Contents

Glossary
General

Active switching zone
Area above the sensing face in which a proximity sensor responds by a change in switching status when attenuating material is brought nearer.

Cables
PUR cable
- oil-resistant cable
- not resistant to hydrolysis

PVC cable
- not suitable for continuous use in environments containing oil
- not ozone- or UV-resistant

PUR-PVC cable
- PVC cable coated with PUR

The cables must not be moved in temperatures below -5 °C otherwise they may rupture.

Complementary output
A DC 4-wire with one NO and NC output that can be used at the same time.

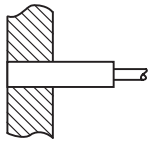
Continuous current I_a
Current at which the proximity sensor can function reliably.

Enclosure rating
The conditions for the enclosure rating IP 68 are the following at the SICK AG:

- 1 m water depth
- temperature of 20° C
- permanent immersion

EMC
Electromagnetic compatibility

Flush installation
A proximity sensor can be embedded in an attenuating material so that it is flush with the active surface.



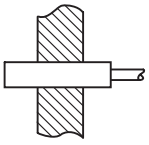
Housing material
- Brass, nickel-plated
- Stainless steel
- Aluminium
- Plastic (PA12, PBT, PPE)

If the sensors are to be frequently or continuously exposed to chemicals, an application test must be performed. Contact SICK AG for further information.

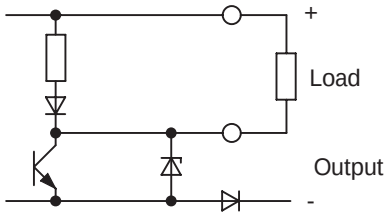
Hysteresis H
The hysteresis is the positional difference between the activation and deactivation point for attenuating material as it is brought closer or moved away. It is required to ensure a smooth, stable switching action. It is given as a percentage of the real sensing range or in mm.

Minimum load current
Smallest load current that must flow with connected output in order to ensure the reliable operation of 2-wire proximity sensors.

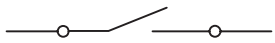
Non-flush installation
A proximity sensor must be installed in such a way that a free-zone is maintained.



NPN output
Proximity sensors with NPN output switch the negative potential to the load. They are also described as negative-switching or current-sinking.



Output function
Normally open: A proximity sensor with make function is disabled in the unattenuated state (high resistance) and is switched in the attenuated state (low resistance).



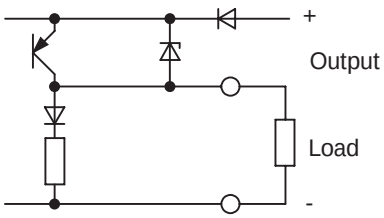
Normally closed: A proximity sensor with brake function is switched in the unattenuated state (low resistance) and disabled in the attenuated state (high resistance).

Operating voltage U_b
Voltage range in which the proximity sensor can function reliably.

Overload resistance
See also short-circuit protection.
The response threshold for overload protection is greater than the value for continuous current-carrying capacity.

Peak current I_k
Current that may flow for a specified period at a defined switching frequency without destroying the proximity sensor.

PNP output
Proximity sensors with PNP output switch the positive potential to the load. They are also described as positive-switching or current-sourcing.



Power-up pulse suppression
The power-up pulse suppression ensures that no incorrect switching signal is sent to the output between the time when the operating voltage is applied and when the oscillator begins to oscillate.

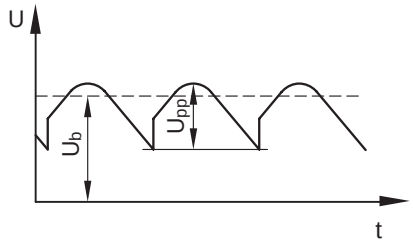
Repeatability R
Switching point difference for the useful sensing range between two consecutive measurements under identical conditions.

Residual current I_r
The residual current is used to supply power to the 2-wire sensors and also flows across the load if the output is disabled.

Reverse polarity protected
(with NAMUR sensor to EN 50227)
The connections of the proximity sensor can be connected to the wrong terminals without the sensor being damaged.

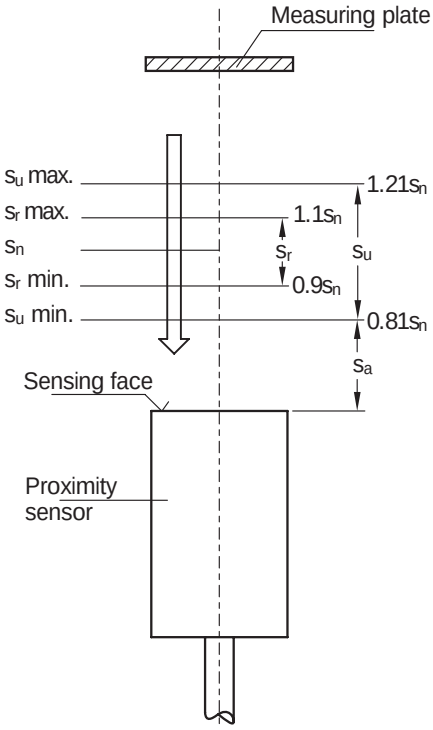
Reverse polarity protection
An internal protection circuit prevents the DC 3/4-wire proximity sensors from being destroyed if the supply voltage connections are incorrectly connected, and also ensures that no misoperation can occur which would result in an undesired signal being issued.

Ripple U_{pp}
The DC operating voltage of the ripple voltage content (maximum permissible peak value, given in % of U_b).



Sensing face
Surface of a proximity sensor to which the sensing range relates.

Sensing range
The sensing range of a proximity sensor is the distance at which one of the measuring plates being moved axially towards the active surface triggers a signal change.



Rated sensing range s_n:
Device characteristics

Real sensing range s_r:
$0.9\ s_n \leq s_r \leq 1.1\ s_n$

Useful sensing range s_u:
$0.9\ s_r \leq s_u \leq 1.1\ s_r$

Actuation distance s_a:
The actuation distance is the distance at which a proximity sensor reacts under specified temperature and voltage conditions.
It is between 0% and 81% of the rated sensing range.

Glossary
General

Shock stress

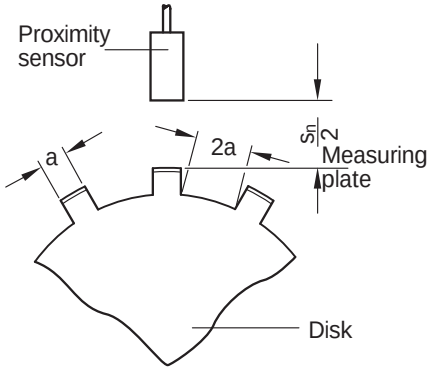
Pulse shape:	semi-sinoidal
Acceleration:	≤ 30 g_n
Pulse length:	11 ms

Short-circuit protection
Proximity sensors with short-circuit protection cannot be destroyed by either overloading or a direct short-circuit. When the triggering threshold is exceeded, the output is disabled and then periodically (in cycles) polled to establish whether the short-circuit still exists. An automatic reset is performed once the short-circuit has been eliminated.

Short-circuit protection (with NAMUR sensor to EN 50227)
The proximity sensor is not destroyed if the load short-circuits or in the case of a short-cirtcuit to ground at the output.

Status indicator
The forced triggering of the output (low-resistance) is indicated by an LED. With some sensors, standby is indicated by a second LED.

Switching frequency f
Maximum number of switching actions per second.



Temperature drift
Shifting of the switching point caused by a change in ambient temperature.

Time delay before availability t_v
Time required by the proximity sensor to become operational after the operating voltage is applied.

Vibration stress

Frequency range:	10 to 55 Hz
Amplitude:	1 mm
Vibration length:	5 min
Endurance at resonance frequency or at 55 Hz:	30 min. in each axis

Voltage drop U_d (at I_a max)
Reduction in voltage occurring at maximum load current across the switching module of the proximity sensor. Special attention must be paid to this in the case of serial connections.

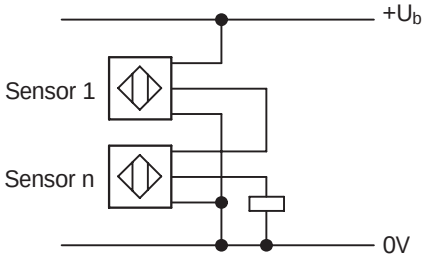
Wire-break protection
If one of the supply lines is broken, the output remains disabled (no misoperation).

DC 3/4-wire sensors
Apart from the oscillator, direct-current sensors also have an output amplifier. They are supplied as 3/4-wire sensors with NO, NC, complementary or programmable outputs. Sensors of this type have short-circuit, reverse-polarity protection, and power-up pulse suppression. The residual current is negligable. A capacitive load of up to 0.15 µF can be connected. These sensors are supplied as:

- NC, negative-switching (NPN)
- NC, positive-switching (PNP)
- NO, negative-switching (NPN)
- NO, positive-switching (PNP)
- programmable NO/NC, negative-switching (NPN)
- programmable NO/NC, positive-switching (PNP)
- complementary NO and NC negative-switching (NPN)
- complementary NO and NC positive-switching (PNP)
- free configurable as
  NO, negative-switching (NPN)
  NO, positive-switching (PNP)
  NC, negative-switching (NPN)
  NC, positive-switching (PNP)

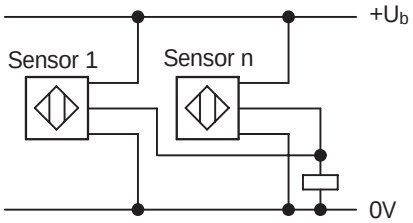
Serial connection of 3-wire sensors:
With series connection, the voltage drops and the standby delay times of the individual proximity sensors are added together.
That is the reason for a reduced load voltage.

PNP-connection:



Parallel connection of 3-wire sensors:
The LEDs of all proximity sensors light up if only one sensor is active. It is therefore advisable to install blocking diodes in the switching output.

PNP-connection:



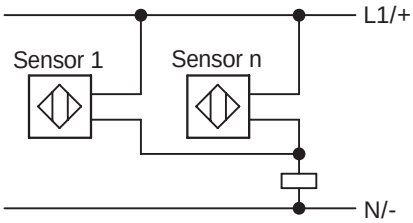
AC/DC 2-wire sensors
Apart from the oscillator, alternating current 2-wire sensors also have a transistor as an output amplifier. These sensors are directly operated in series with the load. As a result, a small residual current flows across the load when the sensors are disabled. In forced-tripping mode, a drop in voltage also occurs at the sensor.

These points are particularly relevant in the case of parallel and serial connections. These sensors are supplied as:

- normally open
- normally closed
- programmable NO/NC

Serial connection
of 2-wire sensors:
Not recommended

Parallel connection of 2-wire sensors:
In the case of parallel connection, the residual currents of all proximity sensors are added together.



Protection class
Sensors not bearing the symbol ⊡ must be operated at power sources which comply with the safety requirements for extra-low voltage as per VDE 100.

Glossary
Electrical

NAMUR sensor to EN 50227
These sensors are 2-wire electric position encoders which are usually connected to the control input of a switching amplifier.

The direct-current source of the switching amplifier provides the sensors with power. If metal or magnets are positioned close to the sensors, the internal resistance of the NAMUR sensor changes (constant distance/current curve, see graph). The change in internal resistance is evaluated by the switching amplifier and converted into a digital signal.

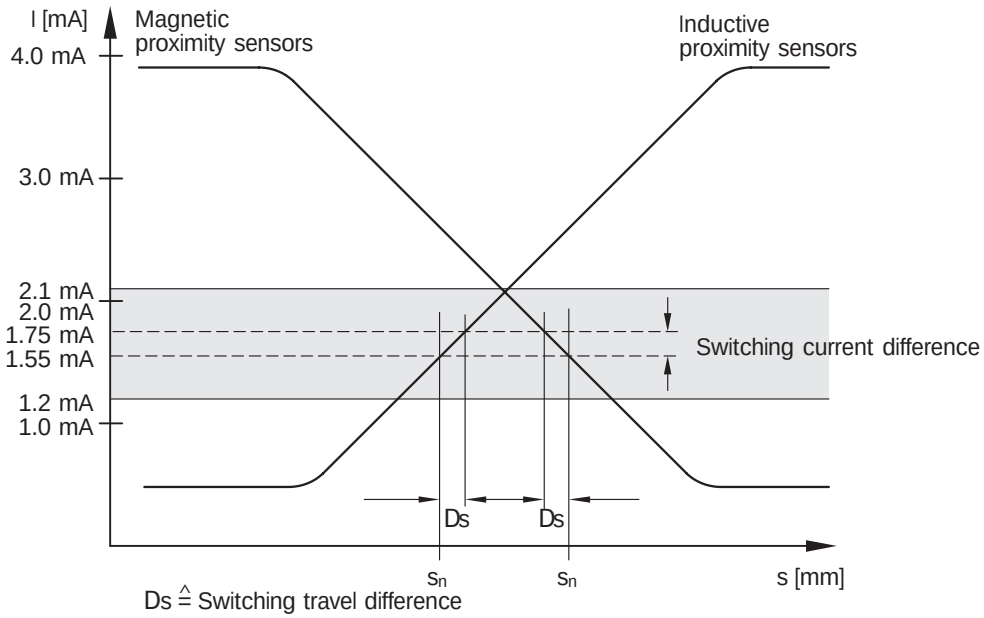
All NAMUR sensors have a classification for division 1 areas. They can be used in combination with Isolating units.

Typical standard operating values for a control circuit with intrinsic safety protection:

U_N = 8.2 V
R_i = 1KW
$I_{attenuated}$ < 1.2 mA
$I_{unattenuated}$ > 2.1 mA

The falling curve from right to left only applies to inductive sensors. The curve for magnetic sensors has exactly the same characteristics, but ascends from right to left:

$I_{attenuated}$ > 2.1 mA
$I_{unattenuated}$ < 1.2 mA



Glossary
Standards and conformities

Standards

EN 60 947-1 - IEC 947-1 DIN VDE 0660 Part 100	Low-voltage switchgear; part 1: General specifications
EN 60 947-5-1 - IEC 947-5-1 DIN VDE 0660 Part 200	Low-voltage switchgear; part 5: Controllers and switching elements Section 1: Electromechanical controllers
EN 60 947-5-2 - IEC 947-5-2 DIN VDE 0660 Part 208	Switchgear; low-voltage switchgear; auxiliary circuit switch; additional specifications for inductive proximity switches
IEC 664 DIN VDE 0110	Specification for measuring air and creepage distances of electric equipment
EN 60 204-1 - IEC 204-1 DIN VDE 113 Part 1	Electric components in industrial machines; Part 1: General requirements
DIN VDE 0160	Components in power systems with electronic equipment
EN 60 529 - IEC 529	Enclosure ratings provided by housing (IP code)
EN 50 227	NAMUR - electric position encoder - direct-current interface for position encoder and switching amplifier

Conformities

CE

Directives for consumer and capital goods enetering the European market have been established by the EU commission to standardise the European single market. To indicate fulfilment of these directives, manufacturers attach the "CE-symbol" to their products.

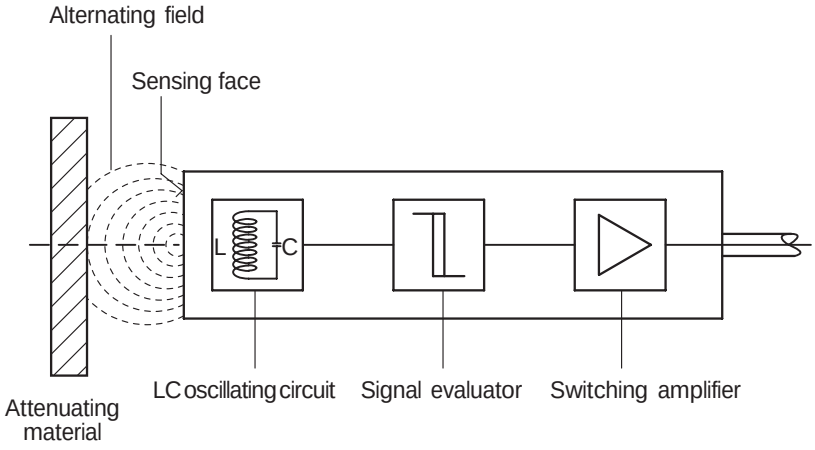
UL

This symbol also issued by the Underwriters Laboratories bears the letter "L" ("listed". This means that the machine has been granted an individual approval ' with an approval number. This symbol permits the checking of product´s mass production at any time and without prior notice.

CSA

The Canadian operating regulations for electrical plants and components are subject to the CEC /Canadian Electrical Code) whicg descibes CSA conformity for all machines. The Canadian Standard Assiciation issues the CSA symbol after the testing of individual components.

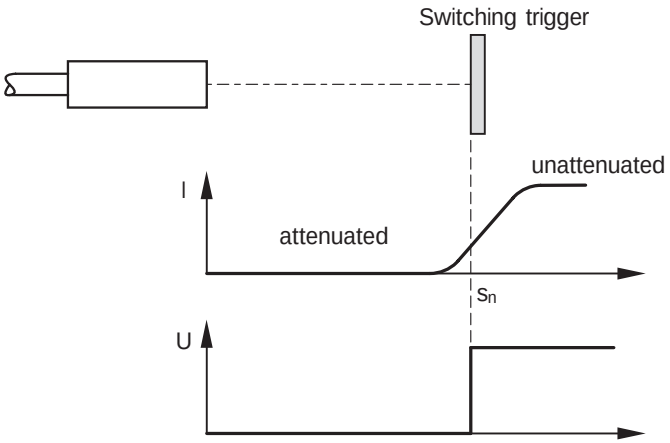
Operating Principle
Inductive proximity sensors



An inductive proximity sensor comprises an LC oscillating circuit, a signal evaluator, and a switching amplifier.
The coil of this oscillating circuit generates a high-frequency electromagnetic alternating field. This field is emitted at the sensing face of the sensor.
If attenuating material nears the sensing face, eddy currents are generated in the case of non-ferrite metals.

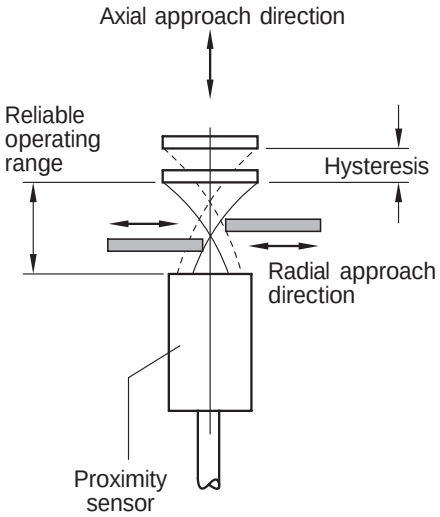
In the case of ferromagnetic metals, hysteresis and eddy-current loss also occurs.
These losses draw energy from the oscillating circuit and reduce oscillation. The signal evaluator detects this reduction and converts it into a switching signal.

The terms "attenuated" and "unattenuated" are used to describe the two switching states of the inductive proximity sensors.



Response curve for inductive proximity sensors
The specified sensing ranges are determined in the case of axial approach along the reference axis of the sensor.

Radial approach results in a reduction of the sensing range. The edge of the switching trigger has only a small surface area. As a result, less eddy-current losses occur. The sensor therefore only reacts if the switching trigger laterally enters the alternating field relatively close to the sensing face. In the case of axial approach, the full surface of the switching trigger is exposed to the scattered electromagnetic field. Axial alignment therefore provides the maximum sensing range.



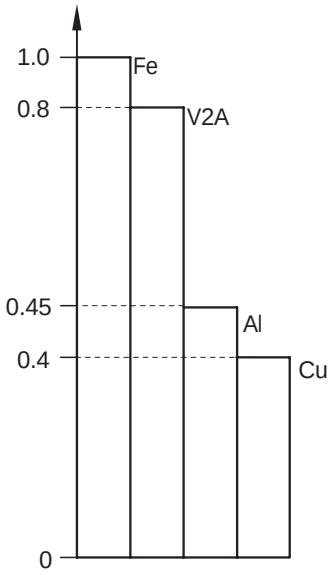
Rated switching trigger
All sensing range measurements must be performed by axially moving a standard square measuring plate made of St37 (1 mm thick) through the alternating field. The length of the switching trigger sides is equal to the diameter of the response area or is 3 s_n. The larger value should be taken.

Reduction factor R_M
The specified sensing ranges all relate to St37. Considerable reductions in distance sometimes occur in the case of other materials.
Approximate reference values, which can vary from type to type:

St37 (Fe)	1
Stainless steel (V2A)	0.8
Aluminium (solid)	0.45
Copper (Cu)	0.4

These correction factors must be taken into consideration when selecting actuation elements or when calibrating to objects made of the respective alloys.

When proximity sensors are installed, the reliable sensing range (81 % of s_n) should always be used as the basis. The exact switching point must be set by means of fine adjustment.



Installation Notes
Inductive proximity sensors

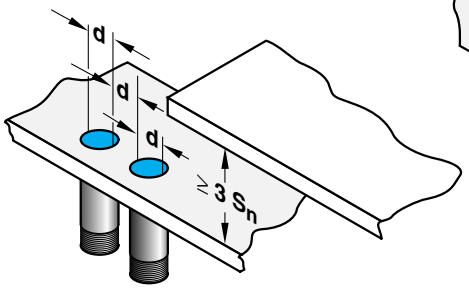
Flush installation in metal
Proximity sensors for flush installation are shielded internally around the ferrite core. As a result, the sensor can be embedded in the metal up to the sensing face.

Proximity sensors for flush installation have a smaller sensing range compared to proximity sensors for non-flush installation with the same shape and design.

Exceeding zone
These sensors with enhanced sensing range are not flush installable in metal:

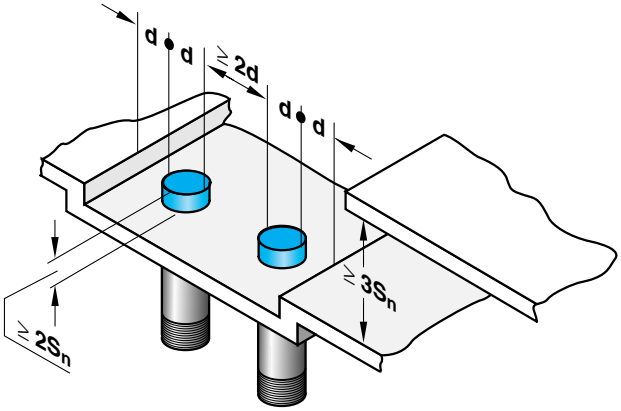
Type	Exceeding zone
IM12-04B ...	0,1 x d
IM18-08B ...	0,1 x d
IM30-15B ...	0,1 x d
IH06-02B ...	2 mm

Flush installation:

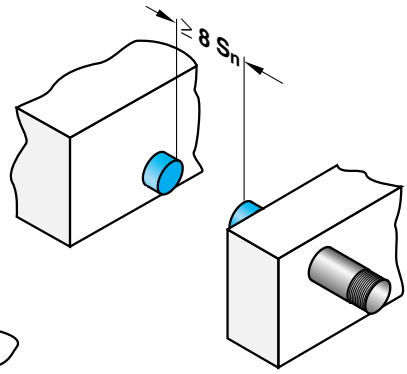


Non-flush installation in metal
With proximity sensors for non-flush installation, a metal-free zone must be maintained owing to the scattered field distribution.

Non-flush installation:



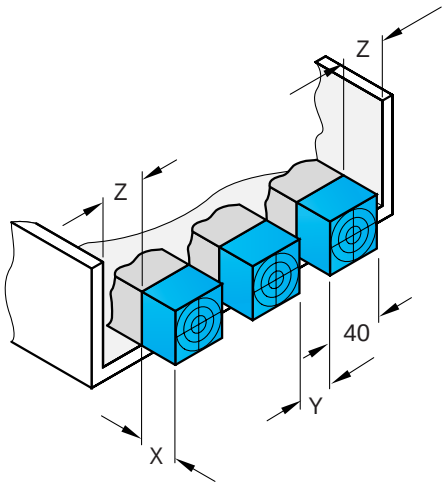
Opposite installation:



Cylindrical design
General installation notes for cylindrical design for flush and non-flush installation in metal:

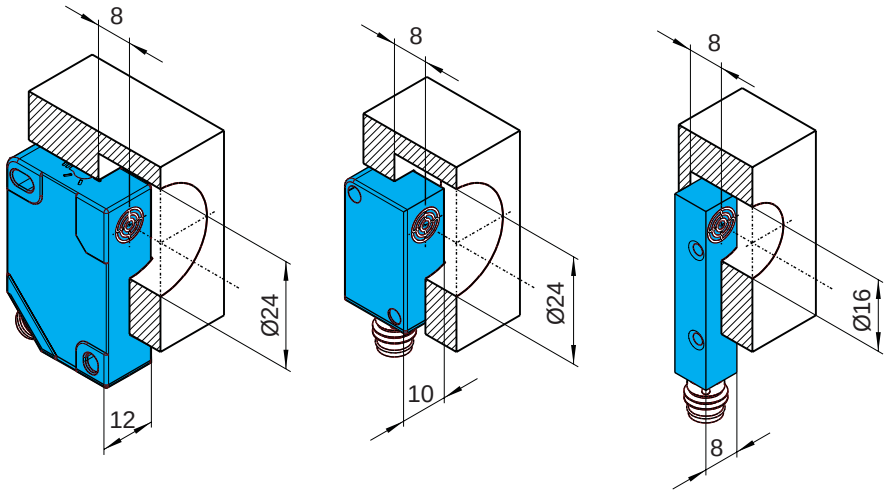
Cuboidal design

General installation notes for cuboidal design in metal:



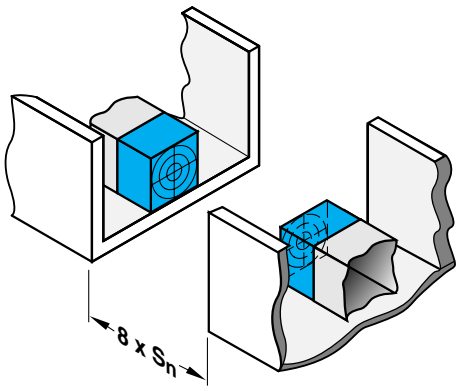
in mm

design	X	Y	Z
IQ40-15B	0	40	0
IQ40-20B	0	40	0
IQ40-20N	0	80	80
IQ40-35N	40	80	80



in mm

design	Y
IQ08-02B ...	8
IQ08-04N ...	16
IQ10-03B ...	10
IQ10-06N ...	20
IQ12-03B ...	12
IQ12-06N ...	24

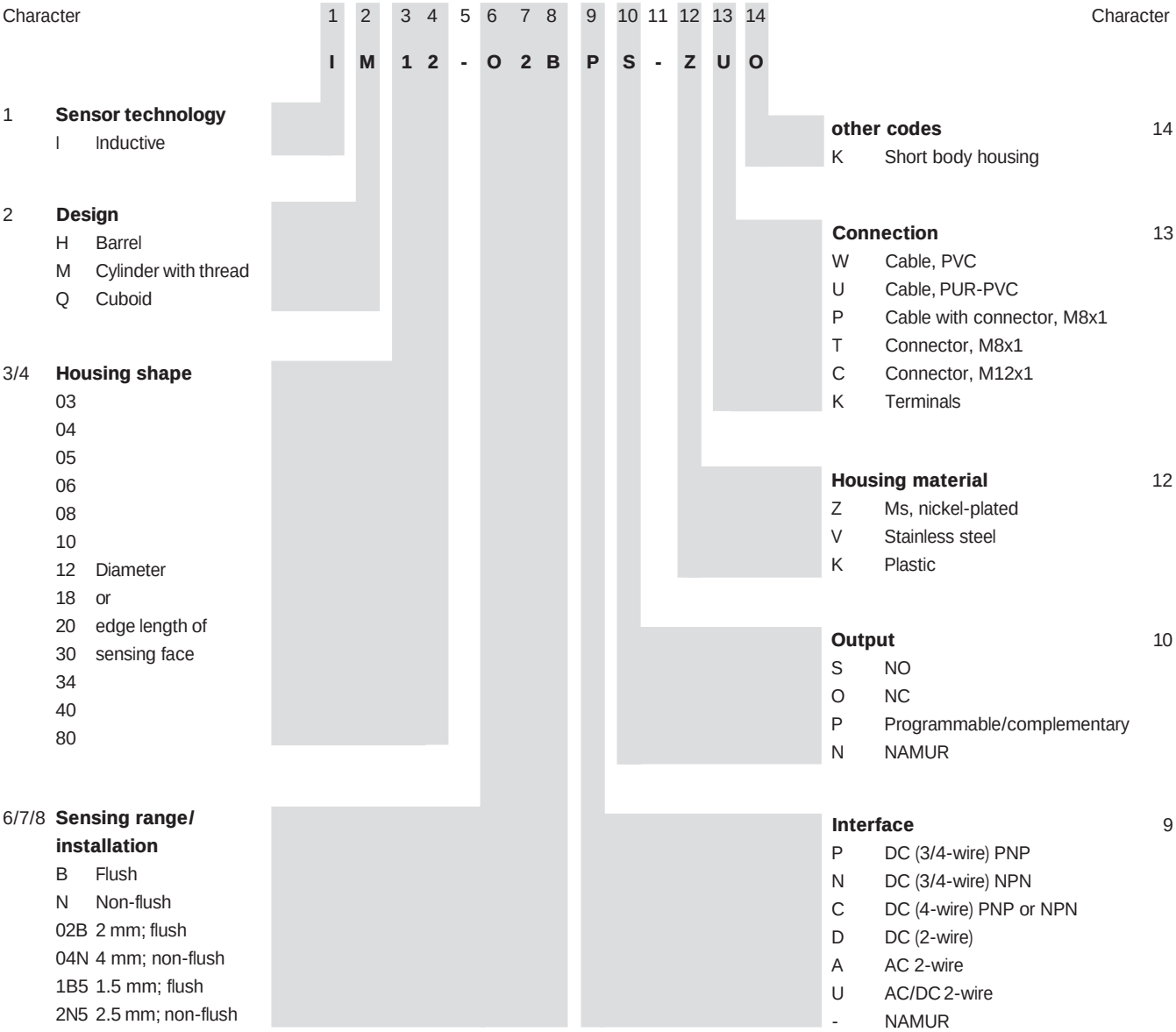


Selection Table

Inductive proximity sensors

Series	Housing			Sensing range s_n in mm		Switching-output		Output function			Connection type			Electr. config.	Page
	Design	Size in mm	Material	Flush	Non flush	PNP	NPN	NO	NC	NO/NC progr./compl.	Cable	Connector	Terminals		
IM04	Cylinder with thread	M4	Brass	0,6		•	•	•			•			DC 3-w.	20
IM05		M5	Brass	0,8		•	•	•			•	•		DC 3-w.	22
IM08		M8	Brass	1,5/2	2,5/4	•	•	•	•		•	•		DC 3-w.	24
IM12		M12	Brass	2/4	4/8	•	•	•	•	•	•	•		DC 3/4-w.	30
IM18		M18	Brass	5/8	8/12	•	•	•	•	•	•	•		DC 3/4-w.	40
IM30		M30	Brass	10/15	15/20	•	•	•	•		•	•		DC 3-w.	50
IH03	Barrel, smooth	Ø3	Stainless steel	0,6		•	•	•			•			DC 3-w.	56
IH04		Ø4	Stainless steel	0,8		•	•	•			•	•		DC 3-w.	58
IH06		Ø6,5	Stainless steel	1,5/2	4	•	•	•			•	•		DC 3-w.	60
IQ05	Cuboid	5x5x25	Brass	0,8		•	•	•			•			DC 3-w.	64
IQ08		8x40/8x49	Plastic	2	4	•	•	•			•	•		DC 3-w.	66
IQ10		10x28/16x37	Plastic	3	6	•	•	•			•	•		DC 3-w.	68
IQ12		12x40/26x49	Plastic	3	6	•	•	•			•	•		DC 3-w.	70
IQ40		41x41x121	Plastic	15	20	•				•			•	DC 3-w.	72
IQ40		40x40x66	Plastic	15/20	35	•		•		•		•		DC 3/4-w.	74
IQ80		80x40x105	Plastic		60	•				•			•	DC 3-w.	76
IM12	Cylinder with thread	M12	Brass	2	4			•			•	•		DC 2-w.	78
IM18		M18	Brass	5	8			•			•	•		DC 2-w.	80
IM30		M30	Brass	10	15			•			•	•		DC 2-w.	82
IM12	Cylinder with thread	M12	Brass	2	4			•	•		•			AC	84
IM18		M18	Brass	5	8			•	•		•			AC/DC	86
IM30		M30	Brass	10	15			•	•		•			AC/DC	88
IH20	Barrel, smooth	Ø20	Plastic		10			•			•			AC/DC	90
IH34		Ø34	Plastic		30			•	•		•			AC/DC	92
IQ40	Cuboid	41x41x121	Plastic	15	20					•			•	AC/DC	94
IQ80		80x40x105	Plastic		60					•			•	AC/DC	96
IM08	Cylinder with thread	M8	Brass	1							•			NAMUR	98
IM12		M12	Brass	2	4						•			NAMUR	100
IM18		M18	Brass	5	8						•			NAMUR	102
IM30		M30	Brass	10	15						•			NAMUR	104

Type Code
Inductive proximity sensors

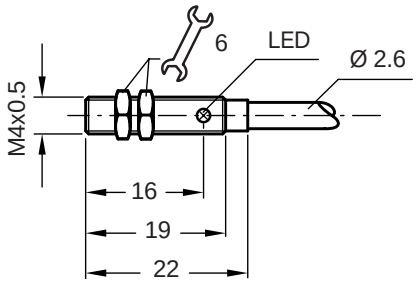


Inductive proximity sensors

IM 04 series, sensing range 0.6 mm
DC 3-wire, miniature metal housing

Miniature series

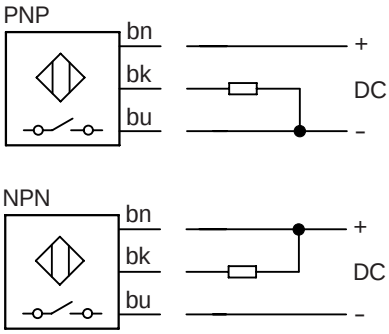
Dimensions in mm



Features

- Can be installed flush
- PNP or NPN output
- Normally open function
- High switching frequency
- Short-circuit protection (pulsed)
- Robust brass housing, nickel-plated with fine thread M4 x 0.5 mm
- Cable
- Enclosure rating IP 67
- LED status indicator

Connection diagram

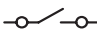
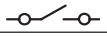


Wire colour		Assignement
bn	brown	+ V DC
bk	black	NO
bu	blue	- V DC

Electrical and mechanical data

Operating voltage U_b	10 ... 30 V DC
Ripple U_{pp}	≤ 20% of U_b
Voltage drop U_d (at I_a = 50 mA)	≤ 0.6 V max.
Power consumption (without load)	10 mA
Continuous current I_a	≤ 100 mA
Time delay before availability t_v	≤ 10 ms
Hysteresis H typ.	10% of s_r
Repeatability R (U_b and T_a constant)	≤ 2%
Temperature drift	± 10% of s_r
EMC	to EN 60 947-5-2
Short-circuit protection (pulsed)	yes
Reverse polarity protection	yes
Power-up pulse suppression	yes
Enclosure rating to EN 60529	IP 67
Shock and vibration stress	30 g, 11 ms 10 to 55 Hz, 1 mm
Ambient temperature T_a	- 25 ... + 70 °C
Housing material	Brass, nickel-plated, plastic
Tightening torque	0.8 Nm
Connection cable	PUR, 3 x 0.055 mm^2

Selection table

Sensing range s_n mm	Installation in metal	Switching output	Output function	Switching frequency f in Hz	Connection	Type	Order number
0,6		PNP		2000	Cable 2 m	IM04-0B6PS-ZU1	6020145
0,6		NPN		2000	Cable 2 m	IM04-0B6NS-ZU1	6020146

Normaly closed function available on request

Inductive proximity sensors

IM 05 series, sensing range 0.8 mm
DC 3-wire, miniature metal housing

Miniature series

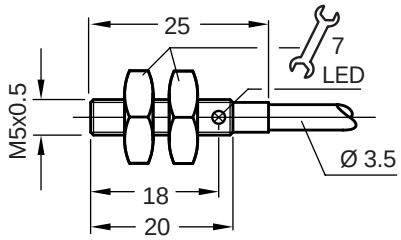
Features

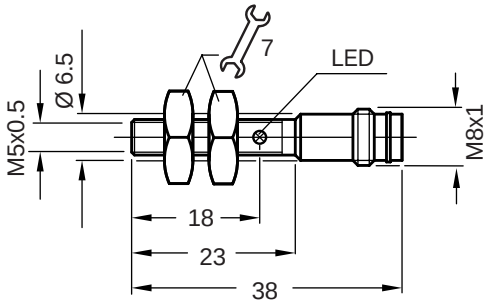
- Can be installed flush
- PNP or NPN output
- Normally open function
- High switching frequency
- Short-circuit protection (pulsed)
- Robust brass housing, nickel-plated with fine thread M5 x 0.5 mm
- Cable or Connector
- Enclosure rating IP 67
- LED status indicator

Accessories

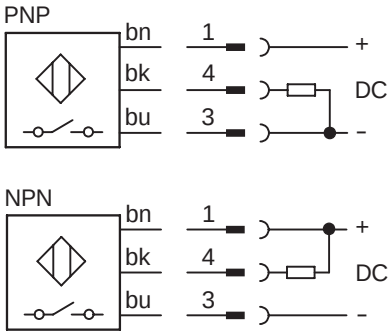
Round connectors

Dimensions in mm

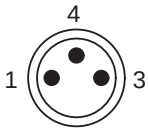




Connection diagram



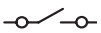
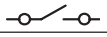
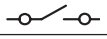
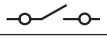
Wire colour		Contact	Assignment
bn	brown	1	+ V DC
bk	black	4	NO
bu	blue	3	- V DC



Electrical and mechanical data

Operating voltage U_b	10 ... 30 V DC
Ripple U_{pp}	≤ 20% of U_b
Voltage drop U_d (at I_a = 200 mA)	≤ 2.0 V max.
Power consumption (without load)	10 mA
Continuous current I_a	≤ 200 mA
Time delay before availability t_v	≤ 10 ms
Hysteresis H typ.	10% of s_r
Repeatability R (U_b and T_a constant)	≤ 1,5%
Temperature drift	± 10% of s_r
EMC	to EN 60 947-5-2
Short-circuit protection (pulsed)	yes
Reverse polarity protection	yes
Power-up pulse suppression	yes
Enclosure rating to EN 60529	IP 67
Shock and vibration stress	30 g, 11 ms 10 to 55 Hz, 1 mm
Ambient temperature T_a	- 25 ... + 70 °C
Housing material	Brass, nickel-plated, plastic
Tightening torque	1.5 Nm
Connection cable	PVC, 3 x 0.14 mm^2

Selection table

Sensing range s_n mm	Installation in metall	Switching output	Output function	Switching frequency f in Hz	Connection	Type	Order number
0.8		PNP		5000	Cable 2 m	IM05-0B8PS-ZW1	6011591
0.8		NPN		5000	Cable 2 m	IM05-0B8NS-ZW1	6020155
0.8		PNP		5000	Connector M8 x 1	IM05-0B8PS-ZT1	6020110
0.8		NPN		5000	Connector M8 x 1	IM05-0B8NS-ZT1	6020158

Normaly closed function available on request

Inductive proximity sensors

IM 08 series, sensing range 1.5 / 2.5 mm
DC 3-wire, metal housing

Standard series

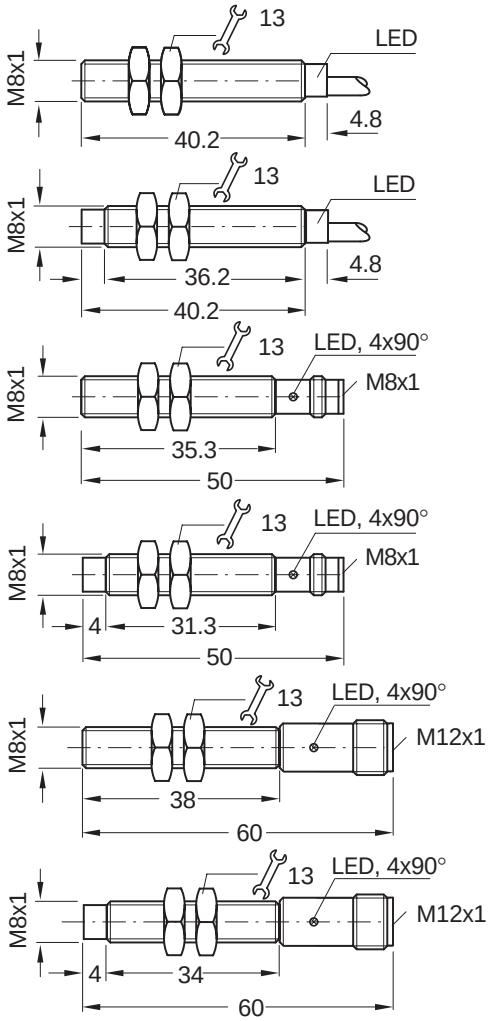
Features

- Can be installed flush or non-flush in metal
- PNP or NPN output
- Normally open/ normally closed function
- High switching frequency
- Short-circuit protection (pulsed)
- Robust brass housing, nickel-plated with fine thread M8 x 1 mm
- Cable or connector
- Enclosure rating IP 67
- LED status indicator

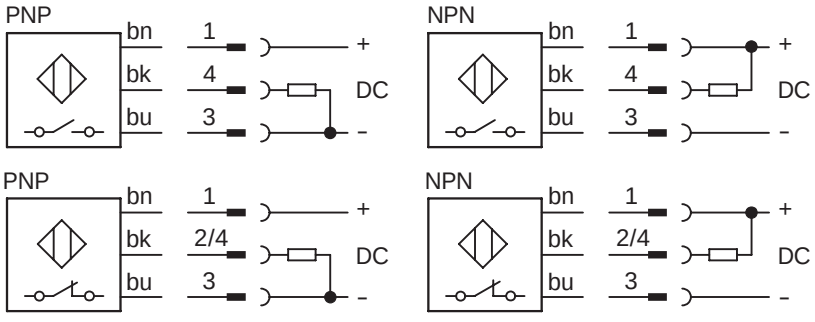
Accessories

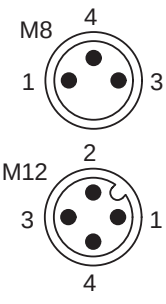
Round connectors

Dimensions in mm



Connection diagram





Wire colour		Contact M8	Contact M12	Assignment
bn	brown	1	1	+ V DC
bk	black	4	2/4	NC/NO
bu	blue	3	3	- V DC

Electrical and mechanical data

Operating voltage U_b	10 ... 30 V DC
Ripple U_{pp}	≤ 10%
Voltage drop U_d (at I_a max.)	≤ 1.2 V
Power consumption (without load)	≤ 20 mA
Continuous current I_a	≤ 200 mA
Time delay before availability t_v	≤ 100 ms
Hysteresis H	2% - 10% of s_r
Repeatability R (U_b and T_a constant)	≤ 2% of s_r
Temperature drift	± 10% of s_r
EMC	to EN 60 947-5-2

Short-circuit protection (pulsed)	yes
Reverse polarity protection	yes
Power-up pulse suppression	yes
Enclosure rating to EN 60529	IP 67
Shock and vibration stress	30 g, 11 ms 10 to 55 Hz, 1 mm
Ambient temperature T_a	- 25 ... + 70 °C
Housing material	Brass, nickel-plated, plastic
Tightening torque	4 Nm
Connection cable	PVC, 3 x 0.14 mm^2

Selection table

Sensing range s_r mm	Installation in metal	Switching output	Output function	Switching frequency f in Hz	Connection	Type	Order number
1.5		PNP		3000	Cable 2 m	IM08-1B5PS-ZW1	6020215
1.5		NPN		3000	Cable 2 m	IM08-1B5NS-ZW1	6020216
1.5		PNP		3000	Cable 2 m	IM08-1B5PO-ZW1	6020217
1.5		NPN		3000	Cable 2 m	IM08-1B5NO-ZW1	6020218
1.5		PNP		3000	Connector M8 x 1 mm	IM08-1B5PS-ZT1	6020219
1.5		NPN		3000	Connector M8 x 1 mm	IM08-1B5NS-ZT1	6020220
1.5		PNP		3000	Connector M8 x 1 mm	IM08-1B5PO-ZT1	6020221
1.5		PNP		3000	Connector M12 x 1 mm	IM08-1B5PS-ZC1	6020223
1.5		NPN		3000	Connector M12 x 1 mm	IM08-1B5NS-ZC1	6020224
2.5		PNP		2500	Cable 2 m	IM08-2N5PS-ZW1	6020227
2.5		NPN		2500	Cable 2 m	IM08-2N5NS-ZW1	6020228
2.5		PNP		2500	Connector M8 x 1 mm	IM08-2N5PS-ZT1	6020231
2.5		NPN		2500	Connector M8 x 1 mm	IM08-2N5NS-ZT1	6020232
2.5		PNP		2500	Connector M12 x 1 mm	IM08-2N5PS-ZC1	6020235
2.5		NPN		2500	Connector M12 x 1 mm	IM08-2N5NS-ZC1	6020236

Inductive proximity sensors

IM 08 series, sensing range 1.5 mm
DC 3-wire, metal housing

Miniature series

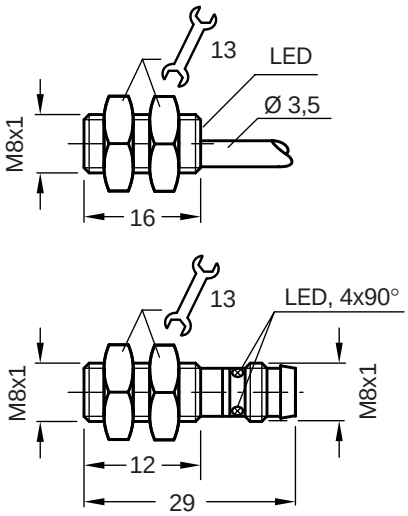
Features

- Can be installed flush
- PNP or NPN output
- Normally open function
- High switching frequency
- Short-circuit protection (pulsed)
- Robust brass housing, nickel-plated with fine thread M8 x 1 mm
- Cable or Connector
- Enclosure rating IP 67
- LED status indicator

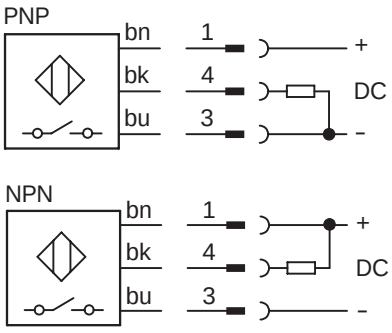
Accessories

Round connectors

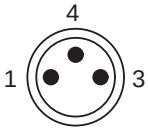
Dimensions in mm



Connection diagram



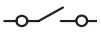
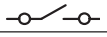
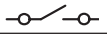
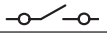
Wire colour		Contact	Assignment
bn	brown	1	+ V DC
bk	black	4	NO
bu	blue	3	- V DC



Electrical and mechanical data

Operating voltage U_b	10 ... 30 V DC
Ripple U_{pp}	≤ 20% of U_b
Voltage drop U_d (at I_a = 200 mA)	≤ 2.0 V max.
Power consumption (without load)	≤ 10 mA
Continuous current I_a	≤ 200 mA
Time delay before availability t_v	≤ 10 ms
Hysteresis H	10% of s_r
Repeatability R (U_b and T_a constant)	≤ 5% of s_r
Temperature drift	± 10% of s_r
EMC	to EN 60 947-5-2
Short-circuit protection (pulsed)	yes
Reverse polarity protection	yes
Power-up pulse suppression	yes
Enclosure rating to EN 60529	IP 67
Shock and vibration stress	30 g, 11 ms 10 to 55 Hz, 1 mm
Ambient temperature T_a	- 25 ... + 70 °C
Housing material	Brass, nickel-plated, plastic
Tightening torque	4 Nm
Connection cable	PVC, 3 x 0.14 mm^2

Selection table

Sensing range s_n mm	Installation in metal	Switching output	Output function	Switching frequency f in Hz	Connection	Type	Order number
1.5		PNP		5000	Cable 2 m	IM08-1B5PS-ZWK	6020111
1.5		NPN		5000	Cable 2 m	IM08-1B5NS-ZWK	6020173
1.5		PNP		5000	Connector M8 x 1 mm	IM08-1B5PS-ZTK	6020112
1.5		NPN		5000	Connector M8 x 1 mm	IM08-1B5NS-ZTK	6020176

Normaly closed function available on request

Inductive proximity sensors

IM 08 series, sensing range 2 / 4 mm
DC 3-wire, metal housing

Advanced series

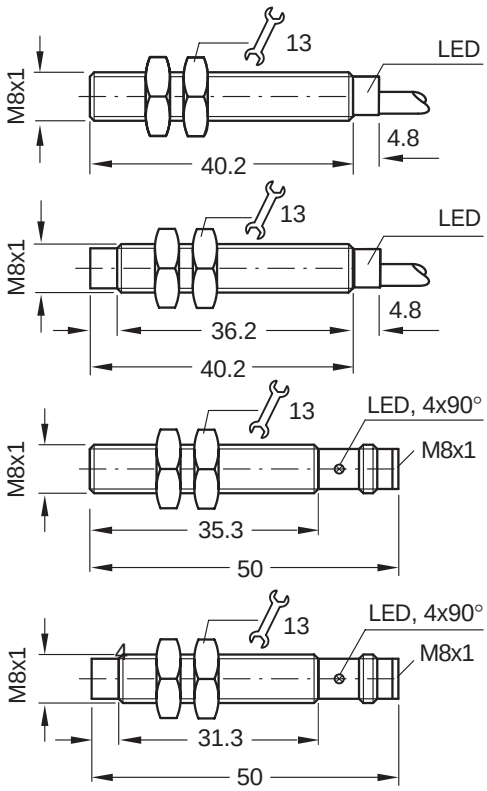
Features

- Enhanced sensing range
- Can be installed flush or non-flush in metal
- PNP or NPN output
- Normally open/ normally closed function
- High switching frequency
- Short-circuit protection (pulsed)
- Robust brass housing, nickel-plated with fine thread M8 x 1 mm
- Cable or connector
- Enclosure rating IP 67
- LED status indicator

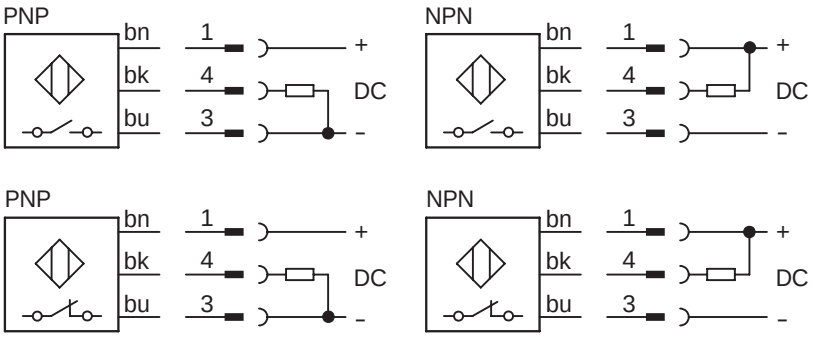
Accessories

Round connectors

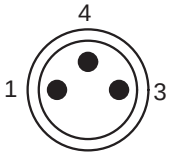
Dimensions in mm



Connection diagram



Wire colour		Contact	Assignment
bn	brown	1	+ V DC
bk	black	4	NC/NO
bu	blue	3	- V DC



Electrical and mechanical data

Operating voltage U_b	10 ... 30 V DC
Ripple U_{pp}	≤ 10% of U_b
Voltage drop U_d (at I_a max.)	≤ 1.2 V
Power consumption (without load)	≤ 20 mA
Continuous current I_a	≤ 200 mA
Time delay before availability t_v	≤ 100 ms
Hysteresis H	2% - 15% of s_r
Repeatability R (U_b and T_a constant)	≤ 5% of s_r
Temperature drift	± 10% of s_r
EMC	to EN 60 947-5-2

Short-circuit protection (pulsed)	yes
Reverse polarity protection	yes
Power-up pulse suppression	yes
Enclosure rating to EN 60529	IP 67
Shock and vibration stress	30 g, 11 ms 10 to 55 Hz, 1 mm
Ambient temperature T_a	- 25 ... + 70 °C
Housing material	Brass, nickel-plated, plastic
Tightening torque	4 Nm
Connection cable	PVC, 3 x 0.14 mm^2

Selection table

Sensing range s_n mm	Installation in metal	Switching output	Output function	Switching frequency f in Hz	Connection	Type	Order number
2		PNP		3000	Cable 2 m	IM08-02BPS-ZW1	7900001
2		NPN		3000	Cable 2 m	IM08-02BNS-ZW1	7900002
2		PNP		3000	Cable 2 m	IM08-02BPO-ZW1	7900003
2		PNP		3000	Connector M8 x 1 mm	IM08-02BPS-ZT1	7900005
2		NPN		3000	Connector M8 x 1 mm	IM08-02BNS-ZT1	7900006
2		PNP		3000	Connector M8 x 1 mm	IM08-02BPO-ZT1	7900007
2		NPN		3000	Connector M8 x 1 mm	IM08-02BNO-ZT1	7900008
4		PNP		3000	Cable 2 m	IM08-04NPS-ZW1	7900009
4		NPN		3000	Cable 2 m	IM08-04NNS-ZW1	7900010
4		PNP		3000	Cable 2 m	IM08-04NPO-ZW1	7900011
4		PNP		3000	Connector M8 x 1 mm	IM08-04NPS-ZT1	7900013
4		NPN		3000	Connector M8 x 1 mm	IM08-04NNS-ZT1	7900014
4		PNP		3000	Connector M8 x 1 mm	IM08-04NPO-ZT1	7900015
4		NPN		3000	Connector M8 x 1 mm	IM08-04NNO-ZT1	7900016

Inductive proximity sensors

IM 12 series, sensing range 2 / 4 mm
DC 3-wire, metal housing

Standard series

Features

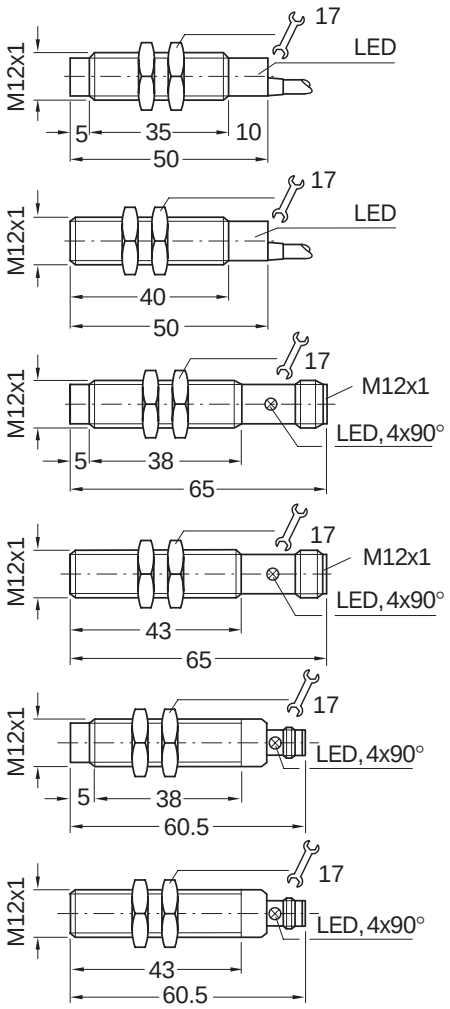
- Can be installed flush or non-flush in metal
- PNP or NPN output
- Normally open/ normally closed function
- Short-circuit protection (pulsed)
- Robust brass housing, nickel-plated with fine thread M12 x 1 mm
- Cable or connector
- Enclosure rating IP 67
- LED status indicator

Accessories

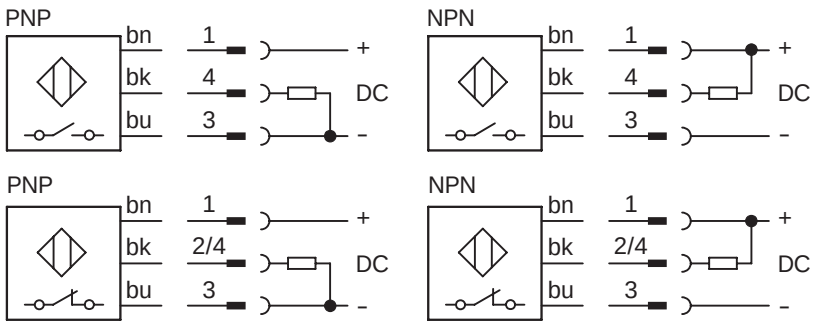
Round connectors

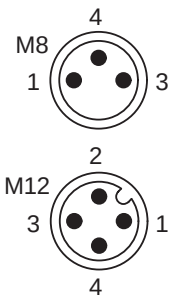
Mounting bracket

Dimensions in mm



Connection diagram





Wire colour		Contact M8	Contact M12	Assignment
bn	brown	1	1	+ V DC
bk	black	4	2/4	NC/NO
bu	blue	3	3	- V DC

Electrical and mechanical data

Operating voltage U_b	10 ... 30 V DC
Ripple U_{pp}	≤ 10%
Voltage drop U_d (at I_a max.)	≤ 1.2 V
Power consumption (without load)	≤ 20 mA
Continuous current I_a	≤ 200 mA
Time delay before availability t_v	≤ 100 ms
Hysteresis H	2% - 10% of s_r
Repeatability R (U_b and T_a constant)	≤ 2% of s_r
Temperature drift	± 10% of s_r
EMC	to prEN 60 947-5-2
Short-circuit protection (pulsed)	yes
Reverse polarity protection	yes
Power-up pulse suppression	yes
Enclosure rating to EN 60529	IP 67
Shock and vibration stress	30 g, 11 ms 10 to 55 Hz, 1 mm
Ambient temperature T_a	- 25 ... + 70 °C
Housing material	Brass, nickel-plated, plastic
Tightening torque	10 Nm
Connection cable	PVC, 3 x 0.22 mm^2

Selection table

Sensing range s_n mm	Installation in metal	Switching output	Output function	Switching frequency f in Hz	Connection	Type	Order number
2		PNP		2000	Cable 2 m	IM12-02BPS-ZW1	6011963
2		NPN		2000	Cable 2 m	IM12-02BNS-ZW1	6011964
2		PNP		2000	Cable 2 m	IM12-02BPO-ZW1	6011965
2		NPN		2000	Cable 2 m	IM12-02BNO-ZW1	6011966
2		PNP		2000	Connector M8 x 1 mm	IM12-02BPS-ZT1	6011967
2		NPN		2000	Connector M8 x 1 mm	IM12-02BNS-ZT1	6011968
2		PNP		2000	Connector M12 x 1 mm	IM12-02BPS-ZC1	6011971
2		NPN		2000	Connector M12 x 1 mm	IM12-02BNS-ZC1	6011972
2		PNP		2000	Connector M12 x 1 mm	IM12-02BPO-ZC1	6011973
2		NPN		2000	Connector M12 x 1 mm	IM12-02BNO-ZC1	6011974
4		PNP		2000	Cable 2 m	IM12-04NPS-ZW1	6011975
4		NPN		2000	Cable 2 m	IM12-04NNS-ZW1	6011976
4		PNP		2000	Cable 2 m	IM12-04NPO-ZW1	6011977
4		PNP		2000	Connector M8 x 1 mm	IM12-04NPS-ZT1	6011979
4		NPN		2000	Connector M8 x 1 mm	IM12-04NNS-ZT1	6011980
4		PNP		2000	Connector M12 x 1 mm	IM12-04NPS-ZC1	6011983
4		NPN		2000	Connector M12 x 1 mm	IM12-04NNS-ZC1	6011984
4		PNP		2000	Connector M12 x 1 mm	IM12-04NPO-ZC1	6011985

Inductive proximity sensors

IM 12 series, sensing range 2 / 4 mm
DC 3-wire, metal housing

Short version

Features

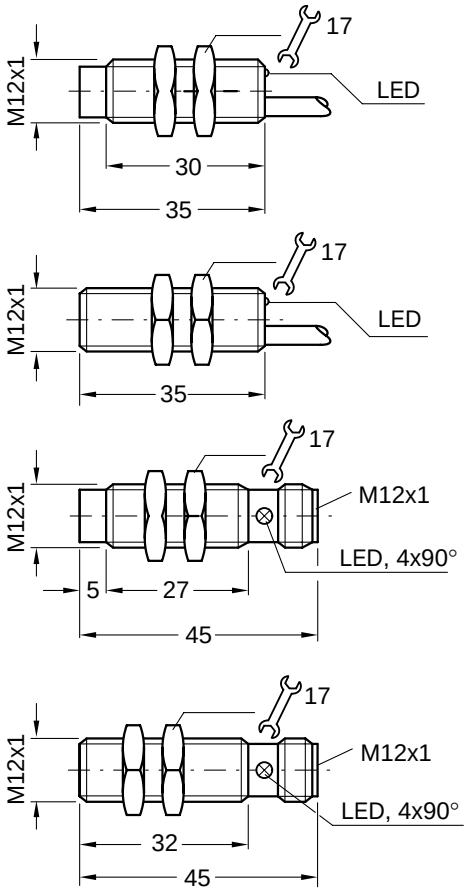
- Can be installed flush or non-flush in metal
- PNP or NPN output
- Normally open function
- High switching frequency
- Short-circuit protection (pulsed)
- Robust brass housing, nickel-plated with fine thread M12 x 1 mm
- Cable or connector
- Enclosure rating IP 67
- LED status indicator

Accessories

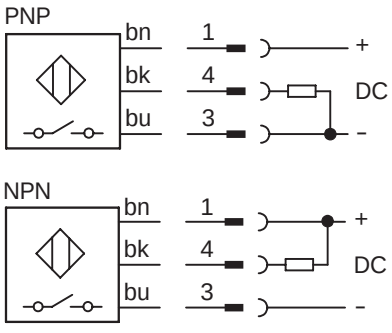
Round connectors

Mounting bracket

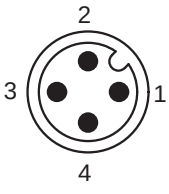
Dimensions in mm



Connection diagram



Wire colour		Contact	Assignment
bn	brown	1	+ V DC
bk	black	4	NO
bu	blue	3	- V DC



Electrical and mechanical data

Operating voltage U_b	10 ... 30 V DC
Ripple U_{pp}	≤ 10% of U_b
Voltage drop U_d (at I_a max.)	≤ 1.5 V
Power consumption (without load)	≤ 10 mA
Continuous current I_a	≤ 300 mA
Time delay before availability t_v	≤ 2 ms
Hysteresis H	1% - 10% of s_r
Repeatability R (U_b and T_a constant)	≤ 1% of s_r
Temperature drift	± 10% of s_r
EMC	to EN 60 947-5-2

Wire-break protection	yes
Short-circuit protection (pulsed)	yes
Reverse polarity protection	yes
Power-up pulse protection	yes
Enclosure rating to EN 60529	IP 67
Shock and vibration stress	30 g, 11 ms 10 to 55 Hz, 1 mm
Ambient temperature T_a	- 25 ... + 75 °C
Housing material	Brass, nickel-plated, plastic
Tightening torque	7.0 Nm
Connection cable	PUR-PVC, 3 x 0.25 mm^2

Selection table

Sensing range s_n mm	Installation in metal	Switching output	Output function	Switching frequency f in Hz	Connection	Type	Order number
2		PNP		2000	Cable 2 m	IM12-02BPS-ZUK	1017426
2		NPN		2000	Cable 2 m	IM12-02BNS-ZUK	1017438
2		PNP		2000	Connector M12 x 1 mm	IM12-02BPS-ZCK	1017428
2		NPN		2000	Connector M12 x 1 mm	IM12-02BNS-ZCK	1017440
4		PNP		2000	Cable 2 m	IM12-04NPS-ZUK	1017427
4		NPN		2000	Cable 2 m	IM12-04NNS-ZUK	1017439
4		PNP		2000	Connector M12 x 1 mm	IM12-04NPS-ZCK	1017429
4		NPN		2000	Connector M12 x 1 mm	IM12-04NNS-ZCK	1017441

Inductive proximity sensors

IM 12 series, sensing range 4 / 8 mm
DC 3-wire, metal housing

Advanced series

Features

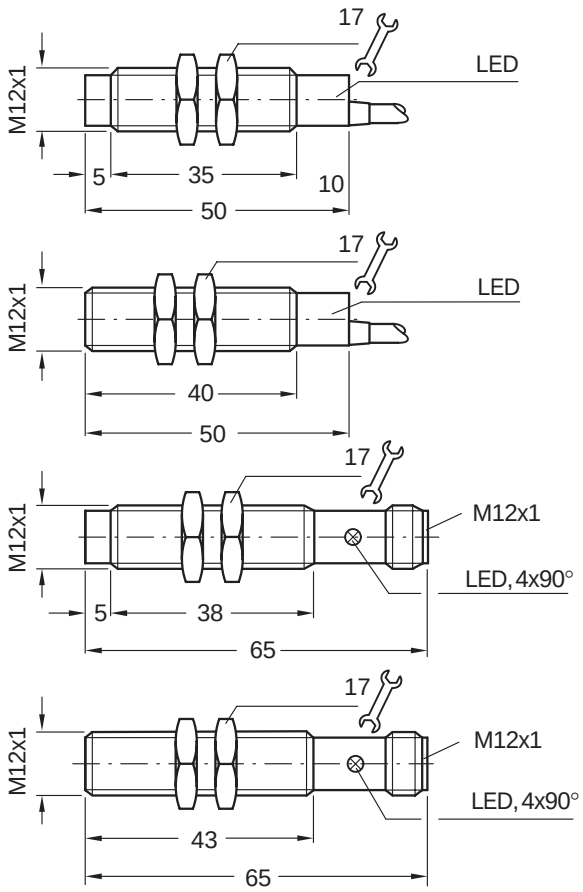
- Enhanced sensing range
- Can be installed flush or non-flush in metal
- PNP or NPN output
- Normally open/ normally closed function
- High switching frequency
- Short-circuit protection (pulsed)
- Robust brass housing, nickel-plated with fine thread M12 x 1 mm
- Cable or connector
- Enclosure rating IP 67
- LED status indicator

Accessories

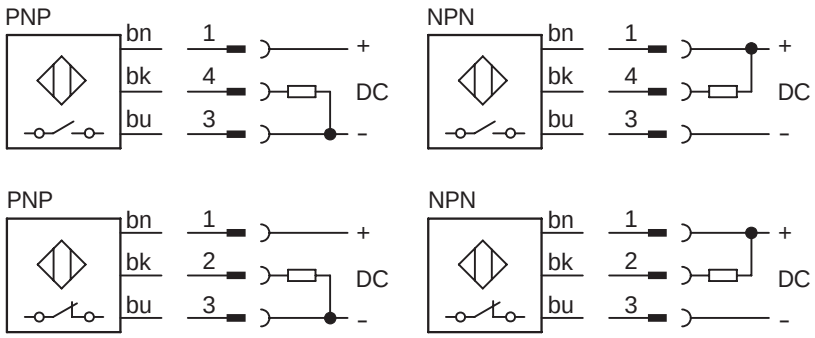
Round connectors

Mounting bracket

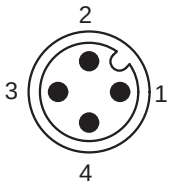
Dimensions in mm



Connection diagram



Wire colour		Contact	Assignment
bn	brown	1	+ V DC
bk	black	2/4	NC/NO
bu	blue	3	- V DC



Electrical and mechanical data

Operating voltage U_b	10 ... 30 V DC
Ripple U_{pp}	≤ 10% of U_b
Voltage drop U_d (at I_a max.)	≤ 1.2 V
Power consumption (without load)	≤ 10 mA
Continuous current I_a	≤ 200 mA
Time delay before availability t_v	≤ 100 ms
Hysteresis H	1% - 15% of s_r
Repeatability R (U_b and T_a constant)	≤ 5% of s_r
Temperature drift	± 10% of s_r
EMC	to EN 60 947-5-2

Short-circuit protection (pulsed)	yes
Reverse polarity protection	yes
Power-up pulse suppression	yes
Enclosure rating to EN 60529	IP 67
Shock and vibration stress	30 g, 11 ms 10 to 55 Hz, 1 mm
Ambient temperature T_a	- 25 ... + 70 °C
Housing material	Brass, nickel-plated, plastic
Tightening torque	10 Nm
Connection cable	PVC, 3 x 0.22 mm^2

Selection table

Sensing range s_n mm	Installation in metal	Switching output	Output function	Switching frequency f in Hz	Connection	Type	Order number
4	*	PNP		1000	Cable 2 m	IM12-04BPS-ZW1	7900033
4	*	NPN		1000	Cable 2 m	IM12-04BNS-ZW1	7900034
4	*	PNP		1000	Cable 2 m	IM12-04BPO-ZW1	7900035
4	*	PNP		1000	Connector M12 x 1 mm	IM12-04BPS-ZC1	7900037
4	*	NPN		1000	Connector M12 x 1 mm	IM12-04BNS-ZC1	7900038
4	*	PNP		1000	Connector M12 x 1 mm	IM12-04BPO-ZC1	7900039
8		PNP		1000	Cable 2 m	IM12-08NPS-ZW1	7900041
8		NPN		1000	Cable 2 m	IM12-08NNS-ZW1	7900042
8		PNP		1000	Cable 2 m	IM12-08NPO-ZW1	7900043
8		NPN		1000	Cable 2 m	IM12-08NNO-ZW1	7900044
8		PNP		1000	Connector M12 x 1 mm	IM12-08NPS-ZC1	7900045
8		NPN		1000	Connector M12 x 1 mm	IM12-08NNS-ZC1	7900046
8		PNP		1000	Connector M12 x 1 mm	IM12-08NPO-ZC1	7900047

* see installation notes

Inductive proximity sensors

IM 12 series, sensing range 2 / 4 mm
DC 4-wire, metal housing

For harsh environment

Features

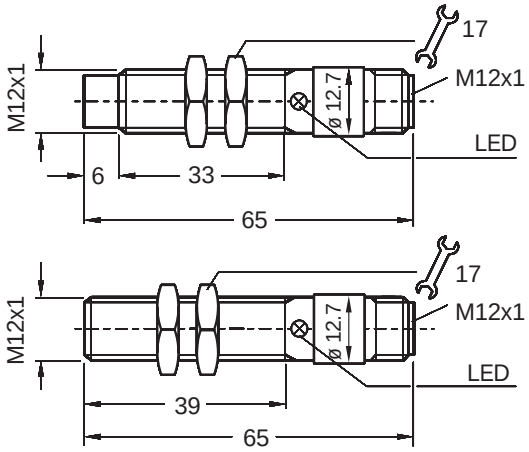
- For harsh environment, resistant to most cutting oils
- Enclosure rating IP 68
- Can be installed flush or non-flush in metal
- PNP or NPN output
- Complementary output function
- Short-circuit protection (pulsed)
- Robust brass housing, nickel-plated with fine thread M12 x 1 mm
- Internal enclosure housing in technopolymer
- Connector
- LED status indicator (NO function)

Accessories

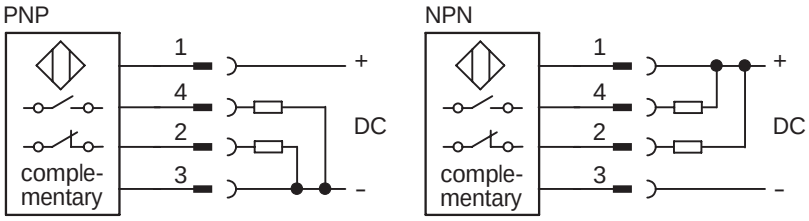
Round connectors

Mounting bracket

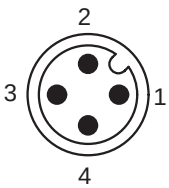
Dimensions in mm



Connection diagram



Wire colour		Contact	Assignment
bn	brown	1	+ V DC
wh	white	2	NC
bu	blue	3	- V DC
bk	black	4	NO



Electrical and mechanical data

Operating voltage U_b	10 ... 30 V DC
Ripple U_{pp}	≤ 10%
Voltage drop U_d (at I_a max.)	≤ 1.2 V
Power consumption (without load)	≤ 20 mA
Continuous current I_a	≤ 100 mA
Time delay before availability t_v	≤ 100 ms
Hysteresis H	2% - 10% of s_r
Repeatability R (U_b and T_a constant)	≤ 5% of s_r
Temperature drift	± 10% of s_r
EMC	to EN 60 947-5-2

Short-circuit protection (pulsed)	yes
Reverse polarity protection	yes
Power-up pulse suppression	yes
Enclosure rating	IP 68
Shock and vibration stress	30 g, 11 ms 10 to 55 Hz, 1 mm
Ambient temperature T_a	- 25 ... + 70 °C
Housing material	Brass, nickel-plated, plastic
Tightening torque	10 Nm

Selection table

Sensing range s_n mm	Installation in metal	Switching output	Output function	Switching frequency f in Hz	Connection	Type	Order number
2		PNP	 complementary	2000	Connector M12 x 1 mm	IM12-02BPP-ZC1	7902923
2		NPN	 complementary	2000	Connector M12 x 1 mm	IM12-02BNP-ZC1	7902924
4		PNP	 complementary	2000	Connector M12 x 1 mm	IM12-04NPP-ZC1	7902925
4		NPN	 complementary	2000	Connector M12 x 1 mm	IM12-04NNP-ZC1	7902926

Inductive proximity sensors

IM 12 series, sensing range 2 / 4 mm
DC 4-wire, metal housing

Multitalents

Features

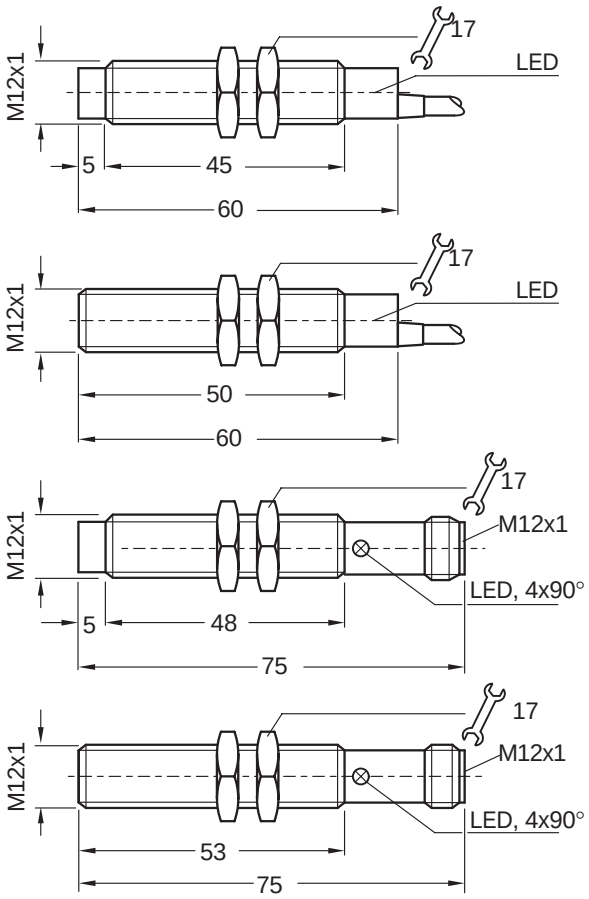
- Free configurable output functions in one sensor PNP / NO, PNP / NC NPN / NO, NPN / NC
- Can be installed flush or non-flush in metal
- Short-circuit protection
- Robust brass housing, nickel-plated with fine thread M12 x 1 mm
- Cable or connector
- Enclosure rating IP 67
- LED status indicator (NO function)

Accessories

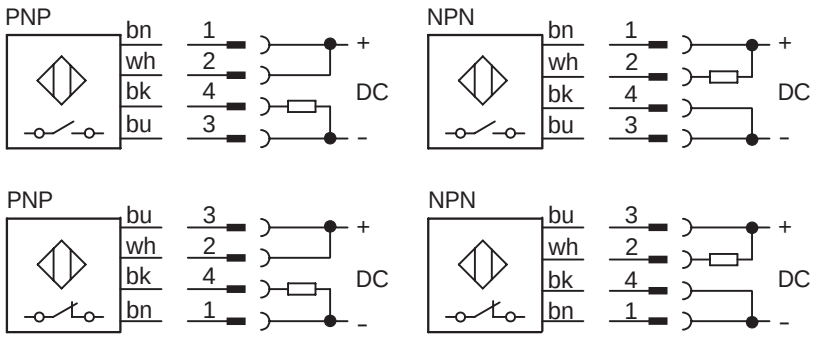
Round connectors

Mounting bracket

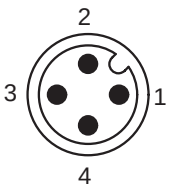
Dimensions in mm



Connection diagram



Wire colour		Contact	configurable output function PNP		NPN	
bn	brown	1	+V DC	-V DC	+V DC	-V DC
wh	white	2	+V DC	+V DC	NO	NC
bu	blue	3	- V DC	+V DC	-V DC	+V DC
bk	black	4	NO	NC	-V DC	-V DC



Electrical and mechanical data

Operating voltage U_b	10 ... 30 V DC	**Short-circuit protection**	yes
Ripple U_{pp}	≤ 10%	**Reverse polarity protection**	yes
Voltage drop U_d (at I_a max.)	≤ 1.2 V	**Power-up pulse suppression**	yes
		Enclosure rating to EN 60529	IP 67
Power consumption (without load)	≤ 30 mA	**Shock and vibration stress**	30 g, 11 ms 10 to 55 Hz, 1 mm
Continuous current I_a	≤ 100 mA	**Ambient temperature** T_a	- 25 ... + 70 °C
Time delay before availability t_v	≤ 250 ms	**Housing material**	Brass, nickel-plated, plastic
Hysteresis H	2% - 10% of s_r	**Tightening torque**	15 Nm
Repeatability R (U_b and T_a constant)	≤ 5% of s_r	**Connection cable**	PVC, 4 x 0.22 mm^2
Temperature drift	± 10% of s_r		
EMC	to EN 60 947-5-2		

Selection table

Sensing range s_n mm	Installation in metal	Switching output	Output function	Switching frequency f in Hz	Connection	Type	Order number
2		PNP/NPN config.	 config.	1000	Cable 2 m	IM12-02BCP-ZW1	7902927
2		PNP/NPN config.	 config.	1000	Connector M12 x 1 mm	IM12-02BCP-ZC1	7902928
4		PNP/NPN config.	 config.	1000	Cable 2 m	IM12-04NCP-ZW1	7902929
4		PNP/NPN config.	 config.	1000	Connector M12 x 1 mm	IM12-04NCP-ZC1	7902930

Inductive proximity sensors

IM 18 series, sensing range 5 / 8 mm
DC 3-wire, metal housing

Standard series

Features

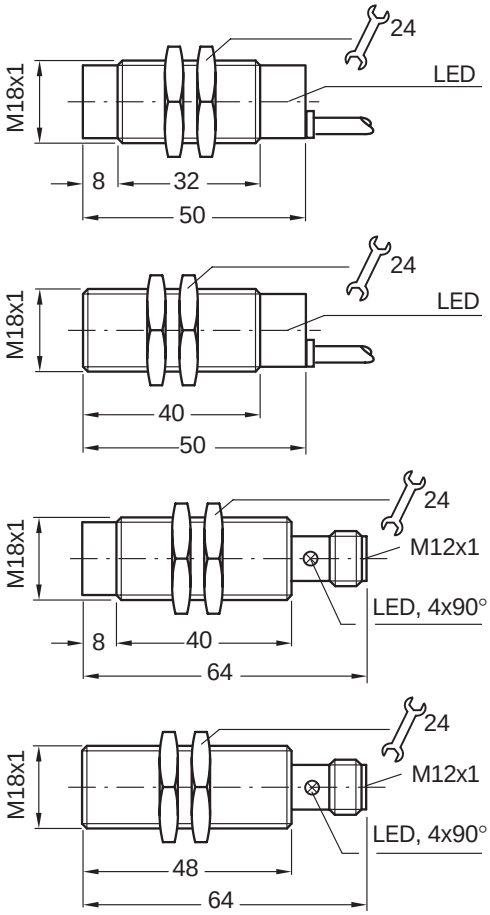
- Can be installed flush or non-flush in metal
- PNP or NPN output
- Normally open/ normally closed function
- Short-circuit protection (pulsed)
- Robust brass housing, nickel-plated with fine thread M18 x 1 mm
- Cable or connector
- Enclosure rating IP 67
- LED status indicator

Accessories

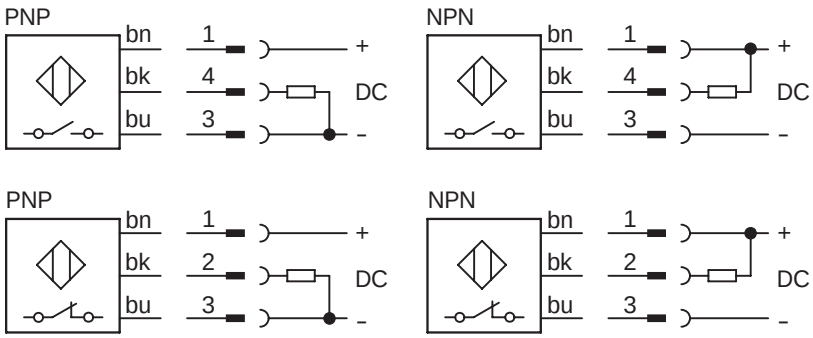
Round connectors

Mounting bracket

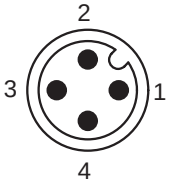
Dimensions in mm



Connection diagram



Wire colour		Contact	Assignment
bn	brown	1	+ V DC
bk	black	2/4	NC/NO
bu	blue	3	- V DC



Electrical and mechanical data

Operating voltage U_b	10 ... 30 V DC
Ripple U_{pp}	≤ 10%
Voltage drop U_d (at I_a max.)	≤ 1 V
Power consumption (without load)	≤ 20 mA
Continuous current I_a	≤ 400 mA
Time delay before availability t_v	≤ 100 ms
Hysteresis H	2% - 10% of s_r
Repeatability R (U_b and T_a constant)	≤ 2% of s_r
Temperature drift	± 10% of s_r
EMC	to EN 60 947-5-2

Short-circuit protection (pulsed)	yes
Reverse polarity protection	yes
Power-up pulse suppression	yes
Enclosure rating to EN 40050	IP 67
Shock and vibration stress	30 g, 11 ms 10 to 55 Hz, 1 mm
Ambient temperature T_a	- 25 ... + 70 °C
Housing material	Brass, nickel-plated, plastic
Tightening torque	30 Nm
Connection cable	PVC, 3 x 0.34 mm^2

Selection table

Sensing range s_n mm	Installation in metal	Switching output	Switching function	Switching frequency f in Hz	Connection	Type	Order number
5		PNP		600	Cable 2 m	IM18-05BPS-ZW1	6011987
5		NPN		600	Cable 2 m	IM18-05BNS-ZW1	6011988
5		PNP		600	Cable 2 m	IM18-05BPO-ZW1	6011989
5		PNP		600	Connector M12 x 1 mm	IM18-05BPS-ZC1	6011991
5		NPN		600	Connector M12 x 1 mm	IM18-05BNS-ZC1	6011992
5		PNP		600	Connector M12 x 1 mm	IM18-05BPO-ZC1	6011993
8		PNP		600	Cable 2 m	IM18-08NPS-ZW1	6011995
8		NPN		600	Cable 2 m	IM18-08NNS-ZW1	6011996
8		NPN		600	Cable 2 m	IM18-08NNO-ZW1	6011998
8		PNP		600	Connector M12 x 1 mm	IM18-08NPS-ZC1	6011999
8		NPN		600	Connector M12 x 1 mm	IM18-08NNS-ZC1	6012000
8		PNP		600	Connector M12 x 1 mm	IM18-08NPO-ZC1	6012001

Inductive proximity sensors

IM 18 series, sensing range 5 / 8 mm
DC 3-wire, metal housing

Short version

Features

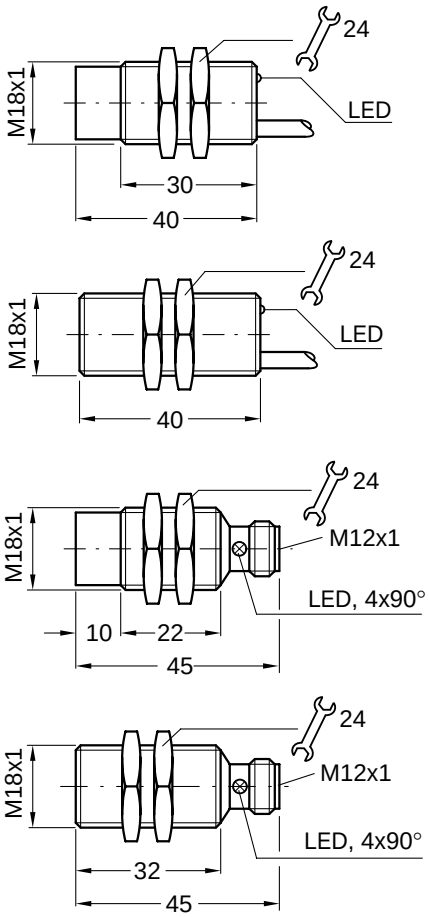
- Can be installed flush or non-flush in metal
- PNP or NPN output
- Normally open function
- Short-circuit protection (pulsed)
- Robust brass housing, nickel-plated with fine thread M18 x 1 mm
- Cable and connector
- Enclosure rating IP 67
- LED status indicator

Accessories

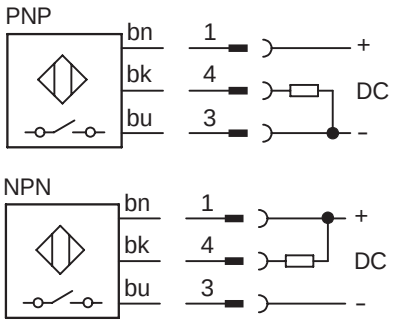
Round connectors

Mounting bracket

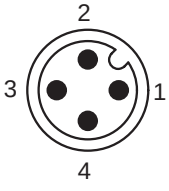
Dimensions in mm



Connection diagram



Wire colour		Contact	Assignment
bn	brown	1	+ V DC
bk	black	4	NO
bu	blue	3	- V DC



Electrical and mechanical data

Operating voltage U_b	10 ... 30 V DC
Ripple U_{pp}	≤ 10% of U_b
Voltage drop U_d (at I_a max.)	≤ 1.5 V
Power consumption (without load)	≤ 10 mA
Continuous current I_a	≤ 300 mA
Time delay before availability t_v	≤ 10 ms
Hysteresis H	2% - 10% of s_r
Repeatability R (U_b and T_a constant)	≤ 2% of s_r
Temperature drift	± 10% of s_r
EMC	to EN 60 947-5-2

Wire-break protection	yes
Short-circuit protection (pulsed)	yes
Reverse polarity protection	yes
Power-up pulse suppression	yes
Enclosure rating to EN 60529	IP 67
Shock and vibration stress	30 g, 11 ms 10 to 55 Hz, 1 mm
Ambient temperature T_a	- 25 ... + 75 °C
Housing material	Brass, nickel-plated, plastic
Tightening torque	25 Nm
Connection cable	PUR-PVC, 3 x 0.25 mm^2

Selection table

Sensing range s_n mm	Installation in metal	Switching output	Switching function	Switching frequency f in Hz	Connection	Type	Order number
5		PNP		1000	Cable 2 m	IM18-05BPS-ZUK	1017430
5		NPN		1000	Cable 2 m	IM18-05BNS-ZUK	1017442
5		PNP		1000	Connector M12 x 1 mm	IM18-05BPS-ZCK	1017432
5		NPN		1000	Connector M12 x 1 mm	IM18-05BNS-ZCK	1017444
8		PNP		1000	Cable 2 m	IM18-08NPS-ZUK	1017431
8		NPN		1000	Cable 2 m	IM18-08NNS-ZUK	1017443
8		PNP		1000	Connector M12 x 1 mm	IM18-08NPS-ZCK	1017433
8		NPN		1000	Connector M12 x 1 mm	IM18-08NNS-ZCK	1017445

Inductive proximity sensors

IM 18 series, sensing range 8 / 12 mm
DC 3-wire, metal housing

Advanced series

Features

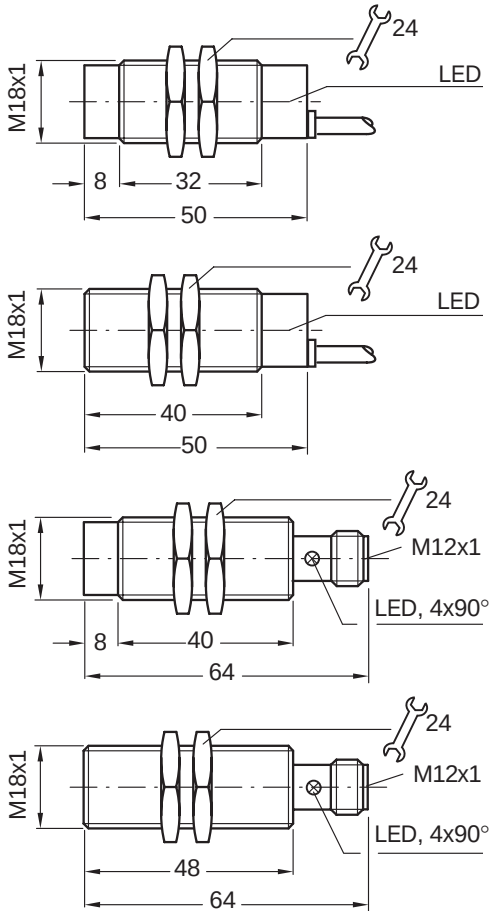
- Enhanced sensing range
- Can be installed flush or non-flush in metal
- PNP or NPN output
- Normally open/ normally closed function
- High switching frequency
- Short-circuit protection (pulsed)
- Robust brass housing, nickel-plated with fine thread M18 x 1 mm
- Cable and connector
- Enclosure rating IP 67
- LED status indicator

Accessories

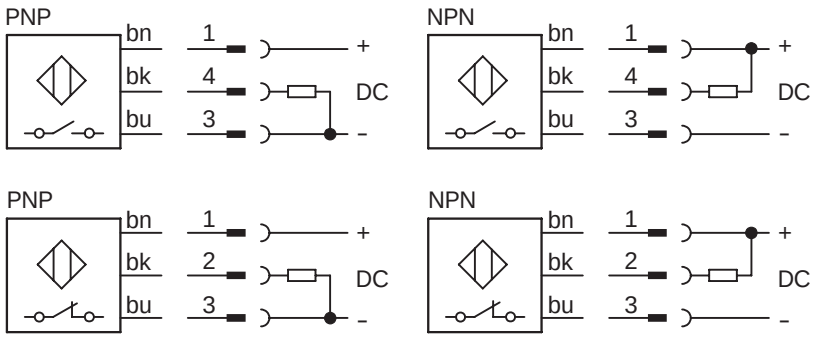
Round connectors

Mounting bracket

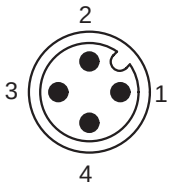
Dimensions in mm



Connection diagram



Wire colour		Contact	Assignment
bn	brown	1	+ V DC
bk	black	2/4	NC/NO
bu	blue	3	- V DC



Electrical and mechanical data

Operating voltage U_b	10 ... 30 V DC
Ripple U_{pp}	≤ 10% of U_b
Voltage drop U_d (at I_a max.)	≤ 1 V
Power consumption (without load)	≤ 10 mA
Continuous current I_a	≤ 400 mA
Time delay before availability t_v	≤ 100 ms
Hysteresis H	2% - 15% of s_r
Repeatability R (U_b and T_a constant)	≤ 5% of s_r
Temperature drift	± 10% of s_r
EMC	to EN 60 947-5-2

Short-circuit protection (pulsed)	yes
Reverse polarity protection	yes
Power-up pulse suppression	yes
Enclosure rating to EN 60529	IP 67
Shock and vibration stress	30 g, 11 ms 10 to 55 Hz, 1 mm
Ambient temperature T_a	- 25 ... + 70 °C
Housing material	Brass, nickel-plated, plastic
Tightening torque	30 Nm
Connection cable	PVC, 3 x 0.34 mm^2

Selection table

Sensing range s_n mm	Installation in metal	Switching output	Output function	Switching frequency f in Hz	Connection	Type	Order number
8	*	PNP		300	Cable 2 m	IM18-08BPS-ZW1	7900081
8	*	NPN		300	Cable 2 m	IM18-08BNS-ZW1	7900082
8	*	PNP		300	Connector M12 x 1 mm	IM18-08BPS-ZC1	7900085
8	*	NPN		300	Connector M12 x 1 mm	IM18-08BNS-ZC1	7900086
8	*	PNP		300	Connector M12 x 1 mm	IM18-08BPO-ZC1	7900087
12		PNP		300	Cable 2 m	IM18-12NPS-ZW1	7900093
12		NPN		300	Cable 2 m	IM18-12NNS-ZW1	7900094
12		PNP		300	Connector M12 x 1 mm	IM18-12NPS-ZC1	7900097
12		NPN		300	Connector M12 x 1 mm	IM18-12NNS-ZC1	7900098
12		PNP		300	Connector M12 x 1 mm	IM18-12NPO-ZC1	7900099

* see installation notes

Inductive proximity sensors

IM 18 series, sensing range 5 / 8 mm
DC 4-wire, metal housing

For harsh environment

Features

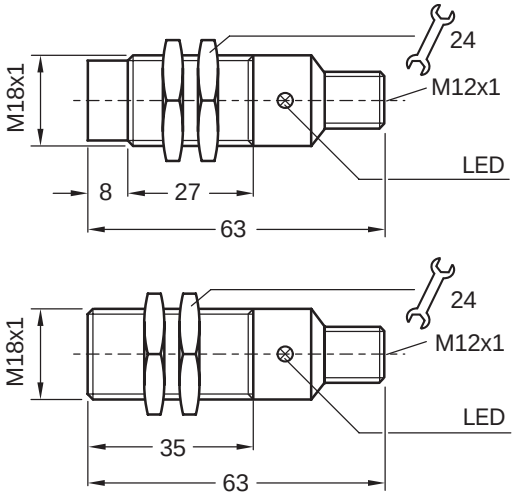
- For harsh environment, resistant to most cutting oils
- Enclosure rating IP 68
- Can be installed flush or non-flush in metal
- PNP or NPN output
- Complementary output function
- Short-circuit protection (pulsed)
- Robust brass housing, nickel-plated with fine thread M12 x 1 mm
- Internal enclosure housing in technopolymer
- Connector
- LED status indicator (NO function)

Accessories

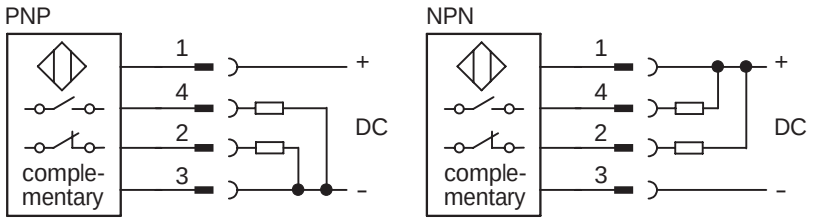
Round connectors

Mounting bracket

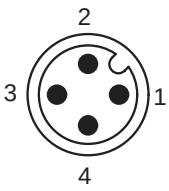
Dimensions in mm



Connection diagram



Wire colour		Contact	Assignment
bn	brown	1	+ V DC
wh	white	2	NC
bu	blue	3	- V DC
bk	black	4	NO



Electrical and mechanical data

Operating voltage U_b	10 ... 30 V DC
Ripple U_{pp}	≤ 10%
Voltage drop U_d (at I_a max.)	≤ 0.8 V
Power consumption (without load)	≤ 20 mA
Continuous current I_a	≤ 400 mA
Time delay before availability t_v	≤ 100 ms
Hysteresis H	2% - 10% of s_r
Repeatability R (U_b and T_a constant)	≤ 5% of s_r
Temperature drift	± 10% of s_r
EMC	to EN 60 947-5-2

Short-circuit protection (pulsed)	yes
Reverse polarity protection	yes
Power-up pulse suppression	yes
Enclosure rating	IP 68
Shock and vibration stress	30 g, 11 ms 10 to 55 Hz, 1 mm
Ambient temperature T_a	- 25 ... + 70 °C
Housing material	Brass, nickel-plated, plastic
Tightening torque	40 Nm

Selection table

Sensing range s_n mm	Installation in metal	Switching output	Output function	Switching frequency f in Hz	Connection	Type	Order number
5		PNP	 complementary	1000	Connector M12 x 1 mm	IM18-05BPP-ZC1	7902931
5		NPN	 complementary	1000	Connector M12 x 1 mm	IM18-05BNP-ZC1	7902932
8		PNP	 complementary	1000	Connector M12 x 1 mm	IM18-08NPP-ZC1	7902933
8		NPN	 complementary	1000	Connector M12 x 1 mm	IM18-08NNP-ZC1	7902934

Inductive proximity sensors

IM 18 series, sensing range 5 / 8 mm
DC 4-wire, metal housing

Multitalents

Features

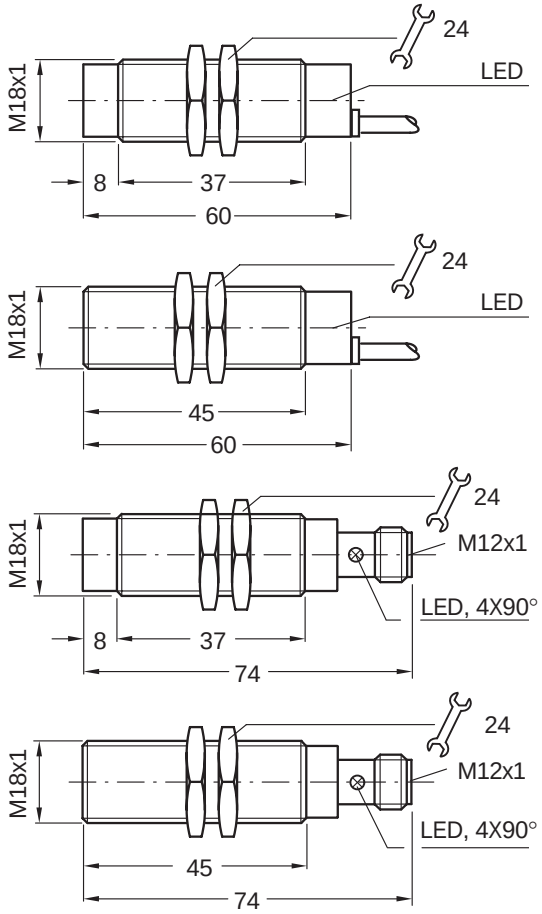
- Free configurable output functions in one sensor PNP / NO, PNP / NC NPN / NO, NPN / NC
- Can be installed flush or non-flush in metal
- Short-circuit protection
- Robust brass housing, nickel-plated with fine thread M18 x 1 mm
- Cable or connector
- Enclosure rating IP 67
- LED status indicator (NO function)

Accessories

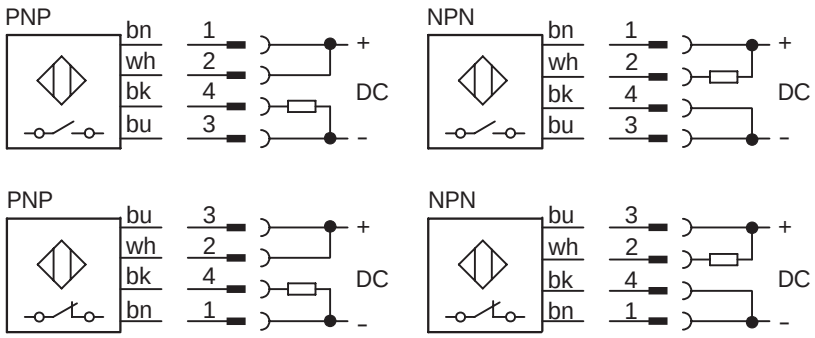
Round connectors

Mounting bracket

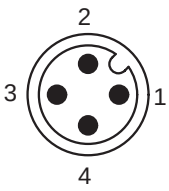
Dimensions in mm



Connection diagram



Wire colour		Contact	configurable output function PNP		NPN	
bn	brown	1	+V DC	-V DC	+V DC	-V DC
wh	white	2	+V DC	+V DC	NO	NC
bu	blue	3	- V DC	+V DC	-V DC	+V DC
bk	black	4	NO	NC	-V DC	-V DC



Electrical and mechanical data

Operating voltage U_b	10 ... 30 V DC	**Short-circuit protection**	yes
Ripple U_{pp}	≤ 10%	**Reverse polarity protection**	yes
Voltage drop U_d (at I_a max.)	≤ 1.2 V	**Power-up pulse suppression**	yes
		Enclosure rating to EN 60529	IP 67
Power consumption (without load)	≤ 30 mA	**Shock and vibration stress**	30 g, 11 ms 10 to 55 Hz, 1 mm
Continuous current I_a	≤ 100 mA	**Ambient temperature** T_a	- 25 ... + 70 °C
Time delay before availability t_v	≤ 200 ms	**Housing material**	Brass, nickel-plated, plastic
Hysteresis H	2% - 10% of s_r	**Tightening torque**	40 Nm
Repeatability R (U_b and T_a constant)	≤ 5% of s_r	**Connection cable**	PVC, 4 x 0.34 mm^2
Temperature drift	± 10% of s_r		
EMC	to prEN 60 947-5-2		

Selection table

Sensing range s_n mm	Installation in metal	Switching output	Output function	Switching frequency f in Hz	Connection	Type	Order number
5		PNP/NPN config.	 config.	300	Cable 2 m	IM18-05BCP-ZW1	7902935
5		PNP/NPN config.	 config.	300	Connector M12 x 1 mm	IM18-05BCP-ZC1	7902936
8		PNP/NPN config.	 config.	300	Cable 2 m	IM18-08NCP-ZW1	7902937
8		PNP/NPN config.	 config.	300	Connector M12 x 1 mm	IM18-08NCP-ZC1	7902938

Inductive proximity sensors

IM 30 series, sensing range 10 / 15 mm
DC 3-wire, metal housing

Standard series

Features

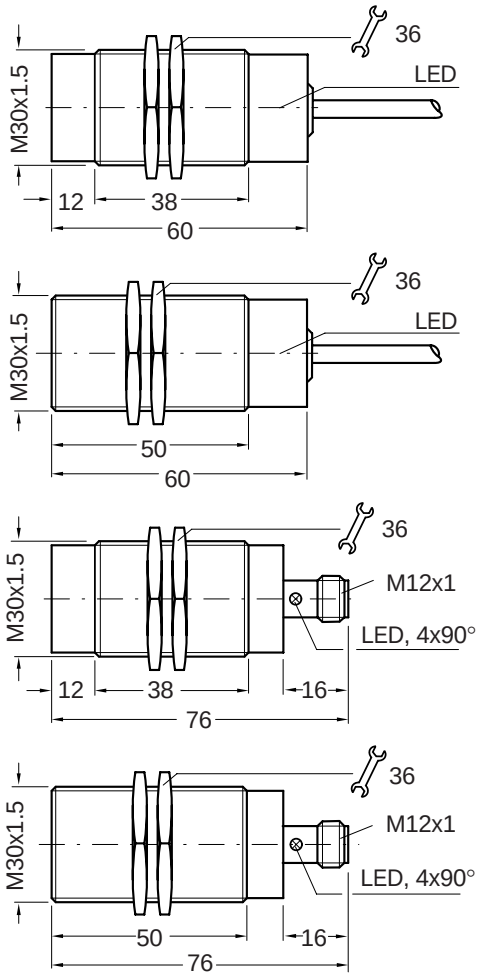
- Can be installed flush or non-flush in metal
- PNP or NPN output
- Normally open/ normally closed function
- High switching frequency
- Short-circuit protection (pulsed)
- Robust brass housing, nickel-plating with fine thread M30 x 1.5 mm
- Cable or connector
- Enclosure rating IP 67
- LED status indicator

Accessories

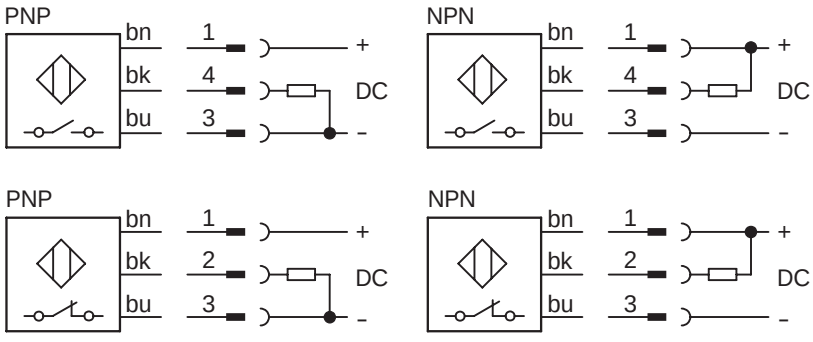
Round connectors

Mounting bracket

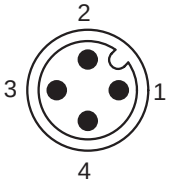
Dimensions in mm



Connection diagram



Wire colour		Contact	Assignment
bn	brown	1	+ V DC
bk	black	2/4	NC/NO
bu	blue	3	- V DC



Electrical and mechanical data

Operating voltage U_b	10 ... 30 V DC
Ripple U_{pp}	≤ 10%
Voltage drop U_d (at I_a max.)	≤ 1 V
Power consumption (without load)	≤ 20 mA
Continuous current I_a	≤ 400 mA
Time delay before availability t_v	≤ 100 ms
Hysteresis H	2% - 10% of s_r
Repeatability R (U_b and T_a constant)	≤ 2% of s_r
Temperature drift	± 10% of s_r
EMC	to EN 60 947-5-2

Short-circuit protection (pulsed)	yes
Reverse polarity protection	yes
Power-up pulse suppression	yes
Enclosure rating to EN 60529	IP 67
Shock and vibration stress	30 g, 11 ms 10 to 55 Hz, 1 mm
Ambient temperature T_a	- 25 ... + 70 °C
Housing material	Brass, nickel-plated, plastic
Tightening torque	60 Nm
Connection cable	PVC, 3 x 0.5 mm^2

Selection table

Sensing range s_n mm	Installation in metal	Switching output	Output function	Switching frequency f in Hz	Connection	Type	Order number
10		PNP		200	Cable 2 m	IM30-10BPS-ZW1	6020274
10		NPN		200	Cable 2 m	IM30-10BNS-ZW1	6020275
10		PNP		200	Connector M12 x 1 mm	IM30-10BPS-ZC1	6020278
10		NPN		200	Connector M12 x 1 mm	IM30-10BNS-ZC1	6020279
10		PNP		200	Connector M12 x 1 mm	IM30-10BPO-ZC1	6020280
15		PNP		200	Cable 2 m	IM30-15NPS-ZW1	6020282
15		NPN		200	Cable 2 m	IM30-15NNS-ZW1	6020283
15		PNP		200	Cable 2 m	IM30-15NPO-ZW1	6020284
15		PNP		200	Connector M12 x 1 mm	IM30-15NPS-ZC1	6020286
15		NPN		200	Connector M12 x 1 mm	IM30-15NNS-ZC1	6020287

Inductive proximity sensors

IM 30 series, sensing range 10 / 15 mm
DC 3-wire, metal housing

Short version

Features

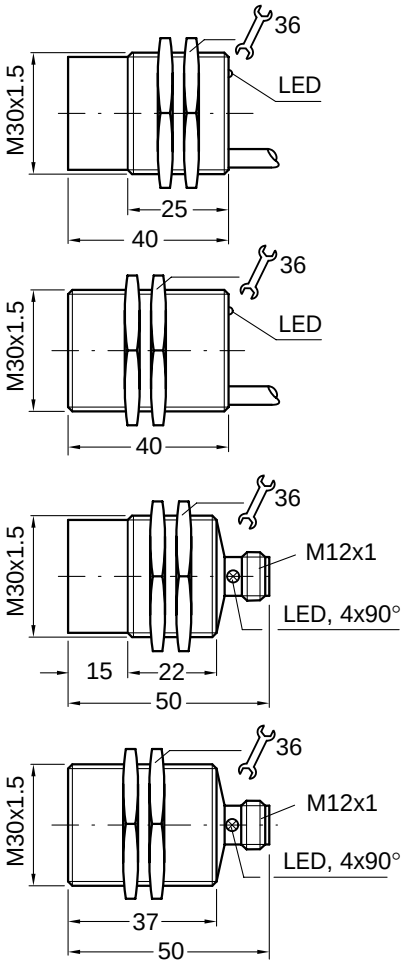
- Can be installed flush or non-flush in metal
- PNP or NPN output
- Normally open function
- Short-circuit protection (pulsed)
- Robust brass housing, nickel-plating with fine thread M30 x 1.5 mm
- Cable or connector
- Enclosure rating IP 67
- LED status indicator

Accessories

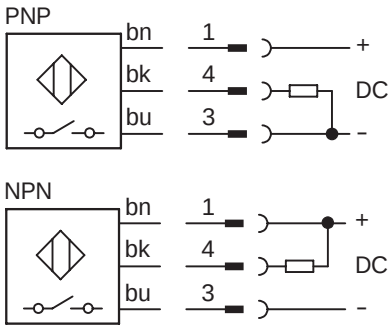
Round connectors

Mounting bracket

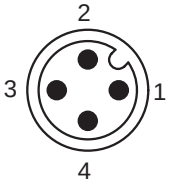
Dimensions in mm



Connection diagram



Wire colour		Contact	Assignment
bn	brown	1	+ V DC
bk	black	4	NO
bu	blue	3	- V DC



Electrical and mechanical data

Operating voltage U_b	10 ... 30 V DC
Ripple U_{pp}	≤ 10% of U_b
Voltage drop U_d (at I_a max.)	≤ 1.5 V
Power consumption (without load)	≤ 10 mA
Continuous current I_a	≤ 300 mA
Time delay before availability t_v	≤ 15 ms
Hysteresis H	1% - 10% of s_r
Repeatability R (U_b and T_a constant)	≤ 3% of s_r
Temperature drift	± 10% of s_r
EMC	to EN 60 947-5-2

Wire-break protection	yes
Short-circuit protection (pulsed)	yes
Reverse polarity protection	yes
Power-up pulse suppression	yes
Enclosure rating to EN 60529	IP 67
Shock and vibration stress	30 g, 11 ms 10 to 55 Hz, 1 mm
Ambient temperature T_a	- 25 ... + 75 °C
Housing material	Brass, nickel-plated, plastic
Tightening torque	50 Nm
Connection cable	PUR-PVC, 3 x 0.5 mm^2

Selection table

Sensing range s_n mm	Installation in metal	Switching output	Output function	Switching frequency f in Hz	Connection	Type	Order number
10		PNP		500	Cable 2 m	IM30-10BPS-ZUK	1017434
10		NPN		500	Cable 2 m	IM30-10BNS-ZUK	1017446
10		PNP		500	Connector M12 x 1 mm	IM30-10BPS-ZCK	1017436
10		NPN		500	Connector M12 x 1 mm	IM30-10BNS-ZCK	1017448
15		PNP		500	Cable 2 m	IM30-15NPS-ZUK	1017435
15		NPN		500	Cable 2 m	IM30-15NNS-ZUK	1017447
15		PNP		500	Connector M12 x 1 mm	IM30-15NPS-ZCK	1017437
15		NPN		500	Connector M12 x 1 mm	IM30-15NNS-ZCK	1017449

Inductive proximity sensors

IM 30 series, sensing range 15 / 20 mm
DC 3-wire, metal housing

Advanced series

Features

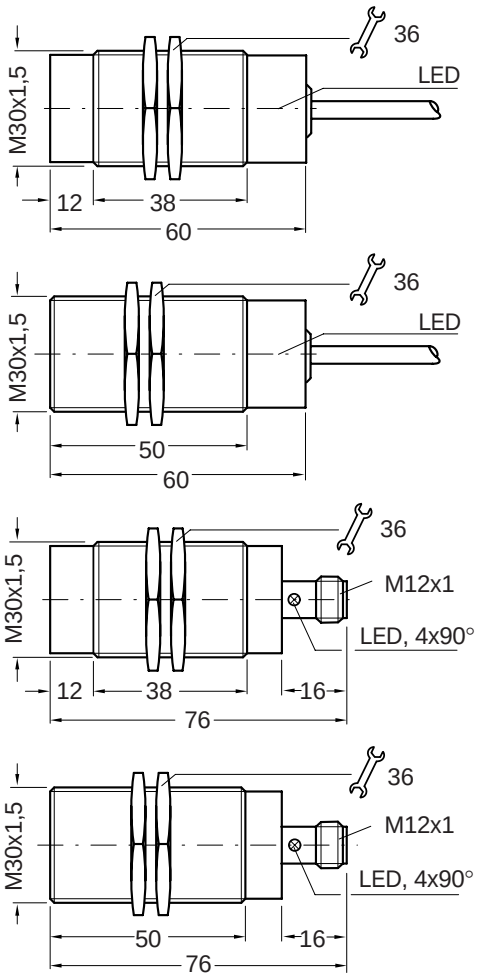
- Enhanced sensing range
- Can be installed flush or non-flush in metal
- PNP or NPN output
- Normally open/ normally closed function
- High switching frequency
- Short-circuit protection (pulsed)
- Robust brass housing, nickel-plated with fine thread M30 x 1.5 mm
- Cable or connector
- Enclosure rating IP 67
- LED status indicator

Accessories

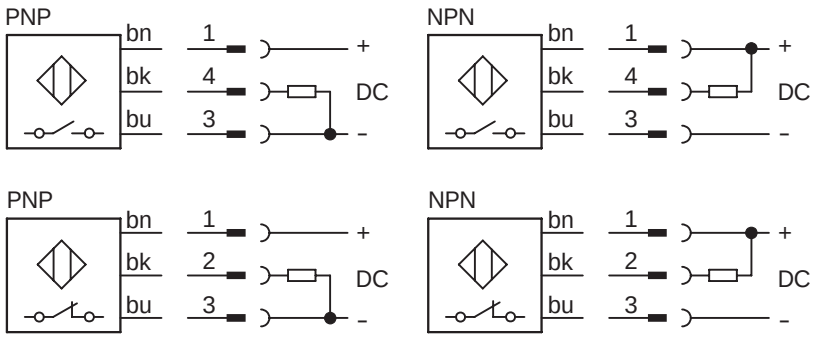
Round connectors

Mounting bracket

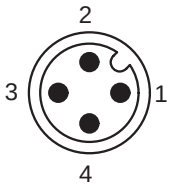
Dimensions in mm



Connection diagram



Wire colour		Contact	Assignment
bn	brown	1	+ V DC
bk	black	2/4	NC/NO
bu	blue	3	- V DC



Electrical and mechanical data

Operating voltage U_b	10 ... 30 V DC
Ripple U_{pp}	≤ 10% of U_b
Voltage drop U_d (at I_a max.)	≤ 1 V
Power consumption (without load)	≤ 10 mA
Continuous current I_a	≤ 400 mA
Time delay before availability t_v	≤ 100 ms
Hysteresis H	2% - 15% of s_r
Repeatability R (U_b and T_a constant)	≤ 5% of s_r
Temperature drift	± 10% of s_r
EMC	to EN 60 947-5-2

Short-circuit protection (pulsed)	yes
Reverse polarity protection	yes
Power-up pulse suppression	yes
Enclosure rating to EN 60529	IP 67
Shock and vibration stress	30 g, 11 ms 10 to 55 Hz, 1 mm
Ambient temperature T_a	- 25 ... + 70 °C
Housing material	Brass, nickel-plated, plastic
Tightening torque	60 Nm
Connection cable	PVC, 3 x 0.5 mm^2

Selection table

Sensing range s_n mm	Installation in metal	Switching output	Output function	Switching frequency f in Hz	Connection type	Type	Order number
15	*	PNP		150	Cable 2 m	IM30-15BPS-ZW1	7900141
15	*	NPN		150	Cable 2 m	IM30-15BNS-ZW1	7900142
15	*	PNP		150	Cable 2 m	IM30-15BPO-ZW1	7900143
15	*	PNP		150	Connector M12 x 1 mm	IM30-15BPS-ZC1	7900145
15	*	NPN		150	Connector M12 x 1 mm	IM30-15BNS-ZC1	7900146
15	*	PNP		150	Connector M12 x 1 mm	IM30-15BPO-ZC1	7900147
20		PNP		150	Cable 2 m	IM30-20NPS-ZW1	7900153
20		PNP		150	Cable 2 m	IM30-20NPO-ZW1	7900155
20		PNP		150	Connector M12 x 1 mm	IM30-20NPS-ZC1	7900157
20		NPN		150	Connector M12 x 1 mm	IM30-20NNS-ZC1	7900158

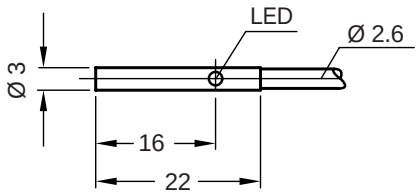
* see installation notes

Inductive proximity sensors

IH 03 series, sensing range 0.6 mm
DC 3-wire, miniature metal housing

Miniature series

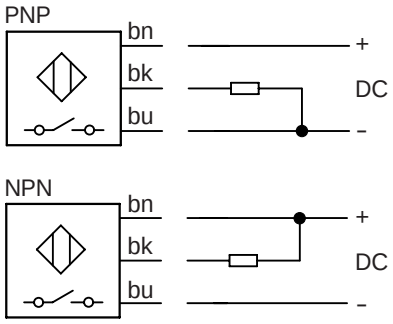
Dimensions in mm



Features

- Can be installed flush
- PNP or NPN output
- Normally open function
- High switching frequency
- Short-circuit protection (pulsed)
- Solid stainless steel housing
- Cable
- Enclosure rating IP 67
- LED status indicator

Connection diagram



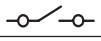
Wire colour		Assignment
bn	brown	+ V DC
bk	black	NO
bu	blue	- V DC

Electrical and mechanical data

Operating voltage U_b	10 ... 30 V DC
Ripple U_{pp}	≤ 20% of U_b
Voltage drop U_d (at I_a max.)	≤ 0.6 V max.
Power consumption (without load)	10 mA
Continuous current I_a	≤ 100 mA
Time delay before availability t_v	≤ 10 ms
Hysteresis H	10% of s_r
Repeatability R (U_b and T_a constant)	≤ 2%
Temperature drift	± 10% of s_r
EMC	to EN 60 947-5-2

Short-circuit protection (pulsed)	yes
Reverse polarity protection	yes
Power-up pulse suppression	yes
Enclosure rating to EN 60529	IP 67
Shock and vibration stress	30 g, 11 ms 10 to 55 Hz, 1 mm
Ambient temperature T_a	- 25 ... + 70 °C
Housing material	Stainless steel, plastic
Connection cable	PUR, 3 x 0.055 mm^2

Selection table

Sensing range s_n mm	Installation in metal	Switching output	Output function	Switching frequency f in Hz	Connection	Type	Order number
0.6		PNP		2000	Cable 2 m	IH03-0B6PS-VU1	6020141
0.6		NPN		2000	Cable 2 m	IH03-0B6NS-VU1	6020142

Normaly closed function available on request

Inductive proximity sensors

IH 04 series, sensing range 0.8 mm
DC 3-wire, miniature metal housing

Miniature series

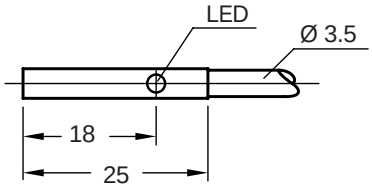
Features

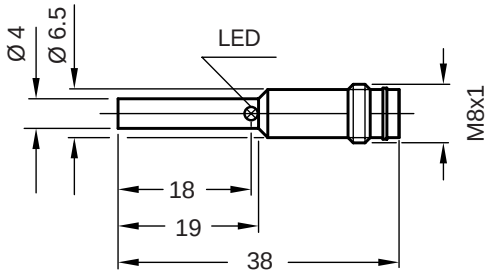
- Can be installed flush
- PNP or NPN output
- Normally open function
- High switching frequency
- Short-circuit protection (pulsed)
- Solid stainless steel housing
- Cable or connector
- Enclosure rating IP 67
- LED status indicator

Accessories

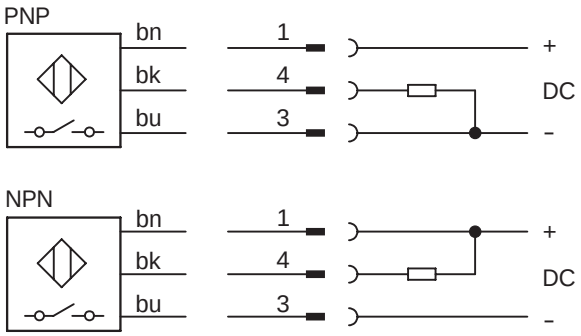
Round connectors

Dimensions in mm

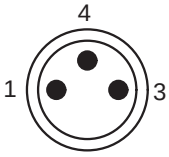




Connection diagram



Wire colour		Contact	Assignment
bn	brown	1	+ V DC
bk	black	4	NO
bu	blue	3	- V DC

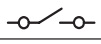
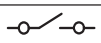
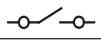
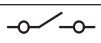


Electrical and mechanical data

Operating voltage U_b	10 ... 30 V DC
Ripple U_{pp}	≤ 20% of U_b
Voltage drop U_d (at I_a max.)	≤ 2.0 V max.
Power consumption (without load)	10 mA
Continuous current I_a	≤ 200 mA
Time delay before availability t_v	≤ 10 ms
Hysteresis H	10% of s_r
Repeatability R (U_b and T_a constant)	≤ 1.5%
Temperature drift	± 10% of s_r
EMC	to EN 60 947-5-2

Short-circuit protection (pulsed)	yes
Reverse polarity protection	yes
Power-up pulse suppression	yes
Enclosure rating to DIN 40050	IP 67
Shock and vibration stress	30 g, 11 ms 10 to 55 Hz, 1 mm
Ambient temperature T_a	- 25 ... + 70 °C
Housing material	Stainless steel, plastic
Connection cable	PVC, 3 x 0.14 mm^2

Selection table

Sensing range s_n mm	Installation in metal	Switching output	Output function	Switching frequency f in Hz	Connection	Type	Order number
0.8		PNP		5000	Cable 2 m	IH04-0B8PS-VW1	6020113
0.8		NPN		5000	Cable 2 m	IH04-0B8NS-VW1	6020149
0.8		PNP		5000	Connector M8 x 1 mm	IH04-0B8PS-VT1	6020114
0.8		NPN		5000	Connector M8 x 1 mm	IH04-0B8NS-VT1	6020152

Normaly closed function available on request

Inductive proximity sensors

IH 06 series, sensing range 1,5 mm
DC 3-wire, metal housing

Miniature series

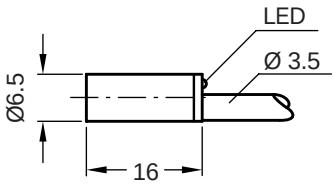
Features

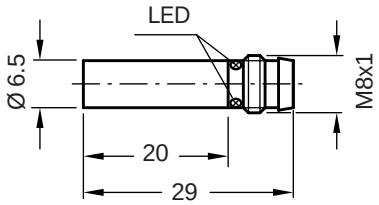
- Can be installed flush
- PNP or NPN output
- Normally open function
- High switching frequency
- Short-circuit protection (pulsed)
- Solid stainless steel housing
- Cable or connector
- Enclosure rating IP 67
- LED status indicator

Accessories

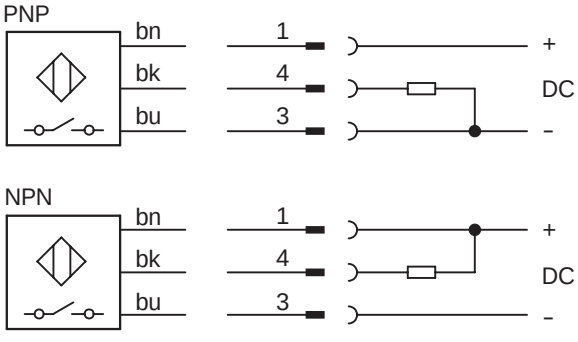
Round connectors

Dimensions in mm

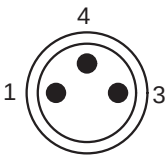




Connection diagram



Wire colour		Contact	Assignment
bn	brown	1	+ V DC
bk	black	4	NO/NC
bu	blue	3	- V DC



Electrical and mechanical data

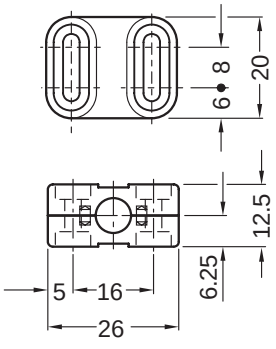
Operating voltage U_b	10 ... 30 V DC
Ripple U_{pp}	≤ 20% of U_b
Voltage drop U_d (at I_a max.)	≤ 2.0 V max.
Power consumption (without load)	10 mA
Continuous current I_a	≤ 200 mA
Time delay before availability t_v	≤ 10 ms
Hysteresis H	10% of s_r
Repeatability R (U_b and T_a constant)	≤ 5%
Temperature drift	± 10% of s_r
EMC	to EN 60 947-5-2

Short-circuit protection (pulsed)	yes
Reverse polarity protection	yes
Power-up pulse suppression	yes
Enclosure rating to EN 60529	IP 67
Shock and vibration stress	30 g, 11 ms 10 to 55 Hz, 1 mm
Ambient temperature T_a	- 25 ... + 70 °C
Housing material	Stainless steel, plastic
Connection cable	PVC, 3 x 0.14 mm²

Selection table

Sensing range s_n mm	Installation in metal	Switching output	Output function	Switching frequency f in Hz	Connection	Type	Order number
1.5		PNP		5000	Cable 2 m	IH06-1B5PS-VWK	6020165
1.5		NPN		5000	Cable 2 m	IH06-1B5NS-VWK	6020166
1.5		PNP		5000	Connector M8 x 1 mm	IH06-1B5PS-VTK	6020169
1.5		NPN		5000	Connector M8 x 1 mm	IH06-1B5NS-VTK	6020170

Accessories



Mounting clamp for H06 type
Plastic with 2 srews

Order No. 7901771

Inductive proximity sensors

IH 06 series, sensing range 2 / 4 mm
DC 3-wire, metal housing

Advanced series

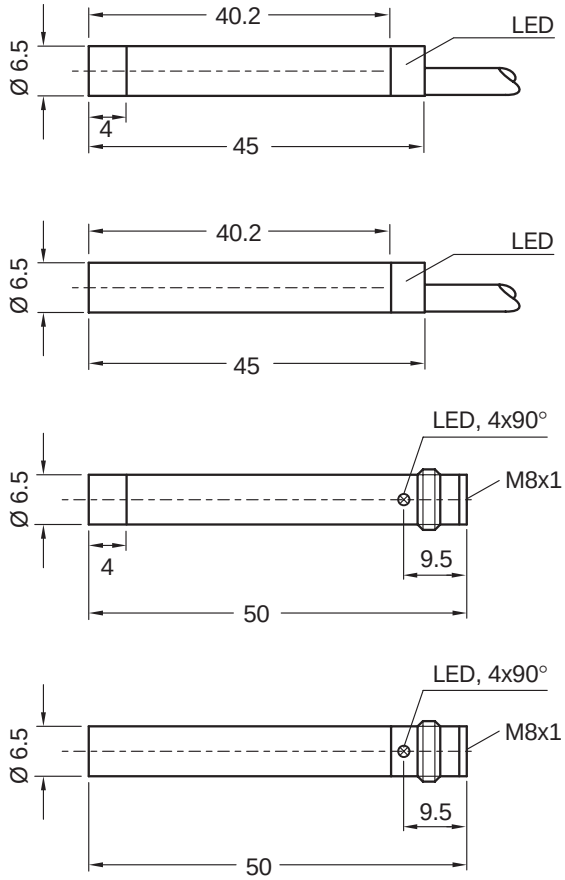
Features

- Enhanced sensing range
- Can be installed flush or non-flush in metal
- PNP or NPN output
- Normaly closed or normaly open function
- High switching frequency
- Short-circuit protection (pulsed)
- Solid stainless steel housing
- Cable or connector
- Enclosure rating IP 67
- LED status indicator

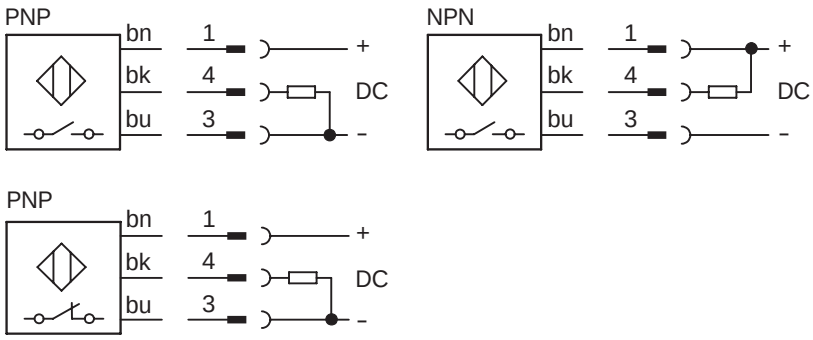
Accessories

Round connectors

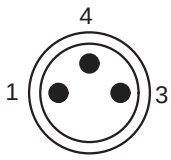
Dimensions in mm



Connection diagram



Wire colour		Contact	Assignment
bn	brown	1	+ V DC
bk	black	4	NO/NC
bu	blue	3	- V DC



Electrical and mechanical data

Operating voltage U_b	10 ... 30 V DC
Ripple U_{pp}	≤ 10% of U_b
Voltage drop U_d (at I_a max.)	≤ 1.2 V
Power consumption (without load)	≤ 20 mA
Continuous current I_a	≤ 200 mA
Time delay before availability t_v	≤ 100 ms
Hysteresis H	2% - 15% of s_r
Repeatability R (U_b and T_a constant)	≤ 5% of s_r
Temperature drift	± 10% of s_r
EMC	to EN 60 947-5-2

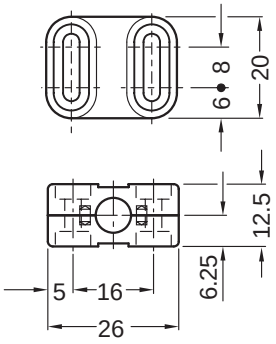
Short-circuit protection (pulsed)	yes
Reverse polarity protection	yes
Power-up pulse suppression	yes
Enclosure rating to EN 60529	IP 67
Shock and vibration stress	30 g, 11 ms 10 to 55 Hz, 1 mm
Ambient temperature T_a	- 25 ... + 70 °C
Housing material	Stainless steel, plastic
Connection cable	PVC, 3 x 0.14 mm²

Selection table

Sensing range s_n mm	Installation in metal	Switching output	Output function	Switching frequency f in Hz	Connection	Type	Order number
2	*	PNP		3000	Cable 2 m	IH06-02BPS-VW1	7900177
2	*	NPN		3000	Cable 2 m	IH06-02BNS-VW1	7900178
2	*	PNP		3000	Connector M8 x 1 mm	IH06-02BPS-VT1	7900179
2	*	NPN		3000	Connector M8 x 1 mm	IH06-02BNS-VT1	7900180
2	*	PNP		3000	Connector M8 x 1 mm	IH06-02BPO-VT1	1016857
4		PNP		3000	Cable 2 m	IH06-04NPS-VW1	7900181
4		NPN		3000	Cable 2 m	IH06-04NNS-VW1	7900182
4		PNP		3000	Connector M8 x 1 mm	IH06-04NPS-VT1	7900183

* see installation notes

Accessories



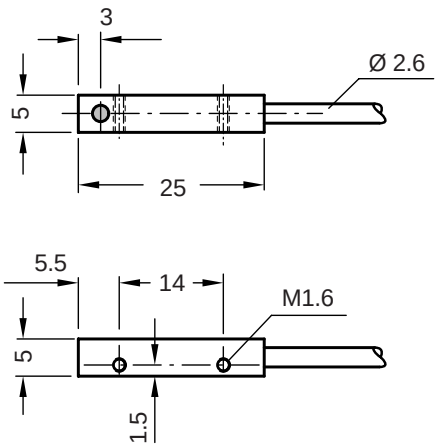
Mounting clamp for H06 type
Plastic with 2 srews

Order No. 7901771

Inductive proximity sensors

IQ 05 series, sensing range 0.8 mm
DC 3-wire, miniature metal housing

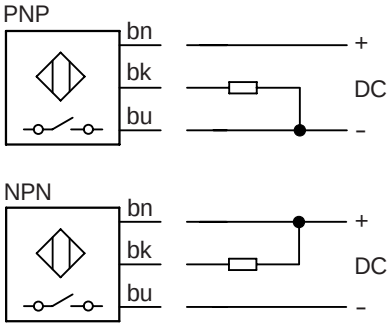
Dimensions in mm



Features

- Can be installed flush
- PNP or NPN output
- Normally open function
- High switching frequency
- Short-circuit protection (pulsed)
- Robust brass housing, nickel-plated
- Cable
- Enclosure rating IP 67
- LED status indicator

Connection diagram

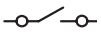
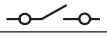


Wire colour		Assignment
bn	brown	+ V DC
bk	black	NO
bu	blue	- V DC

Electrical and mechanical data

Operating voltage U_b	10 ... 30 V DC
Ripple U_{pp}	≤ 20% of U_b
Voltage drop U_d (at I_a = 200 mA)	≤ 2.0 V max.
Power consumption (without load)	≤ 10 mA
Continuous current I_a	≤ 200 mA
Time delay before availability t_v	≤ 10 ms
Hysteresis H	10% of s_r
Repeatability R (U_b and T_a constant)	≤ 1.5% of s_r
Temperature drift	± 10% of s_r
EMC	to EN 60 947-5-2
Short-circuit protection (pulsed)	yes
Reverse polarity protection	yes
Power-up pulse suppression	yes
Enclosure rating to EN 60529	IP 67
Shock and vibration stress	30 g, 11 ms 10 to 55 Hz, 1 mm
Ambient temperature T_a	- 25 ... + 70 °C
Housing material	Brass, nickel-plated, plastic
Connection cable	PUR, 3 x 0.055 mm^2

Selection table

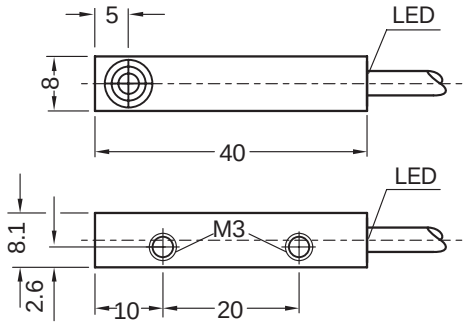
Sensing range s_n mm	Installation in metal	Switching output	Output function	Switching frequency f in Hz	Connection	Type	Order number
0.8		PNP		5000	Cable 2 m	IQ05-0B8PS-ZU1	6020161
0.8		NPN		5000	Cable 2 m	IQ05-0B8NS-ZU1	6020162

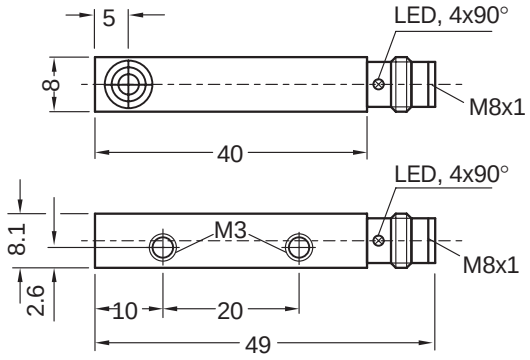
Normaly closed function available on request

Inductive proximity sensors

IQ 08 series, sensing range 2 / 4 mm
DC 3-wire, plastic housing

Dimensions in mm





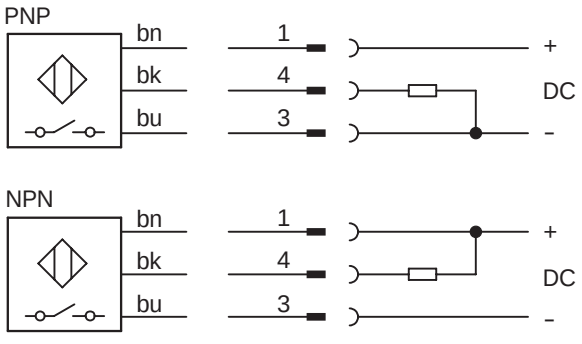
Features

- Can be installed flush or non-flush in metal
- PNP or NPN output
- High switching frequency
- Short-circuit protection (pulsed)
- Small plastic housing
- Cable or connector
- Enclosure rating IP 67
- LED status indicator
- For the series IQ08-04N the added plastic screws shall be used
- Installation notes see page 17

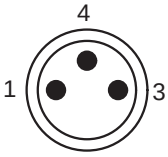
Accessories

Round connectors

Connection diagram



Wire colour		Contact	Assignment
bn	brown	1	+ V DC
bk	black	4	NO
bu	blue	3	- V DC



Electrical and mechanical data

Operating voltage U_b	10 ... 30 V DC
Ripple U_{pp}	≤ 10% of U_b
Voltage drop U_d (at I_a max.)	≤ 1.5 V
Power consumption (without load)	≤ 10 mA
Continuous current I_a	≤ 300 mA
Time delay before availability t_v	≤ 2 ms
Hysteresis H	1% - 10% of s_r
Repeatability R (U_b and T_a constant)	≤ 1% of s_r
Temperature drift	± 10% of s_r
EMC	to EN 60 947-5-2

Wire-break protection	yes
Short-circuit protection (pulsed)	yes
Reverse polarity protection	yes
Power-up pulse suppression	yes
Enclosure rating to EN 60529	IP 67
Shock and vibration stress	30 g, 11 ms 10 to 55 Hz, 1 mm
Ambient temperature T_a	- 25 ... + 75 °C
Housing material	Plastic
Connection cable	PVC, 3 x 0.25 mm^2

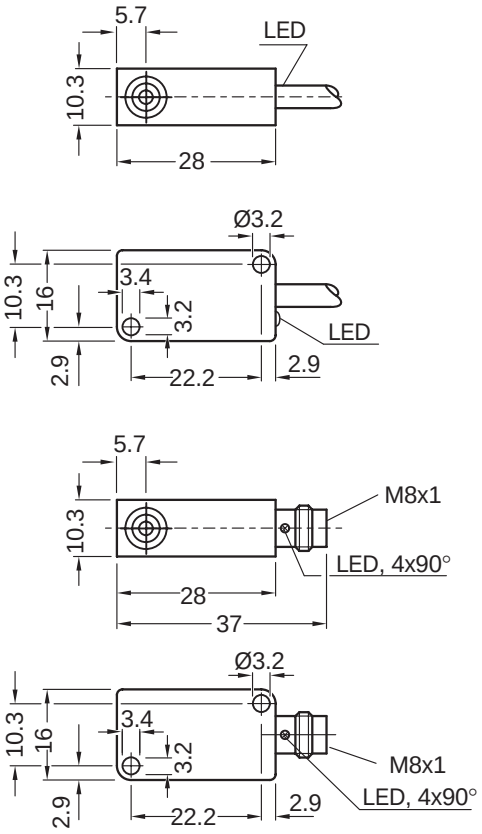
Selection table

Sensing range s_n mm	Installation in metal	Switching output	Output function	Switching frequency f in Hz	Connection	Type	Order number
2		PNP		5000	Cable 2 m	IQ08-02BPS-KW1	7900195
2		NPN		5000	Cable 2 m	IQ08-02BNS-KW1	7900196
2		PNP		5000	Connector M8 x 1 mm	IQ08-02BPS-KT1	7900197
2		NPN		5000	Connector M8 x 1 mm	IQ08-02BNS-KT1	7900198
4		PNP		5000	Cable 2 m	IQ08-04NPS-KW1	7900199
4		PNP		5000	Connector M8 x 1 mm	IQ08-04NPS-KT1	7900201

Inductive proximity sensors

IQ 10 series, sensing range 3 / 6 mm
DC 3-wire, plastic housing

Dimensions in mm



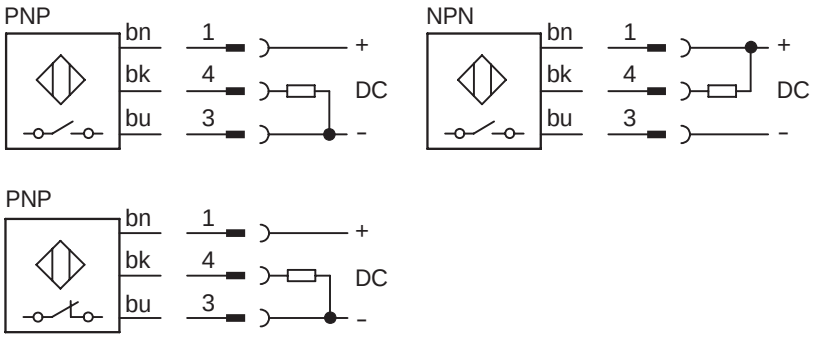
Features

- Can be installed flush or non-flush in metal
- PNP or NPN output
- Normaly closed or normaly open function
- High switching frequency
- Short-circuit protection (pulsed)
- Plastic housing
- Cable or connector
- Enclosure rating IP 67
- LED status indicator
- Installation notes see page 17

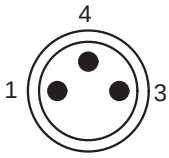
Accessories

Round connectors

Connection diagram



Wire colour		Contact	Assignment
bn	brown	1	+ V DC
bk	black	4	NO
bu	blue	3	- V DC



Electrical and mechanical data

Operating voltage U_b	10 ... 30 V DC
Ripple U_{pp}	≤ 10% of U_b
Voltage drop U_d (at I_a max.)	≤ 1.5 V
Power consumption (without load)	≤ 5 mA
Continuous current I_a	≤ 300 mA
Time delay before availability t_v	≤ 10 ms
Hysteresis H	1% - 15% of s_r
Repeatability R (U_b and T_a constant)	≤ 1% of s_r
Temperature drift	± 10% of s_r
EMC	to EN 60 947-5-2

Wire-break protection	yes
Short-circuit protection (pulsed)	yes
Reverse polarity protection	yes
Power-up pulse suppression	yes
Enclosure rating to EN 60529	IP 67
Shock and vibration stress	30 g, 11 ms 10 to 55 Hz, 1 mm
Ambient temperature T_a	- 25 ... + 75 °C
Housing material	Plastic
Connection cable	PVC, 3 x 0.25 mm^2

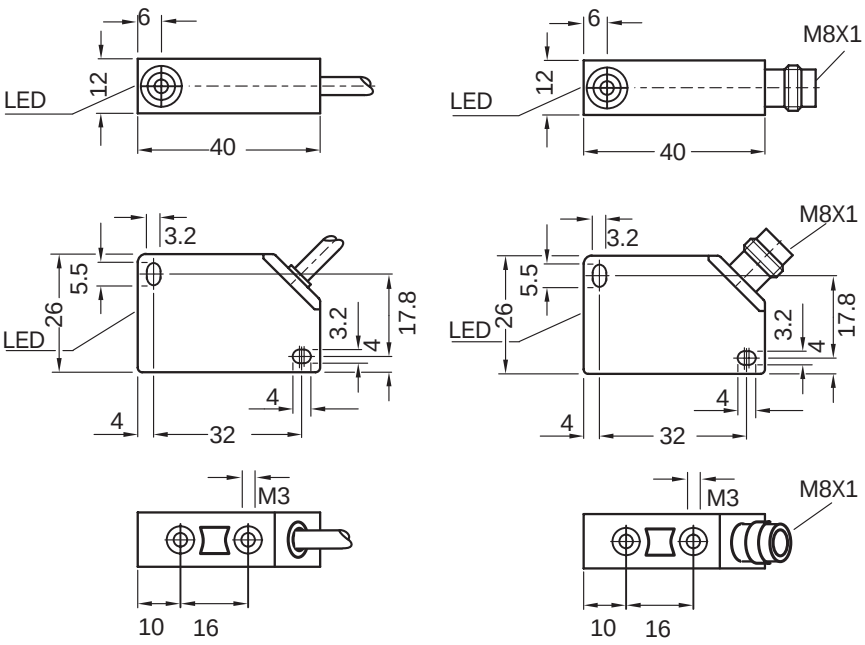
Selection table

Sensing range s_n mm	Installation in metal	Switching output	Output function	Switching frequency f in Hz	Connection	Type	Order number
3		PNP		3000	Cable 2 m	IQ10-03BPS-KW1	7900203
3		NPN		3000	Cable 2 m	IQ10-03BNS-KW1	7900204
3		PNP		3000	Connector M8 x 1 mm	IQ10-03BPS-KT1	7900205
3		NPN		3000	Connector M8 x 1 mm	IQ10-03BNS-KT1	7900206
3		PNP		3000	Connector M8 x 1 mm	IQ10-03BPO-KT1	7901530
6		PNP		1000	Cable 2 m	IQ10-06NPS-KW1	7900207
6		NPN		1000	Cable 2 m	IQ10-06NNS-KW1	7900208
6		PNP		1000	Connector M8 x 1 mm	IQ10-06NPS-KT1	7900209
6		NPN		1000	Connector M8 x 1 mm	IQ10-06NNS-KT1	7900210

Inductive proximity sensors

IQ 12 series, sensing range 3 / 6 mm
DC 3-wire, plastic housing

Dimensions in mm



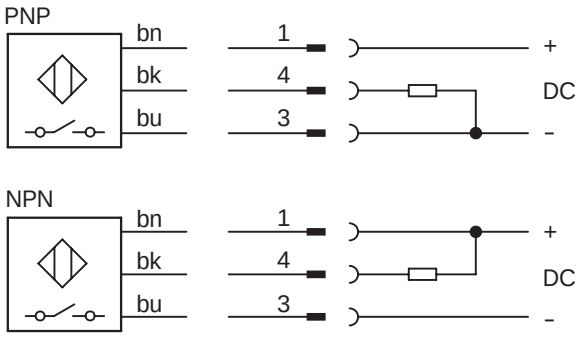
Features

- Can be installed flush or non-flush in metal
- PNP or NPN output
- High switching frequency
- Short-circuit protection (pulsed)
- Plastic housing
- Cable or connector
- Enclosure rating IP 67
- LED status indicator
- Installation notes see page 17

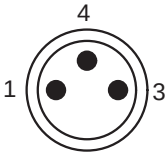
Accessories

Round connectors

Connection diagram



Wire colour		Contact	Assignment
bn	brown	1	+ V DC
bk	black	4	NO
bu	blue	3	- V DC



Electrical and mechanical data

Operating voltage U_b	6 ... 36 V DC
Ripple U_{pp}	≤ 10% of U_b
Voltage drop U_d (at I_a max.)	≤ 1.5 V
Power consumption (without load)	≤ 5 mA
Continuous current I_a	≤ 300 mA
Time delay before availability t_v	≤ 10 ms
Hysteresis H	1% - 15% of s_r
Repeatability R (U_b and T_a constant)	≤ 1% of s_r
Temperature drift	± 10% of s_r
EMC	to EN 60 947-5-2

Wire-break protection	yes
Short-circuit protection (pulsed)	yes
Reverse polarity protection	yes
Power-up pulse suppression	yes
Enclosure rating to EN 60529	IP 67
Shock and vibration stress	30 g, 11 ms 10 to 55 Hz, 1 mm
Ambient temperature T_a	- 25 ... + 75 °C
Housing material	Plastic
Connection cable	PVC, 3 x 0.25 mm^2

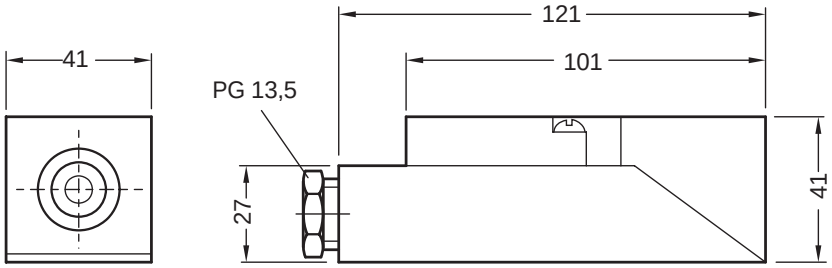
Selection table

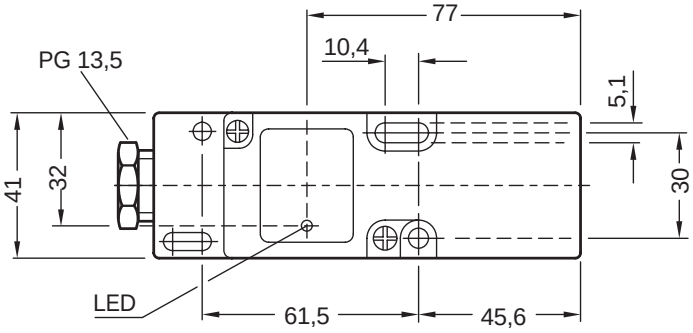
Sensing range s_n mm	Installation in metal	Switching output	Output function	Switching frequency f in Hz	Connection	Type	Order number
3		PNP		3000	Cable 2 m	IQ12-03BPS-KW1	1016275
3		NPN		3000	Cable 2 m	IQ12-03BNS-KW1	1016299
3		PNP		3000	Connector M8 x 1 mm	IQ12-03BPS-KT1	1016276
3		NPN		3000	Connector M8 x 1 mm	IQ12-03BNS-KT1	1016461
6		PNP		1000	Cable 2 m	IQ12-06NPS-KW1	1016463
6		PNP		1000	Connector M8 x 1 mm	IQ12-06NPS-KT1	1016467

Inductive proximity sensors

IQ 40 series, sensing range 15 / 20 mm
DC 3-wire, plastic housing

Dimensions in mm

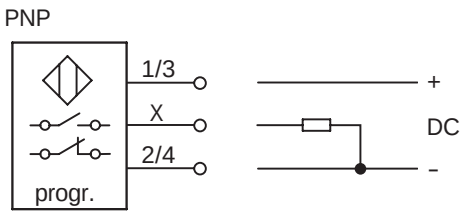




Features

- Can be installed flush or non-flush in metal
- Variable switching zone
- PNP output
- Programmable NO/NC function
- Short-circuit protection (pulsed)
- Plastic housing
- Terminal
- Enclosure rating IP 65
- LED status indicator
- Installation notes see page 17
- UL CSA

Connection diagram



Programming with wirelinks
Link closed: NO
Link open: NC

Terminal	Assignment
1/3	+ V DC
X	NO/NC
2/4	- V DC

Electrical and mechanical data

Operating voltage U_b 10 ... 36 V DC
Voltage drop U_d ≤ 2.5 V
(at I_a max. and U_b 24 V)
Power consumption ≤ 15 mA
(without load)
Continuous current I_a ≤ 250 mA
Time delay before availability t_v approx. 4 ms
Hysteresis H 1% - 15% of s_r
Repeatability R ≤ 10% of s_r
(U_b and T_a constant)
Temperature drift ± 10% of s_r
EMC to EN 60 947-5-2

Short-circuit protection (pulsed) yes
Reverse polarity protection yes
Power-up pulse suppression yes
Enclosure rating to EN 60529 IP 65
Protection class ⧈
Shock and vibration stress 30 g, 11 ms
10 to 55 Hz, 1 mm
Ambient temperature T_a - 25 ... + 80 °C
Housing material Plastic

Selection table

Sensing range s_n mm	Installation in metal	Switching output	Output function	Switching frequency f in Hz	Connection	Type	Order number
15		PNP	 progr.	300	Terminal up to 2.5 mm²	IQ40-15BPP-KK0	7900219
20		PNP	 progr.	300	Terminal up to 2.5 mm²	IQ40-20NPP-KK0	7900221

Inductive proximity sensors

IQ 40 series, sensing range 15 / 20 / 35 mm
DC 3/4-wire, plastic housing

Short version

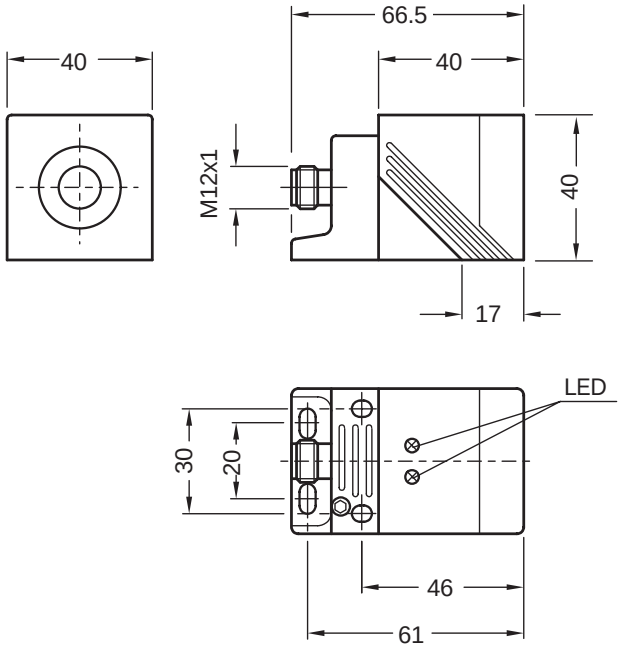
Features

- Can be installed flush or non-flush in metal
- Variable switching zone
- PNP output
- NO and complementary output function
- Short-circuit protection (pulsed)
- Plastic housing
- Connector
- Enclosure rating IP 67
- LED status indicator
- LED function indicator
- Installation notes see page 17
- (only normaly open function)

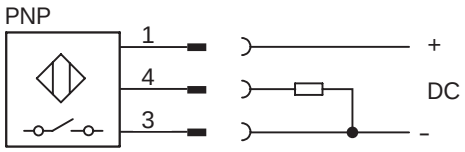
Accessories

Round connectors

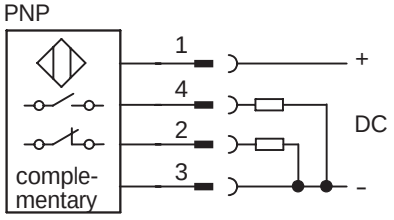
Dimensions in mm



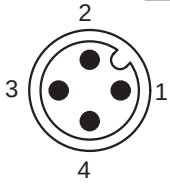
Connection diagram



Contact	Assignment
1	+ V DC
4	NO
3	- V DC
2	free



Contact	Assignment
1	+ V DC
2	NC
3	- V DC
4	NO



Electrical and mechanical data

Operating voltage U_b	10 ... 36 V DC
Voltage drop U_d (at I_a max. and U_b 24 V)	≤ 2.5 V
Power consumption (without load)	≤ 15 mA
Continuous current I_a	≤ 250 mA
Time delay before availability t_v	approx. 4 ms
Hysteresis H	1% - 15% of s_r
Repeatability R (U_b and T_a constant)	≤ 10% of s_r
Temperature drift	± 10% of s_r
EMC	to EN 60 947-5-2

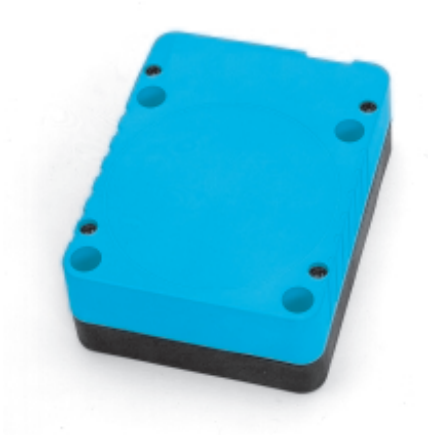
Short-circuit protection (pulsed)	yes
Reverse polarity protection	yes
Power-up pulse suppression	yes
Enclosure rating to EN 60529	IP 67
Protection class	⧈
Shock and vibration stress	30 g, 11 ms 10 to 55 Hz, 1 mm
Ambient temperature T_a	- 25 ... + 70 °C
Housing material	Plastic

Selection table

Sensing range s_n mm	Installation in metal	Switching output	Output function	Switching frequency f in Hz	Connection	Type	Order number
15		PNP		300	Connector M12 x 1 mm	IQ40-15BPS-KC0	7900223
20		PNP	 antivalent	200	Connector M12 x 1 mm	IQ40-20BPP-KCK	6012014
35		PNP		100	Connector M12 x 1 mm	IQ40-35NPS-KC0	7900224
35		PNP	 antivalent	100	Connector M12 x 1 mm	IQ40-35NPP-KCK	6012015

Inductive proximity sensors

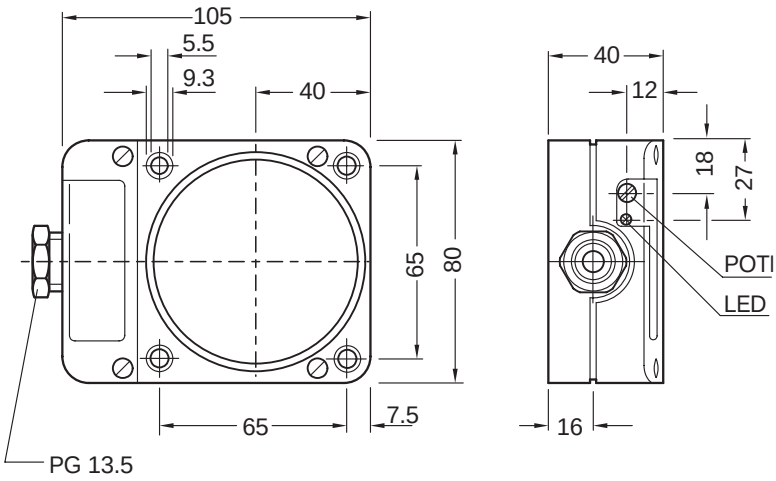
IQ 80 series, sensing range 60 mm
DC 3-wire, plastic housing



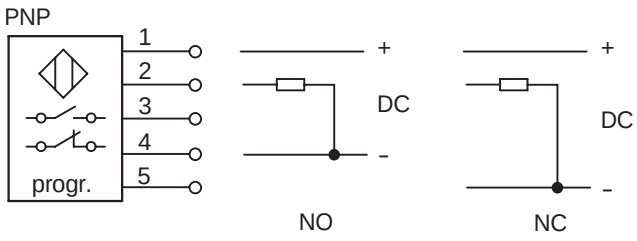
Features

- Can be installed non-flush in metal
- Adjustable switching distance between 20 to 60 mm
- PNP output
- Programmable NO/NC function
- Short-circuit protection (pulsed)
- Robust plastic housing
- Terminal connection
- Enclosure rating IP 65
- LED status indicator
- UL CSA

Dimensions in mm



Connection diagram



Terminal	Assignment
1	+ V DC
2	Output
3	free
4	- V DC / NO
5	- V DC / NC

Electrical and mechanical data

Operating voltage U_b	10 ... 36 V DC
Voltage drop U_d	≤ 2.5 V at I_a max. and U_b 24 V
Power consumption (without load)	≤ 15 mA
Continuous current I_a	≤ 250 mA
Time delay before availability t_v	approx. 250 ms
Hysteresis H	1% - 15% of s_r
Repeatability R (U_b and T_a constant)	≤ 10% of s_r
Temperature drift	± 10% of s_r
EMC	to EN 60 947-5-2
Short-circuit protection (pulsed)	yes
Reverse polarity protection	yes
Power-up pulse suppression	yes
Enclosure rating to EN 60529	IP 65
Protection class	⧈
Shock and vibration stress	30 g, 11 ms 10 to 55 Hz, 1 mm
Ambient temperature T_a	- 25 ... + 80 °C
Housing material	Plastic

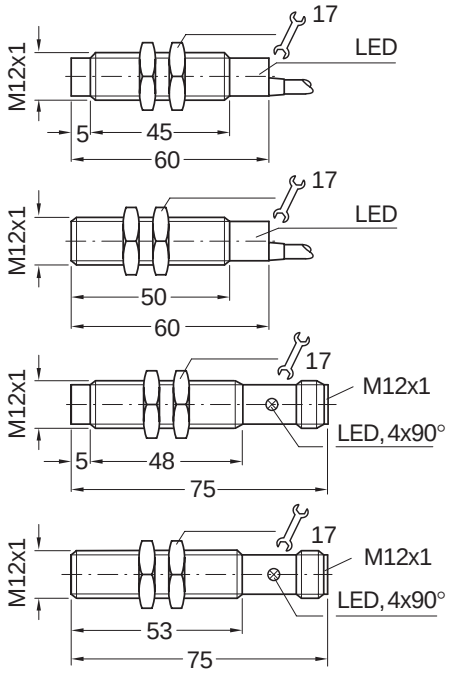
Selection table

Sensing range s_n mm	Installation in metal	Switching output	Output function	Switching frequency f in Hz	Connection	Type	Order number
60		PNP	 progr.	4	Terminal up to 2.5 mm²	IQ80-60NPP-KK0	7900227

Inductive proximity sensors

IM 12 series, sensing range 2 / 4 mm
DC 2-wire, metal housing

Dimensions in mm



Features

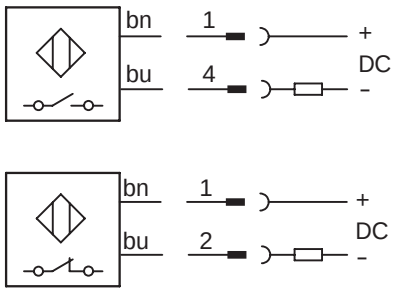
- Can be installed flush or non-flush in metal
- Normaly open function
- Short-circuit protection (pulsed)
- Robust brass housing, nickel-plated with fine thread M12 x 1 mm
- Cable or connector
- Enclosure rating IP 67
- LED-status indicator

Accessories

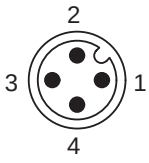
Round connector

Mounting bracket

Connection diagram



Wire colour		Contact	Assignment
bn	brown	1	+ V DC
bu	blue	2/4	– V DC

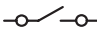


Electrical and mechanical data

Operating voltage U_b	10 ... 30 V DC
Ripple U_{pp}	≤ 10%
Voltage drop U_d (at I_a max)	≤ 2.8 V
Load current	≥ 3 mA
Continuous current I_a	≤ 100 mA
Off state current	≤ 0.8 mA
Time delay before availability t_v	≤ 50 ms
Hysteresis H	2% - 10% of s_r
Repeatability R (U_b and T_a constant)	≤ 5% of s_r
Temperature drift	± 10% of s_r
EMC	to EN 60 947-5-2

Short-circuit protection (pulsed)	yes
Reverse polarity protection	yes
Enclosure rating to EN 60529	IP 67
Shock and vibration stress	30 g, 11 ms 10 bis 55 Hz, 1 mm
Ambient temperature T_a	- 25 ... + 70 °C
Housing material	Brass, nickel-plated, plastic
Tightening torque	10 Nm
Connection cable	PVC, 2 x 0.22 mm^2

Selection table

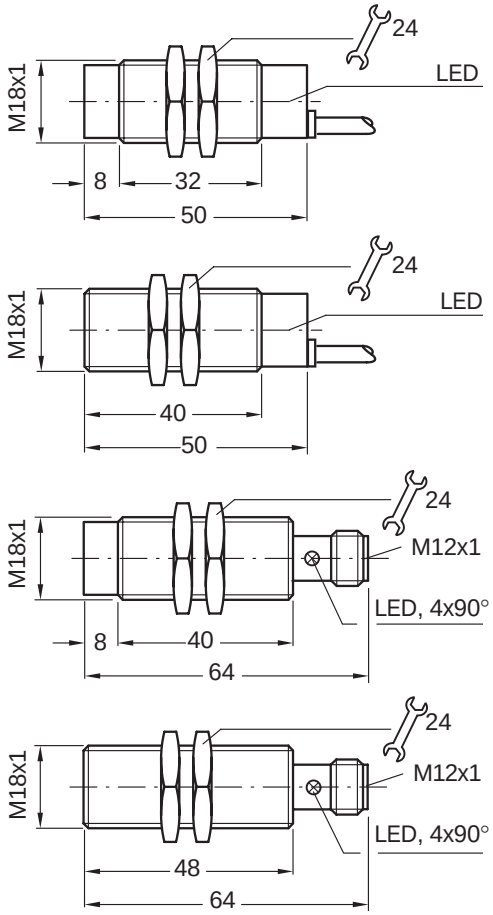
Sensing range s_n mm	Installation in metall	Output function	Switching frequency f in Hz	Connection	Type	Order number
2			1500	Cable 2 m	IM12-02BDS-ZW1	6020310
2			1500	Connector M12 x 1 mm	IM12-02BDS-ZC1	6020312
4			1500	Cable 2 m	IM12-04NDS-ZW1	6020314
4			1500	Connector M12 x 1 mm	IM12-04NDS-ZC1	6020316

Normaly closed function available on request

Inductive proximity sensors

IM 18 series, sensing range 5 / 8 mm
DC 2-wire, metal housing

Dimensions in mm



Features

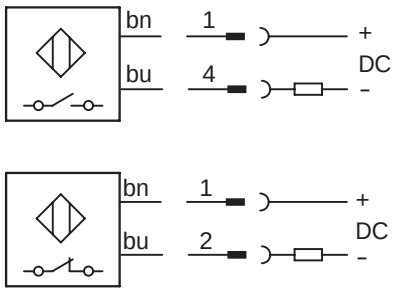
- Can be installed flush or non-flush in metal
- Normaly open function
- Short-circuit protection (pulsed)
- Robust brass housing, nickel-plated with fine thread M18 x 1 mm
- Cable or connector
- Enclosure rating IP 67
- LED-status indicator

Accessories

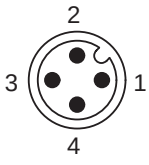
Round connector

Mounting bracket

Connection diagram



Wire colour	Contact	Assignment
bn brown	1	+ V DC
bu blue	2/4	– V DC



Electrical and mechanical data

Operating voltage U_b	10 ... 30 V DC
Ripple U_{pp}	≤ 10%
Voltage drop U_d (at I_a max)	≤ 2.8 V
Load current	≥ 3 mA
Continuous current I_a	≤ 100 mA
Off state current	≤ 0.8 mA
Time delay before availability t_v	≤ 50 ms
Hysteresis H	2% - 10% of s_r
Repeatability R (U_b and T_a constant)	≤ 2% of s_r
Temperature drift	± 10% of s_r
EMC	to EN 60 947-5-2
Short-circuit protection (pulsed)	yes
Reverse polarity protection	yes
Enclosure rating to EN 60529	IP 67
Shock and vibration stress	30 g, 11 ms 10 bis 55 Hz, 1 mm
Ambient temperature T_a	- 25 ... + 70 °C
Housing material	Brass nickel-plated, plastic
Tightening torque	30 Nm
Connection cable	PVC, 2 x 0.34 mm^2

Selection table

Sensing range s_n mm	Installation in metall	Output function	Switching frequency f in Hz	Connection	Type	Order number
5			300	Cable 2 m	IM18-05BDS-ZW1	6020318
5			300	Connector M12 x 1 mm	IM18-05BDS-ZC1	6020320
8			300	Cable 2 m	IM18-08NDS-ZW1	6020322
8			300	Connector M12 x 1 mm	IM18-08NDS-ZC1	6020324

Normaly closed function available on request

Inductive proximity sensors

IM 30 series, sensing range 10 / 15 mm
DC 2-wire, metal housing

Features

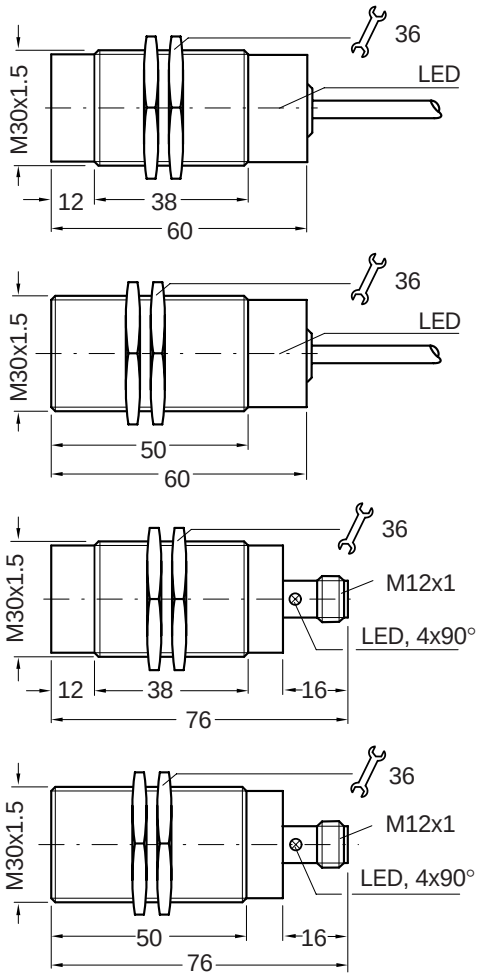
- Can be installed flush or non-flush in metal
- Normaly open function
- Short-circuit protection (pulsed)
- Robust brass housing, nickel-plated with fine thread M30 x 1 mm
- Cable or connector
- Enclosure rating IP 67
- LED-status indicator

Accessories

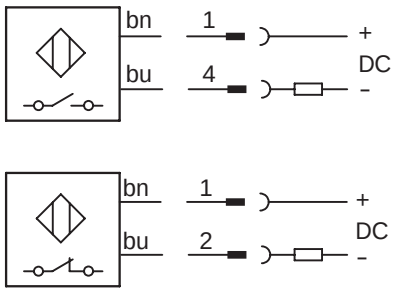
Round connector

Mounting bracket

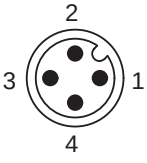
Dimensions in mm



Connection diagram



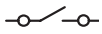
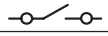
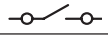
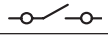
Wire colour		Contact	Assignment
bn	brown	1	+ V DC
bu	blue	2/4	– V DC



Electrical and mechanical data

Operating voltage U_b	10 ... 30 V DC
Ripple U_{pp}	≤ 10%
Voltage drop U_d (at I_a max)	≤ 2.8 V
Load current	≥ 3 mA
Continuous current I_a	≤ 100 mA
Off state current	≤ 0.8 mA
Time delay before availability t_v	≤ 50 ms
Hysteresis H	2% - 10% of s_r
Repeatability R (U_b and T_a constant)	≤ 2% of s_r
Temperature drift	± 10% of s_r
EMC	to EN 60 947-5-2
Short-circuit protection (pulsed)	yes
Reverse polarity protection	yes
Enclosure rating to EN 60529	IP 67
Shock and vibration stress	30 g, 11 ms 10 bis 55 Hz, 1 mm
Ambient temperature T_a	- 25 ... + 70 °C
Housing material	Brass, nickel-plated, plastic
Tightening torque	60 Nm
Connection cable	PVC, 2 x 0.34 mm^2

Selection table

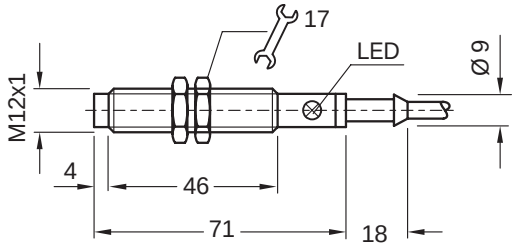
Sensing range s_n mm	Installation in metall	Output function	Switching frequency f in Hz	Connection	Type	Order number
10			150	Cable 2 m	IM30-10BDS-ZW1	6020326
10			150	Connector M12 x 1 mm	IM30-10BDS-ZC1	6020328
15			150	Cable 2 m	IM30-15NDS-ZW1	6020330
15			150	Connector M12 x 1 mm	IM30-15NDS-ZC1	6020332

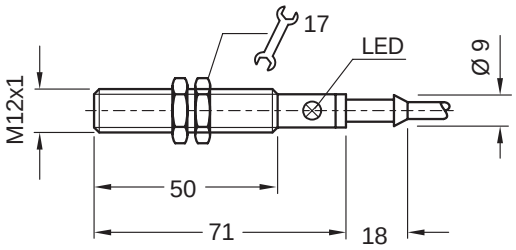
Normaly closed function available on request

Inductive proximity sensors

IM 12 series, sensing range 2 / 4 mm
AC 2-wire, metal housing

Dimensions in mm





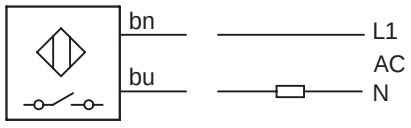
Features

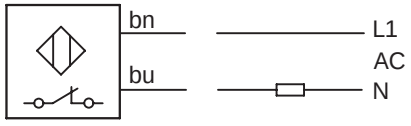
- Can be installed flush or non-flush in metal
- Broad operating voltage range in AC
- Normally open/ normally closed function
- Robust brass housing, nickel-plated, with fine thread M12 x 1 mm
- Enclosure rating IP 67
- LED status indicator

Accessories

Mounting bracket

Connection diagram





Wire colour		Assignment
bn	brown	L1
bu	blue	N

Electrical and mechanical data

Operating voltage U_b	20 ... 250 V AC
Voltage drop U_d (at I_a max.)	≤ 8.5 V AC
Continuous current I_a	≤ 250 mA AC (... + 50 °C) ≤ 200 mA AC (... + 80 °C)
Peak current I_K	0.9 A (20 ms/0.5 Hz)
Min. load current	8 mA
Residual current	≤ 3 mA (250 V AC) ≤ 1.5 mA (120 V AC)
Time delay before availability t_v	approx. 10 ms
Hysteresis H	1% - 15% of s_r
Repeatability R (U_b and T_a constant)	≤ 10% of s_r
Temperature drift	± 10% of s_r
EMC	to EN 60 947-5-2

Wire-break protection	-
Short-circuit protection (pulsed)	-
Reverse polarity protection	-
Power-up pulse suppression	yes
Enclosure rating to EN 60529	IP 67
Protection class	⧈
Shock and vibration stress	30 g, 11 ms 10 to 55 Hz, 1 mm
Ambient temperature T_a	- 25 ... + 80 °C
Housing material	Brass, nickel-plated, plastic
Tightening torque	7 Nm
Connection cable	PUR-PVC, 2 x 0.5 mm^2

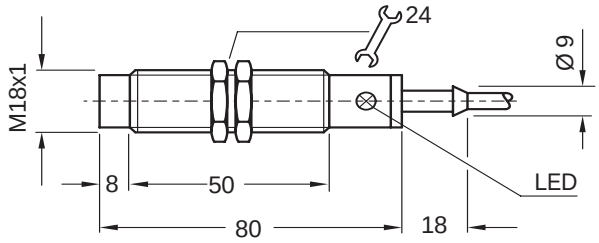
Selection table

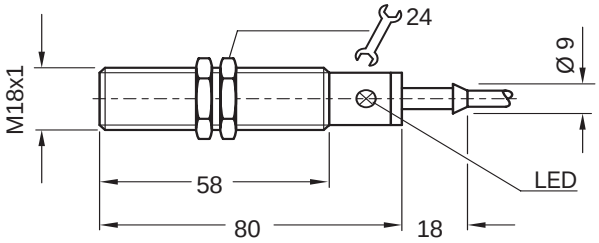
Sensing range s_n mm	Installation in metal	Output function	Switching frequency f in Hz	Connection	Type	Order number
2			25	Cable 2 m	IM12-02BAS-ZU0	7902118
2			25	Cable 2 m	IM12-02BAO-ZU0	7902119
4			25	Cable 2 m	IM12-04NAS-ZU0	7902120
4			25	Cable 2 m	IM12-04NAO-ZU0	7902121

Inductive proximity sensors

IM 18 series, sensing range 5 / 8 mm
AC / DC 2-wire, metal housing

Dimensions in mm





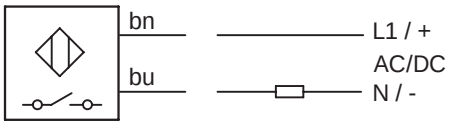
Features

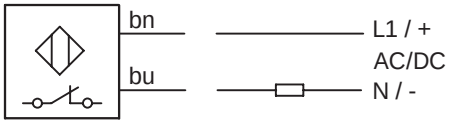
- Can be installed flush or non-flush in metal
- Broad operating voltage range in AC and DC
- Normally open/ normally closed function
- High switching frequency
- Robust brass housing, nickel-plated, with fine thread M18 x 1 mm
- Enclosure rating IP 67
- LED status indicator

Accessories

Mounting bracket

Connection diagram





Wire colour		Assignment
bn	brown	L1 / +
bu	blue	N / -

Electrical and mechanical data

Operating voltage U_b	20 ... 250 V AC / DC
Voltage drop U_d (at I_a max.)	≤ 6.5 V AC / ≤ 6 V DC
Continuous current I_a	≤ 350 mA AC (... + 50 °C) ≤ 250 mA AC (... + 80 °C) ≤ 100 mA DC
Peak current I_K	2.2 A (20ms/0.5 Hz)
Min. load current	5 mA
Residual current	≤ 2.5 mA (250 V AC) ≤ 1.3 mA (110 V AC) ≤ 0.8 mA (24 V DC)
Time delay before availability t_v	approx. 8 ms
Hysteresis H	1% - 15% of s_r
Repeatability R (U_b and T_a constant)	≤ 10% of s_r
Temperature drift	± 10% of s_r
EMC	to EN 60 947-5-2
Wire-break protection	-
Short-circuit protection (pulsed)	-
Reverse polarity protection	-
Power-up pulse suppression	yes
Enclosure rating to EN 60529	IP 67
Protection class	⧈
Shock and vibration stress	30 g, 11 ms 10 to 55 Hz, 1 mm
Ambient temperature T_a	- 25 ... + 80 °C
Housing material	Brass, nickel-plated, plastic
Tightening torque	35 Nm
Connection cable	PUR-PVC, 2 x 0.5 mm^2

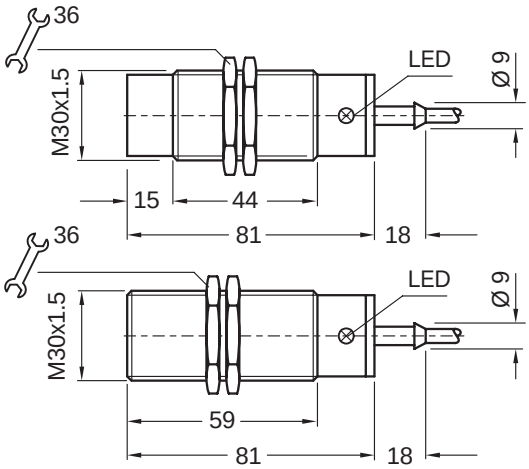
Selection table

Sensing range s_n mm	Installation in metal	Output function	Switching frequency f in Hz	Connection	Type	Order number
5			25 (AC) / 100 (DC)	Cable 2 m	IM18-05BUS-ZU0	7902122
5			25 (AC) / 100 (DC)	Cable 2 m	IM18-05BUO-ZU0	7902123
8			25 (AC) / 100 (DC)	Cable 2 m	IM18-08NUS-ZU0	7902124
8			25 (AC) / 100 (DC)	Cable 2 m	IM18-08NUO-ZU0	7902125

Inductive proximity sensors

IM 30 series, sensing range 10 / 15 mm
AC / DC 2-wire, metal housing

Dimensions in mm



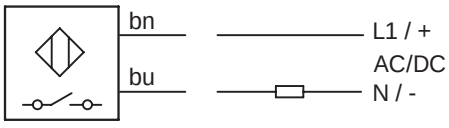
Features

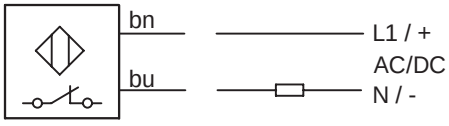
- Can be installed flush or non-flush in metal
- Broad operating voltage range in AC and DC
- Normally open/ normally closed function
- Robust brass housing, nickel-plated, with fine thread M30 x 1.5 mm
- Enclosure rating IP 67
- LED status indicator

Accessories

Mounting bracket

Connection diagram





Wire colour		Assignment
bn	brown	L1 / +
bu	blue	N / -

Electrical and mechanical data

Operating voltage U_b	20 ... 250 V AC / DC
Voltage drop U_d (at I_a max.)	≤ 6.5 V AC / ≤ 6 V DC
Continuous current I_a	≤ 350 mA AC (... + 50 °C) ≤ 250 mA AC (... + 80 °C) ≤ 100 mA DC
Peak current I_K	2.2 A (20ms/0.5 Hz)
Min. load current	5 mA
Residual current	≤ 2.5 mA (250 V AC) ≤ 1.3 mA (110 V AC) ≤ 0.8 mA (24 V DC)
Time delay before availability t_v	approx. 8 ms
Hysteresis H	1% - 15% of s_r
Repeatability R (U_b and T_a constant)	≤ 10% of s_r
Temperature drift	± 10% of s_r
EMC	to EN 60 947-5-2
Wire-break protection	-
Short-circuit protection (pulsed)	-
Reverse polarity protection	-
Power-up pulse suppression	yes
Enclosure rating to EN 60529	IP 67
Protection class	⧈
Shock and vibration stress	30 g, 11 ms 10 to 55 Hz, 1 mm
Ambient temperature T_a	- 25 ... + 80 °C
Housing material	Brass, nickel-plated, plastic
Tightening torque	50 Nm
Connection cable	PUR-PVC, 2 x 0.5 mm^2

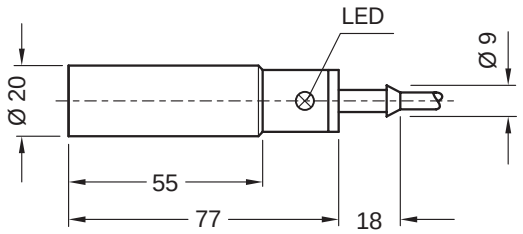
Selection table

Sensing range s_n mm	Installation in metal	Output function	Switching frequency f in Hz	Connection	Type	Order number
10			25 (AC) / 30 (DC)	Cable 2 m	IM30-10BUS-ZU0	7902126
10			25 (AC) / 30 (DC)	Cable 2 m	IM30-10BUO-ZU0	7902127
15			25 (AC) / 30 (DC)	Cable 2 m	IM30-15NUS-ZU0	7902128
15			25 (AC) / 30 (DC)	Cable 2 m	IM30-15NUO-ZU0	7902129

Inductive proximity sensors

IH 20 series, sensing range 10 mm
AC / DC 2-wire, plastic housing

Dimensions in mm



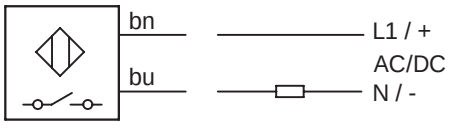
Features

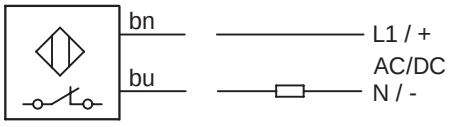
- Can be installed non-flush in metal
- Broad operating voltage range in AC and DC
- Normally open function
- Plastic housing
- Enclosure rating IP 67
- LED status indicator

Accessories

- Mounting clamps incl.

Connection diagram





Wire colour		Assignment
bn	brown	L1 / +
bu	blue	N / -

Electrical and mechanical data

Operating voltage U_b	20 ... 250 V AC / DC
Voltage drop U_d (at I_a max.)	≤ 6.5 V AC / ≤ 6 V DC
Continuous current I_a	≤ 350 mA AC (... + 50 °C) ≤ 250 mA AC (... + 80 °C) ≤ 100 mA DC
Peak current I_K	2.2 A (20ms/0.5 Hz)
Min. load current	5 mA
Residual current	≤ 2.5 mA (250 V AC) ≤ 1.3 mA (110 V AC) ≤ 0.8 mA (24 V DC)
Time delay before availability t_v	approx. 45 ms
Hysteresis H	1% - 15% of s_r
Repeatability R (U_b and T_a constant)	≤ 10% of s_r
Temperature drift	± 10% of s_r
EMC	to EN 60 947-5-2
Wire-break protection	-
Short-circuit protection (pulsed)	-
Reverse polarity protection	-
Power-up pulse suppression	yes
Enclosure rating to EN 60529	IP 67
Protection class	⧈
Shock and vibration stress	30 g, 11 ms 10 to 55 Hz, 1 mm
Ambient temperature T_a	- 25 ... + 80 °C
Housing material	Plastic
Connection cable	PUR-PVC, 2 x 0.5 mm^2

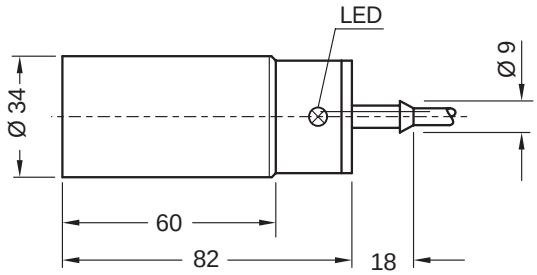
Selection table

Sensing range s_n mm	Installation in metal	Output function	Switching frequency f in Hz	Connection	Type	Order number
10			25 (AC) / 70 (DC)	Cable 2 m	IH20-10NUS-KU0	7902130

Inductive proximity sensors

IH 34 series, sensing range 30 mm
AC / DC 2-wire, plastic housing

Dimensions in mm



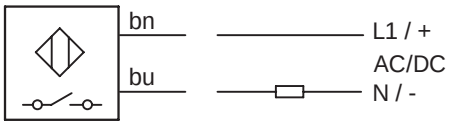
Features

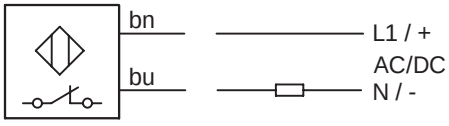
- Can be installed non-flush in metal
- Enhanced sensing range
- Broad operating voltage range in AC and DC
- Normally open/ normally closed function
- Plastic housing
- Enclosure rating IP 67
- LED status indicator

Accessories

- Mounting clamps incl.

Connection diagram





Wire colour		Assignment
bn	brown	L1 / +
bu	blue	N / -

Electrical and mechanical data

Operating voltage U_b	20 ... 250 V AC / DC
Voltage drop U_d (at I_a max.)	≤ 6.5 V AC / ≤ 6 V DC
Continuous current I_a	≤ 350 mA AC (... + 50 °C) ≤ 250 mA AC (... + 80 °C) ≤ 100 mA DC
Peak current I_K	2.2 A (20ms / 0.5 Hz)
Min. load current	5 mA
Residual current	≤ 2.5 mA (250 V AC) ≤ 1.3 mA (110 V AC) ≤ 0.8 mA (24 V DC)
Time delay before availability t_v (with s_n 20 / 30 mm)	approx. 8 / 50 ms
Hysteresis H	1% - 15% of s_r
Repeatability R (U_b and T_a constant)	≤ 10% of s_r
Temperature drift	± 10% of s_r
EMC	to EN 60 947-5-2

Wire-break protection	-
Short-circuit protection (pulsed)	-
Reverse polarity protection	-
Power-up pulse suppression	yes
Enclosure rating to EN 60529	IP 67
Protection class	⧈
Shock and vibration stress	30 g, 11 ms 10 to 55 Hz, 1 mm
Ambient temperature T_a	- 25 ... + 80 °C
Housing material	Plastic
Connection cable	PUR-PVC, 2 x 0.5 mm^2

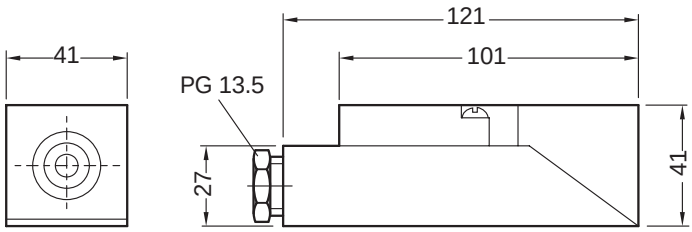
Selection table

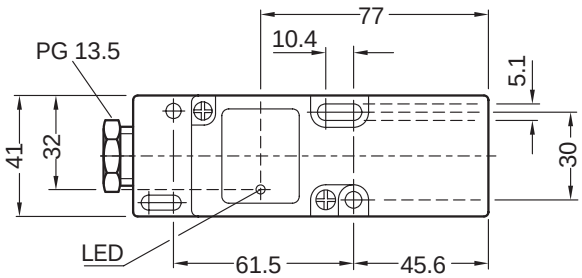
Sensing range s_n mm	Installation in metal	Output function	Switching frequency f in Hz	Connection	Type	Order number
30			7	Cable 2 m	IH34-30NUS-KU0	7902134
30			7	Cable 2 m	IH34-30NUO-KU0	7902135

Inductive proximity sensors

IQ 40 series, sensing range 15 / 20 mm
AC / DC 2-wire, plastic housing

Dimensions in mm

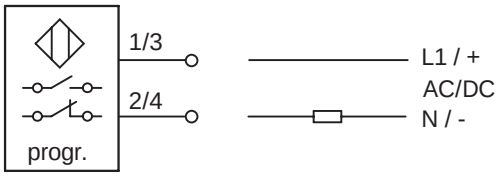




Features

- Can be installed flush or non-flush in metal
- Variable switching zone
- Broad operating voltage range in AC and DC
- Programmable switching output: NO or NC
- Plastic housing
- Enclosure rating IP 65
- Terminal connection
- LED status indicator
- UL CSA

Connection diagram



Programming with wire links

Link closed:	NO
Link open:	NC

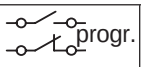
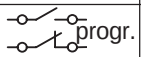
Terminal	Assignment
1/3	L1 / +
2/4	N / -

Electrical and mechanical data

Operating voltage U_b	20 ... 250 V AC / DC
Voltage drop U_d (at I_a max.)	≤ 6.5 V AC / ≤ 6 V DC
Continuous current I_a	≤ 350 mA AC (... + 50 °C) ≤ 250 mA AC (... + 80 °C) ≤ 100 mA DC
Peak current I_K	2.2 A (20 ms / 0.5 Hz)
Min. load current	5 mA
Residual current	≤ 2.5 mA (250 V AC) ≤ 1.3 mA (110 V AC) ≤ 0.8 mA (24 V DC)
Time delay before availability t_v	approx. 8 ms
Hysteresis H	1% - 15% of s_r
Repeatability R (U_b and T_a constant)	≤ 10% of s_r
Temperature drift	± 10% of s_r
EMC	to EN 60 947-5-2

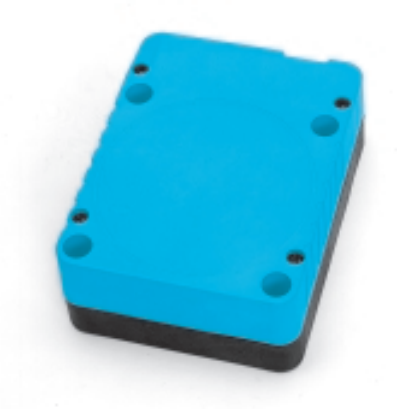
Wire-break protection	-
Short-circuit protection (pulsed)	-
Reverse polarity protection	-
Power-up pulse suppression	yes
Enclosure rating to EN 60529	IP 65
Protection class	⧈
Shock and vibration stress	30 g, 11 ms 10 to 55 Hz, 1 mm
Ambient temperature T_a	- 25 ... + 80 °C
Housing material	Plastic

Selection table

Sensing range s_n mm	Installation in metal	Output function	Switching frequency f in Hz	Connection	Type	Order number
15			20 (AC) / 55 (DC)	Terminal up to 2.5 mm²	IQ40-15BUP-KK0	7902136
20			20 (AC) / 55 (DC)	Terminal up to 2.5 mm²	IQ40-20NUP-KK0	7902137

Inductive proximity sensors

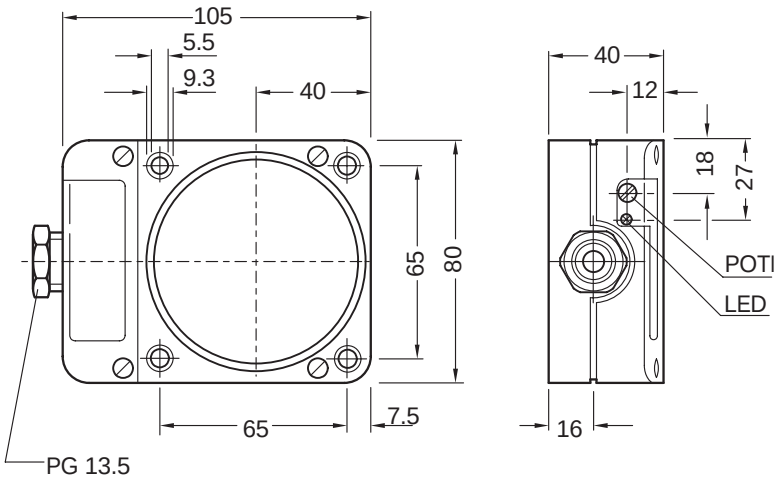
IQ 80 series, sensing range 60 mm
AC / DC 2-wire, plastic housing



Features

- Can be installed non-flush in metal
- Adjustable switching distance between 20 and 60 mm
- Broad operating voltage range in AC and DC
- Programmable switching output: NO or NC
- Robust plastic housing
- Enclosure rating IP 65
- Terminal connection
- LED status indicator
- UL, CSA

Dimensions in mm



Connection diagram

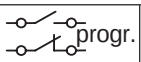
Terminal	Assignment
1	free
2	N /+
3	free
4	L1 / - (NO)
5	L1 / - (NC)

Electrical and mechanical data

Operating voltage U_b	20 ... 250 V AC / DC
Voltage drop U_d (at I_a max.)	≤ 6.5 V AC / ≤ 6 V DC
Continuous current I_a	≤ 350 mA AC (... + 50 °C) ≤ 250 mA AC (... + 80 °C) ≤ 100 mA DC
Peak current I_K	2.2 A (20 ms / 0.5 Hz)
Min. load current	5 mA
Residual current	≤ 2.5 mA (250 V AC) ≤ 1 mA (24 V DC)
Time delay before availability t_v	approx. 8 ms
Hysteresis H	1% - 15% of s_r
Repeatability R (U_b and T_a constant)	≤ 10% of s_r
Temperature drift	± 10% of s_r
EMC	to EN 60 947-5-2

Wire-break protection	-
Short-circuit protection (pulsed)	-
Reverse polarity protection	-
Power-up pulse suppression	yes
Enclosure rating to EN 60529	IP 65
Protection class	⧈
Shock and vibration stress	30 g, 11 ms 10 to 55 Hz, 1 mm
Ambient temperature T_a	- 25 ... + 80 °C
Housing material	Plastic

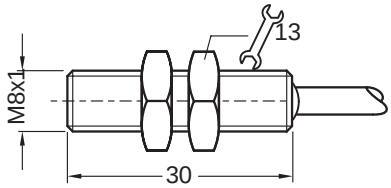
Selection table

Sensing range s_n mm	Installation in metal	Output function	Switching frequency f in Hz	Connection	Type	Order number
60		 progr.	4	Terminal up to 2.5 mm^2	IQ80-60NUP-KK0	7902138

Inductive proximity sensors

IM 08 series, sensing range 1 mm
NAMUR, metal housing

Dimensions in mm



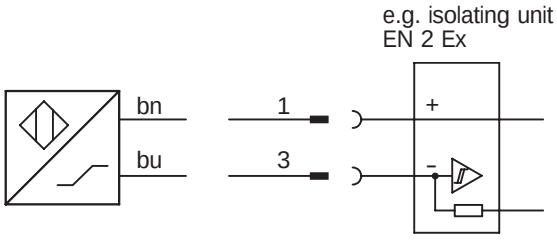
Features

- Can be installed flush in metal
- NAMUR to EN 50227
- High switching frequency
- Robust brass housing, nickel-plated, with fine thread M8 x 1 mm
- Enclosure rating IP 67
- **PTB classification for division 1 areas**
  Ex **EEx ib IIC T6**

Accessories

Isolating unit EN2Ex

Connection diagram



Wire colour			Assignment
bn	braun	brown	+ V DC
bu	blau	blue	- V DC

Electrical and mechanical data

Operating voltage U_b	5 ... 25 V DC
Nominal voltage U_n	8.2 V DC
Power consumption, attenuated	≤ 1.0 mA
Power consumption, unattenuated	≥ 2.2 mA
Internal capacitance	≤ 80 nF
Internal inductance	≤ 110 µH
Cable resistance	≤50 Ω
Temperature drift	± 10% of s_r
EMC	to EN 60 947-5-2
Enclosure rating to EN 60529	IP 67
Shock and vibration stress	30 g, 11 ms 10 to 55 Hz, 1 mm
Ambient temperature T_a	- 25 ... + 70 °C
Housing material	Brass, nickel-plated, plastic
Tightening torque	2.5 Nm
Connection cable	PVC, 2 x 0.14 mm², blue

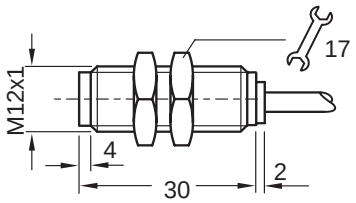
Selection table

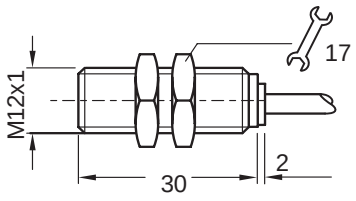
Sensing range s_n mm	Installation in metal	Version	Output function	Switching frequency f in Hz	Connection	Type	Order number
1		NAMUR		2000	Cable 2 m	IM08-01B-N-ZW0	6021123

Inductive proximity sensors

IM 12 series, sensing range 2 / 4 mm NAMUR, metal housing

Dimensions in mm





Features

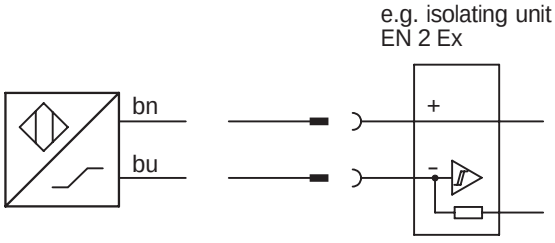
- Can be installed flush or non-flush in metal
- NAMUR to EN 50227
- High switching frequency
- Robust brass housing, nickel-plated, with fine thread M12 x 1 mm
- Enclosure rating IP 67
- **PTB classification for division 1 areas**
  Ex **EEx ia IIC T6**

Accessories

Isolating unit EN2Ex

Mounting bracket

Connection diagram



Wire colour			Assignment
bn	braun	brown	+ V DC
bu	blau	blue	- V DC

Electrical and mechanical data

Operating voltage U_b	5 ... 25 V DC	**Short-circuit protected**	yes
Rated voltage U_n	8.2 V DC	**Reverse polarity protected**	yes
Power consumption, attenuated	≤ 1.0 mA	**Enclosure rating** to EN 60529	IP 67
Power consumption, unattenuated	≥ 2.2 mA	**Shock and vibration stress**	30 g, 11 ms 10 to 55 Hz, 1 mm
Internal capacitance	≤ 230 nF	**Ambient temperature** T_a	- 25 ... + 70 °C
Internal inductance	≤ 380 µH	**Housing material**	Brass, nickel-plated, plastic
Cable resistance	≤ 50 Ω	**Tightening torque**	7.0 Nm
Temperature drift	± 10% of s_r	**Connection cable**	PVC, 2 x 0.34 mm^2, blue
EMC	to EN 60 947-5-2		

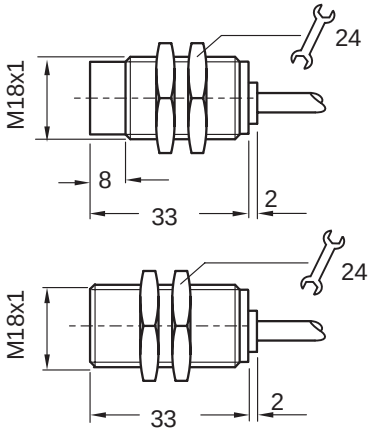
Selection table

Sensing range s_n mm	Installation in metal	Version	Output function	Switching frequency f in Hz	Connection	Type	Order number
2		NAMUR		1200	Cable 2 m	IM12-02B-N-ZW0	6021124
4		NAMUR		1500	Cable 2 m	IM12-04N-N-ZW0	6021125

Inductive proximity sensors

IM 18 series, sensing range 5 / 8 mm NAMUR, metal housing

Dimensions in mm



Features

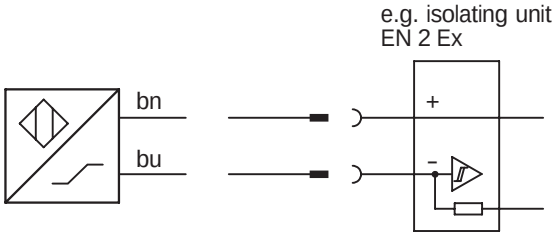
- Can be installed flush or non-flush in metal
- NAMUR to EN 50227
- High switching frequency
- Robust brass housing, nickel-plated, with fine thread M18 x 1 mm
- Enclosure rating IP 67
- **PTB classification for division 1 areas**
  Ex **EEx ia IIC T6**

Accessories

Isolating unit EN2Ex

Mounting bracket

Connection diagram



Wire colour			Assignment
bn	braun	brown	+ V DC
bu	blau	blue	- V DC

Electrical and mechanical data

Operating voltage U_b 5 ... 25 V DC
Rated voltage U_n 8.2 V DC
Power consumption, attenuated ≤ 1.0 mA
Power consumption, unattenuated ≥ 2.2 mA
Internal capacitance ≤ 230 nF (flush)
≤ 240 nF (non-flush)
Internal inductance ≤ 60 µH
Cable resistance ≤ 50 Ω
Temperature drift ± 10% of s_r
EMC to EN 60 947-5-2

Short-circuit protected yes
Reverse polarity protected yes
Enclosure rating to EN 60529 IP 67
Shock and vibration stress 30 g, 11 ms
10 to 55 Hz, 1 mm
Ambient temperature T_a - 25 ... + 70 °C
Housing material Brass, nickel-plated, plastic
Tightening torque 35 Nm
Connection cable PVC, 2 x 0.34 mm^2, blue

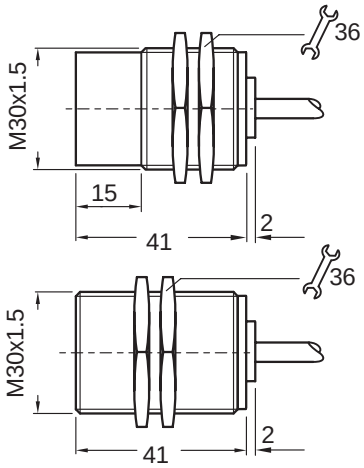
Selection table

Sensing range s_n mm	Installation in metal	Version	Output function	Switching frequency f in Hz	Connection	Type	Order number
5		NAMUR		720	Cable 2 m	IM18-05B-N-ZW0	6021126
8		NAMUR		300	Cable 2 m	IM18-08N-N-ZW0	6021127

Inductive proximity sensors

IM 30 series, sensing range 10 / 15 mm NAMUR, metal housing

Dimensions in mm



Features

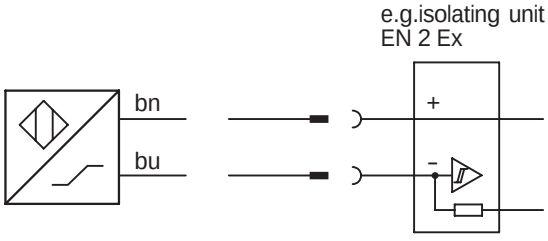
- Can be installed flush or non-flush in metal
- NAMUR to EN 50227
- High switching frequency
- Robust brass housing, nickel-plated, with fine thread M30 x 1.5 mm
- Enclosure rating IP 67
- **PTB classification for division 1 areas**
  Ex **EEx ia IIC T6**

Accessories

Isolating unit EN2Ex

Mounting bracket

Connection diagram



Wire colour			Assignment
bn	braun	brown	+ V DC
bu	blau	blue	- V DC

Electrical and mechanical data

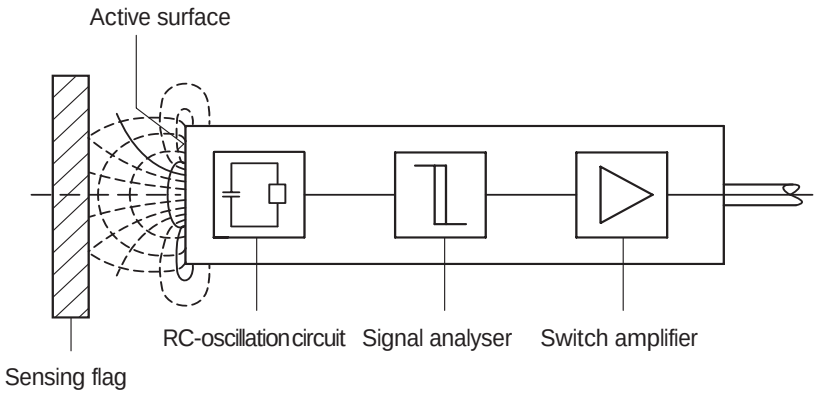
Operating voltage U_b 5 ... 25 V DC
Rated voltage U_n 8.2 V DC
Power consumption, attenuated ≤ 1.0 mA
Power consumption, unattenuated ≥ 2.2 mA
Internal capacitance ≤ 230 nF (flush)
≤ 240 nF (non-flush)
Internal inductance ≤ 130 µH (flush)
≤ 100 µH (non-flush)
Cable resistance ≤ 50 Ω
Temperature drift ± 10% of s_r
EMC to EN 60 947-5-2

Short-circuit protected yes
Reverse polarity protected yes
Enclosure rating to EN 60529 IP 67
Shock and vibration stress 30 g, 11 ms
10 to 55 Hz, 1 mm
Ambient temperature T_a - 25 ... + 70 °C
Housing material Brass, nickel-plated, plastic
Tightening torque 50 Nm
Connection cable PVC, 2 x 0.5 mm^2, blue

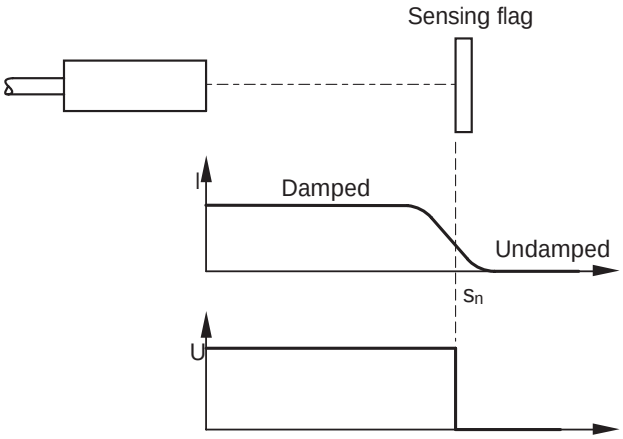
Selection table

Sensing range s_n mm	Installation in metal	Version	Output function	Switching frequency f in Hz	Connection	Type	Order number
10		NAMUR		450	Cable 2 m	IM30-10B-N-ZW0	6021128
15		NAMUR		200	Cable 2 m	IM30-15N-N-ZW0	6021129

Operating Principle
Capacitive proximity sensors



The active element in a capacitive proximity sensor consists of a sensor electrode and shielding. Together, these two electrodes form the capacitor.
On the approach of a sensing flag (metallic or non-metallic object), a change in capacity takes place in the electrical field of this capacitor, i.e. the capacitor of the RC oscillation circuit is arranged in such a way that its capacity increases when an object approaches.



The oscillator is set in such a way that it only becomes capable of oscillation through this increase in capacity. The start in oscillation when an object approaches is detected by the signal analyser and output via the signal amplifier.

Reduction factor R

As with the inductive proximity sensors, the reduction factor depends on the material. It describes the factor by which the sensing range s is reduced by a certain material, with reference to the nominal sensing range sn, which results from the use of an earthed ST37 metal plate as sensing flag.

The most important reduction factors for capacitive proximity sensors are:

iron, earthed	1.0
water	1.0
wheat (moisture content 12%)	0.
wood	0.7
glass	0.6
oil	0.4
PVC	0.4
PE	0.37
ceramic material	0.3

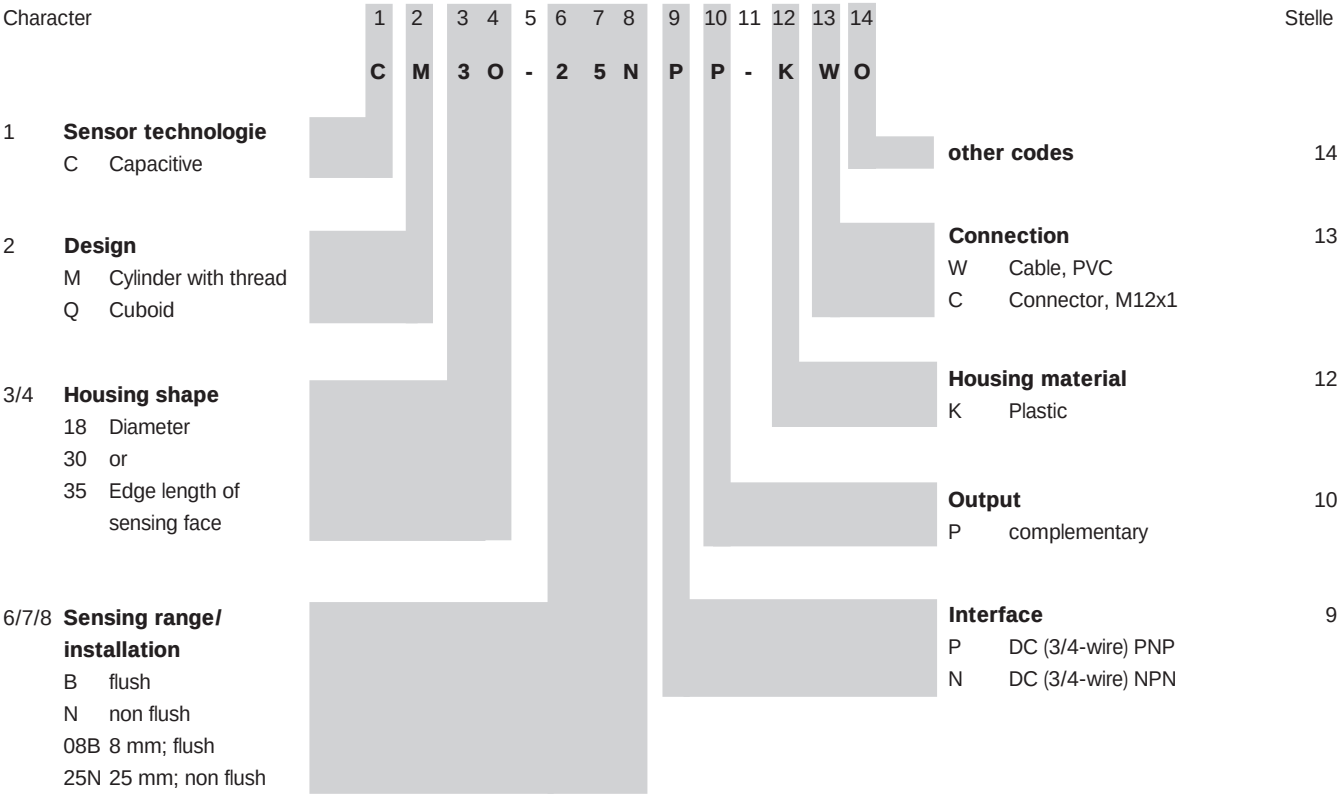
EMC-overview

Test	Standard	Product Standard EN 60947-5-2	Generic Standard EN 50082-2	SICK Capacitive Sensors
Electrostatic Discharge ESD	EN 61000-4-2 (IEC 1000-4-2)	4 kV cd / 8 kV ad*	4 kV cd78 kV ad*	17 kV cd/ad*
HF radiated	EN 61000-4-3 (IEC 1000-4-3)	3 V/m 80 ... 1000 MHz	10 V/m 80 ... 1000 MHz	< 15 V/m 80 ... 1000 MHz
HF wire conducted	EN 61000-4-6 (IEC 1000-4-6)	–	10 V 0,15 ... 80 MHz	> 10 V
Burst	EN 61000-4-4 (IEC 1000-4-4)	1 kV	2 kV	4 kV
Surge	IEC 255-5	1 kV, 500 Ohm	–	2.5 kV, 500 Ohm

*cd = contact discharge ad = air discharge

Selection table/Type code
Capacitive proximity sensors

Series	Housing			Sensing range s_n in mm		Switching output	Outout function	Connection type		Electr. config.	Page
	Design	Size in mm	Material	Flush	N. flush	PNP	complementary	Cable	Connector		
CM18	with thread	M18	Plastic	8	12	•	•	•	•	DC	108
CM30		M30	Plastic	16	25	•	•	•	•	DC	110
CQ35	Cuboid	35x55x15	Plastic	16	25	•	•	•	•	DC	112



Capacitive proximity sensors

CM18 series, sensing range 8 / 12 mm
DC 4-wire, plastic housing

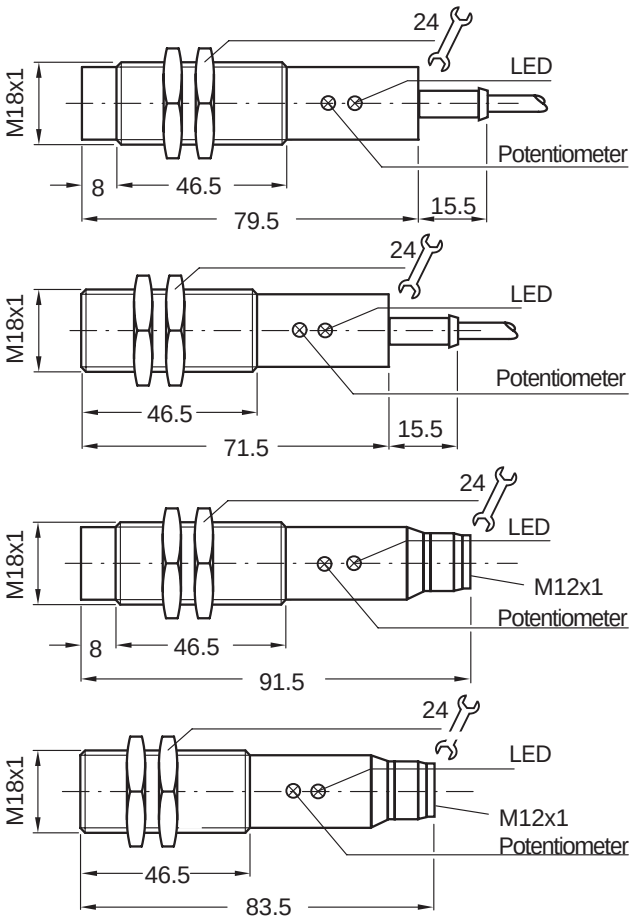
Features

- High EMC-immunity
- Can be installed flush or non-flush
- PNP output
- Adjustable sensing range: 3 to 8 mm (flush), 3 to 12 mm (non flush)
- Complementary output function
- Short-circuit protection (pulsed)
- Plastic housing with fine thread M18 x 1 mm
- Cable or connector
- Enclosure rating IP 67
- LED-status indicator
- UL, CSA

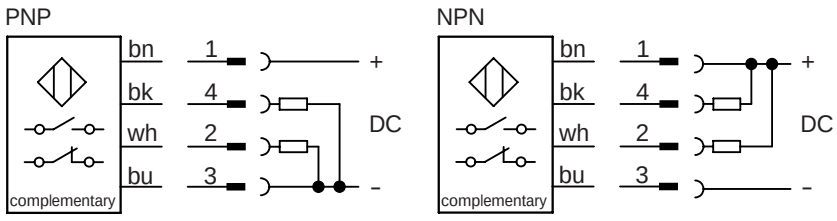
Accessories

Round connector

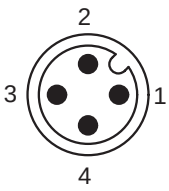
Mounting bracket



Connection diagram



Wire colour		Contact	Assignment
bn	brown	1	+ V DC
bk	black	4	Schließer
wh	white	2	Öffner
bu	blue	3	- V DC



Electrical and mechanical data

Operating voltage U_b	10 ... 40 V DC
Ripple U_{pp}	≤ 10% of U_b
Voltage drop U_d	≤ 2,5 V
Power consumption (without load)	≤ 10 mA
Continuous current I_a	≤ 200 mA
Time delay before availability t_v	≤ 100 ms
Hysteresis H	4% ... 20% of s_r
Repeatability R (U_b and T_a constant)	≤ 5% of s_r
Temperature drift	± 10% of s_r
EMV	to EN 60 947-5-2

Short circuit protection (pulsed)	yes
Reverse polarity protection	yes
Power-up pulse suppression	yes
Enclosure rating to EN 60529	IP 67
Shock und vibration stress	30 g, 11 ms 10 to 55 Hz, 1 mm
Ambient temperature T_a	- 25 ... + 80 °C
Housing material	Plastic
Tightening torque	2,6 Nm
Connection cable	PVC, 4 x 0.34 mm^2

Selection table

Sensing range s_n mm	Installation	Switching output	Output function	Switching frequency f in Hz	Connection	Type	Order number
8		PNP	 complementary	30	cable 2 m	CM18-08BPP-KW1	6020136
8		NPN	 complementary	30	cable 2 m	CM18-08BNP-KW1	6021455
8		PNP	 complementary	30	connector M12 x 1 mm	CM18-08BPP-KC1	6020388
8		NPN	 complementary	30	connector M12 x 1 mm	CM18-08BNP-KC1	6021456
12		PNP	 complementary	30	cable 2 m	CM18-12NPP-KW1	6020389
12		NPN	 complementary	30	cable 2 m	CM18-12NNP-KW1	6021457
12		PNP	 complementary	30	connector M12 x 1 mm	CM18-12NPP-KC1	6020410
12		NPN	 complementary	30	connector M12 x 1 mm	CM18-12NNP-KC1	6021458

Capacitive proximity sensors

CM30 series, sensing range 16 / 25 mm
DC 4-wire, plastic housing

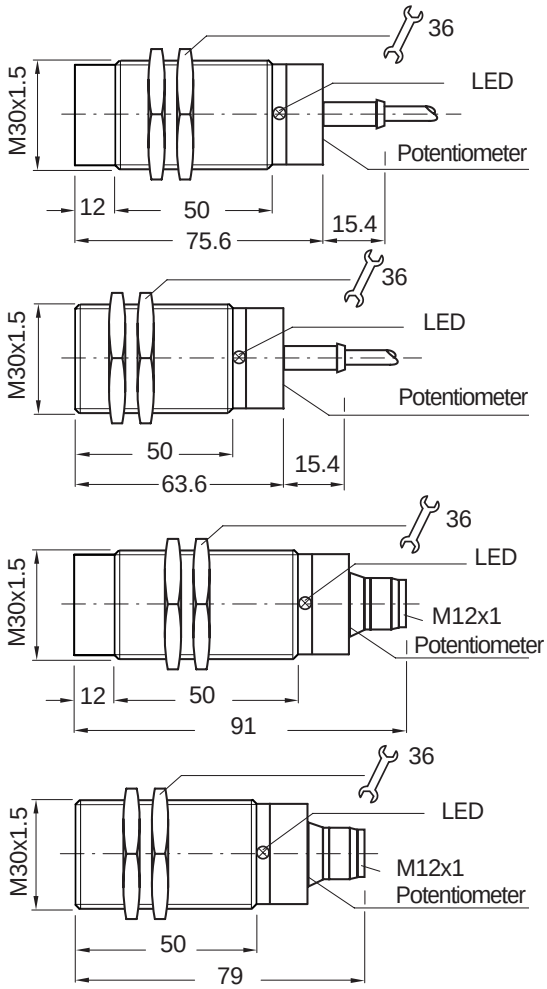
Features

- High EMC-immunity
- Can be installed flush or non-flush
- PNP output
- Adjustable sensing range: 2 to 16 mm (flush), 4 to 25 mm (non flush)
- Complementary output function
- Short-circuit protection (pulsed)
- Plastic housing with fine thread M30 x 1.5 mm
- Cable or connector
- Enclosure rating IP 67
- LED-status indicator
- UL CSA

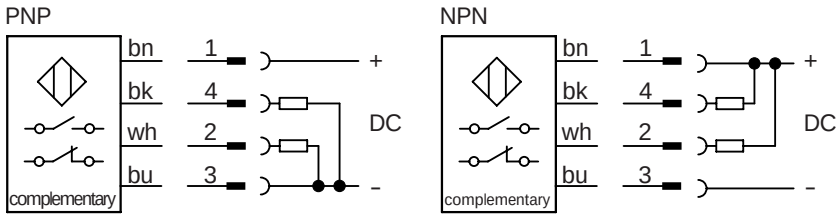
Accessories

Round connector

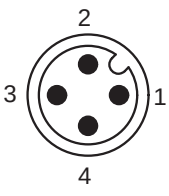
Mounting bracket



Connection diagram



Wire colour		Contact	Assignment
bn	brown	1	+ V DC
bk	black	4	NO
wh	white	2	NC
bu	blue	3	- V DC

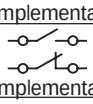


Electrical and mechanical data

Operating voltage U_b	10 ... 40 V DC
Ripple U_{pp}	≤ 10% of U_b
Voltage drop U_d	≤ 2,5 V
Power consumption (without load)	≤ 10 mA
Continuous current I_a	≤ 200 mA
Time delay before availability t_v	≤ 100 ms
Hysteresis H	4% ... 20% of s_r
Repeatability R (U_b and T_a constant)	≤ 5% of s_r
Temperature drift	± 10% of s_r
EMV	to EN 60 947-5-2

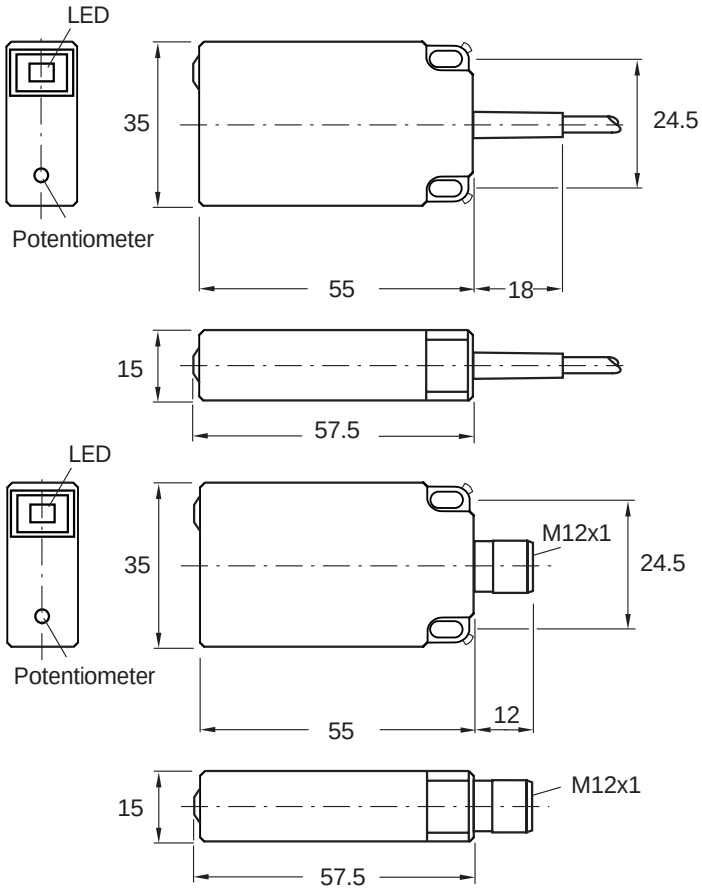
Short circuit protection (pulsed)	yes
Reverse polarity protection	yes
Power-up pulse suppression	yes
Enclosure rating to EN 60529	IP 67
Shock und vibration stress	30 g, 11 ms 10 to 55 Hz, 1 mm
Ambient temperature T_a	- 25 ... + 80 °C
Housing material	Plastic
Tightening torque	7,5 Nm
Connection cable	PVC, 4 x 0.34 mm^2

Selection table

Sensing range s_n mm	Installation	Switching output	Output function	Switching frequency f in Hz	Connection	Type	Order number
16		PNP	 complementary	50	cable 2 m	CM30-16BPP-KW1	6020473
16		NPN	 complementary	50	cable 2 m	CM30-16BNP-KW1	6021459
16		PNP	 complementary	50	connector M12 x 1 mm	CM30-16BPP-KC1	6020475
16		NPN	 complementary	50	connector M12 x 1 mm	CM30-16BNP-KC1	6021460
25		PNP	 complementary	50	cable 2 m	CM30-25NPP-KW1	6020476
25		NPN	 complementary	50	cable 2 m	CM30-25NNP-KW1	6021461
25		PNP	 complementary	50	connector M12 x 1 mm	CM30-25NPP-KC1	6020477
25		NPN	 complementary	50	connector M12 x 1 mm	CM30-25NNP-KC1	6021462

Capacitive proximity sensors

CQ35 series, sensing range 25 mm
DC 4-wire, plastic housing



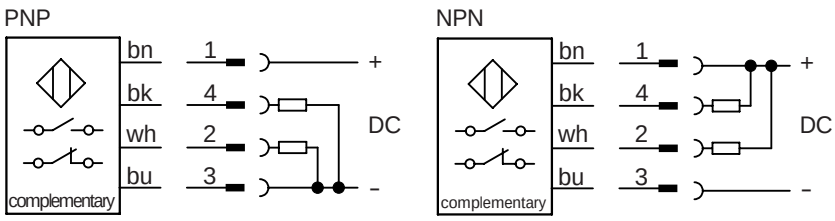
Features

- High EMC-immunity
- Can be installed flush or non-flush
- PNP output
- Adjustable sensing range: 4 to 25 mm (non flush)
- Device can be flush mounted, sensing range: 16 mm
- Complementary output function
- Short-circuit protection (pulsed)
- Plastic housing
- Cable or connector
- Enclosure rating IP 67
- LED-status indicator
- UL, CSA

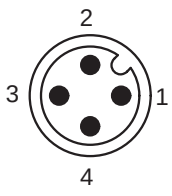
Accessories

Round connector

Connection diagram



Wire colour		Contact	Assignment
bn	brown	1	+ V DC
bk	black	4	NO
wh	white	2	NC
bu	blue	3	- V DC



Electrical and mechanical data

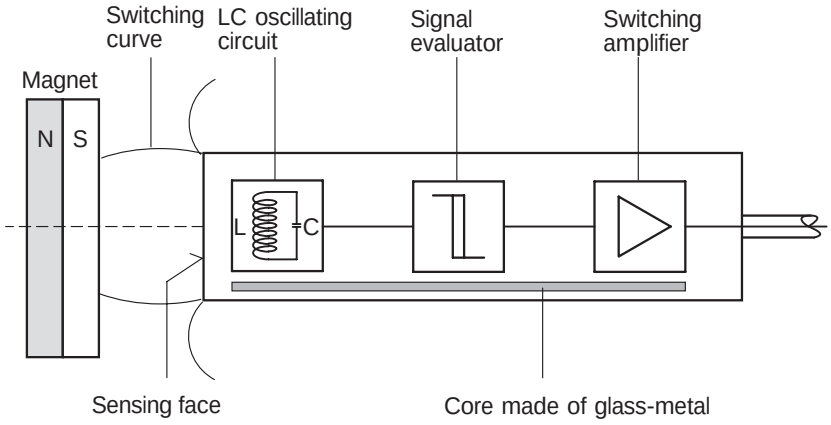
Operating voltage U_b	10 ... 40 V DC
Ripple U_{pp}	≤ 10% of U_b
Voltage drop U_d	≤ 2,5 V
Power consumption (without load)	≤ 10 mA
Continuous current I_a	≤ 200 mA
Time delay before availability t_v	≤ 100 ms
Hysteresis H	4% ... 20% of s_r
Repeatability R (U_b und T_a constant)	≤ 5% of s_r
Temperature drift	± 10% of s_r
EMV	to EN 60 947-5-2

Short circuit protection (pulsed)	yes
Reverse polarity protection	yes
Power-up pulse suppression	yes
Enclosure rating to EN 60529	IP 67
Shock und vibration stress	30 g, 11 ms 10 to 55 Hz, 1 mm
Ambient temperature T_a	- 25 ... + 75 °C
Housing material	Plastic
Connection cable	PVC, 4 x 0.34 mm^2

Selection table

Sensing range s_n mm	Installation	Switching output	Output function	Switching frequency f in Hz	Connection	Type	Order number
25		PNP	 complementary	50	cable 2 m	CQ35-25NPP-KW1	6020478
25		NPN	 complementary	50	cable 2 m	CQ35-25NNP-KW1	6021463
25		PNP	 complementary	50	connector M12 x 1 mm	CQ35-25NPP-KC1	6020479
25		NPN	 complementary	50	connector M12 x 1 mm	CQ35-25NNP-KC1	6021464

Operating Principle
Magnetic proximity sensors

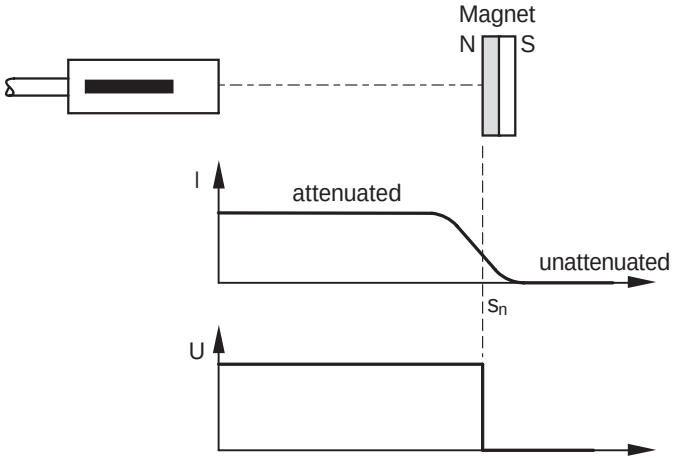


A major advantage of this technology is that large sensing ranges are possible even with small sensor types.

Permanent magnets are usually used to trigger magnetic proximity sensors. They comprise magnetically hard substances - steel alloyed with other metals such as aluminium, cobalt, and nickel. Magnetically hard ferrite with similar properties can be also be produced from sintered compounds containing iron oxide and other metal oxides.

As with inductive proximity sensors, magnetic proximity sensors also have an LC oscillating circuit, a signal evaluator, and a switching amplifier. They also have a core (strip) made of amorphous, highly permeable, and magnetically soft glass-metal.

This strip attenuates the oscillating circuit using eddy-current losses. The core becomes magnetically saturated very quickly if a magnetic field is applied, e.g. if a magnet is brought closer. The eddy-current losses attenuating the oscillating circuit are reduced and the oscillating de-attenuates. The power consumption of a magnetic proximity sensor therefore increases as a magnet is brought closer, in contrast to inductive proximity sensors where the oscillator current is reduced as the switching trigger is brought closer. For this reason, the starting curves are not the lines of an electro-magnetic field, but “limit lines” which describe the saturation of the glass-metal strip by a magnet and the associated “switch-through” of the sensor.



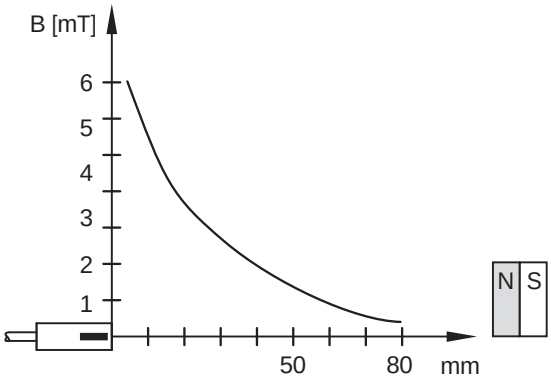
Rated response sensitivity

The response sensitivity applies to both magnetic field poles without external field interference.
In rooms and industrial plants, external magnetic fields are caused by the earth's magnetic field, electrical conductors, magnetic coils, permanent magnets, and steel objects containing residual magnetism. Neighbouring iron parts may increase external interference or have a shielding effect. External magnetic fields are usually constant or periodically effective and can therefore be taken into consideration. If necessary, magnetic shielding plates must be used or the sensors must be installed flush in the steel.

design	response sensitivity
MM08	1 mT
MM12	1 mT
MM18	0,9 mT
MQ10	1 mT

Magnetic induction

The illustration shows magnetic induction as a function of the distance to the actuating magnet. Electric coils or permanent magnets are used to adjust the response sensitivity of the sensors and also for comparative measurements. An oxide magnet made of barium ferrite with a 30 mm diameter and 10 mm in height (M4.0) is used as the standard measure.

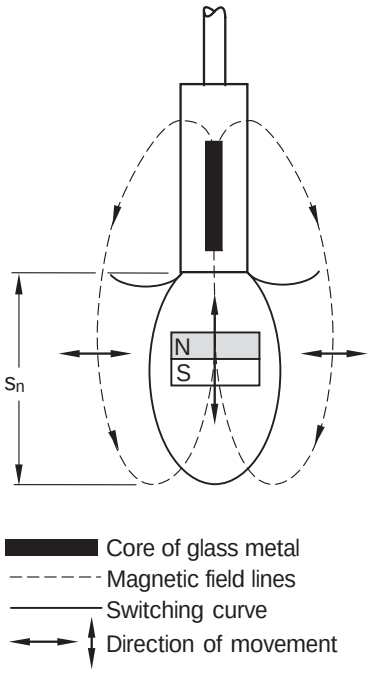


Approach curves

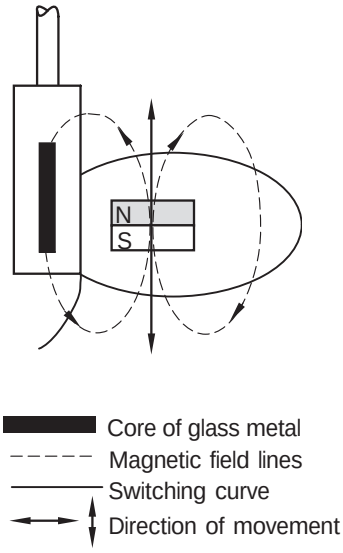
In the case of magnetic proximity sensors, it must be remembered that the alignment of the magnet relative to the sensor axis changes the sensing range. The lines of magnetic flux have to be in one line with the core of glass metal.
A distinction can be made between the following cases:

Sensor and magnet axis are in alignment with each other.

Case 1
The sensor responds as soon as the magnet reaches the switching curve. It can approach the proximity sensor axially or pass in front of the sensor inside the sensing range.



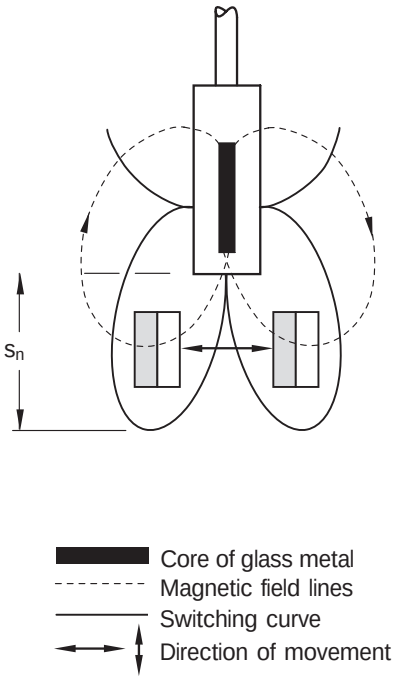
Case 2
The sensor responds if the magnet approaches the switching curve laterally. If the sensor leaves the switching curve, the sensor switches back again. This principle is largely used for magnetic cylinder sensors.



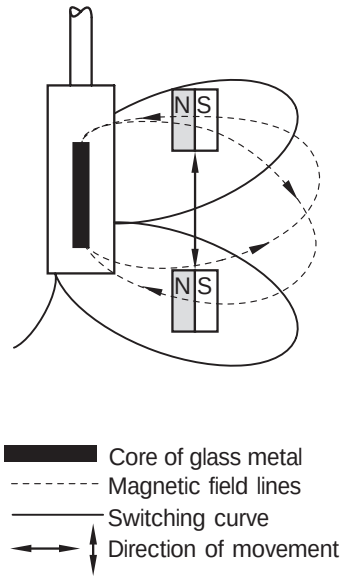
Glossary
Magnetic proximity sensors

Sensor and magnet axis are offset by 90°.

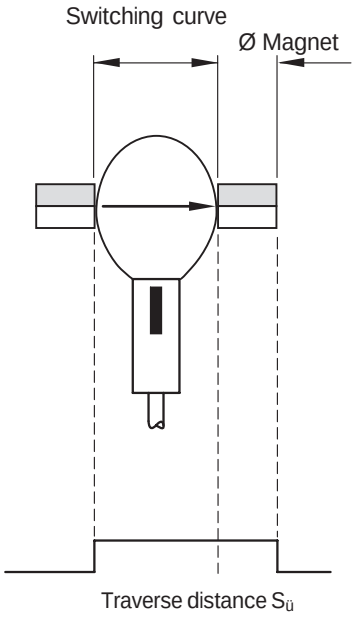
Case 3
If the magnet passes radially in front of the proximity sensor, the sensing range is smaller than that in the case 1. If, for example, the sensor enters the left-hand switching curve from the right-hand switching curve, it passes through an area in which the magnetic field is reversed. This briefly de-attenuates the proximity sensor before it is re-attenuated in the left-hand switching curve. Whether or not the evaluation unit can detect this interruption depends on the actuating speed and the axial distance of the traversing magnet.



Case 4
In this case, the magnet passes through two switching curves. The magnetic field reverses at the boundary of these curves and two switching points are produced. The detection of this interruption again depends on the actuating speed and the radial distance relative to the sensor axis.



Traverse distance $S_ü$
The traverse distance $s_ü$ is the distance between the left- and right-hand boundary of the switching curve plus the diameter of the magnet. If a magnet approaches the switching curve from the left-hand side, the sensor responds. If the magnet leaves the switching curve at the opposite side, the sensor only switches if the magnet has completely left the envelope curve.



Traverse time $t_ü$

$$t_ü = \frac{S_ü}{v_ü}$$

$s_ü$ = Traverse distance
$v_ü$ = Traverse velocity

Sensing range and switching curves

The following tables show the sensing ranges s_n and switching curve diameter (s_D) relative to the actuating magnets (M1.0 - M5.0):

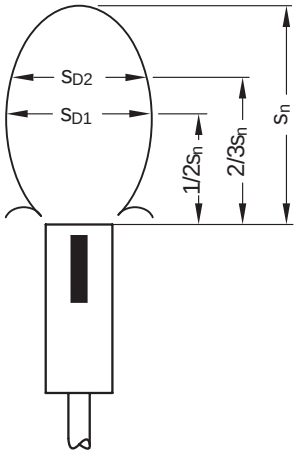
Series: MM08 - 60 A - ...
MQ10 - 60 A - ...
MM12 - 60 A - ...

Magnet type	S_n mm On	Off	s_{D1} mm	s_{D2} mm
M 1.0	23	25	28	23
M 2.0	24	25	30	27
M 3.0	36	37	41	36
M 4.0	**60**	61	68	60
M 5.0	68	70	80	67

Series: MM18 - 70 A - ...

Magnet type	S_n mm On	Off	s_{D1} mm	s_{D2} mm
M 1.0	24	25	30	26
M 2.0	25	26	36	32
M 3.0	38	39	45	40
M 4.0	**70**	72	75	65
M 5.0	85	87	86	75

The difference between S_n "ON" und S_n "OFF" describes the hysteresis of each sensor.



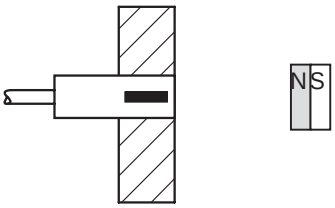
Magnet material

M1.0 - Samarium cobalt (Ø 10 x 3 mm)
M2.0 - AlNiCo (Ø 6 x 25 mm)
M3.0 - Barium ferrite (Ø 20 x 6.5 mm)
M4.0 - Barium ferrite (Ø 30 x 10 mm)
M5.0/5.1 - Barium ferrite (Ø 30/35 x 15 mm)

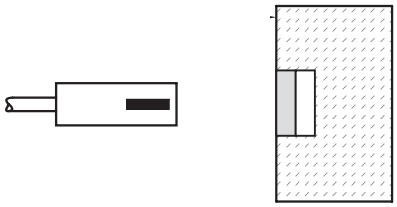
The magnet M4.0 is used as the standard measure.

Installation Notes
Magnetic proximity sensors

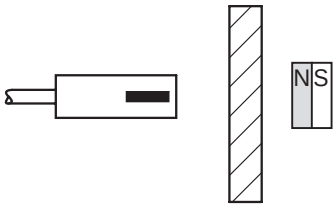
Flush sensor installation
Magnetic proximity sensors can be installed flush in all materials and metals (with the exception of magnetizable material) without any detrimental effects to the sensing range.



Flush magnet installation
The sensing range is reduced up to 60 % if the magnets are installed in magnetizable material.

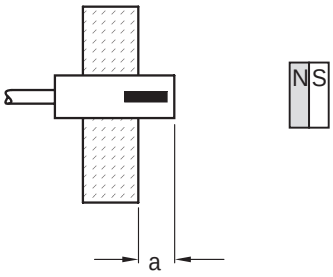


Penetration of material
Since magnetic fields do not penetrate all non-magnetizable material, magnetic proximity sensors can be used to detect magnets e.g. behind a non-ferrous metal, plastic, or wooden panel.

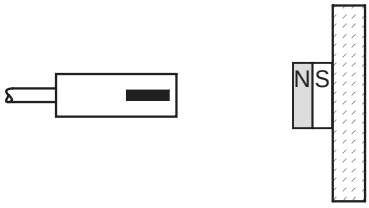


Non-flush sensor installation
The table shows how much the proximity sensor must protrude when installed in magnetizable material so that a reduction in sensing range of more than 5 % is avoided.

Standard measure M 4.0	
Series	a = Free zone (mm)
MM08-60 A-...	10 mm
MM12-60 A-...	10 mm
MM18-70 A-...	15 mm
MQ10-60 A-...	10 mm



Mounting on magnetizable material
If the magnets are mounted on magnetizable material, the sensing range increases to the values printed in bold in the table below:

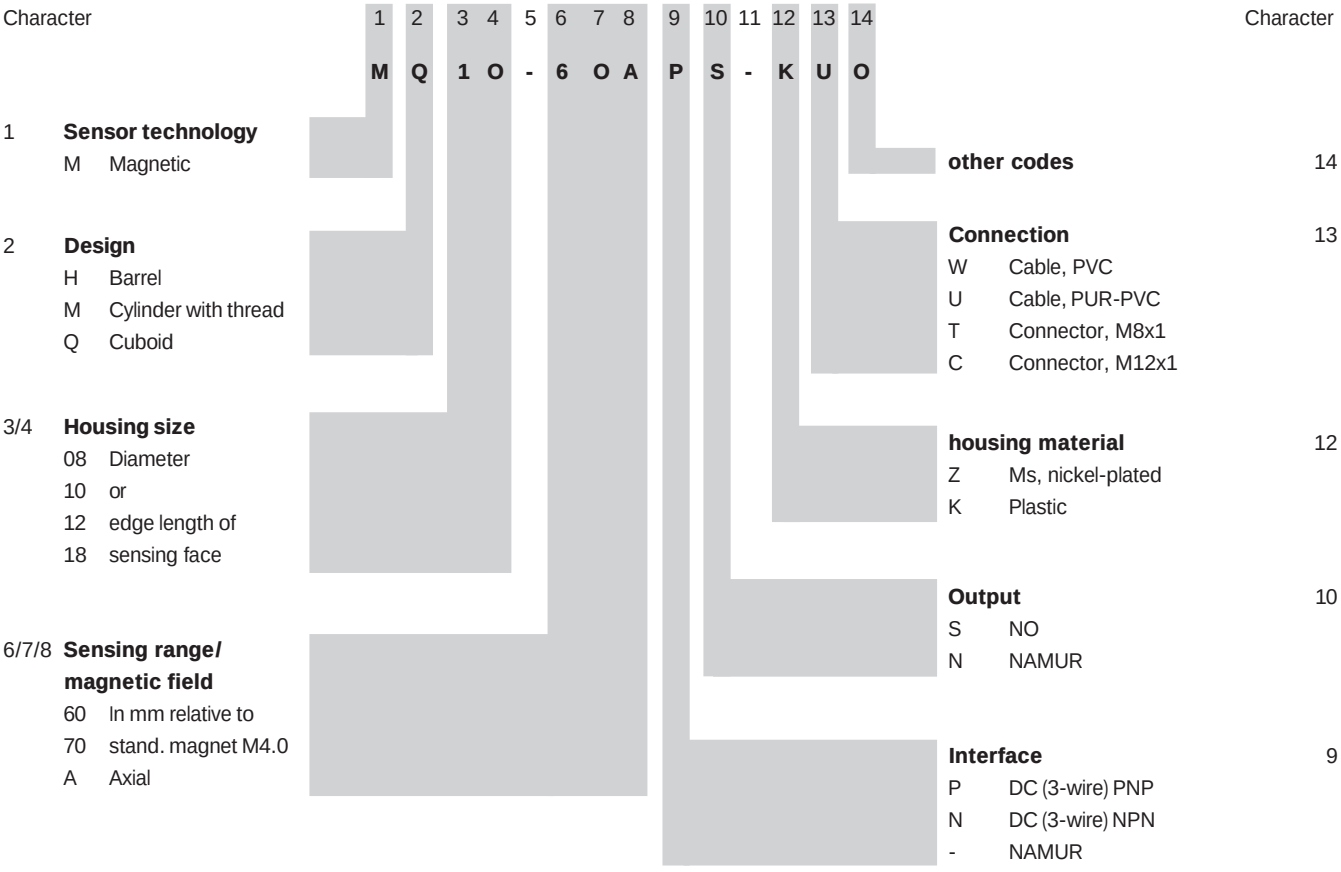


	Actuating magnets s_n mm				
Series	M 1.0	M 2.0	M 3.0	M 4.0	M 5.0
MM08-60 A-...	23 **36**	24 **32**	36 **45**	60 **67**	68 **73**
MM12-60 A-...	23 **36**	24 **32**	36 **45**	60 **67**	68 **73**
MM18-70 A-...	24 **38**	25 **35**	38 **50**	70 **82**	85 **95**
MQ10-60 A-...	23 **36**	24 **32**	36 **45**	60 **67**	68 **73**

Selection Table/Type Code

Magnetic proximity sensors

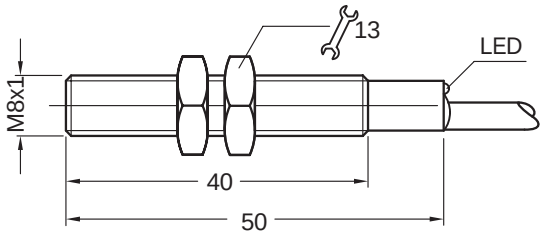
Series	Housing			Sensing range s_n in mm	Switching output		Output function	Connection		Electr. config.	Page
	Form	Size in mm	Material		PNP	NPN	NO	Cable	Connector		
MM08	Cylinder with thread	M8	Brass	60	•	•	•	•	•	DC	120
MM12		M12	Brass	60	•	•	•	•	•	DC	122
MM18		M18	Brass	70	•	•	•	•	•	DC	124
MQ10	Cuboid	10x28/37x16	Plastic	60	•	•	•	•	•	DC	126
MM12	Cylinder with thread	M12	Brass	60				•	•	NAMUR	128
MM18		M18	Brass	70				•	•	NAMUR	130

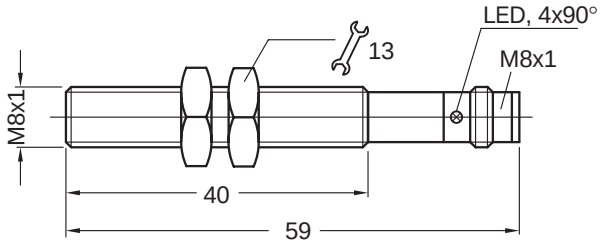


Magnetic proximity sensors

MM 08 series, sensing range 60 mm
DC 3-wire, metal housing

Dimensions in mm





Features

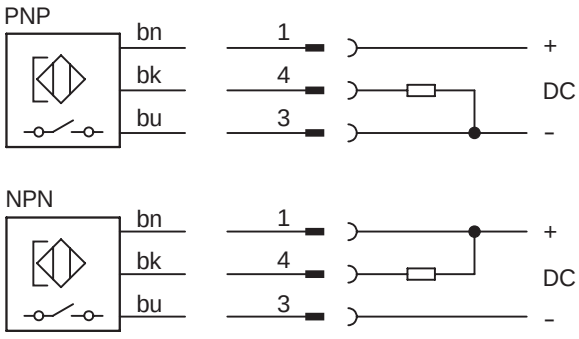
- Can be installed flush and non-flush in metal
- Sensing range up to 60 mm
- PNP or NPN output
- High switching frequency
- Short-circuit protection (pulsed)
- Robust brass housing, nickel-plated with fine thread M8 x 1 mm
- Cable or connector
- Enclosure rating IP 67
- LED status indicator

Accessories

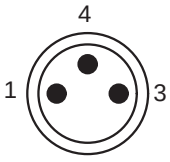
Round connectors

Magnets

Connection diagram



Wire colour		Contact	Assignment
bn	brown	1	+ V DC
bk	black	4	NO
bu	blue	3	- V DC



Electrical and mechanical data

Operating voltage U_b	10 ... 30 V DC
Ripple U_{pp}	≤ 10% of U_b
Voltage drop U_d (at I_a max.)	≤ 1.5 V
Power consumption (without load)	≤ 10 mA
Continuous current I_a	≤ 300 mA
Time delay before availability t_v	≤ 2 ms
Hysteresis H	1% - 10% of s_r
Repeatability R (U_b and T_a constant)	≤ 1% of s_r
Temperature drift	± 10% of s_r
EMC	to EN 60 947-5-2

Wire-break protection	yes
Short-circuit protection (pulsed)	yes
Reverse polarity protection	yes
Power-up pulse suppression	yes
Enclosure rating to EN 60529	IP 67
Shock and vibration stress	30 g, 11 ms 10 to 55 Hz, 1 mm
Ambient temperature T_a	- 25 ... + 75 °C
Housing material	Brass, nickel-plated, plastic
Tightening torque	0.8 Nm (with plastic nuts, included in package) 2.0 Nm (with metal nuts)
Connection cable	PUR-PVC, 3 x 0.25 mm^2

Selection table

Sensing range s_n* mm	Magnetic alignment	Switching output	Output function	Switching frequency f in Hz	Connection	Type	Order number
60	Axial	PNP		5000	Cable 2 m	MM08-60APS-ZU0	7900264
60	Axial	PNP		5000	Connector M8 x 1 mm	MM08-60APS-ZT0	7900266

* Sensing range s_n based on installation in non-magnetizable material using magnet M 4.0

Output NPN on request

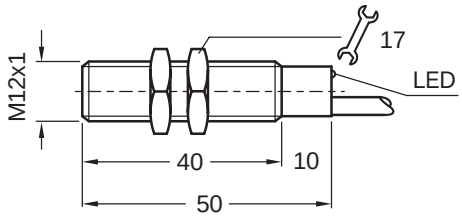
Sensing ranges (Typical values)

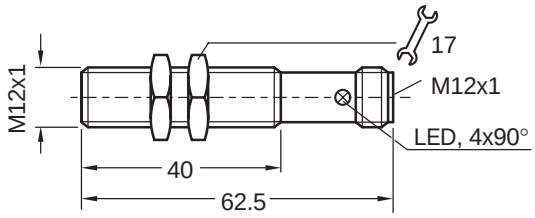
Magnet type	Sensing range s_n Any installation type (flush or non-flush) in non-magnetizable material	Sensing range s_n Flush installation in magnetizable material (e.g. iron)
M 1.0	23 mm	12 mm
M 2.0	24 mm	10 mm
M 3.0	36 mm	15 mm
M 4.0	**60 mm**	20 mm
M 5.0 / 5.1	68 mm	25 mm

Magnetic proximity sensors

MM 12 series, sensing range 60 mm
DC 3-wire, metal housing

Dimensions in mm





Features

- Can be installed flush and non-flush in metal
- Sensing range up to 60 mm
- PNP or NPN output
- High switching frequency
- Short-circuit protection (pulsed)
- Robust brass housing, nickel-plated with fine thread M12 x 1 mm
- Cable or connector
- Enclosure rating IP 67
- LED status indicator

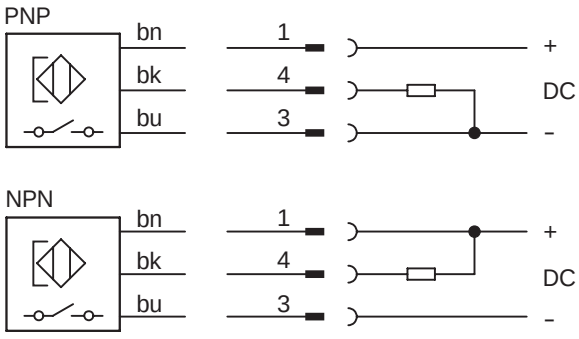
Accessories

Round connectors

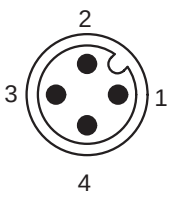
Magnets

Mounting bracket

Connection diagram



Wire colour		Contact	Assignment
bn	brown	1	+ V DC
bk	black	4	NO
bu	blue	3	- V DC
		2	free



Electrical and mechanical data

Operating voltage U_b	10 ... 30 V DC
Ripple U_{pp}	≤ 10% of U_b
Voltage drop U_d (at I_a max.)	≤ 1.5 V
Power consumption (without load)	≤ 10 mA
Continuous current I_a	≤ 300 mA
Time delay before availability t_v	≤ 2 ms
Hysteresis H	1% - 10% of s_r
Repeatability R (U_b and T_a constant)	≤ 1% of s_r
Temperature drift	± 10% of s_r
EMC	to EN 60 947-5-2

Wire-break protection	yes
Short-circuit protection (pulsed)	yes
Reverse polarity protection	yes
Power-up pulse suppression	yes
Enclosure rating to EN 60529	IP 67
Shock and vibration stress	30 g, 11 ms 10 to 55 Hz, 1 mm
Ambient temperature T_a	- 25 ... + 75 °C
Housing material	Brass, nickel-plated, plastic
Tightening torque	7.0 Nm
Connection cable	PUR-PVC, 3 x 0.25 mm^2

Selection table

Sensing range s_n* mm	Magnetic alignment	Switching output	Output function	Switching frequency f in Hz	Connection	Type	Order number
60	Axial	PNP		5000	Cable 2 m	MM12-60APS-ZU0	7900268
60	Axial	PNP		5000	Connector M12 x 1 mm	MM12-60APS-ZC0	7900270

* Sensing range s_n based on installation in non-magnetizable material using magnet M 4.0

Output NPN on request

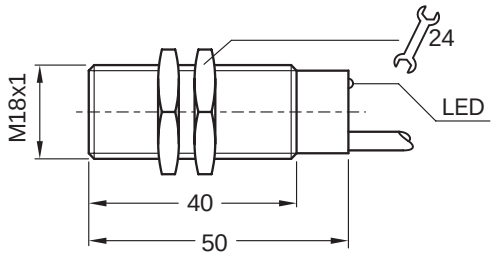
Sensing ranges (Typical values)

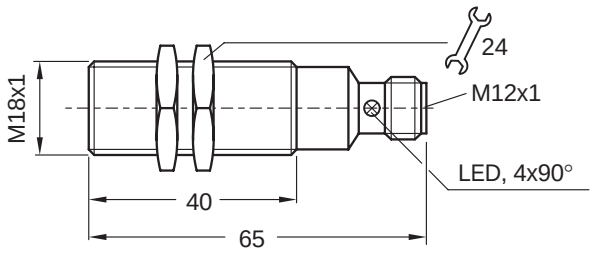
Magnet type	Sensing range s_n Any installation version (flush or non-flush) in non-magnetizable material	Sensing range s_n Flush installation in magnetizable material (e.g. iron)
M 1.0	23 mm	17 mm
M 2.0	24 mm	14 mm
M 3.0	36 mm	23 mm
M 4.0	**60 mm**	37 mm
M 5.0 / 5.1	68 mm	44 mm

Magnetic proximity sensors

MM 18 sensors, sensing range 70 mm
DC 3-wire, metal housing

Dimensions in mm





Features

- Can be installed flush and non-flush in metal
- Sensing range up to 70 mm
- PNP or NPN output
- High switching frequency
- Short-circuit protection (pulsed)
- Robust brass housing, nickel-plated with fine thread M18 x 1 mm
- Cable or connector
- Enclosure rating IP 67
- LED status indicator

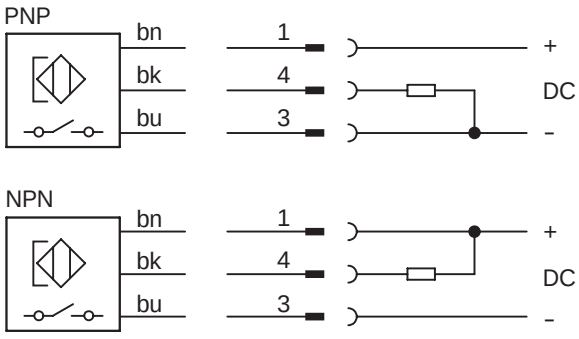
Accessories

Round connectors

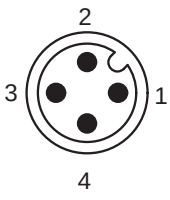
Magnets

Mounting bracket

Connection diagram



Wire colour		Contact	Assignment
bn	brown	1	+ V DC
bk	black	4	NO
bu	blue	3	- V DC
		2	free

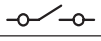


Electrical and mechanical data

Operating voltage U_b	10 ... 30 V DC
Ripple U_{pp}	≤ 10% of U_b
Voltage drop U_d (at I_a max.)	≤ 1.5 V
Current consumption (without load)	≤ 10 mA
Continuous current I_a	≤ 300 mA
Time delay before availability t_v	≤ 2 ms
Hysteresis H	1% - 10% of s_r
Repeatability R (U_b and T_a constant)	≤ 1% of s_r
Temperature drift	± 10% of s_r
EMC	to EN 60 947-5-2

Wire-break protection	yes
Short-circuit protection (pulsed)	yes
Reverse polarity protection	yes
Power-up pulse suppression	yes
Enclosure rating to EN 60529	IP 67
Shock and vibration stress	30 g, 11 ms 10 to 55 Hz, 1 mm
Ambient temperature T_a	- 25 ... + 75 °C
Housing material	Brass, nickel-plated, plastic
Tightening torque	25 Nm
Connection cable	PUR-PVC, 3 x 0.25 mm^2

Selection table

Sensing range s_n* mm	Magnetic alignment	Switching output	Output function	Switching frequency f in Hz	Connection	Type	Order number
70	Axial	PNP		5000	Cable 2 m	MM18-70APS-ZU0	7900272
70	Axial	PNP		5000	Connector M12 x 1 mm	MM18-70APS-ZC0	7900274

* Sensing range s_n based on installation in non-magnetizable material using magnet M 4.0

Output NPN on request

Sensing ranges (Typical values)

Magnet type	Sensing range s_n Any installation version (flush or non-flush) in non-magnetizable material	Sensing range s_n Flush installation in magnetizable material (e.g. iron)
M 1.0	24 mm	20 mm
M 2.0	25 mm	17 mm
M 3.0	38 mm	32 mm
M 4.0	**70 mm**	55 mm
M 5.0 / 5.1	85 mm	60 mm

Magnetic proximity sensors

MQ 10 series, sensing range 60 mm
DC 3-wire, plastic housing

Features

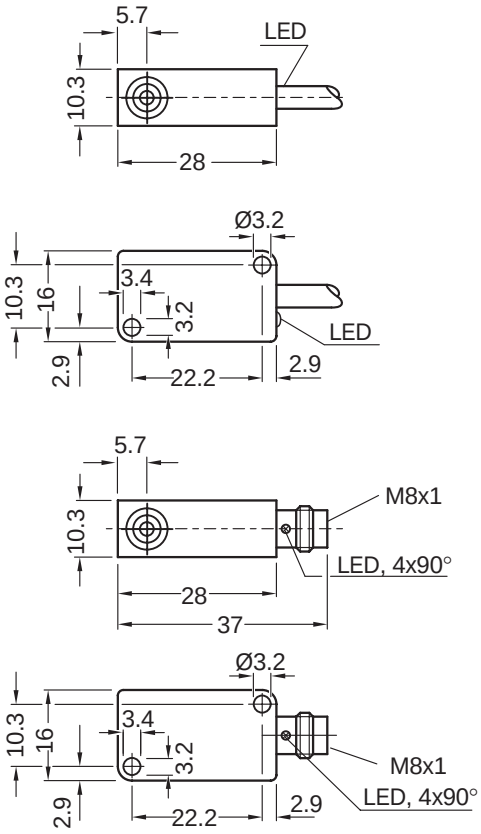
- Can be installed flush and non-flush in metal
- Sensing range up to 60 mm
- PNP or NPN output
- High switching frequency
- Short-circuit protection (pulsed)
- Plastic housing
- Cable or connector
- Enclosure rating IP 67
- LED status indicator

Accessories

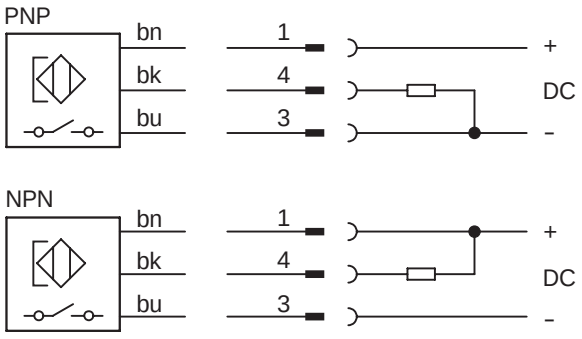
Round connectors

Magnets

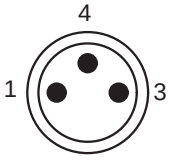
Dimensions in mm



Connection diagram



Wire colour		Contact	Assignment
bn	brown	1	+ V DC
bk	black	4	NO
bu	blue	3	- V DC

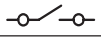
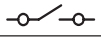
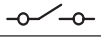


Electrical and mechanical data

Operating voltage U_b	10 ... 30 V DC
Ripple U_{pp}	≤ 10% of U_b
Voltage drop U_d (at I_a max.)	≤ 1.5 V
Power consumption (without load)	≤ 10 mA
Continuous current I_a	≤ 300 mA
Time delay before availability t_v	≤ 2 ms
Hysteresis H	1% - 10% of s_r
Repeatability R (U_b and T_a constant)	≤ 1% of s_r
Temperature drift	± 10% of s_r
EMC	to EN 60 947-5-2

Wire-break protection	yes
Short-circuit protection (pulsed)	yes
Reverse polarity protection	yes
Power-up pulse suppression	yes
Enclosure rating to EN 60529	IP 67
Shock and vibration stress	30 g, 11 ms 10 to 55 Hz, 1 mm
Ambient temperature T_a	- 25 ... + 75 °C
Housing material	Plastic
Connection cable	PUR-PVC, 3 x 0.25 mm^2

Selection table

Sensing range s_n* mm	Magnetic alignment	Switching output	Output function	Switching frequency f in Hz	Connection	Type	Order number
60	Axial	PNP		5000	Cable 2 m	MQ10-60APS-KU0	7900278
60	Axial	NPN		5000	Cable 2 m	MQ10-60ANS-KU0	7900279
60	Axial	PNP		5000	Connector M8 x 1 mm	MQ10-60APS-KT0	7900280
60	Axial	NPN		5000	Connector M8 x 1 mm	MQ10-60ANS-KT0	7900281

* Sensing range s_n based on installation in non-magnetizable material using magnet M 4.0

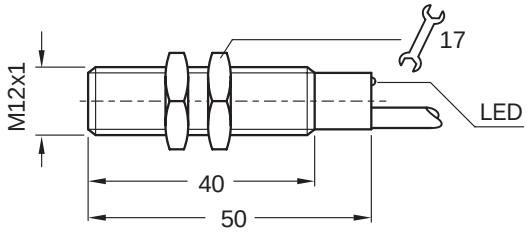
Sensing ranges (Typical values)

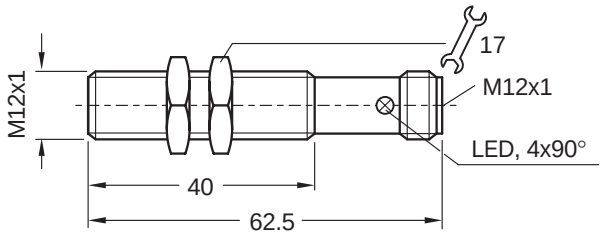
Magnet type	Sensing range s_n Any installation version (flush or non-flush) in non-magnetizable material	Sensing range s_n Flush installation in magnetizable material (e.g. iron)
M 1.0	23 mm	12 mm
M 2.0	24 mm	10 mm
M 3.0	36 mm	15 mm
M 4.0	**60 mm**	20 mm
M 5.0 / 5.1	68 mm	25 mm

Magnetic proximity sensors

MM 12 series, sensing range 60 mm
NAMUR, metal housing

Dimensions in mm





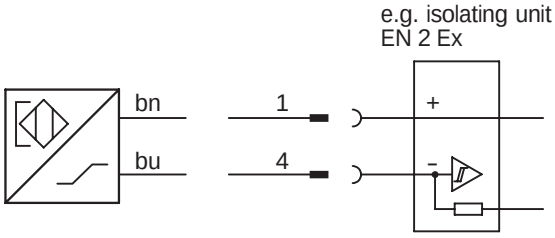
Features

- Can be installed flush and non-flush in metal
- Sensing ranges up to 60 mm
- NAMUR to EN 50 227
- High switching frequency
- Robust brass housing, nickel-plated, with fine thread M12 x 1 mm
- Cable or connector
- Enclosure rating IP 67
- LED status indicator
- **Classification**
  TÜV 99 ATEX 1398
  Ex **EExibII CT6**

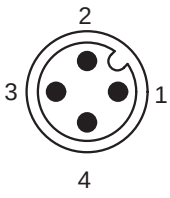
Accessories

Round connectors
Magnets
Mounting bracket
Isolating unit EN 2 Ex

Connection diagram



Wire colour		Contact	Assignment
bn	brown	1	+ V DC
bu	blue	4	- V DC
		3	free
		2	free



Electrical and mechanical data

Operating voltage U_b	5 ... 25 V DC
Rated voltage U_n	8.2 V DC
Ripple U_{pp}	≤ 5% of U_b
Power consumption, attenuated	≥ 2.5 mA
Power consumption, unattenuated	≤ 1.0 mA
Internal capacitance	≤ 45nF
Internal inductance	≤ 30 µH
Cable resistance	≤ 50 Ω
Time delay before availability t_v	≤ 2 ms
Hysteresis H	1% - 10% of s_r
Repeatability R (U_b and T_a constant)	≤ 1% of s_r
Temperature drift	± 10% of s_r
EMC	to EN 60 947-5-2

Short-circuit protected	yes
Reverse-polarity protected	yes
Enclosure rating to EN 60529	IP 67
Shock and vibration stress	30 g, 11 ms 10 to 55 Hz, 1 mm
Ambient temperature T_a	- 25 ... + 70 °C
Housing material	Brass, nickel-plated, plastic
Tightening torque	7.0 Nm
Connection cable	PVC, 2 x 0.34 mm^2, blue

Selection table

Sensing range s_n* mm	Magnetic alignment	Version	Output function	Switching frequency f in Hz	Connection	Type	Order number
60	Axial	NAMUR	⎍	5000	Cable 2 m	MM12-60A-N-ZW0	7900286
60	Axial	NAMUR	⎍	5000	Connector M12 x 1 mm	MM12-60A-N-ZC0	7900287

* Sensing range s_n based on installation in non-magnetizable material using magnet M 4.0

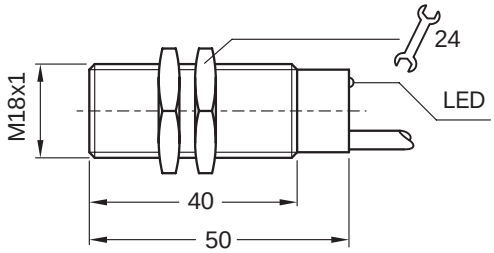
Sensing ranges (Typical values)

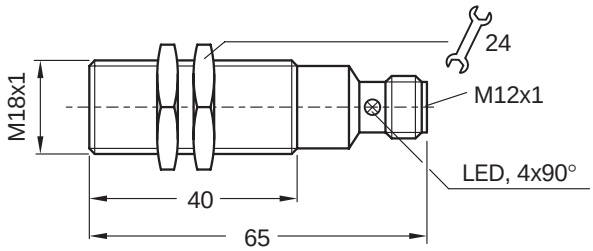
Magnet type	Sensing range s_n Any installation version (flush or non-flush) in non-magnetizable material	Sensing range s_n Flush installation in magnetizable material (e.g. iron)
M 1.0	23 mm	17 mm
M 2.0	24 mm	14 mm
M 3.0	36 mm	23 mm
M 4.0	**60 mm**	37 mm
M 5.0 / 5.1	68 mm	44 mm

Magnetic proximity sensors

MM 18 series, sensing range 70 mm
NAMUR, metal housing

Dimensions in mm





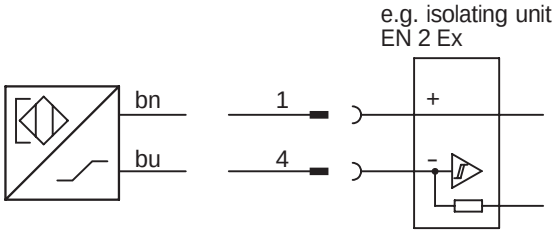
Features

- Can be installed flush and non-flush in metal
- Sensing ranges up to 70 mm
- NAMUR to EN 50 227
- High switching frequency
- Robust brass housing, nickel-plated, with fine thread M18 x 1 mm
- Cable or connector
- Enclosure rating IP 67
- LED status indicator
- **Classification**
  TÜV 99 ATEX 1398
  Ex **EExibII CT6**

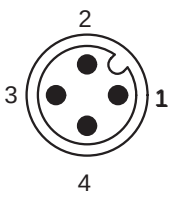
Accessories

Round connectors
Magnets
Mounting bracket
Isolating unit EN 2 Ex

Connection diagrams



Wire colour		Contact	Assignment
bn	brown	1	+ V DC
bu	blue	4	- V DC
		3	free
		2	free



Electrical and mechanical data

Operating voltage U_b	5 ... 25 V DC
Rated voltage U_n	8.2 V DC
Ripple U_{pp}	≤ 5% of U_b
Power consumption, attenuated	≥ 2.5 mA
Power consumption, unattenuated	≤ 1.0 mA
Internal capacitance	≤ 45 nF
Internal inductance	≤ 30 µH
Cable resistance	≤ 50 Ω
Time delay before availability t_v	≤ 2 ms
Hysteresis H	1% - 10% of s_r
Repeatability R (U_b and T_a constant)	≤ 1% of s_r
Temperature drift	± 10% of s_r
EMC	to EN 60 947-5-2

Short-circuit protected	yes
Reverse polarity protected	yes
Enclosure rating to EN 60529	IP 67
Shock and vibration stress	30 g, 11 ms 10 to 55 Hz, 1 mm
Ambient temperature T_a	- 25 ... + 70 °C
Housing material	Brass, nickel-plated, plastic
Tightening torque	25 Nm
Connection cable	PVC, 2 x 0.34 mm^2, blue

Selection table

Sensing range s_n* mm	Magnetic alignment	Version	Output function	Switching frequency f in Hz	Connection	Type	Order number
70	Axial	NAMUR	⎍	5000	Cable 2 m	MM18-70A-N-ZW0	7900288
70	Axial	NAMUR	⎍	5000	Connector M12 x 1 mm	MM18-70A-N-ZC0	7900289

* Sensing range s_n based on installation in non-magnetizable material using magnet M 4.0

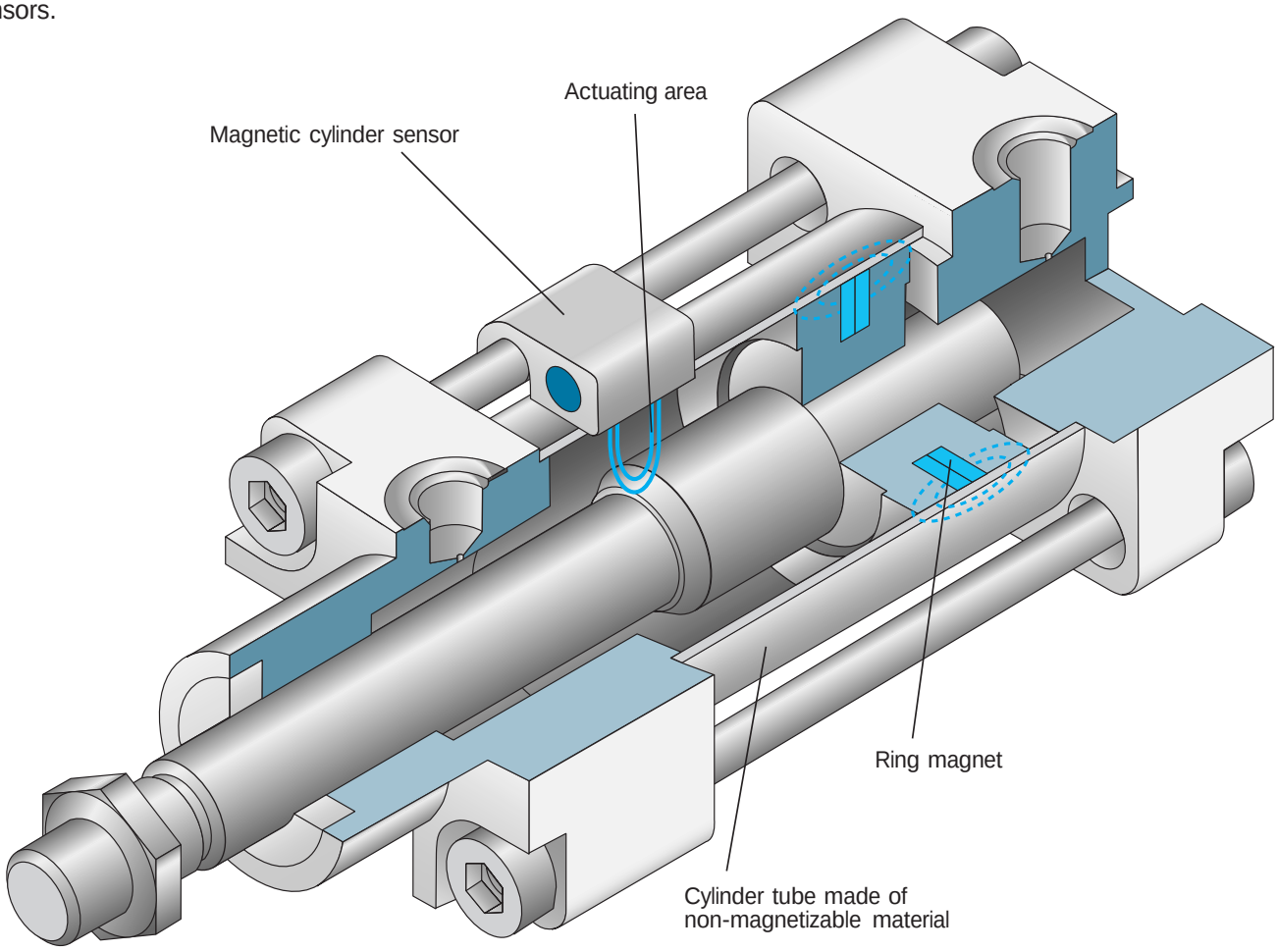
Sensing ranges (Typical values)

Magnet type	Sensing range s_n Any installation version (flush or non-flush) in non-magnetizable material	Sensing range s_n Flush installation in magnetizable material (e.g. iron)
M 1.0	24 mm	20 mm
M 2.0	25 mm	17 mm
M 3.0	38 mm	32 mm
M 4.0	**70 mm**	55 mm
M 5.0 / 5.1	85 mm	60 mm

Operating Principle
Magnetic cylinder sensors

Magnetic cylinder sensors are used to detect the position of pistons in pneumatic cylinders. They are attached directly to the cylinder body and operate according to the same principle as for magnetic proximity sensors.

They detect a ring magnet in the piston through the housing wall made of non-magnetizable material (aluminium, brass, stainless steel).



Response sensitivity
The magnetic induction of pneumatic cylinders is between 5 and 25 mTesla. A response sensitivity of 3 mTesla is enough to ensure signal triggering.
The sensitivity of 3 mT is a guide value which depunds on the design of the cylinder.

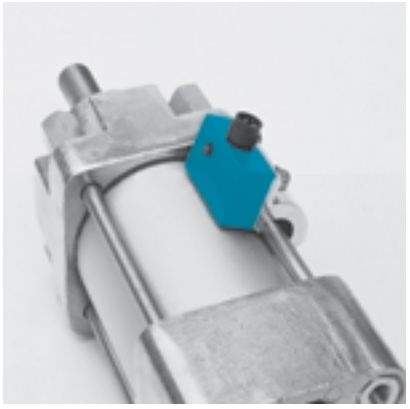
Traverse distance $s_{ü}$
The traverse distance $s_{ü}$ is between 5 and 20 mm, depending on the cylinder's construction (wall thickness, diameter, and magnetic induction). The typical hysteresis is 1 mm and remains constant.

Actuating speed
The short response times of the sensors allow actuating speeds of up to 5 m/s.

MZ R1
Mounting on round-body cylinders Ø 8...63 mm using mounting clamp
Page 136

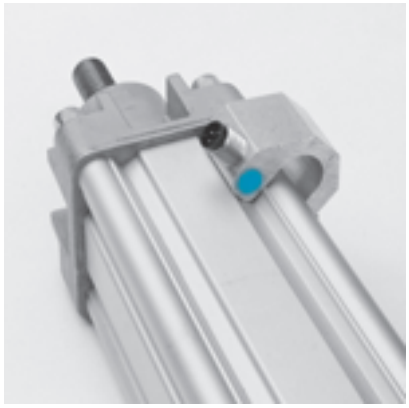
MZ R2
Mounting on round-body cylinders Ø 8 ... 100 mm using clamping band
Page 138

MZ Z1
Mounting on tie-rod cylinders with max. rod diameter of 10 mm
Page 140



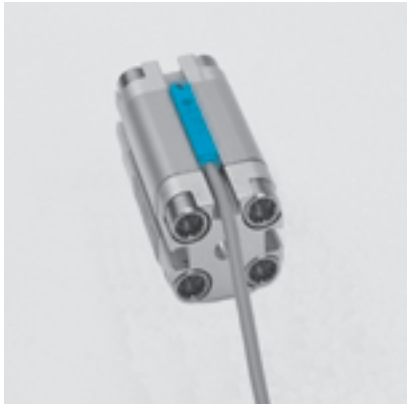
MZ Z2
Mounting on tie-rod cylinders with max. rod diameter of 12.5 mm
Page 142

MZ P3
Mounting on integrated profile cylinders with max. rod diameter of 14 mm
Page 144



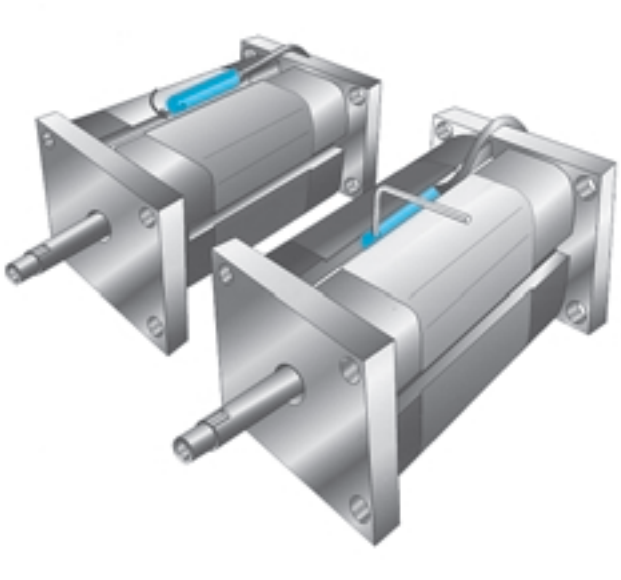
MZ P4
Mounting on integrated profile cylinders with max. rod diameter of 18 mm
Page 146

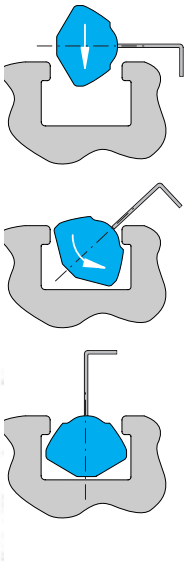
MZ K1, K3
Mounting on cylinders with dovetail slot
Page 148



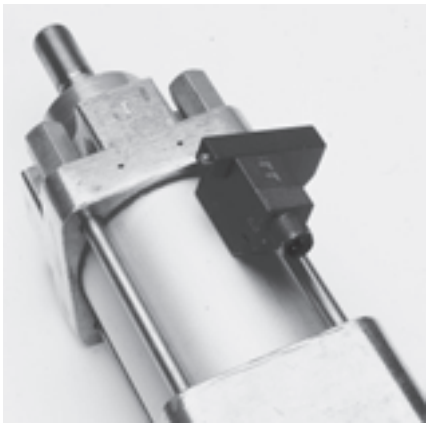
MZ F1
Mounting in T-slot
Page 152

Product Overview
Magnetic cylinder sensors





MZT 1
Mounting in T-slot.
Mountable from the top.
Page 154



MZU 2 – weld immune Version
Mounting on different cylinder types
Page 158

Magnet actuated indicator systems like the magnetic cylinder sensors for pneumatic cylinders can be disturbed by strong magnetic fields. In weld environments this kind of magnetic field can occur. The magnetic cylinder sensors of series MZU2 are equipped with an interference field sensor to detect these interference fields caused by AC-, DC- or medium frequency welders. The response sensivity of the interference detector is > 2 mT and locks the output during the welding process at the last known state. When the welding process stops, the sensor updates the output accordingly.

Type Code
Magnetic cylinder sensors

Character	1	2	3	4	5	6	7	8	9	11	12	13	14	Character
	M	**Z**	**R**	**1**	**-**	**O**	**3**	**V**	**P**	**-**	**A**	**U**	**O**	

1 **Sensor technology**
- M Magnetic
- R Reed switch

2 **Design**
- Z Cylinder sensor

3/4 **Application**
- R1 Round-body cylinder
- R2 Round-body cylinder
- Z1 Tie-rod cylinder
- Z2 Tie-rod cylinder
- P3 Integrated Profile cylinder
- P4 Integrated Profile cylinder
- K1 Short-stroke cylinder
- K3 Short-stroke cylinder
- F1 T-slot
- U2 Universal
- T1 T-Nut

6/7/8 **Response sensitivity, sensor position**
- 02 in mT
- 03 in mT
- V Sensor, front
- Z Sensor, centre

Interface 9
- P DC (3-wire) PNP
- N DC (3-wire) NPN
- U AC/DC 2-wire
- R Reed (3-wire)
- - NAMUR

Output 10
- S NO
- N NAMUR

housing material 12
- A Aluminium
- K Plastic
- D Die-cast zinc
- T Die-cast zinc with teflon coating

Connection 13
- W Cable, PVC
- U Cable, PUR-PVC
- P Cable with connector, M8x1
- T Connector, M8x1
- C Connector, M12x1

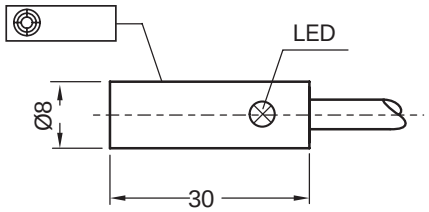
other codes 14
- M Weld immune

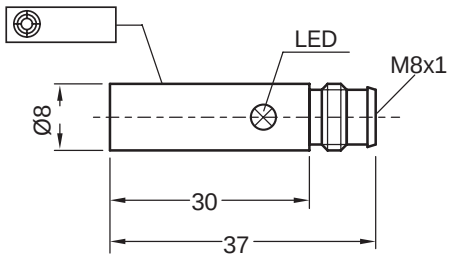
Magnetic cylinder sensors

MZ R1 series

DC 3-wire, for round-body cylinders

Dimensions in mm





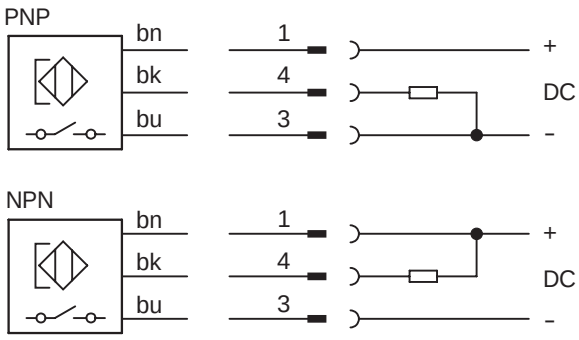
Features

- Non-contact determination of piston position in pneumatic cylinders
- Mounting on round-body cylinders Ø 8 ... 63 mm using R1 mounting clamp
- High response sensitivity ≥ 3 mT
- Frontal sensing face
- No secondary switching ranges
- High repeat accuracy
- Actuating speed ≤ 5 m/s
- PNP or NPN output
- Short-circuit protection (pulsed)
- Solid aluminium housing
- Cable or connector
- Enclosure rating IP 67
- LED status indicator

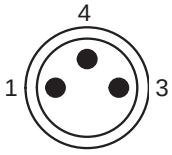
Accessories

Round connectors

Connection diagram



Wire colour		Contact	Assignment
bn	brown	1	+ V DC
bk	black	4	NO
bu	blue	3	- V DC



Electrical and mechanical data

Operating voltage U_b	10 ... 30 V DC
Ripple U_{pp}	≤ 10% of U_b
Voltage drop U_d (at I_a max.)	≤ 1.5 V
Power consumption (without load)	≤ 10 mA
Continuous current I_a	≤ 300 mA
Time delay before availability t_v	≤ 2 ms
Hysteresis H	≤ 1.0 mm
Repeatability R (U_b and T_a constant)	≤ 0.1 mm
EMC	to EN 60 947-5-2

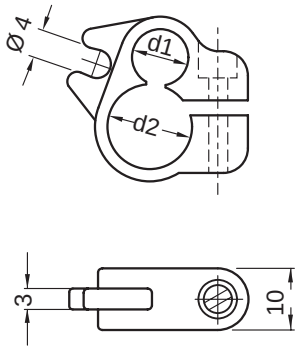
Wire-break protection	yes
Short-circuit protection (pulsed)	yes
Reverse polarity protection	yes
Power-up pulse suppression	yes
Enclosure rating to EN 60529	IP 67
Shock and vibration stress	30 g, 11 ms 10 to 55 Hz, 1 mm
Ambient temperature T_a	- 25 ... + 75 °C
Housing material	Aluminium, plastic
Connection cable	PUR-PVC, 3 x 0.25 mm²

Selection table

Response sensitivity in mT	Sensing face	Switching output	Output function	Switching frequency f in Hz	Connection	Type	Order number
3		PNP		5000	Cable 2 m	MZR1-03VPS-AU0	7900592
3		NPN		5000	Cable 2 m	MZR1-03VNS-AU0	7900593
3		PNP		5000	Connector M8 x 1 mm	MZR1-03VPS-AT0	7900594
3		NPN		5000	Connector M8 x 1 mm	MZR1-03VNS-AT0	7900595

Series is available as reed switch on request.

Accessories



Mounting clamp
Plastic
for magnetic cylinder sensor R1
with d1 Ø 8 mm

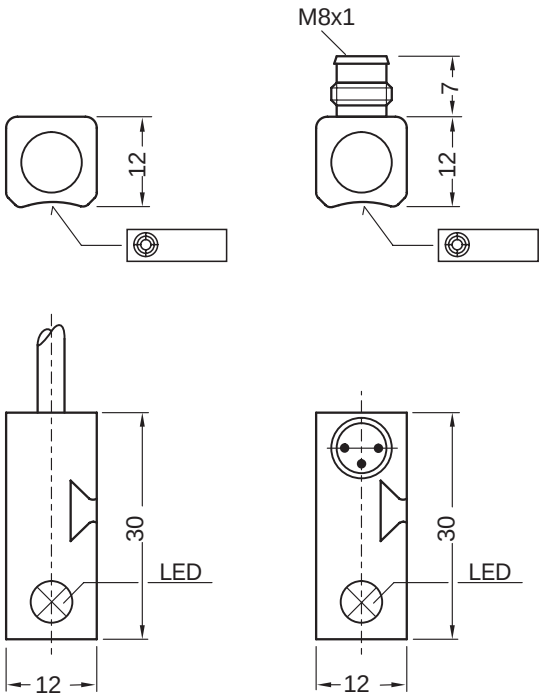
For cylinders with piston diameter	Clamping range d2 in mm	Type	Order-Nr.
8 mm	9,2 ... 10,0	BEF-S-R1-08	7902337
10 mm	10,9 ... 12,0	BEF-S-R1-10	7901753
12 mm	12,9 ... 14,0	BEF-S-R1-12	7901754
16 mm	16,9 ... 18,0	BEF-S-R1-16	7901755
20 mm	21,0 ... 22,0	BEF-S-R1-20	7901756
25 mm	26,1 ... 27,2	BEF-S-R1-25	7901757
32 mm	33,0 ... 35,0	BEF-S-R1-32	7901758
40 mm	41,4 ... 42,5	BEF-S-R1-40	7901759
50 mm	52,5 ... 54,0	BEF-S-R1-50	7901760
63 mm	66,0 ... 67,0	BEF-S-R1-63	7901761

Magnetic cylinder sensors

MZ R2 series

DC 3-wire, for round-body cylinders

Dimensions in mm



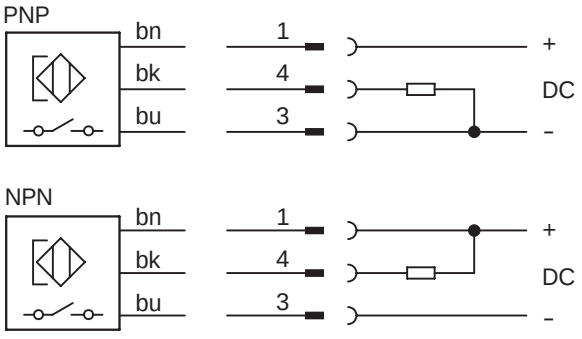
Features

- Non-contact determination of piston position in pneumatic cylinders
- Universal mounting using clamping band for max. cylinder diameter of 100 mm
- High response sensitivity ≥ 3 mT
- Frontal sensing face
- No secondary switching ranges
- High repeat accuracy
- Actuating speed ≤ 5 m/s
- PNP or NPN output
- Short-circuit protection (pulsed)
- Solid aluminium housing
- Cable or connector
- Enclosure rating IP 67
- LED status indicator

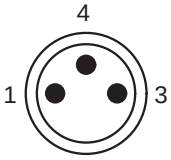
Accessories

Round connectors

Connection diagram



Wire colour		Contact	Assignment
bn	brown	1	+ V DC
bk	black	4	NO
bu	blue	3	- V DC



Electrical and mechanical data

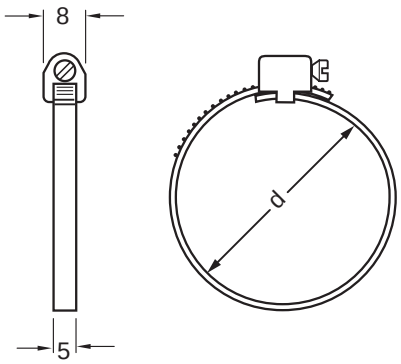
Operating voltage U_b	10 ... 30 V DC
Ripple U_{pp}	≤ 10% of U_b
Voltage drop U_d (at I_a max.)	≤ 1.5 V
Power consumption (without load)	≤ 10 mA
Continuous current I_a	≤ 300 mA
Time delay before availability t_v	≤ 2 ms
Hysteresis H	≤ 1.0 mm
Repeatability R (U_b and T_a constant)	≤ 0.1 mm
EMC	to EN 60 947-5-2

Wire-break protection	yes
Short-circuit protection (pulsed)	yes
Reverse polarity protection	yes
Power-up pulse suppression	yes
Enclosure rating to EN 60529	IP 67
Shock and vibration stress	30 g, 11 ms 10 to 55 Hz, 1 mm
Ambient temperature T_a	- 25 ... + 75 °C
Housing material	Aluminium, plastic
Connection cable	PUR-PVC, 3 x 0.25 mm²

Selection table

Response sensitivity in mT	Sensing face	Switching output	Output function	Switching frequency f in Hz	Connection	Type	Order number
3		PNP		5000	Cable 2 m	MZR2-03VPS-AU0	7900598
3		NPN		5000	Cable 2 m	MZR2-03VNS-AU0	7900599
3		PNP		5000	Connector M8 x 1 mm	MZR2-03VPS-AT0	7900600
3		NPN		5000	Connector M8 x 1 mm	MZR2-03VNS-AT0	7900601

Accessories



Clamping band
stainless steel
for magnetic cylinder sensor R2

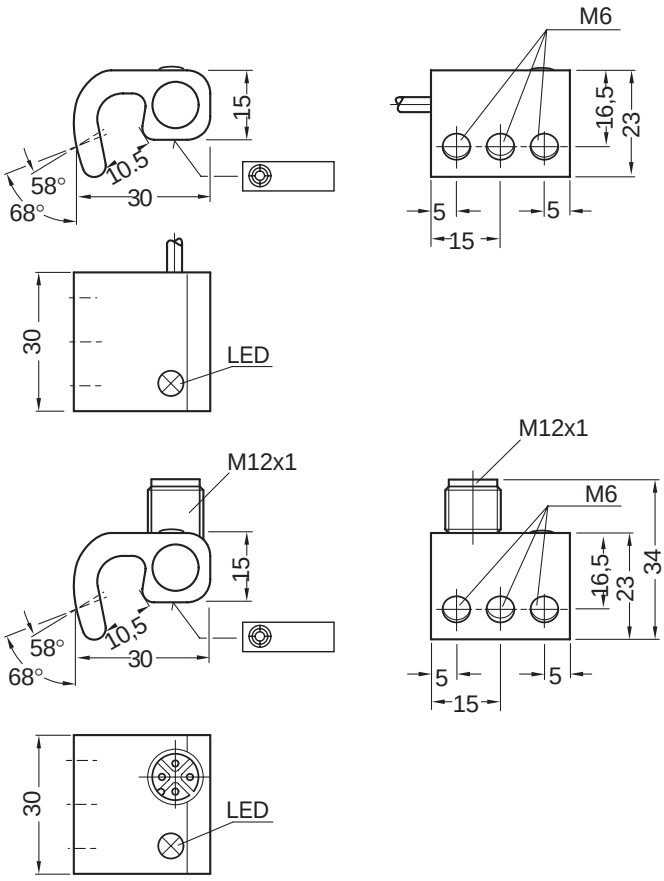
For cylinder range with piston diameter	Clamping range d in mm	Type	Order-No.
8 ... 16 mm	18 - 29	BEF-S-R2-16	7901762
20/25 mm	28 - 39	BEF-S-R2-25	7901763
32 mm	38 - 49	BEF-S-R2-30	7901764
40 mm	48 - 59	BEF-S-R2-40	7901765
50 mm	58 - 69	BEF-S-R2-50	7901766
63 mm	68 - 79	BEF-S-R2-63	7901767
80 mm	88 - 99	BEF-S-R2-80	7901768
100 mm	98 - 109	BEF-S-R2-100	7901769

Magnetic cylinder sensors

MZ Z1 series

DC 3-wire, for tie-rod cylinders

Dimensions in mm



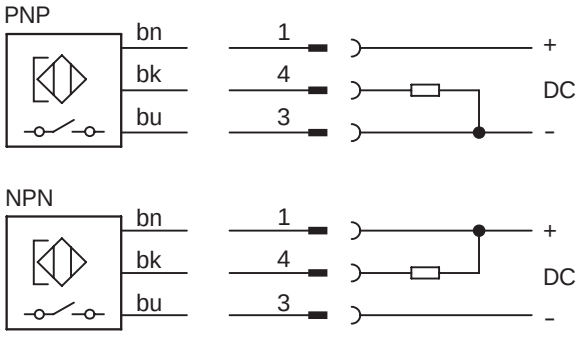
Features

- Non-contact determination of piston position in pneumatic cylinders
- Tie-rod mounting for max. rod diameter of 10 mm
- High response sensitivity ≥ 3 mT
- Frontal sensing face
- No secondary switching ranges
- High repeat accuracy
- Actuating speed ≤ 5 m/s
- PNP or NPN output
- Short-circuit protection (pulsed)
- Solid aluminium housing with integrated mounting claw
- Cable or connector
- Enclosure rating IP 67
- LED status indicator

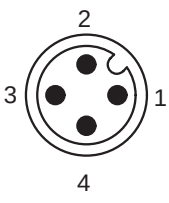
Accessories

Round connectors

Connection diagram



Wire colour		Contact	Assignment
bn	brown	1	+ V DC
bk	black	4	NO
bu	blue	3	- V DC
		2	free

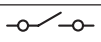


Electrical and mechanical data

Operating voltage U_b	10 ... 30 V DC
Ripple U_{pp}	≤ 10% of U_b
Voltage drop U_d (at I_a max.)	≤ 1.5 V
Power consumption (without load)	≤ 10 mA
Continuous current I_a	≤ 300 mA
Time delay before availability t_v	≤ 2 ms
Hysteresis H	≤ 1.0 mm
Repeatability R (U_b and T_a constant)	≤ 0.1 mm
EMC	of EN 60 947-5-2

Wire-break protection	yes
Short-circuit protection (pulsed)	yes
Reverse polarity protection	yes
Power-up pulse suppression	yes
Enclosure rating to EN 60529	IP 67
Shock and vibration stress	30 g, 11 ms 10 to 55 Hz, 1 mm
Ambient temperature T_a	- 25 ... + 75 °C
Housing material	Aluminium, plastic
Connection cable	PUR-PVC, 3 x 0.25 mm^2

Selection table

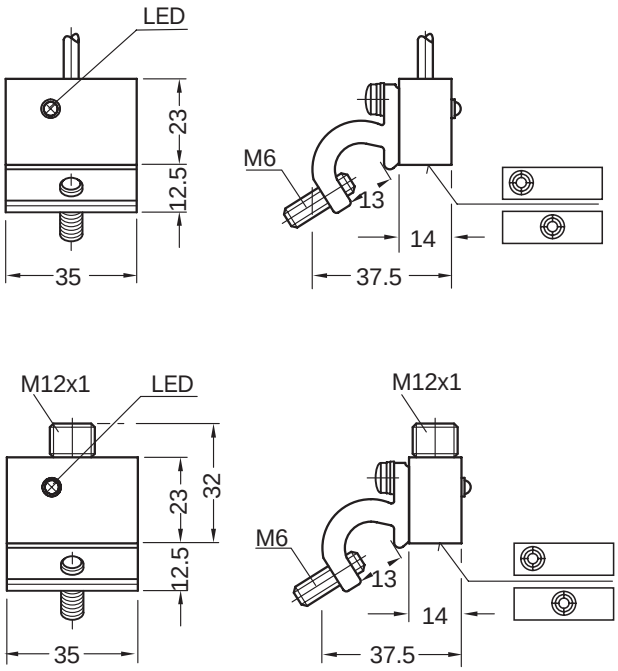
Response sensitivity in mT	Sensing face	Switching output	Output function	Switching frequency f in Hz	Connection	Type	Order number
3		PNP		5000	Cable 2 m	MZZ1-03VPS-AU0	7900606
3		PNP		5000	Connector M12 x 1 mm	MZZ1-03VPS-AC0	7900608
3		NPN		5000	Connector M12 x 1 mm	MZZ1-03VNS-AC0	7900609

Magnetic cylinder sensors

MZ Z2 series

DC 3-wire, for tie-rod cylinders

Dimensions in mm



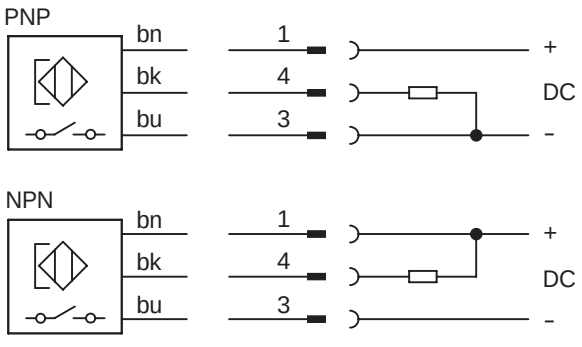
Features

- Non-contact determination of piston position in pneumatic cylinders
- Mounting on tie-rods with max. rod diameter of 12.5 mm
- High response sensitivity ≥ 3 mT
- Frontal or central sensing face
- No secondary switching ranges
- High repeat accuracy
- Actuating speed ≤ 5 m/s
- PNP or NPN output
- Short-circuit protection (pulsed)
- Solid aluminium construction with integrated mounting and plastic housing
- Cable or connector
- Enclosure rating IP 67
- LED status indicator

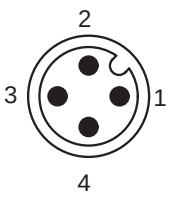
Accessories

Round connectors

Connection diagram



Wire colour		Contact	Assignment
bn	brown	1	+ V DC
bk	black	4	NO
bu	blue	3	- V DC
		2	free

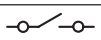
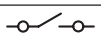
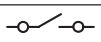
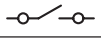


Electrical and mechanical data

Operating voltage U_b	10 ... 30 V DC
Ripple U_{pp}	≤ 10% of U_b
Voltage drop U_d (at I_a max.)	≤ 1.5 V
Power consumption (without load)	≤ 10 mA
Continuous current I_a	≤ 300 mA
Time delay before availability t_v	≤ 2 ms
Hysteresis H	≤ 1.0 mm
Repeatability R (U_b and T_a constant)	≤ 0.1 mm
EMC	to EN 60 947-5-2

Wire-break protection	yes
Short-circuit protection (pulsed)	yes
Reverse polarity protection	yes
Power-up pulse suppression	yes
Enclosure rating to EN 60529	IP 67
Shock and vibration stress	30 g, 11 ms 10 to 55 Hz, 1 mm
Ambient temperature T_a	- 25 ... + 75 °C
Housing material	Aluminium, plastic
Connection cable	PUR-PVC, 3 x 0.25 mm^2

Selection table

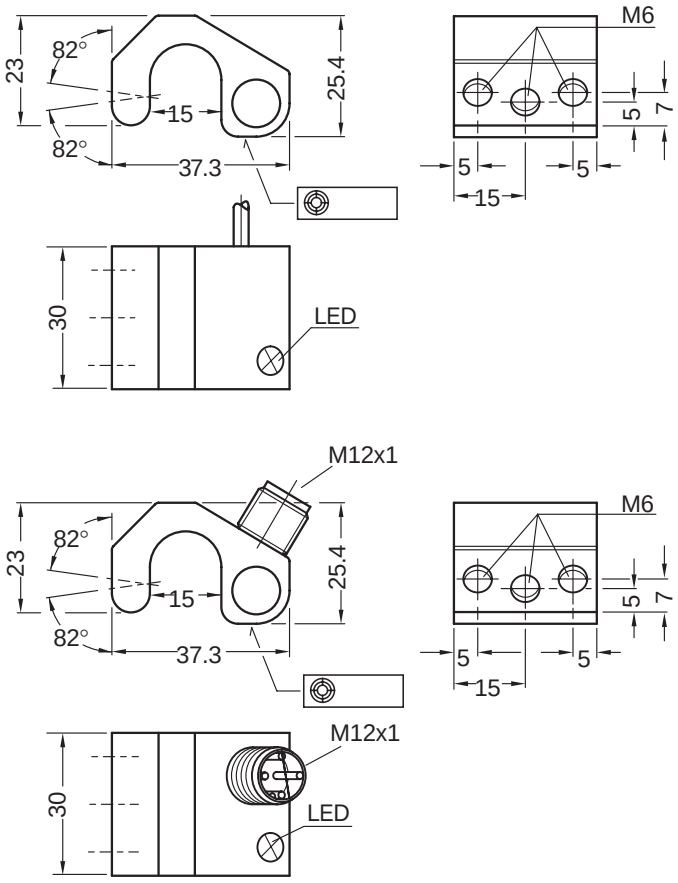
Response sensitivity in mT	Sensing face	Switching output	Output function	Switching frequency f in Hz	Connection	Type	Order number
3		PNP		5000	Cable 2 m	MZZ2-03ZPS-KU0	7900618
3		NPN		5000	Cable 2 m	MZZ2-03ZNS-KU0	7900619
3		PNP		5000	Connector M12 x 1 mm	MZZ2-03ZPS-KC0	7900620
3		PNP		5000	Cable 2 m	MZZ2-03VPS-KU0	7900622
3		PNP		5000	Connector M12 x 1 mm	MZZ2-03VPS-KC0	7900624

Magnetic cylinder sensors

MZ P3 series

DC 3-wire, for integrated profile cylinders

Dimensions in mm



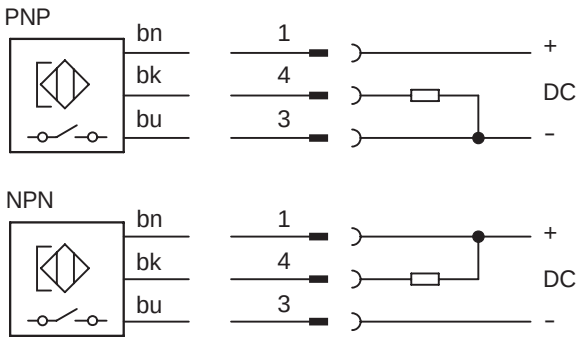
Features

- Non-contact determination of piston position in pneumatic cylinders
- Mounting on integrated profile with max. width of 14 mm
- High response sensitivity ≥ 3 mT
- Frontal sensing face
- No secondary switching ranges
- High repeat accuracy
- Actuating speed ≤ 5 m/s
- PNP output
- Short-circuit protection (pulsed)
- Solid aluminium housing with integrated mounting claw
- Cable or connector
- Enclosure rating IP 67
- LED status indicator

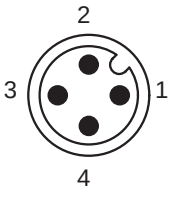
Accessories

Round connectors

Connection diagram



Wire colour		Contact	Assignment
bn	brown	1	+ V DC
bk	black	4	NO
bu	blue	3	- V DC
		2	free

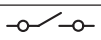


Electrical and mechanical data

Operating voltage U_b	10 ... 30 V DC
Ripple U_{pp}	≤ 10% of U_b
Voltage drop U_d (at I_a max.)	≤ 1.5 V
Power consumption (without load)	10 mA
Continuous current I_a	≤ 300 mA
Time delay before availability t_v	≤ 2 ms
Hysteresis H	≤ 1.0 mm
Repeatability R (U_b and T_a constant)	≤ 0.1 mm
EMC	to EN 60 947-5-2

Wire-break protection	yes
Short-circuit protection (pulsed)	yes
Reverse polarity protection	yes
Power-up pulse suppression	yes
Enclosure rating to EN 60529	IP 67
Shock and vibration stress	30 g, 11 ms 10 to 55 Hz, 1 mm
Ambient temperature T_a	- 25 ... + 75 °C
Housing material	Aluminium, plastic
Connection cable	PUR-PVC, 3 x 0.25 mm^2

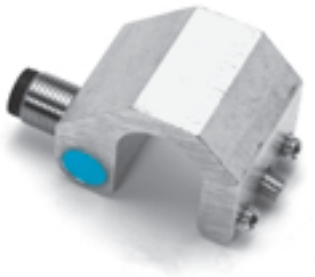
Selection table

Response sensitivity in mT	Sensing face	Switching output	Output function	Switching frequency f in Hz	Connection	Type	Order number
3		PNP		5000	Cable 2 m	MZP3-03VPS-AU0	7900610
3		PNP		5000	Connector M12 x 1 mm	MZP3-03VPS-AC0	7900612

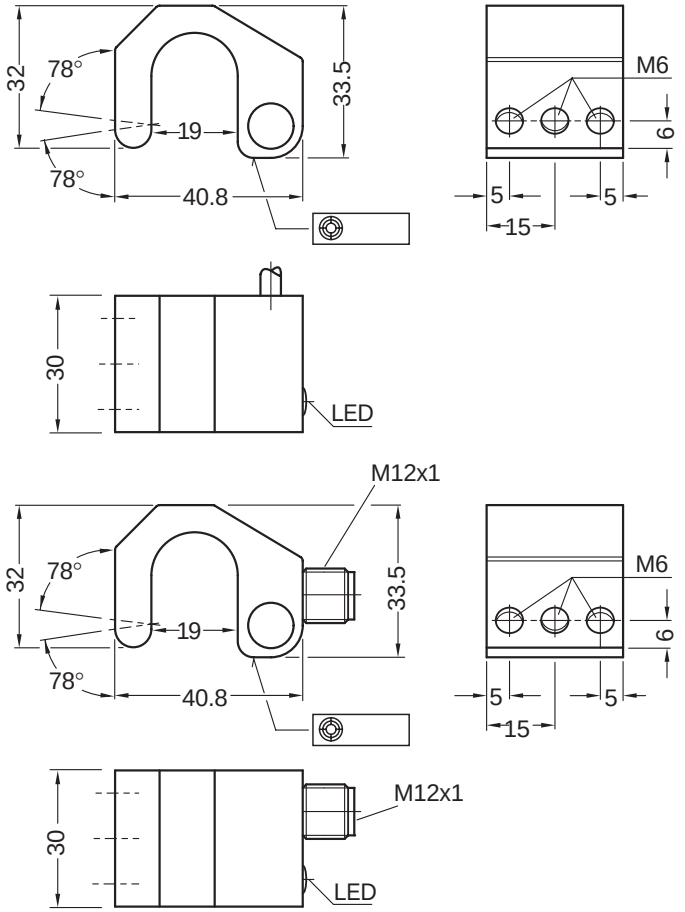
Magnetic cylinder sensors

MZ P4 series

DC 3-wire, for integrated profile cylinders



Dimensions in mm



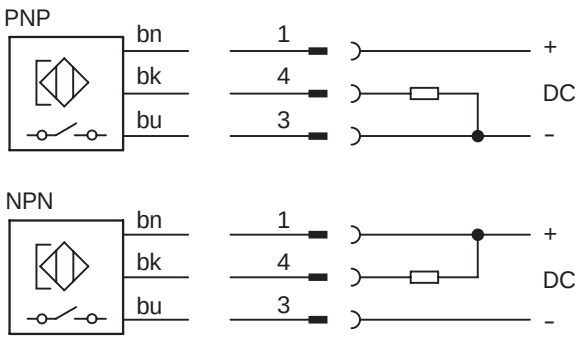
Features

- Non-contact determination of piston position in pneumatic cylinders
- Mounting on integrated profile with max. width of 18 mm
- High response sensitivity ≥ 3 mT
- Frontal sensing face
- No secondary switching ranges
- High repeat accuracy
- Actuating speed ≤ 5 m/s
- PNP output
- Short-circuit protection (pulsed)
- Solid aluminium housing with integrated mounting claw
- Cable or connector
- Enclosure rating IP 67
- LED status indicator

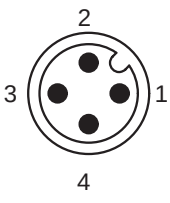
Accessories

Round connectors

Connection diagram



Wire colour		Contact	Assignment
bn	brown	1	+ V DC
bk	black	4	NO
bu	blue	3	- V DC
		2	free



Electrical and mechanical data

Operating voltage U_b	10 ... 30 V DC
Ripple U_{pp}	≤ 10% of U_b
Voltage drop U_d (at I_a max.)	≤ 1.5 V
Power consumption (without load)	≤ 10 mA
Continuous current I_a	≤ 300 mA
Time delay before availability t_v	≤ 2 ms
Hysteresis H	≤ 1.0 mm
Repeatability R (U_b and T_a constant)	≤ 0.1 mm
EMC	to EN 60 947-5-2

Wire-break protection	yes
Short-circuit protection (pulsed)	yes
Reverse polarity protection	yes
Power-up pulse suppression	yes
Enclosure rating to EN 60529	IP 67
Shock and vibration stress	30 g, 11 ms 10 to 55 Hz, 1 mm
Ambient temperature T_a	- 25 ... + 75 °C
Housing material	Aluminium, plastic
Connection cable	PUR-PVC, 3 x 0.25 mm^2

Selection table

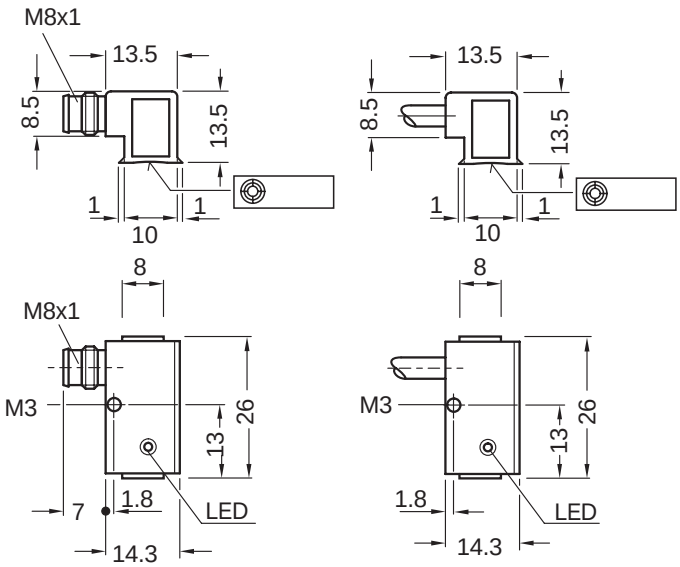
Response sensitivity in mT	Sensing face	Switching output	Output function	Switching frequency f in Hz	Connection	Type	Order number
3		PNP		5000	Cable 2 m	MZP4-03VPS-AU0	7900614
3		PNP		5000	Connector M12 x 1 mm	MZP4-03VPS-AC0	7900616

Magnetic cylinder sensors

MZ K1 series

DC 3-wire, for short-stroke cylinders

Dimensions in mm



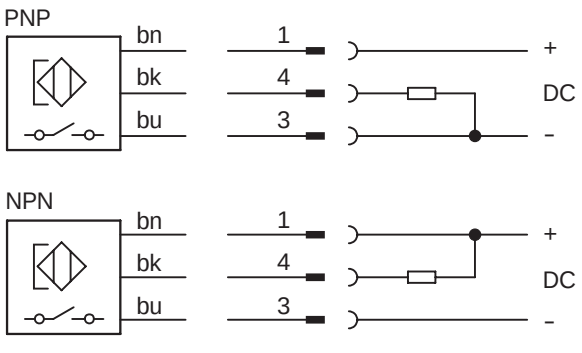
Features

- Non-contact determination of piston position in pneumatic cylinders
- Simple mounting on short-stroke cylinders
- High response sensitivity ≥ 2 mT
- Frontal sensing face
- No secondary switching ranges
- High repeat accuracy
- Actuating speed ≤ 5 m/s
- PNP output
- Short-circuit protection (pulsed)
- Solid aluminium housing with special profile and clamping screw
- Cable or connector
- Enclosure rating IP 67
- LED status indicator

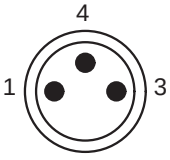
Accessories

Round connectors

Connection diagram



Wire colour		Contact	Assignment
bn	brown	1	+ V DC
bk	black	4	NO
bu	blue	3	- V DC

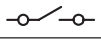


Electrical and mechanical data

Operating voltage U_b	10 ... 30 V DC
Ripple U_{pp}	≤ 10% of U_b
Voltage drop U_d (at I_a max.)	≤ 1.5 V
Power consumption (without load)	≤ 10 mA
Continuous current I_a	≤ 300 mA
Time delay before availability t_v	≤ 2 ms
Hysteresis H	≤ 1.0 mm
Repeatability R (U_b and T_a constant)	≤ 0.1 mm
EMC	to EN 60 947-5-2

Wire-break protection	yes
Short-circuit protection (pulsed)	yes
Reverse polarity protection	yes
Power-up pulse suppression	yes
Enclosure rating to EN 60529	IP 67
Shock and vibration stress	30 g, 11 ms 10 to 55 Hz, 1 mm
Ambient temperature T_a	- 25 ... + 75 °C
Housing material	Aluminium, plastic
Connection cable	PUR-PVC, 3 x 0.25 mm^2

Selection table

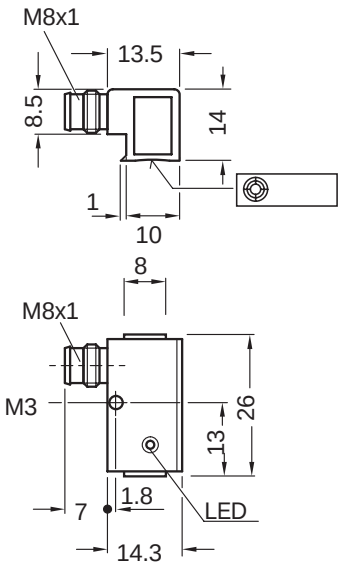
Response sensitivity in mT	Sensing face	Switching output	Output function	Switching frequency f in Hz	Connection	Type	Order number
2		PNP		5000	Cable 2 m	MZK1-02VPS-AU0	7900602
2		PNP		5000	Connector M8 x 1 mm	MZK1-02VPS-AT0	7900604

Magnetic cylinder sensors

MZ K3 series

DC 3-wire, for short-stroke cylinders

Dimensions in mm



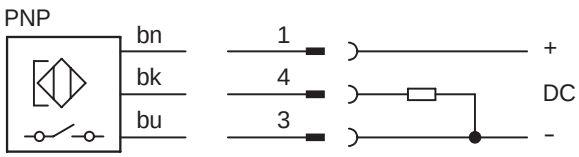
Features

- Non-contact determination of piston position in pneumatic cylinders
- **Mountable from the top**
- Simple mounting on short-stroke cylinders
- High response sensitivity ≥ 2 mT
- Frontal sensing face
- No secondary switching ranges
- High repeat accuracy
- Actuating speed ≤ 5 m/s
- PNP or NPN output
- Short-circuit protection (pulsed)
- Solid aluminium housing with special profile and clamping screw
- Cable
- Enclosure rating IP 67
- LED status indicator

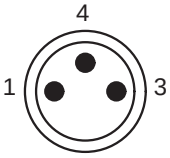
Accessories

Round connectors

Connection diagram



Wire colour		Contact	Assignment
bn	brown	1	+ V DC
bk	black	4	NO
bu	blue	3	- V DC



Electrical and mechanical data

Operating voltage U_b	10 ... 30 V DC	**Wire-break protection**	yes
Ripple U_{pp}	≤ 10% of U_b	**Short-circuit protection (pulsed)**	yes
Voltage drop U_d (at I_a max.)	≤ 1.5 V	**Reverse polarity protection**	yes
Power consumption (without load)	≤ 10 mA	**Power-up pulse suppression**	yes
Continuous current I_a	≤ 300 mA	**Enclosure rating** to EN 60529	IP 67
Time delay before availability t_v	≤ 2 ms	**Shock and vibration stress**	30 g, 11 ms 10 to 55 Hz, 1 mm
Hysteresis H	≤ 1.0 mm	**Ambient temperature** T_a	- 25 ... + 75 °C
Repeatability R (U_b and T_a constant)	≤ 0.1 mm	**Housing material**	Aluminium, plastic
EMC	to EN 60 947-5-2	**Connection cable**	PUR-PVC, 3 x 0.25 mm^2

Selection table

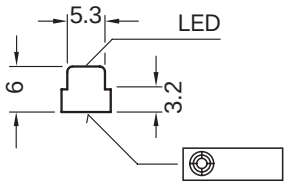
Response sensitivity in mT	Sensing face	Switching output	Output function	Switching frequency f in Hz	Connection	Type	Order number
2		PNP		5000	Connector M8 x 1 mm	MZK3-02VPS-AT0	7901952

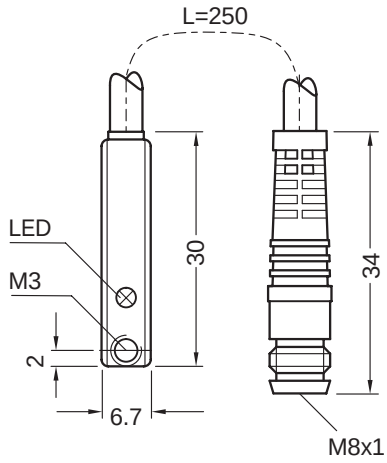
Magnetic cylinder sensors

MZ F1 series

DC 3-wire, for T-slot

Dimensions in mm





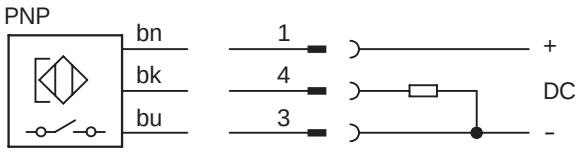
Features

- Non-contact determination of piston position in pneumatic cylinders
- For T-slot
- High response sensitivity ≥ 3 mT
- Frontal sensing face
- No secondary switching ranges
- High repeat accuracy
- Actuating speed ≤ 5 m/s
- PNP output
- Short-circuit protection (pulsed)
- Plastic housing with T-profile and clamping screw
- Connection cable or connector on cable
- Enclosure rating IP 67
- LED status indicator
- Magneto-resistive element

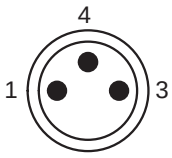
Accessories

Round connectors

Connection diagram



Wire colour		Contact	Assignment
bn	brown	1	+ V DC
bk	black	4	NO
bu	blue	3	- V DC



Electrical and mechanical data

Operating voltage U_b	10 ... 30 V DC
Ripple U_{pp}	≤ 10% of U_b
Voltage drop U_d (at I_a max.)	≤ 2 V
Power consumption (without load)	≤ 10 mA
Continuous current I_a	≤ 150 mA
Time delay before availability t_v	≤ 2 ms
Hysteresis H	≤ 1.5 mm
Repeatability R (U_b and T_a constant)	≤ 0.2 mm
EMC	to EN 60 947-5-2

Wire-break protection	yes
Short-circuit protection (pulsed)	yes
Reverse polarity protection	yes
Power-up pulse suppression	yes
Enclosure rating to DIN 40050	IP 67
Shock and vibration stress	30 g, 11 ms 10 to 55 Hz, 1 mm
Ambient temperature T_a	- 25 ... + 75 °C
Housing material	Plastic
Connection cable	PUR-PVC, 3 x 0.25 mm^2
Connection cable w. M8x1 mm	PUR

Selection table

Response sensitivity in mT	Sensing face	Switching output	Output function	Switching frequency f in Hz	Connection	Type	Order number
3		PNP		5000	Cable 2 m	MZF1-03VPS-KU0	7900596
3		PNP		5000	Cable 5 m	MZF1-03VPS-KUB	7903147
3		PNP		5000	Cable with M8 x 1 mm	MZF1-03VPS-KP0	7900597

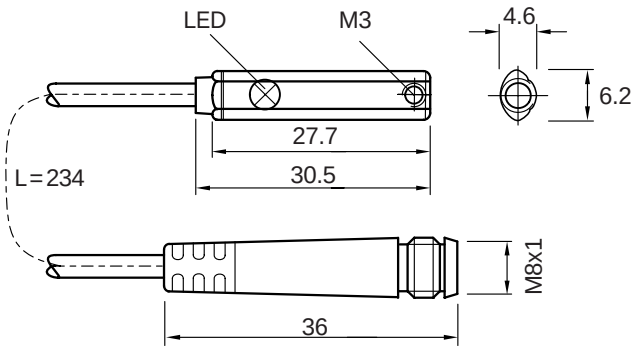
Series is available as reed switch on request.

Magnetic cylinder sensors

MZT1 series

DC 3-wire, for T-slot cylinder

Dimensions in mm



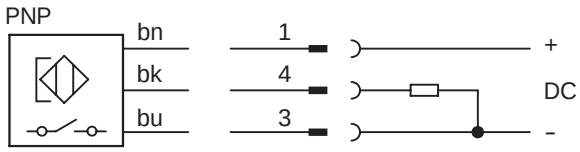
Features

- Non-contact detection of piston position in pneumatic cylinders
- **Mountable from the top**
- For all common used T-slot cylinder e.g. Festo, SMC
- Response sensivity ≥ 3 mT
- Plastic housing with clamping screw
- Connection cable or connector on cable
- Enclosure rating IP 67
- LED status indicator
- Magneto-resistive element

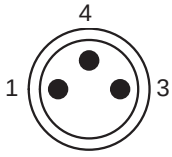
Accessories

Round connector

Connection diagram



Wire colour		Contact	Assignment
bn	brown	1	+ V DC
bk	black	4	NO
bu	blue	3	- V DC



Electrical and mechanical data

Operating voltage U_b	10 ... 30 V DC
Ripple U_{ss}	≤ 10% of U_b
Voltage drop U_d	≤ 2 V
Power consumption (without load)	≤ 10 mA
Continuous current I_a	≤ 100 mA
Time delay before availability t_v	≤ 2 ms
Hysteresis H	≤ 1,5 mm
Repeatability R (U_b and T_a constant)	≤ 0,2 mm
EMC	to EN 60 947-5-2
Wire-break protection	yes
Short-circuit protection (pulsed)	yes
Reverse polarity protection	yes
Power-up pulse suppression	yes
Enclosure rating to EN 60529	IP 67
Shock and vibration stress	30 g, 11 ms 10 to 55 Hz, 1 mm
Ambient temperature T_a	- 25 ... + 75 °C
Housing material	Plastic PA12
Connection cable 2 m	PVC, 3 x 0,14 mm^2
Connection cable with M8x1 mm	PUR

Selection table

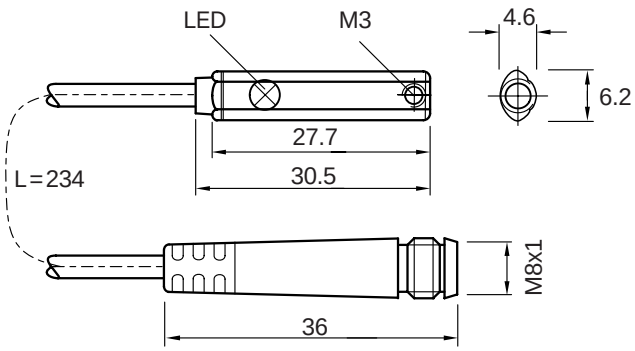
Response sensivity in mT	Sensing face	Switching-output	Output function	Switching frequency in Hz	Connection	Type	Order number
3		PNP		5000	Cable 2 m	MZT1-03VPS-KW0	1016809
3		PNP		5000	Cable w. M8 x 1 mm	MZT1-03VPS-KP0	1016910

Magnetic cylinder sensors

RZT1 series

Reed AC/DC 3-wire, for T-slot

Dimensions in mm



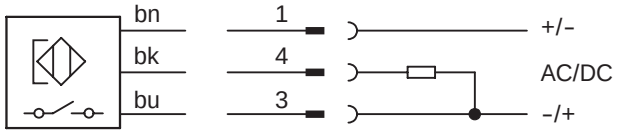
Features

- Non-contact detection of piston position in pneumatic cylinders
- **Mountable from the top**
- For all common used T-slot cylinder e.g. Festo, SMC
- Response sensivity ≥ 3 mT
- Plastic housing with clamping screw
- Connection cable or connector on cable
- Enclosure rating IP 67
- LED status indicator

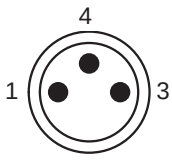
Accessories

Round connector

Connection diagramm



Wire colour		Contact	Assignment
bn	brown	1	+ (–)
bk	black	4	NO
bu	blue	3	– (+)



Electrical and mechanical data

Operating voltage U_b		10 ... 30 V AC/DC
Max. switching power		6 W / VA
Continuous current I_a		≤ 500 mA
Switching delay	ON	app. 1,5 ms
	OUT	app. 0,5 ms
Hysteresis H typ.		≤ 1,5 mm
Repeatability R (U_b und T_a constant)		≤ 0,2 mm
EMC		to EN 60 947-5-2

Enclosure rating to EN 60529	IP 67
Shock and vibration stress	30 g, 11 ms 10 to 55 Hz, 1 mm
Ambient temperature T_a	- 25 ... + 75 °C
Housing material	Plastic PA12
Connection cable 2 m	PVC, 3 x 0,14 mm^2
Connection cable with M8x1 mm connector	PUR

Selection table

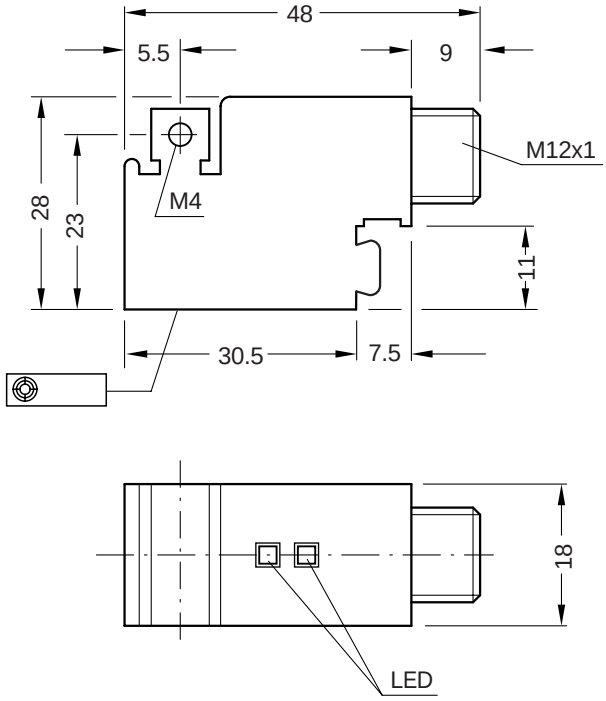
Response sensivity in mT	Sensing face	Version	Output-function	Switching frequency in Hz	Connection	Type	Order number
3		Reed		400	Cable 2 m	RZT1-03ZRS-KW0	1016911
3		Reed		400	Cable w. M8 x 1 mm	RZT1-03ZRS-KP0	1016912

Magnetic cylinder sensors

MZ U2 series

DC 3-wire, weld immune version

Dimensions in mm



Features

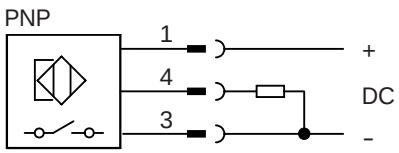
- Non-contact detection of piston position in pneumatic cylinders in weld field environments
- Weld immune in all welding applications (AC, DC and medium frequency)
- Response sensitivity of interference field detector ≥ 2 mT
- The sensors locks the output during the welding process. When the welding process stops, the sensor updates the output accordingly
- Flexible mounting technique for different cylinder styles
- Solid metal housing in die-cast zinc, optional with teflon coating
- Actuating speed < 1m/s
- 2 LED`s
  Status indicator: yellow
  Function indicator: green

Accessories

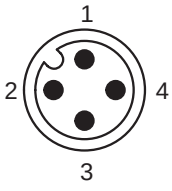
Round connector

Round connector welding splatter resistant

Connection diagram



Contact	Assignment
1	+ V DC
4	NO
3	- V DC
2	free



Electrical and mechanical data

Operating voltage U_b	10 ... 30 V DC	**Wire-break protection**	yes
Ripple U_{pp}	≤ 10% of U_b	**Short-circuit protection (pulsed)**	yes
Voltage drop U_d (at I_a max.)	≤ 2.0 V	**Reverse polarity protection**	yes
Power consumption	≤ 18 mA (unattenuated) ≤ 32 mA (attenuated)	**Power-up pulse suppression**	yes
		Enclosure rating to DIN 60529	IP 67
Continuous current I_a	≤ 300 mA	**Shock and vibration stress**	30 g, 11 ms 10 to 55 Hz, 1 mm
Time delay before availability t_v	≤ 20 ms	**Ambient temperature** T_a	- 25 ... + 75 °C
Hysteresis H	≤ 1.5 mm	**Housing material**	Die-cast zinc, optional with teflon coating
Repeatability R (U_b and T_a constant)	≤ 0.1 mm		
EMC	to EN 60 947-5-2		

Selection table

Response sensitivity in mT	Sensing face	Switching output	Output function	Switching frequency f in Hz	Connection	Type	Order number
3		PNP		40	Connector M12x1 mm	MZU2-03VPS-DCM	1017450
3		PNP		40	Connector M12x1 mm	MZU2-03VPS-TCM*	1017451

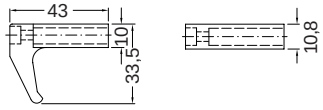
* with teflon coating

Accessories

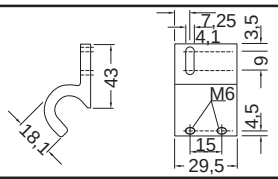
Mounting clamp for pneumatic cylinder sensor MZU2

Mounting clamp: BEF-KS-U2-S1
Material: die-cast zinc
Order-No.: 4030922

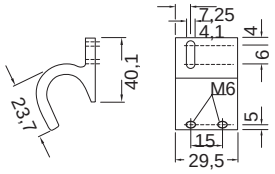
Mounting clamp: BEF-KS-U2-S1T
Material: die-cast zinc with teflon coating
Order-No.: 4031632
Tie-rod cylinder Ø 4 .. 20 mm



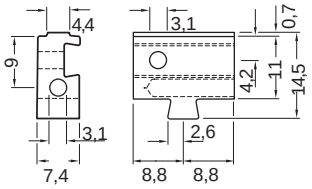
Mounting clamp: BEF-KS-U2-P1
Material: aluminium
Order-No.: 2019824
Integrated profile cylinder with max. rod diameter of 13 mm



Mounting clamp: BEF-KS-U2-P2
Material: aluminium
Order-No.: 2019823
Integrated profile cylinder with max. rod diameter of 18 mm

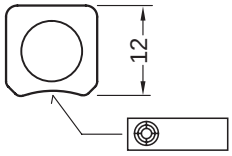


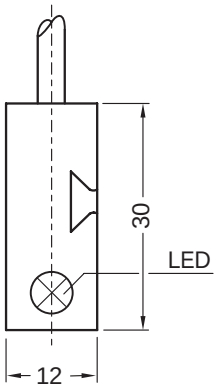
Mounting clamp: BEF-KS-U2-T1
Material: Aluminium
Order-No.: 2019822
Cylinder with T-slot



Magnetic cylinder sensors
MZ R2 series
NAMUR 2-wire, for round-body cylinders

Dimensions in mm





Features

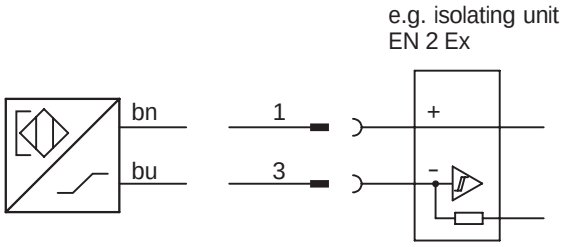
- Non-contact determination of piston position in pneumatic cylinders
- Universal mounting with clamping band for max. cylinder diameter of 100 mm
- High response sensitivity ≥ 3 mT
- Frontal sensing face
- No secondary switching ranges
- High repeat accuracy
- Actuating speed ≤ 5 m/s
- NAMUR to EN 50 227
- Short-circuit protection
- Solid aluminium housing
- Cable or connector
- Enclosure rating IP 67
- LED status indicator
- **Classification**
  TÜV 99 ATEX 1398
  Ex **EExibII CT6**

Accessories

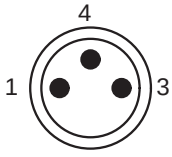
Round connectors

Isolating unit EN 2 Ex

Connection diagram



Wire colour		Contact	Assignment
bn	brown	1	+ V DC
bu	blue	3	- V DC
		4	free



Electrical and mechanical data

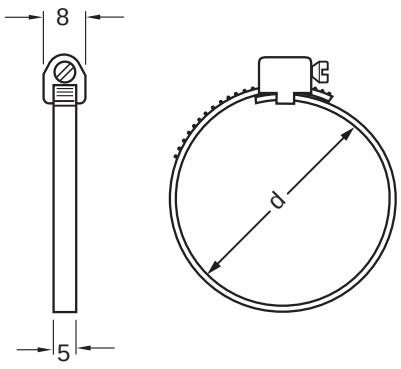
Operating voltage U_b	5 ... 25 V DC
Rated voltage U_n	8.2 V DC
Ripple U_{pp}	≤ 5% of U_b
Power consumption, attenuated	≥ 2.5 mA
Power consumption, unattenuated	≤ 1.0 mA
Internal capacitance	≤ 45nF
Internal inductance	≤ 30 µH
Cable resistance	≤ 50 Ω
Time delay before availability t_v	≤ 2 ms
Hysteresis H	≤ 1.0 mm
Repeatability R (U_b and T_a constant)	≤ 0.1 mm
Temperature drift	± 0.005 mm / °C
EMC	to EN 60 947-5-2

Short-circuit protection	yes
Reverse polarity protection	yes
Enclosure rating to EN 60529	IP 67
Shock and vibration stress	30 g, 11 ms 10 to 55 Hz, 1 mm
Ambient temperature T_a	- 25 ... + 70 °C
Housing material	Aluminium, plastic
Connection cable	PVC, 2 x 0.34 mm², blue

Selection table

Response sensitivity in mT	Sensing face	Version	Output function	Switching frequency f in Hz	Connection	Type	Order number
3		NAMUR		5000	Cable 2 m	MZR2-03V-N-AW0	7901321

Accessories



Clamping band
stainless steel
for magnetic cylinder sensor R2

For cylinder range with piston diameter	Clamping range d in mm	Type	Order-No.
8 ... 16 mm	18 - 29	BEF-S-R2-16	7901762
20/25 mm	28 - 39	BEF-S-R2-25	7901763
32 mm	38 - 49	BEF-S-R2-30	7901764
40 mm	48 - 59	BEF-S-R2-40	7901765
50 mm	58 - 69	BEF-S-R2-50	7901766
63 mm	68 - 79	BEF-S-R2-63	7901767
80 mm	88 - 99	BEF-S-R2-80	7901768
100 mm	98 - 109	BEF-S-R2-100	7901769

Magnetic cylinder sensors

MZ Z1 series

NAMUR 2-wire, for tie-rod cylinders

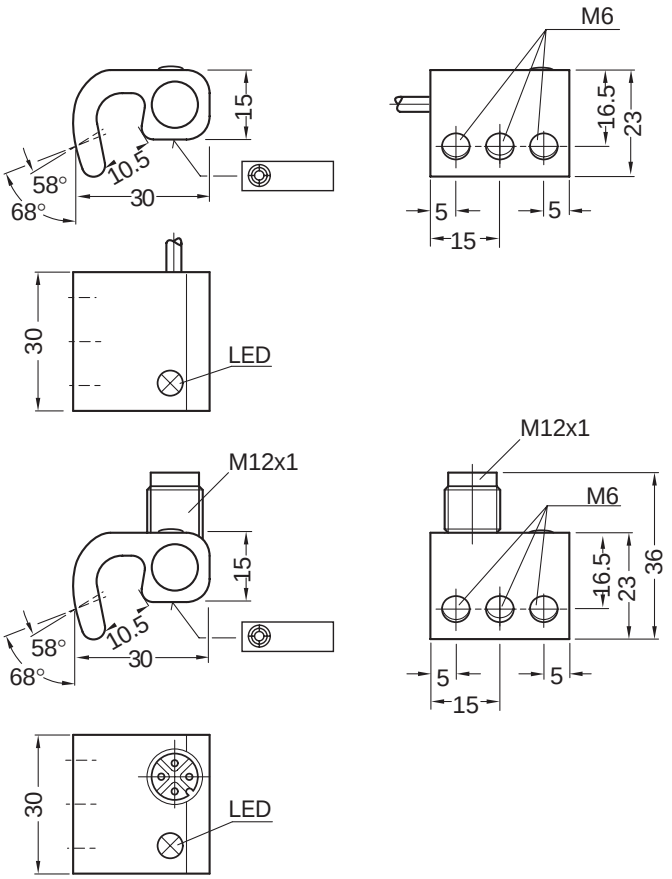
Features

- Non-contact determination of piston position in pneumatic cylinders
- Mounting of tie-rods with max. rod diameter of 10 mm
- High response sensitivity ≥ 3 mT
- Frontal sensing face
- No secondary switching ranges
- High repeat accuracy
- Actuating speed ≤ 5 m/s
- NAMUR to EN50 227
- Solid aluminium construction with integrated mounting claw
- Cable or connector
- Enclosure rating IP 67
- LED status indicator
- **Classification**
  TÜV 99 ATEX 1398
  Ex **EExibII CT6**

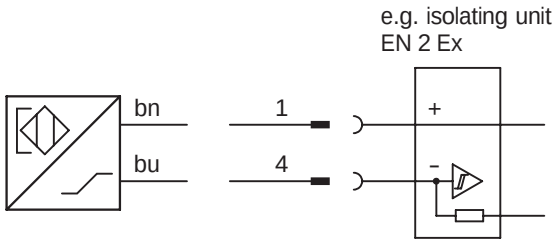
Accessories

Round connectors

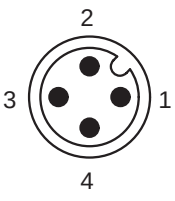
Dimensions in mm



Connection diagram



Wire colour		Contact	Assignment
bn	brown	1	+ V DC
bu	blue	4	- V DC
		2	free
		3	free



Electrical and mechanical data

Operating voltage U_b	5 ... 25 V DC
Rated voltage U_n	8.2 V DC
Ripple U_{pp}	≤ 5% of U_b
Power consumption, attenuated	≥ 2.5 mA
Power consumption, unattenuated	≤ 1.0 mA
Internal capacitance	≤ 45nF
Internal inductance	≤ 30 µH
Cable resistance	≤ 50 Ω
Time delay before availability t_v	≤ 2 ms
Hysteresis H	≤ 1.0 mm
Repeatability R (U_b and T_a constant)	≤ 0.1 mm
Temperature drift	± 0.005 mm / °C
EMC	to EN 60 947-5-2

Short-circuit protected	yes
Reverse polarity protected	yes
Enclosure rating to EN 60529	IP 67
Shock and vibration stress	30 g, 11 ms 10 to 55 Hz, 1 mm
Ambient temperature T_a	- 25 ... + 70 °C
Housing material	Aluminium, plastic
Connection cable	PVC, 2 x 0.34 mm^2, blue

Selection table

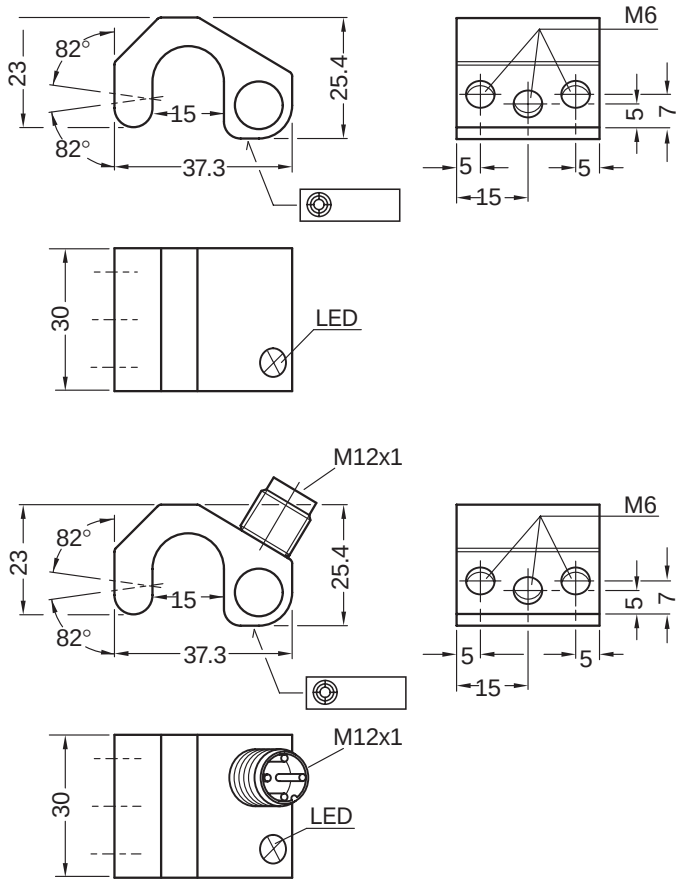
Response sensitivity in mT	Sensing face	Version	Output function	Switching frequency f in Hz	Connection	Type	Order number
3		NAMUR		5000	Cable 2 m	MZZ1-03V-N-AW0	7901323
3		NAMUR		5000	Connector M12 x 1 mm	MZZ1-03V-N-AC0	7901324

Magnetic cylinder sensors

MZ P3 series

NAMUR 2-wire, for integrated profile cylinders

Dimensions in mm



Features

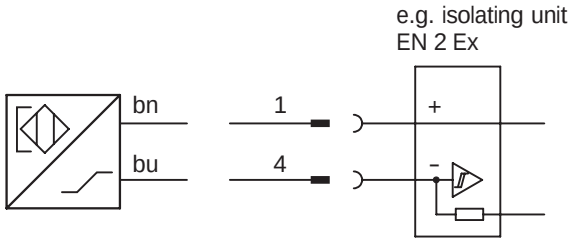
- Non-contact determination of piston position in pneumatic cylinders
- Mounting on integrated profile with max. width of 14 mm
- High response sensitivity ≥ 3 mT
- Frontal sensing face
- No secondary switching ranges
- High repeat accuracy
- Actuating speed ≤ 5 m/s
- NAMUR to EN 50 227
- Solid aluminium housing with integrated mounting claw
- Cable or connector
- Enclosure rating IP 67
- LED status indicator
- **Classification**
  TÜV 99 ATEX 1398
  Ex **EExibII CT6**

Accessories

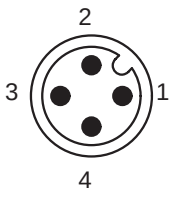
Round connectors

Isolating unit EN 2 Ex

Connection diagram



Wire colour		Contact	Assignment
bn	brown	1	+ V DC
bu	blue	4	- V DC
		2	free
		3	free



Electrical and mechanical data

Operating voltage U_b	5 ... 25 V DC
Rated voltage U_n	8.2 V DC
Ripple U_{pp}	≤ 5% of U_b
Power consumption, attenuated	≥ 2.5 mA
Power consumption, unattenuated	≤ 1.0 mA
Internal capacitance	≤ 45nF
Internal inductance	≤ 30 µH
Cable resistance	≤ 50 Ω
Time delay before availability t_v	≤ 2 ms
Hysteresis H	≤ 1.0 mm
Repeatability R (U_b and T_a constant)	≤ 0.1 mm
Temperature drift	± 0.005 mm / °C
EMC	to EN 60 947-5-2

Short-circuit protected	yes
Reverse polarity protected	yes
Enclosure rating to EN 60529	IP 67
Shock and vibration stress	30 g, 11 ms 10 to 55 Hz, 1 mm
Ambient temperature T_a	- 25 ... + 70 °C
Housing material	Aluminium, plastic
Connection cable	PVC, 2 x 0.34 mm^2, blue

Selection table

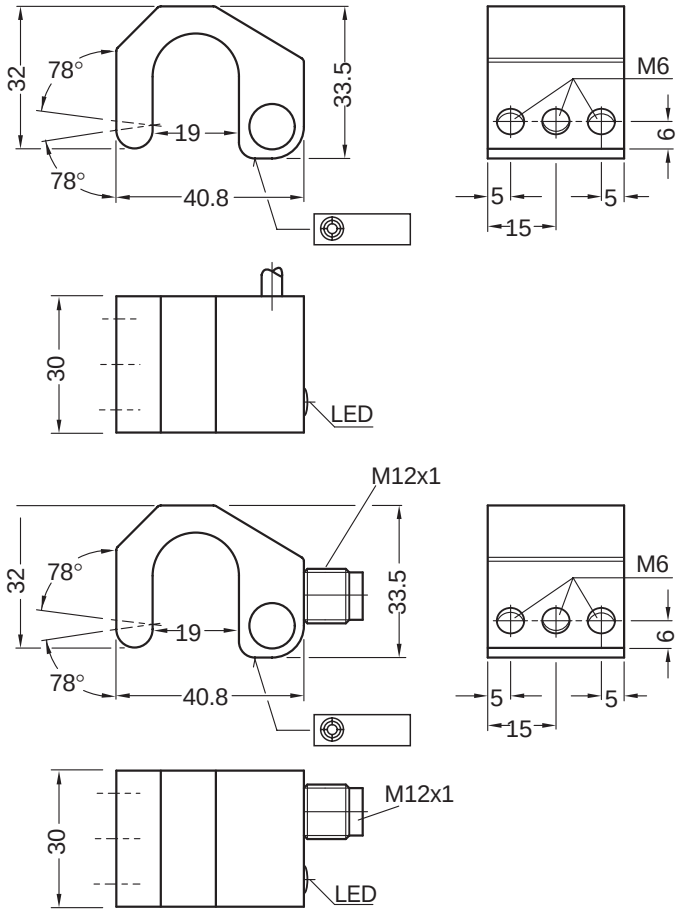
Response sensitivity in mT	Sensing face	Version	Output function	Switching frequency f in Hz	Connection	Type	Order number
3		NAMUR		5000	Cable 2 m	MZP3-03V-N-AW0	7901440
3		NAMUR		5000	Connector M12 x 1 mm	MZP3-03V-N-AC0	7901441

Magnetic cylinder sensors

MZ P4 series

NAMUR 2-wire, for integrated profile cylinders

Dimensions in mm



Features

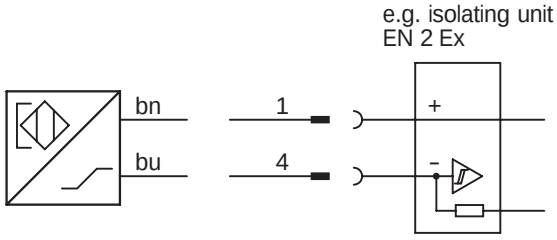
- Non-contact determination of piston condition in pneumatic cylinders
- Mounting on integrated profile with max. width of 18 mm
- High response sensitivity ≥ 3 mT
- Frontal sensing face
- No secondary switching ranges
- High repeat accuracy
- Actuating speed ≤ 5 m/s
- NAMUR to DIN19234
- Solid aluminium housing with integrated mounting claw
- Cable or connector
- Enclosure rating IP 67
- LED status indicator
- **Classification**
  TÜV 99 ATEX 1398
  Ex **EExibII CT6**

Accessories

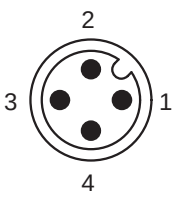
Round connectors

Isolating unit EN 2 Ex

Connection diagram



Wire colour		Contact	Assignment
bn	brown	1	+ V DC
bu	blue	4	- V DC
		2	free
		3	free



Electrical and mechanical data

Operating voltage U_b	5 ... 25 V DC
Rated voltage U_n	8.2 V DC
Ripple U_{pp}	≤ 5% of U_b
Power consumption, attenuated	≥ 2.5 mA
Power consumption, unattenuated	≤ 1.0 mA
Internal capacitance	≤ 45nF
Internal inductance	≤ 30 µH
Cable resistance	≤ 50 Ω
Time delay before availability t_v	≤ 2 ms
Hysteresis H	≤ 1.0 mm
Repeatability R (U_b and T_a constant)	≤ 0.1 mm
Temperature drift	± 0.005 mm / °C
EMC	to EN 60 947-5-2

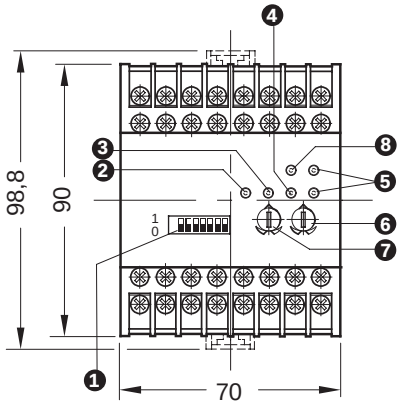
Short-circuit protected	yes
Reverse polarity protected	yes
Enclosure rating to EN 60529	IP 67
Shock and vibration stress	30 g, 11 ms 10 to 55 Hz, 1 mm
Ambient temperature T_a	- 25 ... + 70 °C
Housing material	Aluminium, plastic
Connection cable	PVC, 2 x 0.34 mm², blue

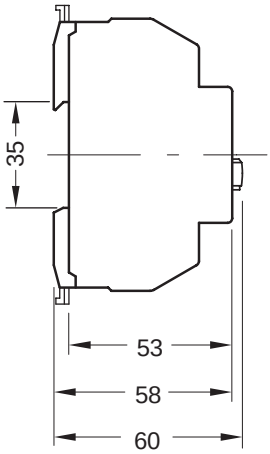
Selection table

Response sensitivity in mT	Sensing face	Version	Output function	Switching frequency f in Hz	Connection	Type	Order number
3		NAMUR		5000	Cable 2 m	MZP4-03V-N-AW0	7901329
3		NAMUR		5000	Connector M12 x 1 mm	MZP4-03V-N-AC0	7901330

Accessories Control unit EN 2

Dimensions in mm

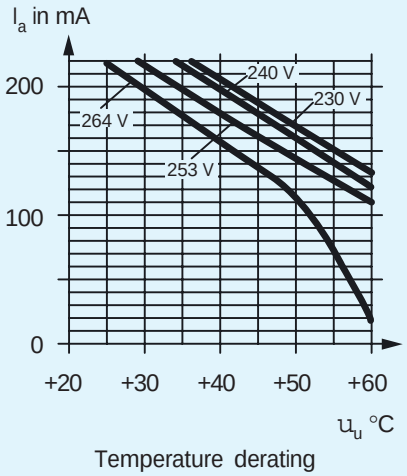




Features

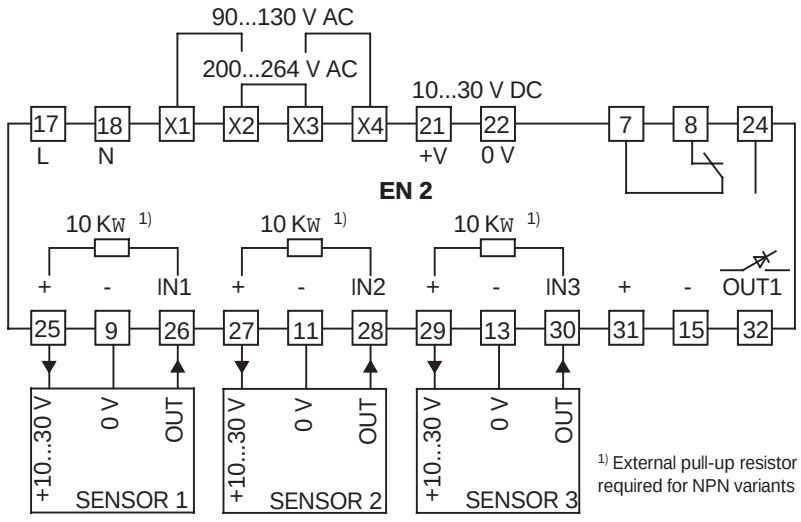
- Universal supply voltage
- 3 inputs
- VDE protection class II
- Power-on indication
- Status indicator
- Housing with snap-on mounting for support rail DIN 46277
- Adjustable response delay
- Adjustable release delay

❶ DIP switches F 1...8
❷ Indicator IN 1
❸ Indicator IN 2
❹ Indicator IN 3
❺ Indicator OUT
❻ Release delay
❼ Response delay
❽ Power indicator



Temperature derating

Connection diagram



1) External pull-up resistor required for NPN variants

Technical data

Operating voltage U_b	90...130 V AC or 200...264 V AC; 10...30 V DC [2]
System frequency	48...62 Hz
Power consumption	approx. 40 VA
Outputs	
Rated supply voltage	24 V DC ± 25%
Output current (total) I_a	220 mA, see temperature derating curve
Transistor output	Terminal 32 (OUT 1)
Type	PNP
Switching current	≤ 100 mA, short-circuit protected, LED flashes if short-circuit occurs
Switching frequency	10 kHz
Relay output	Terminals 7, 8, 24
Switching voltage	≤ 250 V AC
Switching current	≤ 2 A
Switching frequency	10 Hz
Inputs	Terminals 26 (IN 1) and 28 (IN 2) and 30 (IN 3), suitable for PNP, NPN[1] and B sensor outputs
Input voltage	10...30 V DC
HIGH	>10 V DC
LOW	< 6 V DC
Min. power-up time	> 5 µs
Time delays, logics	See Truth table/Functional diagrams/t_1, t_2: adjustable from 0.005 to 1 s
VDE protection class	⧈
Enclosure rating to DIN 40050	IP 20
Ambient temperature T_a	-25...+55 °C
Storage temperature	-40...+70 °C
Shock, vibration	IEC 68, Part 2...6
EMC	IEC 801
Weight	approx. 400 g

1) External pull-up resistor 10kΩ required for NPN variant

2) When supplied: AC 200...264 V, can be upgraded using jumpers

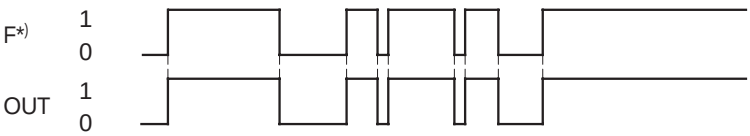
Order No.	6009654

Overview of functions

F3	0	IN 1 normal		
	1	IN 1 inverse		
F5	0	f (IN 1, IN 2) = IN 1 ÷ IN 2		
	1	f (IN 1, IN 2) = IN 1 x IN 2		
F7	0	IN 2 normal		
	1	IN 2 inverse		
F8	0	▼(F 8 = 0)		
	1		▼(F 8 = 1)	
F6	0	f (IN 1, IN 2, IN 3) = IN 3 ÷ f (IN 1, IN 2)	IN 3 normal	
	1	f (IN 1, IN 2, IN 3) = IN 3 x f (IN 1, IN 2)	IN 3 inverse	
F4	0	OUT normal	▼(F 4 = 0)	
	1	OUT inverse		▼(F 4 = 1)
F1 F2	0/1	No delay	Mo 1	Mo `1
	0/1	Response and release delay	Mo 2	Mo `2
	0/1	Dynamically delayed	Mo 3	Mo `3
	0/1	Frequency discriminator	Mo 4	Mo `4

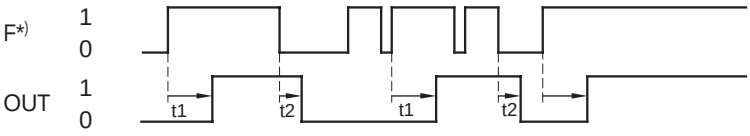
F8 = 0

F1 = 0 F2 = 0



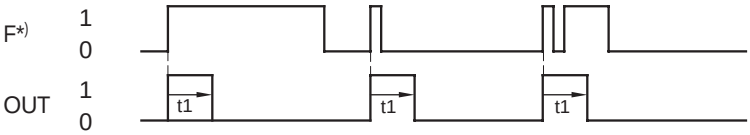
The output OUT follows F*) (the logic operation for inputs IN1, IN 2, and IN 3) without delay.

F1 = 0 F2 = 1



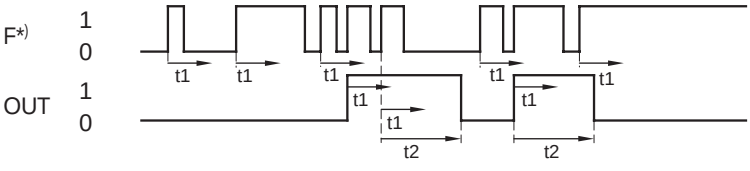
The output OUT follows F*) with a response and release delay. F*) must be high for at least t 1 so that OUT reacts. t 1 is reset by low of F*). OUT responds when t 1 has elapsed, oscillator f. t 1 is stopped. If F*) is then low again, t 2 begins to run after which OUT becomes inactive. If F*) runs high again during t 2, t 2 is reset and begins to run again when F*) = low. Both times, t1 and t2, can therefore be retriggered.

F1 = 1 F2 = 0



The output OUT has a rising edge from F*) for the duration of t 1. This time cannot be retriggered here.

F1 = 1 F2 = 1

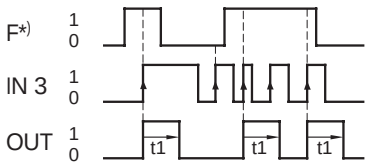


The time delay t 1 is started with the first rising edge of F*). If a further rising edge along F*) occurs within t 1, OUT is set for the duration of t 2 and time delay t 1 is simultaneously retriggered. All subsequent rising edges along F*), if they occur during t 1, retrigger both t 1 and t 2. t 2 must usually be set greater than t 1. If t 1 (but not t 2) has elapsed, t 2 is not retriggered by the next rising edge along F*).
With the setting t 2 ≥ t 1, this function provides a frequency discriminator: If the period T of the input frequency along F*) is less than t 1, OUT remains set to high; if T is or becomes greater than t 1, OUT remains or becomes low.

F*) logic operation of inputs: F = f (IN 1, IN 2, IN 3)

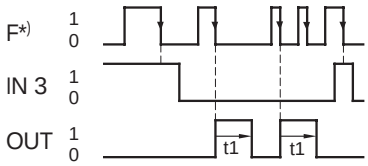
Overview of functions

F8 = 1 F 4 = 0
F 1 = 0 F 2 = 0
Mo 1



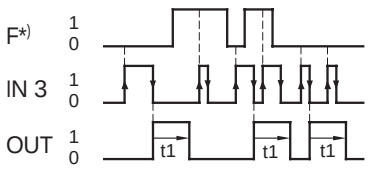
If during the rising edge of IN 3 the operation F*) is high, this edge sets the output OUT for the time t 1.

F 1 = 0 F 2 = 1
Mo 2



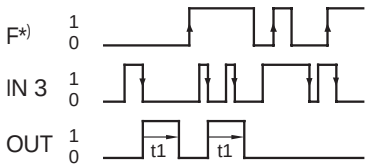
If during the falling edge of F*) IN 3 is not high, the output is set for the duration of t 1.

F 1 = 1 F 2 = 0
Mo 3



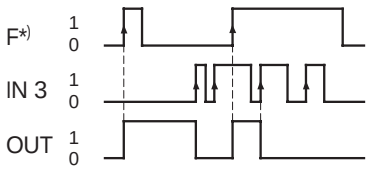
If F*) is not high with a rising edge along IN 3, the falling edge of IN 3 sets the output for the time t 1.

F 1 = 1 F 2 = 1
Mo 4



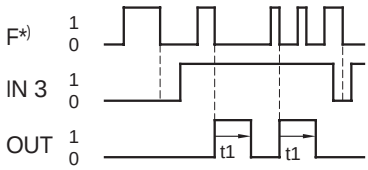
If no rising edge along F*) occurs during the high time of IN 3, at the falling edge of IN 3 the output is set for the duration of t 1.

F 4 = 1
F 1 = 0 F 2 = 0
Mo `1



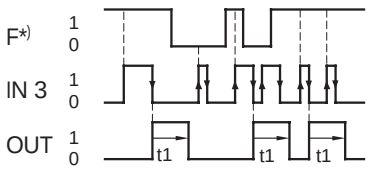
A rising edge along F*) sets the output; a rising edge along IN 3 resets it. (Edge-controlled RS-flipflop)

F 1 = 1 F 2 = 1
Mo `2



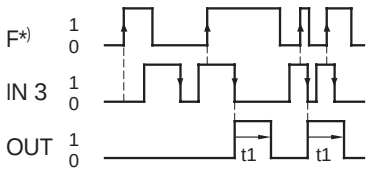
If during the falling edge of F*) IN 3 is high, the output is set for the duration of t 1. (I.e. as for Mo 2, only IN 3 used as inverse)

F 1 = 1 F 2 = 0
Mo `3



If F*) was high with a rising edge along IN 3, the falling edge along IN 3 sets the output for the time t 1. (As for Mo 3, F*) used as inverse)

F 1 = 1 F 2 = 1
Mo `4



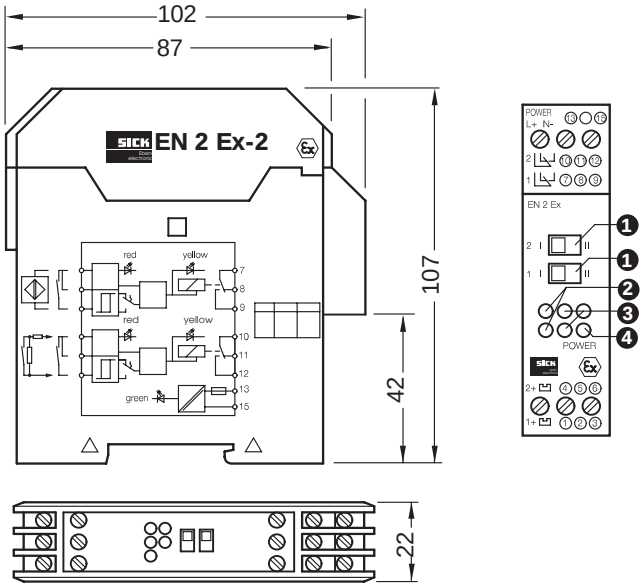
If during the high-time of IN 3 a rising edge along F*) occurs, with the falling edge of IN 3 the output is set for the duration of t 1.

Accessories Isolating unit EN 2 Ex

Features

- Reliable electrical isolation between input, output, and supply voltage to VDE 0100 Part 410
- 2-channel each with one relay output 1 x u
- Invertible outputs
- Conformity certificate PTB-No. EX.-95.C.20003X
- Intrinsically safe inputs to [EEex ia] IIC
- Power-on and status indicators
- Housing with snap-on mounting for support rail DIN 46277
- Suitable for zone 0, FRG: 1

Dimensions in mm



Description of operating elements

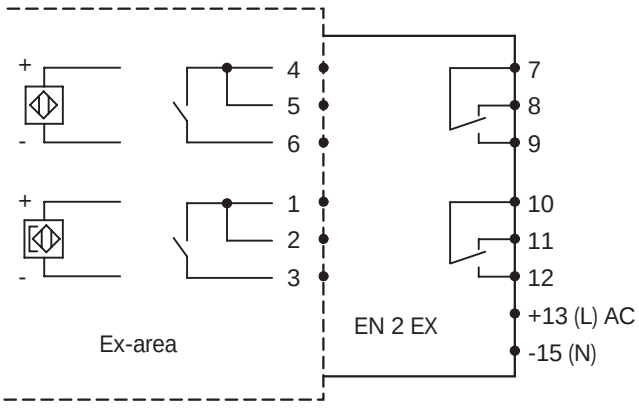
❶ Switch to reverse action
Switch in position I and contact in input circuit closed, output active (ON).
Switch in position II, output action inverted.

❷ LED (red), cable monitoring indicator.
Activation of cable-break and cable-short-circuit monitoring is only functional if a proximity switch to DIN 50227 or NAMUR, or a mechanical contact with suitable resistance circuit as per the operating instructions is connected. This circuit monitors the input current and deactivates the output with input currents < 0.3 mA cable-break / and > 6.5 mA short-circuit - irrespective of the setting for the direction of action.

❸ LED (yellow), status indicator.
This LED is actuated at the same time as the output.

❹ LED (green), voltage supply indicator.

Connection diagram



Technical data EN 2 Ex

	-1	-2	-3
Part No.	6010459	6010460	6009944
Supply voltage V_s	AC 115 V	AC 230 V	DC 24 V
Powert frequency	48 to 62 Hz		-
Line consumption	approx. 1.5 VA per channel		0.7 W
Inputs	for 1 or 2 sensors		
Idling voltage	DC 8.5 V		
Switching points	0 I ≤ 1.55 mA, 1 I ≥ 1.75 mA		
Short-circuit current	I ≥ 6 mA		
Permitted external capacity	max. 567 nF		
Permitted external inductivity	max. 5 mH		
Switching outputs [1]	One relay per input: 1 x u		
Switching voltage U max.	AC 250 V		
Switching current I max.	5A		
Switching capacity P max.	100 VA		
Explosion protection	[EEx ia] IIC		
VDE protection class	I		
Degree of protection	IP 20		
Ambient operating temperature T_u	-25 to +60 °C		
Storage temperature	-25 to +85 °C		
Weight	250 g		

1) Intended as spark suppression suitable for inductive or capacitive load

Transmission behaviour

Direction of action: reversible (see table)
Line monitoring: can be deactivated
Max. switching frequency: 20 Hz

Switching function table

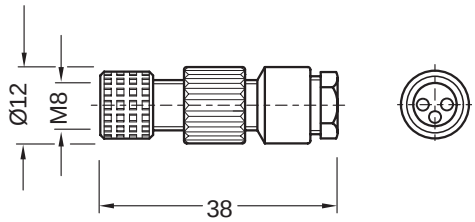
Input		Direction of action	Cable monitoring	Relay	Switching status, yellow LED	Cable monitoring, red LED
Without fault in input circuit	Ind. proximity sensor attenuated Magn. proximity sensor unattenuated	Normal	Any	Released	Off	Off
	Ind. proximity sensor unattenuated Magn. proximity sensor attenuated	Normal	Any	Picked up	On	Off
	Ind. proximity sensor attenuated Magn. proximity sensor unattenuated	Inverse	Any	Picked up	On	Off
	Ind. proximity sensor unattenuated Magn. proximity sensor attenuated	Inverse	Any	Released	Off	Off
With fault in input circuit	Cable-break	Normal	On	Released	Off	On
	Cable-break	Inverse	On	Released	Off	On
	Short-circuit	Normal	On	Released	Off	On
	Short-circuit	Inverse	On	Released	Off	On
	Cable-break	Normal	Off	Released	Off	Off
	Cable-break	Inverse	Off	Picked up	On	Off
	Short-circuit	Normal	Off	Picked up	On	Off
	Short-circuit	Inverse	Off	Released	Off	Off

Accessories

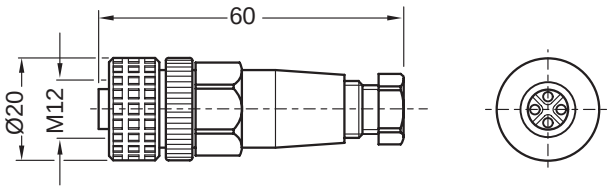
Round connectors adjustable

Cable receptacle, straight design

DOS-0803-G
M8 Order-No. 7902077
connectable cable: Ø 4-5 mm / 0,25 mm²; 0,34 mm²

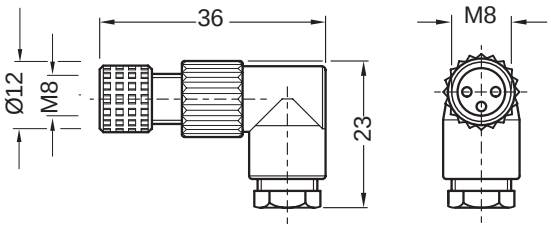


DOS-1204-G
M12 Order-No. 6007302
connectable cable: Ø 4-6 mm / max. 0,75 mm²

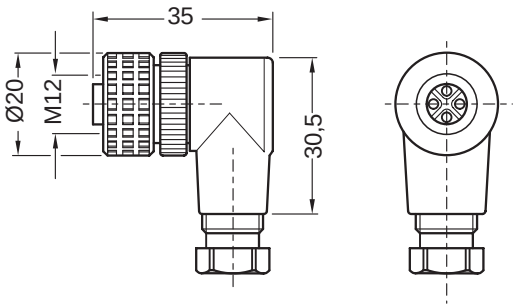


Cable receptacle, angled design

DOS-0803-W
M8 Order-No. 7902078
connectable cable: Ø 4-5 mm / 0,25 mm²; 0,34 mm²



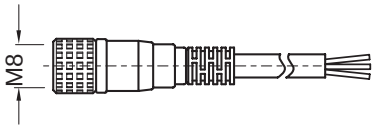
DOS-1204-W
M12 Order-No. 6007303
connectable cable: Ø 4-6 mm / max. 0,75 mm²

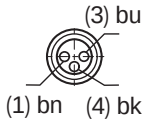


Straight design

DOL-0803-G02M
PVC, 3 x 0,25 mm², 2 m
M8 Order-No. 6010785

DOL-0803-G05MB
PUR, 3 x 0,25 mm², 5 m
M8 Order-No. 7902080



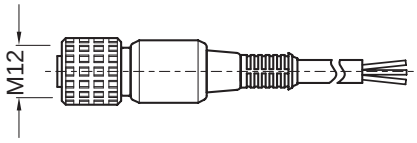


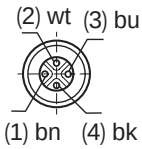
DOL-1204-G02M
PVC, 4 x 0,25 mm², 2 m
M12 Order-No. 6009382

DOL-1204-G05M
PVC, 4 x 0,25 mm², 5 m
M12 Order-No. 6009866

DOL-1204-G05MB
PUR, 3 x 0,34 mm², 5 m
M12 Order-No. 7902084

DOL-1204-G10M
PVC, 4 x 0,25 mm², 10 m
M12 Order-No. 6010543

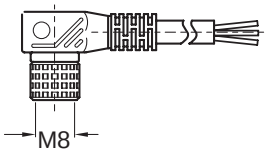


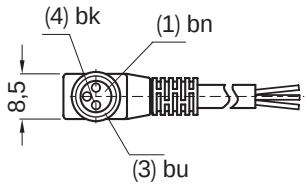


Angled design

DOL-0803-W02M
PVC, 3 x 0,25 mm², 2 m
M8 Order-No. 6008489

DOL-0803-W05MB
PUR, 3 x 0,25 mm², 5 m
M8 Order-No. 7902081





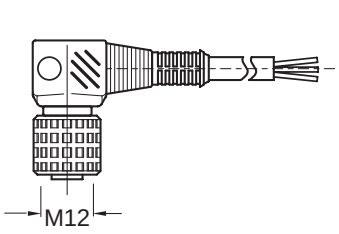
DOL-1204-W02M
PVC, 4 x 0,25 mm², 2 m
M12 Order-No. 6009383

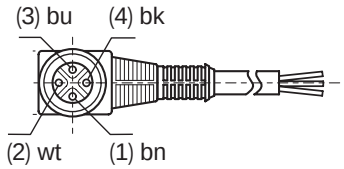
DOL-1204-W05M
PVC, 4 x 0,25 mm², 5 m
M12 Order-No. 6009867

DOL-1204-W05MD
PVC, 4 x 0,34 mm², 5 m, welding splatter resistant
M12 Order-No. 6020399

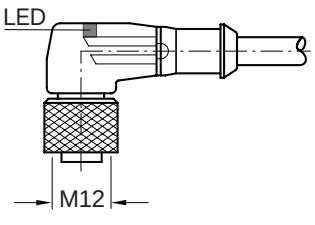
DOL-1204-W05MB
PUR, 3 x 0,34 mm², 5 m
M12 Order-No. 7902085

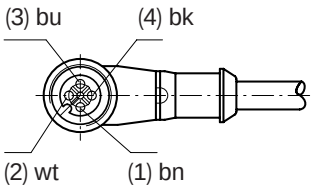
DOL-1204-W10M
PVC, 4 x 0,25 mm², 10 m
M12 Order-No. 6010541





DOL-1204-W05ME
PUR/PVC, 4 x 0,34 mm², 5 m
with LED`s for power and output indication,
PNP-complementary
M12 Order-No. 6020398

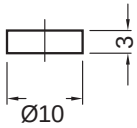




Accessories
Magnets

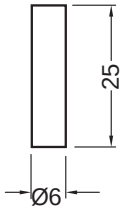
Magnet M 1.0
MAG-1003-S, Samarium cobalt
temperature resistance
-50 °C to +180 °C

Order-No. 7901782



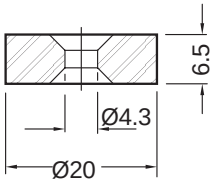
Magnet M 2.0
MAG-0625-A, AlNiCo
temperature resistance
-100 °C to +450 °C

Order-No. 7901783



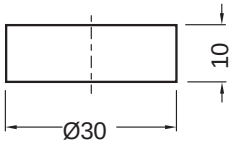
Magnet M 3.0
MAG-2006-B, Barium ferrite
temperature resistance
-25 °C to +130 °C

Order-No. 7901784



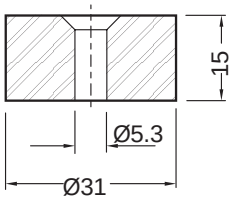
Magnet M 4.0
MAG-3010-B, Barium ferrite
temperature resistance
-25 °C to +130 °C

Order-No. 7901785



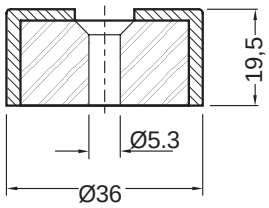
Magnet M 5.0
MAG-3015-B, Barium ferrite
temperature resistance
-25 °C to +130 °C

Order-No. 7901786



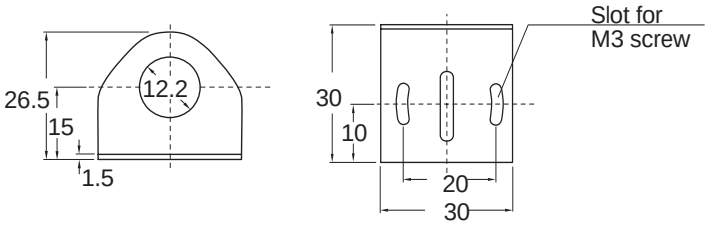
Magnet M 5.1
MAG-3515-B, Barium ferrite with plastic jacket

Order-No. 7902086



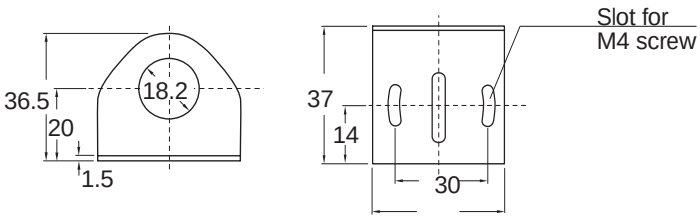
BEF-WN-M12
Mounting bracket for M12
(M3 screws not included)

metal
Order-No. 5308447



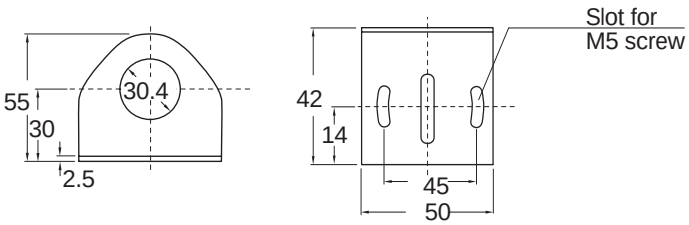
BEF-WN-M18
Mounting bracket for M18
(M4 screws not included)

metal
Order-No. 5308446



BEF-WN-M30
Mounting bracket for M30
(M5 screws not included)

metal
Order-No. 5308445



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SICK Industrial sensor systems
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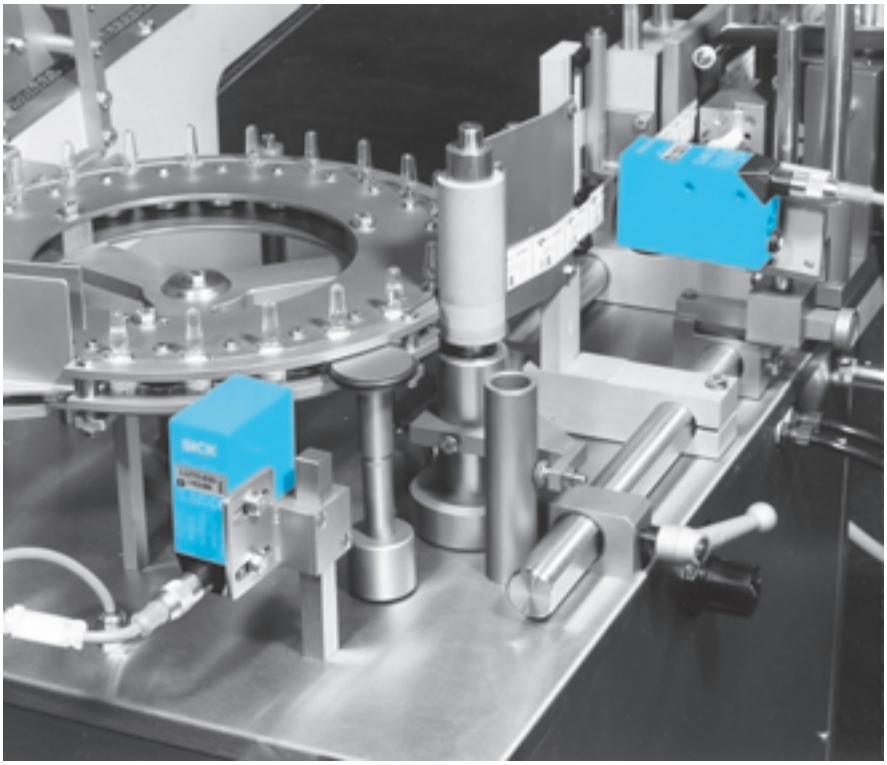

Industrial sensors:
The current range of optical and inductive sensors reflects the experience of more than 50 years of partnership with virtually every sector of industrial automation.
The tasks: recording, counting, classifying and positioning objects, detecting shape and position, colour and surface differences, even under extreme surrounding conditions.
SICK sensors optimise production and logistics processes and therefore contribute to improving product quality.

Products:
Photoelectric switches and photoelectric proximitiy switches, distance sensors, complex sensors, reflex light grids, multi-dimensional sensors, inductive proximity sensors, capacitive proximity sensors, magnetic proximity sensors, magnetic cylinder sensors.

Safety systems
In automated production and logistics processes, safety light curtains, light grids, laser scanners and interlocks assure effective accident prevention and personal protection. Through long years of experience in innumerable industrial applications, pioneering safety products have been developed which have set new standards in many fields. Thanks to its comprehensive expertise in designing, manufacturing and operating safety equipment, SICK has become the leader in its industry.

Products:
Guarding surfaces, danger points, danger zones, preventing access, safety interlocks, software for CE conformity assessment of plant and machinery.

Environmental monitoring
In power stations and industrial plants, SICK systems monitor compliance with statutory limit values for toxic emissions, thereby supporting process operation and improvement. SICH is the only manufacturer to offer a complete program of units for *in situ* and extractive measurement processes. Pioneering SICK systems, e.g. fog-measuring units and sensors for controlling tunnel-ventilation equipment, are also responsible for keeping traffic flowing freely on the roads.

Products:
Dust measurement, gas velocity measuring systems, analysers and analysis systems for process and emission monitoring, tunnel-sensor systems.

Auto Ident
SICK barcode scanners are in demand wherever products and goods have to be identified quickly, safely and reliably. SICK laser scanners have also become indispensable in applications involving the classification and positioning of products or automatic flow control. They reliably record shape, position and contour.
They also monitor access roads, multi-storey car parks, subway stations, level crossings and locks, i.e. wherever the safe and smooth flow of traffic is essential.

Products:
Stationary barcode readers, data-transmitting photoelectric switches, laser measuring systems for indoor and outdoor applications, hand-held barcode reading systems for mobile and stationary use.