OPERATING INSTRUCTIONS

MPS-G with 2 / 3 switching points and IO-Link (up to 16 switching points) & diagnostic function

Magnetic cylinder sensors

SICK
Sensor Intelligence.

Described product

MPS-G

Manufacturer

SICK AG
Erwin-Sick-Str. 1
79183 Waldkirch
Germany

Legal information

Original document

This document is an original document of SICK AG.

c UL US LISTED
IND. CONT. EQ.
4R97

Contents

1 About this document

1.1 Further information

You can find the product page with further information under the **SICK Product ID** at: pid.sick.com/{**P/N**}.

P/N corresponds to the part number of the product.

The following information is available depending on the product:
- Data sheets
- These publication in all available languages
- CAD files and dimensional drawings
- Certificates (e.g., declaration of conformity)
- Other publications
- Software
- Accessories

1.2 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 Intended use

The sensor from the MPS-G product family is an intelligent, magnetic position sensor. It is used for non-contact detection of the piston stroke of pneumatic drives with axially magnetized permanent magnets.

SICK AG assumes no liability for losses or damage arising from the use of the product, either directly or indirectly. This applies in particular to use of the product that does not conform to its intended purpose and is not described in this documentation.

2.2 Improper use

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

NOTICE
Danger due to improper use!

Any improper use can result in dangerous situations.

Therefore, take note of the following information:

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

2.3 Limitation of liability

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

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

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

2.4 Requirements for skilled persons and operating personnel

WARNING
Risk of injury due to insufficient training.

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

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

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

- **Instructed personnel** have been briefed by the operating entity about the tasks assigned to them and about potential dangers arising from improper action.
- **Skilled personnel** have the specialist training, skills, and experience, as well as knowledge of the relevant regulations, to be able to perform tasks assigned to them and to detect and avoid any potential dangers independently.
- **Electricians** have the specialist training, skills, and experience, as well as knowledge of the relevant standards and provisions to be able to carry out work on electrical systems and to detect and avoid any potential dangers independently. In Germany, electricians must meet the specifications of the BGV A3 Work Safety Regulations (e.g., Master Electrician). Other relevant regulations applicable in other countries must be observed.

The following qualifications are required for various activities:

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

2.5 Hazard warnings and operational safety

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

2.6 Notes on UL approval

The device must be supplied by a Class 2 source of supply.

UL Environmental Rating: Enclosure type 1

3 Product description

3.1 Product ID

3.1.1 Device view

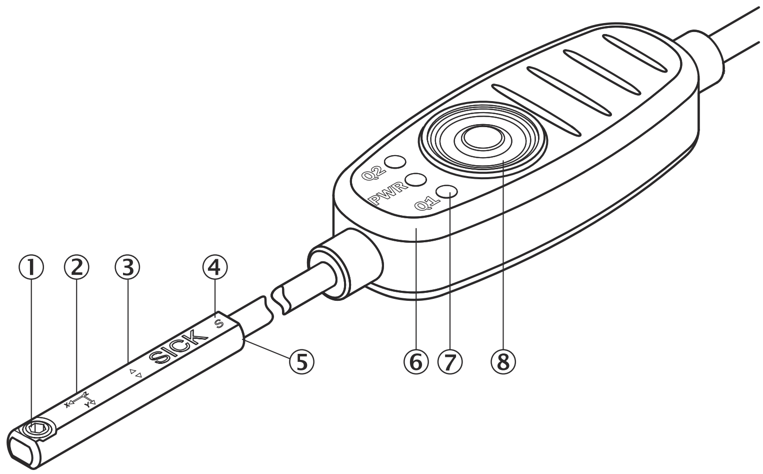


Figure 1: Operating elements and status indicators

①	Fixing screw, size 1.3 (Tightening torque M_A = 0.1 Nm)
②	Orientation of x-y-z axis
③	Physical zero position
④	Cylinder type marking (S = SMC/BIMBA/Schunk/PHD; F = FESTO/ZIMMER)
⑤	Sensor head
⑥	Operating element
⑦	3 x LED indicators
⑧	Teach-in button

3.2 Product characteristics

3.2.1 Product features

The MPS-G with 2 / 3 digital switching points and IO-Link (up to 16 switching points) is used either as a magnetic cylinder sensor for non-contact detection of 2 end positions or intermediate positions (up to 3 individually adjustable switching points in one housing) or via IO-Link as a position sensor for non-contact linear position measurement mainly in pneumatic cylinders, grippers and slides.

When using IO-Link, up to 16 switching points can also be used and additional diagnostic data such as temperature, orientation, vibration and max. acceleration can be recorded and output.

Target application

- Double end position detection via 2 digital switching points
  → Substitute for two individual cylinder switches
- Detection of 3 positions via 3 digital switching points, e.g. for gripper process (open without object / object gripped / closed without object)
  → Substitute for three individual cylinder switches
- Position measurement for short stroke in systems with IO-Link

- Detection of 16 positions via 16 switching points, e.g. for gripper process (gripping of objects of different sizes)
- Detection of data for diagnostics such as temperature, max. acceleration, vibration and position in systems with IO-Link

Mechanical standard variants

The mechanical standard variants differ in the geometry of the sensor head, the length of the connection cable between the head and control panel, the length of the connecting cable between the control panel and connection and in the connection.

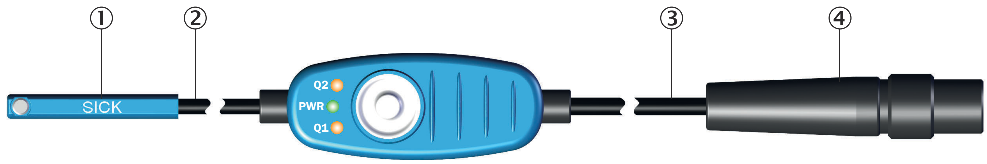


Figure 2: MPS-G structure

① Sensor head:
Festo slot (F)
SMC slot (S)

② Head / Control panel connection cable

③ Sensor connecting cable

④ Sensor connection

Table 1: Mechanical variants

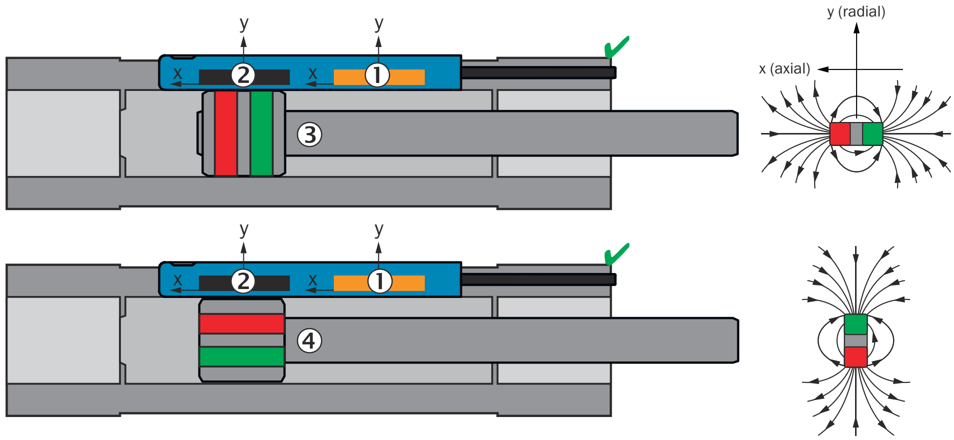
Part number	Type designation	Sensor head	Connection cable	Functional scope (output)	Connecting cable
1108681	MPS-G50 ...	F	0.1 m	2Q + IO-Link + MEMS + temp	0.5 m + M8 knurled screw
1108682	MPS-G50 ...	S	0.1 m	2Q + IO-Link + MEMS + temp	0.5 m + M8 knurled screw

3.3 Operating principle

3.3.1 Principle of operation

The MPS-G determines the position of an encoder magnet via a row of 2 sensor elements located in the sensor head.

Axially and diametrically magnetized magnets can be detected since the two sensor elements measure the field strength in both the X- and Y-direction.



① Sensor element 1
② Sensor element 2
③ Axially magnetized magnet
④ Diametrically magnetized magnet

3.3.2 Detection range

The sensor is designed for a detection range of 50 mm. The zero point / physical zero position is marked with arrows on the sensor head and is located roughly at the center point of the sensor. From the zero point, -25 mm are measured to the cable and +25 mm to the fixing screw.

NOTE
The maximum detection range is 60 mm. The actual detection range can vary and depends on the drive.

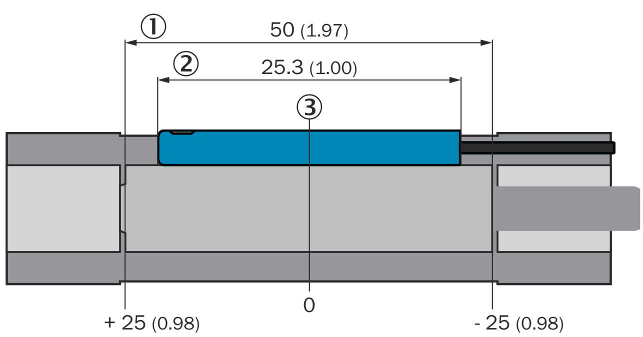


Figure 3: Detection range

① Detection range
② Housing length
③ Zero point / Physical zero position

3.3.3 Position output

The sensor can output a linearized position in a detection range of approx. 50 mm (depends on the drive).

When leaving the detection range, value 32,767 or -32,767 digits[1] is displayed.

1) 1 digit corresponds to 10 µm.

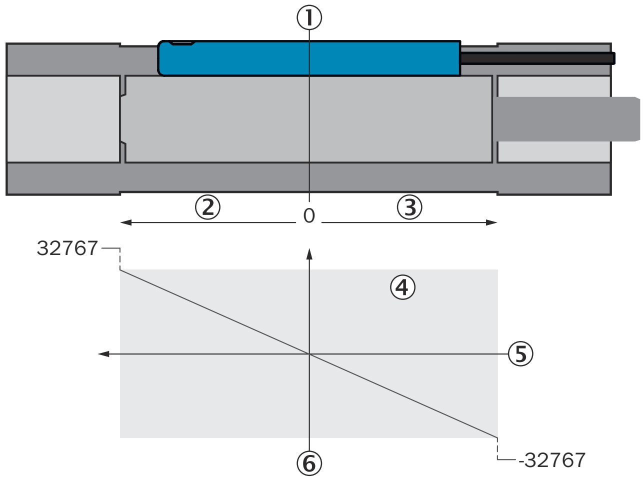


Figure 4: Zero point / Physical zero position

① Zero point / Physical zero position
② Positive positions
③ Negative positions
④ Sensor detection range: -3,000 digits ... 3,000 digits
⑤ Piston position
⑥ Sensor position output

3.3.4 Switching behavior after Manual Teach of up to 3 switching points

Switching behavior after **Manual Teach** is as follows per switching point during operation:

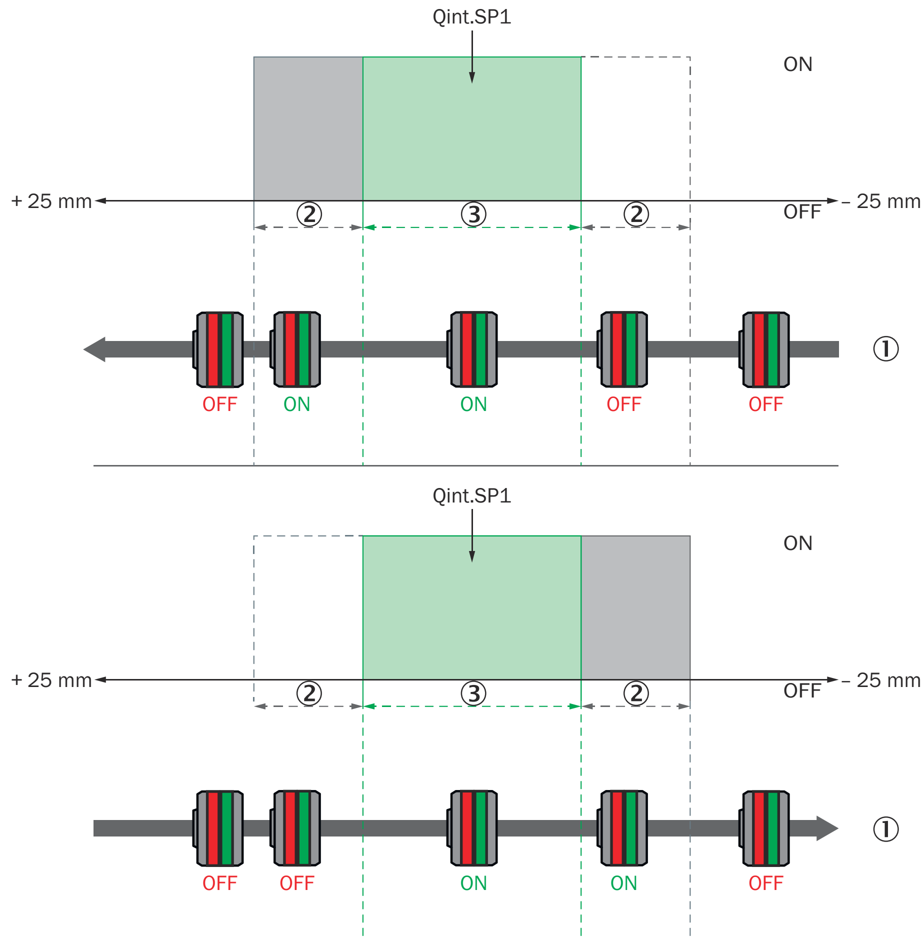


*Figure 5: Switching behavior after **Manual Teach***

① Direction of movement of the magnet

② Hysteresis

③ Width of the switching point

There is no **Dynamic Pilot** during manual teach-in of the switching points. The switching point width is 2 mm according to the factory setting and can be adjusted via the Teach menu (1 – 5 mm).

3.3.5 Switching behavior after Dynamic Teach of 2 switching points

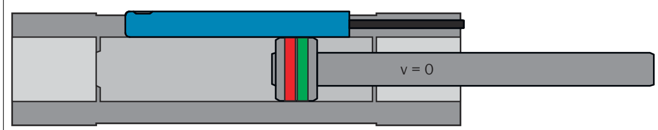
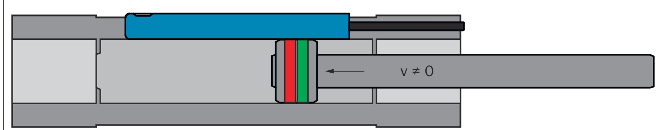
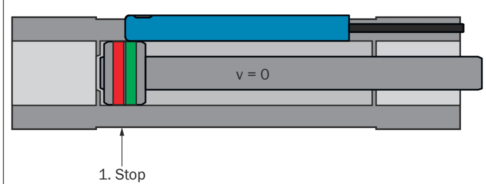
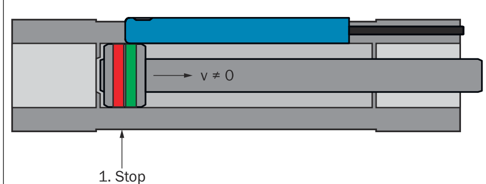
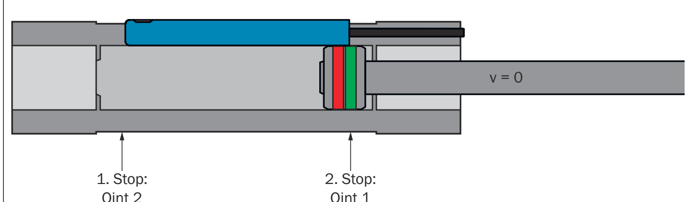
If the sensor, during Dynamic Teach, detects teach 2 x piston status v = 0, 2 switching points are set.

NOTE
Dynamic Teach and **Dynamic Pilot** only start working from a speed of v > 25 mm/s.

Example: Arrangement of switching points for dynamic teach-in of 2 switching points on a pneumatic cylinder

The 2 switching points are always arranged as follows during dynamic teach-in: Qint1 lies in the direction of the cable outlet and Qint2 in the direction of the sensor fixing screw. It does not matter which position is approached first.

Table 2: Switching behavior with 2 switching points

1.) Output position v= 0. No switching point is defined at the output position of the magnet.	
2.) Movement in the direction of the sensor fixing screw	
3.) First stop: First position is defined for switching point	
4.) Movement in the direction of the cable side	
5.) Second stop: Second position for switching point and arrangement of Qint2 (see fixing screw) and Qint1 (cable set) are defined	

Switching behavior after **Dynamic Teach** of 2 switching points is the following during operation:

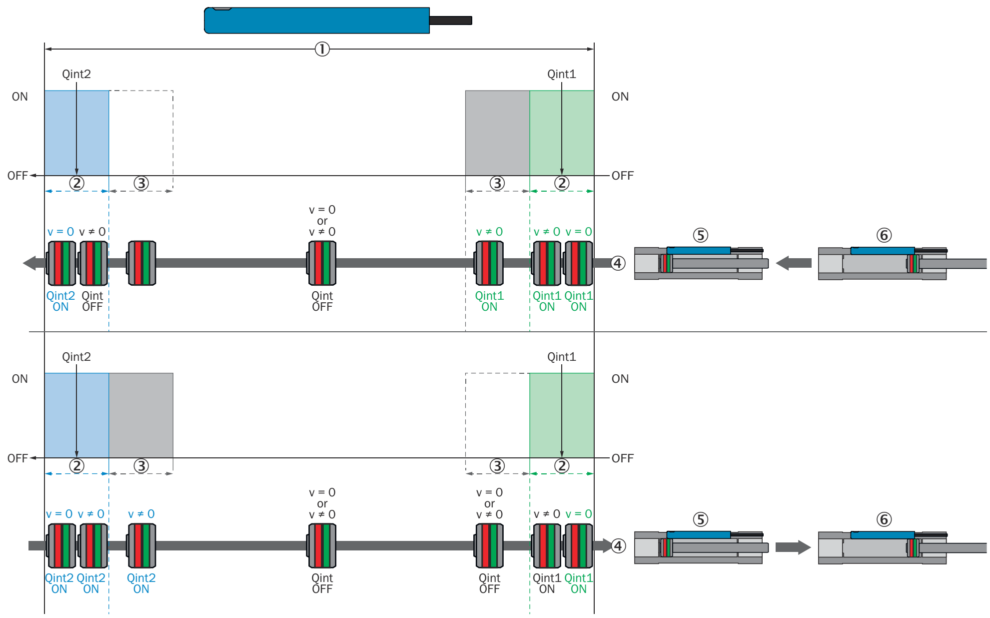


Figure 6: Overview

- ① Max. range of movement of drive
- ② Tolerance
- ③ Hysteresis
- ④ Direction of movement of the magnet
- ⑤ End position in the direction of the fixing screw
- ⑥ End position in direction of the cable connection

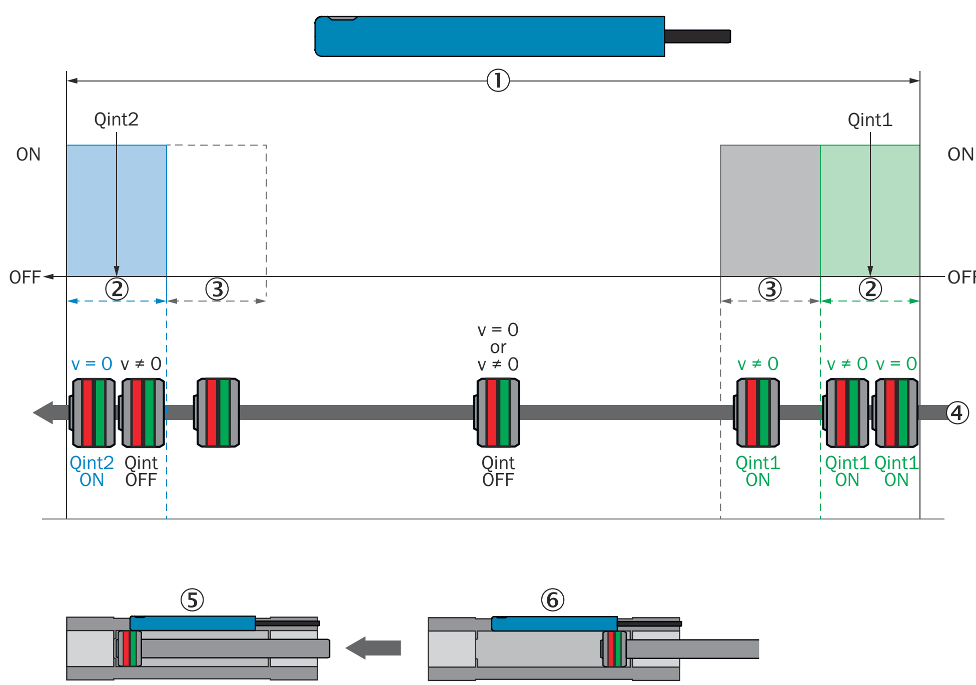


Figure 7: Movement in the direction of the fixing screw

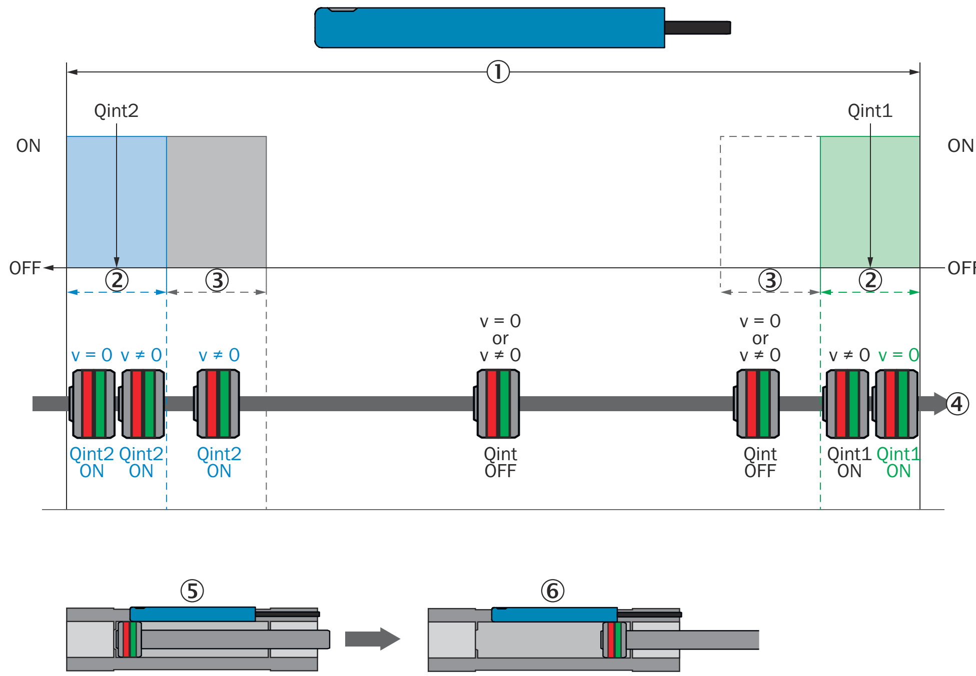


Figure 8: Movement in direction of the cable connection

3.3.6 Switching behavior after Dynamic Teach of 3 switching points

If the sensor, during Dynamic Teach, detects teach 3 x piston status v = 0, 3 switching points are set.

Example: Arrangement of switching points for dynamic teach-in of 3 switching points on a pneumatic internal or external gripper

The switching points are assigned as follows:

Qint1 = idle

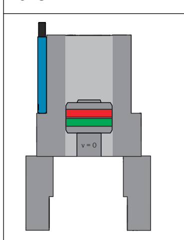
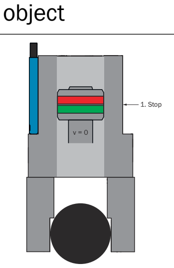
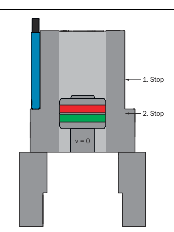
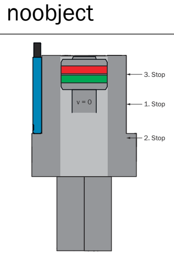
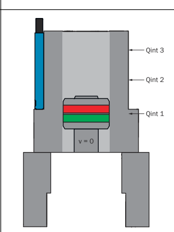
Qint2 = object

Qint3 = noobject

The assignment of the idle and no object states to gripper open or gripper closed depends on the gripper type:

1. External gripper:

Table 3: External gripper

Gripper open without object idle	Gripper closed with object object	Gripper open without object idle	Gripper closed without object noobject	Gripper open without object idle
				

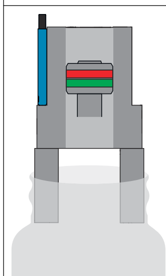
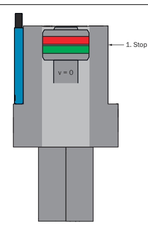
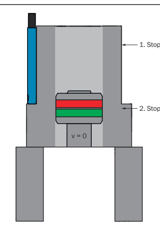
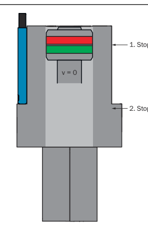
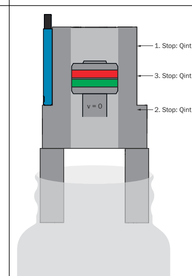
No switching point is defined on the output position of the magnet	First position is defined for switching point	Second position is defined for switching point	Third position is defined for switching point	Switching points are assigned to the positions

After the teach-in process, the Qints are assigned as follows:

- Qint1 gripper open without object (idle)
- Qint2 gripper closed with object (object)
- Qint3 gripper closed without object (noobject)

2. Internal gripper:

Table 4: Internal gripper

Gripper open with object	Gripper closed without object idle	Gripper open without object noobject	Gripper closed without object idle	Gripper open with object object
				
No switching point is defined on the output position of the magnet	First position is defined for switching point	Second position is defined for switching point	First position is already defined and is not saved again	Third position is defined for switching point.

After the teach-in process, the Qints are assigned as follows:

- Qint1 gripper closed without object (idle)
- Qint2 gripper open with object (object)
- Qint3 gripper open without object (noobject)

Switching behavior after **Dynamic Teach** of 3 switching points is the following during operation:

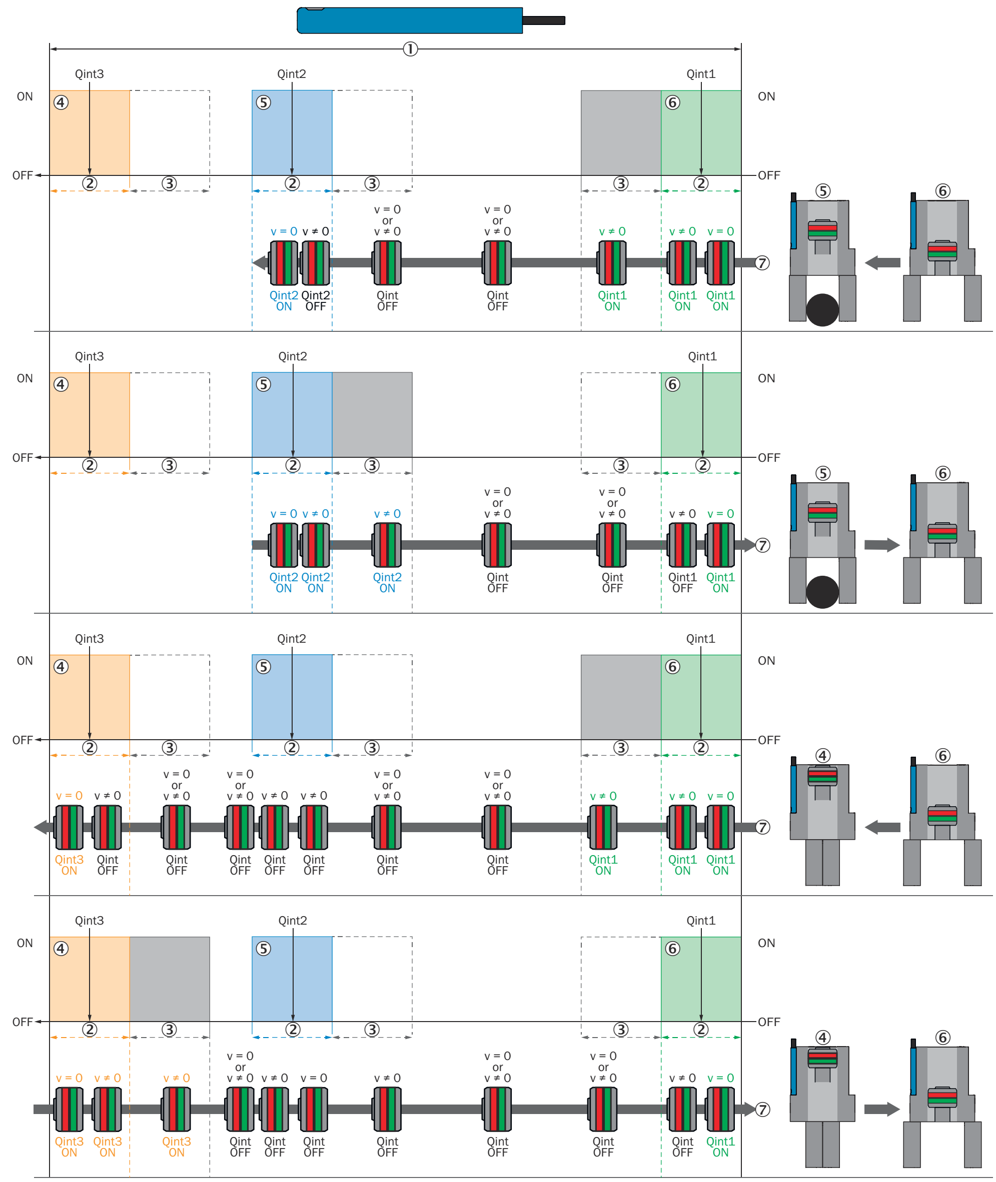


Figure 9: Overview

①	Max. range of movement of drive
②	Tolerance
③	Hysteresis
④	no object
⑤	object
⑥	idle
⑦	Direction of movement of the magnet

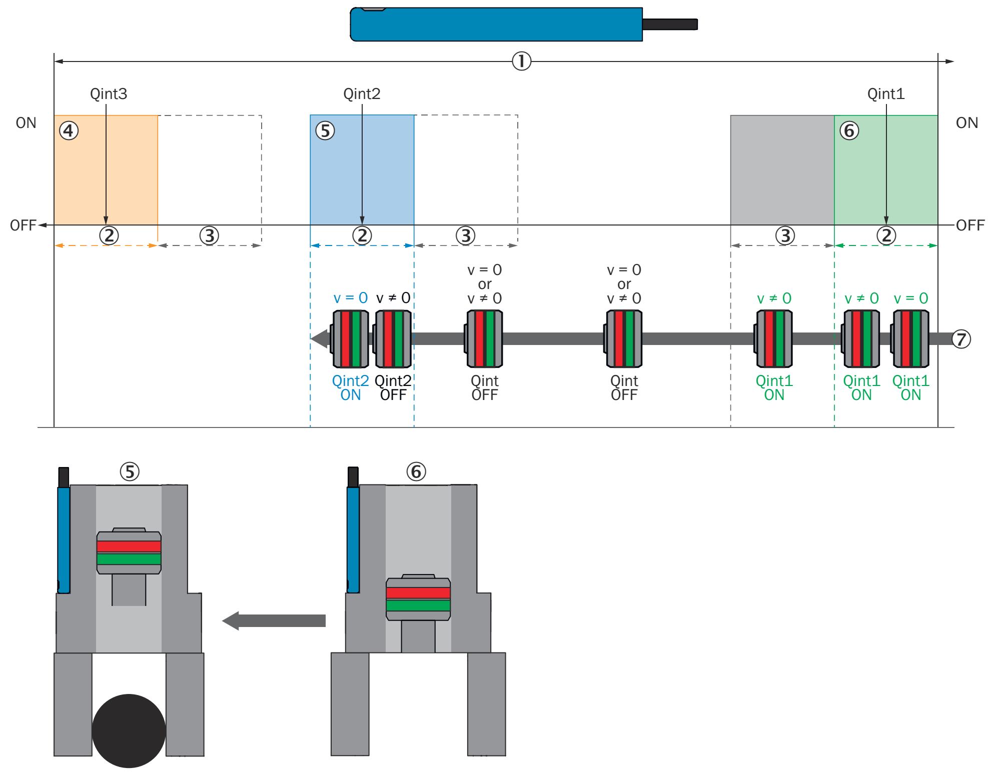


*Figure 10: Movement from **idle** to **object***

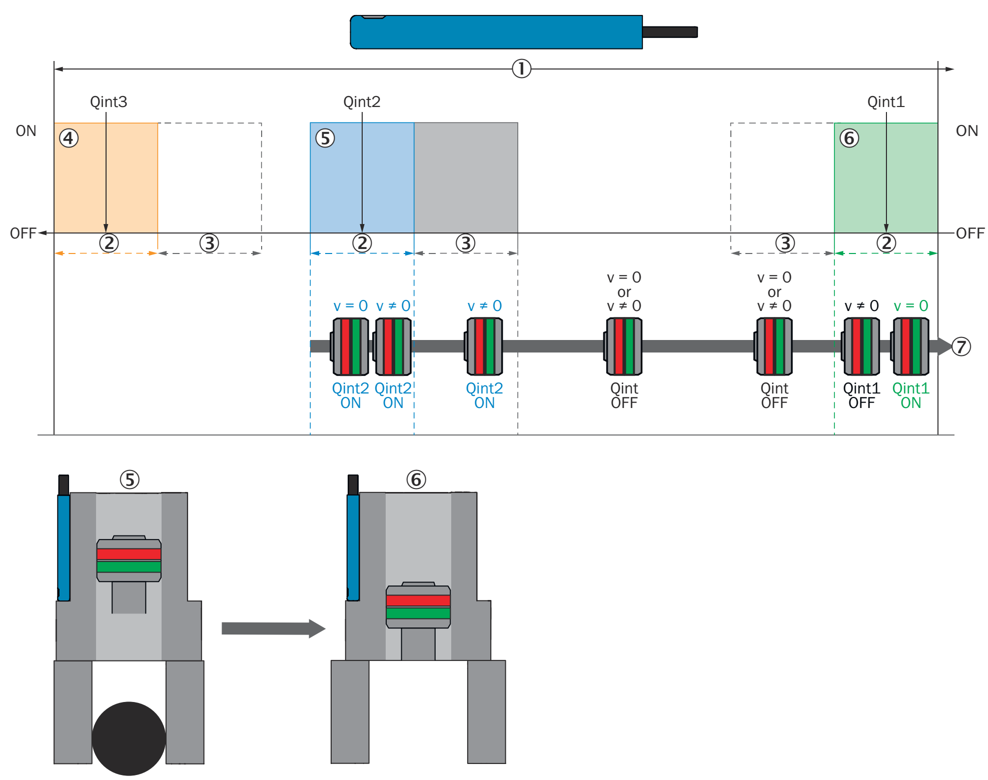


*Figure 11: Movement from **object** to **idle***

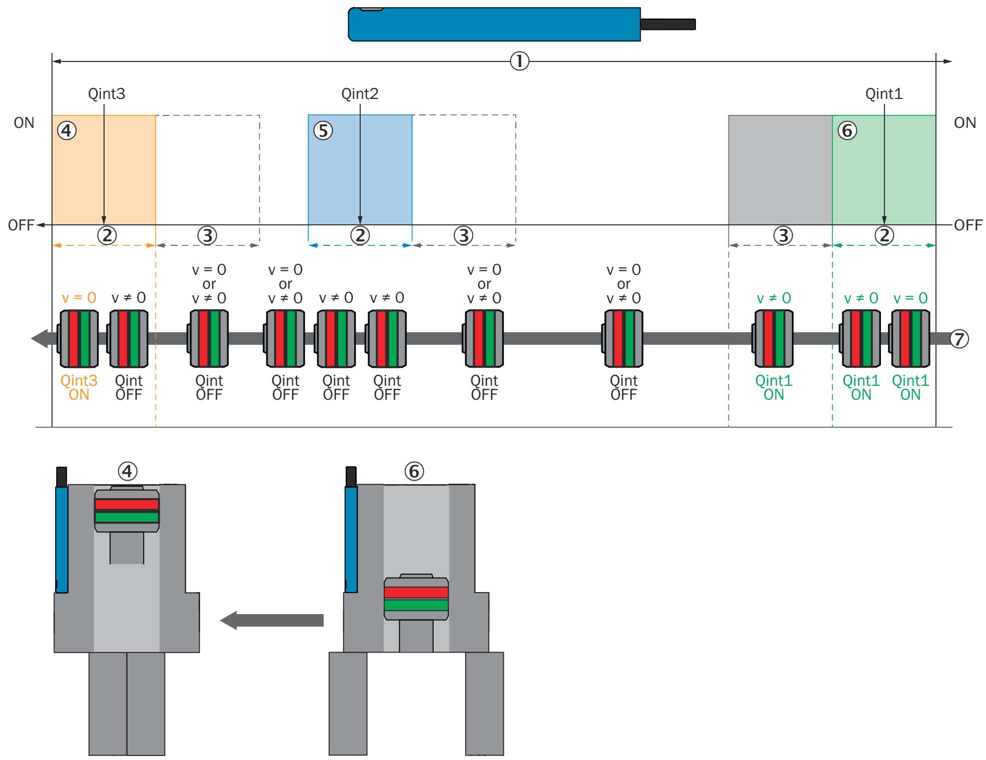


*Figure 12: Movement from **idle** to **no object***

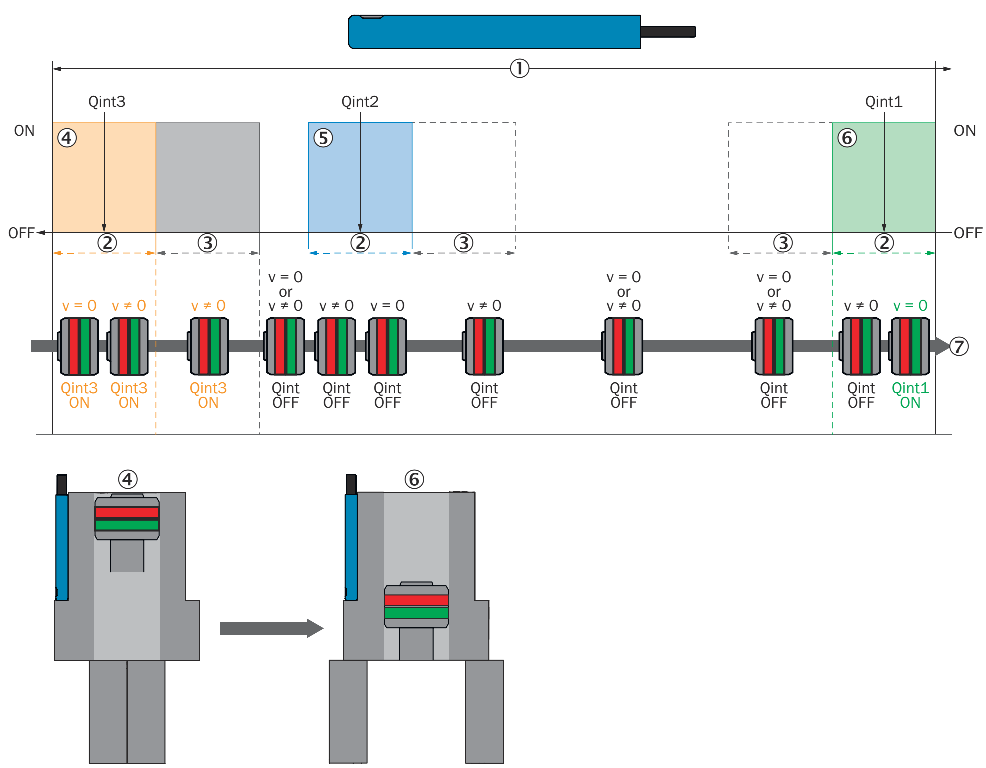


*Figure 13: Movement from **no object** to **idle***

4 Transport and storage

4.1 Transport

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

NOTE
Damage to the sensor due to improper transport.

- The device must be packaged for transport with protection against shock and damp.
- Transport should be performed by specialist staff only.
- The utmost care and attention is required at all times during unloading and transportation on company premises.
- Note the symbols on the packaging.
- Do not remove packaging until immediately before you start mounting.

4.2 Transport inspection

Immediately upon receipt at the receiving work station, check the delivery for completeness and for any damage that may have occurred in transit. In the case of transit damage that is visible externally, proceed as follows:

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

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

4.3 Storage

Store the device under the following conditions:

- Recommendation: Use the original packaging.
- Do not store outdoors.
- Store in a dry area that is protected from dust.
- To allow any residual dampness to evaporate, do not package in airtight containers.
- Do not expose to any aggressive substances.
- Protect from sunlight.
- Avoid mechanical shocks.
- Storage temperature: see "Technical data", page 47.
- Relative humidity: see "Technical data", page 47.

5 Mounting

5.1 Mounting requirements

- Comply with technical data such as the permitted ambient conditions for operation of the sensor (e.g., temperature range, EM interference), see "technical data", page 47.
- Protect the sensor from direct sunlight.
- Only mount sensor with the intended accessories.

Mounting location

When selecting the mounting location, the following factors must be considered:

- The mounting location must be as free from (electro)magnetic disturbance fields as possible

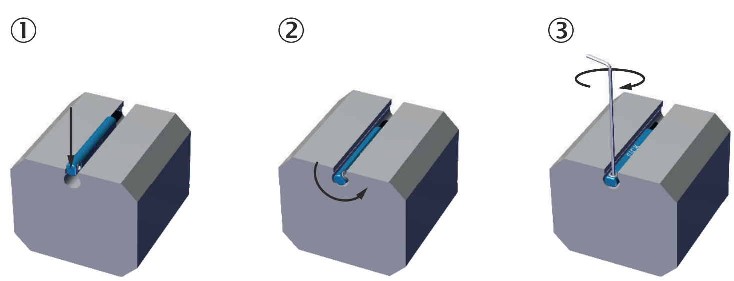
5.2 Optional accessories

Table 5: Optional accessories

Part number	Designation
2117133	Control panel mounting
2117770	T-slot adapter

5.3 Mounting

Insert sensor into the slot from above. The **PWR LED**[2] lights up green .



① Insert sensor
② Turn sensor
③ Tighten screws (tightening torque max. 0.1 Nm)

2) PWR LED = Power LED

6 Electrical installation

6.1 Safety

6.1.1 Notes on electrical installation

CAUTION
Danger due to incorrect supply voltage!
An incorrect supply voltage may result in injuries from electric shocks and/or damage to the device.

- Only operate the sensor with safety/protective extra-low voltage (SELV/PELV).

NOTICE
Sensor damage or unpredictable operation due to working with live parts.
Working with live parts may result in unpredictable operation.

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

- **The electrical installation must only be performed by electrically qualified personnel.**
- **Standard safety requirements must be observed when working on electrical systems!**
- Only switch on the supply voltage for the device when the connection tasks have been completed and the wiring has been thoroughly checked.
- When using extension cables with open ends, ensure that bare wire ends do not come into contact with each other (risk of short-circuit when supply voltage is switched on!). Wires must be appropriately insulated from each other.
- Wire cross-sections in the supply cable from the user’s power system must be designed in accordance with the applicable standards. When this is being done in Germany, observe the following standards: DIN VDE 0100 (Part 430) and DIN VDE 0298 (Part 4) and/or DIN VDE 0891 (Part 1).
- Circuits connected to the device must be designed as SELV circuits (SELV = Safety Extra Low Voltage).
- Protect the device with a separate fuse at the start of the supply circuit.

The IP enclosure rating for the sensor is only achieved if the connected cable is completely screwed in.

6.1.2 Wiring instructions

NOTE
Pre-assembled cables can be found online at:

▶ www.sick.com/mps-g

Please observe the following wiring instructions:

- During installation, pay attention to the different cable groups. The cables are grouped into the following four groups according to their sensitivity to interference or radiated emissions:
  - Group 1: Cables very sensitive to interference, such as analog measuring cables
  - Group 2: Cables sensitive to interference, such as sensor cables, communication signals, bus signals

- Group 3: Cables which are a source of interference, such as control cables for inductive loads, motor brakes
- Group 4: Cables which are powerful sources of interference, such as output cables from frequency inverters, welding system power supplies, power cables

▸ Cables in groups 1, 2 and 3, 4 must be crossed at right angles, see figure 14.

▸ Cables in groups 1, 2 and 3, 4 must be routed in different cable channels or metallic separators must be used, see figure 15 and see figure 16. This applies particularly where cables of devices with a high level of radiated emission, such as frequency converters, are laid parallel to sensor cables.

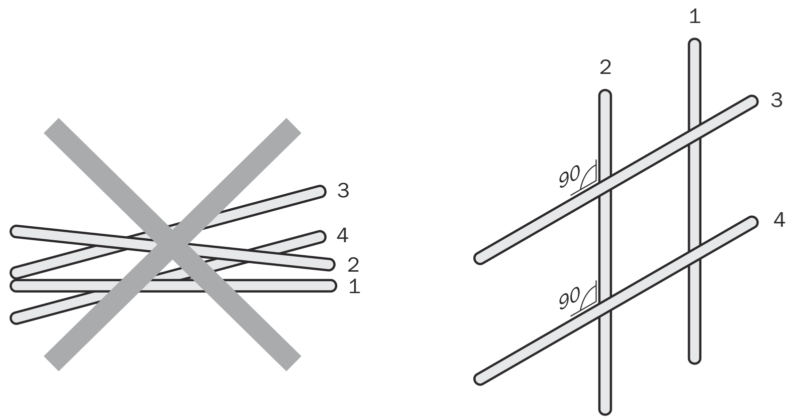


Figure 14: Cross cables at right angles

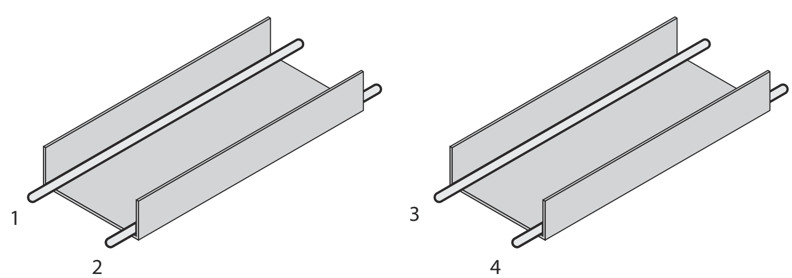


Figure 15: Ideal laying – Place cables in different cable channels

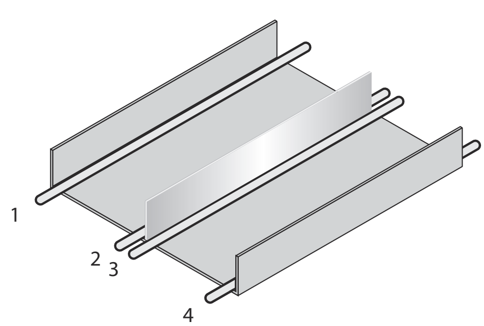


Figure 16: Alternative laying – Separate cables with metallic separators

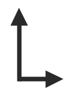
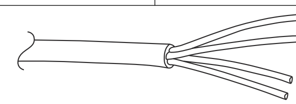
NOTE
Prevent equipotential bonding currents via the cable shield with a suitable earthing method, see "Safety", page 22.

6.2 Connections

6.2.1 Pin assignment/Connection diagram + wire colors

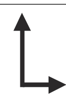
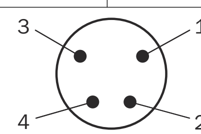
MPS-GxxxxxxxAxxxxxxxxxxxxxxxxx: Open cable end

Table 6: Pin assignment for male connector, M8, A-coded, 4-pin

PIN	Connection	Pin assignment
1	BN	+ (L+)
2	WH	Q2
3	BU	- (M)
4	BK	Q1
	 0.08 mm^2 AWG 28	

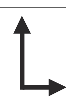
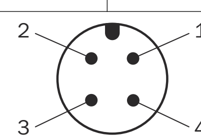
MPS-GxxxxxxxCxxxxxxxxxxxxxxxxx / MPS-GxxxxxxxDxxxxxxxxxxxxxxxxx: M8 connection

Table 7: Pin assignment for male connector, M8, A-coded, 4-pin

PIN	Connection	Pin assignment
1	BN	+ (L+)
2	WH	Q2
3	BU	- (M)
4	BK	Q1 / IO-Link
		

MPS-GxxxxxxxExxxxxxxxxxxxxxxxx: M12 connection

Table 8: Pin assignment for male connector, M12, A-coded, 4-pin

PIN	Connection	Pin assignment
1	BN	+ (L+)
2	WH	Q2
3	BU	- (M)
4	BK	Q1 / IO-Link
		

6.3 Connecting the supply voltage

The sensor must be connected to a voltage supply with the following properties:

- Supply voltage DC 10 V ... 30 V (SELV/PELV as per currently valid standards)
- Electricity source with at least 5 W power

Protecting the supply cables

To ensure protection against short-circuits/overload in the customer’s supply cables, the wire cross-sections used must be appropriately selected and protected.

The following standards must be observed in Germany:

- DIN VDE 0100 (part 430)
- DIN VDE 0298 (part 4) and/or DIN VDE 0891 (part 1)

7 Commissioning

7.1 Overview of commissioning steps

- Connect the voltage supply.
- Commission the sensor using the factory settings.
- Configure the sensor.

7.2 Positioning on drive

To achieve the best possible performance, the sensor should be positioned centrally to the travel range of the magnet.

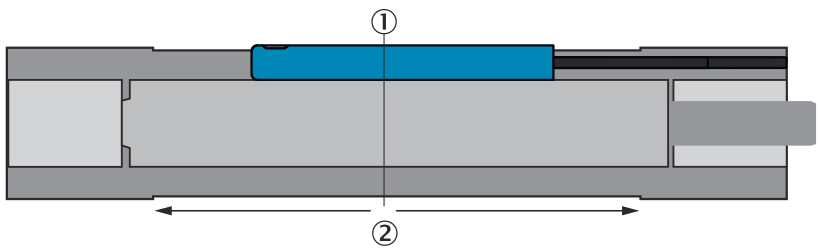


Figure 17: Positioning on drive

① Zero point

② Same distance in both directions

7.3 Commissioning the sensor for the first time

For optimal sensor performance, move the drive through the entire range of movement of the drive roughly 5x. Not until teach-in is complete is the complete accuracy (minimal linearity error, correct display of measuring range) achieved.

If switching points are taught before teach-in is complete, these change their position during the teach-in process.

The teach-in process can be accelerated by running an **Application Reset** via IO-Link after mounting of the sensor. The sensor then only needs about two strokes to teach in the drive with sufficient accuracy.

8 Operation

8.1 General notes on operation

Teach possible using teach-in button.

NOTE
The user is responsible for the correct teach process.

IO-Link

In addition to manual configuration, the sensor can also be configured using IO-Link. A detailed list of IO-Link functions can be found in the leaflet and can be downloaded at www.sick.com/mps-g.

You can find the IODD file at www.sick.com/mps-g.

The following settings can be made and parameters read out via IO-Link:

- Configuration of up to 16 switching points (Qints)
- Position determination in mm
  - Offset
  - Repeatability
- **Pneumatic Actuator Diagnosis:** Read out of the following data:
  - Cycle counter
  - Cylinder stroke in [mm]
  - Total cylinder travel in [m]
  - Cycle time in [ms]
  - Stroke time in [ms] (stroke time in positive direction / stroke time in negative direction)
  - Stroke speed in [m/s] (stroke speed in positive direction / stroke speed in negative direction)
  - Dwell time in start position in [ms]
  - Dwell time in end position in [ms]
  - Currently measured field strength per sensor element in [mT]
  - Measured peak value of the field strength per sensor element in [mT]
- **Condition Monitoring:** Read out of the following data:
  - Temperature
  - Max. acceleration
  - Vibration
  - Location

8.2 Operating and status indicators

8.2.1 Control element

The following settings can be made via the teach-in button.

- Definition of up to 3 switching points (digital outputs) via **Dynamic Teach** function
- Manual definition of 1 to 3 switching points (digital outputs)

- Adjustment of overrun distance per switching point (1 – 5 mm) (after **Manual Teach**)
- Deactivation of all switching points

8.2.2 Status indicators

3 LEDs are arranged on the control panel. The two outer LEDs light up yellow and the center LED in green.

The table below describes the individual function displays. The actual behavior of the LEDs during operation represents a combination of these function displays.

Table 9: Function of the LEDs

Sensor condition	LED 1 (Q1)		LED 2 (PWR)		LED 3 (Q2)	
	Display	**Meaning**	**Display**	**Meaning**	**Display**	**Meaning**
SIO[1]	● Lights up	Q1 high	● Lights up	Power ok	● Lights up	Q2 high
	○ Does not light up	Q1 low			○ Does not light up	Q2 low
IO-Link[2]	● Lights up	Q1 high	◐ Flashing	IO-Link active	● Lights up	Q2 high
	○ Does not light up	Q1 low			○ Does not light up	Q2 low
Error	No error display via LEDs					
Teach	This table only lists the LED behavior during operation. The LED behavior during teach-in can be found in section 8.3.					

1 If LED 1 (Q1), LED 2 (PWR) and LED 3 (Q3) light up at the same time, Q3 is active.

2
- During position measurement via IO-Link, only LED 2 (PWR) flashes
- Up to 16 switching points can be taught in via IO-Link. Only the first 3 switching points are shown via LEDs as in SIO mode.

8.3 Teach-in mode

Table 10: Teach behavior

Teach-in mode	**Dynamic Teach** **Automated switching point teach-in**		**Manual Teach** **Manual switching point teach-in**
Number of switching points	**2 switching points** When 2 x speed v[1] = 0 is detected during teach-in.	**3 switching points** When 3 x speed v[1] = 0 is detected during teach-in.	**3 switching points** Between 1 and 3 switching point (Qints) can be manually taught in independently of each other.
Are switching points (SP) taught in independently?	**NO** Depending on the requirement, 2 or 3 Qints can be taught in one process.		**YES** Up to 3 SP are taught in independently.
Is Dynamic Pilot active?	**YES** In **Dynamic Pilot**, there are 2 conditions for Qint during operation ON: The piston velocity must be v = 0[1]. The magnet must be within the tolerance band defined in **Dynamic Teach** and the direction of movement of the piston must correspond.		**NO** If the switching points are taught in manually, there is no **Dynamic Pilot.**
Arrangement of switching points	**Always the same** Qint1 lies in the direction of the cable outlet and Qint2 in the direction of the sensor fixing screw	**Depends** The switching points are assigned as follows: Qint1 = idle Qint2 = object Qint3 = noobject That is why the arrangement depends on whether an internal or external gripper is used.	**Free arrangement** The Qint1, Qint2 and Qint3 switching points can be freely set.
Application	**End position detection:** Automated teach-in of 2 switching points via **Dynamic Teach** is intended for end position detection on a pneumatic cylinder.	**Gripper status detection:** The automated teach-in of 3 switching points via **Dynamic Teach** is intended for gripper status detection.	**Other applications:** If neither only the end positions on a pneumatic cylinder nor gripper statuses are to be taught in automatically, manually teaching switching points is recommended.
Measuring range	The **measuring range** of the sensor must cover the complete stroke.		The **measuring range** of the sensor must NOT cover the complete stroke.

1 v = speed

For dynamic teach-in of 2 switching points via **Dynamic Teach**, it is assumed that the end positions of a piston should be detected in a pneumatic cylinder. If the 2 switching points are to be placed randomly within the measuring range, we recommend teaching in the 2 switching points manually via **Manual Teach.**

For dynamic teach-in of 3 switching points via **Dynamic Teach**, it is assumed that 3 statuses of a pneumatic gripper should be detected during the gripping process.

- Status 1 “idle”: Gripper open without object (external gripper) / Gripper closed without object (internal gripper)
- Status 2 “object”: Gripper closed without object (external gripper) / Gripper open with object (internal gripper)
- Status 3 “noobject”: Gripper closed without object (external gripper) / Gripper open without object (external gripper)

If the 3 switching points are to be placed randomly within the measuring range, we recommend teaching in 3 switching points manually via Manual Teach.

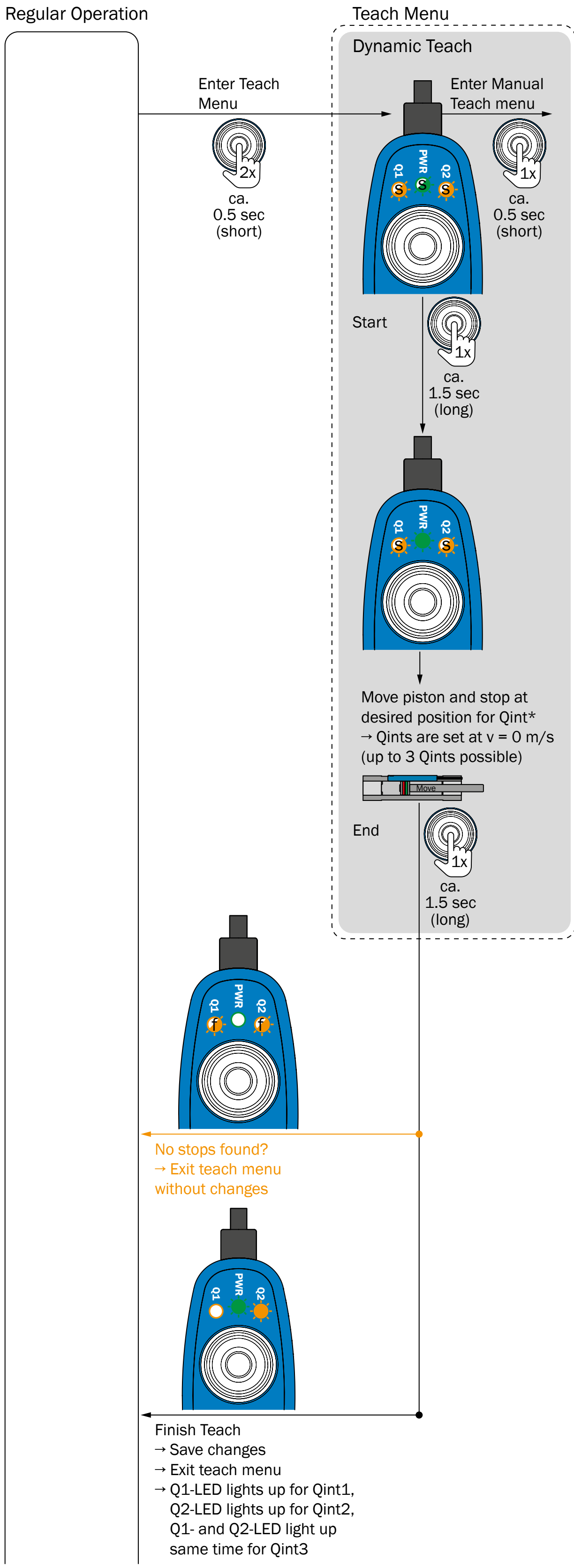
8.3.1 Dynamic Teach

Dynamic Teach is used to have the sensor automatically set the switching points.

The sensor detects the movement stops and then assigns the respective switching points to the found positions. (Taking into account the set switching point width, the positions must be at least 1 mm apart to be detected as two different positions).

The initial position of the piston when **Dynamic Teach** starts is NOT seen as the first stop!

NOTE
The magnet must be moved at a speed greater than 0.025 m/s so the **Dynamic Teach** works correctly.


Regular Operation
Teach Menu
Dynamic Teach
Enter Teach
Menu
2x
ca.
0.5 sec
(short)
Enter Manual
Teach menu
1x
ca.
0.5 sec
(short)
Start
1x
ca.
1.5 sec
(long)
Move piston and stop at
desired position for Qint*
→ Qints are set at v = 0 m/s
(up to 3 Qints possible)
End
1x
ca.
1.5 sec
(long)
No stops found?
→ Exit teach menu
without changes
Finish Teach
→ Save changes
→ Exit teach menu
→ Q1-LED lights up for Qint1,
Q2-LED lights up for Qint2,
Q1- and Q2-LED light up
same time for Qint3

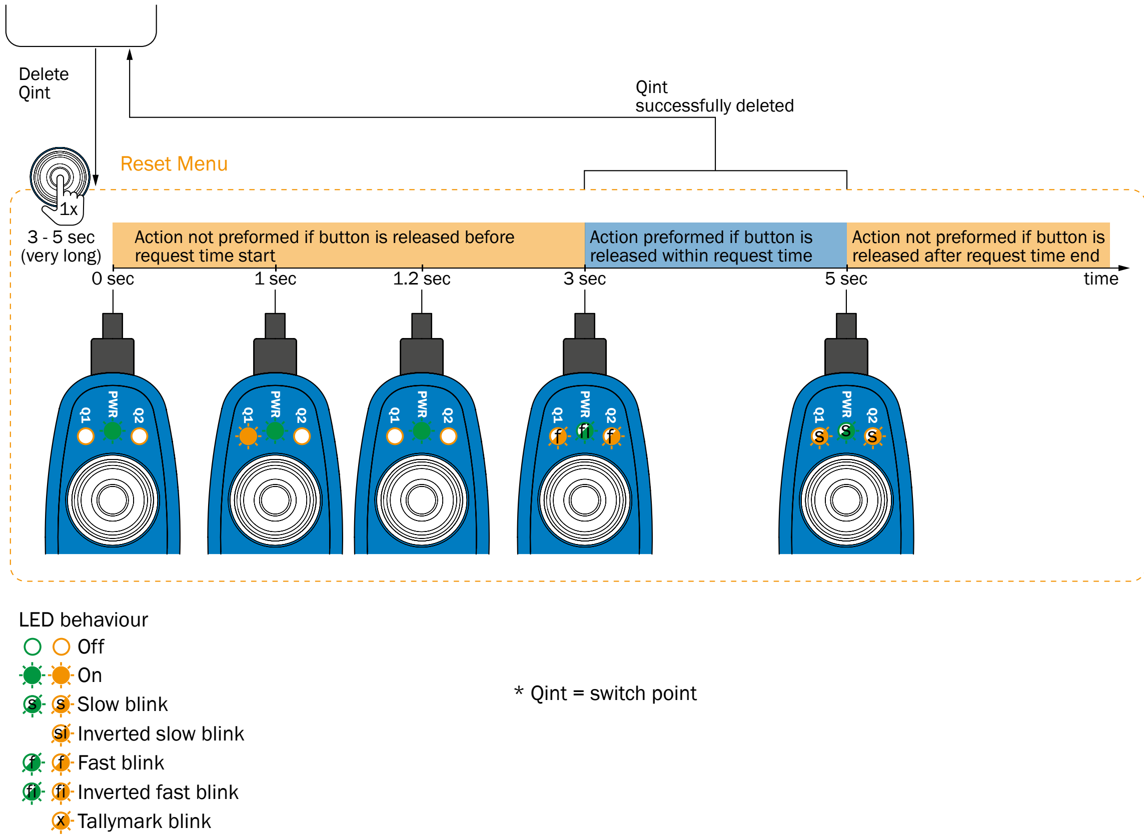


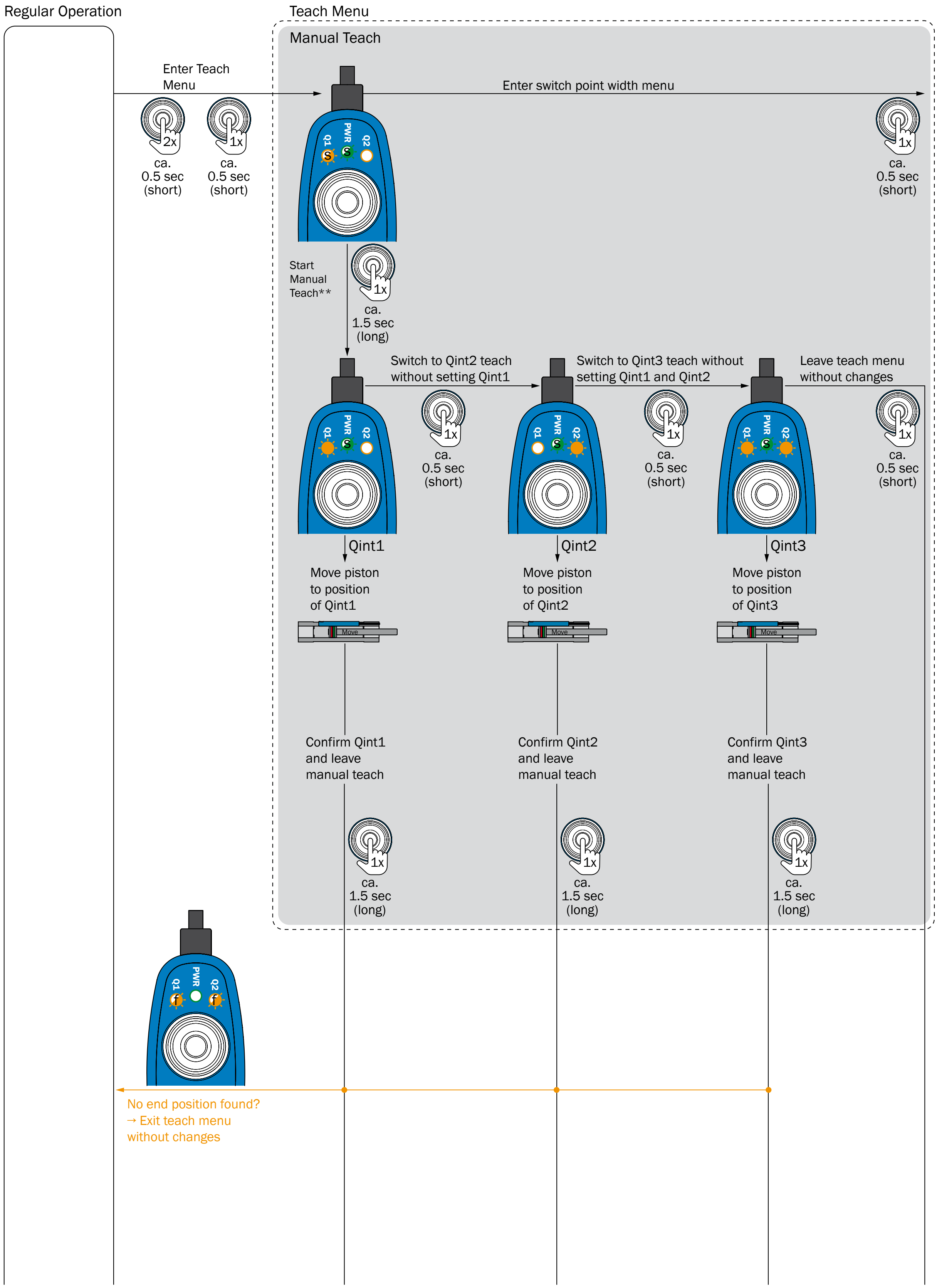
*Figure 18: **Dynamic Teach** teach routine*

Flashing tally sheet:
1 mm = 1 x brief flash
2 mm = 2 x brief flashes
3 mm = 3 x brief flashes
4 mm = 4 x brief flashes
5 mm = 1 x long flash

8.3.2 Manual Teach

Manual Teach is used to manually teach in up to three switching points within the measuring range using the teach-in button. The three switching points are taught in separately from each other (taking into account the set switching point width, the positions must be at least 1 mm apart to be detected as different positions).

NOTE
After **Manual Teach** is run, the width of the switching point (see "Switching behavior after Manual Teach of up to 3 switching points", page 11) can be set.


Regular Operation
Teach Menu
Manual Teach
Enter Teach Menu
2x
ca. 0.5 sec (short)
1x
ca. 0.5 sec (short)
Enter switch point width menu
1x
ca. 0.5 sec (short)
PWR
Q1
Q2
S
Start Manual Teach**
1x
ca. 1.5 sec (long)
Switch to Qint2 teach without setting Qint1
1x
ca. 0.5 sec (short)
Switch to Qint3 teach without setting Qint1 and Qint2
1x
ca. 0.5 sec (short)
Leave teach menu without changes
1x
ca. 0.5 sec (short)
Qint1
Move piston to position of Qint1
Qint2
Move piston to position of Qint2
Qint3
Move piston to position of Qint3
Move
Confirm Qint1 and leave manual teach
Confirm Qint2 and leave manual teach
Confirm Qint3 and leave manual teach
1x
ca. 1.5 sec (long)
f
No end position found?
→ Exit teach menu without changes

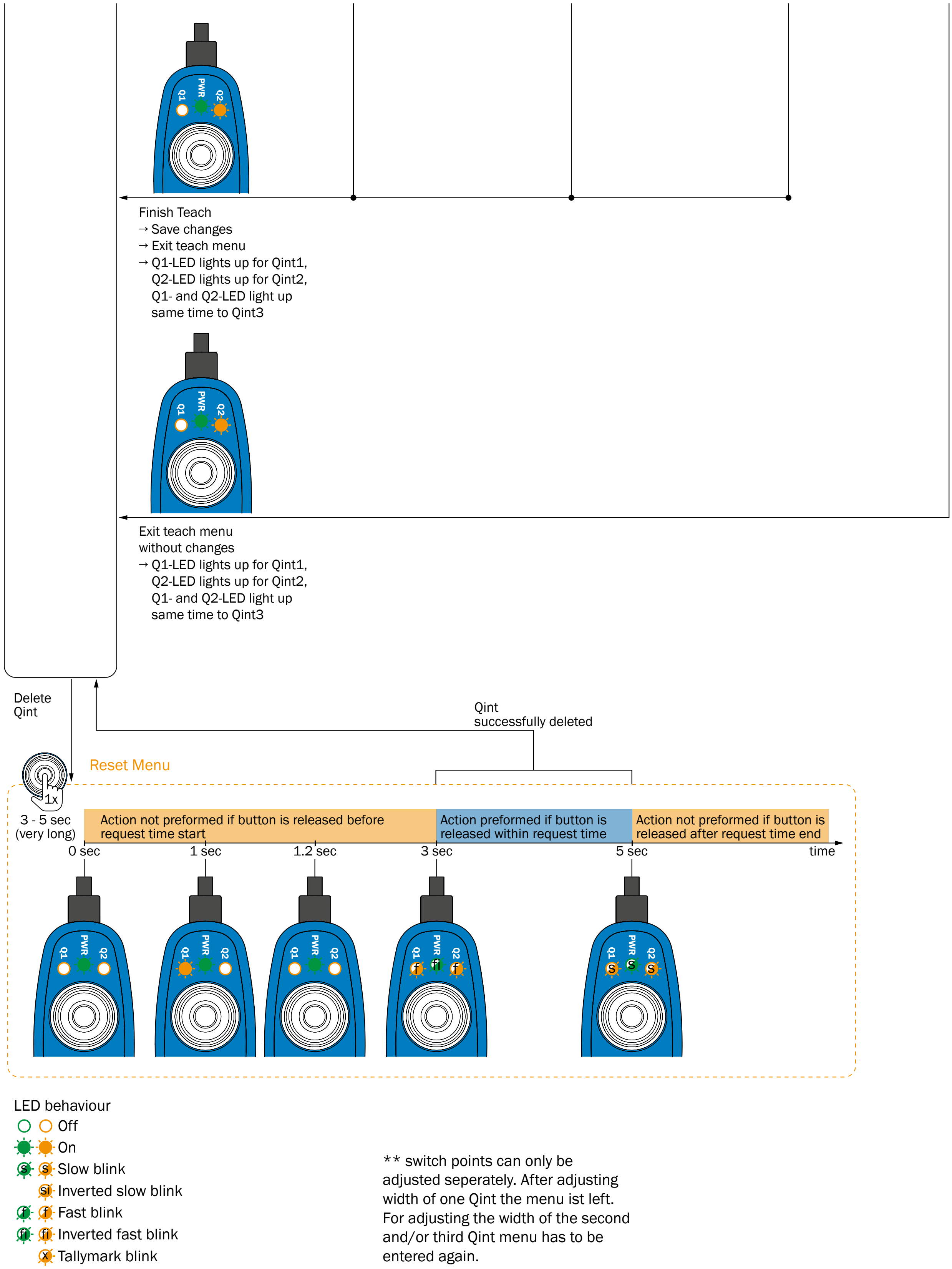
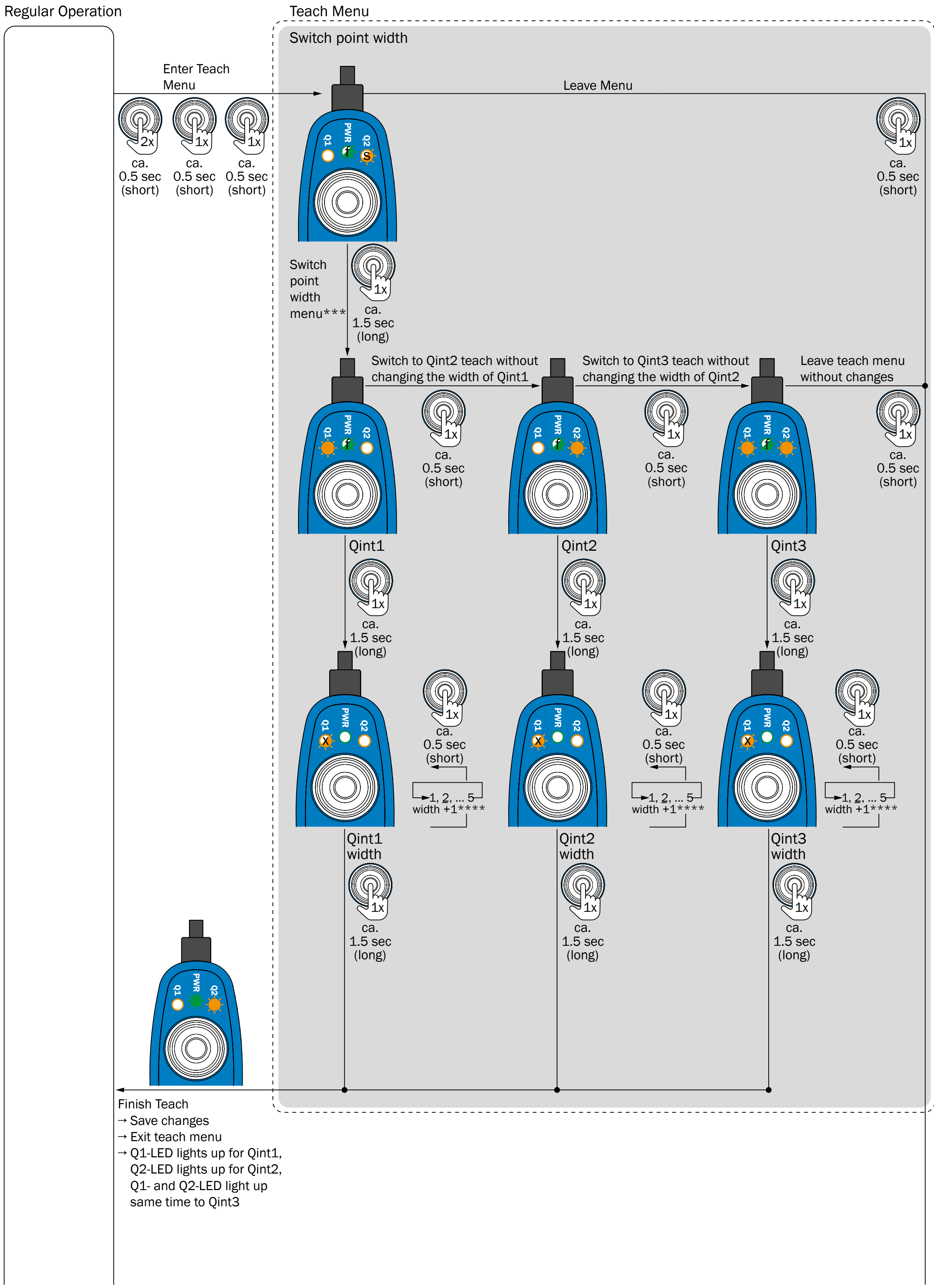


*Figure 19: **Manual Teach** teach routine*

Setting of switching point width:


Regular Operation
Teach Menu
Switch point width
Enter Teach Menu
2x
1x
1x
ca. 0.5 sec (short)
ca. 0.5 sec (short)
ca. 0.5 sec (short)
Leave Menu
1x
ca. 0.5 sec (short)
Switch point width menu***
1x
ca. 1.5 sec (long)
Switch to Qint2 teach without changing the width of Qint1
Switch to Qint3 teach without changing the width of Qint2
Leave teach menu without changes
1x
ca. 0.5 sec (short)
Qint1
Qint2
Qint3
1x
ca. 1.5 sec (long)
1x
ca. 0.5 sec (short)
1, 2, ... 5
width +1****
Qint1 width
Qint2 width
Qint3 width
Finish Teach
→ Save changes
→ Exit teach menu
→ Q1-LED lights up for Qint1, Q2-LED lights up for Qint2, Q1- and Q2-LED light up same time to Qint3

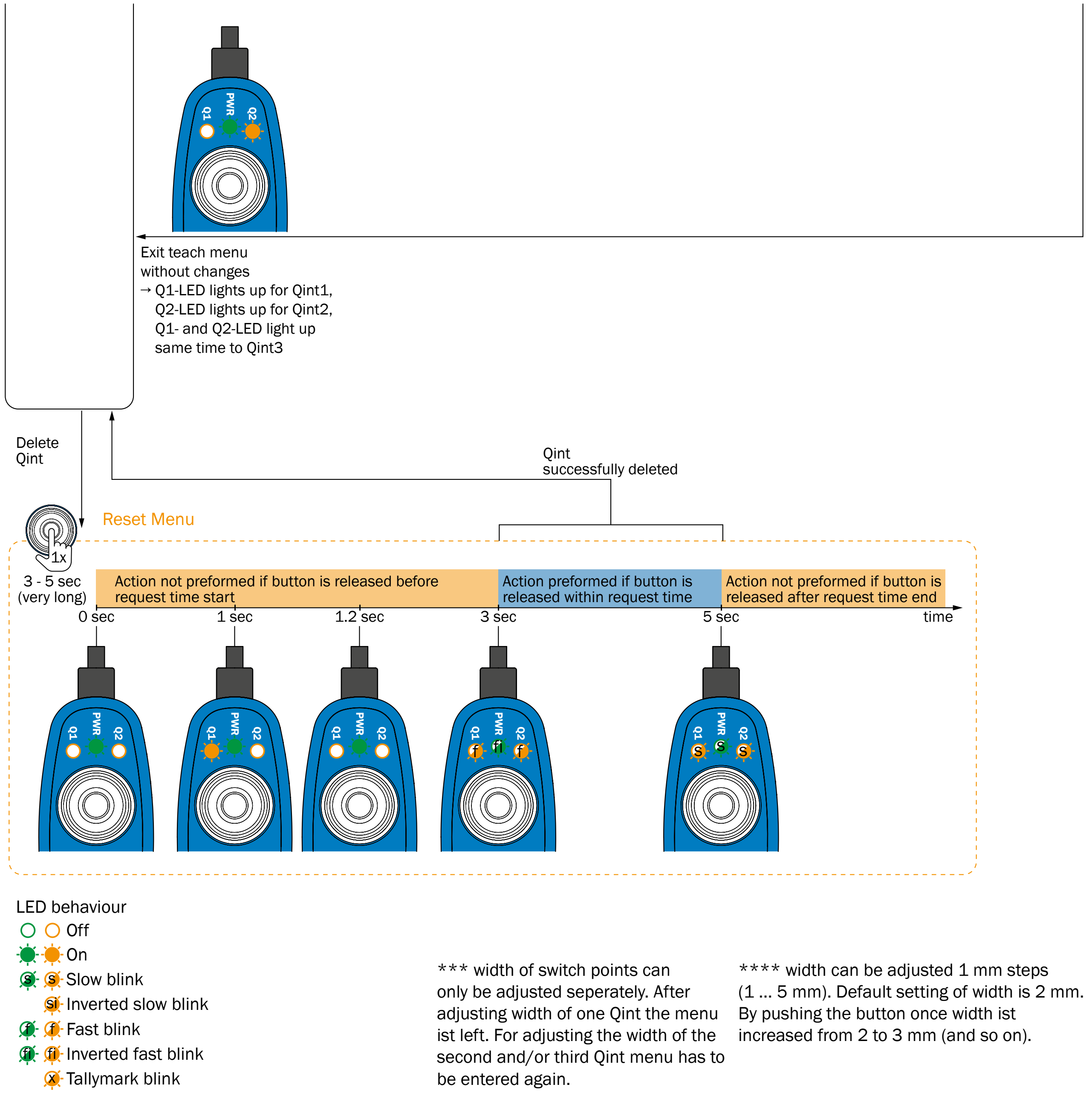


Figure 20: Teach routine for switching point width

Flashing tally sheet:
1 mm = 1 x brief flash
2 mm = 2 x brief flashes
3 mm = 3 x brief flashes
4 mm = 4 x brief flashes
5 mm = 1 x long flash

8.4 Diagnostic function

During the application, the MPS-G Smart Sensor also monitors:

- Stroke traveled
- Cycle time
- Dwell time start position

- Dwell time stop position
- Travel time of the piston during extension
- Travel time of the piston during retraction
- Current measured field strength at sensor element 1
- Current measured field strength at sensor element 2
- Cycle counter
- Maximum measured field strength at sensor element 1
- Maximum measured field strength at sensor element 2
- Total distance traveled by the piston

The individual values are output via the IO-Link interface.

In addition to application-specific information listed above, the MPS-G Smart Sensor also delivers additional information on the status of the machine or the process to detect deviations early on and prevent unplanned system downtime. The process diagnostics functionality of the sensor includes the following functions:

- Vibration analysis
- Position monitoring
- Temperature measurement
- Maximum acceleration

8.4.1 Vibration analysis

The sensor monitors the vibration of critical components in the machine during the time period over all three axes X, Y and Z. The characteristic values RMS, kurtosis and pulse factor are calculated from the recorded vibration values.

These values are calculated from a block of vibration data. The length of this block is a compromise between the update rate of the characteristic values (shorter block length means more frequent update) and the noise of these values (longer block length means higher averaging and therefore lower noise).

The block size can be set via Index 4477 / Index 117D, Subindex 1 in a range of 0.04 – 0.64 seconds. The MPS-G has a preset block size of 0.32 seconds when delivered.

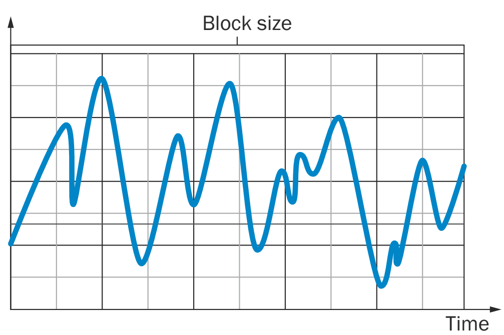


Figure 21: Block size as the basis for calculating RMS, kurtosis and pulse factor

1 **RMS (root mean square)**
The a-RMS is expressed in ‘g’ and is the effective value of the acceleration (a-RMS) and a measure of the energy contained in the vibration. It can be used to estimate the strength of the vibration. Examples of a changed a-RMS can be the following mechanical faults:
- Friction
- Contact with machine components
- Unbalance
- Wear
- Lubricant complications
Readable via ISDU 4483 / Index 0x1183

2 **Kurtosis**
Kurtosis is a dimensionless parameter for the distribution of values in the acceleration signal. The value can be used to estimate the type of vibration measured and thus detect a change. For example, a white noise signal has a kurtosis of 3, whereby a sine wave has a kurtosis of 1.5. Pulses occurring in the vibration are represented by higher values in figure 22.
Readable via ISDU 4495 / Index 0x118F

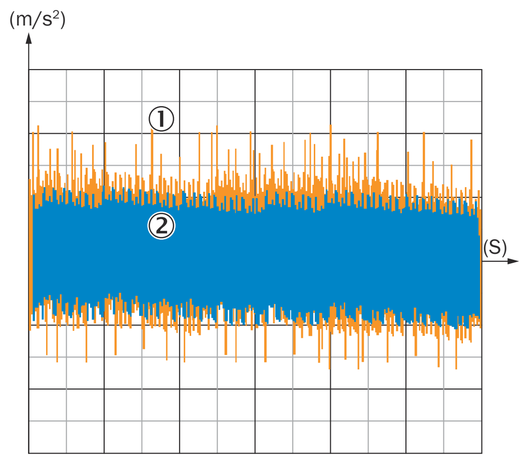


Figure 22: Kurtosis

① Kurtosis = 7

② Kurtosis = 3

3 **Pulse factor**

The pulse factor is the ratio of the maximum absolute value of acceleration to the mean value of these absolute values. The value can be considered an indication of whether brief pulses occur in the acceleration signal which are significantly stronger than the permanent vibration. For example, a pure sine wave has a pulse factor of 1.58; if a much stronger pulse factor is measured for an expected sinusoidal vibration, this is an indication of pulsed faults.
Readable via ISDU 4507 / Index 0x119B
Calculation of the pulse factor:
I_F = maximum value/average value

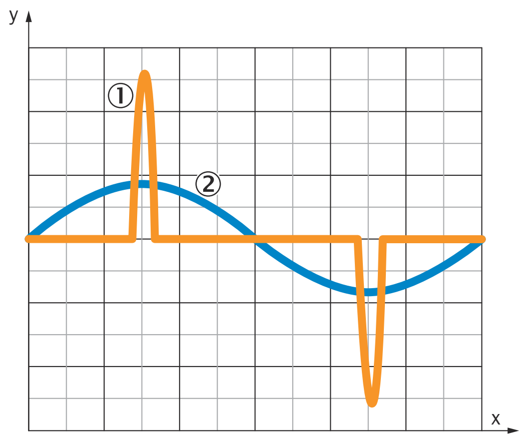


Figure 23: Pulse factor

① $I_F = 4.2$

② $I_F = 1.44$

8.4.2 Position monitoring

The sensor makes it possible to monitor its own position or the position of the machine part on which it is mounted.

The orientation is output as a rotation of the sensor with respect to a zero position defined by default by a coordinate system in which the Z-axis is antiparallel to the acceleration due to gravity and perpendicular to the sensor head, the X-axis is in the longitudinal axis and the Y-axis is in the transverse axis of the sensor head, as illustrated in the following figure. In this orientation, the coordinate system of the sensor corresponds to the reference coordinate system.

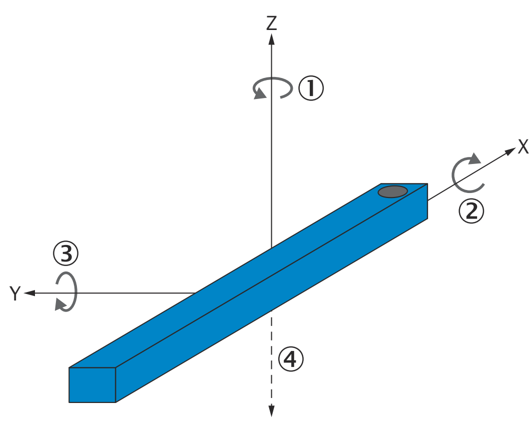


Figure 24: Orientation monitoring

① Yaw

② Roll

③ Pitch
④ Acceleration due to gravity

The current orientation of the sensor is output in two ways: The current main axis for a rough estimate and the rotation in Euler angles for an exact determination of the current orientation.

Main orientation

The main orientation output in ISDU 4466 / Index 0x1172 indicates which sensor axis is currently closest to the Z-axis of the reference system. The main orientation can take the following values:

Table 11: Main orientation

Value	Meaning
3	The Z-axis of the sensor is closest to the Z-axis of the reference system. Both axes point in the same direction
2	The Y-axis of the sensor is closest to the Z-axis of the reference system. Both axes point in the same direction
1	The X-axis of the sensor is closest to the Z-axis of the reference system. Both axes point in the same direction
-1	The X-axis of the sensor is closest to the Z-axis of the reference system. Both axes point in opposite directions
-2	The Y-axis of the sensor is closest to the Z-axis of the reference system. Both axes point in opposite directions
-3	The Z-axis of the sensor is closest to the Z-axis of the reference system. Both axes point in opposite directions

Orientation in Euler angles

The current orientation is output in ISDU 4455 / Index 0x1167 in Euler angles called roll, pitch and yaw.

Table 12: Orientation of the Euler angles

Value	Value range in rad	Value range in °	Meaning
Roll	-π ... +π	-180°...+180°	Rotation of the sensor around the X-axis of the reference or sensor coordinate system (see below)
Pitch	-π/2...+π/2	-90°...+90°	Rotation of the sensor around the Y-axis of the reference or sensor coordinate system (see below)
Yaw	0	0	Rotation of the sensor around the Z-axis of the reference coordinate system, this is not recorded in the MPS-G and is therefore always 0 (value is output for compatibility reasons)

The Euler angles in ISDU 4455 / Index 0x1167 are output as integer values. The angles in radians are obtained by multiplying the integer value by 1/10,000.

(Angle in rad) = (value in ISDU 4455) * 1/10,000

The angle in radians can be converted to the angle in degrees by multiplying by 180°/pi. The angle in degrees is thus given by

(angle in °) = (value in ISDU 4455) * 0.0057296

The Euler angles describe the current rotation of the sensor with respect to the reference coordinate system. The sequence of rotations must be observed and is defined here according to DIN 9300 / DIN ISO 8855. This means that the orientation of the sensor can be determined either (intrinsically) by rotating the sensor from the reference position first around the Y-axis of the sensor (which corresponds to the Y-axis of the reference coordinate system) and then around the X-axis of the already rotated sensor or (extrinsically) by rotating the sensor from the reference position first around the X-axis of the reference coordinate system and then around the Y-axis of the reference coordinate system.

The pitch angle has a smaller range of values to the roll angle, because otherwise the representation of the orientation would not be unambiguous, i.e. different pairs of values of roll and pitch angle could otherwise represent the same orientation of the sensor.

Gimbal Lock

Please note that at a pitch angle of $\pm\pi/2$ rad or $\pm 90°$, the roll angle becomes unstable due to the principle of operation, this is known as the “Gimbal Lock” effect. This happens because at a pitch angle of $\pm\pi/2$ rad, the X-axis coincides with the Z-axis of the reference coordinate system. The roll angle in this case thus indicates the rotation of the sensor around the Z-axis of the reference coordinate system, but this is not detected by the sensor, which makes this angle numerically unstable.

Setting the zero position

However, to allow stable measurements in any initial position, the reference coordinate system can be changed. This is done by writing the desired zero position of the sensor into ISDU 4467 / Index 0x1173, Subindex 1. The following values are possible:

Table 13: Setting the zero position

Value	Meaning
3	The Z-axis of the sensor points into the axis of the acceleration due to gravity, the Z-axis and the acceleration due to gravity point in opposite directions
2	The Y-axis of the sensor points into the axis of the acceleration due to gravity, the Y-axis and the acceleration due to gravity point in opposite directions
1	The X-axis of the sensor points into the axis of the acceleration due to gravity, the X-axis and the acceleration due to gravity point in opposite directions
-1	The X-axis of the sensor points into the axis of the acceleration due to gravity, the X-axis and the acceleration due to gravity point in the same direction
-2	The Y-axis of the sensor points into the axis of the acceleration due to gravity, the Y-axis and the acceleration due to gravity point into the same direction
-3	The Z-axis of the sensor points into the axis of the acceleration due to gravity, the Z-axis and the acceleration due to gravity point into the same direction

In the respective zero position, the roll and pitch angles assume the value zero. The current main orientation of the sensor can also be adopted as the zero position by executing Standard Command 161 (i.e. writing the value 161 to ISDU 2 / Index 0x02).

8.4.3 Temperature measurement

The sensor also monitors the temperature. It outputs the currently measured temperature as well as the minimum and maximum temperature of “all time” and since the last reset.

The temperature data can be read out via ISDU 4352 / Index 0x1100.

8.4.4 Maximum acceleration

To detect shocks, the sensor outputs the maximum acceleration of the three axes X, Y, Z since the last reset in a measuring range of ± 8 g (ISDU 4411 / Index 0x113B).

The acceleration with the largest absolute value is output in each case. To be able to determine the correct direction, a corresponding sign is prefixed to the acceleration. Executing Standard Command 160 (i.e. writing value 160 in ISDU 2 / Index 0x02) resets the maximum acceleration.

9 Process data structure

IO-Link version: 1.1

Process data length 4 bytes

	A00	A70	A71	A72	A73	A75
IO-Link	V1.1					
Process data	2 bytes					4 bytes
	Byte 0: bits 15… 8 Byte 1: bits 7… 0					Byte 0: bits 31… 24 Byte 1: bits 13… 16 Byte 2: bits 15… 8 Byte 3: bits 7… 0
Bit 0 / Data type	Q_{L1} / Boolean					
Bit 1 / Data type	Q_{L2} / Boolean			Qint.1 / Boolean	Q_{L2} / Boolean	Qint.1 / Boolean
Bit… / Description / Data type	2 …15 / [empty]	2 …15 / [time measurement value] / UInt 14	2 … 15 / [counter value] / UInt 14	2 … 15 / [length / speed measurement] / SInt14	2 / Qint.1 / Boolean	2 … 7 / [empty]
Bit… / Description / Data type					3 … 15 / [time measurement value] / UInt13	8 … 31 / [carrier load] / UInt 24

10 Troubleshooting

Table 14: Possible error displays via the LEDs

LED/fault pattern / Fault pattern	Cause	Measures
Green LED does not light up	No voltage or voltage below the limit values	Check the power supply, check all electrical connections (cables and plug connections)
LED 1 + LED 3: Quick flashing	During a teach attempt outside the detection range, no end point is applied	Bring pistons into the detection range of the sensor
	If no or only one end point is found during **Dynamic Teach**, no end points are applied	Adjust the position so that two end points are found
Sensor position is imprecise	Mounting position unfavorable	Position sensor head as recommended in the operating instructions and run voltage reset
Sensor does not find switching points in Dynamic Pilot / does not switch	Traversing speed of the object is insufficient	Increase traversing speed of the piston or deactivate Dynamic Pilot and manually teach in switching points
Switching points are lost	Sensor was not yet completely taught in to drive	Perform several strokes (> 5) and reset switching points

11 Maintenance

SICK sensors are maintenance-free.

We do, however, recommend that the following activities are undertaken regularly:

- Clean the sensor surfaces
- Check the fittings and plug connectors

No modifications may be made to devices.

Subject to change without notice. Specified product properties and technical data are not written guarantees.

12 Decommissioning

12.1 Replace device

The **IO-Link Data Storage** function can be used to save previous parameters and transmit them to the exchange device. This prevents complete re-parameterization of the exchange device.

12.2 Disassembly and disposal

Disassembling the device

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

Disposing of the device

Any device which can no longer be used must be disposed of in an environmentally friendly manner in accordance with the applicable country-specific waste disposal regulations.

NOTE

Disposal of batteries, electric and electronic devices

- According to international directives, batteries, accumulators and electrical or electronic devices must not be disposed of in general waste.
- The owner is obliged by law to return this devices at the end of their life to the respective public collection points.
- 

  This symbol on the product, its package or in this document, indicates that a product is subject to these regulations.

12.3 Returning devices

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

NOTE

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

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

---

13 Technical data

Table 15: Technical data

Cylinder type	C-slot
Detection zone	0 ... 50 mm[1)]
Supply voltage U_B	10 ... 30 V DC
Power consumption	≤ 550 mW
Required magnetic field strength, typ.	≥ 2 mT
overrun distance	can be configured
Hysteresis	can be configured
Time delay before availability	0.15 s
Resolution typ.	0.01 mm
Linearity typ.	0.3 mm[2)]
Repeatability (response time) typ.	0.05 mm[3)]
Sampling rate min.	2 kHz
IO-Link	1.1
Enclosure rating	IP67
Protection class	III
Circuit protection	A, B, D[4)]
Ambient temperature, operation	–20 °C ... +70 °C

1) Deviations are possible depending on the drive.
2) At 25 °C, the linearity error (maximum deviation) depends on response curve and minimum deviation function.
3) At 25 °C, repeatability with magnet movement from one direction.
4) A = UB connections reverse polarity protected
B = Inputs and outputs reverse polarity protected
C = Interference suppression
D = Outputs overcurrent and short-circuit protected

13.1 Dimensional drawing

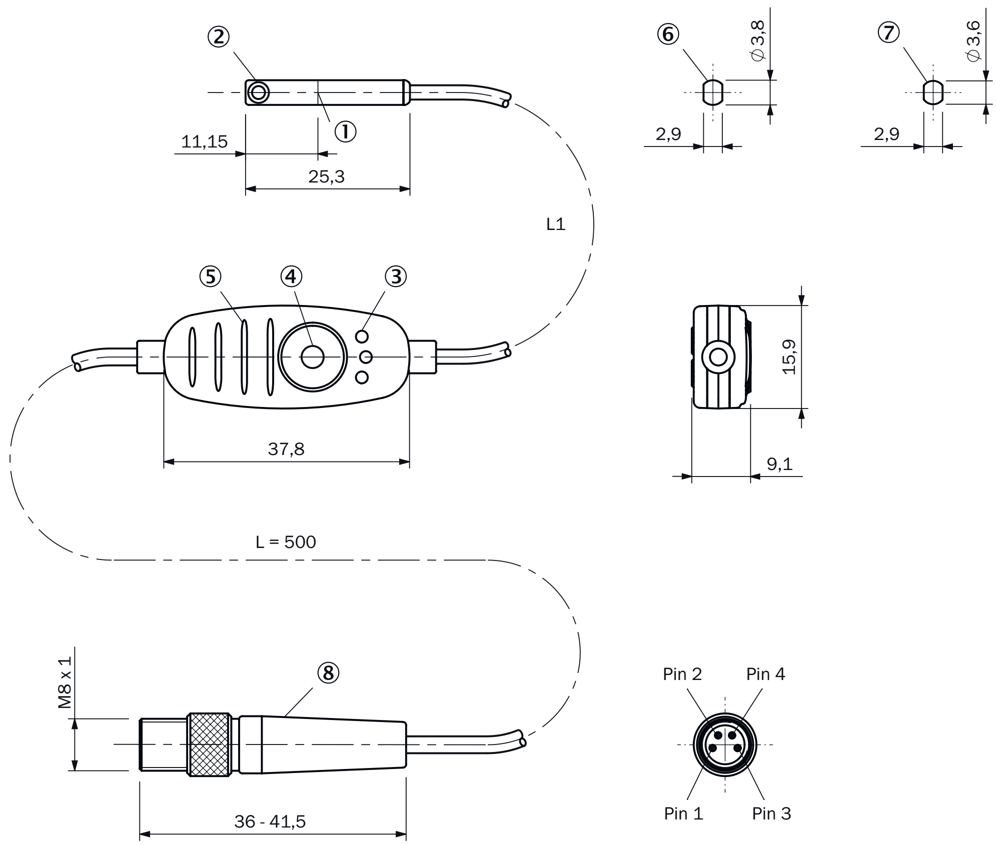


Figure 25: Dimensional drawing with male connector, M8 knurled

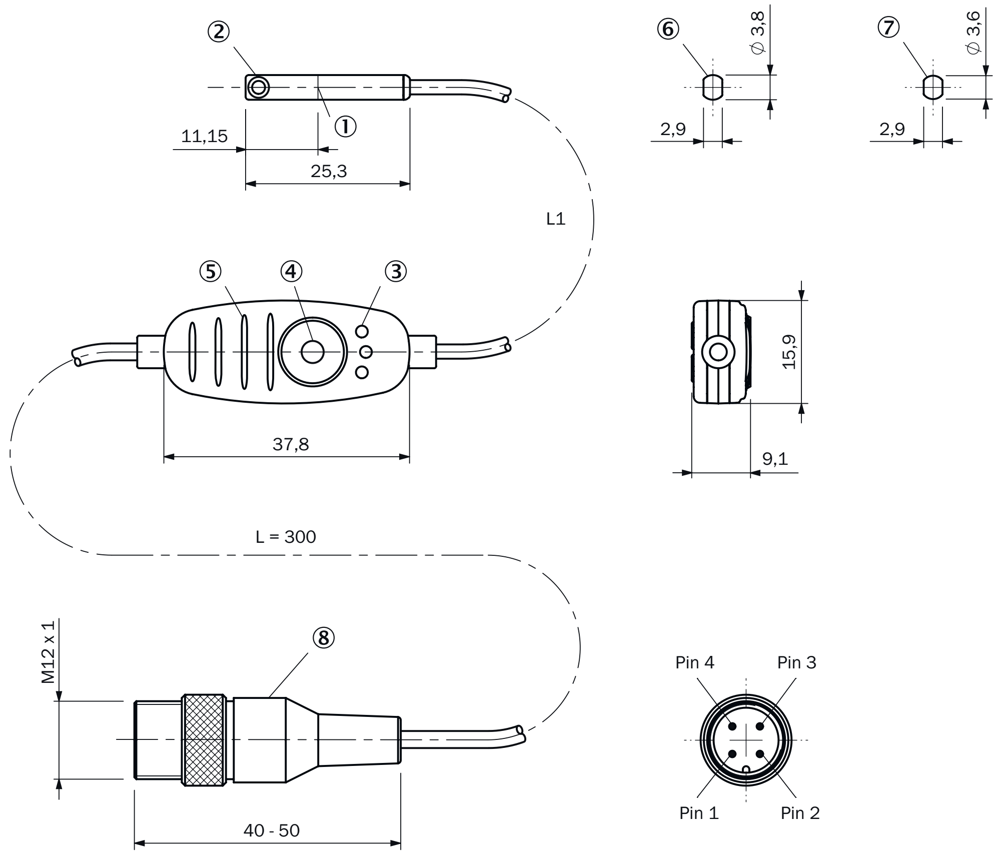


Figure 26: Dimensional drawing with male connector, M12 knurled

①	Center sensor element
②	Fixing screw, size 1.3
③	LED
④	Teach-in button
⑤	Ribs for cable tie
⑥	For SMC, Schunk, PHD, Bimba slot (MPS-G50CS...)
⑦	For Festo-, Zimmer slot (MPS-G50CF...)
⑧	Connection

Table 16: L1 length of sensor head / control panel connection cable

Type code	Connection cable length
MPS-Gxxxxx1xxxxxxxxxxxxxxxxxxx	0.1 m
MPS-Gxxxxx5xxxxxxxxxxxxxxxxxxx	0.5 m

14 Glossary

Currently measured field strength per sensor element	Currently measured field strength for • Sensor element 1 in mT (C1). Sensor element 1 is in the direction of the cable outlet of the sensor. • Sensor element 2 in mT (C2). Sensor element 2 is in the direction of the sensor fixing screw.
Cycle counter	Number of cycles One cycle corresponds to 2 strokes: Start position – stop position – start position The start position is in the direction of the sensor cable. The stop position is in the direction of the sensor fixing screw.
Cycle time	Duration of the last cycle in ms. One cycle corresponds to 2 strokes: Start position – stop position – start position The start position is in the direction of the sensor cable. The stop position is in the direction of the sensor fixing screw.
Cylinder stroke	Measured distance of the last stroke in mm.
Detection range	The detection range describes the maximum physical range in which the sensor can determine a position. The detection range is max. +30 mm and - 30 mm around the physical zero position.
Dwell time in start position	Dwell time in start position in ms. The start position is in the direction of the sensor cable.
Dwell time stop position	Dwell time in stop position in ms. The stop position is in the direction of the sensor fixing screw.
Dynamic Pilot	**Dynamic Pilot** sets an additional condition for the switching process during operation: In addition to the condition that the magnet must be located within the tolerance band defined in **Dynamic Teach**, the speed of the magnet must also be v = 0 and the approach direction must correspond in order to switch on. • Qint switches on ... ... when a magnet moves into the tolerance band and v = 0 for the first time within this tolerance band. (The approach direction must be plausible according to the Move and Grip applications, see figures in section 3.3.6) • After switching on, Qint remains on ... ... as long as the magnet is within the tolerance band and the hysteresis (depending on whether v = 0 or v ≠ 0). • Qint switches off ... ... as soon as the magnet leaves the hysteresis.
Dynamic Teach and Manual Teach	**Dynamic Teach** and **Manual Teach** are two different teach options. The teach-in button can be used to execute both **Dynamic Teach** and **Manual Teach**. • **Dynamic Teach:** **Dynamic Teach** can be used to have the sensor automatically set the end points of the desired measuring range. • **Manual Teach:** **Manual Teach** is used to manually teach in the two end points of the measuring range using the teach-in button. Both end points are taught in separately. The teach-in processes are described in detail in section 8.3.

Linearity error	The linearity error describes the maximum deviation of the output signal from an ideal straight line. It is measured in millimeters. MPS-G with 2/3 digital switching points and IO-Link (up to 16 switching points): The linearity error is typically 0.5 mm and depends on the measuring range and the drive on which the sensor is mounted.
Maximum measured field strength at sensor element 1	Maximum measured field strength for sensor element 1 in mT. This value is recalculated each time the element is passed over. Sensor element 1 is in the direction of the sensor cable.
Maximum measured field strength at sensor element 2	Maximum measured field strength for sensor element 2 in mT. This value is recalculated each time the element is passed over. Sensor element 2 is in the direction of the sensor fixing screw.
Measuring range	The measuring range can be anywhere inside the detection range. The measuring range must always be completely inside the detection range.
Offset	The offset is added to the position identified by the sensor. Negative position values can be output depending on the positioning of the sensor on the drive. If you do not want this, an offset value can be defined around which all position values are added. Position output = identified position of the sensor + offset value. The offset value is specified in digits. 1 digit corresponds to 10 µm.
Peak value of the field strength per sensor element	Maximum measured field strength • Of sensor element 1 in mT. The value is recalculated every time the element is overrun. Sensor element 1 is in the direction of the cable outlet of the sensor. • Of sensor element 2 in mT. The value is recalculated every time the element is overrun. Sensor element 2 is in the direction of the sensor fixing screw.
Piston velocity	Average speed of the piston during extension: Average measured speed of the stroke in the positive direction in m/s. The positive direction goes in the direction of the sensor fixing screw. Average speed of the piston during retraction: Average measured speed of the stroke in the negative direction in m/s. The negative direction goes in the direction of the sensor cable.
Qint	Qint.SP: SP = switching point
Range of movement	The range of movement describes the actual path traveled by the piston.
Repeatability	Repeatability is defined as any move to a preset position from the same direction in every case. MPS-G with 2/3 digital switching points and IO-Link (up to 16 switching points): The repeatability is typically 0.05 mm and depends on the drive on which the sensor is mounted.
Resolution	The sensor resolution describes the minimum, specifiable magnet route change as output by the sensor. MPS-G with 2/3 digital switching points and IO-Link (up to 16 switching points): The resolution is 0.01 mm.

Sampling rate	The sampling rate indicates the time interval in which the signal is updated at the outputs. MPS-G with 2/3 digital switching points and IO-Link (up to 16 switching points): The sampling rate is min. 2 kHz.
Stroke speed in positive direction	Average measured speed of the piston in the positive direction in m/s. The positive direction goes in the direction of the sensor fixing screw.
Stroke time in negative direction	Duration of the last stroke in the negative direction in ms. The negative direction goes in the direction of the cable outlet of the sensor. One stroke corresponds to movement in a direction. Direction of movement for retracting stroke: Start position - end position. The start position is the direction of the cable outlet of the sensor. The end position is in the direction of the sensor fixing screw.
Stroke time in positive direction	Duration of the last stroke in the positive direction in ms. The positive direction goes in the direction of the sensor fixing screw. One stroke corresponds to movement in a direction. Direction of movement for extending stroke: End position - start position. The start position is the direction of the cable outlet of the sensor. The end position is in the direction of the sensor fixing screw.
Stroke traveled	Measured travel of the last stroke in mm
Total cylinder travel	Total piston travel in m.
Total distance traveled by the piston	Total travel of the piston in m
Travel time of the piston during extension	Duration of the last stroke in the positive direction in ms. The positive direction goes in the direction of the sensor fixing screw. One stroke corresponds to movement in a direction. Direction of movement during extension: Stop position – start position. The start position is in the direction of the sensor cable. The stop position is in the direction of the sensor fixing screw.
Travel time of the piston during retraction	Duration of the last stroke in the negative direction in ms. The negative direction goes in the direction of the sensor cable. One stroke corresponds to movement in a direction. Direction of movement during retraction: Start position – stop position The start position is in the direction of the sensor cable. The stop position is in the direction of the sensor fixing screw.

15 Annex

15.1 Teach routine at a glance

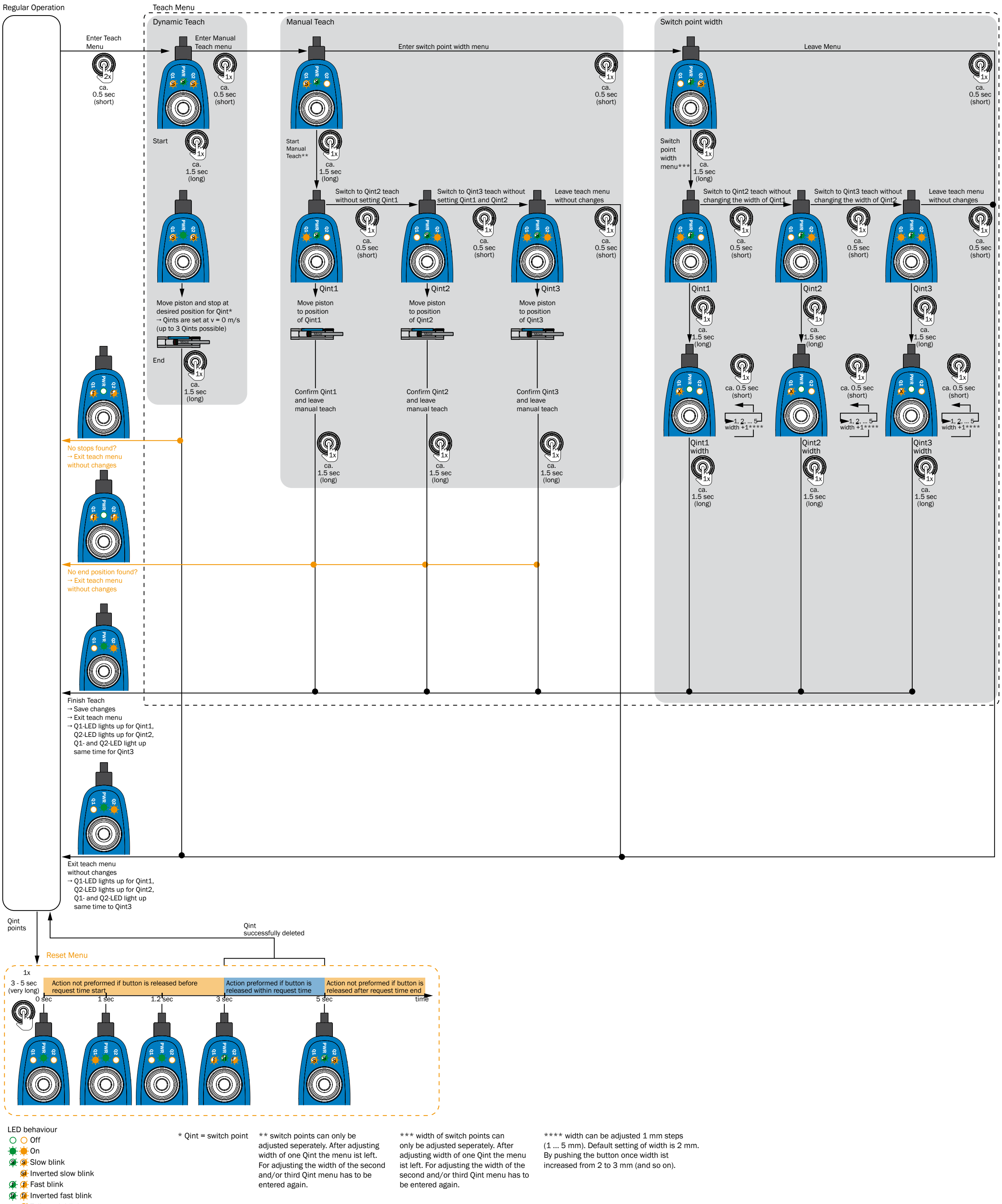


Figure 27: MPS-G IO-Link teach routine

15.2 Conformities and certificates

You can obtain declarations of conformity, certificates and the current documentation 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).

8025943.1GWA/2022-08-15/en

Australia
Phone +61 (3) 9457 0600
1800 33 48 02 – tollfree
E-Mail sales@sick.com.au

Austria
Phone +43 (0) 2236 62288-0
E-Mail office@sick.at

Belgium/Luxembourg
Phone +32 (0) 2 466 55 66
E-Mail info@sick.be

Brazil
Phone +55 11 3215-4900
E-Mail comercial@sick.com.br

Canada
Phone +1 905.771.1444
E-Mail cs.canada@sick.com

Czech Republic
Phone +420 234 719 500
E-Mail sick@sick.cz

Chile
Phone +56 (2) 2274 7430
E-Mail chile@sick.com

China
Phone +86 20 2882 3600
E-Mail info.china@sick.net.cn

Denmark
Phone +45 45 82 64 00
E-Mail sick@sick.dk

Finland
Phone +358-9-25 15 800
E-Mail sick@sick.fi

France
Phone +33 1 64 62 35 00
E-Mail info@sick.fr

Germany
Phone +49 (0) 2 11 53 010
E-Mail info@sick.de

Greece
Phone +30 210 6825100
E-Mail office@sick.com.gr

Hong Kong
Phone +852 2153 6300
E-Mail ghk@sick.com.hk

Hungary
Phone +36 1 371 2680
E-Mail ertekesites@sick.hu

India
Phone +91-22-6119 8900
E-Mail info@sick-india.com

Israel
Phone +972 97110 11
E-Mail info@sick-sensors.com

Italy
Phone +39 02 27 43 41
E-Mail info@sick.it

Japan
Phone +81 3 5309 2112
E-Mail support@sick.jp

Malaysia
Phone +603-8080 7425
E-Mail enquiry.my@sick.com

Mexico
Phone +52 (472) 748 9451
E-Mail mexico@sick.com

Netherlands
Phone +31 (0) 30 229 25 44
E-Mail info@sick.nl

New Zealand
Phone +64 9 415 0459
0800 222 278 – tollfree
E-Mail sales@sick.co.nz

Norway
Phone +47 67 81 50 00
E-Mail sick@sick.no

Poland
Phone +48 22 539 41 00
E-Mail info@sick.pl

Romania
Phone +40 356-17 11 20
E-Mail office@sick.ro

Russia
Phone +7 495 283 09 90
E-Mail info@sick.ru

Singapore
Phone +65 6744 3732
E-Mail sales.gsg@sick.com

Slovakia
Phone +421 482 901 201
E-Mail mail@sick-sk.sk

Slovenia
Phone +386 591 78849
E-Mail office@sick.si

South Africa
Phone +27 10 060 0550
E-Mail info@sickautomation.co.za

South Korea
Phone +82 2 786 6321/4
E-Mail infokorea@sick.com

Spain
Phone +34 93 480 31 00
E-Mail info@sick.es

Sweden
Phone +46 10 110 10 00
E-Mail info@sick.se

Switzerland
Phone +41 41 619 29 39
E-Mail contact@sick.ch

Taiwan
Phone +886-2-2375-6288
E-Mail sales@sick.com.tw

Thailand
Phone +66 2 645 0009
E-Mail marcom.th@sick.com

Turkey
Phone +90 (216) 528 50 00
E-Mail info@sick.com.tr

United Arab Emirates
Phone +971 (0) 4 88 65 878
E-Mail contact@sick.ae

United Kingdom
Phone +44 (0)17278 31121
E-Mail info@sick.co.uk

USA
Phone +1 800.325.7425
E-Mail info@sick.com

Vietnam
Phone +65 6744 3732
E-Mail sales.gsg@sick.com

Detailed addresses and further locations at **www.sick.com**