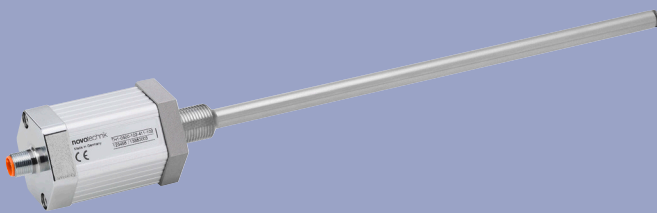


## NOVOSTRICTIVE Position Transducer up to 4250 mm touchless absolute

Series TH1  
with SSI, Start-Stop or  
DyMoS-Interface



### Special features

- rod style transducer
- operating pressure up to 350 bar
- NOVOSTRICTIVE magnetostrictive touchless technology
- wear-free - unlimited mechanical life
- Synchronous Serial Interface - 24/25 bit, binary/gray code
- Start-Stop pulse interface - standardized to 2800 m/s
- DyMoS-interface with data transfer monitoring
- excellent linearity up to 10  $\mu\text{m}$
- resolution up to 1  $\mu\text{m}$  regardless of stroke length
- low temperature coefficient <15 ppm/K
- insensitive to shock and vibration
- cable or connector version available
- protection class IP67 / IP68

TH1 linear transducers employ NOVOSTRICTIVE touchless magnetostrictive technology for direct, precise and absolute measurement of linear position, for use in control and display applications.

The TH1 uses a ring-shaped magnetic position marker, which moves along the sensing rod as a free-floating element. This non-contact coupling is free of wear, providing unlimited mechanical lifetime, and allows the position marker to be moved at any velocity. Stroke lengths of up to 4250 mm are available.

The temperature coefficient of the transducer is extremely low, due to careful attention to design and selection of materials.

The TH1 is highly resistant to shock and vibration. It is designed for integration into the high-pressure areas of hydraulic and pneumatic cylinder. Optional magnetic position markers help ensure easy integration of the transducer.

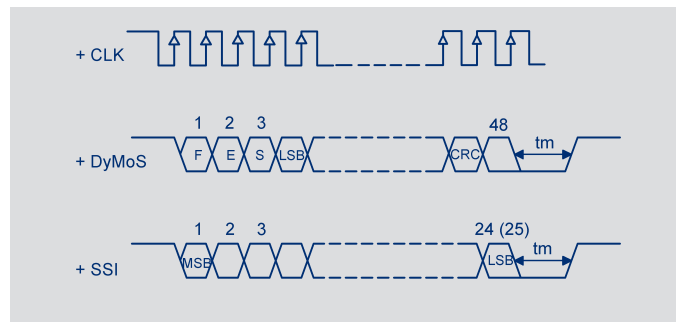
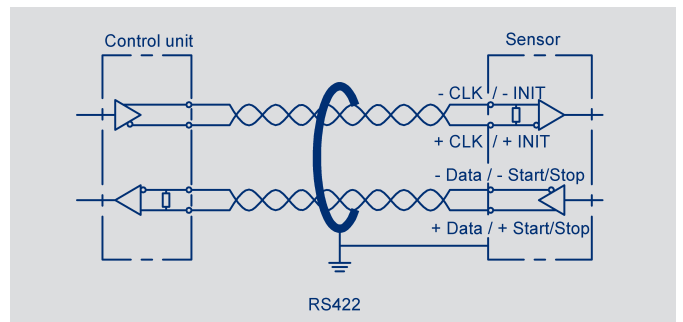
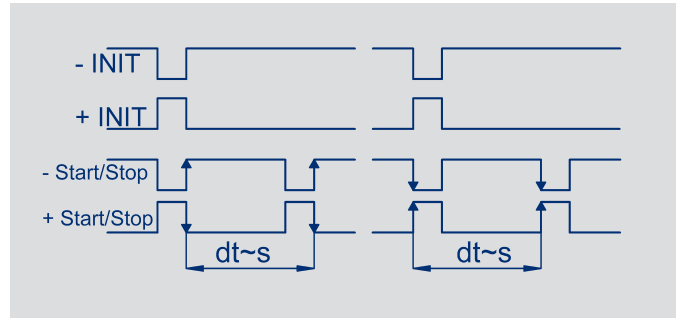
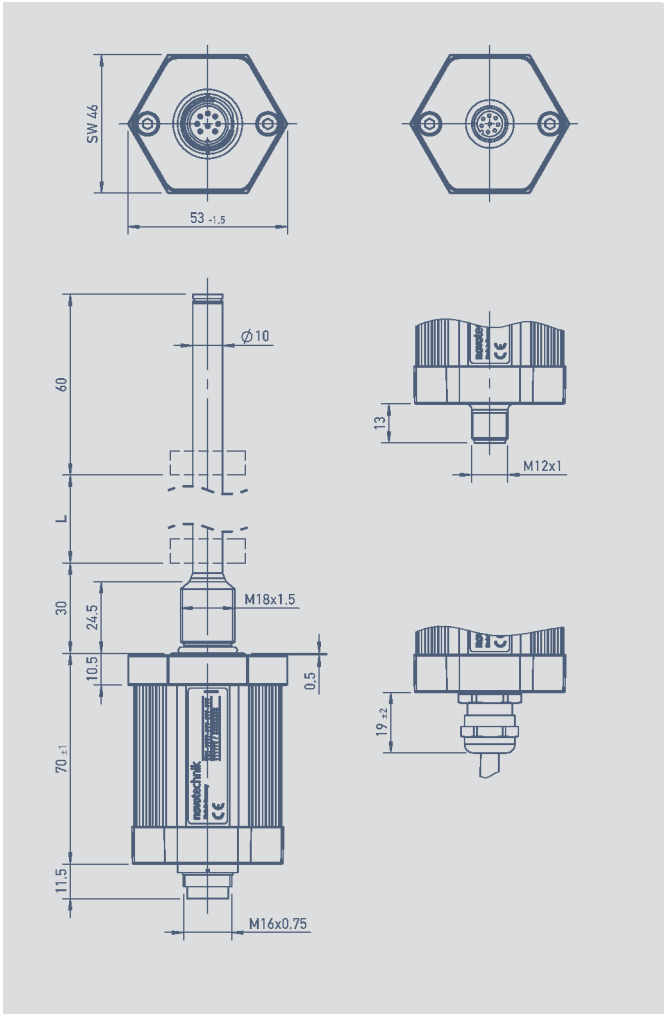
A sophisticated ASIC in the transducer provides for standard absolute output signals.

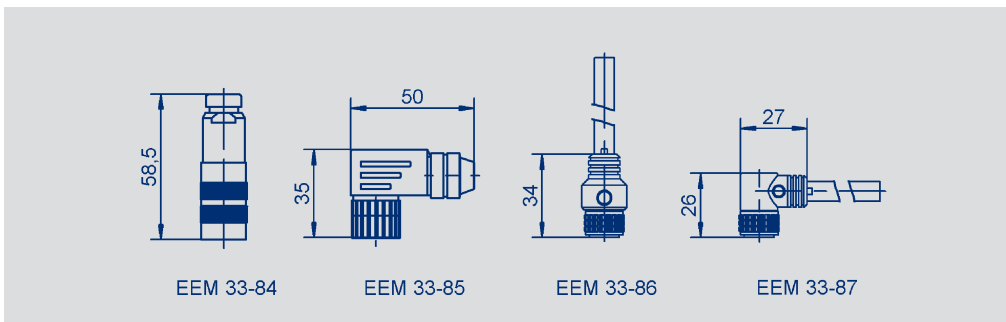
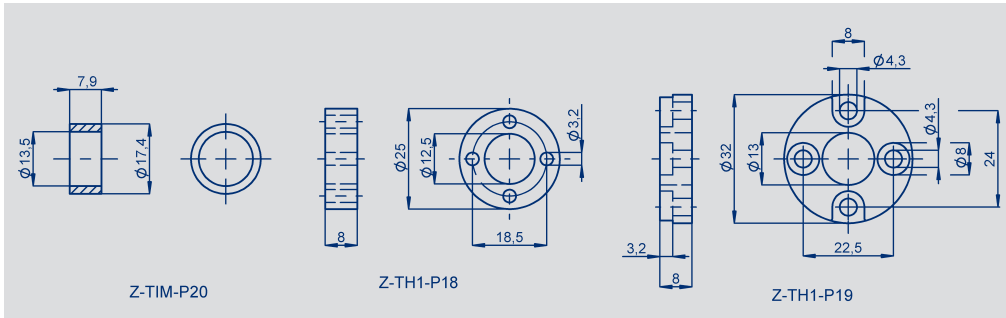
The pulse interface allows a fully tolerated processing of both edges of the Start/Stop signal and an usage of up to 3 position markers.

DyMos is a high-dynamic serial interface with data transfer monitoring. It combines the advantages of conventional and bus-type interfaces. DyMoS can also provide a calculated velocity value.

For TH1 transducers with analog interfaces, see separate data sheet.

Description	
Housing	Aluminium, anodized. Rod: stainless steel
Mounting	Bushing M18x1.5 for screw plug hole per ISO6149
Position marker	Ring position marker
Measuring principle	NOVOSTRICTIVE, touchless magnetostrictive
Electrical connections	8-pin round connector, shielded, M12 x 1 8-pin round connector, shielded, IEC130-9 6-pin round connector, shielded, IEC IEC130-9 8-wire PUR / PVC-cable, 8 x 0.25 mm <sup>2</sup> , shielded: 1 m, 3 m or 5 m length
Electronics	SMD with ASIC, integrated Connector shield is connected to the sensor housing. Sensor housing is capacitively decoupled from the electronics





Output connector Code 101, 102	Cable Code 201, 203, 205	Connector with cable EEM33-86, EEM33-87	Start-Stop-Impulse interface	SSI interface	DyMoS interface
PIN 1	YE	WH	+ INIT	+ CLK	+ CLK
PIN 2	GY	BN	+ Start/Stop	+ DATA	+ DATA 1
PIN 3	PK	GN	- INIT	- CLK	- CLK
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	GND	GND	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	+ CLK	+ INT
PIN 4	- CLK	- INT
PIN 5	+ 24 VDC	+ 24 VDC
PIN 6	GND	GND

Type designations	TH1 - _ _ _ _ _ - 1 _ _ _ _ _ Start-Stop-Impulse interface	TH1 - _ _ _ _ _ - 2 _ _ _ _ _ Synchronous-Serial interface	TH1 - _ _ _ _ _ - 13 _ _ _ _ _ DyMoS interface
<b>Mechanical Data</b>			
Dimensions	see drawing		
<b>Electrical Data</b>			
Electrical measuring range (dimension B)	0050 up to 4250 0050 up to 1000 in 25 mm steps, 1100 up to 2000 in 100 mm steps, 2250 up to 4250 in 250 mm steps; Other lengths on request.		
Absolute linearity	$\leq \pm 50 \mu\text{m}$	$\leq \pm 10 \mu\text{m}$ ** up to 1000 mm $\leq \pm 25 \mu\text{m}$ ** up to 2500 mm $\leq \pm 40 \mu\text{m}$ ** up to 4250 mm	$\leq \pm 10 \mu\text{m}$ ** up to 1000 mm $\leq \pm 25 \mu\text{m}$ ** up to 2500 mm $\leq \pm 40 \mu\text{m}$ ** up to 4250 mm
Tolerance of electrical zero point	$\pm 0.5$		
Output signal	RS422 Impulse	RS22 absolut 24, 25 or 26 bit	RS422 absolut 48 bit synchronous-serial
Resolution	standardized up to 2800 m/s (Other resolutions on request)	1 or 5 $\mu\text{m}$ (Other resolutions on request)	5 $\mu\text{m}$ (Other resolutions on request)
Reproducibility	$\leq 6$		
Hysteresis	$\leq 4$		
Supply voltage $U_b$	24 (13 ... 34)		
Supply voltage ripple	$\leq 10$		
Current consumption (w/o load)	$\leq 100$		
Output update rate max. *	16		
Temperature coefficient	$\leq 15$ (min. 0.01 mm/K)		
Overvoltage protection	40 (permanent)		
Polarity protection	up to $U_{\text{max}}$		
Short circuit protection	7 (permanent)		
Insulation resistance (500 VDC)	$\geq 10$		
<b>Environmental Data</b>			
Temperature range	-40 ... +85		
Storage temperature range	-40 ... +100		
Operating humidity range	0...95 (non-condensing)		
Shock (IEC 60068-2-27)	100 (11 ms)		
Vibration (IEC 60068-2-6)	20 (5...2000 Hz, $A_{\text{max}} = 0.75 \text{ mm}$ )		
Life	mechanically unlimited		
MTTF (ISO 13849-1, parts count method, w/o load)	32		
Functional safety	When using our products in safety-related systems please contact us		
Protection class (DIN EN 60529)	IP67 with fastened connector IP68 with cable connection		
Pressure rating			
Working pressure	$\leq 350$		bar
Pressure peaks	$\leq 600$		bar
Burst pressure	$> 700$		bar
Max. operating speed with valid output signal	10		m/s
Max. operating acceleration with valid output signal	200		$\text{ms}^{-2}$
EMC compatibility	EN 61000-4-2 electrostatic discharges (ESD) 4 kV, 8 kV EN 61000-4-3 electromagnetic fields: 10 V/m EN 61000-4-4 electrical fast transients (Burst) 1 kV EN 61000-4-6 conducted disturbances, induced by RF fields 10 V/m eff. EN 61000-4-8 Power frequency magnetic fields 3 A/m EN 55016-2-3 Radiated disturbances class B		

\* 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

### Electrical interface

**1: Other digital interface**

**2: Synchronous-Serial interface**

Incremental, analog and fieldbus interface on request

### Output signal digital interface 1 \_ \_

**1: Interface Start-Stop Signal**

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

7: SSI 26 bit (25 = Alarm; 26 = Parity Even)

### Impulse interface Start-Stop Signal 11\_

**4: 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

4: Binary code; resolution 1 µm

5: Gray code; resolution 1 µm

### Electrical connection

101: 8-pin round connector IEC130-9

**102: 8-pin round connector M 12x1**

103: 6-pin round connector IEC130-9

**201: NT standard cable 1 m**

203: NT standard cable 3 m

205: NT standard cable 5 m

Other cable lengths an assembled connectors on request

**T H 1 - 0 8 0 0 - 1 0 2 - 2 1 1 - 1 0 2**

Series

Electrical measuring range

Standard lengths

0050 up to 4250 mm

Mechanical version

**102: Screw flange M 18x1.5 zero point at 30 mm**

104: Screw flange M 18x1,5 zero point at 51 mm

106: like 102, but with femal thread M4x6 at the rod end and additional length 7.5 mm

108: like 104, but with femal thread M4x6 at the rod end and additional length 7.5 mm

Other mechanical configurations e.g. screw flange 3/4" 16UNF on request

Required accessories	Ring position marker (one required)				
	Z-TH1-P18, P/N 005697				
	Z-TH1-P19, P/N 005698				
	Z-TIM-P20, P/N 005699. Other position marker on request.				
Recommended accessories	Mating female connector straight, IEC 130-9	Mating female connector angled, IEC130-9	Mating cable set - female connector M12x1, 8-pin, straight, with molded PUR-cable, shielded, 8x0,25 mm2, IP67, open-ended	Mating cable set - female connector 12x1, 8-pin, angled, with molded PUR-cable, shielded, 8x0,25 mm2, IP67, open-ended	Mounting nut M18x1.5-A2
	8-pin, EEM 33-84, P/N. 005627	8-pin, EEM 33-85, P/N 005628	2 m length, EEM 33-86, P/N 005629	2 m length, EEM 33-87, P/N 005630	Z-TH1-M01, P/N 056090
	6-pin, EEM 33-82, P/N 005639	6-pin, EEM 33-94, P/N 005648	5 m length, EEM 33-90, P/N 005635	5 m length, EEM 33-91, P/N 005636	
			10 m length, EEM 33-92, P/N 005637	10 m length, EEM 33-93, P/N 005638	

**Important:** Minimize ground loop currents in the cable shield. Shielded Twisted Pair (STP) cable is recommended.