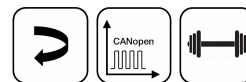


**NOVOHALL
Rotary Sensor
Touchless**

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 ² (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

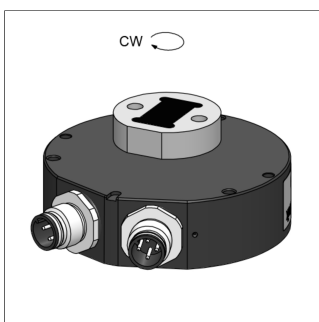
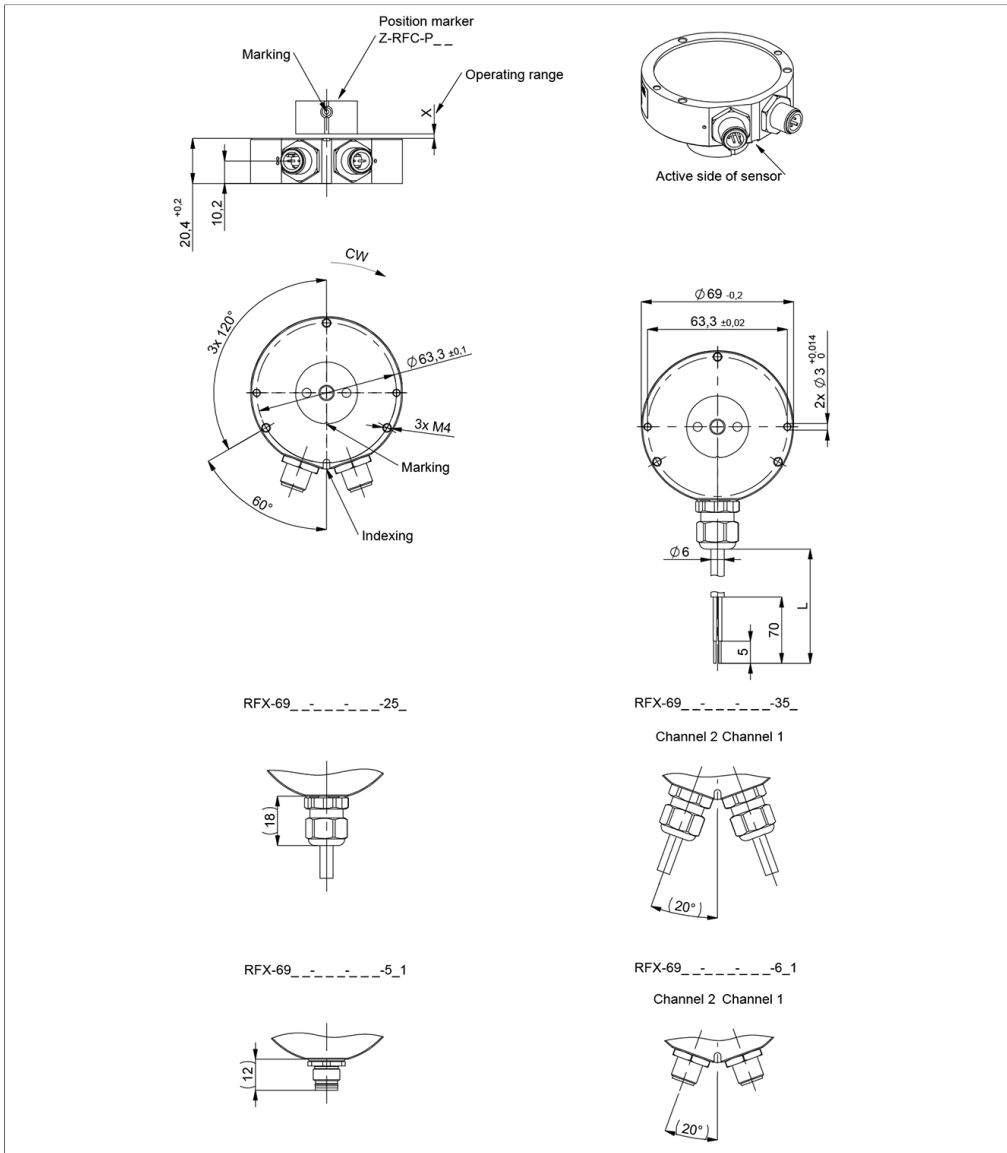
R F X - 6 9 0 1 - 2 1 4 - 6 1 5 - 5 1 1

Series

Model / size
6901: 69 x 20.4 mm

Drawing

CAD data see
www.novotechnik.de/en/download/cad-data/



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.

Technical Data

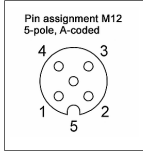


| Type | RFX-69__-214-6__-__-__-__ CANopen |
|---|--|
| Measured variables | Position and speed |
| Measuring range | 360° |
| Measuring range speed | 0 ... 1600 rpm |
| Number of channels | 1 / 2 |
| Protocol | CANopen protocol to CiA DS-301 V4.2.0, Device profile DS-406 V3.2 Encoder Class C2, LSS services 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 U_b | 12/24 VDC (8 ... 34 VDC) |
| Current consumption at Power-on | $\leq 50 \text{ mA}$ |
| Power drain w/o load | $< 0.4 \text{ W}$ |
| Overtoltage 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 Ω (optionally) |
| Environmental Data | |
| Max. operational speed | Mechanically unlimited |
| Vibration IEC 60068-2-6 | 20 g, 5 ... 2000 Hz, $A_{\text{max}} = 0.75 \text{ mm}$ |
| 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) | 413 years (one-channel) or 303 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 https://www.novotechnik.de/en/downloads/certificates/declarations-of-conformity-eu/uk WEEE see https://www.novotechnik.de/en/downloads/certificates/eu-directive-weee/ |
| EMC Compatibility | |
| 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 |

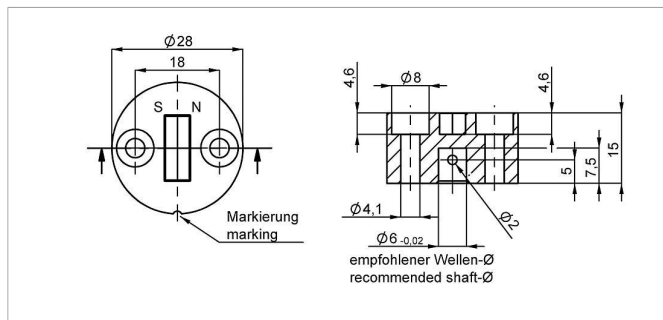
FS = Full scale: Signal span according to electrical measuring range

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

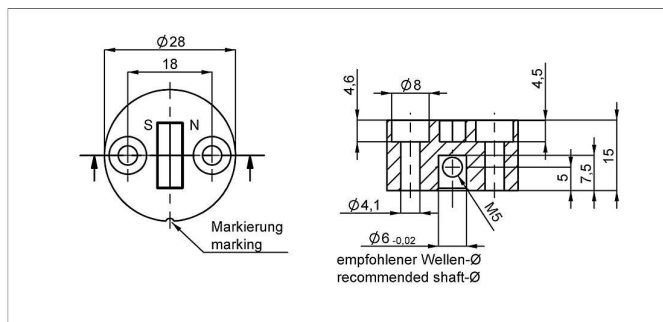


Z-RFC-P02

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 ± 3 mm
radial offset
Operating temp. $-40 \dots +125^\circ\text{C}$

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

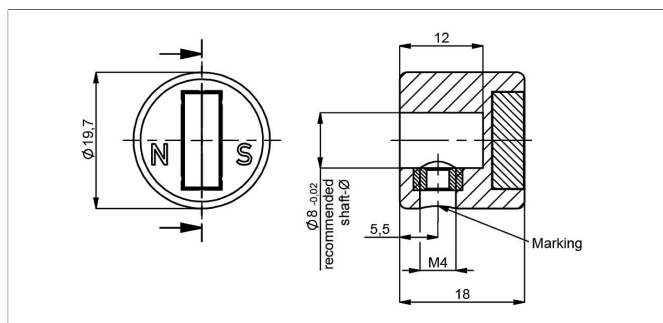


Z-RFC-P08

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

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

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



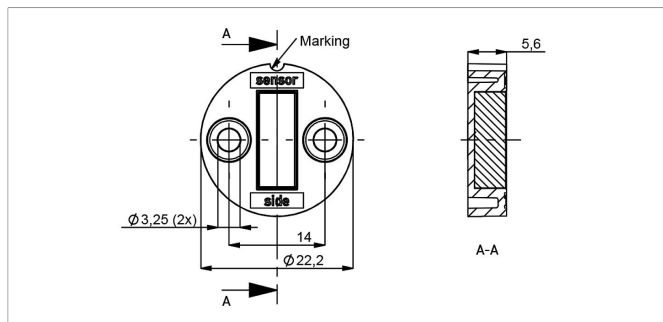
Z-RFC-P23

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 ± 3 mm
radial offset
Operating temp. $-40 \dots +125^\circ\text{C}$

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



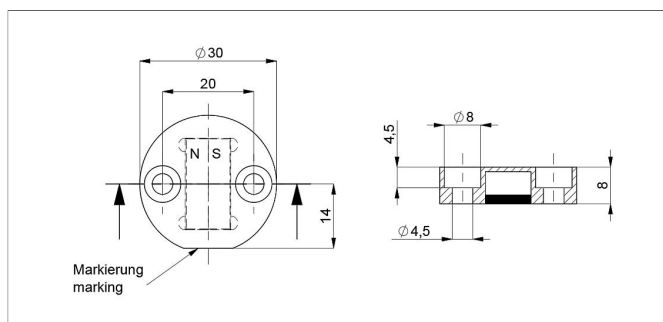
Z-RFC-P31

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

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

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

Position Markers



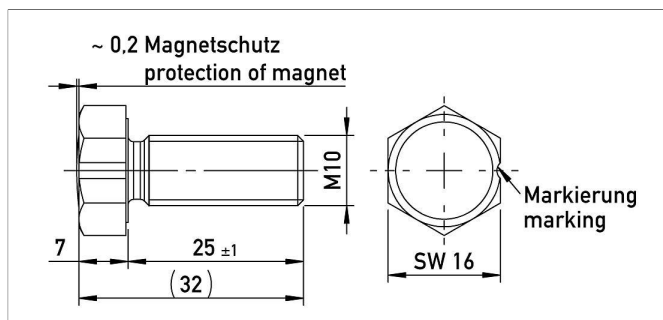
Z-RFC-P22

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 ± 4 mm
Operating temp. $-40 \dots +125^\circ\text{C}$

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

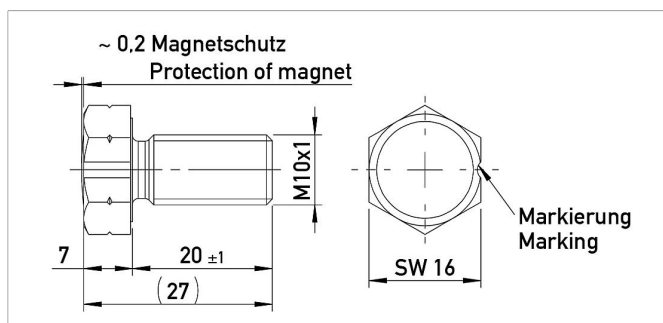


Z-RFC-P18

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

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

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

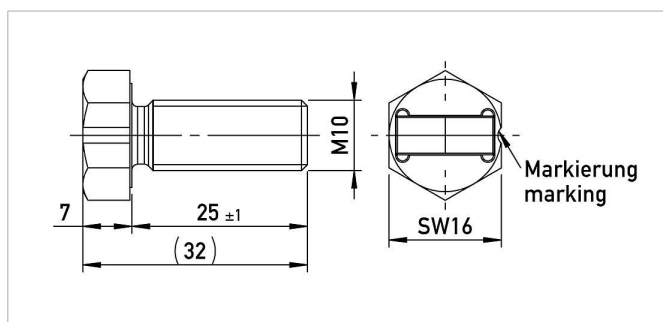


Z-RFC-P28

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

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

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



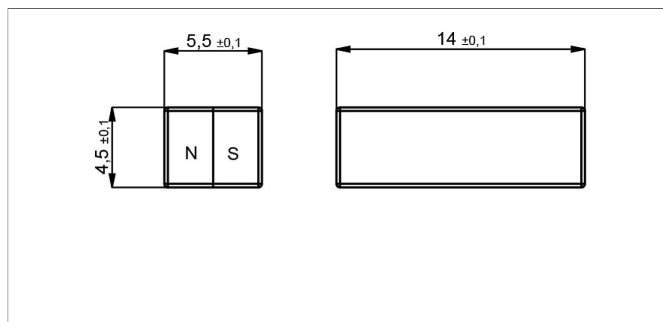
Z-RFC-P20

Screw position marker M10 x 25 mm, similar DIN 933

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

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

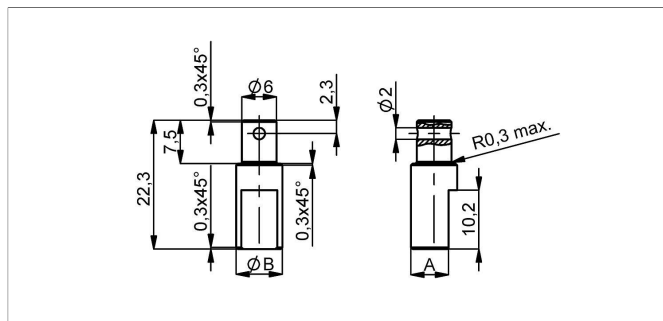
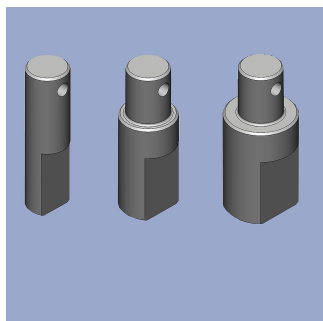
Position Markers



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 ± 3 mm
radial offset
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

Material SS 1.4305 / AISI 303

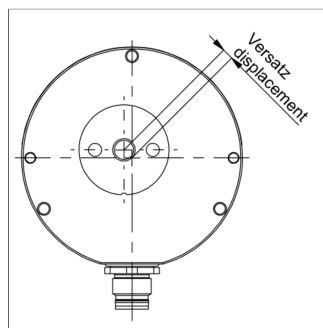
| P/N | Type | $\varnothing B / A$ [mm] |
|-----------|-----------|--------------------------|
| 400056206 | Z-RFC-S01 | 6 / 4.5 |
| 400056207 | Z-RFC-S02 | 8 / 6.5 |
| 400056208 | Z-RFC-S03 | 10 / 8.5 |

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.

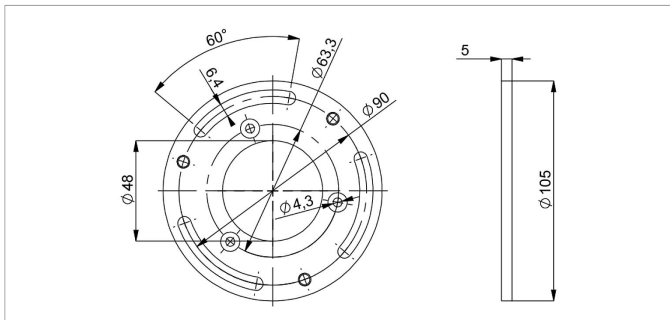
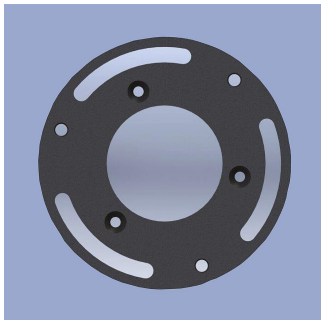
Additional Linearity Error at Radial Displacement - Single-channel Versions

| 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

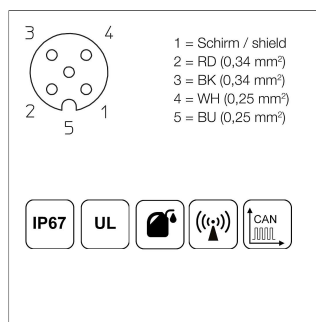
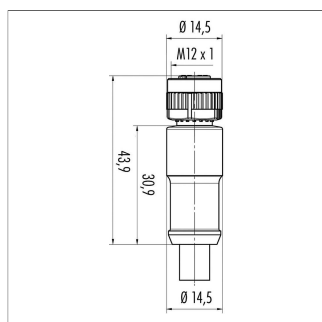
| Z-RFC-P02 / P04 / P08 Z-RFC-P20 / P23 / P31 | Z-RFC-P18 / P28 | Z-RFC-P22 |
|--|-------------------------|-------------------------|
| 0.5 mm: $\pm 0.7^\circ$ | 0.5 mm: $\pm 1.1^\circ$ | 1.0 mm: $\pm 1.1^\circ$ |
| 1.0 mm: $\pm 1.8^\circ$ | 1.0 mm: $\pm 2^\circ$ | 2.0 mm: $\pm 2.4^\circ$ |
| 2.0 mm: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

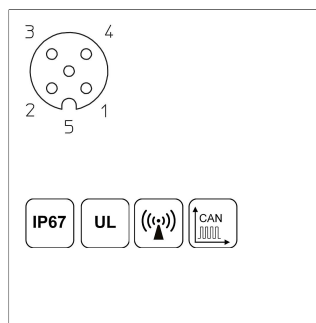
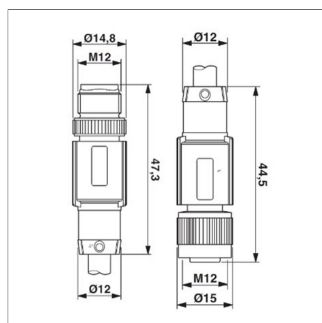
Connector System M12



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 mm²+2x0.34 mm²

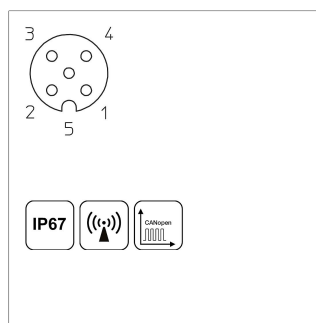
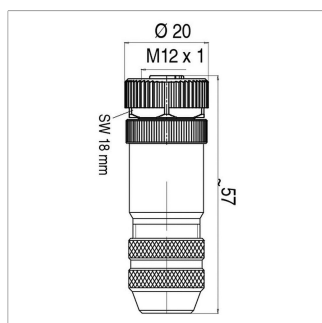
| P/N | Type | Length |
|-----------|-----------|--------|
| 400056141 | EEM-33-41 | 2 m |
| 400056143 | EEM-33-43 | 10 m |



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 mm²+2x0.34 mm²

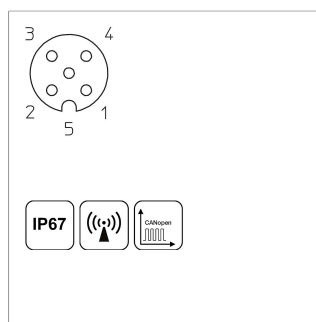
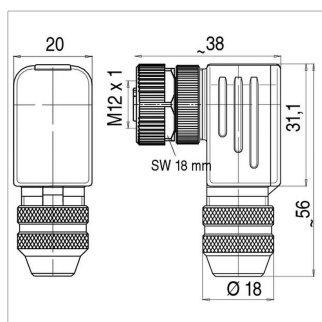
| P/N | Type | Length |
|-----------|-----------|--------|
| 400106373 | EEM-33-52 | 5 m |



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 mm²

| 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 mm²

| P/N | Type |
|-----------|-----------|
| 400005646 | EEM-33-75 |

IP67 Protection class IP67 DIN EN 60529

IP68 Protection class IP68 DIN EN 60529

Very good Electromagnetic Compatibility (EMC) and shield systems

Very good resistance to oils, coolants and lubricants

Suited for applications in dragchains

UL UL - approved

CAN-Bus

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© Jan 10, 2023

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.