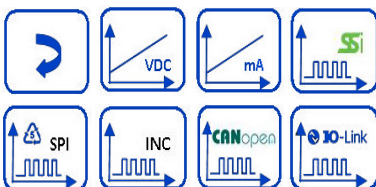
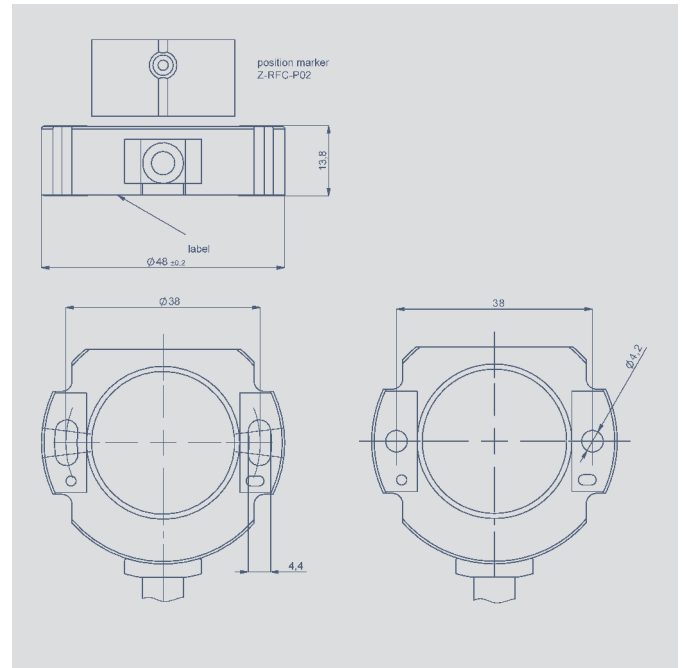
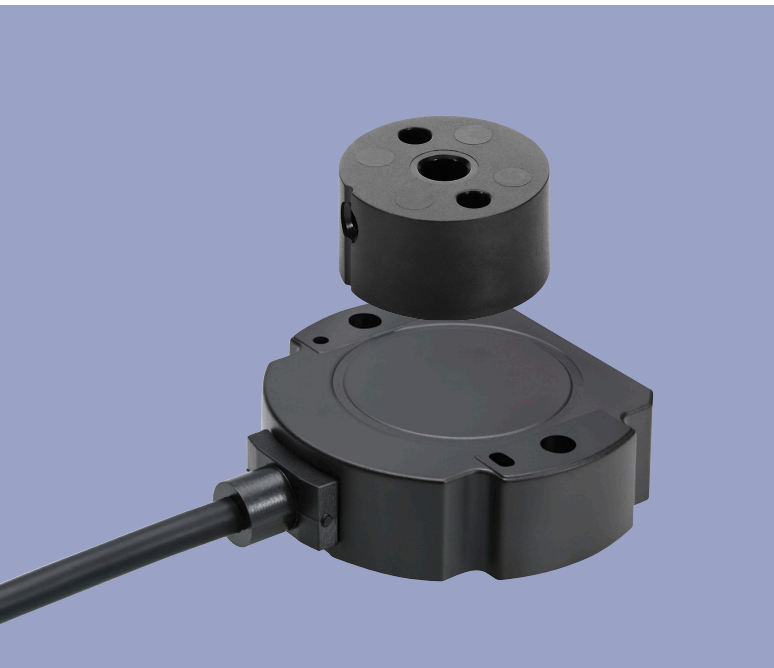


**NOVOHALL**  
**Rotary Sensor**  
**touchless technology**  
**transmissive**

Series RFC-4800



**Special features**

- Touchless hall technology
- Electrical range up to 360°
- 2-part, mechanically decoupled
- High protection class, IP67, IP6K9K
- Resolution up to 14 Bit
- Wear-free
- Temperature range -40 °C to +125 °C
- Single and multi-channel versions
- Optimized for use in industrial and mobile applications
- Interfaces:  
Voltage, current, SSI, incremental, CANopen, SPI, IO-Link
- Customized versions

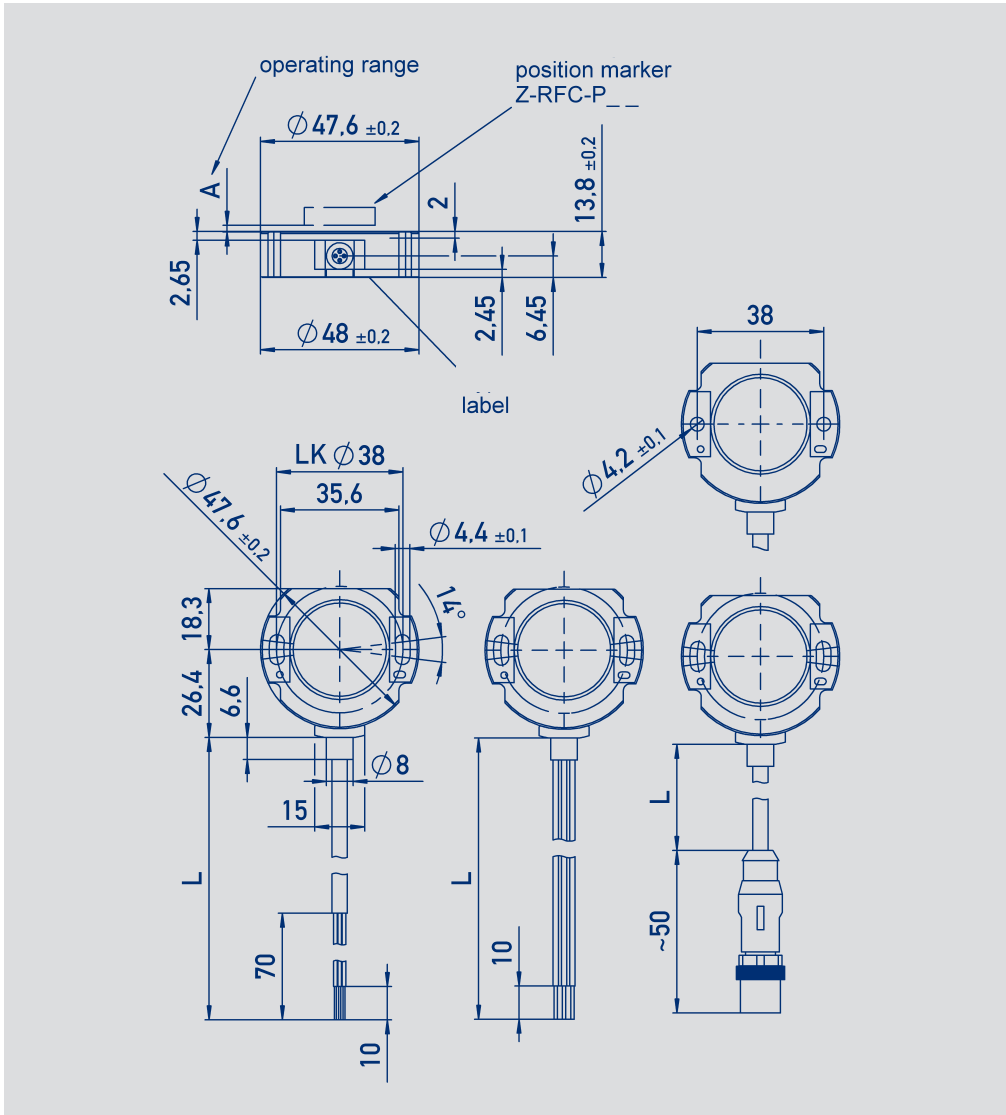
**Applications**

- Manufacturing Engineering  
Textile machinery  
Packaging machinery  
Sheet metal and wire machinery
- Automation technology
- Medical engineering
- Mobile working machines  
Industrial trucks  
Construction machinery  
Agricultural and forestry machinery
- Marine applications

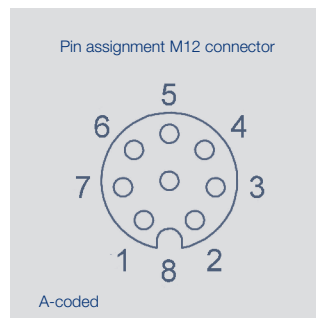
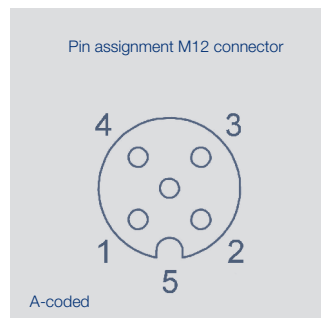
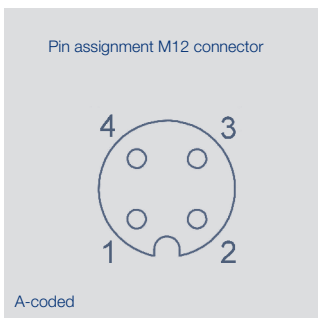
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Drawings



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

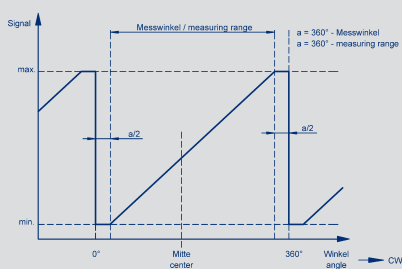


## Mechanical Data

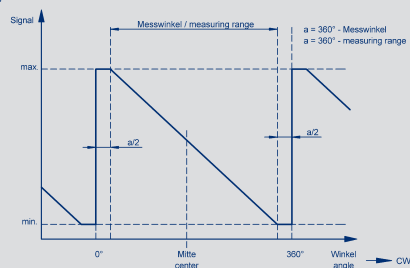
<b>Description</b>		
Housing	high grade, temperature resistant plastic	
Electrical connection	Cable 4x 0.14 mm <sup>2</sup> , AWG 26, TPE, shielded (analog voltage / current CE) Cable 4x 0.14 mm <sup>2</sup> , AWG 26, TPE, unshielded (analog voltage / current mobil) Cable 4x 0.5 mm <sup>2</sup> , AWG 20, TPE, shielded (CANopen) Cable 5x 0.14 mm <sup>2</sup> , AWG 26, PUR, shielded (SPI) Cable 8x 0.25 mm <sup>2</sup> , AWG 24, TPE, shielded (SSI, Incremental, CANopen IN/OUT) Wire 0.5mm <sup>2</sup> , AWG 20, PVC, (analog voltage / current, Incremental Open Collector) Connector M12x1, 4-pin / 5-pin / 8-pin with cable L=0.15 m	
<b>Mechanical Data</b>		
Dimensions	see dimension drawing	
Mounting	with 2 lens flange head screws M4 (enclosed in delivery)	
Fastening torque of mounting screws	250	Ncm
Mechanical travel	360 continuous	°
Maximum operational speed	mechanically unlimited	
Weight (without connection)	approx. 50	g
Vibration IEC 60068-2-6	5...2000 Amax = 0.75 amax = 20	Hz mm g
Shock IEC 60068-2-27	50 (6 ms)	g
Life	mechanically unlimited	
Protection class DIN EN 60529	IP67 / IP68 / IP6K9K (not with M12 connector)	

## Characteristics

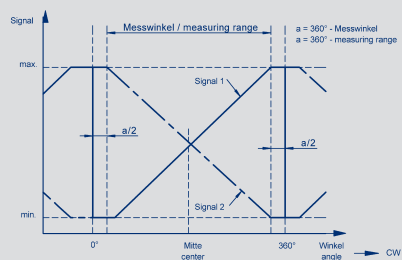
One channel, cw



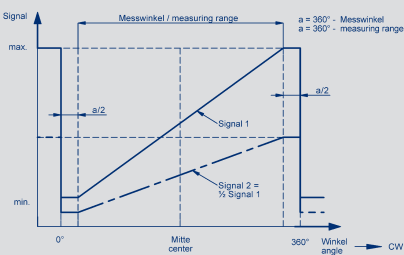
One channel, ccw



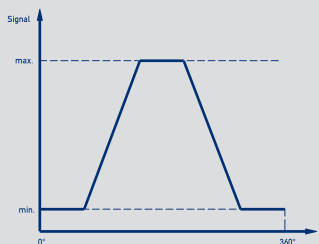
Crossed characteristics, channel 1 cw



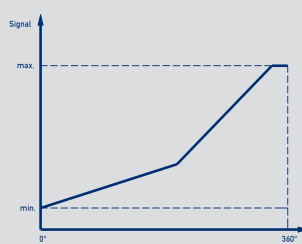
On request:  
two channel, signal 2 = 0.5 x signal 1



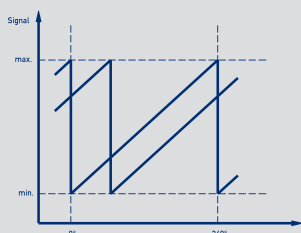
On request:  
Trapeze characteristic



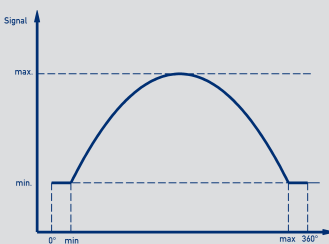
On request:  
different gradients



On request:  
2 staggered characteristics



On request:  
Parabolic characteristic



## Technical Data

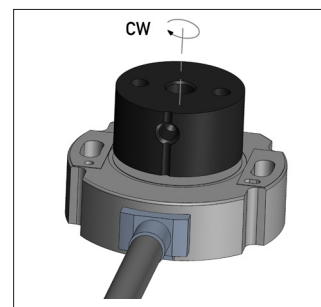


<b>Type designations</b>	<b>RFC-48 _ _ - 214 - 6 _ _ - _ _ _ _</b> <b>CANopen</b>	
<b>Electrical Data</b>		
Measured variables	Position and speed	
Measuring range	360	°
Measurement range speed	0 ... 25 000	min-1
Number of channels	1 / 2 see ordering specifications	
Output signal / protocol	CANopen protocol 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 parameter	Position, speed, cams, working areas, rotating direction, scale, offset, node-ID, baud rate	
Node-ID	1 ... 127 (default 127)	
Baud rate	50 ... 1000 see ordering specifications	kBaud
Resolution across 360° (position)	14	Bit
Resolution speed	360/2 <sup>14</sup> ≈ 0,022	°/ms
Update rate	1	kHz
Independent linearity	0.5	±% FS
Repeatability	0.36	°
Hysteresis	0.36	°
Temperature error	0.2	±% FS
Supply voltage Ub	12/24 (8 ... 34)	VDC
Current consumption (w/o load)	< 100	mA
Reverse voltage	yes, supply lines	
Short circuit protection	yes, output vs.GND and supply voltage Ub (up to 40 VDC)	
Overvoltage protection	< 45 (permanent)	VDC
Insulation resistance (500 VDC)	≥ 10	MΩ
Cross-section cable	AWG 20, 0.5	mm <sup>2</sup>
Bus termination internal	120, optional, see ordering specifications	Ω
<b>Environmental Data</b>		
Operation temperature	-40 ... +105	°C
MTTF (DIN EN ISO 13849-1 parts count method, w/o load, wc)	one channel: 71 / two channel: 58	years
Functional safety	If you need assistance in using our products in safety-related systems, please contact us	
EMC compatibility	ISO TR 10605 Packaging and Handling + Component Test: 8 kV ISO 11452-2 Radiated EM RF fields, Absorberhall: 100 V/m ISO 11452-5 Radiated EM RF fields, Stripline: 200 V/m CISPR 25 Radiated emission class 3 ISO 7637-2 pulse 1, 2a, 2b, 3a, 3b, 4 (24 V systems), 5: SG 5 ISO 7637-3 Transient transmission: SG 4	

### Connection assignment

Signal	Cable Code 2 _ _	Connector M12 Code 511
Supply voltage Ub	White	Pin 2
GND	Brown	Pin 3
CAN_H	Yellow	Pin 4
CAN_L	Green	Pin 5
CAN Shield	Bare	Pin 1

Signal	Cable Code 432
Supply voltage Ub	White and Red
GND	Brown and Blue
CAN_H IN	Yellow
CAN_L IN	Green
CAN_H OUT	Pink
CAN_L OUT	Grey
Shield	Bare



When the marking of the position marker is pointing towards the cable, the sensor output is near the electrical center position.

Technical Data



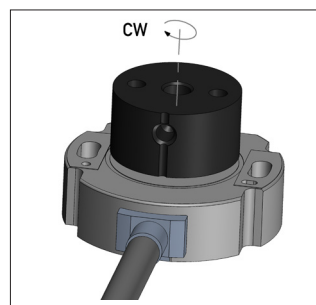
<b>Type designations</b>	RFC-48 _ _ - 214 - A _ _ - _ _ _ _ IO-Link	
<b>Electrical Data</b>		
Measured variables	Position (other parameters such as speed on request)	
Measuring range	360	°
Number of channels	1	
Output signal / protocol	IO-Link Spec V1.1 to IEC 61131-9, Smart Sensor Profile	
Programmable parameter	Zero point offset, averaging, rotating direction	
Resolution across 360° (Position)	14	Bit
Update rate	1	kHz
Transfer rate	COM 3 (230.4 kB)	
Frame type	2.2	
Minimum cycle time	1	ms
Independent linearity	0.5	±% FS
Repeatability	0.36	°
Hysteresis	0.36	°
Temperature error	0.2	±% FS
Supply voltage Ub	24 (18 ... 30)	VDC
Current consumption (w/o load)	< 100	mA
Reverse voltage	yes, supply lines	
Short circuit protection	yes, output vs. GND and Ub (up to 40 VDC)	
Overvoltage protection	< 35 (permanent)	VDC
Insulation resistance (500 VDC)	≥ 10	MΩ
Cross-section cable	AWG 20, 0.5 (4 pole) or AWG 24, 0.25 (8 pole)	
<b>Environmental Data</b>		
Operation temperature	-40 ... +105	°C
MTTF (DIN EN ISO 13849-1 parts count method, w/o load, wc)	single channel: 76	Jahre
Functional safety	If you need assistance in using our products in safety-related systems, please contact us	
EMC compatibility	EN 61000-4-2 electrostatic discharge (ESD) 4 kV, 8 kV EN 61000-4-3 electromagnetic fields 10 V/m EN 61000-4-4 electrical fast transients (burst) 2 kV EN 61000-4-6 I conducted disturbances, induced by RF fields 10 V eff. EN 55016-2-3 Noise radiation class B	



**Connection assignment**

Signal	Cable Code 2 _ _	Connector M12 Code 551
Supply voltage Ub	Brown	Pin 1
GND	White	Pin 3
C/Q	Yellow	Pin 4
dom not connect*	Green	Pin 2

\*) Alternatively on GND



When the marking of the position marker is pointing towards the cable, the sensor output is near the electrical center position.

## Ordering Specifications



### Ordering specifications

**Preferred types printed in bold:**

- Delivery time up to 25 pcs. within 10 working days
- No low volume surcharge

#### Interface

**6: CANopen Interface**

**A: IO-Link**

**Interface parameter CANopen 6 \_ \_**

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

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

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

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

**Interface parameter IO-Link A \_ \_**

**11: 1 x position, rising cw**

Other parameters (such as speed) on request

**Baud rate**

**1: Baud rate 1000 kBaud**

**2: Baud rate 800 kBaud**

**3: Baud rate 500 kBaud**

**4: Baud rate 250 kBaud**

**5: Baud rate 125 kBaud**

**7: Baud rate 50 kBaud**

**Electrical connections CANopen**

**202: Cable 4-pol. 1.0 m, shielded**

**432: Cable 8-pol., 1.0 m shielded (CAN IN/OUT)**

**511: M12 connector 5-pin with cable (L = 0.15 m; shielded)**

**Electrical connections IO-Link**

**252: Cable 4-pol., 1.0 m, unshielded**

**256: Cable 4-pol., 3.0 m, unshielded**

**260: Cable 4-pol., 5.0 m, unshielded**

**270: Cable 4-pol., 10. m, unshielded**

**551: M12 connector 4-pin with cable (L=0.15 m, unshielded)**

Cable versions and assembled connectors on request

**R F C - 4 8 5 2 - 2 1 4 - 6 1 5 - 5 1 1**

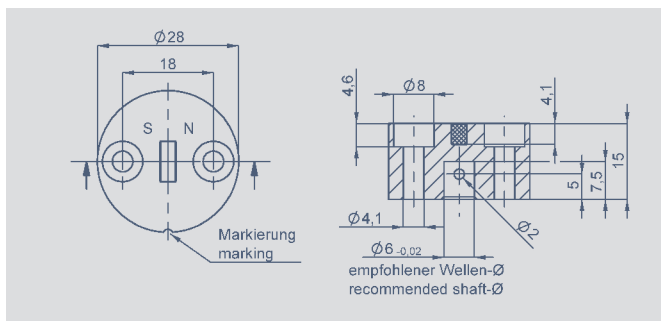
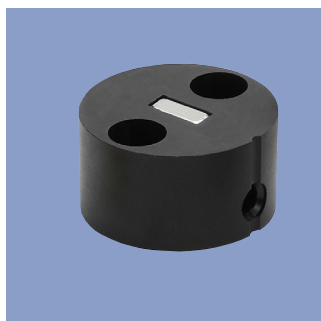
Series

**Mechanical version**

**4851: Elongated hole for easy adjustment**

**4852: Round hole mounting**

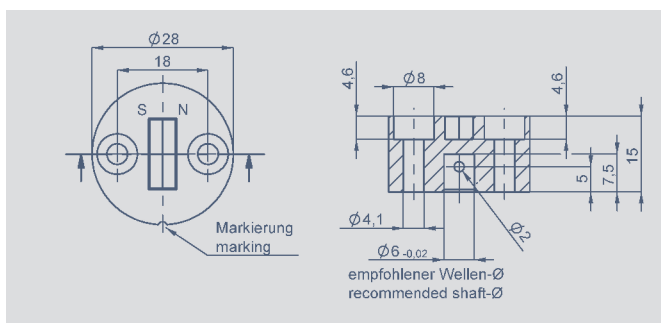
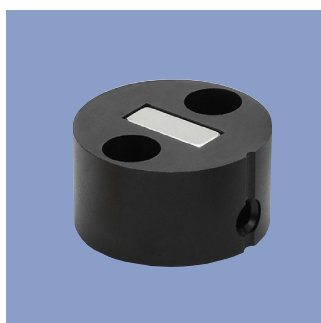
## Position Marker



### Z-RFC-P01

Position marker for frontal fixation with 2 cylinder head screws M4x20 (with microencapsulation) or with locking pin (included in delivery). Not recommended for new designs.

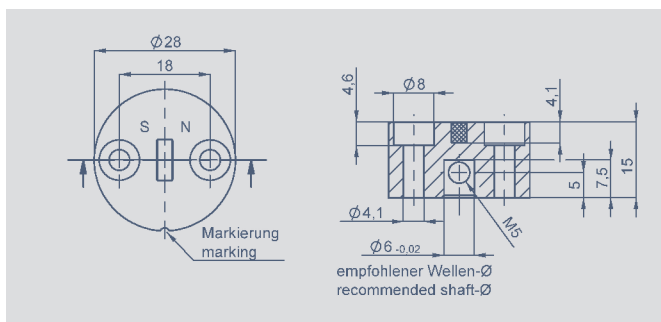
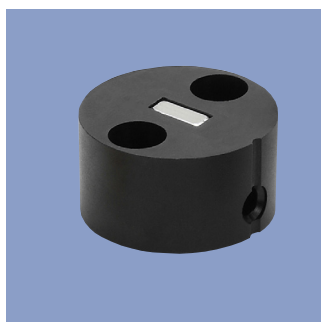
- max. permitted radial offset  $\pm 1.5$  mm
- packaging unit:  
1 pc. P/N 005660  
25 pcs. P/N 056079



### Z-RFC-P02

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

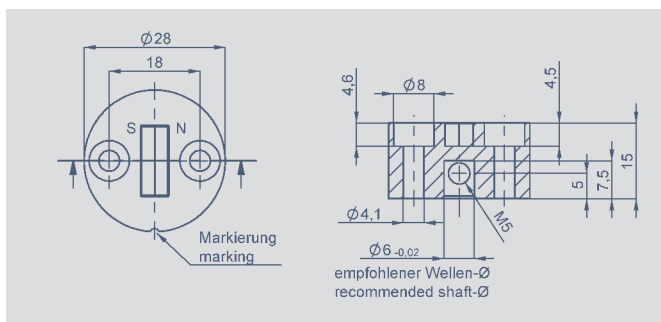
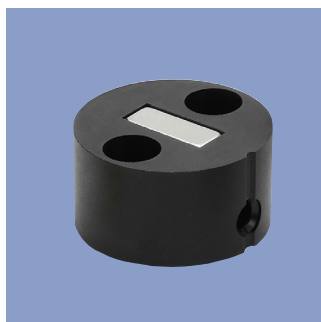
- max. permitted radial offset  $\pm 3$  mm
- packaging unit:  
1 pc. P/N 005661  
25 pcs. P/N 056080



### Z-RFC-P07

Position marker for fixation with threaded pin M5 (included in delivery). Not recommended for new designs.

- max. permitted radial offset  $\pm 1.5$  mm
- packaging unit:  
1 pc. P/N 056069  
25 pcs. P/N 056083

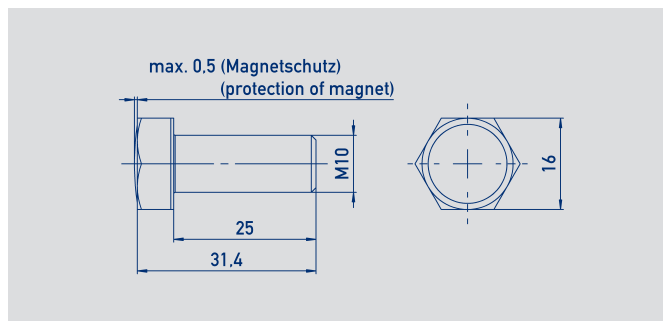


### Z-RFC-P08

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

- max. permitted radial offset  $\pm 3$  mm
- packaging unit:  
1 pc. P/N 056070  
25 pcs. P/N 056084

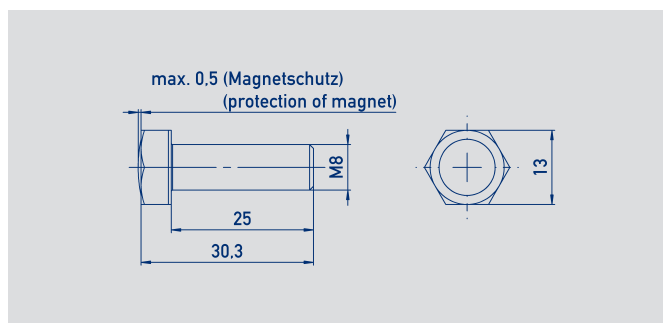
## Position Marker



### Z-RFC-P16

Screw position marker  
M10 x 25 mm, similar DIN 933,  
A2, bare, magnet potted

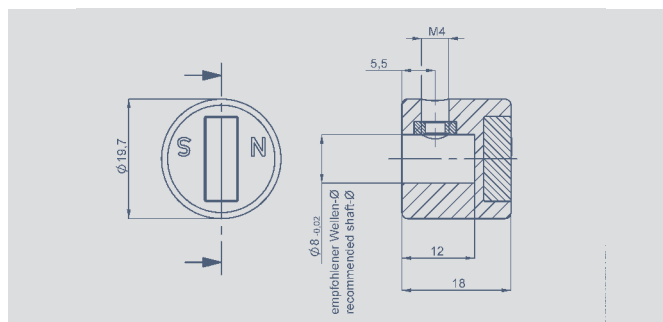
- max. permitted radial offset  $\pm 3$  mm
- packaging unit:  
1 pc. P/N 104203  
25 pcs. /P/N 104204



### Z-RFC-P17

Screw position marker  
M8 x 25 mm, similar DIN 933 /  
ISO 4017, A2, bare, magnet potted

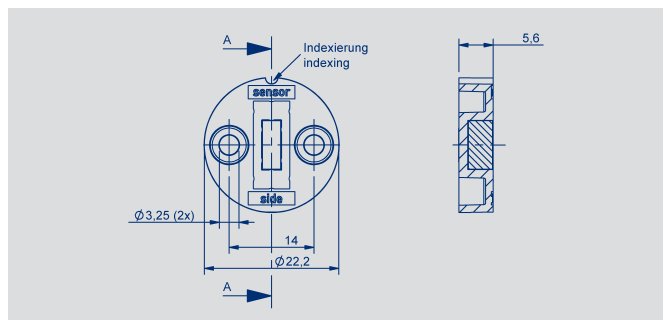
- max. permitted radial offset  $\pm 1,5$  mm
- packaging unit:  
1 pc. P/N 104205  
25 pcs. P/BN 104206



### Z-RFC-P23

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

- max. permitted radial offset  $\pm 3$  mm
- packaging unit:  
1 pc. P/N 056074  
25 pcs. P/N 056085

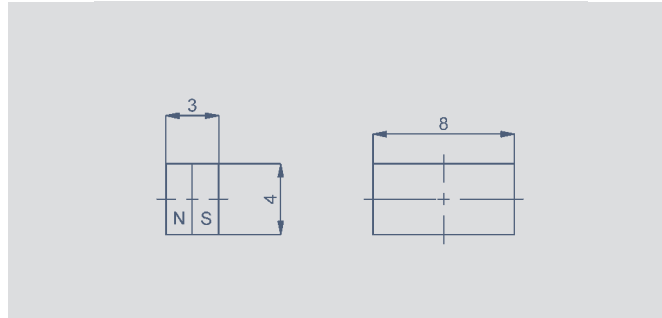
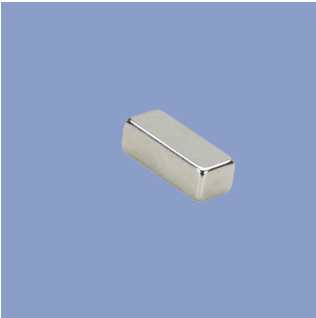


### Z-RFC-P30

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

- max. permitted radial offset  $\pm 1,5$  mm
- packaging unit:  
1 pc. P/N 056086  
25 pcs. P/N 056087

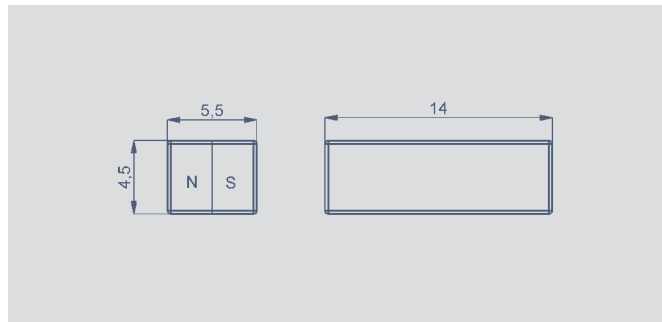
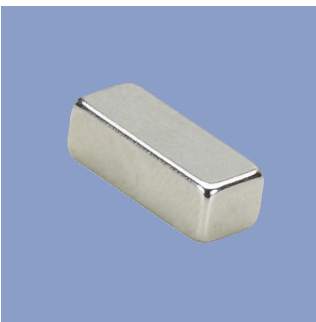
## Position Marker



### Z-RFC-P03

Magnet for direct application onto customer's shaft

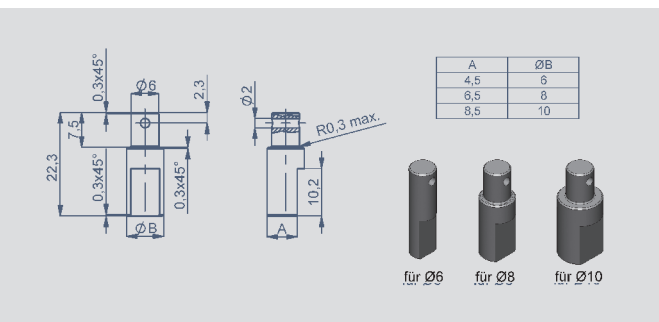
- max. permitted radial offset  $\pm 1,5$  mm
- packaging unit:  
1 pc. P/N 005658  
50 pcs. P/N 056081



### Z-RFC-P04

Magnet for direct application onto customer's shaft

- max. permitted radial offset  $\pm 3$  mm
- packaging unit:  
1 pc. P/N 005659  
50 pcs. P/N 056082



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

Shaft adapter for Z-RFC-P01 and Z-RFC-P02.

Fixation at position marker with locking pin

- Z-RFC-S01: Ø 6 mm, P/N 056206
- Z-RFC-S02: Ø 8 mm, P/N 056207
- Z-RFC-S03: Ø 10 mm, P/N 056208

## Position Marker

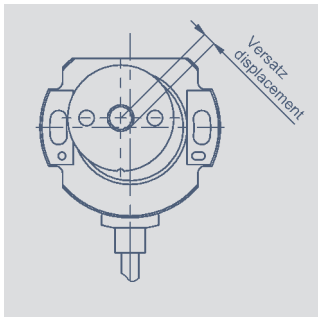
### Working distances (in mm)

Interfaces	Z-RFC- _ _ _									
	P01	P02	P03	P04	P07	P08	P16	P17	P23	P30
Analog (voltage / current), SPI	0 ... 1.5	0 ... 4	0 ... 1.5	0 ... 4	0 ... 1.5	0 ... 4	0 ... 5.5	0 ... 3.0	0 ... 4	0 ... 1.5
Analog multi channel / redundant	0 ... 1.5	0 ... 4	0 ... 1.5	0 ... 4	0 ... 1.5	0 ... 4	0 ... 5.0	0 ... 2.5	0 ... 4	0 ... 1.5
SSI / Incremental	-	0 ... 1.4	-	0 ... 1.4	-	0 ... 1.4	-	-	0 ... 1.4	-
CANopen / IO-Link single	-	2.3 ... 5	-	2.3 ... 5	-	2.3 ... 5	0 ... 5.5	0 ... 3.0	2.3 ... 5	-
CANopen redundant	-	1.9 ... 4.5	-	1.9 ... 4.5	-	1.9 ... 4.5	0 ... 5.0	0 ... 2.5	1.9 ... 4.5	-

### Mounting instructions Z-RFC-P03 / Z-RFC-P04

- In general, we recommend mounting on not magnetizable materials, otherwise the stated working distances can change
- If the shaft is magnetizable please keep sufficient distance
- When the magnet is mounted in the shaft, the shaft may not be magnetizable
- If the magnet is axially fixed on a magnetizable shaft the working distances reduces by approximately 20 %

### Lateral magnet offset

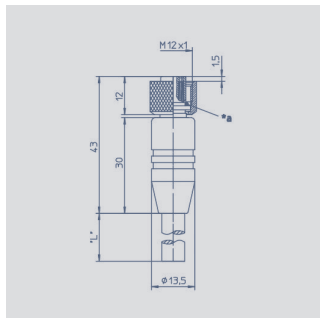


Lateral magnet offset will cause additional linearity error. The angle error, which is caused by radial displacement of sensor and position marker depends on the used position marker or magnet type.

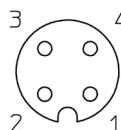
### Additional error (°) at radial displacement

Interface	Z-RFC-P02 / P04 / P08 / P23			Z-RFC-P01 / P03 / P07 / P30			Z-RFC-P16			Z-RFC-P17		
	0.5 mm	1 mm	2 mm	0.5 mm	1 mm	2 mm	0.5 mm	1 mm	2 mm	0.5 mm	1 mm	2 mm
Analog single	0.4	1.1	3.5	1.4	3.7	-	0.7	1.3	3.3	1.3	2.6	-
SPI	0.4	1.1	3.5	1.4	3.7	-	0.7	1.3	3.3	1.3	2.6	-
CANopen / IO-Link single	0.4	1.1	3.5	-	-	-	0.7	1.3	3.3	1.3	2.6	-
Analog redundant	0.7	1.8	5.2	2.5	6.4	-	1.1	2.0	4.6	2.3	4.5	-
CANopen redundant	0.7	1.8	5.2	-	-	-	1.1	2.0	4.6	2.3	4.5	-
SSI / Incremental	0.4	0.7	2.2	-	-	-	-	-	-	-	-	-

## Connector System M12



Pin assignment  
1 = Brown  
2 = White  
3 = Blue  
4 = Black



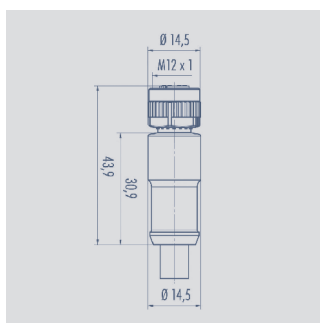
**M12x1 mating female connector, 4-pin, straight, A-coded, with molded cable, shielded, IP67, open ended**

Connector housing Plastic PA

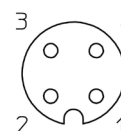
Cable sheath PUR; Ø = max. 6 mm, -25 °C...+80 °C (moved) -50 °C...+80 °C (fixed)

Wires PP, 0.34 mm<sup>2</sup>

Length	Type	P/N
2 m	EEM 33-32	005600
5 m	EEM 33-62	005609
10 m	EEM 33-97	005650



Pin assignment  
1 = Brown  
2 = White  
3 = Blue  
4 = Black



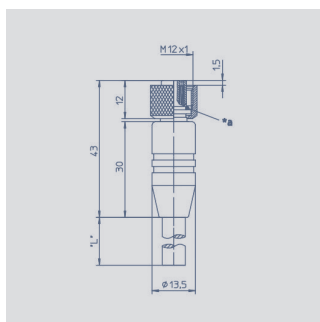
**M12x1 mating female connector, 4-pin, straight, A-coded, with molded cable, not shielded, IP67, open ended**

Connector housing Plastic PA

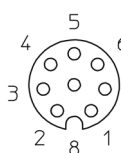
Cable sheath PUR; Ø = max. 6 mm, -40 °C...+85 °C

Wires PP, 0.34 mm<sup>2</sup>

Length	Type	P/N
2 m	EEM 33-35	056135
5 m	EEM 33-36	056136
10 m	EEM 33-37	056137



Pin assignment  
1 = White  
2 = Brown  
3 = Green  
4 = Yellow  
5 = grau  
6 = rosa  
7 = Blue  
8 = Red



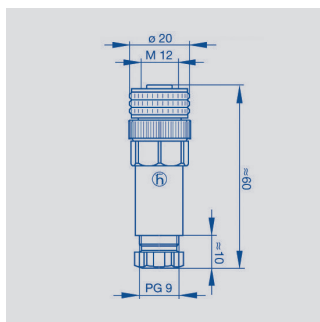
**M12x1 mating female connector, 8-pin, straight, A-coded, with molded cable, shielded, IP67, open ended**

Connector housing Plastic PA

Cable sheath PUR; Ø = max. 8 mm, -25 °C...+80 °C (moved) -50 °C...+80 °C (fixed)

Wires PP, 0.25 mm<sup>2</sup>

Length	Type	P/N
2 m	EEM 33-86	005629
5 m	EEM 33-90	005635
10 m	EEM 33-92	005637



Pin assignment



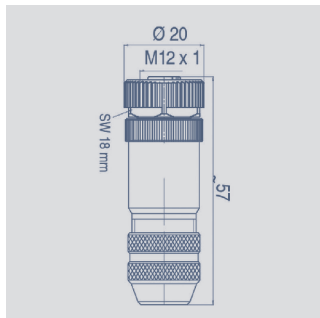
**M12x1 mating female connector, 4-pin, straight, A-coded, with coupling nut, screw termination, IP67, not shielded**

Connector housing Plastic PBT  
-25 °C...+90 °C

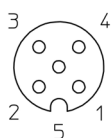
For wire gauge 6...8mm, max. 0,75 mm<sup>2</sup>

Type EEM 33-88, P/N 005633

## Connector System M12

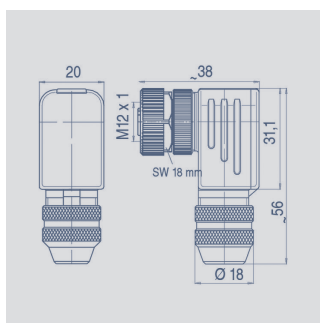


Pin assignment

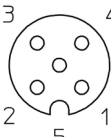


**M12x1 mating female connector, 5-pin, straight, A-coded, with coupling nut, screw termination, IP67, shieldable, CAN bus**

Connector housing	Metal -40 °C...+85 °C
For wire gauge	6...8 mm, max. 0.75 mm <sup>2</sup>
Type	EEM 33-73, P/N 005645



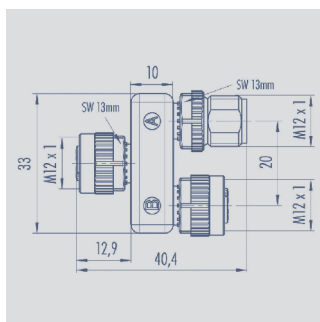
Pin assignment



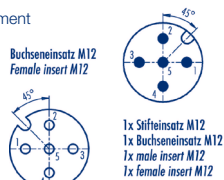
**M12x1 mating female connector, 5-pin, angled, A-coded, with coupling nut, screw termination, IP67, shieldable, CAN bus**

Connector housing	Metal -40 °C...+85 °C
For wire gauge	6...8 mm, max. 0.75 mm <sup>2</sup>
Type	EEM 33-75, P/N 005646

It is possible to turn and fix the contact carrier in 90° positions.



Pin assignment



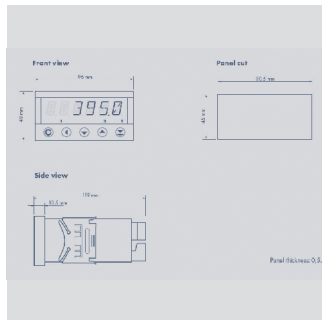
**M12x1 splitter / T-connector, 5-pin, A-coded, IP68, 1:1 connection, female - male - female, CAN-Bus**

Connector housing	PUR
Operating temperature	-25 °C... +85 °C
Type	EEM 33-45, P/N 056145



## Multifunctional Measuring Device with Display

Series MAP4000



### Special features

- Supply voltage 10...30 VDC, 80...250 V DC or AC
- high accuracy
- direct connection of potentiometric and standardized signals
- adjustable supply voltage for sensors 5... 24 V
- Temperature coefficient 100 ppm/K
- optional RS 232, RS 485, analog output, limited switch

### Ordering specifications

#### Number comparator relays

- 0: none
- 2: 2 relays
- 4: 4 relays

#### Analog output

- 0: no analog output
- 1: analog output present

#### Interface

- 0: ni interface
- 1: RS 232
- 2: RS 485

**M A P - 4 0 1 0 - 0 0 0 - 1 0 1**

Series

#### Supply voltage

- 00: 10...30 V AC/DC
- 10: 80...250 V AC

#### Display colour

- 1: Red

#### Data storage (only with interface)

- 0: not storage
- 1: RTC storage
- 2: FAST storage

#### Adjustable Excitation voltage (5...24 V/Max. 1,2 W)

- 1: Excitation present

## Connecting Options on request



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### M12 connector

- Customized lengths
- 3-, 4-, 6- and 8-pol. versions
- Protection class IP68
- Ordering codes of standard versions  
see ordering specifications



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### Tyco AMP Super Seal

- Pin- and bushing housing
- Customized lengths
- 3-, 4- and 6-pol. versions
- Protection class IP67
- on request



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### Deutsch DTM 04

- Pin- and bushing housing
- Customized lengths
- 3-, 4- and 6-pol. versions
- Protection class IP67
- on request



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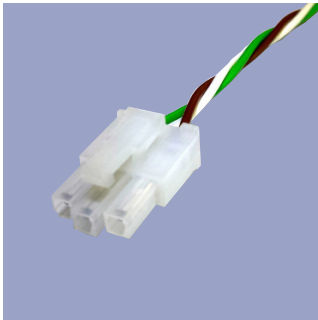
### ITT Cannon Sure Seal connector

- customized lengths
- 3-, 4- and 6-pol. versions
- protection class IP67
- on request

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**Molex Mini Fit jr.**

- Customized length and lead wires
- 3-, 4- and 6-pol. versions
- on request



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**Molex Mini Fit**

- Customized length and lead wires
- 3-, 4-, 6- and 8-pol. versions
- on request