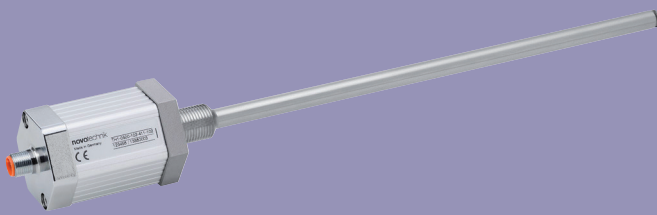


NOVOSTRICTIVE Position Transducer up to 4250 mm touchless absolute

Series TH1
with analog interface



Special features

- rod style transducer
- operating pressure up to 350 bar
- NOVOSTRICTIVE magnetostrictive touchless technology
- wear-free - unlimited mechanical life
- excellent precision - linearity $< \pm 0.02$ (min. $\pm 50 \mu\text{m}$)**, reproducibility $< 0.03 \%$
- 16 bit resolution
- field-teachable zero and limit values
- standard voltage or current output signals
- low temperature coefficient $< 30 \text{ ppm/K}$
- 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.

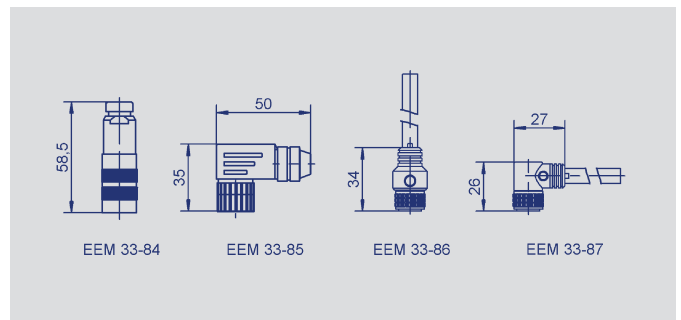
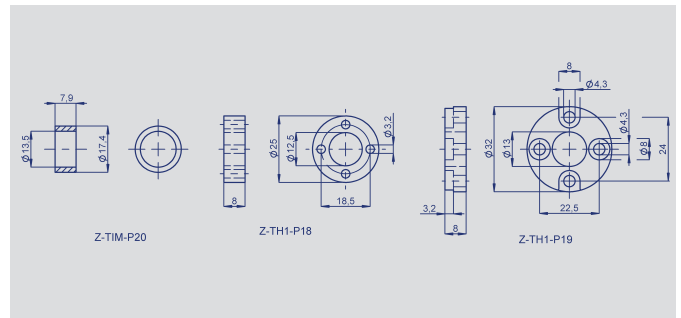
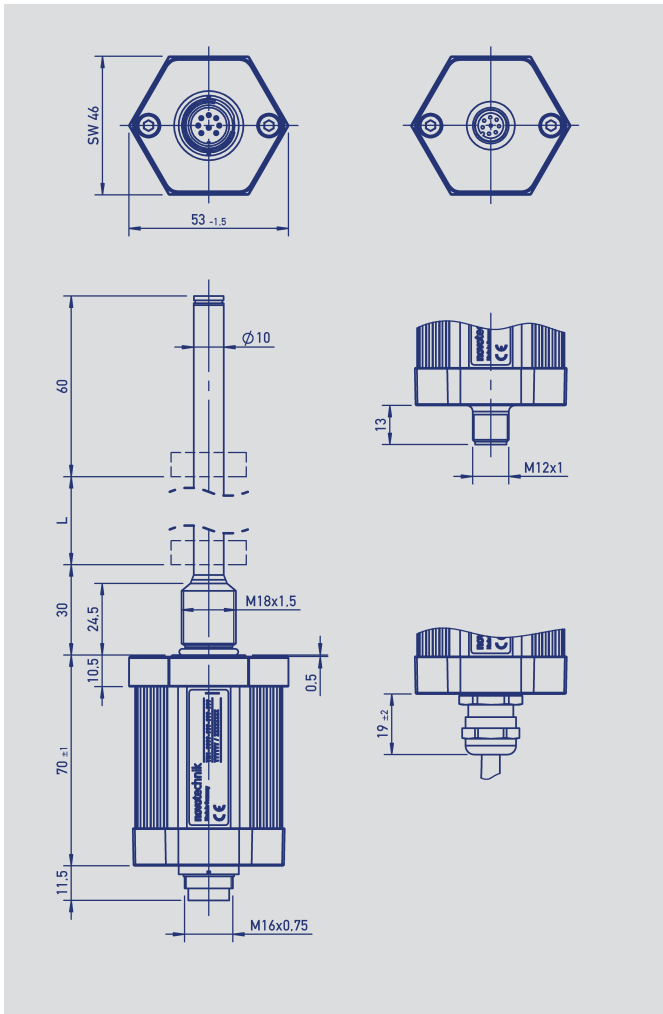
The TH1 is highly resistant to shock and vibration. It is designed for integration into the high-pressure areas of hydraulic and pneumatic cylinder. Optional magnetic position markers help ensure easy integration of the transducer.

A sophisticated ASIC in the transducer provides for standard absolute analog voltage or current output signals.

TH1 transducers with analog outputs offer the ability to set the zero and limit (max) values through a teach-in feature. This is performed through the electrical connection and no custom equipment is needed.

For TH1 transducers with digital 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, $8 \times 0.25 \text{ mm}^2$, 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	Analog current	Analog voltage
PIN 1	YE	WH	0(4) ... 20 mA	do not connect
PIN 2	GY	BN	signal GND	signal GND
PIN 3	PK	GN	do not connect	+10 ... 0(-10) VDC
PIN 4	RD	YE	DIAG *	DIAG *
PIN 5	GN	GY	do not connect	0(-10) ... +10 VDC
PIN 6	BU	PK	supply GND	supply GND
PIN 7	BN	BU	+24 VDC	+24 VDC
PIN 8	WH	RD	PROG *	PROG *
Output connector Code 103	Analog voltage	Analog current	*) connect only for Teach-In function (see manual).	
PIN 1	0...10 VDC	0 (4)...20 mA		
PIN 2	signal GND	signal GND		
PIN 3	10...0 VDC	do not connect		
PIN 4	supply GND	supply GND		
PIN 5	+24 VDC	+ 24 VDC		
PIN 6	supply GND	supply GND		

Type designations	TH1 - _ _ _ _ - _ _ _ _ - 41 _ - _ _ _ _ Analog voltage	TH1 - _ _ _ _ - _ _ _ _ - 42 _ - _ _ _ _ Analog current
Mechanical Data		
Dimensions	see drawing	
Electrical Data		
Electrical measuring range (dimension L)	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.	mm
Absolute linearity	$\leq \pm 0.02$ (min. $\pm 50 \mu\text{m}$) **	\pm % FS
Tolerance of electrical zero point	± 0.5 (min. 2 x reproducibility)	mm
Output signal	Voltage 0.1 ... 10 VDC (load $\geq 5 \text{ k}\Omega$)	Current 0.1 ... 20 mA (burden max. 500 Ω) 4 ... 20 mA (burden max. 500 Ω)
Resolution	16	bit
Reproducibility	≤ 0.03	% FS
Hysteresis	≤ 0.01	% FS
Supply voltage U_b	24 (19 ... 30)	VDC
Supply voltage ripple	≤ 10	% V_{ss}
Current consumption (w/o load)	≤ 100	mA
Output update rate max. *	16	kHz
Temperature coefficient	≤ 30 (min. 0.01 mm/K)	ppm/K
Overvoltage protection	40 (temporary / 1 min.)	VDC
Polarity protection	up to U_{max}	VDC
Short circuit protection	up to U_{max}	VDC
Insulation resistance (500 VDC)	≥ 10	$M\Omega$
Environmental Data		
Temperature range	-40 ... +85	$^{\circ}\text{C}$
Storage temperature range	-40 ... +100	$^{\circ}\text{C}$
Operating humidity range	0...95 (non-condensing)	% R.H.
Life	mechanically unlimited	
MTTF (ISO 13849-1, parts count method, w/o load)	28	years
Functional safety	When using our products in safety-related systems please contact us	
Shock (IEC 60068-2-27)	100 (11 ms)	g
Vibration (IEC 60068-2-6)	20 (5...2000 Hz, $A_{max} = 0.75 \text{ mm}$)	g
Protection class (DIN EN 60529)	IP67 with fastened connector IP68 with cable connection	
Pressure rating		
Working pressure	≤ 350	bar
Pressure peaks	≤ 600	bar
Burst pressure	> 700	bar
Max. operating speed with valid output signal	10	m/s
Max. operating acceleration with valid output signal	200	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.

** Valid for channel 1. Additional offset and gradient tolerances for channel 2. Measured with standard position marker Z-TH1-P18 or Z-TH1-P19.

Ordering specifications

Preferred types printed in bold

Electrical interface 4: Analog interface

Output signal analog interface 4 _ _

- 1: Voltage output
- 2: Current output

Analog interfaces voltage output 41_

- 1: 0 V ...10 V and 10 V ...0 V

Analog interfaces current output 42_

- 1: 0 mA... 20 mA
- 2: 20 mA... 0 mA
- 3: 4 mA... 20 mA
- 4: 20mA... 4 mA

Digital, incremental and fieldbus interface on request

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 and assembled connectors on request

T H 1 - 0 8 0 0 - 1 0 2 - 4 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 female thread M4x6 at the rod end and additional length 7.5 mm
108: like 104, but with female 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 mm ² , IP67, open-ended	Mating cable set - female connector M12x1, 8-pin, angled, with molded PUR-cable, shielded, 8x0,25 mm ² , 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.