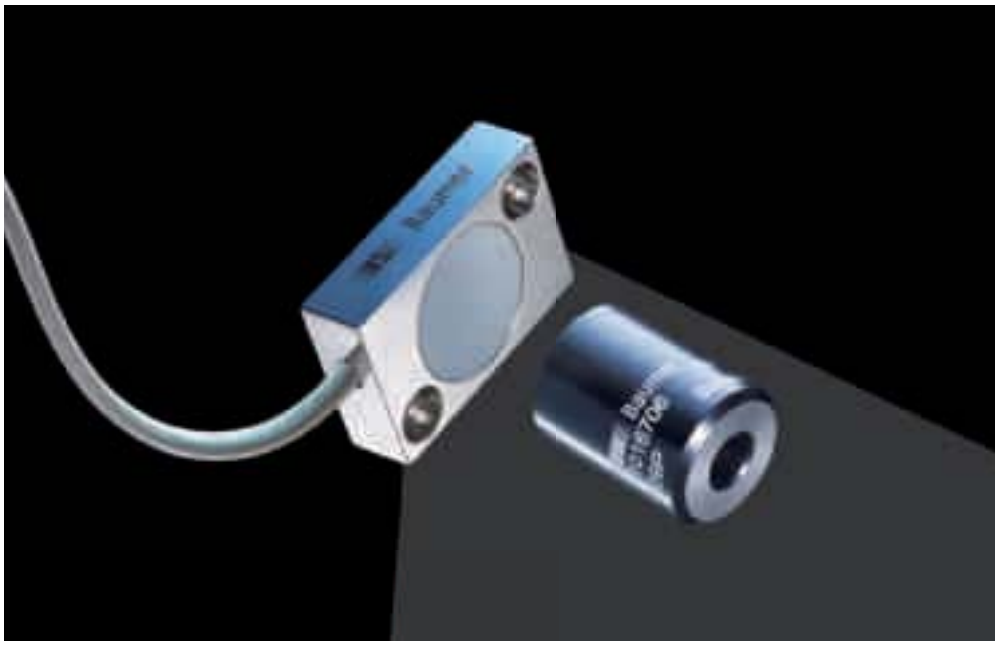
Baumer

Compact, fast, non-contact.
Magnetic sensors.



Edition 2012

Passion for Sensors

Magnetic sensors are proven in the field and are constantly further developed and refined. Thanks to their substantial benefits like high detection speed or extreme dirt resistance and by utilizing a non-contact and wear free sensing principle they are indispensable in many applications. The extensive Baumer portfolio provides magnetic sensors with different techniques and designs and hence the optimal solution for every application.

Make your choice:

- Magnetic angle sensors for non-contact detection of rotation angles throughout 360°
- Hall sensors to pick up rotating speeds and directions of toothed wheels
- Magnetic proximity switches for long-range detection of magnetic fields
- Cylinder sensors to detect limit positions of pistons in cylinders

Table of contents

Baumer – Setting standards with innovations

Development at Baumer

The success story of the Baumer Group is heavily marked by innovations. In the past years, many trend setting Baumer products have been brought to the market. Particular attention was given to miniaturization, precision and measuring speed as well as robustness of sensors. These attributes set Baumer products apart. In order to realize ambitious future targets, Baumer attaches great importance to research and development. Over 10% of our staff, whether hard- and software engineers, designers or process engineers, develop new products and systems. The Baumer development teams are part of an international network and cultivate close contact with research institutions and universities. As one of the technological leaders, Baumer strives to maintain its advantage and to protect its innumerable innovations with patents.

Comprehensive product range

- Actuators and positioning drives
- Capacitive proximity sensors
- Counters
- Digital cameras
- Encoders
- Force and strain sensors
- Inductive sensors
- Level measurement
- Magnetic sensors
- OCR and code reader systems
- Optical inspection systems
- Photoelectric sensors
- Precision switches My-Com
- Pressure measurement
- Process analysis
- Process displays
- Resolvers
- Smart vision sensors
- Speed switches
- Spindle positioning systems
- Tachogenerators
- Temperature sensors
- Ultrasonic sensors
- Vision sensors
- Conductivity sensors
- Network components

Magnetic sensors for every requirement

Always the optimally suited technology

Baumer offers an extensive standard product range with sophisticated solutions for the most diverse demands and applications. There is a wide choice of measuring and switching magnetic sensors, optionally in full-metal or plastic configurations, and sensor platforms individually designed for demanding industries such as railway vehicles and materials handling.

The multifaceted portfolio comprises products with various specifications and properties and is continuously expanded.

The benefits of the all-encompassing product range are obvious:

- Quick availability
- Eased selection of the optimum solution
- Approved and certified products
- No initial costs

Individually adapted to your application

The extensive Baumer portfolio offers end-to-end solutions, individually suited for your very special application. To meet the site's specific requirements or harsh environment, the sensors features and properties are designed to suit your specific application.

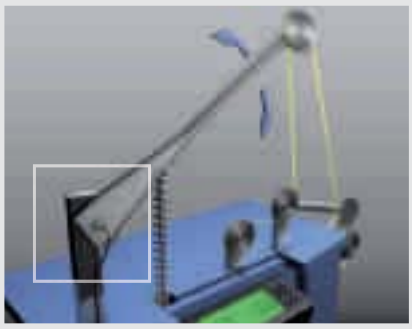
Baumer has got what it takes to be your trusted and expert partner for customised solutions:

- Longstanding experience and know-how in design and engineering
- In-house manufacturing resources including SMD facilities
- Practical application expertise in diverse industries and markets
- Implementation experience from the stage of the product idea to series maturity

Benefit from our dependable, cost-optimized solutions and short implementation time.

Magnetic angle measuring sensors

Fields of application



Strain control via the dancer arm rotation angle

- Non-contact product alternative to mechanical potentiometers
- Non-wearing despite repeating movements
- Top quality of control by short response time and high resolution

Inclination angle detection of the container on garbage trucks

- Reliable absolute angle detection, impervious to moisture and dirt
- The measuring operation is unaffected by any changes in the gap between sensor and magnet when within the specified sensing range
- The electronics being fully integrated in the sensor housing allows for eased installation even if space is a constraint

Output of the crane's current rotation angle

- Dependable position feedback even after power failure thanks to absolute sensing method
- Thanks to the non-contact sensing method both strong vibrations and heavy load conditions on the crane do not have an influence on the sensor performance
- The electronics being fully integrated in the sensor housing allows for eased installation even if space is a constraint

Angle measuring sensors – some facts in brief

Magnetic angle measuring sensors detect rotation angles throughout the entire 360° range by aid of a permanent magnet. The current position is output as an absolute analog signal. The sensor's non-contact sensing method is absolutely wearfree and ensures topgrade fail-free performance. The high resolution of 0,09° and a response time of less than 3 ms enable precise control of complex processes. Even in demanding environments with dust, fabric and moisture, the magnetic angle measuring sensors provide dependable operation.

Hall sensors

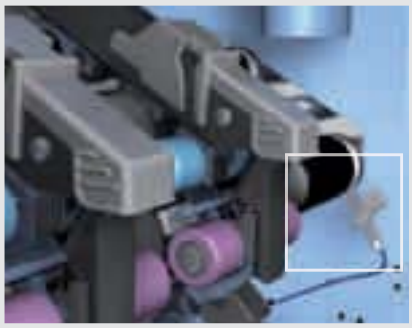
Fields of application

Slide control and speed monitoring at railed vehicles

- Consistent speed feedback prevents the wheels slipping and locking
- Dependable operation by extreme immunity to shocks and vibrations
- Top safety level by compliance with strict railway standards

Speed monitoring at ring spinning machines

- The high switching frequency allows for highly dynamic applications
- Dependable detection in any environment thanks to extreme dirt resistance
- Wearfree and ultra-long service life by non-contact Hall technology



Directly integrated in the gear

- Dependable feedback of speed and rotational direction of toothed wheels
- Sensor face can also be deployed in oil
- Extended temperature range and pressure resistance for a wide application range

Hall sensors – some facts in brief

Thanks to their high switching frequency of max. 20 kHz, Hall sensors are mainly deployed for detecting fast running toothed wheels. The high resolution ensures reliable detection of module sizes as little as 1 and up. By two signals shifted in a phase the sensor not only picks the wheels' speed but at the same time also the sense of rotation. Since Hall sensors fully eliminate the need for any mechanical moving components, wear is down to a minimum whereas longevity is substantially enhanced. In a full-metal housing they are the product to choose in dirty, humid or oily environments.

Magnetic proximity switches

Fields of application

Liquid level detection using a float carried magnet

- Non-invasive detection through the tank wall without direct media contact and contamination by the sensor
- Level detection unaffected by foam and soiling
- Quick and easy sensor installation by cable ties

Monitoring final positions of telescopic outriggers

- Safe detection impervious to humidity and dirt
- Optionally with full-metal sensor and/or magnet encapsulation for improved protection
- Versatile application possibilities thanks to extended switching distance

Stroke limitation in hydraulic cylinders

- The piston-carried permanent magnet is detected from the outside of the cylinder
- Dependable piston feedback unaffected by other metal components
- Substantially eased maintenance since the sensor is installed outside the closed high-pressure system

Magnetic proximity switches – some facts in brief

Magnetic proximity switches respond to magnetic fields within a distance of 60 mm and will detect them even through non-ferromagnetic materials like stainless steel. They provide precise and dependable switching behaviour even in damp or dirty environments. Their sensing range capabilities depend on the selected permanent magnet, thus they provide versatile mounting options even in a confined space.

The permanent magnet can be attached independently from polarity. Generous mounting tolerances save both time and effort during installation.

Magnetic cylinder sensors

Fields of application

Cylinders with C- and T-slot

- Eased installation – simply inserted in the slot
- The permanent magnet inside the cylinder is detected through the cylinder wall
- Completely free from maintenance and wear

Attachment to cylinders without slot

Versatile mounting accessory kits allow attachment to any conventional cylinder:

- Round cylinders
- Tie-rod cylinders
- Dovetail or other specialised slots

Compact sensor designs for short-stroke cylinders

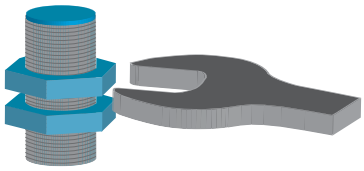
- By virtue of its lateral cable outlet, the sensor is very short and easy to fit into tight spots

Cylinder sensors – some facts in brief

Monitoring the movements of pneumatic cylinders is an essential task in countless fields of automation. Magnetic cylinder sensors exactly recognize the piston positions by non-contact technique and will output a switching signal. Completely free from wear they are attached outside the cylinder. Where standard T- or C-slots are provided, the sensor can be directly inserted into the slot and fixed. For other cylinder types there is a wide selection of accessory kits which enable easy and quick installation.

Maximum installation torque

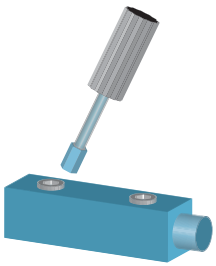
Observe the specified maximum installation torque to prevent the sensor from damage during installation.



Cylindrical design with male (external) thread

Brass nickel-plated	Chrome-nickel-Steel
M8 = 7 Nm	M8 = 10 Nm
M12 = 15 Nm	M12 = 20 Nm
M18 = 40 Nm	M18 = 55 Nm

The values applicable to the sensing head are reduced by approx. 30%.



Rectangular design with female (internal) thread

M2 = 0,1 Nm
M2,5 = 0,1 Nm
M3 = 0,3 Nm

Protection class

1) Protection against penetration of dust and complete protection against contact with electrical components

2) Protection against a water jet from any direction.

IP 67 comprises the IP 65 test specification and further enhanced water protection. The test piece must be immersed in water to a depth of 1 meter for 30 minutes.

Water must not enter in a harmful quantity when the enclosure is immersed in water under defined conditions of pressure and time to be specified between manufacturer and user.

The conditions however must exceed IP 67 requirements.

IP69K was initially developed for road vehicles, especially those needing regular intensive cleaning (dump trucks, cement mixers, etc.), but also finds use in other areas (e.g. food industry, car wash centres). IP 69K is an important standard for components deployed in road vehicles and the food and beverage industry. The test specification describes high-pressure cleaning with pure water at a pressure of 8'000 to 10'000 kPa and at a temperature of +80°C with a flow rate of 14 - 16 l/min for 30 seconds. Since the test specification differs substantially from those of other IPs, IP 69K protection does not automatically imply IP 67 or IP 68. IP 67 is the only standard to comprise also the lower degrees of protection.

Elektrische und mechanische Definitionen

■ A

Anschlusskabel

Magnetsensoren sind serienmässig mit PUR-Kabeln ausgerüstet, wodurch erhöhte Resistenz gegen Öle und Fette gegeben ist. Für spezielle Anforderungen sind ebenfalls Sensoren mit FEP- oder Radox-Kabeln erhältlich.

■ B

Betriebsspannungsbereich +Vs

Bei einer maximalen Restwelligkeit von 10% darf die Betriebsspannung die angegebenen Minimal- und Maximalwerte nicht unter- bzw. überschreiten.

■ D

Differentieller Hallsensor

Differentielle Hallsensoren sind aufgrund ihres Aufbaus weniger empfindlich auf magnetische Störsignale.
Beim Einbau muss deren Orientierung zum Zahnrad beachtet werden.

■ F

Ferromagnetisch

Ferromagnetische Eigenschaften hat ein Material, wenn es in einem beliebig schwachen externen Magnetfeld eine Magnetisierung zeigt. Beispiele sind Eisen, Cobalt, Nickel oder Ferrit.

Feldlinien

Feldlinien veranschaulichen eine Kraftrichtung von einem Feld auf ein Testobjekt.

■ G

Gesicherter Schaltabstand

Abstand gemessen von der aktiven Fläche des Sensors zum Betätigungsobjekt, welcher innerhalb der spezifizierten technischen Daten und unter Einhaltung der Montagehinweise zugesichert wird.

■ H

Hysterese

Die Hysterese ist die Differenz zwischen Einschalt- und Ausschaltpunkt bei Annäherung und Entfernung des Objektes zum Sensor.

■ L

Laststrom

Gibt den maximalen Strom an, der ohne zeitliche Begrenzung über den Ausgang fliessen darf.

■ M

Magnetoresistiv

Durch Anlegen eines äusseren Magnetfeldes wird der elektrische Widerstand eines Materials im Sensor geändert. Diese Änderung wird in der internen Elektronik ausgewertet und ausgegeben.

Modul m

Der Modul m stellt bei einem Zahnrad das Verhältnis von Teilkreisdurchmesser d zur Zähnezahl z dar.
Die ineinandergreifenden Zahnradpaare müssen immer denselben Modul besitzen.
Formel: m = d/z

■ O

Ölbeständigkeit

Für Anwendungen mit ölhaltiger Umgebung eignen sich Sensoren mit Vollmetallgehäuse und PUR-Kabel.

■ P

Permanentmagnet

Als Permanentmagnet oder Dauermagnet bezeichnet man ein Material, welches nach Einwirkung eines Magnetfeldes sein statisches Magnetfeld ohne einen elektrischen Stromfluss behält.

■ R

Rotationssymmetrisch

Der Sensor ist so aufgebaut, dass die Verdrehung des Sensors um seine Achse gegenüber dem Objekt keine Rolle spielt.

■ S

Schaltzustandanzeige

Die LED zeigt den aktuellen Schaltzustand an.

Spannungsabfall Vd

Diese Angabe gibt die maximal abfallende Spannung über dem durchgesteuerten Ausgang an.

Stromaufnahmen

Der maximal von der Schaltung aufgenommene Strom bei Nennspannung (ohne Last).

Systemgenauigkeit

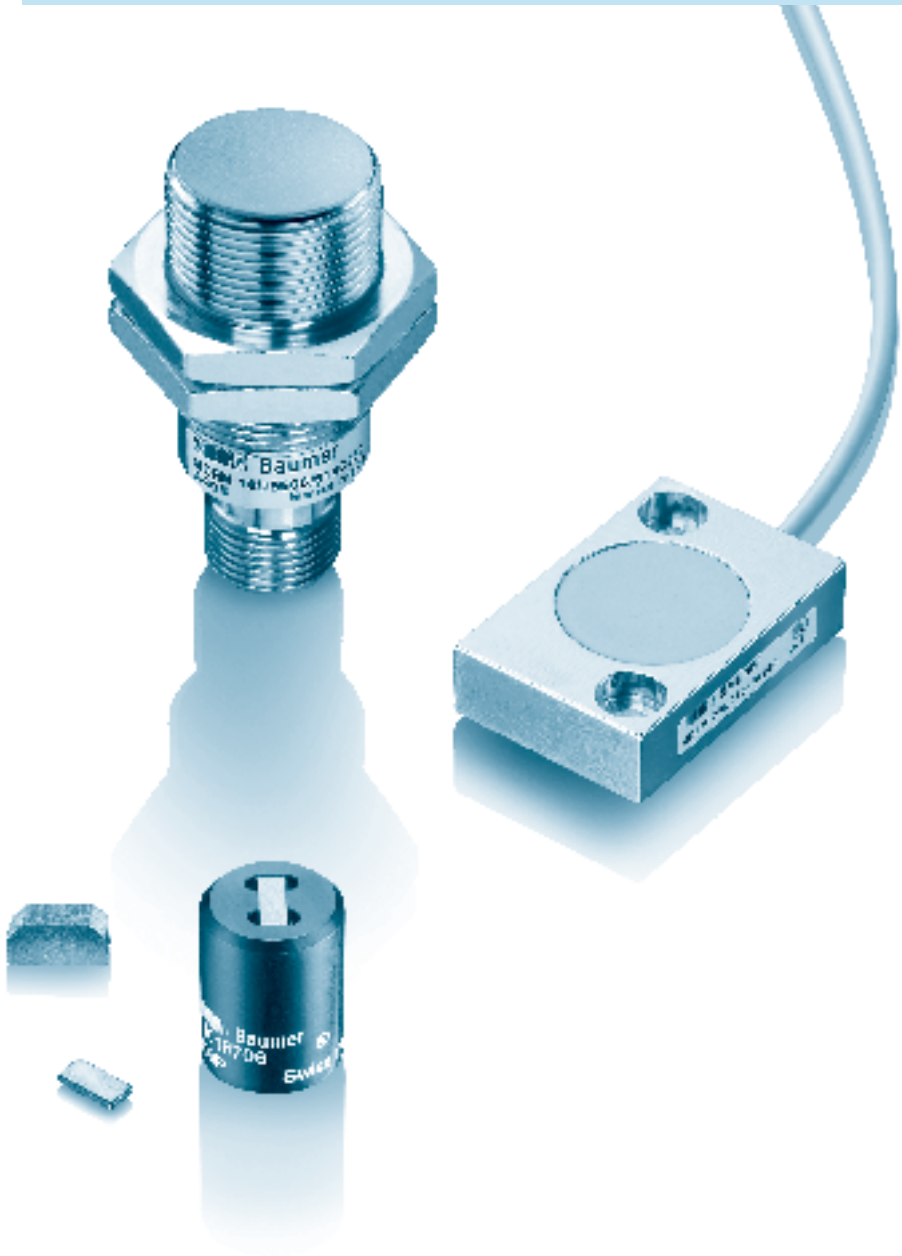
Die Systemgenauigkeit gibt den maximalen Messfehler von Sensor und Permanentmagnet innerhalb des angegebenen Winkelbereiches bei einer Umgebungstemperatur von 22° und unter Einhaltung der angegebeben Montagespezifikationen an.

■ Z

Zulässige Leitungslänge

Grosse Leitungslängen bedeuten für Näherungsschalter eine kapazitive Belastung des Ausgangs und einen verstärkten Einfluss von Störsignalen. Leitungslängen >5 m sollten, wenn möglich, vermieden werden.

Magnetic angle sensors



cylindrical designs

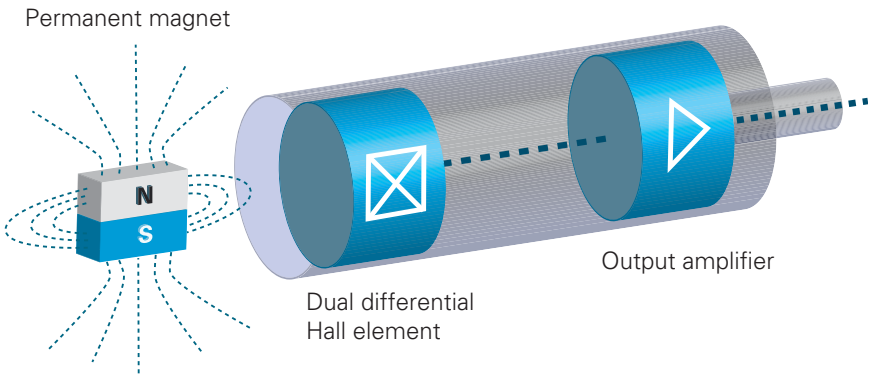
product family	MDRM 18	MDRM 18	MDRM 18	MDRM 18	MDRM 18	MDRM 18
						
angular range	120° linear	270° linear	270° linear	160° linear	360° linear	360° linear
resolution	0,09 °	0,09 °	1,41 °	0,09 °	0,09 °	1,41 °
output signal	4 ... 20 mA	4 ... 20 mA	4 ... 20 mA	0,5 ... 4,5 VDC 1 ... 9 VDC	0 ... 4,3 VDC	0 ... 5 VDC
working distance max.	5 mm, with magnet 11052886	5 mm, with magnet 11052886	4 mm, with magnet 11052886	5 mm, with magnet 11052886	5 mm, with magnet 11052886	4 mm, with magnet 11052886
voltage supply range +Vs	15 ... 30 VDC	15 ... 30 VDC	15 ... 30 VDC	5 VDC 12 ... 28 VDC	4,7 ... 7,5 VDC	4,75 ... 5,25 VDC
cable PUR 3 x 0,25, 2 m	■	■	■	■	■	■
flylead connector PUR M12, L=200 mm	■					
flylead connector PUR M8, L=200 mm				■		
connector M12		■	■		■	■
housing material	brass nickel plated	brass nickel plated	brass nickel plated	brass nickel plated	brass nickel plated	brass nickel plated
Page	**17**	**18**	**19**	**20**	**22**	**21**

rectangular designs

product family	MDFM 20	MDFM 20	MDFM 20	MDFM 20
				
angular range	270° linear	270° linear	360° linear	360° linear
resolution	0,09 °	1,41 °	0,09 °	1,41 °
output signal	4 ... 20 mA	4 ... 20 mA	0 ... 4,3 VDC	0 ... 5 VDC
working distance max.	5 mm, with magnet 11052886	4 mm, with magnet 11052886	5 mm, with magnet 11052886	4 mm, with magnet 11052886
voltage supply range +Vs	15 ... 30 VDC	15 ... 30 VDC	4,7 ... 7,5 VDC	4,75 ... 5,25 VDC
cable PUR 3 x 0,25, 2 m	■	■	■	■
flylead connector PUR M8, L=200 mm	■	■	■	■
housing material	brass nickel plated	brass nickel plated	brass nickel plated	brass nickel plated
Page	**23**	**24**	**25**	**26**

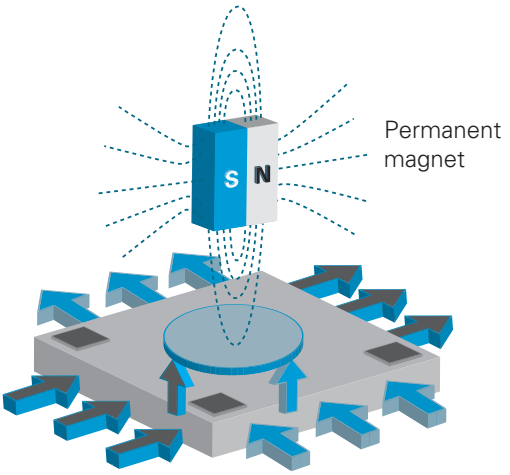
General information

A magnetic angular sensor identifies the rotation angle of a permanent magnet in respect to the sensor. The integrated electronics will evaluate the value into an analog electric output signal.

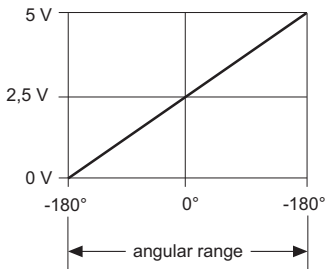


Functional principle

The heart of a magnetic angular sensor is the integrated dual differential Hall element which builds an electrical parameter related to the flux direction of an exterior magnetic field. This magnetic field rotating about the element's center axis generates two sinusoids shifted by 90° which are utilized to detect the rotation angle for output as an absolute value. The integrated electronics evaluates the sinusoids into a linear voltage or current signal. The absolute dection principle ensures output of the correct rotation angle even after power failure.

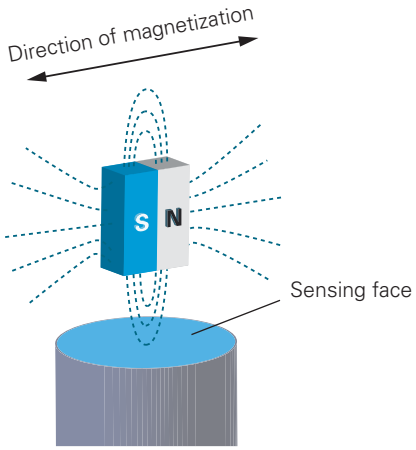


Example of an output signal provided by a sensor with a sensing angle throughout 360° and voltage output



Permanent magnet

When attaching the magnet make sure that its magnetization direction (north / south pole) is aligned in a parallel manner to the sensor's sensing face. The carrier material to hold the magnet should be non-ferromagnetic (e.g. no steel), otherwise it will hamper the sensing distance.

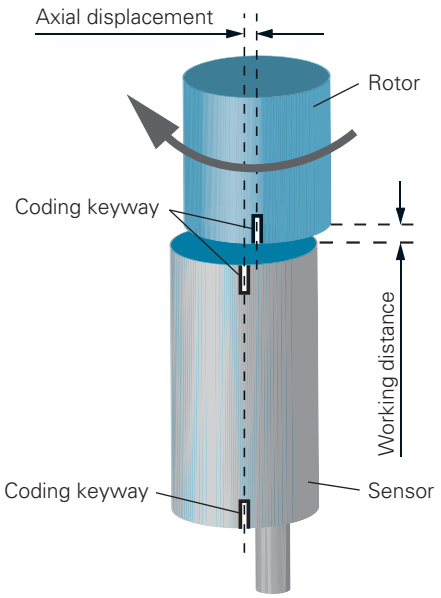


Working distance

The magnet rotor or the permanent magnet must be attached within the specified working distance to the sensor. Observe the specifications in the data sheet for axial displacement.

Zero signal

For coarse zero signal tuning, align the keyways provided at sensor and magnet rotor (accessory) with each other. Finetuning will be performed electronically by the downstream control. Clockwise rotation of the permanent magnet will generate a rise in the output signal.

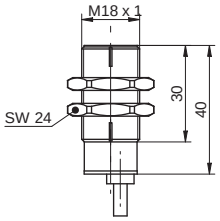


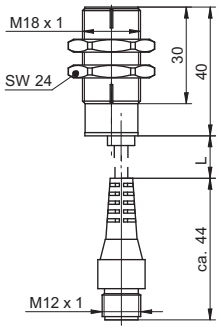
120°; 4 … 20 mA

- Angular range 120° linear
- High resolution and system precision
- Contactless, wear-free system

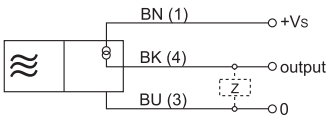
general data	
angular range	120° linear
resolution	0,09°
system accuracy	± 0,25 %
temperature drift	± 0,1 % (Full Scale)
working distance max.	5 mm, with magnet 11052886
axial misalignment max.	0,4 mm
electrical data	
response time	< 4 ms
voltage supply range +Vs	15 ... 30 VDC
current consumption max.	30 mA
output signal	4 ... 20 mA
load resistance	500 Ohm/15 VDC, 1000 Ohm/30 VDC
output circuit	current output
short circuit protection	yes
reverse polarity protection	yes, Vs to GND
mechanical data	
type	cylindrical threaded
housing material	brass nickel plated
dimension	18 mm
material (sensing face)	PBTP
ambient conditions	
operating temperature	-40 ... +85 °C
protection class	IP 67
remarks	
working distance max. in conjunction with permanent magnet 11052886 (available as an accessory)	

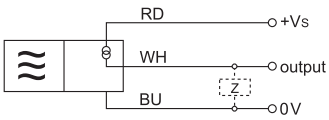
dimension drawings



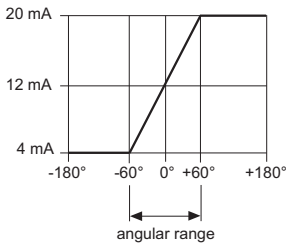


connection diagrams





output signal



order reference	connection types
MDRM 18I9524	cable PUR 3 x 0,25, 2 m
MDRM 18I9524/KS34P	flylead connector PUR M12, L=200 mm

connectors and mating connectors	
ESG 34SH0200	Connector M12, 3 pin, straight, 2 m
ESW 33SH0200	Connector M12, 3 pin, angular, 2 m
additional cable connectors and field wireable connectors: see accessories	
mounting accessories	
11052887	Rotor with permanent magnet MSFN AA01X06
11052885	Permanent magnet MMFN AA01X06
11016706	Rotor with permanent magnet MSFS AA03X08
11052886	Permanent magnet MMFS AA03X08
for details: see accessories section	

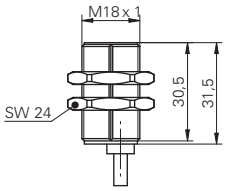
270°; 4 … 20 mA

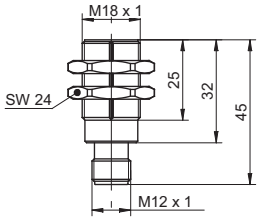
- Angular range 270° linear
- High resolution and system precision
- Contactless, wear-free system

general data	
angular range	270° linear
resolution	0,09°
system accuracy	± 0,25 %
temperature drift	± 0,1 % (Full Scale)
working distance max.	5 mm, with magnet 11052886
axial misalignment max.	0,4 mm
electrical data	
response time	< 4 ms
voltage supply range +Vs	15 ... 30 VDC
current consumption max.	30 mA
output signal	4 ... 20 mA
load resistance	500 Ohm/15 VDC, 1000 Ohm/30 VDC
output circuit	current output
short circuit protection	yes
reverse polarity protection	yes, Vs to GND
mechanical data	
type	cylindrical threaded
housing material	brass nickel plated
dimension	18 mm
material (sensing face)	PBTP
ambient conditions	
operating temperature	-40 ... +85 °C
protection class	IP 67
remarks	
working distance max. in conjunction with permanent magnet 11052886 (available as an accessory)	

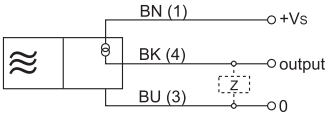
order reference	connection types
MDRM 18I9524/C270	cable PUR 3 x 0,25, 2 m
MDRM 18I9524/S14C270	connector M12

dimension drawings

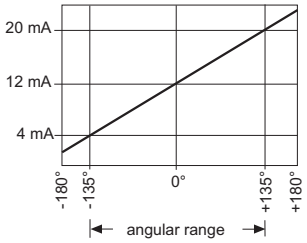




connection diagram



output signal



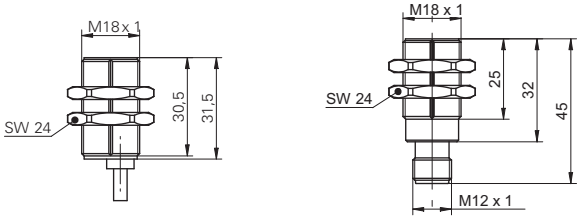
connectors and mating connectors	
ESG 34AH0200	Connector M12, 4 pin, straight, 2 m
ESW 33AH0200	Connector M12, 4 pin, angular, 2 m
additional cable connectors and field wireable connectors: see accessories	
mounting accessories	
11052887	Rotor with permanent magnet MSFN AA01X06
11052885	Permanent magnet MMFN AA01X06
11016706	Rotor with permanent magnet MSFS AA03X08
11052886	Permanent magnet MMFS AA03X08
for details: see accessories section	

270°; 4 … 20 mA

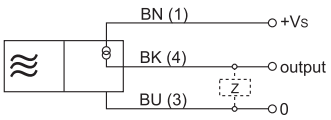
- Angular range 270° linear
- Contactless, wear-free system

general data	
angular range	270° linear
resolution	1,41°
system accuracy	± 0,6 %
temperature drift	± 0,1 % (Full Scale)
working distance max.	4 mm, with magnet 11052886
axial misalignment max.	0,5 mm
electrical data	
response time	< 2 ms
voltage supply range +Vs	15 ... 30 VDC
current consumption max.	30 mA
output signal	4 ... 20 mA
load resistance	500 Ohm/15 VDC, 1000 Ohm/30 VDC
output circuit	current output
short circuit protection	yes
reverse polarity protection	yes, Vs to GND
mechanical data	
type	cylindrical threaded
housing material	brass nickel plated
dimension	18 mm
material (sensing face)	PBTP
ambient conditions	
operating temperature	-40 ... +85 °C
protection class	IP 67
remarks	
working distance max. in conjunction with permanent magnet 11052886 (available as an accessory)	

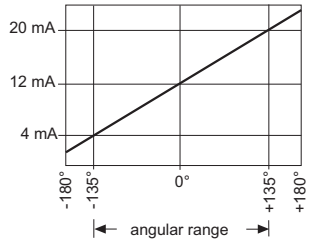
dimension drawings



connection diagram



output signal



order reference	connection types
MDRM 18I9524/A270	cable PUR 3 x 0,25, 2 m
MDRM 18I9524/S14A270	connector M12

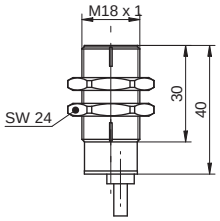
connectors and mating connectors	
ESG 34AH0200	Connector M12, 4 pin, straight, 2 m
ESW 33AH0200	Connector M12, 4 pin, angular, 2 m
additional cable connectors and field wireable connectors: see accessories	
mounting accessories	
11052887	Rotor with permanent magnet MSFN AA01X06
11052885	Permanent magnet MMFN AA01X06
11016706	Rotor with permanent magnet MSFS AA03X08
11052886	Permanent magnet MMFS AA03X08
for details: see accessories section	

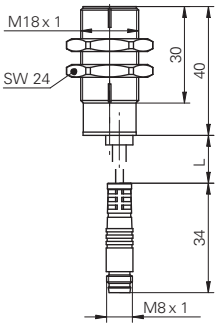
160°; 0,5 … 4,5 or 1 … 9 VDC

- Angular range 160° linear
- High resolution and system precision
- Contactless, wear-free system

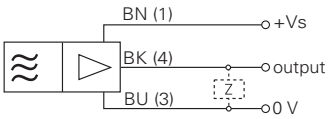
general data	
angular range	160° linear
resolution	0,09°
system accuracy	± 0,25 %
working distance max.	5 mm, with magnet 11052886
axial misalignment max.	0,4 mm
electrical data	
response time	< 4 ms
load resistance	> 1000 Ohm
output circuit	voltage output
short circuit protection	yes
voltage supply range +Vs = 5 VDC	
current consumption max.	10 mA
output signal	0,5 ... 4,5 VDC
reverse polarity protection	no
voltage supply range +Vs = 12 ... 28 VDC	
current consumption max.	20 mA
output signal	1 ... 9 VDC
reverse polarity protection	yes, Vs to GND
mechanical data	
type	cylindrical threaded
housing material	brass nickel plated
dimension	18 mm
material (sensing face)	PBTP
ambient conditions	
protection class	IP 67
remarks	
working distance max. in conjunction with permanent magnet 11052886 (available as an accessory)	

dimension drawings

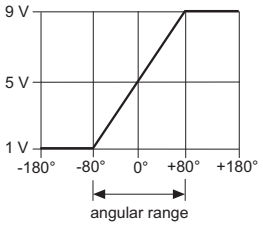


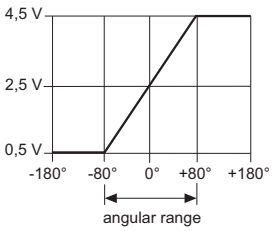


connection diagram



output signal





connectors and mating connectors	
ESG 32SH0200	Connector M8, 3 pin, straight, 2 m
ESW 31SH0200	Connector M8, 3 pin, angular, 2 m
additional cable connectors and field wireable connectors: see accessories	

mounting accessories	
11052887	Rotor with permanent magnet MSFN AA01X06
11052885	Permanent magnet MMFN AA01X06
11016706	Rotor with permanent magnet MSFS AA03X08
11052886	Permanent magnet MMFS AA03X08
for details: see accessories section	

order reference	voltage supply range +Vs	temperature drift	connection types	operating temperature
MDRM 18U9501	5 VDC	± 0,06 % (Full Scale)	cable PUR 3 x 0,25, 2 m	-40 ... +85 °C
MDRM 18U9501/KS35P	5 VDC	± 0,2 % (Full Scale)	flylead connector PUR M8, L=200 mm	-40 ... +85 °C
MDRM 18U9524	12 ... 28 VDC	± 0,2 % (Full Scale)	cable PUR 3 x 0,25, 2 m	-25 ... +85 °C

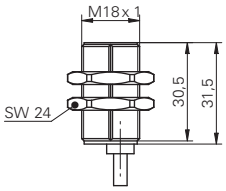
360°; 0 … 5 VDC

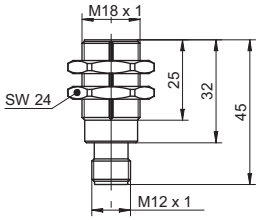
- Angular range 360° linear
- Contactless, wear-free system

general data	
angular range	360° linear
resolution	1,41°
system accuracy	± 0,6 %
temperature drift	± 0,1 % (Full Scale)
working distance max.	4 mm, with magnet 11052886
axial misalignment max.	0,5 mm
electrical data	
response time	< 2 ms
voltage supply range +Vs	4,75 ... 5,25 VDC
current consumption max.	20 mA
output signal	0 ... 5 VDC
load resistance	> 1000 Ohm
output circuit	voltage output
short circuit protection	no
reverse polarity protection	no
mechanical data	
type	cylindrical threaded
housing material	brass nickel plated
dimension	18 mm
material (sensing face)	PBTP
ambient conditions	
operating temperature	-40 ... +85 °C
protection class	IP 67
remarks	
working distance max. in conjunction with permanent magnet 11052886 (available as an accessory)	

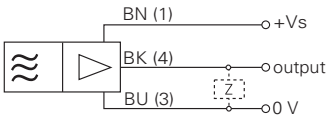
order reference	connection types
MDRM 18U9504/A360	cable PUR 3 x 0,25, 2 m
MDRM 18U9504/S14A360	connector M12

dimension drawings

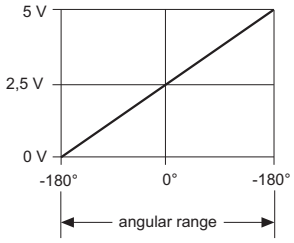




connection diagram



output signal



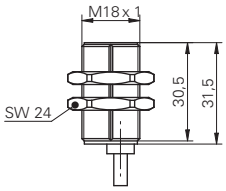
connectors and mating connectors	
ESG 34AH0200	Connector M12, 4 pin, straight, 2 m
ESW 33AH0200	Connector M12, 4 pin, angular, 2 m
additional cable connectors and field wireable connectors: see accessories	
mounting accessories	
11052887	Rotor with permanent magnet MSFN AA01X06
11052885	Permanent magnet MMFN AA01X06
11016706	Rotor with permanent magnet MSFS AA03X08
11052886	Permanent magnet MMFS AA03X08
for details: see accessories section	

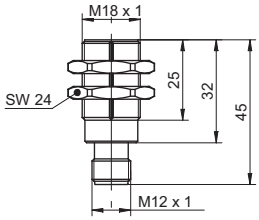
360°; 0 … 4,3 VDC

- Angular range 360° linear
- High resolution and system precision
- Contactless, wear-free system

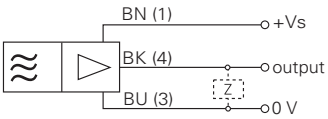
general data	
angular range	360° linear
resolution	0,09°
system accuracy	± 0,25 %
temperature drift	± 1 % (Full Scale)
working distance max.	5 mm, with magnet 11052886
axial misalignment max.	0,4 mm
electrical data	
response time	< 4 ms
voltage supply range +Vs	4,7 ... 7,5 VDC
current consumption max.	10 mA
output signal	0 ... 4,3 VDC
load resistance	> 1000 Ohm
output circuit	voltage output
short circuit protection	yes
reverse polarity protection	no
mechanical data	
type	cylindrical threaded
housing material	brass nickel plated
dimension	18 mm
material (sensing face)	PBTP
ambient conditions	
operating temperature	-40 ... +85 °C
protection class	IP 67
remarks	
working distance max. in conjunction with permanent magnet 11052886 (available as an accessory)	

dimension drawings

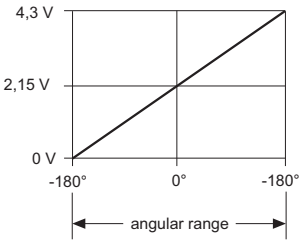




connection diagram



output signal



order reference	connection types
MDRM 18U9505/C360	cable PUR 3 x 0,25, 2 m
MDRM 18U9505/S14C360	connector M12

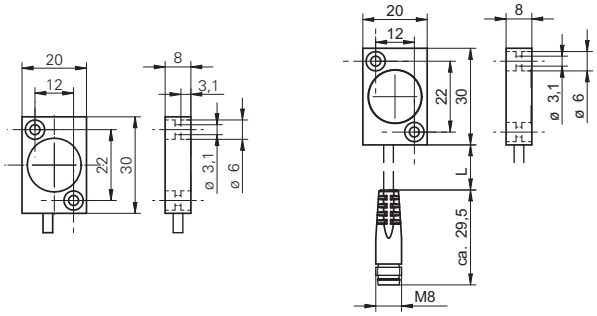
connectors and mating connectors	
ESG 34AH0200	Connector M12, 4 pin, straight, 2 m
ESW 33AH0200	Connector M12, 4 pin, angular, 2 m
additional cable connectors and field wireable connectors: see accessories	
mounting accessories	
11052887	Rotor with permanent magnet MSFN AA01X06
11052885	Permanent magnet MMFN AA01X06
11016706	Rotor with permanent magnet MSFS AA03X08
11052886	Permanent magnet MMFS AA03X08
for details: see accessories section	

270°; 4 … 20 mA

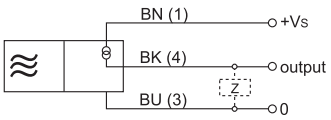
- Angular range 270° linear
- High resolution and system precision
- Contactless, wear-free system

general data	
angular range	270° linear
resolution	0,09°
system accuracy	± 0,25 %
temperature drift	± 0,1 % (Full Scale)
working distance max.	5 mm, with magnet 11052886
axial misalignment max.	0,4 mm
electrical data	
response time	< 4 ms
voltage supply range +Vs	15 ... 30 VDC
current consumption max.	30 mA
output signal	4 ... 20 mA
load resistance	500 Ohm/15 VDC, 1000 Ohm/30 VDC
output circuit	current output
short circuit protection	yes
reverse polarity protection	yes, Vs to GND
mechanical data	
type	rectangular
housing material	brass nickel plated
dimension	20 mm
material (sensing face)	PBTP
ambient conditions	
operating temperature	-40 ... +85 °C
protection class	IP 67
remarks	
working distance max. in conjunction with permanent magnet 11052886 (available as an accessory)	

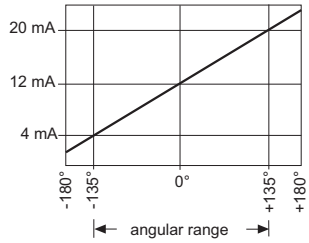
dimension drawings



connection diagram



output signal



order reference	connection types
MDFM 20I9424/C270	cable PUR 3 x 0,25, 2 m
MDFM 20I9424/KS35PC270	flylead connector PUR M8, L=200 mm

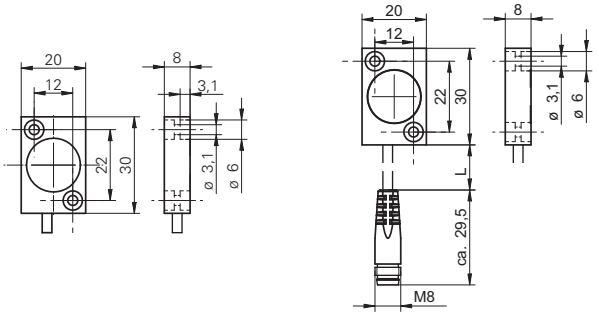
connectors and mating connectors	
ESG 32SH0200	Connector M8, 3 pin, straight, 2 m
ESW 31SH0200	Connector M8, 3 pin, angular, 2 m
additional cable connectors and field wireable connectors: see accessories	
mounting accessories	
11052887	Rotor with permanent magnet MSFN AA01X06
11052885	Permanent magnet MMFN AA01X06
11016706	Rotor with permanent magnet MSFS AA03X08
11052886	Permanent magnet MMFS AA03X08
for details: see accessories section	

270°; 4 … 20 mA

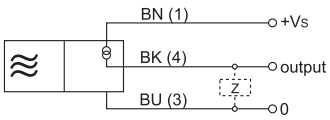
- Angular range 270° linear
- Contactless, wear-free system

general data	
angular range	270° linear
resolution	1,41°
system accuracy	± 0,6 %
temperature drift	± 0,1 % (Full Scale)
working distance max.	4 mm, with magnet 11052886
axial misalignment max.	0,5 mm
electrical data	
response time	< 2 ms
voltage supply range +Vs	15 ... 30 VDC
current consumption max.	30 mA
output signal	4 ... 20 mA
load resistance	500 Ohm/15 VDC, 1000 Ohm/30 VDC
output circuit	current output
short circuit protection	yes
reverse polarity protection	yes, Vs to GND
mechanical data	
type	rectangular
housing material	brass nickel plated
dimension	20 mm
material (sensing face)	PBTP
ambient conditions	
operating temperature	-40 ... +85 °C
protection class	IP 67
remarks	
working distance max. in conjunction with permanent magnet 11052886 (available as an accessory)	

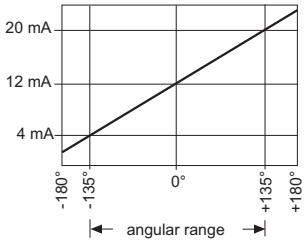
dimension drawings



connection diagram



output signal



order reference	connection types
MDFM 20I9424/A270	cable PUR 3 x 0,25, 2 m
MDFM 20I9424/KS35PA270	flylead connector PUR M8, L=200 mm

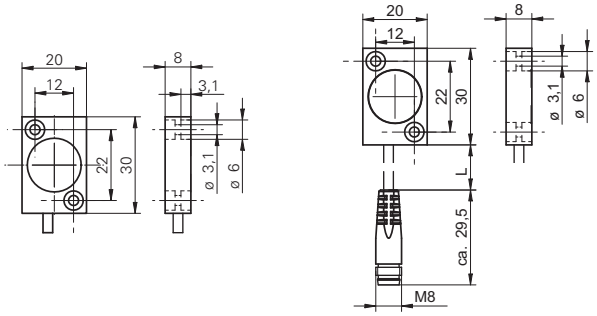
connectors and mating connectors	
ESG 32SH0200	Connector M8, 3 pin, straight, 2 m
ESW 31SH0200	Connector M8, 3 pin, angular, 2 m
additional cable connectors and field wireable connectors: see accessories	
mounting accessories	
11052887	Rotor with permanent magnet MSFN AA01X06
11052885	Permanent magnet MMFN AA01X06
11016706	Rotor with permanent magnet MSFS AA03X08
11052886	Permanent magnet MMFS AA03X08
for details: see accessories section	

360°; 0 … 4,3 VDC

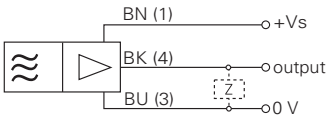
- Angular range 360° linear
- High resolution and system precision
- Contactless, wear-free system

general data	
angular range	360° linear
resolution	0,09°
system accuracy	± 0,25 %
temperature drift	± 1 % (Full Scale)
working distance max.	5 mm, with magnet 11052886
axial misalignment max.	0,4 mm
electrical data	
response time	< 4 ms
voltage supply range +Vs	4,7 ... 7,5 VDC
current consumption max.	10 mA
output signal	0 ... 4,3 VDC
load resistance	> 1000 Ohm
output circuit	voltage output
short circuit protection	yes
reverse polarity protection	no
mechanical data	
type	rectangular
housing material	brass nickel plated
dimension	20 mm
material (sensing face)	PBTP
ambient conditions	
operating temperature	-40 ... +85 °C
protection class	IP 67
remarks	
working distance max. in conjunction with permanent magnet 11052886 (available as an accessory)	

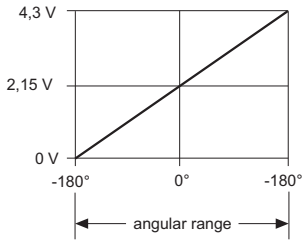
dimension drawings



connection diagram



output signal



order reference	connection types
MDFM 20U9405/C360	cable PUR 3 x 0,25, 2 m
MDFM 20U9405/KS35PC360	flylead connector PUR M8, L=200 mm

connectors and mating connectors	
ESG 32SH0200	Connector M8, 3 pin, straight, 2 m
ESW 31SH0200	Connector M8, 3 pin, angular, 2 m
additional cable connectors and field wireable connectors: see accessories	

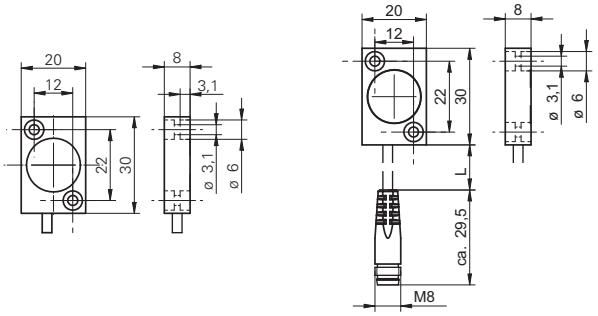
mounting accessories	
11052887	Rotor with permanent magnet MSFN AA01X06
11052885	Permanent magnet MMFN AA01X06
11016706	Rotor with permanent magnet MSFS AA03X08
11052886	Permanent magnet MMFS AA03X08
for details: see accessories section	

360°; 0 … 5 VDC

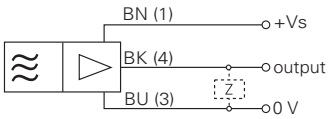
- Angular range 360° linear
- Contactless, wear-free system

general data	
angular range	360° linear
resolution	1,41°
system accuracy	± 0,6 %
temperature drift	± 0,1 % (Full Scale)
working distance max.	4 mm, with magnet 11052886
axial misalignment max.	0,5 mm
electrical data	
response time	< 2 ms
voltage supply range +Vs	4,75 ... 5,25 VDC
current consumption max.	20 mA
output signal	0 ... 5 VDC
load resistance	> 1000 Ohm
output circuit	voltage output
short circuit protection	no
reverse polarity protection	no
mechanical data	
type	rectangular
housing material	brass nickel plated
dimension	20 mm
material (sensing face)	PBTP
ambient conditions	
operating temperature	-40 ... +85 °C
protection class	IP 67
remarks	
working distance max. in conjunction with permanent magnet 11052886 (available as an accessory)	

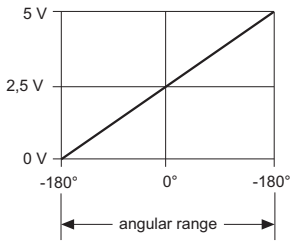
dimension drawings



connection diagram



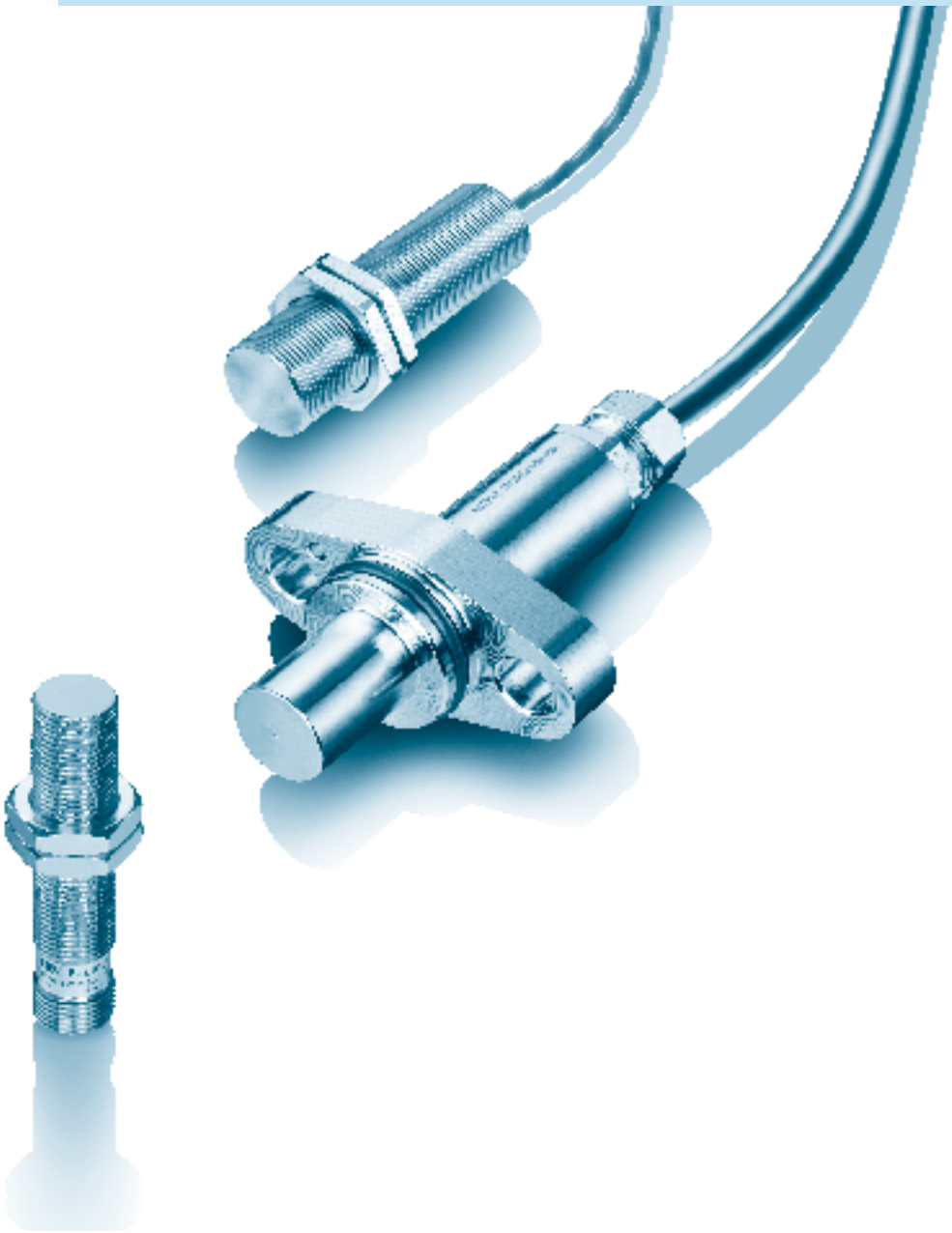
output signal



order reference	connection types
MDFM 20U9404/A360	cable PUR 3 x 0,25, 2 m
MDFM 20U9404/KS35PA360	flylead connector PUR M8, L=200 mm

connectors and mating connectors	
ESG 32SH0200	Connector M8, 3 pin, straight, 2 m
ESW 31SH0200	Connector M8, 3 pin, angular, 2 m
additional cable connectors and field wireable connectors: see accessories	
mounting accessories	
11052887	Rotor with permanent magnet MSFN AA01X06
11052885	Permanent magnet MMFN AA01X06
11016706	Rotor with permanent magnet MSFS AA03X08
11052886	Permanent magnet MMFS AA03X08
for details: see accessories section	

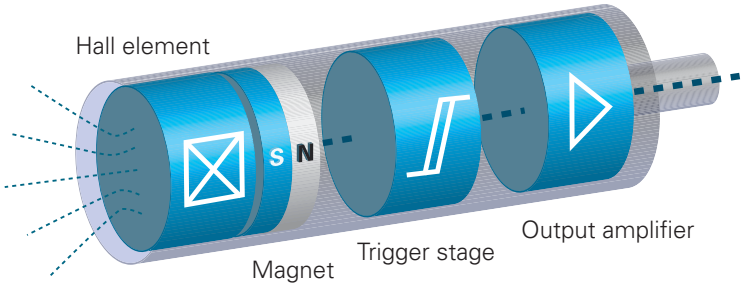
Hall sensors



product family	MHRM 12	MHRM 12	IHRM 12	MHRM 18	MTRM 16
					
dimension	12 mm	12 mm	12 mm	18 mm	16 mm
housing length	50 mm 60 mm	60 mm	60 mm	60 mm	93 mm
switching frequency range	0 ... 15 kHz	0 ... 15 kHz	1 ... 20 kHz	1 ... 20 kHz	2 ... 20 kHz
min. gear size	> module 1	> module 1	> module 1	> module 1	module 1 module 1,5 module 2 module 2,5 module 3
gear width	> 6 mm	> 6 mm	> 6 mm	> 6 mm	> 10 mm
output A	push-pull	push-pull	PNP	PNP	push-pull
output B	none	push-pull	none	none	push-pull
cable PUR, 2 m	■				
cable Radox, 2 m					■
cable FEP, 2 m		■	■	■	
flylead connector PUR M12, L=200 mm			■		
connector	■				
housing material	brass nickel plated	stainless steel	stainless steel	stainless steel	brass nickel plated
version		Full metal	Full metal	Full metal	Full metal
Page	**31**	**32**	**33**	**34**	**35**

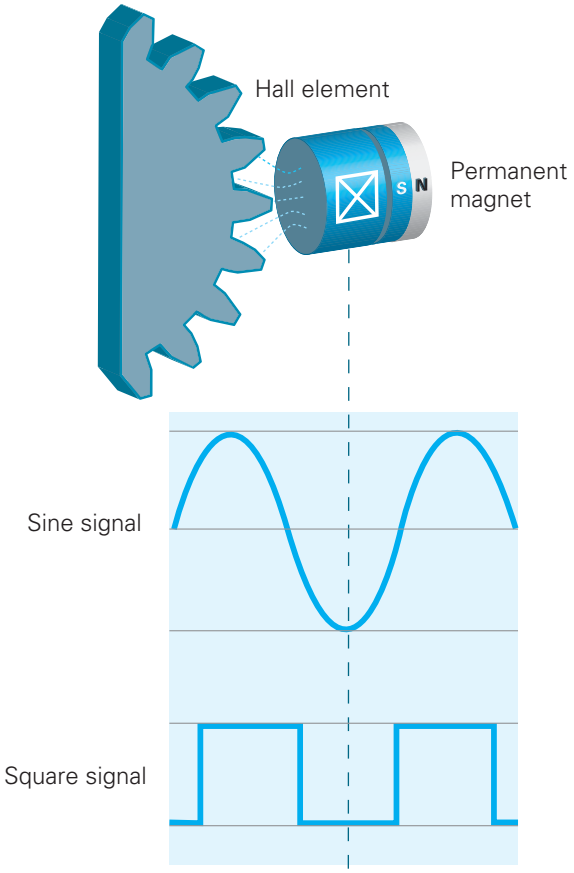
General information

Hall sensors identify ferromagnetic objects by the non-contact sensing principle. Achieving very high switching frequencies, they are ideal for gear applications where rotating speeds and directions of rapidly turning toothed wheels must be reliably detected.



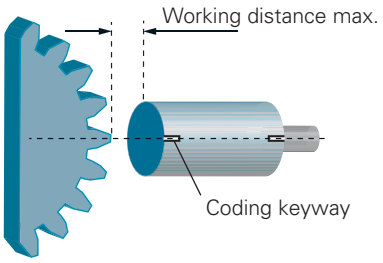
Functional principle

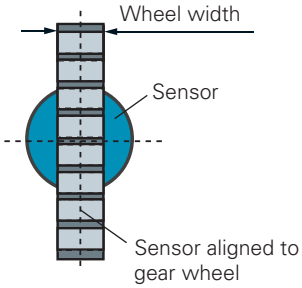
Hall sensors host a current-carrying semiconductor element which is exposed to permanent magnetic prestress built by a stationary permanent magnet. Any change in the magnetic field intensity caused by a ferromagnetic object penetrating the field will be identified by the semiconductor element as voltage change. The sensor's integrated electronics will evaluate the generated sine voltage in an amplified square wave signal.



Installation

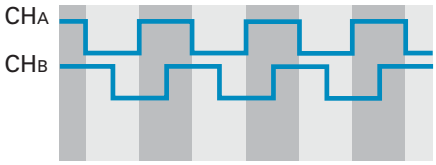
When installing a Hall sensor, make sure that the measured object (gear wheel) is within the maximum working distance. Furthermore, the sensor should be centricly aligned to the gear wheel. Observe the minimum wheel width to ensure sufficient signal reserves. Working distance and installation instructions refer to gear wheels with involute toothing (DIN 867).





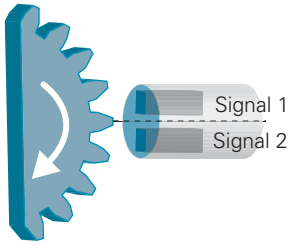
Rotating direction of multichannel sensors

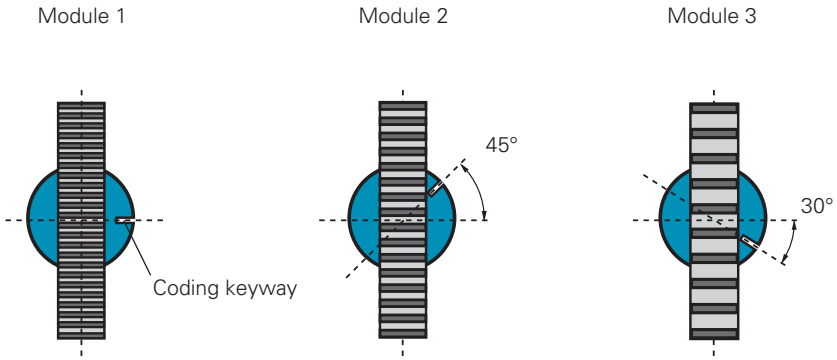
Two Hall semiconductor elements output two differentiated signals shifted by 90° per tooth and thus allow for picking up both rotating speed and direction of a gear wheel. A clockwise turning gear wheel will result in channel A being in lead to channel B.



Adjustment

To ensure proper two-channel output functionality, the Hall elements of multichannel Hall sensors must be arranged in alignment to the wheel's tooth module. The sensor must be aligned to the teeth of the gear by aid of the coding keyway and under consideration of the gear module.





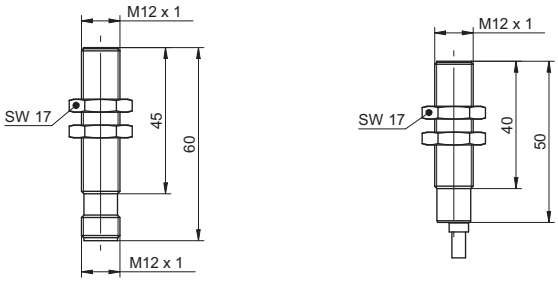
Cylindrical M12, 1 channel

- 1-channel push-pull output
- High switching frequencies
- High temperature range

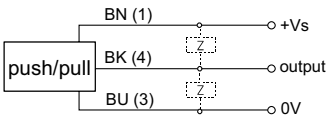
general data	
sensor type	hall sensor
working distance max.	<0,7 mm (module 1), <2,4 mm (module 3)
min. gear size	> module 1
gear width	> 6 mm
gear material	ferromagnetic
electrical data	
switching frequency range	0 ... 15 kHz
voltage supply range +Vs	8 ... 28 VDC
current consumption max.	20 mA
output A	push-pull
output B	none
output current	< 30 mA
voltage drop Vd	< 5 VDC
short circuit protection	yes
reverse polarity protection	yes, Vs to GND
mechanical data	
type	cylindrical threaded
housing material	brass nickel plated
dimension	12 mm
material (sensing face)	PBTP
ambient conditions	
operating temperature	-40 ... +85 °C
protection class (sensing face)	IP 67
protection class (sensor)	IP 67
remarks	
mounting rotationally symmetric	

order reference	housing length	connection types
MHRM 12G5501	50 mm	cable PUR, 2 m
MHRM 12G5501/S14	60 mm	connector

dimension drawings



connection diagram



connectors and mating connectors	
ESG 34SH0200	Connector M12, 3 pin, straight, 2 m
ESW 33SH0200	Connector M12, 3 pin, angular, 2 m
additional cable connectors and field wireable connectors: see accessories	
mounting accessories	
10151720	Sensofix series 12 round
for details: see accessories section	

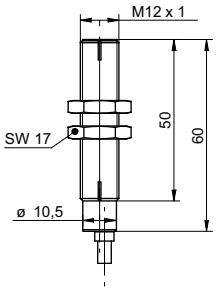
Cylindrical M12, 2 channels

- Detection of rpm speed and rotational direction
- High protection class and compressive strength
- High temperature range

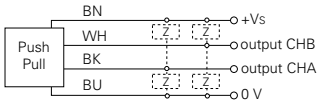
general data	
version	full metal
sensor type	hall sensor
working distance max.	<0,5 mm (module 1), <2,5 mm (module 3)
min. gear size	> module 1
gear width	> 6 mm
gear material	ferromagnetic
electrical data	
switching frequency range	0 ... 15 kHz
voltage supply range +Vs	8 ... 28 VDC
current consumption max.	20 mA
output A	push-pull
output B	push-pull
voltage drop Vd	< 5 VDC
short circuit protection	yes
reverse polarity protection	yes, Vs to GND
mechanical data	
type	cylindrical threaded
housing material	stainless steel
dimension	12 mm
housing length	60 mm
installation aid	keyway
connection types	cable FEP, 2 m
front of sensor durable against pressure	20 bar
ambient conditions	
operating temperature	-40 ... +120 °C
protection class (sensing face)	IP 68
protection class (sensor)	IP 67
remarks	
mounting rotationally symmetric	

order reference
MHRM 12G2501

dimension drawing



connection diagram



mounting accessories

10151720	Sensofix series 12 round

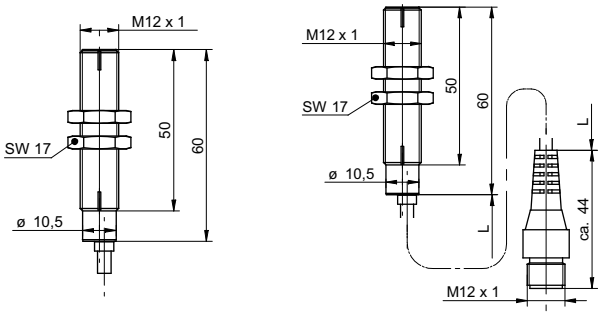
for details: see accessories section

Cylindrical M12, 1 channel

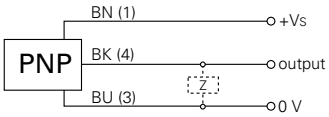
- Robust full metal housing
- High protection class and compressive strength
- High temperature range

general data	
version	full metal
sensor type	differential hall sensor
working distance max.	<1 mm (module 1), <2,5 mm (module 3)
min. gear size	> module 1
gear width	> 6 mm
gear material	ferromagnetic
electrical data	
switching frequency range	1 ... 20 kHz
voltage supply range +Vs	8 ... 28 VDC
current consumption max.	20 mA
output A	PNP
output B	none
output current	< 30 mA
voltage drop Vd	< 3 VDC
short circuit protection	yes
reverse polarity protection	yes, Vs to GND
mechanical data	
type	cylindrical threaded
housing material	stainless steel
dimension	12 mm
housing length	60 mm
installation aid	keyway
front of sensor durable against pressure	20 bar
ambient conditions	
protection class (sensing face)	IP 68
protection class (sensor)	IP 67

dimension drawings



connection diagram



connectors and mating connectors	
ESG 34SH0200	Connector M12, 3 pin, straight, 2 m
ESW 33SH0200	Connector M12, 3 pin, angular, 2 m
additional cable connectors and field wireable connectors: see accessories	
mounting accessories	
10151720	Sensofix series 12 round
10161958	Converter PNP/NPN - M12 x 1
for details: see accessories section	

order reference	operating temperature	connection types
IHRM 12P1501	-40 ... +120 °C	cable FEP, 2 m
IHRM 12P1501/KS34P	-25 ... +75 °C	flylead connector PUR M12, L=200 mm

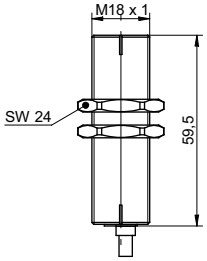
Cylindrical M18, 1 channel

- Robust full metal housing
- 1-channel PNP output
- High temperature range

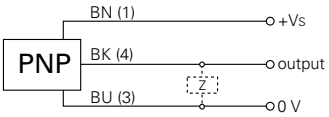
general data	
version	full metal
sensor type	differential hall sensor
working distance max.	0,7 mm (module 1), 1,8 mm (module 2)
min. gear size	> module 1
gear width	> 6 mm
gear material	ferromagnetic
electrical data	
switching frequency range	1 ... 20 kHz
voltage supply range +Vs	8 ... 28 VDC
current consumption max.	20 mA
output A	PNP
output B	none
output current	< 40 mA
voltage drop Vd	< 2 VDC
short circuit protection	yes
reverse polarity protection	yes, Vs to GND
mechanical data	
type	cylindrical threaded
housing material	stainless steel
dimension	18 mm
housing length	60 mm
connection types	cable FEP, 2 m
front of sensor durable against pressure	20 bar
ambient conditions	
operating temperature	-40 ... +120 °C
protection class (sensing face)	IP 68
protection class (sensor)	IP 67

order reference
MHRM 18P5524

dimension drawing



connection diagram



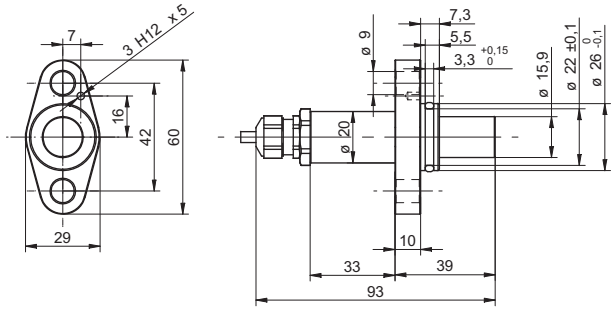
mounting accessories	
10151658	Sensofix series 18
for details: see accessories section	

Railway standard, 2 channels

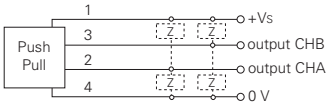
- Fullfills railway standards
- Detection of rpm speed and rotational direction
- High temperature range

general data	
version	full metal
sensor type	differential hall sensor
gear width	> 10 mm
gear material	ferromagnetic
gear shape	involute gear (DIN867)
electrical data	
switching frequency range	2 ... 20 kHz
voltage supply range +Vs	8 ... 28 VDC
current consumption max.	20 mA
output A	push-pull
output B	push-pull
voltage drop Vd	< 5 VDC
short circuit protection	yes
reverse polarity protection	yes, Vs to GND
mechanical data	
type	cylindrical, with flange
housing material	brass nickel plated
dimension	16 mm
housing length	93 mm
installation aid	pin hole
connection types	cable Radox, 2 m
front of sensor durable against pressure	20 bar
ambient conditions	
operating temperature	-40 ... +120 °C
protection class (sensing face)	IP 68
protection class (sensor)	IP 67
remarks	
- fire protection (cable): CEN/TS 45545 - cable diameter 5,4 mm - fullfilled standards: EN 50155:2007 (class S1), EN 50121-3-2:2006 tables 7, 8, 9, EN 61373:1999 (category 3)	

dimension drawing

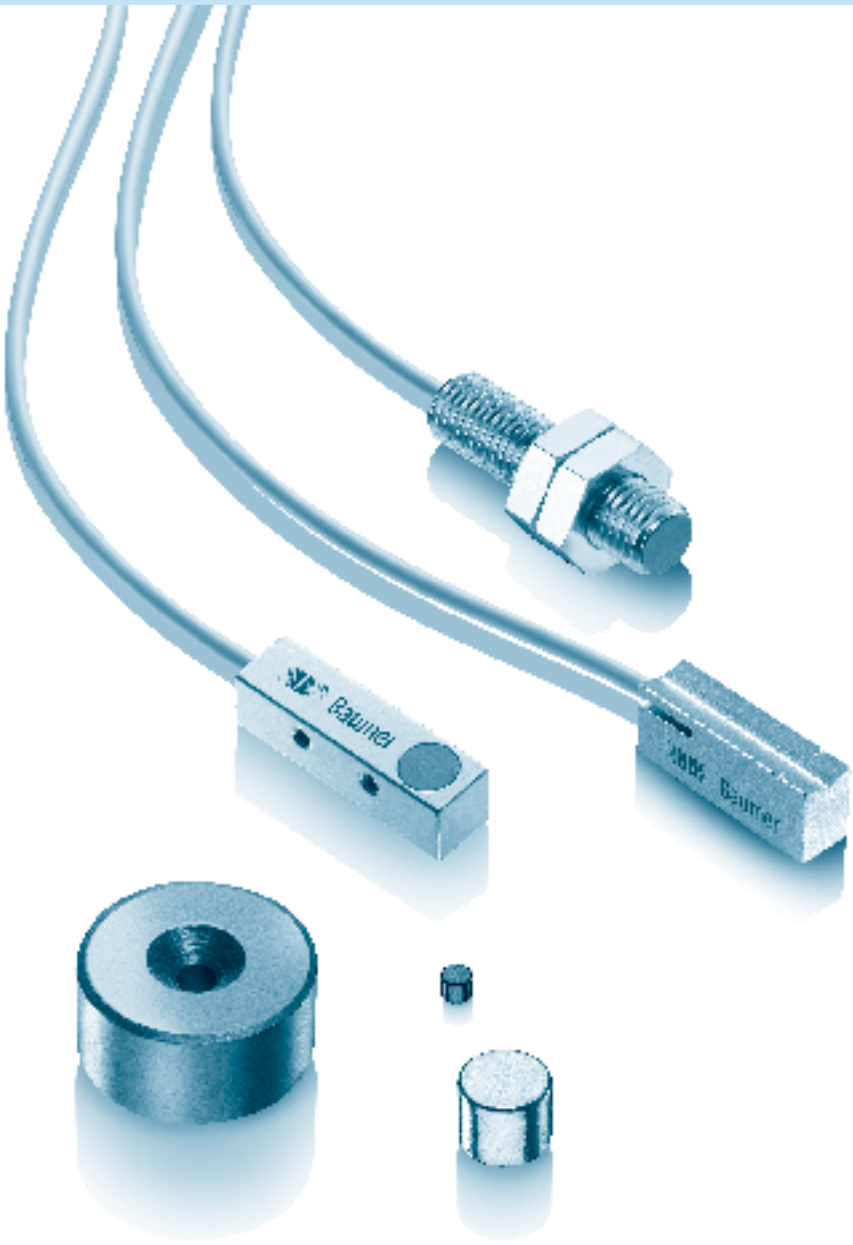


connection diagram



order reference	working distance max.	min. gear size
MTRM 16G2524/M100	1,0 mm (module 1)	module 1
MTRM 16G2524/M150	1,6 mm (module 1,5)	module 1,5
MTRM 16G2524/M200	2 mm (module 2)	module 2
MTRM 16G2524/M250	2,2 mm (module 2,5)	module 2,5
MTRM 16G2524/M300	2,5 mm (module 3)	module 3

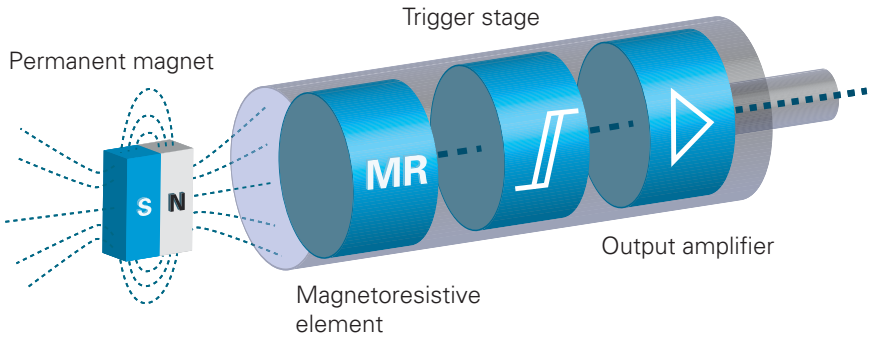
Magnetic proximity switches



product family	MFRM 08	MFFM 08	MFVM 08
			
mounting type	shielded	shielded	shielded
dimension	8 mm	8 mm	8 mm
housing length	30 mm	30 mm	30 mm
NPN	■	■	■
PNP	■	■	■
cable PUR, 2 m	■	■	■
housing material	stainless steel	brass nickel plated	aluminum
Page	**41**	**42**	**43**

Sensor

Magnetoresistive proximity switches detect the magnetic fields of permanent magnets. Depending on size and material of the deployed permanent magnet, the sensors provide different switching distance capabilities.

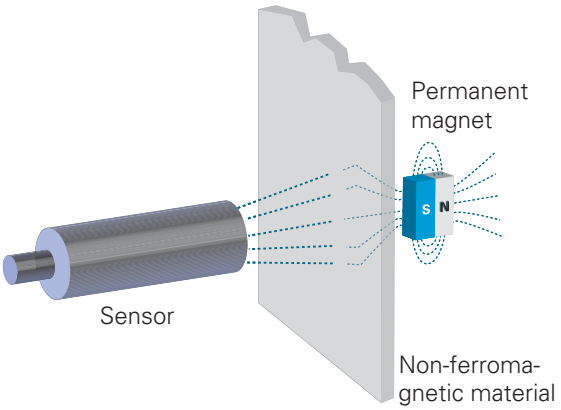


Functional principle

The magnetoresistive element is made of a specialized material which will only respond to magnetic fields, such as generated by a permanent magnet, by outputting a digital signal. Capable of detecting even very weak magnetic fields, the material is about ten times more sensitive than a Hall element and thus allows for substantially extended sensing distances. Magnetoresistive proximity switches are omnipolar and therefore capable of detecting both north and southpole of the permanent magnet.

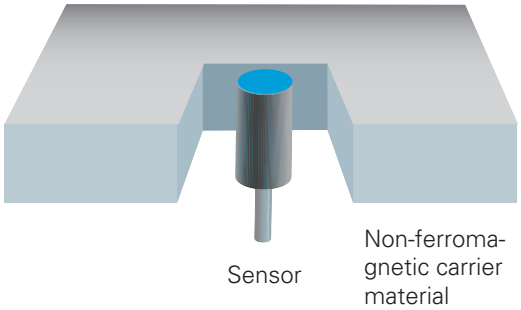
Detection through tank walls

The sensor can detect magnetic fields through non-ferromagnetic materials. This is particularly useful if sensor or permanent magnet require protected or isolated mounting, or when being separated from each other by a tank wall.



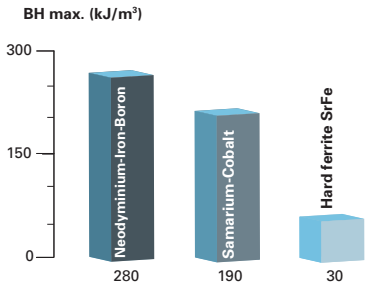
Installation

Shielded (flush) installation
Magnetoresistive proximity switches are conceived for shielded (flush) installation, meaning the sensing face being plain to the carrier surface. The carrier material must be non-ferromagnetic. Shielded installation in a ferromagnetic material will reduce the sensing distance by up to 25%, unshielded or non-flush installation (sensing face protruding by its diameter from the ferromagnetic carrier surface) will enhance the sensing distance by up to 25%.



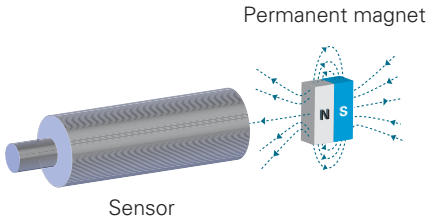
Permanent magnet
Alloy

The switching distance of a magnetic sensor relates to the magnet deployed. Not only size but also alloy of the permanent magnet play a decisive role. The higher the energy product of the magnetic alloy in kJm³, the stronger the magnetic field and hence the more extended the switching distance.



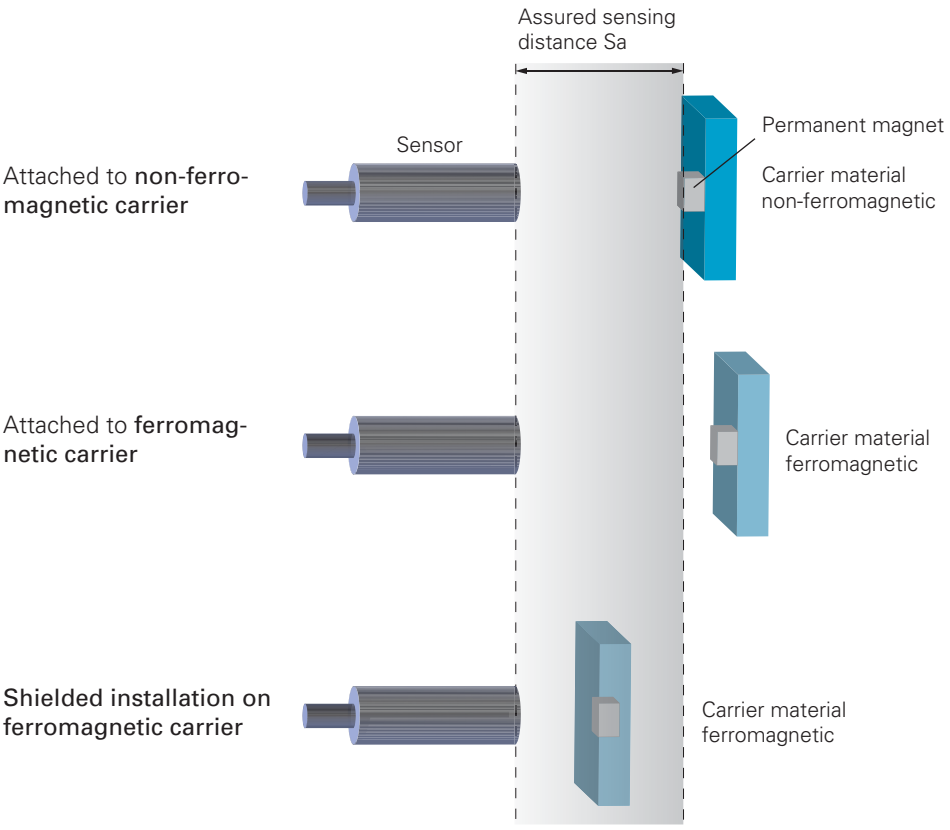
Permanent magnet
Alignment

By principle, magnetoresistive proximity switches are polarity neutral, i.e. the sensor will detect both north and southpole of the permanent magnet. It is recommended to always attach the permanent magnet with one pole in alignment to the sensor to ensure reliable detection.



Permanent magnet
Mounting

The way a permanent magnet is mounted plays a crucial role in the sensing distance. When attached to a non-ferromagnetic carrier, the influence on the assured sensing distance will be nearly not noticeable. However, a permanent magnet mounted unshielded on a ferromagnetic carrier will enhance the switching distance by up to 25%. Attached flush or shielded to a ferromagnetic carrier, the switching distance will be reduced by up to 40% (always related to the assured sensing distance).
If the permanent magnet is to be screwed on, always use non-ferromagnetic screws (e.g. stainless steel).



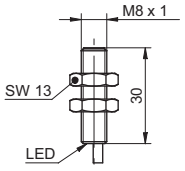
Cylindrical M8

- Detects permanent magnets on long distances
- Polarity independent
- High switching frequencies

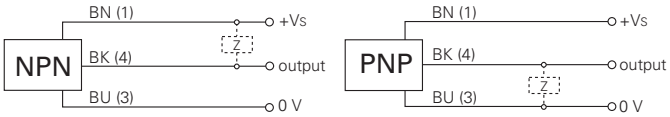
general data	
type	magneto-resistive
assured sensing distance Sa	60 mm
output indicator	LED red
mounting type	shielded
nominal operation point	2,5 mT
hysteresis	2 ... 20 % of Sr
repeat accuracy	< 1 % of Sr
electrical data	
switching frequency	< 5 kHz
voltage supply range +Vs	10 ... 30 VDC
current consumption max.	20 mA
voltage drop Vd	< 3 VDC
output current	< 150 mA
short circuit protection	yes
reverse polarity protection	yes, Vs to GND
mechanical data	
material (sensing face)	PBT
type	cylindrical threaded
dimension	8 mm
housing material	stainless steel
housing length	30 mm
connection types	cable PUR, 2 m
ambient conditions	
operating temperature	-25 ... +75 °C
protection class	IP 67
remarks	
assured sensing distance in conjunction with permanent magnet 11053959 (available as an accessory)	

order reference	output circuit
MFRM 08N1524/PL	NPN make function (NO)
MFRM 08N3524/PL	NPN break function (NC)
MFRM 08P1524/PL	PNP make function (NO)
MFRM 08P3524/PL	PNP break function (NC)

dimension drawing



connection diagrams



mounting accessories

10151719	Sensofix series 08
11052882	Permanent magnet MMRS AA02X02
11052883	Permanent magnet MMRN AA06X05
11053959	Permanent magnet MMRH BA31X15
for details: see accessories section	

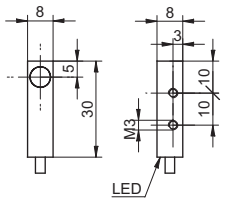
Rectangular

- Detects permanent magnets on long distances
- Polarity independent
- High switching frequencies

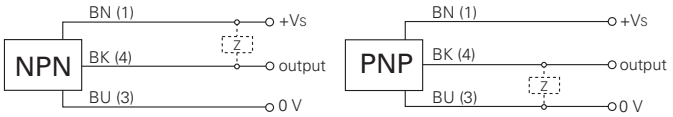
general data	
type	magneto-resistive
assured sensing distance Sa	60 mm
output indicator	LED red
mounting type	shielded
nominal operation point	2,5 mT
hysteresis	2 ... 20 % of Sr
repeat accuracy	< 1 % of Sr
electrical data	
switching frequency	< 5 kHz
voltage supply range +Vs	10 ... 30 VDC
current consumption max.	20 mA
voltage drop Vd	< 3 VDC
output current	< 150 mA
short circuit protection	yes
reverse polarity protection	yes, Vs to GND
mechanical data	
material (sensing face)	PBT
type	rectangular
dimension	8 mm
housing material	brass nickel plated
housing length	30 mm
connection types	cable PUR, 2 m
ambient conditions	
operating temperature	-25 ... +75 °C
protection class	IP 67
remarks	
assured sensing distance in conjunction with permanent magnet 11053959 (available as an accessory)	

order reference	output circuit
MFFM 08N1424/PL	NPN make function (NO)
MFFM 08N3424/PL	NPN break function (NC)
MFFM 08P1424/PL	PNP make function (NO)
MFFM 08P3424/PL	PNP break function (NC)

dimension drawing



connection diagrams



mounting accessories	
11052882	Permanent magnet MMRS AA02X02
11053959	Permanent magnet MMRN AA06X05
11053959	Permanent magnet MMRH BA31X15
for details: see accessories section	

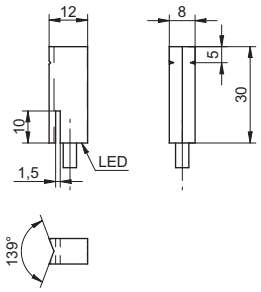
Rectangular, with V-slot

- Fully enclosed full metal housing
- Housing for mounting directly on cylinders
- Detects permanent magnets on long distances

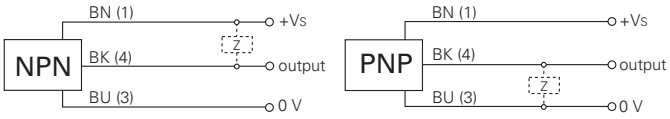
general data	
type	magneto-resistive
version	full metal
assured sensing distance Sa	60 mm
output indicator	LED red
mounting type	shielded
nominal operation point	2,5 mT
hysteresis	2 ... 20 % of Sr
repeat accuracy	< 1 % of Sr
electrical data	
switching frequency	< 5 kHz
voltage supply range +Vs	10 ... 30 VDC
current consumption max.	20 mA
voltage drop Vd	< 3 VDC
output current	< 150 mA
short circuit protection	yes
reverse polarity protection	yes, Vs to GND
mechanical data	
type	rectangular
dimension	8 mm
housing material	aluminum
housing length	30 mm
connection types	cable PUR, 2 m
ambient conditions	
operating temperature	-25 ... +75 °C
protection class	IP 67
remarks	
assured sensing distance in conjunction with permanent magnet 11053959 (available as an accessory)	

order reference	output circuit
MFVM 08N1424/PL	NPN make function (NO)
MFVM 08N3424/PL	NPN break function (NC)
MFVM 08P1424/PL	PNP make function (NO)
MFVM 08P3424/PL	PNP break function (NC)

dimension drawing

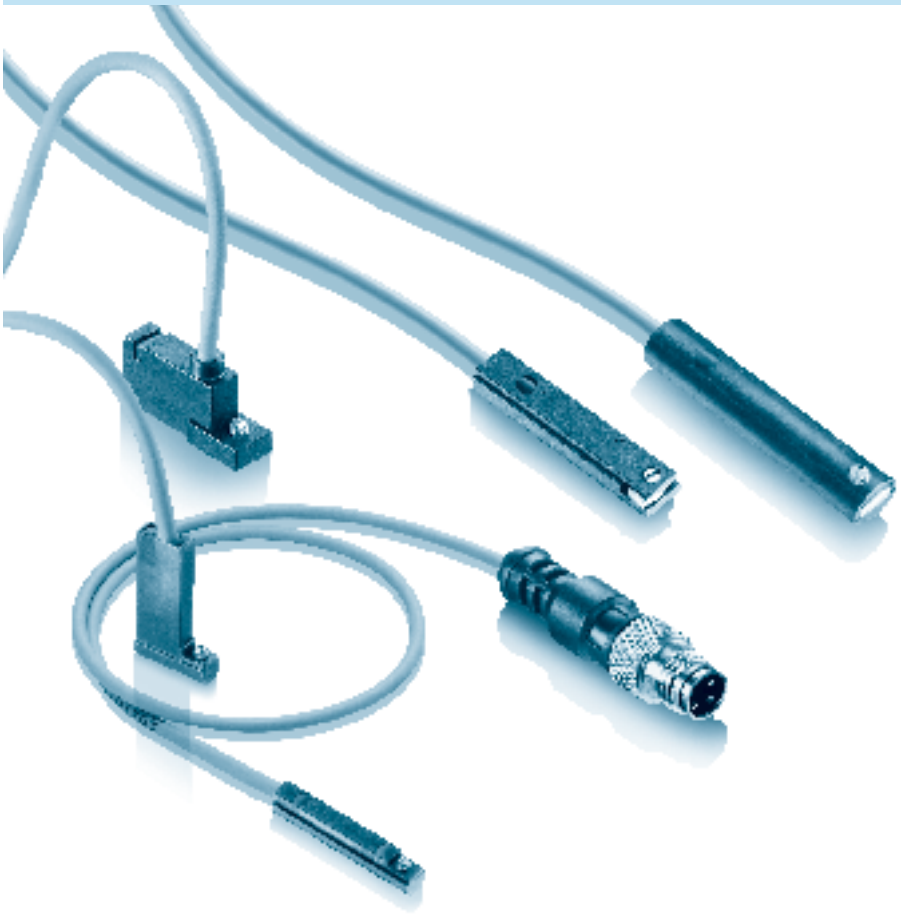


connection diagrams



mounting accessories	
11052882	Permanent magnet MMRS AA02X02
11052883	Permanent magnet MMRN AA06X05
11053959	Permanent magnet MMRH BA31X15
for details: see accessories section	

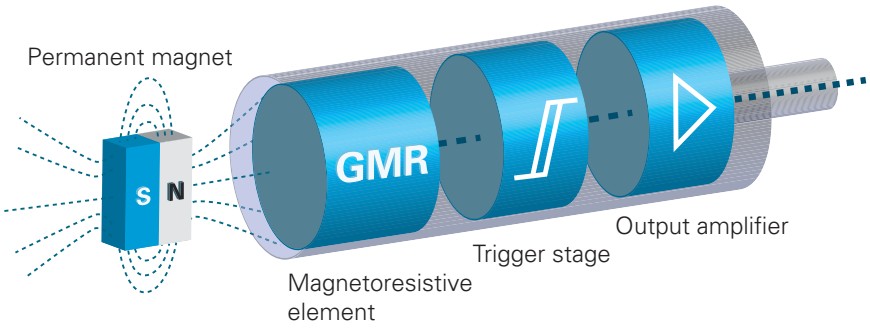
Magnetic cylinder sensors



product family	MZCK 03	MZCK 03	MZTK 06	MZTK 06	MZTK 06
					
version	C-slots	C-slots	T-slots	T-slots	T-slots
nominal operation point	4 mT	4 mT	4 mT	2 mT	4 mT
width / diameter	3,7 mm	3,7 mm	6,2 mm	6,5 mm	6,2 mm
depth	23 mm	9 mm	31 mm	21 mm	31,5 mm
short circuit protection	yes		yes		yes
NPN	■	■	■	■	■
PNP	■	■	■	■	■
cable PUR 3 pin, 2,5 m	■	■	■	■	■
cable PUR 3 pin, 5 m	■		■		■
flylead connector PUR M8, L=300 mm	■	■	■	■	■
housing material	PA66	PA66	PA66	PA66	PA66
Page	**49**	**50**	**51**	**52**	**53**

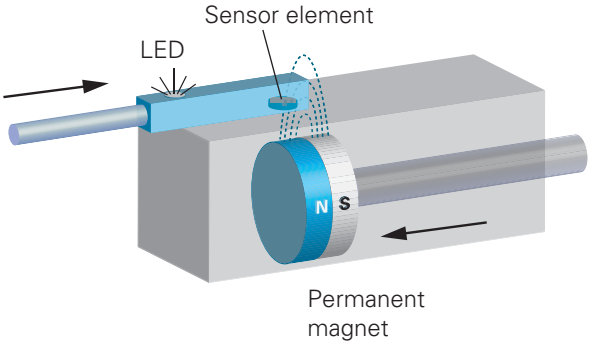
The sensor

Magnetic cylinder sensors are deployed to register the positions of pistons in pneumatic cylinders. They detect the piston-carried permanent magnet through the cylinder wall utilizing the magneto-resistive principle.



Functional principle

The piston inside the cylinder carries a permanent magnet which builds a magnetic field to penetrate all non-ferromagnetic materials. The sensor is tripped when detecting the magnetic field. To mount the sensor it is introduced in the slot provided at the cylinder and secured. By aid of clamps and bolts available as accessories, cylinder sensors can be attached to all conventional cylinders.

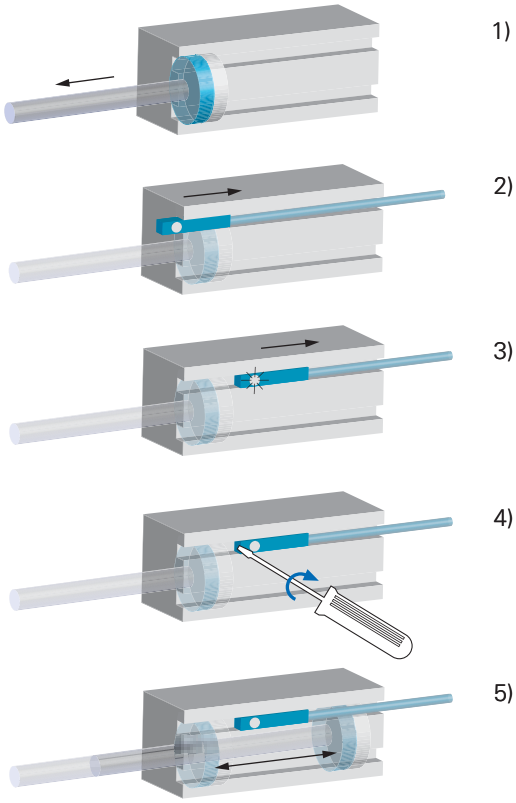


Adjustment

The magnetic fields of the permanent magnets inside the cylinders scatter and will differ in their specifications according to the cylinder type. Thus, it is not possible to specifiy the exact tripping point of the sensor. To ensure the cylinder sensor is placed in the proper position proceed as follows:

1) Get the piston into the required switching position
2) Move the cylinder sensor in the slot in opposite direction to step one*
3) After LED light up, withdraw the sensor a little to ensure reliable switching operation
4) Secure the sensor
5) Verify the switching point by aid of the LED

*Round cylinders or Tie-Rod cylinders: First attach the sensor loosely to the cylinder using a clamp or bolt.



Mounting
Cylinders with slot

Conventional cylinders provide standard T- or C-slots. The cylinder sensors are simply introduced in the slot and secured – either by using a grub screw or by a metal plate which will lock in the slot after having tightened the fastening screw.

T-slot

C-slot

Dovetail slot

Mounting
Round cylinders or cylinders with tension rods

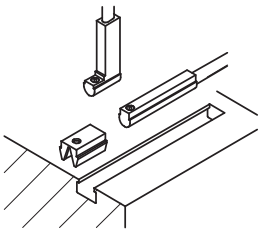
Some commonly deployed round cylinders or cylinders with tension rods may not provide a slot for sensor mount. In this case, the C- or T-slot sensors will be attached using clamps or bolts.

Tie-Rod cylinders

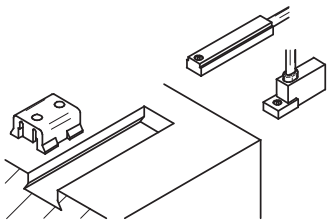
Round cylinders

Mounting
Special slots

C-slot sensors can also be mounted in T-slots by using the adaptor from an accessory kit. Adaptors for special slots such as dovetail are also available.



T-slot



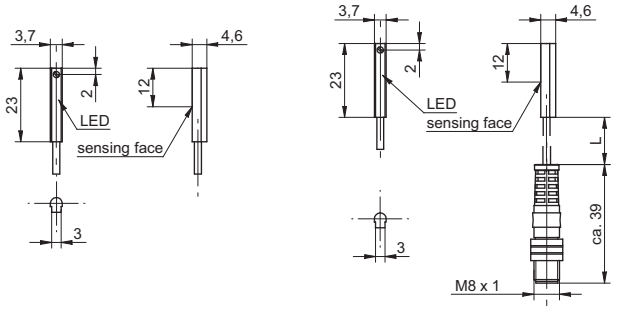
Dovetail slot

C-slot

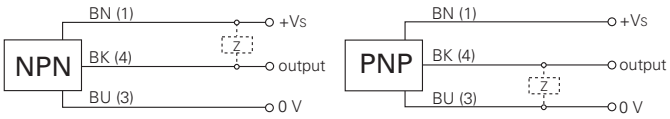
- C-slot housing
- For all common cylinder types
- Wear-free

general data	
type	magneto-resistive
version	C-slots
nominal operation point	4 mT
difference ON-OFF	0,5 ... 1,5 mT
output indicator	LED yellow
electrical data	
switching frequency	< 200 kHz
response time / release time	< 0,0025 ms
output current	< 200 mA
voltage supply range +Vs	5 ... 30 VDC
output function	normally open (NO)
voltage drop Vd	< 1 VDC
reverse polarity protection	yes
short circuit protection	yes
mechanical data	
cable output	axial
type	rectangular
depth	23 mm
width / diameter	3,7 mm
height / length	4,6 mm
housing material	PA66
ambient conditions	
operating temperature	-10 ... +70 °C
protection class	IP 67

dimension drawings



connection diagrams



connectors and mating connectors	
ESG 32SH0200	Connector M8, 3 pin, straight, 2 m
ESW 31SH0200	Connector M8, 3 pin, angular, 2 m
additional cable connectors and field wireable connectors: see accessories	
mounting accessories	
MZZA 01	Adapter set for C- and T-slot sensors in standard slots
for details: see accessories section	

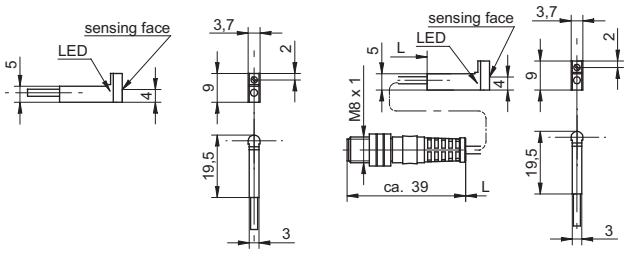
order reference	output circuit	connection types
MZCK 03N1011	NPN	cable PUR 3 pin, 2,5 m
MZCK 03N1011/KS35D	NPN	flylead connector PUR M8, L=300 mm
MZCK 03P1011	PNP	cable PUR 3 pin, 2,5 m
MZCK 03P1011/0500	PNP	cable PUR 3 pin, 5 m
MZCK 03P1011/KS35D	PNP	flylead connector PUR M8, L=300 mm

C-slot

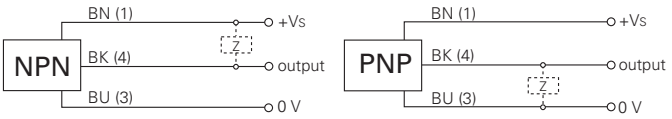
- C-slot housing
- Especially short housing
- Wear-free

general data	
type	magneto-resistive
version	C-slots
nominal operation point	4 mT
difference ON-OFF	0,5 ... 1,5 mT
output indicator	LED yellow
electrical data	
switching frequency	< 200 kHz
response time / release time	< 0,0025 ms
output current	< 200 mA
voltage supply range +Vs	5 ... 30 VDC
output function	normally open (NO)
voltage drop Vd	< 1 VDC
reverse polarity protection	yes
mechanical data	
cable output	lateral
type	rectangular
depth	9 mm
width / diameter	3,7 mm
height / length	19,5 mm
housing material	PA66
ambient conditions	
operating temperature	-10 ... +70 °C
protection class	IP 67

dimension drawings



connection diagrams



connectors and mating connectors	
ESG 32SH0200	Connector M8, 3 pin, straight, 2 m
ESW 31SH0200	Connector M8, 3 pin, angular, 2 m
additional cable connectors and field wireable connectors: see accessories	

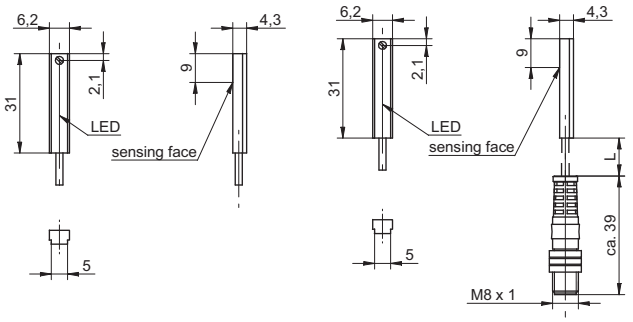
order reference	output circuit	connection types
MZCK 03N1012	NPN	cable PUR 3 pin, 2,5 m
MZCK 03N1012/KS35D	NPN	flylead connector PUR M8, L=300 mm
MZCK 03P1012	PNP	cable PUR 3 pin, 2,5 m
MZCK 03P1012/KS35D	PNP	flylead connector PUR M8, L=300 mm

T-slot

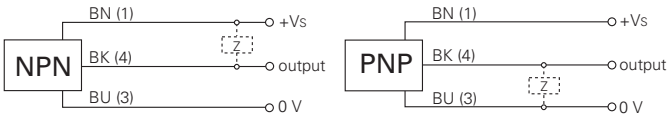
- T-slot housing
- For all common cylinder types
- Wear-free

general data	
type	magneto-resistive
version	T-slots
nominal operation point	4 mT
difference ON-OFF	0,5 ... 1,5 mT
output indicator	LED yellow
electrical data	
switching frequency	< 200 kHz
response time / release time	< 0,0025 ms
output current	< 200 mA
voltage supply range +Vs	5 ... 30 VDC
output function	normally open (NO)
voltage drop Vd	< 1 VDC
reverse polarity protection	yes
short circuit protection	yes
mechanical data	
cable output	axial
type	rectangular
depth	31 mm
width / diameter	6,2 mm
height / length	4,3 mm
housing material	PA66
ambient conditions	
operating temperature	-10 ... +70 °C
protection class	IP 67

dimension drawings



connection diagrams



connectors and mating connectors	
ESG 32SH0200	Connector M8, 3 pin, straight, 2 m
ESW 31SH0200	Connector M8, 3 pin, angular, 2 m
additional cable connectors and field wireable connectors: see accessories	
mounting accessories	
MZZA 01	Adapter set for C- and T-slot sensors in standard slots
for details: see accessories section	

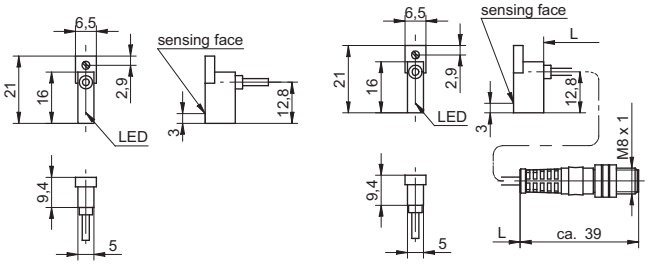
order reference	output circuit	connection types
MZTK 06N1011	NPN	cable PUR 3 pin, 2,5 m
MZTK 06N1011/KS35D	NPN	flylead connector PUR M8, L=300 mm
MZTK 06P1011	PNP	cable PUR 3 pin, 2,5 m
MZTK 06P1011/0500	PNP	cable PUR 3 pin, 5 m
MZTK 06P1011/KS35D	PNP	flylead connector PUR M8, L=300 mm

T-slot

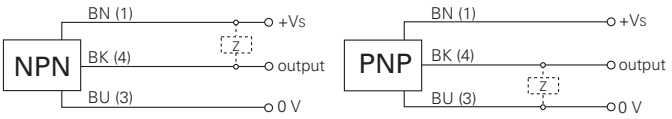
- T-slot housing
- Especially short housing
- Wear-free

general data	
type	magneto-resistive
version	T-slots
nominal operation point	2 mT
difference ON-OFF	0,5 ... 1,5 mT
output indicator	LED yellow
electrical data	
switching frequency	< 200 kHz
response time / release time	< 0,0025 ms
output current	< 200 mA
voltage supply range +Vs	5 ... 30 VDC
output function	normally open (NO)
voltage drop Vd	< 1 VDC
reverse polarity protection	yes
mechanical data	
cable output	lateral
type	rectangular
depth	21 mm
width / diameter	6,5 mm
height / length	9,4 mm
housing material	PA66
ambient conditions	
operating temperature	-10 ... +70 °C
protection class	IP 67

dimension drawings



connection diagrams



connectors and mating connectors	
ESG 32SH0200	Connector M8, 3 pin, straight, 2 m
ESW 31SH0200	Connector M8, 3 pin, angular, 2 m
additional cable connectors and field wireable connectors: see accessories	

mounting accessories	
MZZA 01	Adapter set for C- and T-slot sensors in standard slots
for details: see accessories section	

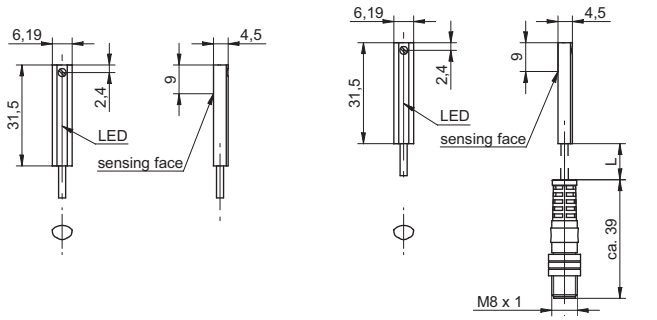
order reference	output circuit	connection types
MZTK 06N1012	NPN	cable PUR 3 pin, 2,5 m
MZTK 06N1012/KS35D	NPN	flylead connector PUR M8, L=300 mm
MZTK 06P1012	PNP	cable PUR 3 pin, 2,5 m
MZTK 06P1012/KS35D	PNP	flylead connector PUR M8, L=300 mm

T-slot

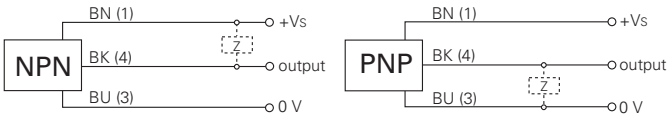
- T-slot housing
- Set into T-slot from the top
- Wear-free

general data	
type	magneto-resistive
version	T-slots
nominal operation point	4 mT
difference ON-OFF	0,5 ... 1,5 mT
output indicator	LED yellow
electrical data	
switching frequency	< 200 kHz
response time / release time	< 0,0025 ms
output current	< 200 mA
voltage supply range +Vs	5 ... 30 VDC
output function	normally open (NO)
voltage drop Vd	< 1 VDC
reverse polarity protection	yes
short circuit protection	yes
mechanical data	
cable output	axial
type	rectangular
depth	31,5 mm
width / diameter	6,2 mm
height / length	4,5 mm
housing material	PA66
ambient conditions	
operating temperature	-10 ... +70 °C
protection class	IP 67

dimension drawings



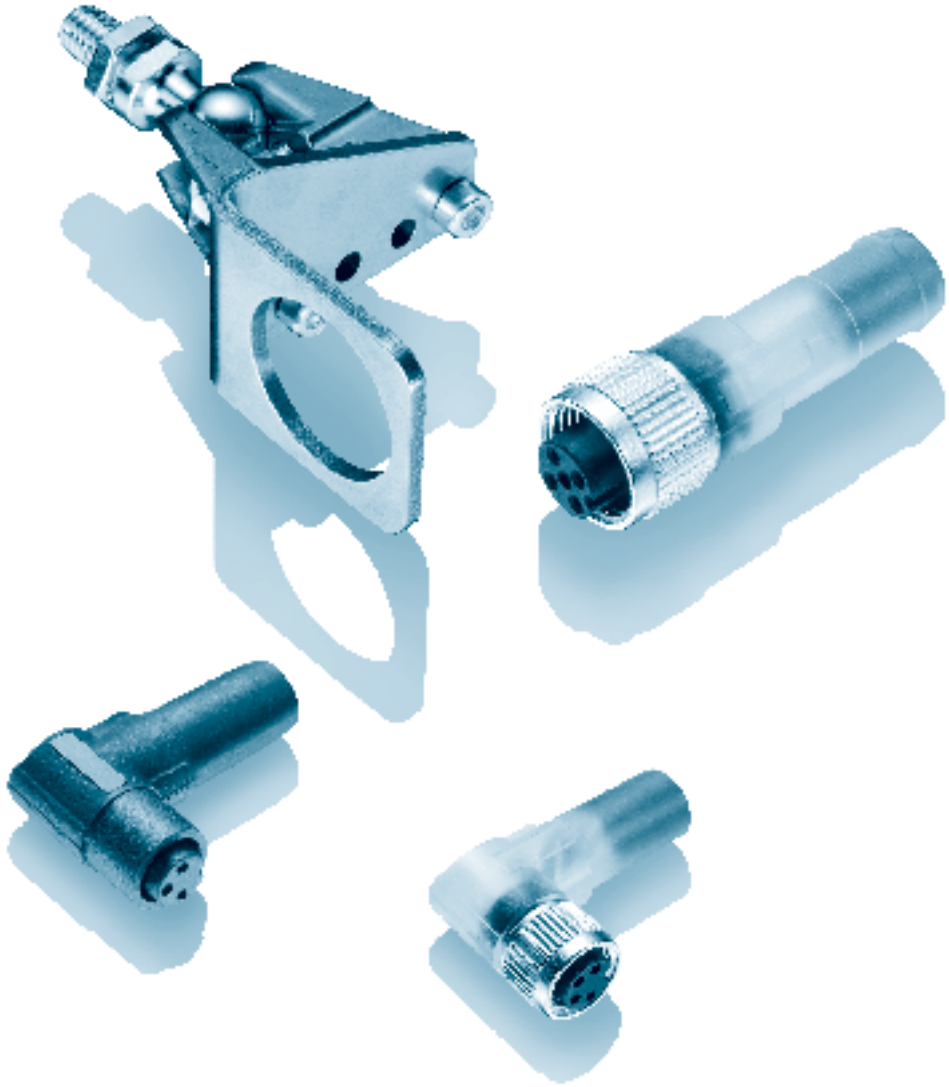
connection diagrams



connectors and mating connectors	
ESG 32SH0200	Connector M8, 3 pin, straight, 2 m
ESW 31SH0200	Connector M8, 3 pin, angular, 2 m
additional cable connectors and field wireable connectors: see accessories	
mounting accessories	
MZZA 01	Adapter set for C- and T-slot sensors in standard slots
for details: see accessories section	

order reference	output circuit	connection types
MZTK 06N1013	NPN	cable PUR 3 pin, 2,5 m
MZTK 06N1013/KS35D	NPN	flylead connector PUR M8, L=300 mm
MZTK 06P1013	PNP	cable PUR 3 pin, 2,5 m
MZTK 06P1013/0500	PNP	cable PUR 3 pin, 5 m
MZTK 06P1013/KS35D	PNP	flylead connector PUR M8, L=300 mm

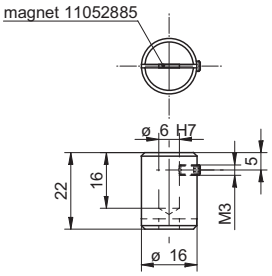
Accessories



Max. working distance sensor – permanent magnet

Sensor family	Max. working distance	
	Permanent magnet MMFN AA01X06	Permanent magnet MMFS AA03X08
Resolution 1,41°	0 ... 1 mm	1 ... 4 mm
Resolution 0,09°	0 ... 2 mm	1 ... 5 mm

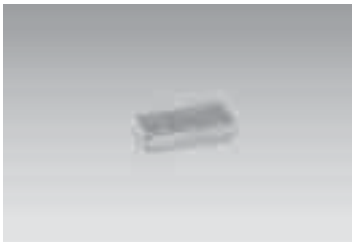
Rotor with permanent magnet

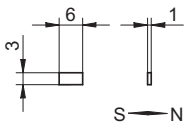


Rotor	Aluminum
Magnet	11052885
Energy product	280 kJ/m3
Operating temp.	-40 ... +85 °C

order reference	
11052887	Rotor with permanent magnet MSFN AA01X06

Single permanent magnet

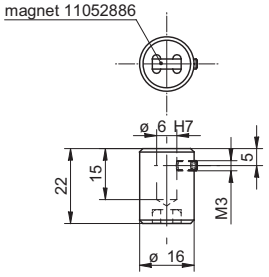




Magnet	NdFeB
Energy product	280 kJ/m3
Operating temp.	-40 ... +100 °C
Quantity	10 pieces

order reference	
11052885	Permanent magnet MMFN AA01X06

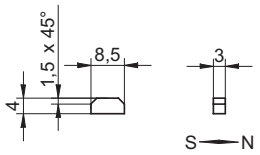
Rotor with permanent magnet



Rotor	Aluminum
Magnet	11052886
Energy product	190 kJ/m3
Operating temp.	-40 ... +125 °C

order reference	
11016706	Rotor with permanent magnet MSFS AA03X08

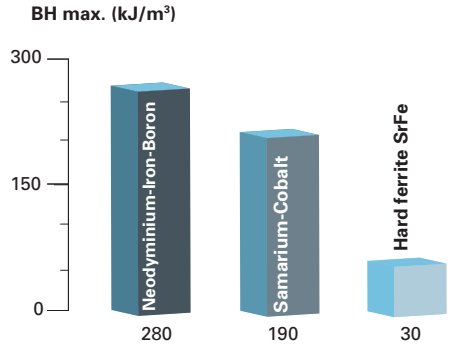
Single permanent magnet



Magnet	SmCo
Energy product	190 kJ/m3
Operating temp.	-40 ... +180 °C
Quantity	10 pieces

order reference	
11052886	Permanent magnet MMFS AA03X08

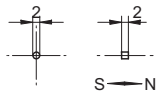
Permanent magnet



Assured sensing distance Sa Sensor – Magnet

Sensor family	Assured sensing distance Sa		
	Permanent magnet MMRS AA02X02	Permanent magnet MMRN AA06X05	Permanent magnet MMRH BA31X15
MFRM 08	5 mm	20 mm	60 mm
MFFM 08	5 mm	20 mm	60 mm
MFVM 08	5 mm	20 mm	60 mm

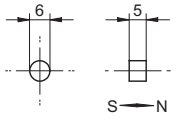
Permanent magnet



Magnet	Samarium-Cobalt (SmCo5)
Energy product	190 kJ/m³
Operating temp.	-40 ... +180 °C
Quantity	10 pieces

order reference	
11052882	Permanent magnet MMRS AA02X02

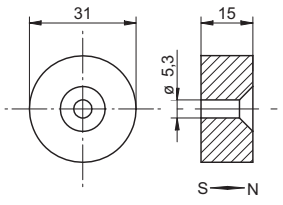
Permanent magnet



Magnet	Neodyminum-Iron-Boron (NdFeB)
Energy product	280 kJ/m³
Operating temp.	-40 ... +100 °C
Quantity	10 pieces

order reference	
11052883	Permanent magnet MMRN AA06X05

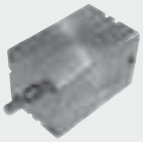
Permanent magnet



Magnet	Hard ferrite (SrFe)
Energy product	30 kJ/m³
Operating temp.	-25 ... +130 °C
Quantity	5 pieces

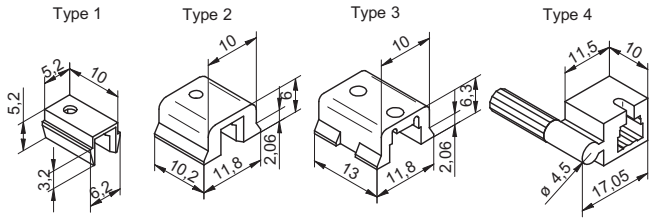
order reference	
11053959	Permanent magnet MMRH BA31X15

Selection matrix – Sensor and mounting accessories

	Cylinder with slots			**Cylinder round**		**Cylinder with Tie-Rod**
						
	C-slot 	T-slot 	Dovetail slot 	Round cylinder MZZB 01 	For different round cylinders MZZB 02 	Mounting bracket MZZC 01 
MZCK 03x1011... 	yes	MZZA 01 Adaptor kit	MZZA 01 Adaptor kit	MZZA 01 Adaptor kit	MZZA 01 Adaptor kit	MZZA 01 Adaptor kit
MZCK 03x1012... 	yes	non	non	non	non	non
MZTK 06x1011... 	non	yes	MZZA 01 Adaptor kit	yes	MZZA 01 Adaptor kit	MZZA 01 Adaptor kit
MZTK 06x1012... 	non	yes	MZZA 01 Adaptor kit	yes	MZZA 01 Adaptor kit	MZZA 01 Adaptor kit
MZTK 06x1013... 	non	yes	MZZA 01 Adaptor kit	yes	MZZA 01 Adaptor kit	MZZA 01 Adaptor kit

Adapter set for standard slots

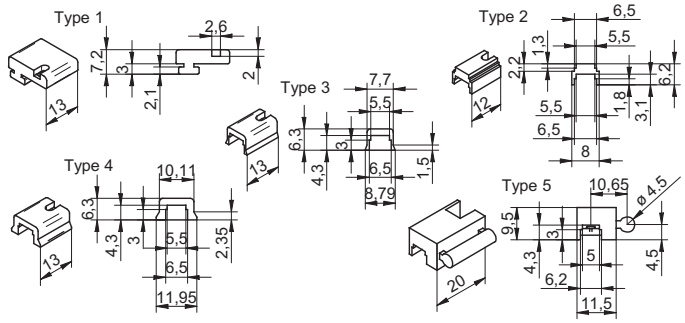
- Type 1: C-slot sensors in T-slots
- Type 1: C-slot sensors in dovetail slots
- Type 3: T-slot sensors in dovetail slots
- Type 4: C- and T-slot sensors with additional fastening clamp or mounting bracket



order reference	
MZZA 01	Adapter set for C- and T-slot sensors in standard slots

Adapter set for special slots

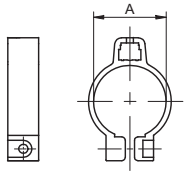
- Type 1 - 4: T-slot sensors in special slots
- Type 5: T-slot sensors with additional fastening clamp for round cylinders



order reference	
MZZA 02	Adapter set for T-slot sensors for special slots

Fastening clamps for micro cylinders

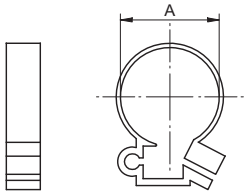
- Diameter: ø 8 ... 25 mm
- Material: PA AISI 303



order reference	
MZZB 01/008	Fastening clamp for micro cylinder ø 8 mm (A)
MZZB 01/010	Fastening clamp for micro cylinder ø 10 mm (A)
MZZB 01/012	Fastening clamp for micro cylinder ø 12 mm (A)
MZZB 01/016	Fastening clamp for micro cylinder ø 16 mm (A)
MZZB 01/020	Fastening clamp for micro cylinder ø 20 mm (A)
MZZB 01/025	Fastening clamp for micro cylinder ø 25 mm (A)

Fastening clamps for round cylinders

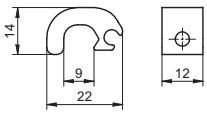
- Diameter: ø 11 ... 65 mm
- Material: PA AISI 303



order reference	
MZZB 02/011	Fastening clamp for round cylinder ø 11,3 mm
MZZB 02/012	Fastening clamp for round cylinder ø 12 mm
MZZB 02/013	Fastening clamp for round cylinder ø 13,3 mm
MZZB 02/014	Fastening clamp for round cylinder ø 14 mm
MZZB 02/016	Fastening clamp for round cylinder ø 16 mm
MZZB 02/017	Fastening clamp for round cylinder ø 17,3 mm
MZZB 02/018	Fastening clamp for round cylinder ø 18 mm
MZZB 02/020	Fastening clamp for round cylinder ø 20 mm
MZZB 02/021	Fastening clamp for round cylinder ø 21,3 mm
MZZB 02/022	Fastening clamp for round cylinder ø 22 mm
MZZB 02/024	Fastening clamp for round cylinder ø 24 mm
MZZB 02/026	Fastening clamp for round cylinder ø 26,3 mm
MZZB 02/027	Fastening clamp for round cylinder ø 27 mm
MZZB 02/029	Fastening clamp for round cylinder ø 29 mm
MZZB 02/030	Fastening clamp for round cylinder ø 30 mm
MZZB 02/033	Fastening clamp for round cylinder ø 33,6 mm
MZZB 02/036	Fastening clamp for round cylinder ø 36 mm
MZZB 02/041	Fastening clamp for round cylinder ø 41,6 mm
MZZB 02/045	Fastening clamp for round cylinder ø 45 mm
MZZB 02/052	Fastening clamp for round cylinder ø 52,4 mm
MZZB 02/065	Fastening clamp for round cylinder ø 65,4 mm

Mounting brackets for round cylinders with tie rods 5 ... 9 mm

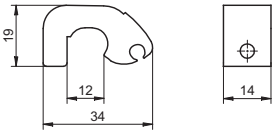
- Cylinder: ø 5 ... 9 mm
- Material: PA AISI 303 6005A



order reference	
MZZC 01/005	Mounting bracket for round cylinders with tie rods ø 5 ... 9 mm

Mounting brackets for round cylinders with tie rods 32 ... 40 mm

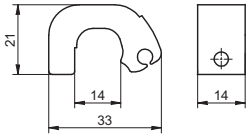
- Cylinder: ø 32 ... 40 mm
- Material: PA AISI 303 6005A



order reference	
MZZC 01/032	Mounting bracket for round cylinders with tie rods ø 32 ... 40 mm

Mounting brackets for round cylinders with tie rods 50 ... 63 mm

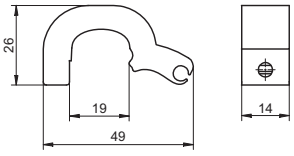
- Cylinder: ø 50 ... 63 mm
- Material: PA AISI 303 6005A



order reference	
MZZC 01/050	Mounting bracket for round cylinders with tie rods ø 50 ... 63 mm

Mounting brackets for round cylinders with tie rods 82 ... 100 mm

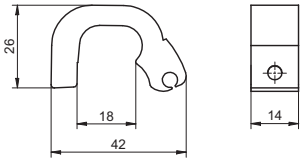
- Cylinder: ø 82 ... 100 mm
- Material: PA AISI 303 6005A



order reference	
MZZC 01/082	Mounting bracket for round cylinders with tie rods ø 82 ... 100 mm

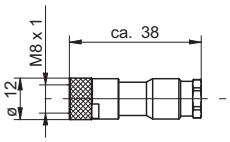
Mounting brackets for round cylinders with tie rods 125 mm

- Cylinder: ø 125 mm
- Material: PA AISI 303 6005A



order reference	
MZZC 01/125	Mounting bracket for round cylinders with tie rods ø 125 mm

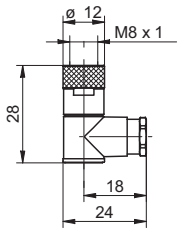
ES 21 - Cable socket M8 straight, not pre-assembled



order reference	
ES 21	Connector M8, 3 pin, straight
ES 21A	Connector M8, 4 pin, straight

- Connector unshielded
- Connector only, no cable supplied
- 3 and 4 pin version

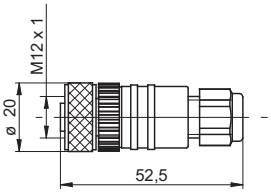
ES 22 - Cable socket M8 angular, not pre-assembled



order reference	
ES 22	Connector M8, 3 pin, angular
ES 22A	Connector M8, 4 pin, angular

- Connector unshielded
- Connector only, no cable supplied
- 3 and 4 pin versions

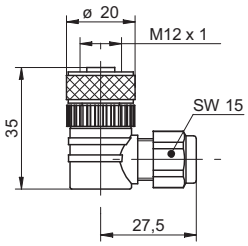
ES 18 - Cable socket M12 straight, not pre-assembled



order reference	
ES 18 PG7	Connector M12, 4 pin, straight
ES 18C PG7	Connector M12, 5 pin, straight

- Connector unshielded
- Connector only, no cable supplied
- 4 and 5 pin versions

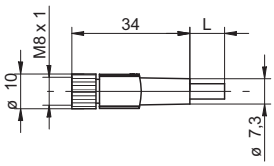
ES 14 - Cable socket M12 angular, not pre-assembled



order reference	
ES 14 PG7	Connector M12, 4 pin, angular
ES 14C PG7	Connector M12, 5 pin, angular

- Connector unshielded
- Connector only, no cable supplied
- 4 and 5 pin versions

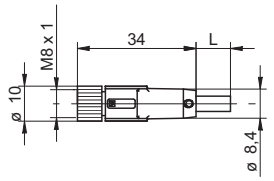
ESG 32 - Connector M8 straight



order reference	
ESG 32AH0200	Connector M8, 4 pin, straight, 2 m
ESG 32AH0500	Connector M8, 4 pin, straight, 5 m
ESG 32AH1000	Connector M8, 4 pin, straight, 10 m
ESG 32SH0200	Connector M8, 3 pin, straight, 2 m
ESG 32SH0500	Connector M8, 3 pin, straight, 5 m
ESG 32SH1000	Connector M8, 3 pin, straight, 10 m

- Connector unshielded
- 3 and 4 pin versions
- Cable coating PUR
- Halogen-free
- Suitable for flexible cable carriers
- UL listed, number E315836

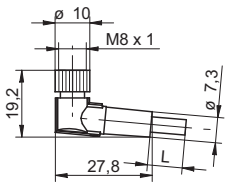
ESG 32G - Connector M8 straight, shielded



order reference	
ESG 32AH0200G	Connector M8, 4 pin, straight, 2 m, shielded
ESG 32AH0500G	Connector M8, 4 pin, straight, 5 m, shielded
ESG 32AH1000G	Connector M8, 4 pin, straight, 10 m, shielded
ESG 32SH0500G	Connector M8, 3 pin, straight, 5 m, shielded
ESG 32SH1000G	Connector M8, 3 pin, straight, 10 m, shielded

- Connector shielded, screen connected with cap nut
- 3 and 4 pin versions
- Cable coating PUR
- Halogen-free
- Suitable for flexible cable carriers
- UL listed, number E315836

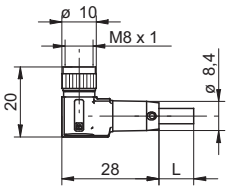
ESW 31 - Connector M8 angular



order reference	
ESW 31AH0200	Connector M8, 4 pin, angular, 2 m
ESW 31AH0500	Connector M8, 4 pin, angular, 5 m
ESW 31AH1000	Connector M8, 4 pin, angular, 10 m
ESW 31SH0200	Connector M8, 3 pin, angular, 2 m
ESW 31SH0500	Connector M8, 3 pin, angular, 5 m
ESW 31SH1000	Connector M8, 3 pin, angular, 10 m

- Connector unshielded
- 3 and 4 pin versions
- Cable coating PUR
- Halogen-free
- Suitable for flexible cable carriers
- UL listed, number E315836

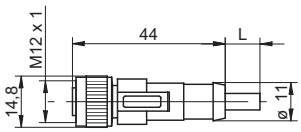
ESW 31G - Connector M8 angular, shielded



order reference	
ESW 31AH0200G	Connector M8, 4 pin, angular, 2 m, shielded
ESW 31AH0500G	Connector M8, 4 pin, angular, 5 m, shielded
ESW 31AH1000G	Connector M8, 4 pin, angular, 10 m, shielded
ESW 31SH0200G	Connector M8, 3 pin, angular, 2 m, shielded
ESW 31SH0500G	Connector M8, 3 pin, angular, 5 m, shielded

- Connector shielded, screen connected with cap nut
- 3 and 4 pin versions
- Cable coating PUR
- Halogen-free
- Suitable for flexible cable carriers
- UL listed, number E315836

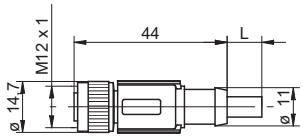
ESG 34 - Connector M12 straight



order reference	
ESG 34AH0200	Connector M12, 4 pin, straight, 2 m
ESG 34AH0500	Connector M12, 4 pin, straight, 5 m
ESG 34AH1000	Connector M12, 4 pin, straight, 10 m
ESG 34CH0200	Connector M12, 5 pin, straight, 2 m
ESG 34CH0500	Connector M12, 5 pin, straight, 5 m
ESG 34SH0200	Connector M12, 3 pin, straight, 2 m
ESG 34SH0500	Connector M12, 3 pin, straight, 5 m
ESG 34SH1000	Connector M12, 3 pin, straight, 10 m

- Connector unshielded
- 3, 4 and 5 pin versions
- Cable coating PUR
- Halogen-free
- Suitable for flexible cable carriers
- UL listed, number E315836

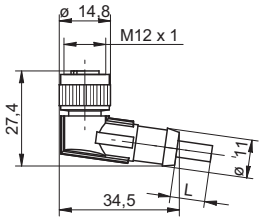
ESG 34G - Connector M12 straight, shielded



order reference	
ESG 34AH0200G	Connector M12, 4 pin, straight, 2 m, shielded
ESG 34AH0500G	Connector M12, 4 pin, straight, 5 m, shielded
ESG 34AH1000G	Connector M12, 4 pin, straight, 10 m, shielded
ESG 34CH0200G	Connector M12, 5 pin, straight, 2 m, shielded
ESG 34CH0500G	Connector M12, 5 pin, straight, 5 m, shielded
ESG 34CH1000G	Connector M12, 5 pin, straight, 10 m, shielded
ESG 34FH0200G	Connector M12, 8 pin, straight, 2 m, shielded
ESG 34FH0500G	Connector M12, 8 pin, straight, 5 m, shielded
ESG 34FH1000G	Connector M12, 8 pin, straight, 10 m, shielded

- Connector shielded, screen connected with cap nut
- 4, 5 and 8 pin versions
- Cable coating PUR
- Halogen-free
- Suitable for flexible cable carriers
- UL listed, number E315836

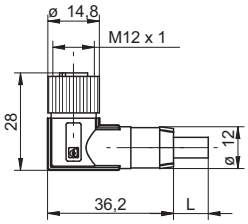
ESW 33 - Connector M12 angular



order reference	
ESW 33AH0200	Connector M12, 4 pin, angular, 2 m
ESW 33AH0500	Connector M12, 4 pin, angular, 5 m
ESW 33AH1000	Connector M12, 4 pin, angular, 10 m
ESW 33CH0200	Connector M12, 5 pin, angular, 2 m
ESW 33CH0500	Connector M12, 5 pin, angular, 5 m
ESW 33SH0200	Connector M12, 3 pin, angular, 2 m
ESW 33SH0500	Connector M12, 3 pin, angular, 5 m
ESW 33SH1000	Connector M12, 3 pin, angular, 10 m

- Connector unshielded
- 3, 4 and 5 pin versions
- Cable coating PUR
- Halogen-free
- Suitable for flexible cable carriers
- UL listed, number E315836

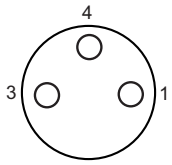
ESW 33G - Connector M12 angular, shielded



order reference	
ESW 33AH0200G	Connector M12, 4 pin, angular, 2 m, shielded
ESW 33AH0500G	Connector M12, 4 pin, angular, 5 m, shielded
ESW 33AH1000G	Connector M12, 4 pin, angular, 10 m, shielded
ESW 33CH0500G	Connector M12, 5 pin, angular, 5 m, shielded
ESW 33FH0200G	Connector M12, 8 pin, angular, 2 m, shielded
ESW 33FH0500G	Connector M12, 8 pin, angular, 5 m, shielded
ESW 33FH1000G	Connector M12, 8 pin, angular, 10 m, shielded

- Connector shielded, screen connected with cap nut
- 4, 5 and 8 pin versions
- Cable coating PUR
- Halogen-free
- Suitable for flexible cable carriers
- UL listed, number E315836

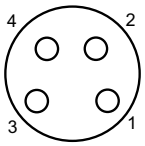
M8 3 pin



1 = BN
3 = BU
4 = BK

ES 21
ES 22
ESG 32S
ESW 31S

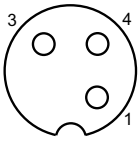
M8 4 pin



1 = BN
2 = WH
3 = BU
4 = BK

ES 21A
ES 22A
ESG 32A
ESW 31A

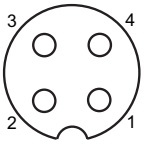
M12 3 pin



1 = BN
3 = BU
4 = WH

ESG 34S
ESW 33S

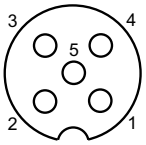
M12 4 pin



1 = BN
2 = WH
3 = BU
4 = BK

ES 14
ES 18
ES 21C
ES 22C
ESG 34A
ESW 33A

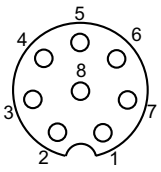
M12 5 pin



1 = BN
2 = WH
3 = BU
4 = BK
5 = GY

ES 14C
ES 18C
ESG 34C
ESW 33C

M12 8 pin



1 = WH
2 = BN
3 = GN
4 = YE
5 = GY
6 = PK
7 = BU
8 = RD

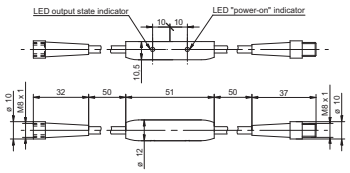
ESG 34F
ESW 33F

Test unit for sensors

This sensor test unit has been designed primarily to test and demonstrate NPN and/or PNP sensors. Sensor connection is simple using the three spring loaded terminals. Red LED indicates PNP output. Green LED indicates NPN output.

order reference	
10115437	Test unit for sensors

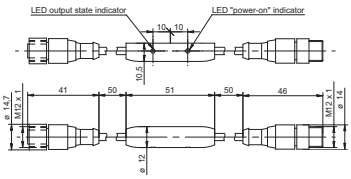
PNP to NPN Converter M8



- PNP to NPN Converter
- For frequencies up to max. 5 kHz
- For connector M8 - 3 pins

order reference	
10161959	Converter PNP/NPN - M8 x 1

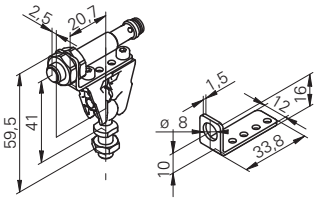
PNP to NPN Converter M12



- PNP to NPN Converter
- For frequencies up to max. 5 kHz
- For connector M12 - 3 pins

order reference	
10161958	Converter PNP/NPN - M12 x 1

Sensofix-Mounting kit for sensors series 08

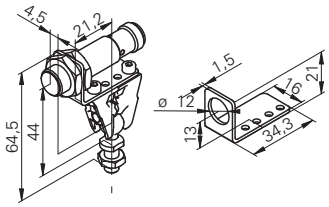


- Clamps made of stainless steel
- Ball pivots made of galvanized steel
- Mounting panel made of stainless steel

For use with all sensors in M8 housing

order reference	
10151719	Sensofix series 08

Sensofix-Mounting kit for sensors series 12 round

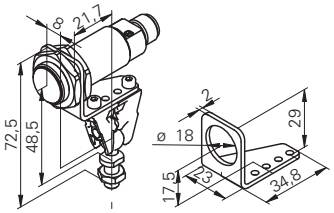


- Clamps made of stainless steel
- Ball pivots made of galvanized steel
- Mounting panel made of stainless steel

For use with all sensors in M12 housing

order reference	
10151720	Sensofix series 12 round

Sensofix-Mounting kit for sensors series 18 round



- Clamps made of stainless steel
- Ball pivots made of galvanized steel
- Mounting panel made of stainless steel

For use with all sensors in M18 housing

order reference	
10151658	Sensofix series 18

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