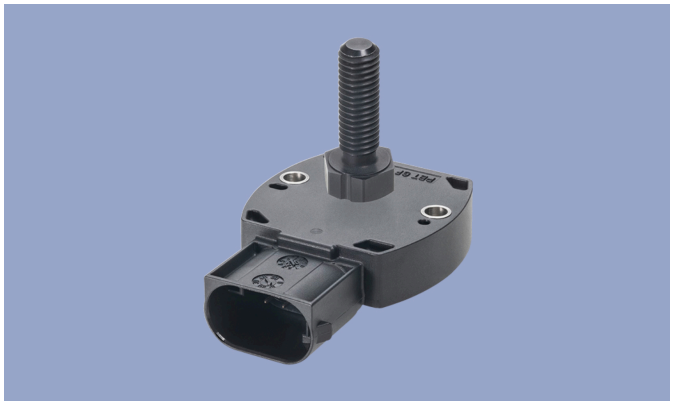
novotechnik
Siedle Group

NOVOHALL
Rotary Sensor
Touchless

RFE-3200
CANopen
Mobile Applications



Special Features
- Touchless hall technology
- Electrical range 360°
- 2 part design, mechanically decoupled
- High protection class IP67, IP68, IP69K
- Resolution 14 bit
- Wear-free
- Temperature range -40 °C to +105 °C
- One and multi-channel versions
- Optimized for use in mobile applications with highest EMC requirements such as ISO pulses and high interferences to ISO 11452, exceeds E1 requirements
- Other configurations see separate data sheets

Applications
- Mobile working machines (industrial trucks, construction machinery, agricultural and forestry machinery)
- Marine applications

The 2 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: high grade, temperature resistant plastic PBT GF30 with stainless steel inserts
Mounting	With 2 pan head screws M4x18 (included in delivery)
Fastening torque of mounting	max. 200 Ncm
Electrical connection	6-pin MQS-connector, code A, tinned contact according to drawing AMP-114-18063-126, Index A1 (Connector: AMP P/N 1-967616-1)

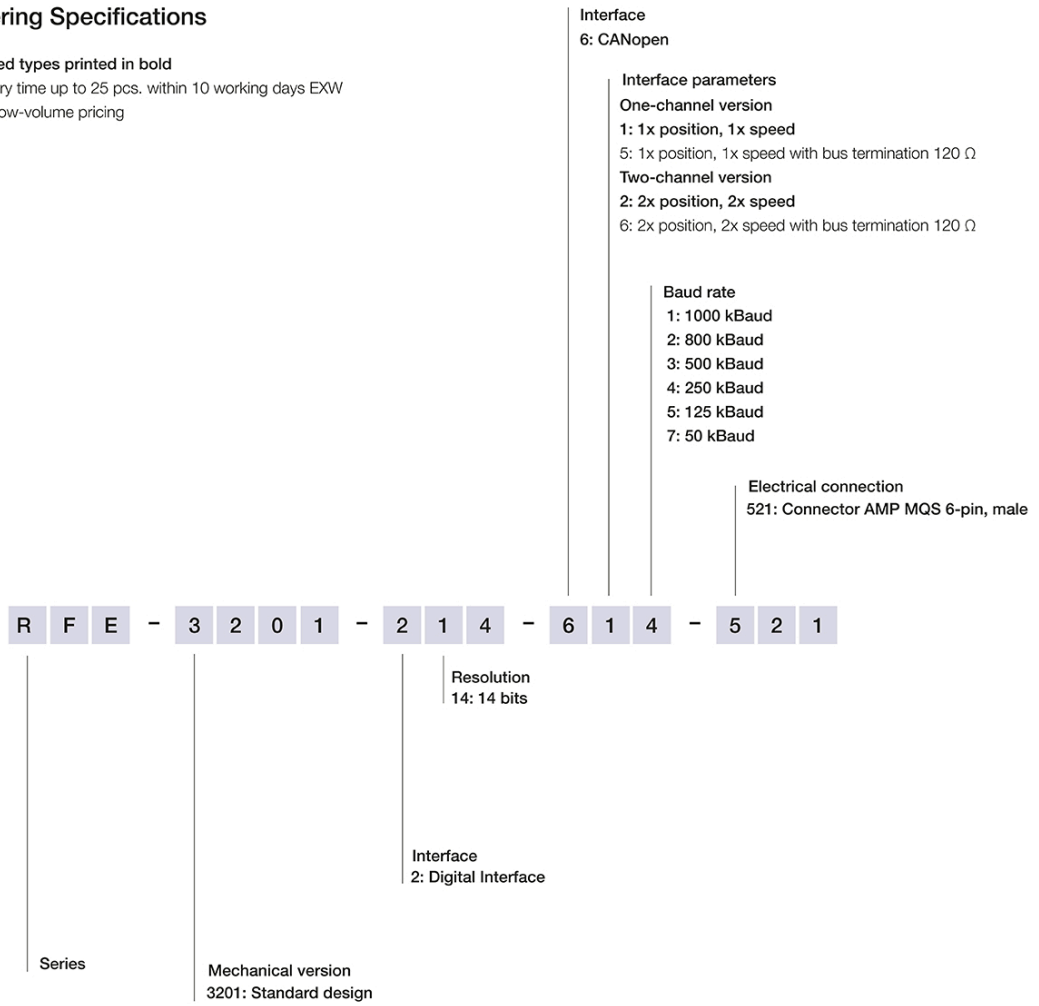
Mechanical Data

Dimensions	See dimension drawing
Mechanical travel	continuous
Weight	approx. 50 g

Ordering Specifications

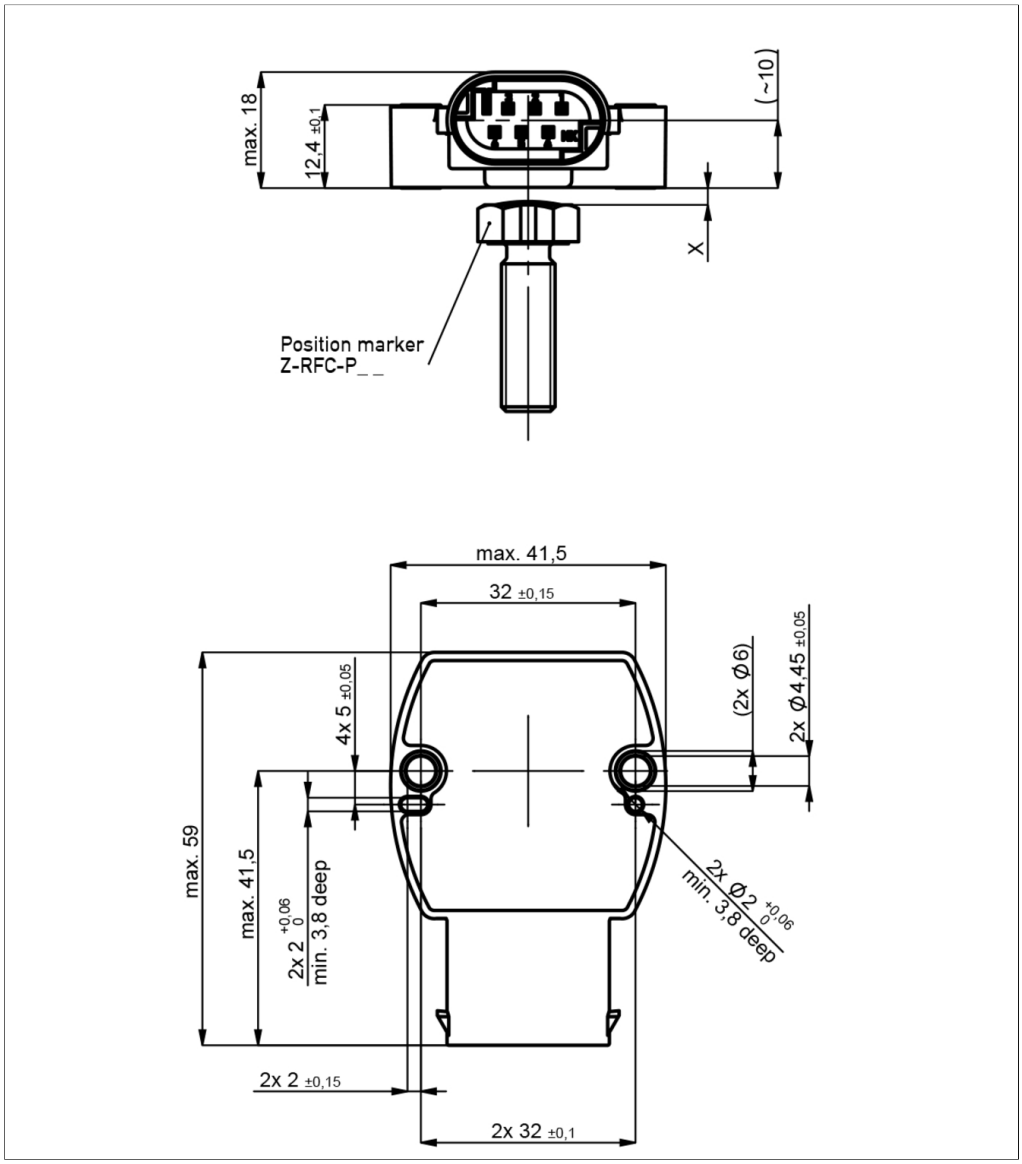
Ordering Specifications

Preferred types printed in bold
- Delivery time up to 25 pcs. within 10 working days EXW
- Best low-volume pricing

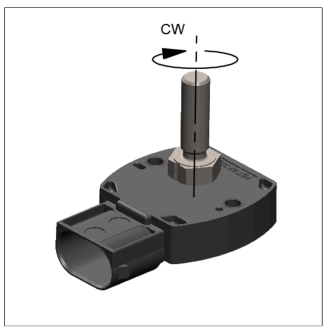


Accessories included in delivery
- 2x Pan head screws M4x18

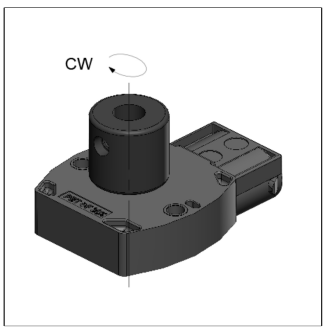
Drawing



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



When the marking of the position marker points towards the connector, the sensor is near the electrical center position (index position).



Only Z-RFC-P23/43:
When the marking of the position marker is pointing away from the connector, the sensor is near the electrical center position (index position).

Technical Data

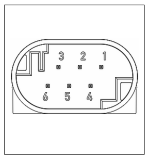
CANopen

Type	**RFE-32_ _-214-6_ _-521**
	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
Diagnosis	activated (in case of error, output signal is outside of the plausible signal range)
Node ID	1 ... 127 (default 127)
Baud rate	50 ... 1000 kBaud
Update rate	1 kHz
Resolution	14 bits
Resolution speed	360°/2^14 ≈ 0.022°/ms
Linearity	≤ ±0.5 %FS
Repeatability	≤ ±0.1°
Hysteresis	≤ ±0.1°
Temperature error	±0.2 %FS
Supply voltage Ub	12/24 VDC (8 ... 34 VDC)
Current consumption at Power-on	≤ 50 mA
Power drain w/o load	< 0.4 W
Overvoltage 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)	≥ 10 MΩ
Bus termination internal	120 Ω (optionally)
Environmental Data	
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 ISO 20653	IP67 / IP68 / IP69K
Operating temperature	-40 ... +105°C
Life	Mechanically unlimited
Functional safety	If you need assistance in using our products in safety-related systems, please contact us
MTTF (IEC 60050)	843 years (one-channel) or 819 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 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 3
ISO 7637-2 Transient Emissions	Level 3
ISO 7637-2 Pulses on supply lines	(1, 2a, 2b, 3a, 3b, 4, 5) Level 4
ISO 7637-3 Pulses on output lines	Level 4
ISO 16750 Pulses on supply lines	Starting profile Level 4 @12 V / Level 3 @24 V
Emission/Immunity	Exceeds E1 requirements

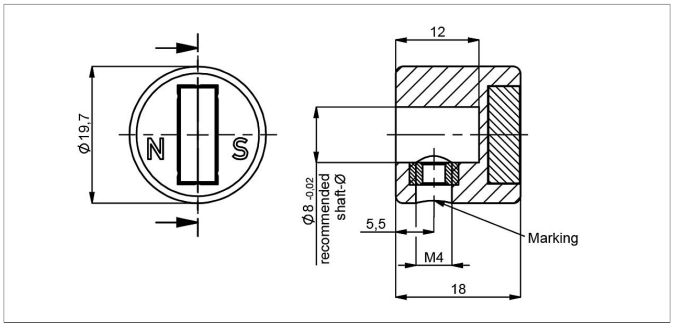
FS = Full scale: Signal span according to electrical measuring range

Connection Assignment

Signal	Connector code 5_ _
Supply voltage Ub	Pin 1
GND	Pin 2
CAN_H	Pin 3, pin 6
CAN_L	Pin 4, pin 5



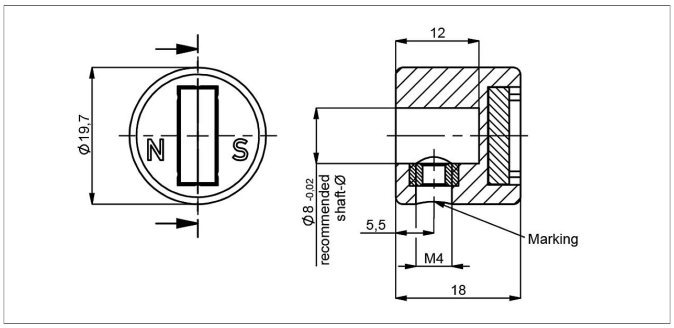
Position Markers



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 radial offset	± 3 mm
Operating temp.	-40 ... +125°C

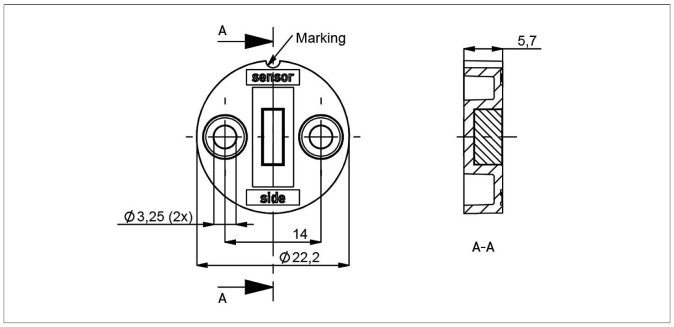
P/N	Pack. unit [pcs]
400056074	1
400056085	25



Z-RFC-P43
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 radial offset	± 3 mm
Operating temp.	-40 ... +125°C

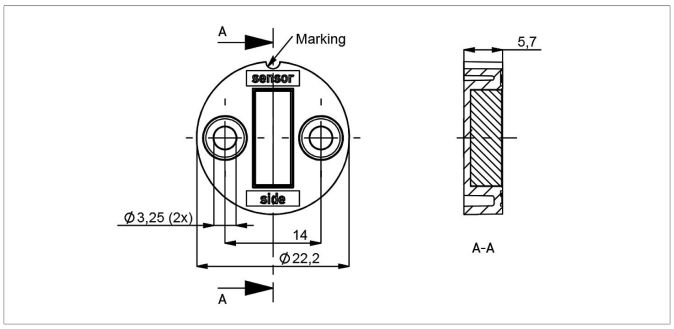
P/N	Pack. unit [pcs]
400105041	1
400105042	25



Z-RFC-P30
Position marker for frontal fixation with 2 cylinder screws M3x8 (included in delivery).

Material	PBT-GF
Max. permitted radial offset	± 1.5 mm
Operating temp.	-40 ... +125°C

P/N	Pack. unit [pcs]
400056086	1
400056087	25

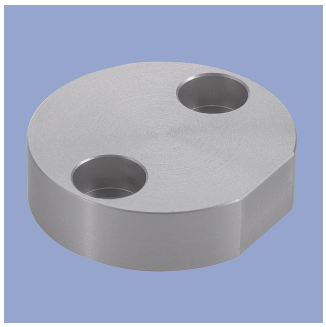


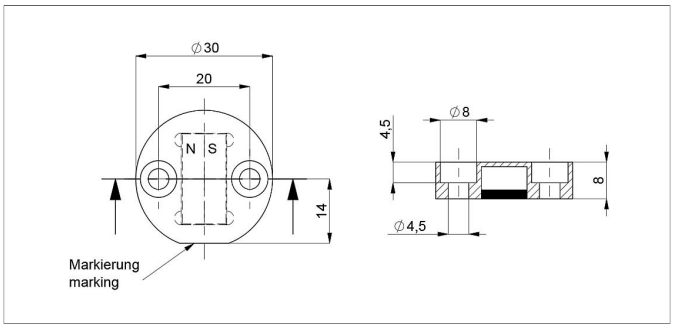
Z-RFC-P31
Position marker for frontal fixation with 2 cylinder screws M3x8 (included in delivery).

Material	PBT-GF
Max. permitted radial offset	± 3 mm
Operating temp.	-40 ... +125°C

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

Position Markers

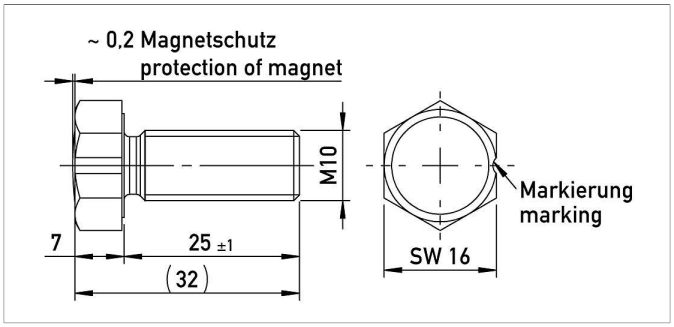




Z-RFC-P22
Position marker for frontal fixation with 2 cylinder head screws M4x20 (with screw lock, included in delivery).
Attention: Closed side of position marker faces the active side of sensor.

Material	Aluminium, anodized
Max. permitted radial offset	± 4 mm
Operating temp.	-40 ... +125°C

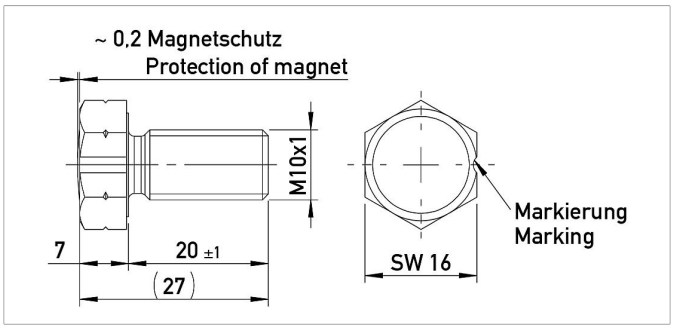
P/N	Pack. unit [pcs]
400106735	1
400106736	25



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 ... +125°C

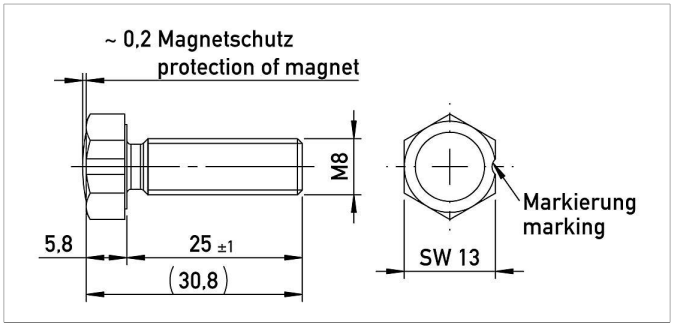
P/N	Pack. unit [pcs]
400104756	1
400104757	25



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 ... +125°C

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

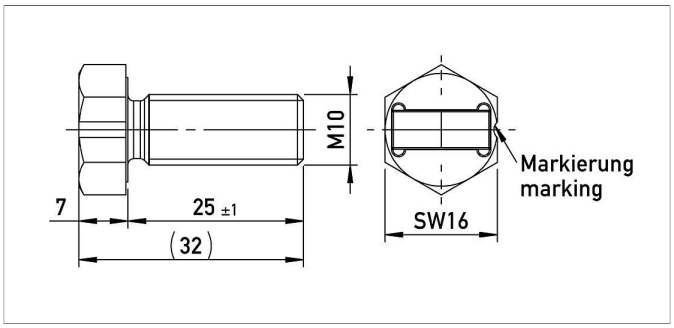


Z-RFC-P19
Screw position marker M8 x 25 mm, similar DIN 933/ISO 4017, magnet potted

Material	Aluminium, anodized
Max. permitted radial offset	± 1.5 mm
Operating temp.	-40 ... +125°C

P/N	Pack. unit [pcs]
400104754	1
400104755	25

Position Markers

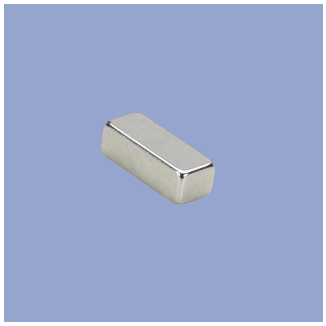


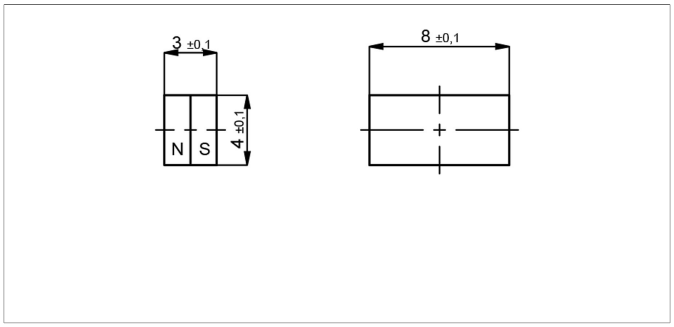
Z-RFC-P20

Screw position marker M10 x 25 mm, similar DIN 933

Material	Aluminium, anodized
Max. permitted radial offset	± 3 mm
Operating temp.	-40 ... +125°C

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



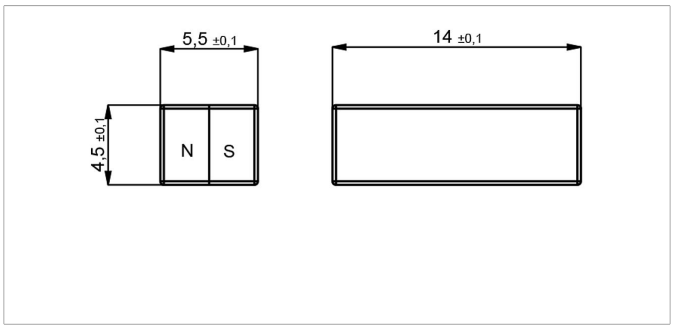


Z-RFC-P03

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	± 1.5 mm
Operating temp.	-40 ... +125°C

P/N	Pack. unit [pcs]
400005658	1
400056081	50



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
Operating temp.	-40 ... +125°C

P/N	Pack. unit [pcs]
400005659	1
400056082	50

Position Markers

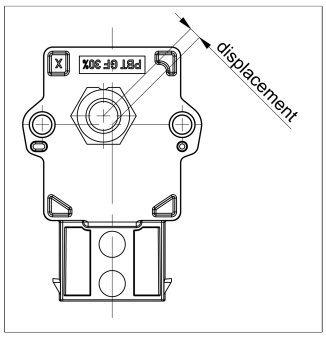
Working Distances Position Markers [mm] - One-channel Versions

Z-RFC-P03	Z-RFC-P04	Z-RFC-P18 / P28	Z-RFC-P19	Z-RFC-P20	Z-RFC-P22	Z-RFC-P23	Z-RFC-P30	Z-RFC-P31	Z-RFC-P43
0.4 ... 1.9	2 ... 4.7	0 ... 4	0 ... 1.8	2 ... 4.7	4.1 ... 8.9	2 ... 4.7	0.4 ... 1.9	2 ... 4.7	0 ... 2.4

Working Distances Position Markers [mm] - Redundant Versions

Z-RFC-P03	Z-RFC-P04	Z-RFC-P18 / P28	Z-RFC-P19	Z-RFC-P20	Z-RFC-P22	Z-RFC-P23	Z-RFC-P30	Z-RFC-P31	Z-RFC-P43
0... 1.5	1.6 ... 4.2	0 ... 3.5	0 ... 1.3	1.6 ... 4.2	3.6 ... 8.4	1.6 ... 4.2	0 ... 1.5	1.6 ... 4.2	0 ... 2

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.

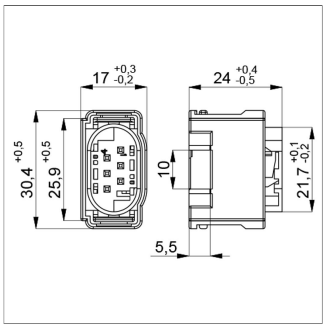
Additional Linearity Error at Radial Displacement - One-channel Versions

Z-RFC-P02 / P04 / P08 Z-RFC-P20 / P23 / P31	Z-RFC-P41 / P43 / P47	Z-RFC-P03 / P30	Z-RFC-P18 / P28	Z-RFC-P19	Z-RFC-P22
0.5 mm: ±0.4°	0.5 mm: ±0.4°	0.5 mm: ±1.4°	0.5 mm: ±0.7°	0.5 mm: ±1.3°	1.0 mm: ±0.8°
1.0 mm: ±1.1°	1.0 mm: ±1.1°	1.0 mm: ±3.7°	1.0 mm: ±1.3°	1.0 mm: ±2.6°	2.0 mm: ±1.8°
2.0 mm: ±3.5°	2.0 mm: ±3.5°	2.0 mm: -	2.0 mm: ±3.3°	2.0 mm: -	4.0 mm: ±5.4°

Additional Linearity Error at Radial Displacement - Redundant Versions

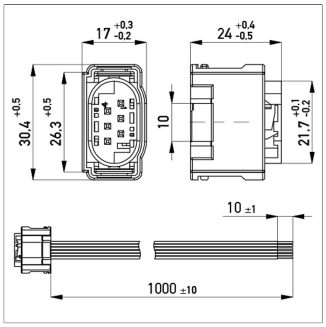
Z-RFC-P02 / P04 / P08 Z-RFC-P20 / P23 / P31	Z-RFC-P41 / P43 / P47	Z-RFC-P03 / P30	Z-RFC-P18 / P28	Z-RFC-P19	Z-RFC-P22
0.5 mm: ±0.7°	0.5 mm: ±0.7°	0.5 mm: ±2.5°	0.5 mm: ±1.1°	0.5 mm: ±2.3°	1.0 mm: ±1.1°
1.0 mm: ±1.8°	1.0 mm: ±1.8°	1.0 mm: ±6.4°	1.0 mm: ±2°	1.0 mm: ±4.5°	2.0 mm: ±2.4°
2.0 mm: ±5,2°	2.0 mm: ±5.2°	2.0 mm: -	2.0 mm: ±4.6°	2.0 mm: -	4.0 mm: ±6.7°

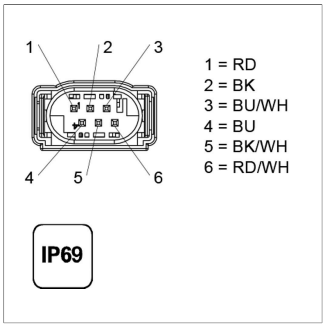
Connector System MQS



EEM-33-34
Connector kit MQS including
• 1 plug socket (female), PBT GF15, AMP P/N 1-967616-1
• 6 tinned contacts for cable cross-section area 0.25 ... 0.35 mm² (AWG 22), AMP-P/N 963727-1 or 5-962885-1
• 6 single conductor sealings AMP P/N 967067-2
Operating temp. -40 ... +120°C

P/N	Type
400005666	EEM-33-34





EEM-33-24
Connector MQS AMP P/N 1-967616-1, 6-pin, PBT GF15, with lead wires 0.5 mm², PVC, 1 m, open ended
Operating temp. -40 ... +120°C
Lead wires PVC, 6x0.5 mm²

P/N	Type	Length
400108029	EEM-33-24	1 m

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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.