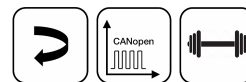


**NOVOHALL  
Rotary Sensor  
Touchless**

**RFX-6900**  
Heavy Duty  
CANopen

**Mobile Applications**



**Special Features**

- Very robust design for extreme environments
- Touchless hall technology
- Electrical range up to 360°, in single and dual-channel version
- 2 part design, mechanically decoupled
- Enhanced corrosion protection due to anodized aluminum housing, salt spray resistant
- Excellent linearity
- High resolution to 14 bits
- Absolutely impermeable to splash-water IP69K
- High temperature resistance
- For highest EMC requirements such as ISO pulses and interference fields according to ISO 11452 and ECE directive

**Applications**

- Position measurement in steering systems
- Pivotal vehicle bracings
- Transport systems with several steered axes
- Construction and agricultural machinery

The angle sensor RFX-6900 is designed for use in mobile applications under extreme environmental conditions. The sensor is suitable for a continuously ambitious operating.

The two-part design consisting of sensor and magnetic position marker offers great flexibility when mounting. The absence of shaft and bearing makes the assembly much less sensitive to axial and radial application tolerances - separate couplings are obsolete. Measurements can be made transmissively through any non-ferromagnetic material. The sensor is perfectly suitable for use in harsh environmental conditions through the completely encapsulated electronics.

**Description**

Material	Housing: aluminium AlMgSi1, anodized, salt spray resistant
Mounting	With 3 screws M4, screw-in depth 7 mm min.
Fastening torque of mounting	250 ± 50 Ncm
Electrical connection	Cable with cable screw connection, 4x 0.5 mm <sup>2</sup> (AWG 20), TPE, shielded / Connector M12x1, A-coded

**Mechanical Data**

Dimensions	See dimension drawing
Mechanical travel	continuous
Weight	approx. 200 g

## Ordering Specifications

### Ordering Specifications

Preferred types printed in bold

- Delivery time up to 25 pcs. within 10 working days EXW
- Best low-volume pricing

### Interface

**6: CANopen**

#### Interface parameters

##### Single-channel version

**1: 1x position, 1x speed**

5: 1x position, 1x speed with bus termination 120 Ω

##### Dual-channel version

**2: 2x position, 2x speed**

6: 2x position, 2x speed with bus termination 120 Ω

#### Baud rate

**1: 1000 kBaud**

**2: 800 kBaud**

**3: 500 kBaud**

**4: 250 kBaud**

**5: 125 kBaud**

**7: 50 kBaud**

#### Electrical connection

##### 1 Output

**201: 1x cable 4-pole 1.0 m, shielded**

**511: 1x connector M12, 5-pole, shielded**

##### 2 Outputs (CAN IN/OUT)

**301: 2x cable 4-pole 1.0 m, shielded**

**611: 2x connector M12 (male), 5-pole, shielded**

Cable versions and assembled connectors on request

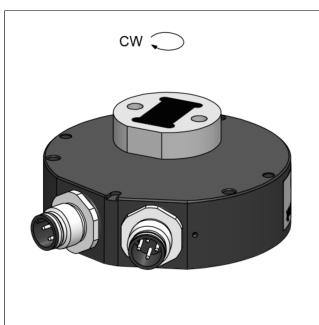
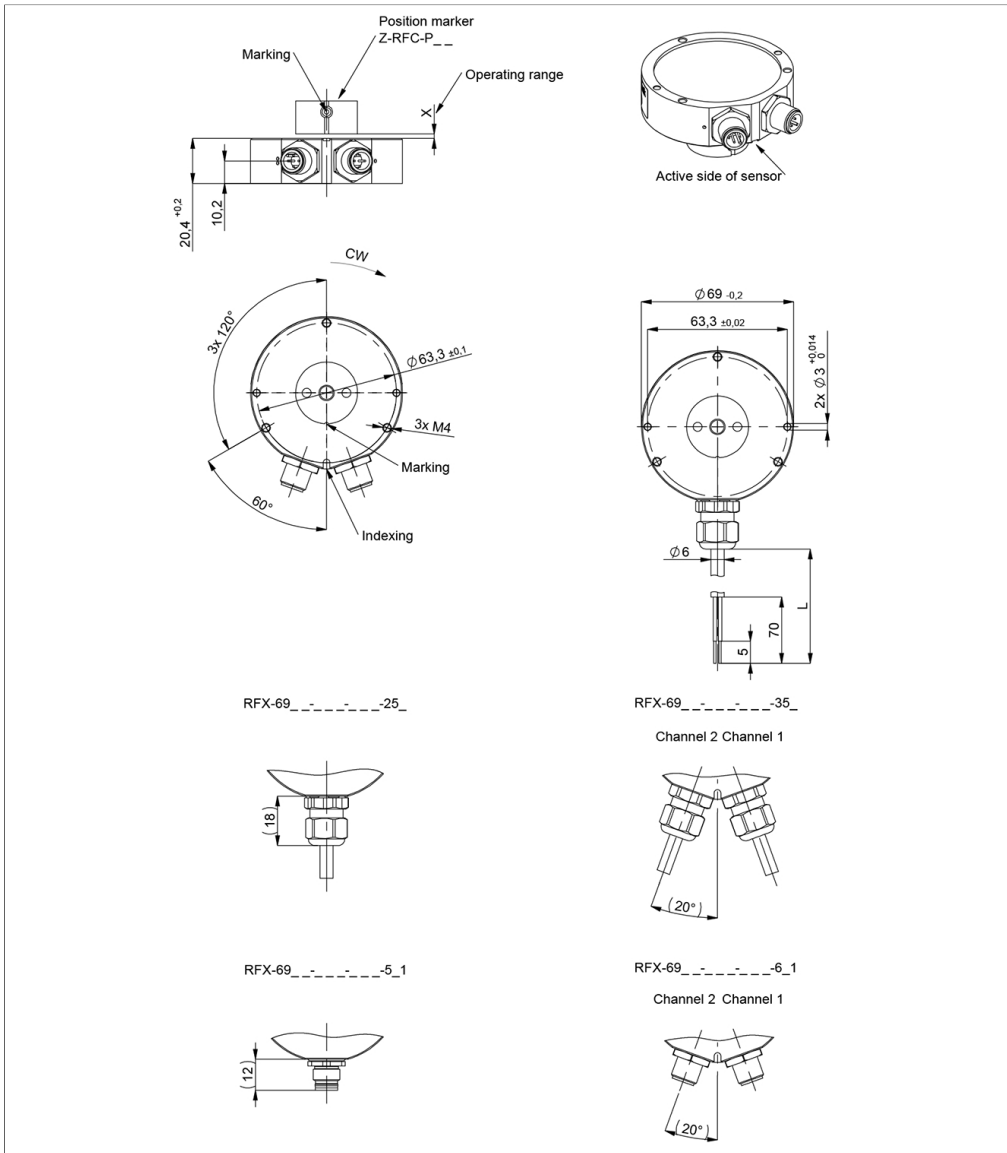
**R F X - 6 9 0 1 - 2 1 4 - 6 1 5 - 5 1 1**

Series

Model / size  
6901: 69 x 20.4 mm

**Drawing**

CAD data see  
[www.novotechnik.de/en/download/cad-data/](http://www.novotechnik.de/en/download/cad-data/)



When the marking of the position marker is pointing towards the electrical outlet or to the indexing, the sensor output is near the electrical center position (index position).

Technical Data

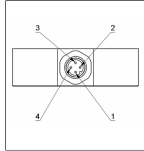
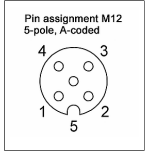


<b>Type</b>	<b>RFX-69__-214-6__-__-__-__</b> <b>CANopen</b>
Measured variables	Position and speed
Measuring range	360°
Measuring range speed	0 ... 1600 rpm
Number of channels	1 / 2
Protocol	CANopen protocol to CiA DS-301 V4.2.0, Device profile DS-406 V3.2 Encoder Class C2, LSS services to CiA DS-305 V1.1.2
Programmable parameters	Position, speed, cams, working areas, rotating direction, scale, offset, node ID, baud rate
Node ID	1 ... 127 (default 127)
Baud rate	50 ... 1000 kBaud
Update rate (output)	1 kHz
Resolution	14 bits
Resolution speed	$360^\circ/2^{14} \approx 0.022^\circ/\text{ms}$
Independent linearity	$\leq \pm 0.5\% \text{FS}$
Repeatability	$\leq \pm 0.1^\circ$
Hysteresis	$\leq \pm 0.1^\circ$
Temperature error	$\pm 0.2\% \text{FS}$
Supply voltage Ub	12/24 VDC (8 ... 34 VDC)
Current consumption at Power-on	$\leq 50 \text{ mA}$
Power drain w/o load	$< 0.4 \text{ W}$
Oversvoltage protection	45 VDC (permanent)
Polarity protection	yes (supply lines)
Short circuit protection	yes (output vs. GND and supply voltage up to 40 VDC)
Insulation resistance (500 VDC)	$\geq 10 \text{ M}\Omega$
Bus termination internal	120 $\Omega$ (optionally)
<b>Environmental Data</b>	
Max. operational speed	Mechanically unlimited
Vibration IEC 60068-2-6	20 g, 5 ... 2000 Hz, Amax = 0.75 mm
Shock IEC 60068-2-27	50 g, 6 ms
Protection class DIN EN 60529	IP67 / IP69K (connector M12: IP67)
Operating temperature	-40 ... +105°C
Functional safety	If you need assistance in using our products in safety-related systems, please contact us
MTTF (IEC 60050)	842 years (one-channel) or 818 years (two-channel, per channel)
Traceability	Serial number on type labeling: production batch of the sensor assembly and relevant sensor components
Conformity/Approval	CE, UKCA, E1 see <a href="https://www.novotechnik.de/en/downloads/certificates/declarations-of-conformity-eu/uk">https://www.novotechnik.de/en/downloads/certificates/declarations-of-conformity-eu/uk</a> WEEE see <a href="https://www.novotechnik.de/en/downloads/certificates/eu-directive-weee/">https://www.novotechnik.de/en/downloads/certificates/eu-directive-weee/</a>
<b>EMC Compatibility</b>	
ISO 10605 ESD (Handling/Component)	8 kV
ISO 11452-2 Radiated HF-fields	100 V/m
ISO 11452-5 Radiated HF-Fields, stripline	200 V/m
CISPR 25 Radiated emission	Level 4
ISO 7637-2 Pulses on supply lines	(1, 2a, 2b, 3a, 3b, 4, 5) Level 3
ISO 7637-3 Pulses on output lines	Level 4
EN 13309 Construction machinery	
Emission/Immunity E1	acc. to ECE-R10
ISO 13786-1/-2 Construction machinery	On request

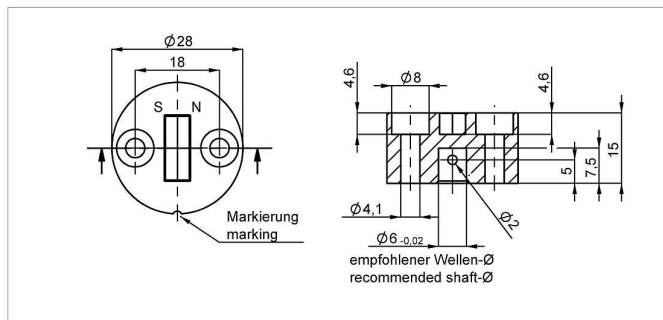
FS = Full scale: Signal span according to electrical measuring range

**Connection Assignment**

Signal	Cable code 2_/_/3_ _	Connector code 5_ _/6_ _
Supply voltage Ub	BN	Pin 2
GND	WH	Pin 3
CAN_H	GN	Pin 4
CAN_L	YE	Pin 5
CAN_SHLD	Shield	Pin 1
Connect cable shielding to GND		



## Position Markers

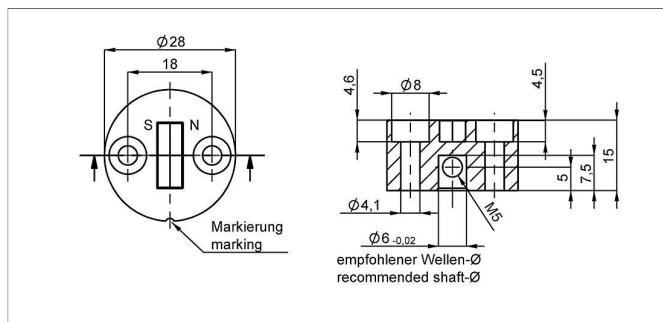
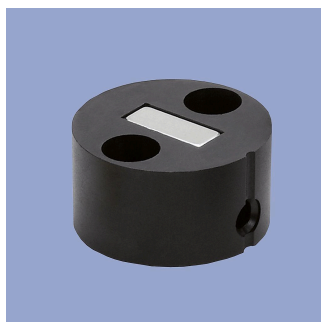


### Z-RFC-P02

Position marker for frontal fixation with 2 cylinder head screws M4x20 (with screw lock) or with locking pin (both included in delivery).

Material PF  
Max. permitted  $\pm 3$  mm  
radial offset  
Operating temp.  $-40 \dots +125^\circ\text{C}$

P/N	Pack. unit [pcs]
40005661	1
400056080	25

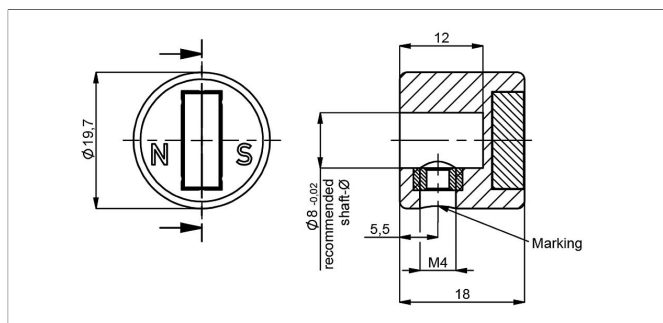


### Z-RFC-P08

Position marker for fixation with threaded pin M5 (included in delivery).

Material PF  
Max. permitted  $\pm 3$  mm  
radial offset  
Operating temp.  $-40 \dots +125^\circ\text{C}$

P/N	Pack. unit [pcs]
400056070	1
400056084	25



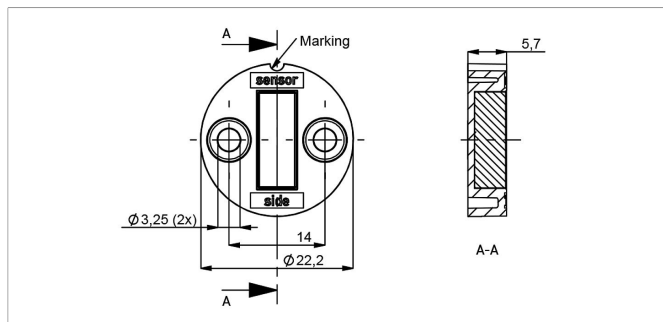
### Z-RFC-P23

Position marker for fixation with threaded pin M4 (included in delivery)

Caution: For orientation of the output characteristic please follow the user manual of the position marker!

Material PA6-GF  
Max. permitted  $\pm 3$  mm  
radial offset  
Operating temp.  $-40 \dots +125^\circ\text{C}$

P/N	Pack. unit [pcs]
400056074	1
400056085	25



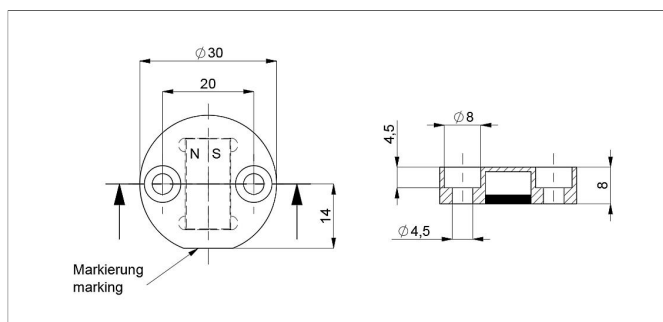
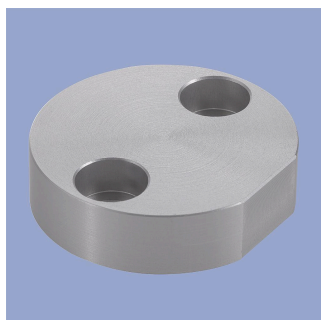
### Z-RFC-P31

Position marker for frontal fixation with 2 cylinder screws M3x8 (included in delivery).

Material PBT-GF  
Max. permitted  $\pm 3$  mm  
radial offset  
Operating temp.  $-40 \dots +125^\circ\text{C}$

P/N	Pack. unit [pcs]
400056088	1
400056089	25

## Position Markers



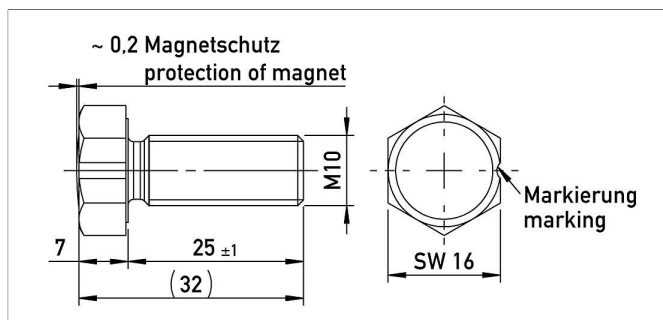
### Z-RFC-P22

Position marker for frontal fixation with 2 cylinder head screws M4x20 (with screw lock, included in delivery).

Attention: Closed side of position marker faces the active side of sensor.

Material Aluminium, anodized  
Max. permitted radial offset  $\pm 4$  mm  
Operating temp.  $-40 \dots +125^\circ\text{C}$

P/N	Pack. unit [pcs]
400106735	1
400106736	25

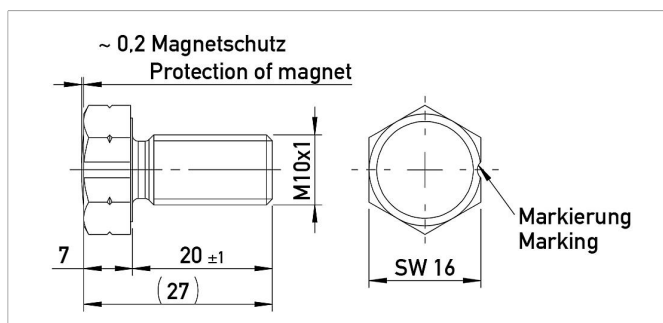


### Z-RFC-P18

Screw position marker M10 x 25 mm, similar DIN 933, magnet potted

Material Aluminium, anodized  
Max. permitted radial offset  $\pm 3$  mm  
Operating temp.  $-40 \dots +125^\circ\text{C}$

P/N	Pack. unit [pcs]
400104756	1
400104757	25

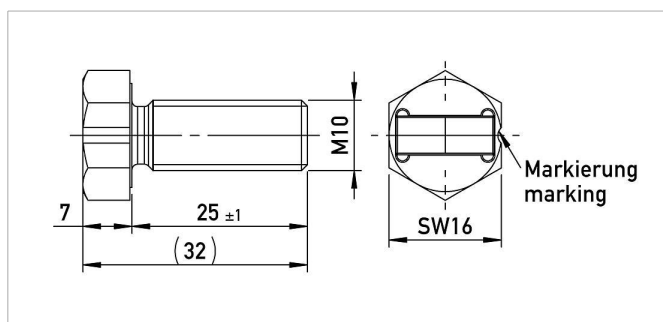


### Z-RFC-P28

Screw position marker M10x1 x 20 mm, similar DIN 933, magnet potted

Material Aluminium, anodized  
Max. permitted radial offset  $\pm 3$  mm  
Operating temp.  $-40 \dots +125^\circ\text{C}$

P/N	Pack. unit [pcs]
400108462	1
400108463	25



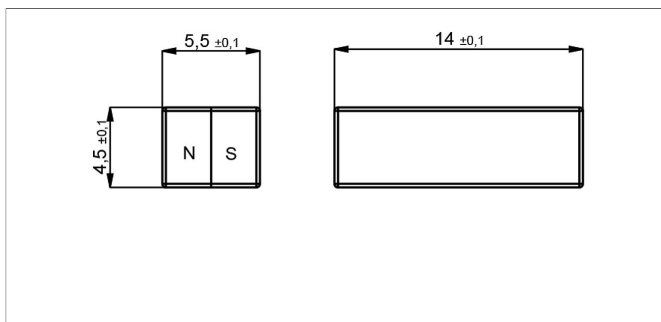
### Z-RFC-P20

Screw position marker M10 x 25 mm, similar DIN 933

Material Aluminium, anodized  
Max. permitted radial offset  $\pm 3$  mm  
Operating temp.  $-40 \dots +125^\circ\text{C}$

P/N	Pack. unit [pcs]
400104758	1
400104759	25

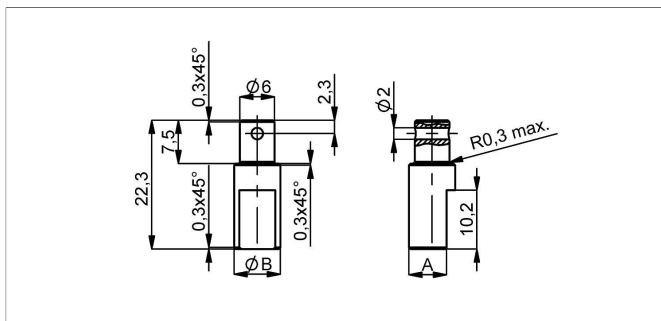
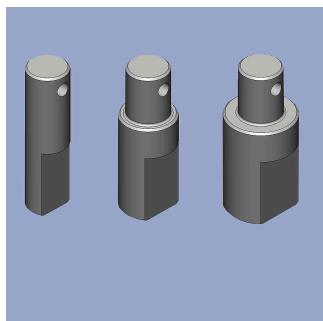
## Position Markers



### Z-RFC-P04

Magnet for direct application onto customer's shaft (see user manual).  
We recommend mounting on non-magnetizable materials, otherwise the specified working distances will vary (e.g. reduction of approx. 20% with axial mounting on a magnetizable shaft).  
Max. permitted radial offset  $\pm 3$  mm  
Operating temp.  $-40 \dots +125^\circ\text{C}$

P/N	Pack. unit [pcs]
40005659	1
400056082	50



### Z-RFC-S01/S02/S03

Shaft adapter for fixation at position marker Z-RFC-P02/P41 with locking pin

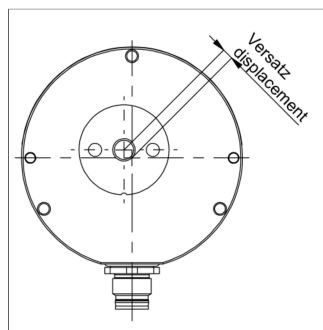
P/N	Type	ØB / A [mm]
400056206	Z-RFC-S01	6 / 4.5
400056207	Z-RFC-S02	8 / 6.5
400056208	Z-RFC-S03	10 / 8.5

## Position Markers

### Working Distances Position Markers [mm] - Redundant Versions

Z-RFC-P02 / P04 / P08 Z-RFC-P20 / P23 / P31	Z-RFC-P18 / P28	Z-RFC-P22
0.3 ... 3.5	0 ... 2.5	2.6 ... 7.3

### Lateral Magnet Offset



Lateral magnet offset will cause additional linearity error. The angle error, which is caused by radial displacement of sensor and position marker depends on the used position marker or magnet.

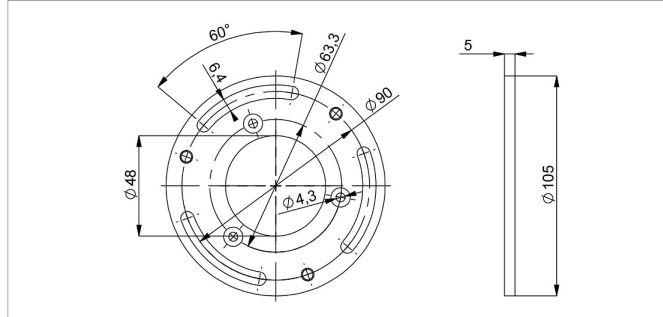
### Additional Linearity Error at Radial Displacement - Single-channel Versions

Z-RFC-P02 / P04 / P08 Z-RFC-P20 / P23 / P31	Z-RFC-P18 / P28	Z-RFC-P22
0.5 mm: $\pm 0.4^\circ$	0.5 mm: $\pm 0.7^\circ$	1.0 mm: $\pm 0.8^\circ$
1.0 mm: $\pm 1.1^\circ$	1.0 mm: $\pm 1.3^\circ$	2.0 mm: $\pm 1.8^\circ$
2.0 mm: $\pm 3.5^\circ$	2.0 mm: $\pm 3.3^\circ$	4.0 mm: $\pm 5.4^\circ$

### Additional Linearity Error at Radial Displacement - Redundant Versions

Z-RFC-P02 / P04 / P08 Z-RFC-P20 / P23 / P31	Z-RFC-P18 / P28	Z-RFC-P22
0.5 mm: $\pm 0.7^\circ$	0.5 mm: $\pm 1.1^\circ$	1.0 mm: $\pm 1.1^\circ$
1.0 mm: $\pm 1.8^\circ$	1.0 mm: $\pm 2^\circ$	2.0 mm: $\pm 2.4^\circ$
2.0 mm: $\pm 5.2^\circ$	2.0 mm: $\pm 4.6^\circ$	4.0 mm: $\pm 6.7^\circ$

## Sensor Mounting



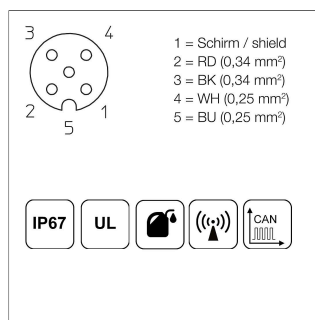
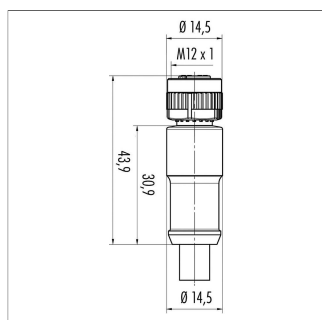
### Z-RFX-M01

Mounting plate for adjustable mounting on screw-hole circle 90 mm. Assembly material (3x countersink screws) included in delivery

Material Aluminium, anodized

P/N	Type
400104278	Z-RFX-M01

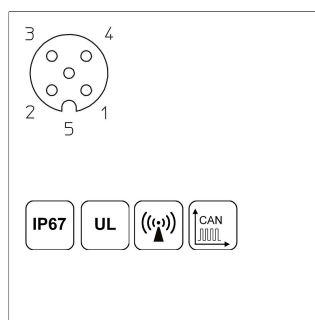
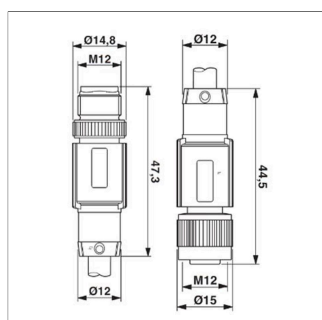
## Connector System M12



**EEM-33-41/43**  
M12x1 Mating female connector, 5-pin, straight, A-coded, with molded cable, IP67, shielded, open ended, CAN-Bus

Plug housing PUR  
Cable sheath PUR, Ø = 7.2 mm, -25 ... +85°C (fixed)  
Lead wires PP, 2x0.25 mm<sup>2</sup>+2x0.34 mm<sup>2</sup>

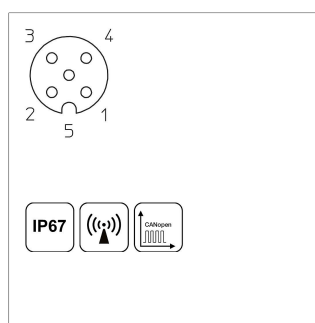
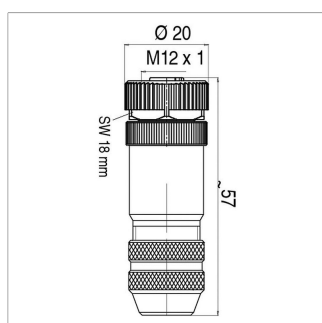
P/N	Type	Length
400056141	EEM-33-41	2 m
400056143	EEM-33-43	10 m



**EEM-33-52**  
M12x1 Mating female/male connector, 5-pin, straight, A-coded, with molded cable, IP67, shielded (shield on knurl), CAN-Bus

Plug housing PUR  
Cable sheath PUR, Ø = 6.7 mm, -25 ... +90°C (plug/socket) -20 ... +80°C (cable)  
Lead wires PE, 2x0.25 mm<sup>2</sup>+2x0.34 mm<sup>2</sup>

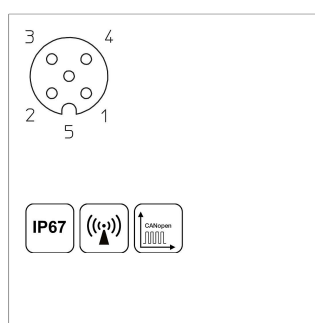
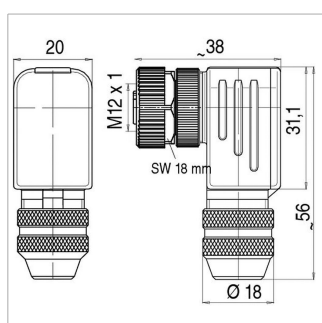
P/N	Type	Length
400106373	EEM-33-52	5 m



**EEM-33-73**  
M12x1 Mating female connector, 5-pin, straight, A-coded, with coupling nut, screw termination, IP67, shieldable, CAN bus

Plug housing Metal, -40 ... +85°C  
For wire gauge 6 ... 8 mm, max. 0.75 mm<sup>2</sup>

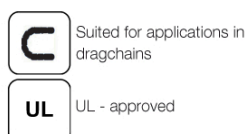
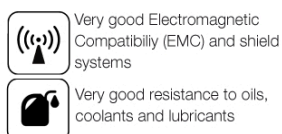
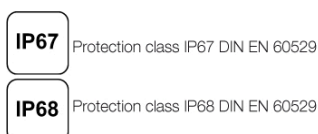
P/N	Type
400005645	EEM-33-73



**EEM-33-75**  
M12x1 mating female connector, 5-pin, angled, A-coded, with coupling nut, screw termination, IP67, shieldable, CAN bus, turning and fixing of contact carrier in 90° positions possible.

Plug housing Metal, -40 ... +85°C  
For wire gauge 6 ... 8 mm, max. 0.75 mm<sup>2</sup>

P/N	Type
400005646	EEM-33-75



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The specifications contained in our datasheets are intended solely for informational purposes. The documented specification values are based on ideal operational and environmental conditions and can vary significantly depending on the actual customer application. Using our products at or close to one or more of the specified performance ranges can lead to limitations regarding other performance parameters. It is therefore necessary that the end user verifies relevant performance parameters in the intended application. We reserve the right to change product specifications without notice.