SIEMENS

SITRANS F

Electromagnetic flowmeters SITRANS FMS100

Operating Instructions

7ME616 (FMS100)

12/2025
A5E53661662-AA

Legal information

Warning notice system

This manual contains notices you have to observe in order to ensure your personal safety, as well as to prevent damage to property. The notices referring to your personal safety are highlighted in the manual by a safety alert symbol, notices referring only to property damage have no safety alert symbol. These notices shown below are graded according to the degree of danger.

⚠ DANGER

indicates that death or severe personal injury **will** result if proper precautions are not taken.

⚠ WARNING

indicates that death or severe personal injury **may** result if proper precautions are not taken.

⚠ CAUTION

indicates that minor personal injury can result if proper precautions are not taken.

NOTICE

indicates that property damage can result if proper precautions are not taken.

If more than one degree of danger is present, the warning notice representing the highest degree of danger will be used. A notice warning of injury to persons with a safety alert symbol may also include a warning relating to property damage.

Qualified Personnel

The product/system described in this documentation may be operated only by **personnel qualified** for the specific task in accordance with the relevant documentation, in particular its warning notices and safety instructions. Qualified persons are those who, because of their training and experience, are familiar with the installation, assembly, commissioning, operation, decommissioning and disassembly of the product and can recognize risks and avoid possible hazards.

Proper use of Siemens products

Note the following:

⚠ WARNING

Siemens products may only be used for the application described in the catalog and the associated usage information. If products and components from other manufacturers are used, these must be recommended or approved by Siemens. Proper transport, storage, installation, assembly, commissioning, operation and maintenance are required to ensure that the products operate safely and without any problems. The permissible ambient conditions must be complied with. The information in the relevant documentation must be observed.

Trademarks

All names identified by ® are registered trademarks of Siemens Aktiengesellschaft. The remaining trademarks in this publication may be trademarks whose use by third parties for their own purposes could violate the rights of the owner.

Disclaimer of Liability

We have reviewed the contents of this publication to ensure consistency with the hardware and software described. Since variance cannot be precluded entirely, we cannot guarantee full consistency. However, the information in this publication is reviewed regularly and any necessary corrections are included in subsequent editions.

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Introduction

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1.1 Purpose of this documentation

These instructions contain all information required to commission and use the device. Read the instructions carefully prior to installation and commissioning. In order to use the device correctly, first review its principle of operation.

The instructions are aimed at persons mechanically installing, connecting and commissioning the device, as well as service and maintenance engineers.

1.2 Document history

The following table shows major changes in the documentation compared to the previous edition.

Edition	Remarks
12/2025	First edition

Use the device in accordance with the information on the nameplate and in the Technical specifications (Page 53).

1.3 Industrial use note

⚠ CAUTION

Use of equipment in a domestic environment

This equipment is not intended for use in residential environments and might not provide adequate protection to radio reception in such environments.

1.4 Checking the consignment

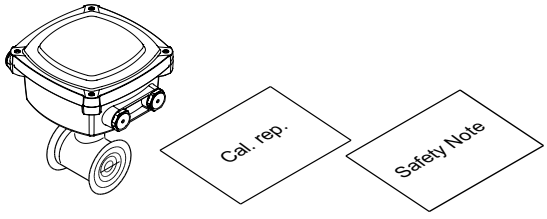
1. Check the packaging and the delivered items for visible damages.
2. Report any claims for damages immediately to the shipping company.

3. Retain damaged parts for clarification.
4. Check the scope of delivery by comparing your order to the shipping documents for correctness and completeness.

WARNING
Using a damaged or incomplete device Risk of explosion in hazardous areas. • Do not use damaged or incomplete devices.

1.5 Items supplied

- SITRANS FMS100
- Calibration report
- Safety Note



See also

Instructions and manuals (https://www.siemens.com/processinstrumentation/documentation)

1.6 Cybersecurity information

Siemens provides products and solutions with industrial cybersecurity functions that support the secure operation of plants, systems, machines and networks.

In order to protect plants, systems, machines and networks against cyber threats, it is necessary to implement – and continuously maintain – a holistic, state-of-the-art industrial cybersecurity concept. Siemens' products and solutions constitute one element of such a concept.

Customers are responsible for preventing unauthorized access to their plants, systems, machines and networks. Such systems, machines and components should only be connected to an enterprise network or the internet if and to the extent such a connection is necessary and only when appropriate security measures (e.g. firewalls and/or network segmentation) are in place.

For additional information on industrial cybersecurity measures that may be implemented, please visit
https://www.siemens.com/cybersecurity-industry.

Siemens' products and solutions undergo continuous development to make them more secure. Siemens strongly recommends that product updates are applied as soon as they are available and that the latest product versions are used. Use of product versions that are no

longer supported, and failure to apply the latest updates may increase customer's exposure to cyber threats.

To stay informed about product updates, subscribe to the Siemens Industrial Cybersecurity RSS Feed under
https://new.siemens.com/cert.

NOTICE
Unauthorized product information or software Use only authorized Siemens websites when accessing any product information or software, including firmware updates, device integration files (EDD, for example), as well as other product documentation. Using unauthorized product information or software could result in a security incident, such as breach of confidentiality, or loss of integrity and availability of the system. For more information, see Product documentation and support (Page 73).

1.7 Transportation and storage

To guarantee sufficient protection during transport and storage, observe the following:

- Keep the original packaging for subsequent transportation.
- Devices/replacement parts should be returned in their original packaging.
- If the original packaging is no longer available, ensure that all shipments are properly packaged to provide sufficient protection during transport. Siemens cannot assume liability for any costs associated with transportation damages.

NOTICE
Insufficient protection during storage The packaging only provides limited protection against moisture and infiltration. • Provide additional packaging as necessary.

Special conditions for storage and transportation of the device are listed in Technical specifications (Page 53).

1.8 Notes on warranty

The contents of this manual shall not become part of or modify any prior or existing agreement, commitment or legal relationship. The sales contract contains all obligations on the part of Siemens as well as the complete and solely applicable warranty conditions. Any statements regarding device versions described in the manual do not create new warranties or modify the existing warranty.

The content reflects the technical status at the time of publishing. Siemens reserves the right to make technical changes in the course of further development.

Safety notes

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This device left the factory in good working condition. In order to maintain this status and to ensure safe operation of the device, observe these instructions and all the specifications relevant to safety.

Observe the information and symbols on the device. Do not remove any information or symbols from the device. Always keep the information and symbols in a completely legible state.

2.1 Warning symbols on the device

Symbol	Explanation
	Consult operating instructions

2.2 Laws and directives

Observe the safety rules, provisions and laws applicable in your country during connection, assembly and operation. These include, for example:

- National Electrical Code (NEC - NFPA 70) (USA)
- Canadian Electrical Code (CEC - CSA C22.1) (Canada)

Further provisions for hazardous area applications are for example:

- IEC 60079-14 (international)
- EN 60079-14 (EU and UK)

The product described in this document is in conformity with the relevant harmonization legislation, and its amendments, of the European Union.

Electromagnetic compatibility directive EMC 2014/30/EU	Directive of the European Parliament and of the Council on the harmonisation of the laws of the Member States relating to electromagnetic compatibility
Low voltage directive LVD 2014/35/EU	Directive of the European Parliament and of the Council on the harmonisation of the laws of the Member States relating to the making available on the market of electrical equipment designed for use within certain voltage limits

Pressure equipment directive PED 2014/68/EU	Directive of the European Parliament and of the Council on the harmonisation of the laws of the Member States relating to the making available on the market of pressure equipment
Restriction of hazardous substances directive RoHS 2011/65/EU	Directive of the European Parliament and the Council on the restriction of the use of certain hazardous substances in electrical and electronic equipment

The applicable directives can be found in the EU Declaration of Conformity of the specific device.

Conformity with UK regulations

The product described in this document is in conformity with the relevant harmonization legislation, and its amendments, of the United Kingdom. The applicable regulations can be found in the UKCA declaration of conformity of the specific device.

See also

Certificates (http://www.siemens.com/processinstrumentation/certificates)

WARNING

Improper device modifications

Risk to personnel, system, and environment can result from modifications to the device, particularly in hazardous areas.

- Only carry out modifications that are described in the instructions for the device. Failure to observe this requirement cancels the manufacturer's warranty and the product approvals. Do not operate the device after unauthorized modifications.

Description

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3.1 Applications

The pulsed DC-powered magnetic flowmeters are suitable for measuring the flow of almost all electrically conductive liquids, pastes, and slurries with max. 40% solids.

The main applications can be found in the following sectors:

- Water and waste water
- Chemical and pharmaceutical industries
- Food & beverage industry
- Mining and cements industries
- Pulp and paper industry
- Steel industry
- Power generation; utility and chilled water industry

3.2 System components

The SITRANS FM flowmeter system includes:

- Transmitter (types: SITRANS FMT020)
- Sensor (types: SITRANS FMS100)
- Communication module (optional) (types: HART, PROFINET, Modbus TCP/RTU, PROFIBUS DP/PA and EtherNet/IP)
- SENSORPROM memory unit

3.3 Design

The SITRANS FMS100 is an electromagnetic flow sensor in a compact wafer design designed for flow applications in the process industry.

The SITRANS FMS100 is constructed identically to the SITRANS MAG1100. The HT and the F versions have been consolidated into the FMS100, and can be configured using options.

Sensor housing and flanges are designed in stainless steel (AISI 304) or carbon steel (ASTM A 105) and terminal box in polycarbonate or optionally in stainless steel (AISI 316). Measuring pipe is made of stainless steel (AISI 304) while liners and electrodes are available in various materials, making the sensor highly resistant to a wide range of chemicals.

The present range of liner types includes:

- PFA
- Ceramic

Electrodes are available in:

- Hastelloy C22 / 2.4602 (only with PFA liner)
- Platinum (only with ceramic liner)

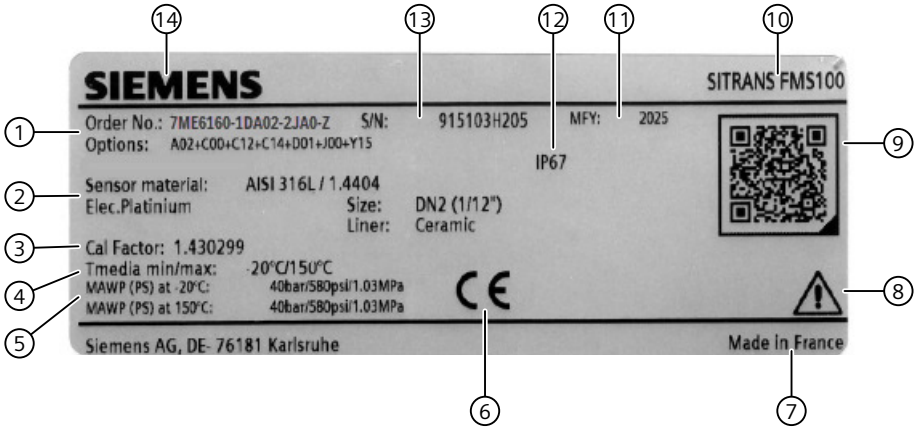
The sensors carry a wide range of approvals, see Technical specifications (Page 53).

3.4 Nameplate layout

Inspection

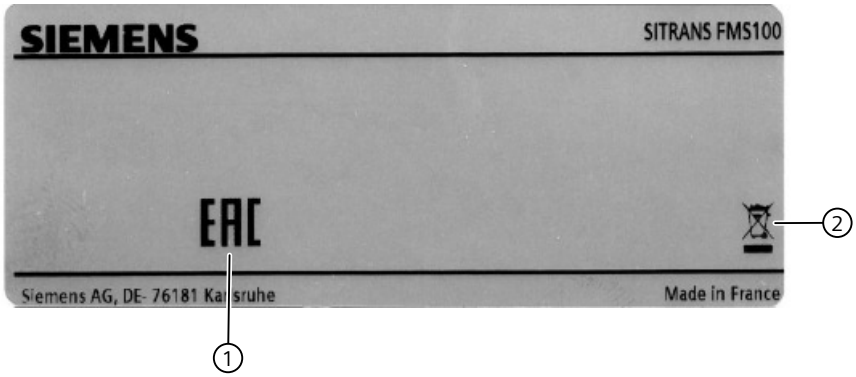
1. Check for mechanical damage due to possible improper handling during shipment. All claims for damage are to be made promptly to the shipper.
2. Make sure the scope of delivery, and the information on the type plate correspond to the ordering information

Identification



①	Article number	⑧	Consult operating instructions, certificates and approvals
②	Sensor material	⑨	Identification link (ID link) according to IEC 61406
③	Calibration factor	⑩	Product name
④	Process media temperature	⑪	Year of manufacture
⑤	Maximum allowable working pressures at -20 °C (-4 °F) and 150 °C (302 °F)	⑫	Degree of protection
⑥	Conformity with country-specific directives	⑬	Serial number (S/N)
⑦	Place of manufacture	⑭	Manufacturer

Figure 3-1 FMS100 nameplate, example

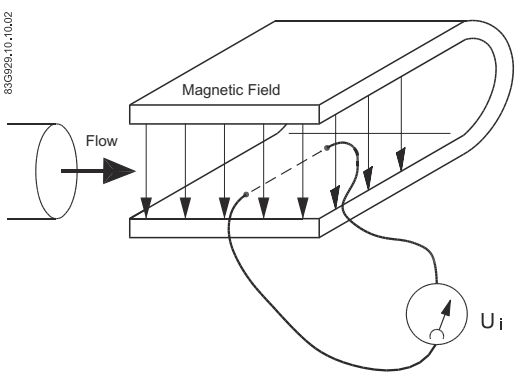


① Conformity with country-specific directives
② WEEE symbol see Disposal (Page 47)

Figure 3-2 FMS100 additional nameplate, example

3.5 Theory of operation

The flow measuring principle is based on Faraday's law of electromagnetic induction.



U_i = When an electrical conductor of length L is moved at velocity v, perpendicular to the lines of flux through a magnetic field of strength B, the voltage U_i is induced at the ends of the conductor

U_i = L x B x v

- U_i = Induced voltage
- L = Conductor length = Inner pipe diameter = k_1
- B = Magnetic field strength = k_2
- v = Velocity of conductor (media)
- k = k_1 x k_2

U_i = k x v, the electrode signal is directly proportional to the fluid velocity

Operating principle

The transmitter generates a pulsating magnetizing current that drives the coils in the sensor. The current is permanently monitored and corrected. Errors or cable faults are registered by the self-monitoring circuit.

The input circuit amplifies the flow-proportional induced voltage signal from the electrodes. The input impedance is extremely high: $>10^{14}$ Ω which allows flow measurements on fluids with conductivities as low as 5 µS/cm. Measuring errors due to cable capacitance are eliminated due to active cable screening.

The digital signal processor converts the analog flow signal to a digital signal and suppresses electrode noise through a digital filter. Inaccuracies in the transmitter as a result of long-term drift and temperature drift are monitored and continuously compensated for via the self-monitoring circuit. The analog to digital conversion takes place in an ultra low noise ASIC with 23 bit signal resolution. This has eliminated the need for range switching. The dynamic range of the transmitter is therefore unsurpassed with a turn down ratio of minimum 3000:1.

Installing/mounting

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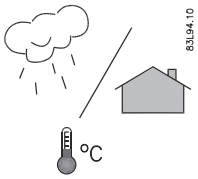
4.1 Introduction



SITRANS F flowmeters are suitable for indoor and outdoor installations.

- Make sure that pressure and temperature specifications indicated on the device nameplate / label will not be exceeded.

4.2 Installation safety precautions

WARNING

High pressure hazard

In applications with working pressures/media that can be dangerous to people, surroundings, equipment or others in case of pipe fracture, we recommend that special precautions such as special placement, shielding or installation of a pressure guard or a safety valve are taken when the flowmeter is mounted.

4.3 Vibrations

Vibrations

In installations with strong vibrations remote installation of the transmitter is recommended. Alternatively mitigate vibrations by installing pipe support in close proximity to the flowmeter.

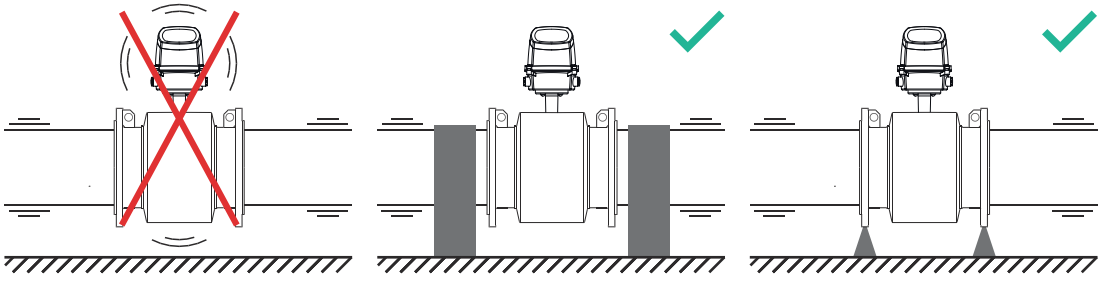


Figure 4-1 Avoid vibrations

4.4 Determining a location

Note

The sensor must always be completely filled with liquid.

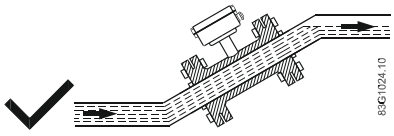


Figure 4-2 Correct installation with filled pipes

- Avoid the following installations
  - Installation at the highest point in the pipe system
  - Installation in vertical pipes with free outlet

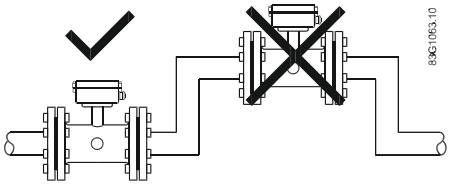


Figure 4-3 Wrong installation at high point

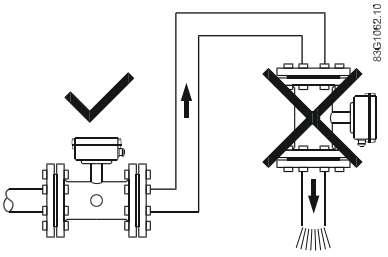
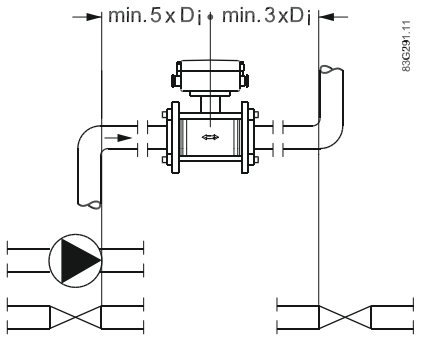


Figure 4-4 Correct installation at low point before outlet

Inlet and outlet conditions

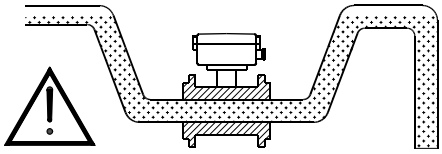
To achieve accurate flow measurement it is essential to have straight lengths of inlet and outlet pipes and a certain distance to pumps and valves.

It is also important to centre the flowmeter in relation to pipe flanges and gaskets.



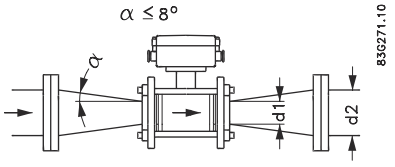
Installation in partially filled pipes

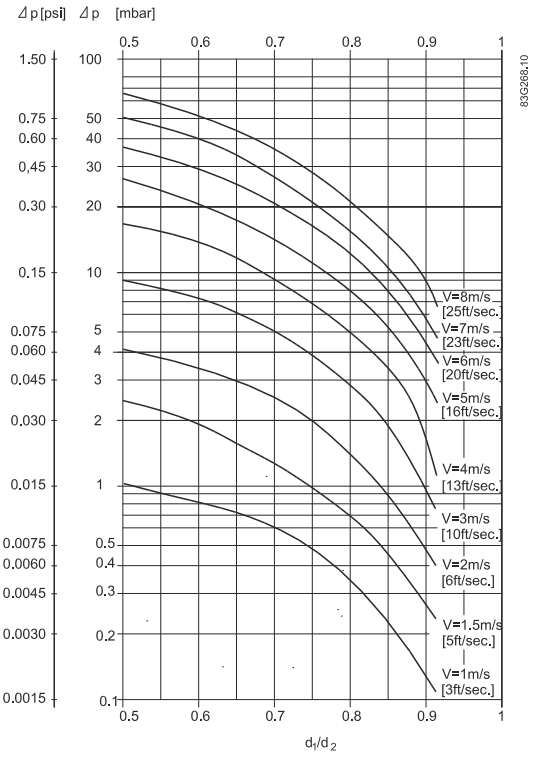
For partially filled pipes or pipes with downward flow and free outlet the flowmeter should be located in a U-tube.



Installation in large pipes

The flowmeter can be installed between two reducers (for example DIN 28545). At α ≤ 8° the following pressure drop curves apply. The curves are applicable to water.





Example:

A flow of 3 m/s (v) in a sensor with a diameter reduction from DN 100 to DN 80 ($d_1/d_2 = 0.8$) gives a pressure drop of 2.9 mbar.

4.5 Orienting the sensor

Flow direction

The calibrated flow direction is marked by the arrow on the sensor. Flow in this direction is indicated as positive by default. The accuracy of the sensor does not change with reverse flow.

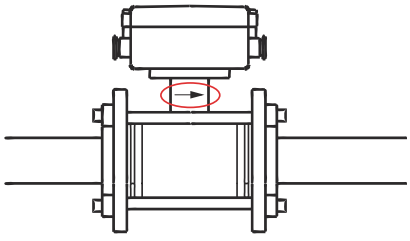


Figure 4-5 Flow direction indicator

Orientation

The sensor operates in all orientations, but Siemens has the following recommendations:

- Vertical installation with an upwards flow

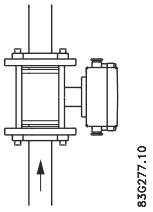


Figure 4-6 Vertical orientation, upwards flow

NOTICE
Abrasive liquids / liquids containing solid particles
A vertical installation minimizes wear and deposits in the sensor

Note

Gas/air bubbles in the liquid

A vertical installation minimizes any negative effect of gas/air bubbles in the liquid

- Horizontal installation, terminal box upwards or downwards

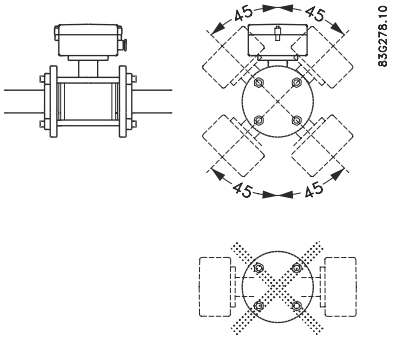


Figure 4-7 Horizontal installation, various terminal box positions

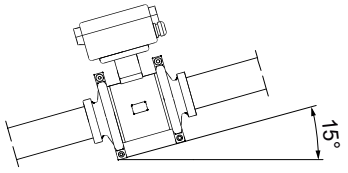
NOTICE
Do NOT mount the sensor with the terminal box sideways
This will position the electrodes at the top where there is possibility for air bubbles and at the bottom where there is possibility for mud, sludge, sand etc.

Note

Empty pipe detection

For applications with empty pipe detection, the sensor can be tilted 45°, as shown above.

- Self-draining installation, minimum incline of 15° to the horizontal plane



Note

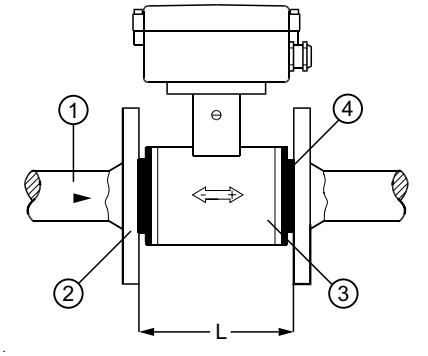
3A certification

For the hygenic certifications 3A it is required to mount the sensor either vertically or with the shown incline of at least 15°

4.6 Mounting FMS100

- Install the sensor in rigid pipelines in order to support the weight of the meter.
- Center the connecting pipelines axially in order to avoid turbulent flow profiles.
- Use proper gaskets according to liner type

Remove liner protectors before installing the flow meter



1. Existing pipe
2. Flange
3. Sensor
4. Gaskets
5. Sensor length incl. gaskets

Tightening

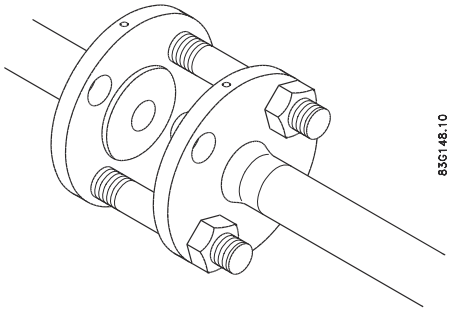
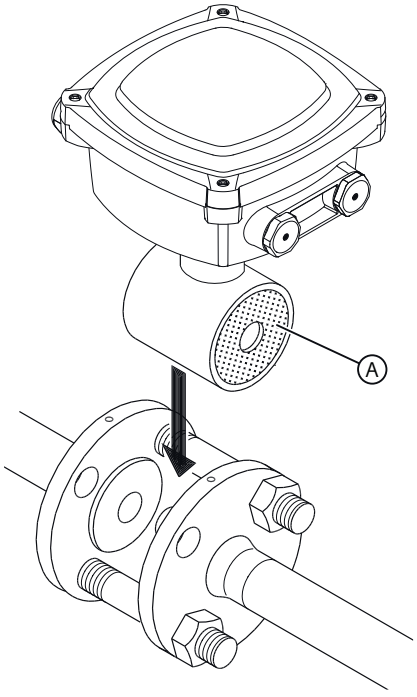
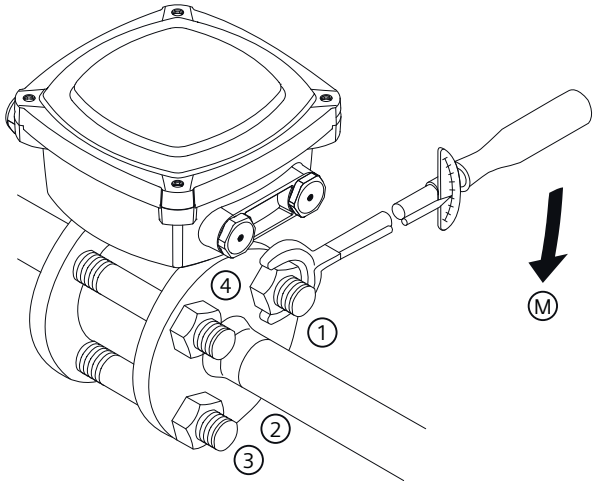


Figure 4-8 First place three stay-bolts to locate the sensor

These should be tightened gently, making sure that each gasket fits exactly into its recess at either end of the sensor



The remaining flange bolts can now be inserted and tightened using about 25% of the actual tightening torque, see table below.



The bolts must be tightened using up to 50% of the max. tightening torque for the pipe dimensions stated. The max. tightening torque for different size pipes is given in the table.

The bolts must now be cross-tightened in the sequence shown, using up to 100% torque.

DN	$M_A[N_m]$
2	13
3	13
6	13
10	13
15	16
25	30
40	54
50	90
65	90
80	90
100	115

10 Nm - 1 kpm

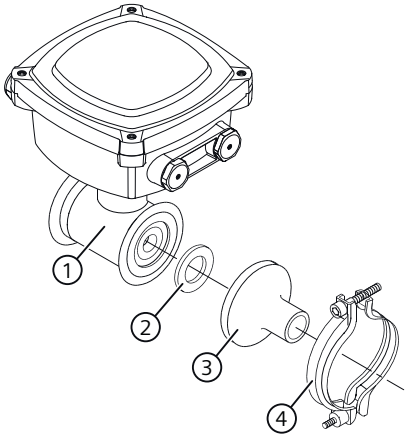
NOTICE
Do not use sharp objects to remove the blanks as this can damage the liner!

4.7 Mounting FMS100

4.7.1 Mounting FMS100

The FMS100 sensor has an integrated clamp connection and is designed for installation between two adapters, which are supplied separately. The adapters are available for a variety of standards according to: ISO, DIN, SMS, BS and DS, for direct welding into dairy pipes or with clamp- or threaded fittings.

At assembly, a gasket is located in the recess in the face of the adapter, and the adapter is then fastened to the FMS100 with a clamp ring.



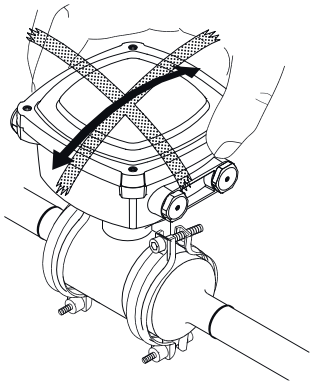
① Sensor
② Gasket
③ Process connection adapter
④ Clamp ring

Note

In order to meet the 3A Sanitary Standard the sensor must be installed as a remote unit.

Note

To obtain optimum accuracy and hygenic conditions, it is important that the sensor and the pipes are correctly aligned around their centerline, fittings must be perpendicular to the pipeline and upstream pipelines must be straight without curves.

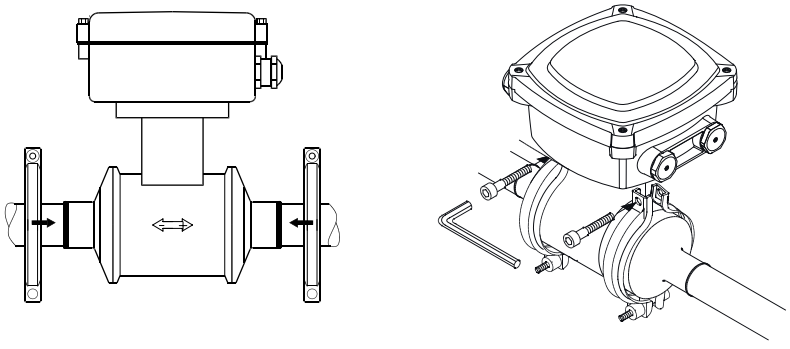


NOTICE
Damage to the liner
Turning the sensor around the adapter centre line after the clamp rings have been fastened will damage the liner. The sensor may therefore only be turned when the clamp rings have either been removed or completely loosened.

4.7.2 Mounting with a welding type adapter

To mount a FMS100 Food grade version and welding type adapters, follow these steps:

1. Cut a piece out of the pipeline equal to the built-in length "L".
2. Assemble the sensor and the adapters with the clamp rings. Leave the gaskets off.
3. Mount the sensor and stitch weld the adapters to the pipe.
4. Remove the clamp rings and dismount the sensor.
5. Ensure that the adapters are firmly welded to the pipe.
6. Remount the sensor with gaskets and clamp rings.

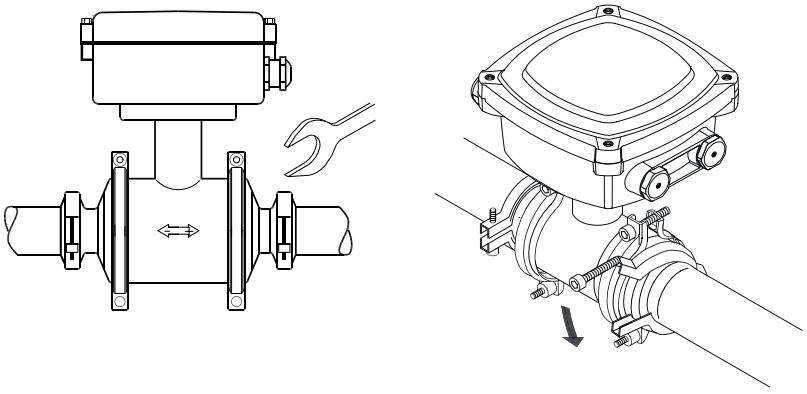


The stainless steel terminal box of the FMS100 Food grade version differs from the illustration.

4.7.3 Mounting with a clamp type adapter

To mount a FMS100 Food grade version and clamp type adapters, follow these steps:

1. Prepare the pipeline with a suitable fitting.
2. Assemble the sensor and adapters together with the gaskets.
3. Place the clamp rings around the clamp connections between the adapters and pipeline.
4. Close and tighten the clamp rings.

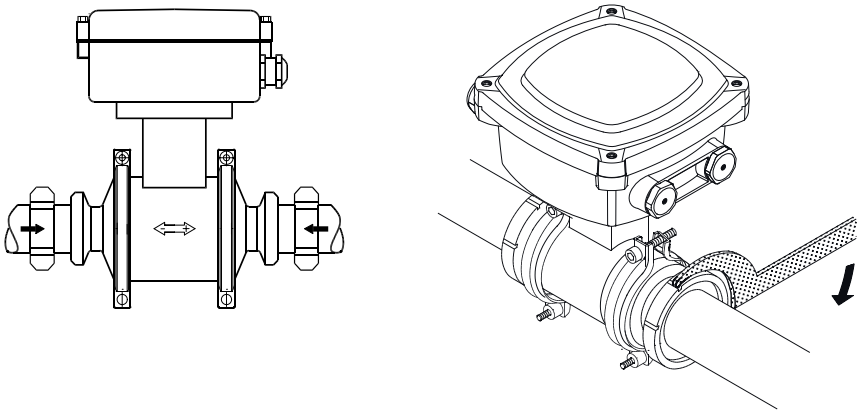


The stainless steel terminal box of the FMS100 Food grade version differs from the illustration.

4.7.4 Mounting with a threaded type adapter

To mount a FMS100 Food grade version and threaded type adapters, follow these steps:

1. Prepare the pipeline with a suitable fitting.
2. Assemble the sensor and adapters together with the gaskets.
3. Tighten the threaded connectors by using a C-spanner.



The stainless steel terminal box of the FMS100 Food grade version differs from the illustration.

4.8 Torques values

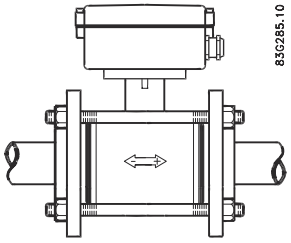
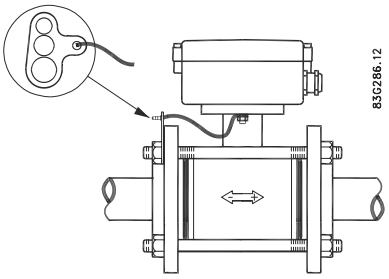
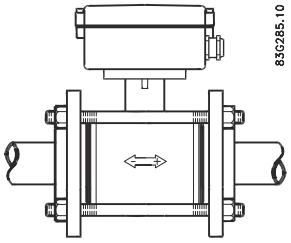
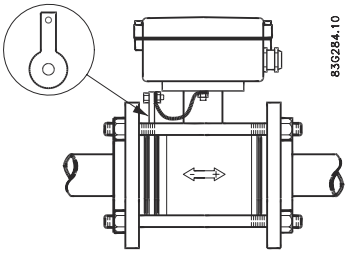
Note

Torque values are calculated on the basis of use of gaskets.

DN **mm/inch**	**Nm**
2 / $^{1}/_{12}$	13
3 / $^{1}/_{8}$	13
6 / $^{1}/_{4}$	13
10 / $^{3}/_{8}$	13
15 / $^{1}/_{2}$	16
25 / 1	30
40 / 1 $^{1}/_{2}$	54
50 / 2	90
65 / 2 $^{1}/_{2}$	90
80 / 3	90
100 / 4	115

4.9 Potential equalization

To obtain optimum results from the measuring system, the sensor must have the same electrical potential as the liquid being measured.

	Graphite	EPDM or PTFE gaskets
Electrically conductive piping	 Potential equalization with electrically graphite gaskets	 Potential equalization using earth strap supplied
Electrically non-conductive piping	 Potential equalization with electrically conductive graphite gaskets	 Potential equalization using separate potential equalization ring **NOTE** For bidirectional flow use two grounding rings

NOTICE
For sizes DN 2-10 with Hastelloy or stainless steel adaptors potential equalization is done ensured through adaptors

Cathodic protection

Special attention must be paid to systems with cathodic protection

- Isolate the sensor from cathodic protected pipes using insulated bolts.
- Use bypass cable between the mating flanges.

Note

Remote mounted sensor versions

If the above is not acceptable, remote mounted sensors can alternatively be connected as follows:

- Connect coil current cable shield at sensor end via a 1.5 µF condensator
- Make sure that electrode cable shield is not connected at both ends

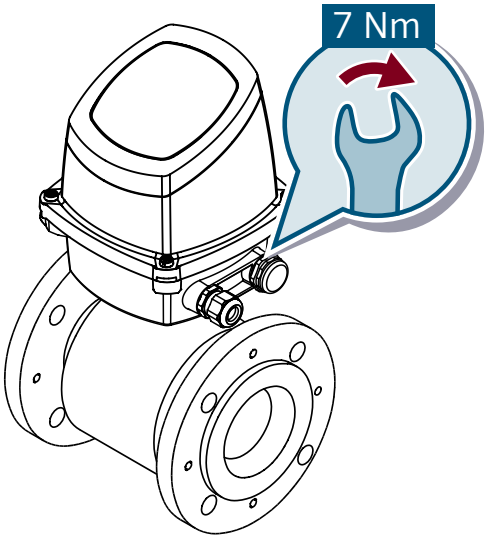
4.10 Installing a breathing vent (optional)

Order and install a breathing vent to equalize the internal and external pressure in the enclosure. Pressure equalization reduces stress on the seals and prevents moisture condensation, corrosion, and subsequent device failures. The breathing vent is certified for degree of protection IP67 and for Ex e II. The approval applies only to the breathing vent. Consider the approval restrictions of your product. Its membrane repels water, oil, and dirt. You can install the breathing vent on either the transmitter or the sensor, in both compact and remote designs.

Procedure

NOTICE
Water ingress due to an unsealed NPT thread If you install a breathing vent with NPT threads without sealing tape, water can enter the enclosure and damage the device. Before installation, wrap each engaged NPT thread with three clockwise turns of PTFE (Teflon) tape, starting at the thread end.

1. Remove one of the blanking plugs on the side of the terminal box. Do not use the entries on the bottom side of the terminal box.
2. Tighten the breathing vent to 7 Nm.



Connecting

5

5.1 General information

The following contains a short description of how to connect a remote mounted sensor to a transmitter type SITRANS FMT020. For more information, e.g. about wiring of power supply and outputs, refer to the Operating Instructions for the respective transmitter.

Before connecting

- Check that serial numbers on sensor and SENSORPROM® unit are identical.

5.2 General safety requirements

⚠ WARNING

The pertinent regulations must be observed for electrical installation.

- Never install the device with the mains voltage switched on!
- Danger of electric shock!
- The electrodes and magnetic current line may only be connected when the device is not connected to the power supply.
- If the housing is under voltage (power supply), the cover may be unscrewed by qualified personnel only.

⚠ WARNING

Mains supply from building installation Class II

A switch or circuit breaker (max. 15 A) must be installed in close proximity to the equipment and within easy reach of the operator. It must be marked as the disconnecting device for the equipment.

Cable specifications

- Only use cables with at least the same degree of protection as the sensor to install the sensor.
- The line length from the cable gland to the terminals must be kept as short as possible. Line loops in the terminal box must be avoided.
- To guarantee the IP67 degree of protection, use cables with the required specifications.

⚠ WARNING

Protective conductor terminal

The required cable is min. AWG16 or 1.5 mm^2 Cu. Refer to FMT020 Operating Instructions for acceptable conductor cross sections.

⚠ WARNING

Wire insulation

For field wiring installation: Ensure that the national requirements of the country in which the flowmeters are installed is met.

NOTICE

Only use cable glands and O-rings provided by Siemens for this device

The usage of other cable glands and O-rings voids UL61010-1 certification, can damage the device and downgrade IP rating.

5.3 Connecting the sensor

Before you start

- Read the Safety notes (Page 11)
- Read the Basic safety notes: Installing/mounting (Page 17)
- Read the Basic safety notes: Connecting (Page 33)

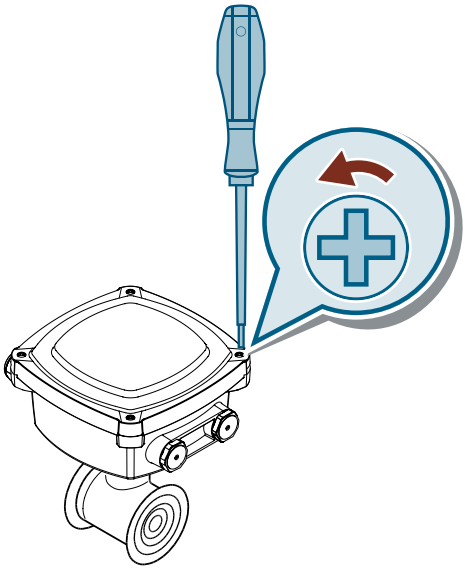
NOTICE

Do not use rigid conduits

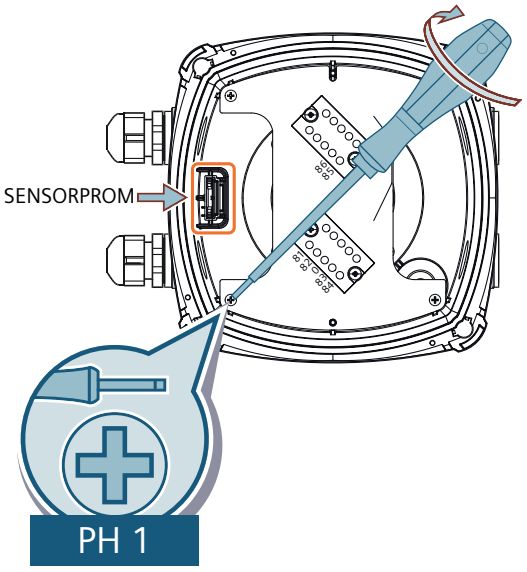
Using rigid conduits can damage the terminal box.

Procedure

1. Remove the lid from the sensor terminal box.



2. Remove SENSORPROM from the holder in the sensor terminal box. The SENSORPROM has to be mounted in the transmitter terminal box.
   Ensure that the serial number on the SENSORPROM label is identical to the sensor serial number.
3. The terminal board with premounted terminal blocks is included in the delivery of the wall mounting unit.
   Mount the sensor terminal board in the sensor terminal box. Tighten completely to maximum torque: 1 Nm.

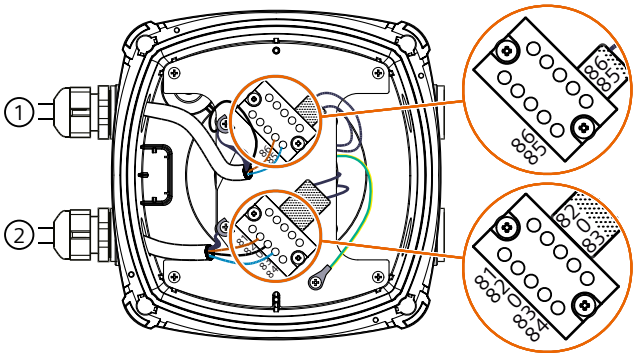


4. Fit the coil cable ① and electrode cable ② through the cable glands. Connect the cables to the corresponding terminals on the terminal blocks. Tighten all terminal screws to the specified maximum torque: 0.5 Nm.

Note

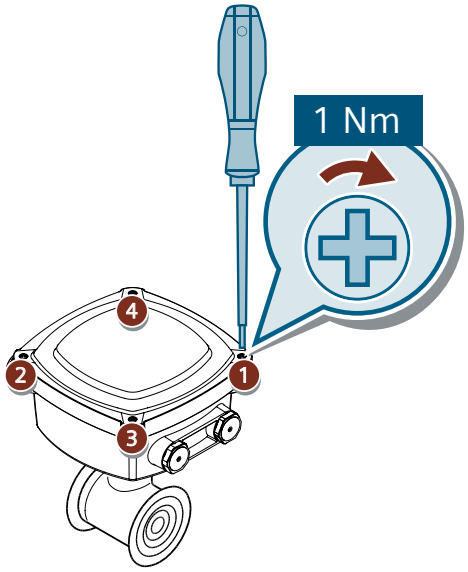
Electrode cable with two or three wires

Depending on your configuration, the electrode connector can have either two or three wires. In both cases, the grounding is always connected through the center pin.



5. Connect the coil and electrode cable shields and grounding cables to the terminal board by using grounding lugs.
   The black wire can be used as an alternative way to equalize potential, or, if not needed, it can be cut off. Use the black wire to equalize potential if you are using:
   - 24 V DC PSU without PE
   - Sensor without grounding electrode

6. Remount terminal box lid by cross tightening as indicated. Do not tighten fully at first to avoid damage to the device.



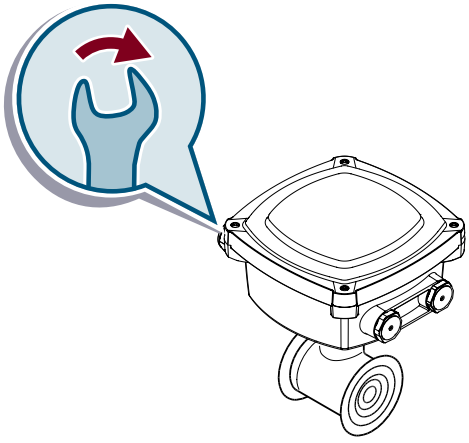
Note

Tightening torque for FMS100 Food grade version

For FMS100 Food grade verision with stainless steel terminal box the tightening torque is 2 Nm.

7. To obtain optimum sealing, tighten cable glands. For the right torque values refer to FMT020 Operating Instructions (https://sieportal.siemens.com/su/blxYS).

NOTICE
Do not overtighten the NPT adapter Overtightening can result in cracks of the terminal box. Use a second wrench to hold the NPT adapter firmly in place while tightening the cable glands or flexible conduits.



5.4 Electrical connection

WARNING

Safety requirement for DC power supply input

The DC power supply version is intended to be supplied from one of the following:

- Isolated limited energy source UL61010-1, 3rd ed cl. 9.4
- Limited power source per UL62368-1
- PS2 per UL62368-1
- Class 2 per NEC

WARNING

Safety requirement for power supply for communication terminals

When applicable, the communication terminals are intended to be supplied from one of the following:

- Isolated limited energy source UL61010-1, 3rd ed cl. 9.4
- Limited power source per UL62368-1
- PS2 per UL62368-1
- Class 2 per NEC

WARNING

Safety requirement for power supply for communication terminals

The device is intended to be supplied from an isolated Limited Energy Source per UL61010-1, 3rd ed cl. 9.4 or Limited Power Source per UL62368-1 or Class 2 per NEC.

WARNING

Disconnecting the device from power

To be able to disconnect the device from the electrical supply source, install an external switch or a circuit breaker upstream to the device.
Choose a position so that it is easy to operate the disconnecting protection device.

WARNING

Grounding

Connect mains protective ground earth to PE terminal in accordance with diagram (due to class 1 power supply).

WARNING

High vibration environment

Use relay output only in NO mode in an environment with high vibration.

Note

Mains cable connection

Mains cable connection with cable glands is allowed for NFPA79 applications only.

Note

For mains wiring: Use cables in copper material, with a conductor temperature rating of at least 65 °C.

Note

Terminals 81 and 84 are only to be connected if a special electrode cable with double shielding is used.

Note

In applications with a risk of low supply voltage below the specifications for more than 10 minutes, install an under voltage relay or protection circuit for DC installations.

Note

Output cables

Use shielded cables if long cables are used in noisy environments.

Note

Digital output

If internal resistance of a load exceeds 10 kΩ, connect an external 10 kΩ load resistor in parallel to this load.

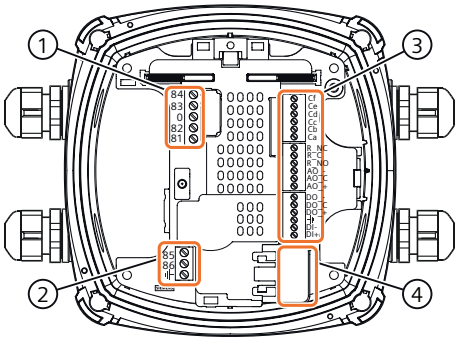
Note

Mains frequency

Select the right mains frequency in parameter 2.1.2 for the mains supply frequency, that you are using.

For input and output specification refer to Technical specifications (Page 53).

Connection board overview



① Electrode cable terminals
② Coil cable terminals
③ Input/Output and communication terminals
④ Power supply terminal

Power supply

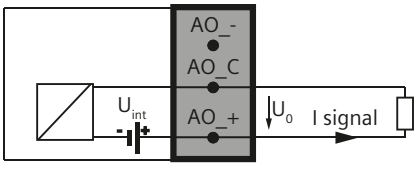
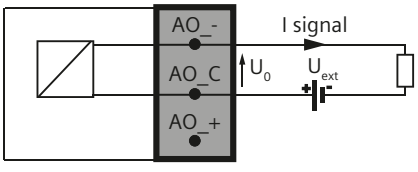
Table 5-1 Power supply transmitter side

AC power supply	DC power supply
⏚ ← P N ← N L ← L	⏚ ← PE + ← + - ← -

Cable section and insulation as described in FMT020 Operating Instructions (http://www.siemens.com/processinstrumentation/documentation).

Current output

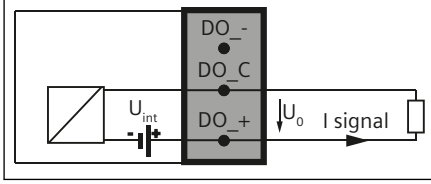
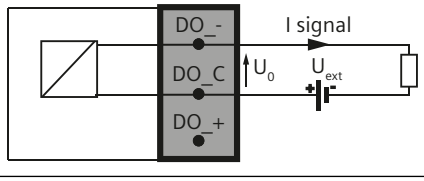
Table 5-2 Current output

Active output	Passive output
	

Rload < 470 Ω, max. current 30 mA

Digital output

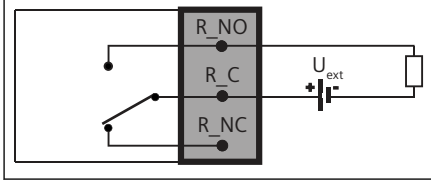
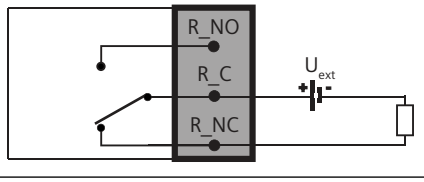
Table 5-3 Digital output - current driven

Active output	Passive output
	

Rload < 1 kΩ, max. current 30 mA

Relay output

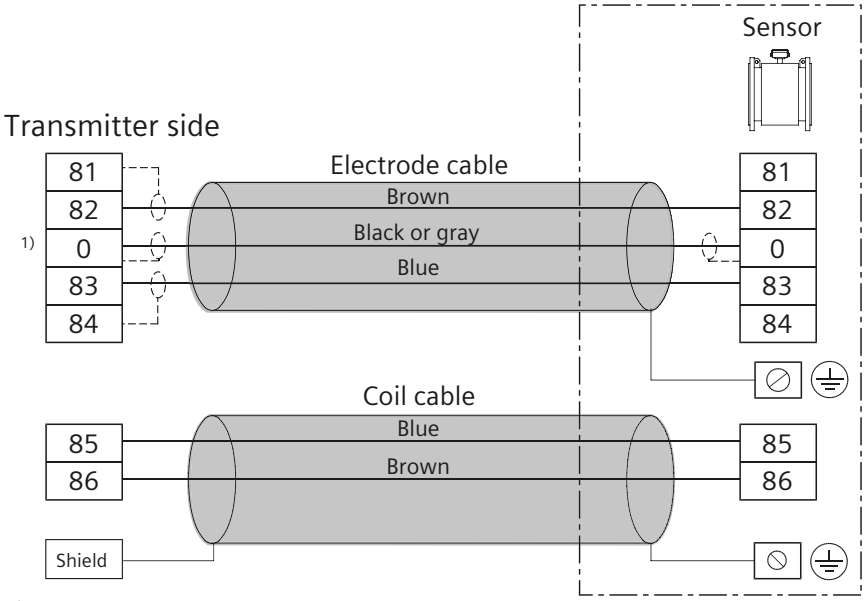
Table 5-4 Relay output

Relay output normally open	Relay output normally closed
	

Communication cable

Ca, Cb, Cc, Cd, Ce, Cf are reserved for communication modules as described in FMT020 Operating Instructions (http://www.siemens.com/processinstrumentation/documentation).

Transmitter to sensor cable connection



1) Note:
Special cable with individual wire shields (shown as dotted lines) are only required when in a noisy environment or using long cables.

Figure 5-1 Electrode and coil cable

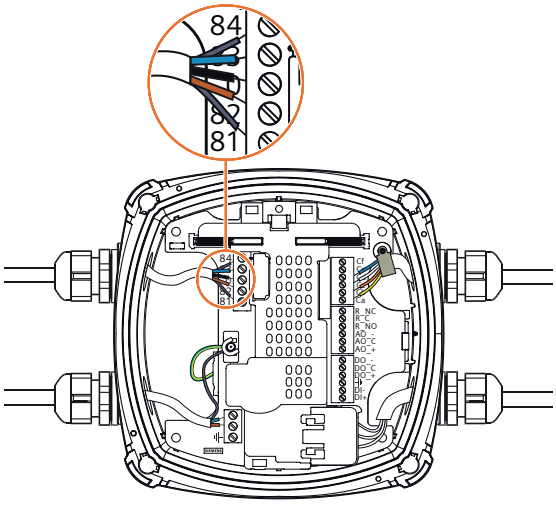


Figure 5-2 Electrode cable with individual wire shields

5.5 Installation check

The meter is now ready to go into normal operation - for commissioning and setting of parameters refer to the relevant transmitter manual.

Before commissioning it must be checked that:

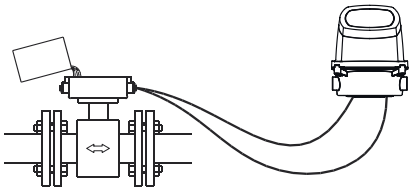
- The device has been installed and connected in accordance with the guidelines provided previous in this chapter and in Installing/mounting (Page 17).

5.6 Potting

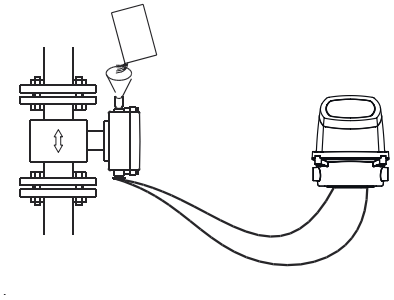
If sensor is buried or permanently submerged, terminal box must be encapsulated with silicon dielectric gel (non-toxic, transparent and self-healing gel).

NOTICE
Electrical connections Do **not** pot meter before electrical connections have been made.

- Mix the two components of the potting kit well and pour into terminal box.
- Let cure for approximately 24 hours at approximately 25°C (77°F). Curing time increases by 100% per -10°C (-18°F).



Horizontal orientation



Vertical orientation

Note

Gel can be penetrated with test instruments or be removed in case of cable replacement.

Service and maintenance

6

6.1 Maintenance

The device is maintenance-free. However, a periodic inspection according to pertinent directives and regulations must be carried out.

An inspection can include check of:

- Ambient conditions
- Seal integrity of the process connections, cable entries, and cover screws
- Reliability of power supply, lightning protection, and grounds

Note

Siemens defines flow sensors as non-repairable products.

⚠ WARNING
Impermissible repair and maintenance of the device • Repair and maintenance must be carried out by Siemens authorized personnel only.

6.2 Unit repair

NOTICE
Repair and service must be carried out by Siemens authorized personnel only.

Note

Siemens defines flow sensors as non-repairable products.

6.3 Ordering of spare parts and accessories

Condition

- You have a Siemens Industry Mall account.

Procedure

1. Open the Process instrumentation catalog (https://www.siemens.com/processinstrumentation/catalogs).
2. Select the desired language.
3. To find spare parts for your device, do one of the following:
   - Enter the complete order number of your device (e.g. 7ME4633-4KA51-8DC3-Z A05+B11+E06+F11) into the "Product number" field and click "Go".
   - Enter the serial number of your device (e.g. N1KXXXXXXX) in the "Serial number" field and click "Go".
   - If you do not know the product or serial number, search for your device under "Product family".
4. Navigate to the "Spare parts" and "Accessory parts" tab.
   You see the list of spare parts and accessories available for your device.

5. Select a spare part or an accessory and add it to your watch list.
   The watch list opens.
6. Click "Add to cart of Industry Mall".

The Siemens Industry Mall opens and you can order your spare part and your accessories.

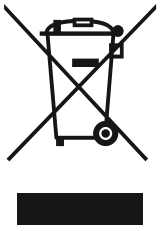
6.4 Return procedure

To return a product to Siemens, see Returns to Siemens (www.siemens.com/returns-to-siemens).

Contact your Siemens representative to clarify if a product is repairable, and how to return it. They can also help with quick repair processing, a repair cost estimate, or a repair report/ cause of failure report.

NOTICE
Decontamination The product may have to be decontaminated before it is returned. Your Siemens contact person will let you know for which products this is required.

6.5 Disposal



Devices described in this manual should be recycled. They may not be disposed of in the municipal waste disposal services according to the Directive 2012/19/EC on waste electronic and electrical equipment (WEEE).

Devices can be returned to the supplier within the EC and UK, or to a locally approved disposal service for eco-friendly recycling. Observe the specific regulations valid in your country.

Further information about devices containing batteries can be found at: Information about battery / product return (WEEE) (https://support.industry.siemens.com/cs/document/109479891/)

NOTICE
Data misuse resulting from non-secure deletion of data Incomplete or non-secure deletion of data from data memories can result in data misuse by third parties. For this reason, ensure secure deletion of data from all storage media used before disposing of the product.

Troubleshooting

7

7.1 Improving the application

The first step in the troubleshooting procedure is to check for some easily resolved problems.

Check that:

- Sensor and SENSORPROM unit correspond (serial numbers)
- The sensor is properly installed.
- The sensor is located in a vibration-free position. Vibrations can disturb the sensor and therefore cause measurement error.
- The sensor is filled with liquid and liquid only. Air or gas bubbles in the liquid cause instability and can result in measurement errors.

Note

The liquid must be homogeneous in order to achieve high-accuracy measurements. If the liquid contains solid particles of greater density than the liquid, then these solids can precipitate, especially at low flow rates, which will cause instability in the sensor and lead to measurement errors.

Resolving problems

1. Make sure that the serial numbers on the sensor and the SENSORPROM® unit are identical.
2. Make sure that the sensor is installed as described in the installation chapter (Page 17) of the sensor Operating Instructions.
3. Flush the pipe systems and the sensor for several minutes at maximum flow rate to remove any air bubbles which may be present.

7.2 Sensor check

Requirement

To check the SITRANS FM sensors the following test instruments will be required:

- Digital Meter/Multimeter
- Ohmmeter "Megger"
- (Moving Coil Meter)

Sensor check

Remove the transmitter from the sensor or remote position before making the following checks.

Coil resistance check

- Measure the coil resistance between connection numbers 85 and 86 using a digital meter. Resistance should be within range stated in Coil resistance table (Page 77).

A low reading may indicate moisture within the coil housing or shorted coil turns.

A high reading would indicate an open circuit coil.

Note

In case of deviation from nominal coil values, the sensor is damaged and must be replaced

Coil insulation check

⚠ WARNING

Potential hazard!

Only carry out a coil insulation check in non-hazardous area!

- Megger between connection number 85 and the sensor body.
  The resistance should be above 20 MΩ.

A low megger reading would indicate the coil insulation is breaking down. This is usually due to fluid ingress into the coil housing.

Sensors with an insulation resistance down to 1 MΩ may still work satisfactorily but this is not guaranteed.

Electrode resistance check

- Measure the electrode resistance between connections 82 and 0 with a moving coil meter. With a sensor full of fluid the resistance should be between 5 kΩ and 50 kΩ.
  If the sensor is empty the resistance will be infinite.
- Repeat the resistance measurements between connections 83 and 0.
  The results should be the same.

If the resistance is low there may be a short on the electrodes or wiring (in the case of a remote mounted transmitter). Alternatively there may be water ingress or moisture in the terminal box.

If the resistance is high and the pipe is completely full of fluid check the following:

1. Fluid is electrically conductive.
2. Electrodes are not coated with grease or any deposit.
3. Electrode circuit is not open.

4. Remote mounted transmitter has a 3 core cable with an overall shield continuously from sensor to transmitter, including junction boxes and terminal rails inside panels.
5. Shield is connected to 0 or to earth terminal (PE) on sensor.

Note

Sensors removed from line

For sensors removed from line with dry bore, use megger between terminal 82 and compression plate, and 83 and compression plate to show any water ingress behind electrodes or within enclosure.

7.3 Fluctuating process values

Question

Why do the displayed process values fluctuate when the electrode cable is moved?

Answer

There are several causes of the fluctuating process values:

- Deposits on electrodes
  - Clean the electrodes.
- Defect electrode cable
  - Replace the cable
- Incorrect cable connection
  - Connect the electrode cable (82, 83, 0 and shield) according to the instructions in Connecting (Page 33)

Note

Vibrating environments

It is recommended to use special low noise cables for sensor sizes DN 2 and DN 3 installed in vibrating environments.

Technical specifications

8

8.1 Process connections

Table 8-1 Process connections

FMS100	
Nominal size	
- Ceramic	- DN 2 to 100 (1/12" to 4")
- PFA	- DN 10 to 100 (3/8" to 4")
Mating flanges	
EN 1092-1 (DIN 2501), ANSI B 16.5 class 150 and 300 or equivalent	- DN 2 to 100 (1/12" to 4") (Ceramic) - DN 10 to 100 (3/8" to 4") (PFA) Option: DN 2 to 10 (1/12" to 3/8"): G½" / NPT ½" pipe connection adapters
Weld in	
DIN 11850	- DN 10 to 100 (3/8" to 4")
ISO 2037 (SMS 3008)	- DN 10 to 100 (3/8" to 4")
Tri-Weld/BS 4825-1	- DN 10 to 100 (3/8" to 4")
Clamp type	
DIN 32676	- DN 10 to 100 (3/8" to 4")
ISO 2852 (SMS 3016)	- DN 25 to 100 (1" to 4")
Tri-Clamp/BS 4825-3	- DN 10 to 100 (3/8" to 4")
Threaded type	
DIN 11851	- DN 10 to 100 (3/8" to 4")
SMS 1145	- DN 25 to 65 (1" to 2½")

8.2 Rated operating conditions

Note

Environmental operating guidance

Operating the device closer to the lower end of the specified ambient temperature range can help extend its service life. Avoiding continuous operation at the maximum rated temperature reduces thermal stress and supports long-term reliability, contributing to improved environmental performance.

Table 8-2 Ambient temperatures [1] [2]

FMS100	
Standard Sensor	-20 to +100 °C (-4 to +212 °F)
With compact transmitter	
FMT020	-20 to +65 °C (-4 to +149 °F)

[1] Conditions also dependent on liner characteristiques

[2] With HART communication the max. ambient temperature is 50 °C (122 °F)

8.3 Media temperature

Table 8-3 Media temperature

Version	**FMS100**	**FMS100 High temperature version**
Ceramic	-20 to +150 °C (-4 to +302 °F)	-20 to +200 °C (-4 to +392 °F)
PFA	-30 to +130 °C (-22 to +266 °F) Suitable for steam sterilization at 150 °C (302 °F)	
	-30 to +130 °C (-22 to +266 °F) Suitable for steam sterilization at 150 °C (302 °F)	

8.4 Temperature shock

Table 8-4 Temperature shock

Version	**FMS100**	**FMS100 High temperature version**	**FMS100 Food grade version**
Ceramic Duration ≤ 1 min, followed by 10 min rest	DN 2 and 3 (1/12 " and 3/8"): No limitations DN 6, 10, 15 and 25: Max ΔT ≤ 80 °C/min (1/4", 3/8", ½" and 1": Max ΔT ≤ 144 °F/min) DN 40, 50 and 65: Max ΔT ≤ 70 °C/min (1½", 2", and 2½": Max ΔT ≤ 126 °F/min) DN 80 and 100: Max ΔT ≤ 60 °C/min (3" and 4": Max ΔT ≤ 108 °F/min)	DN 10, 15 and 25: Max. ΔT ≤ 80 °C/min (3/8”, ½” and 1”: Max. ΔT ≤ 144 °F/min) DN 40 50, and 65: Max. ΔT ≤ 70 °C/min (1½”, 2” and 2½”: Max. ΔT ≤ 126 °F/min) DN 80 and 100: Max. ΔT ≤ 60 °C/min (3”, 4”: Max. ΔT ≤ 108 °F/min)	DN 10, 15 and 25: Max. ΔT ≤ 80 °C/min (3/8”, ½” and 1”: Max. ΔT ≤ 144 °F/min) DN 40 and 50: Max. ΔT ≤ 70 °C/min (1½” and 2”: Max. ΔT ≤ 126 °F/min) DN 80 and 100: Max. ΔT ≤ 60 °C/min (3”, 4”: Max. ΔT ≤ 108 °F/min)
PFA	DN 15, 25, 40, 50, 65: Max. ΔT 120 °C/min (½", 1", 1½", 2", 2½": Max. ΔT 248 °F/min) DN 80, DN 100: Max. ΔT 110 °C/min (3", 4": Max. ΔT 230 °F/min)		

8.5 Operating pressure

Table 8-5 Operating pressure

Version	FMS100	FMS100 High temperature version	FMS100 Food grade version
Ceramic	• DN 2 to 65: 40 barg (1/12" to 2½":: 580 psig) • DN 80: 37.5 barg (3": 540 psig) • DN 100: 30 barg (4": 435 psig) Vacuum 1 x 10^{-6} bar_{abs} (1.5 x 10^{-5} psi_{abs})	• DN 15 to 50: 40 barg (½" to 2": 580 psig) • DN 80: 37.5 barg (3": 540 psig) • DN 100: 25 barg (4": 363 psig) Vacuum 1 x 10^{-6} bar_{abs} (1.5 x 10^{-5} psi_{abs})	• DN 10 ... 65: 40 barg (3/8" to 2½": 580 psig) • DN 80: 25 barg (3": 363 psig) • DN 100: 25 barg (4": 363 psig) Vacuum 1 x 10^{-6} bar_{abs} (1.5 x 10^{-5} psi_{abs})
PFA	20 bar to (290 psi) Vacuum 0.02 bar_{abs} (0.3 psi_{abs}) DN 80 to 100: CO_2 pressure max. 7 bar (101.5 psi)		

8.6 Vibration

Table 8-6 Mechanical load/Vibration

FMS100	
Mechanical load (vibration) - compact version	
With compact transmitter FMT020	• Vibration, sinusoidal according to IEC 60068-2-6: 1 g peak • Vibration broad-band random, according to IEC 60068-2-64: 1.54 g rms
Mechanical load (vibration) - remote version	
Sensor	• 18 to 1000 Hz random in x, y, z, directions for 2 hours according to EN 60068-2-36 • Sensor: 3.17 grms
Transmitter FMT020	• Vibration, sinusoidal according to IEC 60068-2-6: 0.7 g peak • Vibration broad-band random, according to IEC 60068-2-64: 1.54 g rms

8.7 Enclosure rating (standard)

Table 8-7 Mechanical load/Vibration

Version	FMS100	FMS100 Food grade version
EMC (2014/30/EU)	IP66/67, NEMA 4X/6	IP67 to EN 60529 (NEMA 4X), 1m H_2O for 30 min
Optional	IP68 and NEMA 6P (2m, 10 days) for sensor in compact (integral mount) and remote design IP68 and NEMA 6P (10m, continuously) for sensor in remote design	

8.8 Design

Table 8-8 Design

Version	FMS100	FMS100 High temperature version	FMS100 Food grade version
Material			
• Sensor – FMS100	Stainless steel AISI 316L (1.4404)	Stainless steel AISI 316L (1.4404)	Stainless steel AISI 316L (1.4404)
• Terminal box	Polycarbonate or stainless steel AISI 316 (1.4436)	Stainless steel AISI 316 (1.4436)	Stainless steel AISI 316 (1.4436)
• Fixing elements	Stainless steel AISI 304 (1.4301), Number and size to EN 1092-1:2001	Stainless steel AISI 304 (1.4301), Number and size to EN 1092-1:2001	Stainless steel AISI 304 (1.4301), Number and size to EN 1092-1:2001
• Gaskets - Standard	EPDM (max. 150 °C, PN 40 (max. 300 °F, 600 psi)) Graphite (max. 200 °C, PN 40 (max. 390 °F, 600 psi))	Graphite (max. 200 °C, PN 40 (max. 390 °F, 600 psi))	**For ceramic:** EPDM (-20 ... +140 °C (-4 ... +284 °F))
- Option	Graphite (max. 200 °C, PN 40 (max. 390 °F, 600 psi)) PTFE (max. 130 °C, PN 25 (max. 270 °F, 300 psi))		**For PFA:** EPDM (-20 to +140 °C (-4 to +284 °F))
• Pipe connection adapters: DN 2, 3, 6 and 10 (1/12", 1/8", ¼" and 3/8")	• Stainless steel • Hastelloy • PVDF		

8.9 Liner

Table 8-9 Liner

FMS100	
Ceramic	DN 2 and 3 (1/12" and 1/8"): Zirconium oxide (ZrO_2) (ceramic) DN 6 to 100 (¼" to 4"): Aluminum oxide Al_2O_3
PFA	Reinforced PFA (not for Ex)

8.10 Electrodes

Table 8-10 Electrodes

FMS100	
Ceramic	DN 10 to 100 (3/8" to 4") : Platinum with gold / Titanium brazing alloy DN 2 to 6 (1/12" to ¼"): Platinium
PFA	DN 25 to 100 (1" to 4"): Hastelloy C22

8.11 Cable data

Description

Cable for standard electrode or coil	
Electrode cable, double shielded	
Cable kit with standard coil cable and electrode cable double shielded (also available as low noise cable for FMS100)	
Low-noise electrode coax cable for low conductivity and high vibration levels, 3 x 0.13 mm^2	

Standard applications

Table 8-11 Technical specifications, standard application cables

		Coil cable	**Standard electrode cable**	**Coax cable**
Basic data	No. of conductors	2	3	3
	Min. sqr. area	0.5 mm^2	0.2 mm^2	
	Shield	Yes	Yes	Yes
	Max. capacitance	N/A	350 pF/m	101 pF/m
Max. cable loop resistance	Media temperature:			
	< 100 °C (212 °F)	40 Ω	N/A	
	> 200 °C (392 °F)	6 Ω	N/A	
Cable glands on sensor and transmitter	M20x1.5 gland - Cable ø 6 to 12 mm (0.24 to 0.47 inches)			
	½ NPT gland - cable ø 6 to 12 mm (0.24 to 0.47 inches)			

Special applications, for example low conductivity or electrical noise

Table 8-12 Technical specifications, special application cables

		Coil cable	Special electrode cable	Coax
Basic data	No. of conductors	3	3	3
	Sqr. area	1.5 mm^2	0.25 mm^2	
	Shield	Yes	Double	Yes
	Color code	Brown, blue, black	Brown, blue, black	
	Outside color	Grey	Grey	Black
	Ext. diameter	7.8 mm	8.1 mm	9.2 mm
	Conductor	Flexible CU	Flexible CU	Flexible CU
	Isolation material	PVC	PVC	PVC
Ambient temperature	Flexible installation	-5 to +70°C (23 to 158°F)	-5 to +70°C (23 to 158°F)	-5°C to +85°C (23°F to 185°F)
	Non-flexible installation	-30 to +70°C (-22 to 158°F)	-30 to +70°C (-22 to 158°F)	-25°C to +85°C (-13°F to 185°F)
Cable parameter	Capacity	161.50 pF/m	N/A	
	Inductance	0.583 µH/m	N/A	
	L/R	43.83 þH/Ω	N/A	

8.12 Pressure / temperature range

The following diagrams and tables show the maximum allowable working pressure at various working temperatures. For maximum allowable working pressure (MAWP) at 20 °C and at maximum working temperature, see the nameplate on the device.

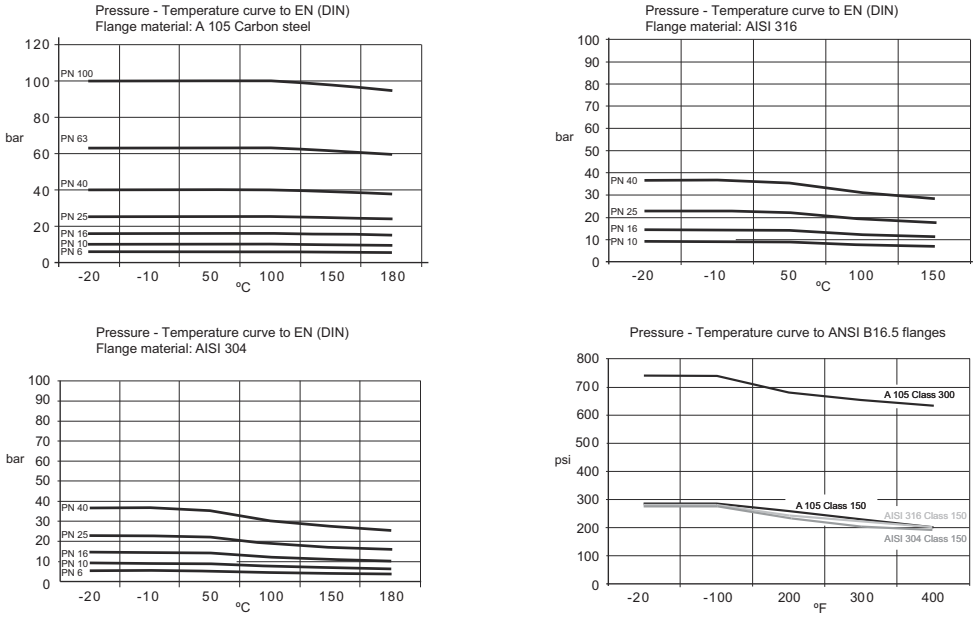


Table 8-13 Metric measures (pressure in bar) - Sizes 25 mm, 40 mm and >300 mm

Flange specifications	Flange rating	Temperature (°C)			
		-5	10	50	90
EN 1092-1	PN 10	10.0	10.0	9.7	9.4
	PN 16	16.0	16.0	15.5	15.1
	PN 40	40.0	40.0	38.7	37.7
ANSI B16.5	150 lb	19.7	19.7	19.3	18.0
AWWA C-207	Class D	10.3	10.3	10.3	10.3

Table 8-14 Imperial measures (pressure in psi) - Sizes 1", 1½" and >12"

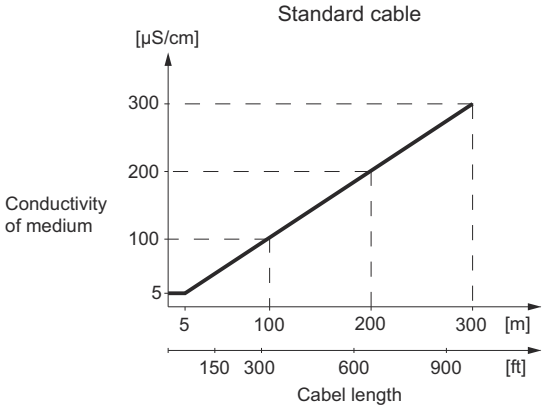
Flange specifications	Flange rating	Temperature (°F)			
		23	50	120	200
EN 1092-1	PN 10	145	145	141	136
	PN 16	232	232	225	219
	PN 40	580	580	561	547
ANSI B16.5	150 lb	286	286	280	261
AWWA C-207	Class D	150	150	150	150l

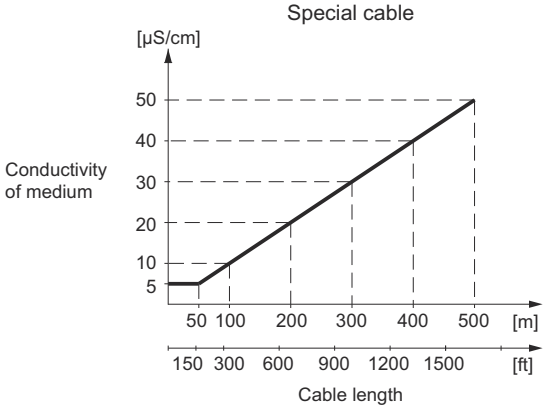
8.13 Process fluid conductivity

Compact installation

Liquids with an electrical conductivity ≥ 5 µS/cm.

Remote installation





8.14 Certificates and approvals

Table 8-15 Certificates and approvals

Version	FMS100	FMS100 Food grade version
Calibration Standard production calibration, calibration report shipped with sensor	Zero-point, 2 x 25 % and 2 x 90 %	Zero-point, 2 x 25 % and 2 x 90 %
General purpose		CE, UKCA

Version	**FMS100**	**FMS100 Food grade version**
Hygienic		Ceramic: 3A certificate (Hygienic – US) PFA: FDA declaration of conformity (food contact - US) [3A certificate (Hygienic – US)] EC/1935/2004 Food contact declaration of conformity (food contact - EU)
Conforms to	PED - 2014/68/EU and CRN (PFA)	PED - 2014/68/EU
Others	Environmental Product Declaration (EPD) CRN (Canadian Registration Number) UL 61010 (ordinary locations US/C) RCM (Australia) EAC (KZ) KC (Ko)	

Dimension drawings

9

9.1 Dimensions and weight

FMS100

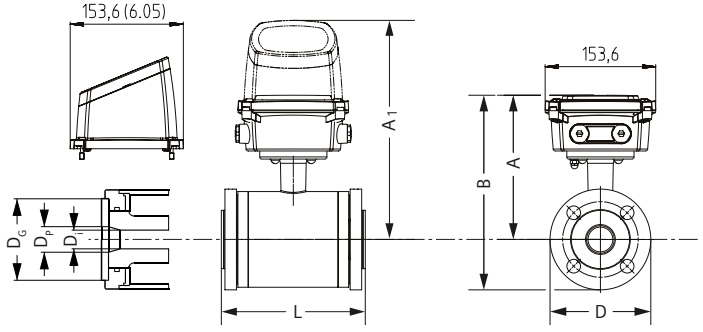


Table 9-1 Dimensions in mm

Nominal size DN	A[1)]	B[1)]	A_1	D	D_i	D_i (PFA)	D_p	D_G	Weight[2)]
DN	mm	mm	mm	mm	mm	mm	mm	mm	kg
2	154	179	258	48.7	2		17.3	34	2.2
3	154	179	258	48.7	3		17.3	34	2.2
6	154	179	258	48.7	6		17.3	34	2.2
10	154	179	258	48.7	10	10	13.6	34	2.2
15	154	179	258	48.7	15	16	17.3	40	2.2
25	162	194	266	63.5	25	26	28.5	56	2.7
40	172	214	276	84.0	40	38	43.4	75	3.4
50	181	232	285	101.6	50	50	54.5	90	4.2
65	191	251	294	120.9	65	66	68.0	112	5.5
80	197	263	300	133.0	80	81	82.5	124	7.0
100	210	289	313	159.0	100	100	107.1	150	10.0

1) 7.5 mm shorter when the stainless steel terminal box is used (High temperature 200 °C (392 °F) version)

2) With transmitter FMT020 installed, weight is increased by approximately 1 kg.

Table 9-2 Dimensions in inch

Nominal size DN	A[1)]	B[1)]	A_1	D	Di	D_i (PFA)	D_P	D_G	Weight[2)]
inch	inch	inch	inch	inch	inch	inch	inch	inch	lb
1/12	6.1	7.05	10.2	1.92	0.08		0.68	1.34	4.8

Nominal size DN	A[1)]	B[1)]	A_1	D	Di	D_i (PFA)	D_P	D_G	Weight[2)]
1/8	6.1	7.05	10.2	1.92	0.12		0.68	1.34	4.8
¼	6.1	7.05	10.2	1.92	0.24		0.68	1.34	4.8
3/8	6.1	7.05	10.2	1.92	0.39	0.39	0.53	1.34	4.8
½	6.1	7.05	10.2	1.92	0.59	0.63	0.68	1.57	4.8
1	6.4	7.64	10.5	2.50	0.98	1.02	1.12	2.20	5.9
1½	6.8	8.42	10.9	3.31	1.57	1.50	1.71	2.95	7.5
2	7.1	9.13	11.2	4.00	1.97	1.97	2.15	3.54	9.2
2½	7.5	9.88	11.6	4.76	2.56	2.60	2.68	4.41	12
3	7.8	10.35	11.8	5.24	3.15	3.19	3.25	4.88	15
4	8.3	11.37	12.3	6.26	3.94	3.94	4.22	5.91	22

1) 0.29 inch shorter when the stainless steel terminal box is used (High temperature 200 °C (392 °F) version)

2) With transmitter FMT020 installed, weight is increased by approximately 2.2 lb.

Table 9-3 FMS100 built-in length

Nominal size DN		L[1)]									
		EN 1092-1-201									
		EPDM		Graphite		PTFE (Teflon)		Without gasket		Grounding ring	
DN	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch
2...10[1)]	1/12... 3/8[1)]	64	2.52	66	2.60	70	2.75	64	2.52	77	3.03
15	½	65	2.56	66	2.60	70	2.75	64	2.52	77	3.03
25	1	80	3.15	81	3.19	85	3.35	79	3.10	92	3.62
40	1½	95	3.74	96	3.78	100	3.94	94	3.70	107	4.21
50	2	105	4.13	106	4.17	110	4.33	104	4.05	117	4.61
65	2½	130	5.12	131	5.15	135	5.31	129	5.05	142	5.60
80	3	155	6.10	156	6.14	160	6.30	154	6.00	167	6.57
100	4	185	7.28	186	7.31	190	7.48	184	7.20	197	7.76

1) When earthing flanges are used, the thickness of the earthing flange must be added to the built-in length

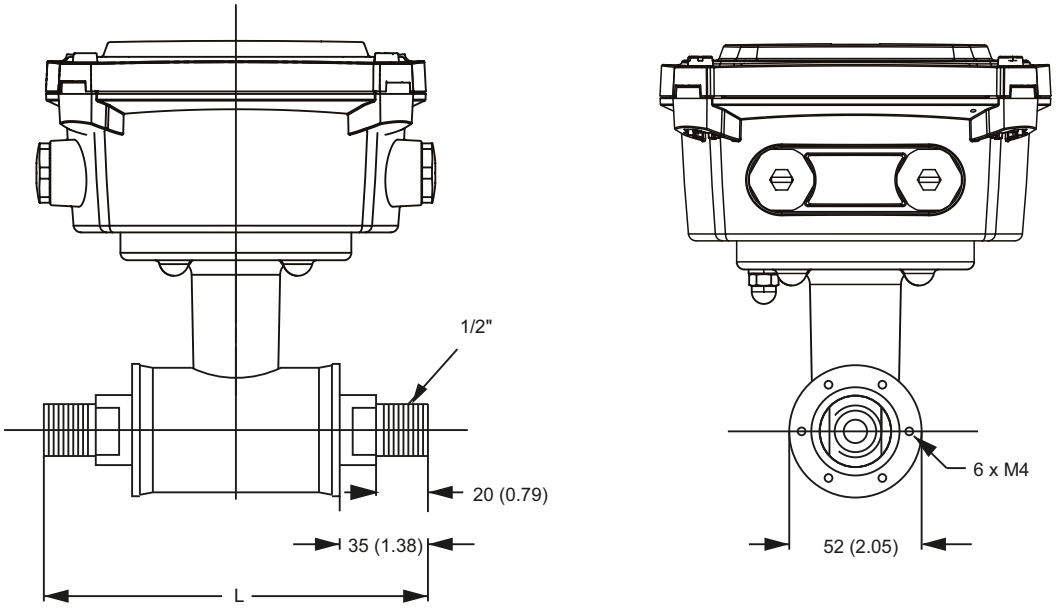


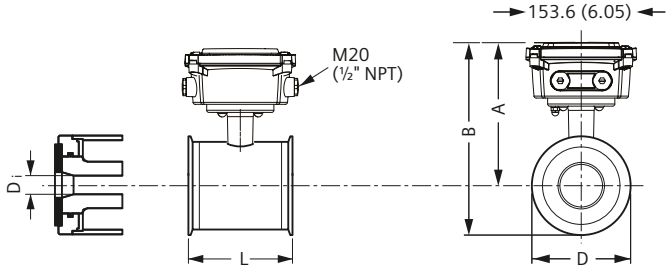
Figure 9-1 FMS100 with adapters

The FMS100 DN 2, 3, 6 and 10 (1/12", 1/8", ¼" and 3/8") are prepared for assembly with the ½" pipe connections. Dimensions in mm (inch) The length "L" varies dependent on the gasket choice.

Stainless steel and Hastelloy pipe connections								**PVDF pipe connections**	
Without gasket		EPDM		Graphite		PTFE		PTFE	
mm	inch	mm	inch	mm	inch	mm	inch	mm	inch
150	5.9	150	5.9	152	6.0	156	6.1	133	5.2

9.2 Built-in length for FMS100

FMS100 Food grade version



The stainless steel terminal box of the FMS100 Food grade version differs from the illustration.

Table 9-4 Dimensions in mm

Nominal size DN	**L**	**A[1)]**	**B[1)]**	**D**	**D_i (Al_2O_3)**	**D_i (PFA)**	**Weight[2)]**
mm	mm	mm	mm	mm	mm	mm	kg
10	64	161	193.7	64.0	10	10	2.2
15	64	161	193.7	64.0	15	16	2.2
25	79	169	207.5	77.5	25	26	2.7
40	94	179	228.0	91.0	40	38	3.4
50	104	188	247.7	119.0	50	50	4.2
65	131	197.5	262.6	130.0	65	66	5.5
80	156	204	281.0	155.0	80	81	7.0
100	186	217	308.0	183.0	100	100	10.0

1) 7.4 mm shorter when the stainless steel terminal box is used.

2) With transmitter FMT020 installed, weight is increased by approximately 1 kg.

Table 9-5 Dimensions in inch

Nominal size DN	**L**	**A[1)]**	**B[1)]**	**D**	**D_i (Al_2O_3)**	**D_i (PFA)**	**Weight[2)]**
inch	inch	inch	inch	inch	inch	inch	lb
3/8	2.52	6.34	7.62	2.52	0.39	0.39	4.8
½	2.52	6.34	7.62	2.52	0.59	0.63	4.8
1	3.11	6.66	8.17	3.05	0.98	1.02	5.9
1½	3.70	7.05	8.98	3.58	1.57	1.50	7.5
2	4.09	7.40	9.75	4.68	1.97	1.97	9.2
2½	5.16	7.78	10.34	5.12	2.56	2.60	12.0
3	6.14	8.03	11.06	6.10	3.15	3.19	15.0
4	7.32	8.54	12.13	7.20	3.94	3.94	22.0

1) 0.29 inch shorter when the stainless steel terminal box is used.

2) With transmitter FMT020 installed, weight is increased by approximately 2.2 lb.

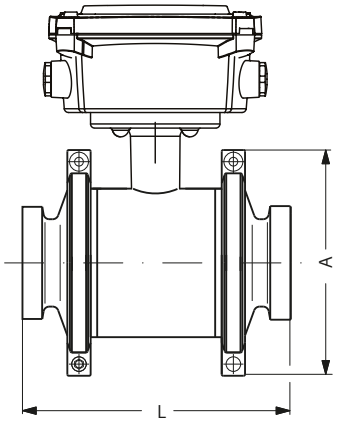


Table 9-6 FMS100 Food grade version built-in length

Nominal size DN		**A**		**L[1)]**	
mm	inch	mm	inch	mm	inch
10	3/8	99	3.90	146	5.75
15	½	99	3.90	146	5.75
25	1	113	4.45	161	6.34
40	1½	126	4.96	176	6.93
50	2	154	6.06	186	7.32
65	2½	165	6.50	223	8.78
80	3	200	7.87	258	10.16
100	4	225	8.86	288	11.34

[1)] The total built-in length "L" is independent of the adapter type selected.

9.3 Accessories for FMS100

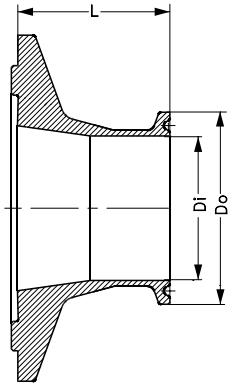


Table 9-7 Weld-in types

Adapter	Sensor	L	Weld-in type					
			DIN 11850		ISO 2037 (SMS 3008)		BS 4825-1 (Tri-Weld)	
DN	DN		Di	Do	Di	Do	Di	Do
mm	mm	mm	mm	mm	mm	mm	mm	mm
10	10	40	10.0	13.0	10.0	13.0	9.4	12.7
15	15	40	16.0	19.0	16.0	19.0	-	-
15.9	15	40	-	-	-	-	15.75	19.05
20	15	40	-	-	20.0	23.0	-	-
25	25	40	-	-	22.6	25.6	22.1	25.4
25	25	40	26.0	29.0	-	-	-	-
28	25	40	-	-	25.6	28.6	-	-
32	25	40	-	-	-	-	-	-
32	25	40	32.0	35.0	-	-	-	-
38	40	40	-	-	35.6	38.6	34.8	38.1
40	40	40	-	-	37.6	40.6	-	-
40	40	40	38.0	41.0	-	-	-	-
50	50	40	-	-	48.6	51.6	47.5	50.8
50	50	40	50.0	53.0	-	-	-	-
63.5	65	45	-	-	60.3	64.1	60.2[1)]	63.5[1)]
65	65	45	66.0	70.0	-	-	-	-
76	65	45	-	-	-	-	-	-
76.1	80	50	-	-	72.9	76.7	72.9	76.2
80	80	50	81.0	85.0	-	-	-	-
100	100	50	100	104	-	-	-	-
101.6	100	50	-	-	97.6	102.5	97.38[1)]	101.6[1)]
114.3	100	50	-	-	110.3	115.6	-	-

Table 9-8 Weld-in types

Adapter	Sensor	L	Weld-in type					
			DIN 11850		ISO 2037 (SMS 3008)		BS 4825-1 (Tri-Weld)	
DN	DN		Di	Do	Di	Do	Di	Do
mm	mm	mm	mm	mm	mm	mm	mm	mm
10	10	40	10.0	34.0	10.0	34.0	10.0	34.0
15	15	40	16.0	34.0	16.0	34.0	10.0	34.0
25	25	40	-	-	-	-	22.6	50.5
25	25	40	26.0	50.5	26.0	-	-	-
33.7	25	40	-	-	31.3	50.5	-	-
38	40	40	-	-	35.6	38.6	35.6	50.5
40	40	40	38.0	50.0	-	-	-	-
50	50	40	50.0	64.0	-	-	-	-
51	50	40	-	-	48.6	64.0	48.6	64.0
63.5	65	45	-	-	60.3	77.5	60.3[1)]	77.5[1)]
65	65	45	66.0	91.0	-	-	-	-
76.1	80	50	-	-	72.9	91.0	72.9	91.0
80	80	50	81.0	85.0	-	-	-	-
100	100	50	100	119.9	-	-	-	-
101.6	100	50	-	-	97.6	119.0	97.6[1)]	119.0

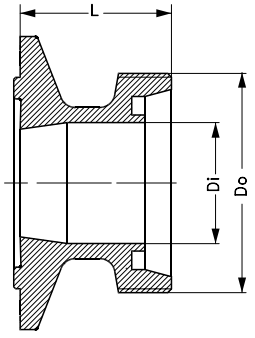


Table 9-9 Threaded type DIN 11851

Adapter	Sensor	L	Threaded type	
			DIN 11851[1)]	
DN	DN		Di	Do
mm	mm	mm	mm	mm
10	10	40	10.0	28.0
15	15	40	16.0	34.0
20	15	40	20.0	44.0
25	25	40	26.0	52.0
32	25	40	32.0	58.0
40	40	40	38.0	65.0

Adapter	Sensor	L	Threaded type	
			DIN 11851[1]	
DN	DN		Di	Do
50	50	40	50.0	78.0
65	65	45	66.0	95.0
80	80	50	81.0	110.0
100	100	50	100.0	130.0

[1] Only 3A used with self centering gaskets

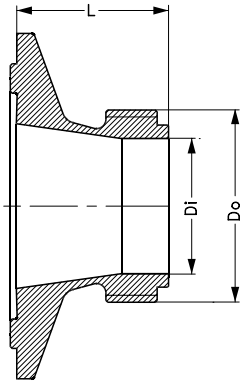


Table 9-10 Threaded type ISO 2853/BS 4825-4

Adapter	Sensor	L	Threaded type			
			ISO 2853[1]		BS 4825-4[1]	
DN	DN		Di	Do	Di	Do
mm	mm	mm	mm	mm	mm	mm
25	25	40	22.6	37.0	22.6	37.0
38	40	40	35.6	51.0	35.6	51.0
51	50	40	48.6	64.0	48.6	64.0
63.5	65	45	60.3	78.0	60.3	78.0
76.1	80	50	72.9	91.0	72.9	91.0
101.6	100	50	-	-	97.6	126.0
101.6	100	50	97.6	118.0	-	-

[1] Not suitable for 3A approval

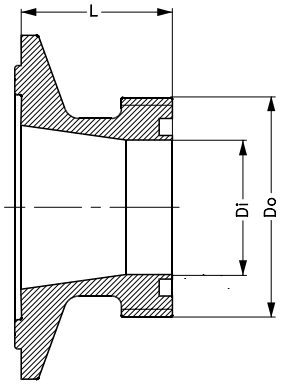


Table 9-11 Threaded type SMS 1145

Adapter	**Sensor**	**L**	**Threaded type**	
			SMS 1145[1)]	
DN	**DN**		**Di**	**Do**
mm	mm	mm	mm	mm
25	25	40	22.6	40.0
38	40	40	35.6	60.0
51	50	40	48.6	70.0
63.5	65	45	60.3	85.0
76	65	45	72.0	98.0

1) Not suitable for 3A approval

Product documentation and support

A

A.1 Product documentation

Process instrumentation product documentation is available in the following formats:

- Certificates (http://www.siemens.com/processinstrumentation/certificates)
- Downloads (firmware, EDDs, software) (http://www.siemens.com/processinstrumentation/downloads)
- Catalog and catalog sheets (http://www.siemens.com/processinstrumentation/catalogs)
- Manuals (http://www.siemens.com/processinstrumentation/documentation)
  You have the option to display or download the manual.
  - "Display": Open the manual. Different format options may be available.
  - "Download": Download the manual. Different format options may be available.

You can also find manuals on the Mobile app at Industry Online Support (https://support.industry.siemens.com/cs/ww/en/sc/2067). Download the app to your mobile device and scan the device ID link.

ID Link

The ID Link is a globally unique identifier, according to IEC 61406-1. The ID Link can be found as a QR code on products and is marked by a black frame with a triangle in the bottom right corner.

The ID Link displays the digital nameplate of the product.

The following image shows an example of an ID Link.

1. Scan the ID Link on your device with a mobile device.
2. Follow the prompt on your mobile device to access the ID Link.
   The ID Link page displays.

General product documentation

To access content such as manuals, technical data, certificates, and downloads, click “General product documentation”.

Specific product documentation

1. To access specific product documentation via PIA Mobile, click “S/N-Specific product documentation”.
   The PIA Mobile screen displays.
2. To display serial number-specific product information, including technical specifications, spare parts, calibration data, or factory certificates, if available, log in to PIA Mobile or register.

PIA Life Cycle Portal

Entering a serial number

1. Open the PIA Life Cycle Portal (https://www.pia-portal.automation.siemens.com).
2. Select the desired language.
3. Log in or sign up.
4. Enter the serial number of your device and click "go".
   The product documentation and certificates relevant for your device display and can be downloaded.

A.2 Technical support

Technical support

If this documentation does not completely answer your technical questions, you can enter a Support Request (http://www.siemens.com/automation/support-request).

For help creating a support request, view this video here (www.siemens.com/opensr).

Additional information on our technical support can be found at Technical Support (http://www.siemens.com/automation/csi/service).

Service & support on the Internet

In addition to our technical support, Siemens offers comprehensive online services at service & support (http://www.siemens.com/automation/serviceandsupport).

Contact

If you have further questions about the device, contact your local Siemens representative, by doing the following:

1. Visit Contact at Siemens (http://www.automation.siemens.com/partner).
2. Select "All Products and Branches" > "Products & Services" > "Industrial automation".
3. Choose either "Process analytics" or "Process instrumentation", depending on your product.

4. Select the product category ("Pressure measurement", for example), then select your product.
5. Click "Search".
   The contacts for your product in all regions display.

Contact address for business unit:
Siemens AG
Digital Industries
Process Automation
Östliche Rheinbrückenstr. 50
76187 Karlsruhe, Germany

Appendix

B

B.1 Factory settings

Dimension-dependent factory settings

DN		Flow velocity cut-off	Volume flow cut-off	Qmax DN/ Analog output upper range (20 mA)	Volume flow unit	Totalizer unit	Volume/ pulse	Pulse unit	Pulse width	Pulse width unit	Excitation frequency	
mm	Inch	m/s	m^3/h	m^3/h			l		s		50 Hz version	60 Hz version
2	1/12	0.015	0.0002	0.11	m^3/h	l	0.01	l	0.1	s	12.5 Hz	15 Hz
3	1/8	0.015	0.0004	0.25	m^3/h	l	0.01	l	0.1	s	12.5 Hz	15 Hz
6	¼	0.015	0.0015	1.02	m^3/h	l	1	l	0.1	s	12.5 Hz	15 Hz
10	3/8	0.015	0.0042	2.83	m^3/h	l	1	l	0.1	s	12.5 Hz	15 Hz
15	½	0.015	0.0095	6.36	m^3/h	l	1	l	0.1	s	12.5 Hz	15 Hz
25	1	0.015	0.0265	17.67	m^3/h	l	10	l	0.1	s	12.5 Hz	15 Hz
40	1½	0.015	0.0679	45.24	m^3/h	l	10	l	0.1	s	12.5 Hz	15 Hz
50	2	0.015	0.1060	70.69	m^3/h	l	10	l	0.1	s	12.5 Hz	15 Hz
65	2½	0.015	0.1792	119.46	m^3/h	l	100	l	0.1	s	12.5 Hz	15 Hz
80	3	0.015	0.2714	180.96	m^3/h	l	100	l	0.1	s	6.25 Hz	7.5 Hz
100	4	0.015	0.4241	282.74	m^3/h	l	100	l	0.1	s	6.25 Hz	7.5 Hz

B.2 Coil resistance

Table B-1 Coil resistance [Ω]

		FMS100	
DN	Inch	Resistance	Tolerance
2	1/12	104	+/– 5
3	1/8	104	+/– 5
6	1/4	99	+/– 17
10	3/8	99	+/– 17
15	1/2	91	+/– 9
25	1	91	+/– 17
40	1 1/2	91	+/– 9
50	2	91	+/– 9

		FMS100	
65	2 1/2	99	+/– 17
80	3	91	+/– 17
100	4	91	+/– 17

Note

Reference values

- All resistance values are at 20 °C
- The resistance changes proportionally 0.4% / °C

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