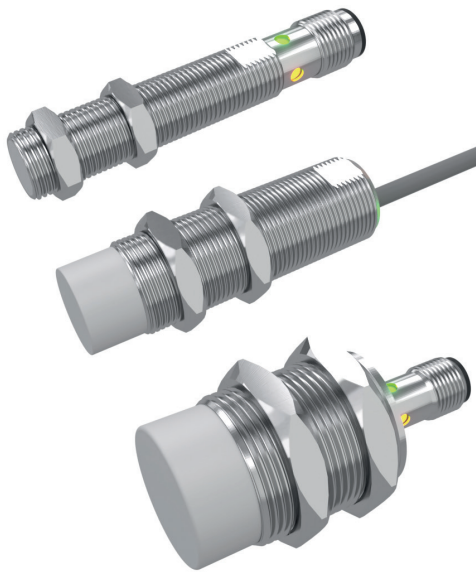


# ICB12, ICB18 & ICB30 IO-Link 3-wire DC



## New generation inductive proximity sensors with IO-Link communication



### Description

The new generation ICB series is a complete family of high performance inductive sensors for contactless and wear free detection of metallic objects in industrial automation applications, such as packaging, materials handling and machine tools. The advanced electronics is enclosed in a robust nickel-plated brass housing. It is available in three diameters: M12, M18 and M30 with an extended sensing distance range between 4 and 22 mm.

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 M12, M18 and M30 robust nickel-plated brass housings with an operating distance of 4 to 22 mm.
- **Less machine downtime.** Lower risk of mechanical damage thanks to the extended operating distance.
- **Easy to install.** ICB sensors have a milled section for wrench grip and two different thread lengths. The user can choose between 2 m PVC cable and M12-disconnect plug versions.
- **High precision.** The onboard advanced microcontroller ensures better stability with respect to environmental influences, with highly reliable repeatable measurements between -25 and +70°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.
- **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 33%, 50%, 75% 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
- 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: 33%, 50%, 75% 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**



Enter the code option instead of

Code	Option	Description
I	-	Inductive sensor
C	-	Cylindrical housing with threaded barrel
B	-	Nickel-plated brass housing
<input type="checkbox"/>	12	M12 housing
	18	M18 housing
	30	M30 housing
<input type="checkbox"/>	S30	Short housing with thread length of 30mm
	L50	Long housing with thread length of 50mm
<input type="checkbox"/>	F	Flush
	N	Non-flush
<input type="checkbox"/>	-	Sensing distance [mm] E.g. 04 = 4mm; 14 = 14mm
	04 or 08	ICB12 flush: 4mm ICB12 non-flush: 8mm
	08 or 14	ICB18 flush: 8mm ICB18 non-flush: 14mm
	15 or 22	ICB30 flush: 15mm ICB30 non-flush: 22mm
<input type="checkbox"/>	M1	M12 plug
	A2	2 m PVC cable
IO	-	IO-Link programmable version

Additional characters can be used for customized versions.

**Selection guide**

**ICB12**

Con- nec- tion	Body style	Dete- ction princi- ple	Rated operating dis- tance S <sub>n</sub>	Output type	Ordering no.
Cable	Short	Flush	Configurable: 33%, 50%, 75% or 100% of the maximum S <sub>n</sub> <b>Factory setting: 100%</b>	Configurable: NPN/PNP/push-pull NO/NC <b>Factory setting: PNP, NO</b>	<b>ICB12S30F04A2IO</b>
Plug		Non-flush			<b>ICB12S30F04M1IO</b>
Cable	Long				Flush
Plug		Non-flush			<b>ICB12S30N08M1IO</b>
Cable	Long	Flush			<b>ICB12L50F04A2IO</b>
Plug		Non-flush			<b>ICB12L50F04M1IO</b>
Cable			<b>ICB12L50N08A2IO</b>		
Plug		<b>ICB12L50N08M1IO</b>			

**ICB18**

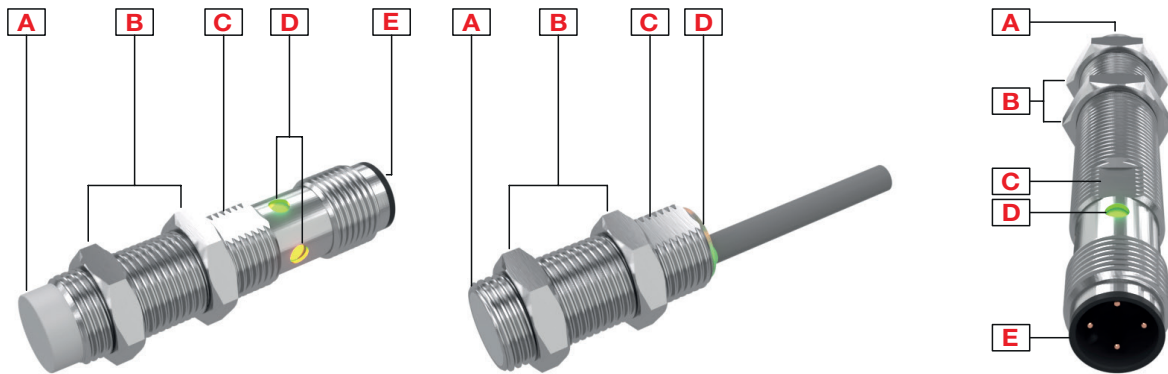
Con- nec- tion	Body style	Dete- ction princi- ple	Rated operating dis- tance S <sub>n</sub>	Output type	Ordering no.
Cable	Short	Flush	Configurable: 33%, 50%, 75% or 100% of the maximum S <sub>n</sub> <b>Factory setting: 100%</b>	Configurable: NPN/PNP/push-pull NO/NC <b>Factory setting: PNP, NO</b>	<b>ICB18S30F08A2IO</b>
Plug		Non-flush			<b>ICB18S30F08M1IO</b>
Cable	Long				Flush
Plug		Non-flush			<b>ICB18S30N14M1IO</b>
Cable	Long	Flush			<b>ICB18L50F08A2IO</b>
Plug		Non-flush			<b>ICB18L50F08M1IO</b>
Cable			<b>ICB18L50N14A2IO</b>		
Plug		<b>ICB18L50N14M1IO</b>			

**ICB30**

Con- nec- tion	Body style	Dete- ction princi- ple	Rated operating dis- tance S <sub>n</sub>	Output type	Ordering no.
Cable	Short	Flush	Configurable: 33%, 50%, 75% or 100% of the maximum S <sub>n</sub> <b>Factory setting: 100%</b>	Configurable: NPN/PNP/push-pull NO/NC <b>Factory setting: PNP, NO</b>	<b>ICB30S30F15A2IO</b>
Plug		Non-flush			<b>ICB30S30F15M1IO</b>
Cable	Long				Flush
Plug		Non-flush			<b>ICB30S30N22M1IO</b>
Cable	Long	Flush			<b>ICB30L50F15A2IO</b>
Plug		Non-flush			<b>ICB30L50F15M1IO</b>
Cable			<b>ICB30L50N22A2IO</b>		
Plug		<b>ICB30L50N22M1IO</b>			

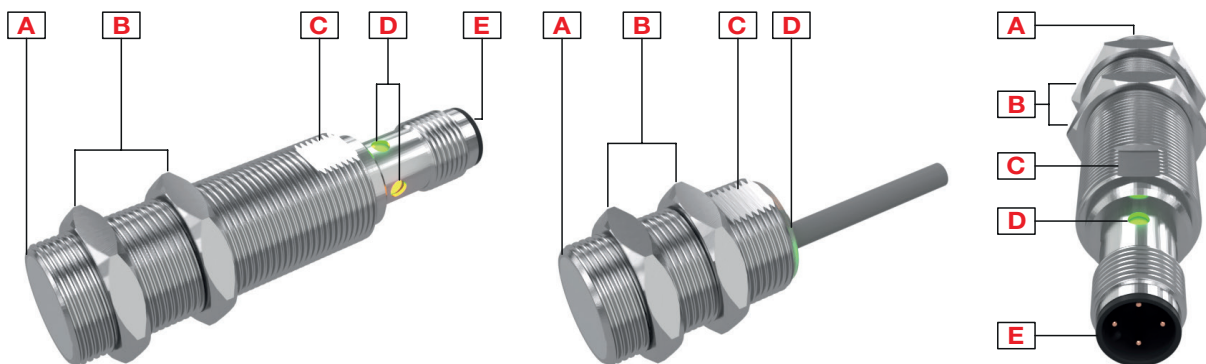
# Structure

## ICB12



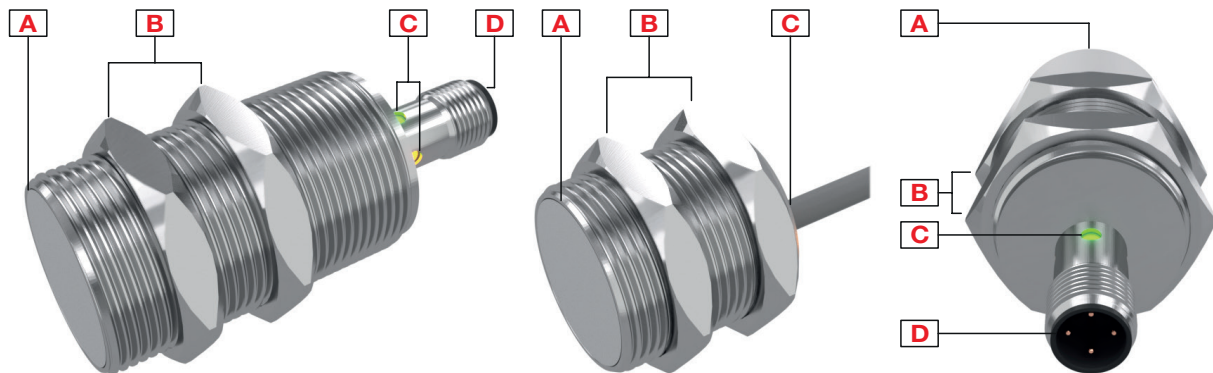
Element	Component	Function
A	Sensing face	Flush or non-flush
B	2 nuts	For sensor mounting
C	Milled section	For wrench grip
D	LED	Green and Yellow LED: Output flashing: short circuit or overload indication
E	M12 x 1, 4 pin, male connector	For plug versions only

## ICB18



Element	Component	Function
A	Sensing face	Flush or non-flush
B	2 nuts	For sensor mounting
C	Milled section	For wrench grip
D	LED	Green and Yellow LED: Output flashing: short circuit or overload indication
E	M12 x 1, 4 pin, male connector	For plug versions only

ICB30

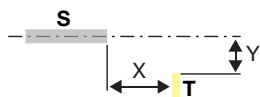


Element	Component	Function
A	Sensing face	Flush or non-flush
B	2 nuts	For sensor mounting
C	LED	Green and Yellow LED: Output flashing: short circuit or overload indication
D	M12 x 1, 4 pin, male connector	For plug versions only

# Sensing

## Detection

<b>Rated operating distance <math>S_n</math></b>	4 to 22 mm: depending on housing diameter and version (flush or 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 4 mm, $S_a$ is 0 ... 3.24 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>	$0.9 \times S_n \leq S_u \leq 1.1 \times S_n$
<b>Hysteresis (H)</b>	1...20%



S: sensor  
T: target

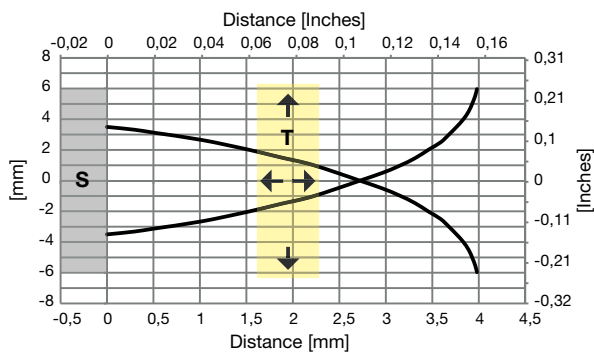


Fig. 1 M12 Flush

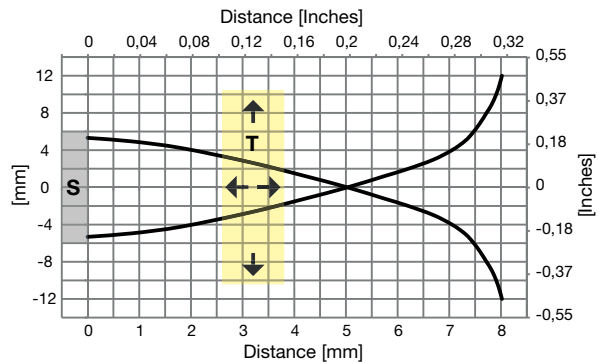


Fig. 2 M12 Non-flush

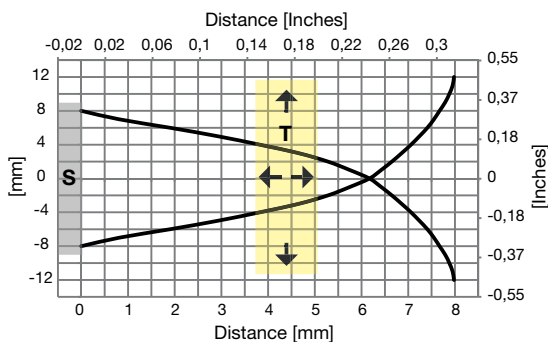


Fig. 3 M18 Flush

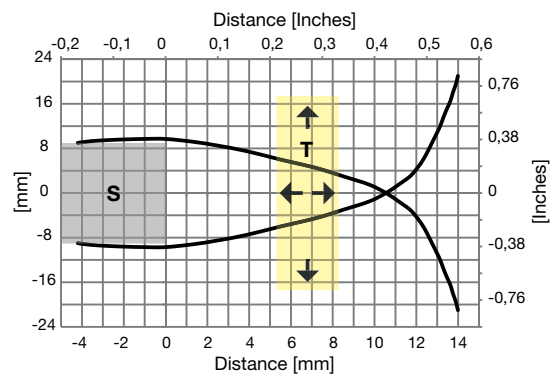


Fig. 4 M18 Non-flush

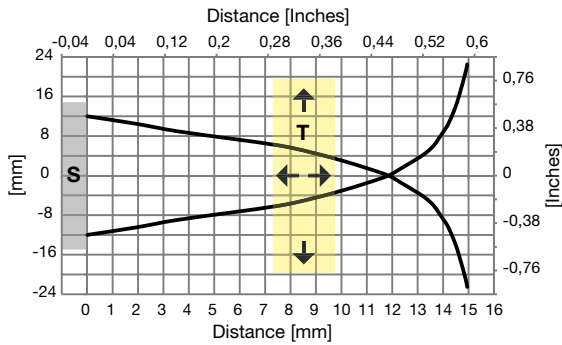


Fig. 5 M30 Flush

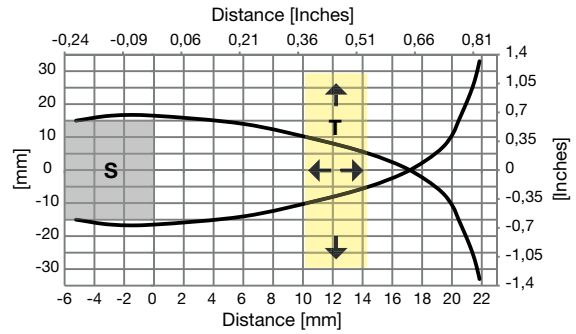


Fig. 6 M30 Non-flush

Sensors with IO-Link communication

Rated operating distance $S_n$	Programmable via IO-Link: 33%, 50%, 75% or 100% of the maximum $S_n$ Factory setting: 100% of the maximum $S_n$
Hysteresis (H)	Programmable via IO-Link: standard or increased Factory setting: standard

Correction factors

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

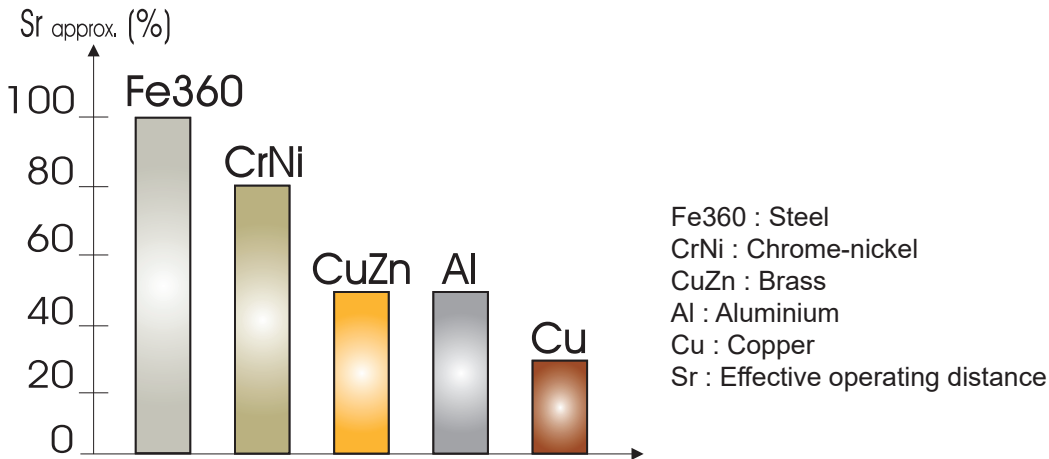


Fig. 7 The rated operating distance is reduced by the use of metals and alloys other than Fe360. The most important reduction factors for inductive proximity sensors are shown in the figure.

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 ( $I_o$ )	$\leq 20$ mA
Power ON delay ( $t_v$ )	$\leq 50$ ms

### Outputs

Output functions	Configurable via IO-Link: PNP, NPN or push-pull Factory setting: PNP
Output configuration	Configurable via IO-Link: N.O. or N.C. Factory setting: N.O.
Output current ( $I_o$ )	$\leq 200$ mA
OFF-state current ( $I_o$ ) (only for PNP or NPN output)	$\leq 100$ $\mu$ A
Voltage drop ( $U_d$ )	Max. 2.5 VDC @ 200 mA
Protection	Short-circuit, reverse polarity and transients
Voltage transient	1 kV/0.5 J

### Response times

Operating frequency (f)	$\leq 2$ kHz	ICB12
	$\leq 1.5$ kHz	ICB18
	$\leq 1$ kHz	ICB30

### 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)

Green LED	Output	Description
OFF	-	Sensor is not operational
ON	-	Sensor is operational





## IO-Link mode:

Yellow LED	Output	Description
OFF / ON	SIO	Shows SIO status if no short circuit or temperature errors.
Blinking	f: 2 Hz	Short-circuit or overload
	f: 1 Hz	Temperature alarm (if enabled)
Disabled	-	Possibility to disable the LED





## Green LED:

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

## Environmental

Ambient temperature for cable versions	Operating: -25° to +70°C (-13° to +158°F)	
	Storage: -30° to +80°C (-22° to +176°F)	
Ambient temperature for plug versions	Operating: -40° to +70°C (-40° to +158°F)	
	Storage: -40° to +80°C (-40° 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
Rough handling shocks	2 times from 1m, 100 times from 0.5m	IEC 60068-2-31
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 (ICB30: 12 V/m)
	IEC 61000-4-4 Burst immunity	2 kV (ICB30: 4 kV)
	IEC 61000-4-6 Conducted radio frequency	3 V (ICB30: 10 V)
	IEC 61000-4-8 Power frequency magnetic fields	30 A/m
MTTF <sub>d</sub>	ICB12: 3963 years @50°C (122°F) ICB18: 3945,2 years @50°C (122°F) ICB30: 3479,3 years @50°C (122°F)	
Approvals	    <b>IO-Link</b>	
	CCC is not required for products rated ≤ 36 V	

## Mechanical data

<b>Weight (including 2 nuts and the packaging) max.</b>	<b>M12</b>	Cable version: short, flush: 76.2g; short, non-flush: 76.8g; long, flush: 82.2g; long, non-flush: 82.8g; Plug version: short, flush: 29.5g; short, non-flush: 30.1g; long, flush: 35.2g; long, non-flush: 35.8g.
	<b>M18</b>	Cable version: short, flush: 100.3g; short, non-flush: 102.8g; long, flush: 112.6g; long, non-flush: 115.1g; Plug version: short, flush: 57.4g; short, non-flush: 59.9g; long, flush: 69.8g; long, non-flush: 72.3g.
	<b>M30</b>	Cable version: short, flush: 191.1g; short, non-flush: 197.6g; long, flush: 219.4g; long, non-flush: 226g; Plug version: short, flush: 127g; short, non-flush: 133.5g; long, flush: 159.6g; long, non-flush: 166.1g.
<b>Mounting</b>	Flush mountable or non-flush mountable	
<b>Material</b>	Housing: Nickel-plated brass Front cap: Grey thermoplastic polyester	
<b>Max tightening torque</b>	ICB12: 10 Nm ICB18: 25 Nm ICB30: 30 Nm	

## Electrical connection

<b>Cable</b>	ICB12 and ICB18: 2m, 3 x 0.25 mm <sup>2</sup> , Ø4.1 mm, PVC, grey, oil proof ICB30: 2m, 3 x 0.34 mm <sup>2</sup> , Ø5.2 mm, PVC, grey, oil proof
<b>Plug</b>	M12 x 1, 4 pin, male connector

## Communication

<b>Communication</b>	Via IO-Link V1.1 or via standard I/O
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## Connection Diagrams

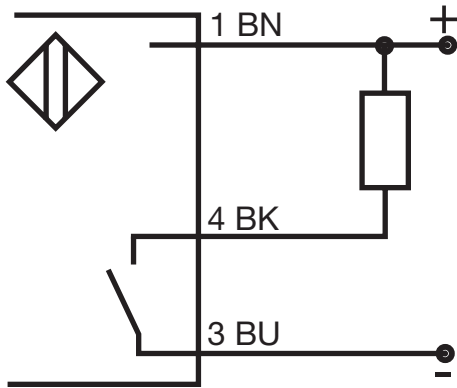


Fig. 8 NPN - Normally open

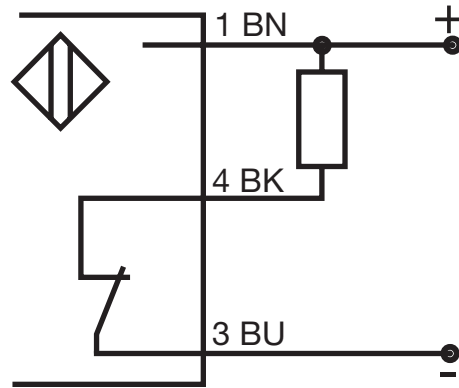


Fig. 9 NPN - Normally closed

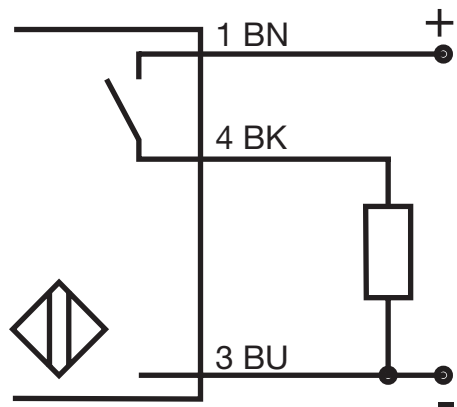


Fig. 10 PNP - Normally open

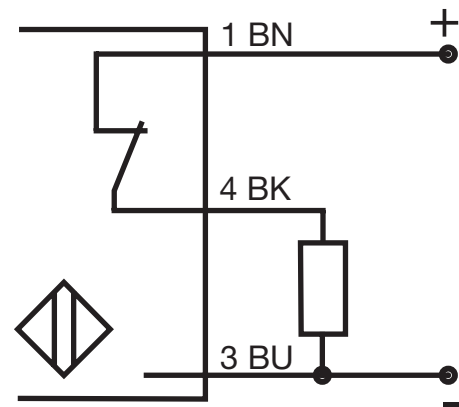


Fig. 11 PNP - Normally closed

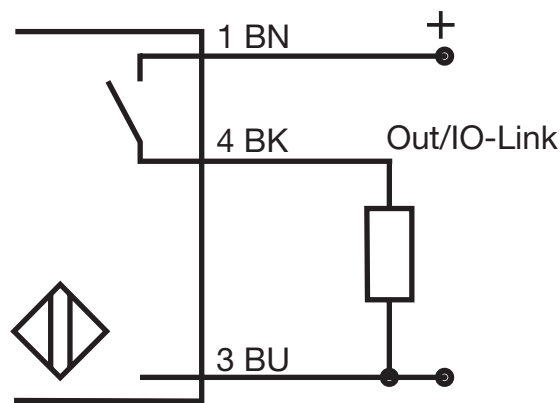


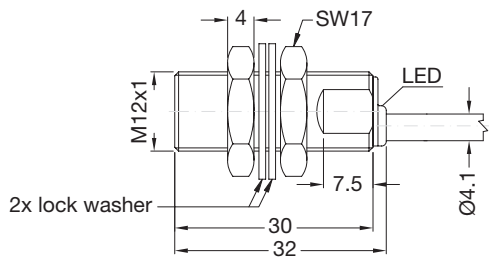
Fig. 12 IO-Link

Colour code		
BN: brown	BK: black	BU: blue

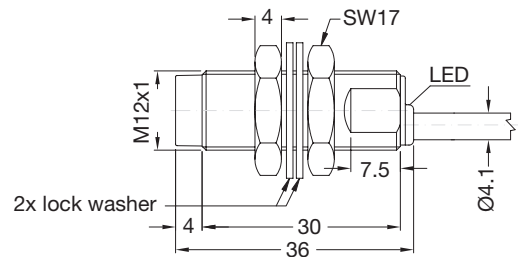
Wire colors in accordance with EN 60947-5-2

# Dimensions [mm]

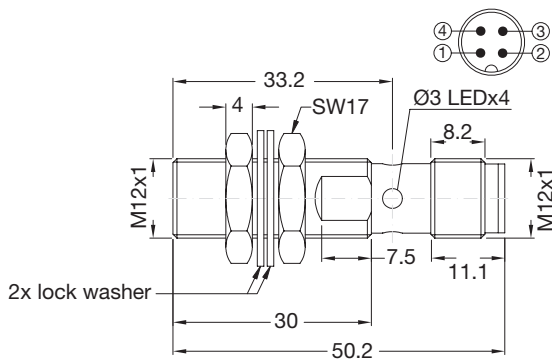
**ICB12 [mm]**



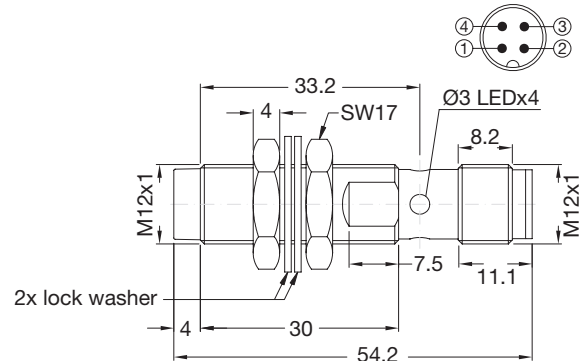
**Fig. 13** Short body, flush version, cable



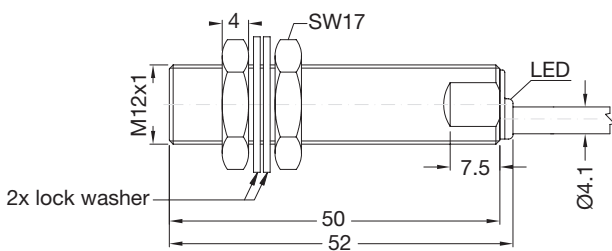
**Fig. 14** Short body, non-flush version, cable



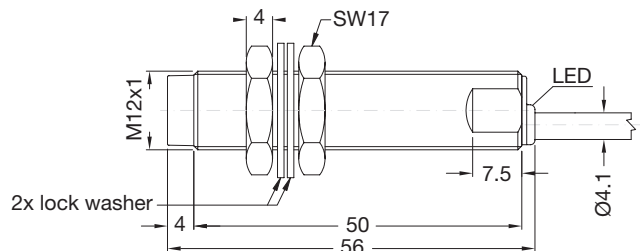
**Fig. 15** Short body, flush version, plug



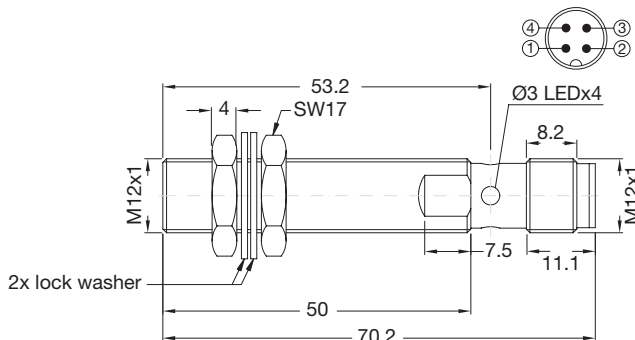
**Fig. 16** Short body, non-flush version, plug



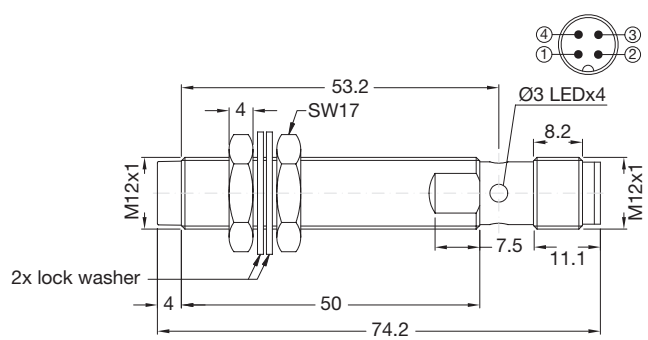
**Fig. 17** Long body, flush version, cable



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

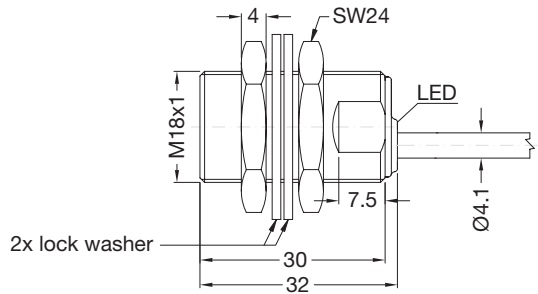


**Fig. 19** Long body, flush version, plug

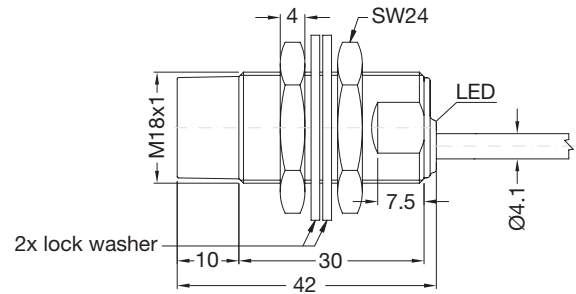


**Fig. 20** Long body, non-flush version, plug

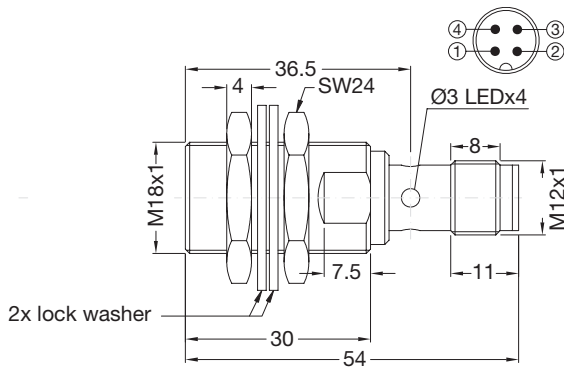
**ICB18 [mm]**



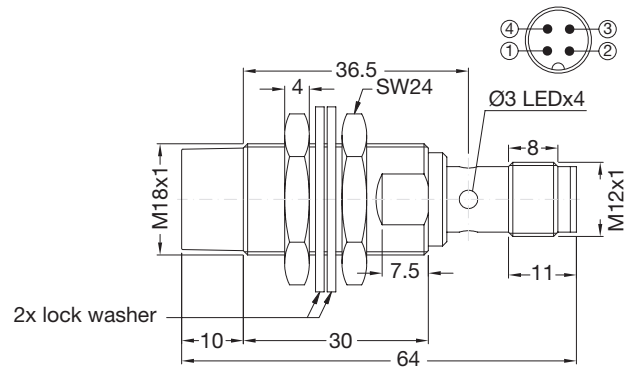
**Fig. 21** Short body, flush version, cable



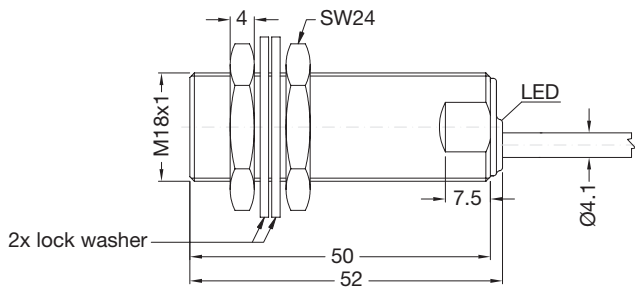
**Fig. 22** Short body, non-flush version, cable



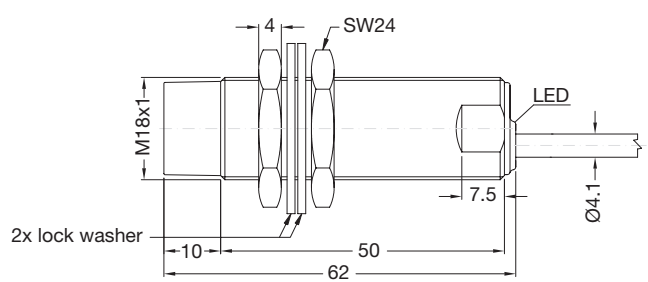
**Fig. 23** Short body, flush version, plug



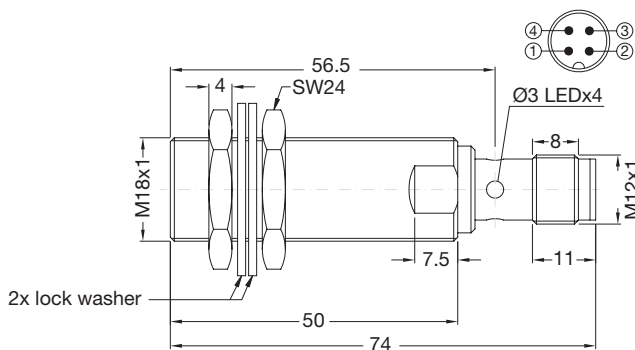
**Fig. 24** Short body, non-flush version, plug



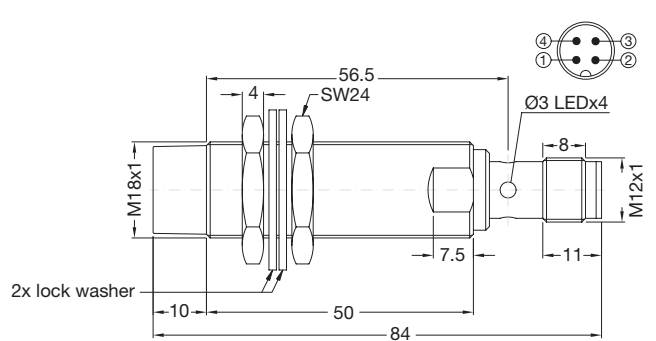
**Fig. 25** Long body, flush version, cable



**Fig. 26** Long body, non-flush version, cable



**Fig. 27** Long body, flush version, plug



**Fig. 28** Long body, non-flush version, plug

ICB30 [mm]

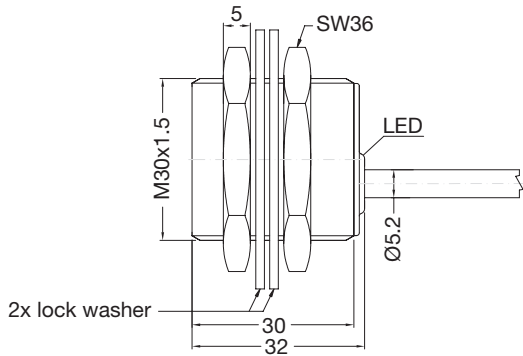


Fig. 29 Short body, flush version, cable

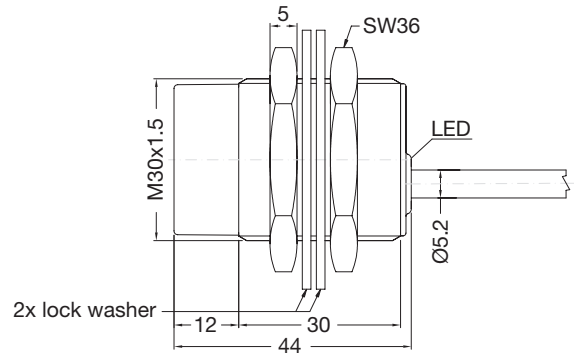


Fig. 30 Short body, non-flush version, cable

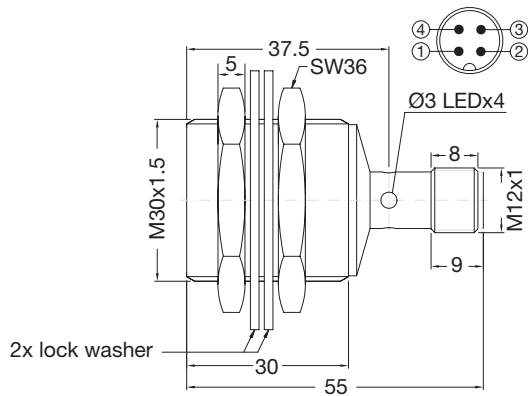


Fig. 31 Short body, flush version, plug

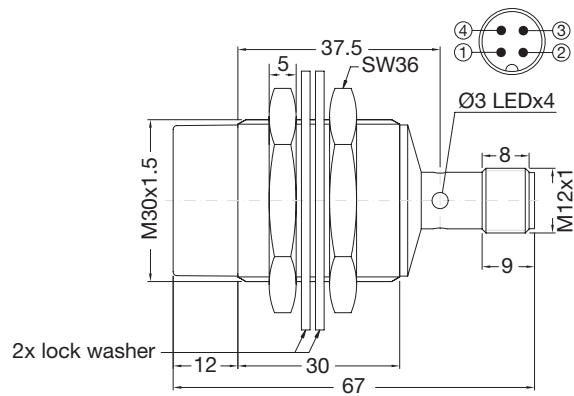


Fig. 32 Short body, non-flush version, plug

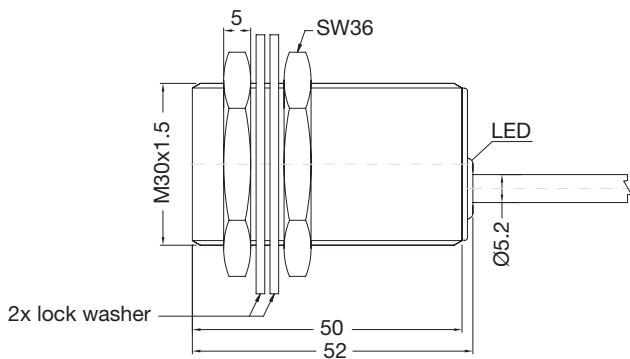


Fig. 33 Long body, flush version, cable

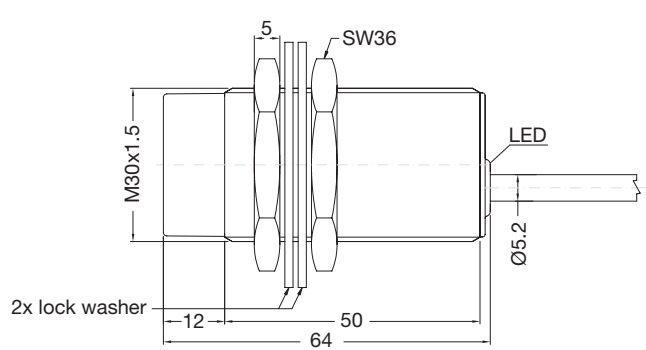
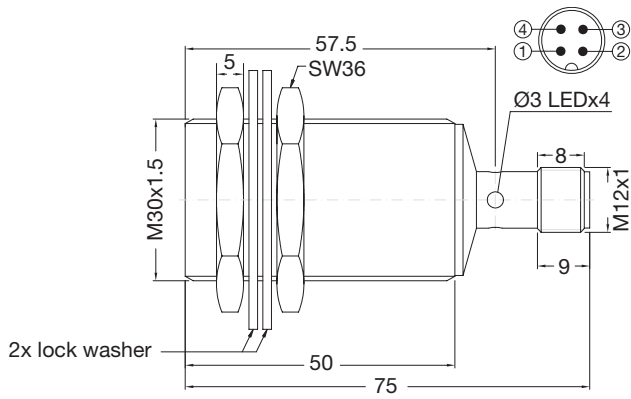
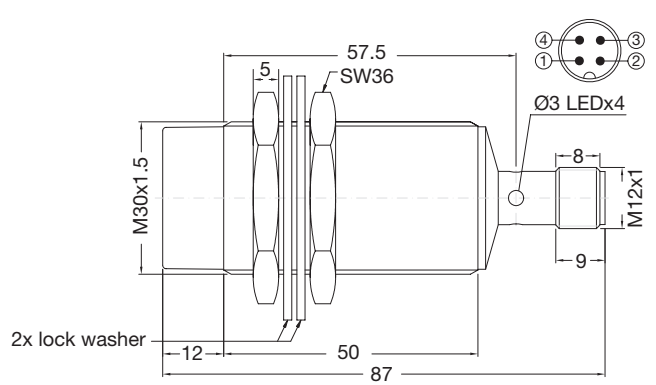


Fig. 34 Long body, non-flush version, cable



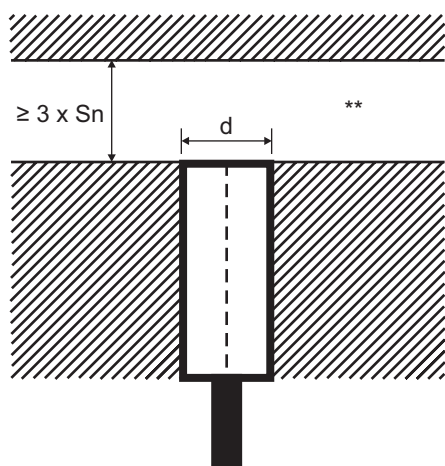
**Fig. 35** Long body, flush version, plug



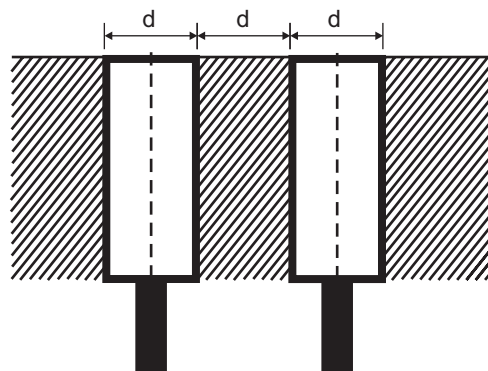
**Fig. 36** Long body, non-flush version, plug

# Installation

**M12, M18 and M30 flush**

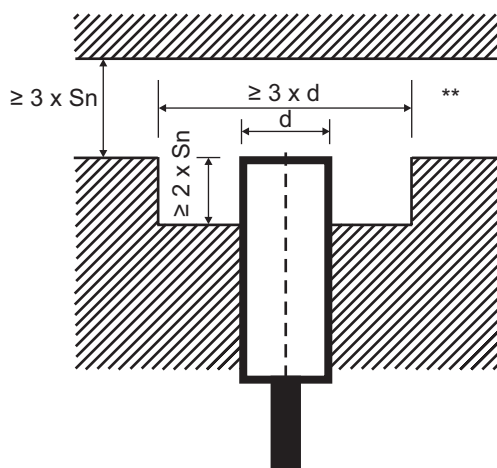


**Fig. 37** Flush sensor, when installed in damping material

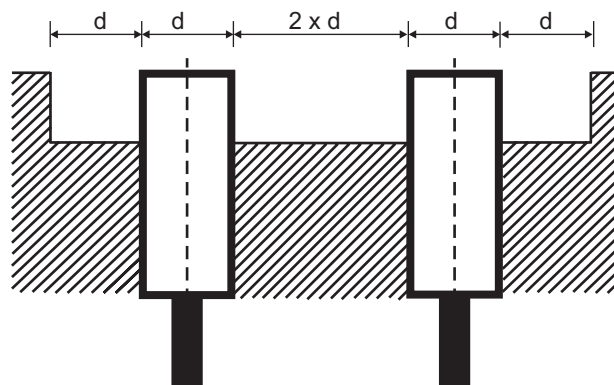


**Fig. 38** Flush sensors, when installed together in damping material

**M12 and M18 non-flush**



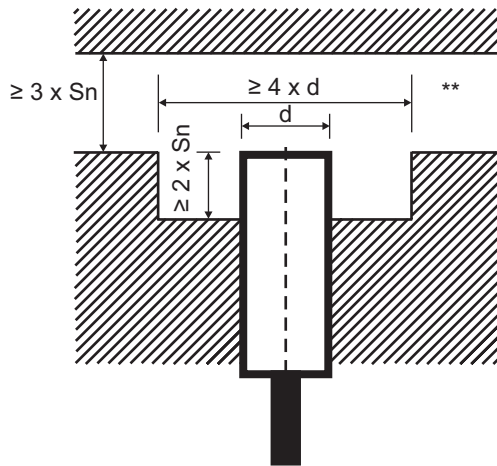
**Fig. 39** Non-flush sensor, when installed in damping material



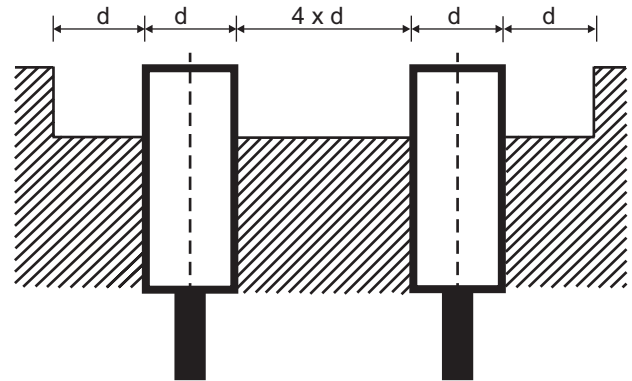
**Fig. 40** Non-flush sensors, when installed together in damping material



**M30 non-flush**

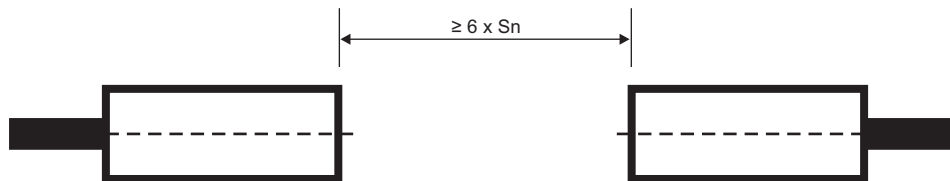


**Fig. 41** Non-flush sensor, when installed in damping material



**Fig. 42** Non-flush sensor, when installed together in damping material

**Sensors installed opposite each other**



**Fig. 43** 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 (12 mm for ICB12, 18 mm for ICB18, 30 mm for ICB30)