Special Features
- Compact design for tight spaces
- Touchless magnetostrictive measurement technology
- Operating pressure up to 350 bar, peaks up to 450 bar
- Non-contacting position detection with ring-shaped position marker
- 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 industrial applications
- Other configurations see separate data sheets

Applications
- Manufacturing Engineering
- Level measurement
- Actuators

The absolute linear transducer TM1 enables a compact and cost-effective position measurement. It consists of a stainless steel flange welded to a pressure-resistant rod and can therefore be used under harsh environmental conditions. 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: SS 1.4307 / AISI 304L
- Flange cover: AlSiMgBi
- Rod: SS 1.4571 / AISI 316Ti
- Sealing: O-ring NBR 90 SH A

Mounting
Screwed via thread M18x1.5

Electrical connection
Connector M12x1, A-coded

Mechanical Data
Dimensions
See dimension drawing
Ordering Specifications

Preferred types printed in bold

Supply voltage Ub
8: 24 VDC

Output signal
1: 0.1 ... 10 VDC
2: 0.5 ... 4.5 VDC
5: 0.25 ... 4.76 VDC

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

Electrical connection
104: Connector M12x1, 4-pole

T M 1 - 0 5 0 0 - 3 0 6 - 8 5 1 - 1 0 4

Series

Mechanical version
306: Screw flange M18x1.5
308: Screw flange M18x1.5 with internal thread M4x0.75 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

<table>
<thead>
<tr>
<th>Type</th>
<th>TM1-__-306-84-104</th>
<th>TM1-__-306-85-104</th>
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<tbody>
<tr>
<td>Output signal</td>
<td>0.25 ... 4.75 V</td>
<td>0.1 ... 10 V</td>
</tr>
<tr>
<td>Output signal</td>
<td>0.5 ... 4.5 V</td>
<td></td>
</tr>
<tr>
<td>Load</td>
<td>≥ 10 kΩ</td>
<td></td>
</tr>
<tr>
<td>Sampling rate / Update rate</td>
<td>0.5 kHz</td>
<td></td>
</tr>
<tr>
<td>Electrical measuring range (dim. L)</td>
<td>0 ... 50 mm up to 0 ... 2000 mm</td>
<td></td>
</tr>
<tr>
<td>Absolute linearity</td>
<td>≤ ±0.04 %FS [mm: 300 µm]</td>
<td></td>
</tr>
<tr>
<td>Tolerance of electr. zero point</td>
<td>≤ ±1 mm</td>
<td></td>
</tr>
<tr>
<td>Resolution</td>
<td>≤ 0.1 mm</td>
<td></td>
</tr>
<tr>
<td>Repeatability</td>
<td>≤ ±0.1 mm</td>
<td></td>
</tr>
<tr>
<td>Hysteresis</td>
<td>≤ ±0.1 mm</td>
<td></td>
</tr>
<tr>
<td>Temperature error</td>
<td>typ. 50 ppm/K (min. 0.01 mm/K)</td>
<td></td>
</tr>
<tr>
<td>Supply voltage Ub</td>
<td>12/24 VDC (12 ... 32 VDC)</td>
<td>24 VDC (16 ... 34 VDC)</td>
</tr>
<tr>
<td>Supply voltage ripple</td>
<td>≤ 10% Ub</td>
<td></td>
</tr>
<tr>
<td>Power drain w/o load</td>
<td>≤ 3 W</td>
<td></td>
</tr>
<tr>
<td>Overvoltage protection</td>
<td>36 VDC (permanent)</td>
<td></td>
</tr>
<tr>
<td>Polarity protection</td>
<td>yes (-36 VDC)</td>
<td></td>
</tr>
<tr>
<td>Short circuit protection</td>
<td>yes (output vs GND and supply voltage up to 36 VDC)</td>
<td></td>
</tr>
<tr>
<td>Insulation resistance (500 VDC)</td>
<td>≥ 10 MΩ</td>
<td></td>
</tr>
</tbody>
</table>

### Electrical measuring range (dim. L)

0 ... 50 mm up to 0 ... 2000 mm

### Absolute linearity

≤ ±0.04 %FS [mm: 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 (12 ... 32 VDC) 24 VDC (16 ... 34 VDC)

### Supply voltage ripple

≤ 10% Ub

### Power drain w/o load

≤ 3 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 60052

IP67

### Operating temperature

-40 ... +105°C

### Operating humidity

0 ... 95 % R.H. (no condensation)

### Working pressure

≤ 350 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)

346 years 346 years

### EMC Compatibility

- **EN 61000-4-2 ESD (contact/air discharge)**: 4 kV, 8 kV
- **EN 61000-4-3 Electromagnetic fields (RFI)**: 10 V/m
- **EN 61000-4-4 Fast transients (burst)**: 1 kV
- **EN 61000-4-6 Cond. disturbances (HF fields)**: 10 V eff.
- **EN 55016-2-3 Radiated disturbances**: Industrial and residential area

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

### Connection Assignment

<table>
<thead>
<tr>
<th>Signal</th>
<th>Connector</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply voltage Ub</td>
<td>Pin 1</td>
</tr>
<tr>
<td>GND</td>
<td>Pin 3</td>
</tr>
<tr>
<td>Signal output</td>
<td>Pin 2</td>
</tr>
<tr>
<td>Do not connect</td>
<td>Pin 4</td>
</tr>
</tbody>
</table>

Connect cable shielding to protection earth
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: 400005697
Pack. unit [pcs]: 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/mm²
Fastening torque: max. 100 Ncm
P/N: 400005698
Spacer: 400107117 incl. 1

Z-TH1-P20
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/mm²
P/N: 400106139
Pack. unit [pcs]: 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: 400105676
Pack. unit [pcs]: 1
Position Markers

Z-TH1-P32  
Ball-type floating position marker  
Material: SS 1.4571 / AISI 316Ti  
Weight: approx. 42 g  
Operating temp.: -40 ... +100°C  
Compression strength: ≤ 40 bar  
Density: 720 kg/m³  
Immersion depth: 36.7 mm in water  
P/N: 400105703  
Pack. unit [pcs]: 1

Z-TH1-P21  
Cylinder floating position marker  
Material: SS 1.4404 / AISI 316L  
Weight: approx. 20 g  
Operating temp.: -40 ... +100°C  
Compression strength: ≤ 8 bar  
Density: 740 kg/m³  
Immersion depth: approx. 26.6 mm in water  
P/N: 400056044  
Pack. unit [pcs]: 1

Floating Position Marker - Installation Recommendation  
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).

Z-TH1-M01  
Lock nut ISO 8675, M18x1.5-A2  
P/N: 400056090  
Pack. unit [pcs]: 1
Connector System
M12

M12x1 Mating female connector, 4-pin, straight, A-coded, with molded cable, shielded, IP67, open ended
Plug housing: PA
Cable sheath: PUR, Ø = max. 6 mm,
-25 ... +80°C (moved)
-50 ... +80°C (fixed)
Lead wires: PP, 0.34 mm²

<table>
<thead>
<tr>
<th>P/N</th>
<th>Type</th>
<th>Length</th>
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<td>400005600</td>
<td>EEM-33-32</td>
<td>2 m</td>
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<td>400005609</td>
<td>EEM-33-62</td>
<td>5 m</td>
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<tr>
<td>400005650</td>
<td>EEM-33-97</td>
<td>10 m</td>
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</tbody>
</table>

M12x1 Mating female connector, 4-pin, angled, A-coded, with molded cable, shielded, IP67, open ended
Plug housing: PA
Cable sheath: PUR, Ø = max. 6 mm,
-25 ... +80°C (moved)
-50 ... +80°C (fixed)
Lead wires: PP, 0.34 mm²

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<tr>
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<td>EEM-33-33</td>
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<td>400005610</td>
<td>EEM-33-63</td>
<td>5 m</td>
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<tr>
<td>400005696</td>
<td>EEM-33-99</td>
<td>10 m</td>
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</table>

Protection class IP67 DIN EN 60529
Very good Electromagnetic Compatibility (EMC) and shield systems
Very good resistance to oils, coolants and lubricants
Suitable for applications in draughts
UL - approved
CAN-Bus
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.