

# ICS08 3-wire DC



## Miniaturized proximity inductive sensors



### Benefits

- **A complete family.** Available in M8 male thread robust stainless steel housings with an operating distance of 1 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.
- **Integrated diagnostic function** with flashing LED in the event of a short circuit or overload
- **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.

### 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. Output is open collector NPN or PNP transistors.

### 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

## References

### Order code

 ICS08

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 |
|                          | L45    | Long housing with thread length of 45 mm  |
| <input type="checkbox"/> | F      | Flush                                     |
|                          | N      | Non-flush                                 |
| <input type="checkbox"/> | 01     | Sensing distance 1mm                      |
|                          | 02     | Sensing distance 2mm                      |
|                          | 04     | Sensing distance 4mm                      |
| <input type="checkbox"/> | NO     | NPN – normally open output                |
|                          | NC     | NPN – normally closed output              |
|                          | PO     | PNP – normally open output                |
|                          | PC     | PNP – normally closed output              |
| <input type="checkbox"/> | M5     | M8 plug                                   |
|                          | (null) | 2 m PVC cable                             |

Additional characters can be used for customized versions.

### Selection guide

#### M8 standard range, short housing

| Con-<br>nec-<br>tion | Rated<br>operating<br>distance<br>Sn | Dete-<br>ction<br>princi-<br>ple | Ordering no.<br>NPN,<br>Normally open | Ordering no.<br>PNP,<br>Normally open | Ordering no.<br>NPN,<br>Normally closed | Ordering no.<br>PNP,<br>Normally closed |
|----------------------|--------------------------------------|----------------------------------|---------------------------------------|---------------------------------------|---|---|
| Cable<br>Plug        | 1 mm                                 | Flush                            | ICS08S30F01NO                         | ICS08S30F01PO                         | ICS08S30F01NC                           | ICS08S30F01PC                           |
|                      |                                      |                                  | ICS08S30F01NOM5                       | ICS08S30F01POM5                       | ICS08S30F01NCM5                         | ICS08S30F01PCM5                         |
| Cable<br>Plug        | 2 mm                                 | Non-<br>flush                    | ICS08S30N02NO                         | ICS08S30N02PO                         | ICS08S30N02NC                           | ICS08S30N02PC                           |
|                      |                                      |                                  | ICS08S30N02NOM5                       | ICS08S30N02POM5                       | ICS08S30N02NCM5                         | ICS08S30N02PCM5                         |



### M8 standard range, long housing

| Con-<br>nec-<br>tion | Rated<br>operating<br>distance<br>Sn | Dete-<br>ction<br>princi-<br>ple | Ordering no.<br>NPN,<br>Normally open | Ordering no.<br>PNP,<br>Normally open | Ordering no.<br>NPN,<br>Normally closed | Ordering no.<br>PNP,<br>Normally closed |
|----------------------|--------------------------------------|----------------------------------|---------------------------------------|---------------------------------------|---|---|
| Cable                | 1 mm                                 | Flush                            | ICS08L45F01NO                         | ICS08L45F01PO                         | ICS08L45F01NC                           | ICS08L45F01PC                           |
| Plug                 |                                      |                                  | ICS08L45F01NOM5                       | ICS08L45F01POM5                       | ICS08L45F01NCM5                         | ICS08L45F01PCM5                         |
| Cable                | 2 mm                                 | Non-<br>flush                    | ICS08L45N02NO                         | ICS08L45N02PO                         | ICS08L45N02NC                           | ICS08L45N02PC                           |
| Plug                 |                                      |                                  | ICS08L45N02NOM5                       | ICS08L45N02POM5                       | ICS08L45N02NCM5                         | ICS08L45N02PCM5                         |

### M8 extended range, short housing

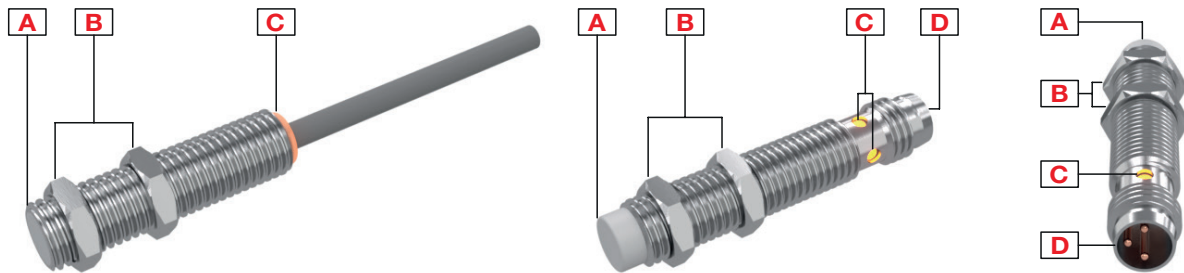
| Con-<br>nec-<br>tion | Rated<br>operating<br>distance<br>Sn | Dete-<br>ction<br>princi-<br>ple | Ordering no.<br>NPN,<br>Normally open | Ordering no.<br>PNP,<br>Normally open | Ordering no.<br>NPN,<br>Normally closed | Ordering no.<br>PNP,<br>Normally closed |
|----------------------|--------------------------------------|----------------------------------|---------------------------------------|---------------------------------------|---|---|
| Cable                | 2 mm                                 | Flush                            | ICS08S30F02NO                         | ICS08S30F02PO                         | ICS08S30F02NC                           | ICS08S30F02PC                           |
| Plug                 |                                      |                                  | ICS08S30F02NOM5                       | ICS08S30F02POM5                       | ICS08S30F02NCM5                         | ICS08S30F02PCM5                         |
| Cable                | 4 mm                                 | Non-<br>flush                    | ICS08S30N04NO                         | ICS08S30N04PO                         | ICS08S30N04NC                           | ICS08S30N04PC                           |
| Plug                 |                                      |                                  | ICS08S30N04NOM5                       | ICS08S30N04POM5                       | ICS08S30N04NCM5                         | ICS08S30N04PCM5                         |

### M8 extended range, long housing

| Con-<br>nec-<br>tion | Rated<br>operating<br>distance<br>Sn | Dete-<br>ction<br>princi-<br>ple | Ordering no.<br>NPN,<br>Normally open | Ordering no.<br>PNP,<br>Normally open | Ordering no.<br>NPN,<br>Normally closed | Ordering no.<br>PNP,<br>Normally closed |
|----------------------|--------------------------------------|----------------------------------|---------------------------------------|---------------------------------------|---|---|
| Cable                | 2 mm                                 | Flush                            | ICS08L45F02NO                         | ICS08L45F02PO                         | ICS08L45F02NC                           | ICS08L45F02PC                           |
| Plug                 |                                      |                                  | ICS08L45F02NOM5                       | ICS08L45F02POM5                       | ICS08L45F02NCM5                         | ICS08L45F02PCM5                         |
| Cable                | 4 mm                                 | Non-<br>flush                    | ICS08L45N04NO                         | ICS08L45N04PO                         | ICS08L45N04NC                           | ICS08L45N04PC                           |
| Plug                 |                                      |                                  | ICS08L45N04NOM5                       | ICS08L45N04POM5                       | ICS08L45N04NCM5                         | ICS08L45N04PCM5                         |

## Structure

### ICS08

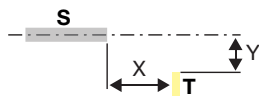


| Element | Component                 | Function  |
|---------|---------------------------|---|
| A       | Sensing face              | Flush or non-flush  |
| B       | 2 nuts                    | For sensor mounting   |
| C       | LED                       | Yellow LED: Output flashing: short circuit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

# Sensing

## Detection

|  |   |
|--|---|
| <b>Rated operating distance <math>S_n</math></b>             | Standard range: 1 mm (flush) and 2 mm (non-flush)<br>Extended range: 2 mm (flush) and 4mm (non-flush)   |
| <b>Reference target</b>                                      | The operating distance is measured according to IEC 60947-5-2, using a standard target moving axially.<br>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.<br>The length of the side of the square is equal to<br>– the diameter of the circle inscribed on the active surface of the sensing face, or<br>– three times the rated operating distance $S_n$ whichever is greater |
| <b>Assured operating sensing distance (<math>S_a</math>)</b> | $0 \leq S_a \leq 0.81 \times S_n$ (e.g. with $S_n$ of 2 mm, $S_a$ is 0 ... 1.62 mm)   |
| <b>Effective operating distance (<math>S_r</math>)</b>       | $0.9 \times S_n \leq S_r \leq 1.1 \times S_n$   |
| <b>Usable operating distance (<math>S_u</math>)</b>          | $0.9 \times S_r \leq S_u \leq 1.1 \times S_r$   |
| <b>Temperature drift</b>                                     | $\leq \pm 10\%$   |
| <b>Hysteresis (H)</b>  | 1...20%   |



S: sensor  
T: target

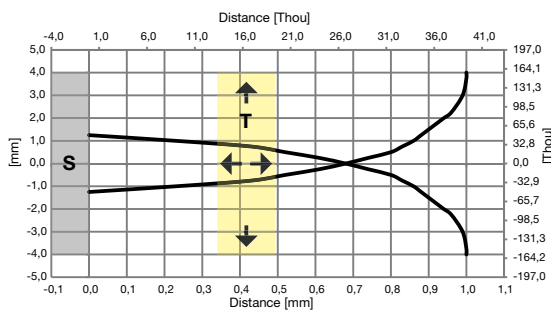


Fig. 1 Flush, 1mm

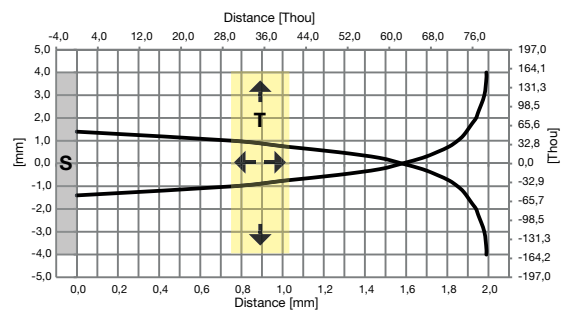


Fig. 2 Flush, 2mm

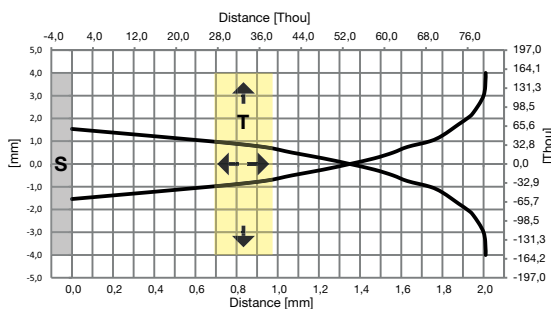


Fig. 3 Non-flush, 2mm

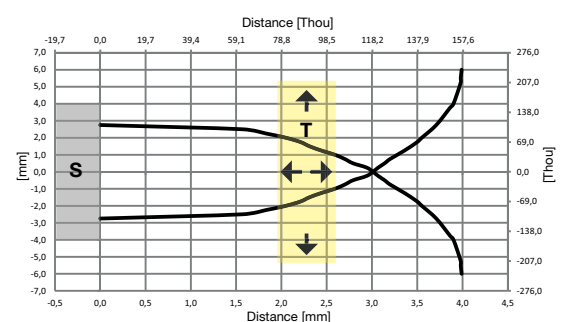
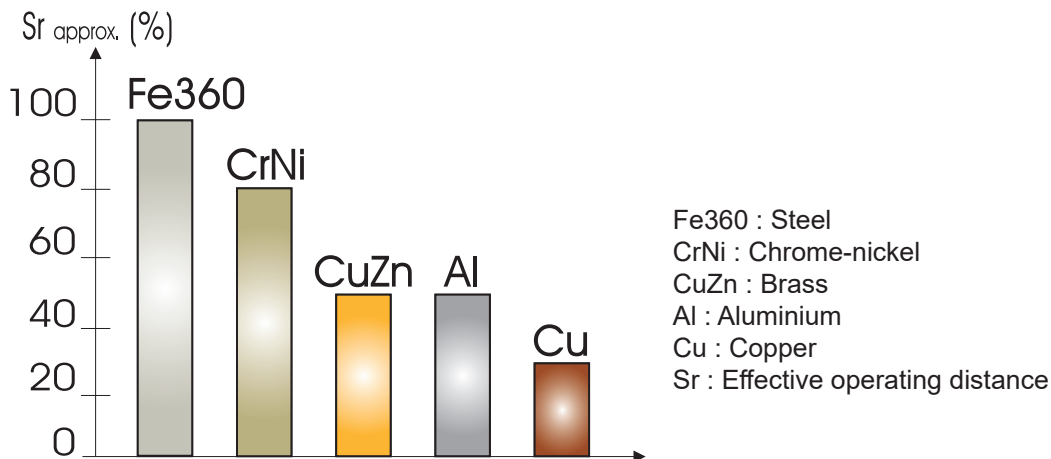


Fig. 4 Non-flush, 4mm

## Correction factors

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



**Fig. 5** 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 36 VDC (ripple included) |
| Ripple ( $U_{rip}$ )                | ≤ 10%                          |
| No load supply current ( $I_o$ )    | ≤ 16 mA                        |
| Power ON delay ( $t_v$ )            | ≤ 20 ms                        |

### Outputs

|                             |   |
|-----------------------------|---|
| Output functions            | NPN or PNP by sensor type                                       |
| Output configuration        | N.O. and N.C. by sensor type                                    |
| Output current ( $I_o$ )    | ≤ 200 mA @ 50°C (122°F); ≤ 150 mA @ 50°C...80°C (122°F...176°F) |
| OFF-state current ( $I_o$ ) | ≤ 50 μA   |
| Voltage drop ( $U_d$ )      | Max. 1.6 VDC @ 200 mA   |
| Protection                  | Short-circuit, reverse polarity, transients and overload        |
| 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<br>N.C. output, target present |
| ON         | ON     | N.O. output, target present<br>N.C. output, target not present |
| Blinking   | f: 2Hz | Short-circuit or overload                                      |

## 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<br>IEC 60947-5-2 | IEC 61000-4-2 Electrostatic discharge   | 8 kV air discharge<br>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 <sub>d</sub>               | 2914 years @ 50°C (122°F)   |  |
| Approvals                       |   |  |
|                                 | CCC is not required for products rated ≤ 36 V   |  |

### Mechanical data

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

### Electrical connection

|              |   |
|--------------|---|
| <b>Cable</b> | 2m, 3 x 0.14 mm <sup>2</sup> , Ø3.2 mm, PVC, grey, oil proof, laser write |
| <b>Plug</b>  | M8 x 1 quick disconnect, 3 pin, male connector                            |



## Connection Diagrams

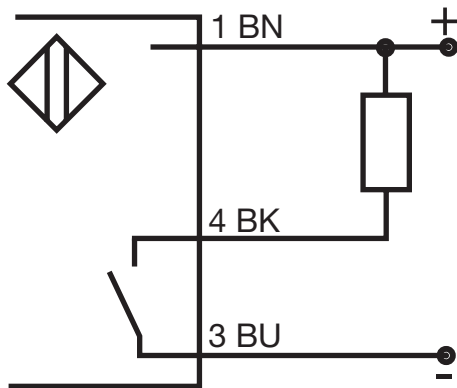


Fig. 6 NPN - Normally open

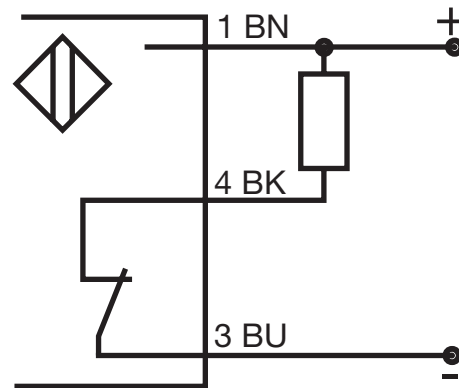


Fig. 7 NPN - Normally closed

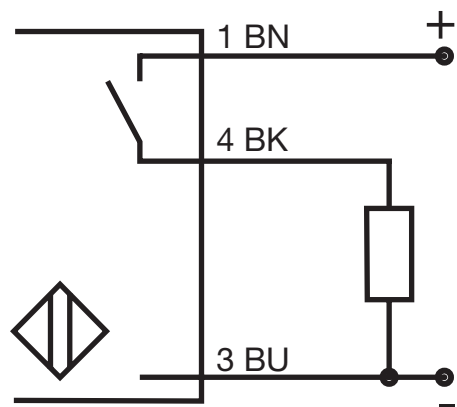


Fig. 8 PNP - Normally open

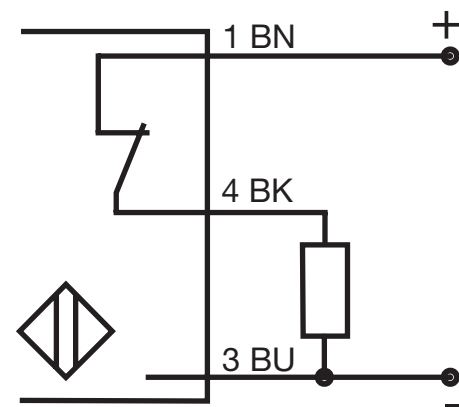
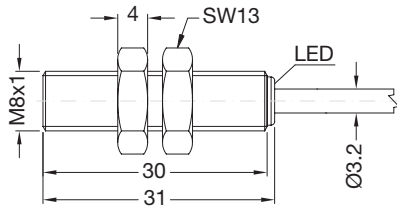


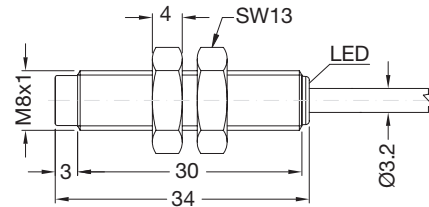
Fig. 9 PNP - Normally closed

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

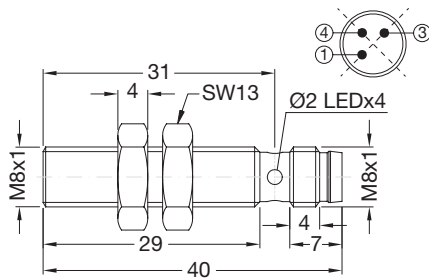
## Dimensions [mm]



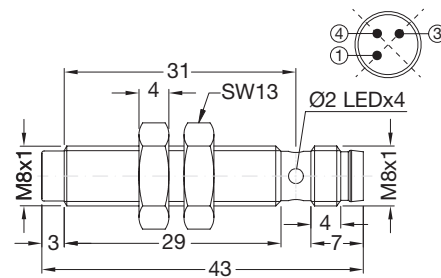
**Fig. 10** Short body, flush version, cable



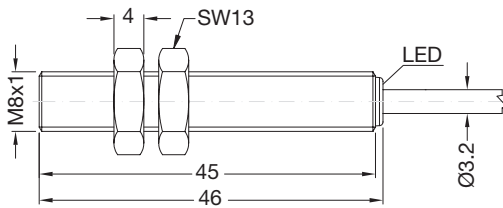
**Fig. 11** Short body, non-flush version, cable



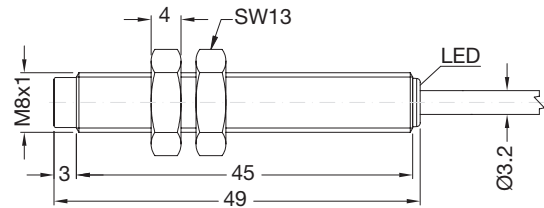
**Fig. 12** Short body, flush version, plug



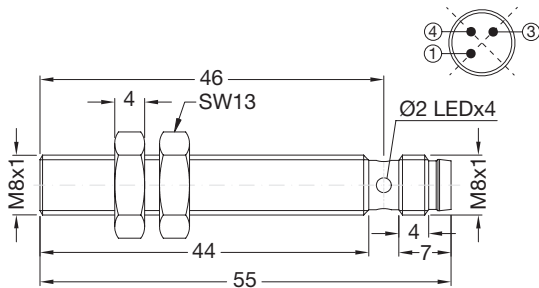
**Fig. 13** Short body, non-flush version, plug



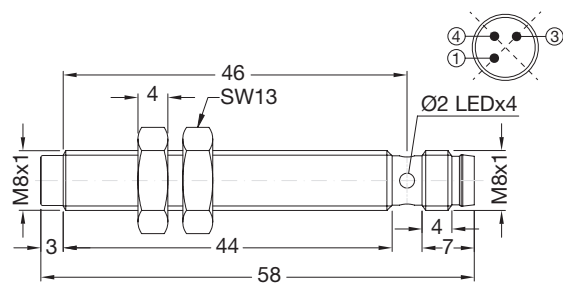
**Fig. 14** Long body, flush version, cable



**Fig. 15** Long body, non-flush version, cable



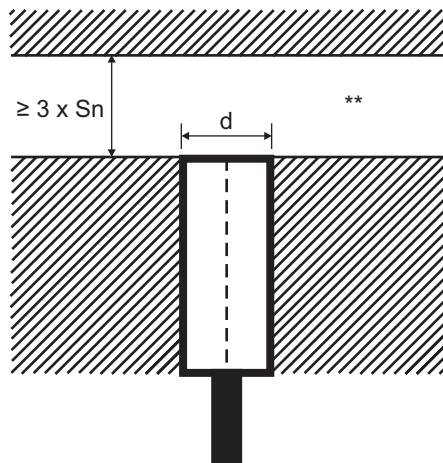
**Fig. 16** Long body, flush version, plug



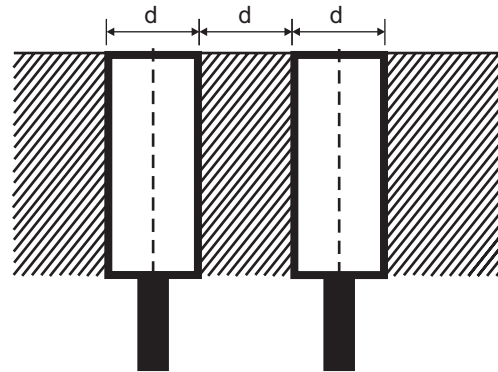
**Fig. 17** Long body, non-flush version, plug

# Installation

## M8 flush

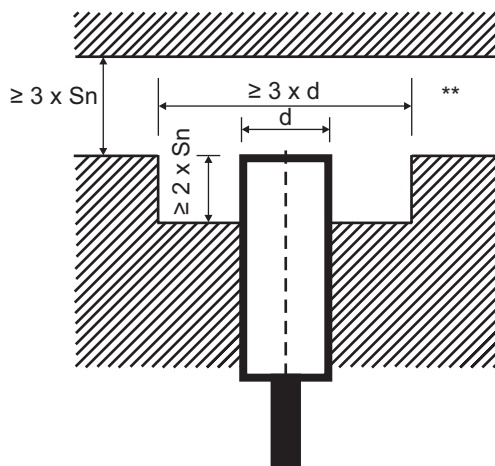


**Fig. 18** Flush sensor, when installed in damping material

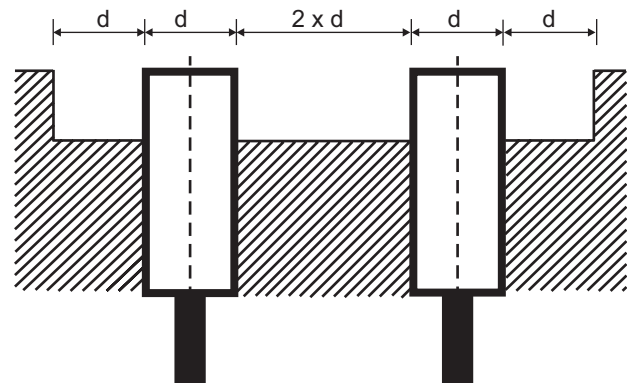


**Fig. 19** Flush sensors, when installed together in damping material

## M8 non-flush



**Fig. 20** Non-flush sensor, when installed in damping material



**Fig. 21** Non-flush sensors, when installed together in damping material