NOVOSTRICTIVE Transducer Touchless
TM1 Screw flange CANopen Industrial

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**

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

#### Interface

- **6: CANopen**

#### Interface parameters

1: 1x position, 1x speed

- **Baud rate**
  1: 1000 kbit/s
  2: 800 kbit/s
  3: 500 kbit/s
  4: 250 kbit/s
  5: 125 kbit/s
  7: 50 kbit/s

#### Electrical connection

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

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**Series**

- **Mechanical version**
  - 306: Screw flange M16x1.5
  - 308: Screw flange M18x1.5 with internal thread M4x0.7 at rod end, additional length 7.5 mm

**Electrical measuring range**

- Standard lengths 0000 up to 2000 mm in 25 mm-steps
- Other lengths on request
### Technical Data

**Type**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
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<tbody>
<tr>
<td>Type</td>
<td>TM1-...-306-6-106</td>
</tr>
</tbody>
</table>

**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 kBit/s
- Update rate (output): 1 kHz (internal measuring rate 0.5 kHz)
- Resolution: ≤ 0.1 mm
- Resolution speed: 2 mm/s
- Absolute linearity: ≤ ±0.04 %FS [mm, 300 μm]
- Tolerance of zero point: ≤ ±1 mm
- Repeatability: ≤ ±0.1 mm
- Hysteresis: ≤ ±0.1 mm
- Temperature error: ≤ ±15 ppm/VK [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 (±)
- 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)

**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
- Operating temperature: -40 ... +105°C
- 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 60068): 391 years
- Traceability: Serial number on type labeling, production batch of the sensor assembly and relevant sensor components

**EMC Compatibility**

- EN 61000-4-2 ESD (contact/air discharge): 4 kV, 8 kV
- EN 61000-4-3 Electromagnetic fields (RF): 10 V/m
- EN 61000-4-4 Fast transients (burst): 1 kV
- EN 61000-4-6 Cond. disturbances (RF fields): 10 V off.
- 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 Code 106</th>
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</thead>
<tbody>
<tr>
<td>Supply voltage Ub</td>
<td>Pin 2</td>
</tr>
<tr>
<td>GND</td>
<td>Pin 3</td>
</tr>
<tr>
<td>CAN_H</td>
<td>Pin 4</td>
</tr>
<tr>
<td>CAN_L</td>
<td>Pin 5</td>
</tr>
<tr>
<td>Do not connect</td>
<td>Pin 1</td>
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</tbody>
</table>

Connect cable shielding to protection earth
## 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

<table>
<thead>
<tr>
<th>P/N</th>
<th>Pack. unit [pcs]</th>
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<tr>
<td>400005697</td>
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### Z-TH1-P19
- 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

<table>
<thead>
<tr>
<th>P/N</th>
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<td>400107117</td>
<td>incl.</td>
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### 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/mm²

<table>
<thead>
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### 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**
  - max. 100 Ncm

<table>
<thead>
<tr>
<th>P/N</th>
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</table>
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 in water**: 36.7 mm

**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 in water**: approx. 26.6 mm

**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**

**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)
- **Lead wires**: PE, 2x0.25 mm²+2x0.34 mm²

<table>
<thead>
<tr>
<th>P/N</th>
<th>Type</th>
<th>Length</th>
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<td>400106368</td>
<td>EEM-33-49</td>
<td>2 m</td>
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<td>400106371</td>
<td>EEM-33-50</td>
<td>5 m</td>
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<tr>
<td>400106372</td>
<td>EEM-33-51</td>
<td>10 m</td>
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</table>

**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)
- **Lead wires**: PE, 2x0.25 mm²+2x0.34 mm²

<table>
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<tr>
<th>P/N</th>
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<td>400106373</td>
<td>EEM-33-52</td>
<td>5 m</td>
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**EEM-33-45**
M12x1 splitter / T-connector, 5-pin, A-coded, IP68, 1:1 connection, female - male - female, CAN-Bus

- **Plug housing**: PUR
- **Temperature**: -25 ... +85°C

<table>
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<th>P/N</th>
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<td>400056145</td>
<td>EEM-33-45</td>
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**EEM-33-47**
M12x1 terminating resistor, 5-pin, A-coded, IP67, 120 Ω resistance, CAN-Bus

- **Plug housing**: PUR, -25 ... +85°C

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<tr>
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<td>EEM-33-47</td>
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**Protection class IP67 DIN EN 60529**

**Protection class IP68 DIN EN 60529**

- **IP67**: Very good Electromagnetic Compatibility (EMC) and shield systems
- **IP68**: Very good resistance to oils, coolants and lubricants

**SUITE for applications in aerial hose**

**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.