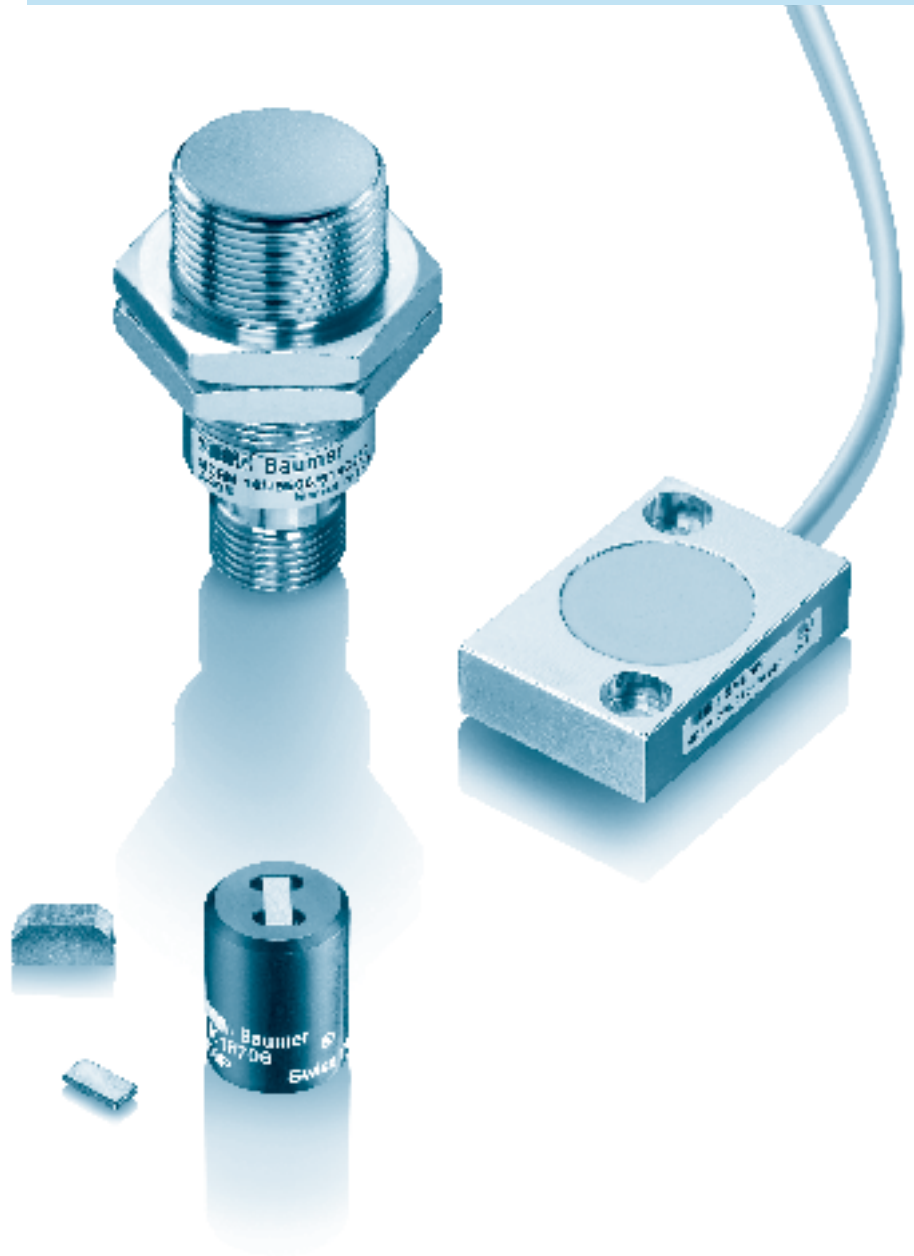




Magnetic angle sensors



Overview

Functional principle and installation

Cylindrical designs

Rectangular designs







Page 14

Page 15





Page 17

Page 23

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

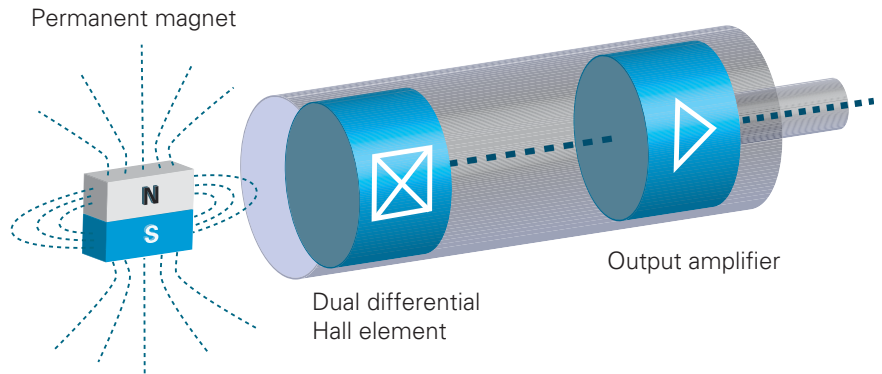
rectangular designs

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



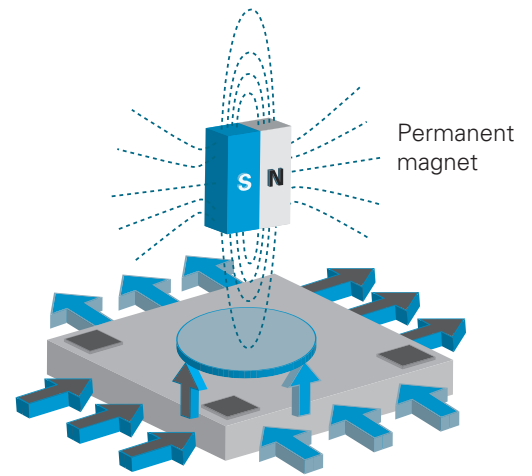
General information

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.

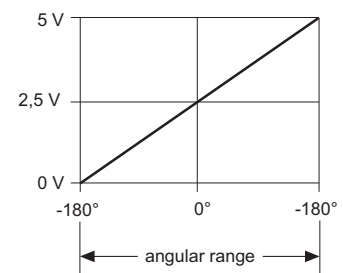


Functional principle

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 detection principle ensures output of the correct rotation angle even after power failure.



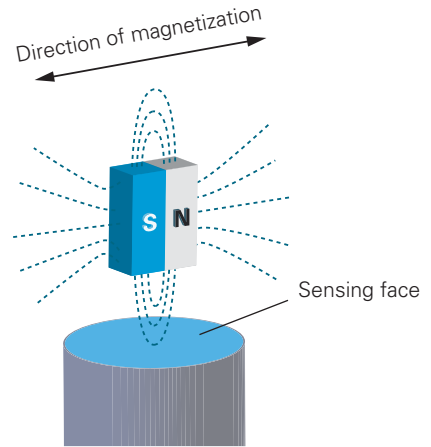
Example of an output signal provided by a sensor with a sensing angle throughout 360° and voltage output





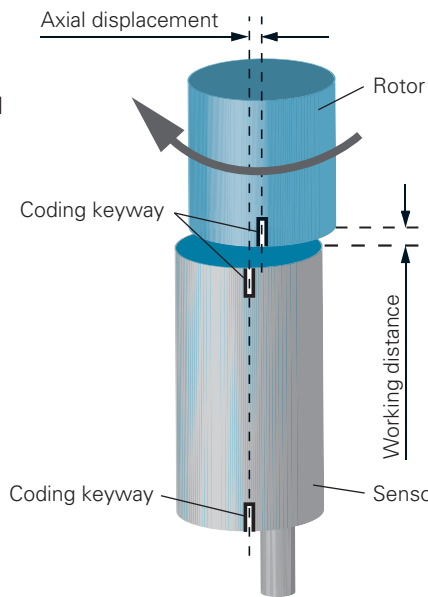
Permanent magnet

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

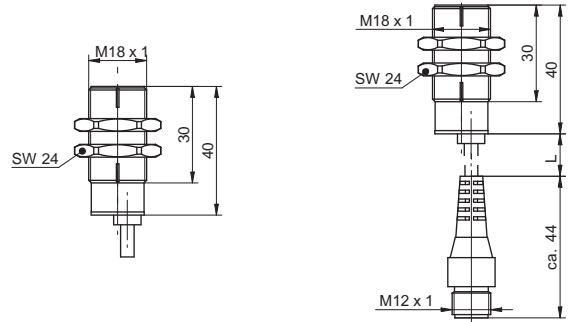
ambient conditions

operating temperature	-40 ... +85 °C
protection class	IP 67

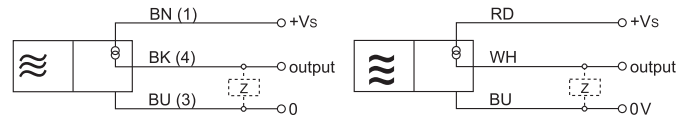
remarks

working distance max. in conjunction with permanent magnet 11052886 (available as an accessory)

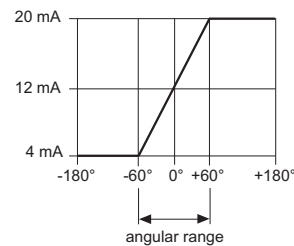
dimension drawings



connection diagrams



output signal



order reference

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

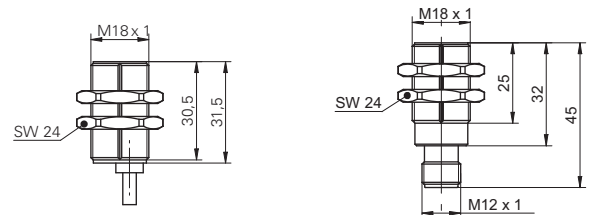
working distance max. in conjunction with permanent magnet 11052886 (available as an accessory)

order reference

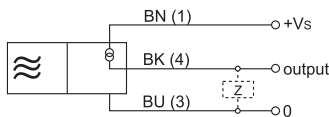
MDRM 18I9524/C270	cable PUR 3 x 0,25, 2 m
MDRM 18I9524/S14C270	connector M12

connection types

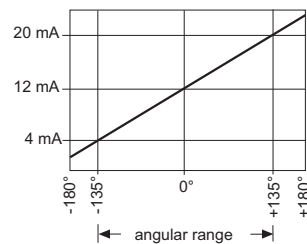
dimension drawings



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

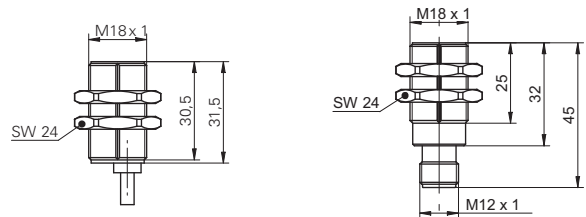
ambient conditions

operating temperature	-40 ... +85 °C
protection class	IP 67

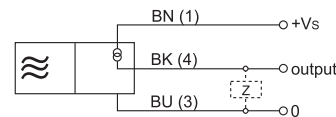
remarks

working distance max. in conjunction with permanent magnet 11052886 (available as an accessory)

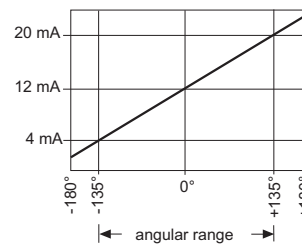
dimension drawings



connection diagram



output signal



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

order reference

MDRM 1819524/A270	cable PUR 3 x 0,25, 2 m
MDRM 1819524/S14A270	connector M12

connection types



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

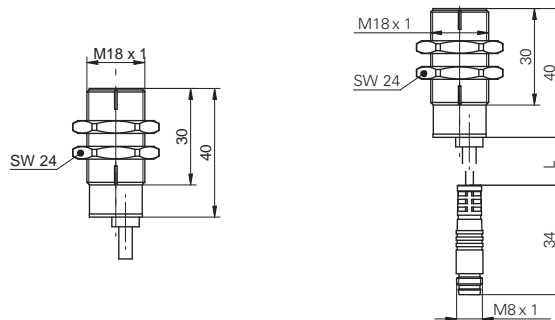
protection class	IP 67
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remarks

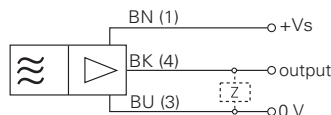
working distance max. in conjunction with permanent magnet 11052886 (available as an accessory)



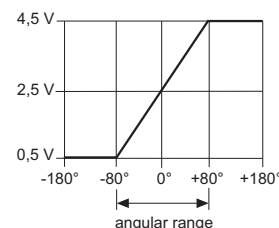
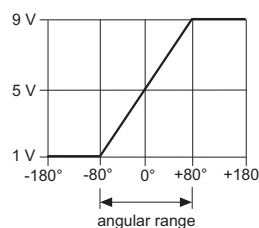
dimension drawings



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

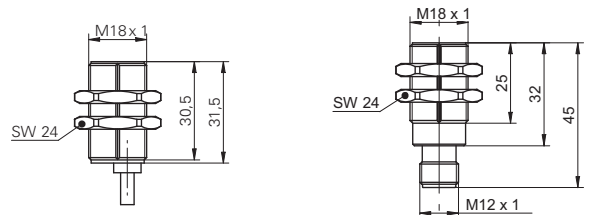
remarks

working distance max. in conjunction with permanent magnet 11052886 (available as an accessory)

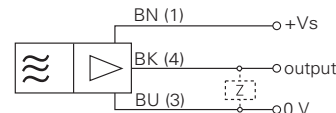
order reference

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

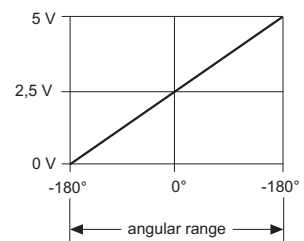
dimension drawings



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

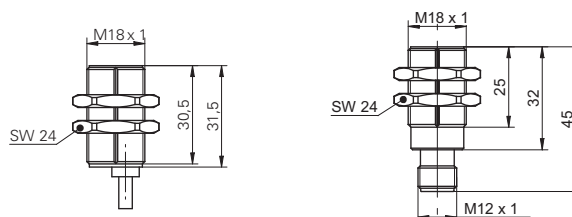
working distance max. in conjunction with permanent magnet 11052886 (available as an accessory)

order reference

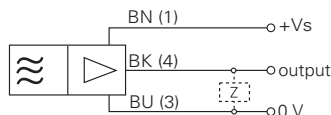
order reference	connection types
MDRM 18U9505/C360	cable PUR 3 x 0,25, 2 m
MDRM 18U9505/S14C360	connector M12



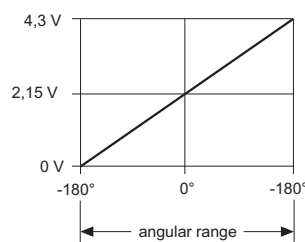
dimension drawings



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
- 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

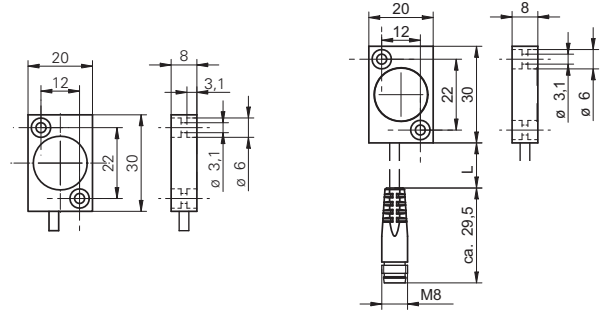
ambient conditions

operating temperature	-40 ... +85 °C
protection class	IP 67

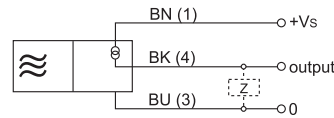
remarks

working distance max. in conjunction with permanent magnet 11052886 (available as an accessory)

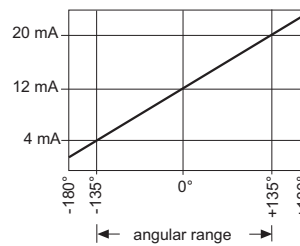
dimension drawings



connection diagram



output signal



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

MDFM 2019424/C270	cable PUR 3 x 0,25, 2 m
MDFM 2019424/KS35PC270	flylead connector PUR M8, L=200 mm

connection types



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)

order reference

MDFM 20I9424/A270

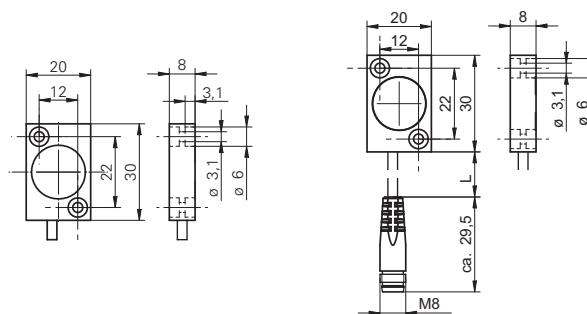
connection types

cable PUR 3 x 0,25, 2 m

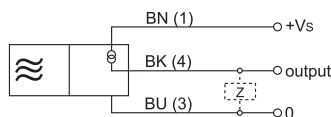
MDFM 20I9424/KS35PA270

flylead connector PUR M8, L=200 mm

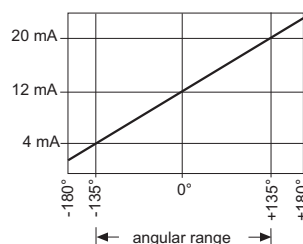
dimension drawings



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



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

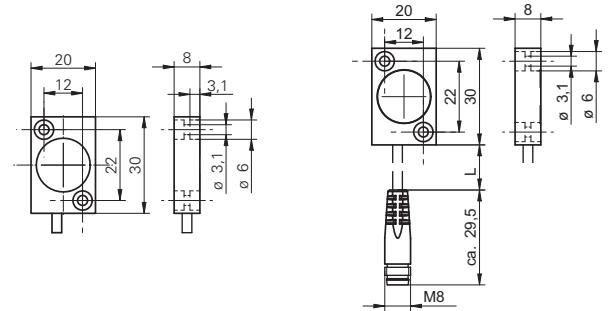
ambient conditions

operating temperature	-40 ... +85 °C
protection class	IP 67

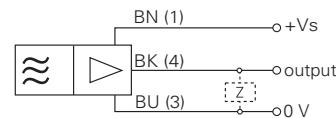
remarks

working distance max. in conjunction with permanent magnet 11052886 (available as an accessory)

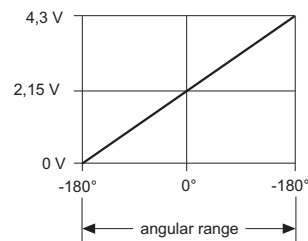
dimension drawings



connection diagram



output signal



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

MDFM 20U9405/C360

connection types

cable PUR 3 x 0,25, 2 m

MDFM 20U9405/KS35PC360

flylead connector PUR M8, L=200 mm



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

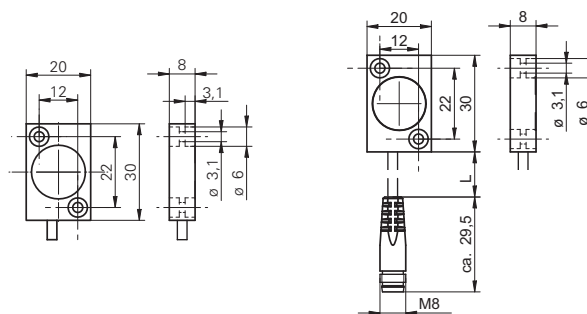
remarks

working distance max. in conjunction with permanent magnet 11052886 (available as an accessory)

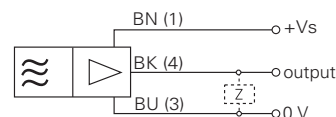
order reference

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

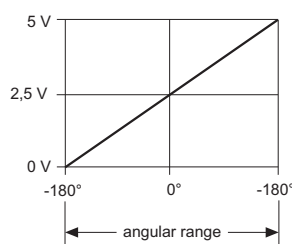
dimension drawings



connection diagram



output signal



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