

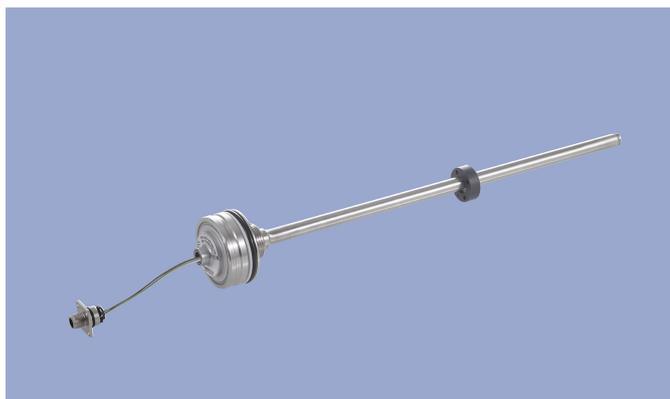
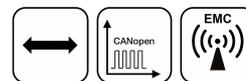
**NOVOSTRICTIVE  
Transducer  
Touchless**

**TM1**

Plug-in Flange

CANopen

**Mobile Applications**



**Special Features**

- For integration in pneumatic and hydraulic cylinders
- Touchless magnetostrictive measurement technology
- Operating pressure up to 350 bar, peaks up to 450 bar
- Ring-shaped position marker does not contact sensor
- Unlimited mechanical life
- No velocity limit for position marker
- Absolute output
- Outstanding accuracy performance up to 0.04 %
- Wide range of supply voltage
- 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**

Hydraulic or pneumatic cylinders in

- Agricultural and forestry machinery
- Construction machines
- Vehicles with loading and unloading devices
- Vehicles with extension arms

The absolute position transducer can be used directly in-cylinder and thus enables a compact and cost-effective position measurement. The sensor consists of a stainless steel flange welded to a pressure tight rod and can therefore be used in harsh environments.

The magnetostrictive measuring technology offers excellent accuracy for measuring lengths up to 2000 mm.

The passive ring-shaped position marker allows a mechanically decoupled measurement.

**Description**

Material	Flange: stainless steel 1.4307 / AISI 304L Flange cover: AlSiMgBi Rod: stainless steel 1.4571 / AISI 316Ti Sealing: O-ring FKM 80, Supporting ring: PTFE
Mounting	Plugged into cylinders, secured in position with set screw M5 ISO 4026
Electrical connection	Connector M12x1, A-coded / Connector system M12x1, A-coded with lead wires

**Mechanical Data**

Dimensions	See dimension drawing
------------	-----------------------

## Ordering Specifications

### Ordering Specifications

Preferred types printed in bold

#### Interface

**6: CANopen**

#### Interface parameters

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

#### Baud rate

**1: 1000 kBaud**

**2: 800 kBaud**

**3: 500 kBaud**

**4: 250 kBaud**

**5: 125 kBaud**

**7: 50 kBaud**

#### Electrical connection

**106: Connector M12x1, 5-pin**

468: Plug system M12x1, 5-pin, with lead wires 80 mm

**472: Plug system M12x1, 5-pin, with lead wires 120 mm**

476: Plug system M12x1, 5-pin, with lead wires 160 mm

480: Plug system M12x1, 5-pin, with lead wires 200 mm

484: Plug system M12x1, 5-pin, with lead wires 240 mm

**T M 1 - 0 5 0 0 - 3 0 5 - 6 1 4 - 4 7 2**

Series

#### Mechanical version

**305: Plug-in flange Ø 48 mm**

307: Plug-in flange Ø 48 mm with internal thread M4x6 at rod end, additional length 7.5 mm

#### Electrical measuring range

Standard lengths 0050 up to 2000 mm in 25 mm-steps

Other lengths on request



Technical Data

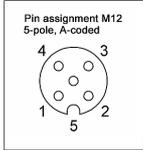


Type	TM1-____-305-6_ _ _ _ CANopen
Measured variables	Position, speed and temperature
Electrical measuring range (dim. L)	0 ... 50 mm up to 0 ... 2000 mm
Measuring range speed	25 ... 1000 mm/s
Protocol	CANopen protocol to CiA DS-301 V4.2.0, Device profile DS-406 V3.2 Encoder Class C2, LSS services to CiA DS-305 V1.1.2
Programmable parameters	Position, speed, cams, working areas, temperature, node ID, baud rate
Node ID	1 ... 127 (default 127)
Baud rate	50 ... 1000 kBaud
Update rate (output)	1 kHz (internal measuring rate 0.5 kHz)
Resolution position	≤ 0.1 mm
Resolution speed	2 mm/s
Absolute linearity	≤ ±0.04 %FS (min. 300 μm)
Tolerance of electr. zero point	±1 mm
Repeatability	≤ ±0.1 mm
Hysteresis	≤ ±0.1 mm
Temperature error	≤ ±15 ppm/K (min. 0.01 mm/K)
Supply voltage Ub	12/24 VDC (8 ... 34 VDC)
Supply voltage ripple	≤ 10% Ub
Power drain w/o load	< 1.5 W
Overvoltage protection	40 VDC (6 s)
Polarity protection	yes (supply lines and outputs)
Short circuit protection	yes (all outputs vs. GND and supply voltage)
Insulation resistance (500 VDC)	≥ 10 MΩ
Bus termination internal	w/o (internal load resistance 120 Ω on request)
<b>Environmental Data</b>	
Max. operational speed	Mechanically unlimited
Vibration IEC 60068-2-6	20 g, 10 ... 2000 Hz, Amax = 0.75 mm
Shock IEC 60068-2-27	100 g, 11 ms (single hit)
Protection class DIN EN 60529	IP67 (Connector system M12, fastened, when correctly fitted in cylinder: IP69)
Operating temperature	-40 ... +105°C, -40 ... +85°C (connector system M12)
Operating humidity	0 ... 95 % R.H. (no condensation)
Working pressure	≤ 350 bar
Pressure peaks	≤ 450 bar
Burst pressure	> 700 bar
Life	Mechanically unlimited
Functional safety	If you need assistance in using our products in safety-related systems, please contact us
MTTF (IEC 60050)	391 years
Traceability	Serial number on type labeling: production batch of the sensor assembly and relevant sensor components
<b>EMC Compatibility</b>	
ISO 10605 ESD (Handling/Component)	8 kV / 15 kV
ISO 11452-2 Radiated HF-fields	100 V/m
ISO 11452-4 BCI (Bulk current injection)	200 mA
CISPR 25 Radiated emission	Level 4
ISO 7637-2 Transient Emissions	Level 1/2
ISO 7637-2 Pulses on supply lines	(1, 2a, 2b, 3a, 3b) Level 4
ISO 7637-3 Pulses on output lines	(3a, 3b) Fast Level 2
ISO 16750 Pulses on supply lines	Starting profile Level 4 @12 V / Level 3 @24 V, Load dump A +200 V
EN 13309 Construction machinery	
ISO 14982 Agricult./forestry machines	
Emission/Immunity	Exceeds E1 requirements
	The EMC measurements are conducted in a reference cylinder. The EMC properties can deviate when using different cylinders.

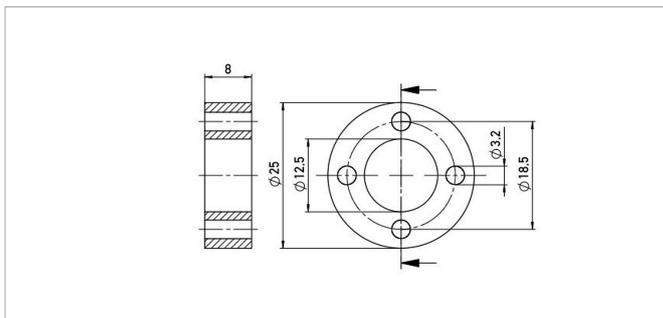
FS = Full scale: Signal span according to electrical measuring range

**Connection Assignment**

Signal	Connector code 106	Plug system code 4_ _
Supply voltage Ub	Pin 2	Pin 2
GND	Pin 3	Pin 3
CAN_H	Pin 4	Pin 4
CAN_L	Pin 5	Pin 5
Not assigned	Pin 1	Pin 1



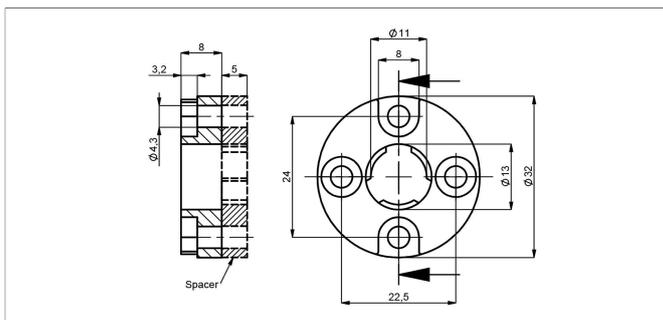
## Position Markers



### Z-TH1-P18

Ring position marker for fixation with screws M3  
 Material PA6-GF  
 Weight approx. 12 g  
 Operating temp. -40 ... +100°C  
 Surface pressure max. 40 N/mm<sup>2</sup>  
 Fastening torque max. 100 Ncm  
 of mounting

P/N	Pack. unit [pcs]
400005697	1

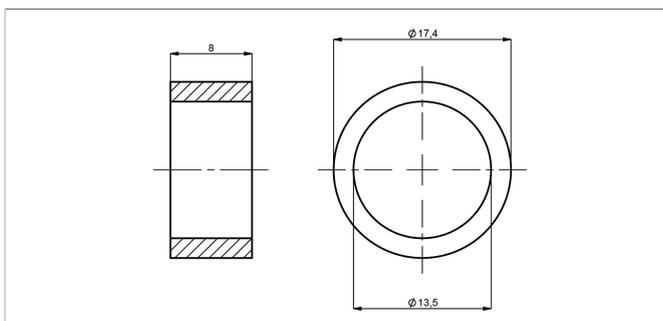
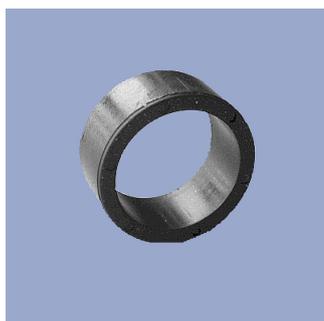


### Z-TH1-P19

#### Z-TH1-PD19 With spacer

Ring position marker for fixation with screws M4, optionally with or without spacer  
 Material PA6-GF, Spacer: POM-GF  
 Weight approx. 14 g  
 Operating temp. -40 ... +100°C  
 Surface pressure max. 40 N/mm<sup>2</sup>  
 Fastening torque max. 100 Ncm

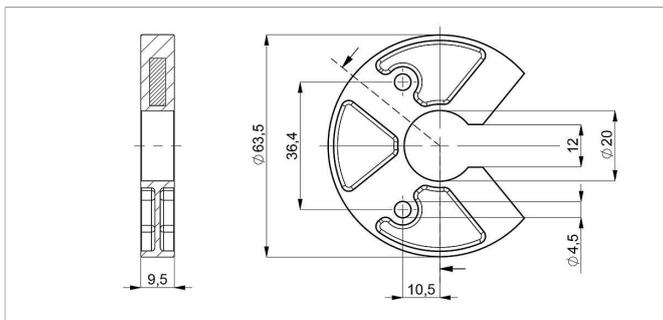
P/N	Spacer	Pack. unit [pcs]
400005698	-	1
400107117	incl.	1



### Z-TH1-P30

Ring position marker for mounting via lock washer and retaining ring  
 Material NdFeB bonded (EP)  
 Weight approx. 5 g  
 Operating temp. -40 ... +100°C  
 Surface pressure max. 10 N/mm<sup>2</sup>

P/N	Pack. unit [pcs]
400106139	1



### Z-TH1-P25

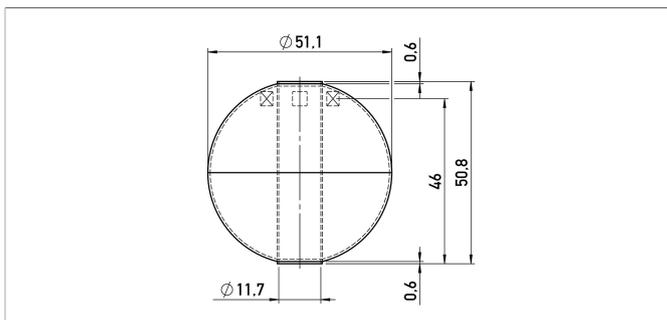
U-shaped position marker for fixation with M4 screws

Caution: for dimension of electrical zero point please follow the user manual!

Material PA6-GF  
 Operating temp. -40 ... +105°C  
 Surface pressure max. 40 N/mm<sup>2</sup>  
 Fastening torque max. 100 Ncm  
 of mounting

P/N	Pack. unit [pcs]
400105076	1

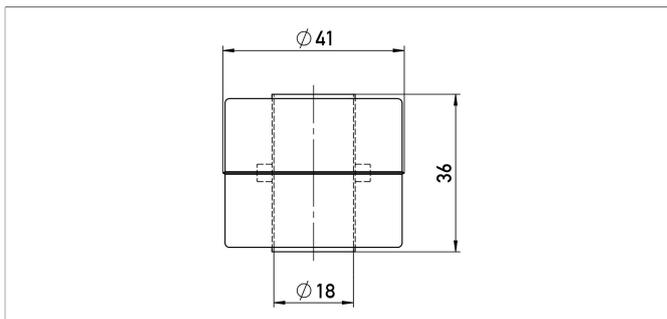
## Position Markers



### Z-TH1-P32

Ball-type floating position marker  
 Material Stainless steel 1.4571  
 Weight approx. 42 g  
 Operating temp. -40 ... +100°C  
 Compression strength  $\leq 40$  bar  
 Density 720 kg/m<sup>3</sup>  
 Immersion depth in water 36.7 mm

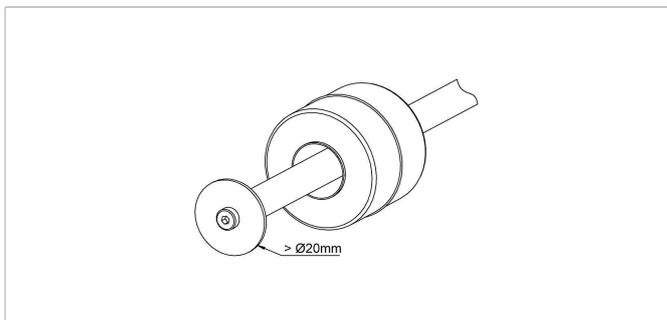
P/N	Pack. unit [pcs]
400105703	1



### Z-TH1-P21

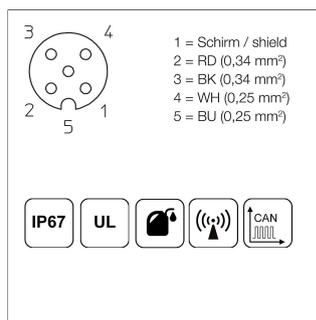
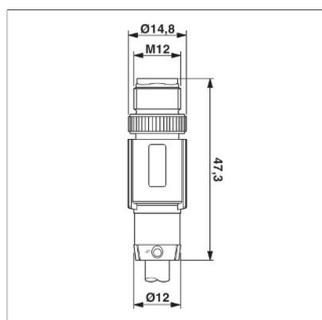
Cylinder floating position marker  
 Material Stainless steel 1.4404  
 Weight approx. 20 g  
 Operating temp. -40 ... +100°C  
 Compression strength  $\leq 8$  bar  
 Density 740 kg/m<sup>3</sup>  
 Immersion depth in water approx. 26.6 mm

P/N	Pack. unit [pcs]
400056044	1



When using floating position markers, we recommend to secure the marker against loss with a washer at the rod end.  
 For this purpose, a sensor version with inner thread at the rod end is required (s. ordering code).

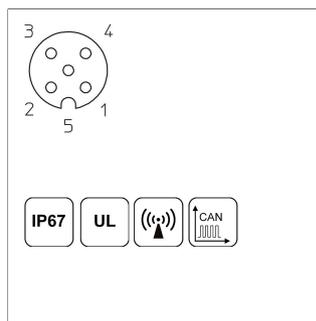
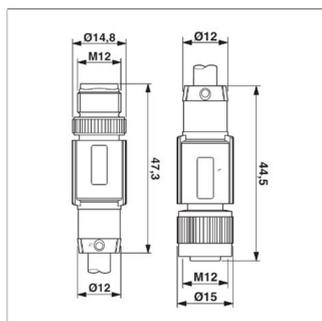
## Connector System M12



### EEM-33-49/50/51

M12x1 Mating female connector, 5-pin, straight, A-coded, with molded cable, IP67, shielded (shield on knurl), open ended

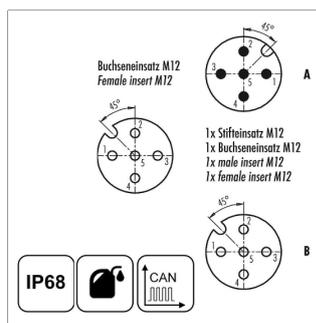
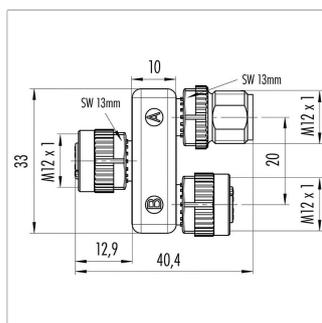
Plug housing	TPU
Cable sheath	PUR, Ø = 6.7 mm, -25 ... +90°C (socket) -20 ... +80°C (cable)
Lead wires	PE, 2x0.25 mm <sup>2</sup> +2x0.34 mm <sup>2</sup>
P/N	Type Length
400106368	EEM-33-49 2 m
400106371	EEM-33-50 5 m
400106372	EEM-33-51 10 m



### EEM-33-52

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

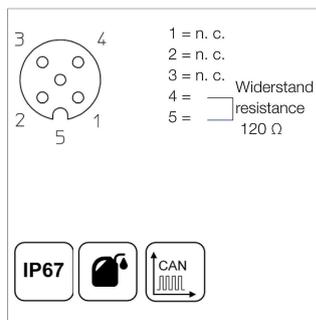
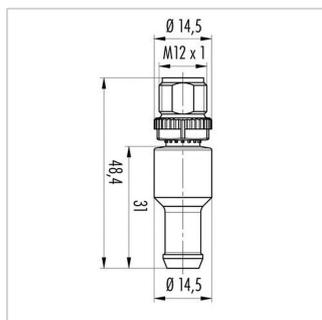
Plug housing	PUR
Cable sheath	PUR, Ø = 6.7 mm, -25 ... +90°C (plug/socket) -20 ... +80°C (cable)
Lead wires	PE, 2x0.25 mm <sup>2</sup> +2x0.34 mm <sup>2</sup>
P/N	Type Length
400106373	EEM-33-52 5 m



### EEM-33-45

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

Plug housing	PUR, -25 ... +85°C
P/N	Type
400056145	EEM-33-45



### EEM-33-47

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

Plug housing	PUR, -25 ... +85°C
P/N	Type
400056147	EEM-33-47

**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

**C** Suited for applications in dragchains

**UL** UL - approved

CAN-Bus

Novotechnik  
Messwertaufnehmer OHG  
P.O.Box 4220  
73745 Ostfildern (Germany)  
Horbstrasse 12  
73760 Ostfildern (Germany)  
Phone +49 711 4489-0  
Fax +49 711 4489-118  
info@novotechnik.de  
www.novotechnik.de



© Jul 18, 2022

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.