OPERATING INSTRUCTIONS

OLM200

Linear measurement sensor

SICK
Sensor Intelligence.

Described product

OLM200

Manufacturer

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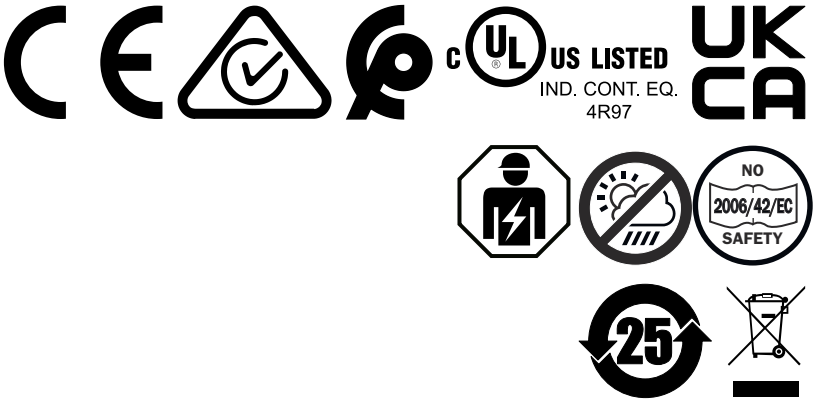
Legal information

Original document

This document is an original document of SICK AG.



Contents

1 About this document

1.1 Information on the operating instructions

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

The operating instructions are an integral part of the product and should remain accessible to the personnel at all times. When handing this product over to a third party, include these operating instructions.

These operating instructions do not provide information on the handling and safe operation of the machine or system in which the product is integrated. Information on this can be found in the operating instructions for the machine or system.

1.2 Further information

You can find the product page with further information via the SICK Product ID: pid.sick.com/{P/N}/{S/N}
(see "Product identification via the SICK product ID", page 12).

The following information is available depending on the product:

- This document in all available language versions
- Data sheets
- Other publications
- CAD files and dimensional drawings
- Certificates (e.g., declaration of conformity)
- Software
- Accessories

1.3 Symbols and document conventions

Warnings and other notes

DANGER
Indicates a situation presenting imminent danger, which will lead to death or serious injuries if not prevented.

WARNING
Indicates a situation presenting possible danger, which may lead to death or serious injuries if not prevented.

CAUTION
Indicates a situation presenting possible danger, which may lead to moderate or minor injuries if not prevented.

NOTICE
Indicates a situation presenting possible danger, which may lead to property damage if not prevented.

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

Instructions to action

► The arrow denotes instructions to action.

1. The sequence of instructions is numbered.
2. Follow the order in which the numbered instructions are given.

✓ The tick denotes the results of an action.

2 Safety information

2.1 Correct use

The linear measurement sensor is an opto-electronic sensor and is used for positioning of a displacement unit by means of a barcode tape.

Areas of application:

- Automated high-bay warehouses
- Positioning of overhead conveyors, curve-going stackers, turning rings/tables, shuttles
- Applications in which movable devices need to be positioned in relation to a reference

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

Any use outside of the stated areas, in particular use outside of the technical specifications and the requirements for intended use, will be deemed to be incorrect use.

- The device must not be used in explosion-hazardous or corrosive areas or under extreme ambient conditions.

WARNING
Danger due to improper use!

Any improper use can result in dangerous situations.

Therefore, observe the following information:

- Product should be used only in accordance with its intended use.
- All information in the documentation must be strictly observed.
- Shut down the product immediately in case of damage.

2.3 Cybersecurity

Overview

To protect against cybersecurity threats, it is necessary to continuously monitor and maintain a comprehensive cybersecurity concept. A suitable concept consists of organizational, technical, procedural, electronic, and physical levels of defense and considers suitable measures for different types of risks. The measures implemented in this product can only support protection against cybersecurity threats if the product is used as part of such a concept.

You will find further information at www.sick.com/psirt, e.g.:

- General information on cybersecurity
- Contact option for reporting vulnerabilities
- Information on known vulnerabilities (security advisories)

2.4 Limitation of liability

Relevant standards and regulations, the latest technological developments, and our many years of knowledge and experience have all been taken into account when compiling the information and notes contained in these operating instructions. The manufacturer accepts no liability for damage caused by:

- Non-compliance with product documentation (e.g. operating instructions)
- Improper use
- Use of untrained staff.
- Unauthorized conversions or repair
- Technical modifications
- Use of unauthorized spare parts, wear and tear parts, and accessories

2.5 Modifications and conversions

NOTICE
Modifications and conversions to the device may result in unforeseeable dangers.

Interrupting or modifying the device or SICK software will invalidate any warranty claims against SICK AG. This applies in particular to opening the housing, even as part of mounting and electrical installation.

2.6 Qualification of personnel

Any work on the product may only be carried out by personnel qualified and authorized to do so.

Qualified personnel are able to perform tasks assigned to them and can independently recognize and avoid any potential hazards. This requires, for example:

- technical training
- experience
- knowledge of the applicable regulations and standards

2.7 Operational safety and specific hazards

Please observe the safety notes and the warnings listed here and in other sections of this product documentation to reduce the possibility of risks to health and avoid dangerous situations.

WARNING
Electrical voltage!
Electrical voltage can cause severe injury or death.

- Work on electrical systems must only be performed by qualified electricians.
- The power supply must be disconnected when attaching and detaching electrical connections.
- The product must only be connected to a voltage supply as set out in the requirements in the operating instructions.
- National and regional regulations must be complied with.
- Safety requirements relating to work on electrical systems must be complied with.

WARNING

Risk of injury and damage caused by potential equalization currents!

Improper grounding can lead to dangerous equipotential bonding currents, which may in turn lead to dangerous voltages on metallic surfaces, such as the housing. Electrical voltage can cause severe injury or death.

- Work on electrical systems must only be performed by qualified electricians.
- Follow the notes in the operating instructions.
- Install the grounding for the product and the system in accordance with national and regional regulations.

3 Product description

3.1 Product identification via the SICK product ID

SICK product ID

The SICK product ID uniquely identifies the product. It also serves as the address of the web page with information on the product.

The SICK product ID comprises the host name pid.sick.com, the part number (P/N), and the serial number (S/N), each separated by a forward slash.

For many products, the SICK product ID is displayed as text and QR code on the type label and/or on the packaging.

Figure 1: SICK product ID

3.2 Function

The linear measurement sensor is a device that can measure product travel paths up to 10 km without moving parts. The device with its visible, red LED light beam orientates itself by means of a barcode tape attached along the product travel path. By reading the barcode, the device determines the absolute position and delivers this via an interface.

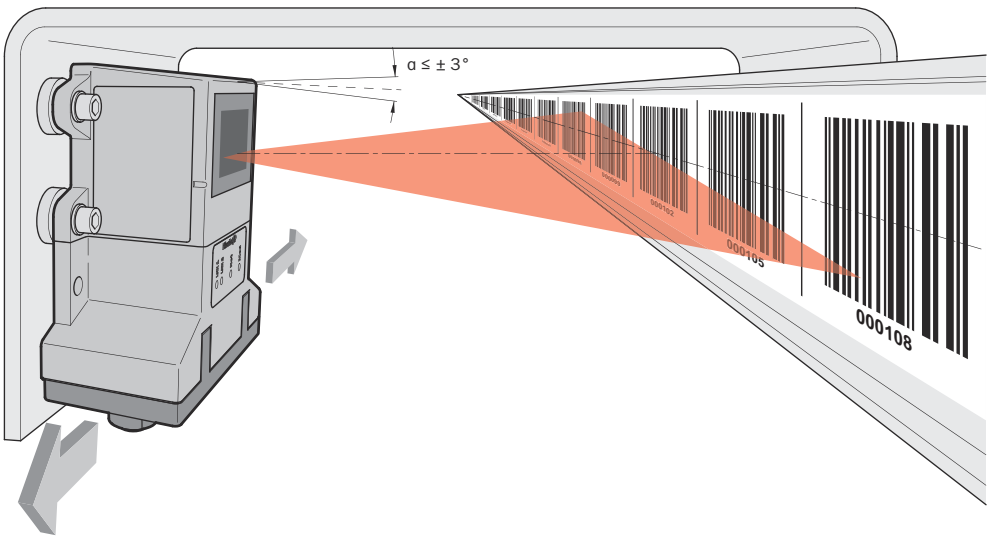


Figure 2: Functionality schematic diagram

Determining bar code tape alignment

On startup, the device initially detects the alignment in relation to the barcode tape (0° or 180°). The device automatically adapts itself to the alignment that is detected, and starts outputting position values.

If there are no barcodes in the field of view when the device is started up, the device selects the orientation which it detected before being deactivated. The device starts position value output as soon as barcodes with the expected orientation are located in the field of view.

Error F4 and the measured value "0" are output if an unexpected alignment is detected, and this also applies if the alignment is changed during the product travel path. In such a case, position values are not output until after the supply voltage has been interrupted and the new alignment has been detected successfully (if the "Detect tape position during operation" function has not been activated via SOPAS ET).

NOTE

In the delivery condition, the tape position is assumed to be 0°, i.e. the alignment of the device and the barcode tape to each other is such that the lower edge of the device (black part of the housing) and the lower edge of the barcode tape are directly opposite each other.

During running operation, the alignment of the bar code tape can also be altered using SOPAS ET see "Configuration and servicing with SOPAS Engineering Tool (SOPAS ET)", page 28 or by configuration marks see "Configuration marks", page 14.

NOTE

If the barcode tape is mounted in the entire system with an alignment of 180° in relation to the device, then it is necessary to make sure that the barcode tape is located in the field of view when the device is started for the first time.

Error condition

If the device detects an error condition during the traversing (e.g. no barcode tape, or barcode tape defective), this is immediately suppressed and extrapolated measured values are output. The extrapolation time depends on the measured value history and in the delivery condition is max. 160 ms.

The measured value "0" is output if the error status is present for longer or exists from the moment of switching on. Individual faulty bar codes do not have any effect on the measured value.

Error statuses can be interrogated via the data interface. Alternatively, the SOPAS ET software is also available for this in conjunction with the Ethernet configuration interface.

3.3 Bar code tape

For the OLM-xx0x variants, suitable barcode tapes with a barcode width of 30 mm and a tape height of 25 mm, 30 mm, 40 mm, 60 mm and 100 mm are available as accessories see "Bar code tape", page 76.

3.4 Control marks and configuration marks

NOTE

The marks are available for download and subsequent printing on the online product page.

The product page can be accessed via the **SICK Product ID**: **pid.sick.com/{P/N}/{S/N}**

{P/N} corresponds to the part number of the product, see type label.

{S/N} corresponds to the serial number of the product, see type label (if indicated).

The print resolution must be at least 1200 dpi (pixels per inch). Page or size adjustment must be deactivated.

3.4.1 Control marks

The purpose of control marks is to trigger a certain action in the device:

- Output of the control mark value at the data interface
- Switching the MF1 digital output (active or inactive)

Control marks can be stuck onto the barcode tape at selected points (e.g. switches). When doing this, make sure that the cut markings of the fiducial are congruent with the cut markings of the position mark that has been stuck over.

NOTE

In order to obtain a continuous distance value, it is necessary to ensure that there is a position mark directly before and after a control mark. A maximum of one control mark is permitted in the field of view of the device. Therefore, at least two position marks must lie between two control marks.

Output of the value via the data interface

The information on a control mark consists of a letter (A, B, C, D or Z) followed by two digits (0 - 9). All other control codes are output via the data interface as ASCII hex values. The control code must be interpreted byte-by-byte as ASCII characters. In this case, the most recently read control code is always output every cycle.

3.4.2 Configuration marks

Configuration marks are special barcodes with which parameters in the device can be adjusted. After reading the configuration marks, the change is stored permanently in the device.

To change a parameter, the appropriate configuration mark is placed in the field of view of the device. The device confirms reading a configuration mark with both LEDs on the upper part of the side of the housing (**Power** and **Status**). The responses have the following meanings:

Signal	Meaning
Both LEDs flash green	Parameter has been changed.
Both LEDs flash orange	Parameter was already set and remains unchanged.
Both LEDs flash red	Parameter is not supported.

The following settings can be changed using configuration marks:

- Action in case of read error
- SmartPOS operating mode,
- Activation of SmartPOS warning F2
- Multiple reading
- Bus address (only variants OLM100-1xx6OLM200-1xx2)
- Resolution
- Resetting all settings to the factory setting

NOTE

Parameterization marks can be generated using the configuration mark generator. You can find it on the following product page under **Downloads**.

The product page can be accessed via the **SICK Product ID**: **pid.sick.com/{P/N}/{S/N}**

{P/N} corresponds to the part number of the product, see type label.

{S/N} corresponds to the serial number of the product, see type label (if indicated).

The printout must have a resolution of at least 1,200 dpi (dots per inch). Page or size adjustment must be deactivated.

4 Mounting

4.1 Mounting procedure

1. Applying barcode tape see "Attaching the barcode tape", page 15.
2. Mounting the device see "Mounting the device", page 20.
3. Establishing electrical connection, see "Electrical installation", page 25.

4.2 Mounting instructions

- Observe the technical data.
- To prevent condensation, avoid exposing the device to rapid changes in temperature.
- The mounting site has to be designed for the weight of the device.

4.3 General data on the bar code tape

The barcode tapes have a nominal length of 20 m; they are supplied rolled up with the smallest number on the outside. The particular measuring ranges are selected so that successive barcode tapes can be placed against one another without gaps. The sequential roll number is located on the barcode tapes to make it easier to maintain the correct sequence.

Irrespective of the starting code required, bar code tapes with a customer specific measuring range always begin with the sequential roll number "1".

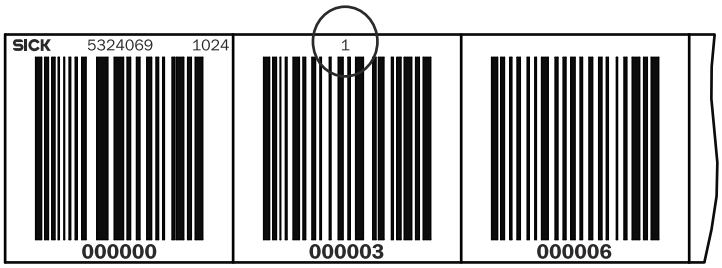


Figure 3: Example for roll 1, measuring range 0 to 20 m

Measuring range [m]		Sequential roll number	Code	
from	to		Start	End
0	20	1	000000	002001
20	40	2	002004	004002
40	60	3	004005	006000
60	80	4	006003	008001
80	100	5	008004	010002
100	120	6	010005	012000

4.4 Attaching the barcode tape

The orientation of the barcode tape in relation to the device must remain the same throughout the entire product travel path (alignment always 0° or always 180° in relation to the device).

For the best adhesion, the temperature of the surface and the barcode tape must be between 15 and 25 °C at the time of application.

Align the barcode tape with a reference edge (e.g. rail) of the product travel path and stick this onto the smooth, dry surface that is free from grease and dust, without any tension, folds or creases. The surface must be free of grease, dust and other soiling.

Small expansion joints and minor points of unevenness can be stuck over. At disruptive points which would cause the barcode tape to be significantly distorted were it to be stuck over, it is possible to cut out an individual barcode at the corresponding cut marks.

To ensure optimum linearity, the distance between the two cut marks at the resulting gap must be 30 mm. At least two contiguous barcodes must follow after a gap. Continuous output of position values by the device is ensured if the width of the gap is not more than 30 mm and the barcodes were separated cleanly at the cut mark.

It is recommended that the self-adhesive, cut-to-length blank labels should be stuck over the gap in order to allow it to be traversed without problems see "Blank labels for repair codes or control marks", page 79.

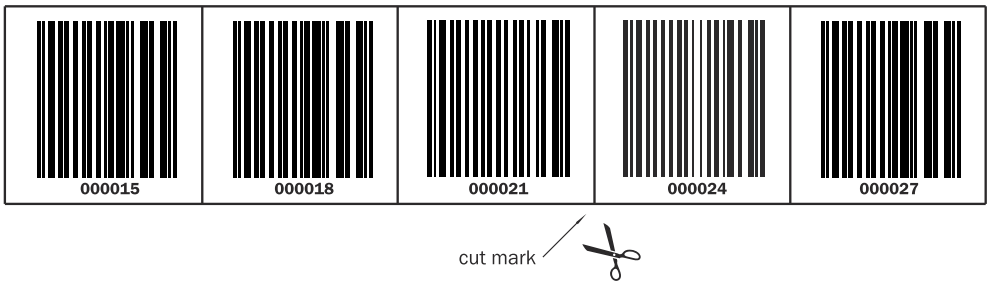


Figure 4: Barcode tape cut marks

① Cut mark

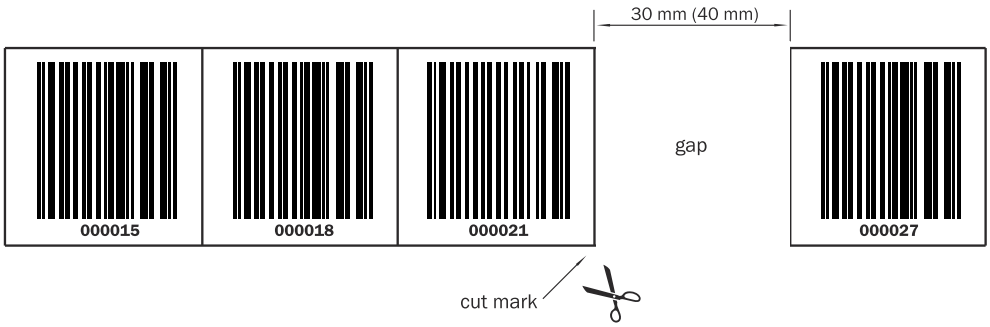


Figure 5: Gap in the separated barcode tape, unit: mm (inch), decimal separator: point

① Cut mark

② Gap

A sequence of barcode tapes with discontinuous measuring ranges is not allowed, otherwise a continuous position cannot be indicated. Where there is non-continuity (e.g. at diverters), the device outputs a corresponding jump in the position value as soon as at least two sequential barcodes of the new measuring range have been identified.

The device cannot output negative position values. Therefore, in applications in which it is necessary to go below the 0 cm position (e.g. turntables, diverters), it is recommended to dispense with the measuring range 0 ... 20 m, or else to remove the first two position codes 0 cm and 3 cm.

NOTE

Affix the barcode tape as near as possible to the vertical in order to avoid dust build-ups.

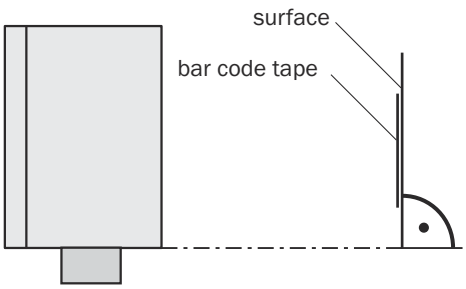


Figure 6: Vertical mounting of the barcode tape

① Tape carrier
② Barcode tape

NOTE
Avoid strong ambient light reflections on the barcode tape.

NOTE
Illustrations and dimension values apply to the 30 mm barcode width.

4.4.1 Applying barcode tape in horizontal curves

A minimum radius must be complied with for horizontal curves. This depends on the mounting position of the device. As a rule, the device should be mounted on the axis of rotation if possible. Tangential differences, referred to below as L, leading to the device swiveling in or out during the course of a curve mean that larger curve radii are required. This requirement applies both to outer and inner radii.

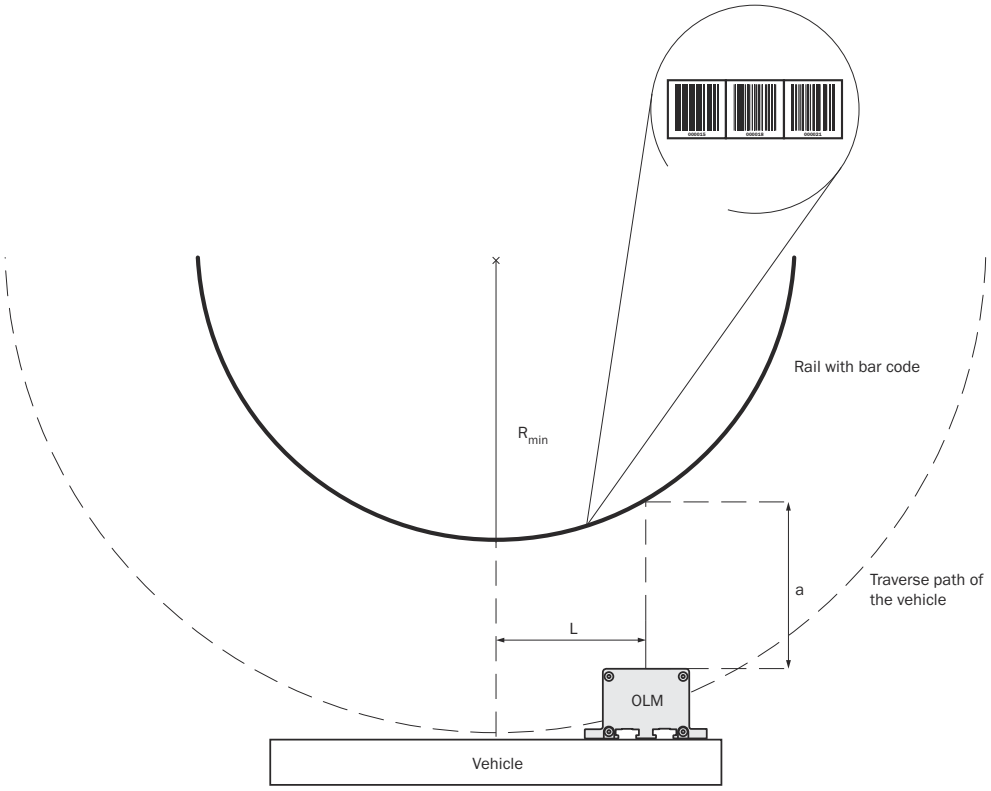


Figure 7: Tangential distance L during cornering

① Vehicle
② Travel path of the vehicle
③ Rail with barcode
④ R_{min}: Minimum radius
⑤ L: Tangential distance during cornering
⑥ a: Reading distance

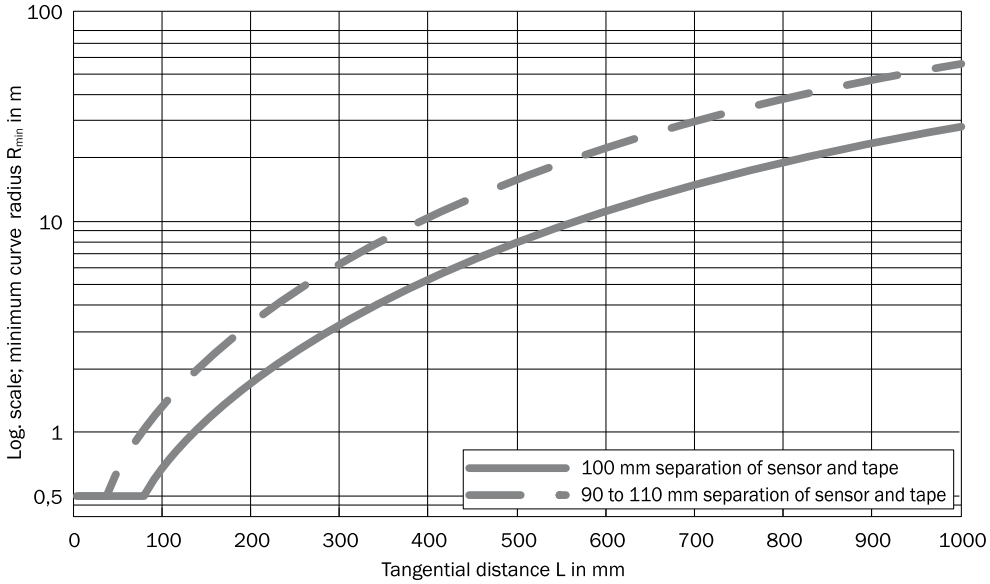


Figure 8: Minimum curve radius R_{min} dependent upon the tangential distance L

① log. scale: minimum curve radius R_{min} in mm

② Tangential distance L in m

③ Reading distance a 90 and 110 mm

④ Reading distance a 100 mm

4.4.2 Applying barcode tape in vertical curves

To apply barcode tape along a vertical curve, cut the barcode tape at the cut marks and fan it out. The maximum angle must not exceed 3°. This corresponds to a gap d of 1.5 mm. This produces a smallest case minimum radius of 500 mm. The voids created by fanning open should not have a shiny surface, in order to ensure an optimum function reserve.

Cover the open positions indicated by arrows with blank labels see "Blank labels for repair codes or control marks", page 79.

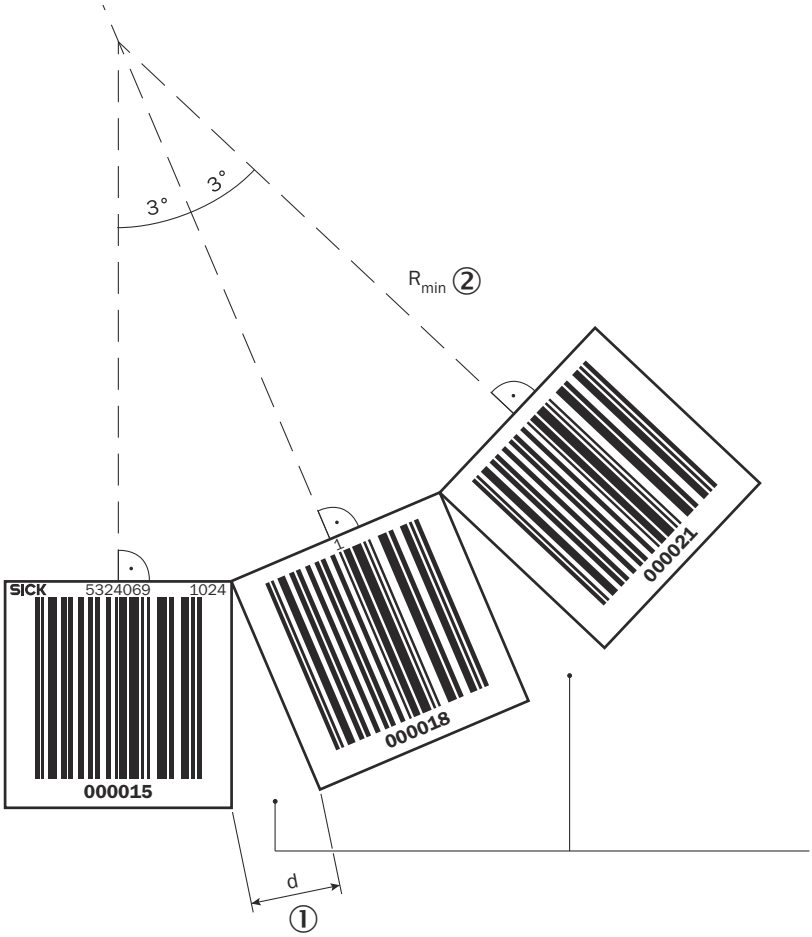


Figure 9: Vertical curves

① d: Gap

② R_{min}: Minimum radius

NOTE

For vertical curve paths, ensure that the barcode tape is always in the field of view of the device. The mounting location of the device should therefore be selected so that its product travel path runs parallel to the longitudinal axis of the barcode tape. If this is not done and the device is mounted with a tangential distance from the axis of rotation, this will result in swiveling of the device and the barcode tape will move out of the field of view.

NOTE

With a vertical curve path, only restricted accuracy and repeatability are possible.

4.5 Mounting the device

The device can be mounted either using the six housing through-holes or the T-slots on the back using sliding nuts see "Sliding nuts", page 79. To ensure optimum reading results and the greatest possible functional reserve, mount the device at a distance of 100 mm from the barcode tape. Align perpendicular to the barcode tape. The depth of field of the device is ± 20 mm.

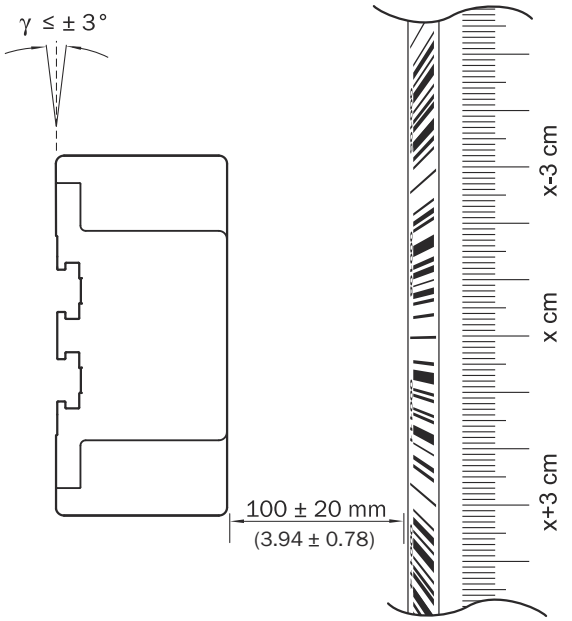


Figure 10: Mounting distances for OLM200-xx0x, unit: mm (inch), decimal separator: point

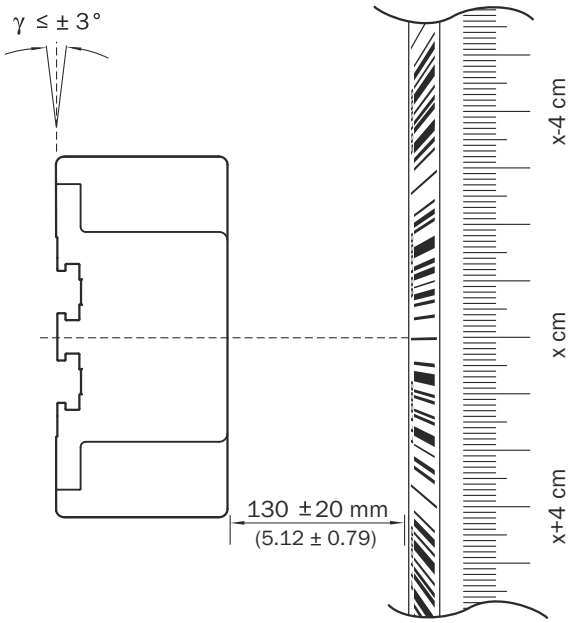


Figure 11: Mounting distances for OLM200-xx5x, unit: mm (inch), decimal separator: point

A vertical distance that depends on the barcode tape used is to be maintained between the lower edge of the housing and the lower edge of the barcode tape see "table 1: Vertical distance dependent upon the barcode tape", page 22.

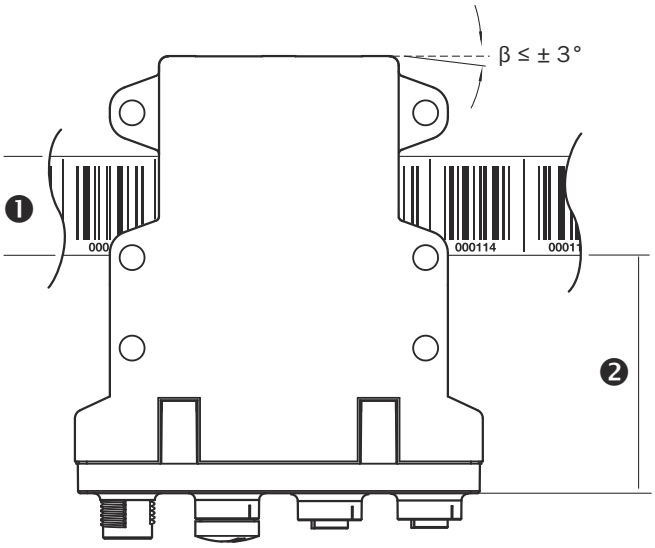


Table 1: Vertical distance dependent upon the barcode tape

Barcode tape height ❶	Distance ❷	Tolerance
15 mm	51 mm	± 3.5 mm
18 mm	51 mm	± 3.5 mm
25 mm	51 mm	± 3.5 mm
30 mm	47 mm	± 3.5 mm
40 mm	42 mm	± 8.5 mm
60 mm	32 mm	± 18.5 mm
100 mm	12 mm	± 38.5 mm

NOTE
In particular during cornering, ensure a distance of 100 mm ± 20 mm from the barcode tape is maintained.

A reading distance > 85 mm must be maintained in order to ensure an optimum functional reserve in applications in which individual barcodes are not always fully readable.

If optimally aligned, the two alignment marks on the front of the device are located in the vertical center of the barcode tape. When the device is switched on, the red light spot moves from top left to bottom right along the barcode tape. The light spot is centered vertically on the barcode tape see figure 12.

This vertical alignment of the device to the barcode tape must lie within a specified tolerance. This depends on the height of the barcode tape used see "table 1: Vertical distance dependent upon the barcode tape", page 22.

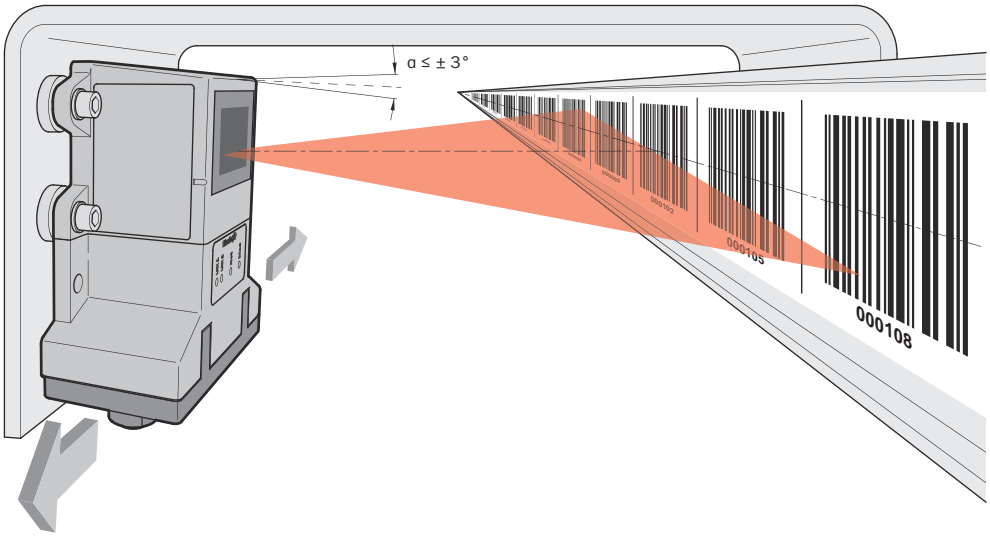


Figure 12: Vertical alignment

When two devices are operated next to one another, it is necessary to maintain a minimum gap between the two devices of 120 mm. If the travel path includes cornering, make sure that the device is mounted as close as possible to the axis of rotation. Information on recommended minimum radii when cornering see "Applying barcode tape in horizontal curves", page 17.

NOTE

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

- The field of view of the device must be completely clear
- There are no reflective surfaces in the field of view of the device
- The device and barcode tape are mounted vibration-free

It is recommended to mount the device so that subsequent intricate adjustment of the field of view is possible.

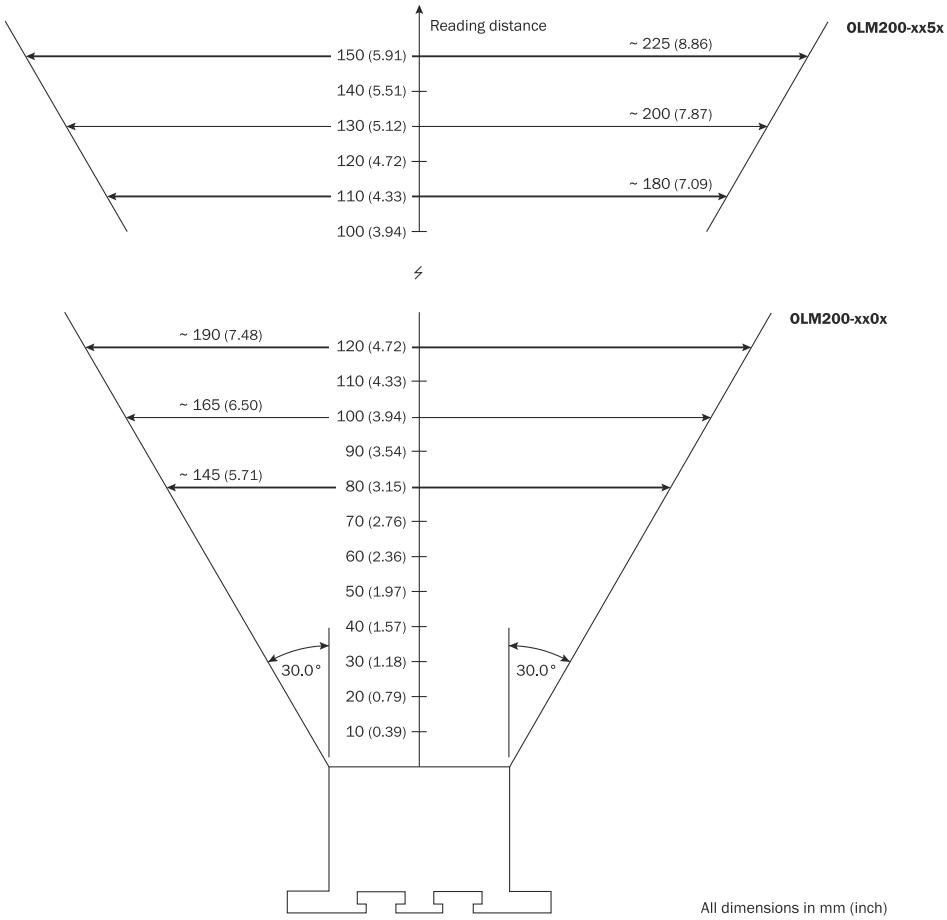


Figure 13: Field of view; unit: mm (inch), decimal separator: point

① Working distance

5 Electrical installation

5.1 Safety

WARNING
Personal injury due to improper supply voltage!

- Only operate the device using safety extra-low voltage and safe electrical insulation as per protection class III.

NOTICE
Equipment 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 or disconnect electrical connections when the power is off.

5.2 Wiring instructions

NOTE
Pre-assembled cables can be found on the product page.
It can be accessed via the **SICK Product ID: pid.sick.com/{P/N}/{S/N}**
{P/N} corresponds to the part number of the product, see type label.
{S/N} corresponds to the serial number of the product, see type label (if specified).

NOTICE
Faults during operation and defects in the device or the system
Incorrect wiring may result in operational faults and defects.

- Follow the wiring notes precisely.

5.3 Connecting the device electrically

NOTE
The connection diagram, and information on inputs and outputs can be found on the type label on the device.

1. Ensure the voltage supply is not connected.
2. Connect the device according to the connection diagram.

5.4 Connection diagrams

5.4.1 Ethernet connection diagram

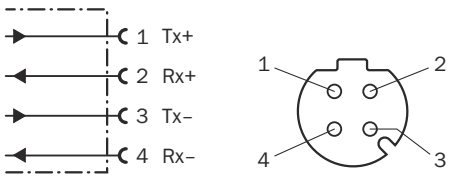


Table 2: Ethernet port connection diagram

Contact	Marking	Description
1	Tx+	Send data signal +
2	Rx+	Receive data signal +
3	Tx–	Send data signal –
4	Rx–	Receive data signal –

NOTE

Connect the device to the network via Ethernet connecting cables. If the network is not to be connected to a further network subscriber, connection to one of the Ethernet female connectors is sufficient. Close the unused female connector with a cover or dummy connector.

5.4.2 PROFIBUS connection diagram

If the device forms the end of a PROFIBUS segment, then a terminator plug must be mounted for the PROFIBUS-OUT connection (e.g. part no. 6021156).

PROFIBUS-OUT interface

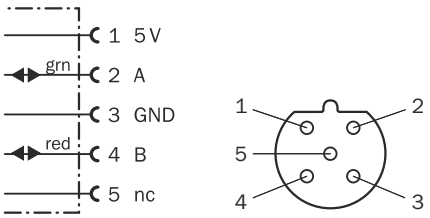


Table 3: Connection diagram for PROFIBUS-OUT, M12 female connector, 5-pin, B-coded

Contact	Marking	Wire color	Description
1	5 V	–	Supply voltage: +18 ... +30 V DC
2	A	Green	Data
3	GND	–	Bus voltage 0 V, e.g., electrically isolated for terminator
4	B	Red	Data
5	N/C	–	Not connected

PROFIBUS-IN interface

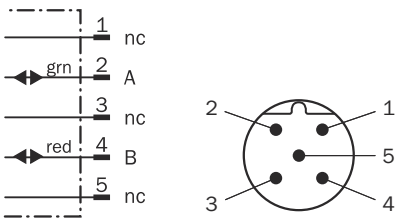


Table 4: Connection diagram for PROFIBUS-IN, M12 male connector, 5-pin, B-coded

Contact	Marking	Wire color	Description
1	N/C	–	Not connected
2	A	Green	Data
3	N/C	–	Not connected
4	B	Red	Data
5	N/C	–	Not connected

5.4.3 Supply voltage connection diagram

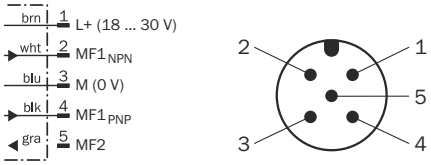


Figure 14: Connection diagram for supply voltage (M12, 5-pin, A-coded)

Contact	Marking	Wire color	Description
1	L+	Brown	Supply voltage: +18 ... +30 V DC
2	$MF1_{NPN}$	White	Multifunctional output MF1, NPN
3	M	Blue	Supply voltage: 0 V
4	$MF1_{PNP}$	Black	Multifunctional output MF1, PNP
5	MF2	Gray	Multifunctional input MF2

NOTE

The sensor has an electrical protection class of III. This means the device is intended for operation in protective extra-low voltage systems (PELVs).

6 Commissioning

6.1 Configuring the device

Configuration of the participants

Each sensor has its own MAC address. The MAC address of the device can be found on the type label (e.g. 00:06:77:02:00:A7). You can change the setting for the internet protocol (IP) via the SOPAS Engineering Tool.

Parameterization

The **Extrapolation time** parameter cannot be configured via EtherNet/IP. You can configure the parameter either via control marks or via SOPAS ET see "Configuration and servicing with SOPAS Engineering Tool (SOPAS ET)", page 28.

6.2 Configuration and servicing with SOPAS Engineering Tool (SOPAS ET)

For configuration and servicing or diagnostic purposes, the device can be accessed using the SOPAS ET software.

To use the SOPAS ET with the device, a computer with an Ethernet connection is required. In addition, a suitable Ethernet connecting cable (RJ45 male connector on M12 male connector) is required.

NOTE
The latest version of the SOPAS ET software can be downloaded at www.sick.com/SOPAS_ET.

The relevant system requirements for installing SOPAS ET on a computer are also specified there.

The device has the following IP network configuration in its delivery condition:

- Permanent IP address (no DHCP)
- IP address: 192.168.100.236
- IP network mask: 255.255.255.0
- Standard gateway: not present (address 0.0.0.0)

6.2.1 Parameters for output of measured values

On the **Parameters page**, settings for output of measured values can be made.

NOTE
The parameters **Action in case of read errors**, **Multiple reading** and **SmartPOS** can only be modified using SOPAS ET or via configuration marks see "Configuration marks", page 14.

Action in case of read errors

If the device cannot detect any barcodes on a barcode tape, the position value 0 is output. At the same time the error is displayed in SOPAS ET and output over the data interface.

The action on read errors can optionally be changed to **Hold measured value**. With this setting, instead of the value 0, the last valid position value is output, should there be an error. This value is retained until a valid position value is available again.

At the data interface, the error is always output, irrespective of this setting.

NOTE
The **Retain measured value** option is only available if the data interface has been configured to enable the regular output of errors.

Resolution

The output of the position value at the data interface can be at different resolutions.

Possible values are:
- 0.1 mm (default)
- 1 mm
- 10 mm
- 100 mm

Multiple reading

The **Multiple reading** option allows the detection reliability of the device to be increased. With this, a barcode is only evaluated if it has been read correctly several times. The settings which can be used for multiple reading depend on the maximum traversing speed. With the **auto** option, multiple reading is adjusted dynamically according to the current traversing speed.

Setting	Max. traverse speed
Dynamic (1x)	Max. specified traversing speed
Medium (3x)	up to 3.3 m/s
Rugged (5x)	up to 2.0 m/s
Auto	Max. specified traversing speed

SmartPOS

The **SmartPOS** function enables the output of a position value even under impeded reading conditions. These can be caused by:

- Dirty bar code tape
- Damaged bar code tape
- Interruption of the barcode tape (e.g. at diverters or expansion joints)

If, as a result of the stated read interference barcodes can no longer be read, the current position value is determined in another way. Initially, an attempt is made to determine the position change by processing the raw images taken by the device. Pictures taken in sequence are compared to determine a change in position (shift). Starting from the last valid position value, the current position value is updated incrementally.

If image data cannot be evaluated, the position value is calculated by extrapolation. For this, the most recent position, traversing speed, and acceleration are taken into account. Extrapolation is only used in the **Measuring error** and **Extrapolation time** SmartPOS operating modes.

With the **SmartPOS operating mode** settings, it can be established if and to what extent these two procedures should be used. The maximum duration of the extrapolation is adjustable and can be up to 2 seconds. As soon as it is once again possible to detect a valid position value from the barcodes read, output will recommence.

SmartPOS operating mode	Description
Measuring error	It is guaranteed that the maximum possible measurement error (difference between the output position and the actual position) is no greater than the defined value. If the maximum possible measurement error could exceed the defined value, the **SmartPOS** function is interrupted and an error output.

SmartPOS operating mode	Description
Product travel path	The **SmartPOS** function is restricted to a particular product travel path. Starting with the position at which bar codes could last be read, with **SmartPOS** the maximum set distance can be reset in both directions. If this distance is exceeded, the **SmartPOS** function is interrupted and an error output.
Extrapolation time	The **SmartPOS** function is restricted to a particular duration. Starting from the most recent time at which bar codes could be read, the position value is determined with **SmartPOS** for the set duration. If this duration is exceeded, the **SmartPOS** function is interrupted and an error output.

As an option, the device can indicate whether **SmartPOS** is active. To do this, the output for warning F2 **SmartPOS active** must be switched on in SOPAS ET. The output is effected via the status LED on the device (flashes green), SOPAS ET, and the data interface. Warning F2 **SmartPOS active** is deactivated by default.

Application mode

Application mode	Description
Automated storage and retrieval systems	In this mode, position value jumps (e.g. for switches) are not permitted and are deliberately ignored by the device
Electrical overhead conveyor	Position jumps are allowed in this mode
Shuttles	Position jumps are allowed in this mode

6.2.2 Diagnostics

Using SOPAS ET, it is possible to monitor the operational status of the device. In particular, the following values can be monitored:

Page	Values
Measured data	Current plotter position and travel speed for position and numerical value
Diagnostics	Read quality (number of barcodes in the field of view), errors and warnings, signal quality (exposure time), temperature in the device. Illustration of the LEDs on the device.

NOTE
With the data recorder present in SOPAS ET, it is possible to record measurement and diagnostics data from the device and to export them as a file (e.g. Microsoft Excel).

6.2.3 Changing the bar code tape alignment

Using SOPAS ET, the barcode tape alignment can be manually changed during running operation see "Function", page 12. This function can be found on the **Methods** page.

NOTE
Changes to barcode alignment are not stored permanently by SOPAS ET and are deleted after restarting the device.

The activation for automatic tape position detection during operation is also located on the **Parameters** page.

7 Ethernet interface

7.1 Establishing a connection

The devices have the following factory default settings:

- IP address: 192.168.100.236 (modifiable via SOPAS ET)
- TCP port: 2112 (fixed setting)

The connection to the device must therefore also be a TCP connection.

7.2 Protocol structure

The commands to be sent are shown as HEX values in square brackets. E.g. [02 A5] means the HEX values “02” and “A5” must be sent to the OLM via the Ethernet connection as the data content of a TCP frame.

[02 02 02 02	00 00 00 06	73 52 41	00 1D	7F	02]
Protocol framing	Length information In the example “0x06” = 6 bytes	Part of the SOPAS protocol	Index number of the read variable	Value of the variable = user data. In the example “7F”. This means for the error telegram that bit 0 to 7 is set = all errors active.	Checksum

7.3 Commands with examples

Reading the error number

To the device	[02 02 02 02 00 00 00 05 73 52 49 00 1D 75]
From the device	[02 02 02 02 00 00 00 06 73 52 41 00 1D 7F 02]
	The value is output as a bit field (each bit stands for an error)

Table 5: Fault numbers

Byte no.	Description
0	Temperature warning
1	Speed information
2	No barcode
3	Incorrect distance calculation
4	Contamination warning
5	Interface problems
6	Measured value overflow

Reading the operating temperature

To the device	[02 02 02 02 00 00 00 05 73 52 49 00 24 4C]
From the device	[02 02 02 02 00 00 00 07 73 52 41 00 24 00 00 44]
	The output value is in “°C” (0 °C in the example).

Reading the exposure time

To the device	[02 02 02 02 00 00 00 05 73 52 49 00 25 4D]

From the device	[02 02 02 02 00 00 00 06 73 52 41 00 25 00 45]
	The output value is in µs (0 µs in the example).

Reading the read quality (exposure time) with high averaging depth

To the device	[02 02 02 02 00 00 00 05 73 52 49 00 26 4E]
From the device	[02 02 02 02 00 00 00 06 73 52 41 00 26 62 24]
	The value output is in % (98% in the example). A read quality of 100% is the optimum. For checking longer barcode sections - averaging over several seconds. After about 30 seconds without a valid barcode tape, the read quality is still 70%.

Reading the read quality (exposure time) with medium averaging depth

To the device	[02 02 02 02 00 00 00 05 73 52 49 00 27 4F]
From the device	[02 02 02 02 00 00 00 06 73 52 41 00 27 62 25]
	For checking local barcode sections - averaging over a few seconds. After about 1 second without a valid barcode tape, the read quality is still 70%.

8 PROFINET IO interface

The sensor with PROFINET IO supports Ethernet networks with a transmission speed of 100 Mbit/s and PROFINET IO/RT, Conformance Class B. The following I&M (Identification and Maintenance) functions are also supported:

- IM0 = Device identification (serial number, version number, part number, etc.)
- IM1 = Users can enter system and location identification (AKZ and OKZ)
- IM2 = Installation date
- IM3 = Description of the function
- IM4 = Signature (config CRC)

The version number of the **IM0** I&M function describes the version of the PROFINET interface and is not identical to the version number of the device firmware.

8.1 Description of PROFINET IO modules for configuration and IO data

To enable it to be flexibly adapted to different control tasks, the device offers various PROFINET IO modules with a range of module types:

- Pure input modules that only transmit values to the PROFINET IO master and, optionally, can contain configuration data
- Input and output modules that can transmit values to the PROFINET IO master as well as receive values, and can optionally contain configuration data
- Setup modules that only contain configuration data, and do not transfer any process data to the PROFINET IO master or receive process data from the PROFINET IO master.

The naming of the modules follows the scheme: <module number><name>/<signature>, <name>/<signature>, ... The module names are read from left to right, and specify the values without any gaps which are transported by the module. A value further to the left is transmitted before a value further to the right in this case, and input and output values count independently of one another. The signature specifies whether the value is an input or an output value, and how many words or bytes the value contains. The signature has the structure: <direction><number><unit> Direction is:

- **i** for an input value from the PROFINET IO device to the PROFINET IO master
- **o** for an output value from the PROFINET IO master to the PROFINET IO device

Unit is:

- **b** for bytes
- **w** for words

Examples

- 5-Position/i2w, Preset dyn/o2w
- 13-Temp/i1b, Level/i2b, res/i2b

The first example deals with the module with number 5 which contains two values:

1 a two-word input value to the PROFINET IO master named **Position**
2 a two-word output value from the PROFINET IO master to the PROFINET IO device called **Preset dyn**

The second example is module number 13 with 3 values:

1 a 1-byte long input value **Temp** for temperature
2 a 2-byte long input value **Level**
3 A reserved area 2 bytes long

8.2 Definitions

- A byte is an 8-bit value.
- A word is a 16-bit value.
- Consistency means that all values within a module are updated simultaneously.
- An input value is cyclically transferred from the PROFINET IO device to the PROFINET IO master (PLC).
- An output value is cyclically transferred from the PROFINET IO master (PLC) to the PROFINET IO device. A configuration value is only transferred once from the PROFINET IO master to the PROFINET IO device when the PROFINET IO device is switched on.
- It is not possible to use a specific module multiple times in the hardware configuration of the PROFINET IO master

8.3 Configuring participants

Each PROFINET IO field device has its own MAC address. The MAC address of the sensor can be found on the type label (e.g. 00:06:77:02:00:A7). In addition, a PROFINET IO field device requires a unique, system-specific device name. The device name is used by the IO controller to determine the IP address of the field device.

The IP address is established in two steps:

- You accept the device name allocated by the network engineering tool or you configure a unique, system-specific device name with the aid of the network engineering tool.
- The IO controller assigns the IP address based on the device name.

Manually defining the name and IP address of the device

1. Double-click on the device symbol in the network engineering tool.

✓ The **Properties** dialog box appears.

2. Select the **General** tab.
3. Enter device name.
4. Assign new IP address.

8.4 Load electronic data sheet (EDS)

Before you can configure PROFINET IO for the device for the first time, you will have to load the electronic data sheet of the device into the hardware catalog of the network-engineering-tool (e.g., SIMATIC-Manager from Siemens).

1. Download the GSD file from the product page.
   The product page can be accessed via the **SICK Product ID**:
   pid.sick.com/{P/N}/{S/N}
   {P/N} corresponds to the part number of the product, see type label.
   {S/N} corresponds to the serial number of the product, see type label (if indicated).
2. Follow instructions in online help or in the user manual of the network engineering tool in order to load the electronic data sheet.

✓ The hardware catalogue is displayed in the network engineering tool.

8.5 Reset device to the factory settings

NOTE

You can reset the device to the factory setting using the network engineering tool. On resetting to the factory settings, the IP configuration becomes invalid and the device is no longer responsive in the network. In order to be able to establish a connection to the device, a valid IP configuration will first need to be assigned via the network engineering tool.

8.6 Module categories

8.6.1 Module category 01_measured values

Table 6: Module category "01_measured values"

Module no.	Total size	Type	Contents		
			Name	Type	Size/config. option
1	2 words	Input module	Position	Input	2 words
			Resolution of the position value	Configuration	0.1 mm ... 100 mm
2	1 word	Input module	Position	Input	1 word
			Resolution of the position value	Configuration	0.1 mm ... 100 mm
3	2 words	Input module	Speed	Input	2 words
			Resolution of the speed value	Configuration	0.1 mm/s ... 100 mm/s
4	4 words	Input module	Position	Input	2 words
			Speed	Input	2 words
			Resolution of the position value	Configuration	0.1 mm ... 100 mm
			Resolution of the speed value	Configuration	0.1 mm/s ... 100 mm/s
5	2 words	Input and output module	Position	Input	2 words
			Dynamic preset value	Output	2 words
			Resolution of the position value	Configuration	0.1 mm ... 100 mm

8.6.2 Module category 02_device status

Table 7: Module category "02_device status"

Module no.	Total size	Type	Contents		
			Name	Type	Size/config. option
10	1 byte	Input module	Status	Input	8 bits
12	4 bytes	Input module	Label	Input	3 bytes
			Reserved	Input	1 byte
13	5 bytes	Input module	Temperature [°C]	Input	1 byte
			Measured value quality	Input	2 bytes
			Reserved	Input	2 bytes

8.6.3 Module category 03_device settings

Table 8: Module category "03_device settings"

Module no.	Total size	Type	Contents		
			Name	Type	Size/config. option
20	Empty	Setup module	Polarity of output MF1	Parameter	HIGH or LOW
			Function of output MF1	Parameter	position, speed, service, control mark, illumination off
			Position value	Parameter	–10000000 ... 10000000
			Position hysteresis	Parameter	–10000000 ... 10000000
			Speed value	Parameter	–10000 ... 10000
			Speed mode	Parameter	(+), (–), (±)
			Range overrun	Parameter	Switch yes/no
			Temperature overrun	Parameter	Switch yes/no
			No bar code	Parameter	Switch yes/no
			No plausible measured value	Parameter	Switch yes/no
			Pre-failure signal	Parameter	Switch yes/no
21	Empty	Setup module	Polarity of the MF2 input	Parameter	HIGH or LOW
			Function of the MF2 input	Parameter	inactive, preset activation, illumination off
22	Empty	Setup module	Static preset value [mm]	Parameter	–10000000 ... 10000000
			Offset value [mm]	Parameter	–10000000 ... 10000000

8.6.4 Module category 04_device information

Table 9: Module category "04_device information"

Module no.	Total size	Type	Contents		
			Name	Type	Size/config. option
30	8 bytes	Input module	Serial number	Input	8 characters
31	14 bytes	Input module	Product code	Input	14 characters
32	8 bytes	Input module	Version number of the hardware	Input	8 characters
33	10 words	Input module	Version no. of FPGA	Input	19 characters
			Reserved	Input	1 byte
34	10 words	Input module	Version number of firmware 1	Input	19 characters
			Reserved	Input	1 byte

Module no.	Total size	Type	Contents		
			Name	Type	Size/config. option
35	10 words	Input module	Version number of firmware 2	Input	19 characters
			Dynamic preset value	Input	1 byte

8.7 Module descriptions

8.7.1 Module 1 (position/i2w)

Type

Input module, 2 words, consistent

Description

This module reads the current position value of the tape according to the offset and resolution settings. Corresponds to the Class 1 module of the encoder profile.

Input values

Rel. Address	Type	Description
0	Signed 32-bit number in two's complement	Current position in selected resolution with regard to the offset. Depending on resolution, a digit corresponds to 0.1 mm ... 100 mm.

Module parameters

Name	Value range	Standard value	Description
Resolution	0.1 mm, 1 mm, 10 mm, 100 mm	1 mm	Determines the resolution of the position value.

8.7.2 Module 2 (position/i1w)

Type

Input module, 1 word, consistent

Description

This module reads the current position value of the tape according to the offset and resolution settings, however only as a 16-bit number in contrast to module 1. Corresponds to the optional Class 1 module of the encoder profile.

NOTE

The actual position value may exceed the value range for this module. In this case, the following truncated values are output as an error value.

- If the value is less than –32767 (in the corresponding unit) then –32768 (hexadecimal 0x8000) is output.
- If the value is greater than 32766 (in the corresponding unit) then 32767 (hexadecimal 0x7FFF) is output.

If it is not possible to determine a valid position value, e.g., due to missing barcode tape or contamination, then the value 0 is output for the position and the corresponding bits are set in the status byte see "Module 10 (status/i1b)", page 40.

Input values

Rel. Address	Type	Description
0	Signed 16-bit number in two's complement (inverted)	Current position in selected resolution with regard to the offset. Depending on the resolution, one digit corresponds to 0.1 mm ... 100 mm.

Module parameters

Name	Value range	Standard value	Description
Resolution	0.1 mm, 1 mm, 10 mm, 100 mm	1 mm	Determines the resolution of the position value.

8.7.3 Module 3 (speed/i2w)

Type

Input module, 2 words, consistent

Description

This module reads the currently ascertained speed according to the selected resolution.

NOTE
If it is not possible to determine a valid position value, e.g., due to missing barcode tape or contamination, then the value 0 is output for the speed and the corresponding bits are set in the status byte see "Module 10 (status/i1b)", page 40.

Input values

Rel. Address	Type	Description
0	Signed 32-bit number in two's complement	Current speed in selected resolution Depending on the resolution, one digit corresponds to 0.1 mm/s ... 100 mm/s.

Module parameters

Name	Value range	Standard value	Description
Resolution	0.1 mm/s, 1 mm/s, 10 mm/s, 100 mm/s	1 mm/s	Determines the resolution of the speed value.

8.7.4 Module 4 (position/i2w, speed/i2w)

Type

Input module, 4 words, consistent

Description

This module reads both the current position and the currently ascertained speed in accordance with the selected resolution and offset.

NOTE

If it is not possible to determine a valid position value, e.g., due to missing barcode tape or contamination, then the value 0 is output for both the position and the speed and the corresponding bits are set in the status byte see "Module 10 (status/i1b)", page 40.

Input values

Rel. Address	Type	Description
0	Signed 32-bit number in two's complement	Current position in selected resolution with regard to the offset. Depending on the resolution, one digit corresponds to 0.1 mm ... 100 mm.
4	Signed 32-bit number in two's complement	Current speed in selected resolution Depending on the resolution, one digit corresponds to 0.1 mm/s ... 100 mm/s.

Module parameters

Name	Value range	Standard value	Description
Position resolution	0.1 mm, 1 mm, 10 mm, 100 mm	1 mm	Determines the resolution of the position value.
Speed resolution	0.1 mm/s, 1 mm/s, 10 mm/s, 100 mm/s	1 mm/s	Determines the resolution of the speed value.

8.7.5 Module 5 (position/i2w, preset dyn/o2w)

Type

Input/output module, 2 words, consistent

Description

This module reads the current position value of the barcode tape according to the resolution settings. Any active dynamic preset or offset is included in the calculation. When the module is written, the preset value is changed and the preset function can be called up if the most significant bit (bit 31) has been set.

NOTE

Each time the module is transferred to the device, the preset value is transferred to the device, even if bit 31 has not been set. This can be used for dynamically specifying the preset value if there are several calibration positions present on the section, and the MF input is used for triggering the preset function. A preset or offset value changed by this module is not permanently adopted, and is lost when the device is deactivated.

If it is not possible to determine a valid position value, e.g., due to missing barcode tape or contamination, then the value 0 is output for the position and the corresponding bits are set in the status byte, see below see "Module 10 (status/i1b)", page 40.

Input values

Rel. Address	Type	Description
0	Signed 32-bit number in two's complement	Current position in selected resolution with regard to the offset. Depending on the resolution, one digit corresponds to 0.1 mm ... 100 mm.

Output values

Rel. Address	Type	Description
0.31	Bit, 0 or 1	If bit 31 is not set (0) then the value is adopted in bits 0 ... 30 as the new preset value, although the offset is not recalculated. The output position value is not influenced. If bit 31 has been set (1) then the value is also adopted in bits 0 ... 30 as a new preset value, but in this case the preset function is called up as well. This function adapts the offset so that the preset value is output at the current position from now on.
0.0 ... 0.30	Signed 31-bit number in two's complement	New preset position in 1 mm.

Module parameters

Name	Value range	Standard value	Description
Resolution	0.1 mm, 1 mm, 10 mm, 100 mm	1 mm	Determines the resolution of the position value.

8.7.6 Module 10 (status/i1b)

Type

Input module, 1 byte

Description

This module reads out the status byte of the device.

Input values

Rel. Address	Type	Description
0.0	1 bit	Unavailability: If set (1) then no measured value (position or speed) can be read.
0.1	1 bit	Device error: If set (1) then the temperature is outside the permitted range or the device is contaminated.
0.2	1 bit	Measuring error: If set (1) then there is no plausible measured value present or the device cannot detect a barcode tape.
0.3	1 bit	Pre-failure error: If set (1) then the device is contaminated or the integrated illumination unit is approaching the maximum service life. However, measured values can still be read.
0.4	1 bit	LED off: If set (1) then the internal illumination is switched off.

Rel. Address	Type	Description
0.5	1 bit	If set (1), SmartPOS is active (see "Parameters for output of measured values", page 28).
0.6	1 bit	MF2: If set (1) then there is an active level present after debouncing on input MF2.
0.7	1 bit	MF1: If set (1) then output MF1 has been activated.

8.7.7 Module 12 (label/i3b and res/i1b)

Type

Input module, 4 bytes, consistent

Description

This module outputs the last fiducial read from the bar code tape.

NOTE
If no fiducial has been read yet then the read value for the label is 0x00,0x00,0x00.

The most recently read value of the fiducial is repeatedly output until a new fiducial has been read. It is not possible to differentiate between several identical fiducials that are in direct succession. It is recommended to cancel each fiducial by means of another fiducial.

Input values

Rel. Address	Type	Description
0	3 bytes	Content of the fiducial
3	1 byte	Reserved

8.7.8 Module 13 (Temp/i1b, Level/i2b, res/i2b)

Type

Input module, 5 bytes, consistent

Description

The diagnostic data of the device can be read using this module.

Input values

Rel. Address	Type	Description
0	Signed 8-bit number in two's complement	Device temperature [°C]
1	Unsigned 16-bit number in two's complement	Device-specific value for the quality of the measured value. Corresponds to the exposure time. Higher values mean poorer quality or increased ambient light.
3	2 bytes	Reserved

8.7.9 Module 20 (MF1 output)

Type

Setup module, no input/output data

Description

This module defines the behavior of output Q.

Module parameters

Name	Value range	Standard value	Description
Active level	HIGH, LOW	High	Active switching level of the output.
Function	position, speed, service, control mark, illumination off	service	Function of the output: ■ **position**: Output switches if the position from the module parameter **position threshold** has been exceeded. ■ **speed**: Output switches if the speed threshold from the module parameter **speed threshold** has been exceeded in the direction specified by **speed mode**. ■ **service**: The output switches if at least one of the switched-on service bits has been set. ■ **Control mark**: The output switches according to the special switch-on and switch-off control marks (see "Control marks", page 13). ■ **illumination off**: The output switches when the integrated illumination is switched off.
Position threshold	-10,000,000 mm ... 10,000.000 mm	0 mm	Value of the position threshold in [mm].
Position hysteresis	-10,000,000 mm ... 10,000.000 mm	10 mm	Hysteresis of the position threshold in [mm].
Speed threshold	0 mm/s ... 10,000 mm/s	0 mm/s	Speed threshold in [mm/s].
Speed sign	(+) positive direction (–) negative direction (+/–) both directions	(+) positive direction	Mode for detecting the speed overrun.
Service position out of range	disabled, enabled	enabled	If **enabled**, the output switches if the position leaves the permit range of -10 km ... 10 km.
Service temperature failure	disabled, enabled	enabled	If **enabled**, the output switches if the device temperature is outside the permitted range.
Service no bar code visible	disabled, enabled	enabled	If **enabled**, the output switches if no barcode tape is detected.
Service no plausible position	disabled, enabled	enabled	If **enabled**, the output switches if no plausible measured value is present any longer.
Service prefailure	disabled, enabled	enabled	If **enabled**, the output switches if the **prefailure** status (device contaminated or illumination approaching service life limit) has been active.

8.7.10 Module 21 (MF2 input)

Type

Setup module, no input/output data

Description

This module defines the behavior of the multi-function input MF.

Module parameters

Name	Value range	Standard value	Description
Active level	HIGH, LOW	HIGH	Input level that is interpreted as active.
Function	inactive, preset activation, illumination off	inactive	Function of the input: ■ **inactive**: an active signal at the input does not trigger a response. ■ **preset activation**: the preset function is activated via the input. ■ **illumination off**: the integrated illumination can be deactivated via the input.

8.7.11 Module 22 (preset stat and offset)

Type

Setup module, no input/output data

Description

This module is used for presetting the preset value and the initial position offset.

NOTE
If module 5 is also active then the parameter data of module 22 is overwritten by the output data from module 5.

Module parameters

Name	Value range	Standard value	Description
Position preset	-10,000,000 mm ... 10,000,000 mm	0 mm	Defines the initial preset value in [mm].
Position offset	-10,000,000 mm ... 10,000,000 mm	0 mm	Defines the initial position value in [mm].

8.7.12 Module 30 (serial no/i8b)

Type

Input module, 8 byte

Description

The serial number of the device can be queried using this module.

Input values

Rel. Address	Type	Description
0	8 ASCII characters	Serial number, unused characters at the end of the string are filled with 0 bytes (0x00).

8.7.13 Module 31 (product code/i14b)

Type

Input module, 14 byte

Description

The product code of the device can be queried using this module.

Input values

Rel. Address	Type	Description
0	14 ASCII characters	String with fixed length. Unused characters at the end of the string are filled with 0 bytes (0x00).

8.7.14 Module 32 (version HW/i8b)

Type

Input module, 8 byte

Description

This module can be used for querying the status of the version number of the device hardware.

Input values

Rel. Address	Type	Description
0	8 ASCII characters	Hardware version number

8.7.15 Module 33 (version FPGA/i10w)

Type

Input module, 10 words

Description

This module can be used for querying the FPGA firmware version number of the device. Corresponds to the SOPAS firmware component **Board0/Component2**.

NOTE
If this value is not present in the device then a zero byte (0x00) is transmitted for each character.

Input values

Rel. Address	Type	Description
0	19 ASCII characters	String with fixed length. Unused characters at the end of the string are filled with 0 bytes (0x00).
19	1 byte	Reserved

8.7.16 Module 34 (version µC/i10w)

Type

Input module, 10 words

Description

This module can be used for querying the firmware version number of the main controller of the device. Corresponds to the SOPAS firmware component **Board0/Component0**.

NOTE
If this value is not present in the device then a zero byte (0x00) is transmitted for each character.

Input values

Rel. Address	Type	Description
0	19 ASCII characters	String with fixed length. Unused characters at the end of the string are filled with 0 bytes (0x00).
19	1 byte	Reserved

8.7.17 Module 35 (version µC2/i10w)

Type

Input module, 10 words

Description

This module can be used for querying the firmware version number of the communication controller in the device. Corresponds to the SOPAS firmware component **Board1/Component0**.

NOTE
If this value is not present in the device then a zero byte (0x00) is transmitted for each character.

Input values

Rel. Address	Type	Description
0	19 ASCII characters	String with fixed length. Unused characters at the end of the string are filled with 0 bytes (0x00).
19	1 byte	Reserved

9 PROFIBUS interface

The device supports transmission speeds from 9.6 kbit/s to 12 Mbit/s and PROFIBUS® version DPV0.

9.1 Nomenclature

- A byte is an 8-bit value.
- A word is a 16-bit value.
- Consistency means that all values within a module are updated simultaneously.
- An input value is transmitted cyclically from the PROFIBUS device to the PROFIBUS master (PLC).
- An output value is transmitted cyclically from the PROFIBUS master (PLC) to the PROFIBUS device.
- A configuration value is only transmitted once from the PROFIBUS master to the PROFIBUS device when the PROFIBUS device is switched on.

9.2 Description of PROFIBUS modules for configuration and IO data

Module types

To enable it to be flexibly adapted to different control tasks, the device offers various PROFIBUS modules with a range of module types:

- Pure input modules that only transmit values to the PROFIBUS master and, optionally, can contain configuration data
- Input and output modules that can transmit values to the PROFIBUS master as well as receive values, and can optionally contain configuration data and
- Setup modules that only contain configuration data, and do not transfer any process data to the PROFIBUS master or receive process data from the PROFIBUS master.

Module designation

The modules are named according to the following scheme: <Module number>-<Name>/<Signature>, <Name>/<Signature>, ...

The module names are read from left to right, and specify the values without any gaps which are transported by the module. A value further to the left is transmitted before a value further to the right in this case, and input and output values count independently of one another. The signature specifies whether the value is an input or an output value, and how many words or bytes the value contains.

The signature has the structure: <direction><number><unit> Direction is:

- **i** for an input value from the PROFIBUS device to the PROFIBUS master
- **o** for an output value from the PROFIBUS master to the PROFIBUS device.

Unit is:

- **b** for bytes
- **w** for words

Examples:

1 5-Position/i2w, Preset dyn/o2w
2 13-Temp/i1b, Level/i2b, res/i2b

The first example deals with the module with number 5 which contains two values:

- a two-word input value to the PROFIBUS master named **Position**
- a two-word long output value from the PROFIBUS master to the PROFIBUS device called **Preset dyn**

The second example is module number 13 with 3 values:

- a 1-byte long input value **Temp** for temperature
- a 2-byte long input value **Level**
- a reserved area 2 bytes long.

Table 10: Module overview

Module number	Total size	Type	Contents		
			Name	Type	Size/configuration option
1	2 words	Input module	Position	Input	2 words
			Resolution of the position value	Configuration	0.1 mm ... 100 mm
2	1 word	Input module	Position	Input	1 word
			Resolution of the position value	Configuration	0.1 mm ... 100 mm
3	2 words	Input module	Speed	Input	2 words
			Resolution of the value	Configuration	0.1 mm/s, 100 mm/s
4	4 words	Input module	Position	Input	2 words
			Speed	Input	2 words
			Resolution of the position value	Configuration	0.1 mm ... 100 mm
			Resolution of the speed value	Configuration	0.1 mm/s ... 100 mm/s
5	2 words	Input/output module	Position	Input	2 words
			Dynamic preset value	Output	2 words
			Resolution of the position value	Configuration	0.1 mm ... 100 mm
10	1 byte	Input module	Status	Input	8 bits
12	4 bytes	Input module	Label	Input	3 bytes
			Reserved	Input	1 byte
13	5 bytes	Input module	Temperature [°C]	Input	1 byte
			Measured value quality	Input	2 bytes
			Reserved	Input	2 bytes
20	Empty	Setup module	Polarity of output MF1	Parameter	HIGH or LOW
			Function of output MF1	Parameter	position, speed, service, control mark, illumination off
			Position value	Parameter	-10000000 ... 10000000
			Position hysteresis	Parameter	-10000000 ... 10000000
			Speed value	Parameter	-10000 ... 10000
			Speed mode	Parameter	(+), (-), (±)
			Range overrun	Parameter	Switch yes/no
			Temperature overrun	Parameter	Switch yes/no
			No bar code	Parameter	Switch yes/no
			No plausible measured value	Parameter	Switch yes/no
			Pre-failure signal	Parameter	Switch yes/no

Module number	Total size	Type	Contents		
			Name	Type	Size/configuration option
21	Empty	Setup module	Polarity of the MF2 input	Parameter	HIGH or LOW
			Function of the MF2 input	Parameter	inactive, preset activation, illumination off
			Static preset value [mm]	Parameter	-10000000 ... 10000000
			Offset value [mm]	Parameter	-10000000 ... 10000000
30	8 bytes	Input module	Serial number	Input	8 characters
31	14 bytes	Input module	Product code	Input	14 characters
32	8 bytes	Input module	Version number of the hardware	Input	8 characters
33	10 words	Input module	Version no. of FPGA	Input	19 characters
			Reserved	Input	1 byte
34	10 words	Input module	Version number of firmware 1	Input	19 characters
			Reserved	Input	1 byte
35	10 words	Input module	Version number of firmware 2	Input	19 characters
			Reserved	Input	1 byte

9.3 Module descriptions

9.3.1 Module 1 (position/i2w)

Type

Input module, 2 words, consistent

Description

This module reads the current position value of the tape according to the offset and resolution settings. Corresponds to the Class 1 module of the encoder profile.

Input values

Rel. Address	Type	Description
0	Signed 32-bit number in two's complement	Current position in selected resolution with regard to the offset. Depending on resolution, a digit corresponds to 0.1 mm ... 100 mm.

Module parameters

Name	Value range	Standard value	Description
Resolution	0.1 mm, 1 mm, 10 mm, 100 mm	1 mm	Determines the resolution of the position value.

9.3.2 Module 2 (position/i1w)

Type

Input module, 1 word, consistent

Description

This module reads the current position value of the tape according to the offset and resolution settings, however only as a 16-bit number in contrast to module 1. Corresponds to the optional Class 1 module of the encoder profile.

NOTE

The actual position value may exceed the value range for this module. In this case, the following truncated values are output as an error value.

- If the value is less than –32767 (in the corresponding unit) then –32768 (hexadecimal 0x8000) is output.
- If the value is greater than 32766 (in the corresponding unit) then 32767 (hexadecimal 0x7FFF) is output.

If it is not possible to determine a valid position value, e.g., due to missing barcode tape or contamination, then the value 0 is output for the position and the corresponding bits are set in the status byte see "Module 10 (status/i1b)", page 40.

Input values

Rel. Address	Type	Description
0	Signed 16-bit number in two's complement (inverted)	Current position in selected resolution with regard to the offset. Depending on the resolution, one digit corresponds to 0.1 mm ... 100 mm.

Module parameters

Name	Value range	Standard value	Description
Resolution	0.1 mm, 1 mm, 10 mm, 100 mm	1 mm	Determines the resolution of the position value.

9.3.3 Module 3 (speed/i2w)

Type

Input module, 2 words, consistent

Description

This module reads the currently ascertained speed according to the selected resolution.

NOTE

If it is not possible to determine a valid position value, e.g., due to missing barcode tape or contamination, then the value 0 is output for the speed and the corresponding bits are set in the status byte see "Module 10 (status/i1b)", page 40.

Input values

Rel. Address	Type	Description
0	Signed 32-bit number in two's complement	Current speed in selected resolution Depending on the resolution, one digit corresponds to 0.1 mm/s ... 100 mm/s.

Module parameters

Name	Value range	Standard value	Description
Resolution	0.1 mm/s, 1 mm/s, 10 mm/s, 100 mm/s	1 mm/s	Determines the resolution of the speed value.

9.3.4 Module 4 (position/i2w, speed/i2w)

Type

Input module, 4 words, consistent

Description

This module reads both the current position and the currently ascertained speed in accordance with the selected resolution and offset.

NOTE

If it is not possible to determine a valid position value, e.g., due to missing barcode tape or contamination, then the value 0 is output for both the position and the speed and the corresponding bits are set in the status byte see "Module 10 (status/i1b)", page 40.

Input values

Rel. Address	Type	Description
0	Signed 32-bit number in two's complement	Current position in selected resolution with regard to the offset. Depending on the resolution, one digit corresponds to 0.1 mm ... 100 mm.
4	Signed 32-bit number in two's complement	Current speed in selected resolution Depending on the resolution, one digit corresponds to 0.1 mm/s ... 100 mm/s.

Module parameters

Name	Value range	Standard value	Description
Position resolution	0.1 mm, 1 mm, 10 mm, 100 mm	1 mm	Determines the resolution of the position value.
Speed resolution	0.1 mm/s, 1 mm/s, 10 mm/s, 100 mm/s	1 mm/s	Determines the resolution of the speed value.

9.3.5 Module 5 (position/i2w, preset dyn/o2w)

Type

Input/output module, 2 words, consistent

Description

This module reads the current position value of the barcode tape according to the resolution settings. Any active dynamic preset or offset is included in the calculation. When the module is written, the preset value is changed and the preset function can be called up if the most significant bit (bit 31) has been set.

NOTE

Each time the module is transferred to the device, the preset value is transferred to the device, even if bit 31 has not been set. This can be used for dynamically specifying the preset value if there are several calibration positions present on the section, and the MF input is used for triggering the preset function. A preset or offset value changed by this module is not permanently adopted, and is lost when the device is deactivated.

If it is not possible to determine a valid position value, e.g., due to missing barcode tape or contamination, then the value 0 is output for the position and the corresponding bits are set in the status byte, see below see "Module 10 (status/i1b)", page 40.

Input values

Rel. Address	Type	Description
0	Signed 32-bit number in two's complement	Current position in selected resolution with regard to the offset. Depending on the resolution, one digit corresponds to 0.1 mm ... 100 mm.

Output values

Rel. Address	Type	Description
0.31	Bit, 0 or 1	If bit 31 is not set (0) then the value is adopted in bits 0 ... 30 as the new preset value, although the offset is not recalculated. The output position value is not influenced. If bit 31 has been set (1) then the value is also adopted in bits 0 ... 30 as a new preset value, but in this case the preset function is called up as well. This function adapts the offset so that the preset value is output at the current position from now on.
0.0 ... 0.30	Signed 31-bit number in two's complement	New preset position in 1 mm.

Module parameters

Name	Value range	Standard value	Description
Resolution	0.1 mm, 1 mm, 10 mm, 100 mm	1 mm	Determines the resolution of the position value.

9.3.6 Module 10 (status/i1b)

Type

Input module, 1 byte

Description

This module reads out the status byte of the device.

Input values

Rel. Address	Type	Description
0.0	1 bit	Unavailability: If set (1) then no measured value (position or speed) can be read.
0.1	1 bit	Device error: If set (1) then the temperature is outside the permitted range or the device is contaminated.

Rel. Address	Type	Description
0.2	1 bit	Measuring error: If set (1) then there is no plausible measured value present or the device cannot detect a barcode tape.
0.3	1 bit	Pre-failure error: If set (1) then the device is contaminated or the integrated illumination unit is approaching the maximum service life. However, measured values can still be read.
0.4	1 bit	LED off: If set (1) then the internal illumination is switched off.
0.5	1 bit	If set (1), SmartPOS is active (see "Parameters for output of measured values", page 28).
0.6	1 bit	MF2: If set (1) then there is an active level present after debouncing on input MF2.
0.7	1 bit	MF1: If set (1) then output MF1 has been activated.

9.3.7 Module 12 (label/i3b and res/i1b)

Type

Input module, 4 bytes, consistent

Description

This module outputs the last fiducial read from the bar code tape.

NOTE
If no fiducial has been read yet then the read value for the label is 0x00,0x00,0x00.

The most recently read value of the fiducial is repeatedly output until a new fiducial has been read. It is not possible to differentiate between several identical fiducials that are in direct succession. It is recommended to cancel each fiducial by means of another fiducial.

Input values

Rel. Address	Type	Description
0	3 bytes	Content of the fiducial
3	1 byte	Reserved

9.3.8 Module 13 (Temp/i1b, Level/i2b, res/i2b)

Type

Input module, 5 bytes, consistent

Description

The diagnostic data of the device can be read using this module.

Input values

Rel. Address	Type	Description
0	Signed 8-bit number in two's complement	Device temperature [°C]

Rel. Address	Type	Description
1	Unsigned 16-bit number in two's complement	Device-specific value for the quality of the measured value. Corresponds to the exposure time. Higher values mean poorer quality or increased ambient light.
3	2 bytes	Reserved

9.3.9 Module 20 (MF1 output)

Type

Setup module, no input/output data

Description

This module defines the behavior of output Q.

Module parameters

Name	Value range	Standard value	Description
Active level	HIGH, LOW	High	Active switching level of the output.
Function	position, speed, service, control mark, illumination off	service	Function of the output: ■ **position**: Output switches if the position from the module parameter **position threshold** has been exceeded. ■ **speed**: Output switches if the speed threshold from the module parameter **speed threshold** has been exceeded in the direction specified by **speed mode**. ■ **service**: The output switches if at least one of the switched-on service bits has been set. ■ **Control mark**: The output switches according to the special switch-on and switch-off control marks (see "Control marks", page 13). ■ **illumination off**: The output switches when the integrated illumination is switched off.
Position threshold	-10,000,000 mm ... 10,000.000 mm	0 mm	Value of the position threshold in [mm].
Position hysteresis	-10,000,000 mm ... 10,000.000 mm	10 mm	Hysteresis of the position threshold in [mm].
Speed threshold	0 mm/s ... 10,000 mm/s	0 mm/s	Speed threshold in [mm/s].
Speed sign	(+) positive direction (–) negative direction (+/–) both directions	(+) positive direction	Mode for detecting the speed overrun.
Service position out of range	disabled, enabled	enabled	If **enabled**, the output switches if the position leaves the permit range of -10 km ... 10 km.
Service temperature failure	disabled, enabled	enabled	If **enabled**, the output switches if the device temperature is outside the permitted range.

Name	Value range	Standard value	Description
Service no bar code visible	disabled, enabled	enabled	If **enabled**, the output switches if no barcode tape is detected.
Service no plausible position	disabled, enabled	enabled	If **enabled**, the output switches if no plausible measured value is present any longer.
Service pre-failure	disabled, enabled	enabled	If **enabled**, the output switches if the **prefailure** status (device contaminated or illumination approaching service life limit) has been active.

9.3.10 Module 21 (MF2 input)

Type

Setup module, no input/output data

Description

This module defines the behavior of the multi-function input MF.

Module parameters

Name	Value range	Standard value	Description
Active level	HIGH, LOW	HIGH	Input level that is interpreted as active.
Function	inactive, preset activation, illumination off	inactive	Function of the input: ■ **inactive**: an active signal at the input does not trigger a response. ■ **preset activation**: the preset function is activated via the input. ■ **illumination off**: the integrated illumination can be deactivated via the input.

9.3.11 Module 22 (preset stat and offset)

Type

Setup module, no input/output data

Description

This module is used for presetting the preset value and the initial position offset.

NOTE
If module 5 is also active then the parameter data of module 22 is overwritten by the output data from module 5.

Module parameters

Name	Value range	Standard value	Description
Position preset	-10,000,000 mm ... 10,000,000 mm	0 mm	Defines the initial preset value in [mm].
Position offset	-10,000,000 mm ... 10,000,000 mm	0 mm	Defines the initial position value in [mm].

9.3.12 Module 30 (serial no/i8b)

Type

Input module, 8 byte

Description

The serial number of the device can be queried using this module.

Input values

Rel. Address	Type	Description
0	8 ASCII characters	Serial number, unused characters at the end of the string are filled with 0 bytes (0x00).

9.3.13 Module 31 (product code/i14b)

Type

Input module, 14 byte

Description

The product code of the device can be queried using this module.

Input values

Rel. Address	Type	Description
0	14 ASCII characters	String with fixed length. Unused characters at the end of the string are filled with 0 bytes (0x00).

9.3.14 Module 32 (version HW/i8b)

Type

Input module, 8 byte

Description

This module can be used for querying the status of the version number of the device hardware.

Input values

Rel. Address	Type	Description
0	8 ASCII characters	Hardware version number

9.3.15 Module 33 (version FPGA/i10w)

Type

Input module, 10 words

Description

This module can be used for querying the FPGA firmware version number of the device. Corresponds to the SOPAS firmware component **Board0/Component2**.

NOTE
If this value is not present in the device then a zero byte (0x00) is transmitted for each character.

Input values

Rel. Address	Type	Description
0	19 ASCII characters	String with fixed length. Unused characters at the end of the string are filled with 0 bytes (0x00).
19	1 byte	Reserved

9.3.16 Module 34 (version µC/i10w)

Type

Input module, 10 words

Description

This module can be used for querying the firmware version number of the main controller of the device. Corresponds to the SOPAS firmware component **Board0/Component0**.

NOTE
If this value is not present in the device then a zero byte (0x00) is transmitted for each character.

Input values

Rel. Address	Type	Description
0	19 ASCII characters	String with fixed length. Unused characters at the end of the string are filled with 0 bytes (0x00).
19	1 byte	Reserved

9.3.17 Module 35 (version µC2/i10w)

Type

Input module, 10 words

Description

This module can be used for querying the firmware version number of the communication controller in the device. Corresponds to the SOPAS firmware component **Board1/Component0**.

NOTE
If this value is not present in the device then a zero byte (0x00) is transmitted for each character.

Input values

Rel. Address	Type	Description
0	19 ASCII characters	String with fixed length. Unused characters at the end of the string are filled with 0 bytes (0x00).
19	1 byte	Reserved

10 EtherNet/IP interface

10.1 EtherNet/IP

EtherNet/IP is a fieldbus, which is based on Ethernet. EtherNet/IP uses the Common Interface Protocol (CIP) of the Open DeviceNet Vendor Association (ODVA). CIP uses "objects" to exchange data between devices. The data exchange can be cyclic or acyclic. The cyclic communication is carried out for EtherNet/IP using Implicit Messaging via UDP (User Datagram Protocol) and is used for the transfer of time-critical process data such as, e.g., distance value. The acyclic communication is carried out using Explicit Messaging via TCP (Transport Control Protocol) and is used for the transfer of data that is not time-critical such as, e.g., device configuration or diagnosis.

There are two equal Ethernet interfaces available on the device. They lead to an internal switch and are used for communication via EtherNet/IP. They can also be used for communication via the configuration software SOPAS ET.

The Ethernet interfaces have the following features:

- Transmission rate 10 or 100 MBit, half or full duplex
- Auto-negotiation (automatic adjustment of transfer rate and duplex procedures)
- Auto-crossover (automatic adjustment in the case of crossed lines)

EtherNet/IP interface

EtherNet/IP is a fieldbus, which is based on Ethernet. EtherNet/IP uses the Common Interface Protocol (CIP) of the Open DeviceNet Vendor Association (ODVA). CIP uses "objects" to exchange data between devices. The data exchange can be cyclic or acyclic. The cyclic communication is carried out for EtherNet/IP using Implicit Messaging via UDP (User Datagram Protocol). The acyclic communication is carried out using Explicit Messaging via TCP (Transport Control Protocol).

The device supports the following EtherNet/IP performance features:

- One "listen only", one "input only", and one "exclusive owner" connection
- Cycle time (request packet interval) ≥ 2 ms
- DLR (device level ring/ring topology)
- DHCP (dynamic host configuration protocol/dynamic address allocation)
- ACD (address conflict detection)
- EDS (electronic data sheet/description of the device)

Address conflict detection

The device supports the "Address Conflict Detection (ACD)" performance feature. In the factory setting, the **ACD** feature is activated. To deactivate the **ACD** feature, you need to set the attribute **10** to **FALSE (Disable ACD)** in the object **TCP/IP Interface** (classID 0xF5). This setting is saved in the device in a non-volatile manner.

NOTE

Every time the device detects there is an address conflict present via ACD, this event will be written into the internal memory (flash memory) of the sensor as diagnosis information. The number of permitted write processes is limited. It is recommended that the **ACD** feature should be deactivated in networks in which address conflicts frequently occur.

Data types used

Table 11: Data types used

Name	Size [byte]	Description
BOOL	1	Boolean value FALSE = 0, TRUE = 1
BYTE	1	Bit container
WORD	2	Bit container
DWORD	4	Bit container
SINT	1	Integer with sign in two's complement
INT	2	Integer with sign in two's complement
DINT	4	Integer with sign in two's complement
USINT	1	Integer without sign
UINT	2	Integer without sign
DINT	4	Integer without sign
ENGUINT	2	Physical unit, see next section
SHORT_STRING	1+n	Chain with n characters, 1 byte length data prefixed

Specific units of measure (engineering units)

Table 12: Position

Value	unit
0x801	0.1 mm
0x2203	1 mm
0x2203	10 mm
0x805	100 mm
0x1001	Counts (0.1 mm)

Table 13: Speed

Value	unit
0x0816	0.1 mm/s
0x0810	1 mm/s
0x2B01	10 mm/s
0x0811	100 mm/s
0x1F04	Counts (0.1 mm/s)

10.2 Description of the individual attributes

"Operating status" (attribute-ID 41)

Table 14: "Operating status"

Bit	Name	Description	Supported by OLM200
0	Direction	increasing (0) decreasing (1)	Yes
1	Scaling	off (0), on (1)	Yes
2 to 4	Reserved by CIP	Always 0	–
5 to 7	Vendor specific		No

"Alarms" (attribute ID 44) and "supported alarms" (attribute ID 45)

The attribute "alarms" (attribute ID 44) can have the following values:

NOTE
The same bit layout applies for the attribute "supported alarms" (attribute ID 45).

Table 15: "Alarms" and "supported alarms"

Bit	Name	Description	Supported by OLM200
0	Position error	increasing (0) decreasing (1)	Yes
1	Diagnostic error		No
2 to 11	Reserved by CIP		–
12	Vendor specific	Not ready	Yes
13	Vendor specific	F1: Temperature too low or too high	Yes
14	Vendor specific	F3: No barcode detected	Yes
15	Vendor specific	F4: Reading error	Yes

"Warnings" (Attribute ID 47) and "supported warnings" (attribute ID 48)

The attribute "warnings" (attribute ID 47) can have the following values:

NOTE
The same bit layout applies for the attribute "supported warnings" (attribute ID 48).

Table 16: "Alarms" and "supported alarms"

Bit	Name	Description	Supported by OLM200
0	Frequency exceeded		No
1	Diagnostic error		No
2	Reserved by CIP		No
3	Operating time limit warning		No
4	Battery charge		No
5	Reference point		No
6	Minimum velocity flag		No
7	Maximum velocity flag		No
8	Minimum acceleration flag		No
9	Maximum acceleration flag		No
10	Position limits exceeded		No
11 to 12	Reserved by CIP	Always 0	–
13	Vendor specific	F5: Pollution	Yes
14	Vendor specific	F2: SmartPOS active	Yes
15	Vendor specific		No

"Label" (attribute-ID 100)

The "label" attribute supplies the value of the last read control code

"Warning" and "alarm flags" (attribute ID 103)

Table 17: "Warning" and "alarm flags"

Bit	Name	Description	Supported by OLM200
0	Alarm flag identical to attribute ID 46		Yes
1	Warning flag identical to attribute ID 49		Yes
2 to 4	Reserved by CIP		–
5 to 7	Vendor specific		No

Switching output MF1 (attribute ID 120 ... 130)

Table 18: Switching output MF1

Attribute	Value	Meaning
Active Level 0 (Default) HIGH (attribute D 120)	0 (default)	HIGH
	1	LOW
Function (attribute ID 121)	0	POSITION
	1	VELOCITY
	2 (default)	SERVICE
	3	CONTROL LABEL
	4	ILLUMINATION OFF
Velocity sign (attribute ID 125)	0 (default)	+ (positive direction)
	1	- (negative direction)
	2	+/- (both directions)
Service (attribute ID 126 ... 130)	0 (FALSE)	DISABLED
	1 (TRUE) (default)	ENABLED

Switching input MF2 (attribute ID 140 ... 141)

Table 19: Switching input MF2

Attribute	Value	Meaning
Active level (attribute ID 140)	0 (default)	HIGH
	1	LOW
Function (attribute ID 141)	0 (default)	INACTIVE
	1	PRESET ACTIVATION
	2	ILLUMINATION OFF

"Dynamic preset control" (attribute ID 143)

Table 20: Dynamic preset control

Bit	Name	Description	Supported by OLM200
0	Clear preset	Resets preset and offset	Yes
1	Set preset	Sets preset to "Dynamic Preset Value" and calculates new offset	Yes
2 to 7	–	Reserved for future use	–

10.3 Acyclic data exchange

10.3.1 Standard objects

From the CIP standard and the EtherNet/IP standard, the following objects are available for the acyclic data exchange (Explicit Messaging):

- Identity (classID 0x01)
- Message router (classID 0x02)
- Connection manager (classID 0x06)
- Ethernet link (classID 0xF6)
- TCP/IP (classID 0xF5)
- Device level ring (classID 0x47)
- Quality of service (classID 0x48)

10.3.2 Objects from the encoder profile

The following objects are available in the CIP profile **Encoder**:

- Assembly object
- Position sensor object

Assembly object (classID 0x04)

Table 21: Assembly object class attributes

Attribute ID	Name	Data type	Size [byte]
1	Revision	UINT	2

Position sensor object (classID 0x23)

Table 22: Position sensor object class attributes

Attribute ID	Name	Data type	Size [byte]
1	Revision	UNIT	2

Table 23: Standard instance attributes for position sensor object

Attribute ID	Name	Data type	Size [byte]	Get	Set
9	Auto Zero	BOOL	1		X
10	Position value signed	DINT	4	X	
11	Position sensor type constant value: 0x0008 (absolute linear encoder)	UINT	2	X	
12	Direction counting toggle default value: 0 (FORWARD)	BOOL	1		X
15	Position format, default value: 0x1001 (counts, 0.1 mm), range: 0x1001 (counts), 0x0801 (0.1 mm), 0x2203 (1 mm), 0x2202 (10 mm), 0x0805 (100 mm)	ENGUNIT (UINT)	2		X
19	Preset value [1)]	DINT	4		X
24	Velocity value	DINT	4	X	
25	Velocity format default value: 0x1F04 (counts/s, 0.1 mm/s), range: 0x1F04 (counts/s), 0x0816 (0.1 mm/s), 0x0810 (1 mm/s), 0x2B01 (10 mm/s), 0x0811 (100 mm/s)	ENGUNIT (UINT)	2		X
41	Operating status	BYTE	1	X	

Attribute ID	Name	Data type	Size [byte]	Get	Set
44	Alarms	WORD	2	X	
45	Supported alarms	WORD	2	X	
46	Alarm flag	BOOL	1	X	
47	Warnings	WORD	2	X	
48	Supported warnings	WORD	2	X	
49	Warning flag	BOOL	1	X	
51	Offset value	DINT	4	X	

1) Must be activated by MF

10.3.3 Manufacturer-specific attributes

The device also provides the following attributes:

Table 24: Manufacturer-specific instance attributesposition sensor object

Attribute ID	Name	Data type	Size [byte]	Get	Set
100 1)	Label (3 bytes)	DWORD	4	X	
101	Temperature	SINT	1	X	
102 2)	Quality	WORD	2	X	
103	Warning and alarm flags	BYTE	1	X	
120	[MF1 output] active level	BOOL	1		X
121	[MF1 output] function	USINT	1		X
122	[MF1 output] position threshold, range: –10,000,000 ... 10,000,000 [mm], default value: 0 [mm]	DINT	4		X
123	[MF1 output] position hysteresis, range: 1 ... 10,000,000 [mm], default value: 10 [mm]	DINT	4		X
124	[MF1 output] velocity threshold, range: 0 ... 10,000 [mm/s], default value: 0 [mm/s]	DINT	4		X
125	[MF1 output] velocity sign	USINT	1		X
126	[MF1 output] service: position out of range	BOOL	1		X
127	[MF1 output] service: temperature failure	BOOL	1		X
128	[MF1 output] service: no bar code visible	BOOL	1		X
129	[MF1 output] service: no plausible position	BOOL	1		X
130	[MF1 output] service: pre-failure	BOOL	1		X
140	[MF2 input] active level	BOOL	1		X
141	[MF2 input] function	USINT	1		X
142	Dynamic preset value, default value: 0 [mm]	DINT	4		X
143	Dynamic preset control, range: 0 ... 3, default value: 0	BYTE	1		X
150	Serial number (8 characters)	SHORT_ STRING	1+8	X	

Attribute ID	Name	Data type	Size [byte]	Get	Set
151	Product code (14 characters)	SHORT_ STRING	1+14	X	
152	Version HW (8 characters)	SHORT_ STRING	1+8	X	
153	Version FPGA (19 characters)	SHORT_ STRING	1+20 [3]	X	
154	Version µC (19 characters)	SHORT_ STRING	1+20 [3]	X	
155	Version µC2 (19 characters)	SHORT_ STRING	1+20 [3]	X	

1) Hexadecimal value of the last control mark to be read.
2) Device-specific value for the quality of the measured value (exposure time). Higher values mean poorer quality or increased ambient light.
3) Only the first 19 characters of 20 possible characters will be used.

10.3.4 Preset functionality

There are two options for setting a preset value:

- Via a control bit of the **Dynamic Preset Control** attribute by with cyclic or acyclic data exchange
- Via the switching input MF2

Dynamic Preset Control attribute

The preset can be dynamically activated via bit 1 **Set Preset** of the attribute **Dynamic Preset Control** (ID 143). The preset can be deleted again via bit 0 **Clear Preset.** The following steps are required for this purpose:

- Writing the preset value for the attribute **Dynamic Preset Value** (ID 142).
- Set preset: First set attribute **Dynamic Preset Control** (ID 143) to 0x00 and then to 0x02. Delete preset: First set attribute **Dynamic Preset Control** (ID 143) to 0x00 and then to 0x01.

The preset is activated with transition of the control bit from 0 to 1 (calculation of the offset). The calculated offset can be read via the attribute **Offset Value** (ID 51).

Switching input MF2

The preset can be activated via switching input MF2. The following steps are required:

- Writing the preset value for the attribute **Dynamic Preset Value** (ID 19).
- Set attribute **MF2 Input Preset** (ID 141) to 0x01 (**PRESET ACTIVATION**). The preset is activated as soon as an active level is present at switching input MF2 (calculation of the offset). The calculated offset can be read via the attribute **Offset Value** (ID 51).

10.4 Cyclic data exchange

Special CIP objects, which are also known as assemblies, are used for the cyclic data exchange (Implicit Messaging). Each assembly is made up of one or more attributes of CIP objects of the device. **The device only provides the static assemblies.**

A CIP object named **Assembly** (classID 0x04) is used to set the cyclic data exchange with predefined assemblies. In each case, precisely one assembly can be used for the input, output and configuration for the cyclic data exchange.

For the device, all assemblies from the attributes of the **Position Sensor** CIP object are combined together.

Input assemblies

Table 25: Input assemblies

Instance ID	Description	Size [byte]	Attribute name	Data type	Attribute ID
0x01	Position	4	Position value signed	DINT	10
0x02	Position, flags	5	Position value signed	DINT	10
			Warning and alarm flags	BYTE	103
0x03	Position, velocity	8	Position value signed	DINT	10
			Velocity value	DINT	24
0x64	Velocity	4	Velocity value	DINT	24
0x65	Position, velocity, flags	12	Position value signed	DINT	10
			Velocity value	DINT	24
			Warning and alarm flags	BYTE	103
			Reserved	3 BYTE	–
0x66	Position, velocity, label, flags	16	Position value signed	DINT	10
			Velocity value	DINT	24
			Label	DWORD	100
			Warning and alarm flags	BYTE	103
			Reserved	3 BYTE	–
0x67	Extended	24	Position value signed	DINT	10
			Velocity value	DINT	24
			Label	DWORD	100
			Offset value	DINT	51
			Alarms	WORD	44
			Warnings	WORD	47
			Operation status	BYTE	41
			Temperature	SINT	101
			Quality	WORD	102

Output assembly

Table 26: Output assembly

Instance ID	Description	Size [byte]	Attribute name	Data type	Attribute ID
0x80	Dynamic preset	8	Dynamic preset value	DINT	142
			Dynamic Preset Control	BYTE	143
			Reserved	3 BYTE	–

The following table shows examples of the values for the output assembly **Dynamic Preset**. In this case, the preset value is neither set nor deleted.

Table 27: Example: Output assembly

Designation	Attribute name	Data type	Value
Dynamic preset	Dynamic preset value	DINT	0
	Dynamic Preset Control	BYTE	0x00
	Reserved	3 BYTE	0x00, 0x00, 0x00

Configuration assembly

Table 28: Configuration assembly

Instance ID	Description	Size [byte]	Attribute name	Data type	Attribute ID
0x99	Configure All	28	Auto Zero	BOOL	9
			Direction counting toggle	BOOL	12
			Position format	ENGUNIT (UINT)	15
			Velocity format	ENGUNIT (UINT)	25
			[MF1 output] active level	BOOL	120
			[MF1 output] function	USINT	121
			[MF1 output] position threshold	BOOL	122
			[MF1 output] position hysteresis	BOOL	123
			[MF1 output] velocity threshold	BOOL	124
			[MF1 output] velocity sign	BOOL	125
			[MF1 output] service: position out of range	BOOL	126
			[MF1 output] service: temperature failure	BOOL	127
			[MF1 output] service: no bar code visible	BOOL	128
			[MF1 output] service: no plausible position	BOOL	129
			[MF1 output] service: pre-failure	BOOL	130
			[MF2 input] active level	BOOL	140
			[MF2 input] function	USINT	141

The attributes must be set according to the following table in order to get a valid basic configuration. Ensure that a valid value is entered for the attributes **Position Format** and **Velocity Format**. The **Default value** according to the CIP specification must not be used.

Table 29: Example configuration

Designation	Attribute name	Data type	Recommended initial value
Configure All	Auto Zero	BOOL	0 (DISABLED)
	Direction counting toggle	BOOL	0 (FORWARD)
	Position format	ENGUNIT (UINT)	0x2203 (mm)
	Velocity format	ENGUNIT (UINT)	0x0810 (mm/s)
	[MF1 output] active level	BOOL	0 (HIGH)
	[MF1 output] function	USINT	2 (SERVICE)
	[MF1 output] position threshold	BOOL	0
	[MF1 output] position hysteresis	BOOL	10
	[MF1 output] velocity threshold	BOOL	0
	[MF1 output] velocity sign	BOOL	0 (+)
	[MF1 output] service: position out of range	BOOL	1 (ENABLED)
	[MF1 output] service: temperature failure	BOOL	1 (ENABLED)
	[MF1 output] service: no barcode visible	BOOL	1 (ENABLED)
	[MF1 output] service: no plausible position	BOOL	1 (ENABLED)
	[MF1 output] service: pre-failure	BOOL	1 (ENABLED)
	[MF2 input] active level	BOOL	0 (HIGH)
	[MF2 input] function	USINT	0 (INACTIVE)

11 Maintenance

11.1 Cleaning

NOTICE

Equipment damage due to improper cleaning.

Improper cleaning may result in equipment damage.

- Only use recommended cleaning agents and tools.
- Never use sharp objects for cleaning.

11.2 Maintenance schedule

12 Troubleshooting

12.1 Warning and error messages

Possible faults and corrective actions are described in the table below for troubleshooting. For faults that cannot be resolved using the information below, please contact SICK Service. To find your agency, see the back page of this document.

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

Table 30: Warning and error messages

Indication on display (meaning)	LED display	Possible causes	Troubleshooting
Error F1 (Over or under temperature)	▪ Power LED: red ▪ Status LED: off	The internal temperature of the device is outside the permissible range.	▪ Check the ambient temperature. Provide better ventilation if necessary. ▪ Shield the device from radiated heat, e.g. shade the device from direct sunlight. ▪ Where ambient temperatures are low, wait for warm up phase (at temperatures ≤ -20 °C).
Warning F2 SmartPOS active	▪ Power LED: green ▪ Status LED: green, flashing	SmartPOS function is active. Position is not determined from barcodes, but from processing raw images or extrapolation see "Configuration and servicing with SOPAS Engineering Tool (SOPAS ET)", page 28.	Check barcode tape and device. Remove contamination and rectify damage.
Error F3 (no barcode tape detected)	▪ Power LED: green ▪ Status LED: red	▪ No barcode tape present. ▪ Device poorly aligned. ▪ Device or barcode tape totally contaminated. ▪ Working distance too small/large.	▪ Mount barcode tape in front of device. ▪ Align device with the barcode tape. ▪ Clean the optical interfaces of the device and the barcode tape. ▪ Check the distance between the device and the barcode tape.
Error F4 (error during position value calculation/read error)	▪ Power LED: green ▪ Status LED: red	▪ Alignment of barcode not detected. ▪ Barcode tape is damaged. ▪ Unsuitable barcode tape used.	▪ Interrupt the supply voltage or send cold start command. ▪ Replace barcode tape. ▪ Use original barcode tape see "Bar code tape", page 76.
Warning F5 (contamination)	▪ Power LED: green ▪ Status LED: red, flashing	▪ Device or barcode tape contaminated. ▪ Insufficient illumination.	▪ Clean the barcode tape and optical interfaces of the device. ▪ Replace device.

Indication on display (meaning)	LED display	Possible causes	Troubleshooting
Error F7 (position outside measuring range)	■ Power LED: green ■ Status LED: red	Calculated position value less than 0 or greater than 10 km.	Modify the value range of the attached barcode tape accordingly.
Memory error	■ Power LED: red ■ Status LED: red	Internal error	Restart the device (interrupt voltage supply). If the fault recurs, contact SICK customer services. For address, see rear side.

12.2 Communication problems

12.2.1 PROFINET IO problems

The LEDs **BF** and **SF** signal the PROFINET status:

*Table 31: LED **BF** and **SF***

LED indication BF	LED indication SF	Status	Actions
Off	On	Status directly after switching on.	-
On	On	The PROFINET IO interface has been activated but no PROFINET IO master has connected yet.	Check network settings. Ensure that there is a valid IP configuration present see "Reset device to the factory settings", page 35.
Off	Off	The device has been incorporated into the bus and can exchange data.	-
Flashing	On	There is a bus error.	■ Check cabling. ■ Check function of PROFINET IO master (PLC).

12.2.2 PROFIBUS problems

The LEDs **BF** and **STA** signal the PROFIBUS status:

*Table 32: LED **BF** and **STA***

LED indication BF (red)	LED indication STA (green)	Status	Actions
Off	On	Status directly after switching on.	-
On	Off	The PROFIBUS interface has been activated but no PROFIBUS master has connected yet.	■ Check whether at least one module of the device has been activated. ■ Check whether the bus address of the PROFIBUS device has been entered correctly into the PROFIBUS master (PLC).
Off	On	The device has been incorporated into the bus and can exchange data.	-

LED indication BF (red)	LED indication STA (green)	Status	Actions
Flashing	Off	There is a bus error.	■ Check cabling. ■ Check function of PROFIBUS master (PLC).

12.2.3 EtherNet/IP faults

The LEDs **Mod** (module status) and **Net** (network status) signal the EtherNet/IP status:

*Table 33: LED **Net***

Indication	Status	Actions
Off	No supply voltage or IP address assigned.	■ Check supply voltage. ■ Check Ethernet connection. ■ Check IP settings.
Flashing green	Connection established and IP settings made but no CIP connection established.	Check control configuration.
Lit green	Device is working correctly.	–
Flashing red	Connection error (timeout) in exclusive owner CIP connection.	Establish new CIP connection or perform power reset.
Lit red	IP address assigned twice.	Check IP settings.
Flashing red/ green	Self-testing. Takes place when sensor starts.	–

*Table 34: LED **Mod***

Display	Status	Measures
Off	Supply voltage not available.	Check the supply voltage.
Flashing green	■ Device is on standby. ■ No suitable IP settings assigned. ■ Device is not configured.	■ Check IP settings. ■ Check control configuration.
Lit green	Connection is available.	–
Flashing red	Incorrect or inconsistent configuration.	Check control configuration.
Lit red	Serious error.	Contact Service. For contacts, see back page.
Flashing red/ green	Self-testing. Occurs when the device is started.	–

12.2.4 Ethernet problems

The LED **LINK** signals the connection status (link) of Ethernet ports 1 and 2.

*Table 35: LED **LINK***

Indication	Status	Actions
Off	No physical connection available to the next participant.	Check Ethernet wiring.

12.3 Return

► Only send in devices after consulting with SICK Service.
► The device must be sent in the original packaging or an equivalent padded packaging.

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 error that occurred

12.4 Repair

Repairs on the device may only be performed by qualified and authorized personnel from SICK AG. Interference with or modifications to the device on the part of the customer will invalidate any warranty claims against SICK AG.

12.4.1 Repairing damage to bar code tape

Replace bar code tape

For a high quality and long-lasting result, the use of original SICK barcode tape is recommended see "Order notes and variants of the bar code tape", page 77. The minimum order quantity is 5 m.

Using repair codes

PDF documents with bar codes that can be printed are available to quickly repair damaged areas on bar code tape. These can be printed on self-adhesive DIN A4 blank labels see "Blank labels for repair codes or control marks", page 79.

The PDF documents are available for download on the product page.

The product page can be accessed via the **SICK Product ID**: **pid.sick.com/{P/N}/{S/N}**

{P/N} corresponds to the part number of the product, see type label.

{S/N} corresponds to the serial number of the product, see type label (if indicated).

This means individual codes can be printed independently if necessary, in order, for example, to replace damaged segments in the short term. The bar codes can be found by following the **'Products'** link on the web page, and then selecting the relevant product type.

The bar codes can be printed out using a laser printer. Use the following settings in the printer menu:

- Paper format A4
- Resolution as high as possible – at least 1200 dpi
- Deactivate automatic page and size adjustment

Using SmartPOS repair bar code tape

Damaged areas can be temporarily covered with SmartPOS repair barcode tape see "Order notes and variants of the bar code tape", page 77. This is a special repair tape that, unlike the normal barcode tape, does not contain any absolute position values and can therefore be used anywhere. When traveling over this tape, the device detects the position incrementally.

NOTE
The **SmartPOS** function must be active when using SmartPOS tape see "Configuration and servicing with SOPAS Engineering Tool (SOPAS ET)", page 28.

NOTE
A position value determined by SmartPOS is not stored in the device. If the device is switched off and on again whilst only the SmartPOS tape is in the field of view, no position value is output.

12.5 Disposal

If a device can no longer be used, dispose of it in an environmentally friendly manner in accordance with the applicable country-specific waste disposal regulations. Do not dispose of the product along with household waste.

NOTICE
Danger to the environment due to improper disposal of the device.
Disposing of devices improperly may cause damage to the environment.
Therefore, observe the following information:

- Always observe the national regulations on environmental protection.
- Separate the recyclable materials by type and place them in recycling containers.

13 Technical data

13.1 Type-specific data

Interface	Barcode tape reading distance	Barcode width	Type designation
PROFIBUS	100 mm ± 20 mm	30 mm	OLM200-xx02
PROFIBUS	130 mm ± 20 mm	40 mm	OLM200-xx52
PROFINET IO	100 mm ± 20 mm	30 mm	OLM200-xxx9
EtherNet/IP	100 mm ± 20 mm	30 mm	OLM200-xxx8

13.2 Performance

Resolution	0.1 mm, 1 mm, 10 mm, 100 mm
Repeatability [1]	0.15 mm
Response time [2]	10 ms
Output rate	2.5 ms
Light sender	LED, red
Measurement range of the travel path [3]	0 m ... 10,000 m
Max. traverse speed	7 m/s
Accuracy of speed output	± 5 mm/s

1) Statistical error 3 σ, no warm-up time required
2) Response time of switching output
3) Dependant on the set resolution and transfer protocol

13.3 Interfaces

13.3.1 PROFIBUS

Data interface	PROFIBUS DP-V0
Maximum data transmission rate	12 Baud
Switching input	Multifunctional input MF2
Switching output	▪ Multifunctional output MF1: PNP ▪ Multifunctional output MF1: NPN
Data transmission rate	3 Mbit/s

13.3.2 PROFINET IO

Data interface	PROFINET IO/RT [1]
Switching input	Multifunctional input MF2
Switching output	▪ Multifunctional output MF1: PNP ▪ Multifunctional output MF1: NPN
Data transmission rate	100 Mbit/s

1) Conformance class B, PN specification V2.25

13.3.3 Ethernet/IP

Data interface	EtherNet/IP [1]

Maximum data transmission rate	12 baud
Switching input	Multifunctional input MF2
Switching output	■ Multifunctional output MF1: PNP ■ Multifunctional output MF1: NPN
Data transmission rate	100 Mbit/s

1) Industrial level with device level ring (DLR)

13.4 Ambient data

Table 36: Ambient data

Protection class	 Suitable for operation in PELV (Protective Extra Low Voltage) systems with safe separation.
Electromagnetic compatibility	EN 61000-6-2, EN 61000-6-4
Ambient temperature range [1) 2)]	– 30 °C ... + 60 °C
Storage temperature range	–40 °C ... +75 °C
Permissible relative humidity	0% ... 90%, non-condensing
Typical ambient light immunity [3)]	≤ 5,000 lx
Enclosure rating	IP65
Vibration resistance	EN 60068-2-6, EN 60068-2-64
Shock resistance	EN 60086-2-27

1) Temperatures ≤ 20 °C with 5 min warm-up time
2) Maximum 95% humidity, non condensing
3) Typ. Value at +25 °C ambient temperature

13.5 Mechanics/electronics

Output current I_A [1)]	100 mA
Supply voltage V_S [2)]	DC 18 V ... 30 V
Residual ripple [3)]	≤ 5 Vss
Power consumption	< 5.5 W
Power-up time	approx. 10 s
Weight	approx. 290 g
Housing material	■ Housing: magnesium, zinc ■ Front screen: PMMA
Connections	M12, SpeedCon™

1) MF1 switching outputs, short-circuit protected
2) Limit values, reverse-polarity protected
3) May not fall below or exceed U_V tolerances

13.6 Dimensional drawing

13.7 Bar code tape

Table 37: Bar code tape

Upper material	Polyester film, white, matt, silicone-free	
Foil thickness according to ISO 534	56 µm ± 10%	
Upper material thickness incl. adhesive	Approx. 102 µm	
Carrier material	Compressed paper, silicone-coated on both sides, white	
Grammage	62 g/m^2	
Carrier material thickness	approx. 56 µm	
Adhesive	Permanent adhesive based on modified acrylates. Suitable for problem substrates.	
Adhesive force (adhesive force level T according to DIN 30646, measured on stainless steel)	Steel	> 21 N / 25 mm
	Aluminum	> 18 N / 25 mm
	Polypropylene	> 14 N / 25 mm
	Polyethylene	> 10 N / 25 mm
Min. adhesion temperature	> +4 °C	
Temperature Resistance	–40 °C ... +150 °C	
Chemical resistance	Resistant to most oils and greases, fuels, aliphatic solvents and dilute acids.	
Load test (bonded to stainless steel), no issues	Diesel	4 h
	Isopropanol	4 h
	Brake fluid	1 h
	Heptane	4 h
	Engine oil 15W40	4 h
	Toluol	1 h
	Industrial cleaner (lemon)	4 h
	Washing-up liquid	4 h
	MEK	1 h
	Heptane	4 h
	Lye (PH10)	4 h
	Acid (PH4)	4 h
	Salt spray test according to DIN 50021 SS	150 h
	Climatic stress according to DIN 50018 – SFW 2.0	No change after 2 stress cycles
Determination of chemical resistances using the immersion method. Testing of label properties and barcode labeling in digital printing with UV protective coating	• Immersion resistance after 2 h / 60 °C NaOH 5% • Immersion resistance after 24 h / 21 °C H_2NO_3 3% • Immersion resistance after 10 d / 21 °C water. • Immersion resistance after 24 h / 21 °C heptane. • Immersion resistance after 24 h / 21 °C DOT4 brake fluid. • Wipe resistance after 2 min/ethanol/soaked cloth / 500 g pressure. • Immersion resistance after 72 h / 21 °C acetic acid 3%. • Immersion resistance after 24 h / 21 °C $NaNO_3$ 3%.	
Base corrosion	No corrosion on the glued base	
Dimensional stability	Classification number 02 (tested according to DIN 30646) shrinkage < 0.2%	

14 Accessories

NOTE

On the product page you will find accessories and, if applicable, related installation information for your product.

The product page can be accessed via the **SICK Product ID**: **pid.sick.com/{P/N}/{S/N}**

{P/N} corresponds to the part number of the product, see type label.

{S/N} corresponds to the serial number of the product, see type label (if indicated).

14.1 Bar code tape

The barcode tape is available in the following heights: 25 mm, 30 mm, 40 mm, 60 mm and 100 mm. The width of the barcode is always 30 mm.

For correct mounting of the bar code tape see "Attaching the barcode tape", page 15.

Dimensions of the bar code tape

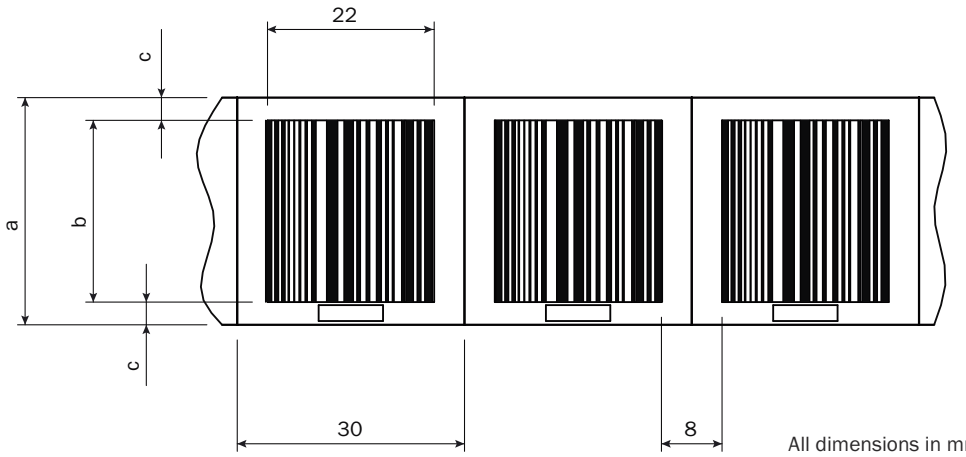


Figure 15: Unit: mm (inch), decimal separator: point

a (height of the bar code tape)	b (height of the bar code)	c (distance of the bar code to the edge of the bar code tape)
25 [1]	24	0
30	24	3
40	34	3
60	54	3
100	94	3

[1] Target application must be analyzed in detail and checked for feasibility before ordering.

Bar code tape printing

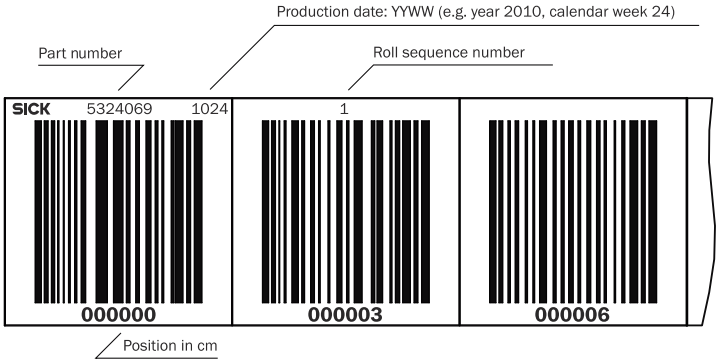


Figure 16: Barcode tape, height 30/40/60/100 mm

① Part number
② Date of manufacture: YYWW (e.g. year 2010, calendar week 24)
③ Sequential roll number
④ Position in cm

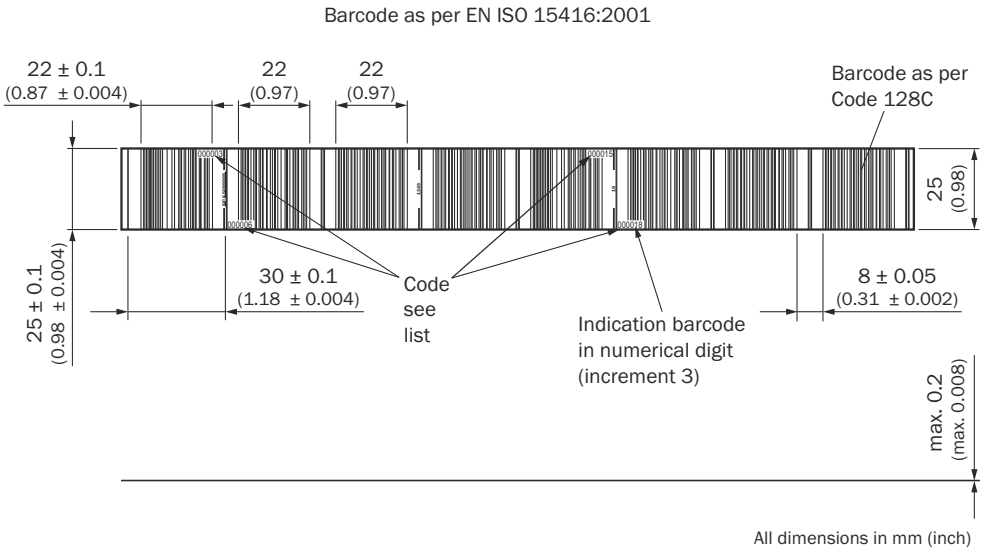


Figure 17: Barcode tape 25 mm high, barcode according to EN ISO 15416:2001; unit mm (inch), decimal separator: point

① Code, see list
② Specification of barcode in digits (increment 3)
③ Barcode according to code 128C

14.2 Order notes and variants of the bar code tape

Barcode tapes with a height of 30 or 40 mm, for the measuring range 0 to 120 m, are available from stock in rolls of 20 m each. Barcode tapes for measuring ranges > 120 m are not available from stock and are custom made. All barcode tapes with a height of 25 mm, 60 mm and 100 mm are custom made and are not available from stock.

NOTE

For detailed ordering information on the barcode tape, please visit the online product page.

The product page can be accessed via the **SICK Product ID: pid.sick.com/{P/N}/{S/N}**

{P/N} corresponds to the part number of the product, see type label.

{S/N} corresponds to the serial number of the product, see type label (if indicated).

Customer specific bar code tape

Bar code tape	Part no.	Description
Width 30 mm Height 25 mm	5328960	Barcode tape with customer specific printed measuring range. Delivered on rolls of max. 100 m length per roll
Width 30 mm Height 30 mm	5322556	Barcode tape with customer specific printed measuring range. Delivered on rolls of max. 100 m length per roll
Width 30 mm Height 40 mm	5323951	Barcode tape with customer specific printed measuring range. Delivered on rolls of max. 100 m length per roll
Width 30 mm Height 60 mm	5327812	Barcode tape with customer specific printed measuring range. Delivered on rolls of max. 100 m length per roll
Width 30 mm Height 100 mm	5327576	Barcode tape with customer specific printed measuring range. Delivered on rolls of max. 100 m length per roll

Calculation of the start and end codes (for customer specific tape)

1. Divide the selected value from start to end of the measuring range in centimeters by 3.
2. For start code: Round the result from "1." down to the next whole number. For end code: Round the result from "1." up to the next whole number.
3. Multiply the result from "2." by 3. This produces the start or end code.

Example:

Start of measuring range = 251 cm

1. 251 / 3 = 83.667 (divide by 3).
2. 83.667 → 83 (round down to next whole number).
3. 83 x 3 = 249 x 3 (multiply by 3). **Start code = 249 cm**

End of measuring range = 986 cm

1. 986/3 = 328.667 (divide by 3).
2. 328.667 → 329 (round up to next whole number).
3. 329 x 3 = 987 (multiply by 3). **End code = 987 cm**

SmartPOS repair bar code tape

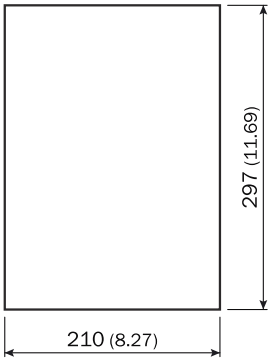
Bar code tape	Part no.
Height 25 mm Width 30 mm	5329017
Height 30 mm Width 30 mm	5329018
Height 40 mm Width 30 mm	5329019

Bar code tape	Part no.
Height 60 mm Width 30 mm	5329020
Height 100 mm Width 30 mm	5329021

14.3 Blank labels for repair codes or control marks

Table 38: Blank labels

Type	Part number
Blank labels, self-adhesive, DIN-A4, 10 items (BES-A4-OLM)	5322680



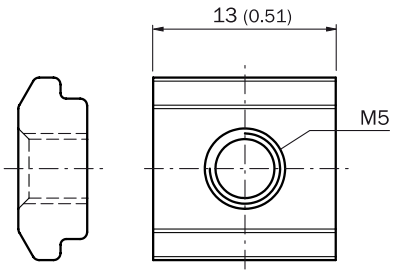
All dimensions in mm (inch)

Figure 18: Unit: mm (inch), decimal separator: point

14.4 Sliding nuts

Table 39: Sliding nuts, M5

Type	Part number
Sliding nuts M5 (4 items)	2017550



All dimensions in mm (inch)

Figure 19: Unit: mm (inch), decimal separator: point

15 Annex

15.1 Conformities and certificates

You can obtain declarations of conformity, certificates, and the current operating instructions for the product at www.sick.com. To do so, enter the product part number in the search field (part number: see the entry in the “P/N” or “Ident. no.” field on the type label).

8017592.1NRX/2024-10-29/en

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