novotechnik TM1 Linear Displacement Sensor User Manual

Contents

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novotechnik TM1 Linear Displacement Sensor

General description

This device is a magnetostrictive transducer for direct, precise and absolute measurement of a linear position in control, regulation and measuring applications.

Safety instructions

Intended conditions of use
The transducer is intended to be installed in a machine or system. Together with a controller (e.g. PLC) it comprises a position measuring system and may only be used for this purpose. Unauthorized modifications, improper usage or non-observance of the instructions for installation will result in the loss of warranty and and voids all manufacturer liability claims.

Installation and startup
The transducer must be installed only by qualified personnel in consideration of all relevant safety regulations. All necessary safety measures to protect personnel and property in case of a transducer defect or failure must be taken before startup.

- Strong magnetic or electromagnetic fields in close proximity of the transducer may lead to faulty signals!

Check connections
Improper connections and overvoltage can damage the transducer. Please always check the connections carefully before turning on the system.

Turning on the system
The system may execute uncontrolled movements during first turning-on mainly when the transducer is part of a control system whose parameters have not yet been set. Therefore make sure that hereof no dangers for personnel and property can result.

Check output values
After replacement of a transducer, it is advisable to verify the output values for start- and end position of the position marker in manual mode (transducers are subject to modification or manufacturing tolerances).

Check functionality
The functionality of the transducer system and all its associated components should be regularly checked and recorded.

Failure malfunction
If the transducer system doesn‘t operate properly, it should be taken out of service and protected against unauthorized use.

Limitations for application
Our products are regularly not approved for aeronautic or aerospace applications and are not allowed to be used in nuclear or military, in particular ABC-relevant applications. For more information see our Terms and Conditions.

Disposal

- Observe the national regulations for disposal.

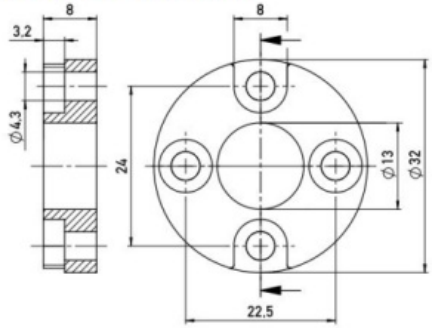
Instructions for installation

All relevant dimensions see drawing (**https://www.novotechnik.de/en/downloads/cad-data**).

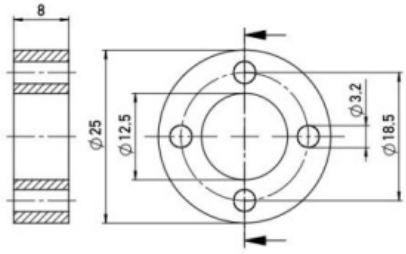
Bore diameter of the piston rod
The bore in the piston rod has to be laid out depending on the pressure and the operating speed. The recommended bore diameter amounts to Dk 12,7 mm. The end of the rod has to be protected against wear. The position marker may not touch the rod. When the transducer will be mounted in a cylinder of magnetizable material, it‘s important that the axial distance between the position marker at the zero point and the cylinder is min. 15 mm.

Position marker
For direct stroke measuring in a cylinder the position marker has to be fixed directly on the cylinder‘s piston bottom:- Z-TH1-P18, -P19, PD-19, P-25: fixed with 2 screws M3 or M4 (depending on the position marker), Fastening torque for M4 screws max. 1 Nm. Alternatively the position marker can also be fixed by a threaded ring or by a press-fit-connection. – Z-TH1-P30: with non magnetic spring washer and circlip.For the mounting of the position marker non-magnetic material (e.g. stainless steel, brass, aluminum, plastic) should preferably be used. Mount a non-magnetizable spacer of min. 5 mm thickness between position marker and cylinder‘s piston bottom, if necessary.

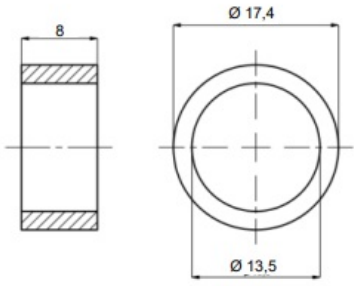
Z-TH1-P19 400005698



Z-TH1-P18 40005697



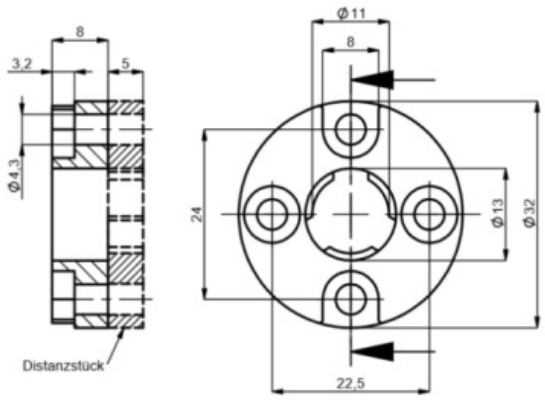
Z-TH1-P30 400106139



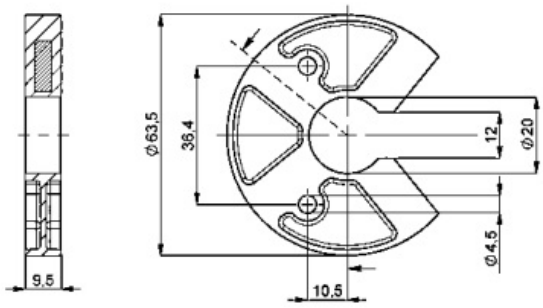
Z-TH1-PD19 400105076
mit Distanzstück / *with spacer*

Z-TH1-P25 400105076
Mit abweichendem Nullpunkt siehe Kapitel 5.1/5.2 /
With deviating zero point see chapter 5.1/5.2

Z-TH1-PD19 400105076
mit Distanzstück / *with spacer*



Z-TH1-P25 400105076
Mit abweichendem Nullpunkt siehe Kapitel 5.1/5.2 /
With deviating zero point see chapter 5.1/5.2



Displacement of the position marker

Position marker	*Radial displacement*	*Signal change*
Z-TH1-**P18**	0 … 1,25 mm	40 µm/mm (< Auflösung / *resolution*)
Z-TH1-**P19**, Z-TH1-**PD19,** Z-TH1-**P 30**	0 … 1,5 mm	40 µm/mm (< Auflösung / *resolution*)
Z-TH1-**P25**	0 … 4 mm	50 µm/mm (max. 200 µm @ 5 mm)

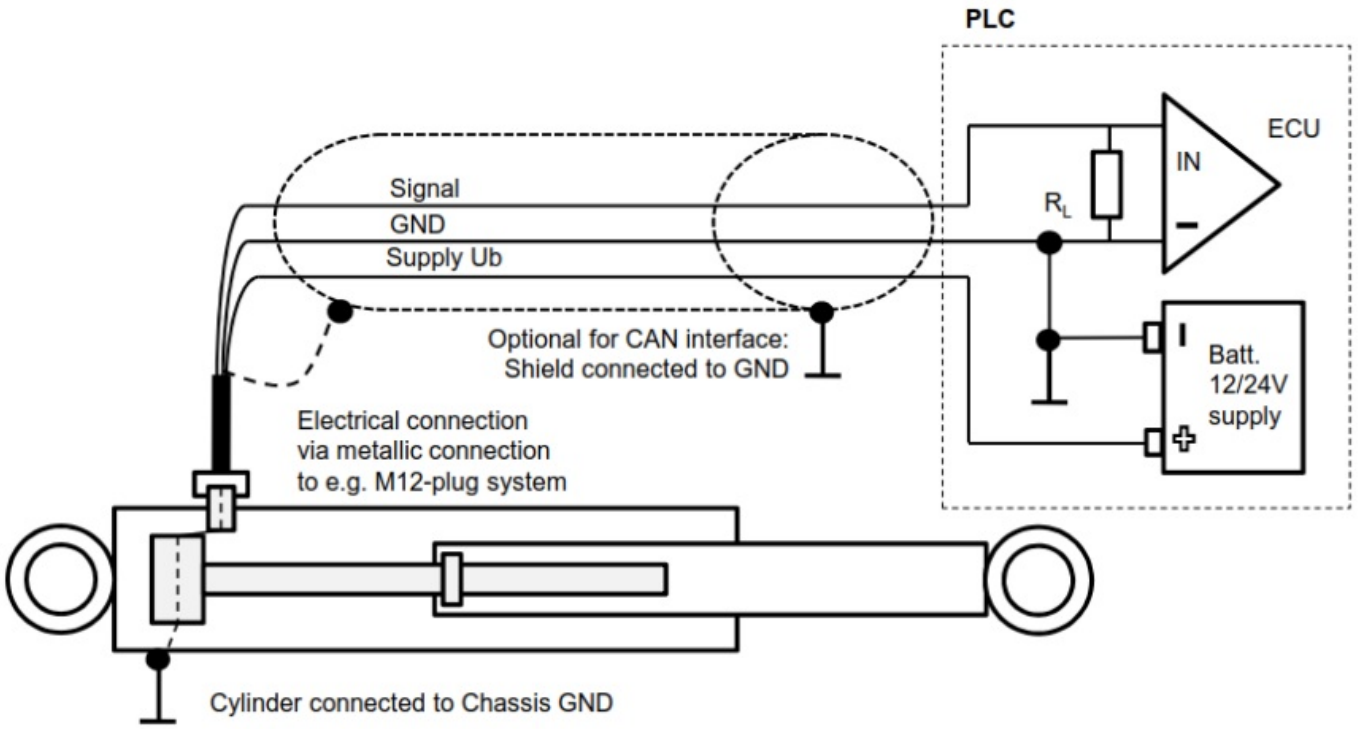
General information
For horizontal mounting of the transducer with an electrical range longer than 1000 mm it is advisable to support or attach the rod at the end (models with internal thread on rod end recommended).For the area of the cable and lead wire please take care that enough space is available. The minimum bending radius must be observed and sharp edges must be avoided.

Welding
When welding on the cylinder or adjacent components, the following must be observed to avoid any damage to the sensor or seals by welding current:

- preferably, the transducer should be removed before welding
- with a built-in sensor, all sensor connections must be disconnected during welding and the grounding connection of the welding unit must not be attached to the cylinder or the piston rod

EMC, Machine ground, and cable shielding

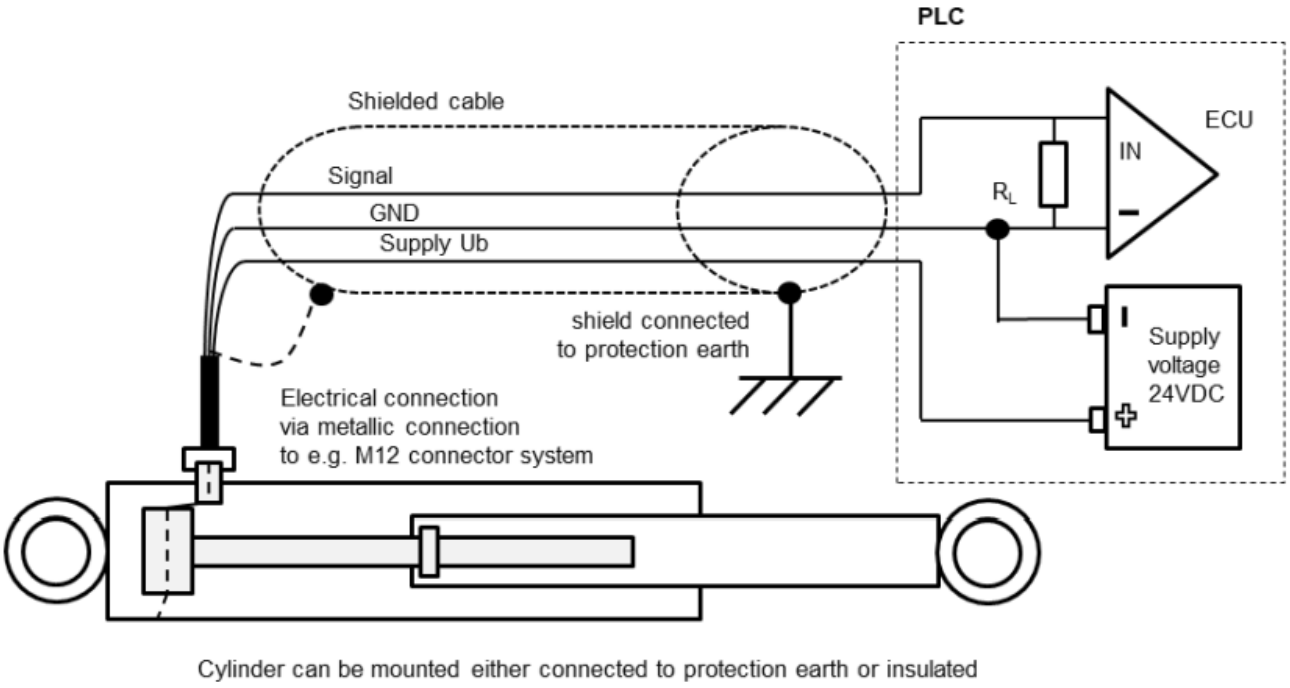
Mobile hydraulics with installation in the cylinder
The EMC measurements were conducted in a reference cylinder. The EMC properties can however deviate when using different cylinders. In critical applications, it is therefore recommended to submit the complete system to its own EMC testing. For correct operation and to compensate for potential differences, the cylinder must be connected to the machine ground. This is usually given by the mechanical contact of the cylinder with the other parts of the machine. If the cylinder is insulated and connected to the machine, a separate grounding must be ensured e.g. by a grounding strap. The built-in transducer is shielded sufficiently by the metallic hydraulic cylinder. Therefore, the transducer does not provide a separate shielding via the connector or cable outlet. CAN interface: If a shielded cable is used between the transducer and the controller, the cable shield must be connected to GND.



Installation in a cylinder with CE conformity accord. to EN 61000-6-2/-3

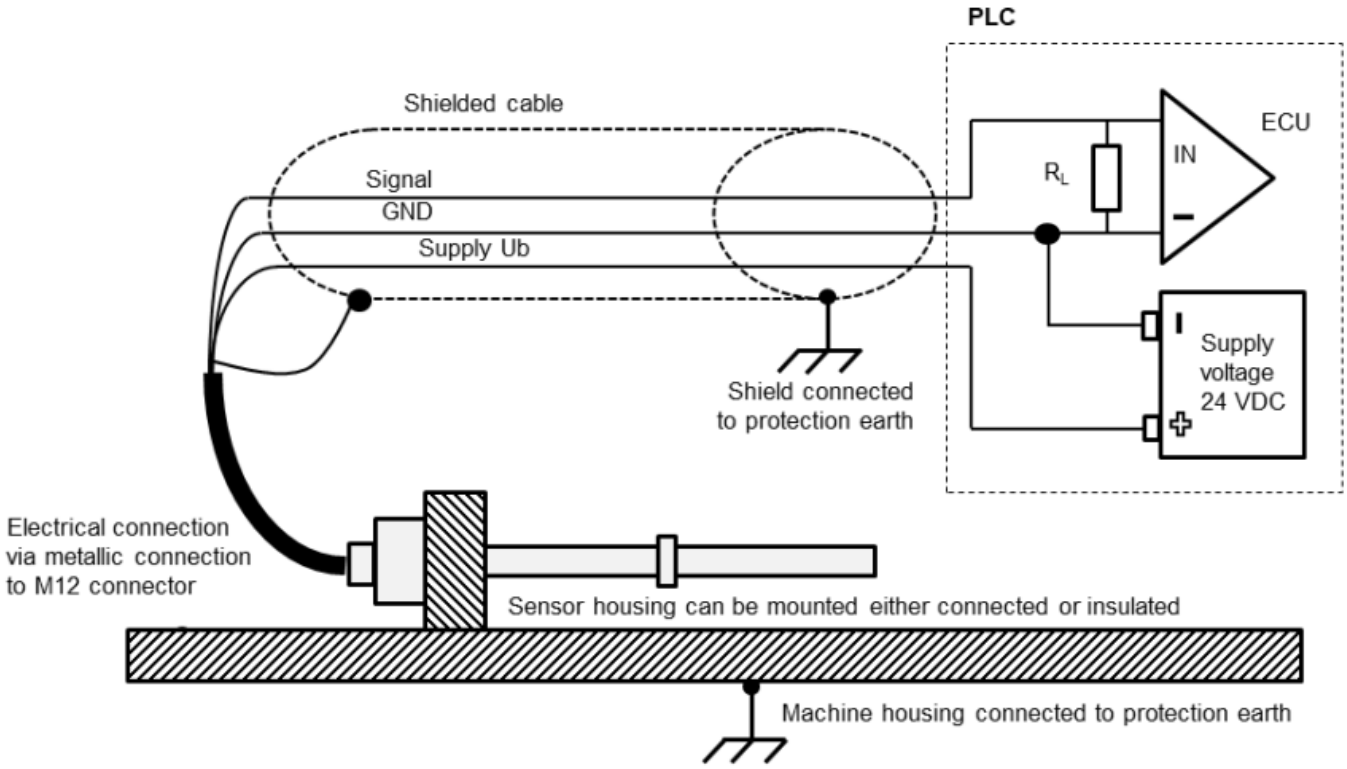
- Model: TM1 – _ _ _ _- _ _ _ – _ _ _ – 1_ _ TM1 – _ _ _ _- _ _ _ – _ _ _ – 4_ _

The EMC measurements were conducted in a reference cylinder. The EMC properties can however deviate when using different cylinders. In critical applications it is therefore recommended to submit the complete system to an own EMC testing. Transducer and controller must be connected by using a shielded cable. The cable shield must be connected to protection earth (shielding: copper filament braided, 85% coverage, cable length <30 m).



Application outside of a cylinder with CE conformity accord. to EN 61000-6-2/-3

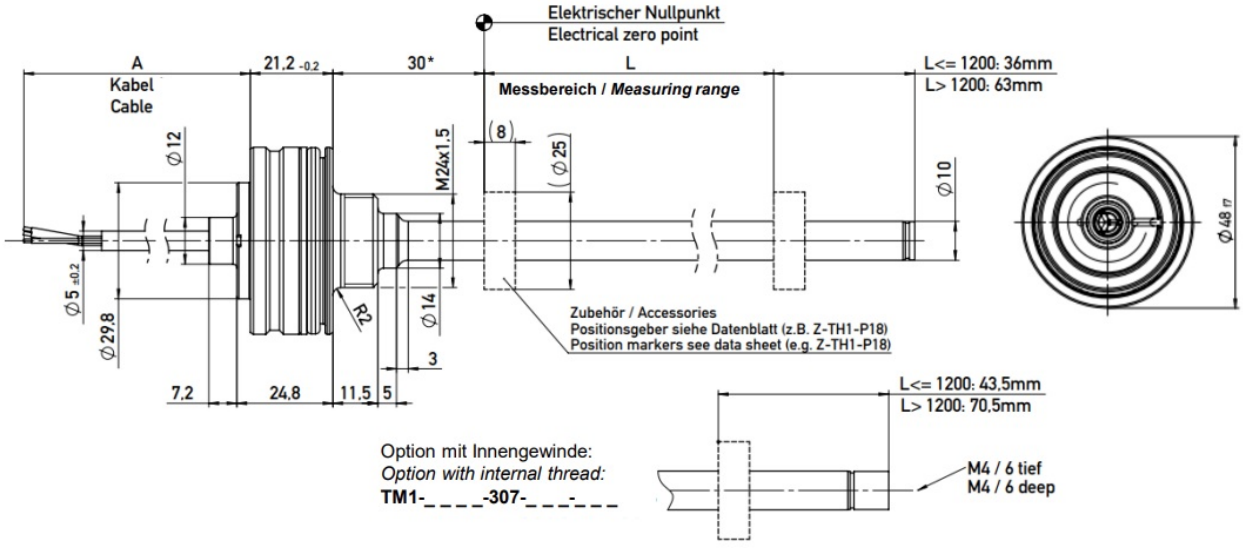
Model: TM1 – _ _ _ _- _ _ _ – _ _ _ – 1_ _ Transducer and controller must be connected by using a shielded cable. The cable shield must be connected to protection earth (shielding: copper filament braided, 85% coverage, cable length <30 m).



Installation

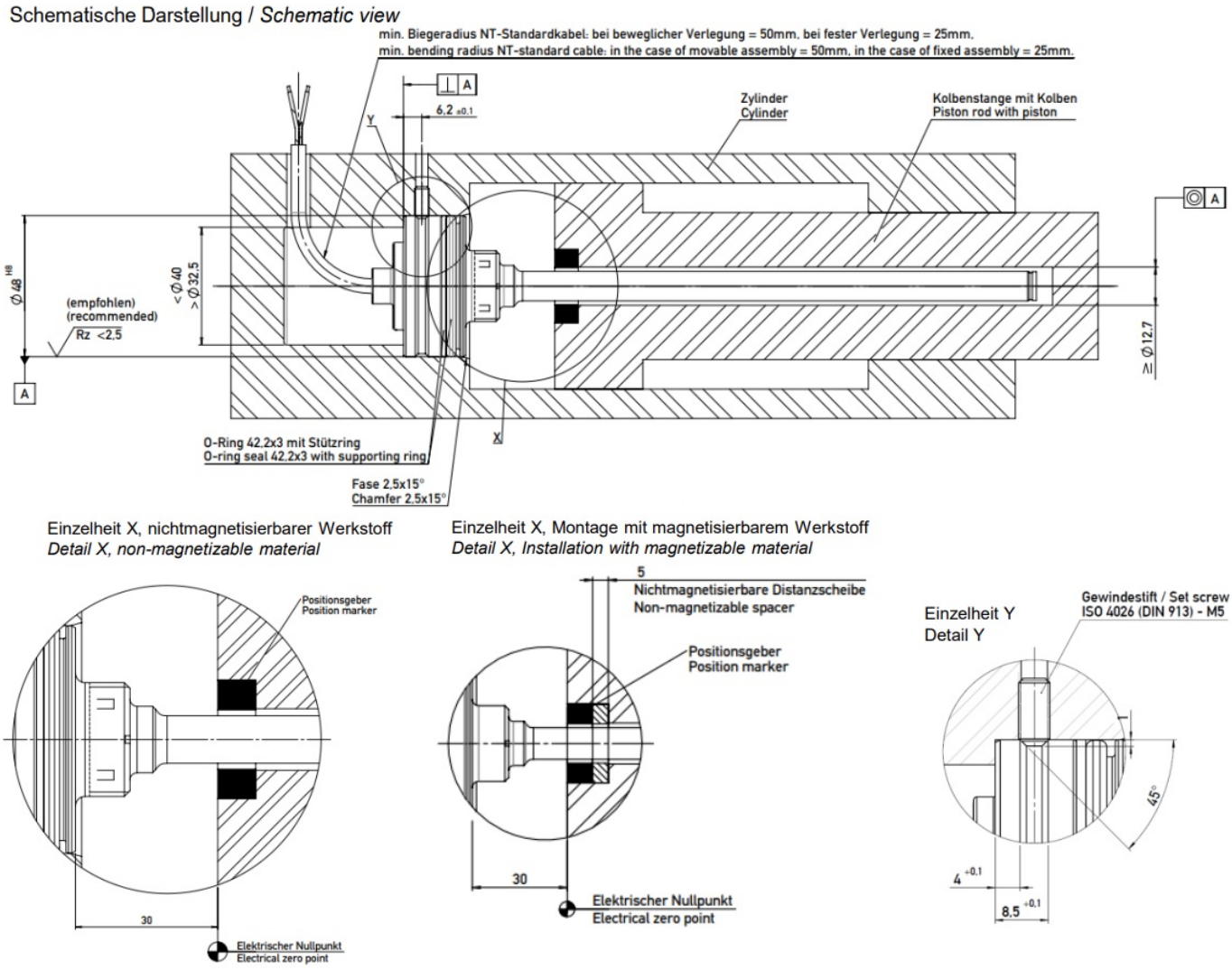
Plug-in flange (TM1-_ _ _ _-305-_ _ _-_ _ _)

- The transducer with Ø 48 mm flange has to be mounted in a fitting bore Ø 48 H8.
- The sealing between the flange and the cylinder is realized with an O-ring and a support ring (included in delivery).
- The flange of the transducer is to be fixed with M5 set screws.
    - Nur bei Positionsgeber Z-TH1-P25: Elektrischer Nullpunkt: 29,25 mm
    - Only with position marker Z-TH1-P25: Electrical zero point: 29.25 mm

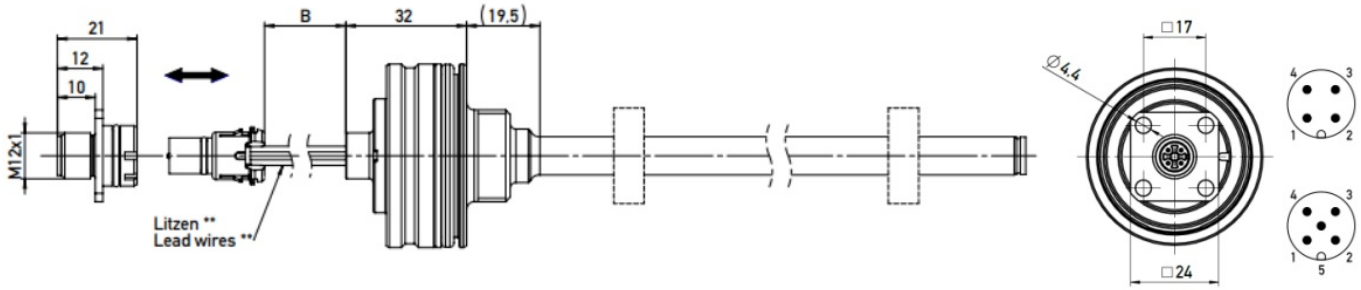


Installation example

- Schematic view

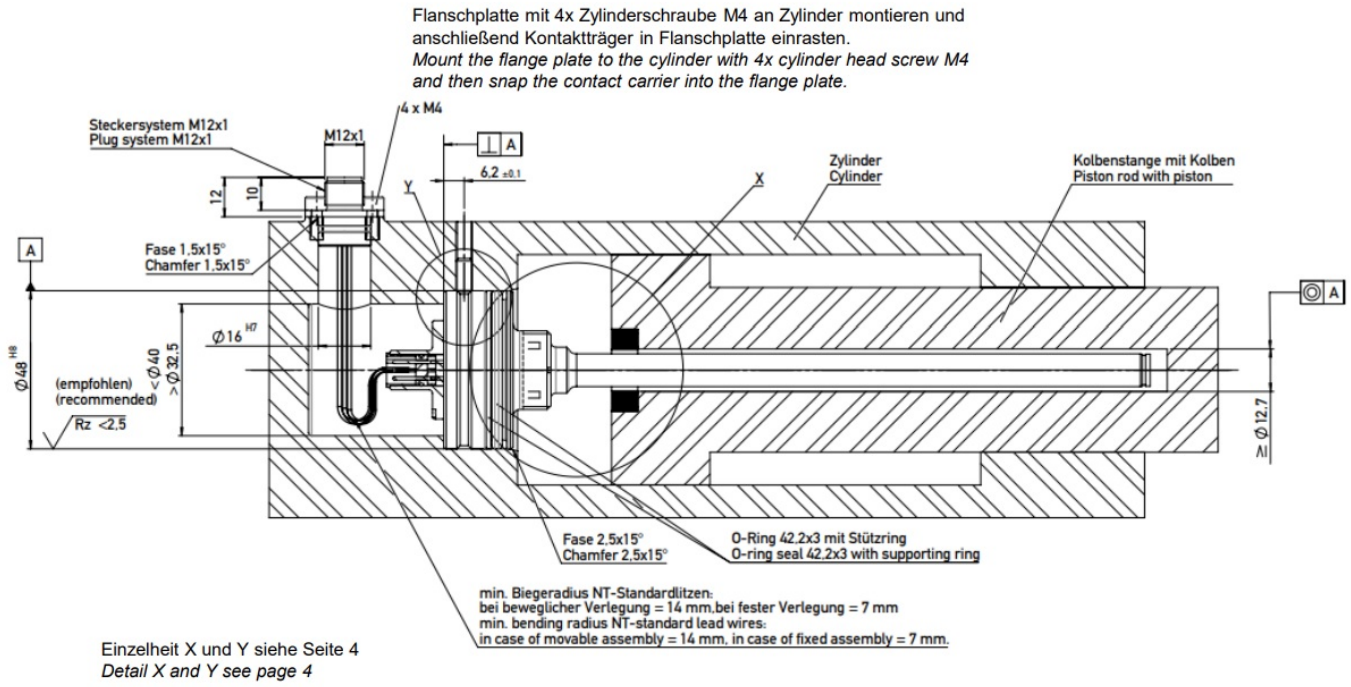


Plug system M12x1 (TM1-_ _ _ _-305-_ _ _-4_ _)

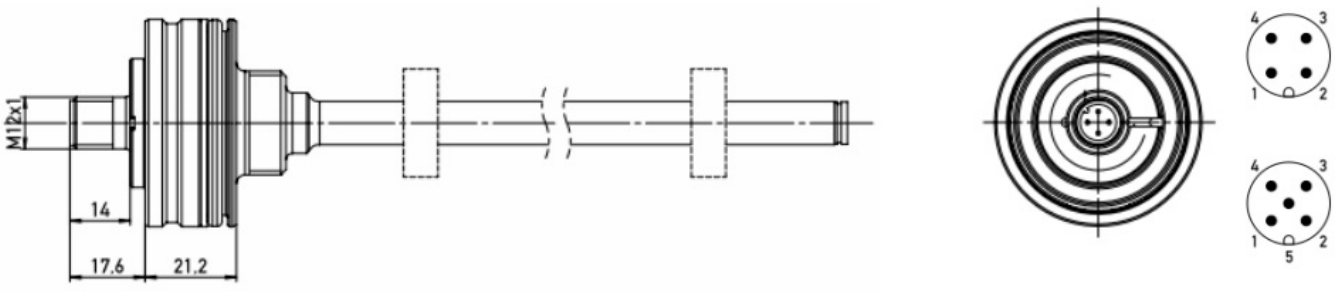


Installation example

- Schematic view



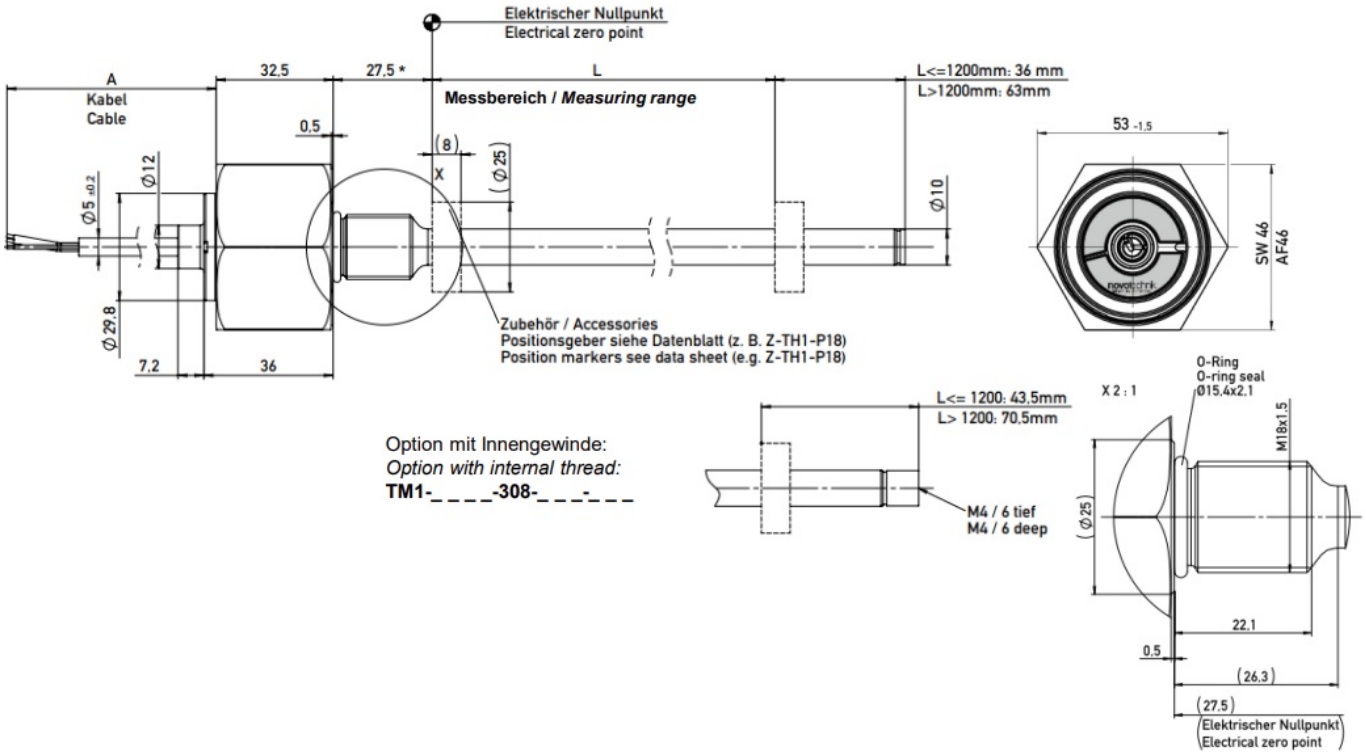
Abgang Stecker M12x1 / Plug M12x1 (TM1-_ _ _ _-305-_ _ _-1_ _)



- Mating connector: max. tightening torque 0.5 Nm
- Models with plugs are suitable for installation in or outside of cylinders (EMC, grounding and cable shielding see chapter 4).

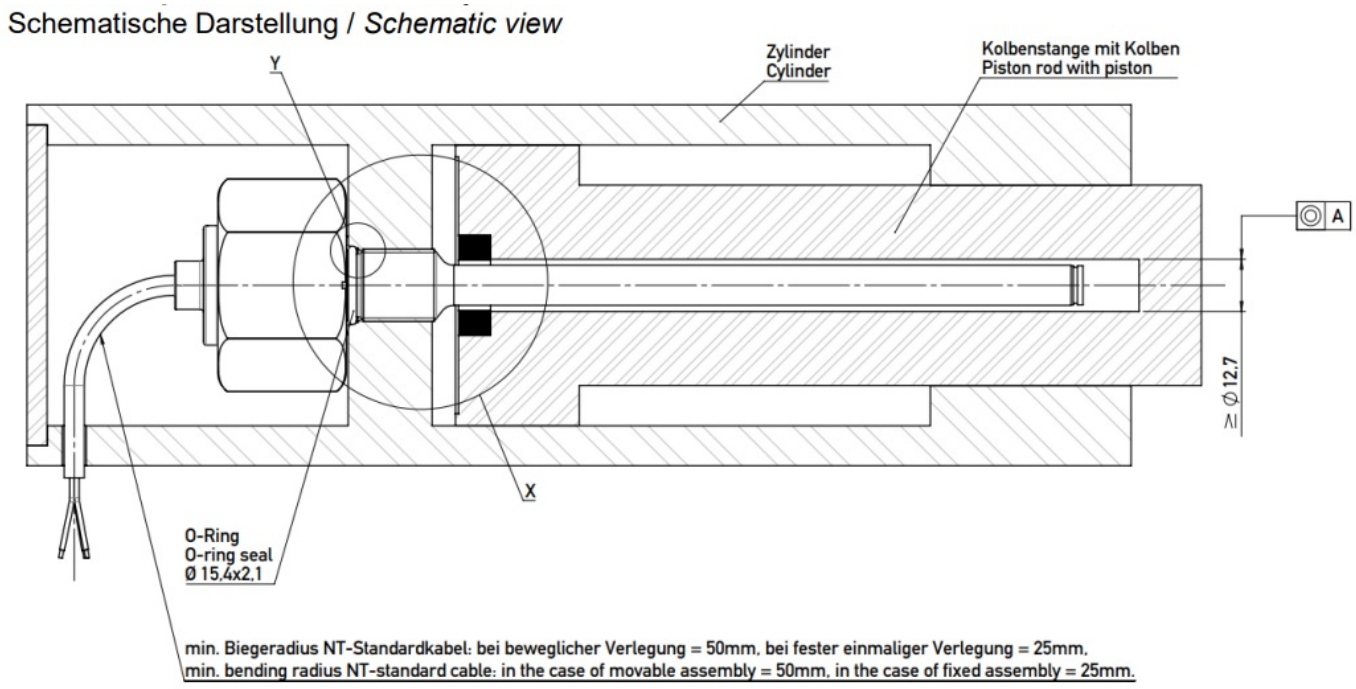
Screw flange M18 (TM1-_ _ _ _-306-_ _ _-_ _ _)
The transducer has to be screwed in using the hexagon flange (AF46). The fastening torque must not exceed 50 Nm! The provided O-ring seals the pressure area of the cylinder at the screw plug hole. The contact surface of the flange must seat completely on the mounting surface of the cylinder.

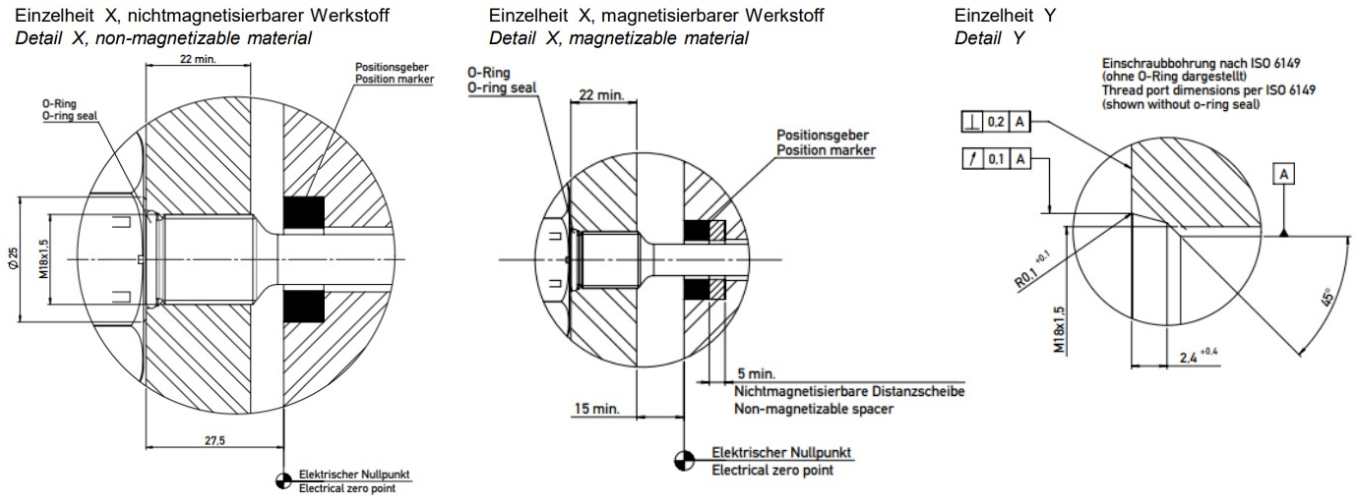
- Only with position marker Z-TH1-P25: Electrical zero point: 26,75 mm



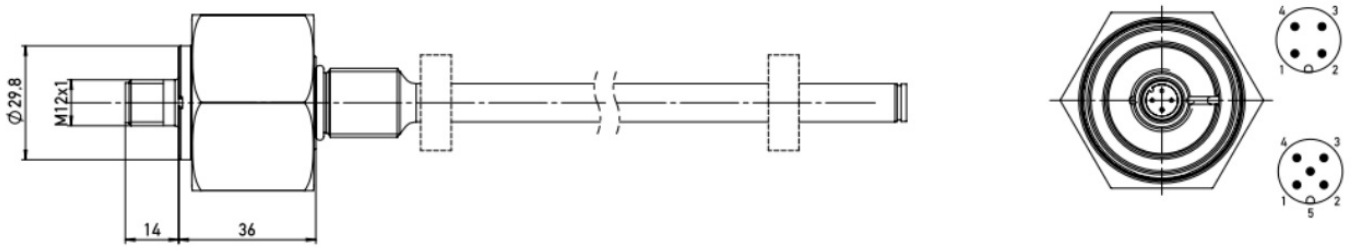
Installation example

- Schematic view





Plug M12x1 (TM1-____-306-___-1__)



- Mating connector: max. tightening torque 0.5 Nm
- Models with plug are suitable for installation in or outside of cylinders (EMC, grounding and cable shielding see chapter 4).

Interfaces and Connection Assignment

Bestellcode *Ordering code*	Versorgung *Supply voltage*	Leistungsaufnahme *Power consumption*	Lastwiderstand *Load*	Fehlersignal (außerhalb Messbereich L) *Error condition (out of electrical measuring range L)*
TM1———— 81_-___	24 VDC (16 … 34 VDC)	< 1 W ohne Last *< 1 W w/o load*	≥ 10 kΩ (Pulldown)	≥ 12 VDC
TM1———— 84_-___	12/24 VDC (8 … 32 VDC)			≥ 5,5 VDC
TM1———— 85_-___				

Analog Output

Bestellcode *Ordering code*	Versorgung *Supply voltage*	Leistungsaufnahme *Power consumption*	Bürde *Burden*	Fehlersignal (außerhalb Messbereich L) *Error condition (out of electrical measuring range L)*	Fehlersignal (Kabelbruch GND) *Error condition (cable break GND)*
TM1-____–___-82_- _ TM1———— 8B_-_	12/24 VDC (8 … 32 VDC)	< 1 W ohne Last *< 1 W w/o load*	@24 V: ≤ 500 Ω @12 V: ≤ 250 Ω	≥ 24 mA	≤ 3,5 mA

Stecker *Plug* **104, 4__**  4 pin	Stecker 4-pol m. Kabel *Plug 4 pin w. cable* **EEM33-_ _**  4 pin	Kabel *Cable* **2__** 	**Signal**
PIN 1	BN braun / *brown*	BN braun / *brown*	Versorgung / *supply* Ub
PIN 2	WH weiß / *white*	GN grün / *green*	Signalausgang / *Signal output*
PIN 3	BU blau / *blue*	WH weiß / *white*	*GND*
PIN 4	BK schwarz / *black*	-	nicht anschließen / *do not connect*

- Customized cable may show different color coding !
- Connections with the label „do not connect“ must be isolated !

Digital Output

Bestellcode *Ordering code*	Versorgung *Supply voltage*	Leistungsaufnahme *Power consumption*	Fehlersignal (außerhalb Messbereich…) *Error condition (out of electrical measuring range …)*	Fehlersignal (Kabelbruch GND) *Error condition (cable break GND)*
TM1———— 6_–__	12/24 VDC (8 … 34 VDC)	< 1,5 W ohne Last *< 1,5 W w/o load*	Siehe / *see* 6.2.1	keine Kommunikation *No communicaton*
TM1———— J_–__			Siehe / *see* 6.2.2	

Stecker / *Plug* **106, 4__**  5 pin	**Signal**
PIN 1	Nicht anschließen / *do not connect*
PIN 2	Versorgung / *supply* Ub
PIN 3	GND
PIN 4	CAN High
PIN 5	CAN Low
Rändelmutter / *Ring nut*	CAN SHLD Schirm / *Shield*

- Customized cables may show different color coding! Shielded twisted pair cable (STP) is recommended.
- Connections with the label „do not connect“ must be isolated!

CANopen Interface
The description of the CANopen interface (…CANopen_Detail) and the electronic data sheet (EDS) can be downloaded from Novotechnik website, see Downloads/Operating manuals => Click on TM1

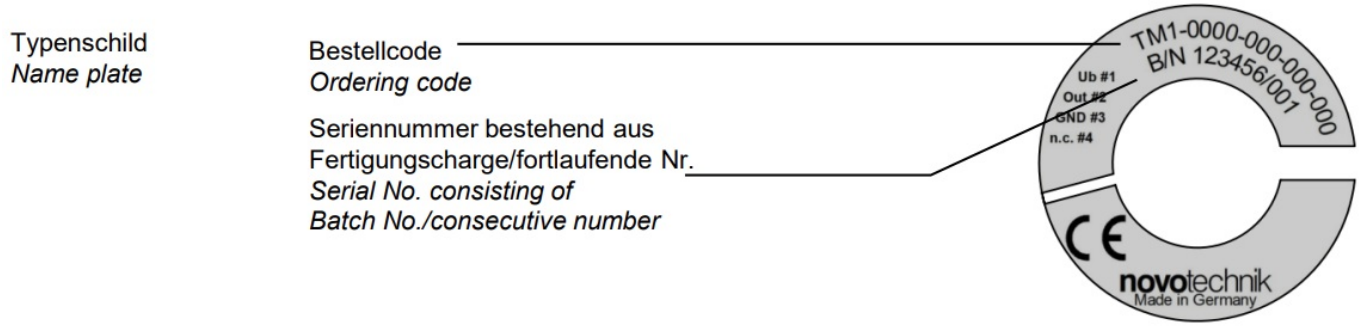
CAN SAE J1939 Interface
The description of the CAN SAE J1939 interface (…CAN_SAEJ1939_Detail) can be downloaded from Novotechnik website, see Downloads/Operating manuals=> Click on TM1

Ordering Specifications

TM1 - _ _ _ _ - _ _ _ - _ _ _ - _ _ _

Electrical measuring range	***Mechanical configuration***	***Electrical interface***	***Electrical connection***
Length L in mm	*305 Plug In flange*	*81 _ Voltage output 24 V*	*1_ _ plug M12*
	306 Screw flange	*82_ / 8B_ Current output 12/24 V*	*2_ _ cable*
	307 Plug In flange with M4 thread	*84_ / 85_ Voltage output 12/24 V*	*4_ _ plug system M12*
	308 Screw flange with M4 thread	*6_ _ CANopen*	
		J_ _ CAN SAE J1939	

Product Identification



Specifications

- **Product Name**: TM1 Magnetostrictive Transducer
- **Measurement Type**: Linear position
- **Applications**: Control, regulation, and measuring
- **Bore Diameter**: Recommended Dk 12.7 mm
- **Operating Speed**: Dependent on pressure and speed

FAQs

Q: What should I do if the transducer system doesn't operate properly?
A: If the system malfunctions, take it out of service immediately and protect it against unauthorized use. Contact customer support for assistance.

Documents / Resources

	novotechnik TM1 Linear Displacement Sensor [pdf] User Manual TM1 Linear Displacement Sensor, TM1, Linear Displacement Sensor, Displacement Sensor

References

- CAD-Daten: Weg- und Winkelsensoren
- CAD Data: Weg- und Winkelsensoren
- User Manual