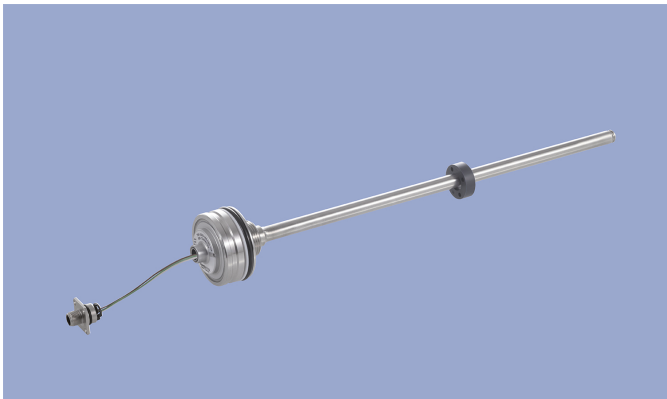
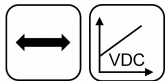


**NOVOSTRICTIVE
Transducer
Touchless**

TM1
Plug-in Flange
Voltage
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 / Cable 3x 0.5 mm² (AWG 20), PUR, unshielded |

Mechanical Data

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

Ordering Specifications

Ordering Specifications

Preferred types printed in bold

Supply voltage U_b
8: $U_b = 12/24\text{ VDC}, 24\text{VDC}$

Output signal
1: 0.1 ... 10 VDC
4: 0.5 ... 4.5 VDC
5: 0.25 ... 4.75 VDC

Output characteristic
1: Rising output characteristic, seen from flange
2: Falling output characteristic, seen from flange

Electrical connection
104: Connector M12x1, 4-pin
251: Cable, 3-pole, unshielded, 1 m
253: Cable, 3-pole, unshielded, 3 m
255: Cable, 3-pole, unshielded, 5 m
438: Plug system M12x1, 4-pin, with lead wires 80 mm
442: Plug system M12x1, 4-pin, with lead wires 120 mm
446: Plug system M12x1, 4-pin, with lead wires 160 mm
450: Plug system M12x1, 4-pin, with lead wires 200 mm
454: Plug system M12x1, 4-pin, with lead wires 240 mm

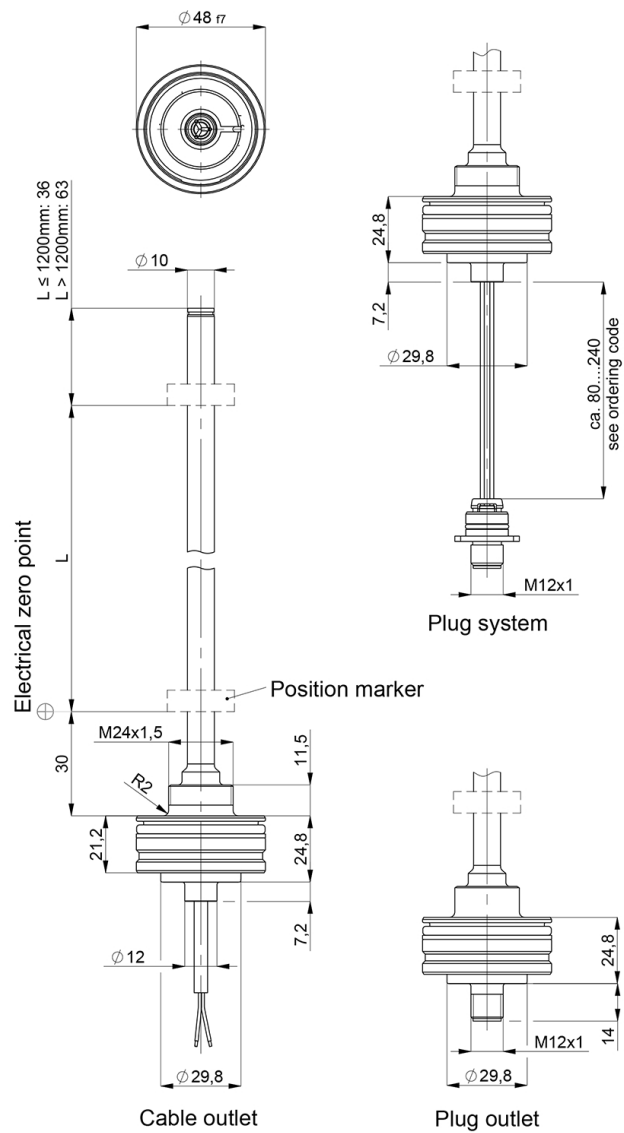
T M 1 - 0 5 0 0 - 3 0 5 - 8 5 1 - 4 4 2

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

Drawing



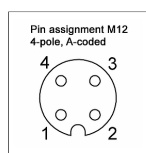
CAD data see
www.novotechnik.de/en/download/cad-data/

Technical Data

| Type | TM1-____-305-84_-_-_- TM1-____-305-85_-_-_- | TM1-____-305-81_-_-_- |
|----------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------|------------------------|
| Output signal | 0.25 ... 4.75 V 0.5 ... 4.5 V | 0.1 ... 10 V |
| Load / burden | ≥ 10 kΩ | |
| Update rate | 0.5 kHz | |
| Measuring range | 0 ... 50 mm up to 0 ... 2000 mm | |
| Linearity | ≤ ±0.04 %FS (min. 300 μm) | |
| Tolerance of electr. zero point | ±1 mm | |
| Resolution | 0.1 mm | |
| Repeatability | ≤ ±0.1 mm | |
| Hysteresis | ≤ ±0.1 mm | |
| Temperature error | typ. 50 ppm/K (min. 0.01 mm/K) | |
| Supply voltage Ub | 12/24 VDC (8 ... 32 VDC) | 24 VDC (16 ... 34 VDC) |
| Supply voltage ripple | ≤ 10% Ub | |
| Power drain w/o load | < 1 W | |
| Overvoltage protection | 36 VDC (permanent) | |
| Polarity protection | yes (-36 VDC) | |
| Short circuit protection | yes (output vs GND and supply voltage up to 36 VDC) | |
| Insulation resistance (500 VDC) | ≥ 10 MΩ | |
| Environmental Data | | |
| 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 / IP6K9K (connector M12 / cable: IP67) | |
| Operating temperature | -40 ... +105°C (connector M12 / cable), -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) | > 20 years | > 20 years |
| EMC Compatibility | | |
| ISO 10605 ESD (Handling/Component) | 8 kV / 15 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 5 | |
| ISO 7637-2 Pulses on supply lines | (1, 2a, 2b, 3a, 3b) Level 4 | |
| ISO 16750 Pulses on supply lines | (4, 5) Level 4 | |
| ISO 7637-2 Transient Emissions | Level 3 | |
| ISO 7637-3 Pulses on output lines | Level 4 | |
| EN 13309 Construction machinery | | |
| ISO 14982 Agricult./forestry machines | | |
| The EMC measurements are conducted in a reference cylinder. The EMC properties can deviate when using different cylinders. | | |

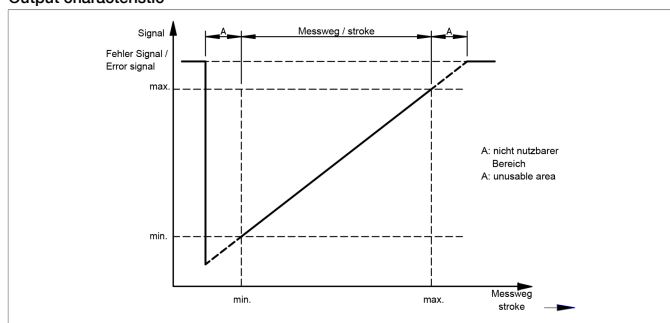
Connection Assignment

| Signal | Connector code 1_ _ | Plug system code 4_ _ | Cable code 2_ _ |
|-------------------|------------------------|--------------------------|--------------------|
| Supply voltage Ub | Pin 1 | Pin 1 | BN |
| GND | Pin 3 | Pin 3 | WH |
| Signal output | Pin 2 | Pin 2 | GN |
| Do not connect | Pin 4 | Pin 4 | - |

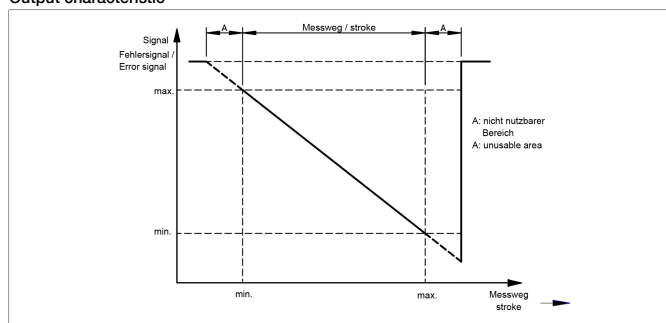


Technical Data Output Characteristics

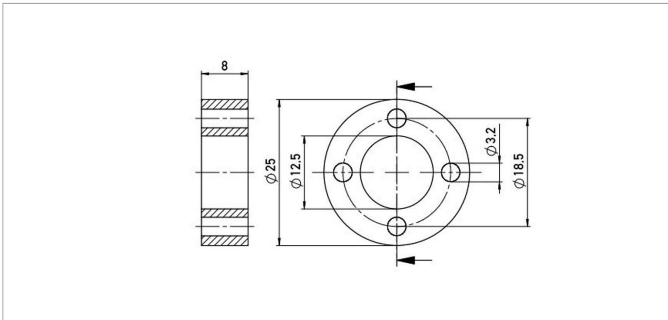
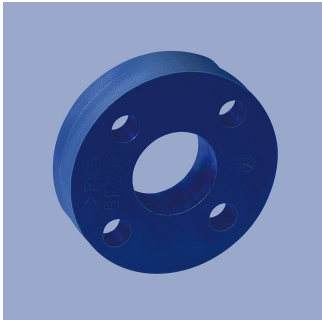
Output characteristic



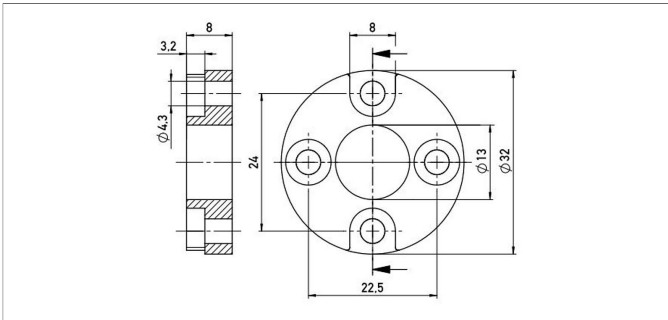
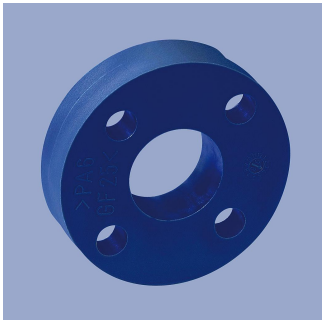
Output characteristic



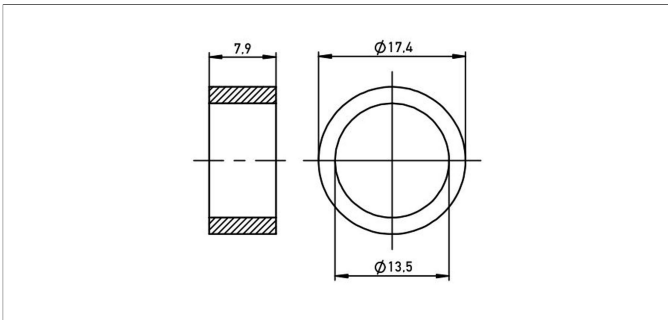
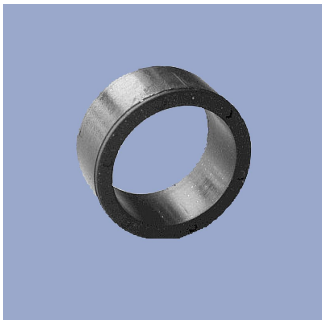
Position Markers



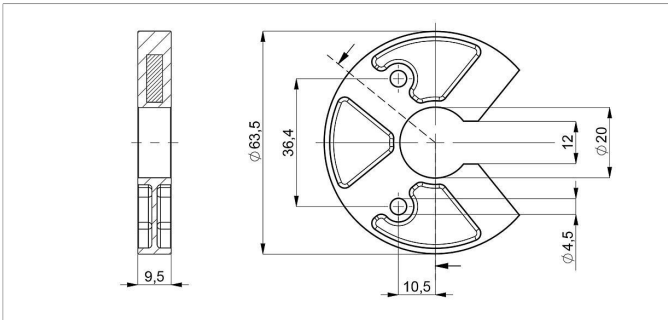
| | |
|--------------------------------------------------|-------------------------|
| Z-TH1-P18 | |
| Ring position marker for fixation with screws M3 | |
| Material | PA6-GF |
| Weight | approx. 12 g |
| Operating temp. | -40 ... +100°C |
| Surface pressure | max. 40 N/mm² |
| Fastening torque of mounting | max. 100 Ncm |
| P/N | Pack. unit [pcs] |
| 400005697 | 1 |



| | |
|--------------------------------------------------|-------------------------|
| Z-TH1-P19 | |
| Ring position marker for fixation with screws M4 | |
| Material | PA6-GF |
| Weight | approx. 14 g |
| Operating temp. | -40 ... +100°C |
| Surface pressure | max. 40 N/mm² |
| Fastening torque of mounting | max. 100 Ncm |
| P/N | Pack. unit [pcs] |
| 400005698 | 1 |

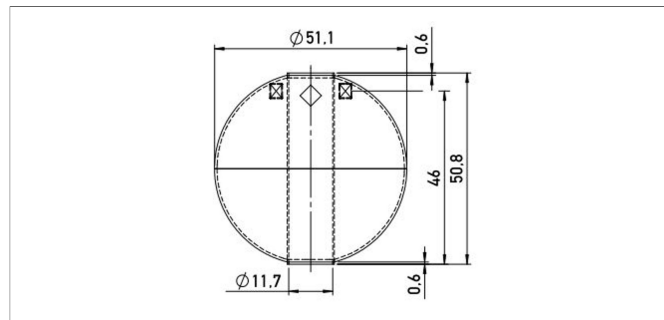


| | |
|----------------------------------------------------------------------|-------------------------|
| Z-TIM-P20 | |
| Ring position marker for mounting via lock washer and retaining ring | |
| Material | PA-Neonbond Compound |
| Weight | approx. 5 g |
| Operating temp. | -40 ... +100°C |
| Surface pressure | max. 10 N/mm² |
| P/N | Pack. unit [pcs] |
| 400005699 | 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/mm² |
| Fastening torque of mounting | max. 100 Ncm |
| P/N | Pack. unit [pcs] |
| 400105076 | 1 |

Position Markers



Z-TH1-P22

Ball-type floating position marker

| | |
|----------|------------------------|
| Material | Stainless steel 1.4571 |
|----------|------------------------|

Weight approx. 42 g

Operating temp. -40 ... +100°C

Compression ≤ 60 bar

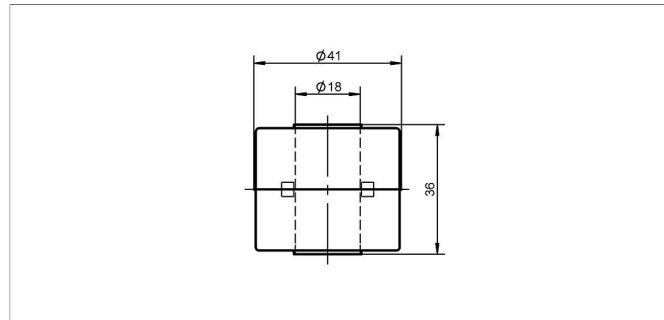
strength

Density 720 kg/m³

Immersion depth 36.7 mm

in water

| P/N | Pack. unit [pcs] |
|-----------|------------------|
| 400056045 | 1 |



Z-TH1-P21

Cylinder floating position marker

| | |
|----------|------------------------|
| Material | Stainless steel 1.4404 |
|----------|------------------------|

Weight approx. 20 g

Operating temp. -40 ... +100°C

Compression ≤ 8 bar

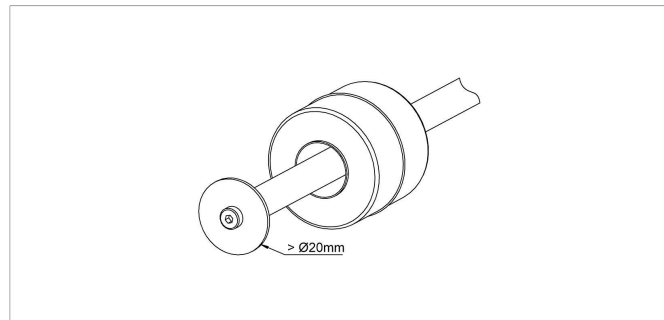
strength

Density 740 kg/m³

Immersion depth approx. 26.6 mm

in water

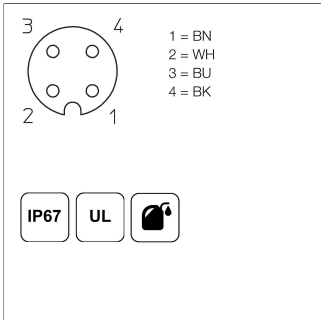
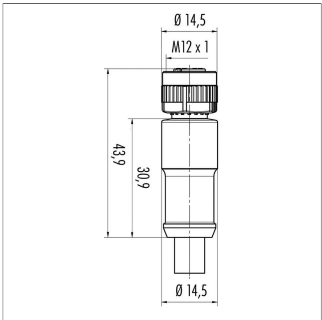
| P/N | Pack. unit [pcs] |
|-----------|------------------|
| 400056044 | 1 |



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).

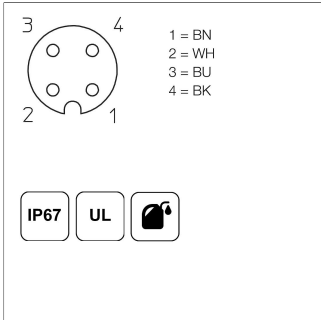
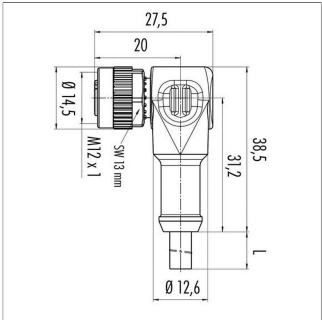
Connector System
M12



EEM-33-35/36/37
M12x1 Mating female connector, 4-pin, straight, A-coded, with molded cable, not shielded, IP67, open ended

Plug housing PA
Cable sheath PUR, Ø = max. 6 mm, -40 ... +85°C (fixed)
Lead wires PP, 0.34 mm²

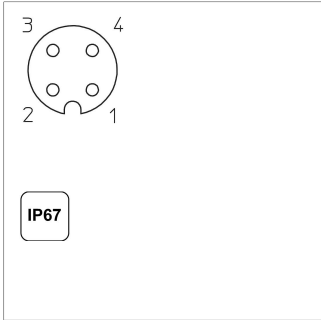
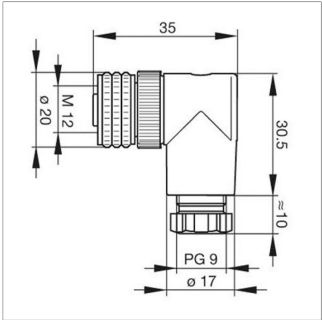
| P/N | Type | Length |
|-----------|-----------|--------|
| 400056135 | EEM-33-35 | 2 m |
| 400056136 | EEM-33-36 | 5 m |
| 400056137 | EEM-33-37 | 10 m |



EEM-33-38/39/40
M12x1 Mating female connector, 4-pin, angled, A-coded, with molded cable, not shielded, IP67, open ended

Plug housing PA
Cable sheath PUR, Ø = max. 6 mm, -40 ... +85°C (fixed)
Lead wires PP, 0.34 mm²

| P/N | Type | Length |
|-----------|-----------|--------|
| 400056138 | EEM-33-38 | 2 m |
| 400056139 | EEM-33-39 | 5 m |
| 400056140 | EEM-33-40 | 10 m |



EEM-33-89
M12x1 Mating female connector, 4-pin, angled, A-coded, with coupling nut, screw termination, IP67, not shieldable

Operating temp. -25 ... +90°C
Plug housing PBT
For wire gauge 6 ... 8 mm, max. 0.75 mm²

| P/N | Type |
|-----------|-----------|
| 400005634 | EEM-33-89 |

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



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