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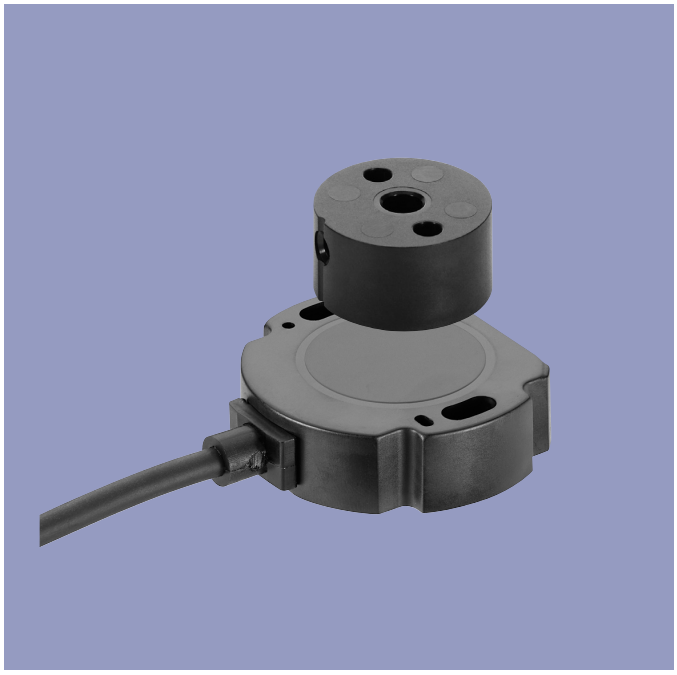
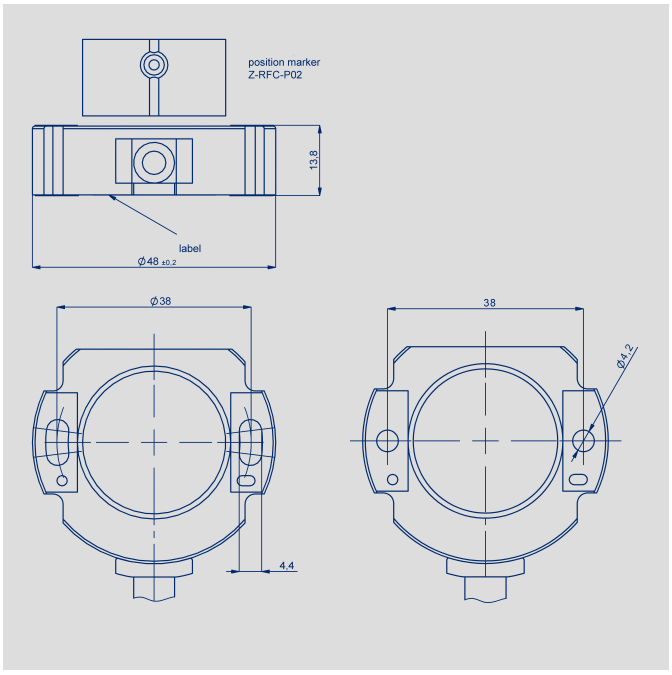
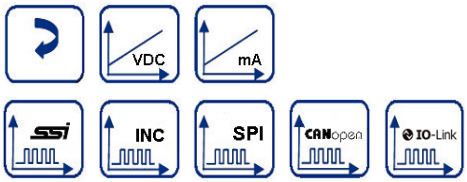
Siedle Group

NOVOHALL
Rotary Sensor
touchless technology

Series RFC-4800







Special features

- Touchless hall technology
- Electrical range up to 360°
- 2-part, mechanically decoupled
- High protection class, IP67, IP69
- Resolution up to 14 bit
- Wear-free
- Temperature range -40 °C to +105 °C
- Single and multi-channel versions
- Optimized for use in industrial and mobile applications with highest EMC requirements such as ISO pulses and high interferences to ISO 11452 and ECE-Standard
- Suitable for safety-relevant applications according to DIN EN ISO 13849
- Interfaces:
  Voltage, current, SSI, incremental, CANopen, SPI, IO-Link
- Customized versions

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.

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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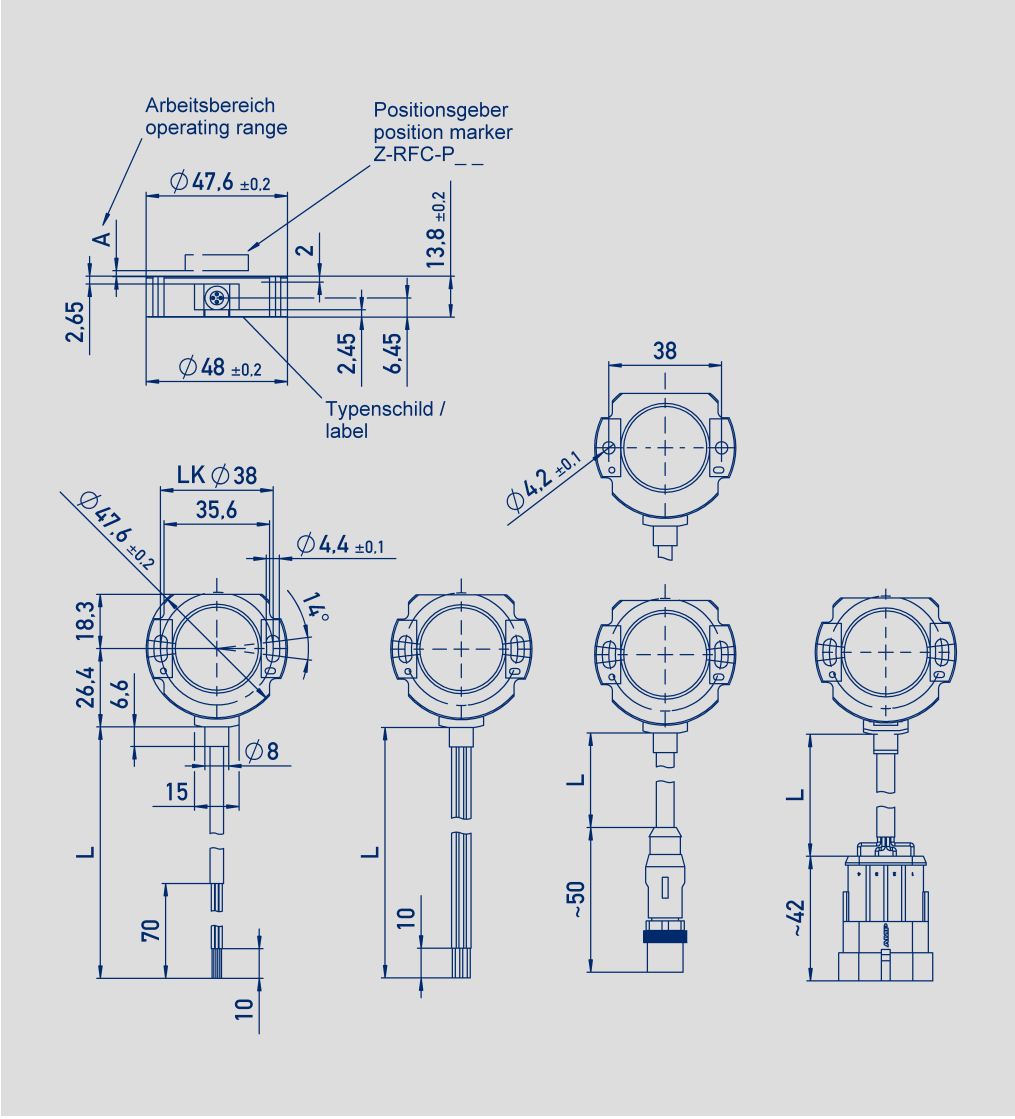
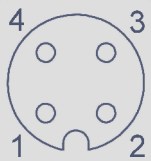
Contents

Drawings



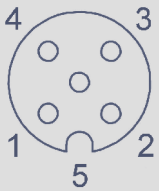
CAD data see
www.novotechnik.de/en/
download/cad-data/

Pin assignment M12 connector



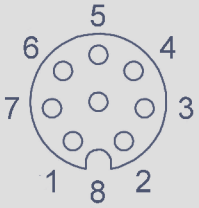
A-coded

Pin assignment M12 connector



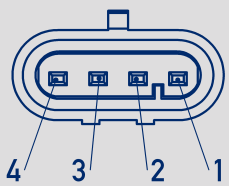
A-coded

Pin assignment M12 connector



A-coded

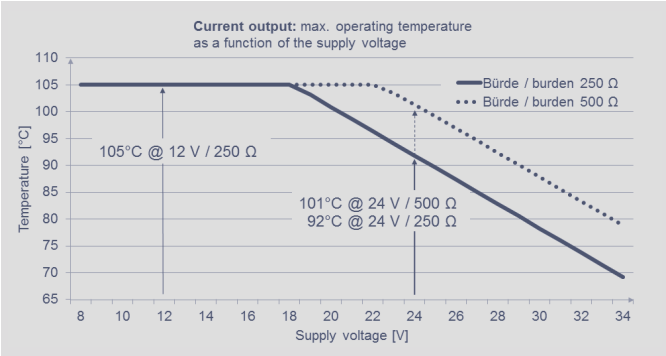
Pin assignment AMP Superseal

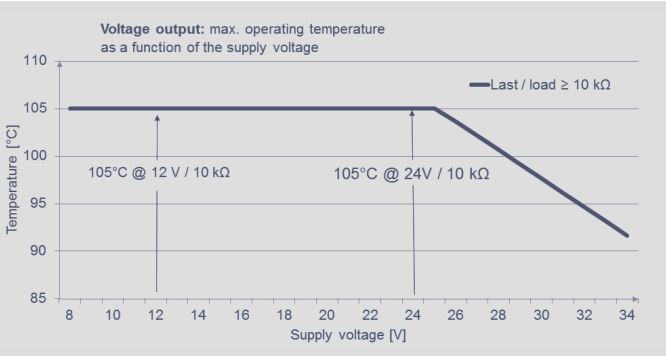


Mechanical Data

Description		
Housing	high grade, temperature resistant plastic	
Electrical connection	Cable 4 x 0.5 mm², AWG 20, TPE, shielded (analog voltage / current CE, CANopen) Cable 4 x 0.5 mm², AWG 20, TPE, unshielded (analog voltage / current mobil) Cable 5 x 0.14 mm², AWG 26, PUR, shielded (SPI) Cable 8 x 0.25 mm², AWG 24, TPE, shielded (SSI, Incremental, CANopen IN/OUT) Wire 0.5 mm², AWG 20, PVC (analog voltage / current mobile, Incremental Open Collector) Connector M12x1, 4-pin / 5-pin / 8-pin with cable L=0.15 m Connector AMP-Superseal, 4-pin with cable L = 0.15 m	
Mechanical Data		
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 / IP69 (with M12 connector: IP67)	

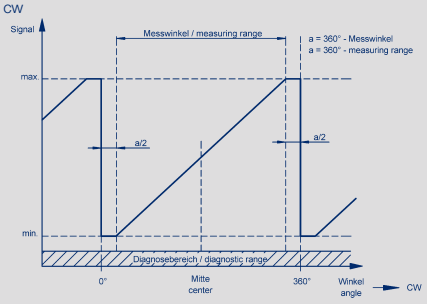
Temperature diagram



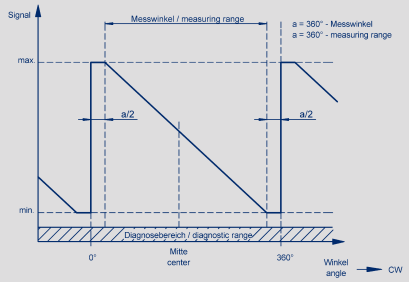


Output Characteristics

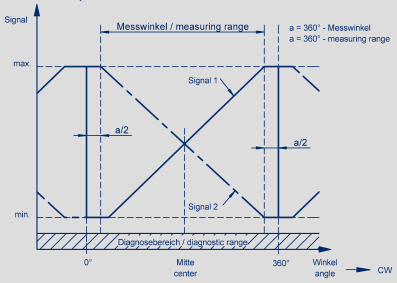
One-channel, cw



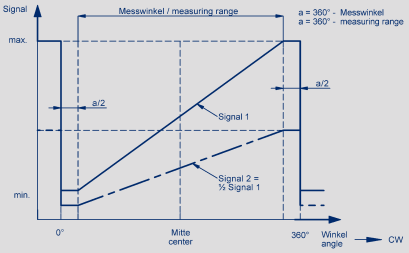
One-channel, ccw



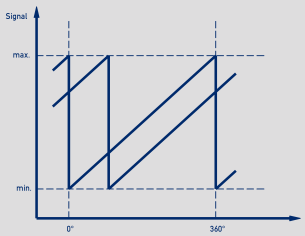
Two channels, crossed output characteristics, channels 1 cw



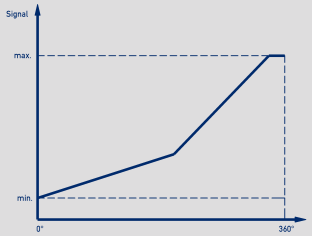
On request: Two channels, signal 2 = 0.5 x signal 1



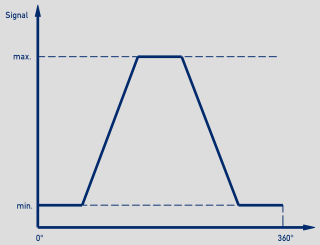
On request: 2 offset output characteristics



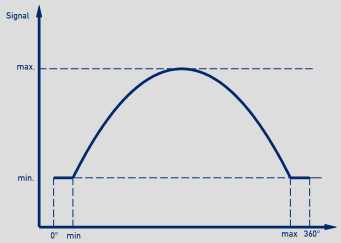
On request: Different gradients



On request: Trapezoid output characteristic



On request: Parabolic output characteristic



Technical Data - Analog Versions - Voltage - Current
for Mobile Applications

Technical Data - Versions for Mobile Applications
These versions are optimzed for the high requirements in mobile applications. Tested to the highest requirements as ISO-pulses and high interferences to ISO 11452.

Type Designations	**RFC-48_ _- _ _ _ -2 _ _ - _ _ _ ratiometric**	**RFC-48_ _- _ _ _ -3 _ _ - _ _ _ voltage**	**RFC-48_ _- _ _ _ -32 _ _ - _ _ _ current**	
Electrical Data				
Output signal	ratiometric to supply voltage Ub 0.25 ... 4.75 V (5 ... 95 %) 0.5 ... 4.5 V (10 ... 90 %) (load ≥5 kΩ)	0.25 ... 4.75 V 0.5 ... 4.5 V (load ≥10 kΩ)	4 ... 20 mA (burden @ Ub > 13 V: ≤ 500 Ω burden @ Ub ≤ 13 V: ≤ 250 Ω)	
Number of channels	1 / 2			
Diagnosis	activated (in case of error output signal is outside of the plausible signal range)			
Update rate	typical 3.4			kHz
Resolution	12			bit
Measuring range	0 ... 30 up to 0 ... 360, in 10°-steps			°
Independent linearity	≤ 0,5			±% FS
Repeatability	typical ≤ 0,1			°
Hysteresis at measuring range < 360° Hysteresis at measuring range 360°	typical ≤ 0,1 typical ≤ 0,25 (lower hysteresis on request)			° °
Temperature error at measuring range 30 and 170° Temperature error at measuring range 180 and 360°	typical ±0.7 typical ±0.35	typical ±1.0 typical ±0.5	typical ±1.2 typical ±0.6	% FS % FS
Supply voltage Ub	5 (4.5 ... 5.5)	12/24 (8 ... 34)	12/24 (8 ... 34)	VDC
Current consumption (w/o load)	typical 12 per channel			mA
Reverse voltage	yes, supply lines and outputs			
Short circuit protection	yes (vs. GND and supply voltage)			
Insulation resistance (500 VDC)	≥ 10			MΩ
Cross-section cable / lead wires	0.5 (AWG 20)			mm^2
Environmental Data				
Operating temperature	-40 ... +105 -25 ... +85 with M12 connector *) The max. operating temperature depends on supply voltage Ub and load resp. burden (see page 4)	-40 ... +105 * -25 ... +85 with M12 connector	-40 ... +105 * -25 ... +85 with M12 connector	°C °C
MTTF (DIN EN ISO 13849-1 parts count method, w/o load, wc)	99 (per channel)	44 (per channel)	40 (per channel)	years
MTTFd (DIN EN ISO 13849-1 parts count method, w/o load, wc)	198 (per channel) MTTF certificate s. https://www.novotechnik.de/en/downloads/certificates/mttfd-certificates/	88 (per channel)	80 (per channel)	years
Functional safety	Suitable for safety-relevant applications according to ISO 13849 after customer validation. Further safety data (DCavg...) and support for functional safety are available on request.			
EMC compatibility E1	ISO 10605 Packaging and Handling + Component Test 8 kV, 15 kV ISO 11452-2 Radiated EM HF-Fields, Absorber Hall 100 V/m ISO 11452-5 Radiated EM HF-Fields, Stripline 200 V/m CISPR25 Radiated emission class 5 ISO 7637-2 Pulses on supply lines (1, 2a, 2b, 3a, 3b, 4, 5) Level 4 ISO 7637-3 Transient disturbances Level 4 EN 13309 Construction machinery Emission and immunity according to ECE - R10 (E1)			

Connection assignment

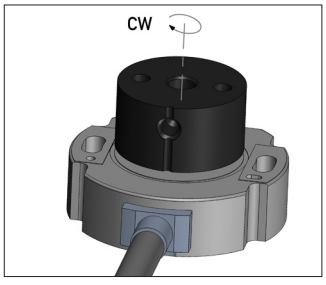
One-channel versions

Signal	**Lead wires code 4 _ _**	**Cable code 2 _ _**	**Connector code 551 / 552**
Supply voltage Ub	RD	GN	pin 1
Signal output	BU	WH	pin 2
GND	BK	BN	pin 3
Not assigned	-	YE	pin 4

Redundant versions

Signal	**Lead wires code 4 _ _**	**Cable code 2 _ _**	**Connector code 551 / 552**
Supply voltage Ub 1	RD	GN	pin 1
Signal output 1	BU	WH	pin 2
GND 1	BlK	BN	pin 3
Signal output 2	BU/WH	YE	pin 4
Supply voltage Ub 2	RD/WH	-	-
GND 2	BK/WH	-	-

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



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Ordering Specifications - Analog Versions for Mobile Applications

Ordering specifications

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

Supply voltage
2: Supply voltage Ub = 5 V (4.5 ... 5.5 V)
3: Supply voltage Ub = 12/24 V (8 ... 34 V)

Output signal Supply voltage Ub = 5 V
1: 0.25 ... 4.75 V ratiometric to supply voltage Ub (5 ... 95 %)
2: 0.5 ... 4.5 V ratiometric to supply voltage Ub (10 ... 90 %)

Output signal supply voltage Ub = 12/24 V
2: 4 ... 20 mA
4: 0.5 ... 4.5 V
5: 0.25 ... 4.75 V

Output characteristics
1: Rising cw
2: Rising ccw
3: Crossed output channel 1 rising cw (partly redundant)
4: Crossed output channel 1 rising cw (fully redundant)
Other output characteristics on request

Electrical connections
251: Cable 4-pole, 0,5 m unshielded, one-channel and partly redundant
252: Cable 4-pole, 1 m unshielded, one-channel and partly redundant
256: Cable 4-pole, 3 m unshielded, one-channel and partly redundant
260: Cable 4-pole, 5 m unshielded, one-channel and partly redundant
270: Cable 4-pole, 10 m unshielded, one-channel and partly redundant
401: Lead wires 3 x L = 0,5 m, single
411: Lead wires 4 x L = 0,5 m, partly redundant
421: Lead wires 6 x L = 0,5 m, fully redundant
551: M12 connector 4-pin, with cable L = 0.15 m unshielded, one-channel and partly redundant
552: Connector AMP Superseal, 4-pin, with cable L = 0.15 m, unshielded, one-channel and partly redundant
Cable versions and assembled connectors on request

R	F	C	–	4	8	5	1	–	6	3	6	–	2	1	1	–	2	5	2

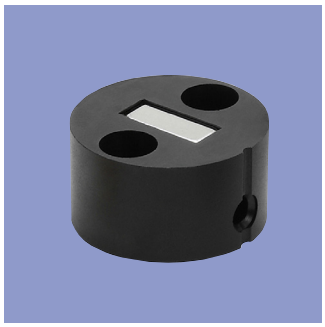
Measuring range
03: Angle 0° ... 30° min.
...
06, 12, 18, 24, 36
...
36: Angle 0° ... 360° max.
Other angles on request

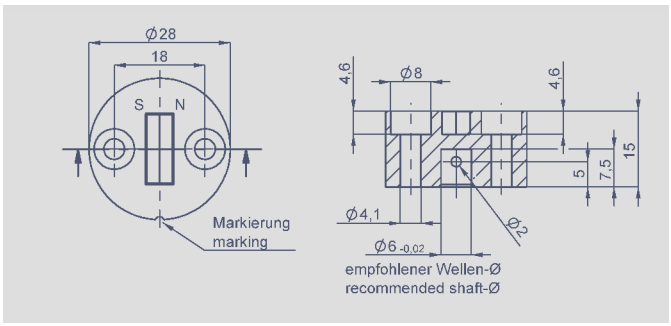
Number of channels
6: one-channel 1x supply voltage Ub / 1 x output
7: partly redundant 1 x supply voltage Ub / 2 x output
8: fully redundant 2 x supply voltage Ub / 2 x output

Series

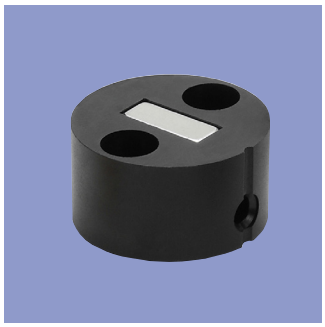
Mechanical version
4851: Elongated hole mounting for easy adjustment
4852: Round hole mounting
4853: Elongated hole mounting, without diagnostic function
4854: Round hole mounting, without diagnostic function
Further versions f.e. with internal shielding against magnetic fields on request.

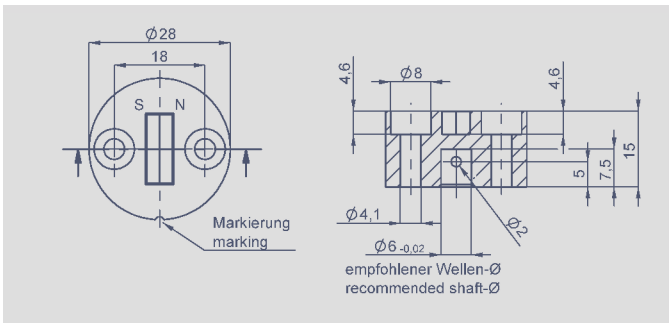
Position Markers



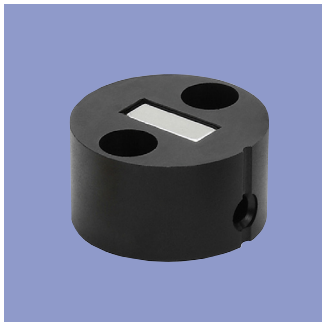


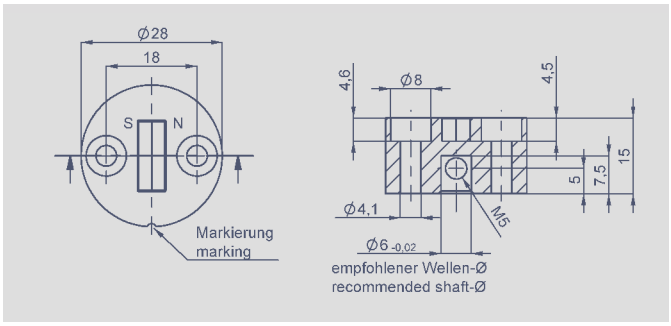
Z-RFC-P41
Position marker for frontal fixation with 2 cylinder head screws M4x20 (with microencapsulation) or with locking pin (both included in delivery).
- max. permitted radial offset ± 3 mm
- packaging unit:
  1 pc. P/N 400105037
  25 pcs. P/N 400105038



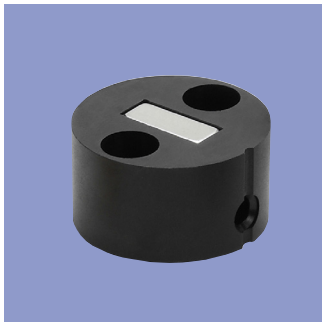


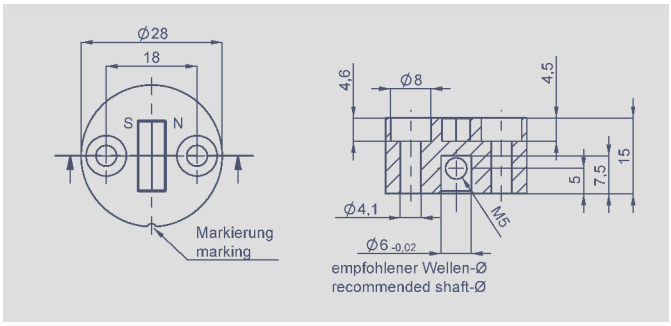
Z-RFC-P02
Position marker for frontal fixation with 2 cylinder head screws M4x20 (with microencapsulation) or with locking pin (both are included in delivery).
- max. permitted radial offset ±3 mm
- packaging unit:
  1 pc. P/N 400005661
  25 pcs. P/N 400056080





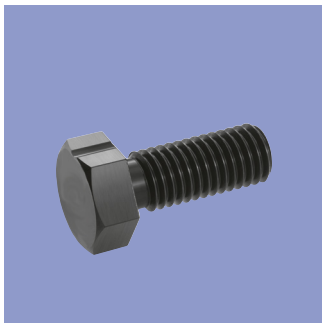
Z-RFC-P47
Position marker for fixation with threaded pin M5 (included in delivery).
- max. permitted radial offset ±3 mm
- packaging unit:
  1 pc. P/N 400105039
  25 pcs. P/N 40005040

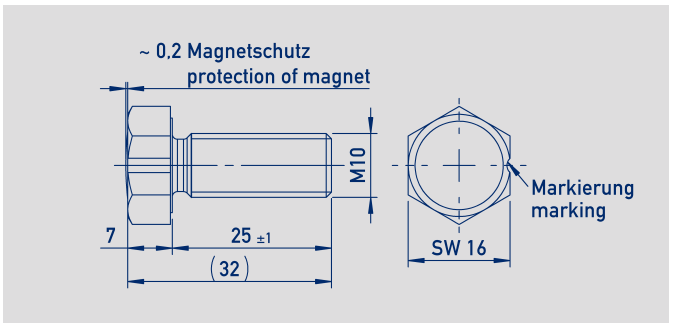




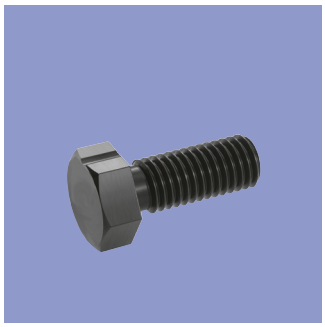
Z-RFC-P08
Position marker for fixation with threaded pin pin M5 (included in delivery).
- max. permitted radial offset ±3 mm
- packaging unit:
  1 pc. P/N 400056070
  25 pcs. P/N 400056084

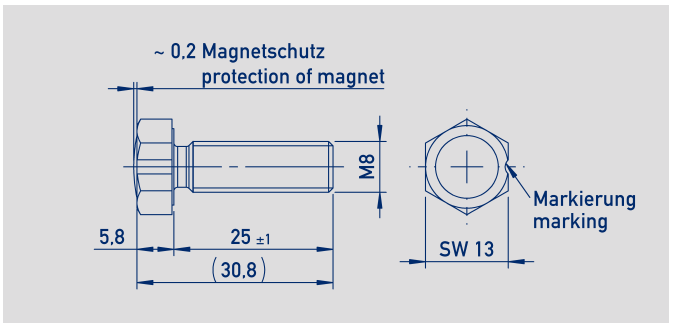
Position Markers



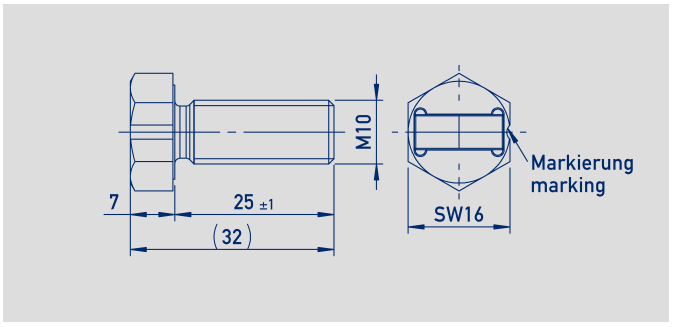


Z-RFC-P18
Screw position marker
M10 x 25 mm, similar DIN 933,
Aluminum anodized,
magnet potted
- max. permitted radial offset ±3 mm
- packaging unit:
  1 pc. P/N 400104756
  25 pcs. P/N 400104757

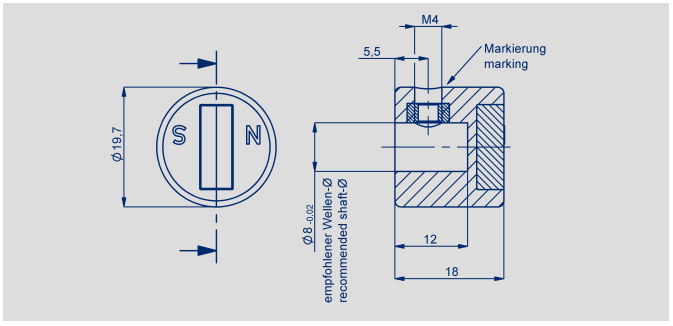




Z-RFC-P19
Screw position marker
M8 x 25 mm, similar DIN 933 / ISO 4017
Aluminum anodized,
magnet potted
- max. permitted radial offset ±1.5 mm
- packaging unit:
  1 pc. P/N 400104754
  25 pcs. P/N 400104755

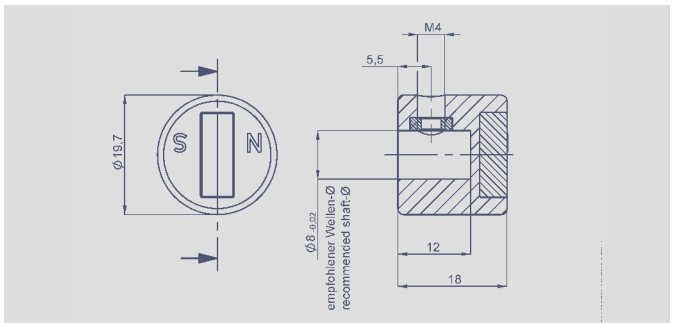


Z-RFC-P20
Screw position marker
M10 x 25 mm, similar DIN 933,
Aluminum anodized
- max. permitted radial offset ±3 mm
- packaging unit:
  1 pc. P/N 400104758
  25 pcs. P/N 400104759

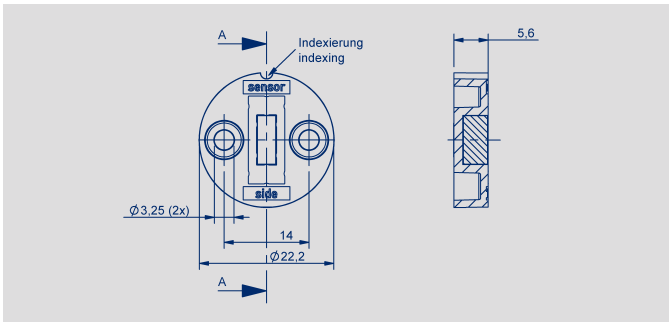


Z-RFC-P43
Position marker for fixation with threaded pin M4
(included in delivery)
- max. permitted radial offset ±3 mm
- packaging unit:
  1 pc. P/N 400105041
  25 pcs. P/N 400105042

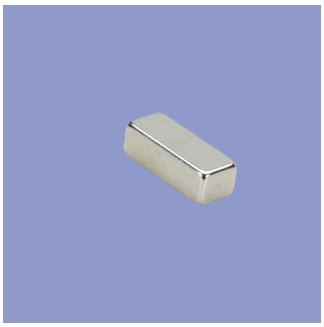
Position Markers

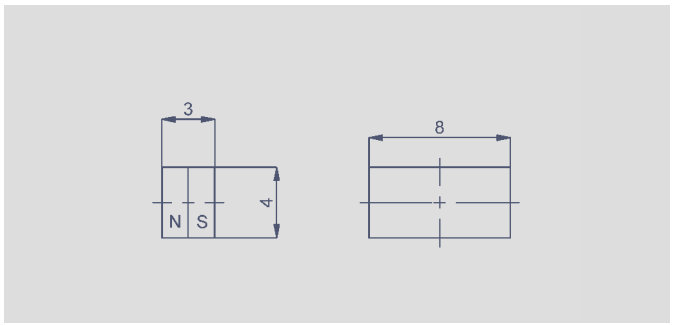


Z-RFC-P23
Position marker for fixation with threaded pin M4
(included in delivery)
- max. permitted radial offset ±3 mm
- packaging unit:
  1 pc. P/N 400056074
  25 pcs. P/N 400056085

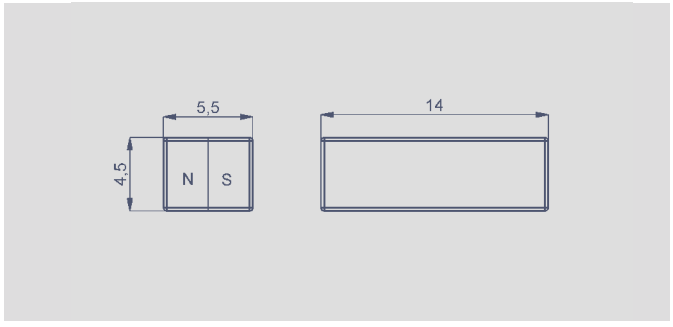


Z-RFC-P30
Position marker for frontal fixation with 2 fillister screws M3x8
(included in delivery)
- max. permitted radial offset ±1.5 mm
- packaging unit:
  1 pc. P/N 400056086
  25 pcs. P/N 400056087



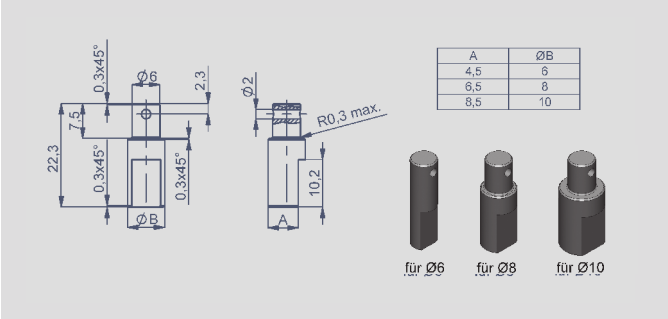


Z-RFC-P03
Magnet for direct application onto customer's shaft
- max. permitted radial offset ±1,5 mm
- packaging unit:
  1 pc. P/N 400005658
  50 pcs. P/N 400056081



Z-RFC-P04
Magnet for direct application onto customer's shaft
- max. permitted radial offset ±3 mm
- packaging unit:
  1 pc. P/N 400005659
  50 pcs. P/N 400056082

Position Markers



Shaft adapter for Z-RFC-P41 and Z-RFC-P02
Fixation at position marker with locking pin

- Z-RFC-S01: Ø 6 mm, P/N 400056206
- Z-RFC-S02: Ø 8 mm, P/N 400056207
- Z-RFC-S03: Ø 10 mm, P/N 400056208

Working distances (mm)

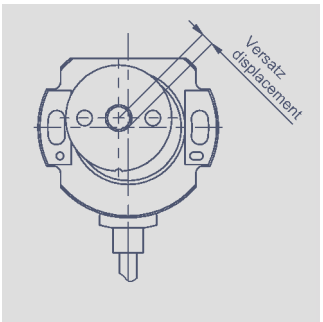
Interface	Z-RFC- _ _ _ P02 / P08	P03	P04	P18	P19	P20	P23	P30	P41 / P47	P 43
One channel										
RFC-4853/4854: Analog * / SPI	0 ... 4	0 ... 1.5	0 ... 4	0 ... 4.5	0 ... 2.2	0 ... 4	0 ... 4	0 ... 1.5	0 ... 2.7	0 ... 2.7
SSI / Incremental	0 ... 1.4	-	0 ... 1.4	-	-	0 ... 1.4	0 ... 1.4	-	-	-
RFC-4851/4852: Analog / CANopen / IO-Link	2.3 ... 5	0.7 ... 2.2	2.3 ... 5	0 ... 4.5	0 ... 2.2	2.3 ... 5	2.3 ... 5	0.7 ... 2.2	0 ... 2.7	0 ... 2.7
Partly / Fully redundant										
RFC-4851/4852: Analog / CANopen	1.9 ... 4.5	0.3 ... 1.8	1.9 ... 4.5	0 ... 4	0 ... 1.7	1.9 ... 4.5	1.9 ... 4.5	0.3 ... 1.8	0 ... 2.3	0 ... 2.3
RFC-4853/4854: Analog *	0 ... 4	0 ... 1.5	0 ... 4	0 ... 4	0 ... 1.7	0 ... 4	0 ... 4	0 ... 1.5	0 ... 2.3	0 ... 2.3

*) without diagnostic function

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

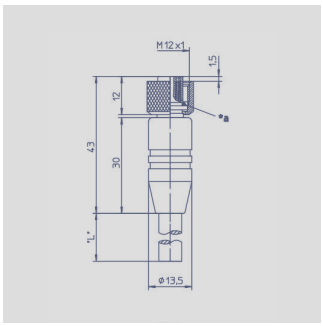


Lateral magnet offset will cause additional linearity error.
The angle error, which is caused by radial displacement of sensor and position marker depends on the used position marker or magnet.

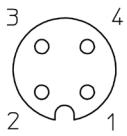
Additional linearity error (°) at radial displacement

Interface	Z-RFC-P02 / P04 / P08 / P20 / P23			Z-RFC-P41 / P43 / P47			Z-RFC-P03 / P30			Z-RFC-P18			Z-RFC-P19		
	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	0,5 mm	1 mm	2 mm
One channel															
Analog / SPI / CANopen / IO-Link	0.4	1.1	3.5	0.4	1.1	3.5	1.4	3.7	-	0.7	1.3	3.3	1.3	2.6	-
SSI / Incremental	0.4	0.7	2.2	-	-	-	-	-	-	-	-	-	-	-	-
Partly / Fully redundant															
Analog / CANopen	0.7	1.8	5.2	0.7	1.8	5.2	2.5	6.4	-	1.1	2.0	4.6	2.3	4.5	-

Connector System M12



Pin assignment

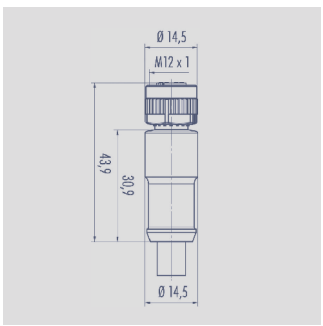


1 = Brown
2 = White
3 = Blue
4 = Black

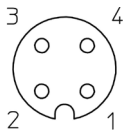
M12x1 mating female connector, 4-pin, straight, A-coded, with molded cable, shielded, IP67, open ended

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 mm²

Length	Type	P/N
2 m	EEM 33-32	400005600
5 m	EEM 33-62	400005609
10 m	EEM 33-97	400005650



Pin assignment

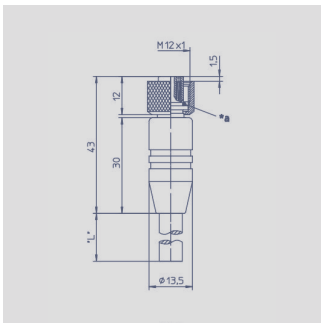


1 = Brown
2 = White
3 = Blue
4 = Black

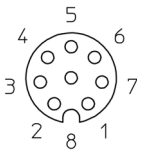
M12x1 mating female connector, 4-pin, straight, A-coded, with molded cable, not shielded, IP67, open ended

Connector housing	Plastic PA
Cable sheath	PUR; Ø = max. 6 mm, -40 °C...+85 °C
Wires	PP, 0.34 mm²

Length	Type	P/N
2 m	EEM 33-35	400056135
5 m	EEM 33-36	400056136
10 m	EEM 33-37	400056137



Pin assignment



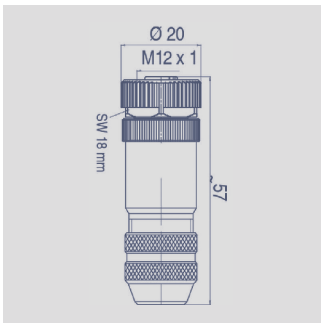
1 = White
2 = Brown
3 = Green
4 = Yellow
5 = grau
6 = rosa
7 = Blue
8 = Red

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

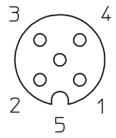
Connector housing	Plastic PA
Cable sheath	PUR; Ø = max. 8 mm, -25 °C...+80 °C (moved) -50 °C...+80 °C (fixed)
Wires	PP, 0.25 mm²

Length	Type	P/N
2 m	EEM 33-86	400005629
5 m	EEM 33-90	400005635
10 m	EEM 33-92	400005637

Connector System M12



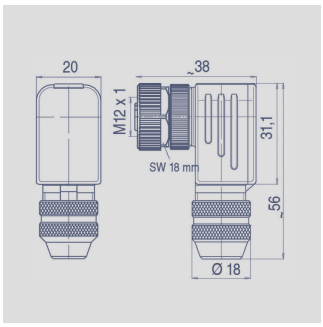
Pin assignment



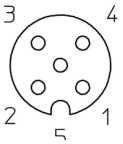
M12x1 mating female connector, 5-pin, straight, A-coded, with coupling nut, screw termination, IP67, shieldable, CAN bus

Connector housing	Metal -40 °C...+85 °C
For wire gauge	6...8 mm, max. 0.75 mm²

Type EEM 33-73, P/N 400005645



Pin assignment

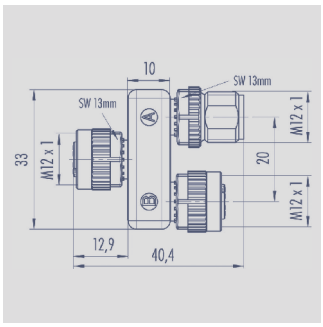


M12x1 mating female connector, 5-pin, angled, A-coded, with coupling nut, screw termination, IP67, shieldable, CAN bus

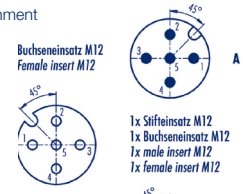
Connector housing	Metal -40 °C...+85 °C
For wire gauge	6...8 mm, max. 0.75 mm²

Type EEM 33-75, P/N 400005646

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



Pin assignment

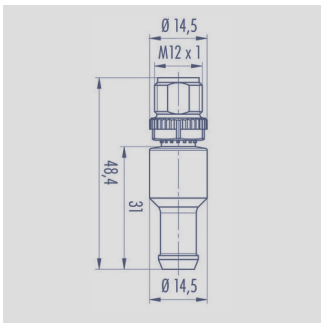


M12x1 splitter / T-connector, 5-pin, A-coded, IP68,1:1 connection, female - male - female, CAN-Bus

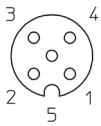
Connector housing	PUR
Operating temperature	-25 °C... +85 °C

Type EEM 33-45, P/N 400056145

Connector System M12



Pin assignment

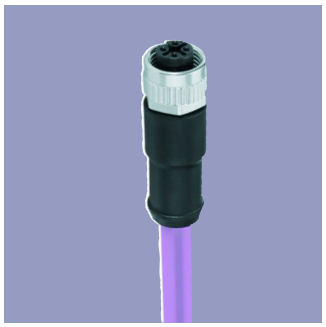


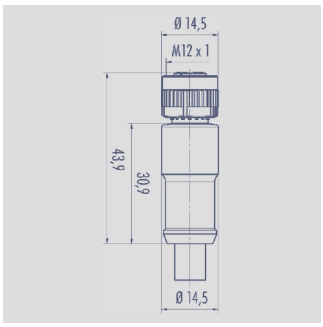
1 = n. c.
2 = n. c.
3 = n. c.
4 = ┐ Widerstand
5 = ┘ 120 Ω

M12x1 terminating resistor, 5-pin, A-coded, IP67, 120 Ω resistance, CAN-Bus

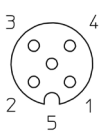
Connector housing	PUR
Operating temperature	-25 °C... +85 °C

Type EEM 33-47, P/N 400056147





Pin assignment

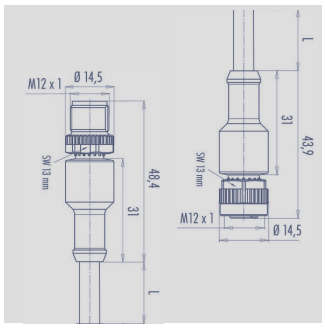


1 = Shield
2 = Red (0,34 mm²)
3 = Black (0,34 mm²)
4 = White (0,25 mm²)
5 = Blue (0,25 mm²)

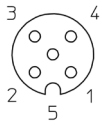
M12x1 mating female connector, 5-pin, straight, A-coded, with molded cable, IP67, shielded, open ended, CAN-Bus

Connector housing	PUR
Cable sheath	PUR Ø = max. 7.2 mm, -25 °C...+85 °C (moved)
Wiires	PP 2x 0.25 mm² + 2 x 0.34 mm²

Length	Type	P/N
2 m	EEM 33-41	400056141
5 m	EEM 33-42	400056142
10 m	EEM 33-43	400056143



Pin assignment



M12x1 mating female connector, 5-pin, straight, A-coded, with molded cable, IP68, CAN-Bus

Connector housing	PUR
Cable sheath	PUR; Ø 7.2 mm -25 °C... +85 °C (fixed)

Length	Type	P/N
5 m	EEM 33-44	400056144

IP67 Protection class IP67 DIN EN 60529

IP68 Protection class IP68 DIN EN 60529

CAN-bus

Very good Electromagnetic Compatibility (EMC) and shield systems

Very good resistance to oils, coolants und lubricants

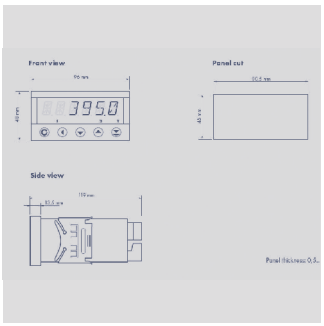
UL - approved

Suited for applications in dragchains

Note: The protection class is valid only in locked position with its plugs. The application of these products in harsh environments must be checked in particular cases.

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 sensoren 5 ... 24 V
- Temperature coefficient 100 ppm/K
- optional RS 232, RS 485, analog output, limited switch
- complete data see separate data sheet MAP-4000

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

Display colour
1: Red

Data storage (only with interface)
0: not storage
1: RTC storage
2: FAST storage

Series

Supply voltage
00: 10...30 V AC/DC
10: 80...250 V AC

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

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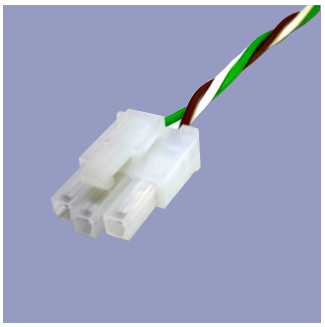
73760 Ostfildern (Ruit)

Telefon +49 711 4489-0
Telefax +49 711 4489-118
info@novotechnik.de
www.novotechnik.de

Connecting Options
on request

M12 connector
- Customized lengths
- 3-, 4-, 6- and 8-pole versions
- Protection class IP68
- Ordering codes of standard versions see ordering specifications



Molex Mini Fit jr.
- Customized length and lead wires
- 3-, 4- and 6-pole versions
- on request

Tyco AMP Super Seal
- Pin- and bushing housing
- Customized lengths
- 3-, 4- and 6-pole versions
- Protection class IP67
- on request

Molex Mini Fit
- Customized length and lead wires
- 3-, 4-, 6- and 8-pole versions
- on request

Deutsch DTM 04
- Pin- and bushing housing
- Customized lengths
- 3-, 4- and 6-pole versions
- Protection class IP67
- on request

ITT Cannon Sure Seal connector
- customized lengths
- 3-, 4- and 6-pole versions
- protection class IP67
- on request