

ICS08 IO-Link 3-wire DC



Miniaturized proximity inductive sensors with IO-Link communication



Description

ICS08 series represents the optimal solution for industrial automation equipment in applications where space is limited, but long switching distance is needed, including tool-selection and textile machines. The advanced electronics is encapsulated in a robust stainless steel housing. The availability of the M8-plug and 2m-PVC cable connection in short or long housing construction allows flexible mounting.

On-board IO-Link communication opens up many possibilities, such as easy configuration and set-up of the devices and advanced parameter setting.

Benefits

- **A complete family.** Available in M8 male thread robust stainless steel housings with an operating distance of 2 to 4 mm.
- **Easy to install.** Both flush and non-flush construction are available. The user can choose between short and long body housings in 2 m PVC cable or M8-disconnect plug versions.
- **High precision.** The onboard advanced microcontroller ensures better stability with respect to environmental influences, with highly repeatable measurements between -25 and +80°C.
- **Easy customization to specific OEM requests:** different cable lengths and materials, special labelling, customized pig-tail solutions with special cables and connectors are possible on request.

Only for IO-Link sensors

- **The output** can be operated either as a switching output or in IO-Link mode.
- **Fully configurable via IO-Link v1.1.** Electrical outputs can be configured as PNP/NPN/Push-pull, normally open or normally closed.
- **Timer functions** can be set, such as switch-on and switch-off delay
- **Adjustable sensing distance and hysteresis:** sensing distance can be set to 50% or 100% of the maximum sensing distance
- **Temperature monitoring:** over or under-run temperature alarms can be set



Applications

- Non contact detection of metal objects in general position-sensing and presence-sensing in industrial applications
- Particularly suitable for rotational speed monitoring thanks to the high operating frequency

Main functions

- Integrated diagnostic function with flashing LED in the event of a short circuit or overload

IO-Link sensors

- The devices can be operated in IO-Link mode once connected to an IO-Link master, or in standard I/O mode.
- In IO-Link mode the switching signals of the sensor are made available in the process data via the IO-Link interface.
- Several sensor functions can be set via the IO-Link interface:
 - ▶ Adjustable switching distance: 50% or 100% of the maximum switching distance.
 - ▶ Adjustable hysteresis: standard or increased value.
 - ▶ Divider function: the sensor gives a signal after a specified number of actuation pulses has been reached.
 - ▶ Switch-on delay: the switching pulse is generated after the sensor actuation.
 - ▶ Switch-off delay: the generation of the switch signal is delayed by the set time after sensor actuation.
 - ▶ Temperature error: temperature is out of specifications.
 - ▶ Temperature over-run and under-run: temperature is out of the limits defined by the user.

References


Order code

 I C S 08

Enter the code option instead of

| Code | Option | Description |
|--------------------------|--------|---|
| I | - | Inductive sensor |
| C | - | Cylindrical housing with threaded barrel |
| S | - | Stainless steel housing |
| 08 | - | M8 housing |
| <input type="checkbox"/> | S30 | Short housing with thread barrel of 30 mm |
| <input type="checkbox"/> | L45 | Long housing with thread length of 45 mm |
| <input type="checkbox"/> | F | Flush |
| <input type="checkbox"/> | N | Non-flush |
| <input type="checkbox"/> | 20 | Sensing distance 2mm |
| <input type="checkbox"/> | 40 | Sensing distance 4mm |
| <input type="checkbox"/> | M5 | M8 plug |
| <input type="checkbox"/> | A2 | 2 m PVC cable |
| <input type="checkbox"/> | NO | NPN – normally open output |
| <input type="checkbox"/> | NC | NPN – normally closed output |
| <input type="checkbox"/> | PO | PNP – normally open output |
| <input type="checkbox"/> | PC | PNP – normally closed output |
| <input type="checkbox"/> | IO | IO-Link programmable version |

Additional characters can be used for customized versions.


Selection guide
M8 extended range, short housing

| Con- nec- tion | Rated operating distance Sn | Dete- ction princi- ple | Ordering no. NPN, Normally open | Ordering no. PNP, Normally open | Ordering no. NPN, Normally closed | Ordering no. PNP, Normally closed |
|----------------------|--------------------------------------|----------------------------------|---------------------------------------|---------------------------------------|---|---|
| Cable | 2 mm | Flush | ICS08S30F20A2NO | ICS08S30F20A2PO | ICS08S30F20A2NC | ICS08S30F20A2PC |
| Plug | | | ICS08S30F20M5NO | ICS08S30F20M5PO | ICS08S30F20M5NC | ICS08S30F20M5PC |
| Cable | 4 mm | Non- flush | ICS08S30N40A2NO | ICS08S30N40A2PO | ICS08S30N40A2NC | ICS08S30N40A2PC |
| Plug | | | ICS08S30N40M5NO | ICS08S30N40M5PO | ICS08S30N40M5NC | ICS08S30N40M5PC |

M8 extended range, long housing

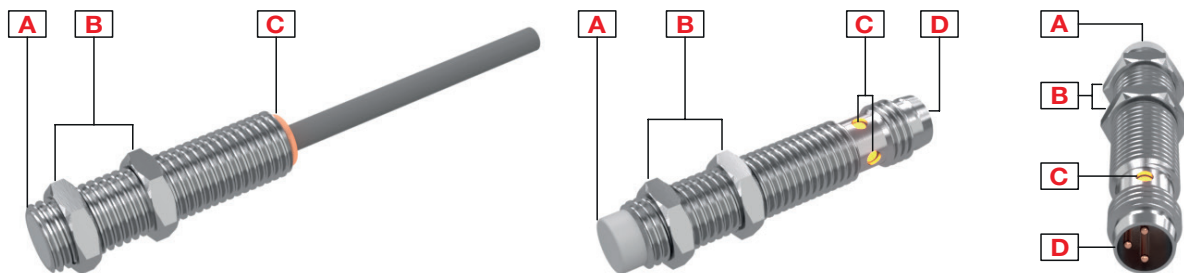
| Con- nec- tion | Rated operating distance Sn | Dete- ction princi- ple | Ordering no. NPN, Normally open | Ordering no. PNP, Normally open | Ordering no. NPN, Normally closed | Ordering no. PNP, Normally closed |
|----------------------|--------------------------------------|----------------------------------|---------------------------------------|---------------------------------------|---|---|
| Cable | 2 mm | Flush | ICS08L45F20A2NO | ICS08L45F20A2PO | ICS08L45F20A2NC | ICS08L45F20A2PC |
| Plug | | | ICS08L45F20M5NO | ICS08L45F20M5PO | ICS08L45F20M5NC | ICS08L45F20M5PC |
| Cable | 4 mm | Non- flush | ICS08L45N40A2NO | ICS08L45N40A2PO | ICS08L45N40A2NC | ICS08L45N40A2PC |
| Plug | | | ICS08L45N40M5NO | ICS08L45N40M5PO | ICS08L45N40M5NC | ICS08L45N40M5PC |

IO-Link types

| Con- nec- tion | Body style | Dete- ction princi- ple | Rated operating distance Sn | Output type | Ordering no. |
|----------------------|---------------|----------------------------------|---|---|-----------------|
| Cable | Short | Flush | Configurable: 1 or 2mm Factory setting: 2mm | Configurable: NPN/PNP/ push-pull NO/NC Factory setting: PNP, NO | ICS08S30F20A2IO |
| Plug | | | ICS08S30F20M5IO | | |
| Cable | | Non- flush | Configurable: 2 or 4mm Factory setting: 4mm | | ICS08S30N40A2IO |
| Plug | | | ICS08S30N40M5IO | | |
| Cable | Long | Flush | Configurable: 1 or 2mm Factory setting: 2mm | | ICS08L45F20A2IO |
| Plug | | | ICS08L45F20M5IO | | |
| Cable | | Non- flush | Configurable: 2 or 4mm Factory setting: 4mm | | ICS08L45N40A2IO |
| Plug | | | ICS08L45N40M5IO | | |

Structure

ICS08

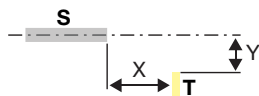


| Element | Component | Function |
|---------|---------------------------|---|
| A | Sensing face | Flush or non-flush |
| B | 2 nuts | For sensor mounting |
| C | LED | Yellow LED: Output flashing: short circuit or overload indication |
| D | M8, 3 pin, male connector | For plug versions only |

Sensing

Detection

| | |
|--|---|
| Rated operating distance S_n | 2 mm flush or 4 mm non-flush |
| Reference target | The operating distance is measured according to IEC 60947-5-2, using a standard target moving axially. This target is square shape 1 mm thickness, made of steel e.g. type Fe 360 as defined in ISO 630 and it shall be of the rolled finish. The length of the side of the square is equal to – the diameter of the circle inscribed on the active surface of the sensing face, or – three times the rated operating distance S_n whichever is greater |
| Assured operating sensing distance (S_a) | $0 \leq S_a \leq 0.81 \times S_n$ (e.g. with S_n of 2 mm, S_a is 0 ... 1.62 mm) |
| Effective operating distance (S_r) | $0.9 \times S_n \leq S_r \leq 1.1 \times S_n$ |
| Usable operating distance (S_u) | $0.9 \times S_r \leq S_u \leq 1.1 \times S_r$ |
| Temperature drift | $\leq \pm 10\%$ |
| Hysteresis (H) | 1...20% |



S: sensor
T: target

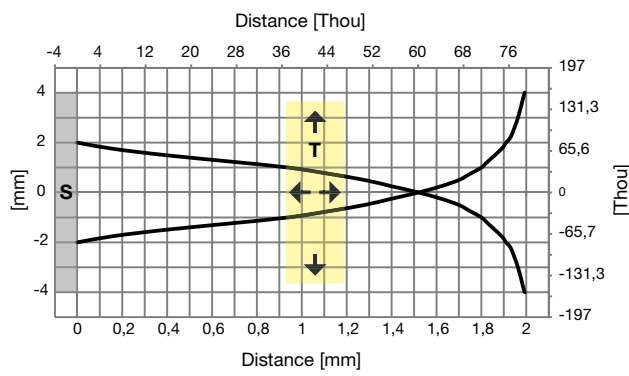


Fig. 1 Flush

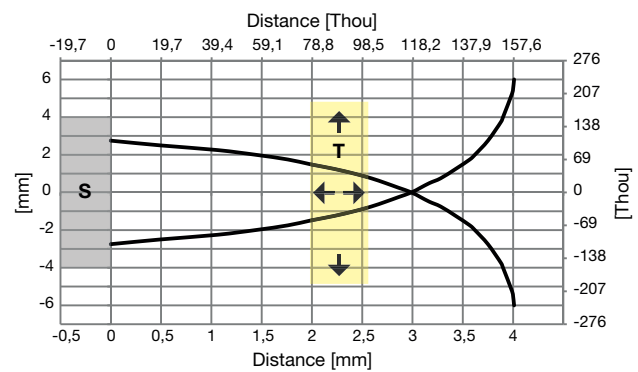


Fig. 2 Non-flush

Sensors with IO-Link communication

| | |
|--|--|
| Rated operating distance S_n | Programmable via IO-Link: 50% or 100% of the maximum S_n |
| Hysteresis (H) | Programmable via IO-Link: standard or increased |

Correction factors

The specific operating distance S_n refers to defined measuring conditions. The following data have to be considered as general guidelines.

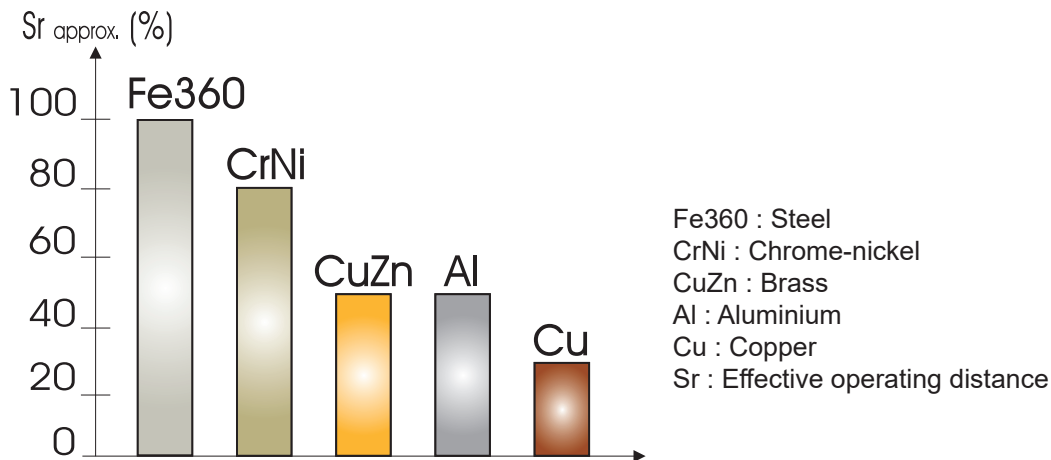


Fig. 3 The rated operating distance is reduced by the use of metals and alloys other than Fe360. The most important reduction factors for inductive proximity sensors are shown in the figure.

Accuracy

| | |
|---------------------|------|
| Repeat accuracy (R) | ≤ 5% |
|---------------------|------|

Features

Power Supply

| | |
|-------------------------------------|--------------------------------|
| Rated operational voltage (U_b) | 10 to 30 VDC (ripple included) |
| Ripple (U_{rpp}) | ≤ 10% |
| No load supply current (I_o) | ≤ 17 mA |
| Power ON delay (t_o) | ≤ 50 ms |

Outputs

| | Standard sensors | IO-Link sensors |
|---|--|---|
| Output functions | NPN or PNP by sensor type | Configurable via IO-Link: PNP, NPN or push-pull Factory setting: PNP |
| Output configuration | N.O. and N.C. by sensor type | Configurable via IO-Link: N.O. or N.C. Factory setting: N.O. |
| Output current (I_o) | ≤ 100 mA | |
| OFF-state current (I_o) (only for PNP or NPN output) | ≤ 100 μ A | |
| Voltage drop (U_d) | Max. 1.2 VDC @ 100 mA | |
| Protection | Short-circuit, reverse polarity and transients | |
| Voltage transient | 1 kV/0.5 J | |

Response times

| | |
|-------------------------|---------|
| Operating frequency (f) | ≤ 2 KHz |
|-------------------------|---------|

Indication

Standard IO mode:

| Yellow LED | Output | Description |
|------------|--------|--|
| OFF | OFF | N.O. output, target not present N.C. output, target present |
| ON | ON | N.O. output, target present N.C. output, target not present |
| Blinking | f: 2Hz | Short-circuit or overload |
| | f: 1Hz | Temperature alarm (if enabled) |





IO-Link mode:

- LED is ON for 0.75 s and OFF for 0.075 s
- Possibility to disable the LED

Environmental

| | | |
|----------------------|---|-----------------------|
| Ambient temperature | Operating: -25° to +80°C (-13° to +176°F) | |
| | Storage: -30° to +80°C (-22° to +176°F) | |
| Ambient humidity | Operating: 35% to 95% | |
| | Storage: 35% to 95% | |
| Vibration | 10 to 55 Hz, amplitude 1.0 mm; sweep cycle 5 min; in X, Y and Z direction | IEC 60068-2-6 |
| Shock | 30 G /11 ms. 10 shocks in X, Y and Z direction | IEC 60068-2-27 |
| Degree of protection | IP67 | IEC 60529; EN 60947-1 |

Compatibility and conformity

| | | |
|-------------------|---|--|
| EMC protection | IEC 61000-4-2 Electrostatic discharge | 8 kV air discharge 4 kV contact discharge |
| | IEC 61000-4-3 Radiated radiofrequency | 3 V/m |
| | IEC 61000-4-4 Burst immunity | 2 kV |
| | IEC 61000-4-6 Conducted radio frequency | 3 V |
| | IEC 61000-4-8 Power frequency magnetic fields | 30 A/m |
| MTTF _d | 4513 years @ 50°C (122°F) | |
| Approvals |     IO-Link | |
| | CCC is not required for products rated ≤ 36 V | |

Mechanical data

| | |
|---|---|
| Weight (including 2 nuts and the packaging) max. | Cable version: short, flush: 44.8g; short, non-flush: 44.9g; long, flush: 47g; long, non-flush: 47.1g; Plug version: short, flush: 16g; short, non-flush: 16.1g; long, flush: 18.4g; long, non-flush: 18.5g. |
| Mounting | Flush mountable or non-flush mountable |
| Material | Housing: stainless steel AISI304 Front cap: Grey thermoplastic polyester |
| Max tightening torque | 7 Nm |

Electrical connection

| | |
|--------------|--|
| Cable | 2m, 3 x 0.14 mm ² , Ø3.2 mm, PVC, grey, oil proof |
| Plug | M8 x 1 quick disconnect, 3 pin, male connector |

IO-Link version only

| | |
|----------------------|--------------------------------------|
| Communication | Via IO-Link V1.1 or via standard I/O |
|----------------------|--------------------------------------|



Connection Diagrams

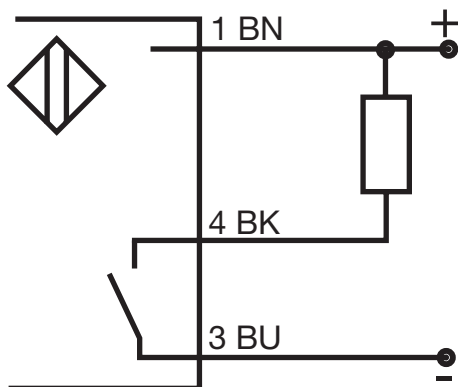


Fig. 4 NPN - Normally open

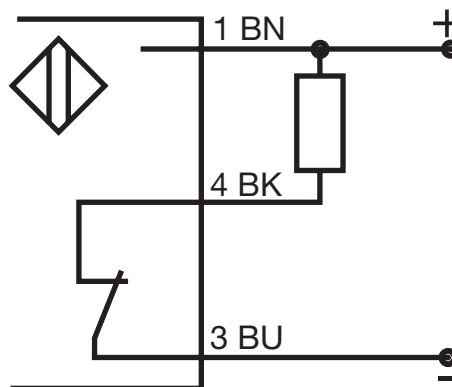


Fig. 5 NPN - Normally closed

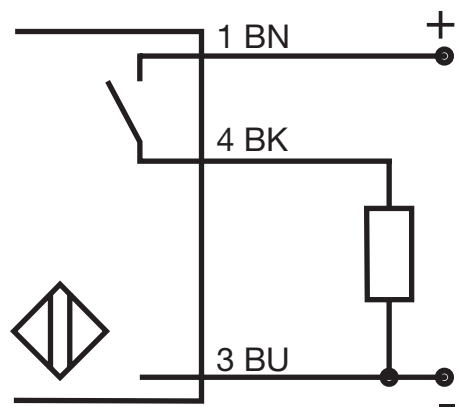


Fig. 6 PNP - Normally open

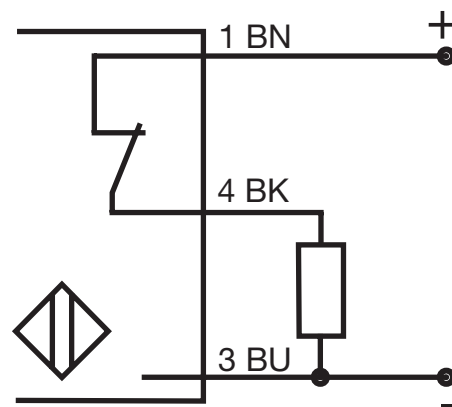


Fig. 7 PNP - Normally closed

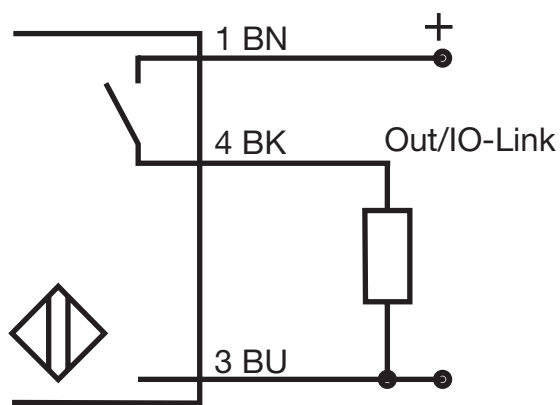


Fig. 8 IO-Link

| Colour code | | |
|-------------|-----------|----------|
| BN: brown | BK: black | BU: blue |

Dimensions [mm]

ICS08 [mm]

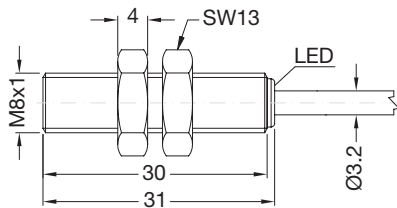


Fig. 9 Short body, flush version, cable

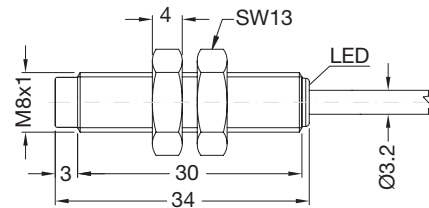


Fig. 10 Short body, non-flush version, cable

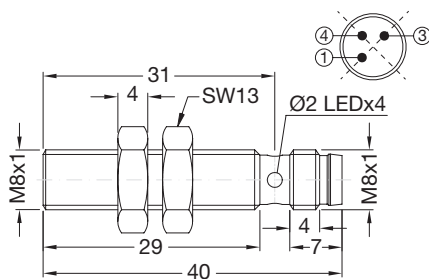


Fig. 11 Short body, flush version, plug

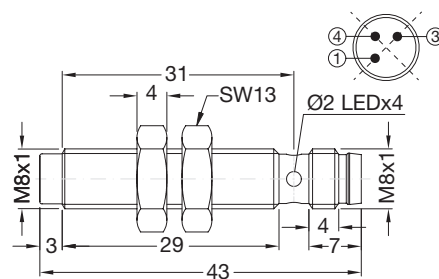


Fig. 12 Short body, non-flush version, plug

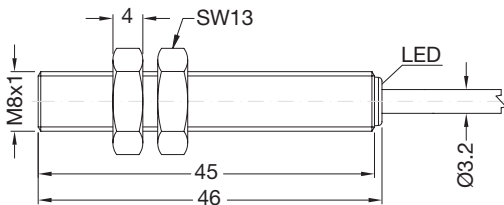


Fig. 13 Long body, flush version, cable

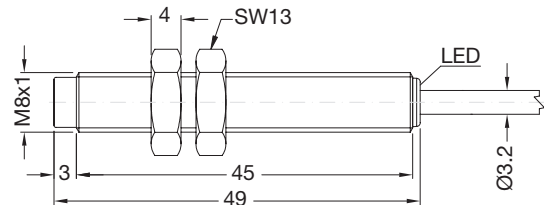


Fig. 14 Long body, non-flush version, cable

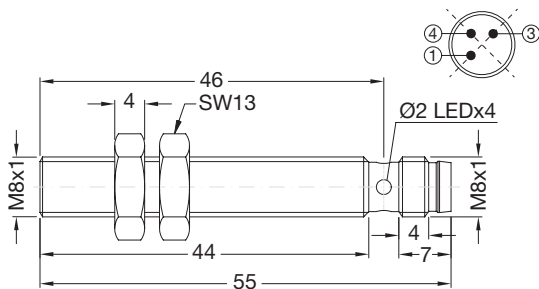


Fig. 15 Long body, flush version, plug

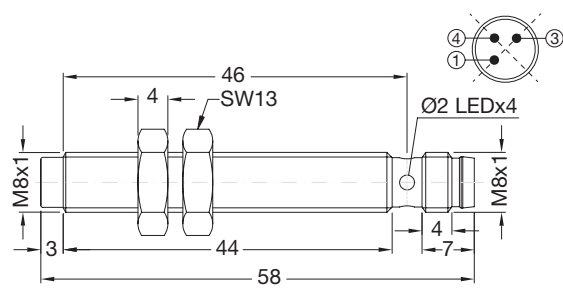


Fig. 16 Long body, non-flush version, plug

Installation

M8 flush

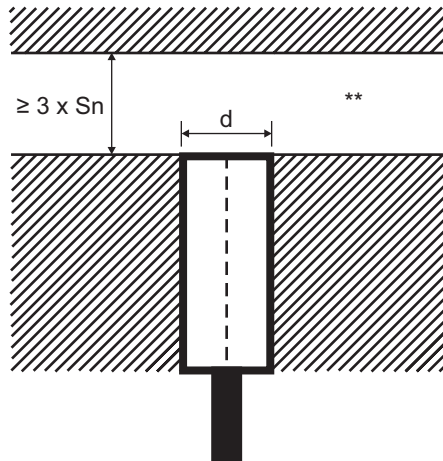


Fig. 17 Flush sensor, when installed in damping material

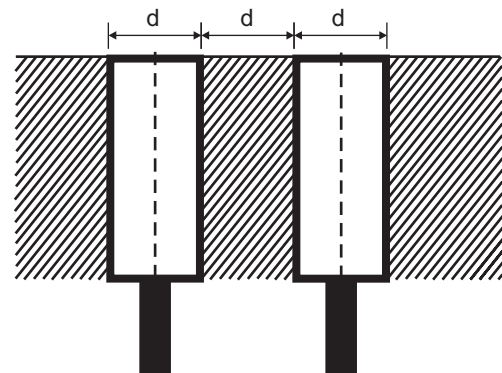


Fig. 18 Flush sensors, when installed together in damping material

M8 non-flush

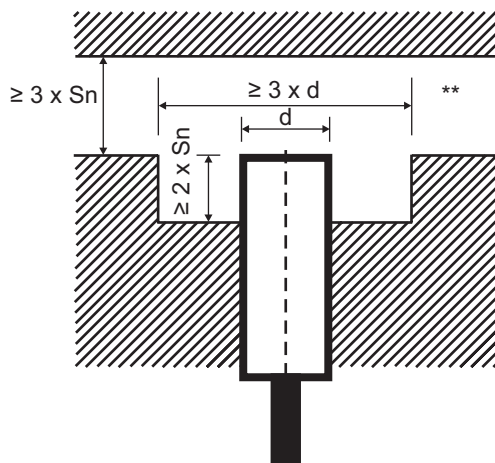


Fig. 19 Non-flush sensor, when installed in damping material

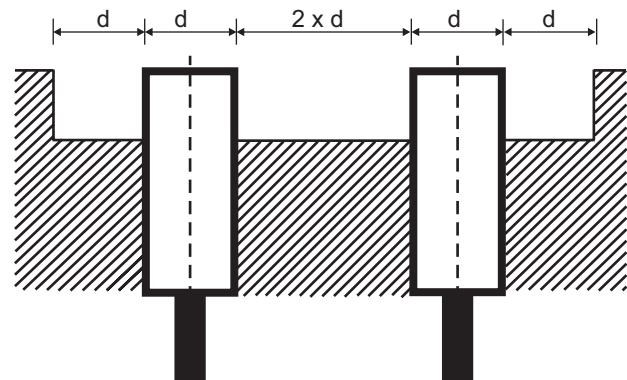


Fig. 20 Non-flush sensors, when installed together in damping material

Sensors installed opposite each other

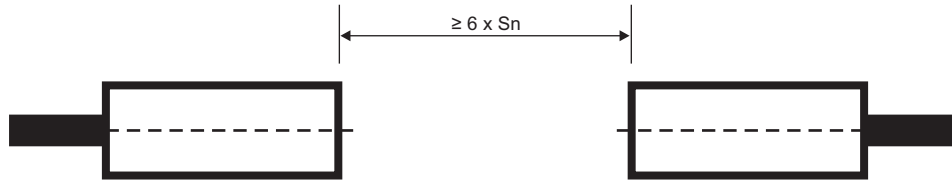


Fig. 21 For sensors installed opposite each other, a minimum space of $6 \times S_n$ (the nominal sensing distance) must be observed

** Free zone or non-damping material

S_n : nominal sensing distance

d: sensor diameter: 8 mm

Delivery contents and compatible components




Delivery contents

- Inductive proximity switch
- 2 fixing nuts
- 2 lock washers
- Packaging: plastic bag

CARLO GAVAZZI compatible components

- Mounting bracket AMB8... to be purchased separately
- Connector type: CONB53... series to be purchased separately

Further reading

| Information | Where to find it | QR |
|-------------------|---|---|
| IO-Link manual | http://www.productselection.net/MANUALS/UK/IOL_IM.pdf |  |
| Mounting brackets | http://www.productselection.net/Pdf/UK/AMB8_30.pdf |  |
| Connectors | http://www.productselection.net/Pdf/UK/CONB5.pdf |  |