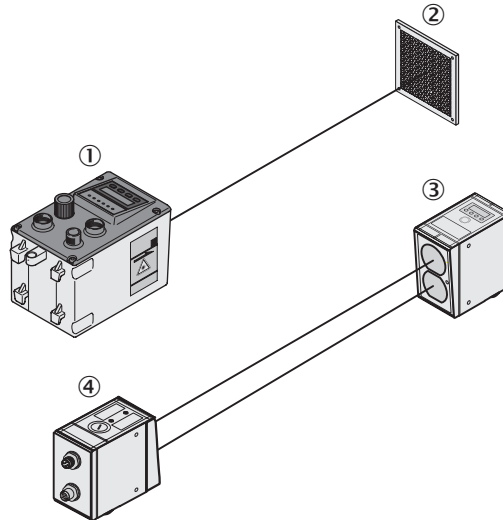


Fig. 7: Arrangement of distance sensor Dx100-2xxBxxxx to data transmission system ISD400-7xxx

- ① Dx100-2xxBxxxx distance sensor
- ② Reflector
- ③ IISD400-7xx2, infrared
- ④ ISD400-7xx1, red

5.4 Mounting the ISD400 Pro



NOTE

→ For mounting accessories, go to "www.sick.com/isd400_pro", "Accessories".

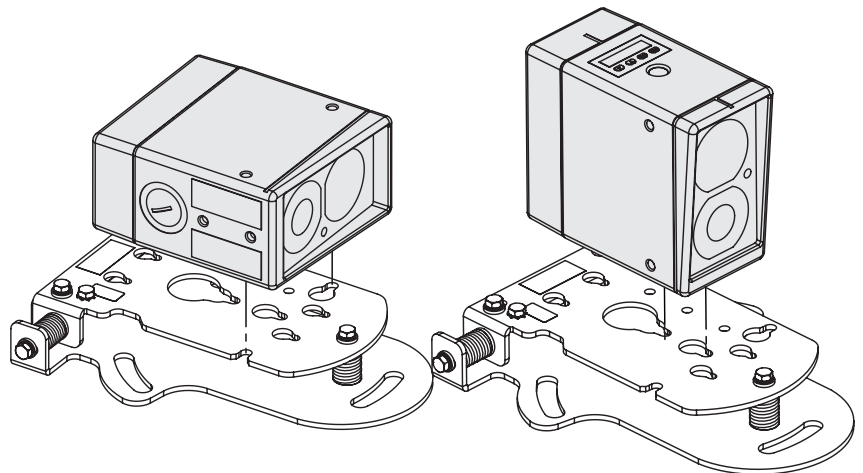
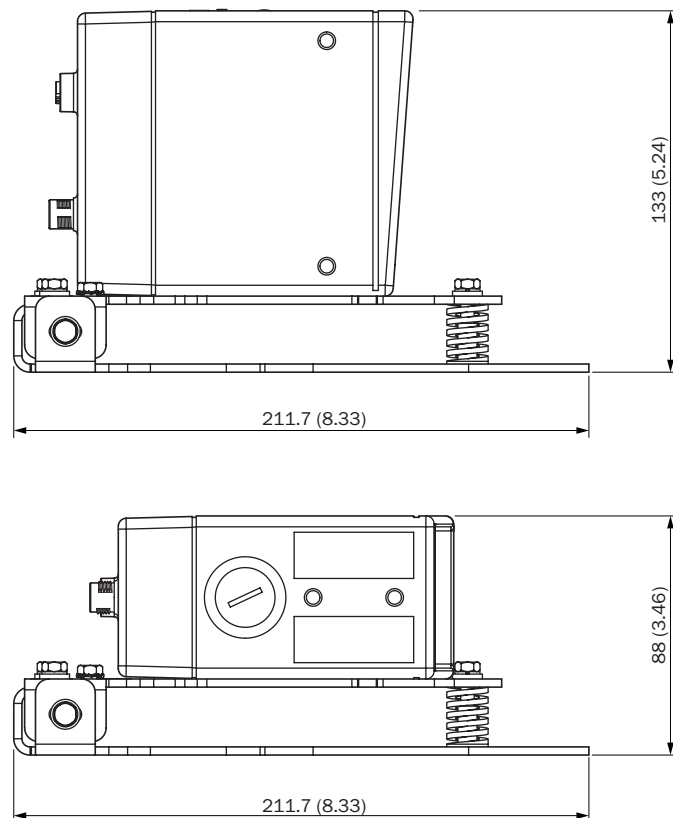


Fig. 8: ISD400 Pro mounting variants on alignment bracket (2046052)



All dimensions in mm (inch)

Fig. 9: ISD400 Pro dimensions when mounted on alignment bracket (2046052)

1. Select the mounting site for the ISD400 Pro in accordance with requirements. Bear in mind the minimum mounting distances. → For dimensions, see Page 44, Chapter 11.1. The devices can be mounted horizontally or vertically on the bracket.
2. Install the devices at a 180° angle to one another, so the optical axes of the two devices match at minimum distance.



NOTE

→ Two transmission lines can be connected in series (cascaded).

6 Electrical connection

6.1 Safety

Incorrect supply voltage



NOTICE

Equipment damage due to incorrect supply voltage.

An incorrect supply voltage may result in damage to the equipment.

For this reason:

- The sensor must only be operated with a protected low voltage and a protected low voltage power supply.

Working with live parts



NOTICE

Equipment damage or unpredictable operation due to working with live parts.

Working with live parts may result in unpredictable operation.

For this reason:

- Only carry out wiring work when the power is off.
- Only connect and disconnect cable connections when the power is off.

6.2 Wiring notes



NOTICE

Faults due to incorrect wiring.

Incorrect wiring may result in operational faults.

For this reason:

- Follow the wiring notes precisely.



NOTE

We recommend using pre-assembled cables for the wiring. → For pre-assembled cables, go to "www.sick.com/isd400_pro", "Accessories".

All electrical connections of the ISD400 Pro are configured as M12 round connectors.

The IP 65 protection class is only achieved using screwed plug connectors.

All electric circuits connected to the ISD400 Pro must be configured as PELV or SELV circuits (PELV= protective extra-low voltage, SELV = safety extra-low voltage).

By using appropriate cable entries and wiring, you can avoid interference from devices such as switching power supplies, motors, clocked drives, and contactors.

- Cables should be laid as far away as possible from cables with a high level of radiated emission. Take additional measures where necessary, e.g. separation by means of screening shields.
- Do not lay cables parallel to other cables, especially not to devices with a high level of radiated emission, such as a frequency converter.
- Do not lay cables parallel to energy cables.

Please observe the following wiring notes:

- A correct and complete cable shielding concept is required for trouble-free operation.
- The cable shield must be connected at both ends in the control cabinet and at the device. The cable shield of the pre-assembled cable is connected to the knurled nut and thus also to the device housing.
- The cable shield in the control cabinet must be connected to the operating ground over a large surface area.
- Appropriate measures must be taken to prevent equipotential bonding currents flowing through the cable shield.
- Do not lay cables parallel to other cables, especially not to devices with a high level of radiated emission, such as a frequency converter.

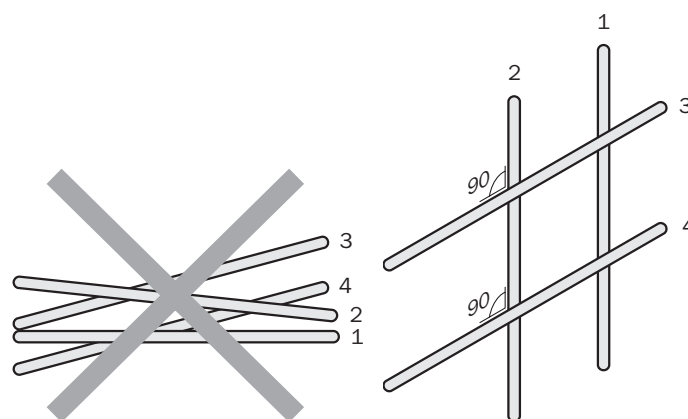


Fig. 10: Cross cables at right angles

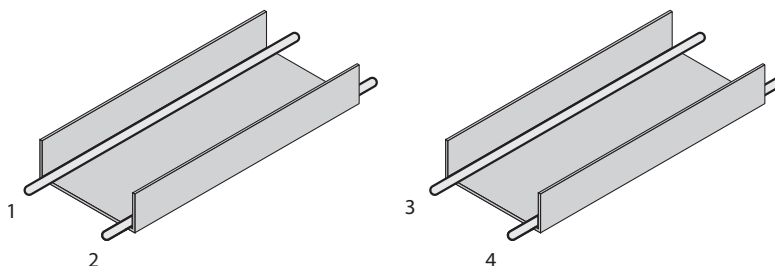


Fig. 11: *Ideal laying - Place cables in different cable channels*

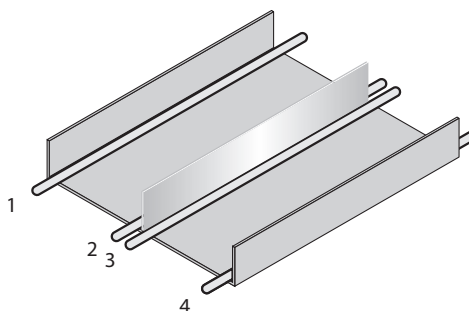


Fig. 12: *Alternative laying - Separate cables with metallic separators*

- ① Cables very sensitive to interference (analog measuring cables)
- ② Cables sensitive to interference (sensor cables, communication signals, bus signals)
- ③ Cables which are a source of interference (control cables for inductive loads, motor brakes)
- ④ Cables which are powerful sources of interference (output cables from frequency inverters, welding system power supplies, power cables)

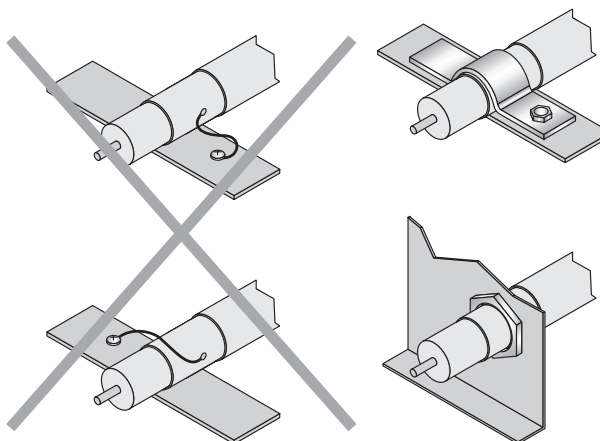


Fig. 13: *Attach the screen using a short connection with a large surface area - ground both ends*

6.3 Connecting the ISD400 Pro electrically

1. Ensure that there is no voltage.
2. Connect the ISD400 Pro according to the connection diagram.
→ See Page 30, Chapter 6.4.

6.4 Connection diagrams



NOTE

The wire colors mentioned in this chapter apply to the pre-assembled cables from SICK AG. Pre-assembled cables from other manufacturers may use different wire colors.

→ For pre-assembled cables, go to "www.sick.com/isd400_pro", "Accessories".

Supply voltage

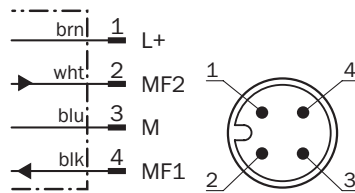


Fig. 14: ISD400 Pro connection diagram, M12 male connector, 4-pin, A-coded

Contact	Marking	Wire color	Description
1	L+	Brown	Supply voltage: → See Page 45, Chapter 11.3.
2	MF2	White	Multifunctional output
3	M	Blue	Supply voltage: 0 V
4	MF1	Black	Multifunctional input

Table 6: Description of supply voltage male connector

Ethernet

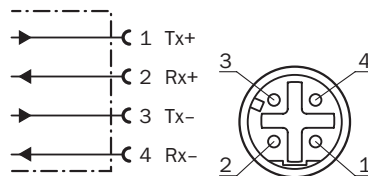





Fig. 15: ISD400 Pro connection diagram, M12 female connector, 4-pin, D-coded

Contact	Marking	Description
1	Tx+	Send data signal, not inverted
2	Rx+	Receive data signal, not inverted
3	Tx-	Send data signal, inverted
4	Rx-	Receive data signal, inverted

Table 7: Description of Ethernet female connector

7 Commissioning

7.1 Aligning the ISD400 Pro

1. Bring the connected devices F1 and F2 as close as possible to one another.
 - ▶ Device is in operating mode. An established optical connection with the device opposite is indicated by the receive indicator.
2. At close range (<1 m), align the device with a straight, mechanical tool such as a long spirit level if necessary, until the green receive indicator lights up.
3. Move devices F1 and F2 away from one another until the connection is lost and the green receive indicator 3 is flashing on one of them.
4. Realign the devices. To use the optical alignment aid on device F1 (ISD400-7xx1), switch off the laser: Press  and  at the same time.
5. Readjust with the alignment sight and optical alignment aid with cross-hairs until the green receive indicator lights up on device F1. If there is a low reception level, the opposing sender must be realigned. In operating mode, the quality of the alignment of the sender can be read directly from the display of the receiver.
6. Switch the laser on again on device F1 (ISD400-7xx1): Press .
7. Check the alignment using the level indicator and fine-tune if necessary to adjust.

8 Operating the device



NOTICE

Pushbutton damage due to improper handling.

Improper handling of the pushbuttons can damage them. This will make operation difficult or impossible.

For this reason:

- Only operate the pushbuttons with your fingers or a suitable pointing device.
- Do not operate the pushbuttons using sharp or hard objects.

8.1 Displaying the received signal level

As soon as voltage is supplied to the device, the signal level is indicated on the display.










8.2 Selecting parameters

You can select a menu, parameter, or option using the **Set**, **▲**, and **▼** pushbuttons. The menu path is specified in the relevant chapters.
→ For the overall menu structure, see Page 48, Chapter 13.

8.3 Selecting options

1. Select the desired parameter using the **Set** and **▼** pushbuttons.
2. Select the desired option using the **▼** or **▲** pushbutton.
3. Perform one of the following steps:
 - Press the **Set** pushbutton to save the change.
 - Press the **Esc** pushbutton to cancel the process. The parameter name is displayed again.
4. Perform one of the following steps to return to the level indicator:
 - Press the **Esc** pushbutton repeatedly until the received signal level is displayed once more.
 - Wait for approx. 2 minutes. The display will automatically switch back to the receive level indicator if no buttons are pressed. Any settings you have made will also be saved.

8.4 Changing the value



1. Select the desired parameter using the , , and  pushbuttons.
2. Press the  pushbutton. The current value of the parameter is displayed. The first digit on the left flashes.
3. Press the  pushbutton to increase the digit. Press the  pushbutton to lower the digit.
4. Press the  pushbutton to save the digit entered. The next digit flashes.
Press the  pushbutton to cancel the process.
5. Repeat steps 3 and 4 until the last digit is saved. The parameter name is displayed.
6. Press the  pushbutton repeatedly until the received signal level is displayed once more. Alternatively, you can wait a few minutes. The display will automatically switch back to the receive level indicator if no buttons are pressed.

8.5 Parameter description

8.5.1 Operating mode

→ For the overall menu structure, see Page 48, Chapter 13.

The received signal level is displayed in the form of a bar graph by default.

You can scroll within the menu using the  and  pushbuttons.

Press the  pushbutton for at least 2 seconds to switch to menu mode.

Display	Description
Received signal level	Displays the received signal level as a bar graph
Numerical level	Displays the received signal level as a numerical value in dB
Temperature	Displays the internal temperature of the device
Operating hour counter	Displays the operating hours
Warnings	Displays the pending warnings. If there is a warning pending, the background of the display flashes. If there are no warnings pending, no warnings are displayed. → See also Page 42, Chapter 10.2, list of possible warnings.
Errors	Displays the pending errors. If there is an error pending, the RUN symbol disappears and the background of the display flashes. If there are no errors pending, no errors are displayed. → See also Page 42, Chapter 10.2, list of possible errors.

Table 8: Operating mode menu

8.5.2 Menu mode

→ For the overall menu structure, see Page 48, Chapter 13.

"Menu" menu

In this menu and its submenus, you can activate/deactivate and configure the multifunctional inputs MF1 and MF2.

The "Align" menu is accessed via the following menu path:

Operating mode → **Set** → Menu → **Set** → Align

Press the **Set** pushbutton. The option that is currently set is displayed.

You can scroll within the menu using the **▼** and **▲** pushbuttons. Press the **Set** pushbutton to display the relevant parameter value.

Parameter	Description
Align	Switches the laser off for commissioning.
MFx On	<p>Activates or deactivates the multifunctional inputs MF1 and MF2.</p> <p>Options</p> <ul style="list-style-type: none"> • Enable: Multifunctional inputs MF1 and MF2 are activated. • Disable: Multifunctional inputs MF1 and MF2 are deactivated. <p>Factory setting</p> <p>Enable</p>
MF1In	<p>Prerequisite for the display: "MFx" menu: "Enable" option</p> <p>ActSta</p> <p>Selects the level of the multifunctional input MF1.</p> <p>Options</p> <ul style="list-style-type: none"> • ActLow: Input active at LOW level • ActHi: Input active at HIGH level <p>Factory setting</p> <ul style="list-style-type: none"> • ActHi <p>LsrSw</p> <p>Switches the laser on/off.</p> <p>Options</p> <ul style="list-style-type: none"> • On • Off <p>Factory setting</p> <ul style="list-style-type: none"> • On

"Menu" menu continued

Parameter	Description
MF2Out	Prerequisite for the display: "MFx" menu: "Enable" option
	<p>ActSta</p> <p>Selects the level of the multifunctional output MF2.</p> <p>Options</p> <ul style="list-style-type: none"> • ActLow: Output active at LOW level • ActHi: Output active at HIGH level <p>Factory setting</p> <ul style="list-style-type: none"> • ActLow
	<p>WrnLsr</p> <p>Activates or deactivates the warning message when the ageing of the laser means that the device is nearly due to be replaced.</p> <p>Options</p> <ul style="list-style-type: none"> • On • Off <p>Factory setting</p> <ul style="list-style-type: none"> • On
	<p>WrnTemp</p> <p>Activates or deactivates the warning message when the internal temperature of the device is outside the permissible limits.</p> <p>Options</p> <ul style="list-style-type: none"> • On • Off <p>Factory setting</p> <ul style="list-style-type: none"> • On
	<p>OptBrk</p> <p>Activates or deactivates the warning message when the optical path is broken.</p> <p>Options</p> <ul style="list-style-type: none"> • On • Off <p>Factory setting</p> <ul style="list-style-type: none"> • On

"Menu" menu continued

Parameter	Description
MF2Out	EthLnk Activates or deactivates the warning message when there is no Ethernet cable connected. Options <ul style="list-style-type: none"> • On • Off Factory setting <ul style="list-style-type: none"> • Off
	WrnLvl Activates or deactivates the warning message when the received signal level drops, e.g. due to contamination. Options <ul style="list-style-type: none"> • On • Off Factory setting <ul style="list-style-type: none"> • Off
	NotRdy: Activates or deactivates the warning message when the laser is not ready for operation. This may be due to a hardware error or it may be because the laser is switched off. This warning message is also issued during initialization. Options <ul style="list-style-type: none"> • On • Off Factory setting <ul style="list-style-type: none"> • On
	Heat Activates or deactivates the warning message when the heating is switched on. This parameter is only displayed on devices with the "Heating" option (ISD400-7X2X) Options <ul style="list-style-type: none"> • On • Off Factory setting <ul style="list-style-type: none"> • Off
Heat	<ul style="list-style-type: none"> • This parameter is only displayed on devices with the "Heating" option (ISD400-7X2X) • Defines the switch-on threshold for the heating (-10 to +40 °C). Factory setting <ul style="list-style-type: none"> • -10 °C
Reset	Resets all parameters in the menu.

Table 9: "Menu" menu

"Count" menu

The "Count" menu displays all counts for the switching events in Table 10 (page 39). You can reset the counter by switching the device off and on again.

The "Count" menu is accessed via the following menu path:
Operating mode → **Set** → Menu → **▼** → Count

Press the **Set** pushbutton to display the "OptBrk" parameter.

Parameter	Description
OptBrk	Number of light path interruptions
WrnTmp	Number of temperature warnings
EthLink	Number of Ethernet link interruptions
Reset	Yes: Resets all counters in the "Count" menu.

Table 10: "Count" menu



NOTE

If a value or a piece of information in menu mode consists of more than six characters, the characters are automatically shown successively in the display.

"SwVers" menu

The "SwVers" menu displays all information relating to the software.

The "SwVers" menu is accessed via the following menu path:
Operating mode → **Set** → Menu → **▼** → SwVers

Press the **Set** pushbutton to display the "SwVers" parameter.

Parameter	Description
SwVers	Displays the version number

Table 11: "SwVers" menu



NOTE

If a value or a piece of information in menu mode consists of more than six characters, the characters are automatically shown successively in the display.

"HwVers" menu

The "HwVers" menu displays all information relating to the hardware.

The "HwVers" menu is accessed via the following menu path:
Operating mode → **Set** → Menu → **▼** → HwVers

Press the **Set** pushbutton to display the "HwVers" parameter.

Parameter	Description
HwVers	Displays the version number

Table 12: "HwVers" menu

8.6 Performing a reset

1. Select the "Reset" parameter in the "Menu" menu.
→ See Page 36, Chapter 8.5.2.
2. Press the **Set** pushbutton.
3. The confirmation prompt "Sure?" appears.
4. Press the **Set** pushbutton to reset the device to its initial state. Press the **Esc** pushbutton to cancel the process.

9 Cleaning and maintenance

9.1 Cleaning



NOTICE

Equipment damage due to improper cleaning.

Improper cleaning may result in equipment damage.

For this reason:

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

9.2 Maintenance

The ISD400 Pro requires the following maintenance work at regular intervals:

Interval	Maintenance work	To be performed by
Cleaning interval depends on ambient conditions and climate	Clean housing.	Specialist
Every 6 months	Check the screw connections and plug connections.	Specialist

Table 13: Maintenance schedule

10 Troubleshooting

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

In case of faults that cannot be rectified using the information below, please contact the manufacturer. A list of representatives can be found on the back page.

10.1 Warning messages

Display	Meaning/Possible causes	Troubleshooting
NoWarn	No warning	–
WrnLsr	The laser is still ready for operation but is at the end of its service life.	Keep a replacement device ready for use.
WrnLvl	The current received signal level is below the recommended value.	<ul style="list-style-type: none"> • Clean the outer optical surfaces. • Reduce the distance between the devices. • Realign the devices → See Page 32, Chapter 7.1
WrnTmp	The internal temperature of the device is approaching the limit of the permissible range. → For the permissible ambient temperature, see Page 46, Chapter 11.5.	<ul style="list-style-type: none"> • Check ambient temperature. Provide better ventilation if necessary. • Shield the device from radiant heat, e.g. shade the device from direct sunlight. • At low ambient temperatures, use a heating system for the device. • At high ambient temperatures, use a cooling housing.
WrnOvr	Receiver unit is not aligned correctly.	<p>If the warning message is displayed for more than 10 seconds:</p> <ul style="list-style-type: none"> • Realign the devices → Follow the instructions on Page 32, Chapter 7.1 until the warning message disappears permanently.

Table 14: Warning messages

10.2 Error messages

Display	Meaning/Possible causes	Troubleshooting
NoErr	No error	–
ErrLsr	The service life of the laser has been exceeded.	Replace the device.
ErrLvl	The current received signal level is below the warning threshold.	<ul style="list-style-type: none"> • Clean the outer optical surfaces. • Reduce the distance between the devices. • Realign the devices → See Page 32, Chapter 7.1
ErrTmp	The internal temperature of the device is outside the permissible range. → For the permissible ambient temperature, see Page 46, Chapter 11.5.	<ul style="list-style-type: none"> • Check ambient temperature. Provide better ventilation if necessary. • Shield the device from radiant heat, e.g. shade the device from direct sunlight. • At low ambient temperatures, use a heating system for the device. • At high ambient temperatures, use a cooling housing.

Display	Meaning/Possible causes	Troubleshooting
ErrHv	Receiver unit is faulty.	Device is not ready for operation, contact customer service (a list of representatives can be found on the back page).
LsrOff	Laser has been switched off for commissioning.	Device F1 (ISD400-7xx1): Switch on laser: Press Esc .

Table 15: Error messages

10.3 Possible error indicators

Problem	Possible causes	Troubleshooting
Green receive indicator and display are flashing rapidly, no signal	Two devices with the same frequency (F1/F1; F2/F2), no frequency pair mounted.	Mount devices with different frequencies (F1/F2).
	Laser switched off, device not in operating mode	Device F1 (ISD400-7xx1): Switch on laser: Press Esc .
	Minimum mounting distances not observed.	<ul style="list-style-type: none"> When using multiple sensors, observe the minimum mounting distances → See Page 22, Chapter 5.3.
Receive indicator off	No power supply/hardware faulty	<ul style="list-style-type: none"> Check connection. Replace device.
No RUN symbol in the display	No Ethernet cable connected. No optical connection to communication partner available.	<ul style="list-style-type: none"> Check cabling. Check Ethernet settings on opposite side. Check alignment.

Table 16: Possible error indicators

10.4 Disposal

Please observe the following when disposing of the device:

- Do not dispose of the device along with household waste.
- Dispose of the device according to the applicable regulations in your country.

11 Technical data



NOTE

You can download, save, and print the relevant online data sheet for your ISD400 Pro, including technical data, dimensions, and connection diagrams, from "www.sick.com/isd400_pro".

11.1 Dimensions

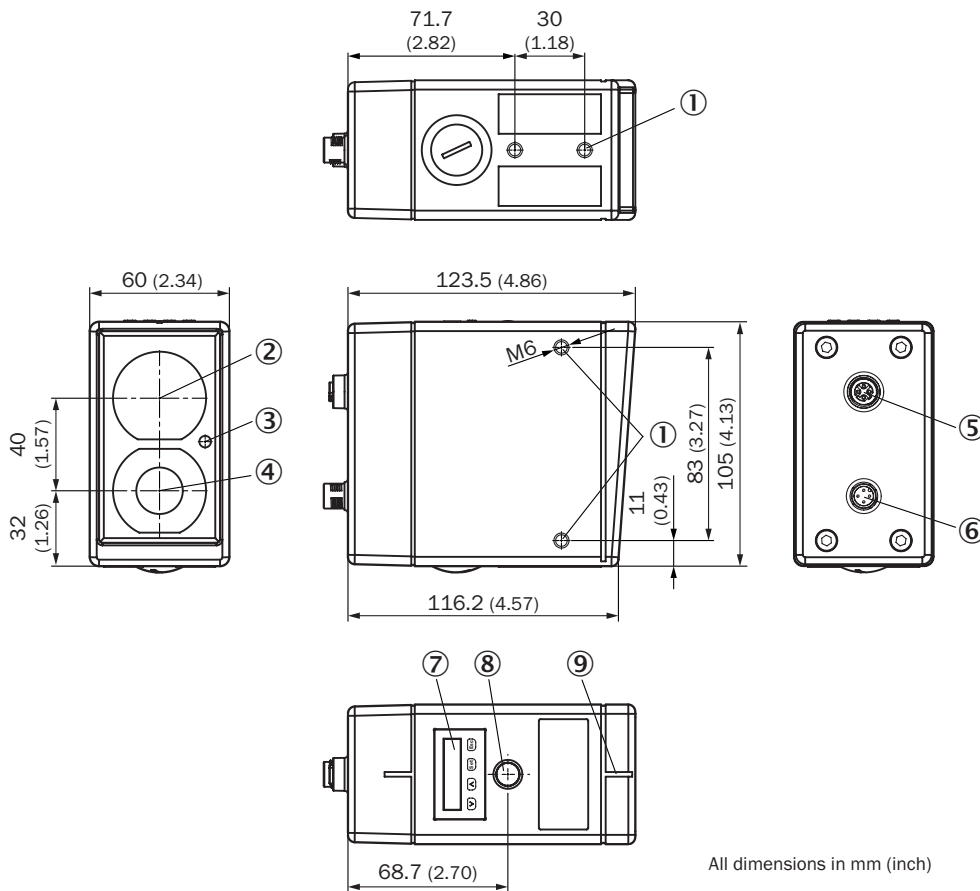


Fig. 16: ISD400 Pro structure

- ① Threaded mounting hole M6
- ② Center of optical axis, sender
- ③ Receive indicator
- ④ Center of optical axis, receiver
- ⑤ Ethernet female connector, M12, 4-pin, D-coded
- ⑥ Power supply male connector, M12, 4-pin, A-coded
- ⑦ Control element
- ⑧ Optical alignment aid
- ⑨ Alignment sight

11.2 Performance data

Light sender	<ul style="list-style-type: none"> • Red laser (ISD400-7xx1): 660 nm • Infrared laser (ISD400-7xx2): 785 nm
Light spot size (distance)	1.75 m (at 100m); diameter = 0.0175 m x d(m)
Transmission range	<ul style="list-style-type: none"> • 0,2 ... 150 m (ISD400-72xx) • 0,2 ... 200 m (ISD400-73xx)
Aperture angle	<ul style="list-style-type: none"> • Sender: 1° • Receiver: 1.5°
Ambient light	<ul style="list-style-type: none"> • <10 klux (ISD400-72xx) • <5 klux (ISD400-73xx)

Table 17: Performance data

11.3 Power supply

Supply voltage U_V ¹⁾	DC 18–30 V
Circuit protection	U_V connections, reverse polarity protected
Power consumption (without load)	<ul style="list-style-type: none"> • ≤3.6 W (without heating) • ≤50 W (with heating)

1) Limit values, reverse polarity protected

Table 18: Power supply

11.4 Interfaces

Data interface	Fast Ethernet
Data transmission rate	100 Mbit/s
Signal delay	≤ 1.66 μs
Multifunctional output ¹⁾	Hi: $U_V - 3$ V, Lo: <2 V
Maximum output current I_A	100 mA
Multifunctional input	Hi: >8V, Lo: <5V

1) Short-circuit and overload protected

Table 19: Interfaces

Technical data

11.5 Ambient conditions


Protection class		Only suitable for operation with SELV or PELV power supplies.
Electromagnetic compatibility	EN 61000-6-2 EN 61000-6-4	
Ambient temperature range	<ul style="list-style-type: none"> • -20 °C to +55 °C (without heating) ¹⁾ • -40 °C to +55 °C (with heating) 	
Storage temperature range	-40 °C to +75 °C	
Enclosure rating	IP 65	
Fields of application	Indoor and Outdoor ²⁾	
Pollution Degree	2	

Table 20: Ambient conditions

- 1) At temperatures lower than -10 °C, a warm-up time (typically 10 minutes) is required. Max 90 % air humidity, non-condensing
- 2) In outdoor areas, restrictions of the device functionality due to weather conditions (precipitation, fog, light radiation, etc.) are to be expected. Only indoor application is UL-certified.

11.6 Structural design

Dimensions	→ See Page 44, Chapter 11.1.
Weight	800 g
Materials	AlSi12
Connections	M12, 4-pin male connector

Table 21: Structural design

12 Accessories



NOTE

For additional accessories, go to "www.sick.com/isd400_pro", "Accessories".

13 Menu structure



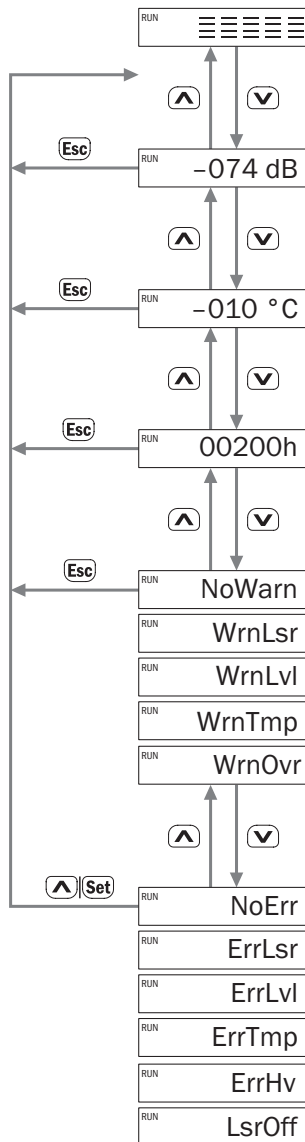
NOTE

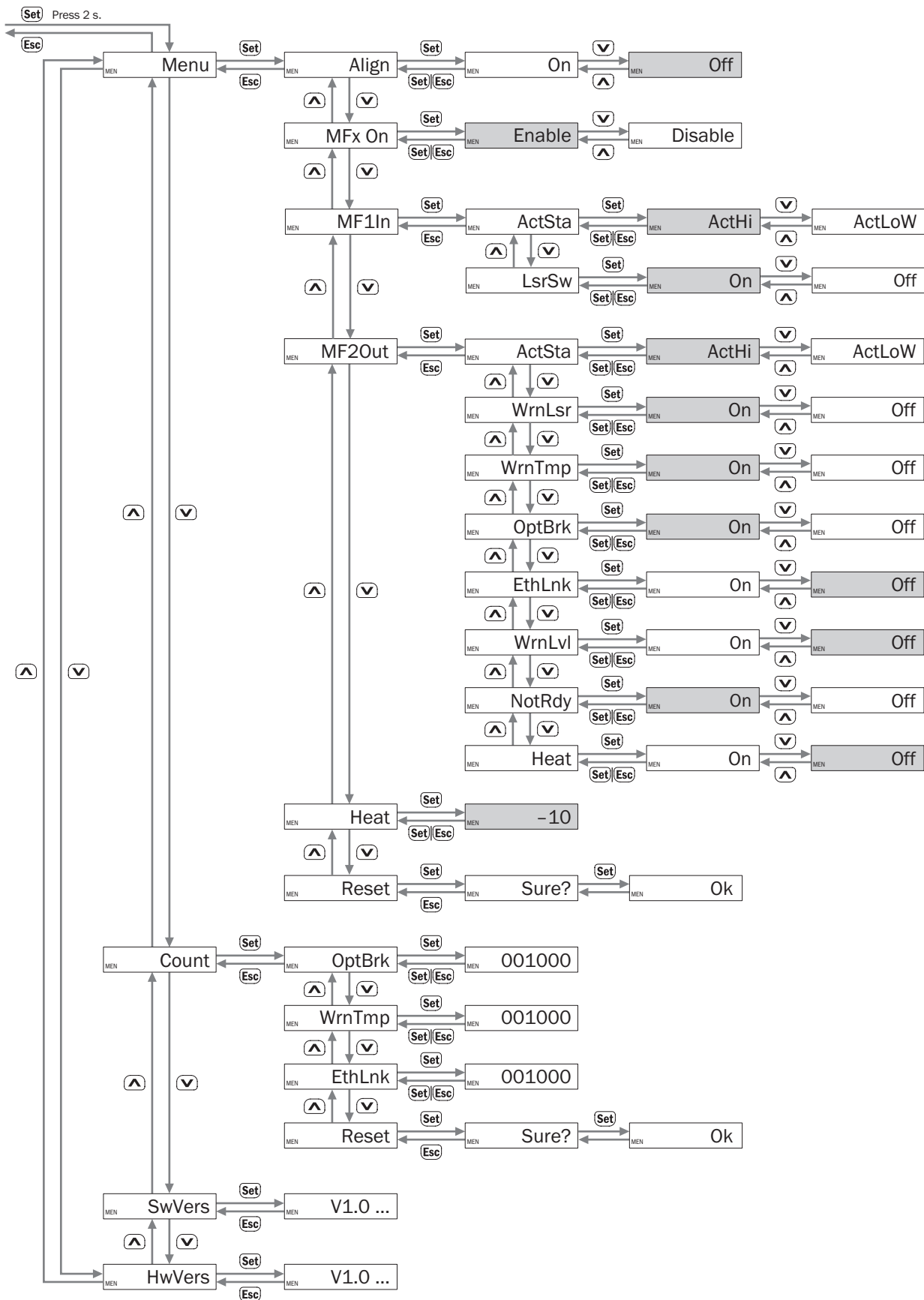
The default settings are shown with a gray background.



NOTE

If a value or a piece of information in menu mode consists of more than six characters, the characters are automatically shown successively in the display.





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