

Thermal Mass Flowmeter FMT400-VTS, FMT400-VTCS (Sensyflow VT-S/VT-CS)

for gases, compact configuration



Thermal Mass Flowmeter FMT400-VTS, FMT400-VTCS (Sensyflow VT-S/VT-CS)

Operating instruction

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1 Important information in advance

Symbols

In order that you can make the best use of this document and to ensure safety during commissioning, operation and maintenance of the equipment, please note the following explanation of the symbols used.

Explanation of the symbols used.

Symbol	Signal Word	Definitions
	DANGER	DANGER indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury. (High level of risk.)
	WARNING	WARNING indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury. (Medium level of risk.)
	CAUTION	CAUTION indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury. (Low level of risk.)
	NOTICE	NOTICE indicates a potentially harmful situation which, if not avoided, may result in damage of the product itself or of adjacent objects. (Damage to property)
	IMPORTANT	IMPORTANT indicates useful hints or other special information which, if not observed, could lead to a decline in operating convenience or affect the functionality. (Does not indicate a dangerous or harmful situation.)

As well as the instructions in this document, you must also follow the generally applicable accident prevention and safety regulations.

If the information in this document is insufficient in any situation, please contact our service department, who will be happy to help you.

Please read this document carefully before installation and commissioning.

In case of questions

If you cannot find any information concerning technical questions or malfunctions in these operating instruction, please apply the ABB service. For all questions concerning the measuring system, please have the calibration certificate readily at hand.

2 Application according to designation, general safety instructions

2.1 Range of application, application according to designation

The thermal mass flowmeter FMT400-VTS/-VTCS is designed for flow rate measurements of gas. It is only suitable to be mounted:

- as insertion sensor in a pipe component with flange mounting in pipes of nominal widths from DN 25...DN 200 (1...8"),
- via weld-on adapter directly in pipes with nominal widths up from DN 100 (4") or in pipes with non-circular cross-sections.



DANGER

- **The device is not certified for use in hazardous areas of zone 0 or 1.** Zone 2/22 applications are certified by a manufacturer declaration of conformity.
- Modification of construction details at the device by the user are not permitted.



CAUTION

For proper use it is required to observe the Technical data section in the data sheets. You will find the data sheets in section chapter 10 "Technical Data" on page 31 of these operating instructions.

Any other use is considered improper.

2.2 General safety instructions

2.2.1 Safe operation

The technology of the mass flow meter is state of the art.

The devices were designed, produced and tested in accordance with IEC 1010-1 (corresp. to EN 61010-1 and DIN VDE 0411 part 1) „Safety requirements for electrical measurement, control and laboratory equipment“ CE-certified, and delivered in a safe condition. To maintain this state and guarantee hazard-free operation, all safety instructions in this manual headed by "**DANGER**", "**WARNING**", "**CAUTION**" or "**NOTICE**" must be observed. Otherwise, personnel might be endangered and the mass flow meter itself or other devices and equipment could be damaged.

Prerequisites for safe operation

These operating instructions contain important information about the safe and proper operation of the equipment. Observing these instructions is mandatory for safe operation.

Failure to observe the instructions can cause hazards for life and limb of the user respectively property damages at the devices or the entire system.

Proper and safe operation of the mass flow meter requires proper transportation and storage, installation and commissioning by qualified personnel, operation within its design limits, and careful maintenance observing all information in these operating instructions.

Qualification of personnel

Only personnel familiar with the installation, commissioning, and maintenance of similar devices and having the required qualifications for their tasks are allowed to work on the device.

Operator

The operator of the plant is fully and solely responsible for proper and workmanlike and, thus, safe operation.

The operator must make sure that the operating instructions have been understood by the target audience.

A copy of the operating instructions must be stored in a suitable place at the usage location of the device at all times.

Read these operating instructions prior to commissioning, decommissioning, maintaining, or repairing a device.

National regulations

The regulations, standards, and guidelines mentioned in these operating instructions are valid for Germany. When using the devices in other countries the appropriate and valid national regulations must be observed.

Notes and regulations to be observed

- Observe
- the contents of these operating instructions and references to other documents and their contents
 - the safety instructions attached to the mass flow meter
 - the application data indicated in the calibration certificate
 - the appropriate and valid safety instructions for the construction and operation of electrical systems
 - the appropriate and valid safety instructions for handling gases
 - the regulations and directives regarding explosion protection.

During operation

The operator must commission a qualified electrician to inspect and examine the system at defined intervals. The examination intervals must be chosen in such a way that any damages that can be expected can be recognised in time.

The examinations must be performed at least every three years.

The examinations can be skipped if the electrical system is continuously monitored by a responsible engineer.

Duties of the operator:

- maintain the system in proper condition
- continuously monitor the system
- execute required maintenance and repair work immediately
- carry out required safety measures.

If the devices are used in areas where dusts can cause explosion hazards, you must clean the devices frequently.

Use genuine spare parts, only.

Warranty provision

A use contrary to the device's stipulated use, disregarding of this manual, the use of under-qualified personnel as well as unauthorized alterations excludes the manufacturer of liability from any resulting damages. The manufacturer's warranty expires.

2.2.2 Notes concerning the use in potentially explosive areas

Only FMT400-VTS is available in a version authorized for use in zone 2 / zone 22. The manufacturer's declaration and the declaration of conformity can be found in the appendix. For devices authorized for use in zone 2 / zone 22, only the data and instructions for use stated in the declaration of conformity (ATEX) shall apply.


DANGER

Using the devices in zone 1 / 21 or in zone 0 / 20 is not allowed.

2.2.3 Returning devices

According to EC guidelines for hazardous materials, the owner of hazardous waste is responsible for its disposal or must observe the following regulations for its shipping:

- a. All flow sensors and/or flow transducers sent to ABB Automation Products GmbH for repair must be free of any hazardous substances (acids, lyes, solutions, solids).
- b. Flow sensors must be flushed and rinsed in order to neutralize hazardous substances. Flow sensors have cavities. Therefore, the cavity must be neutralized after operation with hazardous materials.
- c. In case of service or repair the measures listed in a) and b) must be confirmed in writing. Confirmation must be provided and signed by authorized specialists. A preprinted form is included in the appendix or can be requested from ABB Service.
- d. Costs arising from increased efforts for handling of contaminated devices and the disposal of hazardous substances during repair shall be invoiced to the owner of the device!

2.2.4 Disposal

ABB Automation Products GmbH actively promotes environmental consciousness and has an operational management system in accordance with DIN EN ISO 9001:2000, EN ISO 14001:2004 and OHSAS 18001. Our products and solutions should have minimum impact on the environment and persons during manufacture, storage, transport, use and disposal.

This includes the environmentally friendly use of natural resources. Through its publications ABB conducts an open dialog with the public.

This product/solution is manufactured from materials that can be reused by specialized recycling companies.

2.2.5 Information on WEEE directive 2002/96/EC (Waste Electrical and Electronic Equipment)

This product/solution is not subject to the WEEE directive 2002/96/EC and relevant national laws (e.g., ElektroG in Germany).

Dispose of the product/solution directly in a specialized recycling facility and do not use the municipal garbage. Only privately used products may be disposed of in the municipal garbage according to the WEEE directive 2002/96/EC. Proper disposal prevents negative effects on people and the environment, and supports the reuse of valuable raw materials.

If it is not possible to dispose of old equipment properly, ABB Service can accept and dispose of returns for a fee.

2.2.6 Instructions acc. to Directive 97/23/EC, pressure Devices

2.2.6.1 General

- The thermal mass flowmeters FMT400-VTS and FMT400-VTCS and the pipe components:
 - wafer flange version,
 - flange version with integrated partial measuring section and
 - weld-on adapter
 have been designed, produced and approved in accordance with Directive 97/23/EC for pressure devices.
- The declaration of conformity can be found in the appendix.
- The "FMT400-VT, -VTCS" measuring systems are intended to be used for flow measurement of gaseous media, only.
- The device may be used for the specific application and under the conditions specified in the order confirmation, only. Otherwise, the device may be impaired, damaged or even destroyed.
- Only those media (fluids) may be measured which – according to the state of the art or the operator's experience – do not affect the chemical or physical material properties of process-wetted parts that are essential for operational reliability.
- The threshold for changing stress reversals has been taken from the AD-2000 Leaflet S1, Section 1.4, and was neither calculated nor checked by us.
- The device must be included in the routine maintenance procedure of the plant and checked accordingly.
- The used materials must be checked by the user for compatibility with the respective application.
- The max. temperature and pressure specified on the rating plate must not be exceeded.
- Prior to mounting or dismounting the pipe components or transducers always make sure that the pipe is fully depressurized (except when using an easy-change fitting for mounting/dismounting a transducer).
- Prior to starting any installation work on pipes with aggressive, toxic, irritant or noxious substances always rinse the pipes carefully. When working on the pipes observe the applicable regulations for the prevention of accidents.
- Do not use damaged pipe components or transducers. Such units must be withdrawn immediately and returned to the vendor for repair.
- Dismounted pipe components or transducers that have been in contact with aggressive, toxic, irritant or noxious substances must be cleaned thoroughly and wrapped and marked accordingly when they are returned to the vendor.
- If a leakage should occur at a measuring point, the respective point must be put out of service.
- Immediately replace defective gaskets or O-ring seals. Do not re-use.

- Mechanically marking or making alterations to pipe components or sensors can lead to damage to the components and is thus prohibited. For weld-on adapters, cutting to length and welding on to the pipe are permitted.
- Damage to hot tap fittings due to external fire must be prevented by the system operator.

2.2.6.2 Mounting/Dismounting the pipe component

- When mounting the pipe components, make sure that the flow direction is in accordance with the marking.
- Observe the respective welding regulations when welding in a weld-on adapter. Do not apply more heat than absolutely necessary to avoid that the sealing face of the mounting flange gets distorted.
- When mounting a pipe component insert a flat flange gasket between the two pipe flanges. The gasket must be intact and resistant to the conducted substances.
- Prior to mounting always check the pipe component or transducer incl. the gaskets for possible damage.
- Make sure that the pipe components are not twisted when they are mounted.
- Use the appropriate screws with the required strength and dimensions for screwing the flanges together.
- Fasten the flange screws evenly and with the appropriate torque specified for the built-in gasket.
- After mounting the pipe components, close the insertion pipe with an appropriate blind flange with gasket, or close the existing stop valve, if applicable.

2.2.6.3 Mounting/Dismounting the transducer

- When mounting the transducer make sure that its specifications are in accordance with the specifications of the measuring point.
- Exclusively use the flawless, media-resistant O-ring seal delivered with the transducer for mounting. Do not use a flat packing.
- Insert the O-ring seal into the respective O-ring groove of the connection flange.
- Handle the transducer with care when inserting it into the pipe. Make sure that the sensor unit is not damaged.
- Screw the transducer to the flange of the insertion pipe. Evenly fasten the screws with the appropriate torque. Torque for the screws supplied: 87 Nm (unlubricated, without the use of sprung washers).
- When using a pipe component with integrated hot tap fitting make sure that the fitting is in dismantling position before undoing the screws.

2.2.6.4 Potential risks that may occur during operation

- The surfaces of parts run through by hot fluids may get very hot. Do not touch. Otherwise, there is a risk of being burnt.
- Aggressive fluids may cause corrosion or abrasion which may result in leakage of fluids under pressure.
- The flange or process gaskets may become leaky due to material fatigue. Media under pressure might escape then.

WARNING

An uncontrolled escaping the measuring fluid poses a danger to life and/or health.



3 Design and function

FMT400-VTS/-VTCS (Sensyflow VT-S/VT-CS) operates on the thermal principle. This measurement method is based on the principle that gas flowing around a heated body absorbs heat from that body. The result of this flow-dependent cooling down process is used as a measurement effect. Since the loss of heat depends on the number of particles reaching the surface of the heated body, it is possible to determine the mass flow directly. It thus becomes unnecessary to correct pressure and temperature effects.

The measuring systems consist of only the 2 components:

- detecting element and
- pipe component.

Fig. 3-1 and Fig. 3-2 show a schematic representation of the measuring systems

- FMT400-VTS (process version) and
- FMT400-VTCS (hygienic version).

3.1 Pipe components

Pipe components in process version

Pipe components in process version are available in various types for nominal pipe widths from DN 25...DN 200 (1...8"). In addition it is possible to integrate the transducer directly into pipes as of DN 100 (4") or into pipes with non-circular cross-sections using a weld-on adapter.

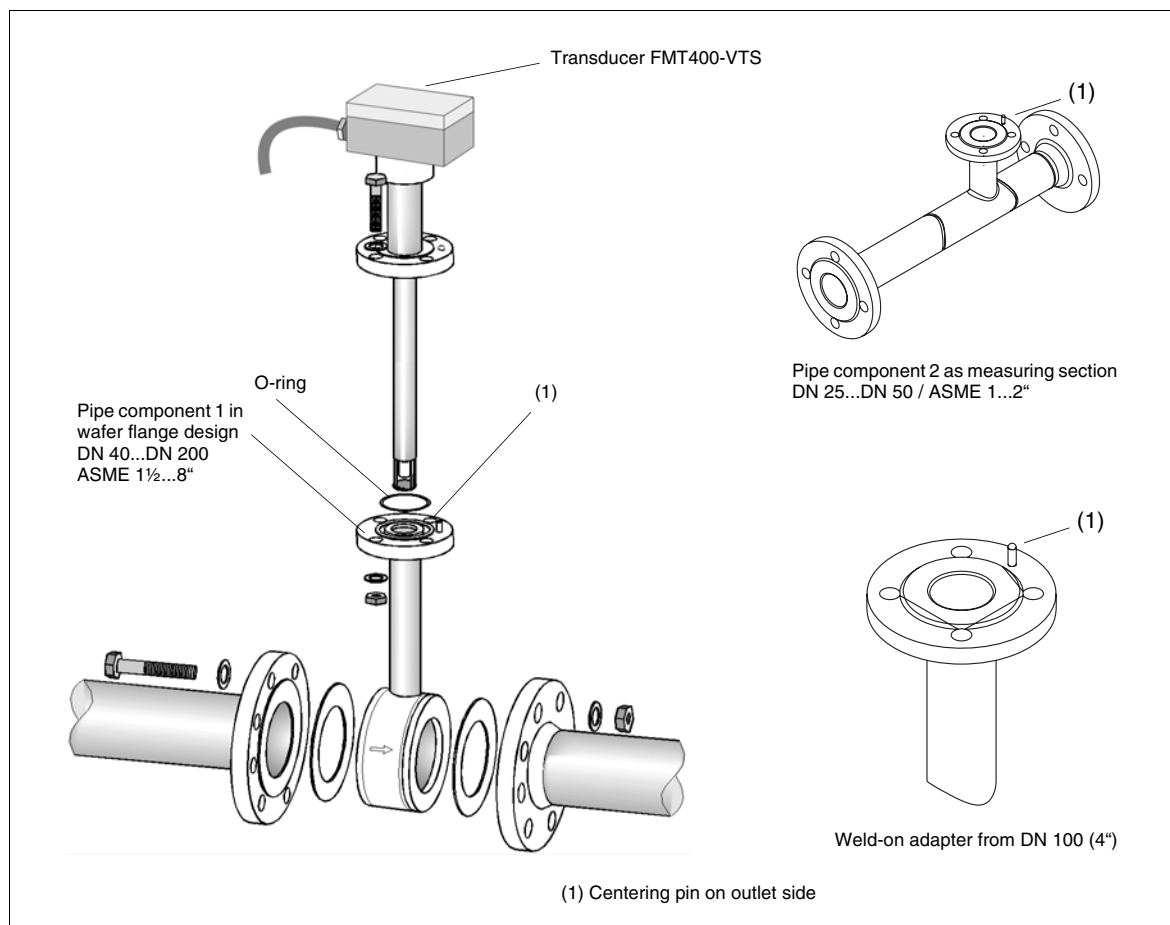


Fig. 3-1 FMT400-VTS, Process version

Pipe components in hygienic version

The pipe components in hygienic version are available either with FG flanges or threaded pipe connections S in accordance with DIN 11851.

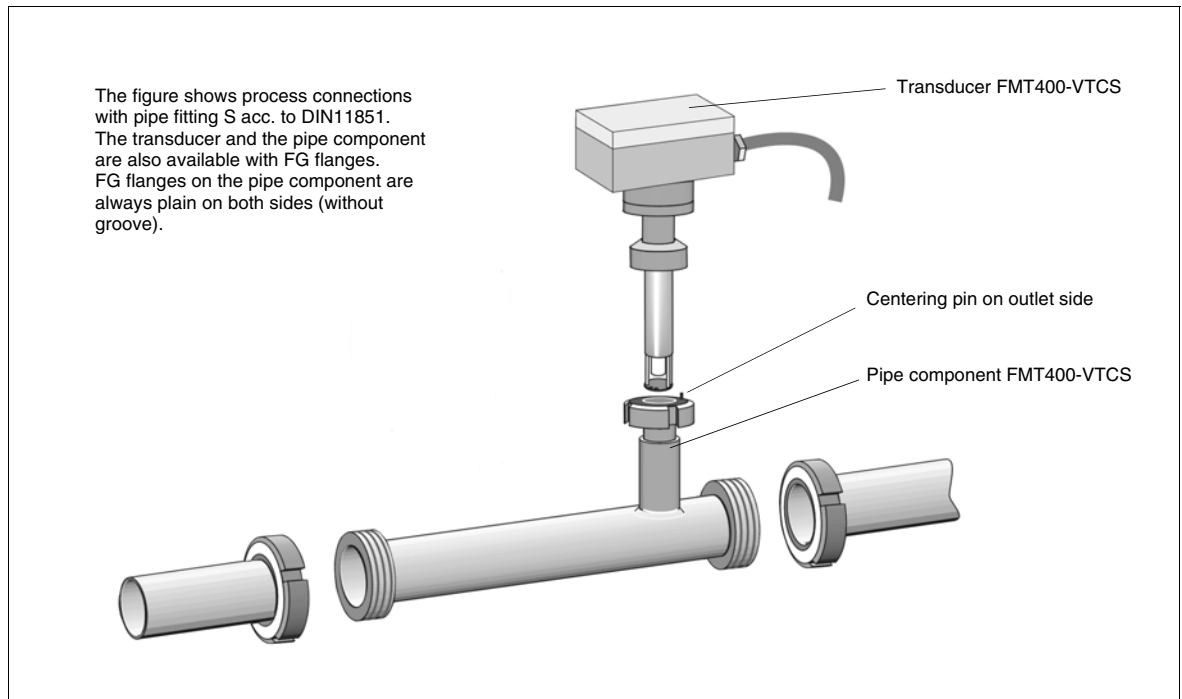


Fig. 3-2 Hygienic version FMT400-VTCS

The pipe components and weld-on adapters guarantee the defined installation of the transducer in the pipeline. Moreover, they allow simple removal and installation of the transducer for inspection and/or cleaning.

By closing the pipe component with a blind flange, it is possible to use the measuring section even without installed transducer.

The versions available as standard – depending on the respective nominal width and the desired adaptation – are shown in chapter 10, “Technical Data”.

3.2 Transducer (detecting element)

The detecting element which is designed as a plug-in sensor contains, apart from the sensor unit, the completely cast transmitter switching unit installed in the connection head. This is mainly composed of the passive part of the differential temperature controller for the sensor elements, a memory for all parameter-related measuring points, the connector for the LCS adapter and the computer for generating flow-specific data.

In addition, a flow-linearized analog signal of 0/4...20 mA (electrically isolated) is directly provided. No special supply/evaluation device is required.

The transducer is flanged or screwed into pipe component as a plug-in sensor with a centering pin in a defined manner.

See also chapter 10, “Technical Data”.

4 Mechanical installation

4.1 Important information to begin with (check list)



CAUTION

Prior to commissioning please pay attention to the following points and read the operating instructions carefully.

Each measuring system is delivered with a calibration certificate containing all important information on the respective device such as measuring medium, measuring range, operating temperature range, nominal size, serial number, ..., ABB Catalog No).

Measuring systems used for gaseous oxygen are given an extra clearance certificate in the form of a Manufacturer's certificate.

The following points should be given special attention:

1. Do the operating data of the existing measuring point correspond to the data stated on the calibration certificate (e.g. medium, operating temperature, pressure, measuring range, ...)?
2. Have the permissible ambient temperatures been kept?
3. Is the pipe component or the weld-on adapter correctly installed (pay attention to the flow direction!)?
4. Have the recommended input and output lengths been complied with?
5. Is the installation between detecting element and pipe component correctly done?
6. Are the used sealings in their correct positions and in good condition?
7. Have the electrical connections U_{IN} (24 V) and I_{OUT} (0/4...20 mA) been correctly made?

4.2 Place of installation

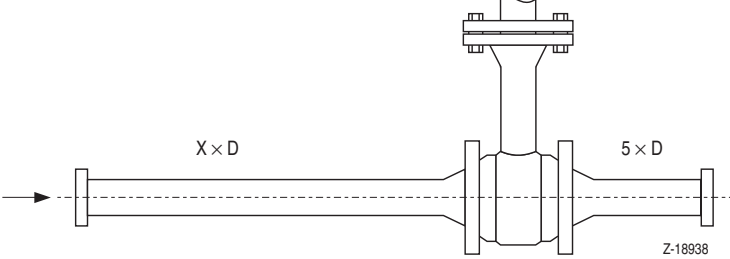
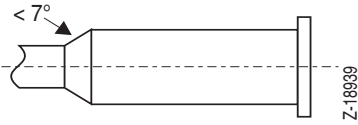
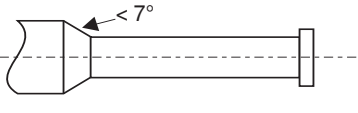
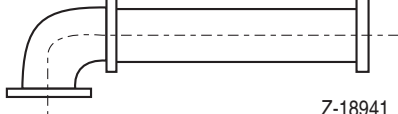
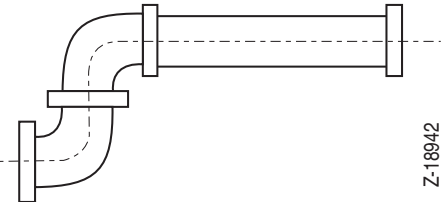
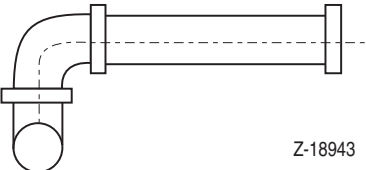
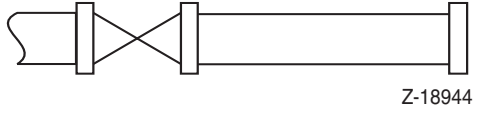
- The installation site must fulfill the requirements stated in the chapter "Technical Data: Operating Conditions, Environmental Conditions".
- In order to avoid adverse effects on the measurement accuracy, input and output measuring sections should be provided (see chapter 4.3).
- When matching up the detecting element with a weld-on adapter, please read the information in chapter 4.6.

Please make sure that the units are easily accessible when they are installed.

4.3 Recommended steadying run lengths for inlet run disturbances

Inlet and outlet runs must be provided to avoid negative effects on the measuring accuracy. These steadying run lengths make sure that disturbances of the flow profile are eliminated before they can reach the actual measuring point at the transducer. Straight, undisturbed pipe lengths are used as steadying run lengths, their length depends on the type of the inlet run disturbance.

Recommended steadying lengths according to DIN EN ISO 5167-1

	
	Expansion $X = 15$
	Reducer $X = 15$
	90°-elbow $X = 20$
	Two 90°-elbows in 1 level $X = 25$
	Two 90°-elbows in 2 levels $X = 40$
	Valve/slide $X = 50$

To achieve the stated measuring accuracy, the steadying lengths seen above must be provided. The inlet and outlet run lengths are stated as multiples of the pipe diameter D .

For combinations of inlet run disturbances, e. g. valve and reducer, you must always consider the longer inlet run length.

In confined spaces at the mounting location the outlet run length can be shortened to $3 \times D$. The reduction of the minimum inlet run length, however, will impact on the achievable accuracy. High repeatability of the measuring value is still provided.

Under certain circumstances, special calibration can be performed for insufficient steadying lengths. For this purpose and in individual cases, consult the DKD Calibration Department of ABB Automation Products GmbH at Alzenau. An on-site adjustment is also possible, if reference flow values are precisely known, by entering a calibration factor.

The specifications for the steadying sections relate to air and most other measurable gases.

**IMPORTANT**

For gases with extremely low density (hydrogen, helium) the steadying lengths must be doubled. If type 2 pipe components with integrated flow straighteners are used, then the steadying lengths specified for air are sufficient.

Components that influence the flow (e. g. valves, shut-off fittings and similar components) should possibly be mounted at the outlet run length, i. e. behind the measuring point.

4.4 Installation



CAUTION

Safety instructions

When dismantling, with more than 1.1 bar absolute pressure, or with high temperatures or health-hazardous gases in the pipe, the use of the exchange tool is recommended and obligatory for safety reasons (see chapter 4.7).

Non-observance may lead to severe injuries of persons.

The installation is described using the example of a pipe component of type 1 in intermediate flange version. The description analogously also applies to a type 2 pipe component and the weld-on adapters.

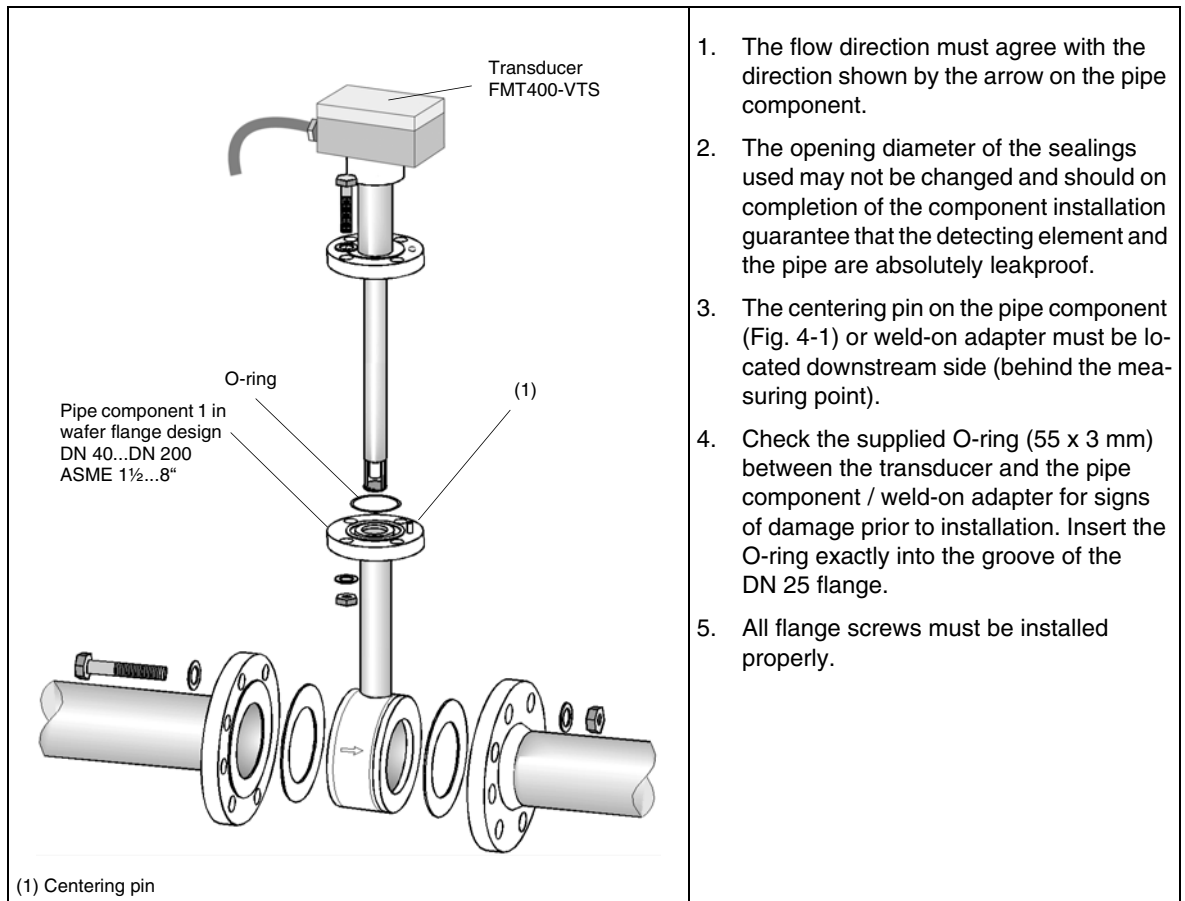


Fig. 4-1 Schematic illustration of a pipe component 1 with intermediate flange



IMPORTANT

In the case of the type 1 pipe component (intermediate flange version) with ball valve and a nominal width DN 125, DN 150 und DN 200 / 6" und 8", transducers with a length of 425 mm (16,73") must be used.

4.5 Dimensional drawings, version for process engineering

Transducer	Pipe component 1 Wafer flange	Pipe component 2 Measuring section	Weld-on adapter up to DN 100 (4")

PN 40									
Nom. size		L2	h	D1	d1	d2	D4	L3	L4
DN 25		269 (10.59)	263 (10.35)	—	28.5 (1.12)	—	115 (4.53)	600 (23.62)	486 (19.13)
DN 40				94 (3.70)	43.1 (1.70)	88 (3.46)	150 (5.91)	860 (33.86)	731 (28.78)
DN 50	B1 = 125 (4.92)			109 (4.29)	54.5 (2.15)	102 (4.02)	165 (6.50)	1000 (39.37)	837 (32.95)
DN 65	B2 = 80 (3.15)			129 (5.67)	70.3 (2.77)	122 (4.80)	185 (7.28)	1400 (55.12)	1190 (46.85)
DN 80	B3 = Ø115 (4.53)			144 (5.67)	82.5 (3.25)	138 (5.43)	200 (7.87)	1700 (66.93)	1450 (57.09)
DN 100	B4 = 58 (2.28)			170 (6.69)	107.1 (4.22)	162 (6.38)	—	—	—
DN 125	L1 = 188 (7.40)			196 (7.72)	131.7 (5.19)	188 (7.40)	—	—	—
DN 150	L5 = 450 (17.72)			226 (8.90)	159.3 (6.27)	218 (8.58)	—	—	—
DN 200	L7 = 65 (2.56)			293 (11.54)	206.5 (8.13)	285 (11.22)	—	—	—
> 350		431 (16.97)	425 (16.73)						
> 700		781 (30.75)	775 (30.51)						

Dimensions in mm (inch)

ASME B 16.5, Cl. 150 (ANSI), Sch 40 S									
1"		269 (10.59)	263 (10.35)	—	26.6 (1.05)	—	108 (4.25)	560 (22.05)	454 (17.87)
1½"	B1 = 125 (4.92)			85 (3.35)	40.9 (1.61)	73 (2.87)	127 (5.00)	864 (34.02)	741 (29.17)
2"	B2 = 80 (3.15)			103 (4.06)	52.6 (2.07)	92 (3.62)	154 (6.06)	1003 (39.49)	846 (33.31)
3"	B3 = Ø115 (4.53)			135 (5.31)	78.0 (3.07)	127 (5.00)	—	—	—
4"	B4 = 58 (2.28)			173 (6.81)	102.4 (4.03)	157 (6.18)	—	—	—
6"	L1 = 188 (7.40)			221 (8.70)	154.2 (6.07)	216 (8.50)	—	—	—
8"	L5 = 450 (17.72)			278 (10.94)	202.7 (7.98)	270 (10.63)	—	—	—
> 14"	L7 = 65 (2.56)	431 (16.97)	425 (16.73)						
> 28"		781 (30.75)	775 (30.51)						

Dimensions in mm (inch)

ASME B 16.5, Cl. 300 (ANSI), Sch 40 S									
1"		269 (10.59)	263 (10.35)	—	26.6 (1.05)	—	123.9 (4.88)	560 (22.05)	454 (17.87)
1½"	B1 = 125 (4.92)			94 (3.70)	40.9 (1.61)	73 (2.87)	155.4 (6.12)	864 (34.02)	741 (29.17)
2"	B2 = 80 (3.15)			110 (4.33)	52.6 (2.07)	92 (3.62)	165.1 (6.50)	1003 (39.49)	846 (33.31)
3"	B3 = Ø115 (4.53)			148 (5.83)	78.0 (3.07)	127 (5.00)	—	—	—
4"	B4 = 58 (2.28)			180 (7.09)	102.4 (4.03)	157 (6.18)	—	—	—
6"	L1 = 188 (7.40)			249 (9.80)	154.2 (6.07)	216 (8.50)	—	—	—
8"	L5 = 450 (17.72)			307 (12.09)	202.7 (7.98)	270 (10.63)	—	—	—
> 14"	L7 = 65 (2.56)	431 (16.97)	425 (16.73)						
> 28"		781 (30.75)	775 (30.51)						

Dimensions in mm (inch)

4.6 Weld-on adapter

4.6.1 Weld-on adapter for FMT400-VTS (Sensyflow VT-S) transducer

When installing the transducer in pipes with larger nominal width or non-round cross-section, the weld-on adapter must be welded to the pipeline under consideration of the following information:

- The weld-on adapter must have a length L after welding (see Fig. 4-2 and Fig. 4-3)

$$L = h - \frac{1}{2} \times \varnothing D_{\text{outside}} \quad \text{with } h = 263 \text{ mm (10,35")}, 425 \text{ mm (16,73") or } 775 \text{ mm (30,51")}$$
 (transducer lengths)
 - The weld-on adapter must be shortened to the corresponding length before welding. After welding in place, a few mm of the weld-on adapter can protrude into the pipe, max. 10 mm (0,39").
 - Observe the pipeline wall thickness and amount of shrinkage when welding!
 - The distance h from the flange top edge of the adapter to the pipe center line must be within a tolerance of $\pm 2 \text{ mm (0,08")}$.
- Rectangularity to the pipe axis must be absolutely kept (max. tolerance: 2°).
- The centering pin of the adapter must be aligned in flow direction to the pipe axis (at outlet run length, behind measuring point).
- After welding the free passage for inserting the transducer must be at least 28 mm (1,10") (if required, use drill to clear).
- Transducer installation:
 - Insert the supplied O-ring (55 mm $\times$ 3 mm) into the provided groove.
 - Push the transducer into the adapter and screw together.

Weld-on adapter for FMT400-VTS (Sensyflow VT-S)

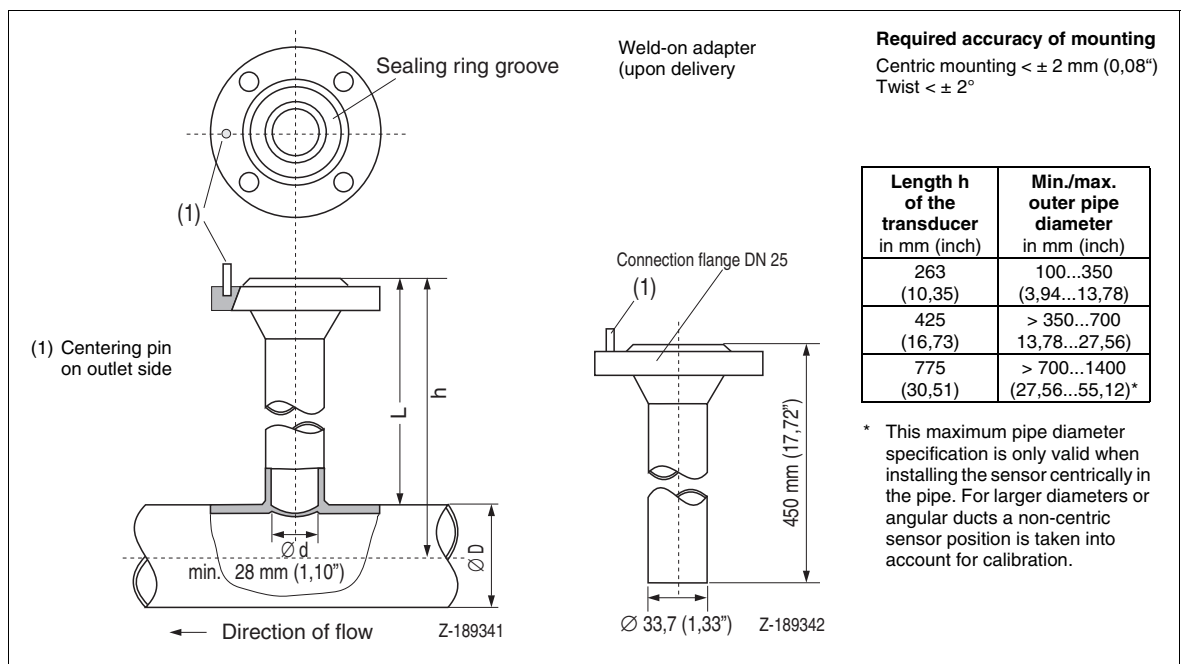


Fig. 4-2 Installation of the weld-adapter



IMPORTANT

Deviations from the stated dimension and position tolerances cause additional measuring uncertainty.

4.6.2 Pipe component and weld-on adapter with ball valve

The ball valve version allows you to mount and dismount the transducer even with low overpressure in the pipe letting very little gas escape.

The weld-on adapter is mounted as described in chapter 4.6.1.

NOTICE

When welding, it must be ensured that the seals in the ball valve do not overheat. In there is any doubt, the ball valve must be removed before starting the welding.

When mounting and dismounting the transducer always make sure that the gas pressure inside the pipe is not as high that the transducer is pressed out of the pipe component or weld-on-adapter. We recommend to use the integrated hot tap fitting for gas pressures above 1.1 bar abs.

Fully open the ball valve before mounting the transducer. Fit in the appropriate gasket, thoroughly center the transducer and fasten it.

Prior to dismounting the transducer always check that the pipe is depressurized or that the pressure in the pipe is low enough to ensure safe dismounting. Only then undo the 4 screws on the DN 25 flange, dismount the transducer and close the ball valve.

NOTICE

Do not close the ball valve before removing the transducer. Otherwise, the ball may considerably damage the cage or the sensor elements.

Weld-on adapter with ball valve for FMT400-VTS (Sensyflow VT-S)

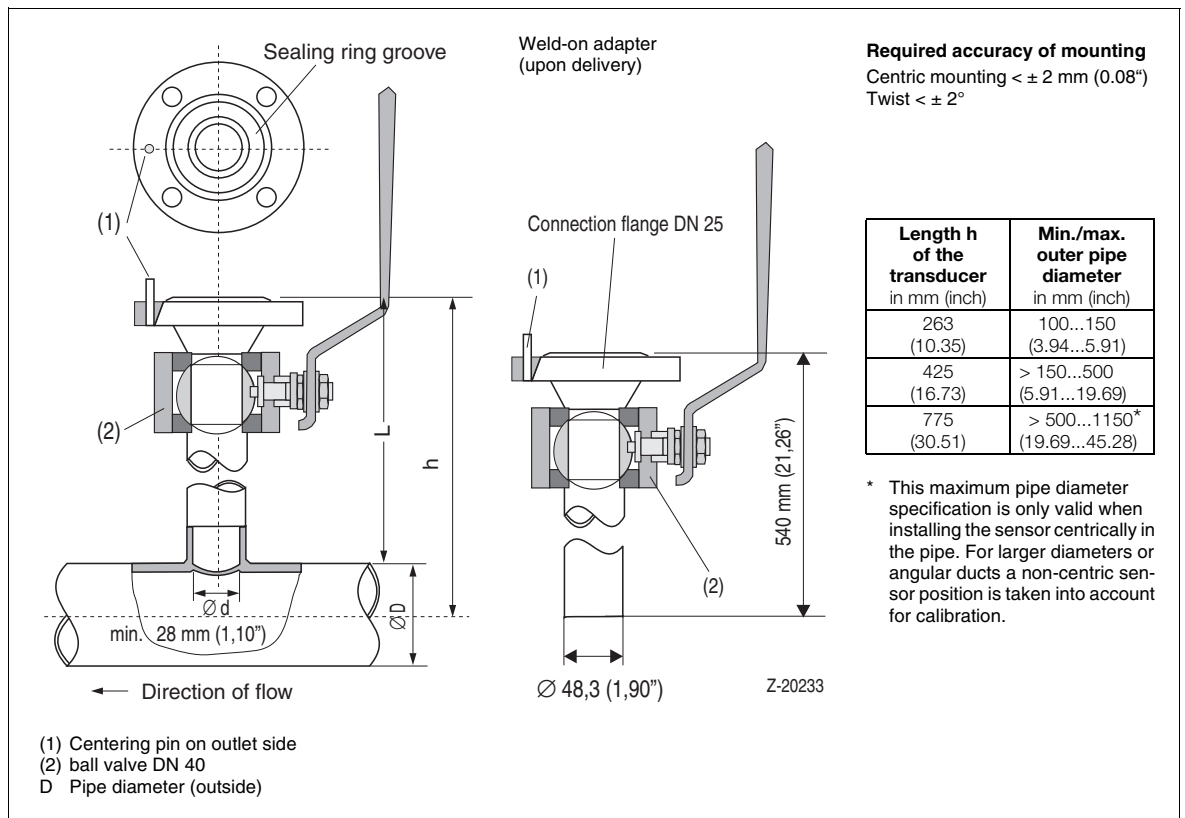


Fig. 4-3 Installation of the weld-on adapter with ball valve

IMPORTANT

Deviations from the stated dimension and position tolerances cause additional measuring uncertainty.

4.7 Integrated hot tap fitting for FMT400-VTS (Sensyflow VT-S)



WARNING

Safety instructions

When dismantling, with more than 1.1 bar absolute pressure, or with high temperatures or health-hazardous gases in the pipe, the use of the exchange tool is recommended and obligatory for safety reasons.

Non-observance may lead to severe injuries of persons.

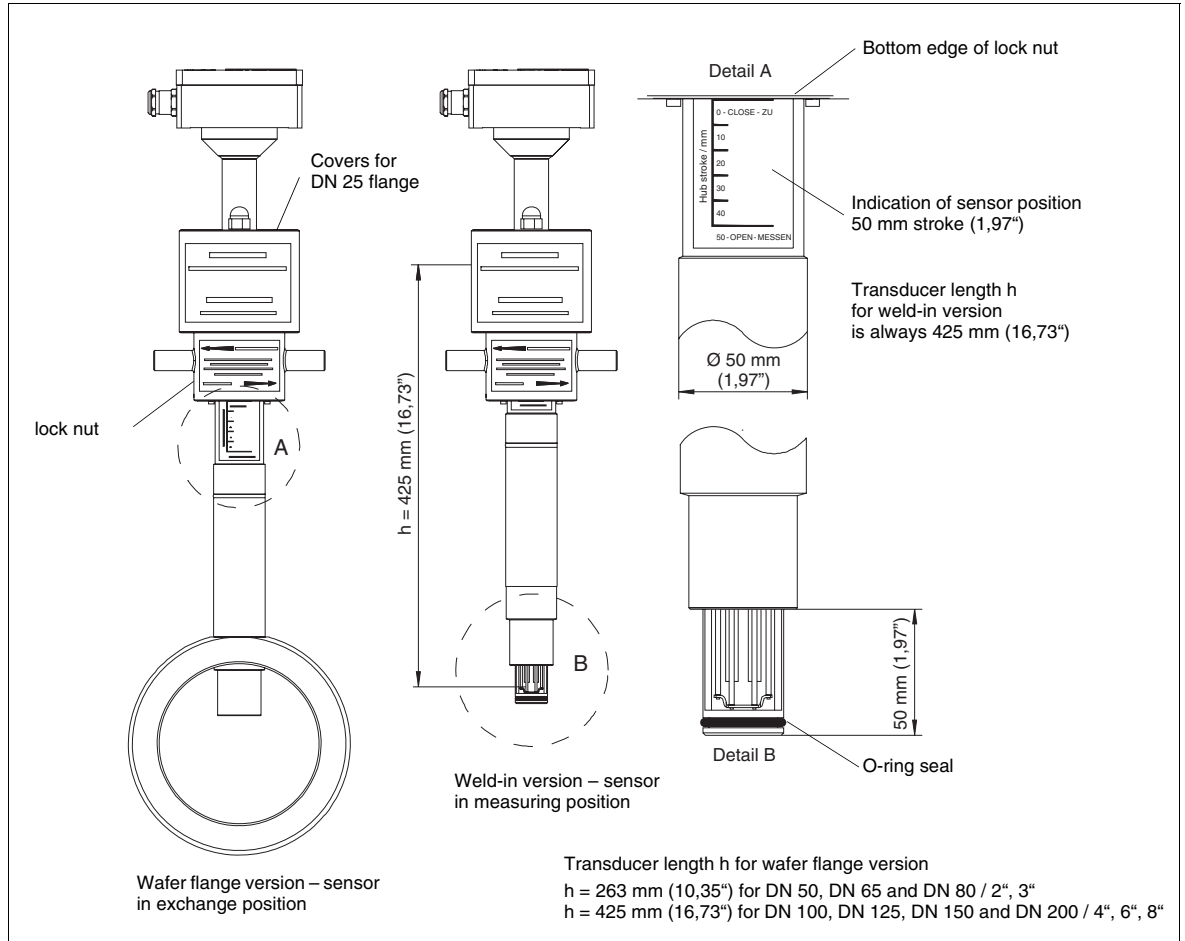


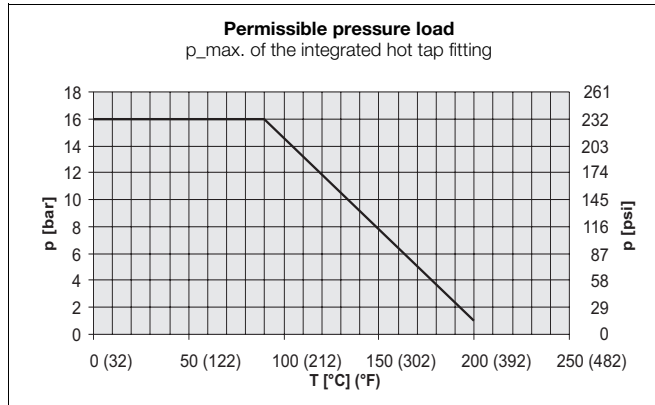
Fig. 4-4 Integrated hot tap fitting, wafer flange and weld-in versions

The integrated hot tap fitting is used instead of the pipe component and weld-on adapter assembly described above if the sensor must be exchangeable during operation with virtually no gas escaping from the system.

It is recommended to use the hot tap fitting for measurements in main conduits (e.g. compressed air systems) or for measuring points which otherwise require rinsing prior to removing the sensor. As a rule, hot tap fittings should be preferred for all systems where, otherwise, the entire system or parts of it must be switched off to replace a sensor.

4.7.1 Technical data for integrated hot tap fittings

The hot tap fitting is designed for compressive loads of max. 16 bar. To ensure interchangeability with standard pipe components (Design 1), the wafer version (fig. Fig. 4-6) was developed for DIN flanges DN 50 and DN 80 with a pressure stage of PN 40 (DN 65 in pressure stage PN16, use a connection flange with 4 screw holes). Imperial versions 2...8" are designed for connection flange ASME B16.5 Cl.150 only. Suitable sensor lengths are listed in Fig. 4-4.



Temperature: max. 200 °C (392 °F)
 Pressure (abs) 16 bar - 90 °C
 (232 psi - 194 °F)
 1 bar - 200 °C
 (14.5 psi - 392 °F)

Fig. 4-5 Maximum pressure/temperature values for the integrated hot tap fitting

4.7.2 Mounting the wafer flange version

Fig. 4-6 (left) shows the wafer flange version of the hot tap fitting mounted in the pipeline in disassembly position, i.e., the guide tube is in its upper end position and seals the Sensyflow opening (right).

The hot tap fitting is sealed on both sides with the flat gaskets against the mounting flange of the pipeline. For greatest measurement accuracy, it must be centered exactly between the flanges, as it is for conventional pipe components (see Fig. 4-1). Please observe the proper flow direction (arrow on pipe component).



Fig. 4-6 Hot tap fitting in disassembly position

4.7.3 Mounting the weld-in version

The weld-in version of the hot tap fitting is available in two overall lengths:

- For meter sizes DN100 / 4" to DN125 / 5" and
- For meter sizes DN150 / 6" to DN300 / 12"

The sensor length is $h = 425 \text{ mm}$ (16,73") in both cases.

The installation depth depends on the pipe diameter and is calculated individually.

NOTICE

The components of the hot tap fitting may not be shortened or altered structurally.

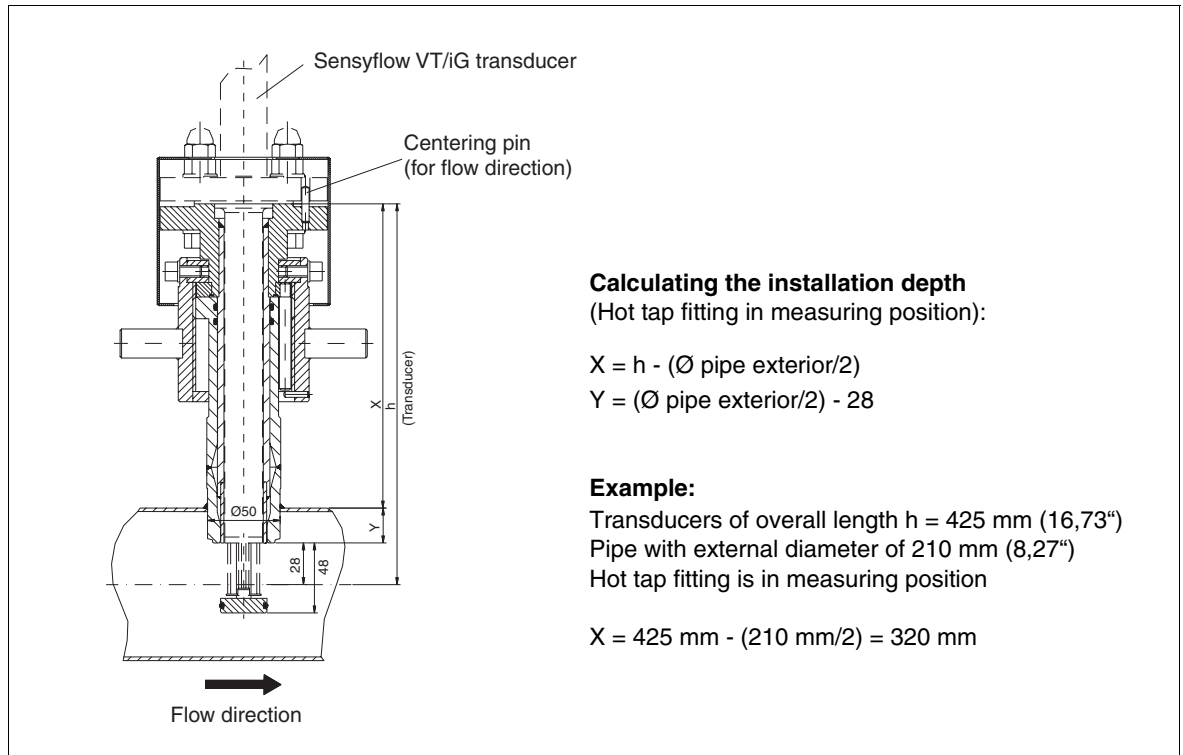


Fig. 4-7 Hot tap fitting in measuring position

When welding the hot tap fitting into the pipeline the following points must be taken into consideration:

- Observe pipeline wall strength and degree of shrinkage for welding.
- The distance h from the upper edge of the flange on the fitting to the pipe central axis must be within a tolerance of $\pm 2 \text{ mm}$ (0,08") in measuring position.
- Maintain the right angle to the pipe axis (max. tolerance: 2°).
- The centering pin must be aligned with the pipe axis in the flow direction (outflow side, behind the measuring site (see Fig. 4-7)).



NOTICE

- Make sure that welded joints do not overheat to prevent warping of the seal surface and damage to the O-rings. You may need to pause and allow the fitting to cool.



IMPORTANT

Deviations from the stated dimension and position tolerances cause additional measuring uncertainty.

4.7.4 Mounting the transducer with system in operation

- The hot tap fitting must be in disassembly position (Fig. 4-6), i.e., Sensyflow opening is sealed.
- Place the supplied O-ring (55 mm x 3 mm [2,17 x 0,12"]) in the appropriate groove (Fig. 4-8). The O-ring gasket and screws are included in the delivery scope.
- Insert the Sensyflow transducer in the hot tap fitting and secure with screws (two M12 screws and two extended special screws, installed opposite each other (Fig. 4-9).
- Install the covers and use nuts to attach them to the special screws (Fig. 4-10).
- Rotate the Sensyflow transducer into measuring position using the lock nut (Fig. 4-10). The lower edge of the lock nut indicates the current position of the sensor. When you reach the measuring position 50 - OPEN - MESSEN (lower stop of lock nut), the sensor is in the middle of the pipeline and accurate values will be provided (see detail A in Fig. 4-4).



NOTICE

The lock nut may only be operated manually. Use of tools or other devices is prohibited.

- Electrically connect the Sensyflow transducer (see chapter 5)

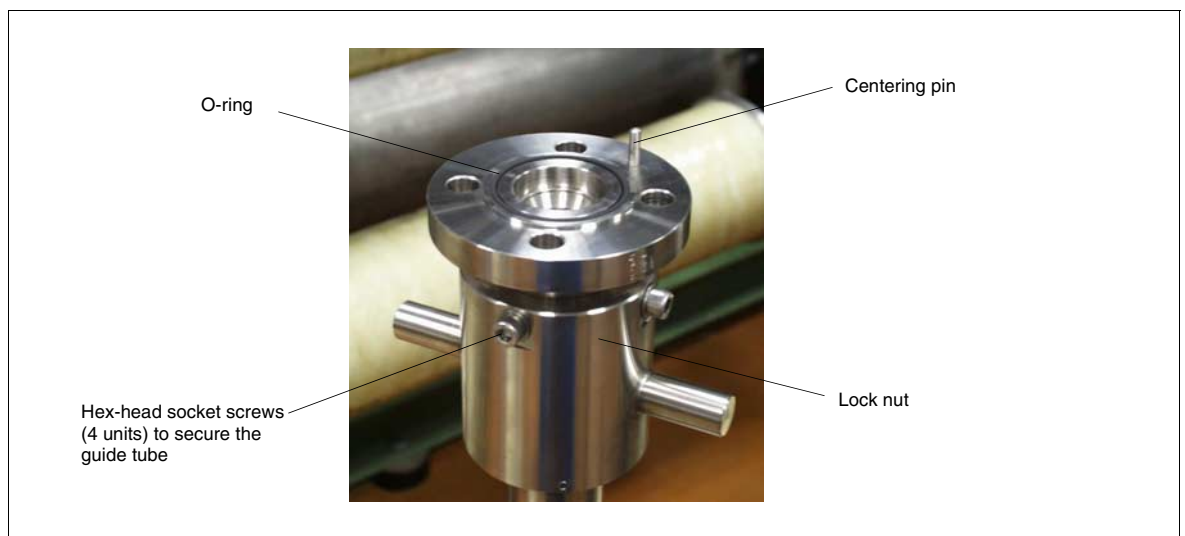


Fig. 4-8

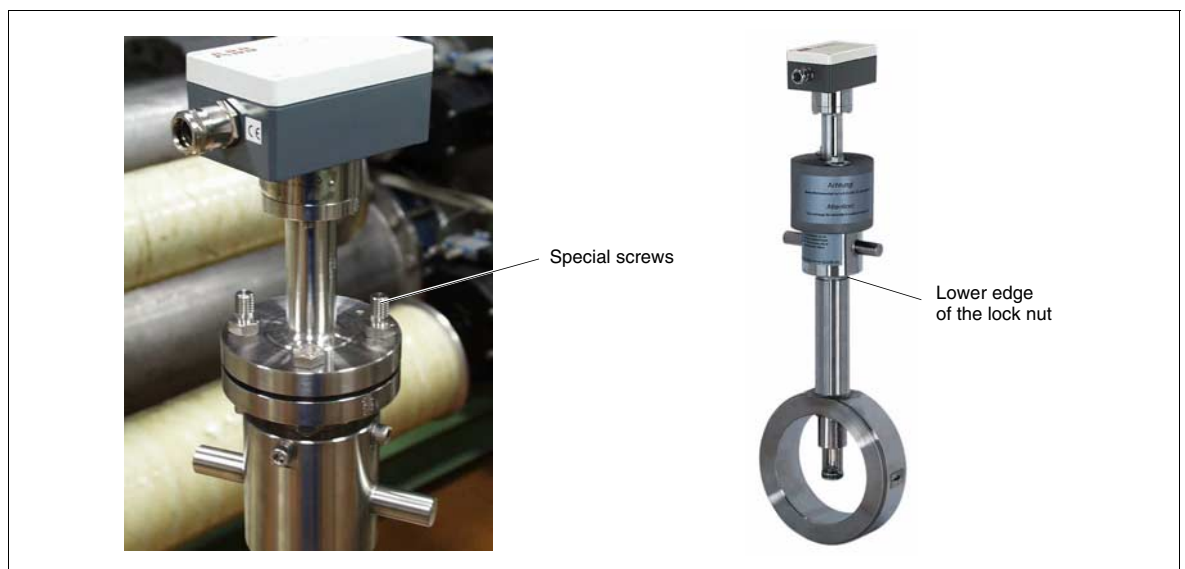


Fig. 4-9 Special screws for covers

Fig. 4-10 Transducer with integrated hot top-fitting in measuring position

4.7.5 Disassembling the transducer with system in operation

- Rotate the hot tap fitting using the lock nut. (Upper stop of lock nut, with lettering 0 - CLOSE - ZU must be visible; see detail A in Fig. 4-4).
- Disconnect transducer electrically according to instructions manual.
- Remove the nuts for the covers and carefully release the screws securing the transducer according to the following instructions.



DANGER

The mounting screws of the Sensyflow transducer may only be released when the hot tap fitting is in disassembly position. Do not release the mounting screws when the fitting is in measuring position.



WARNING

Depending on design, a small amount of process gas (some cm³) may be released when disassembling the transducer. For toxic or explosive gases, make sure that sufficient ventilation is provided.



WARNING

If when releasing the mounting screws you notice a large amount of gas escaping, the activities must be stopped and screws retightened. Check whether the fitting is actually in disassembly position. If it is positioned properly, disassembly of the transducer can only be performed after emptying and, if necessary, cleaning the pipeline (defective hot tap fitting, see Maintenance).

- Remove the transducer from the hot tap fitting. Warning: Do not tip to the side.

4.7.6 Maintenance

After approx. 100 installation and disassembly procedures, the transducer O-ring gaskets for the PN 16 hot tap fitting must be replaced. When working with dusty, abrasive or aggressive measured media, it may be necessary to replace these more frequently.

Only ABB Service or qualified personnel of the operator is authorized to replace O-ring gaskets. For the latter case, the warranty is no longer valid for ABB.

Fig. 4-11 shows the individual parts of the hot tap fitting:



Fig. 4-11 Components of the integrated hot tap fitting

1. Pipe component with lock nut (flange version)
2. Guide tube with slip ring and guide pin. The specially processed surface of the guide tube maintains the seal during installation and disassembly.



NOTICE

The surface of the guide tube must not be damaged. When disassembling the guide tube, the warranty is no longer valid for ABB.

3. Covers
4. Sensyflow VT/iG transducer

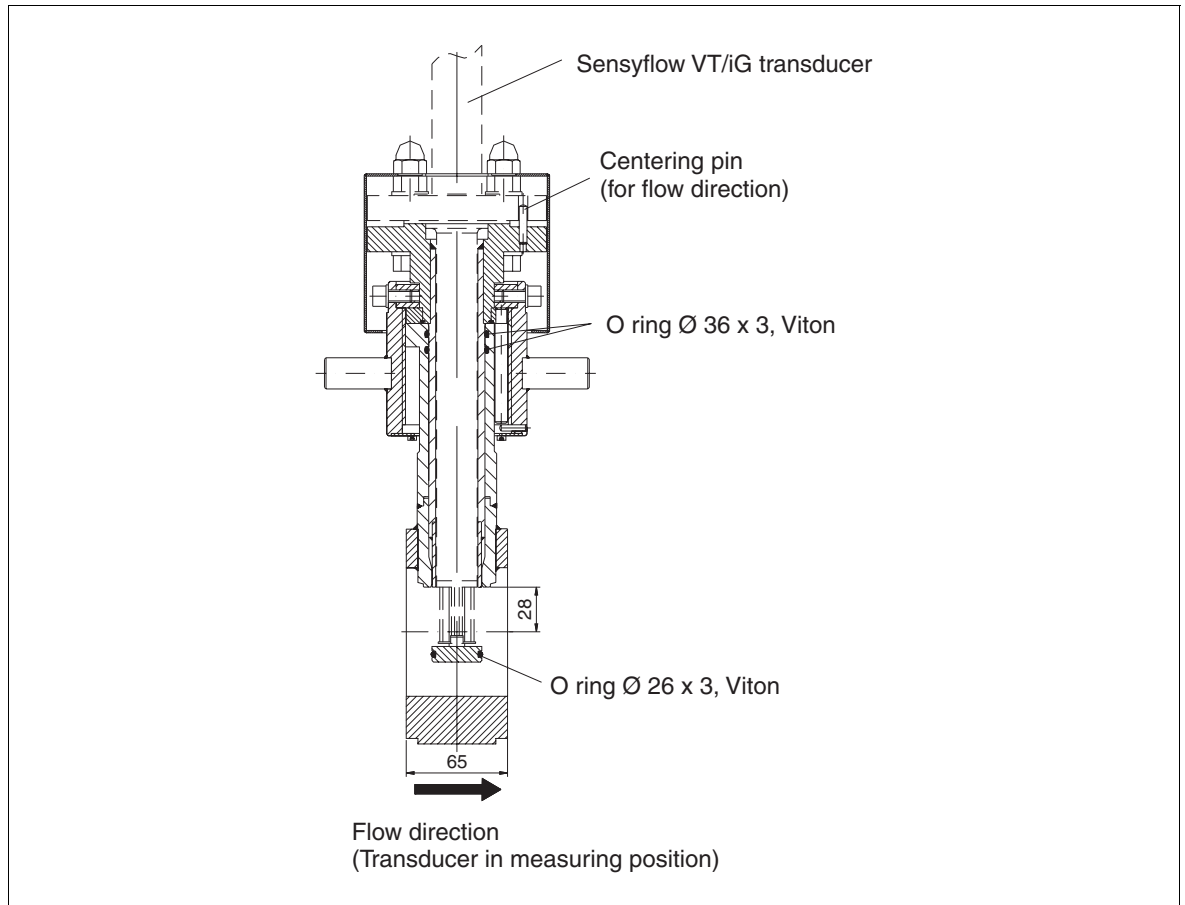


Fig. 4-12 Hot tap fitting in wafer configuration for DIN flange PN 40



DANGER

Before disassembling the guide tube, make sure that the pipeline has been relieved of atmospheric pressure and cleaned.

Disassembling transducers (see chapter 4.7.5)

- To disassemble the guide tube, release the 4 hex-head screws on the lock nut (Fig. 4-8) and remove the guide tube. Clean parts, if necessary.
- Replace the two internal Viton 36 x 3 mm O-rings of the fitting and the Viton 26 x 3 mm O-ring of the guide tube (see Fig. 4-12). Lightly lubricate the O-rings as well as the threads of the lock nut and slip ring of the guide tube. For oxygen applications, only approved O₂ fittings grease may be used (e.g., Krytox GPL-226).
- Insert the guide tube in the fitting and tighten the 4 hex-head screws of the lock nut until reaching the stop in identical position as with disassembly.
- Verify correct installation by rotating the lock nut into measuring and disassembly positions.

4.8 FMT400-VTCS (Sensyflow VT-CS), hygienic versions

Measuring ranges at atmospheric pressure

Type of gas			Air, nitrogen, oxygen -25...150 °C (-13...302 °F)										
Nominal size:			q_{min}		q_{max}	q_{min}		q_{max}	q_{min}		q_{max}		
mm	inch		kg/h	kg/h		Nm ³ /h	Nm ³ /h		lbs/h	lbs/h			
for 0 °C (32 °F) / 1013.25 hPa (14.696 psia)													
DN 25	(1)	0	(1.6)	...	160	0	(1.2)	...	120	0	(3.5)	...	350
DN 40	(1,5)	0	(4)	...	430	0	(3)	...	330	0	(10)	...	950
DN 50	(2)	0	(7)	...	700	0	(5)	...	540	0	(15)	...	1,500
DN 80	(3)	0	(17)	...	1,700	0	(13)	...	1,300	0	(37)	...	3,700

Type of gas			Carbon dioxide -25...150 °C (-13...302 °F)										
Nominal size:			q_{min}		q_{max}	q_{min}		q_{max}	q_{min}		q_{max}		
mm	inch		kg/h		kg/h	Nm ³ /h		Nm ³ /h		lbs/h	lbs/h		
						for 0 °C (32 °F) / 1013.25 hPa (14.696 psia)							
DN 25	(1)	0	(1.8)	...	180	0	(0.9)	...	90	0	(4)	...	400
DN 40	(1,5)	0	(4)	...	440	0	(2)	...	220	0	(10)	...	970
DN 50	(2)	0	(7)	...	730	0	(4)	...	370	0	(16)	...	1,600
DN 80	(3)	0	(19)	...	1.900	0	(10)	...	900	0	(42)	...	4.200

4.9 Dimensional drawings FMT400-VTCS

Pipe fitting S acc. to DIN 11851

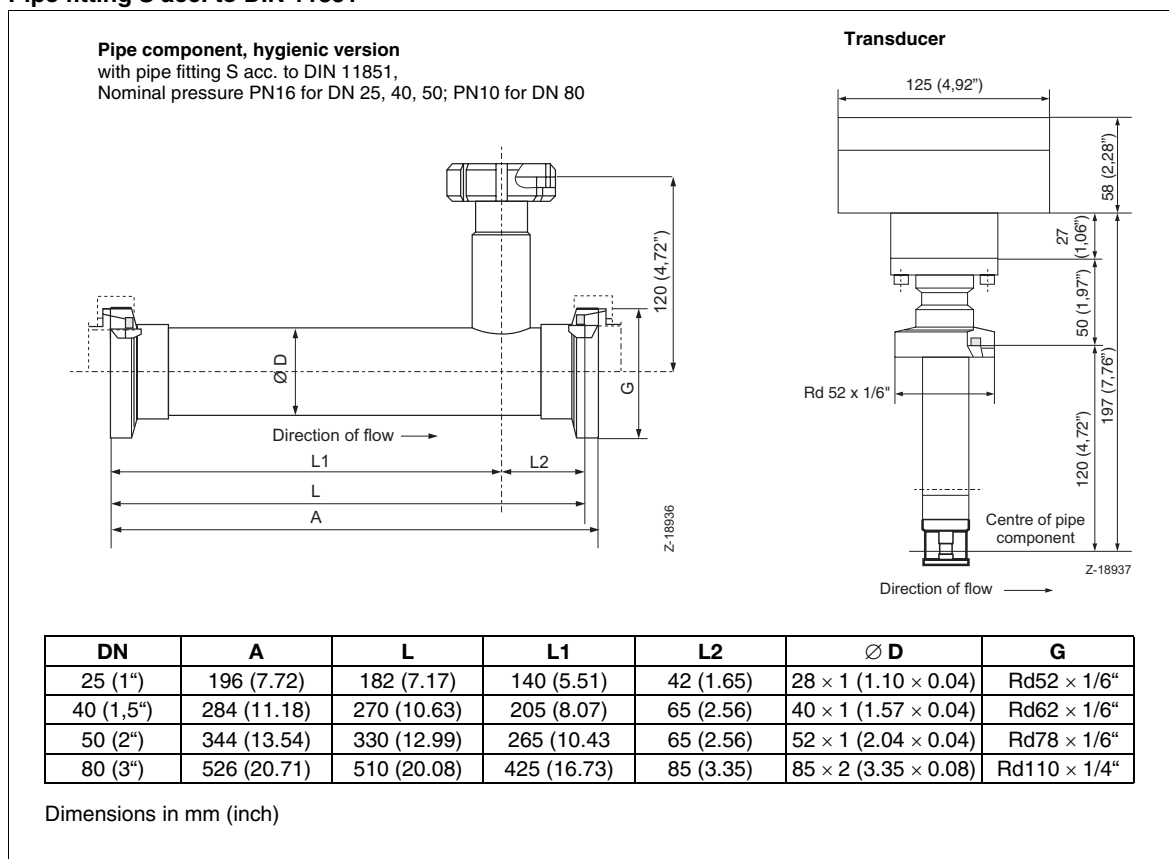


Fig. 4-13 Dimensional drawings hygienic version with pipe fitting S

FG flange

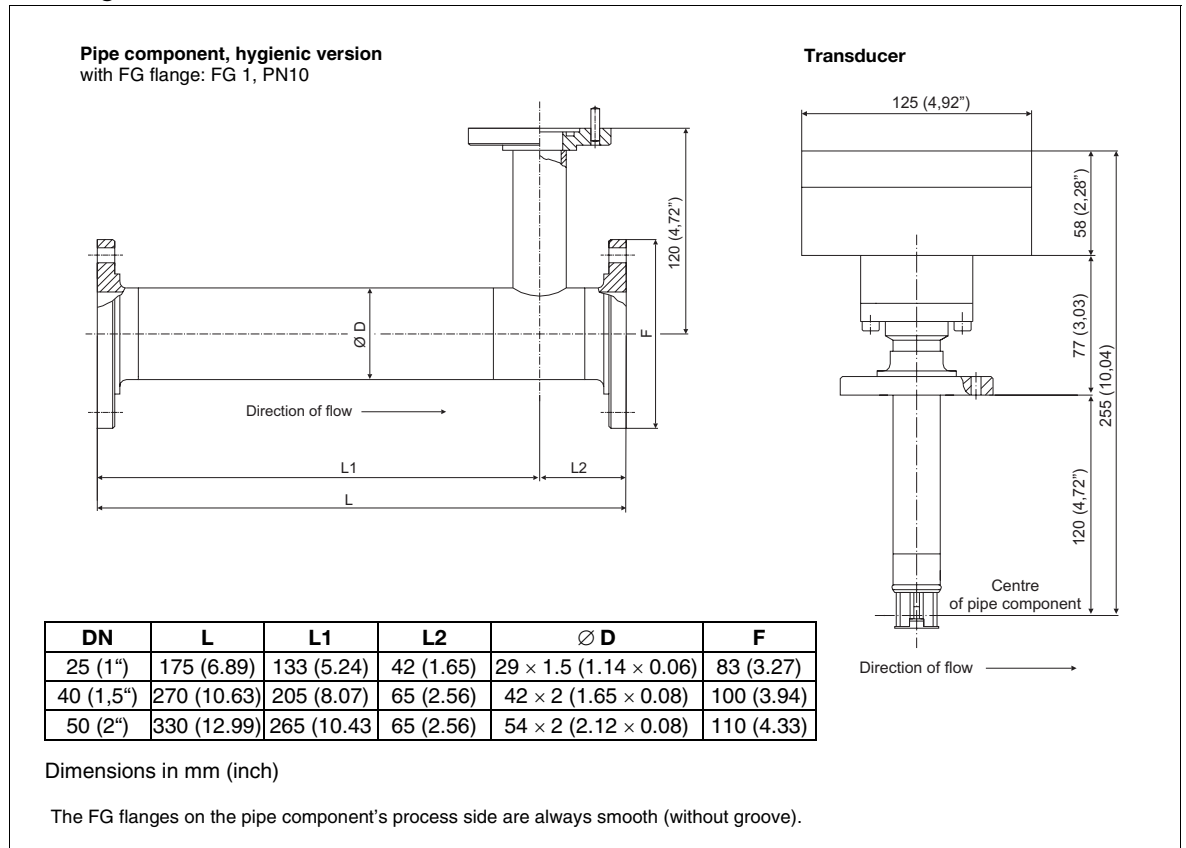


Fig. 4-14 Dimensional drawings Hygienic version with FG flange

Follow the instructions given in chapter 4.4 to install the transducers in the pipe components.

Select the gaskets in accordance with the connection standard used.

5 Electrical installation

Requirement Prior to connecting electrical cables the device must be mounted properly. The auxiliary power is switched off.

Destination Measuring system is ready for operation.

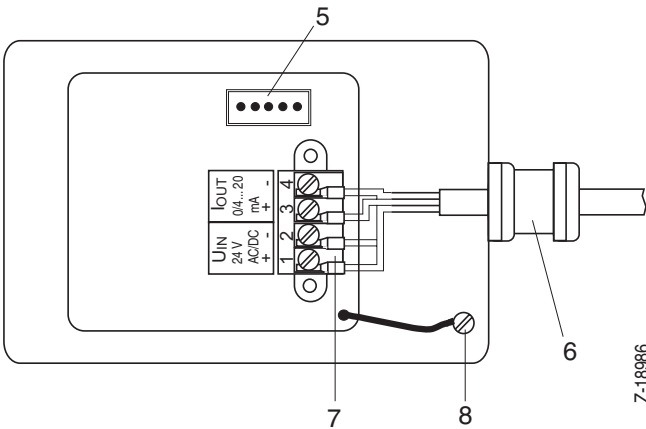


Fig. 5-1 Detecting connection head (without cap of connection head)

1 ... 4 Terminals Fig. 5-2

5 Terminals for parameter setting (Plug connection for LKS adapter)

6 Cable entry with shielding connected

7 Terminal board

8 Ground

1. A shielded, four-wire cable (e. g. 4 x 1 mm² / AWG 18) is required to connect the detector.
2. Remove the connecting head cap of the detector by undoing the 4 screws.
3. Connect the four wires to the terminal of the detector electronic unit (see Fig. 5-2).

CAUTION
Electrical isolation is only safeguarded when terminal 4 is not connected to terminal 2 of the auxiliary voltage!

4. Connect the shielding to the EMC cable entry.

IMPORTANT
For reasons of EMC the shielding should not be routed through the case, in order to preserve the shielding effect!

5. Replace the connection head cap and screw tightly. Make sure that the sealing is in the correct position.

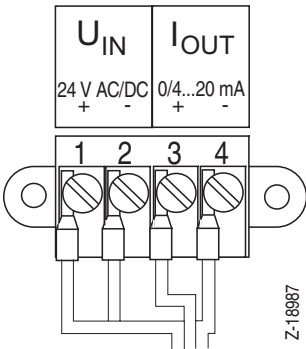


Fig. 5-2

1 Power supply 24 V AC / DC +

2 Power supply 24 V AC / DC -

3 Analog output 0/4...20 mA (electrically isolated) +

4 Analog output 0/4...20 mA (electrically isolated) -


CAUTION

When powering the device with 24 V UC exclusively use extra low voltage with protective separation from other circuits (German standard DIN VDE 0106).

Do not connect mains voltage 115 V AC or 230 V AC to the 24 V UC input.

This will damage the device electronics!

Connecting
Connecting power supply 24 V

Step	Action
1.	 Check whether the operating voltage specified on the device matches the power supply voltage.
2.	Use a power supply line with sufficient dimensions and ratings (recommended line safety switches as of 2 A, slow-blow).
3.	Provide a mains switch or switchable power socket close to the device to be able to disconnect the device from all power if required. Mark the mains switch accordingly to allow for a clear allocation to the respective equipment.
4.	Connect the power cable to the mains.
5.	Absolutely observe the notes in chapter 6 before switching on the power supply.

6 Start-up – Safety instructions

Requirements

The device must be installed and the electrical signal lines must be connected prior to start-up.

6.1 Checking the installation

Prior to starting the device, make sure that it has been installed properly.

Follow the checklist:

Step	Check	✓
1.	Is the unit securely fastened?	☐
2.	Are the electrical signal, control and interface cable laid and connected correctly?	☐
3.	Do the operating data of the existing measuring point correspond to the data stated on the calibration certificate (e.g. medium, operating temperature, pressure, measuring range, ...)?	☐
4.	Have the permissible ambient temperatures been kept?	☐
5.	Is the pipe component or the weld-on adapter correctly installed (pay attention to the flow direction!)?	☐
6.	Have the recommended input and output lengths been complied with?	☐
7.	Is the installation between detecting element and pipe component correctly done?	☐
8.	Are the used sealings in their correct positions and in good condition?	☐
9.	Have the electrical connections U_{IN} (24 V) and I_{OUT} (0/4...20mA) been made correctly?	☐

6.2 Switching on

CAUTION

Prior to switching on the device make sure that all steps described in chapter 4 and chapter 5 have been executed properly.

Check again that the operating voltage selected on the device is identical with the local mains voltage.

🔊 After power-on, the device is automatically on.



7 Changing the configuration

The configuration/parameter definition of the FMT400-VTS/-VTCS measuring systems can be modified via LKS adapter (local communication interface) (Fig. 5-1).

This adapter is provided separately as an accessory and will be supplied completely with software and appropriate instructions.

The following parameters can be changed or imported:

• Read device data	display current settings
• Measuring range	select within the calibration measuring range
• Low-flow cutoff	zero setting, 0...20 % upper range of measuring range
• Filter factor	attenuation, 1...500 adjustable (standard 50)
• Output in case of fault	MIN. (< 3.5 mA) or MAX. (> 22.5 mA)
• Analog output	0/4...20 mA
• Save modified data	adjustments are stored
• Factory setting	basic settings
• Status	Check function
• Reset	Start anew
• Printout	print out current settings
• Passwort	only for service technician!

To activate the configuration changes, the device must be restarted. To do so, use the command "restart reset" or interrupt the power supply for approximately 10 seconds.

8 Fault messages

If faults occur (e. g. sensor leakage), the 0/4...20 mA output will accept the configured value, i. e. the following settings will be possible in case of fault:

The following settings will be possible in case of fault:

- MIN < 3.5 mA
- MAX > 22.5 mA

Notice:

The standard setting in case of fault is 0...20 mA for (MAX.) and 4...20 mA for (MIN.).

These settings can be modified via the LKS interface and the respective configuration software.

Further fault messages (e.g. data error) can be received via the status function („Check function“, chapter 7).

9 Maintenance

All measuring systems are calibrated with our own calibration equipment for which the manufacturer is associated with the German Calibration Service. They are calibrated with air or the respective process gas and the values are converted for the respective application if necessary.

The mass flowmeter is almost maintenance-free. Only gases with moist impurities may cause the transducer to require occasional cleaning (depending on the degree of contamination).



9.1 Cleaning the detecting element

1. Switch off the supply voltage.
2. Remove the detector from the pipe component or weld-on adapter (make sure that the pipe is not under pressure).
3. Remove the flowmeter sensor from the pipe component or weld-on adapter.
4. Clean **carefully** the sensor unit with warm water or alcohol. We recommend the use of a soft brush or a cotton-tipped stick.
CAUTION
Under no circumstance should hard objects like screwdrivers, pincers or similar articles be used. These could cause irreparable, mechanical damage to the sensor unit!
 The unit **must not** be cleaned in an ultrasonic bath.
5. Dry sensor unit for some minutes or blow it dry.
6. Check the sealing between the detector and pipe component or weld-on adapter for correct status and neatness, and if need be replace sealing with a new one.
7. Process version FMT400-VTS O-ring (55 mm × 3 mm)
8. Hygienic version FMT400-VTCS Sealing G acc. to DIN 11851 or
 Sealing DN25 for FG flange
9. Install the detector in the pipe component or weld-on adapter
 (se also chapter 4.4 "Installation" on page 14).
10. The commissioning may only be carried out according to the specified procedures and under observation of the safety instruction listed in chapter 6.

9.2 Decommissioning

When there is a chance that safe operation is no longer possible, put the device out of operation and secure it against unintended operation.

It can be assumed that safe operation is no longer possible

- if the device shows visible signs of damage,
- if the device does no longer work,
- after long storage under unfavorable conditions,
- after transport under unfavorable conditions.

10 Technical Data

Type	FMT400-VTS				FMT400-VTCS Hygienic version			
Application	Process engineering				Food and beverage industry			
Measured variable (measured gases)	Flow rate of gases and gas mixtures with known composition				Flow rate of air, N ₂ , CO ₂ , O ₂			
Measuring ranges Nominal sizes (DN)	q_{min} kg/h	q_{max} kg/h	q_{min} Nm ³ /h	q_{max} Nm ³ /h	q_{min} kg/h	q_{max} kg/h	q_{min} Nm ³ /h	q_{max} Nm ³ /h
	for 0 °C (32 °F) / 1013.25 hPa (14.696 psia)				for 0 °C (32 °F) / 1013.25 hPa (14.696 psia)			
DN 25	0 (1.6) ...	160	0 (1.2) ...	120	0 (1.6) ...	160	0 (1.2) ...	120
DN 40	0 (4) ...	430	0 (3) ...	330	0 (4) ...	430	0 (3) ...	330
DN 50	0 (7) ...	700	0 (5) ...	540	0 (7) ...	700	0 (5) ...	540
DN 65	0 (12) ...	1,200	0 (9) ...	940				
DN 80	0 (17) ...	1,700	0 (13) ...	1,300	0 (17) ...	1,700	0 (13) ...	1,300
DN 100	0 (30) ...	3,000	0 (23) ...	2,300				
DN 125	0 (51) ...	5,100	0 (39) ...	3,900				
DN 150	0 (80) ...	8,000	0 (62) ...	6,200				
DN 200	0 (130) ...	13,000	0 (100) ...	10,000				
up to 3000 mm	0 (27,000) ...	2,700,000	0 (21,000) ...	2,100,000				
(square ducts and larger diameters on request)								
Measuring ranges Nominal sizes (inch)	q_{min} lbs/h	q_{max} lbs/h	q_{min} SCFM	q_{max} SCFM				
	for 15 °C (59 °F) / 1013.25 hPa (14.696 psia)							
1.0	0 (3.1) ...	310	0 (0.7) ...	65				
1.5	0 (8.4) ...	840	0 (1.8) ...	180				
2.0	0 (14) ...	1,400	0 (3) ...	310				
3.0	0 (35) ...	3,500	0 (8) ...	760				
4.0	0 (60) ...	6,000	0 (13) ...	1,300				
6.0	0 (165) ...	16,500	0 (36) ...	3,600				
8.0	0 (285) ...	28,500	0 (62) ...	6,200				
120.0	0 (60,000) ...	6,000,000	0 (13,000) ...	1,300,000				
(square ducts and larger diameters on request)								
Note regarding measuring ranges	The above values are reference values for applications involving air or nitrogen under atmospheric conditions (other gases available upon request). The values for q _{max} can be increased by approx. 10 % upon request (with lower accuracy in the extended range). Readings are displayed for 0 kg/h / SCFM and higher (or other mass flow unit)							
Measured error	Under calibration conditions in the stated measuring range ≤ ± 0.9 % of measured value ± 0.05 % of possible end value in this nominal size (see measuring ranges) ≤ ± 1.8 % of measured value ± 0.10 % of possible end value in this nominal size (see measuring ranges) For special calibration on request							
Repeatability error	< 0.25 % of measured value							
Influence of medium temperature	< 0.05 % / K of measured value (dependent on type of gas)							
Influence of medium pressure	< 0.2 %/100 kPa (/bar) of measured value (dependent on type of gas)							
Response time	T ₆₃ = 0,5 s				T ₆₃ = 2 s			

Parameter setting

The output signal range of the FMT400-VTS/VTCS flowmeters can be set to either 0...20 mA or 4...20 mA. Additionally, the measuring range window can be extended such that a smaller span corresponds to a 20 mA current signal. Alarm signalling is possible at < 3.5 mA or > 22 mA (selectable).

The measuring instrument parameters can be set via the LKS-adapter. A standard PC or laptop allows you to change the used output signal and to adjust the measuring range.

Type	FMT400-VTS (Sensyflow VT-S)	FMT400-VTCS (Sensyflow VT-CS)
Operating conditions		
Recommended inlet and outlet runs	according to DIN EN ISO 5167-1 min. inlet 15 × D, outlet 5 × D	
Environmental conditions		
Ambient temperature	-25...70 °C (-13...158 °F)	
Connection head	Zone 2/22 version: -20...50 °C (-4...122 °F)	
Storage temperature	-25...85 °C (-13...185 °F)	
Process conditions		
Operating temperature medium (transducer)	Standard range: -25...150 °C (-13...302 °F) Extended range: -25...300 °C (-13...572 °F) Zone 2/22 version: -20...130 °C (-4...266 °F)	-25...150 °C (-13...302 °F)
Operating pressure (max.)	40 × 10 ⁵ Pa (40 bar)	16 × 10 ⁵ Pa (16 bar) pipe fitting S (for DN 80: 10 × 10 ⁵ Pa (10 bar)) 10 × 10 ⁵ Pa (10 bar) FG flange
Pressure loss (logarithmic diagram)	< 1.0 kPa (10 mbar), typical value 0.1 kPa (1 mbar) Z-18927	
Mechanical construction		
Design/dimensions/weight	dependent on nominal size	dependent on nominal size
Material (standard)	1.4571, Ceramics	stainless steel e.g. 1.4301
Process connection (standard)	Flange acc. to EN1092-1 form B1, PN 40 (DIN 2635 form C) or ASME B 16.5 Cl. 150 / 300	Pipe fitting S acc. to DIN 11851 or FG flange
Components	– VTS transducer – VT pipe component design 1 or 2 or weld-on adapter	VTCS transducer VTC pipe component
Standard nominal pipe sizes	Pipe component design 1: Wafer flange DN 40, 50, 65, 80, 100, 125, 150, 200 – ASME 1½", 2", 3", 4", 6", 8" Pipe component design 2: measuring section DN 25, 40, 50, 65, 80 – ASME 1", 1½", 2" Weld-on adapter for square ducts or pipe sizes ≥ DN 100	Pipe component hygienic version: measuring section DN 25, 40, 50, 80
Type of protection	IP 65 / Nema 4X	
Auxiliary energy		
Electrical power supply	24 V DC ± 25 %; 24 V AC ± 25 %, 48...62 Hz	
Voltage	< 15 W	
Power consumption	< 600 mA, slow-blow fuse of at least 2 A recommended	
Current drain		
Cable entry	M20 x 1.5	
Output		
Output signal, analog	0/4...20 mA, load < 750 Ω, electrical isolated, alert < 3.5 or > 22 mA	
Explosion protection	Manufacturer's Declaration zone 2/22 II 3G EEx nA ib II T4 II 3D T 135°C IP 65	

11 Packaging for transport

Packaging for transport or return to the manufacturer

If the original packaging material is no longer available, wrap the device in a padded plastic film or corrugated paper board and place it in a box of sufficient size lined with a shock-absorbing material (e.g. foam rubber). The thickness of the shock-absorber should be in accordance with the device weight and the type of shipment. The box must be handled with care and has to be labeled accordingly.

For overseas shipment always add a desiccant (e.g. silica gel) and wrap the device and the desiccant bag in apolyethylene foil of 0.2 mm. Adapt the amount of desiccant to the packing volume and the expected transport time (at least sufficient for 3 months). Additionally line the box with a layer of union paper.

All equipment returned to ABB must be accompanied by a completed and signed decontamination certificate (see chapter 2.2.4). Without this confirmation, ABB will not process the return.

12 Appendix 1: Declarations of conformity



Nr. 38 - 2004

EG-Konformitätserklärung *EC-Certificate of Compliance*

ABB Automation Products GmbH
Borsigstr. 2
D-63755 Alzenau
Germany

**Erklärt, dass die Produkte der
Geräteart:**
Declare that the products of device type:

**Thermischer
Masse-Durchflussmesser
Thermal Mass Flowmeter**

Modell- / Typebezeichnung:
Model- / type name:

**FMT400-VTS (Sensyflow VT-S)
FMT400-VTCS (Sensyflow VT-CS)**

Produktnummer
Product number:

V14222-....

den EG-Richtlinien:
comply to EC-Directives:

**94/9/EG (ATEX)
89/336/EWG (EMV/EMC)**

entsprechen.

Qualitätssicherung Produktion
Production Quality notification

PTB 99 ATEX – Q004-....

Alzenau, 29 April 2008


i. V. Reiner Laurinat
Leiter Qualitätsmanagement
Quality Manager


i.A. Harald Müller
Leiter Hardware-Entwicklung
R&D Manager Hardware

ABB Automation Products GmbH



Declaration of conformity

ABB Automation Products GmbH

Borsigstraße 2
63755 Alzenau
Germany

declares, the following products

Type: pipe components for Sensyflow FMT 400 and FMT 500

Designation		Type-no.	Examination-no.
Wafer flange version, Design 1	PN 40, DN 40/50/80/100/150/200	V14232-1200 ...V14232-1700	40869917/1
Wafer flange version, Design 1, with Ball valve	PN 40, DN 40/50/80/100/150/200	V14232-1201 ...V14232-1701	40869917/1
Wafer flange version, Design 1	ANSI 150 lbs, D 1½"/2"/3"/4"/6"/8"	V14232-2B00 ...V14232-2G00	40869917/1
Wafer flange version, Design 1, with Ball valve	ANSI 150 lbs, D 1½"/2"/3"/4"/6"/8"	V14232-2B01 ...V14232-2G01	40869917/1
Wafer flange version, Design 1	ANSI 300 lbs, D 1½"/2"/3"/4"/6"/8"	V14232-3B00 ...V14232-3G00	40869917/1
Wafer flange version, Design 1, with Ball valve	ANSI 300 lbs, D 1½"/2"/3"/4"/6"/8"	V14232-3B01 ...V14232-3G01	40869917/1
Partial measuring section, Design 2	PN 40, DN 25/40/50	V14233-110 ...V14233-130	40869917/2
Partial measuring section, Design 2, with Flow straightener	PN 40, DN 25/40	V14233-140 ...V14233-150	40869917/2
Partial measuring section, Design 2	ANSI lbs 150/300, D 1"/1½"/2"	V14233-1A0 ...V14233-1C0	40869917/2
Partial measuring section, Design 2, with Flow straightener	ANSI lbs 150/300, D 1"/1½"/2"	V14233-1D0 ...V14233-1E0	40869917/2
Partial measuring section, Hygienic version, Screw connection S	D 25/40/50/80	V14234-601 ...V14234-604	40869917/2
Partial measuring section, Hygienic version, FG flange	D 25/40/50/80	V14234-801 ...V14234-804	40869917/2
Wafer flange version, Design 1, with integrated hot tap fitting	DN 50/80	V14232-1304 ...V14232-1404	40869917/3
Wafer flange version, Design 1, with integrated hot tap fitting	ANSI 2"/3"	V14232-xC04 ...V14232-xD04	40869917/3
Wafer flange version, Design 1, with integrated hot tap fitting	DN 100/150	V14232-1305 ...V14232-1405	40869917/3
Wafer flange version, Design 1, with integrated hot tap fitting	ANSI 4"/6"	V14232-xC05 ...V14232-xD05	40869917/3
Wafer flange version, Design 2, with integrated hot tap fitting		V14233-xx0x	40869917/4

complying with the requirements of the European directive:

97/23/EG Pressure equipment directive

Application:

pipng and piping accessories category III,
for gases, group 1 and 2

The conformity assessment has been subjected to the following procedure:

EC type examination (B) and
product quality assurance (E)

Applied standards and technical specification:

AD 2000 technical rules

Monitoring of quality management system and of manufacturing is performed by:

TÜV Technische Überwachung Hessen GmbH – notified no. 0091

Alzenau 01.07.2008

ppa.

Heinrich Esslinger
Plant Manager Alzenau

ABB Automation Products GmbH

13 Appendix 2: Manufacturer's Declaration

MANUFACTURER'S DECLARATION

No. 38 - 2004

Test Item, Tests, Test Results	
Manufacturer:	ABB Automation Products GmbH Borsigstrasse 2 D-63755 Alzenau
Type of unit:	Thermal Mass Flowmeter for gas, for applications in Zones 2 and 22.
Type identification:	FMT400-VTS (Sensyflow VT-S) (Ordering No.: V14222-021...)
Supply circuit	with type of protection "non-sparking" EEx nA II $U_n = 24V\ DC \pm 20\%$, $P_n < 20\ W$ The supply circuit must be protected by an IEC 2A slow-blow fuse.
PE – circuit:	with type of protection „non-sparking“ EEx nA II
PA – circuit:	with type of protection „non-sparking“ EEx nA II
Ambient temperature:	-20°C ... +50° C
Temperature of medium	- 20° C ... + 130°C
Marking:	ABB FMT400-VTS (Sensyflow VT-S)  II 3G EEx nA II T4 II 3D T 135°C IP 65
Remarks:	The sensor may only be used in Zone 2. The connection box containing the electronic components can be installed in Zone 2 as well as in Zone 22 for non-conducting dust with a layer thickness of up to 5 mm. Installation in an area with hybrid mixtures is not allowed.
Start-up:	The process connection of the Thermal Mass Flowmeter is established with a Sensyflow pipe component. The Sensyflow pipe must be mounted in such a way that its dust-proof quality is guaranteed. With the cover closed, the connecting head equipped with a cable gland, guarantees a type of protection IP 65.



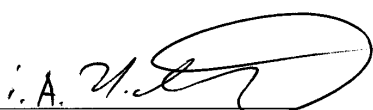
2

MANUFACTURER'S DECLARATION

No. 38 - 2004

- Application:** The Thermal Mass Flowmeter FMT400-VTS (Sensyflow VT-S) is used to measure gas flows in different nominal sizes, according to the Data Sheet.
- Mounting and Dismounting:** During mounting and dismounting operations, no electrical voltages may be applied.
If the Thermal Mass Flowmeter is to be dismounted, it must be ascertained that the process has been shut down and that no pressures exist, or that a hot tap fitting is used.
Appropriate measures must be taken to ensure that no leakage of dangerous media occurs.
- Maintenance:** The function must be checked regularly and the Thermal Mass Flowmeter must be replaced in case of malfunction. Only genuine parts may be used.
When mounting the Sensyflow pipe component the user must ensure its immunity to dust.
- Equipotential-bonding:** Should a connection to the equipotential bonding become necessary, this can be effected via the connecting head.
- Operation:** The Mass Flowmeter FMT400-VTS (Sensyflow VT-S) can be operated as an electrical appliance in both Zones 2 and 22 by respecting the electrical characteristics of Category 3.
During installation, the EN 50281-1-2 and/or EN 61241-14 (VDE 0165 Part 2 and/or Part 2/A2 classification) for dust and the DIN EN 60079-14 (VDE 0165 Part 1) for gas must be respected.
In addition, the Operating Instructions for FMT400-VTS must be adhered to.

Alzenau, 11 April 2008


for Harald Müller
Head of Hardware Development

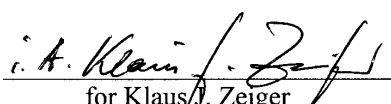

for Klaus J. Zeiger
In Charge of Explosion Protection

ABB Automation Products GmbH

14 Appendix 3: Statement of contamination

Statement about the contamination of devices and components

The repair and/or maintenance of devices and components will only be performed when a completely filled out explanation is present.

Otherwise, the shipment can be rejected. This explanation may only be filled out and signed by authorized specialist personnel of the operator.

Customer details:

Company: _____

Address: _____

Contact person: _____

Telephone: _____

Fax: _____

E-Mail: _____

Device details:

Type: _____

Serial no.: _____

Reason for the return/description of the defect: _____

Was this device used for working with substances which pose a threat or health risk?

☐ Yes ☐ No

If yes, which type of contamination (please place an X next to the applicable items)

biological	☐	corrosive/irritating	☐	combustible (highly/extremely combustible)	☐
toxic	☐	explosive	☐	other toxic substances	☐
radioactive	☐				

Which substances have had contact with the device?

1. _____

2. _____

3. _____

We hereby certify that the devices/parts shipped were cleaned and are free from any dangerous or poisonous materials.

City, Date _____

Signature and company stamp _____

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ABB has Sales & Customer Support expertise in over 100 countries worldwide.

www.abb.com/flow

The Company's policy is one of continuous product improvement and the right is reserved to modify the information contained herein without notice.

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