OPERATING INSTRUCTIONS

PS30

Pattern sensor

SICK
Sensor Intelligence.

Described product

PS30

Manufacturer

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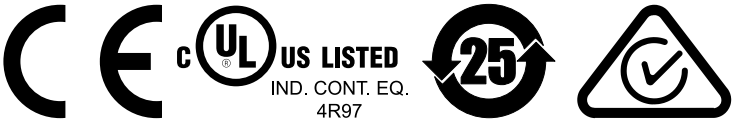
Germany

Legal information

Original document

This document is an original document of SICK AG.



Contents

1 About this document

1.1 Information on the operating instructions

These operating instructions provide important information on how to use devices from SICK AG.

Prerequisites for safe work are:

- Compliance with all safety notes and handling instructions supplied
- Compliance with local work safety regulations and general safety regulations for device applications

The operating instructions are intended to be used by qualified personnel and electrical specialists.

NOTE
Read these operating instructions carefully before starting any work on the device, in order to familiarize yourself with the device and its functions.

The instructions constitute an integral part of the product and are to be stored in the immediate vicinity of the device so they remain accessible to staff at all times. Should the device be passed on to a third party, these operating instructions should be handed over with it.

These operating instructions do not provide information on operating the machine in which the device is integrated. For information about this, refer to the operating instructions of the specific machine.

1.2 Scope

These operating instructions serve to incorporate the device into a customer system. Instructions are given in stages for all actions required.

These instructions apply to all listed device variants of the product.

Available device variants are listed on the online product page.

▶ www.sick.com/PS30

Commissioning is described using one particular device variant as an example.

Simplified device designation in the document

In the following, the sensor is referred to in simplified form as “PS30” or “device”.

1.3 Explanation of symbols

Warnings and important information in this document are labeled with 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.

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

1.4 Further information

NOTE
All the documentation available for the device can be found on the online product page at:

▶ www.sick.com/PS30

The following information is available for download from this page:

- Type-specific online data sheets for device variants, containing technical data and dimensional drawings
- EU declaration of conformity for the product family
- Dimensional drawings and 3D CAD dimension models in various electronic formats
- These operating instructions, available in English and German, and in other languages if necessary
- Other publications related to the devices described here
- Publications dealing with accessories
- IO-Link driver files and IO-Link Technical Information v1.1

1.5 Customer service

If you require any technical information, our customer service department will be happy to help. To find your agency, see the final page of this document.

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

2 Safety information

2.1 Intended use

The PS30 pattern sensor is an opto-electronic sensor intended for non-contact recognition of recurring patterns. A machine cycle as the input signal, e.g., via an encoder or a motor feedback system, is required to operate the pattern sensor.

Alternatively, the speed of the material can be stored as a constant. This alternative is intended for applications with a constant or only slowly changing material speed.

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 not described in this documentation.

2.2 Improper use

- The device does not constitute a safety-relevant device according to the EC Machinery Directive (2006/42/EC).
- The device must not be used in explosion-hazardous areas.
- Any other use that is not described as intended use is prohibited.
- Any use of accessories not specifically approved by SICK AG is at your own risk.

The device is not suitable for the following applications (this list is not exhaustive):

- As a safety device to protect persons, their hands, or other body parts
- Underwater
- In explosion-hazardous areas
- Outdoors, without additional protection

NOTICE

Danger due to improper use!

Any improper use can result in dangerous situations.

Therefore, observe the following information:

- ▶ The device should be used only in line with intended use specifications.
- ▶ All information in these operating instructions must be strictly complied with.

2.3 Modifications and conversions

Modifications and conversions to the pattern sensor and/or the installation may result in unforeseeable dangers.

Before any technical modifications to and expansions of the pattern sensor, the prior written approval of the manufacturer must be obtained.

2.4 Limitation of liability

Applicable standards and regulations, the latest state of technological development, and our 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:

- Failure to observe the operating instructions
- Improper use
- Use by untrained personnel
- Unauthorized conversions
- Technical modifications
- Use of unauthorized spare parts, wear and tear parts, and accessories

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.

2.5 Requirements for skilled persons and operating personnel

WARNING
Risk of injury due to insufficient training!

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

- All work must only ever be carried out by the stipulated persons.

The operating instructions state the following qualification requirements for the various areas of work:

- **Instructed personnel** have been briefed by the operating entity about the tasks assigned to them and about potential dangers arising from improper action.
- **Skilled personnel** have the specialist training, skills, and experience, as well as knowledge of the relevant regulations, to be able to perform tasks assigned to them and to detect and avoid any potential dangers independently.
- **Electricians** have the specialist training, skills, and experience, as well as knowledge of the relevant standards and provisions to be able to carry out work on electrical systems and to detect and avoid 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.

The following qualifications are required for various activities:

Activities	Qualification
Mounting, maintenance	▪ Basic practical technical training ▪ Knowledge of the current safety regulations in the workplace
Electrical installation, device replacement	▪ Practical electrical training ▪ Knowledge of current electrical safety regulations ▪ Knowledge of the operation and control of the devices in their particular application
Commissioning, configuration	▪ Basic knowledge of the design and setup of the described connections and interfaces ▪ Basic knowledge of data transmission ▪ Knowledge of the operation and control of the devices in their particular application
Operation of the devices in their particular application	▪ Knowledge of the operation and control of the devices in their particular application ▪ Knowledge of the software and hardware environment in the application

2.6 Hazard warnings and operational safety

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.

2.6.1 Eye safety

CAUTION
The device is equipped with LEDs. The device meets the criteria of risk group 1 according to IEC 62471:2006. No special measures are required (e.g., eye protection).

2.7 Repair

The product is a replacement device. The device is not intended to be repaired. Interference with or modifications to the device on the part of the customer will invalidate any warranty claims against SICK AG.

3 Product description

3.1 Product ID

3.1.1 Type label

The type label is located on the back of the pattern sensor.

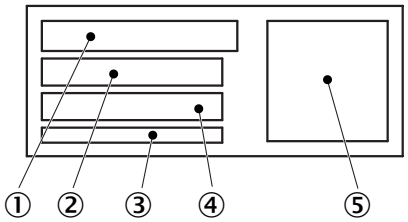


Figure 1: Type label

① Type designation
② Material number
③ MAC address
④ Serial number
⑤ Machine-readable code

3.2 Product features and functions

3.2.1 Device view

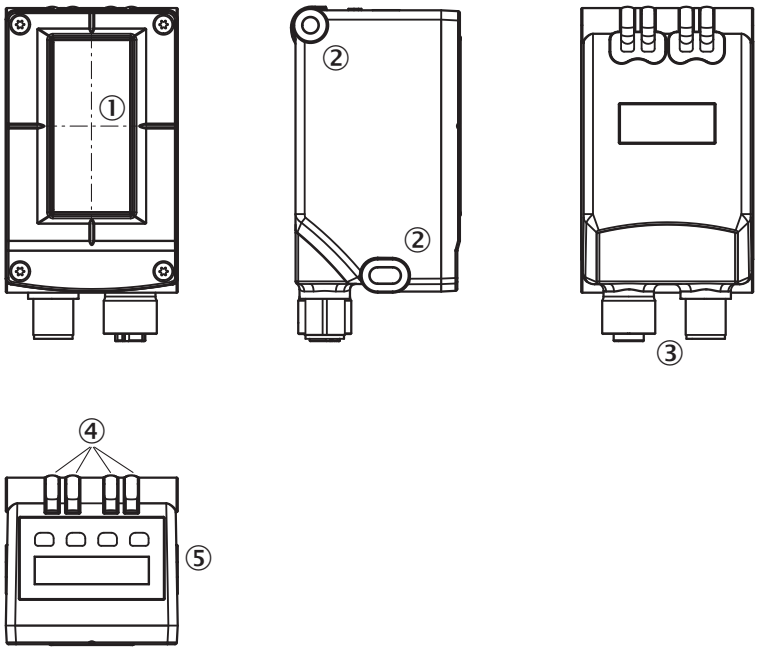


Figure 2: PSS Prime light emission long housing side

① Center of the optical axis
② Fixing hole
③ M12 male connector, 12-pin/M12 female connector, 4-pin, rotatable
④ Function indicators
⑤ Display and control unit

3.2.2 Product characteristics

Figure 3: Recorded image from the perspective of the “PS30 pattern sensor”

① Field of view

② Light spot

Vertical bars: Cuts of the individual lines, corresponds to the encoder resolution.

Blue square marks: Clear and contrast-rich pattern areas automatically selected by the sensor. Five areas have been selected in this example.

Function

The PS30 pattern sensor is an opto-electronic sensor that detects recurring patterns in a contactless manner.

The principle of operation is based on a line camera which constantly searches for contrast differences and sharp edges in the print image (see figure). These distinct and unique areas in the pattern are automatically selected by the sensor during the teach-in process. If the image and contrast pattern stay the same, these points will be in exactly the same locations. The sensor evaluates grayscale information.

A taught-in image is used as a reference for the subsequent detection of a recurring contrast pattern. The print marks usually used for determining position are no longer necessary. When a pattern matching the reference pattern is identified, a switching output is initiated.

The PS30 pattern sensor requires for its operation information about the speed of the material, e.g., from encoder pulses, from a motor feedback system, or as a defined variable with a fixed value or a value updated via TCP/IP.

3.3 Operating modes

The PS30 pattern sensor can be operated in one of two modes:

1 Endless material
2 Single object

3.3.1 Endless material operating mode

When further processing endless materials such as film and paper webs to produce, for example, labels and packaging with a constant repeat length, exact determination of position is essential, e.g., to determine the cut position.

Typically, the target cut position is selected as the start point of the reference image, and the reference image is terminated before the end of the repeat length. The start point of the teach-in area is the position of the switching signal. A switching point offset can also be configured.

Figure 4: Recorded image from the perspective of the “PS30 pattern sensor”

① Teach Stop
② Teach Start
③ Offset
④ Signal

3.3.2 Single object operating mode

In this case the position is to be determined for repeating, separate objects with identical patterns but not separated by a fixed distance. An object, or a section of the object is taught in as a reference.

The end of the teach-in area is used as the position for outputting the switching signal. A switching point offset can be defined.

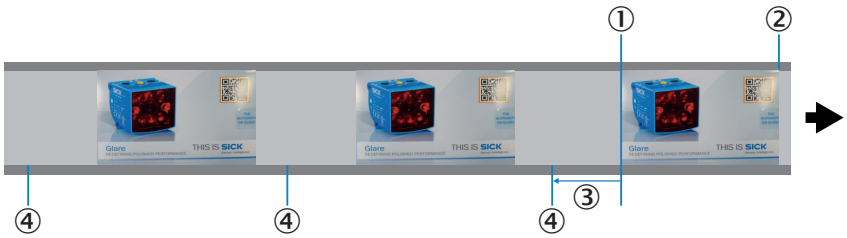


Figure 5: Endless material operating mode

① Teach Stop
② Teach Start
③ Offset
④ Signal

3.4 Display and operating elements

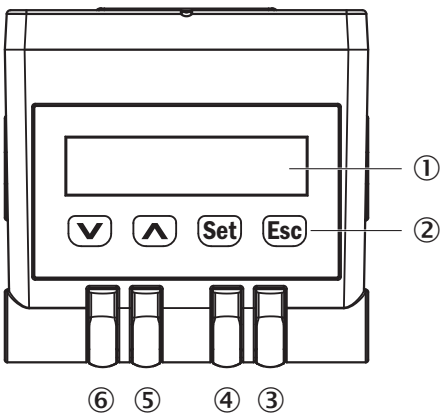


Figure 6: Display and operating elements

① Display
② Pushbuttons
③ Function indicator (yellow) “Act”

④ Function indicator (green) “Link”
⑤ Function indicator (yellow) “Q”
⑥ Function indicator (green) “ON”

Function indicators (LEDs)

Table 1: Function indicators (LEDs)

Function indicator	Description
Act	Data transfer display • Yellow LED: Data transfer • LED off: No data transfer
Link	Ethernet connection display • Green LED: Ethernet connection available • LED off: No Ethernet connection available
Q	Switching output display • Yellow LED: Output high • LED off: Output low • LED flashing (10 Hz): Overcurrent/short-circuit protection has triggered
ON	Operating status display • Green LED: Normal operation/Supply voltage on • LED off: No operation

Symbols on the display

The following symbols may appear on the display: “RUN”, “MEN” and “SET”.

Table 2: Symbols on the display

Icon	Description
RUN	RUN symbol is lit up: The display shows the current operating data of the sensor.
MEN	MEN symbol is lit up: You are in the menu structure and have not yet reached the last selection level.
SET	SET symbol is lit up: Sensor settings can be changed and, for example, values set.

Pushbuttons

Table 3: Pushbuttons

Pushbutton	Description
	• Select operating menu, parameter, or option • Reduce value
	• Select operating menu, parameter, or option • Increase value
	• Short press: o Switch to the next-lowest menu level o Save parameter change o Confirm selection • Long press (> 2 sec.): o Start the operating menu

Pushbutton	Description
Esc	• Short press: Exit parameters without saving. Switch to the next-highest menu level. • Long press: Exit parameters without saving. Change to the default display - Quality of Run.

3.5 Display

Default display

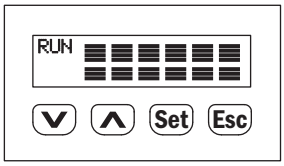


Figure 7: Default display

Operating menus - Monitoring/Setting/Teach-in/Info

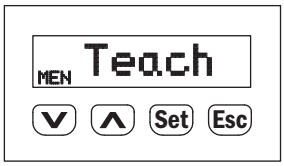


Figure 8: Operating menu

Parameters using example of monitoring

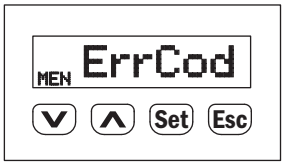


Figure 9: Parameter display

3.6 Bar graph

Teach-in quality

After teach-in has been run, the number of flashing bars indicates the quality of the teach-in process:

- If 3 or more bars are flashing: the teach-in process was successful.
- If fewer than 3 bars are flashing: check whether the signal is switching correctly. If the signal is not switching correctly, repeat the teach-in process.

Process quality

When the RUN symbol is lit up, the number of bars indicates the process quality.

- If 2 or fewer bars are flashing: check whether the signal is switching correctly.
- If the signal is not switching correctly, verify that the sensor is installed correctly, and check the quality of the print image and the mechanical guiding of the object.
- If necessary, repeat the teach-in process.

4 Transport and storage

4.1 Transport

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

NOTE

Damage to the sensor due to improper transport.

- The device must be packaged for transport with protection against shock and damp.
- Recommendation: Use the original packaging as it provides the best protection.
- Transport should be performed by 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

Immediately upon receipt at the receiving work station, 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

Store the device under the following conditions:

- Recommendation: Use the original packaging.
- Do not store outdoors.
- Store in a dry area that is protected from dust.
- So that any residual damp can evaporate, do not package in airtight containers.
- Do not expose to any aggressive substances.
- Protect from sunlight.
- Avoid mechanical shocks.
- Storage temperature: see "Technical data", page 63.
- Relative humidity: see "Technical data", page 63.
- 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 Scope of delivery

Included with delivery:

- PS30 pattern sensor
- Blind plug for M12 Ethernet connection
- Adjustment tool
- Optional: accessories, see "Accessories", page 66
- Quickstart

5.2 Mounting requirements

- Typical space requirement for the device, see type-specific dimensional drawing, see "Technical data", page 63.
- Comply with technical data, such as the permitted ambient conditions for operation of the device (e.g., temperature range, EMC interference emissions, ground potential),
- To prevent condensation, avoid exposing the device to rapid changes in temperature.
- Protect the device from direct sunlight.
- The device must only be mounted using the pairs of mounting threads/fixing holes provided for this purpose.
- Shock and vibration-free mounting.
- The light spot must cover a significant area on the print image. Select an area with high contrast differences and unique pattern elements as the significant area. The center of the light spot is marked with a notch on the upper side of the housing.
- Sensing distance: 20 mm
  The sensing distance is the distance from the front edge of the sensor (housing edge) to the sensing target (e.g., an object).

NOTE
We recommend using the supplied adjustment tool to align the pattern sensor.

Significant areas

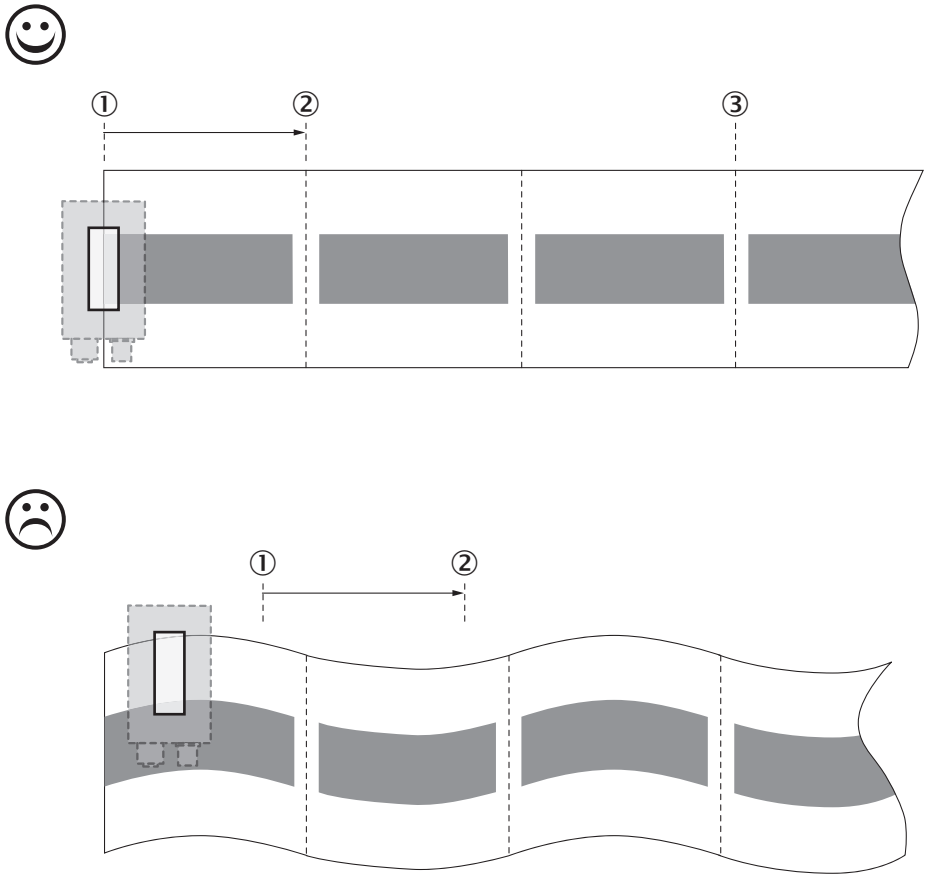


Figure 10: Align the light spot on the print image

① Start (SET/ET)
② Stop (SET/ET)
③ Q

The gray squares correspond to the print areas with unique features.

Arrangement when scanning on a flat surface or flat material

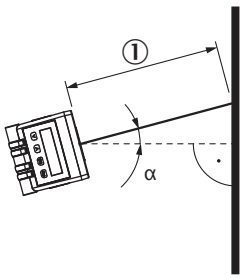


Figure 11: Arrangement of the pattern sensor when scanning on a flat surface or flat material

① SD

α: 15° angle

SD: 20 mm sensing distance

Arrangement when scanning rotary systems

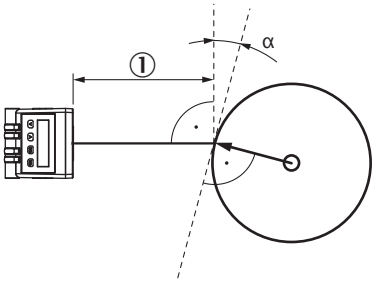


Figure 12: Arrangement of the pattern sensor when scanning rotary systems

① SD

α: 15° angle

SD: 20 mm sensing distance

Using the adjustment tool

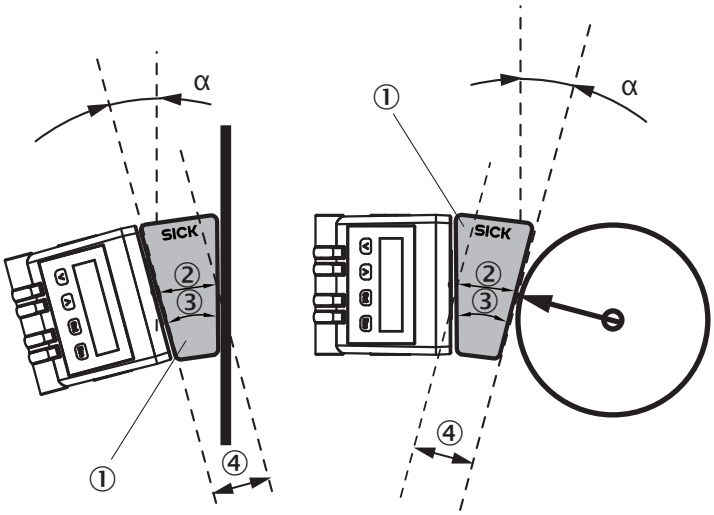


Figure 13: Using the adjustment tool

① Adjustment tool
② 20 mm
③ 15°
④ SD

5.3 Mounting the device

1. Select a mounting location for the pattern sensor (see "Mounting requirements", page 17).
2. Mount the pattern sensor using the fixing holes (see "Technical data", page 63).

6 Electrical installation

6.1 Notes on the electrical installation

NOTICE
Device damage due to incorrect supply voltage!

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

- Only operate the device with safety/protective extra-low voltage (SELV/PELV).
- The sensor is a device of protection class III.

NOTICE
Device damage due to incorrect supply voltage!

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

- Only operate the device with an LPS (limited power source) in accordance with IEC 60950-1 or an NEC Class 2 power supply unit.

NOTICE
Device damage or unpredictable operation due to working with live parts!

Working with live parts may result in unpredictable operation.

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

- **The electrical installation must only be performed by electrically qualified personnel.**
- **Standard safety requirements must be met when working on electrical systems!**
- Only switch on the supply voltage for the device when the connection tasks have been completed and the wiring has been thoroughly checked.
- When using extension cables with open ends, ensure that bare wire ends do not come into contact with each other (risk of short-circuit when supply voltage is switched on!). Wires must be appropriately insulated from each other.
- Wire cross-sections in the supply cable from the user's power system must be selected in accordance with the applicable standards.
- Only operate the device with an LPS (limited power source) in accordance with IEC 60950-1 or an NEC Class 2 power supply unit.
- All circuits connected to the device must be designed as SELV/PELV circuits.
- Operation in short-circuit protected network at max. 8 A.

NOTE
Layout of data cables

- Use screened data cables with twisted-pair wires.
- Implement the screening design correctly and completely.
- To avoid interference, e.g., from switching power supplies, motors, clocked drives, and contactors, always use cables and layouts that are suitable for EMC.
- Do not lay cables over long distances in parallel with voltage supply cables and motor cables in cable channels.

The IP enclosure rating for the device is only achieved under the following conditions:

- The cables plugged into the connections are screwed tight.
- Any other covers present must be closed and lie flush on the device.

If these instructions are not complied with, the IP enclosure rating for the device is not guaranteed!

6.2 Wiring notes

NOTICE
Faults due to incorrect wiring!
Incorrect wiring may result in operational faults.

- For data transmission, use only shielded cables with twisted-pair wires.
- Follow the wiring notes precisely.

NOTE
Preassembled cables can be found online at:

▶ www.sick.com/PS30

All electrical connections of the device are configured as M12 round connectors. The enclosure rating is only achieved with screwed plug connectors or cover caps.

Please observe the following wiring notes:

- A correct and complete cable shielding design is required for trouble-free data transmission.
- The cable shield must be connected at both ends in the control cabinet and at the device. The cable shield of the pre-assembled cables is connected to the knurled nut of the male/female connector and thus also to a large area of the device housing.
- The cable shield in the control cabinet must be connected to a large area of the signal ground, see figure 17.
- Appropriate measures must be taken to prevent equipotential bonding currents flowing through the cable shield.
- During installation, pay attention to the different cable groups. The cables are grouped into the following four groups according to their sensitivity to interference or radiated emissions:
  - Group 1: Cables very sensitive to interference, such as analog measuring cables
  - Group 2: Cables sensitive to interference, such as sensor cables, communication signals, bus signals
  - Group 3: Cables which are a source of interference, such as control cables for inductive loads, motor brakes
  - Group 4: Cables which are powerful sources of interference, such as output cables from frequency inverters, welding system power supplies, power cables
  - ▷ Cables in groups 1, 2 and 3, 4 must be crossed at right angles, see figure 14.
  - ▷ Cables in groups 1, 2 and 3, 4 must be routed in different cable channels or metallic separators must be used, see figure 15 and see figure 16. This applies particularly where cables of devices with a high level of radiated emission, such as frequency converters, are laid parallel to sensor cables.

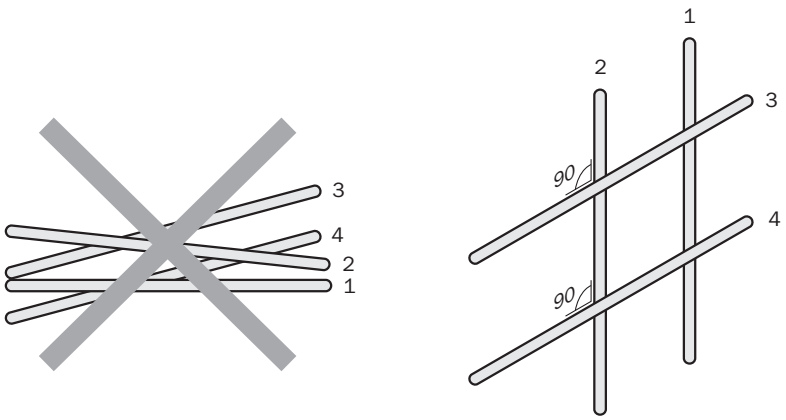


Figure 14: Cross cables at right angles

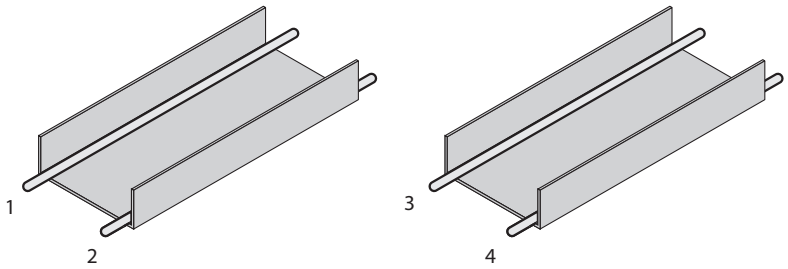


Figure 15: Ideal laying – Place cables in different cable channels

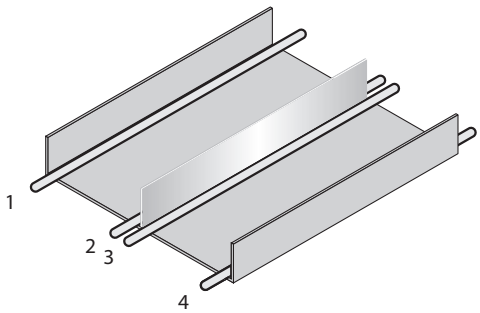


Figure 16: Alternative laying – Separate cables with metallic separators

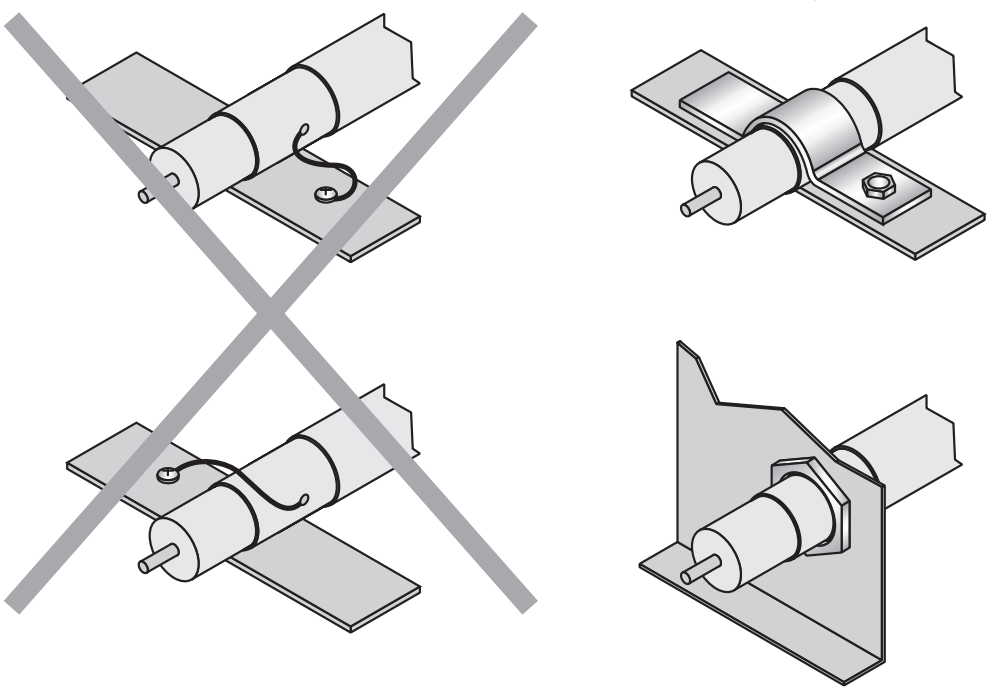


Figure 17: Make an extensive and low-impedance ground connection of the cable shield in the control cabinet

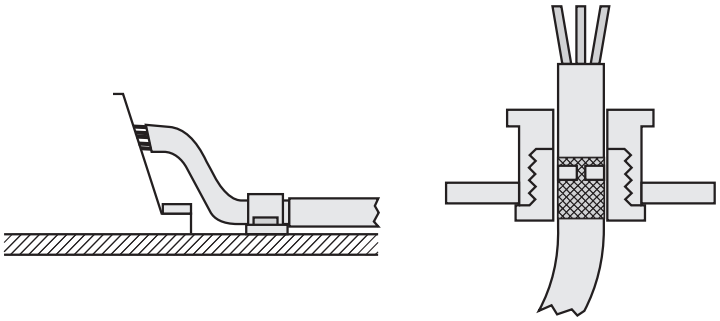


Figure 18: Shield connection in plastic housings

NOTE

Prevent equipotential bonding currents via the cable shield with a suitable grounding concept.

6.3 Note on the swivel connector

NOTICE

Damage to the connector unit from over-tightening!

The connector unit on the device has two opposite end positions.

- Do not rotate the connector unit from either of the two end positions by more than 180°.

6.4 System configuration

The integration of the PS30 pattern sensor into the machine controller is shown in the following figure. The information on the movement of the material does not necessarily need to be provided by an encoder, the signal can of course also be created by a motor feedback system or the controller.

Alternatively, the speed of the material can be stored as a constant. This alternative is intended for applications with a constant or only slowly changing material speed.

The connection to an operating terminal is not essential, but is recommended to allow the visually-supported operation and diagnostic features to be used. If no connection to the HMI is provided, e.g., the device is operated via the display and operating elements on the pattern sensor itself, a PC can, where necessary, be connected via Ethernet for commissioning and/or service work, and to utilize the SOPASair configuration tool provided on the web server.

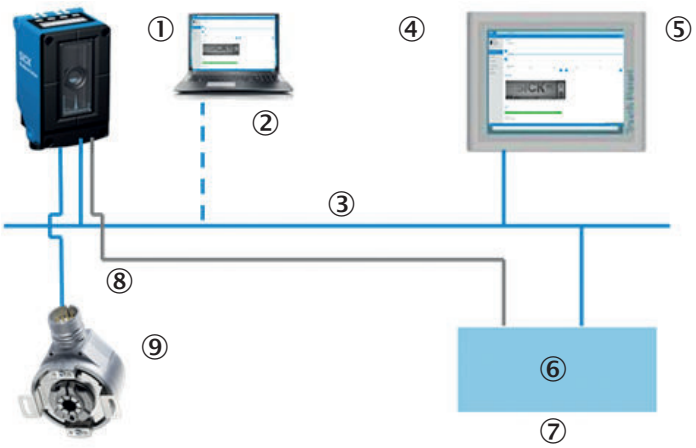


Figure 19: Example system configuration

① PC
② SOPASair
③ Ethernet TCP/IP
④ OPC DA, JSON API
⑤ HMI
⑥ PLC
⑦ Function blocks
⑧ TTL/HTL
⑨ A machine cycle as the input signal, e.g., via an encoder or a motor feedback system

6.5 Connecting the device electrically

DANGER
Pre-assembled cables see "Technical data", page 63.

1. Ensure the voltage supply is not connected.
2. If necessary, turn the swivel connector into the desired position as shown in the figure.

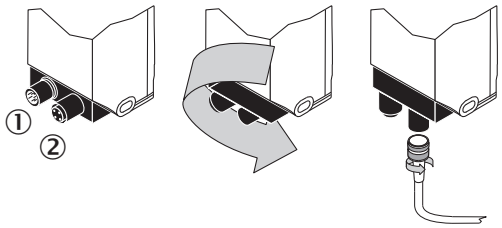


Figure 20: Rotate the swivel connector, establish the electrical connection

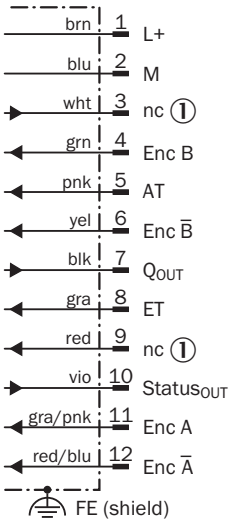
① Supply voltage, external teach-in signal and, if applicable, encoder signal and switching output

② Ethernet

3. Connect the device according to the connection diagram.

6.6 Pin assignment of the connections

6.6.1 Pin assignment for supply voltage and encoder signals



M12 (A-coded)

Figure 21: Connection diagram for supply voltage, external teach-in signal, encoder signal and switching output

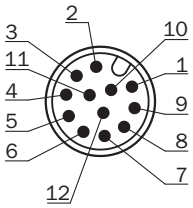


Figure 22: Male connector, M12, 12-pin, A-coded

① nc: not connected

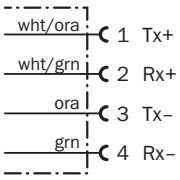
Table 4: Description of supply voltage male connector, external teach-in signal, encoder signal and switching output

Pin	Marking	Wire color	Description
1	L+	Brown	Supply voltage: +12 ... +30 V DC
2	M	Blue	Supply voltage: 0 V
3	nc	White	Not assigned (spare)
4	Enc B	Green	Encoder signal B
5	AT	Pink	Blanking input
6	Enc B(overline)	Yellow	Encoder signal B’
7	Q_{OUT}	Black	Switching output (see "Technical data", page 63)
8	ET	Gray	External teach-in signal

Pin	Marking	Wire color	Description
9	nc	Red	Not assigned (spare)
10	$Status_{OUT}$	Violet	Sensor status (see "Technical data", page 63)
11	Enc A	Gray/pink	Encoder signal A
12	Enc Ā	Red/blue	Encoder signal A’

6.6.2 Pin assignment for Ethernet

The pattern sensor is equipped with a 100Base-T Ethernet connection.



M12 (D-coded)

Figure 23: Ethernet connection diagram

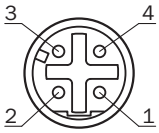


Figure 24: Female connector, M12, 4-pin, D-coded

Table 5: Ethernet female connector description

Pin	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

7 Commissioning

7.1 Pushbutton damage

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.

7.2 Steps to take

1. Switch on the supply voltage. “RUN” appears on the display during initial commissioning. In this case, press the SET pushbutton for at least 2 seconds. “Setup” appears on the display.
2. Set the parameters for the encoder (see "Setting up the encoder", page 27).
3. Select “Endless material” or “Single object” operating mode (see "Operating modes", page 12).
4. If necessary, change the resolution (see "Settings menu", page 33).
5. Run the teach-in process and, if necessary, set identical areas for blanking.
   You can choose between the following options for the teach-in process:
   - Manual start-length teach-in via the “Teach” menu, see "Teach menu", page 37
   - Start-stop teach-in via an external teach-in signal, see "Executing start-stop teach-in via an external teach-in signal", page 34
   - Start-length teach-in via an external teach-in signal, see "Executing start-length teach-in via an external teach-in signal", page 35
   - Start-length teach-in via SOPASair or Ethernet , see "Integrating the PS30 pattern sensor in the network", page 45

   You can choose between the following options for blanking:
   - Blanking via the “Blank” parameter in the Teach menu of the control panel see "Blanking areas (Blank) parameter", page 40
   - Blanking via the AT input, see "Specifying image areas via an “AT” external signal", page 42
   - Blanking via SOPASair or Ethernet, see "Teach-in menu", page 46
6. If necessary, set an offset for adjustment of the switching point:
   - via the “Offset” menu item in the Teach menu of the control panel see "Switching point offset (OffSet) parameter", page 39
   - via SOPASair or Ethernet, see "Teach-in menu", page 46

NOTE

Teach-in via an external signal always has priority over the other teach-in methods.

7.3 Setting up the encoder

NOTE

The encoder resolution (EncRes) must be between 100 µm ... 600 µm. If necessary, use a configurable encoder. Provided the above encoder resolution range is adhered to, you can also use an existing motor feedback system.

Menu structure

For details of the menu structure, see "Menu structure", page 69.

Encoder settings

“Setup” is shown on the display during initial commissioning. During this setup, the device will prompt for the settings of the encoder used. The following parameters must be entered for the encoder:

- “EncTyp” (encoder type)
- “EncRes” (encoder resolution) → See the following section on calculating the encoder resolution
- “EncDir” (encoder direction)

If you are not using an encoder, accept the factory settings for these parameters. Further settings can be configured in SOPASair (see "Operation via SOPASair", page 45).

NOTE

To ensure a correct signal, the rotational direction during the teach-in process must match the configured encoder direction.

Calculating the encoder resolution

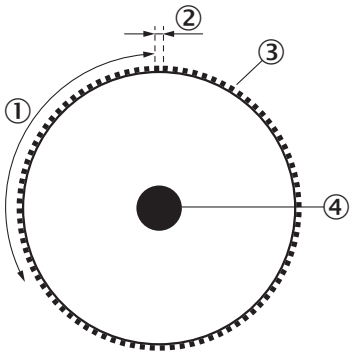


Figure 25: Calculating the encoder resolution

① U
② S
③ n
④ Encoder

The graphic is provided as an example for the purposes of illustrating the encoder resolution. The roller geometry is not essential. The encoder resolution is the path covered by the material from encoder bar to encoder bar.

The encoder resolution (EncRes) can be calculated using the following formula:

S = U/n

S: Encoder resolution

U = External circumference of the roller

n: Number of encoder bars in 360°

Setup menu encoder settings

Table 6: Setup menu encoder settings

Display	Description
EncTyp	Select the encoder type. Options • TTL: 4.5 V ... 5.5 V, TTL / RS-422 (differential) • HTL: 12 V ... 30 V, HTL / push-pull Factory setting • TTL
EncRes	Set the encoder resolution. Adjustment range • 100 µm ... 600 µm (in 1 µm increments) Factory setting • 100 µm
EncDir	Select the encoder direction. Options • Auto: the direction is determined automatically at the beginning of the teach-in process • CW: clockwise • CCW: counter-clockwise Factory setting • Auto

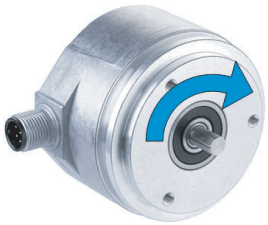


Figure 26: Clockwise direction of rotation

Figure 27: Counter-clockwise direction of rotation

Running the Setup menu

"Setup" appears on the display.

1. Press the SET pushbutton. The "EncTyp" (encoder type) parameter is displayed.
2. Press the SET pushbutton. The current value is displayed.
3. Select the encode type using the arrow pushbuttons.
4. Press the SET pushbutton; the "EncRes" (encoder resolution) parameter is displayed. The first digit on the left flashes.
5. Press the up arrow pushbutton to increase the digit. Press the down arrow pushbutton to decrease the digit.
6. Press the SET pushbutton. The next digit flashes.
7. Repeat steps 5 and 6 until the last digit has been set. The "EncDir" (encoder direction) parameter is displayed.
8. Select the encoder direction using the arrow pushbuttons.
9. Press the SET pushbutton. The prompt "Store?" is displayed.
10. Perform one of the following steps:
    - Press the SET pushbutton to save all inputs for the encoder. The Monitor menu is displayed.
    - Press the ESC pushbutton to cancel the process.

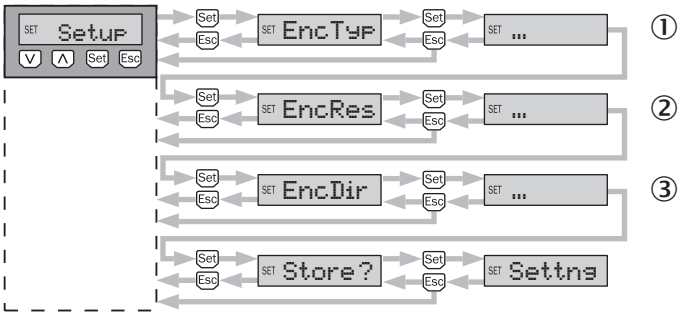


Figure 28: Setup during initial commissioning

① Default setting: TTL

Range: TTL/ HTL

Description: The encoder type must be specified.

② Default setting: 100 µm

Range: 100 µm ... 600 µm in 1 µm increments

Description: The encoder resolution must be specified.

③ Default setting: Auto

Range: Auto/ CW/ CCW

Description: The direction of rotation of the encoder must be specified.

NOTE

The encoder settings are retained even after a reset. You can change the encoder settings later in the “Setting” menu.

7.4 Operation without encoder or machine cycle

If no external encoder will be used, the speed can be stored as a constant via SOPASair. For general information on using SOPASair, see "Operation via SOPASair", page 45.

To store the speed of the material as a constant, open the following page in your web browser: 192.168.100.100/velocity.

If the IP address of the sensor was changed, insert that value (in place of 192.168.100.100).

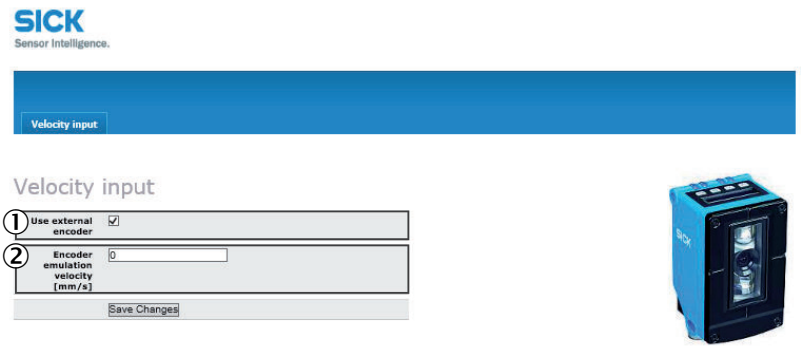


Figure 29: Appearance of the display when not using an encoder

① Using an external encoder

② Speed in mm/s

Proceed as follows:

1. Deselect the checkbox.
2. Enter the material speed in mm/s.

Save the settings using “save changes”.

The PS30 will now use the stored speed.

The specified speed is stored in the udiEncEmulationVelocity variable. This can be changed dynamically via TCP/IP. Any changes in speed can therefore be taken into consideration. For real-time conditions, we recommend using an encoder signal or machine cycle.

For a detailed description of the Ethernet interface and information about udiEncEmulationVelocity, see **www.sick.com/PS30**.

8 Operation

8.1 Pushbutton damage

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.

8.2 Navigation

You can select a menu, parameter, option or value using the SET pushbutton and the arrow pushbuttons. The menu path is specified in the relevant chapters of these instructions.

For the overall menu structure and navigation (see "Menu structure", page 69).

8.3 Selecting an option

1. Select the desired parameter using the SET pushbutton and the arrow pushbuttons.
2. Select the desired option using the arrow pushbuttons.
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 default display: Quality of Run:
   - Press the SET pushbutton repeatedly until the status display is displayed again.
   - Wait for approx. one minute. The display will automatically switch back to the status display 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 SET pushbutton and the arrow pushbuttons.
2. Press the SET pushbutton. The current value of the parameter is displayed. The first digit on the left flashes.
3. Press the up arrow pushbutton to increase the digit. Press the down arrow pushbutton to decrease the digit.
4. Press the SET pushbutton to save the digit entered. The next digit flashes.
   Press the ESC 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 SET pushbutton repeatedly until the Quality of Run default display is shown again. Alternatively, you can wait for approx. one minute. The display will automatically switch back to the default display if no pushbuttons are pressed.

8.5 Settings menu

The Settings menu – displayed as MENSettng – is used to configure the sensor configuration parameters listed below.

To access the parameters in the Settings menu, press SET then select the parameter using the arrow pushbuttons.

The available options are selected by pressing SET followed by the arrow pushbuttons, and confirmed by pressing SET.

8.5.1 Operating mode (Mode) parameter

Table 7: Operating mode (Mode) parameter

Parameter	Description
Endl	Endless material operating mode A web with recurring, connected patterns is moved past the pattern sensor. The switching point corresponds to the start of the teach-in area. An offset can be used to shift the switching point.
Single	Single object operating mode Single, non-connected objects are moved past the pattern sensor. The switching point corresponds to the end of the taught-in object area. An offset can be used to shift the switching point.

Factory setting: Endl – Endless material

8.5.2 Encode type (EncTyp) parameter

Table 8: Encode type (EncTyp) parameter

Parameter	Description
EncTyp	Select the encoder type. Options • TTL: 4.5 V ... 5.5 V, TTL / RS-422 (differential) • HTL: 12 V ... 30 V, HTL / push-pull Factory setting • TTL

8.5.3 Encode resolution (EncRes) parameter

Table 9: Encode resolution (EncRes) parameter

Parameter	Description
EncRes	Set the encoder resolution Adjustment range • 100 ... 600 µm (in 1 µm increments) Factory setting • 100 µm

8.5.4 Encoder direction (EncDir) parameter

Table 10: Encoder direction (EncDir) parameter

Parameter	Description
EncDir	Select the encoder direction Options • Auto: • CW: clockwise • CCW: counter-clockwise Factory setting • Auto

8.5.5 External teach-in (ETeach) parameter

Table 11: External teach-in (ETeach) parameter

Option	Description
Start-stop teach-in (StaSto)	The rising signal edge at the input starts the teach-in process, the falling signal edge ends the teach-in process. About teach-in: see "Executing start-stop teach-in via an external teach-in signal", page 34
Start-length teach-in (StaLen)	The rising signal edge at the input starts the teach-in process. The teach-in process is automatically ended by the sensor after the teach-in length entered as a parameter is reached. About teach-in: see "Executing start-length teach-in via an external teach-in signal", page 35

Factory setting: StaSto – Start-stop teach-in

8.5.5.1 Executing start-stop teach-in via an external teach-in signal

Prerequisite: The encoder settings, the operating mode, and the resolution have been configured.

1. Press and hold the SET pushbutton for at least 2 seconds to access the “Monitr” menu.
2. Select the “StaSto” option.
   Menu path: Status display → SET→ Monitr → Arrow pushbuttons → Setting → SET → Mode → Arrow pushbuttons → ETeach → SET → StaSto
3. Position the light spot at a significant point on the print image. This point later becomes the start point. When using the Endless material operating mode, the start point corresponds to the switching point.
4. Apply an external voltage signal to the “ET” input. The teach-in process starts. The current point is saved as the start point.
5. Pass a maximum of one object length/format length through the light spot in the rotational direction of the encoder with positional accuracy. Note that to ensure a correct signal, the rotational direction during the teach-in process must match the configured encoder direction (EncDir).
6. Remove the external voltage signal from the “ET” input. The current point is saved as the end point. The stop point is the switching point when in Single object operating mode. The teach-in process ends. The display shows the message “Busy”.
7. When using the Endless material operating mode, continue moving formats through the light spot until the message “Busy” disappears. When using the Single object operating mode, no further objects are required. The calculation of the teach-in image and the reference areas is performed while the message “Busy” is displayed. Once the teach-in process is complete, the quality of the teach-in process is displayed as a bar graph:

- If 3 or more bars are flashing: the teach-in process was successful.
- If fewer than 3 bars are flashing: check whether the signal is switching correctly. If the signal is not switching correctly, the teach-in process must be repeated.

8. The bar graph flashes for another 10 format lengths, then the display automatically changes to the “Quality of Run” status display. The bar graph indicating the process quality no longer flashes. The RUN symbol is displayed.

Requirements

- Note the “Minimum format length”, “Maximum format length” and “Minimum format height” technical data, see "Technical data", page 63.
- The light spot must cover a significant area on the print image. Select an area with high contrast differences and unique features as the significant area, see "Mounting requirements", page 17.
- The sensing distance (distance from the front edge of the sensor to the object) and the angle of the pattern sensor to the image must be adhered to, see "Mounting requirements", page 17.
- Avoid fluctuations in distance and height.
- Teach in a maximum of a complete format length/object length.

8.5.5.2 Executing start-length teach-in via an external teach-in signal

Prerequisite: The encoder settings, the operating mode, and the resolution have been configured.

1. Press and hold the SET pushbutton for at least 2 seconds to access the “Monitr” menu.
2. Select the “StaLen” option.
   Menu path: Status display → SET→ Monitr → Arrow pushbuttons → Setting → SET → Mode → Arrow pushbuttons → ETeach → SET → StaSto →Arrow pushbuttons → StaLen
3. Press the SET pushbutton. The currently entered object length/format length is displayed.
4. Press the SET pushbutton. The first digit on the left flashes.
5. If necessary, change the value, see "Changing the value", page 32.
6. Position the light spot at a significant point on the print image. This point later becomes the start point. When using the Endless material operating mode, the start point corresponds to the switching point.
7. Apply an external voltage pulse to the “ET” input. The teach-in process starts at the rising signal edge. The current point is saved as the start point.
8. Pass the format or object through the light spot in the rotational direction of the encoder with positional accuracy. Note that to ensure a correct signal, the rotational direction during the teach-in process must match the configured encoder direction (EncDir).
9. After the entered teach-in length has run through, the teach-in process stops automatically. When using the Single object operating mode, the end point of the teach-in process corresponds to the switching point.
10. When using the Endless material operating mode, continue moving formats through the light spot until the message “Busy” disappears. When using the Single object operating mode, no further objects are required. The calculation of the teach-in image and the reference areas is performed while the message “Busy” is displayed. The quality of the teach-in process is shown as a bar graph on the display:
    - If 3 or more bars are flashing: the teach-in process was successful.
    - If fewer than 3 bars are flashing: check whether the signal is switching correctly. If the signal is not switching correctly, the teach-in process must be repeated.

11. The bar graph flashes for another 10 format lengths, then the display automatically changes to the “Quality of Run” status display. The bar graph indicating the process quality no longer flashes. The RUN mode is displayed.

Requirements

- Note the “Minimum format length”, “Maximum format length” and “Minimum format height” technical data, see "Technical data", page 63.
- The light spot must cover a significant area on the print image. Select an area with high contrast differences and unique features as the significant area, see "Mounting requirements", page 17.
- The sensing distance (distance from the front edge of the sensor to the object) and the angle of the pattern sensor to the image must be adhered to, see "Mounting requirements", page 17.
- Avoid fluctuations in distance and height.
- Teach in a maximum of one format length/object length.

8.5.6 Ethernet configuration (Ethern) parameter

NOTE
Changes to the “Ethern” parameter are not adopted until the device is restarted.

Set the Ethernet configuration using the “Ethern” parameter.

For more information about the Ethernet interface, see "Operation via SOPASair", page 45.

For the menu structure and navigation, see see "Menu structure", page 69.

Table 12: Ethern parameter

Parameter	Description
IPAdr	Enter an IP address. Factory setting • MSB: 192 • Byte 2: 168 • Byte 1: 100 • LSB: 100
SubMas	Enter IP network mask. Factory setting • MSB: 255 • Byte 2: 255 • Byte 1: 255 • LSB: 0
D gate	Enter default gateway. Factory setting • MSB: 0 • Byte 2: 0 • Byte 1: 0 • LSB: 0

Table 13: “Ethern” parameter - default values

Parameter	Description
DHCP	Factory setting: Deactivated.
MAC ID	Individual address

Entering IPAdr, SubMas, DHCP, MAC ID and D gate

The “IPAdr”, “SubMas” and “D gate” parameters are entered in an identical manner. Entry for the IP address is described here.

1. Select the “IPAdr” parameter under “Ethern”.
2. Press the SET pushbutton. The current value for the “Most significant byte” is displayed. The first digit on the left flashes.
3. Press the up arrow pushbutton to increase the digit. Press the down arrow pushbutton to decrease the digit.
4. Press the SET pushbutton to save the digit entered. The next digit flashes.
5. Repeat steps 3 and 4 until the last digit is saved. The value of the next byte is displayed.
6. Repeat steps 3 to 5 for the second, third and fourth byte (least significant byte).
7. After you have set the value of the fourth byte by pressing the SET pushbutton, the “IPAdr” parameter is displayed.

8.5.7 Device reset (Reset) parameter

Performing a reset

Table 14: Device reset (Reset) parameter

Parameter	Description
Reset	Perform a reset. Options • Yes: Perform a reset. • No Factory setting • No

1. Select the “Reset” parameter in the “Settng” menu (see "Settings menu", page 33).
2. Press the SET pushbutton.
3. Select the “yes” option.
4. Press the SET pushbutton to reset the device to its initial state. Press the ESC pushbutton to cancel the process.

8.6 Teach menu

The Teach menu – displayed as $_{MEN}$Teach – is used to execute the manual start-length teach-in via the control panel. It can also be used to configure a switching point offset and blanking areas for manual and external teach-in.

To access the parameters in the Teach menu, press SET then select the parameter using the arrow pushbuttons.

The available options are selected by pressing SET followed by the arrow pushbuttons, and confirmed by pressing SET.

8.6.1 Manual start-length teach-in via the control panel (StaLen) parameter

Requirements

- Note the “Minimum format length”, “Maximum format length” and “Minimum format height” technical data (see "Technical data", page 63).
- The light spot must cover a significant area on the print image. Select an area with high contrast differences and unique features as the significant area (see "Mounting requirements", page 17).

- The sensing distance (distance from the front edge of the sensor to the object) and the angle of the pattern sensor to the image must be adhered to (see "Mounting requirements", page 17).
- Avoid fluctuations in distance and height.
- Teach in a maximum of one format length or object length.

StaLen parameter

Table 15: StaLen parameter

Value / option	Description
Length	Enter the length of the teach-in area in mm. Use a maximum of the format length or object length as the teach-in length.
Currently entered format length	Displays the currently entered length of the teach-in area. Confirm or change the current length of the teach-in area. Input range • 15 mm ... 1,000 mm Factory setting • 240 mm
START?	Set the start point for the teach-in process.
Busy	When using the Single object operating mode, move one object past the sensor; no further objects are required for the teach-in. When using the Endless material operating mode, continue moving patterns through the light spot until the message “Busy” disappears.

Performing start-length teach-in

Prerequisite: The encoder settings, the operating mode, and the resolution have been configured.

1. Press and hold the SET pushbutton for at least 2 seconds to access the “Monitr” menu.
2. Select the “StaLen” parameter.
   Menu path: Status display→ SET→ Monitr → Arrow pushbuttons → Teach → SET → StaLen
3. Press the SET pushbutton. The currently entered format length is displayed.
4. Press the SET pushbutton. The first digit on the left flashes.
5. If necessary, change the value, see "Changing the value", page 32.
6. Repeat step 5 until the last digit is saved. The “Start?” parameter is displayed.
7. Position the light spot at a significant point on the print image. This point later becomes the start point. When using the Endless material operating mode, the start point corresponds to the switching point.
8. Press the SET pushbutton. The point is saved as the start point. The display shows the message “Busy”.
9. When using the Single object operating mode, move the object past the sensor. The stop point of the teach-in process corresponds to the switching point in Single object operating mode.
   When using the Endless material operating mode, continue moving formats through the light spot until the message “Busy” disappears. The quality of the teach-in process is shown as a bar graph on the display:
   - If 3 or more bars are flashing: the teach-in process was successful.
   - If fewer than 3 bars are flashing: check whether the signal is switching correctly. If the signal is not switching correctly, the teach-in process must be repeated, see "Manual start-length teach-in via the control panel (StaLen) parameter", page 37.

10. The bar graph flashes for another 10 format lengths, then the display automatically changes to the “Quality of Run” status display. The bar graph indicating the process quality no longer flashes. The RUN symbol is displayed.

8.6.2 Switching point offset (OffSet) parameter

NOTE

If an offset is required, it must be entered after the areas to be blanked are set.

The offset is reset to 0 mm after every new teach-in.

Figure 30: Setting the offset (switching point shift) for Endless material operating mode

① Teach Stop
② Teach Start
③ Offset

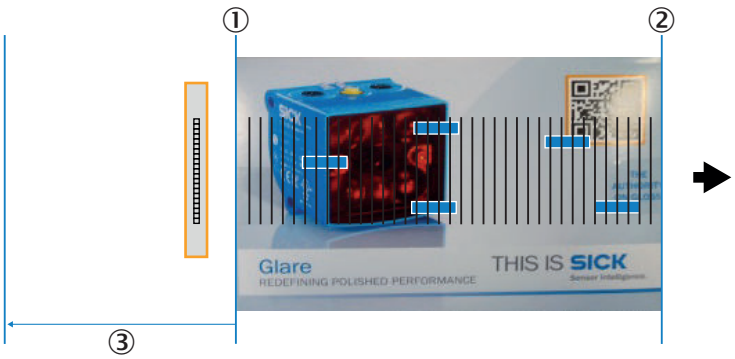


Figure 31: Setting the offset (switching point shift) for Single object operating mode

① Teach Stop
② Teach Start
③ Offset

Offset parameter

You can shift the switching point for the “Q” switching output using the Offset parameter.

For the menu structure and navigation, see "Menu structure", page 69.

Table 16: Offset parameter

Parameter	Description
Offset	Shifts the switching point for the “Q” switching output to the desired position. In Endless material operating mode, the start point of the teach-in process is used as the switching point; in Single object operating mode, the stop point of the teach-in process is used as the switching point. Adjustment range • 0 mm ... taught-in format length in mm Factory setting • 0 mm

Setting the offset

Prerequisite: The encoder settings, the operating mode, and the resolution have been configured.

1. Press and hold the SET pushbutton for at least 2 seconds to access the “Monitr” menu.
2. Select the “Offset” parameter.
   Menu path: Status display → SET→ Monitr → Arrow pushbuttons → Teach → SET → StaLen→ Arrow pushbuttons → Offset
3. Press the SET pushbutton. The currently entered offset is displayed.
4. Press the SET pushbutton. The first digit on the left flashes.
5. If necessary, change the value, see "Changing the value", page 32.
6. Repeat step 5 until the last digit is saved.
7. Press the SET pushbutton. The point is saved as the start point.

8.6.3 Blanking areas (Blank) parameter

NOTE
Blanking of image areas can only be performed after a successful teach-in process. The blanking areas are deactivated again after each new teach-in process.

The teach-in quality can change due to the use of blanking areas.

Figure 32: Blanking out image areas

① Start value for blanking
② Blanking area
③ End value for blanking

You can use the “Blank” parameter to blank identical image areas (see "Menu structure", page 69).

Table 17: “Blank” parameter

Parameter / option	Description
Area1	Enter the first area for blanking. An upper and lower limit must be entered for each area. Adjustment range • 0 ... 999 mm
Area2	Select the second area for blanking. Adjustment range • 0 ... 999 mm
Area3	Press the SET pushbutton to start the blanking process.

Entering blanking areas

In Endless material operating mode you can configure two areas for blanking in the sensor’s control panel. Areas that have been blanked are no longer analyzed. Blanking provides a way of ignoring varying elements, for example a best-before date. The process is identical for the “Area1” and “Area2” parameters.

1. Select the “Blank” parameter.
   Menu path: Status display → SET→ Monitr → Arrow pushbuttons → Teach → SET → StaLen→ Arrow pushbuttons → Blank
2. Press the SET pushbutton. The “IDArea” parameter is selected and then, after pressing SET again, the “Area1” parameter is selected. Either jump to “Area2” by pressing the arrow pushbuttons, or press SET to display the current value for the start of “Area1”.
3. If necessary, change the value, see "Changing the value", page 32.
4. The end value for the “Area1” parameter is displayed. The first digit on the left flashes.
5. If necessary, change the value, see "Changing the value", page 32.
6. If necessary, repeat steps 2 to 6 for the “Area2” parameter.

Blanking out image areas

To blank out the entered image areas, you need to activate them using the “Apply?” parameter.

1. Select the “Apply” parameter under “Blank”
   Menu path: Status display→ SET → Monitr → Arrow pushbuttons → Teach → SET → StaLen → Arrow pushbuttons → Blank → SET → IDArea → SET → Area1 → Arrow pushbuttons → Apply?
2. Press the SET pushbutton. “Busy” is displayed. The sensor now recalculates the reference areas for the now-defined area.
3. When the recalculation is complete, the quality of the teach-in process is shown as a bar graph on the display:
   - If 3 or more bars are flashing: the teach-in with blanking areas was successful.
   - If fewer than 3 bars are flashing: check whether the signal is switching correctly. If the signal is not switching correctly, the blanking areas must be modified.
4. When using the Endless material operating mode, the bar graph flashes for another 10 format lengths, then the display automatically changes to the “RUN” status display. The bar graph indicating the process quality no longer flashes. The RUN mode is displayed.

Deactivating blanking

You can deactivate blanking as follows:

- By executing a new teach-in process.
- By selecting the “Blank” parameter. This will recalculate the teach-in data from the saved teach-in image.

To deactivate blanking using the “Blank” parameter:

1. Select the “Area1” or “Area2” parameter under “Blank”.
2. Set the upper and lower values to “0 mm”.
3. Press the SET pushbutton. The teach-in data is recalculated from the saved teach-in image.

8.6.4 Specifying image areas via an “AT” external signal

NOTE
The specification of blanking areas via an external signal to the “AT” input is only possible during a teach-in process.

NOTE
You can view the start and end values of the blanking areas in the “Blank” parameter after the teach-in process is complete.

Figure 33: Blanking out image areas

① Low
② High
③ AT
④ Start value for blanking
⑤ Blanking area
⑥ End value for blanking

To blank out areas via the “AT” input, set the signal to “High” during the teach-in process. Those areas of the image for which a high signal was present during the teach-in process are blanked during operation.

You can blank up to a maximum of two image areas. If the high signal is present more often than this, no further image areas are blanked.

8.7 Monitoring menu

The Monitoring menu – displayed as $_{MEN}$Monitr – is used to display details of the quality of the teach-in process, current parameters values, and error messages via the parameters listed below.

To access the parameters in the Monitoring menu, press SET then select the parameter using the arrow pushbuttons.

The available values are selected by pressing SET (parameter selection) followed by the arrow pushbuttons, and confirmed by pressing SET.

For the menu structure and navigation, see "Menu structure", page 69.

Table 18: “Monitoring” menu

Parameter	Description
QoR (Quality of Run)	Displays the quality of pattern recognition during the process Displays • Display see "Display", page 15. • The QoR display is the default display and is selected automatically after 60 s if the device is not operated.
QoT (Quality of Teach-in)	Displays the quality of the teach-in process. Displays • 3 or more bars: the teach-in process was successful. • Fewer than 3 bars: check whether the signal is switching correctly. If the signal is not switching correctly, the teach-in process must be repeated.
TeaLen	Shows the programmed pattern length in mm.
ActLen	Shows the current format length in mm when using the Endless material operating mode.
EncPos	Displays the current encoder position. Display range • 0 ... 16383 • A “+” indicates that the current rotational direction matches the taught-in rotational direction. • A “-” indicates that the current rotational direction is opposite to the taught-in rotational direction. Unit • Lines
ErrCod	Shows the current error code when an error is present. “NoErr” is displayed if there is no error present. Error codes see "Possible error indicators", page 53.

8.8 Info menu

The IP address, serial number and software version parameters can be viewed in the Info menu.

To access the parameters in the Monitoring menu, press SET then select the parameter using the arrow pushbuttons.

The respective values are displayed after pressing SET (parameter selection).

9 Operation via Ethernet TCP/IP

Operation and integration variants

Configuration, operation and diagnostics of the PS30 pattern sensor can be performed using the Ethernet interface as an alternative to manual operation via the operating and display elements on the device. SICK AG offers the following tools for controlling and analyzing the PS30 via Ethernet TCP/IP:

1. Function blocks for integrating the PS30 via a machine controller in common PLC systems. The function blocks, including documentation, are available as downloads on the SICK AG homepage (www.sick.com/PS30).
2. OPC DA for controlling the PS30 via the machine controller or HMI of the machine. The OPC DA profile, including documentation, is available as a download on the SICK AG homepage (www.sick.com/PS30).
3. SICK AG provides the SOPASair configuration and diagnostic software for the PS30 which can be accessed from a PC or HMI through the web server integrated in the sensor. If only specific operating and display elements are to be integrated in the user interface of the machine, these controls can be accessed and integrated by the user via specific addresses.
   Documentation of the interface for directly communicating with the device via the Ethernet TCP/IP interface is available at www.sick.com/PS30.

IP network configuration

The web server of the PS30 pattern sensor is accessed via the IP address of the sensor.

The PS30 supports UPnP. The sensor is automatically configured in an UPnP-capable system.

The DHCP function is deactivated on delivery. If DHCP is activated and a DHCP server is on the network, the PS30 obtains the IP address from that server.

If DHCP is deactivated, the configured static IP address is used (factory setting 192.168.100.100).

NOTE
The currently set IP address can be found on the device via the display and operating element in the “INFO” menu (see "Info menu", page 70).

NOTE
If you change the IP configuration of the sensor, you need to switch the supply voltage off and on again to activate the new setting.

10 Operation via SOPASair

10.1 Integrating the PS30 pattern sensor in the network

1. Connect the PS30 pattern sensor to the PC or machine network using an Ethernet cable.
2. Enter the IP address in a web browser. SICK recommends using the Google Chrome web browser.
3. The SOPASair configuration software starts. The user interface for the PS30 is displayed.

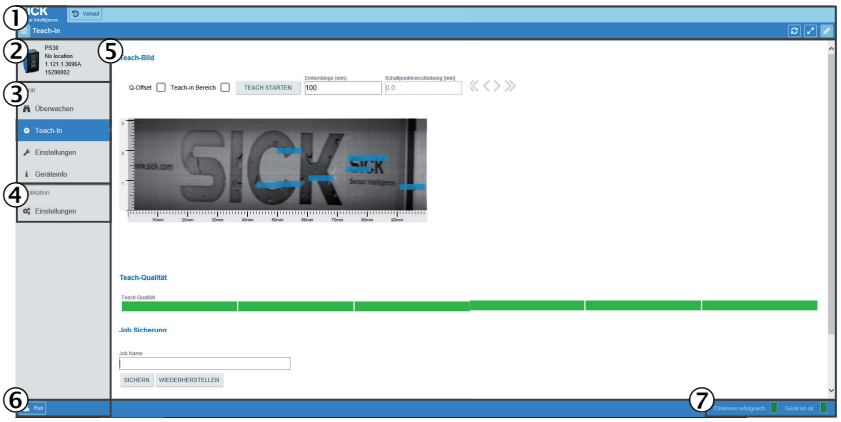


Figure 34: Layout of the user interface

① Basic functions
② Device identification
③ Menu selection
④ Configuration of the SOPASair software tool
⑤ Display and user interface
⑥ User level selection
⑦ Status bar

1 Basic functions
- ≡ Monitoring: folding out objects 2, 3 and 4
- Search function
- Updating the interface Refreshing the interface with the current sensor data
- Switching the editing function on/off for input fields
  When the editing function is not active, inputs via the sensor display are not visualized in SOPASair.

2 Device identification
- Display of the item description,
- User-specified name for the sensor location
- Software version of the sensor
- Serial number of the sensor

3 Menu selection
There are four menus available, as with operation on the sensor:
- Monitoring
- Teach-in
- Settings
- Device info

The currently selected menu with its corresponding interface is displayed at ⑥ on the screen and is color-coded. Clicking the cursor on the corresponding line at ③ on the screen switches between the menus.

4 SOPASair software tool settings Position the cursor and click in this area of the screen to switch to this mode. The corresponding interface is displayed at ⑥ on the screen.

5 Display and user interface for the selected menu.
- Controls for teach-in
- Display of the teach-in image
- Display of the teach-in quality
- Controls for saving the job

User level selection:
The available user levels are Run and Maintenance.
The factory-set password for the Maintenance user level is: “maintenance”.
It can be changed in the settings.

6 Status bar
- Displays the device status in text format and as a colored indicator
- Displays the success of the process in text format and as a colored indicator

10.2 Monitoring menu

The screen displayed when using the Endless material operating mode is shown in the following figure.

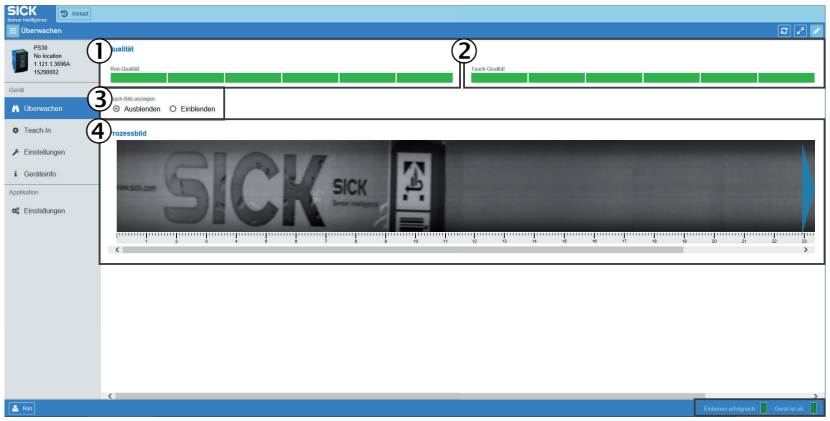


Figure 35: Appearance of the Monitoring menu when using Endless material operating mode

① Quality of Run bar graph

② Quality of Teach bar graph

③ Button for hiding/showing the teach-in image

④ Teach-in image

1. The bar graph displays the Quality of Run and the resultant switching accuracy. If fewer than 3 bars are displayed, the color changes to red to indicate that the measurement accuracy is inadequate and switching is not ensured.
2. The bar graph displays the Quality of Teach and the resultant teach-in accuracy. If fewer than 3 bars are displayed, the color changes to red to indicate that the teach-in operation has failed.
3. If necessary, you can select to display the current teach-in image, e.g., to compare the process image with the teach-in image.
4. An image of the object recorded when the process is running can be accessed by double clicking. It is a snapshot; a continuous display is not possible due to the volume of data involved.

10.3 Teach-in menu

The screen displayed after selecting the Teach-in menu is shown in the following figure. This menu can be used to execute the teach-in process as a start-length teach-in.

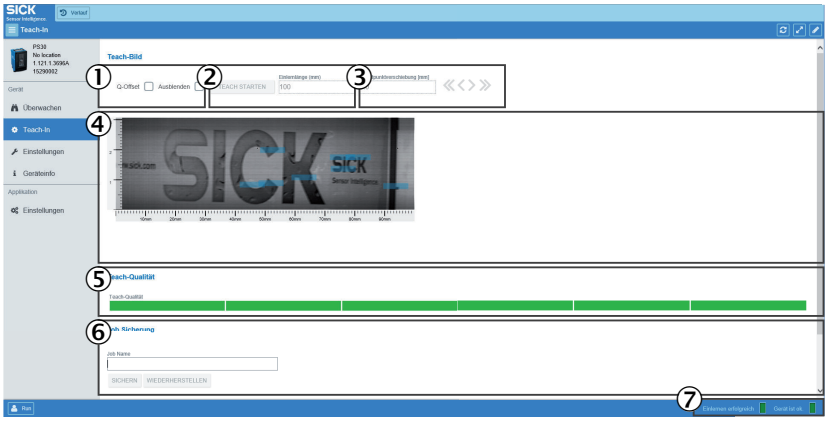


Figure 36: Appearance of the Teach-in menu when using Endless material operating mode

① Switching point shift (offset) button and blanked areas
② Teach-in button
③ Field for setting the switching point offset
④ Teach-in image
⑤ Teach-in quality bar graph
⑥ Field for saving the job
⑦ Process status display

1. Activate/deactivate a switching point shift (offset) and blanked areas.
2. Start teach-in process (start-length teach-in). Define the length of the teach-in area.
3. Activate the switching point offset.
4. Display of the teach-in image once the teach-in operation has been completed. The reference areas are represented by blue rectangles.
5. The teach-in quality displayed as a bar graph.
6. Job save function for easy format change.
7. Process status display.

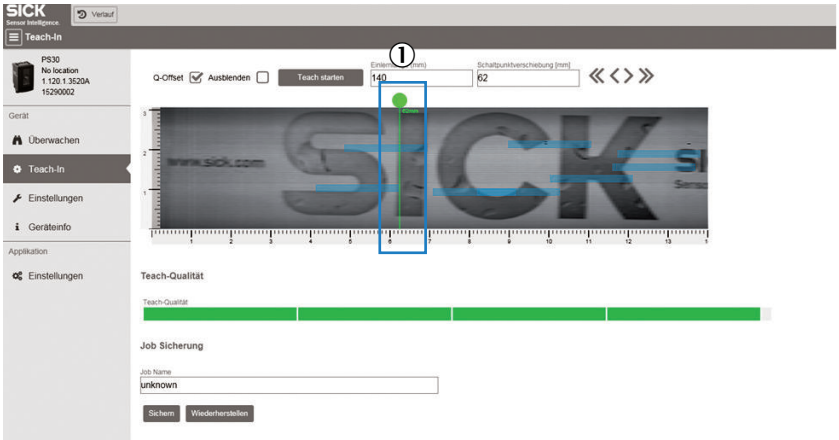


Figure 37: Appearance of the Teach-in menu with activated offset when using Endless material operating mode.

① Switching point offset marker

1. If a switching point offset is required, it can be enabled by selecting the checkbox. The marker displayed in green (see ① in the figure 37) can be moved by dragging the dot to the desired position using the cursor. After deselecting the checkbox, the marker is deleted and the switching point offset is deactivated.

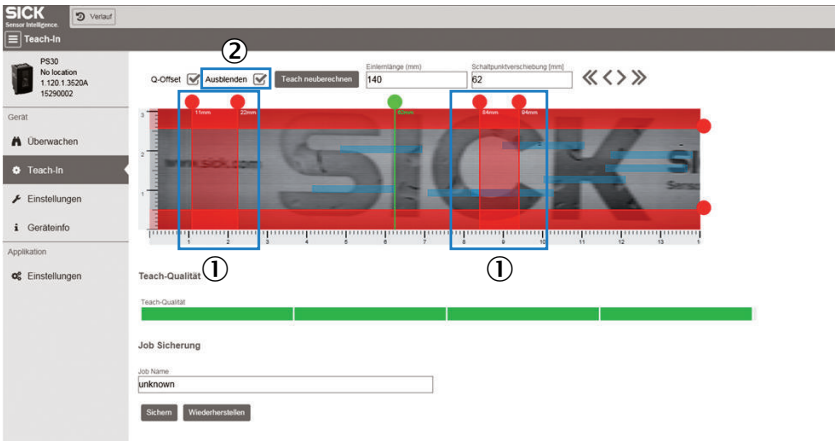


Figure 38: Appearance of the Teach-in menu with blanking.

① Blanked areas or teach-in areas

② Recalculation of the reference areas

Selecting the checkbox using the cursor enables the blanking function; up to two areas (in Endless material operating mode) can then be blanked by moving the red markers using the cursor (see ① in the figure 38). Areas that have been blanked are no longer analyzed. Blanking provides a way of ignoring varying elements, for example a best-before date. In Single object operating mode, this provides a way of restricting the area of the label to be analyzed. To activate the function, the reference areas must be recalculated by selecting the “Recalculate teach” field (see ② in the figure 38). The reference areas are placed in the non-blanked area. This can reduce the teach-in quality.

2. Click the “Start teach” field to initiate the teach-in process. When using the Single object operating mode, move one object past the sensor. The teach image and reference areas are then calculated. While this processing is in progress, this is indicated by the words “In progress” on the status bar as well as the color yellow. Once the teach-in process is complete, the Quality of Teach is displayed as a bar graph. When using the Endless material operating mode, continue moving the material past the sensor for the entire duration of the teach-in process, as indicated in the status bar. The repeat length is also calculated by the sensor.
3. The required switching point offset can also be entered directly as a numerical value in mm or it can be shifted to the left or right using the arrows displayed. In Endless material operating mode, the switching point offset can only be set starting from the end of the format.
   The value must be entered in mm. Instead of being at the end of the format, the switching point is then offset by the distance value entered. When running a start-length teach-in, the length of the teach-in area must be specified. Values between 15 mm and 1,000 mm are permitted.
4. Display of the teach-in image once the teach-in operation has been completed. The reference areas are represented by blue rectangles.
5. The bar graph displays the Quality of Teach and the resultant teach-in accuracy. If fewer than 3 bars are displayed, the color changes to red to indicate that the teach-in operation has failed.
6. Job assurance
   The data of the current job including the teach-in image, teach-in data (blanked areas and offset, for example), and the sensor configuration can be saved outside of the sensor. This data is saved in a .job file. After this, the format can be changed easily by selecting one of the .job files saved previously. If more than one file is selected initially when a file is loaded, the correct format can be selected from a preview screen.

7. Status bar
   - Displays the device status in text format and as a colored indicator
   - Displays the success of the process in text format and as a colored indicator

10.4 Settings menu

The first time the sensor is accessed, this happens automatically in the Run user level. This user level allows the machine operator to access all of the options for teaching and monitoring the sensor.

If any of the sensor settings (for example the sensor resolution) need to be changed, this must be done using the Maintenance user level. The password when logging in for the first time is “maintenance”. It can be changed at any time in the settings for the SOPASair WebUI.

The screen displayed is shown in the following figure.

Figure 39: Layout of the user interface in the Settings menu

① External teach-in mode
② Error handling
③ Sensor resolution
④ Detection mode
⑤ Encoder type
⑥ Encoder direction
⑦ Encoder resolution
⑧ Q inversion
⑨ System settings

1. The following two options are available for configuring external teach-in:
   a) Start-length teach-in
   b) Start-stop teach-in
   When using start-length teach-in, the desired length of the teach-in area must be configured. The teach-in can be started via the Teach-in menu in SOPASair, or by the machine controller by activating the ET input signal. When start-length teach-in is selected, the teach-in is automatically ended by the sensor after the configured length. When start-stop teach-in is selected, the teach-in process is automatically ended when the ET input signal is deactivated.
2. Automatic error handling can be activated when using the Endless material operating mode. The sensor sets up to 6 switching outputs based on the calculated repeat length, even if the image could not be detected. This option is not available for the Single object operating mode.
3. The sensor resolution can be set to a value between 100 µm and 1,000 µm. The maximum possible object speed is determined by the resolution selected. The following figure shows the relationship.

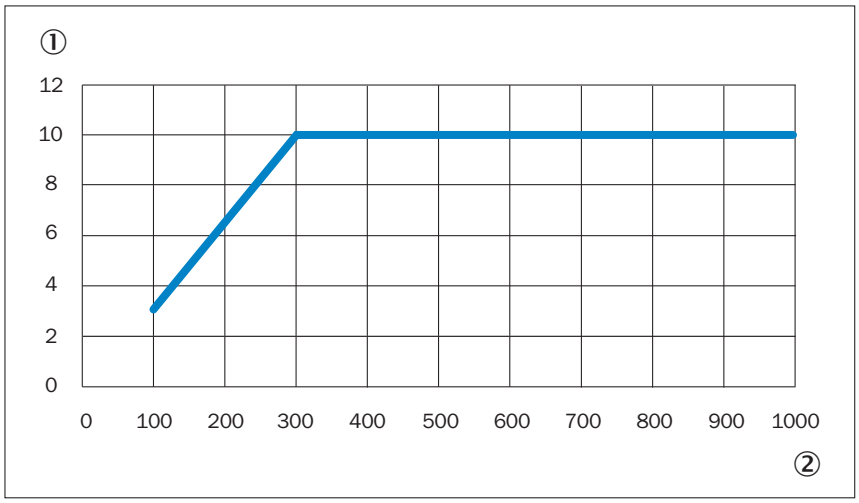


Figure 40: Maximum material speed as a function of sensor resolution

① Maximum speed in m/s

② Selected sensor resolution in µm

4. Either Endless material or Single object operating mode can be selected.
5. The available encoder type options are TTL/differential and HTL/push-pull.
6. The encoder resolution can be calculated in increments of 1 µm using the method described in (see "Setting up the encoder", page 27).
7. The available options for specifying the rotational direction of the encoder are: Auto (the sensor automatically determines the direction of rotation), CW (clockwise) and CCW (counter-clockwise).
8. The Q switching output can be inverted.
9. The Ethernet interface can be configured here. The input field shown in the following figure is displayed. The device can be reset to the factory settings.

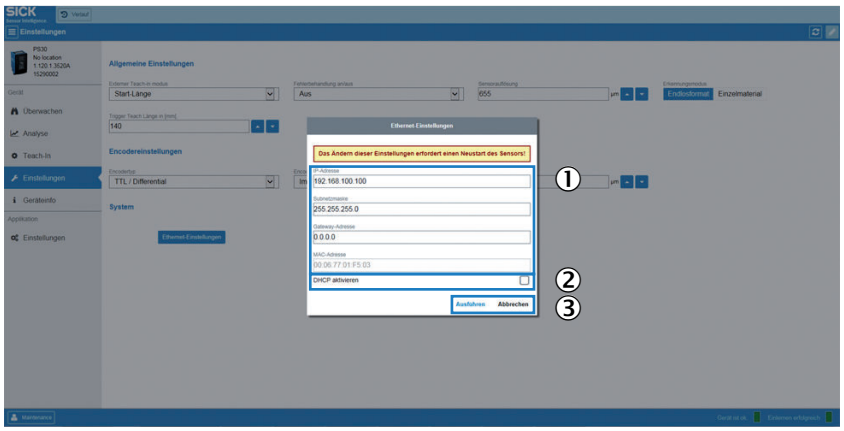


Figure 41: Appearance of the Settings menu screen after selecting the Ethernet setting

① The IP address, the subnet mask, the gateway address, and the MAC address can be configured here.

② To use the DHCP function, select the checkbox.

③ The change is activated. The change will only take effect after the sensor has been restarted.

10.5 Device info menu

The screen displayed after selecting the Device info menu is shown in the following figure.

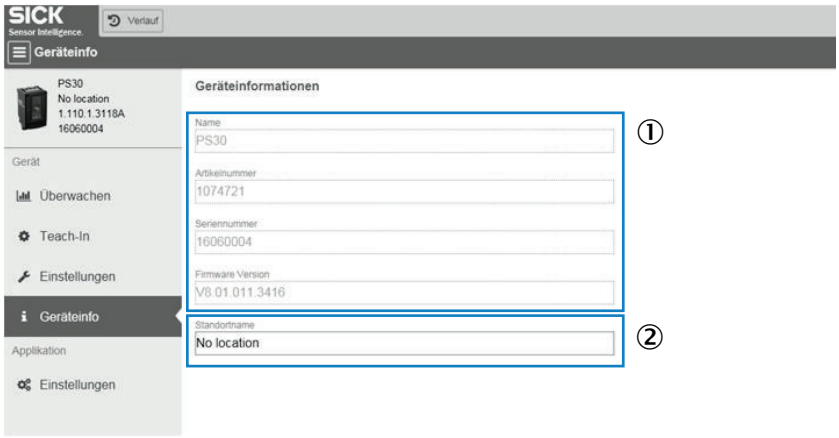


Figure 42: Appearance of the Device info menu screen

① Device information
② Location name

1. The following device information is displayed: item name, item number, serial number, and firmware version number.
2. The user can assign a name to the specific sensor.

10.6 Settings menu (of the SOPASair WebUI)

The screen displayed after selecting the Settings menu is shown in the following figure.

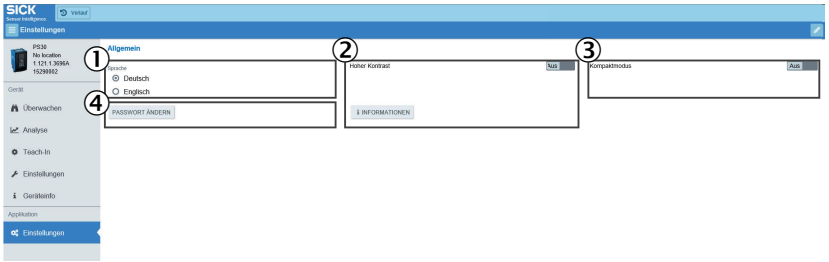


Figure 43: Appearance of Settings operating mode in SOPASair

① Language selection
② Contrast mode
③ Compact mode
④ Change password

1. The available languages options are German and English. The password can also be changed here when in Maintenance user level.
2. In addition to the normal display shown here in the figures, it is also possible to select a high contrast black and white screen mode. This may be necessary under strong ambient lighting.
3. In compact mode, the display is optimized for small screens.
4. When in Maintenance user level, the password for that user level can be changed here.

10.7 Analysis menu

When in Maintenance user level, the Analysis menu can be used to display two different plots for analyzing the detected format length (in Endless material operating mode) as well as the digital Q outputs and the status output.

Detailed analyses of the switching behavior of the sensor can be carried out with the Zoom function, plot offset, and the high-precision time axis in seconds or milliseconds.

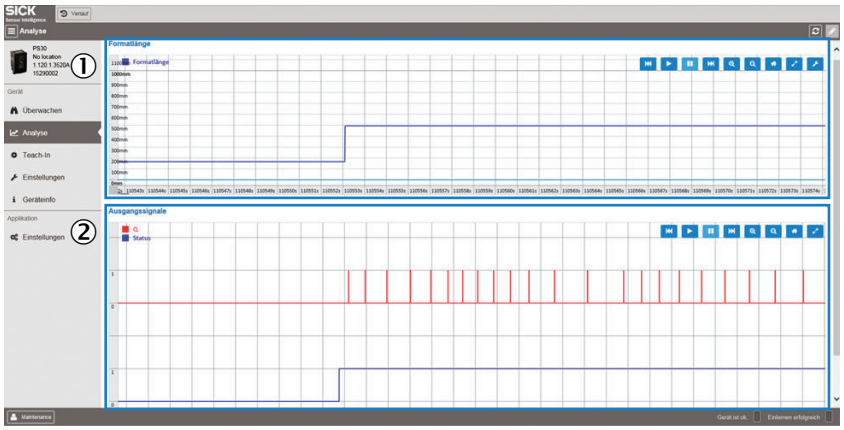


Figure 44: Appearance of the Analysis menu screen

① Display of format length over time

② Display of the switching output (Q) and the status output over time

11 Troubleshooting

11.1 Notes on troubleshooting

Potential faults and rectification measures are described in the table below and in the next chapter.

In the case of faults that cannot be rectified using the information below, please contact the manufacturer. See the back page for your agency.

Warnings

Warnings can only occur during a teach-in process. If there is a warning, the teach-in process is run again in its entirety. If the teach-in result is inadequate, the teach-in process must be run again.

Warnings are displayed in the “ErrCod” parameter with “Wrn” and a number, see "Monitoring menu", page 42.

Errors

Errors can occur during a teach-in process or as a result of other events, for example a short-circuit. If an error occurs, the teach-in process is interrupted. If valid teach-in data is already available, these will be used.

Errors are displayed in the “ErrCod” parameter with “Err” and a number, see "Monitoring menu", page 42.

11.2 Possible error indicators

Table 19: Possible error indicators

Error code indicator on the display	Possible causes (SOPASair display)	Troubleshooting
NoErr	No error is present.	-
Wrn011	The taught-in format length is greater than 1,000 mm.	Repeat the teach-in process with a smaller teach-in range, see "Teach-in menu", page 46.
Wrn012	Sensor signal is overridden due to overexposure.	Check the mounting, see "Mounting", page 17.
Wrn013	Contrast too low in the taught-in format.	Check the mounting, see "Mounting", page 17. If necessary, select another image area with a higher contrast.
Wrn015	The taught-in format was larger than the actual format length (in Endless material).	Repeat the teach-in process with a smaller teach-in range.
Err001	A short-circuit exists at the Q_{OUT} or $Status_{OUT}$ output.	Eliminate the short circuit.
Err010	The taught-in format length is less than the minimum teach-in length, i.e. 15 mm.	Repeat the teach-in process with a larger teach-in range.
Err014	The image speed was too fast during the teach-in process.	Repeat the teach-in process with a lower speed.
Err016	The blanked area is too large, or insufficient reference areas were found in the pattern.	Select a smaller area to be blanked. Repeat the teach-in process.

Error code indicator on the display	Possible causes (SOPASair display)	Troubleshooting
Err017	No taught-in image available.	Repeat the teach-in process.
Err018	The label can not be clearly detected at the selected position.	Change the angle or position of the sensor. Repeat the teach-in process. Contact your SICK agency if the error occurs again. See the addresses on the rear of these operating instructions.
Err101	Device/operation is locked.	Contact your SICK agency. See the addresses on the rear of these operating instructions.

11.3 Troubleshooting guide

Possible causes of faults

The possible types of faults can be grouped into the following categories:

- Faults caused by the combination pattern sensor – encoder
- Faults caused by mounting or teaching-in
- Faults caused by the system
- Faults caused by the network connection and SOPASair

11.3.1 Faults caused by the combination pattern sensor – encoder

Common causes of faults

Common causes of pattern sensor malfunction are:

- incorrectly connected encoder
- incorrectly configured encoder/sensor
- unsuitable encoder

Check the wiring

The following encoder cables must be connected to the pattern sensor:

- “HTL” encoder type: cables A and B
- “TTL” encoder type: cables A, A‘, B and B‘

For the pattern sensor connection example, see see "Pin assignment of the connections", page 25.

Check the mounting

→ See page 61, fig. 39 and page 21, chapter 6.

Check the encoder settings

For the encoder setup, see "Setting up the encoder", page 27.

For the menu structure, see "Menu structure", page 69.

Check the following points:

- The encoder type set on the pattern sensor must match the type of connected encoder. The available options are “HTL” or “TTL”.
  - Setting the encoder type for the sensor: see "Setting up the encoder", page 27
  - Encoder type of the connected encoder: see the data sheet.

- The encoder type set on the pattern sensor must match the bar width of the encoder (see "Setting up the encoder", page 27, “EncRes” parameter).
  You can calculate the encoder resolution as described in the following section.

Calculating the encoder resolution

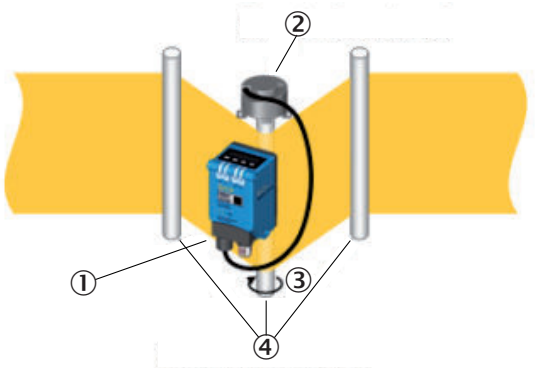


Figure 45: Encoder mounting

① Pattern sensor
② Machine cycle/motor feedback/encoder
③ U
④ Material guide roller

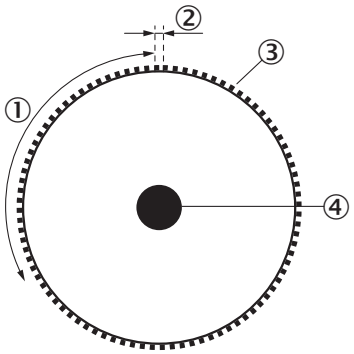


Figure 46: Calculating the encoder resolution

① U
② S
③ n
④ Encoder

The encoder resolution (EncRes) can be calculated using the following formula:

S = U/n

S: Encoder resolution

U = External circumference of the roller

n: Number of encoder bars in 360°

Checking the device function

You can verify that the device is functioning properly, and therefore wired and configured correctly, by means of the displayed encoder position (see "Monitoring menu", page 42, “EncPos” parameter).

- CW direction (clockwise): Counter increases in increments of the encoder resolution
- CCW direction (counter-clockwise): Counter decreases in increments of the encoder resolution

11.3.2 Faults caused by mounting or teaching-in

If the teach-in quality is too low, fewer than 3 bars flash in the display. In SOPASair, the Quality of teach-in graph shows less than 3 bars.

Check the individual items according to the following table.

Table 20: Faults caused by mounting or teaching-in

Cause/item to be checked	Thorough check	Troubleshooting
Material is highly glossy.	Check the sensor distance and angle, see "Mounting requirements", page 17.	If necessary, do not use the prescribed distance and angle. For example, use a higher or lower sensor tilt angle.
The sensor is not installed at the correct height. Sensor does not detect the printed area correctly. For example, a pattern area with significant label edge features is not detected, or the contrast is too low.	View and check the teach-in image using SOPASair, see "Teach-in menu", page 46.	Correct the sensor height, see "Mounting requirements", page 17.
The taught-in pattern length is too long or too short. The taught-in pattern area must be larger than 15 mm and no greater than the object length in Single object operating mode, or the repeated length in Endless material operating mode.	The messages “Wrn11” and “Wrn15” are displayed in the “Monitr” menu (ErrCod submenu). Check the teach-in length (see "Monitoring menu", page 42, “TeaLen” and “ActLen” parameters).	Rerun the teach-in and ensure the permissible range for the format length is adhered to.
The material was not moved in front of the sensor correctly during the teach-in process.	View and check the teach-in image using SOPASair, see "Analysis menu", page 51.	Rerun the teach-in. Ensure that the material is not slanted, rippled, or moved in front of the sensor at the wrong angle during the teach-in process, see "Mounting requirements", page 17.
The rotational direction during the teach-in process does not match the configured encoder direction. To ensure a correct signal, the rotational direction during the teach-in process must match the configured encoder direction.	Check the rotational direction configured in the “EncPos” parameter in the “Monitr” menu. The numerical value must change. A “+” must be displayed before the numerical value. The “+” indicates that the rotational direction during the teach-in process and the current encoder direction match. A “-” indicates that the two directional rotations do not match. The Q switching output is LOW.	Rerun the teach-in. Move the material in the other rotational direction.

Cause/item to be checked	Thorough check	Troubleshooting
Teach-in quality is poor. Reference positions are bunched together in one place instead of being distributed equally across the format length.	• Are there enough distinctive features in the teach-in pattern (sufficient contrast)? • Is the sensor lens dirty (contamination will result in reference positions being positioned incorrectly)? • Are some pixels overexposed (are some areas of the sensor image very bright)?	• If the pattern being used does not have very many features, all of the reference points will be distributed across these few features. Poor distribution results in poor teach-in quality. The better the distribution, the more reliable detection will be. • Contamination of the front screen/lens of the sensor can lead to reference points being distributed to positions where the teach-in material contains no features. Clean the sensor and repeat the teach-in process. • Overexposure leads to contrast variations in the affected parts of the image. These high contrasts cause the sensor to locate its reference points in these positions. However, since these overexposures can never be reproduced, the detection function will not be reliable. Check the tilt angle of the sensor to avoid direct reflections. Repeat the teach-in process.

11.3.3 Faults caused by the system

Check the individual items according to the following table.

Table 21: Faults caused by the system

Cause/item to be checked	Example	Troubleshooting
Material slippage is too great.	Bad material transport, and consequently the encoder signal does not correspond to the path covered.	
Material stretch is too great.	Driving force is not uniform, and the material is flexible.	
Image features are not identical. Details of the formats differ.	The image features are in the same place, but there is a change in the writing.	Replace the material. Rerun the teach-in.
Material with a large surface area is used and the background is irregular, for example due to contamination.	The guide roller is contaminated.	Clean guide roller. Rerun the teach-in.

Cause/item to be checked	Example	Troubleshooting
The system's EMC radiated emission is too high.	Strong stray radiation in the vicinity, e.g., from a frequency converter.	• Check the wiring, see "Notes on the electrical installation", page 20. • Always use shielded and twisted cables for the sensor. For pre-assembled cables, see "Connectivity", page 66.

11.3.4 Faults caused by the network connection and SOPASair

NOTE
We recommend having your network administrator connect the pattern sensor to the network.

Check the individual items according to the following table.

Table 22: Faults caused by the network connection and SOPASair

Cause/item to be checked	Thorough check	Troubleshooting
The sensor is connected to a network using a network cable.	• The "Link" LED on the sensor must light up (Ethernet connection OK). • The "Act" LED on the sensor must light up (data transfer).	
The sensor IP configuration is not correct.	Check the IP configuration on the sensor, see "Operation via Ethernet TCP/IP", page 44.	
The network settings in SOPASair are incorrect.	Check the following information on the "IP communication" page (menu path: Network assistant > "IP communication" page), see "Monitoring menu", page 46.	
After entering the new IP address, the supply voltage of the sensor was not switched off, then back on (restart). The sensor does not adopt the new IP address until the sensor is restarted.	Check the IP configuration on the sensor, see "Ethernet configuration (Ethern) parameter", page 36.	Switch the supply voltage off and back on after checking the IP configuration.
The IP configuration to the existing network is not compatible.	• Check the IP address, subnet mask, and gateway address settings, see "Operation via Ethernet TCP/IP", page 44. • Use the "ping" diagnostics tool to check whether the sensor is correctly integrated in its IP network. The sensor must answer with an echo ICMP package (echo request). The "Activity" LED on the sensor must light up.	Contact your network administrator.

Cause/item to be checked	Thorough check	Troubleshooting
The configured SOPASair Net Scan timeout is too low for the connected network.	Check the value of the “Scantimeout [ms]” parameter. The factor setting is 500 [ms]. Path: Network configuration > IP configuration > Extended.	Increase the value of the “Scantimeout [ms]” parameter, e.g. to 4,000.

12 Maintenance

12.1 Maintenance

During operation, the device works maintenance-free.

Depending on the assignment location, the following preventive maintenance tasks may be required for the device at regular intervals:

Table 23: Maintenance schedule

Maintenance work	Interval	Implementation
Clean housing and front screen	Cleaning interval depends on ambient conditions and climate	Specialist
Check screw connections and plug connectors	Every 6 months	Specialist

12.2 Cleaning the device

At regular intervals (e.g., weekly), check the light emission window and the housing of the device for dirt. This is especially relevant in harsh operating environments (dust, abrasion, damp, fingerprints, etc.). The lens of the light emission window must be kept clean and dry during operation.

NOTICE

Device damage due to improper cleaning!

Improper cleaning may result in device damage.

- Only use suitable cleaning agents.
- Never use sharp objects for cleaning.

Cleaning the light emission window

NOTICE

Damage to the light emission window!

Reduced reading performance due to scratches or streaks on the light emission window!

- ▶ Clean the light emission window only when wet.
- ▶ Use a mild cleaning agent that does not contain powder additives. Do not use aggressive cleaning agents, such as acetone, etc.
- ▶ Avoid any movements that could cause scratches or abrasions on the light emission window.
- ▶ Only use cleaning agents suitable for the lens material.

NOTE

Static charge may cause dust particles to stick to the light emission window. This effect can be avoided by using an anti-static glass cleaner in combination with the SICK lens cloth (can be obtained from www.sick.com).

NOTE

If the light emission window is scratched or damaged (cracked or broken), the device must be replaced. Contact SICK Service to arrange this.

Cleaning the housing

In order to ensure that the heat produced by the internal power loss is adequately dissipated, the housing surface must be kept clean.

13 Decommissioning

13.1 Disassembly and disposal

Disassembling the device

1. Switch off the supply voltage to the device.
2. Detach all connecting cables from the device.
3. If the device is being replaced, mark its position and alignment on the bracket or surroundings.
4. Detach the device from the bracket.

Disposing of the device

Any device which can no longer be used must be disposed of in an environmentally friendly manner in accordance with the applicable country-specific waste disposal regulations. As it is categorized as electronic waste, the device must never be disposed of with household waste!

13.2 Returning devices

- ▶ Do not dispatch devices to the SICK Service department without consultation.

NOTE

To enable efficient processing and allow us to determine the cause quickly, please include the following when making a return:

- Details of the contact person
- Description of the application
- Description of the fault that occurred

14 Technical data

14.1 Dimensional drawings

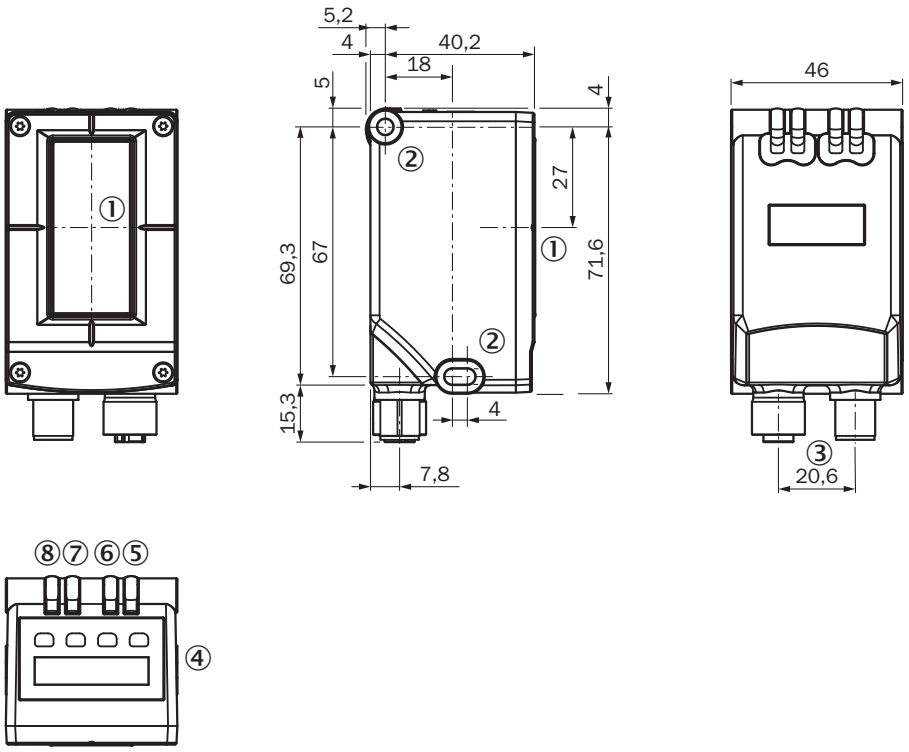


Figure 47: Dimensions in mm

① Center of the optical axis
② Fixing hole, Ø 4.2 mm
③ M12 male connector, 12-pin/M12 female connector, 4-pin with 90° rotation
④ Display and pushbuttons
⑤ Function indicator (green) “on”
⑥ Function indicator (yellow) “Q”
⑦ Function indicator (green) “Link”
⑧ Function indicator (yellow) “Act”

14.2 Optics/features

Table 24: Optics/features

Attribute	Description
Light sender [1)]	LED, white
Wavelength	400 nm ... 700 nm
Light spot size	65 mm x 3 mm
Sensing distance	20 mm
Sensing distance tolerance	± 2.5 mm
Setting	Start-stop teach-in, Start-length teach-in
Format length (min)	15 mm
Format length (max)	1,000 mm
Format height (min)	10 mm
Lateral movement tolerance	± 5 mm

Attribute	Description
Initialization time	< 10 s
Reproducibility [2]	0.1 mm (at 3 m/s), 0.15 mm (at 5 m/s) or 0.3 mm (at 10 m/s) (depending on the configured sensor resolution)
Storage time (ET)	≥ 2 s, non-volatile memory

1) Average service life 100,000 h at T_U = +25 °C
2) Statistical error 2 σ

14.3 Supply

Table 25: Supply

Attribute	Description
Supply voltage U_V	12 V DC ... 30 V DC
Power consumption (without load)	< 6 W
Residual ripple	< 5 V_{ss} within permitted supply voltage U_V (must not exceed or be less than the U_V tolerances.)

1) Limit values: Max. 8 A for operation in a short-circuit protected network

14.4 Inputs

Table 26: Inputs

Attribute	Features
Input, teach-in (ET)	• PNP • Teach: U = 12 V ... < U_V • Run: U < 2 V
Input, blanking input (AT) [1]	• PNP • Blanked: U = 12 V ... < U_V • Free: U < 2 V
Circuit protection	U_V connections, reverse polarity protected, interference-pulse suppression

1) Blanking out of identical image areas

14.5 Outputs

Table 27: Outputs

Attribute	Feature
Switching output (Q_{OUT})	PNP • HIGH = U_V – ≤ 2 V, switching signal for 5 mm • LOW < 0.5 V
Circuit protection	Q_{out} output, short-circuit protected
Maximum output current	< 100 mA (Total I_{OUT}= Q + $Status_{OUT}$)

14.6 Interfaces

Table 28: Interfaces

Attribute	Features
Ethernet TCP/IP	Configuration interface

14.7 Encoder

Table 29: Encoder

Attribute	Features
Encoder resolution	100 µm ... 600 µm (in 1 µm)
Encoder input	• Differential: 4.5 V ... 5.5 V / TTL / RS-422 • Single ended: 12 V ... 30 V / HTL / Push-Pull

14.8 Ambient conditions

Table 30: Ambient conditions

Attribute	Features
Protection class	III, for operation with safety extra-low voltage (SELV/ PELV)
Electromagnetic compatibility	EN 61000-6-2, EN 55011, Class A
Ambient temperature range	–10 °C ... +55 °C
Storage temperature range	–20 °C ... +75 °C
Ambient light immunity	30,000 lx
Enclosure rating	IP 65
Enclosure protection type according to UL:	Enclosure type 1
Max. traversing speed	10 m/s
Vibration resistance (sine)	EN 60068-2-6
Random	EN 60068-2-64
Shock resistance/impact load	EN 60086-2-27

14.9 Structural design

Table 31: Structural design

Attribute	Features
Dimensions	→ See page 63, section 14.1.
Weight	325 g
Materials	Housing: Metal, discharge plate: Plastic
Connections [1]	• Male connector, M12, 12-pin • M12 Ethernet connection, 4-pin
Display	6-digit with a 5 x 7 dot matrix

[1] Use twisted and shielded cables

15 Accessories

NOTE

Accessories can be found on the online product page at:

▶ www.sick.com/PS30

15.1 Connectivity

15.1.1 Female cable connectors with cables

Table 32: Female cable connectors with cables

Description	Type	Order no.
M12 female cable connector, 12-pin, straight, 5 m, shielded, twisted-pair wires	DOL-1212-G05MAS02	6042754
M12 female cable connector, 12-pin, angled, 5 m, shielded, twisted-pair wires	DOL-1212-W05MAS02	6044109

15.1.2 Connection cable

Table 33: Connection cable

Description	Type	Order no.
M12 connection cable. 12-pin, straight male connector/straight female connector, 5 m, shielded, twisted-pair wires	DSL-1212-G05MAS02	6045234

15.1.3 Ethernet cables

Table 34: Ethernet cables

Description	Type	Order no.
Ethernet cable, 4-wire, shielded, M12 male connector, straight, 4-pin (D-coded), RJ-45 male connector, 8-pin, 5 m	Connection cable (male connector-male connector)	6034415
Ethernet cable, 4-wire, shielded, M12 male connector, angled, 4-pin (D-coded), RJ-45 male connector, 8-pin, 5 m	Connection cable (male connector-male connector)	6039488

15.2 Mounting systems

15.2.1 Universal clamp plate

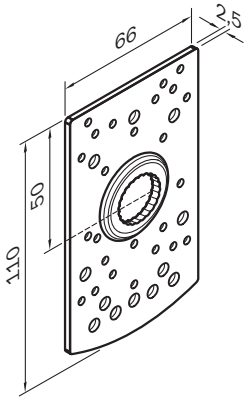


Figure 48: Universal clamp plate, measurements in mm

Table 35: Universal clamp plate

Description	Type	Part no.
Plate N04 for universal clamp, steel, zinc-coated, incl. universal clamp and mounting hardware	BEF-KHS-N04	2051610

15.2.2 Mounting rods

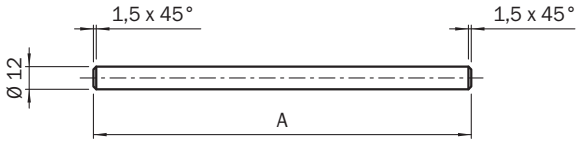


Figure 49: Mounting rod, straight, all dimensions in mm

Table 36: Mounting rod, straight

Description	Type	Part no.
Mounting rod, straight, 200 mm, zinc-coated steel, without mounting hardware	BEF-MS12G-A	4056054

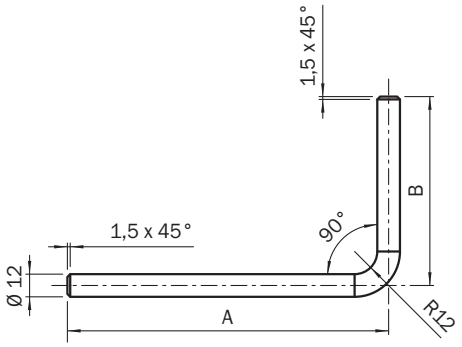


Figure 50: Mounting rod, L-shaped, all dimensions in mm

Table 37: Mounting rod, L-shaped

Description	Type	Part no.
Mounting rod, L-shape, 250 mm x 250 mm, zinc-coated steel, without mounting hardware	BEF-MS12L-B	4056053

16 Menu structure

16.1 Setup menu

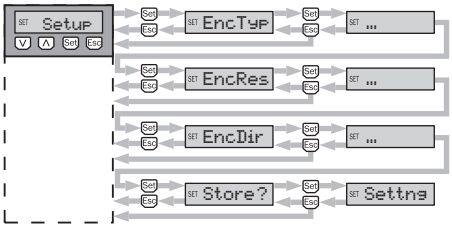


Figure 51: Setup menu

16.2 Monitr menu

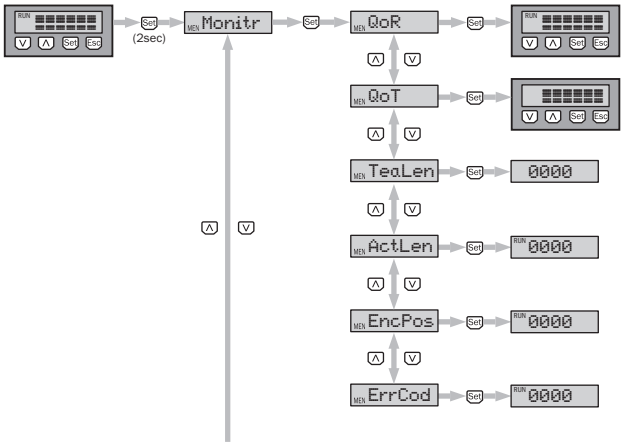


Figure 52: Monitr menu

16.3 Teach menu

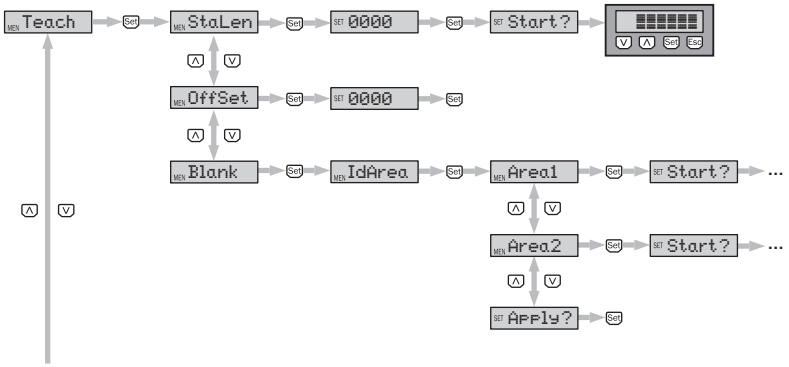


Figure 53: Teach menu

16.4 Settng menu

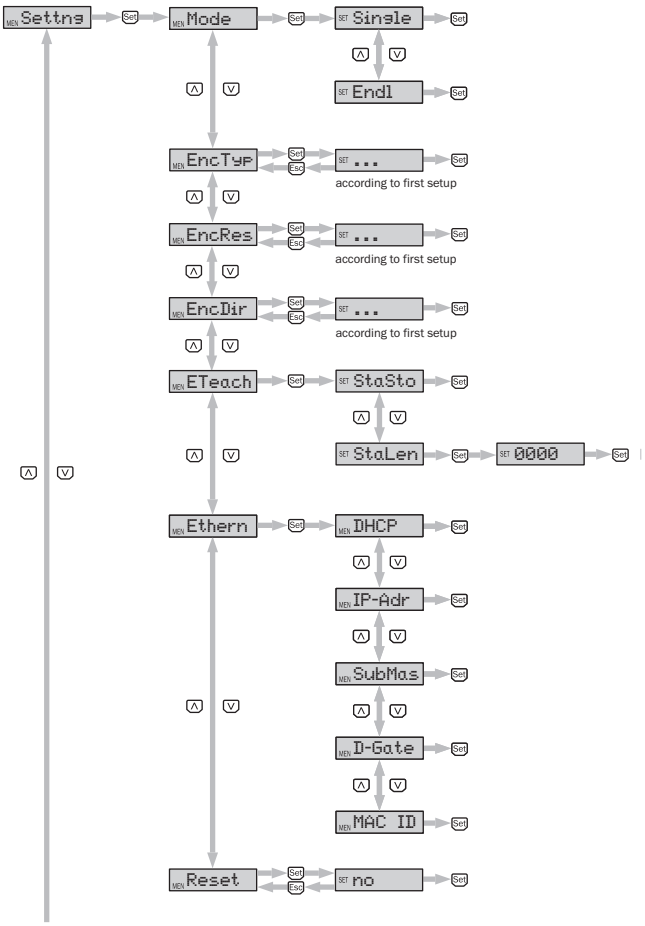


Figure 54: Settng menu

16.5 Info menu

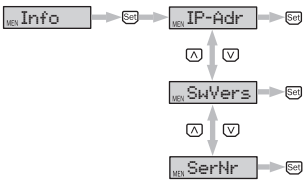


Figure 55: Info menu

17 Annex

17.1 EU declaration of conformity and certificates

The EU declaration of conformity and other certificates can be downloaded from the Internet at:

- www.sick.com/PS30

17.2 Certification according to UL60947-5-2

The PSS Prime Print Detector is certified in accordance with UL60947-5-2 if it is supplied with voltage by LPS or Class 2 power supply units.

The certification is only valid with corresponding device identification on the type label of the respective device.

17.3 Licenses

In the pattern sensors, LwIP 1.4 is used in accordance with the modified BSD license, see http://savannah.nongnu.org/projects/lwip/

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