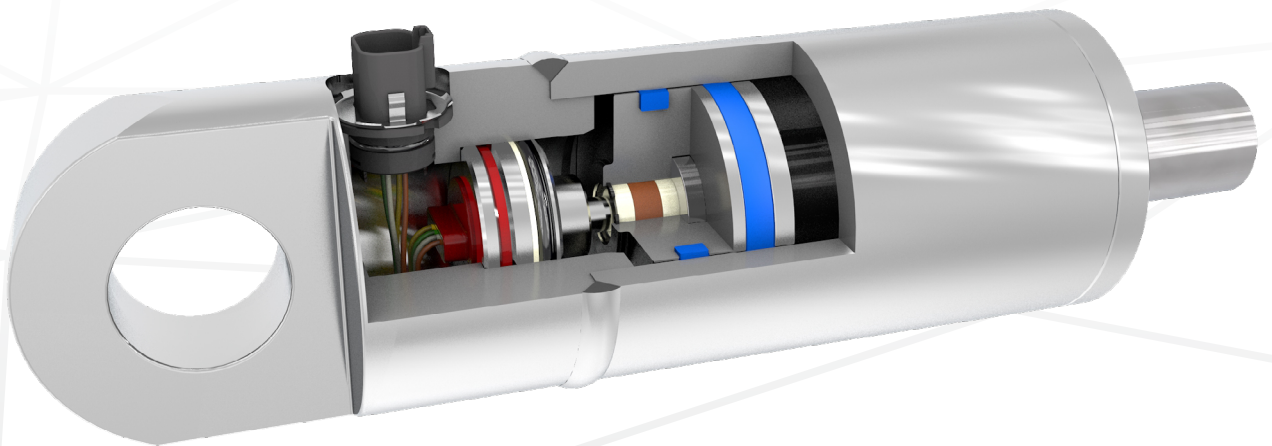


Installation Manual

DT Connector System

for MH-Series Embedded Sensors



MH-Series DT Connector System

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1. Introduction

1.1 Purpose and use of this manual

Before starting the operation of Temposonics® position sensors, read this documentation thoroughly and follow the safety information. Keep this manual for future reference!

The content of this technical documentation and of its appendix is intended to provide information on mounting, installation and commissioning by qualified technical personnel^{1/} or instructed service technicians who are familiar with the project planning and dealing with Temposonics® sensors.

1.2 Used symbols and warnings

Warnings are intended for your personal safety and for avoidance of damage to the described product or connected devices. In this documentation, safety information and warnings to avoid danger that might affect the life and health of operating or service personnel or cause material damage are highlighted by the pictogram defined below.

Symbol	Meaning
NOTICE	This symbol is used to point to situations that may lead to material damage, but not to personal injury.

2. Safety instructions

2.1 Intended use

This product may be used only for the applications defined under item 1 and only in conjunction with the third-party devices and components recommended or approved by Temposonics. As a prerequisite of proper and safe operation the product requires correct transport, storage, mounting and commissioning and must be operated with utmost care.

- The sensor systems of all Temposonics® series are intended exclusively for measurement tasks encountered in mobile hydraulic applications. The sensors are considered as system accessories and must be connected to a suitable electronic control unit.

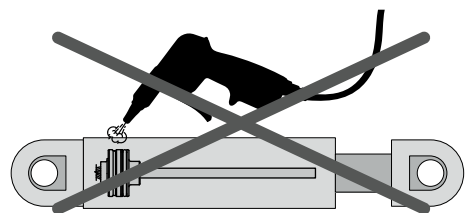
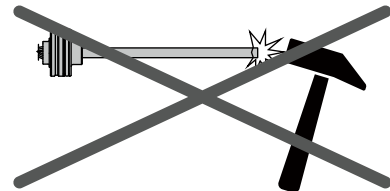
^{1/} The term „qualified technical personnel“ characterizes persons who

- are familiar with the safety concepts of automation technology applicable to the particular project and
- are competent in the field of electromagnetic compatibility (EMC) or
- have received adequate training for commissioning and service operations or
- and are familiar with the operation of the device and know the information required for correct operation provided in the product documentation

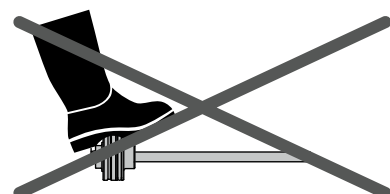
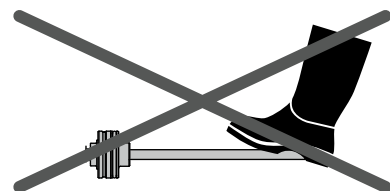
2.2 Foreseeable misuse

Foreseeable misuse	Consequence
Wrong sensor connection	The sensor will not work properly or can be damaged
Operate the sensor out of the operating temperature range	No signal output – the sensor can be damaged
Power supply is out of the defined range	Signal output is wrong/ no signal output/ the sensor will be damaged
Position measurement is influenced by an external magnetic field	Signal output is wrong
Cables are damaged	Short circuit – the sensor can be damaged/sensor does not respond
Spacers are missing/ installed in a wrong order	Error in position measurement
Wrong connection of ground/shield	Signal output is disturbed – the electronics can be damaged
Use of a magnet that is not specified by Temposonics	Error in position measurement

Do not reprocess the sensor or cylinder afterwards.
→ The sensor might be damaged.



Do not step on the sensor.
→ The sensor might be damaged.



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2.3 Installation, commissioning and operation

The position sensors must be used only in technically safe conditions. To maintain this condition and to ensure safe operation, installation, connection and service, work may be performed only by qualified technical personnel.

If danger of injury to persons or of damage to operating equipment is caused by sensor failure or malfunction, additional safety measures such as plausibility checks, limit switches, EMERGENCY STOP systems, protective devices etc. are required. In the event of trouble, shut down the sensor and protect it against accidental operation.

Safety instructions for commissioning

To maintain the sensor's operability, it is mandatory to follow the instructions given below.

1. Protect the sensor against mechanical damage during installation and operation.
2. Do not open or dismantle the sensor.
3. Connect the sensor very carefully and pay attention to the polarity of connections and power supply.
4. Use only approved power supplies.
5. Ensure the sensor is operating within the defined limits for supply voltage, environmental conditions, etc.
6. Check the function of the sensor regularly and provide documentation of the checks.
7. Before applying power, ensure that nobody's safety is jeopardized by starting machines.

2.4 Safety instructions for use in explosion-hazardous areas

The sensor is not suitable for operation in explosion-hazardous areas.

2.5 Warranty

Temposonics grants a warranty period for the Temposonics® position sensors and supplied accessories relating to material defects and faults that occur despite correct use in accordance with the intended application 2. The Temposonics obligation is limited to repair or replacement of any defective part of the unit. No warranty can be provided for defects that are due to improper use or above average stress of the product, as well as for wear parts. Under no circumstances will Temposonics accept liability in the event of offense against the warranty rules, no matter if these have been assured or expected, even in case of fault or negligence of the company. Temposonics explicitly excludes any further warranties. Neither the company's representatives, agents, dealers nor employees are authorized to increase or change the scope of warranty.

2.6 Return

For diagnostic purposes, the sensor can be returned to Temposonics or a repair facility explicitly authorized by Temposonics. Any shipment cost is the responsibility of the sender¹.

NOTICE

When returning sensors, place protective caps on male and female connectors of the sensor. For pigtail cables, place the cable ends in a static shielding bag for electrostatic discharge (ESD) protection. Fill the outer packaging around the sensor completely to prevent damage during transport.

^{1/} See also applicable Temposonics terms of sales and delivery on: www.temposonics.com

3. Product description and technology

3.1 DT Connector type

The new Temposonics MH-Series connector type is made especially for mobile hydraulic applications to connect Temposonics In-cylinder sensors with machine harnesses. It fits to the widely used Deutsch DT connector family. The new fixation method eases its installation as well as the prefabrication of cylinders. In alternative it can get assembled via three metric screws M4.

3.2 Operating conditions

The new Temposonics connector system is sealed up to IP69 (when mating connector attached) and can get operated in a wide temperature range of $-40...+105^{\circ}\text{C}$. It withstands shocks of 100 g/11 ms and vibrations up to 25 g. It is resistant against fuel, diesel, oil, salt and cleaning agents.

3.3 Pin assignments

The new Temposonics connector system offers the same connection assignments as the Temposonics M12 connection system. These are:

Analog output: (e.g. MH-C-0100M-A10E-3-A01)

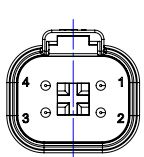
Connector wiring – Analog output				
Pinout	E	G	H	
 <p>View on connector</p>	Pin	Function		
	1	–	VDC	VDC
	2	VDC	–	SIG
	3	GND	GND	GND
	4	SIG	SIG	–

Fig. 1: Connector wiring for Analog outputs

CANbus output: (e.g. MH-C-0100M-B10S-3-C01 27F)

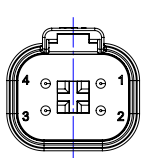
Connector wiring – CANbus output		
Pinout	S	
 <p>View on connector</p>	Pin	Function
	1	VDC
	2	CAN_L
	3	GND
	4	CAN_H

Fig. 2: Connector wiring for CANbus output

3.4 Overview 1-piece version and 2-piece version

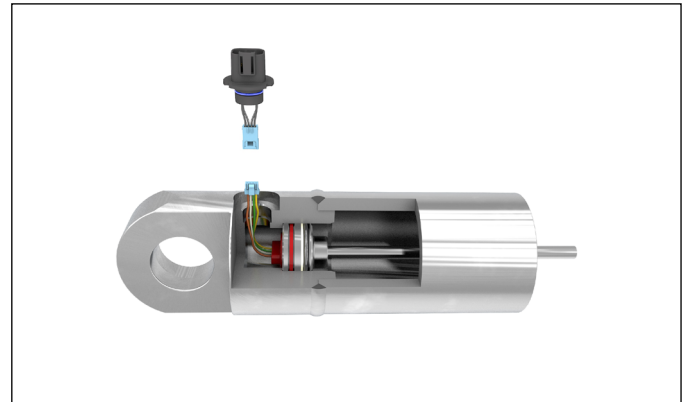


Fig. 3: 1-piece version with integrated contact pins

4. Space requirements – conditions, design (by the example of MH type sensor)

4.1 DT connector dimensions, 1-piece version

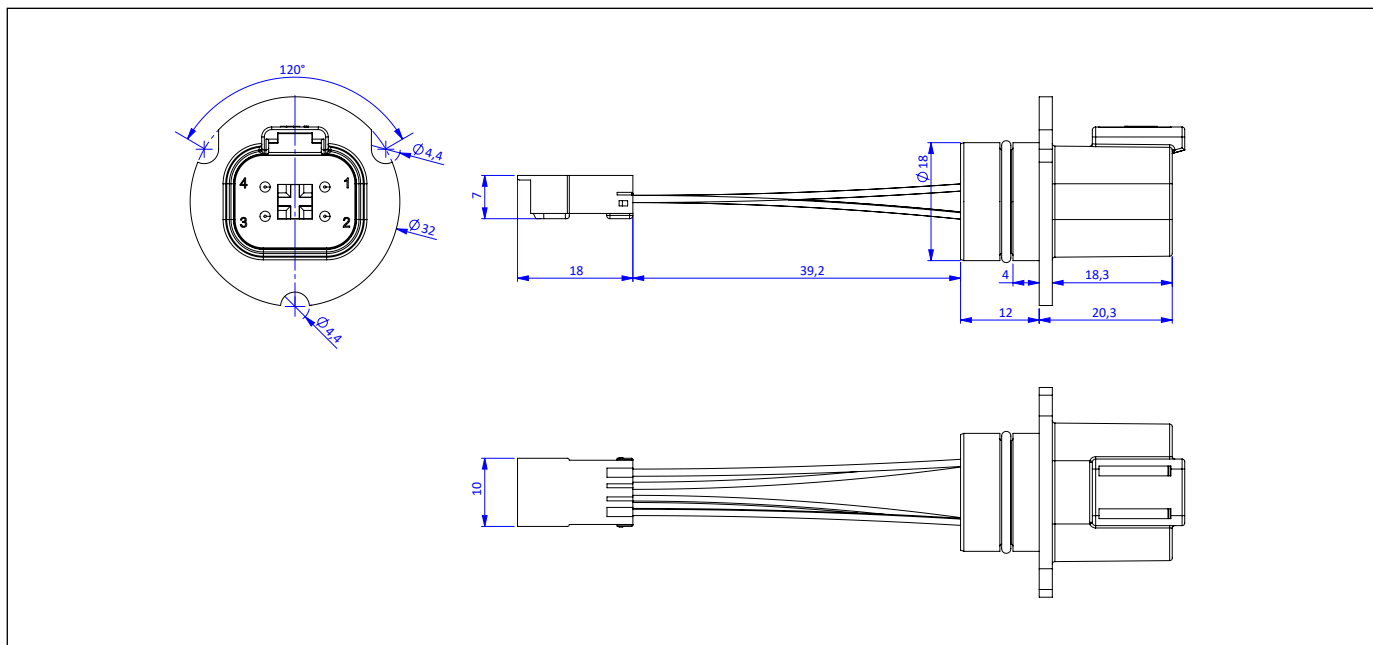


Fig. 4: DT connector dimensions, 1-piece version

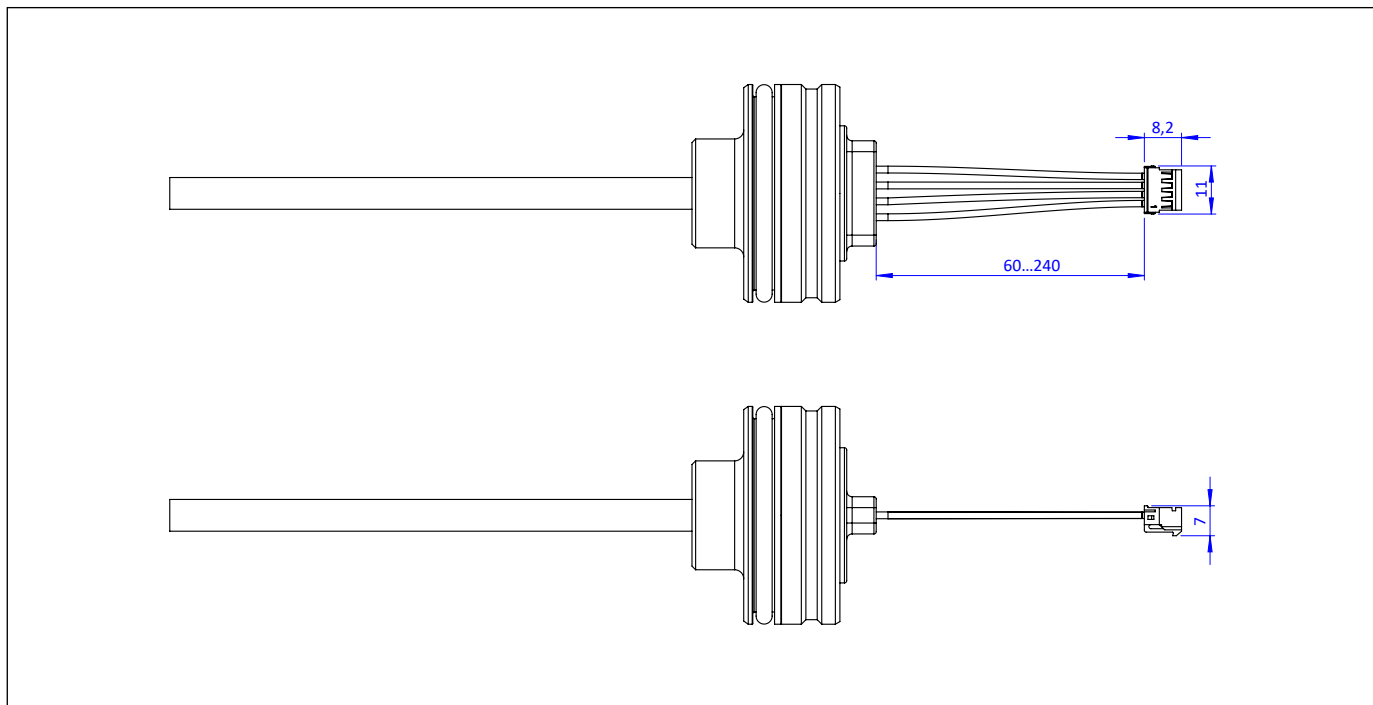


Fig. 5: MH sensor with Temposonics sensor Interconnect

4.2 Dimensions of related bore holes and tolerances, 1-piece version

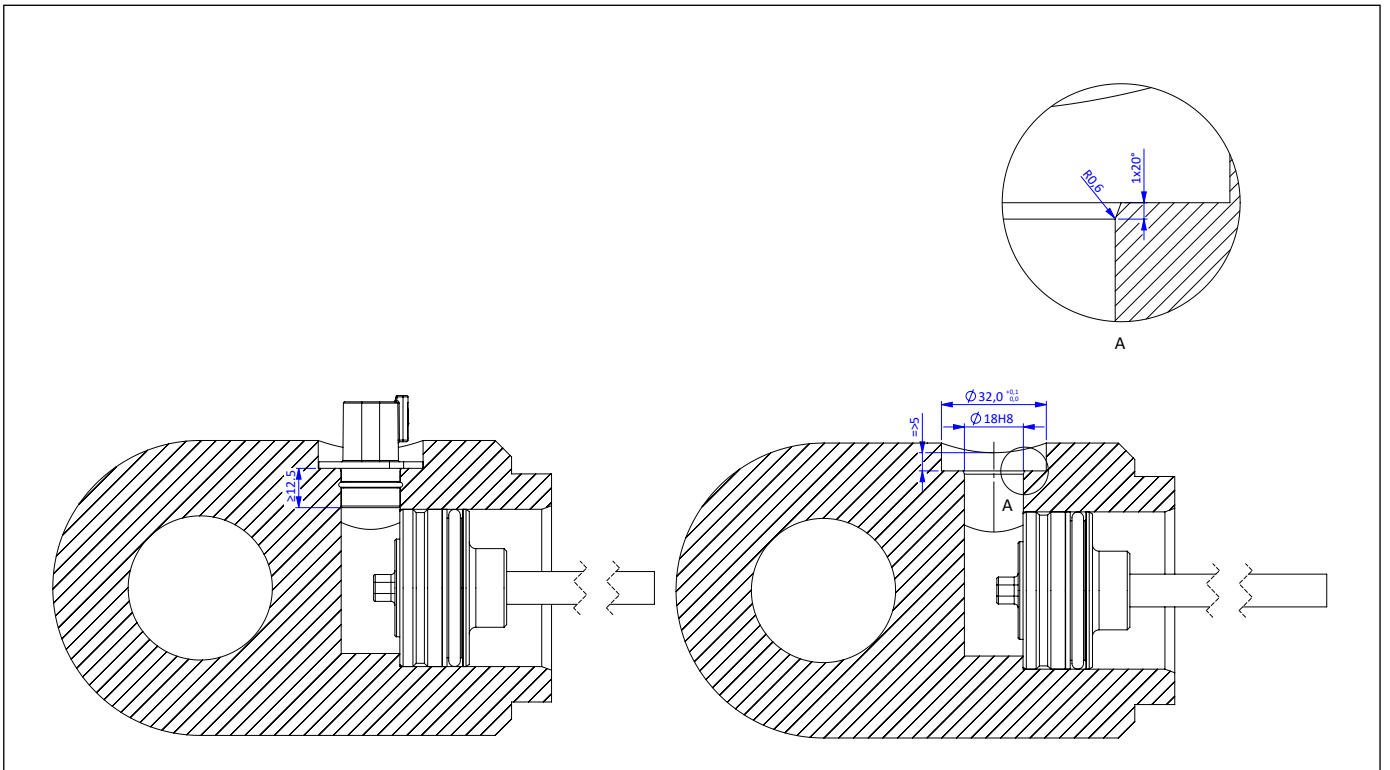


Fig. 6: Dimensions of related bore holes and tolerances, 1-piece version

NOTICE

Dimension 12.5 mm is valid for all versions 1 and 2-piece connector and fixation via screws

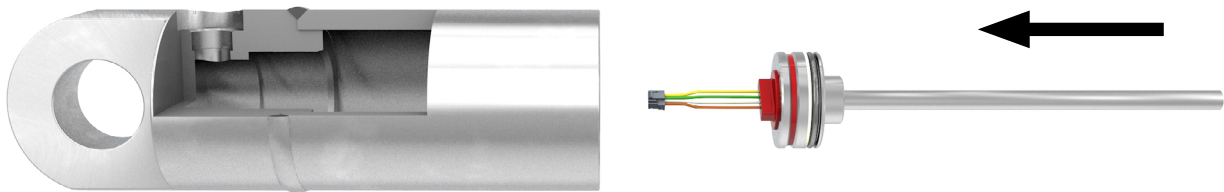
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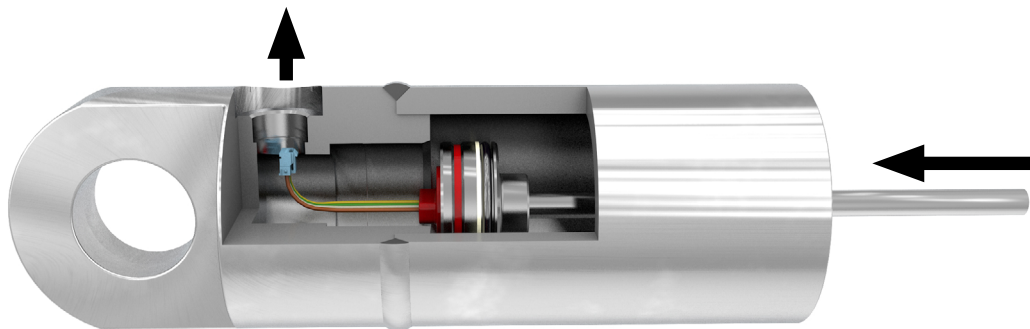
5. Mounting

5.1 Mounting sensor with DT Connectors – 1-piece version

Sensor equipped with 1-piece DT connector and cylinder



Insert the sensor into the cylinder and guide the Temposonics Interconnect through the hole in the cylinder-wall carefully



Push the sensor housing into its seat and pull the Temposonics Interconnect out. Take care to NOT damage the wires

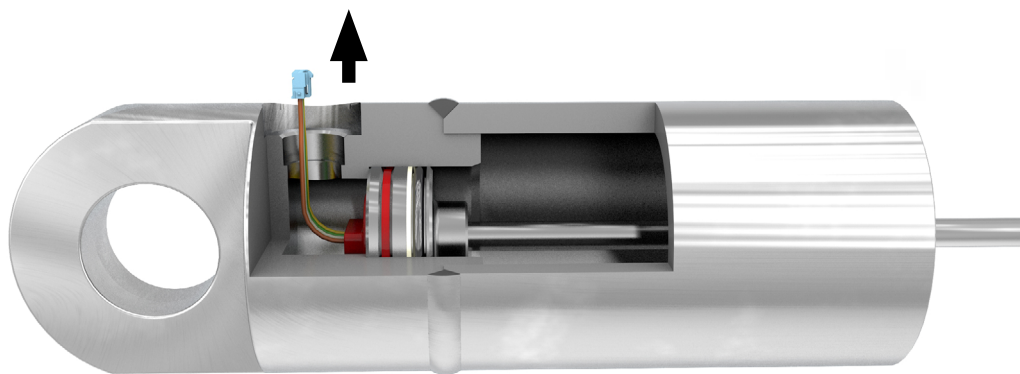
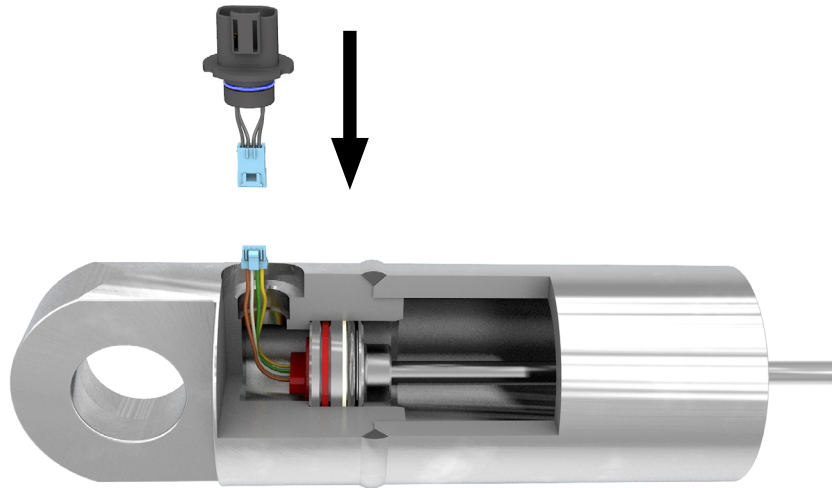
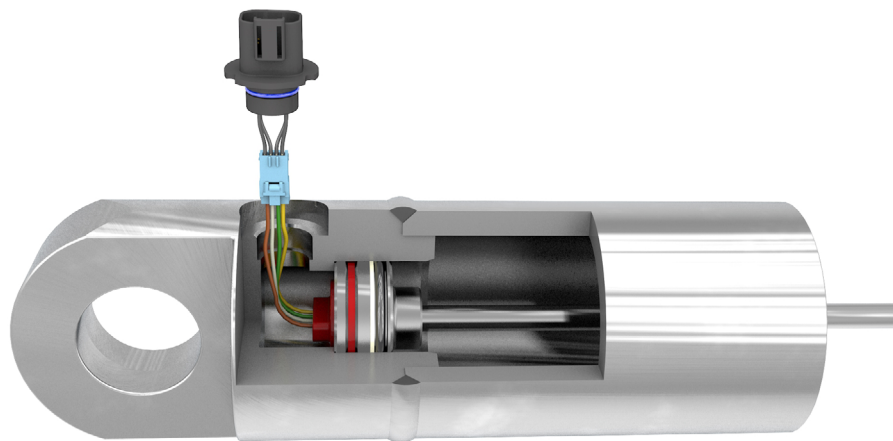


Fig. 7: Mounting sensor with DT Connector – 1-piece version, part 1

Take the new Temposonics DT connector 1-piece version and...



...connect it to the Temposonics Interconnect



Push the Temposonics DT Connector into its seat and rotate to the desired angle. Take care to NOT harm, squeeze or damage the wires

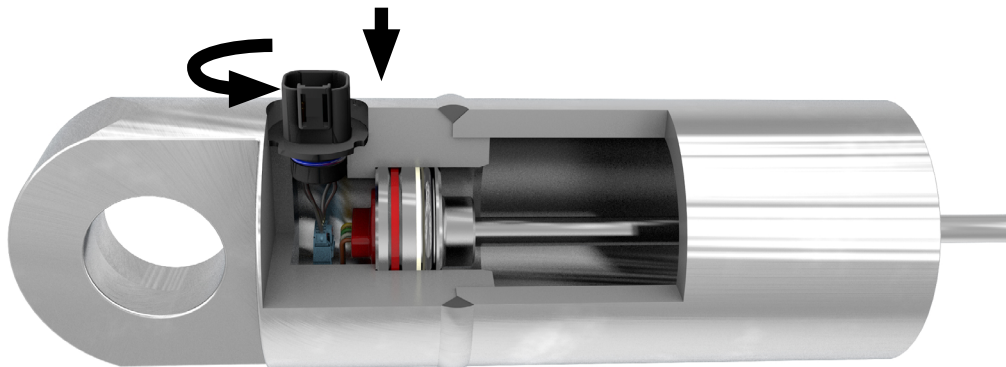
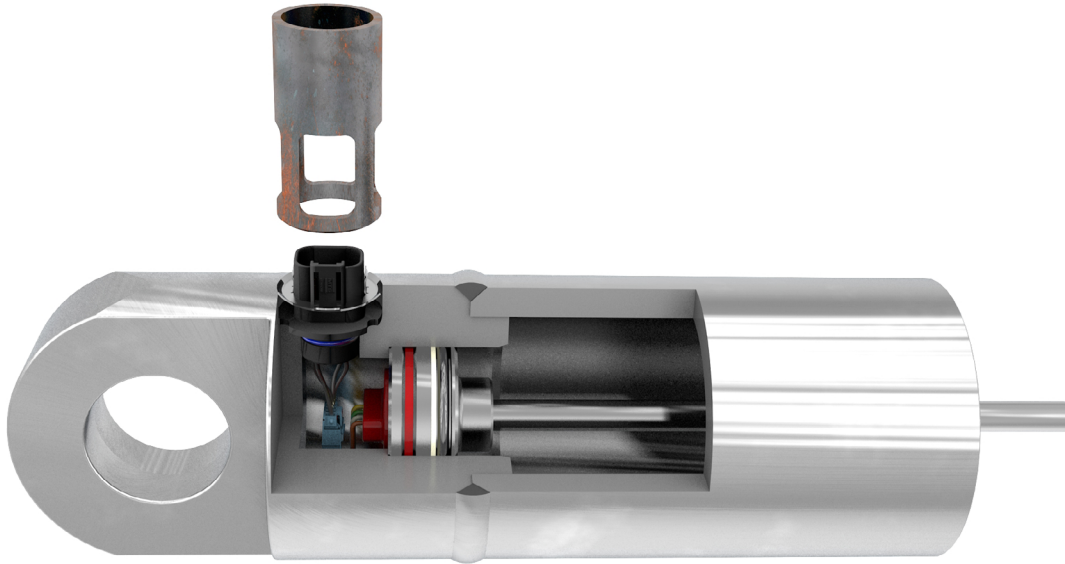


Fig. 8: Mounting sensor with DT Connector – 1-piece version, part 2

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Take the DT Connector Retainer and the tool



Using a rubber mallet, gently drive the DT Connector Retainer into its seat until the flat area of the locking ring is flush with the flange of the connector, and the connector flange flush to the flat surface of the bore hole inside the cylinder wall

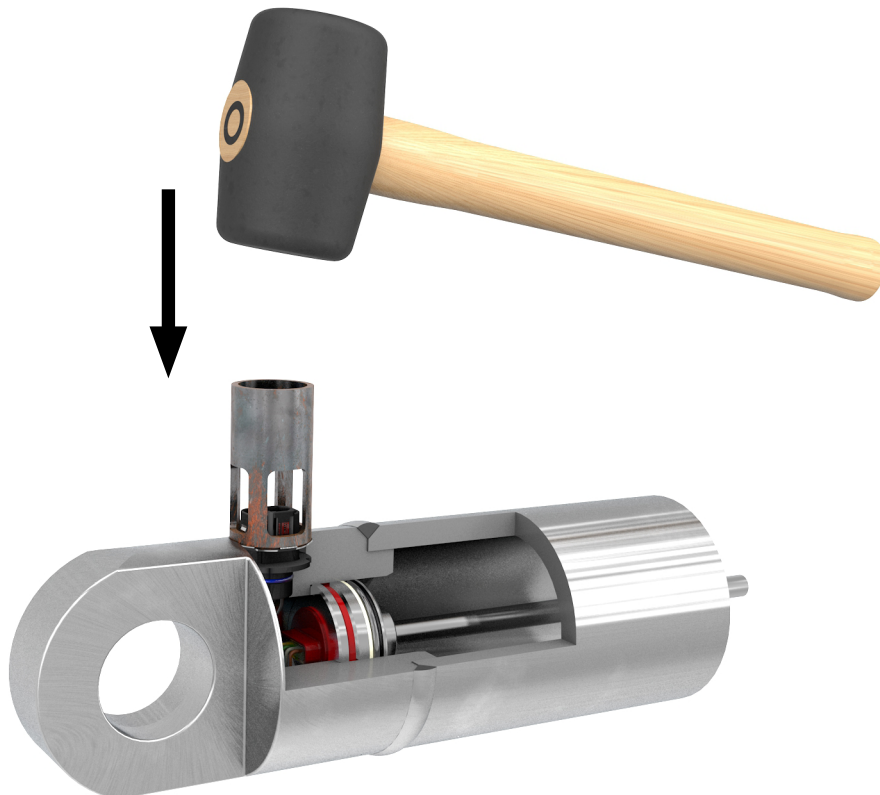


Fig. 9: Mounting sensor with DT Connector – 1-piece version, part 3

After installation of DT Connector and DT Connector Retainer the assembly should look like this:

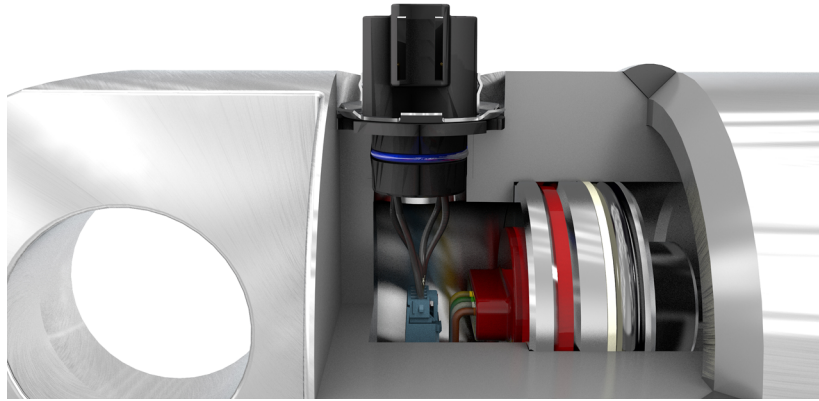


Fig. 10: Mounting sensor with DT connector – 1-piece version, part 4

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5.2 Mounting sensor with DT Connector - fixation via screws

Follow the installation steps as described on the pages above and put the sensor and the connector in place.

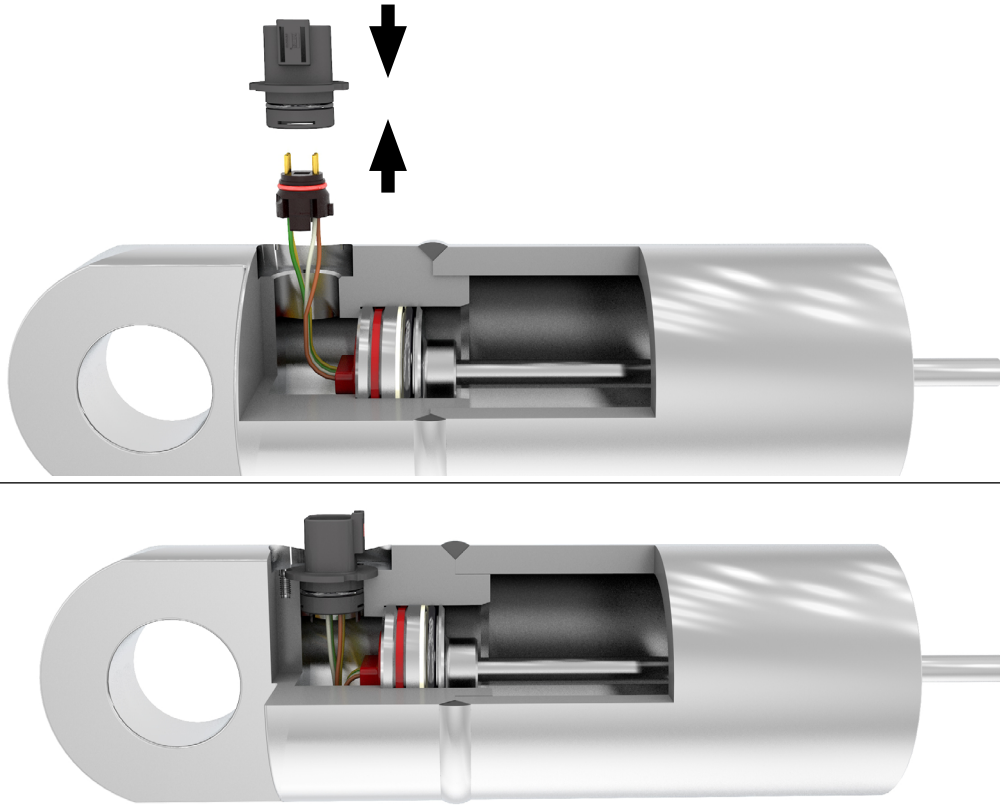


Fig. 11: Mounting sensor with DT Connector - fixation via screws, part 1

Apply 3 screw metric M4 and add a bolt adhesive against loosing.
Tighten the screws according to the recommended torque (~ 2.5...3 Nm).

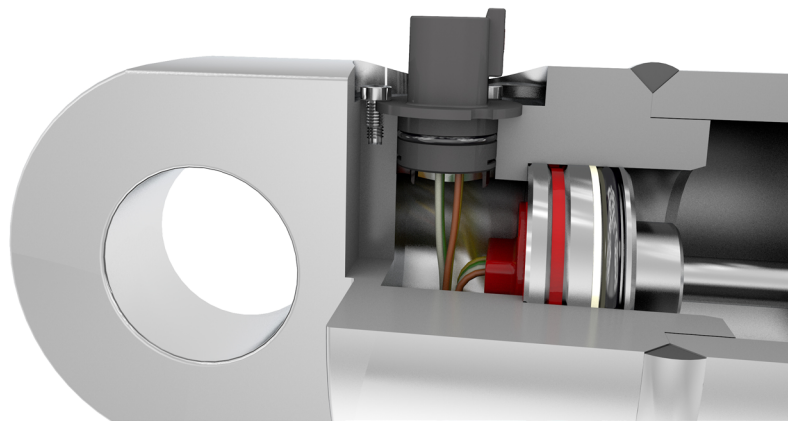
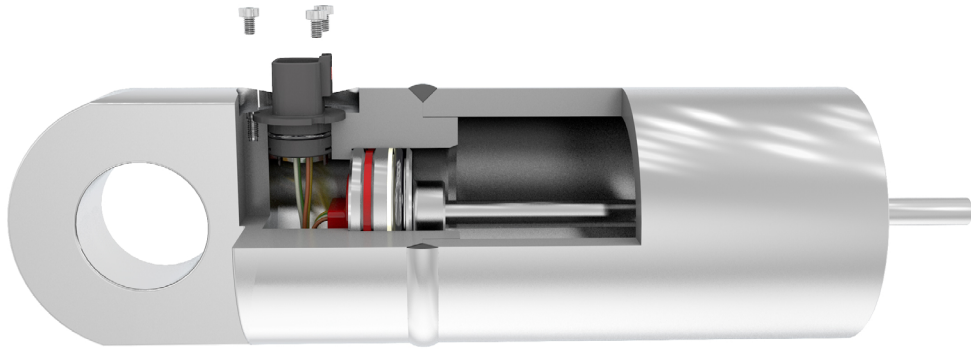


Fig. 12: Mounting sensor with DT Connector - fixation via screws, part 2

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5.3 The mounting tool

To press in the DT Connector Retainer correctly it is necessary to use a tool with dimensions as shown below. Only with this geometry it is guaranteed that the locking ring gets fixed properly.

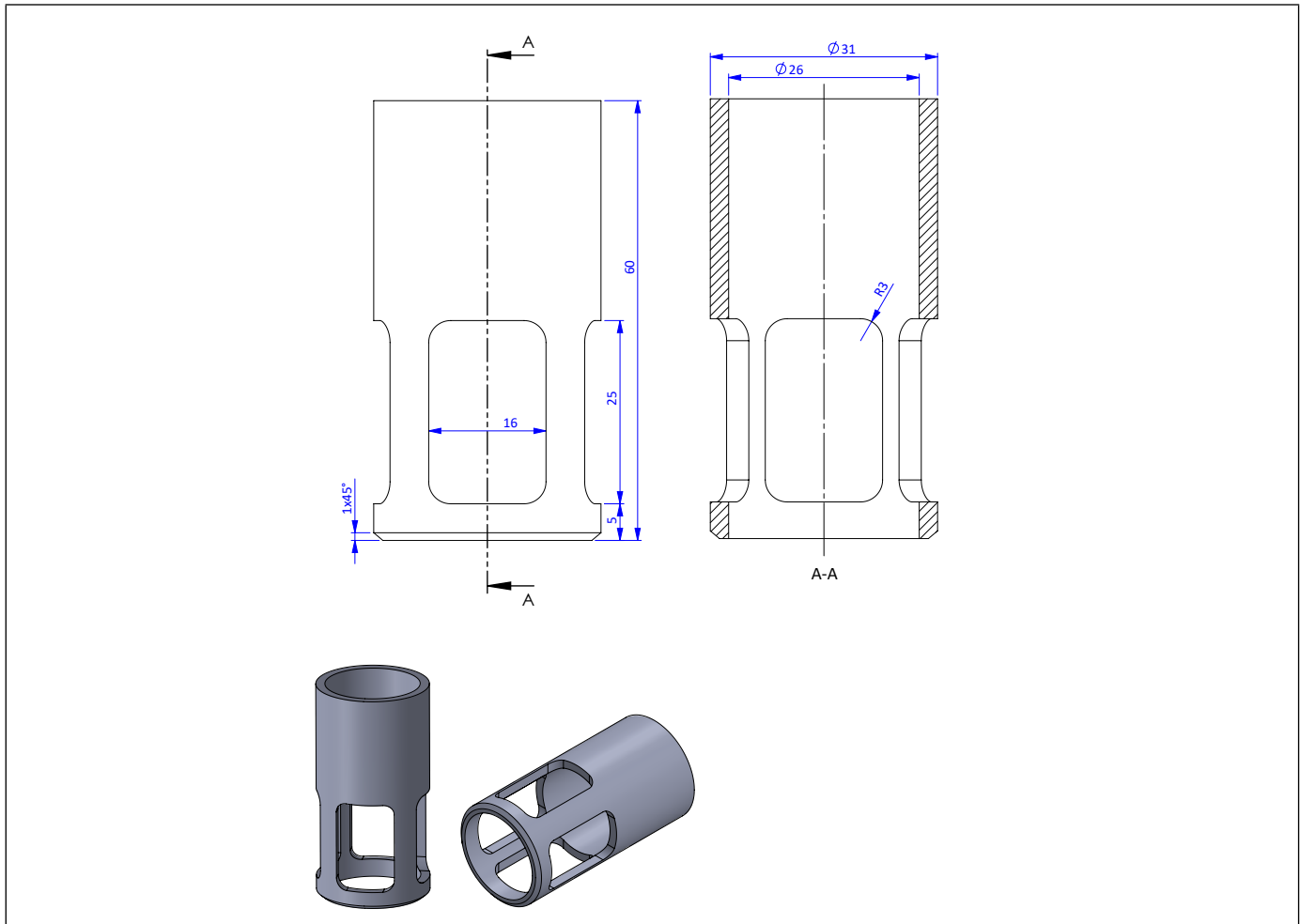


Fig. 13: The mounting tool

6. Cylinder handling after sensor and connector installation

6.1 Washing and drying of cylinders with installed sensors and DT Connectors

During washing and drying procedure it is necessary to protect the DT Connector respectively its DT Connector Insert by a sealing cap. By these caps it is avoided that the contact pins get in contact to acid chemicals or corrosion causing agents.



Fig. 14: Washing and drying of cylinders with installed sensor and DT connectors

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6.2 Painting cylinders with installed sensors and DT connector

6.2.1 Wet painting

At standard wet painting processes the DT connector system has to get protected too. Temposonics recommends to apply at least a sealing cap like shown above. Even better is to use a metal protection cab.

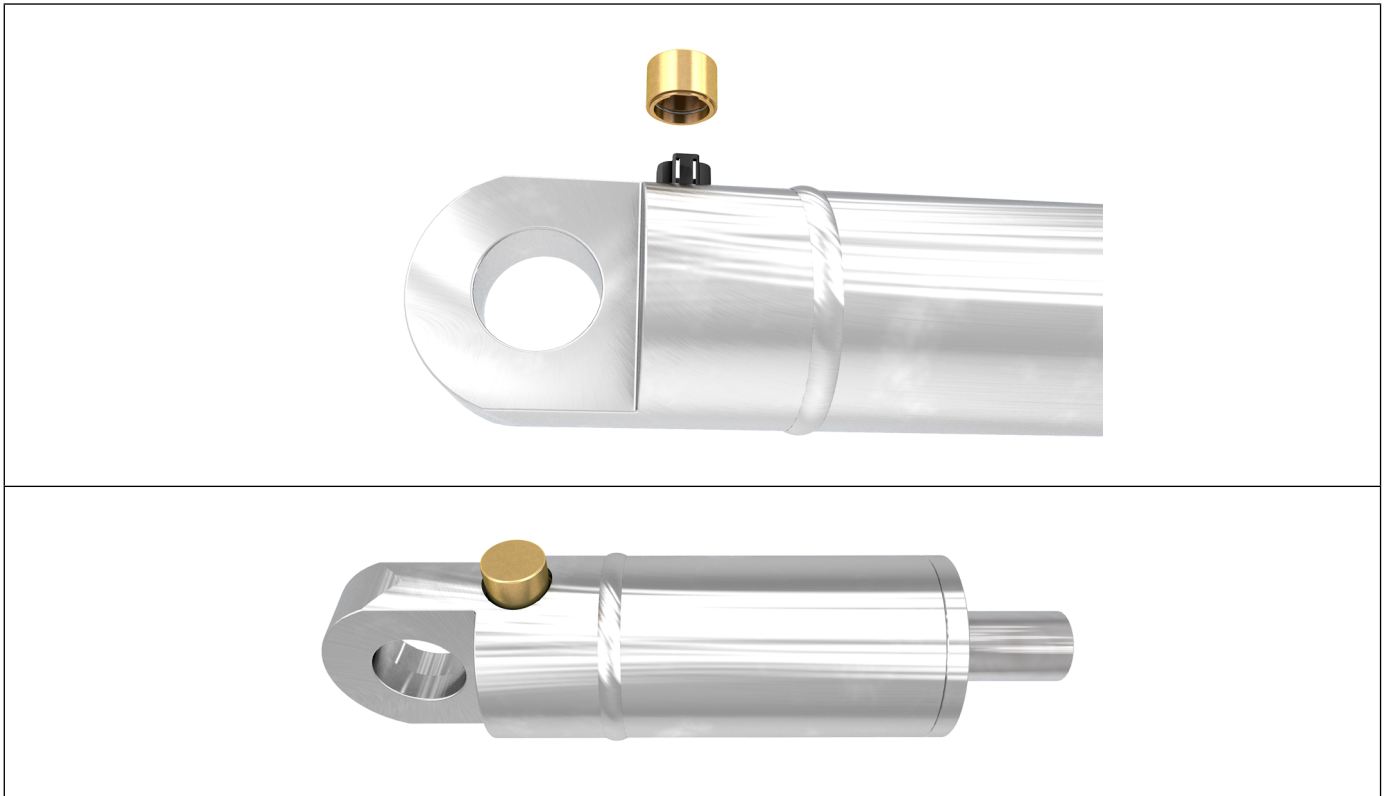


Fig. 15: Sealing cap

6.2.2 Electrostatic painting

Various dry and wet methods of applying paint to the component surface use electrostatic charge to paint cylinders. These methods employ very high voltages up to 100 kV, which can damage the electronics of position measuring systems. To prevent this damage, it is mandatory to take the following measures during electrostatic painting.

Attach the cylinder to the painting frame by the barrel side of the cylinder rather than by the piston rod. The reason is that the integrated sealing and slide rings can cause electric isolation between the piston rod and the cylinder/sensor housing, i.e. low-impedance connection between the painting equipment ground and the sensor housing is not ensured.

Clean the suspension points at the painting system and all connections used for short-circuiting conductors and connection to the painting system ground regularly and remove paint as well as other residues, in order to ensure low-impedance connection.

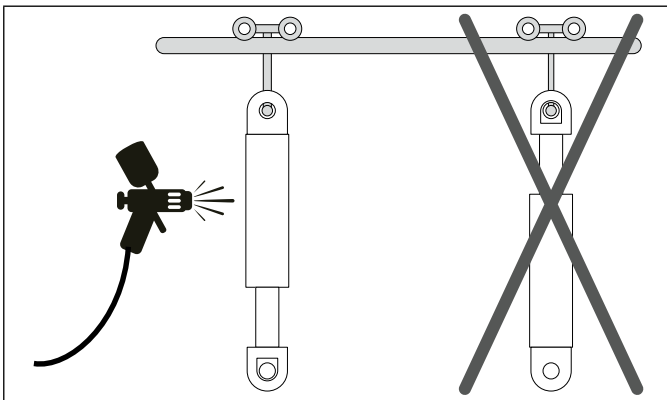


Fig. 16: Electrostatic painting

6.2.3 Painting and electrostatic charging

When using dry or powder painting methods for cylinders, powder is applied to the component surface by means of static charge. These methods employ very high voltages that can damage the electronics of Temposonics position measuring systems integrated in the cylinders. This can be prevented using the following metal protective caps.

The metal protective cap safeguards the contact pins and thus the electronics of the sensor against electrostatic effects (high voltage). It is important to note that:

- The material of the protective cap must be permanently electrically conductive.
- The cap must not be of aluminum (aluminum is subject to oxidation and can cause electric isolation).
- The metal protective cap must have an DT Deutsch connector.
- The cap must be fixed up to the connector flange plate.
- Make sure that no paint particles contaminate the thread or the contact pins.

- The thread of the protective cap must be clean and free from paint particles and other substances at all times.
- The metal protective cap must be tightened only so that it is hand-tight (max. 5 Nm).
- Paint particles on the cap outside are of no concern.
- Drawing examples for the protective cap are given in the attachment.

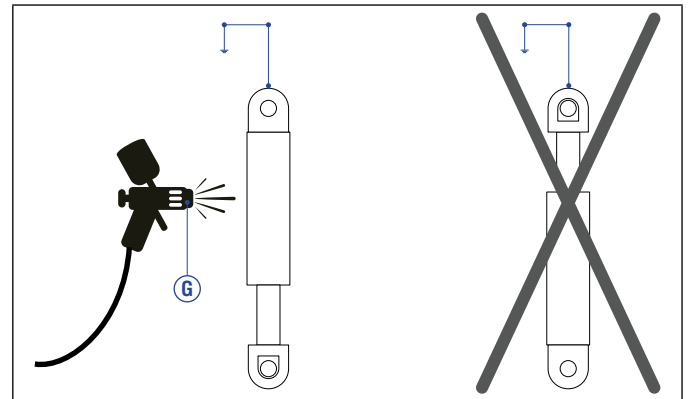


Fig. 17: Electrostatic painting of cylinders with integrated sensors

6.2.4 Protection cap

When using electrostatic painting methods for cylinders, power is applied to the component surface by means of static charge. These methods employ very high voltages that can damage the electronics of Temposonics® position measuring systems integrated in the cylinders. This can be prevented using the following metal protective caps. The metal protective cap safeguards the contact pins and thus the electronics of the sensor against electrostatic effects (high voltage). It is important to note that:

- The material of the protective cap must be permanently electrically conducting
- The cap must NOT be of aluminum (aluminum is subject to oxidation and can cause electric isolation)
- The cap must get pressed properly up to the connector locking ring respectively to its straps
- Make sure that no paint particles contaminate the contacting area of the cap nor the contact pins
- The contacting surface of the protective cap must be clean and free from paint particles and other substances
- Paint particles on the cap outside are uncritical

A detailed drawing of the protection cap is attached at the end of this document. A CAD model of it can be provided by Temposonics.

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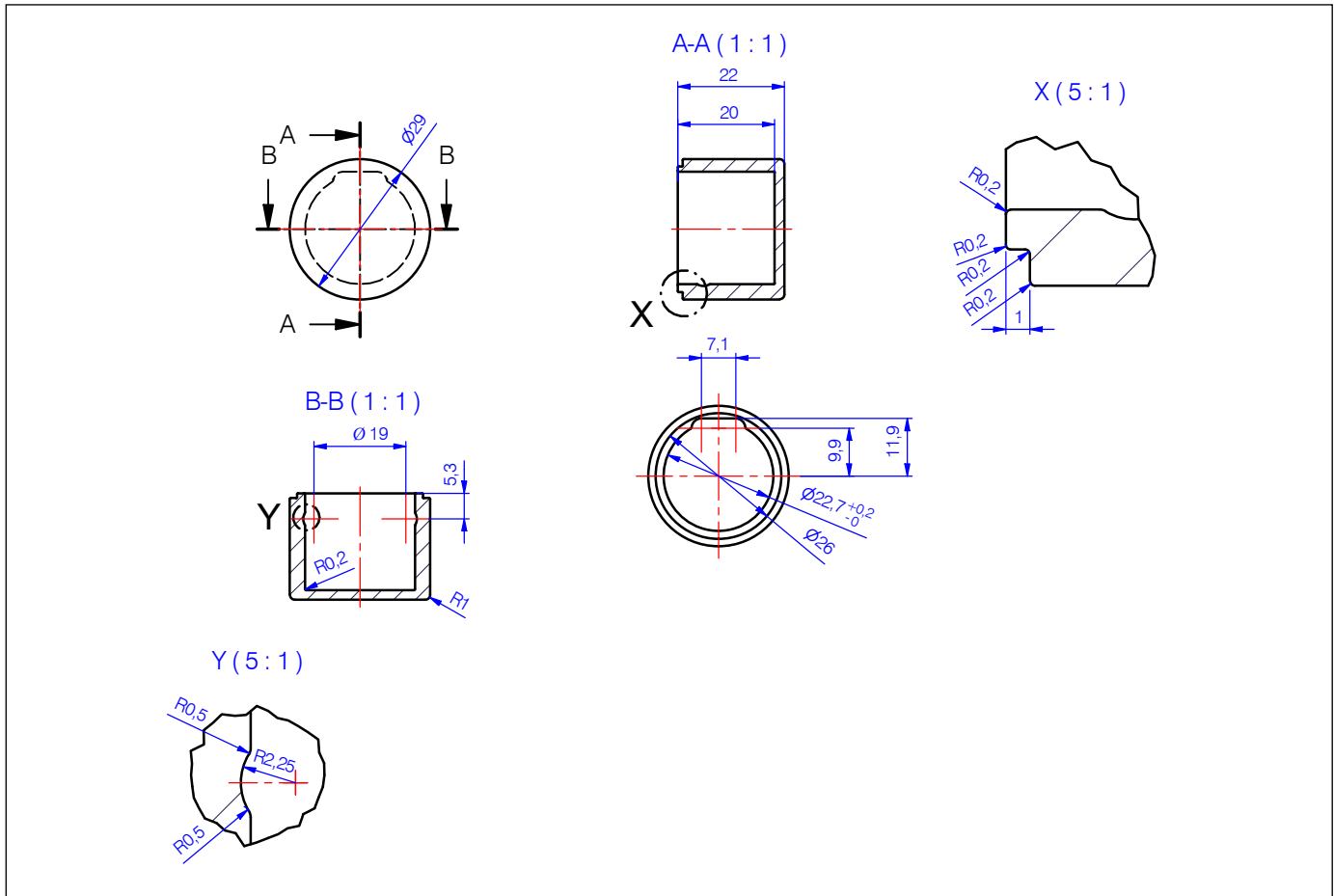


Fig. 18: Protection cap

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