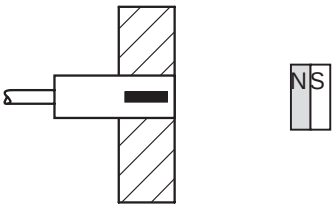
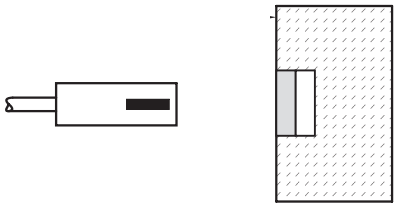
Installation Notes
Magnetic proximity sensors

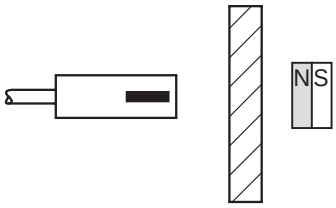
Flush sensor installation
Magnetic proximity sensors can be installed flush in all materials and metals (with the exception of magnetizable material) without any detrimental effects to the sensing range.



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

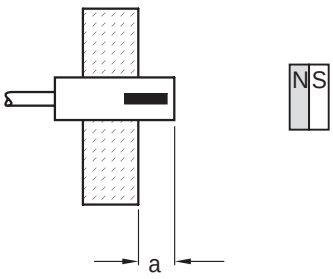


Penetration of material
Since magnetic fields do not penetrate all non-magnetizable material, magnetic proximity sensors can be used to detect magnets e.g. behind a non-ferrous metal, plastic, or wooden panel.

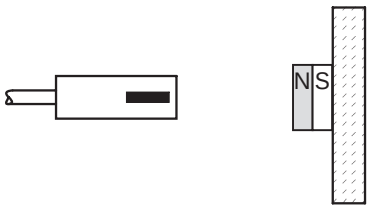


Non-flush sensor installation
The table shows how much the proximity sensor must protrude when installed in magnetizable material so that a reduction in sensing range of more than 5 % is avoided.

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:



Series	Actuating magnets s_n mm				
	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

Character	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Character
	M	**Q**	**1**	**O**	**-**	**6**	**O**	**A**	**P**	**S**	**-**	**K**	**U**	**O**	

1 **Sensor technology**
- M Magnetic

2 **Design**
- H Barrel
- M Cylinder with thread
- Q Cuboid

3/4 **Housing size**
- 08 Diameter
- 10 or
- 12 edge length of
- 18 sensing face

6/7/8 **Sensing range/ magnetic field**
- 60 In mm relative to
- 70 stand. magnet M4.0
- A Axial

other codes 14

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

housing material 12
- Z Ms, nickel-plated
- K Plastic

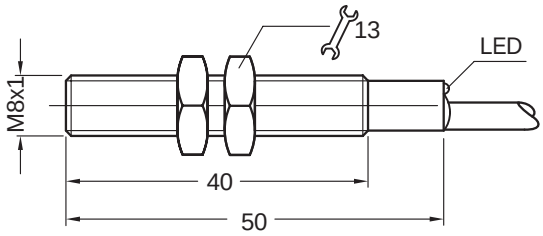
Output 10
- S NO
- N NAMUR

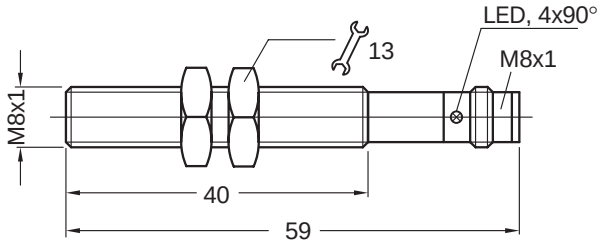
Interface 9
- P DC (3-wire) PNP
- N DC (3-wire) NPN
- - NAMUR

Magnetic proximity sensors

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

Dimensions in mm





Features

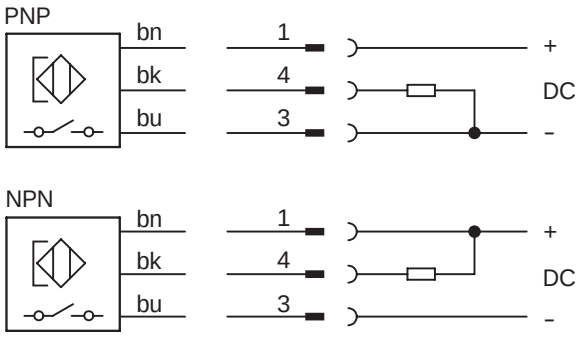
- Can be installed flush and non-flush in metal
- Sensing range up to 60 mm
- PNP or NPN output
- High switching frequency
- Short-circuit protection (pulsed)
- Robust brass housing, nickel-plated with fine thread M8 x 1 mm
- Cable or connector
- Enclosure rating IP 67
- LED status indicator

Accessories

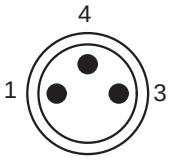
Round connectors

Magnets

Connection diagram



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

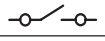


Electrical and mechanical data

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

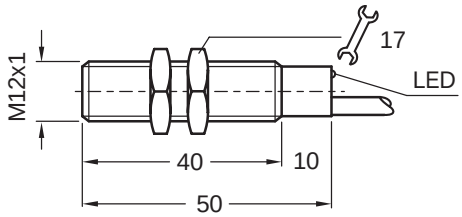
Sensing ranges (Typical values)

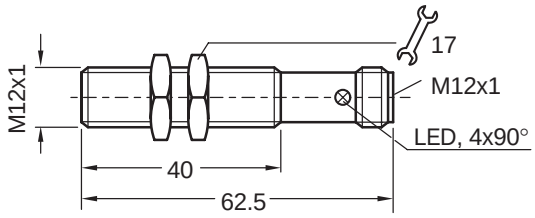
Magnet type	Sensing range s_n Any installation type (flush or non-flush) in non-magnetizable material	Sensing range s_n Flush installation in magnetizable material (e.g. iron)
M 1.0	23 mm	12 mm
M 2.0	24 mm	10 mm
M 3.0	36 mm	15 mm
M 4.0	**60 mm**	20 mm
M 5.0 / 5.1	68 mm	25 mm

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

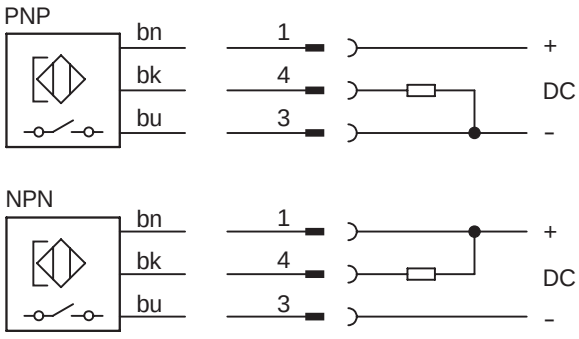
Accessories

Round connectors

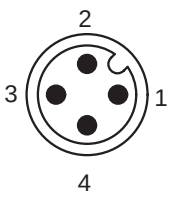
Magnets

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

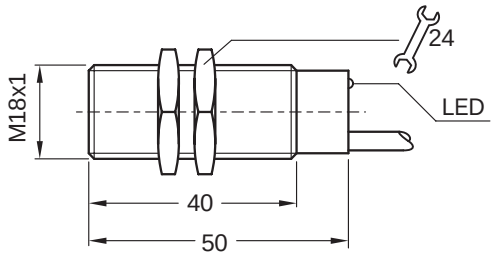
Sensing ranges (Typical values)

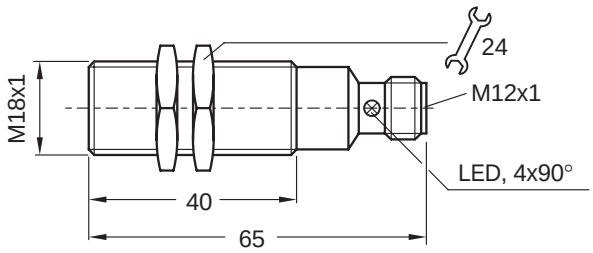
Magnet type	Sensing range s_n Any installation version (flush or non-flush) in non-magnetizable material	Sensing range s_n Flush installation in magnetizable material (e.g. iron)
M 1.0	23 mm	17 mm
M 2.0	24 mm	14 mm
M 3.0	36 mm	23 mm
M 4.0	**60 mm**	37 mm
M 5.0 / 5.1	68 mm	44 mm

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

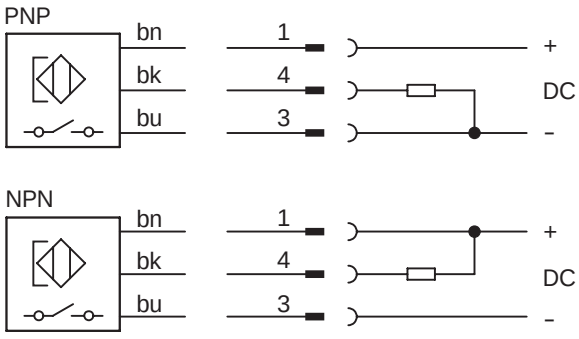
Accessories

Round connectors

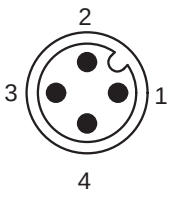
Magnets

Mounting bracket

Connection diagram



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

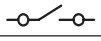


Electrical and mechanical data

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

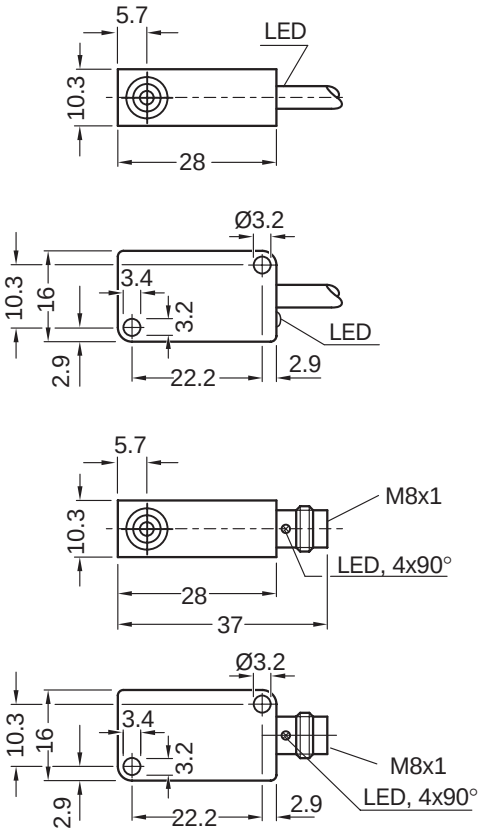
- Can be installed flush and non-flush in metal
- Sensing range up to 60 mm
- PNP or NPN output
- High switching frequency
- Short-circuit protection (pulsed)
- Plastic housing
- Cable or connector
- Enclosure rating IP 67
- LED status indicator

Accessories

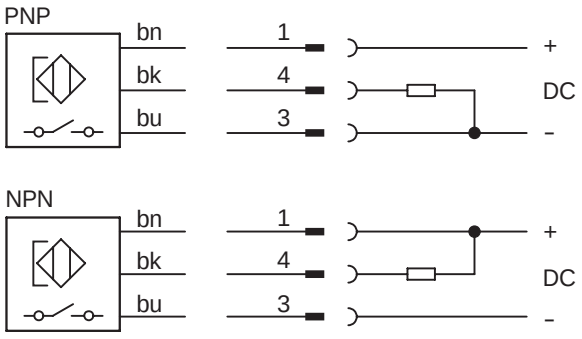
Round connectors

Magnets

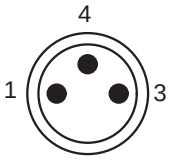
Dimensions in mm



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	**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% - 10% of s_r	**Ambient temperature** T_a	- 25 ... + 75 °C
Repeatability R (U_b and T_a constant)	≤ 1% of s_r	**Housing material**	Plastic
Temperature drift	± 10% of s_r	**Connection cable**	PUR-PVC, 3 x 0.25 mm²
EMC	to EN 60 947-5-2		

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

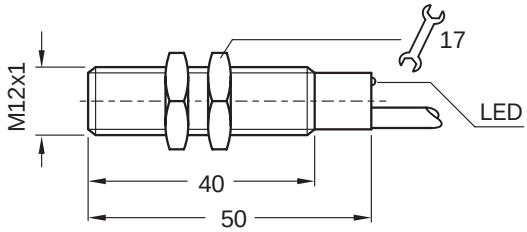
Sensing ranges (Typical values)

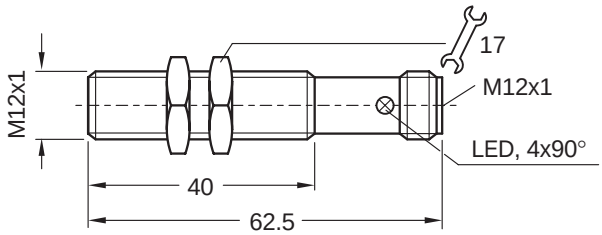
Magnet type	Sensing range s_n Any installation version (flush or non-flush) in non-magnetizable material	Sensing range s_n Flush installation in magnetizable material (e.g. iron)
M 1.0	23 mm	12 mm
M 2.0	24 mm	10 mm
M 3.0	36 mm	15 mm
M 4.0	**60 mm**	20 mm
M 5.0 / 5.1	68 mm	25 mm

Magnetic proximity sensors

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

Dimensions in mm





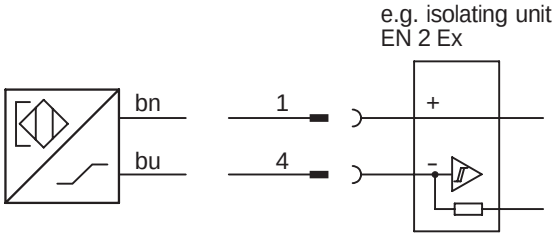
Features

- 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**

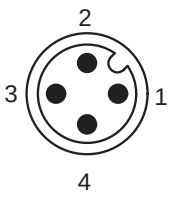
Accessories

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	**Short-circuit protected**	yes
Rated voltage U_n	8.2 V DC	**Reverse-polarity protected**	yes
Ripple U_{pp}	≤ 5% of U_b	**Enclosure rating** to EN 60529	IP 67
Power consumption, attenuated	≥ 2.5 mA	**Shock and vibration stress**	30 g, 11 ms 10 to 55 Hz, 1 mm
Power consumption, unattenuated	≤ 1.0 mA	**Ambient temperature** T_a	- 25 ... + 70 °C
Internal capacitance	≤ 45nF	**Housing material**	Brass, nickel-plated, plastic
Internal inductance	≤ 30 µH	**Tightening torque**	7.0 Nm
Cable resistance	≤ 50 Ω	**Connection cable**	PVC, 2 x 0.34 mm^2, blue
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		

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

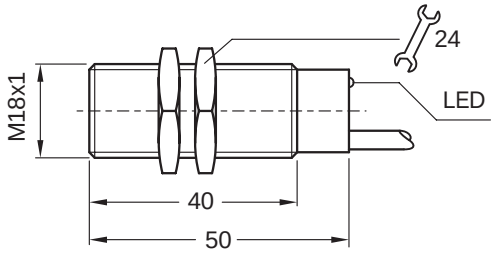
Sensing ranges (Typical values)

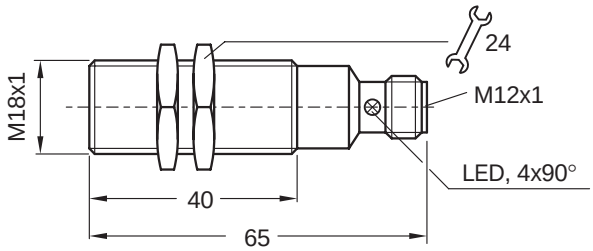
Magnet type	Sensing range s_n Any installation version (flush or non-flush) in non-magnetizable material	Sensing range s_n Flush installation in magnetizable material (e.g. iron)
M 1.0	23 mm	17 mm
M 2.0	24 mm	14 mm
M 3.0	36 mm	23 mm
M 4.0	**60 mm**	37 mm
M 5.0 / 5.1	68 mm	44 mm

Magnetic proximity sensors

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

Dimensions in mm





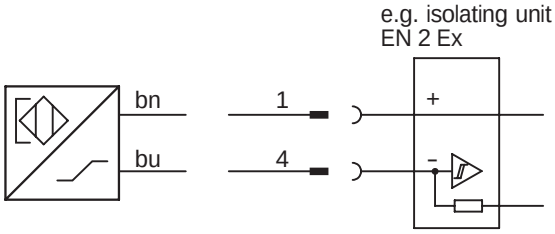
Features

- 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

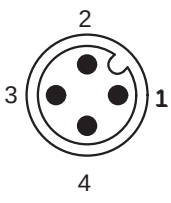
Accessories

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