TP1 transducers employ the NOVOSTRICTIVE touchless magnetostrictive measuring process for direct, precise, and absolute measurement of linear position, for motion control, positioning and measurement display applications.

This measurement principle uses position markers (magnets) as mechanical input devices. The position markers are available in free-floating or rail-guided versions.

Clamps allow easy and flexible transducer mounting, as well as precise adjustment of the installation position.

The transducers are insensitive to dust, humidity, or oils.

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The transducers are mechanically very robust and resistant to high shock and vibration. The active sensing element is encased in an aluminum housing rated to IP68. This makes for excellent ingress protection from dust, moisture and oils.

The pulse interface allows a fully tolerated processing of both edges of the Start/Stop signal and an usage of up to 3 position markers.

The TP1 also provides an option for highly-dynamic serial DyMoS®- interface. It offers the advantages of bus-type and conventional interfaces, and also optionally calculates and transmits position marker velocity.

Additional interfaces - see separate data sheet.

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<td>• absolute transducer in robust profile design</td>
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<tr>
<td>• NOVOSTRICTIVE non-contacting magnetostrictive measurement principle</td>
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<tr>
<td>• non-contact position detection</td>
</tr>
<tr>
<td>• wear-free, unlimited mechanical life span</td>
</tr>
<tr>
<td>• Start-Stop pulse interface with normed speed of operation 2800 m/s</td>
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<tr>
<td>• Synchronous serial interface</td>
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<tr>
<td>• DyMoS®-interface with data transfer monitoring</td>
</tr>
<tr>
<td>• excellent linearity up to 10 μm</td>
</tr>
<tr>
<td>• resolution up to 0.001 mm regardless of stroke length</td>
</tr>
<tr>
<td>• low temperature coefficient &lt;15 ppm/K</td>
</tr>
<tr>
<td>• insensitive to shock and vibration</td>
</tr>
<tr>
<td>• cable or connector version available</td>
</tr>
<tr>
<td>• protection class IP67 / IP68</td>
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<table>
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<tr>
<th>Description</th>
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<tr>
<td>Housing</td>
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<td>Mounting</td>
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<td>Position marker</td>
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<td>Electrical connections</td>
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<td>Electronic</td>
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</table>
Output connector
Code 101, 102
Cable Code 201, 203, 205
Connector with cable EEM33-86, EEM33-87
Start/Stop-Impulse interface
Synchronous-Serial interface
DyMoS® interface

PIN 1 YE WH + INT + Ck + Ck
PIN 2 GY BN + Start/Stop + Data + Data 1
PIN 3 PK GN - INT - Ck - Ck
PIN 4 RD YE do not connect do not connect - Data 2
PIN 5 GN GY - Start/Stop - Data - Data 1
PIN 6 BU PK supply GND supply GND supply GND
PIN 7 BN BU +24 VDC +24 VDC +24 VDC
PIN 8 WH RD do not connect do not connect + Data 2

Output connector
Code 103
SSI interface Start/Stop-Impulse interface

PIN 1 - Data - Start/Stop
PIN 2 + Data + Start/Stop
PIN 3 + Ck + INT
PIN 4 - Ck - INT
PIN 5 + 24 VDC + 24 VDC
PIN 6 supply GND supply GND
Type designations

<table>
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<tr>
<th>Electrical Data</th>
<th>Start-Stop-Impulse interface</th>
<th>Synchronous-Serial interface</th>
<th>DyMoS interface</th>
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### Electrical Data

#### Electrical measuring range
- TP1-11: 0050 up to 4250 mm
- TP1-21: 0050 up to 4250 mm
- TP1-13: 0050 up to 4250 mm

#### Absolute linearity
- TP1-11: ± 10 µm** up to 1000 mm
- TP1-21: ± 25 µm** up to 2500 mm
- TP1-13: ± 40 µm** up to 4250 mm

#### Tolerance of electrical zero point
- TP1-11: ± 0.5 mm
- TP1-21: ± 0.5 mm
- TP1-13: ± 0.5 mm

#### Output signal
- RS422: Impulse
- RS422: absolute
- RS422: absolute

#### Resolution
- TP1-11: 24, 25 or 26 Bit
- TP1-21: 48 bit synchronous-serial

#### Temperature coefficient
- TP1-11: ± 0.25 ... 1 °C
- TP1-21: ± 0.25 ... 1 °C
- TP1-13: ± 0.25 ... 1 °C

#### Temperature coefficient
- TP1-11: ± 15 (min. 0.01 mm/K)
- TP1-21: ± 15 (min. 0.01 mm/K)
- TP1-13: ± 15 (min. 0.01 mm/K)

#### Operation
- TP1-11: 27 years
- TP1-21: 27 years
- TP1-13: 27 years

#### Life
- TP1-11: mechanically unlimited
- TP1-21: mechanically unlimited
- TP1-13: mechanically unlimited

#### Insulation resistance (500 VDC)
- TP1-11: > 10 MΩ
- TP1-21: > 10 MΩ
- TP1-13: > 10 MΩ

#### Dimensions
- TP1-11: see drawing
- TP1-21: see drawing
- TP1-13: see drawing

#### Mechanical Data

#### Environmental Data

#### Operating temperature range
- TP1-11: -40...+85 °C
- TP1-21: -40...+85 °C
- TP1-13: -40...+85 °C

#### Operating humidity range
- TP1-11: 0...95 (%RH) (no condensation)
- TP1-21: 0...95 (%RH) (no condensation)
- TP1-13: 0...95 (%RH) (no condensation)

#### Life
- TP1-11: mechanically unlimited (with floating position marker)
- TP1-21: mechanically unlimited (with floating position marker)
- TP1-13: mechanically unlimited (with floating position marker)

#### MTTF (ISO 13849-1, parts count method, w/o load)
- TP1-11: 27 years
- TP1-21: 27 years
- TP1-13: 27 years

#### Functional Safety

#### Shock per DIN IEC61762-27
- TP1-11: 100 (11 ms) (single hit)
- TP1-21: 100 (11 ms) (single hit)
- TP1-13: 100 (11 ms) (single hit)

#### Vibration per DIN IEC 682-6 20
- TP1-11: 20 g (5...2000 Hz, Amax=0,75 mm)
- TP1-21: 20 g (5...2000 Hz, Amax=0,75 mm)
- TP1-13: 20 g (5...2000 Hz, Amax=0,75 mm)

#### Protection class per DIN EN 60529
- TP1-11: IP67 with fixed connector
- TP1-21: IP67 with fixed connector
- TP1-13: IP67 with fixed connector

#### Max. traverse speed
- TP1-11: 10 ms⁻¹
- TP1-21: 10 ms⁻¹
- TP1-13: 10 ms⁻¹

#### Max. traverse acceleration
- TP1-11: 200 ms⁻²
- TP1-21: 200 ms⁻²
- TP1-13: 200 ms⁻²

#### CE-Conformity

### Emission

#### RF noise field strength EN 55011, class B
- TP1-11: ESD EN 61000-4-2
- TP1-21: Radiated immunity EN 61000-4-3
- TP1-13: Burst EN 61000-4-4

* Data are extrapolated, internal update rate depending on length.
** Measured with 1 micron resolution. With a higher resolution, the permissible linearity error is increased by the resolution.
**Ordering specifications**

**Preferred types printed in bold**

### Mechanical version

**101: Profile design**

#### Electrical interface

1. Other digital interface
2. Synchronous-Serial interface

#### Output signal other digital interface 1...

1. Impulse interface Start Stop Signal (P) (M)
2. Impulse interface measuring time / pulse width
3. DyMoS interface 48 bit Synchronous-Serial

#### Output signal Synchronous-Serial interface 2...

1. SSI 24 bit
2. SSI 25 bit
3. SSI 26 bit (25 = Alarm; 26 = Parity Even)

#### Impulse interface Start Stop Signal 11...

For 1 up to 3 position marker variable

#### Impulse interface measuring time / pulse width 12...

1. Standard

#### DyMoS interface 48 bit Synchronous-Serial 13...

1. Binary code; resolution 5 μm; (Pos. 1 + Vel.1)
2. Binary code; resolution 5 μm; (Pos. 1 + Pos.2)
3. Binary code; resolution 5 μm; (Pos. 1 + Vel. 1) and (Pos. 2 + Vel. 2) two channel

#### Synchronous-Serial interface 2...

1. Binary code; resolution 5 μm
2. Gray code; resolution 5 μm
3. Binary code; resolution 1 μm
4. Gray code; resolution 1 μm

#### Electrical connection

101: 8-pin round connector IEC130-9
102: 8-pin round connector M 12x1
201: NT standard cable 1 m
203: NT standard cable 3 m
205: NT standard cable 5 m

### Series

<table>
<thead>
<tr>
<th>Series</th>
<th>Electrical measuring range</th>
</tr>
</thead>
<tbody>
<tr>
<td>T/P1</td>
<td>0 8 0 0 1 0 1 2 1 1 1 0 2 2</td>
</tr>
</tbody>
</table>

### Important:

Avoid equalizing currents in the cable shield caused by potential differences.

Twisted pair cable is recommended.

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**Included in delivery**

Mounting clamps Z46 elect. isolating incl. cylinder screws.

**Required accessories**

Floating position marker Z-TP1-P06, Art.No. 005693, Z-TP1-P07, Art.No. 005694.

Guided position marker Z-TP1-P08, Art.No. 005695.

Other position marker on request.

**Recommended accessories**

Straight connector IEC 130-9
8-pin, EEM 33-84,
6-pin, EEM 33-82.

Angled connector IEC 130-9
8-pin, EEM 33-85,
6-pin, EEM 33-94.

PUR-cable with 8-pin female connector M12 x 1,
8 x 0.25 mm², shielded:
2 m length, EEM 33-86,
5 m length, EEM 33-90,
10 m length, EEM 33-92.

PUR-cable with 8-pin female angled connector, M12 x 1,
8 x 0.25 mm², shielded:
2 m length, EEM 33-87,
5 m length, EEM 33-91,
10 m length, EEM 33-93.

Actuating rods Z-TP1-S01...

for position marker Z-TP1-P08.

**Available on request**

Standard cable 10 m
Specific connectors
Other resolutions
SSI two channel,
Incremental, analog and fieldbus interfaces