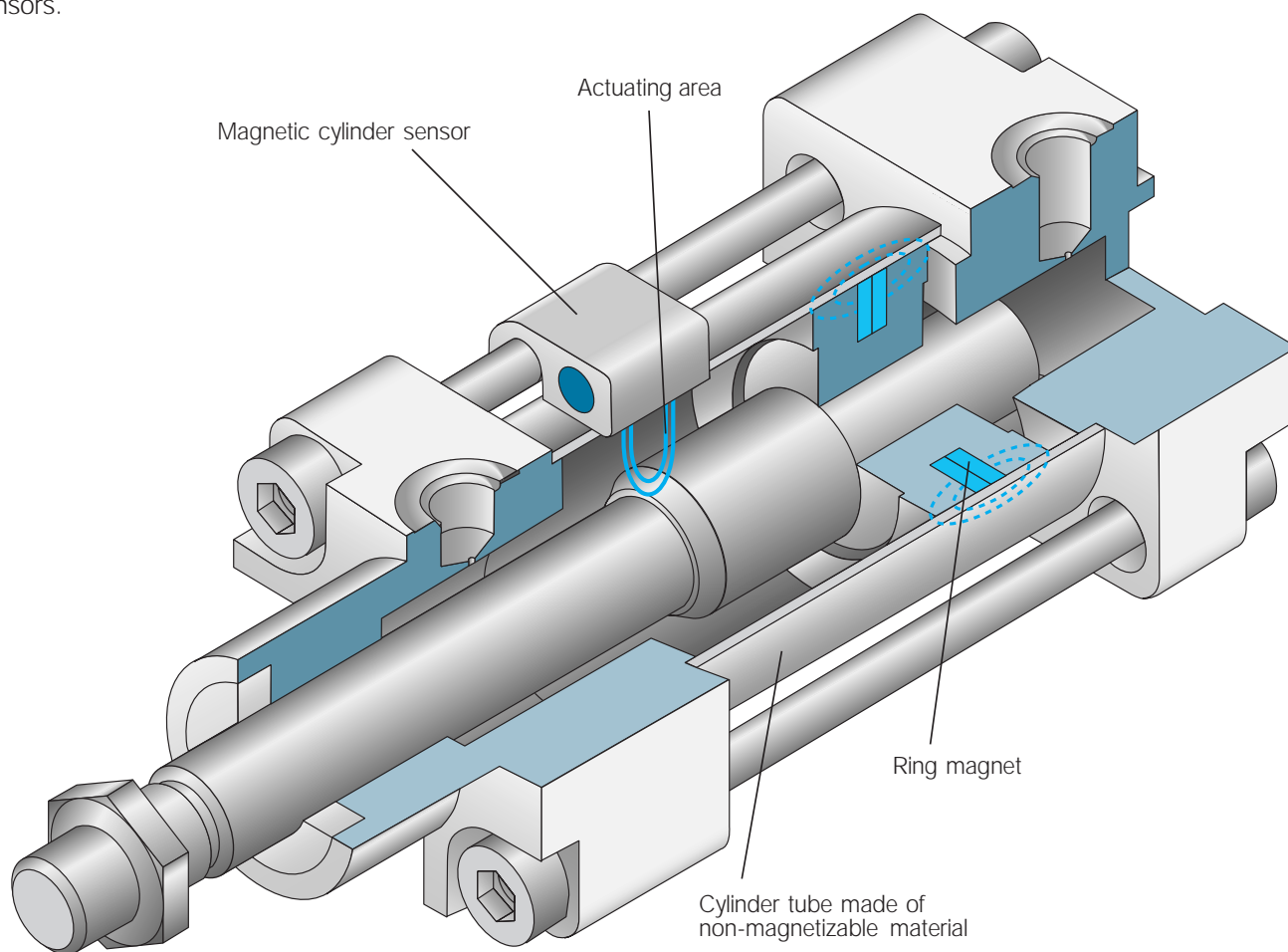


Operating Principle

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 depends on the design of the cylinder.

Traverse distance s_u

The traverse distance s_u 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.

Product Overview

Magnetic cylinder sensors



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



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



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



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



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



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



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



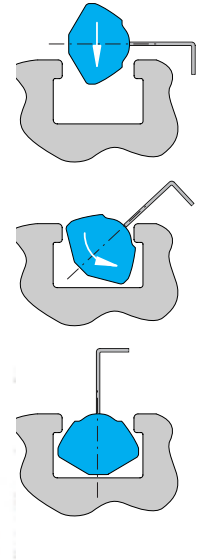
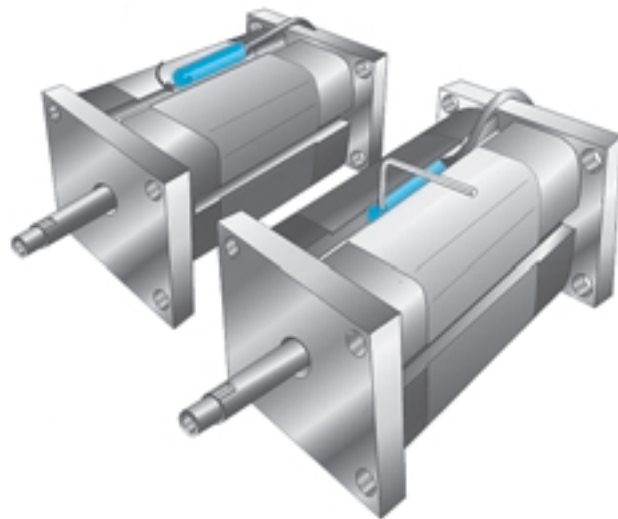
MZ F1
Mounting in T-slot
Page 152

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 sensitivity of the interference detector is $> 2 \text{ mT}$ 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														other codes
R Reed switch														M Weld immune
2 Design														Connection
Z Cylinder sensor														W Cable, PVC
														U Cable, PUR-PVC
														P Cable with connector, M8x1
														T Connector, M8x1
														C Connector, M12x1
3/4 Application														housing material
R1 Round-body cylinder														A Aluminium
R2 Round-body cylinder														K Plastic
Z1 Tie-rod cylinder														D Die-cast zinc
Z2 Tie-rod cylinder														T Die-cast zinc with teflon coating
P3 Integrated Profile cylinder														
P4 Integrated Profile cylinder														
K1 Short-stroke cylinder														Output
K3 Short-stroke cylinder														S NO
F1 T-slot														N NAMUR
U2 Universal														
T1 T-Nut														
6/7/8 Response sensitivity, sensor position														Interface
O2 in mT														P DC (3-wire) PNP
O3 in mT														N DC (3-wire) NPN
V Sensor, front														U AC/DC 2-wire
Z Sensor, centre														R Reed (3-wire)
														- NAMUR

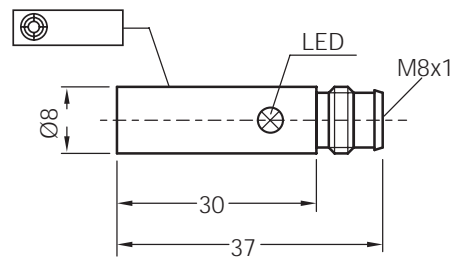
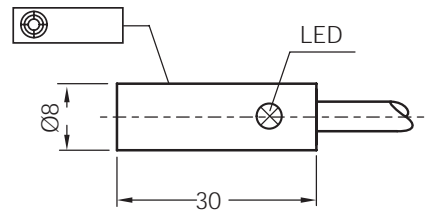


Magnetic cylinder sensors

MZ R1 series

DC 3-wire, for round-body cylinders

Dimensions in mm



Features

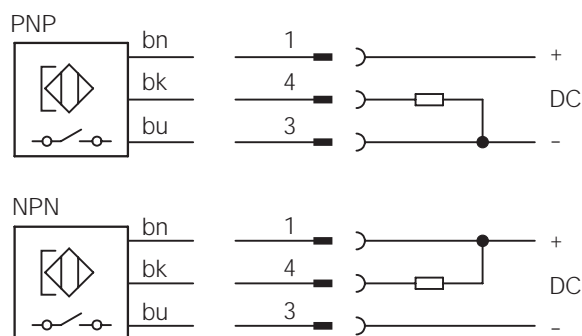


- ▶ Non-contact determination of piston position in pneumatic cylinders
- ▶ Mounting on round-body cylinders Ø 8 ... 63 mm using R1 mounting clamp
- ▶ High response sensitivity ≥ 3 mT
- ▶ Frontal sensing face
- ▶ No secondary switching ranges
- ▶ High repeat accuracy
- ▶ Actuating speed ≤ 5 m/s
- ▶ PNP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

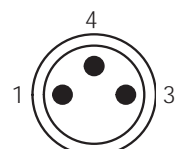
Accessories

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

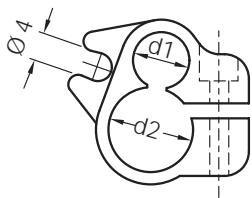
Operating voltage U_b	10 ... 30 V DC	Wire-break protection	yes
Ripple U_{pp}	$\leq 10\%$ of U_b	Short-circuit protection (pulsed)	yes
Voltage drop U_d (at I_a max.)	≤ 1.5 V	Reverse polarity protection	yes
Power consumption (without load)	≤ 10 mA	Power-up pulse suppression	yes
Continuous current I_a	≤ 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
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

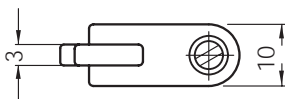
Series is available as reed switch on request.

Accessories



Mounting clamp

Plastic
for magnetic cylinder sensor R1
with d_1 \varnothing 8 mm



For cylinders with piston diameter

For cylinders with piston diameter	Clamping range d_2 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

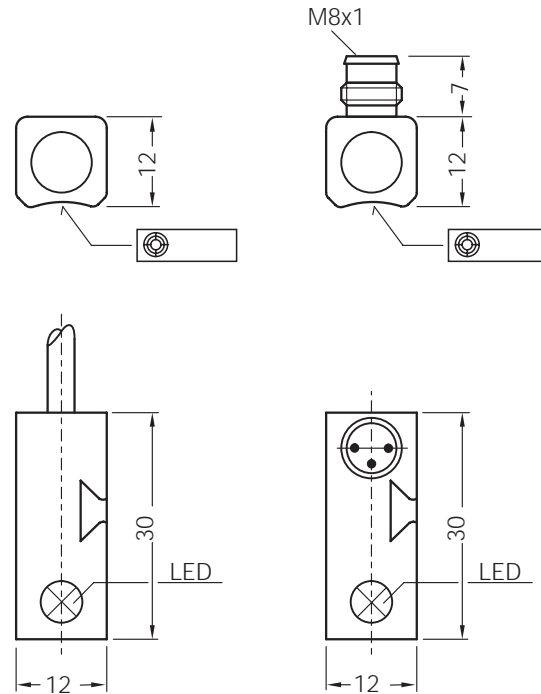


Magnetic cylinder sensors

MZ R2 series

DC 3-wire, for round-body cylinders

Dimensions in mm



Features

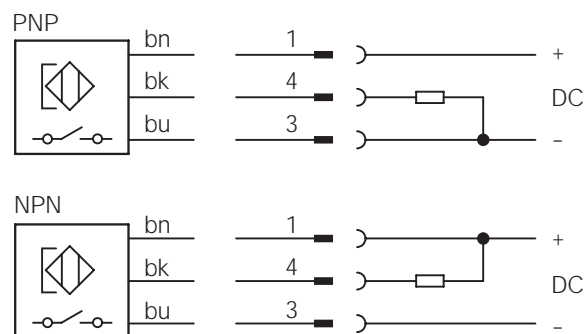


- ▶ Non-contact determination of piston position in pneumatic cylinders
- ▶ Universal mounting using clamping band for max. cylinder diameter of 100 mm
- ▶ High response sensitivity $\geq 3 \text{ mT}$
- ▶ Frontal sensing face
- ▶ No secondary switching ranges
- ▶ High repeat accuracy
- ▶ Actuating speed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

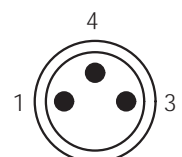
Accessories

Round connectors

Connection diagram











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



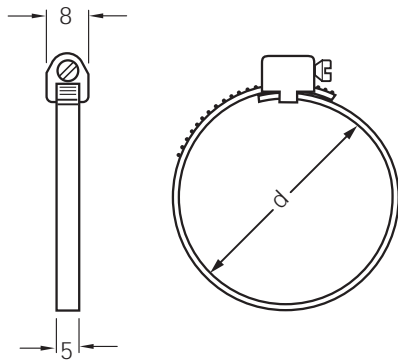
Electrical and mechanical data

Operating voltage U_b	10 ... 30 V DC	Wire-break protection	yes
Ripple U_{pp}	$\leq 10\%$ 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
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

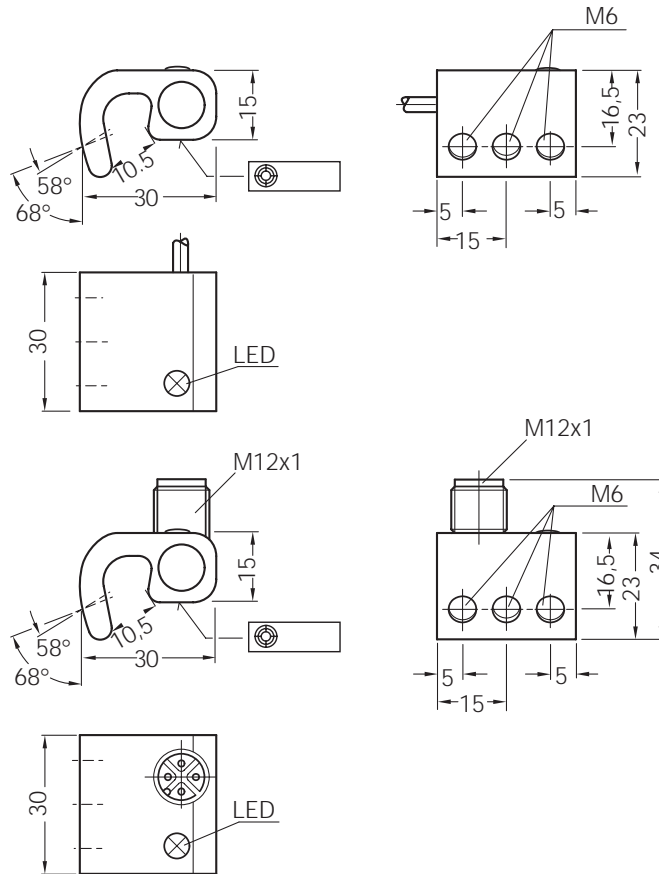
For cylinder range with piston diameter	Clamping range d in mm	Type	Order-No.
8 ... 16 mm	18 - 29	BEF-S-R2-16	7901762
20/25 mm	28 - 39	BEF-S-R2-25	7901763
32 mm	38 - 49	BEF-S-R2-30	7901764
40 mm	48 - 59	BEF-S-R2-40	7901765
50 mm	58 - 69	BEF-S-R2-50	7901766
63 mm	68 - 79	BEF-S-R2-63	7901767
80 mm	88 -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

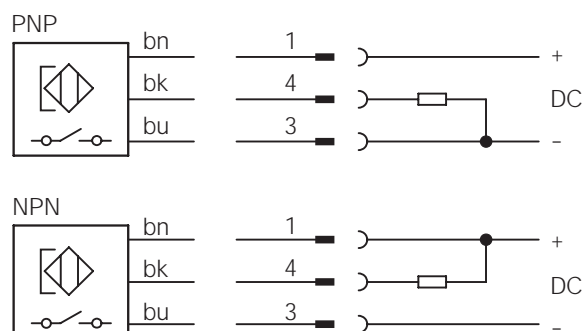


- ▶ Non-contact determination of piston position in pneumatic cylinders
- ▶ Tie-rod mounting for max. rod diameter of 10 mm
- ▶ High response sensitivity ≥ 3 mT
- ▶ Frontal sensing face
- ▶ No secondary switching ranges
- ▶ High repeat accuracy
- ▶ Actuating speed ≤ 5 m/s
- ▶ PNP or NPN output
- ▶ Short-circuit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

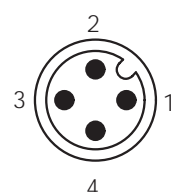
Accessories

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	Wire-break protection	yes
Ripple U_{pp}	$\leq 10\%$ 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	of EN 60 947-5-2	Connection cable	PUR-PVC, 3 x 0.25 mm ²

Selection table

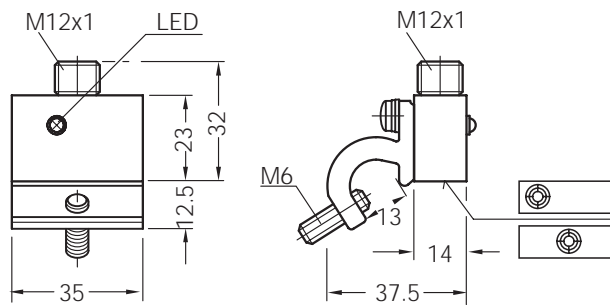
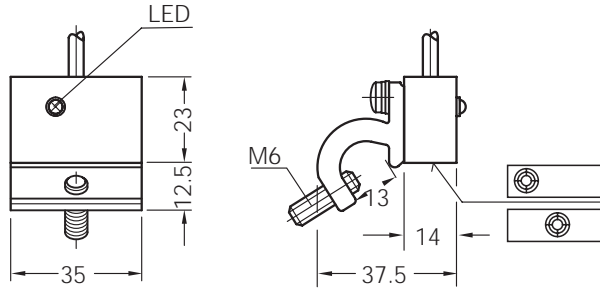
Response sensitivity in mT	Sensing face	Switching output	Output function	Switching frequency f in Hz	Connection	Type	Order number
3		PNP		5000	Cable 2 m	MZZ1-03VPS-AU0	7900606
3		PNP		5000	Connector M12 x 1 mm	MZZ1-03VPS-AC0	7900608
3		NPN		5000	Connector M12 x 1 mm	MZZ1-03VNS-AC0	7900609

Magnetic cylinder sensors

MZ Z2 series

DC 3-wire, for tie-rod cylinders

Dimensions in mm



Features

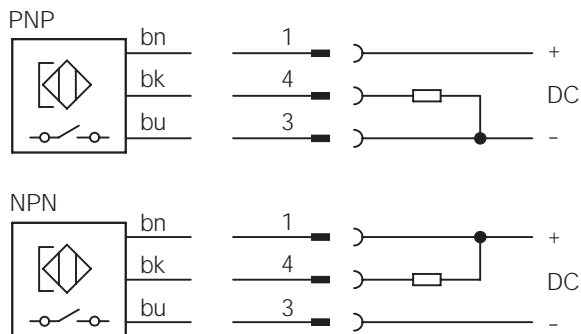


- ▶ Non-contact determination of piston position in pneumatic cylinders
- ▶ Mounting on tie-rods with max. rod diameter of 12.5 mm
- ▶ High response sensitivity ≥ 3 mT
- ▶ Frontal or central sensing face
- ▶ No secondary switching ranges
- ▶ High repeat accuracy
- ▶ Actuating speed ≤ 5 m/s
- ▶ PNP or 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

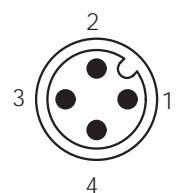
Accessories

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	Wire-break protection	yes
Ripple U_{pp}	$\leq 10\%$ 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

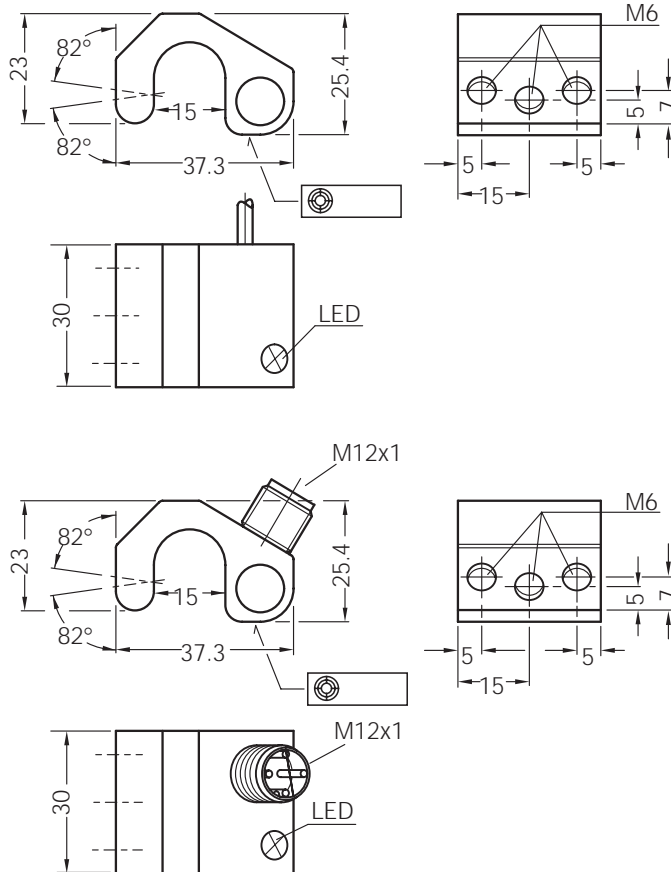
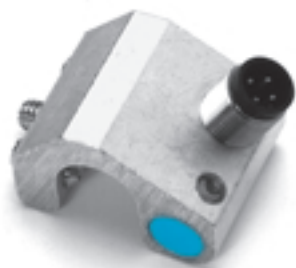
Response sensitivity in mT	Sensing face	Switching output	Output function	Switching frequency f in Hz	Connection	Type	Order number
3		PNP		5000	Cable 2 m	MZZ2-03ZPS-KU0	7900618
3		NPN		5000	Cable 2 m	MZZ2-03ZNS-KU0	7900619
3		PNP		5000	Connector M12 x 1 mm	MZZ2-03ZPS-KC0	7900620
3		PNP		5000	Cable 2 m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

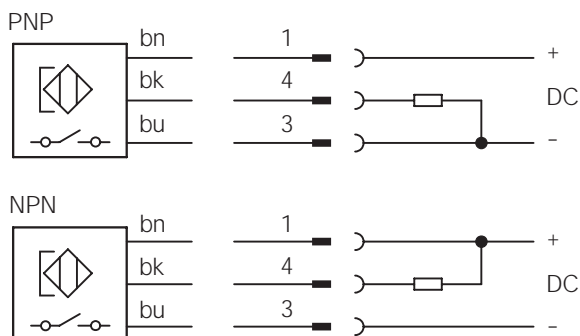


- ▶ Non-contact determination of piston position in pneumatic cylinders
- ▶ Mounting on integrated profile with max. width of 14 mm
- ▶ High response sensitivity ≥ 3 mT
- ▶ Frontal sensing face
- ▶ No secondary switching ranges
- ▶ High repeat accuracy
- ▶ Actuating speed ≤ 5 m/s
- ▶ PNP output
- ▶ Short-circuit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

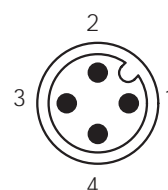
Accessories

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	Wire-break protection	yes
Ripple U_{pp}	$\leq 10\%$ 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

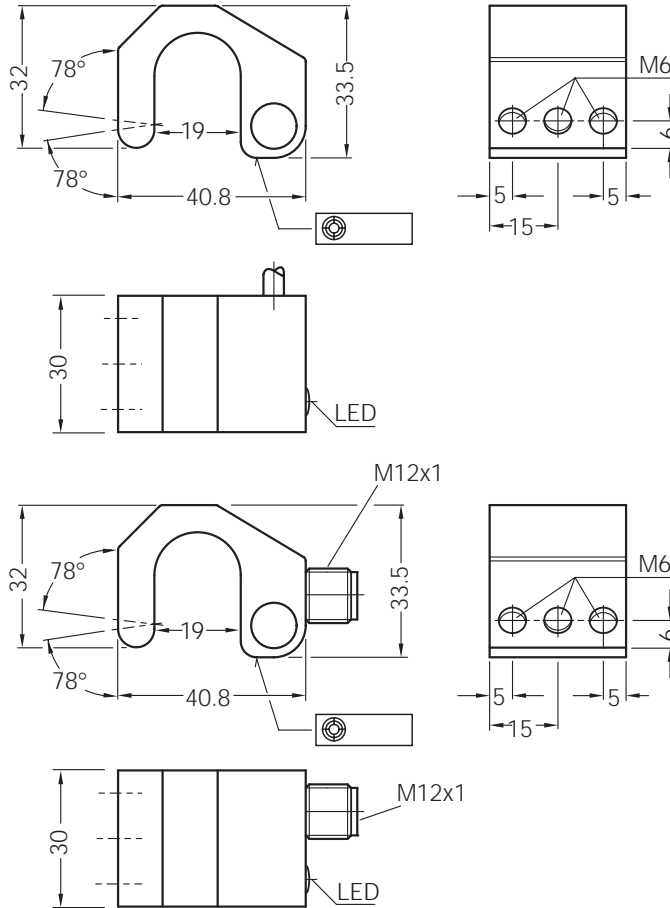
Response sensitivity in mT	Sensing face	Switching output	Output function	Switching frequency f in Hz	Connection	Type	Order number
3		PNP		5000	Cable 2 m	MZP3-03VPS-AU0	7900610
3		PNP		5000	Connector M12 x 1 mm	MZP3-03VPS-AC0	7900612

Magnetic cylinder sensors

MZ P4 series

DC 3-wire, for integrated profile cylinders

Dimensions in mm



Features

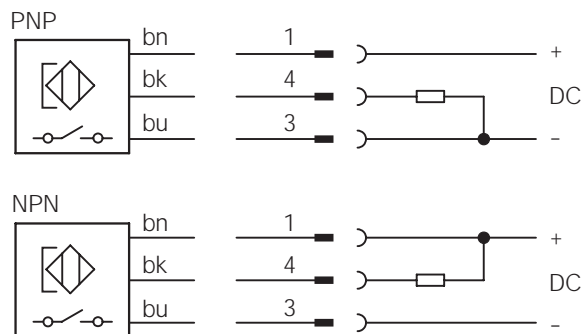


- ▶ Non-contact determination of piston position in pneumatic cylinders
- ▶ Mounting on integrated profile with max. width of 18 mm
- ▶ High response sensitivity ≥ 3 mT
- ▶ Frontal sensing face
- ▶ No secondary switching ranges
- ▶ High repeat accuracy
- ▶ Actuating speed ≤ 5 m/s
- ▶ PNP output
- ▶ Short-circuit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

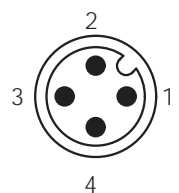
Accessories

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	Wire-break protection	yes
Ripple U_{pp}	$\leq 10\%$ 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

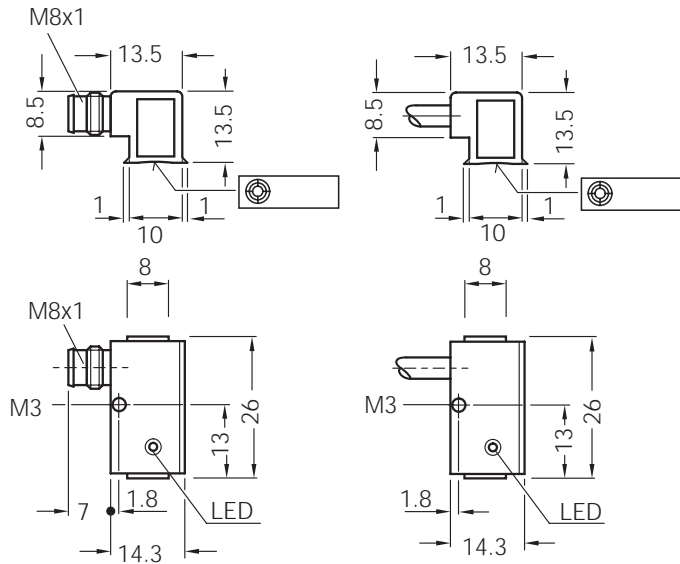
Response sensitivity in mT	Sensing face	Switching output	Output function	Switching frequency f in Hz	Connection	Type	Order number
3		PNP		5000	Cable 2 m	MZP4-03VPS-AU0	7900614
3		PNP		5000	Connector M12 x 1 mm	MZP4-03VPS-AC0	7900616

Magnetic cylinder sensors

MZ K1 series

DC 3-wire, for short-stroke cylinders

Dimensions in mm



Features

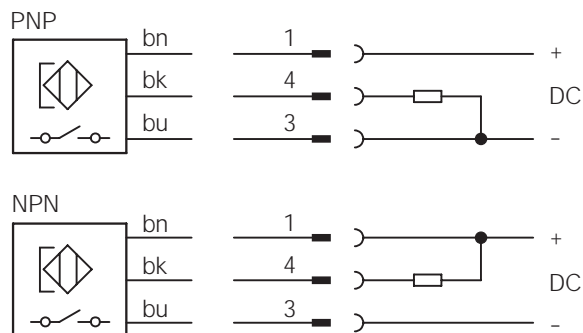


- ▶ Non-contact determination of piston position in pneumatic cylinders
- ▶ Simple mounting on short-stroke cylinders
- ▶ High response sensitivity ≥ 2 mT
- ▶ Frontal sensing face
- ▶ No secondary switching ranges
- ▶ High repeat accuracy
- ▶ Actuating speed ≤ 5 m/s
- ▶ PNP output
- ▶ Short-circuit protection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

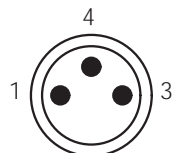
Accessories

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	Wire-break protection	yes
Ripple U_{pp}	$\leq 10\%$ 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

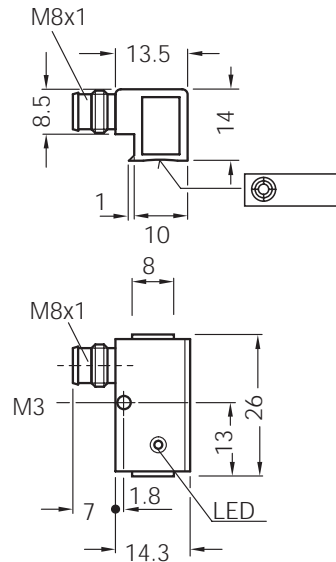
Response sensitivity in mT	Sensing face	Switching output	Output function	Switching frequency f in Hz	Connection	Type	Order number
2		PNP		5000	Cable 2 m	MZK1-02VPS-AU0	7900602
2		PNP		5000	Connector M8 x 1 mm	MZK1-02VPS-AT0	7900604

Magnetic cylinder sensors

MZ K3 series

DC 3-wire, for short-stroke cylinders

Dimensions in mm



Features

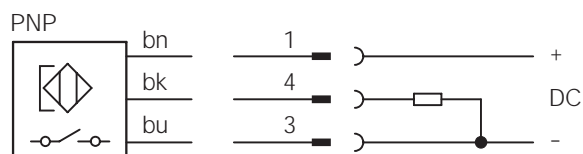


- ▶ Non-contact determination of piston position in pneumatic cylinders
- ▶ **Mountable from the top**
- ▶ Simple mounting on short-stroke cylinders
- ▶ High response sensitivity $\geq 2 \text{ mT}$
- ▶ Frontal sensing face
- ▶ No secondary switching ranges
- ▶ High repeat accuracy
- ▶ Actuating speed $\leq 5 \text{ m/s}$
- ▶ 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

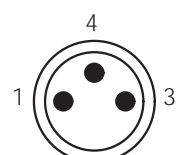
Accessories

Round connectors

Connection diagram





Wire colour	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}	$\leq 10\%$ 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

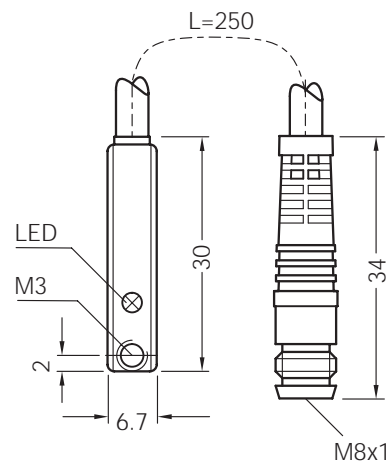
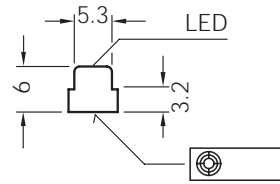


Magnetic cylinder sensors

MZ F1 series

DC 3-wire, for T-slot

Dimensions in mm



Features

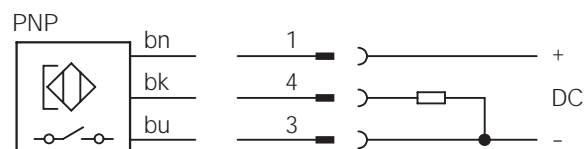


- ▶ Non-contact determination of piston position in pneumatic cylinders
- ▶ For T-slot
- ▶ High response sensitivity ≥ 3 mT
- ▶ Frontal sensing face
- ▶ No secondary switching ranges
- ▶ High repeat accuracy
- ▶ Actuating speed ≤ 5 m/s
- ▶ PNP output
- ▶ Short-circuit protection (pulsed)
- ▶ Plastic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

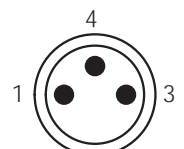
Accessories

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	Wire-break protection	yes
Ripple U_{pp}	$\leq 10\%$ of U_b	Short-circuit protection (pulsed)	yes
Voltage drop U_d (at I_a max.)	≤ 2 V	Reverse polarity protection	yes
Power consumption (without load)	≤ 10 mA	Power-up pulse suppression	yes
Continuous current I_a	≤ 150 mA	Enclosure rating to DIN 40050	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	≤ 1.5 mm	Ambient temperature T_a	- 25 ... + 75 °C
Repeatability R (U_b and T_a constant)	≤ 0.2 mm	Housing material	Plastic
EMC	to EN 60 947-5-2	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.

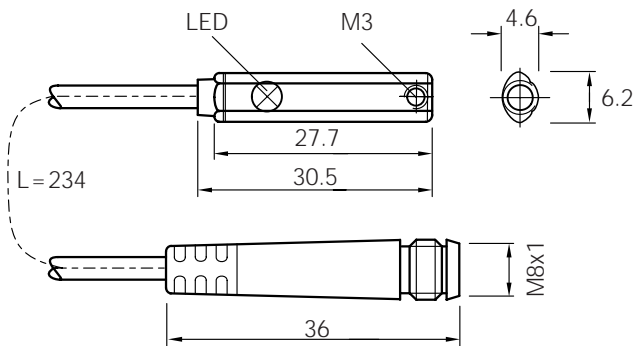


Magnetic cylinder sensors

MZT1 series

DC 3-wire, for T-slot cylinder

Dimensions in mm



Features

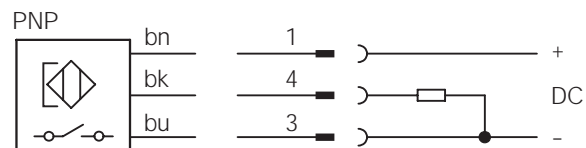


- ▶ Non-contact detection of piston position in pneumatic cylinders
- ▶ **Mountable from the top**
- ▶ For all common used T-slot cylinder e.g. Festo, SMC
- ▶ Response sensitivity ≥ 3 mT
- ▶ Plastic housing with clamping screw
- ▶ Connection cable or connector on cable
- ▶ Enclosure rating IP 67
- ▶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

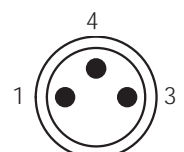
Accessories

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

Selection table

Response sensitivity 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

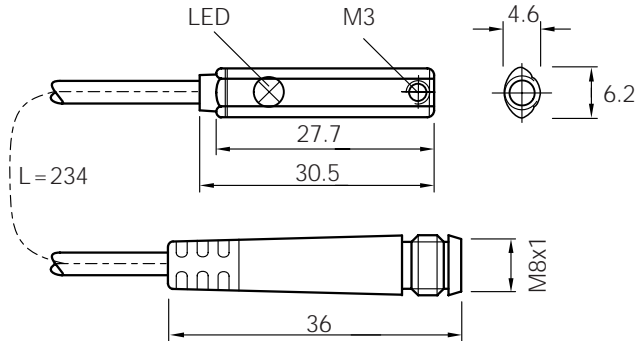


Magnetic cylinder sensors

RZT1 series

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

Dimensions in mm



Features

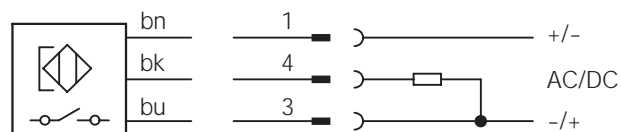


- ▶ Non-contact detection of piston position in pneumatic cylinders
- ▶ **Mountable from the top**
- ▶ For all common used T-slot cylinder e.g. Festo, SMC
- ▶ Response sensitivity ≥ 3 mT
- ▶ Plastic housing with clamping screw
- ▶ Connection cable or connector on cable
- ▶ Enclosure rating IP 67
- ▶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

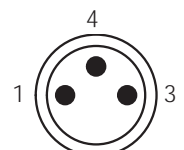
Accessories

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 sensitivity 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

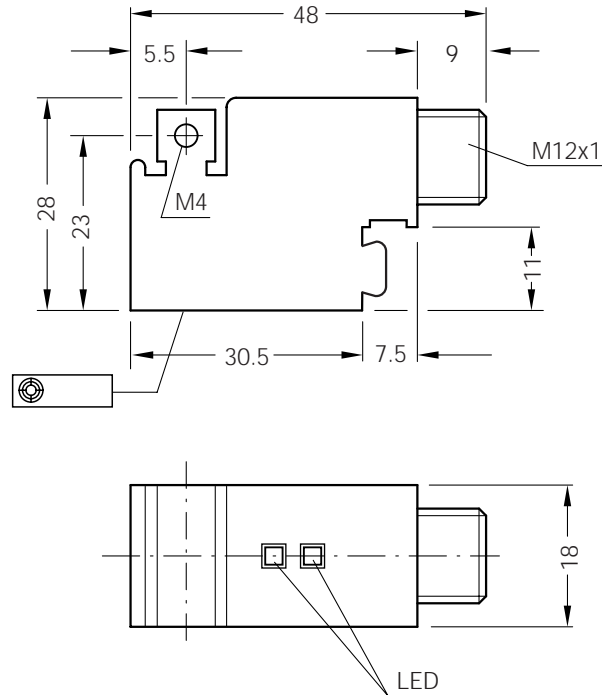


Magnetic cylinder sensors

MZ U2 series

DC 3-wire, weld immune version

Dimensions in mm



Features

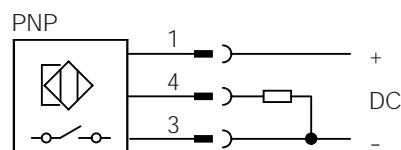


- ▶ Non-contact detection of piston position in pneumatic cylinders in weld field environments
- ▶ Weld immune in all welding applications (AC, DC and medium frequency)
- ▶ Response sensitivity of interference field detector ≥ 2 mT
- ▶ The sensors locks the output during the welding process. When the 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 < 1 m/s
- ▶ 2 LED's
 Status indicator: yellow
 Function indicator: green

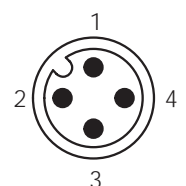
Accessories

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}	$\leq 10\%$ 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
Continuous current I_a	≤ 300 mA	Enclosure rating to DIN 60529	IP 67
Time delay before availability t_v	≤ 20 ms	Shock and vibration stress	30 g, 11 ms 10 to 55 Hz, 1 mm
Hysteresis H	≤ 1.5 mm	Ambient temperature T_a	- 25 ... + 75 °C
Repeatability R (U_b and T_a constant)	≤ 0.1 mm	Housing material	Die-cast zinc, optional with teflon coating
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

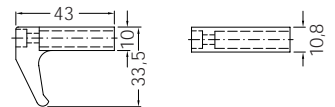
* with teflon coating

Accessories

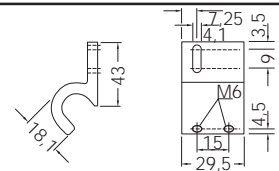
Mounting clamp for pneumatic cylinder sensor MZU2

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

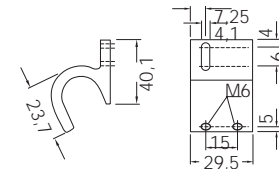
Mounting clamp: BEF-KS-U2-S1T
Material: die-cast zinc with teflon coating
Order-No.: 4031632
Tie-rod cylinder $\varnothing 4 \dots 20$ mm



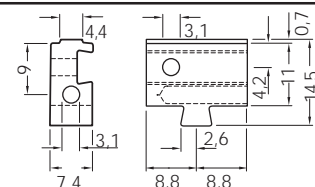
Mounting clamp: BEF-KS-U2-P1
Material: aluminium
Order-No.: 2019824
Integrated profile cylinder with max. rod diameter of 13 mm



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

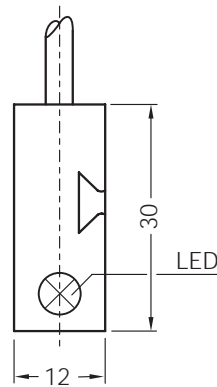
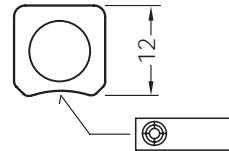
TÜV 99 ATEX 1398

Ex EExibII CT6

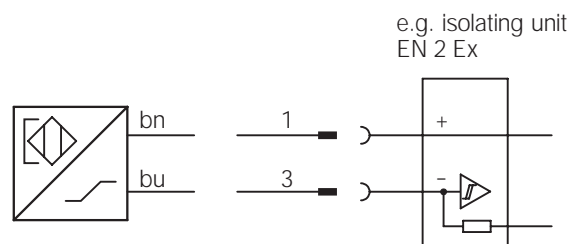
Accessories

Round connectors

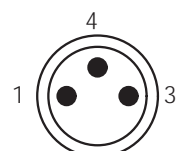
Isolating unit EN 2 Ex



Connection diagram





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



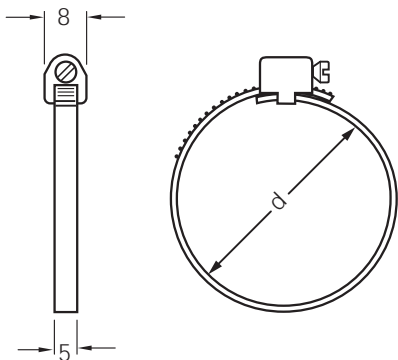
Electrical and mechanical data

Operating voltage U_b	5 ... 25 V DC	Short-circuit protection	yes
Rated voltage U_n	8.2 V DC	Reverse polarity protection	yes
Ripple U_{pp}	$\leq 5\%$ 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	≤ 45 nF	Housing material	Aluminium, plastic
Internal inductance	≤ 30 μ H	Connection cable	PVC, 2 x 0.34 mm ² , blue
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		

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

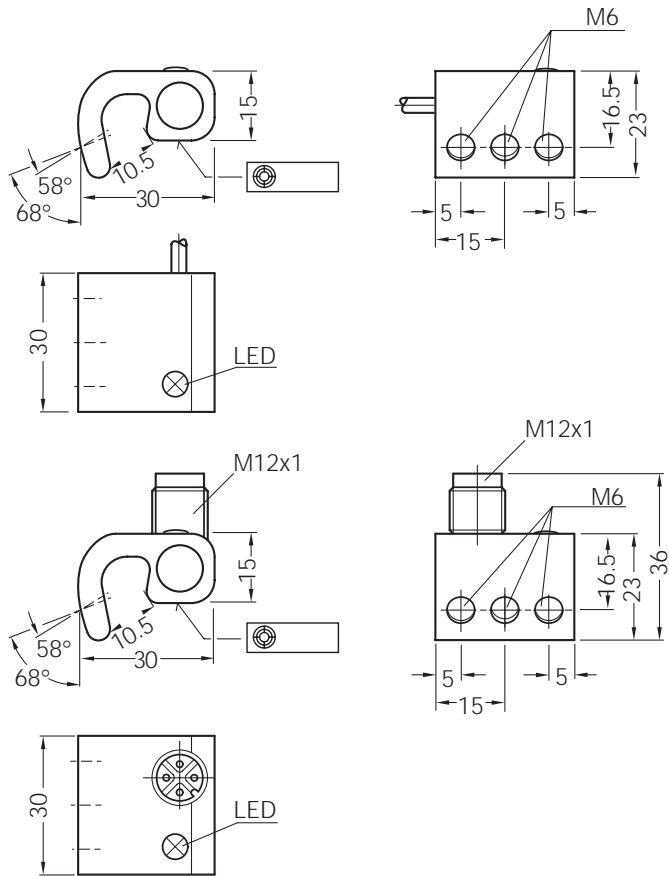
For cylinder range with piston diameter	Clamping range d in mm	Type	Order-No.
8 ... 16 mm	18 - 29	BEF-S-R2-16	7901762
20/25 mm	28 - 39	BEF-S-R2-25	7901763
32 mm	38 - 49	BEF-S-R2-30	7901764
40 mm	48 - 59	BEF-S-R2-40	7901765
50 mm	58 - 69	BEF-S-R2-50	7901766
63 mm	68 - 79	BEF-S-R2-63	7901767
80 mm	88 -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

Dimensions in mm



Features

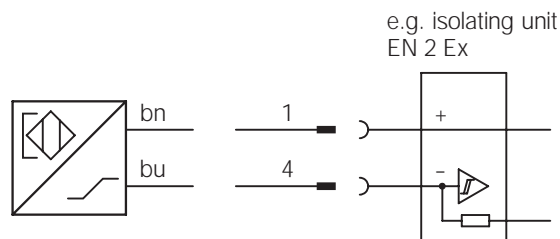


- ▶ Non-contact determination of piston position in pneumatic cylinders
- ▶ Mounting of tie-rods with max. rod diameter of 10 mm
- ▶ High response sensitivity ≥ 3 mT
- ▶ Frontal sensing face
- ▶ No secondary switching ranges
- ▶ High repeat accuracy
- ▶ Actuating speed ≤ 5 m/s
- ▶ NAMUR to EN50 227
-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

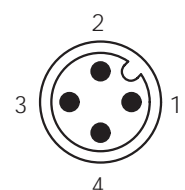
Accessories

Round connectors

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	Short-circuit protected	yes
Rated voltage U_n	8.2 V DC	Reverse polarity protected	yes
Ripple U_{pp}	$\leq 5\%$ 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	≤ 45 nF	Housing material	Aluminium, plastic
Internal inductance	≤ 30 μ H	Connection cable	PVC, 2 x 0.34 mm ² , blue
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		

Selection table

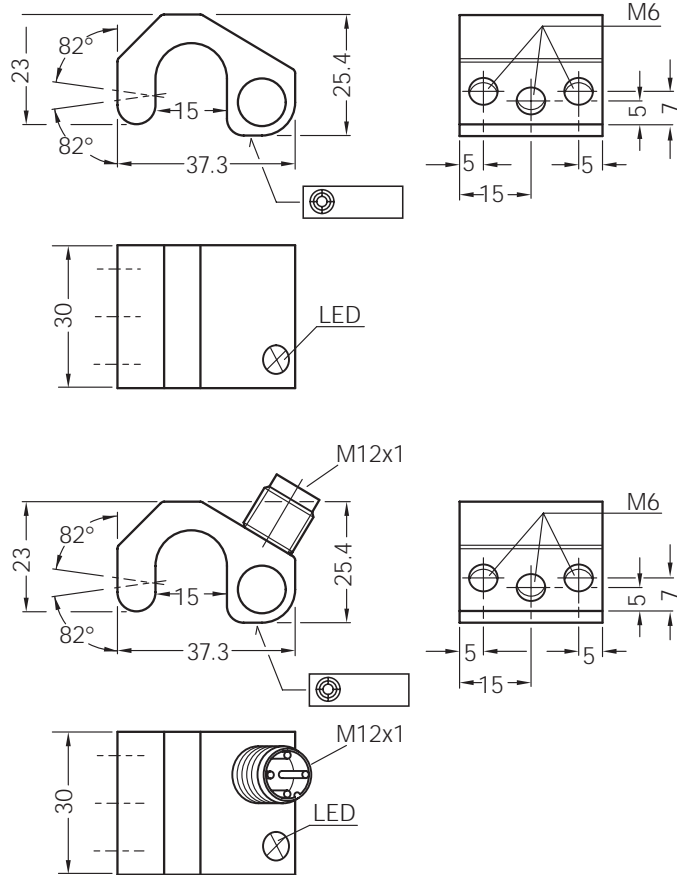
Response sensitivity in mT	Sensing face	Version	Output function	Switching frequency f in Hz	Connection	Type	Order number
3		NAMUR		5000	Cable 2 m	MZZ1-03V-N-AW0	7901323
3		NAMUR		5000	Connector M12 x 1 mm	MZZ1-03V-N-AC0	7901324

Magnetic cylinder sensors

MZ P3 series

NAMUR 2-wire, for integrated profile cylinders

Dimensions in mm



Features



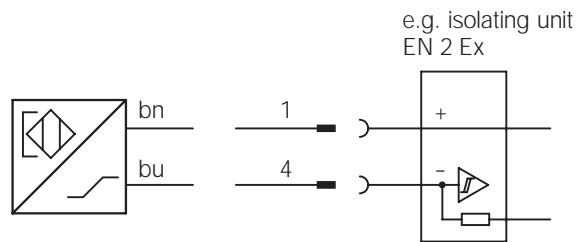
- ▶ Non-contact determination of piston position in pneumatic cylinders
- ▶ Mounting on integrated profile with max. width of 14 mm
- ▶ High response sensitivity ≥ 3 mT
- ▶ Frontal sensing face
- ▶ No secondary switching ranges
- ▶ High repeat accuracy
- ▶ Actuating speed ≤ 5 m/s
- ▶ NAMUR to EN 50 227
- ▶ 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

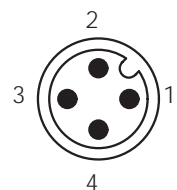
Accessories

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	Short-circuit protected	yes
Rated voltage U_n	8.2 V DC	Reverse polarity protected	yes
Ripple U_{pp}	$\leq 5\%$ 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	≤ 45 nF	Housing material	Aluminium, plastic
Internal inductance	≤ 30 μ H	Connection cable	PVC, 2 x 0.34 mm ² , blue
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		

Selection table

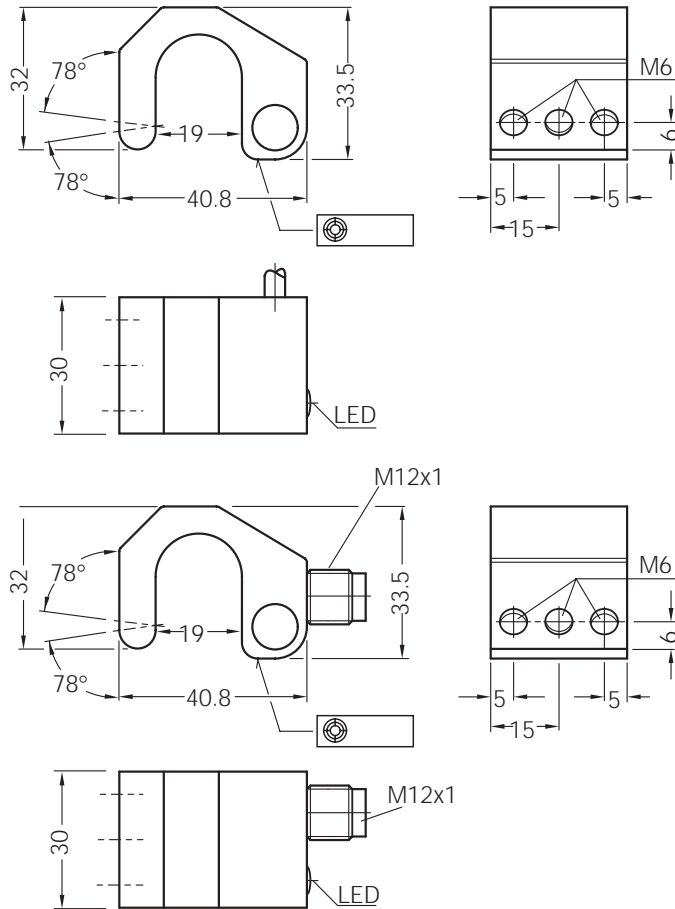
Response sensitivity in mT	Sensing face	Version	Output function	Switching frequency f in Hz	Connection	Type	Order number
3		NAMUR		5000	Cable 2 m	MZP3-03V-N-AW0	7901440
3		NAMUR		5000	Connector M12 x 1 mm	MZP3-03V-N-AC0	7901441

Magnetic cylinder sensors

MZ P4 series

NAMUR 2-wire, for integrated profile cylinders

Dimensions in mm



Features

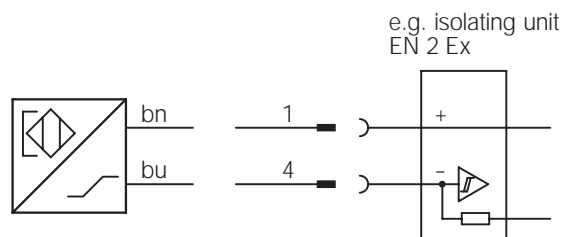


- ▶ Non-contact determination of piston condition in pneumatic cylinders
- ▶ Mounting on integrated profile with max. width of 18 mm
- ▶ High response sensitivity ≥ 3 mT
- ▶ Frontal sensing face
- ▶ No secondary switching ranges
- ▶ High repeat accuracy
- ▶ Actuating speed ≤ 5 m/s
- ▶ NAMUR to DIN19234
- ▶ 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

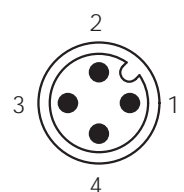
Accessories

- 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

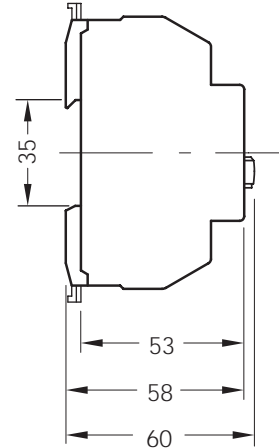
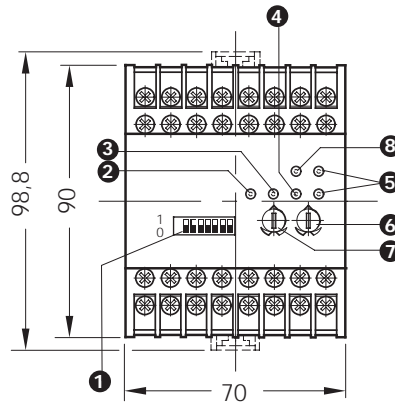
Operating voltage U_b	5 ... 25 V DC	Short-circuit protected	yes
Rated voltage U_n	8.2 V DC	Reverse polarity protected	yes
Ripple U_{pp}	$\leq 5\%$ of U_b	Enclosure rating to EN 60529	IP 67
Power consumption, attenuated	≥ 2.5 mA	Shock and vibration stress	30 g, 11 ms 10 to 55 Hz, 1 mm
Power consumption, unattenuated	≤ 1.0 mA	Ambient temperature T_a	- 25 ... + 70 °C
Internal capacitance	≤ 45 nF	Housing material	Aluminium, plastic
Internal inductance	≤ 30 μ H	Connection cable	PVC, 2 x 0.34 mm ² , blue
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		

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



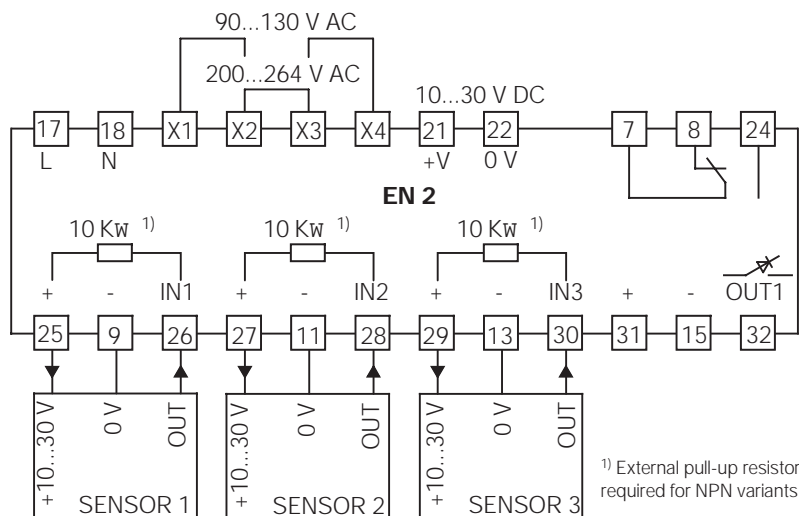
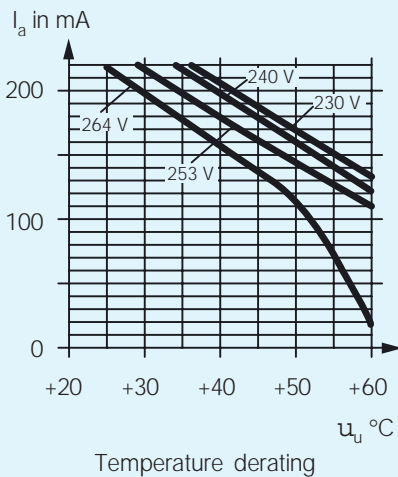
Features



- ▶ 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

Connection diagram



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 \pm 25%
Output current (total) I_a	220 mA, see temperature derating curve
Transistor output	Terminal 32 (OUT 1)
Type	PNP
Switching current	\leq 100 mA, short-circuit protected, LED flashes if short-circuit occurs
Switching frequency	10 kHz
Relay output	Terminals 7, 8, 24
Switching voltage	\leq 250 V AC
Switching current	\leq 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 μ s
Time delays, logics	See Truth table/Functional diagrams/ t_1 , t_2 : adjustable from 0.005 to 1 s
VDE protection class	\square
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 10k Ω required for NPN variant

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

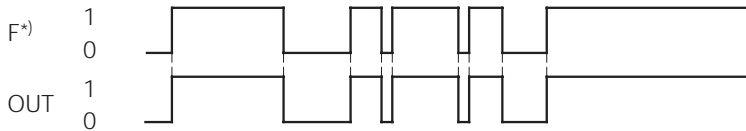
Order No. 6009654

Overview of functions

F3	0	IN 1 normal		
	1	IN 1 inverse		
F5	0	$f(\text{IN } 1, \text{IN } 2) = \text{IN } 1 \div \text{IN } 2$		
	1	$f(\text{IN } 1, \text{IN } 2) = \text{IN } 1 \times \text{IN } 2$		
F7	0	IN 2 normal		
	1	IN 2 inverse		
F8	0		$\nabla(\text{F } 8 = 0)$	
	1			$\nabla(\text{F } 8 = 1)$
F6	0	$f(\text{IN } 1, \text{IN } 2, \text{IN } 3) = \text{IN } 3 \div f(\text{IN } 1, \text{IN } 2)$	IN 3 normal	
	1	$f(\text{IN } 1, \text{IN } 2, \text{IN } 3) = \text{IN } 3 \times f(\text{IN } 1, \text{IN } 2)$	IN 3 inverse	
F4	0	OUT normal	$\nabla(\text{F } 4 = 0)$	
	1	OUT inverse		$\nabla(\text{F } 4 = 1)$
F1	0	No delay	Mo 1	Mo 1
	1	Response and release delay	Mo 2	Mo 2
F2	0	Dynamically delayed	Mo 3	Mo 3
	1	Frequency discriminator	Mo 4	Mo 4

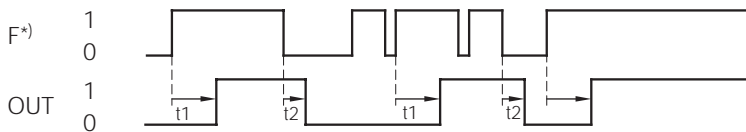
F8 = 0

F1 = 0 F2 = 0



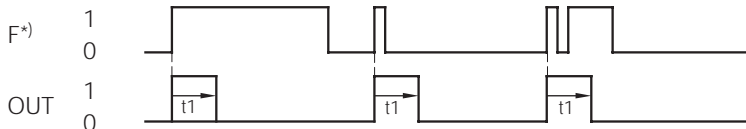
The output OUT follows F^* (the logic operation for inputs IN1, IN 2, and IN 3) without delay.

F1 = 0 F2 = 1



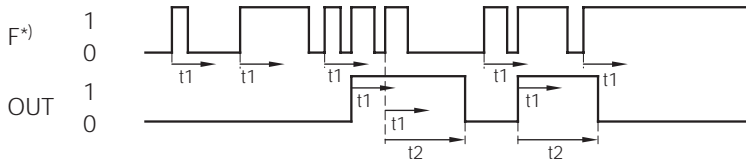
The output OUT follows F^* with a response and release delay. F^* must be high for at least t_1 so that OUT reacts. t_1 is reset by low of F^* . OUT responds when t_1 has elapsed, oscillator f . t_1 is stopped. If F^* is then low again, t_2 begins to run after which OUT becomes inactive. If F^* runs high again during t_2 , t_2 is reset and begins to run again when $F^* = \text{low}$. Both times, t_1 and t_2 , 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



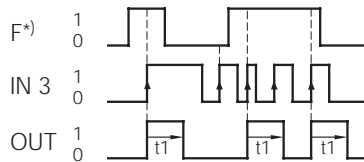
The time delay t_1 is started with the first rising edge of F^* . If a further rising edge along F^* occurs within t_1 , OUT is set for the duration of t_2 and time delay t_1 is simultaneously retriggered. All subsequent rising edges along F^* , if they occur during t_1 , retrigger both t_1 and t_2 . 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 $t_2 \geq t_1$, 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: $F = f(\text{IN } 1, \text{IN } 2, \text{IN } 3)$

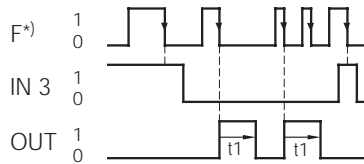
Overview of functions

F8 = 1 F4 = 0
F1 = 0 F2 = 0
Mo 1



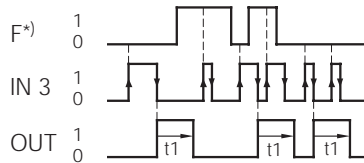
If during the rising edge of IN 3 the operation F* is high, this edge sets the output OUT for the time t 1.

F1 = 0 F2 = 1
Mo 2



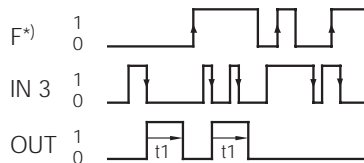
If during the falling edge of F* IN 3 is not high, the output is set for the duration of t 1.

F1 = 1 F2 = 0
Mo 3



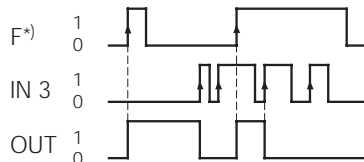
If F* is not high with a rising edge along IN 3, the falling edge of IN 3 sets the output for the time t 1.

F1 = 1 F2 = 1
Mo 4



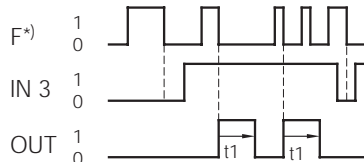
If no rising edge along F* occurs during the high time of IN 3, at the falling edge of IN 3 the output is set for the duration of t 1.

F4 = 1
F1 = 0 F2 = 0
Mo 1



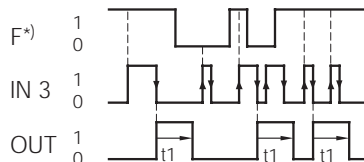
A rising edge along F* sets the output; a rising edge along IN 3 resets it. (Edge-controlled RS-flipflop)

F1 = 1 F2 = 1
Mo 2



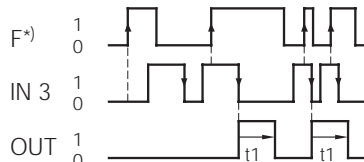
If during the falling edge of F* IN 3 is high, the output is set for the duration of t 1. (I.e. as for Mo 2, only IN 3 used as inverse)

F1 = 1 F2 = 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)

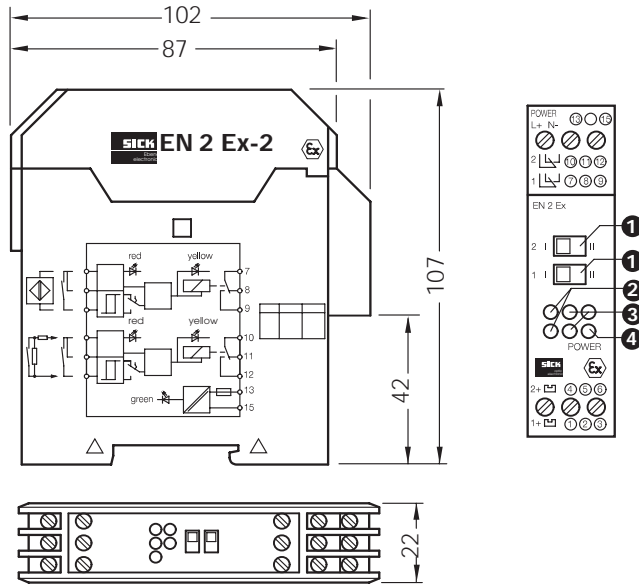
F1 = 1 F2 = 1
Mo 4



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

Dimensions in mm



Features

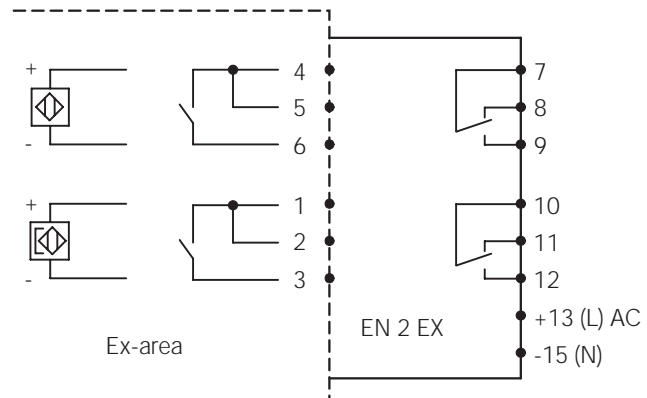


- ▶ Reliable electrical isolation between input, output, and supply voltage to VDE 0100 Part 410
- ▶ 2-channel each with one relay output 1 x u
- ▶ Invertible outputs
- ▶ Conformity certificate PTB-No. EX.-95.C.20003X
- ▶ Intrinsically safe inputs to [EEx ia] IIC
- ▶ Power-on and status indicators
-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

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
Power 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	$0 I \leq 1.55 \text{ mA}$, $1 I \geq 1.75 \text{ mA}$		
Short-circuit current	$I \geq 6 \text{ mA}$		
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

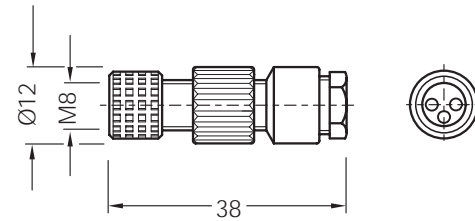
Input		Direction of action	Cable monitoring	Relay	Switching status, yellow LED	Cable monitoring, red LED
Without fault in input circuit	Ind. proximity sensor attenuated Magn. proximity sensor unattenuated	Normal	Any	Released	Off	Off
	Ind. proximity sensor unattenuated Magn. proximity sensor attenuated	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

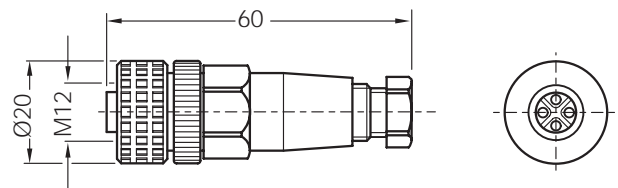
Round connectors adjustable

Cable receptacle, straight design

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

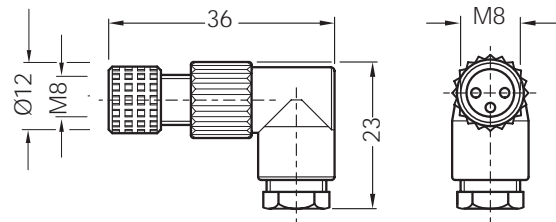


DOS-1204-G
M12 Order-No. 6007302
 connectable cable: \varnothing 4-6 mm / max. 0,75 mm²

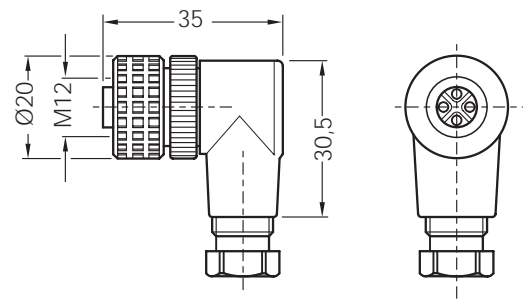


Cable receptacle, angled design

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



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



Accessories

Round connectors with integral cable

Straight design

DOL-0803-G02M

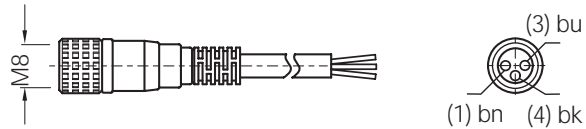
PVC, 3 x 0,25 mm², 2 m

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

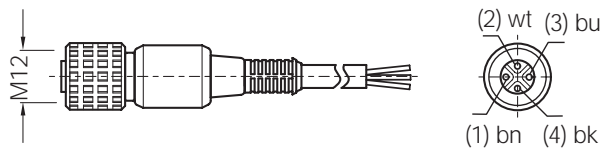
PUR, 3 x 0,34 mm², 5 m

M12 Order-No. 7902084

DOL-1204-G10M

PVC, 4 x 0,25 mm², 10 m

M12 Order-No. 6010543



Angled design

DOL-0803-W02M

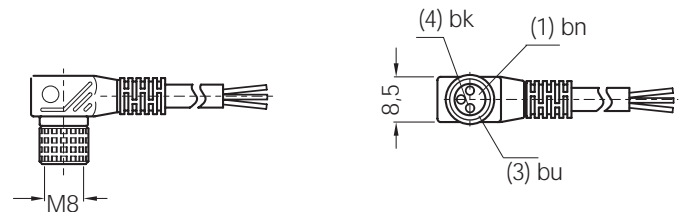
PVC, 3 x 0,25 mm², 2 m

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

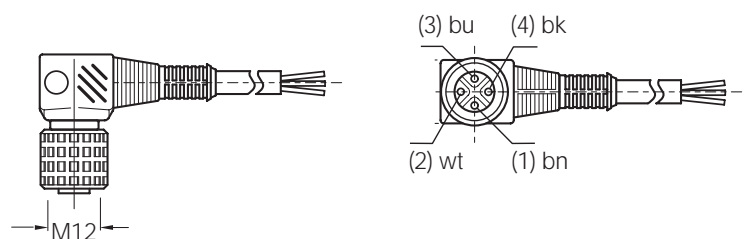
PUR, 3 x 0,34 mm², 5 m

M12 Order-No. 7902085

DOL-1204-W10M

PVC, 4 x 0,25 mm², 10 m

M12 Order-No. 6010541

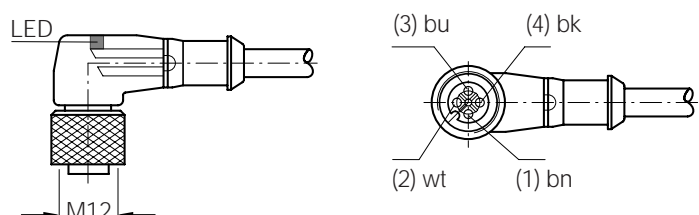


DOL-1204-W05ME

PUR/PVC, 4 x 0,34 mm², 5 m

with LED's for power and output indication,
PNP-complementary

M12 Order-No. 6020398

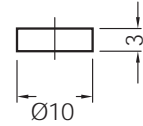


Accessories

Magnets

Magnet M 1.0

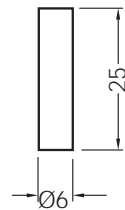
MAG-1003-S, Samarium cobalt
temperature resistance
-50 °C to +180 °C



Order-No. 7901782

Magnet M 2.0

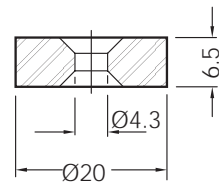
MAG-0625-A, AlNiCo
temperature resistance
-100 °C to +450 °C



Order-No. 7901783

Magnet M 3.0

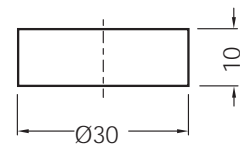
MAG-2006-B, Barium ferrite
temperature resistance
-25 °C to +130 °C



Order-No. 7901784

Magnet M 4.0

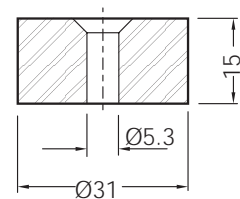
MAG-3010-B, Barium ferrite
temperature resistance
-25 °C to +130 °C



Order-No. 7901785

Magnet M 5.0

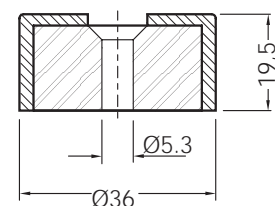
MAG-3015-B, Barium ferrite
temperature resistance
-25 °C to +130 °C



Order-No. 7901786

Magnet M 5.1

MAG-3515-B, Barium ferrite with
plastic jacket



Order-No. 7902086

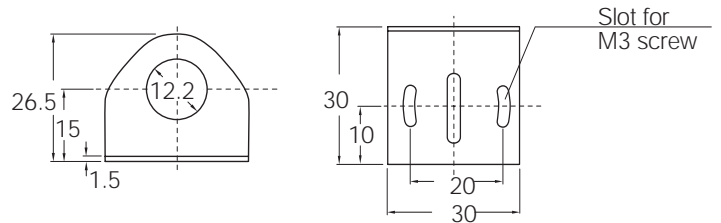
Accessories

Mounting brackets

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

metal

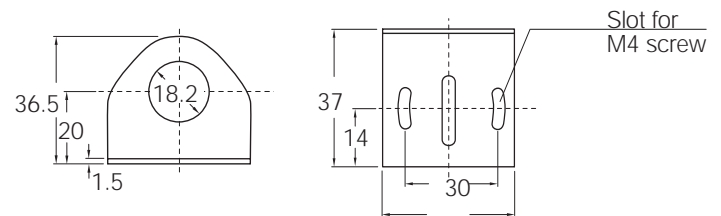
Order-No. 5308447



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

metal

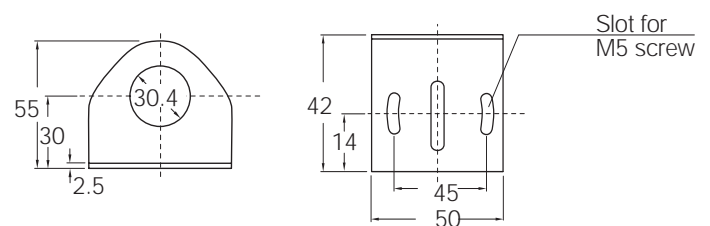
Order-No. 5308446



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

metal

Order-No. 5308445



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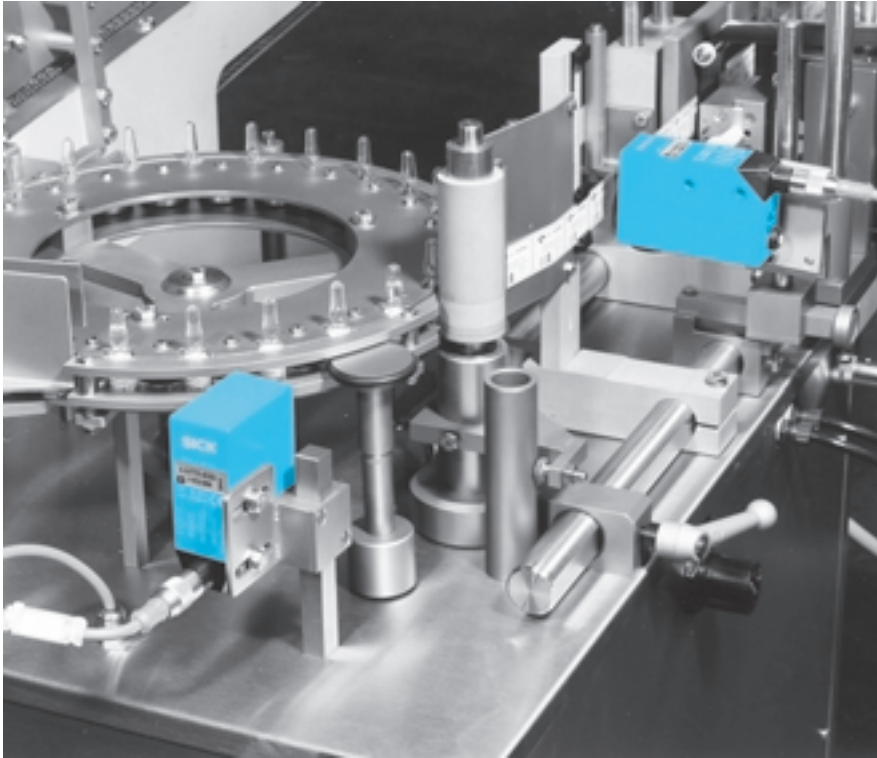
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SICK Industrial sensor systems

Divisions



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 proximity 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. SICK 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.