

# 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. Short body in M12-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, M12-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- 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	1 mm	Flush	ICS08S30F01NO	ICS08S30F01PO	ICS08S30F01NC	ICS08S30F01PC
Plug			ICS08S30F01NOM5	ICS08S30F01POM5	ICS08S30F01NCM5	ICS08S30F01PCM5
Cable	2 mm	Non- flush	ICS08S30N02NO	ICS08S30N02PO	ICS08S30N02NC	ICS08S30N02PC
Plug			ICS08S30N02NOM5	ICS08S30N02POM5	ICS08S30N02NCM5	ICS08S30N02PCM5



### M8 standard 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	1 mm	Flush	ICS08L45F01NO	ICS08L45F01PO	ICS08L45F01NC	ICS08L45F01PC
Plug			ICS08L45F01NOM5	ICS08L45F01POM5	ICS08L45F01NCM5	ICS08L45F01PCM5
Cable	2 mm	Non- flush	ICS08L45N02NO	ICS08L45N02PO	ICS08L45N02NC	ICS08L45N02PC
Plug			ICS08L45N02NOM5	ICS08L45N02POM5	ICS08L45N02NCM5	ICS08L45N02PCM5

### 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	ICS08S30F02NO	ICS08S30F02PO	ICS08S30F02NC	ICS08S30F02PC
Plug			ICS08S30F02NOM5	ICS08S30F02POM5	ICS08S30F02NCM5	ICS08S30F02PCM5
Cable	4 mm	Non- flush	ICS08S30N04NO	ICS08S30N04PO	ICS08S30N04NC	ICS08S30N04PC
Plug			ICS08S30N04NOM5	ICS08S30N04POM5	ICS08S30N04NCM5	ICS08S30N04PCM5

### 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	ICS08L45F02NO	ICS08L45F02PO	ICS08L45F02NC	ICS08L45F02PC
Plug			ICS08L45F02NOM5	ICS08L45F02POM5	ICS08L45F02NCM5	ICS08L45F02PCM5
Cable	4 mm	Non- flush	ICS08L45N04NO	ICS08L45N04PO	ICS08L45N04NC	ICS08L45N04PC
Plug			ICS08L45N04NOM5	ICS08L45N04POM5	ICS08L45N04NCM5	ICS08L45N04PCM5

## M12 plug

### Order code

 I C S 08 S30   P O M1

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
S30	-	Short housing with thread barrel of 30 mm
<input type="checkbox"/>	F	Flush
	N	Non-flush
<input type="checkbox"/>	15	Sensing distance 1.5mm
	02	Sensing distance 2mm
	25	Sensing distance 2.5mm
	04	Sensing distance 4mm
PO	-	PNP – normally open output
M1	-	M12 plug

Additional characters can be used for customized versions.

### Selection guide

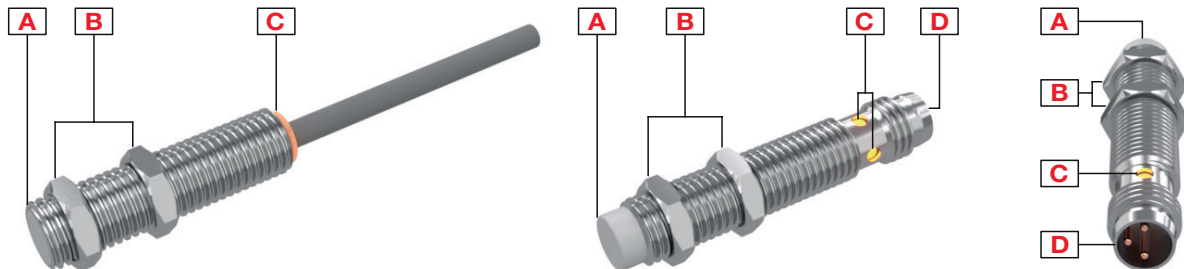
#### M8 standard range, short housing

Connection	Rated operating distance Sn	Detection principle	Ordering no. PNP, Normally open
M12 plug	1.5 mm	Flush	ICS08S30F15POM1
	2.5 mm	Non-flush	ICS08S30N25POM1

#### M8 extended range, short housing

Connection	Rated operating distance Sn	Detection principle	Ordering no. PNP, Normally open
M12 plug	2 mm	Flush	ICS08S30F02POM1
	4 mm	Non-flush	ICS08S30N04POM1

## Structure

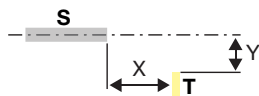


Element	Component	Function
A	Sensing face	Flush or non-flush
B	2 nuts	For sensor mounting
C	LED	Yellow LED: Output flashing: short circuit or overload indication
D	M8, 3 pin, male connector M12, 4 pin, male connector	For plug versions only

# Sensing

## Detection

<b>Rated operating distance <math>S_n</math></b>	Standard range: 1 mm (flush) and 2 mm (non-flush) 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. 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
<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

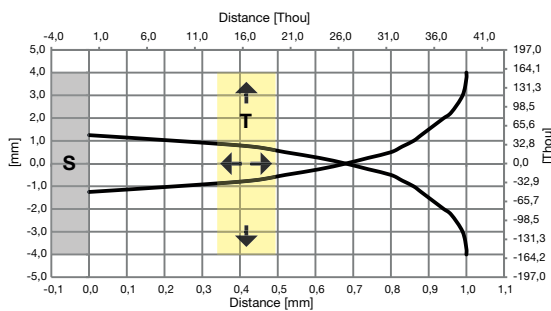


Fig. 1 Flush, 1mm

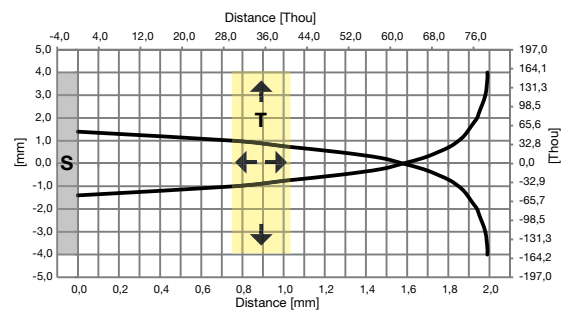


Fig. 2 Flush, 2mm

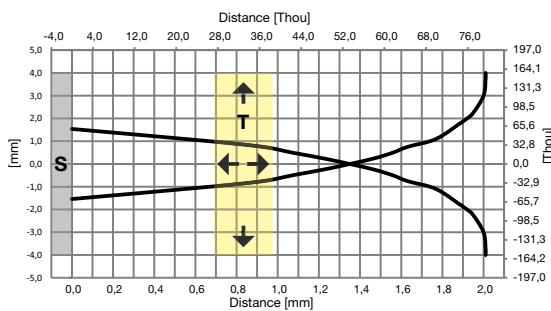


Fig. 3 Non-flush, 2mm

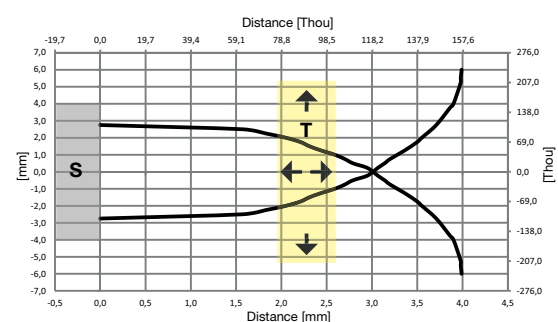


Fig. 4 Non-flush, 4mm

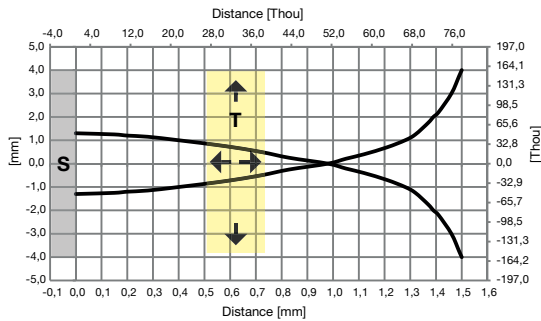


Fig. 5 Plug M12, Flush, 1.5mm

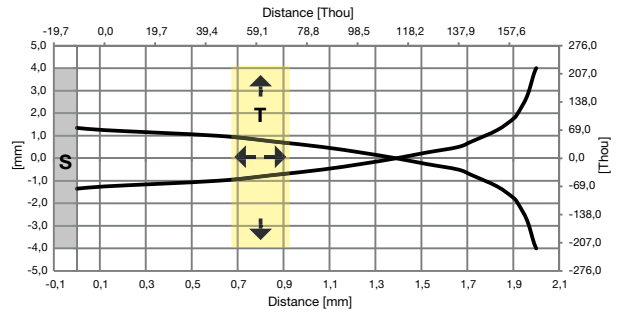


Fig. 6 Plug M12, Flush, 2mm

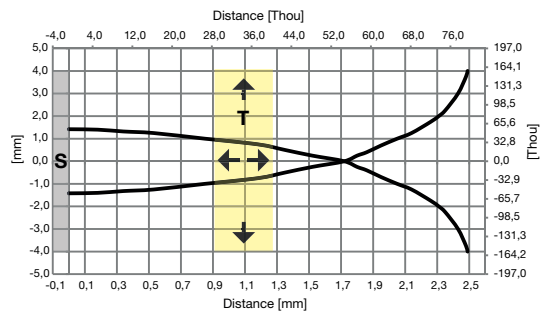


Fig. 7 Plug M12, Non-flush, 2.5mm

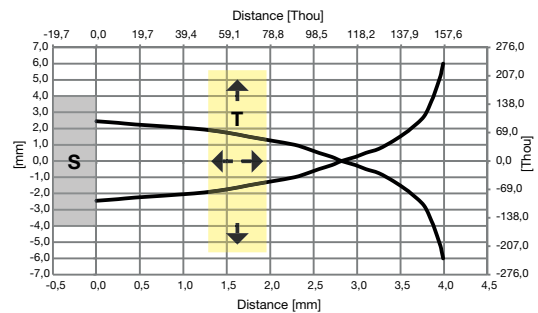
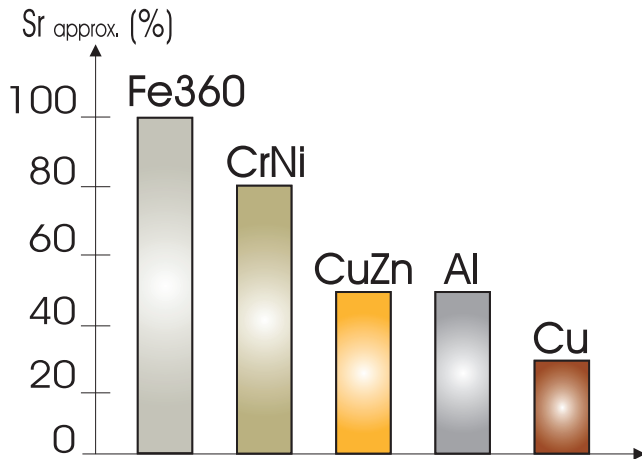


Fig. 8 Plug M12, Non-flush, 4mm

**Correction factors**

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



Fe360 : Steel  
 CrNi : Chrome-nickel  
 CuZn : Brass  
 Al : Aluminium  
 Cu : Copper  
 Sr : Effective operating distance

Fig. 9 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%
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## Features

### Power Supply

Rated operational voltage ( $U_b$ )	10 to 36 VDC (ripple included)
Ripple ( $U_{rpp}$ )	$\leq 10\%$
No load supply current ( $I_o$ )	$\leq 16$ mA
Power ON delay ( $t_v$ )	$\leq 20$ ms

### Outputs

Output functions	NPN or PNP by sensor type
Output configuration	N.O. and N.C. by sensor type
Output current ( $I_o$ )	$\leq 200$ mA @ 50°C (122°F); $\leq 150$ mA @ 50°C...80°C (122°F...176°F)
OFF-state current ( $I_o$ )	$\leq 50$ $\mu$ A
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)	$\leq 2$ KHz
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### 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

### 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

<b>EMC protection</b> IEC 60947-5-2	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
<b>MTTF<sub>d</sub></b>	2914 years @ 50°C (122°F)	
<b>Approvals</b>	 	
	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; 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 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 M12 x 1 quick disconnect, 4 pin, male connector

## Connection Diagrams

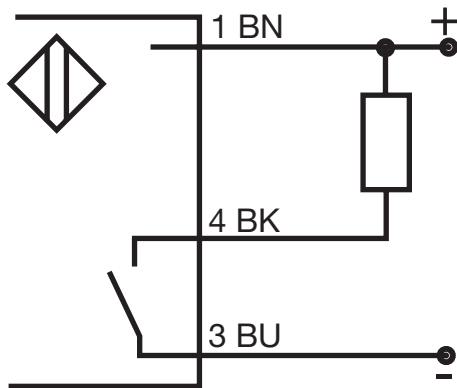


Fig. 10 NPN - Normally open

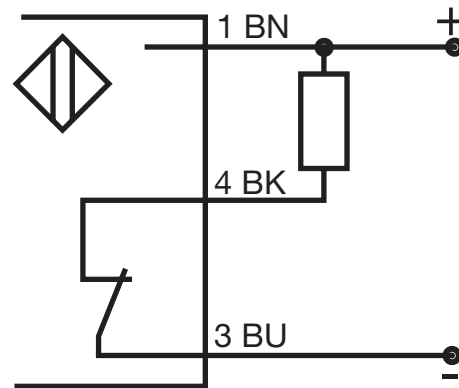


Fig. 11 NPN - Normally closed

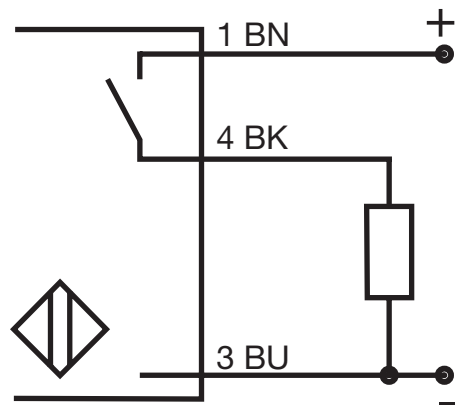


Fig. 12 PNP - Normally open

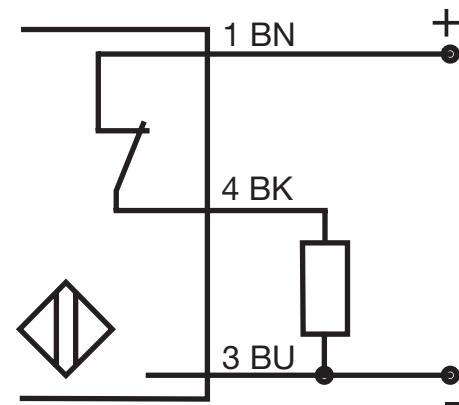
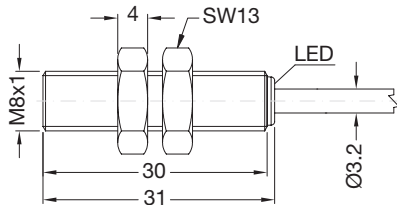


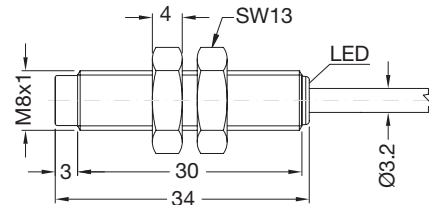
Fig. 13 PNP - Normally closed

Colour code		
BN: brown	BK: black	BU: blue

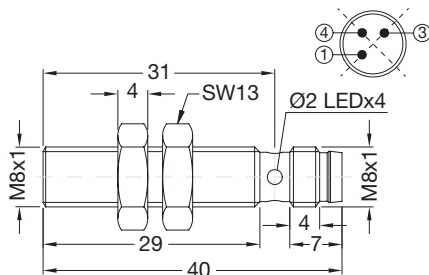
## Dimensions [mm]



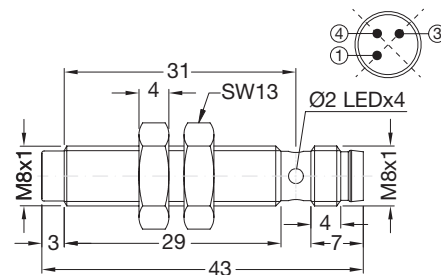
**Fig. 14** Short body, flush version, cable



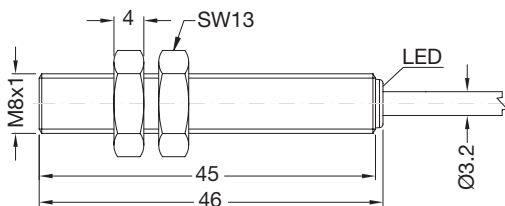
**Fig. 15** Short body, non-flush version, cable



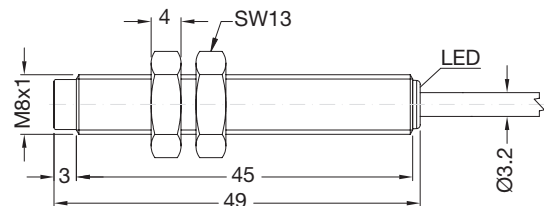
**Fig. 16** Short body, flush version, plug



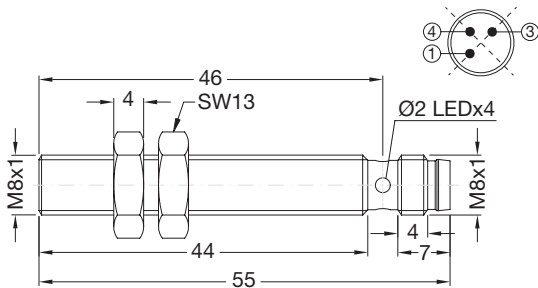
**Fig. 17** Short body, non-flush version, plug



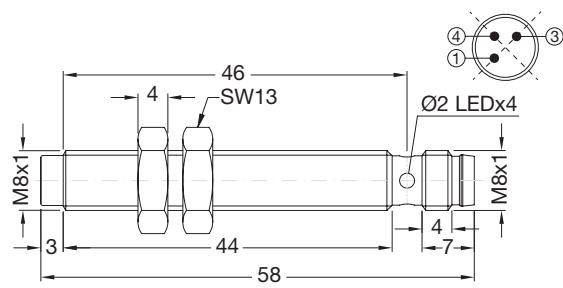
**Fig. 18** Long body, flush version, cable



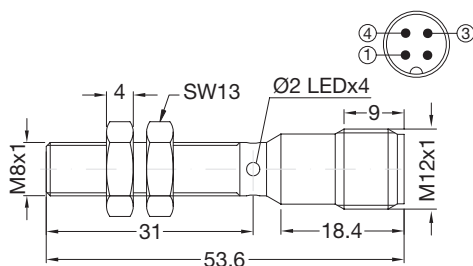
**Fig. 19** Long body, non-flush version, cable



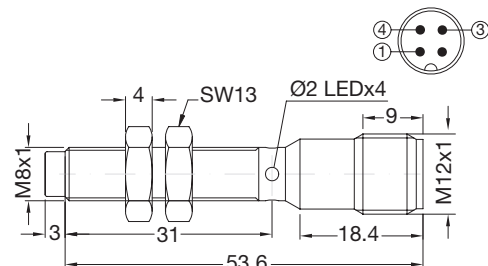
**Fig. 20** Long body, flush version, plug



**Fig. 21** Long body, non-flush version, plug



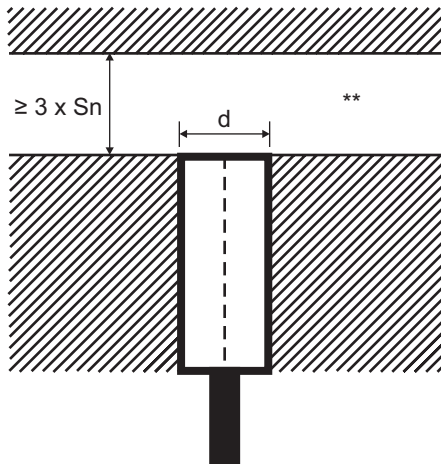
**Fig. 22** Short body, flush version, M12 plug



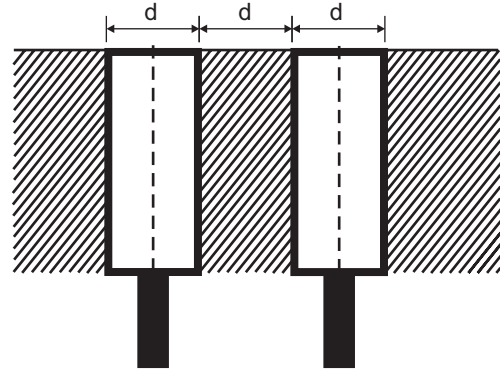
**Fig. 23** Short body, non-flush version, M12 plug

# Installation

## M8 flush

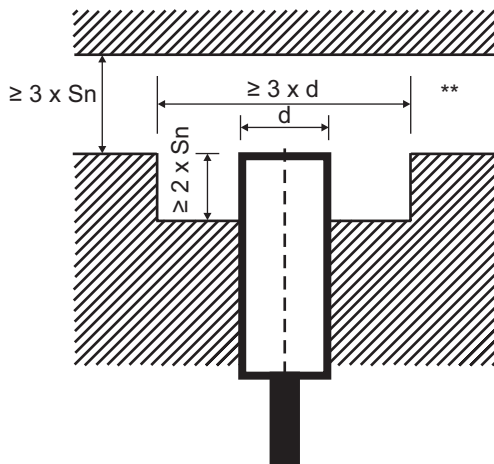


**Fig. 24** Flush sensor, when installed in damping material

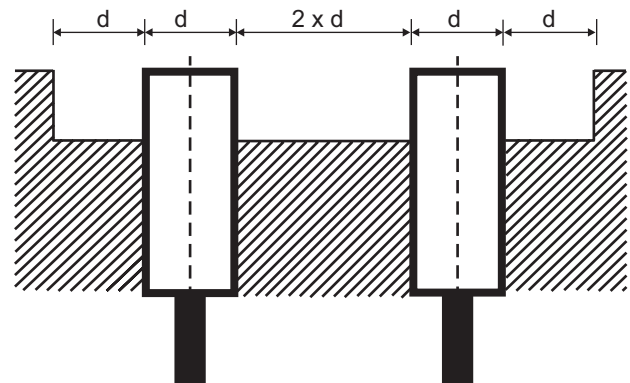


**Fig. 25** Flush sensors, when installed together in damping material

## M8 non-flush

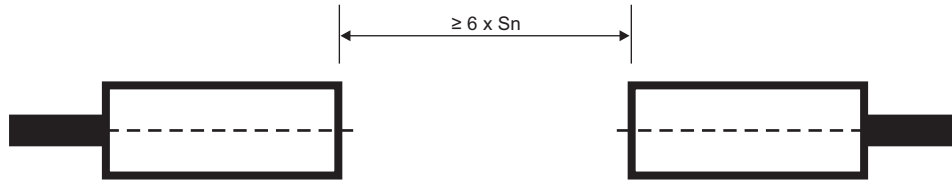


**Fig. 26** Non-flush sensor, when installed in damping material



**Fig. 27** Non-flush sensors, when installed together in damping material

### Sensors installed opposite each other



**Fig. 28** 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

### Cable version

