NOVOSTRICTIVE Transducer Touchless
TM1 Plug-in Flange CAN SAE J1939 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 FKM 80, Supporting ring: PTFE

Mounting
Plugged and 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

**Preferred types printed in bold**

<table>
<thead>
<tr>
<th>T</th>
<th>M1</th>
<th>0</th>
<th>5</th>
<th>0</th>
<th>0</th>
<th>3</th>
<th>0</th>
<th>5</th>
<th>J1</th>
<th>4</th>
<th>106</th>
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</thead>
</table>

**Interface parameters**

- Interface: J: CAN SAE J1939
- 1: 1x position, 1x speed
- Baud rate:
  - 3: 500 kbaud
  - 4: 250 kbaud

**Electrical connection**

- 106: Connector M12x1, 5-pin
- 408: Plug system M12x1, 5-pin, with lead wires 80 mm*
- 472: Plug system M12x1, 9-pin, with lead wires 120 mm*
- 476: Plug system M12x1, 5-pin, with lead wires 150 mm*
- 480: Plug system M12x1, 5-pin, with lead wires 200 mm*
- 484: Plug system M12x1, 5-pin, with lead wires 240 mm*

  * Only for installation in a cylinder

**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
TM1-____-305---1---

Position marker

M12x1

24.8 mm

TM1-____-305---4---

M12x1

24.8 mm

Electrical feed post:

M4 / 6 deep

L = 120 mm / 45
L = 120 mm / 105

TM1-____-307------

With internal thread M4x6

L = 120 mm / 45
L = 120 mm / 105

Φ 10

Φ 48.5 (52.5)

Φ 29.8

Φ 29.8

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

**Type**

TM1- \_ \_ \_ \_\_\_305-J \_ \_\_106

**CAN SAE J1939**

**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**

CAN SAE J1939

**Programmable parameters**

Offset position, averaging, baud rate, transmit mode, transmit cycle, source address

**Node ID**

128 ... 247 (dynamic address claiming)

**Baud rate**

250, 500 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 (min. 300 µm)

**Tolerance of electrical zero point**

≤ 1 mm

**Repeatability**

≤ ±0.1 mm

**Stability**

≤ ±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**

< 1.0 W

**Overvoltage protection**

40 VDC (all)

**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, 1 ms (single hit)

**Protection class DIN EN 60952**

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 60066)**

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 [HF fields]

10 V off.

EN 55016-2-3 Radiated disturbances

Industrial and residential area

Only for connector system M12: Data applies only inside a cylinder.

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

<table>
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<tr>
<th>Signal</th>
<th>Connector code</th>
<th>Plug system code</th>
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<tbody>
<tr>
<td>Supply voltage Ub</td>
<td>Pin 2</td>
<td>Pin 2</td>
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<tr>
<td>GND</td>
<td>Pin 3</td>
<td></td>
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<tr>
<td>CAN_H</td>
<td>Pin 4</td>
<td>Pin 4</td>
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<tr>
<td>CAN_L</td>
<td>Pin 5</td>
<td>Pin 5</td>
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<tr>
<td>Do not connect</td>
<td>Pin 1</td>
<td>Pin 1</td>
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</tbody>
</table>

Connect cable shielding to protection earth

![Pin assignment M12 6-pole, A-coded](image)
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: 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.
Pack. unit [pcs]: 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/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 ... +125°C
Surface pressure: max. 40 N/mm²
Fastening torque: max. 100 Ncm

P/N: 400105076
Pack. unit [pcs]: 1
### 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).
## 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
- **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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<tr>
<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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### 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
- **Lead wires**: PE, 2x0.25 mm² + 2x0.34 mm²

<table>
<thead>
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<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

<table>
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<th>P/N</th>
<th>Type</th>
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<tr>
<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

<table>
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<th>P/N</th>
<th>Type</th>
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<tr>
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<td>EEM-33-47</td>
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**Protection classes**
- IP67: Protection class IP67 (DIN EN 60529)
- IP68: Protection class IP68 (DIN EN 60529)

**Very good traits**
- Electromagnetic Compatibility (EMC) and shield systems
- Resistance to oils, coolants and lubricants

**Suitability**
- Suitable for applications in dragchains
- UL - approved

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![Connector Diagrams]

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