

SensyMaster FMT200, FMT400

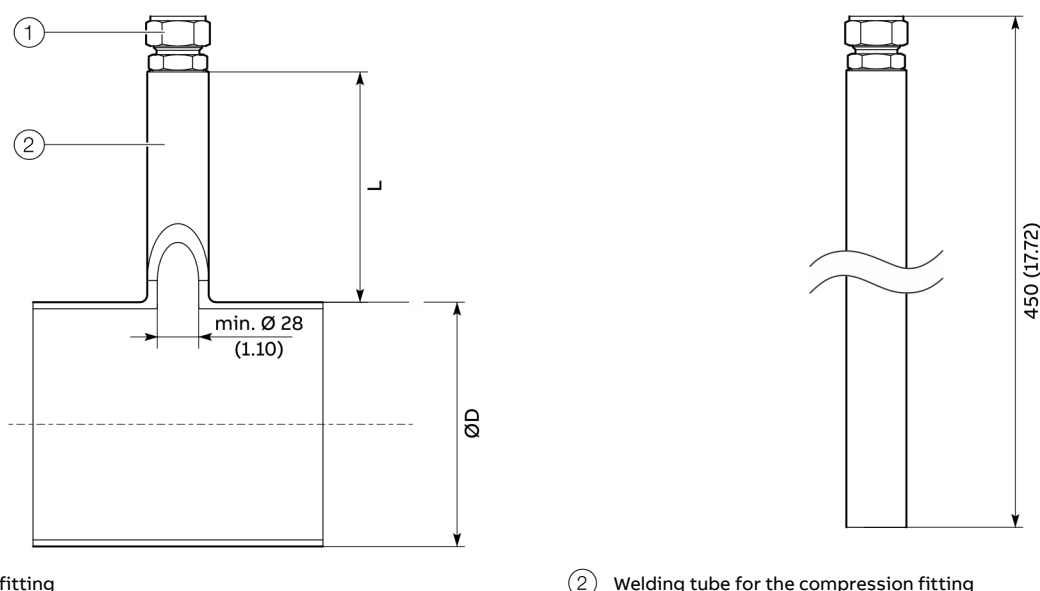
Thermal mass flowmeter

Assembly of compression fitting

EN
English

Supplement to the operating and commissioning instruction for FMT230, FMT250, FMT430 and FMT450

All dimensions in mm (in)



① Compression fitting

② Welding tube for the compression fitting

Figure 1: Welding adapter with compression fitting

h – sensor length	h3 – installation length	$L = h3 - (\frac{1}{2} \times \text{ØD})$	Ø D – outer pipe diameter*(min. / max.)
263 (10.35)	244 (9.61)	to be calculated	> 100 to 350 (> 3.94 to 13.78)
425 (16.73)	406 (15.98)		> 350 to 700 (> 13.78 to 27.56)
775 (30.51)	756 (29.76)		> 700 to 1400 (> 27.56 to 55.12)

Table 1: Dimensions of welding adapter with compression fitting

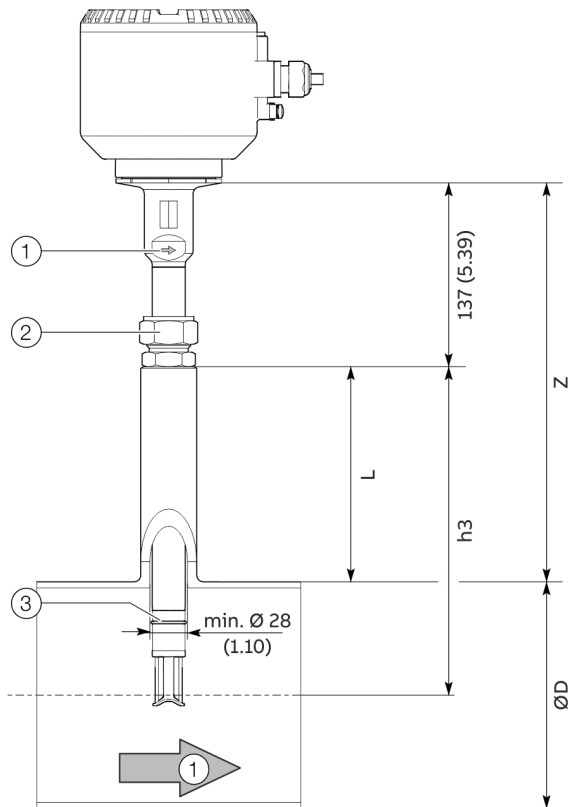
* The limitation of the maximum pipe diameter only applies for installations with the thermal sensor element in the middle of the pipe. In case of larger or non-round cross-sections, a non-centered position of the thermal sensor element in the piping is considered in the calibration.

Note

When installing the adapter tubes for compression fittings, observe the following points:

- The welding adapter tubes should be shortened to dimension L before installation, in accordance with: $L = h3 - (\frac{1}{2} \times \text{ØD})$
- It is imperative that you maintain a right angle to the longitudinal and transversal axes of the meter tube (maximum tolerance $\pm 2^\circ$).
- Make sure that after welding the free opening of the adapter tube is at least 28 mm (1.10 in).

Calculation of mounting dimensions



L Length of the welding adapter h3 Installation length of the sensor
 Z Height dependent on nominal diameter ØD Outside diameter of the piping diameter

- ① Flow direction (arrow marker on the protection tube)
- ② Compression fitting
- ③ Safety snap ring

Figure 2: Calculating mounting dimensions

Calculations (mm)

$$L = h3 - (\frac{1}{2} \times \text{ØD})$$

$$Z = (h3 + 137 \text{ mm}) - (\frac{1}{2} \times \text{ØD})$$

Calculations (in)

$$L = h3 - (\frac{1}{2} \times \text{ØD})$$

$$Z = (h3 + 5.39 \text{ in}) - (\frac{1}{2} \times \text{ØD})$$

Preparing the sensor

⚠ DANGER

Fire hazard in oxygen applications

Fire hazard in oxygen applications due to the use of unapproved thread sealing compound.

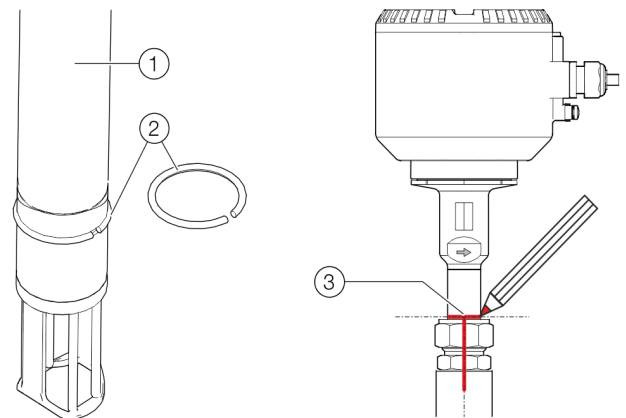
- Use only approved thread sealing compound for oxygen applications!

⚠ WARNING

Risk of injury

Risk of injury due to the sensor ejecting because of a missing safety ring.

- Mount the sensor with compression fitting only with the safety ring in place.



- ① Sensor protection tube
- ② Safety snap ring
- ③ Marking for reinstallation

Figure 3: Snap ring and marking

1. Slide the compression fitting onto the sensor and tighten by hand so that the compression fitting can still be moved.
2. Insert the safety snap ring using mounting pliers (see Figure 3, Pos. ②).

Note

For gas-tight sealing of the NPT thread of the compression fitting, you can for example use special thread sealing compounds by Swagelok such as SWAK™, Silver Goop™, PTFE-Free, etc., or PTFE thread sealing tape.

First installation of the sensor

When mounting the sensor, a distinction is made between **first installation** and reinstallation. We will address **first installation** below.

Please also follow the 'An Installer's Pocket Guide for Swagelok® Tube Fittings – MS-13-151.pdf' available at www.swagelok.de/en.

Required tools

- Open-end wrench, width across flats 35 mm (1 3/8 in)
- Open-end wrench, width across flats 38 mm (1 1/2 in)
- Caliper gage or comparable measurement tool
- Marker pen (permanent marker) for marking

Description of first installation

1. Carefully insert the prepared sensor into the welding adapter.

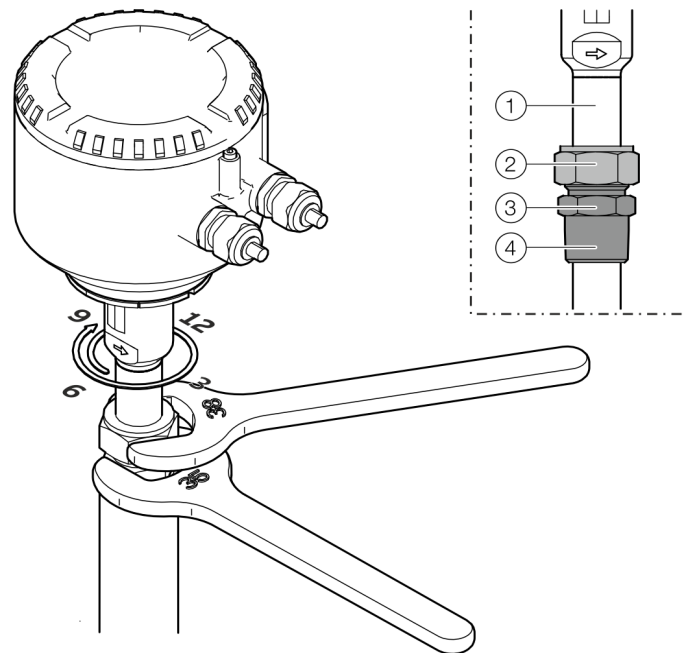
NOTICE

Damage to the device

Mechanical damage to the sensor element can occur due to improper installation.

- When inserting into the welding adapter, the sensor protection frame must not hit the bottom of the piping.

2. Screw in the compression fitting (with thread sealing compound) into the welding adapter, first by hand and then tighten with 1.5 to 2.5 turns.
3. Move the sensor to the correct height for the calculated 'Z' dimension (see Figure 2) and secure the compression fitting against shifting by tightening the union nut by hand.
4. Align the sensor such that the lateral flow arrow on the upper sensor protection tube end points in the exact direction of the flow.
5. Using a suited marker pen, mark the orientation and height of the sensor on the sensor protection tube, compression fitting and the welding adapter (see Figure 3, pos. ③).
The marking on the union nut is also used as a starting position (6 o'clock position, see Figure 4) for the tightening of the compression fitting



- | | |
|--------------------------|----------------|
| ① Sensor protection tube | ③ Fitting body |
| ② Union nut | ④ Thread |

Figure 4: Tighten sensor

6. Using an open-end wrench, hold the fitting body in position and with another open-end wrench, tighten the union nut by 1 1/4 turns clockwise to the 9 o'clock position. In the process, check the orientation of the sensor with the help of the markings and correct as needed. To achieve maximum measuring accuracy, the 'Z' dimension must be set with a tolerance of ±2 mm (±0.08 in) during installation of the sensor.

Note

Before commissioning, the tightness and compressive strength of the measuring point must be guaranteed!

- In addition, check the fittings using a suited leak detection spray.

Reinstallation of the sensor

When mounting the sensor, a distinction is made between first installation and **reinstallation**. We will address **reinstallation** below.

Please also follow the 'An Installer's Pocket Guide for Swagelok® Tube Fittings – MS-13-151.pdf' available at www.swagelok.de/en.

Required tools

- Open-end wrench, width across flats 35 mm (1¾ in)
- Open-end wrench, width across flats 38 mm (1½ in)
- Marker pen (permanent marker) for marking

Disassembly of the sensor

WARNING

Risk of injury due to process conditions

The process conditions, for example high pressures and temperatures, toxic and aggressive measuring media, can give rise to hazards when working on the device.

- Before working on the device, make sure that the process conditions do not pose any hazards.
- If necessary, wear suited personal protective equipment when working on the device.
- Depressurize and empty the device / piping, allow to cool and purge if necessary.

1. Depressurize and empty the device / piping, allow to cool and purge if necessary.
2. Switch off the power supply of the sensor and remove the connection cable.
3. Using a suited marker pen, mark the orientation and height of the sensor on the sensor protection tube, compression fitting and the welding adapter (see Figure 3, pos. ③).
4. Carefully loosen the union nut of the compression fitting and hold the sensor while doing so to prevent the sensor protection frame from hitting the bottom of the piping.

NOTICE

Damage to the device

Mechanical damage to the sensor element can occur due to improper disassembly.

- The sensor protection frame must not hit the bottom of the piping.

5. Loosen the fitting body of the compression fitting on the welding adapter and pull out together with the sensor.

Note

Very high clamping forces are exerted on the clamp ring when the compression fitting is tightened. As a result, the clamp ring is lightly pressed into the sensor protection tube. The compression fitting can no longer be shifted onto the sensor protection tube and the 'Z' dimension can be readjusted once again.

Reinstallation of the sensor

WARNING

Risk of injury

Risk of injury due to the sensor ejecting because of a missing safety ring.

- Mount the sensor with compression fitting only with the safety ring in place.

1. Make sure that the safety snap ring is inserted in the provided snap ring groove (see Figure 3, pos. ②).
2. Apply sealing compound to the pipe thread of the fitting body.
3. Carefully insert the sensor into the welding adapter.

NOTICE

Damage to the device

Mechanical damage to the sensor element can occur due to improper installation.

- When inserting into the welding adapter, sensor protection frame must not hit the bottom of the piping.

4. Screw in the compression fitting (with thread sealing compound) into the welding adapter, first by hand and then tighten with 1.5 to 2.5 turns.
5. Align the sensor in accordance with the marking (height and direction of flow) and tighten the union nut up to the marked position.