

SIEMENS

SITRANS F

Electromagnetic flowmeters SITRANS FM MAG 5100 W

Operating Instructions

| | |
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7ME652
7ME658

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 personnel are those who, based on their training and experience, are capable of identifying risks and avoiding potential hazards when working with these products/systems.

Proper use of Siemens products

Note the following:

| |
|--|
|  WARNING |
| Siemens products may only be used for the applications described in the catalog and in the relevant technical documentation. 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 AG. 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

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 the device, connecting it electronically, configuring the parameters and commissioning it, as well as service and maintenance engineers.

1.2 Document history

The contents of these instructions are regularly reviewed and corrections are included in subsequent editions. We welcome all suggestions for improvement.

The following table shows the most important changes in the documentation compared to each previous edition.

| Edition | Remarks |
|---------|--|
| 09/2021 | Updated Installation instructions |
| 01/2020 | Integration of JIS 10K in 7ME652 |
| 09/2018 | Updated custody transfer |
| 05/2016 | <ul style="list-style-type: none"> • General update • Updated safety notes • Updated torque values • Updated remote installation • Updated technical data |
| 11/2010 | Minor updates |
| 07/2010 | First edition Replaces MAG 5100 W part of SITRANS FM Handbook (A5E02435647) and MAG 5100 W instruction (A5E00718677) |

1.3 Designated use

Use the device in accordance with the information on the nameplate and in the Technical specifications (Page 47).

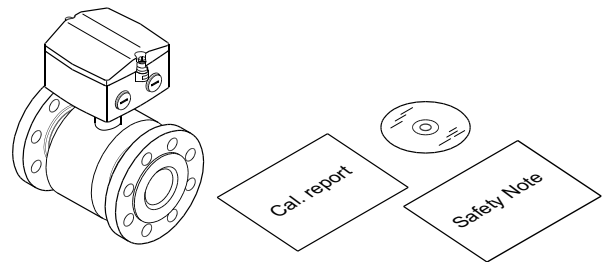
1.4 Checking the consignment

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. |
| <ul style="list-style-type: none">• Do not use damaged or incomplete devices. |

1.5 Items supplied

- SITRANS FM MAG 5100 W
- Calibration report
- DVD with documentation and certificates
- Safety Note



1.6 Industrial use note

| |
|---|
| NOTICE |
| Use in a domestic environment |
| This Class A Group 1 equipment is intended for use in industrial areas. |
| In a domestic environment this device may cause radio interference. |

1.7 Security information

Siemens provides products and solutions with industrial security 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 security 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 security measures that may be implemented, please visit

<https://www.siemens.com/industrialsecurity>.

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 Security RSS Feed under

<https://www.siemens.com/industrialsecurity>.

1.8 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. |
| <ul style="list-style-type: none">• Provide additional packaging as necessary. |

Special conditions for storage and transportation of the device are listed in Technical specifications (Page 47).

1.9 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

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.



CAUTION

Correct, reliable operation of the product requires proper transport, storage, positioning and assembly as well as careful operation and maintenance.

Only qualified personnel should install or operate this instrument.

Note

Alterations to the product, including opening or improper modifications of the product are not permitted.

If this requirement is not observed, the CE mark and the manufacturer's warranty will expire.

2.1 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 Part I) (Canada)

Further provisions for hazardous area applications are for example:

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

2.2 Conformity with European directives

The CE marking on the device symbolizes the conformity with the following European directives:

| | |
|---|---|
| Electromagnetic compatibility 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 |

The applicable directives can be found in the EU declaration of conformity of the specific device.

CE marked equipment

All meters carry either a CE mark or a CE mark followed by eg.200

- CE200: This indicates that the product conforms to:
 - PED 2014/68/EU
 - LVD 2014/35/EU
 - EMC 2014/68/EU
- CE: This indicates that the product conforms to:
 - LVD 2014/35/EU
 - EMC 2014/68/EU

2.3 Conformity with PED directive

Instrument safety standards

The device has been tested at the factory, based on the safety requirements. In order to maintain this condition over the expected life of the device the requirements described in these Operating Instructions must be observed.

| |
|--|
| NOTICE |
| Material compatibility |
| Siemens Flow Instruments can provide assistance with the selection of wetted sensor parts. However, the full responsibility for the selection rests with the customer and Siemens Flow Instruments can take no responsibility for any failure due to material incompatibility. |

Conformity with PED directive

"Pressure Equipment Directive" (PED) is mandatory for all pressure equipment sold within the EU and EFTA.

Note

Liquids danger group

The device is designed for liquids of danger group "Liquids fluid group 1"

Siemens Flow Instruments products confirm to PED by following the tables below.

Table 2-1 MAG 5100 W (7ME6520)

| Flange size | | EN 1092-1 | | | AS 4087 | ANSI B16,5 | AWWA C-207 | JIS B 2220:2004 |
|-------------|------|-----------|---------|-------|---------|------------|------------|-----------------|
| mm | inch | PN 10 | PN 16 | PN 40 | PN 16 | 150 lb | 300 lb | K 10 |
| 15 | ½" | N/A | N/A | SEP | N/A | SEP | N/A | SEP |
| 25 | 1" | N/A | N/A | SEP | N/A | SEP | N/A | SEP |
| 40 | 1½" | N/A | N/A | SEP | N/A | SEP | N/A | SEP |
| 50 | 2" | N/A | SEP | N/A | SEP | SEP | N/A | SEP |
| 65 | 2½" | N/A | SEP | N/A | SEP | SEP | N/A | SEP |
| 80 | 3" | N/A | SEP | N/A | SEP | SEP | N/A | SEP |
| 100 | 4" | N/A | SEP | N/A | SEP | SEP | N/A | SEP |
| 125 | 5" | N/A | SEP | N/A | N/A | Cat II | N/A | SEP |
| 150 | 6" | N/A | Cat II | N/A | Cat II | Cat II | N/A | Cat II |
| 200 | 8" | SEP | Cat II | N/A | Cat II | Cat II | N/A | Cat II |
| 250 | 10" | Cat I | Cat II | N/A | Cat II | Cat II | N/A | Cat II |
| 300 | 12" | Cat I | Cat II | N/A | Cat II | Cat II | N/A | Cat II |
| 350 | 14" | Cat I | Cat II | N/A | Cat II | Cat II | N/A | Cat II |
| 400 | 16" | Cat I | Cat II | N/A | Cat II | Cat II | N/A | Cat II |
| 450 | 18" | Cat I | Cat II | N/A | Cat II | Cat II | N/A | Cat II |
| 500 | 20" | Cat I | Cat II | N/A | Cat II | Cat II | N/A | Cat II |
| 600 | 24" | Cat I | Cat II | N/A | Cat II | Cat II | N/A | Cat II |
| 700 | 28" | Cat I | Cat II* | N/A | Cat II | N/A | Cat I | N/A |
| 750 | 30" | N/A | N/A | N/A | N/A | N/A | Cat I | N/A |
| 800 | 32" | Cat I | Cat II* | N/A | Cat II | N/A | Cat I | N/A |
| 900 | 36" | Cat I | Cat II* | N/A | Cat II | N/A | Cat I | N/A |
| 1000 | 40" | Cat I | Cat II* | N/A | Cat II | N/A | Cat I | N/A |
| 1050 | 42" | N/A | N/A | N/A | N/A | N/A | Cat I | N/A |
| 1100 | 44" | N/A | N/A | N/A | N/A | N/A | Cat I | N/A |
| 1200 | 48" | Cat I | Cat II* | N/A | Cat II | N/A | Cat I | N/A |

2.3 Conformity with PED directive

Table 2-2 MAG 5100 W (7ME6580)


| Flange size | | EN 1092-1 | | | | AS 4087 | ANSI B16,5 | AWWA C-207 | JIS B 2220:2 004 |
|-------------|------|-----------|-------|---------|-------|---------|------------|------------|------------------|
| mm | inch | PN 6 | PN 10 | PN 16 | PN 40 | PN 16 | 150 lb | 300 lb | K 10 |
| 15 | ½" | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| 25 | 1" | N/A | N/A | N/A | SEP | N/A | SEP | N/A | SEP |
| 40 | 1½" | N/A | N/A | N/A | SEP | N/A | SEP | N/A | SEP |
| 50 | 2" | N/A | N/A | N/A | SEP | SEP | SEP | N/A | SEP |
| 65 | 2½" | N/A | N/A | SEP | N/A | SEP | SEP | N/A | SEP |
| 80 | 3" | N/A | N/A | SEP | N/A | SEP | SEP | N/A | SEP |
| 100 | 4" | N/A | N/A | SEP | N/A | SEP | SEP | N/A | SEP |
| 125 | 5" | N/A | N/A | SEP | N/A | N/A | Cat II | N/A | SEP |
| 150 | 6" | N/A | N/A | Cat II | N/A | Cat II | Cat II | N/A | Cat II |
| 200 | 8" | N/A | SEP | Cat II | N/A | Cat II | Cat II | N/A | Cat II |
| 250 | 10" | N/A | Cat I | Cat II | N/A | Cat II | Cat II | N/A | Cat II |
| 300 | 12" | N/A | Cat I | Cat II | N/A | Cat II | Cat II | N/A | Cat II |
| 350 | 14" | N/A | Cat I | Cat II | N/A | Cat II | Cat II | N/A | Cat II |
| 400 | 16" | N/A | Cat I | Cat II | N/A | Cat II | Cat II | N/A | Cat II |
| 450 | 18" | N/A | Cat I | Cat II | N/A | Cat II | Cat II | N/A | Cat II |
| 500 | 20" | N/A | Cat I | Cat II | N/A | Cat II | Cat II | N/A | Cat II |
| 600 | 24" | N/A | Cat I | Cat II | N/A | Cat II | Cat II | N/A | Cat II |
| 700 | 28" | N/A | Cat I | Cat II* | N/A | Cat II | N/A | Cat I | N/A |
| 750 | 30" | N/A | N/A | N/A | N/A | N/A | N/A | Cat I | N/A |
| 800 | 32" | N/A | Cat I | Cat II* | N/A | Cat II | N/A | Cat I | N/A |
| 900 | 36" | N/A | Cat I | Cat II* | N/A | Cat II | N/A | Cat I | N/A |
| 1000 | 40" | N/A | Cat I | Cat II* | N/A | Cat II | N/A | Cat I | N/A |
| 1050 | 42" | N/A | N/A | N/A | N/A | N/A | N/A | Cat I | N/A |
| 1100 | 44" | N/A | N/A | N/A | N/A | N/A | N/A | Cat I | N/A |
| 1200 | 48" | N/A | Cat I | Cat II* | N/A | Cat II | N/A | Cat I | N/A |
| 1400 | 54" | Cat I | Cat I | Cat II* | N/A | N/A | N/A | Cat I | N/A |
| 1500 | 60" | Cat I | Cat I | Cat II* | N/A | N/A | N/A | Cat I | N/A |
| 1600 | 66" | Cat I | Cat I | Cat II* | N/A | N/A | N/A | Cat I | N/A |
| 1800 | 72" | Cat I | Cat I | Cat II* | N/A | N/A | N/A | Cat I | N/A |
| 2000 | 78" | Cat I | Cat I | Cat II* | N/A | N/A | N/A | Cat I | N/A |

The key to the tables is as follows:

Table 2-3 Table key

| | |
|---------|--|
| Cat I | Product covered by PED Cat I and only available as fully PED conforming |
| Cat II | Product covered by PED Cat II and only available as fully PED conforming |
| Cat II* | Product covered by PED Cat II but available as non-conforming to PED |
| SEP | Excluded from PED under Sound Engineering Practice |


2.4 Installation in hazardous area


| |
|---|
|  WARNING |
| Equipment used in hazardous locations |
| Equipment used in hazardous locations must be Ex-approved for the region of installation and marked accordingly. It is required that the special conditions for safe use provided in the manual and in the Ex certificate are followed! |


Hazardous area approvals


The device is approved for use in hazardous area and has the following approvals:

- MAG 5100 W DN 15 to 1200: FM / CSA Class I, Div. 2

| |
|--|
|  WARNING |
| Suitable hazardous area approval |
| Make sure the hazardous area approval is suitable for the environment in which the device will be installed. |

| |
|---|
|  WARNING |
| All approvals are based on non-flammable processes only! |

| |
|---|
|  WARNING |
| Potential equalization |
| In operation, the output is earthed through the conductive medium being measured and therefore potential equalisation is necessary throughout the hazardous area. |
| The apparatus housing shall be connected to the potential equalising conductor in the hazardous area. |

| |
|--|
|  WARNING |
| Laying of cables |
| Cables for use in hazardous area must satisfy the requirements for having a proof voltage < AC 500 V applied between the conductor/ground, conductor/shield and shield/ground. |
| Connect the devices that are operated in hazardous areas as per the stipulations applicable in the country of operation. |

2.5 Improper device modifications

| |
|--|
| ⚠ WARNING |
| Improper device modifications |
| Risk to personnel, system and environment can result from modifications to the device, particularly in hazardous areas. |
| <ul style="list-style-type: none">• 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. |

2.6 Custody transfer

MAG 5100W (7ME652) is approved for custody transfer.

2.6.1 MI-001

The MAG 5100 W MI-001 verified and labeled products are a Class II approval according to Directive 2014/32/EU of the European Parliament and Council of 26 February, 2014 on measuring instruments, Annex VI Thermal Energy Meters (MI-004) in the sizes from DN 50 to DN 1200 (Article No. 7ME6520). The MID certification is obtained as a modul B + D module approval according to the above mentioned directive. Module B : Type approval according to OIML R 49 Module D : Quality insurance approval of production.

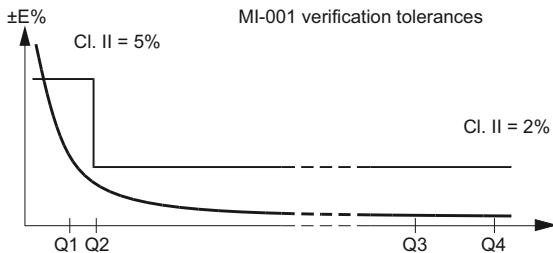


Figure 2-1 MI-001 verification tolerances

MI-001 approval is valid for:

- DN 50 to 1200 mm (2" to 48")
- Horizontal and vertical installation
- Compact or remote with max. 500 m cable
- Power supply 115 to 230 V AC, 12 to 24 V AC/DC

Other restrictions may apply (see certificate).

Special label is required for MI-001 approved meters. An example of the product label is shown below:



Figure 2-2 Nameplate MAG 6000, 5100 W

MAG 5100 W (7ME6520) MI-001 is verified and labeled at a given Q3 and Q3/Q4 = 1.25 and Q2/Q1 = 1.6 measuring ranges see appendix Measuring ranges (Page 65)

2.6.2 PTB K7.2

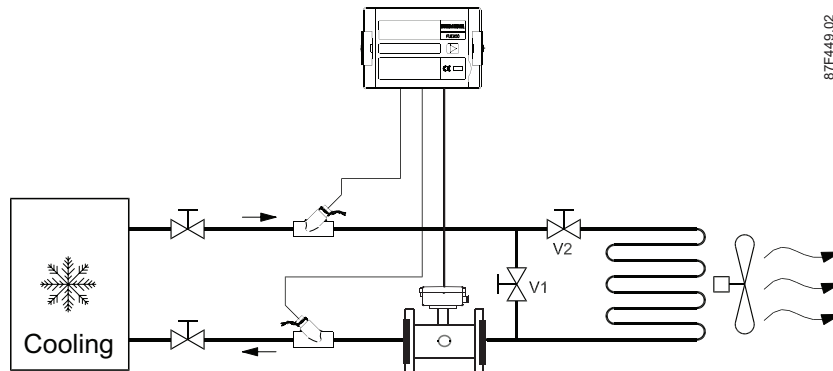
MAG 5000/6000 CT together with MAG 5100W (7ME652) are approved for PTB K7.2 under the following installation conditions:

- DN 50 to 300 mm (2" to 12")
- Horizontal installation
- Compact or remote with max. 10 m (33 ft.) cable

Other restrictions may apply (see certificate 22.76/10.02)

Measuring range according to EN1434 (2007), see appendix Measuring range according to EN1434 (2007) (Page 67)

Installation conditions



Description

The main applications of the SITRANS F M electromagnetic flow sensors can be found in the following fields:

- Process industry
- Chemical industry
- Steel industry
- Mining
- Utility
- Power generation & distribution
- Oil & gas / HPI
- Water & waste water
- Pulp & paper

3.1 System components

The SITRANS FM flowmeter system includes:

- Transmitter (types: SITRANS FM MAG 5000/6000 or MAG 6000 I)
- Sensor (types: SITRANS FM MAG 1100/1100 F, MAG 3100/3100 P or MAG 5100 W)
- Communication module (optional) (types: HART, PROFIBUS PA/DP, MODBUS RTU RS 485, Foundation Fieldbus H1, Devicenet)
- SENSORPROM memory unit

Communication solutions

The SITRANS FM range of add-on modules, presently including HART, Foundation Fieldbus, MODBUS RTU RS 485, PROFIBUS PA / DP and Devicenet, are all applicable with the SITRANS FM MAG 6000 transmitter.

3.2 Design

The SITRANS FM MAG 5100 W is an electromagnetic flow sensor designed to meet the requirements in ground water, drinking water, waste water, sewage or sludge applications. With its coned design, increased low-flow accuracy is achieved making it especially useful for leak detection. It is suitable for direct burial and constant flooding. MAG 5100 W complies with drinking water and custody transfer approvals.



MAG 5100W DN15 to 40



MAG 5100W DN50 to 300
(7ME6520)



MAG 5100W DN350 to 1200
(7ME6520)

MAG 5100W DN25 to 2000
(7ME6580)



MAG 5100W compact installation with MAG 5000/6000 IP67

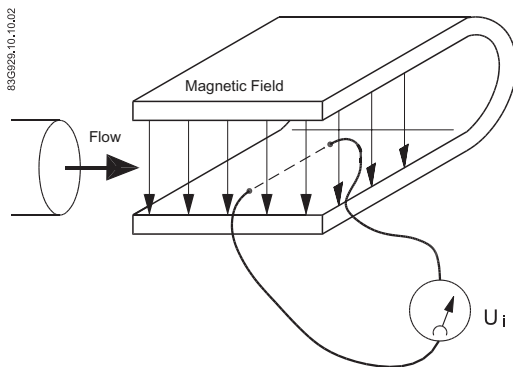


MAG 5100W compact installation with MAG 6000 I

The sensors carry a wide range of approvals, see Technical data (Page 47).

3.3 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

$$U_i = L \times B \times v$$

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

$U_i = k \times v$, the electrode signal is directly proportional to the fluid velocity

Operating principle

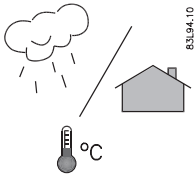
The coil current module generates a pulsating magnetizing current that drives the coils in the sensor. The current is permanently monitored and corrected. Errors or cable faults are registered by the self-monitoring circuit.

The input circuit amplifies the flow-proportional induced voltage signal from the electrodes. The input impedance is extremely high: $>10^{14} \Omega$ which allows flow measurements on fluids with conductivities as low as $5 \mu\text{S}/\text{cm}$. 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.

3.3 Theory of operation

Installing/Mounting



SITRANS F flowmeters with minimum IP65/NEMA 4X enclosure rating are suitable for indoor and outdoor installations.

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

! WARNING

Installation in hazardous location

Special requirements apply to the location and interconnection of sensor and transmitter. See Installation in hazardous area (Page 13)

4.1 Installation safety precautions

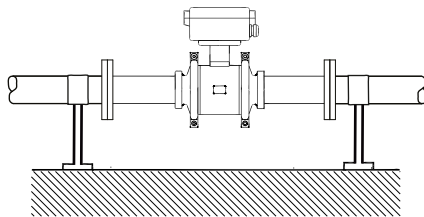
! WARNING

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.

Note

Install the sensor in well-supported pipelines in order to support the weight of the flowmeter.



Vibrations

Avoid strong vibrations.

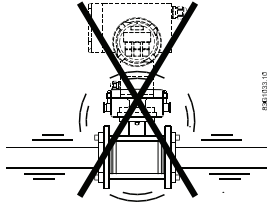


Figure 4-1 Avoid vibrations

⚠ CAUTION

In applications with strong vibrations, Siemens recommends remote mounting of the transmitter!

4.2 Determining a location

Note

The sensor must always be completely filled with liquid.

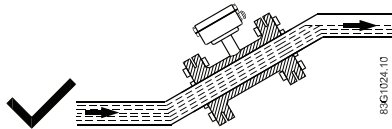


Figure 4-2 Correct installation with filled pipes

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

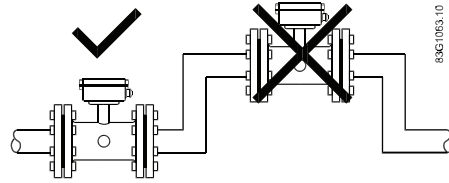


Figure 4-3 Wrong installation at high point

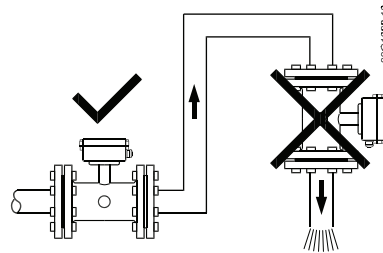


Figure 4-4 Correct installation at low point before outlet

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.

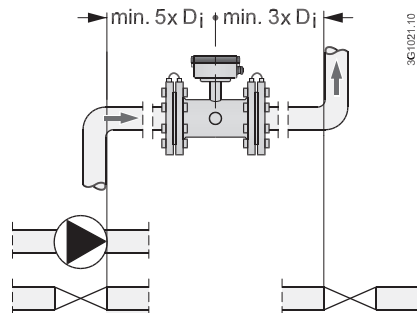


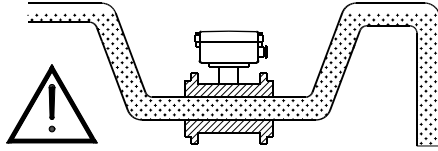
Figure 4-5 Inlet and outlet conditions

Note

MI-001 approved with OD inlet and OD outlet conditions

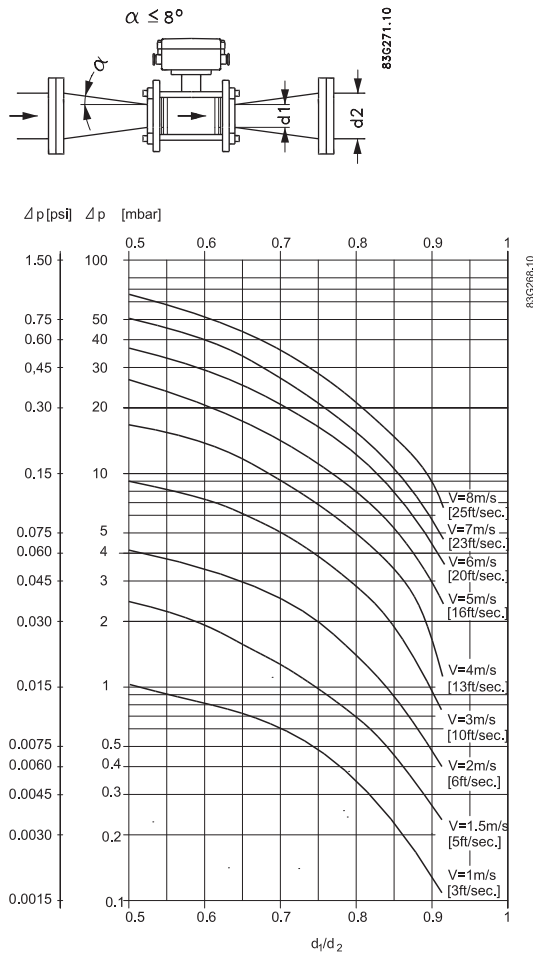
Installation in partially filled pipes

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 $\alpha \leq 8^\circ$ 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.

4.3 Orienting the sensor

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

- Vertical installation with an upwards flow

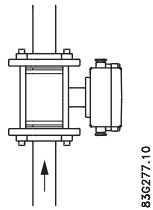


Figure 4-6 Vertical orientation, upwards flow

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

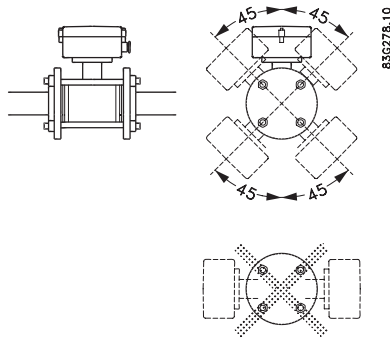


Figure 4-7 Horizontal installation, various terminal box positions

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.

Transporting

| |
|---|
| <p>⚠ WARNING</p> <p>Lifting the sensor</p> <p>Do NOT lift the sensor by the terminal box. Do NOT use a forklift. If available lift the sensor by the lifting eyes fitted to the device. Otherwise lift the sensor by the process connections.</p> |
|---|

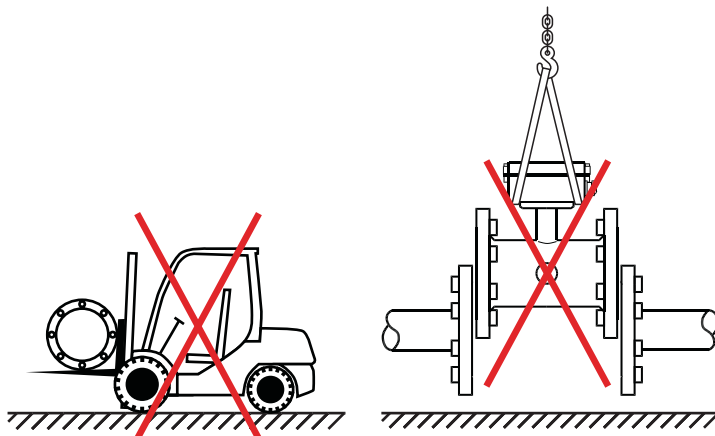


Figure 4-8 Incorrect transportation

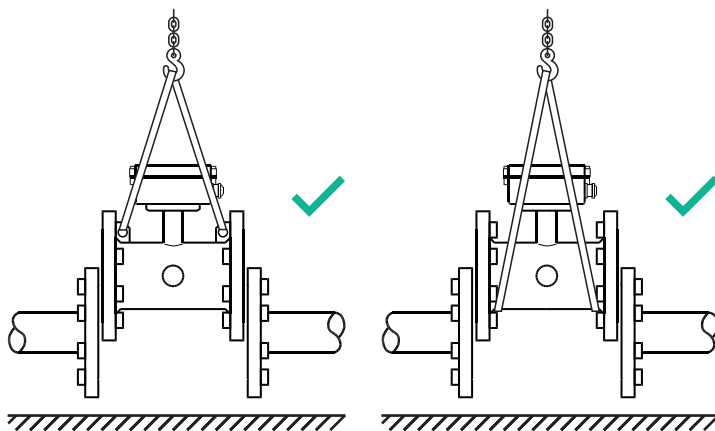
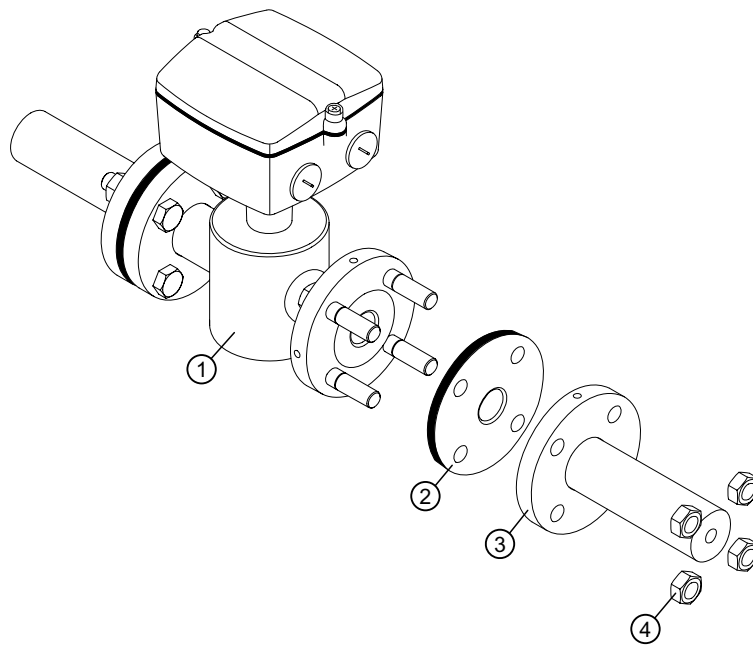


Figure 4-9 Correct transportation

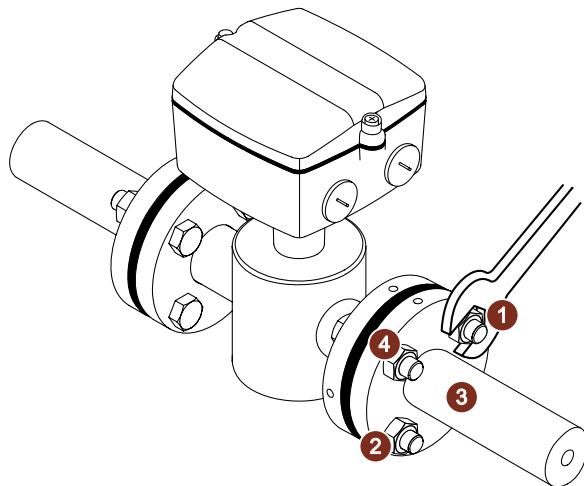
4.4 Mounting

- 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 (not included).



- ① Sensor
- ② Gasket
- ③ Process connection
- ④ Nuts

Tightening



1. Cross-tighten the bolts in the shown sequence.
2. Fasten bolts according to the torques values below.

4.4 Mounting

Note

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

Table 4-1 Maximum allowable torques

| DN | | PN 6 | | PN 10 | | PN 16 | | PN 40 | | Class 150 | | AWWA C-207 | | AS 16 | | JIS10K | |
|------|------|------|-------|-------|-------|-------|-------|-------|-------|-----------|-------|------------|-------|-------|-------|--------|-------|
| mm | inch | Nm | F/lbs | Nm | F/lbs | Nm | F/lbs | Nm | F/lbs | Nm | F/lbs | Nm | F/lbs | Nm | F/lbs | Nm | F/lbs |
| 15 | ½ | N/A | N/A | N/A | N/A | N/A | N/A | 10 | 7 | 6 | 5 | N/A | N/A | N/A | N/A | 6 | 5 |
| 25 | 1 | N/A | N/A | N/A | N/A | N/A | N/A | 10 | 7 | 7 | 5 | N/A | N/A | N/A | N/A | 7 | 5 |
| 40 | 1½ | N/A | N/A | N/A | N/A | N/A | N/A | 16 | 12 | 9 | 7 | N/A | N/A | N/A | N/A | 9 | 7 |
| 50 | 2 | N/A | N/A | N/A | N/A | 25 | 18 | 34 | 25 | 25 | 18 | N/A | N/A | 25 | 18 | 25 | 18 |
| 65 | 2½ | N/A | N/A | N/A | N/A | 25 | 18 | N/A | N/A | 25 | 18 | N/A | N/A | 25 | 18 | 25 | 18 |
| 80 | 3 | N/A | N/A | N/A | N/A | 25 | 18 | N/A | N/A | 34 | 25 | N/A | N/A | 25 | 18 | 25 | 18 |
| 100 | 4 | N/A | N/A | N/A | N/A | 25 | 18 | N/A | N/A | 26 | 19 | N/A | N/A | 25 | 18 | 25 | 18 |
| 125 | 5 | N/A | N/A | N/A | N/A | 32 | 24 | N/A | N/A | 42 | 31 | N/A | N/A | N/A | N/A | 32 | 24 |
| 150 | 6 | N/A | N/A | N/A | N/A | 50 | 37 | N/A | N/A | 57 | 42 | N/A | N/A | 50 | 37 | 50 | 37 |
| 200 | 8 | N/A | N/A | 50 | 37 | 52 | 38 | N/A | N/A | 88 | 65 | N/A | N/A | 52 | 38 | 50 | 37 |
| 250 | 10 | N/A | N/A | 50 | 37 | 88 | 65 | N/A | N/A | 99 | 73 | N/A | N/A | 88 | 65 | 50 | 37 |
| 300 | 12 | N/A | N/A | 57 | 42 | 117 | 86 | N/A | N/A | 132 | 97 | N/A | N/A | 117 | 86 | 57 | 42 |
| 350 | 14 | N/A | N/A | 60 | 44 | 120 | 89 | N/A | N/A | 225 | 166 | N/A | N/A | 120 | 89 | 60 | 44 |
| 400 | 16 | N/A | N/A | 88 | 65 | 170 | 125 | N/A | N/A | 210 | 155 | N/A | N/A | 170 | 125 | 88 | 65 |
| 450 | 18 | N/A | N/A | 92 | 68 | 170 | 125 | N/A | N/A | 220 | 162 | N/A | N/A | 170 | 125 | 92 | 68 |
| 500 | 20 | N/A | N/A | 103 | 76 | 230 | 170 | N/A | N/A | 200 | 148 | N/A | N/A | 230 | 170 | 103 | 76 |
| 600 | 24 | N/A | N/A | 161 | 119 | 350 | 258 | N/A | N/A | 280 | 207 | N/A | N/A | 350 | 258 | 161 | 119 |
| 700 | 28 | N/A | N/A | 200 | 148 | 304 | 224 | N/A | N/A | N/A | N/A | 200 | 148 | 304 | 224 | N/A | N/A |
| 750 | 30 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 240 | 177 | N/A | N/A | N/A | N/A |
| 800 | 32 | N/A | N/A | 274 | 202 | 386 | 285 | N/A | N/A | N/A | N/A | 260 | 192 | 386 | 285 | N/A | N/A |
| 900 | 36 | N/A | N/A | 288 | 213 | 408 | 301 | N/A | N/A | N/A | N/A | 240 | 177 | 408 | 301 | N/A | N/A |
| 1000 | 40 | N/A | N/A | 382 | 282 | 546 | 403 | N/A | N/A | N/A | N/A | 280 | 207 | 546 | 403 | N/A | N/A |
| 1050 | 42 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 280 | 207 | N/A | N/A | N/A | N/A |
| 1100 | 44 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 290 | 214 | N/A | N/A | N/A | N/A |
| 1200 | 48 | N/A | N/A | 395 | 292 | 731 | 539 | N/A | N/A | N/A | N/A | 310 | 229 | 731 | 539 | N/A | N/A |
| 1400 | 54 | 330 | 244 | 503 | 317 | 736 | 543 | N/A | N/A | N/A | N/A | 528 | 389 | N/A | N/A | N/A | N/A |
| 1600 | 66 | 355 | 262 | 590 | 435 | 840 | 620 | N/A | N/A | N/A | N/A | 698 | 515 | N/A | N/A | N/A | N/A |

| DN | | PN 6 | | PN 10 | | PN 16 | | PN 40 | | Class 150 | | AWWA C-207 | | AS 16 | | JIS10K | |
|------|------|------|-------|-------|-------|-------|-------|-------|-------|-----------|-------|------------|-------|-------|-------|--------|-------|
| mm | inch | Nm | F/lbs | Nm | F/lbs | Nm | F/lbs | Nm | F/lbs | Nm | F/lbs | Nm | F/lbs | Nm | F/lbs | Nm | F/lbs |
| 1800 | 72 | 380 | 280 | 684 | 505 | 913 | 674 | N/A | N/A | N/A | N/A | 698 | 515 | N/A | N/A | N/A | N/A |
| 2000 | 78 | 382 | 282 | 771 | 569 | 937 | 692 | N/A | N/A | N/A | N/A | 700 | 516 | N/A | N/A | N/A | N/A |

Torque calculations

All values are theoretical and are calculated making the following assumptions:

1. All bolts are new and material selection is according to EN 1515-1 table 2.
2. Gasket material not exceeding 75 shore A durometer is used between the flowmeter and mating flanges.
3. All bolts are galvanized and adequately lubricated.
4. The values are calculated for use with carbon steel flanges.
5. Flowmeter and mating flanges are correctly aligned.

4.5 Potential equalization

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

This is achieved by means of built-in grounding electrodes.

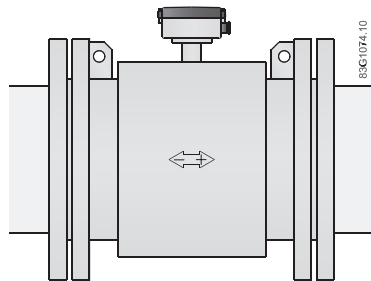



Figure 4-10 Potential equalization with earthing electrodes

Cathodic protected piping

Special attention must be paid to systems with cathodic protection.

| |
|--|
|  WARNING |
| Use in hazardous area! |
| Cathodic pipe protection is not allowed in hazardous areas |

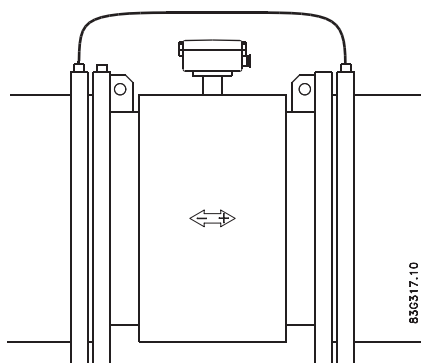


Figure 4-11 Cathodic protection

- 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
-

Connecting

The following contains a short description of how to connect a remote mounted sensor to a transmitter type SITRANS FM MAG 5000 / 6000 or MAG 6000 I. For more information, e.g. about wiring of power supply and outputs, refer to the Operating Instructions for the respective transmitters.

Before connecting

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

 **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. AGW16 or 1.5 mm ² Cu. |

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

See also

Cable data (Page 51)

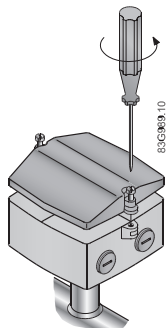
5.1 Remote installation

Note

Remote installation only

The following applies to remote installation of MAG 5000 / 6000 or MAG 6000 I.

1. Unscrew and remove terminal box lid.



2. Mount the two terminal blocks as shown and insert electrode cable plug ① (terminals 82, 0 and 83) and coil cable plug ② (terminals 85 and 86).
Terminals electrode cable: 82, 0 and 83
Terminals special electrode cable: 84, 83, 0, 82 and 81
Terminals coil cable: 85; 86

Note

Special electrode cable

Special electrode cable must be connected to terminals 84, 83, 0, 82 and 81.

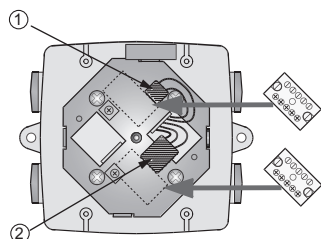
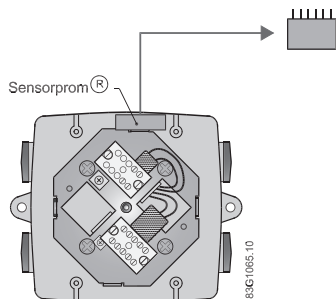


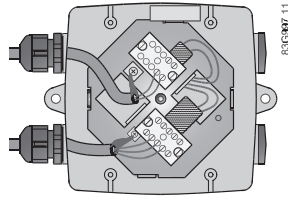
Figure 5-1 Terminal box without blocks

3. Remove SENSORPROM® unit from sensor and mount it on connection plate in transmitter, see relevant transmitter operating instructions.

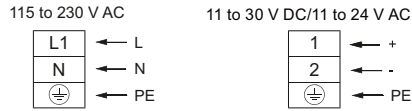


4. Fit the 1/2" NPT or M20 cable glands for supply and output cables.

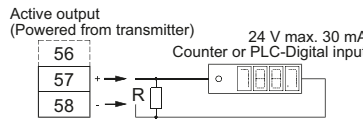
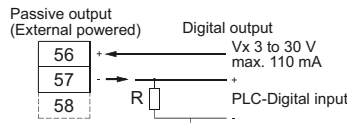
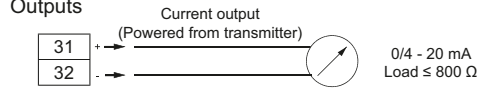
5. Fit and connect electrode and coil cables as shown below.



Power supply
Transmitter



Outputs



Menu setup
Negative: Positive:
R = Pull up/down resistor
1 to 10 KΩ may be
required - depending on
Cables/Input resistance

Relay output

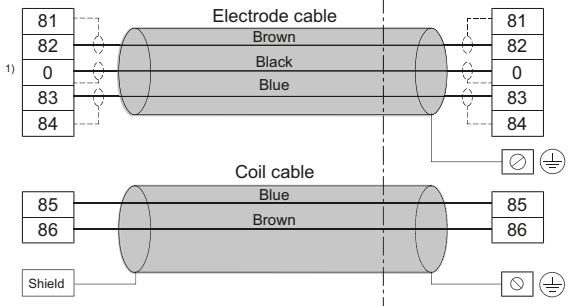
| | | |
|----|--------|-----------------------------------|
| 44 | NO | Relay 24 V DC/1A 42 V AC/2A |
| 45 | NC | |
| 46 | Common | |

Digital input

| | | |
|----|---|---------------------|
| 77 | + | 11 to 30 V DC Input |
| 78 | - | |

91 92 93 94 95 96 97
Reserved for communication modules

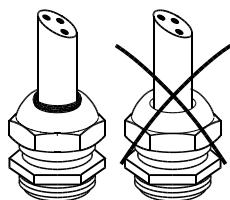
Sensor connection



1) Note:
Special cable with individual wire shields (shown as dotted lines) are only required when using empty pipe function or long cables.

| |
|---|
| ⚠ CAUTION |
| Unscreened cable ends Keep unscreened cable ends as short as possible. |
| ⚠ CAUTION |
| Prevent interference Separate electrode and coil cables to prevent interference. |
| ⚠ WARNING |
| Use in hazardous area Connect mains protective earth to the PE terminal in accordance with the above diagram in order to obtain potential equalization. |

6. Tighten cable glands well to obtain optimum sealing. The cable entry gasket must obtain firm contact with the cable.

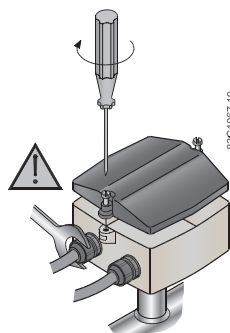


7. Remount terminal box lid.

Note

Tightening torque

Tighten the bolts with 0.5 Nm.



5.2 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 21).

5.3 Potting

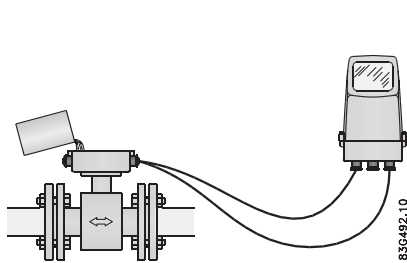
If sensor is buried or permanently submerged, terminal box must be encapsulated with silicon dielectric gel (non-toxic, transparent and self-healing gel).

NOTICE

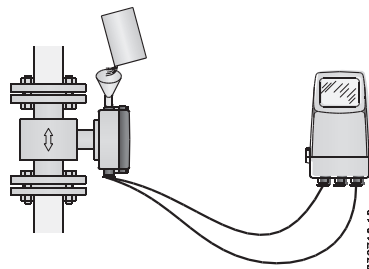
Electrical connections

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.

5.4 Direct burial

Recommendations for direct burial of remote sensor:

- Check for visible damages in paint finish !
- Use protection conduit !
- Protect sensor with pea gravel at least 300 mm around sensor. This provides some drainage and also avoids caking sensor with earth. It also helps to locate sensor in case excavation takes place.

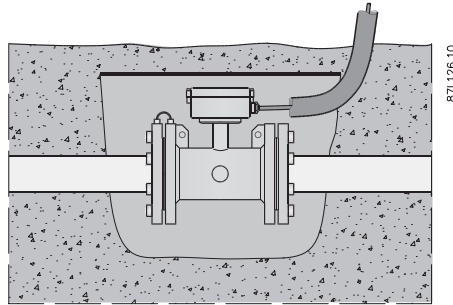


Figure 5-2 Direct burial of sensor

CAUTION

Sensor should not be subject to heavy vehicles applying excessive weight above sensor or pipeline

NOTICE

SENSORPROM memory unit

Remove the SENSORPROM from terminal box on sensor and relocate in remote transmitter prior to burying sensor.

All sensor data plate information and serial number should be recorded for each sensor prior to burying. This will ensure correct matching with SENSORPROM unit.

WARNING

Electrical cable identification

Use suitable coil and electrode cables

Lay electrical cable identification tape above pea gravel before it is covered with earth.

Service and maintenance

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

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

Note

Siemens defines flow sensors as non-repairable products.

6.2 Verification

With the SITRANS FM Vericator It is possible to validate the product, installation and application without interrupting the process. The verification consists of the following test routines:

- Insulation test of the entire flowmeter system and cables
- Test of sensor magnetic properties
- Transmitter gain, linearity and start of scale value test
- Digital output test
- Analog output test

The Vericator can be used for SITRANS FM flowmeters with sensor types MAG 1100, MAG 1100 F, MAG 3100, MAG 3100 P and MAG 5100 W connected to transmitters MAG 5000 or MAG 6000.

When connected to a PC, you can print a full verification report containing all test results.

SIEMENS MAGFLO Verification Certificate

| Customer: Name _____ Address _____ _____ Phone _____ Email _____ | MAGFLO Identification: TAG No./Name <u>0</u> Sensor Code No. <u>7ME65202YC122A</u> Sensor Serial No. <u>101902H441</u> Transmitter Code No. <u>7ME692</u> Transmitter Serial No. <u>062830N231</u> Location _____ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|--|----------|----------------|------------------|----------|------------------|--|--|-------------|-------------|--------|-----------|-------------|--------|-----------|--------|---------|---------|--------|----------|----------|--------|--------|---------|---------|--------|----------|----------|--------|--------|---------|---------|--------|----------|----------|--------|
| Results: | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Verification file name or No. _____ Transmitter <u>Passed</u> Sensor Insulation <u>Passed</u> Magnetic Circuit <u>Passed</u> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 15%;">Velocity</th> <th colspan="3">Current Output</th> <th colspan="3">Frequency Output</th> </tr> <tr> <th>Theoretical</th> <th>Theoretical</th> <th>Actual</th> <th>Deviation</th> <th>Theoretical</th> <th>Actual</th> <th>Deviation</th> </tr> </thead> <tbody> <tr> <td>0,5m/s</td> <td>4,800mA</td> <td>4,800mA</td> <td>-0,05%</td> <td>0,500kHz</td> <td>0,498kHz</td> <td>-0,32%</td> </tr> <tr> <td>1,0m/s</td> <td>5,600mA</td> <td>5,596mA</td> <td>-0,26%</td> <td>1,000kHz</td> <td>0,998kHz</td> <td>-0,37%</td> </tr> <tr> <td>3,0m/s</td> <td>8,800mA</td> <td>8,794mA</td> <td>-0,12%</td> <td>3,000kHz</td> <td>2,997kHz</td> <td>-0,09%</td> </tr> </tbody> </table> | | Velocity | Current Output | | | Frequency Output | | | Theoretical | Theoretical | Actual | Deviation | Theoretical | Actual | Deviation | 0,5m/s | 4,800mA | 4,800mA | -0,05% | 0,500kHz | 0,498kHz | -0,32% | 1,0m/s | 5,600mA | 5,596mA | -0,26% | 1,000kHz | 0,998kHz | -0,37% | 3,0m/s | 8,800mA | 8,794mA | -0,12% | 3,000kHz | 2,997kHz | -0,09% |
| Velocity | Current Output | | | Frequency Output | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Theoretical | Theoretical | Actual | Deviation | Theoretical | Actual | Deviation | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0,5m/s | 4,800mA | 4,800mA | -0,05% | 0,500kHz | 0,498kHz | -0,32% | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1,0m/s | 5,600mA | 5,596mA | -0,26% | 1,000kHz | 0,998kHz | -0,37% | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3,0m/s | 8,800mA | 8,794mA | -0,12% | 3,000kHz | 2,997kHz | -0,09% | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Current Output 4-20mA Frequency Output 0-10kHz | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Transmitter Settings: Basic Qmax <u>20,0000 m³ /h</u> Flow Direction <u>Positive</u> Low flow Cut-off <u>1,50%</u> Empty Pipe <u>ON</u> Output Current Output <u>ON (4-20mA)</u> Time Constant <u>5,0 Sec.</u> Relay Output <u>Error Level</u> Digital Output <u>Pulse</u> Frequency Range <u>N/A</u> Time Constant <u>N/A</u> Volume/pulse <u>10,0 l/p</u> Pulse width <u>0,066 sec.</u> Pulse polarity <u>Positiv</u> Totalizer 1 value before test <u>114,69851 l</u> Totalizer 1 value after test <u>130,3003 l</u> Totalizer 2 value before test <u>5,98203 l</u> Totalizer 2 value after test <u>8,95478 l</u> Operating time in days <u>245</u> | Sensor Details: Size <u>DN 50 2 IN</u> Cal. Factor <u>1,79904997</u> Correction Factor <u>1,0</u> Excitation Freq. <u>3,125Hz</u> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Verificator Details (083F5060) Serial No. <u>010116N258</u> Device No. <u>83948</u> Software Version <u>1.40</u> PC-Software Version <u>5.01</u> Cal. date <u>2017.04.20</u> ReCal. date <u>2018.04.20</u> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Comments These tests verify that the flowmeter is functioning within 2% deviation of the original test parameters. Verification is traceable to National and International Standards. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Date and signature _____ 2017.05.24 B. Andersen | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

Figure 6-1 Example of a verification certificate

6.3 Recalibration

Siemens Process Instrumentation offers to recalibrate the sensor. The following calibration types are offered as standard:

- Standard matched pair calibration
- Customer-specified calibration
- Accredited Siemens ISO/IEC 17025 calibration

Note

For recalibration the SENSORPROM unit must always be returned with the sensor.

6.4 Technical support

If you have any technical questions about the device described in these Operating Instructions and do not find the right answers, you can contact Customer Support:

- Via the Internet using the **Support Request:**
Support request (<http://www.siemens.com/automation/support-request>)
- Via Phone:
 - Europe: +49 (0)911 895 7222
 - America: +1 423 262 5710
 - Asia-Pacific: +86 10 6475 7575

Further information about our technical support is available on the Internet at
Technical support (<http://support.automation.siemens.com/WW/view/en/16604318>)

Service & Support on the Internet

In addition to our documentation, we offer a comprehensive knowledge base online on the Internet at:

Service and support (<http://www.siemens.com/automation/service&support>)

There you will find:

- The latest product information, FAQs, downloads, tips and tricks.
- Our newsletter, providing you with the latest information about your products.
- Our bulletin board, where users and specialists share their knowledge worldwide.
- You can find your local contact partner for Industry Automation and Drives Technologies in our partner database.
- Information about field service, repairs, spare parts and lots more under **Services**.

Additional Support

If you have additional questions about the device, please contact your local Siemens representative and offices at:

Local contact person (<http://www.automation.siemens.com/partner>)

6.5 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. |
| <ul style="list-style-type: none">• Provide additional packaging as necessary. |

Special conditions for storage and transportation of the device are listed in Technical specifications (Page 47).

Handling

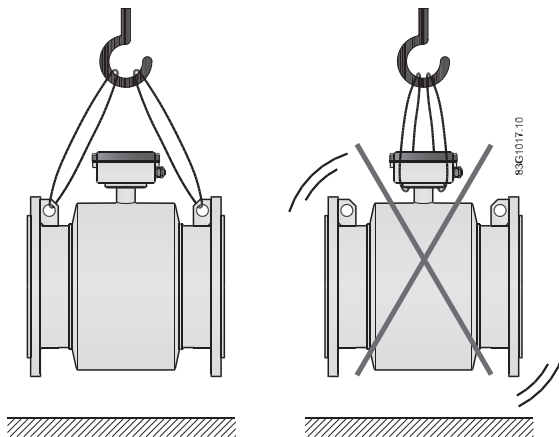


Figure 6-2 Handling of sensor

6.6 Return procedure

To return a product to Siemens, see AUTOHOTSPOT.

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.

See also

Return goods delivery note (<http://www.siemens.com/processinstrumentation/returngoodsnote>)

Decontamination declaration (<http://www.siemens.com/sc/declarationofdecontamination>)

6.7 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/>)

Diagnostics and Troubleshooting

7.1 Sensor check

Requirement

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

- Digital Meter/Multimeter
- 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.

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 M Ω .

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

Sensors with an insulation resistance down to 1 M Ω 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 K Ω and 50 K Ω . 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.

7.2 Fluctuating process values

Question

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

Answer

There can be several causes for 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 Remote installation (Page 32)

Technical specifications

8.1 MAG 5100 W

Table 8-1 Technical data

| Version | MAG 5100W (7ME6520) | MAG 5100W (7ME6580) |
|---|--|--|
| Product characteristic | Mainly for the European market EPDM or NBR lining | Mainly for the non-European market Ebonite lining |
| Design and nominal size | <i>Coned sensor:</i> <ul style="list-style-type: none"> DN 15 to 300 (½" to 12") <i>Full bore sensor:</i> <ul style="list-style-type: none"> DN 350 to 1200 (14" to 48") | <i>Full bore sensor:</i> <ul style="list-style-type: none"> DN 25 to 2000 (1" to 78") |
| Measuring principle | Electromagnetic induction | |
| Excitation frequency (Mains supply: 50 Hz/60 Hz) | <i>DN 15 to 65 (½" to 2½"):</i> <ul style="list-style-type: none"> 12.5 Hz / 15 Hz <i>DN 80 to 150 (3" to 6"):</i> <ul style="list-style-type: none"> 6.25 Hz / 7.5 Hz <i>DN 200 to 300 (8" to 12"):</i> <ul style="list-style-type: none"> 3.125 Hz / 3.75 Hz <i>DN 350 to 1200 (14" to 48"):</i> <ul style="list-style-type: none"> 1.5625 Hz / 1.875 Hz | <i>DN 25 to 65 (1" to 2½"):</i> <ul style="list-style-type: none"> 12.5 Hz / 15 Hz <i>DN 80 to 150 (3" to 6"):</i> <ul style="list-style-type: none"> 6.25 Hz / 7.5 Hz <i>DN 200 to 300 (8" to 12"):</i> <ul style="list-style-type: none"> 3.125 Hz / 3.75 Hz <i>DN 350 to 2000 (14" to 78"):</i> <ul style="list-style-type: none"> 1.5625 Hz / 1.875 Hz |

8.1 MAG 5100 W

Table 8-2 Process connections

| Version | MAG 5100W (7ME6520) | MAG 5100W (7ME6580) |
|-----------------|--|--|
| EN 1092-1 | <p>PN 10 (145 psi):</p> <ul style="list-style-type: none"> DN 200 to 300 (8" to 12") Flat face flanges <p>PN 10 (145 psi):</p> <ul style="list-style-type: none"> DN 350 to 1200 (14" to 48") Raised face flanges <p>PN 16 (232 psi):</p> <ul style="list-style-type: none"> DN 50 to 300 (2" to 12") Flat face flanges <p>PN 16 (232 psi):</p> <ul style="list-style-type: none"> DN 350 to 1200 (14" to 48") Raised face flanges <p>PN 40 (580 psi):</p> <ul style="list-style-type: none"> DN 15 to 40 (½" to 1½") Flat face flanges | <p>Raised face (EN 1092-1, DIN 3501 and BS4504 have the same mating dimensions)</p> <p>PN 16 (87 psi):</p> <ul style="list-style-type: none"> DN 1400 to 2000 (54" to 78") <p>PN 10 (145 psi):</p> <ul style="list-style-type: none"> DN 200 to 2000 (8" to 78") <p>PN16 (232 psi):</p> <ul style="list-style-type: none"> DN 65 to 600 (2½" to 24") <p>PN 40 (580 psi):</p> <ul style="list-style-type: none"> DN 25 to 50 (1" to 2") |
| ANSI B16.5 | Class 150 lb: ½" to 24" | Class 150 lb: 1" to 24" |
| AWWA C-207 | Class D: • 28" to 48", Flat face flanges | Class D: • 28" to 78", Flat face flanges |
| AS4087 | PN 16 (230 psi): • DN 50 to 1200 (2" to 48") | PN 16 (230 psi): • DN 50 to 1200 (2" to 48") |
| JIS B 2220:2004 | K10 (1" to 24") | K10 (1" to 24") |

Table 8-3 Rated operating conditions

| Version | MAG 5100W (7ME6520) | MAG 5100W (7ME6580) |
|--|---|--|
| Ambient temperature | -40 to +70 °C (-40 to +158 °F) | -40 to +70 °C (-40 to +158 °F) |
| • Sensor | | |
| • With compact transmitter | | |
| MAG 5000/6000 ²⁾ | -20 to +60 °C (-4 to +140 °F) | -20 to +60 °C (-4 to +140 °F) |
| MAG 6000 I | -20 to +60 °C (-4 to +140 °F) | -20 to +60 °C (-4 to +140 °F) |
| Operating pressure [abs. bar] ¹ | <p>DN 15 to 40 (½" to 1½") 0.01 to 40 bar (0.15 to 580 psi)</p> <p>DN 50 to 300 (2" to 12")³⁾ 0.03 to 20 bar (0.44 to 290 psi)</p> <p>DN 350 to 1200 (14" to 48") 0.01 to 16 bar (0.15 to 232 psi)</p> | <p>DN 25 to 50 (1" to 2") 0.01 to 40 bar (0.15 to 580 psi)</p> <p>DN 65 to 1200 (2½" to 48") 0.01 to 16 bar (0.15 to 232 psi)</p> <p>DN 1400 to 2000 (54" to 78") 0.01 to 10 bar (0.15 to 145 psi)</p> |
| Enclosure rating | | |
| Standard | IP67 to EN 60529 / NEMA 4X/6 (1 mH ₂ O for 30 minutes) | IP67 to EN 60529 / NEMA 4X/6 (1 mH ₂ O for 30 minutes) |
| Option | IP68 to EN 60529 / NEMA 6P (10 mH ₂ O continuously) | IP68 to EN 60529 / NEMA 6P (10 mH ₂ O continuously) |
| Corrosive category | C4 according to ISO 12944-2 | C4 according to ISO 12944-2 |

| Version | MAG 5100W (7ME6520) | MAG 5100W (7ME6580) |
|-----------------------------|--|--|
| Pressure drop | DN 15 and 25 (½" and 1"): • Max. 20 mbar (0.29 psi) at 1 m/s (3 ft/s) DN 40 to 300 (1½" to 12"): • Max. 25 mbar (0.36 psi) at 3 m/s (10ft/s) DN 350 to 1200 (14" to 48"): • Insignificant | Insignificant |
| Test pressure | 1.5 x PN (where applicable) | 1.5 x PN (where applicable) |
| Mechanical load (vibration) | 18 to 1000 Hz random in x,y, z directions for 2 hours according to EN 60068-2-36 Sensor: 3.17 grms Sensor with compact MAG 5000/6000 transmitter mounted: 3.17 grms Sensor with compact MAG 6000 I transmitter mounted: 1.14 grms | 18 to 1000 Hz random in x,y, z directions for 2 hours according to EN 60068-2-36 Sensor: 3.17 grms Sensor with compact MAG 5000/6000 transmitter mounted: 3.17 grms Sensor with compact MAG 6000 I transmitter mounted: 1.14 grms |
| Process fluid temperature | | |
| <i>NBR</i> | -10 to +70 °C (14 to 158 °F) | - |
| <i>EPDM</i> | -10 to +70 °C (14 to 158 °F) | - |
| <i>EPDM (MI-001)</i> | +0.1 to +30 °C (32 to 76 °F) | - |
| <i>EPDM (PTB K 7.2)</i> | +0.1 to +50 °C (32 to 122 °F) | - |
| <i>Ebonite</i> | - | -10 to +70 °C (14 to 158 °F) |
| EMC | EMC 2004/108/EC | EMC 2004/108/EC |

1) Maximum operating pressure decreases with increasing operating temperature

2) MAG 5000/6000 CT -20 to +50 °C (-4 to +122 °F)

3) For PTB K7.2 DN50 to 150: 0.03 to 16 bar DN200 to 300: 0.03 to 10 bar or 0.03 to 16 bar

Table 8-4 Design

| Version | MAG 5100W (7ME6520) | MAG 5100W (7ME6580) |
|---------------------------------|---|---|
| Housing and flange material | Carbon steel, with corrosion-resistant two-component epoxy coating (min. 150 µm) Corrosive category C4, according to ISO 12944-2 | Carbon steel ASTM A 105, with corrosion-resistant two-component epoxy coating (min. 150 µm) |
| Measuring pipe | AISI 304 (1.4301) | AISI 304 (1.4301) |
| Electrodes | Hastelloy | Hastelloy |
| Grounding electrodes (standard) | Hastelloy | Hastelloy |
| Terminal box | Fibre glass reinforced polyamide | Fibre glass reinforced polyamide |

8.1 MAG 5100 W




Table 8-5 Certificates and approvals

| Version | MAG 5100W (7ME6520) | MAG 5100W (7ME6580) |
|--|--|--|
| 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 % |
| Custody transfer (only with MAG 5000/6000 CT) | <i>OIML R 49 pattern approval cold water (Denmark and Germany):</i> <ul style="list-style-type: none"> • DN 50 to 1200 (2" to 48") <i>MI 001 cold water (EU):</i> <ul style="list-style-type: none"> • DN 50 to 300 (2" to 12") <i>MPTB K7.2 Energy metering:</i> <ul style="list-style-type: none"> • DN 50 to 300 (2" to 12") | |
| Drinking water approvals | <i>EPDM liner:</i> <ul style="list-style-type: none"> • ANSI/NSF 61 Standard (Cold water, US) • WRAS (WRc, BS6920 cold water, GB) • ACS (F) • DVGW W270 (D) • Belgaqua (NBR) <i>NBR liner:</i> <ul style="list-style-type: none"> • ANSI/NSF 61 Standard (Cold water, US), only ANSI and AWWA flanges) | |
| Other approvals | <ul style="list-style-type: none"> • MCERTS • PED - 97/23 EC¹⁾ • CRN • VdS: Extinguishing systems DN 50 to 300 • FM Fire Service Meter (Class Number 1044) DN 50, DN 80, DN 100, DN 150, DN 200, DN 250, DN 300 (2", 3", 4", 6", 8", 10", 12") • CSA Class 1, Div 2 | <ul style="list-style-type: none"> • PED - 97/23 EC¹⁾ (only < DN 600 (< 24")) • FM Class 1, Div 2 • CSA Class 1, Div 2 |

¹⁾ : For sizes larger than 600 mm (24") in PN 16, PED conformity is available as cost-added option. The basic unit will carry the LVD (Low Voltage Directive) and EMC approval.

8.2 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 MAG 1100 sensor) |  |

Standard applications

Table 8-6 Technical data, standard application cables

| | Coil cable | Standard electrode cable |
|---|--|--------------------------|
| Basic data | No. of conductors | 2 |
| | Min. sqr. area | 0.5 mm ² |
| | Shield | Yes |
| | Max. capacitance | N/A |
| Max. cable loop resistance | Media temperature: | |
| | < 100 °C (212 °F) | 40 Ω |
| | > 200 °C (392 °F) | 6 Ω |
| Cable glands on sensor and transmitter | M20x1.5 gland - Cable ø 5 to 13 mm (0.20 to 0.51 inches) | |
| | ½ NPT gland - cable ø 5 to 9 mm (0.20 to 0.35 inches) | |

Special applications, for example low conductivity or electrical noise

Table 8-7 Technical data, special application cables

| | Coil cable | Special electrode cable |
|----------------------------|---------------------------|--------------------------------|
| Basic data | No. of conductors | 3 |
| | Sqr. area | 1.5 mm ² |
| | Shield | Yes |
| | Color code | Brown, blue, black |
| | Outside color | Grey |
| | Ext. diameter | 7.8 mm |
| | Conductor | Flexible CU |
| | Isolation material | PVC |
| Ambient temperature | Flexible installation | -5 to +70°C (23 to 158°F) |
| | Non-flexible installation | -30 to +70°C (-22 to 158°F) |

8.3 Effect of temperature on working pressure

| Cable parameter | Coil cable | | Special electrode cable |
|-----------------|------------|-------------|-------------------------|
| | Capacity | 161.50 pF/m | N/A |
| Inductance | 0.583 μH/m | N/A | |
| L/R | 43.83 μH/Ω | N/A | |

8.3 Effect of temperature on working pressure

Effect of temperature on working pressure.

Table 8-8 Metric measures (pressure in bar)

| Flange specifications | Flange rating | Temperature (°C) | | | |
|---|---------------|------------------|------|------|------|
| | | -5 | 10 | 50 | 90 |
| Sizes DN25 to 2000 | | | | | |
| 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 |
| AS | | 16.0 | 16.0 | 15.5 | 15.1 |
| JIS | 10K | 14.0 | 14.0 | 14.0 | 14.0 |
| Sizes DN 15 to 300 (order no. 7ME6520 only) | | | | | |
| EN 1092-1 | PN 10 | 10.0 | 10.0 | 10.0 | 8.2 |
| | PN 16 | 10.0 | 16.0 | 16.0 | 13.2 |
| | PN 40 | 40.0 | 40.0 | 38.7 | 37.7 |
| ANSI B16.5 | 150 lb | 10.0 | 19.7 | 19.7 | 16.2 |
| AS | | 16.0 | 16.0 | 16.0 | 13.2 |
| JIS | | 14.0 | 14.0 | 14.0 | |

Table 8-9 Imperial measures (pressure in psi)

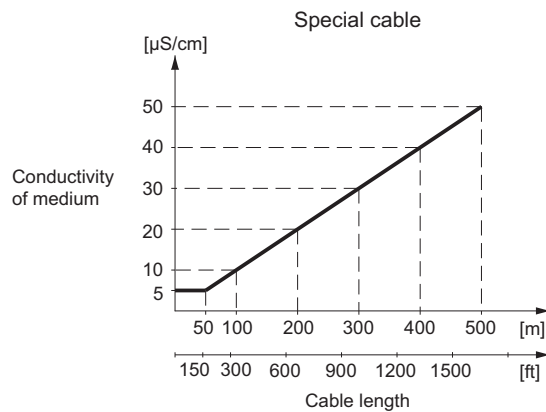
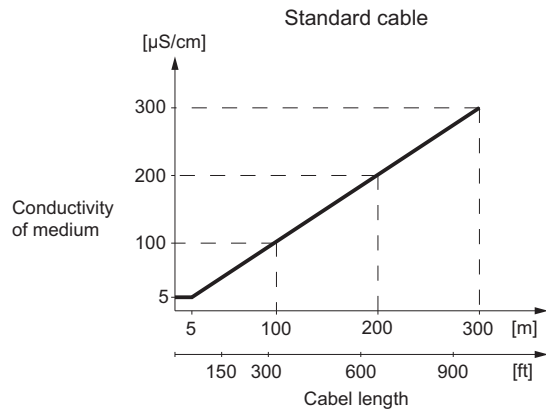
| Flange specifications | Flange rating | Temperature (°F) | | | |
|--|---------------|------------------|-----|-----|-----|
| | | 23 | 50 | 120 | 200 |
| Sizes 1" to 78" | | | | | |
| EN 1092-1 | PN 10 | 145 | 145 | 141 | 136 |
| | PN 16 | 232 | 232 | 225 | 219 |
| | PN 40 | 580 | 580 | 561 | 547 |
| ANSI B16.5 | 150 lb | 286 | 286 | 280 | 261 |
| AWWA C-207 | Class D | 150 | 150 | 150 | 150 |
| Sizes ½" to 12" (order no. 7ME6520 only) | | | | | |
| EN 1092-1 | PN 10 | 145 | 145 | 145 | 119 |
| | PN 16 | 145 | 232 | 232 | 191 |
| ANSI B16.5 | 150 lb | 145 | 286 | 286 | 235 |

8.4 Process fluid conductivity

Compact installation

Liquids with an electrical conductivity $\geq 5 \mu\text{S/cm}$.

Remote installation



Note

Empty sensor detection requirement

For detection of empty sensor the min. conductivity must always be $>50 \mu\text{S/cm}$ and the max. length of the electrode cable when remote mounted is 50 meters (164 ft). Special cable must be used!

8.5 Liner selection

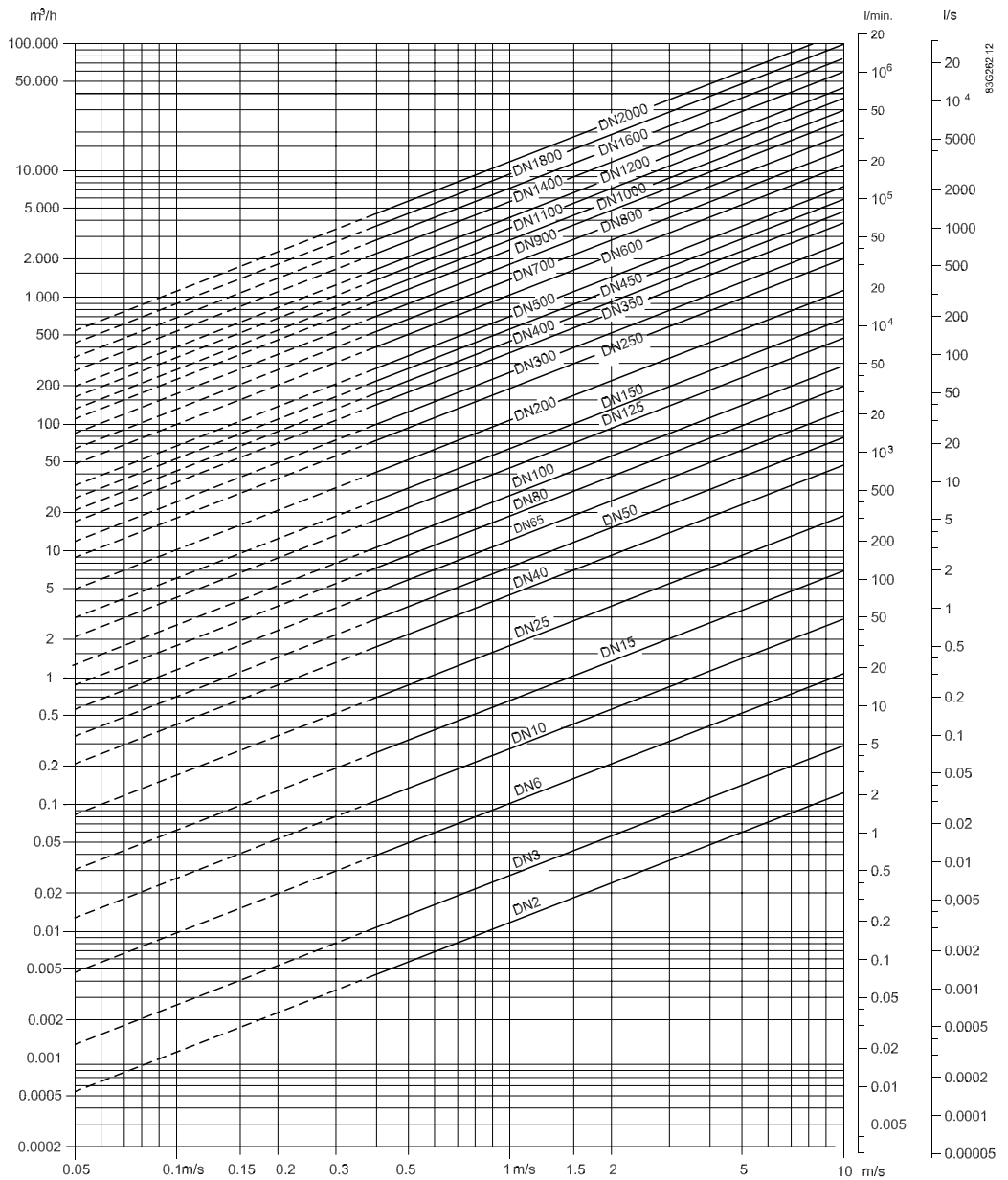
| Liner | Applications |
|---------|--|
| EPDM | Drinking water applications (not hydrocarbons) |
| Ebonite | Drinking water applications wastewater applications and certain chemicals applications |
| NBR | General purpose. Drinking water, sea waters |

8.6 Electrode selection

| Electrodes | |
|-------------|--|
| Hastelloy C | The preferred choice for water and wastewater, chemicals, food and beverage, and pharmaceutical industries |

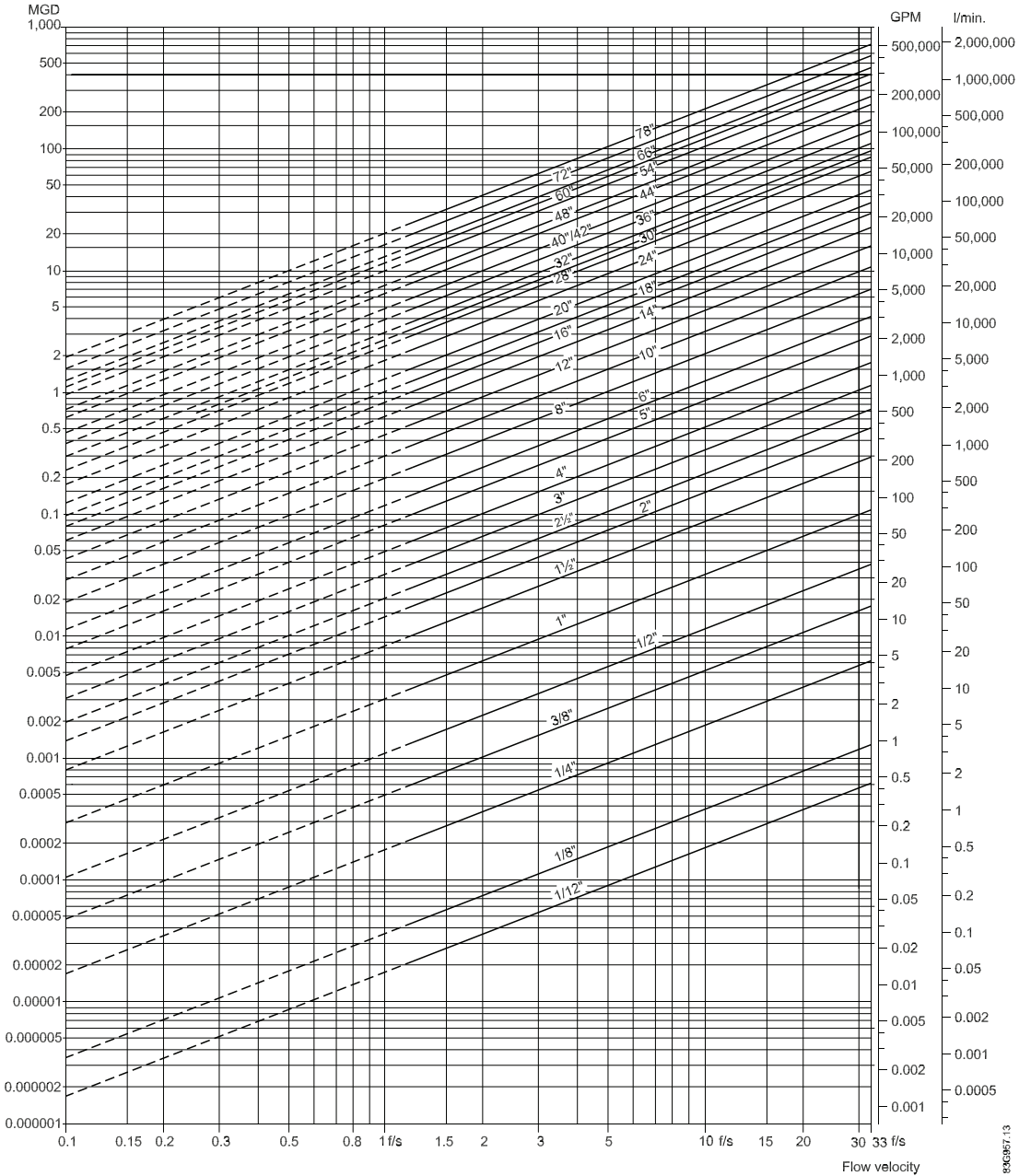
8.7 Sizing tables

Sizing table (DN 2 to DN 2000)



8.7 Sizing tables

Sizing table (DN 1/12" to DN 78")



The tables show the relationship between flow velocity v , flow quantity Q and sensor dimension DN.

Guidelines for selection of sensor

Min. measuring range: 0 to 0.25 m/s (0 to 0.8 ft/s)

Max. measuring range: 0 to 10 m/s (0 to 30 ft/s)

Normally the sensor size is selected so that the nominal flow velocity v lies within the measuring range 1 to 3 m/s (1 to 15 ft/s).

Flow velocity calculation formula:

(metric measures)

$$V = \frac{1273.24 \times Q \text{ [l/s]}}{DN^2 \text{ [mm]}} \text{ [m/s]} \text{ or } V = \frac{353.68 \times Q \text{ [m}^3\text{/h]}}{DN^2 \text{ [mm]}} \text{ [m/s]}$$

(imperial measures)

$$V = \frac{0.408 \times Q \text{ [GPM]}}{(\text{Pipe ID})^2 \text{ [inch]}} \text{ [ft/s]} \text{ or } V = \frac{283.67 \times Q \text{ [MGD]}}{(\text{Pipe ID})^2 \text{ [inch]}} \text{ [ft/s]}$$

8.8 Dimensions and weight

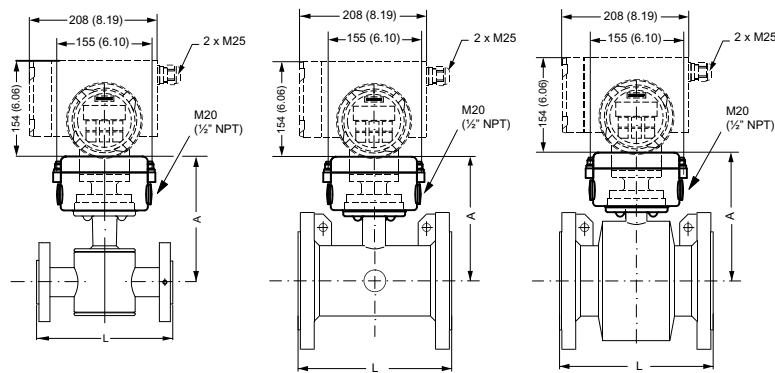


Figure 8-1 MAG 5100 W with MAG 6000 I / MAG 6000 I Ex d

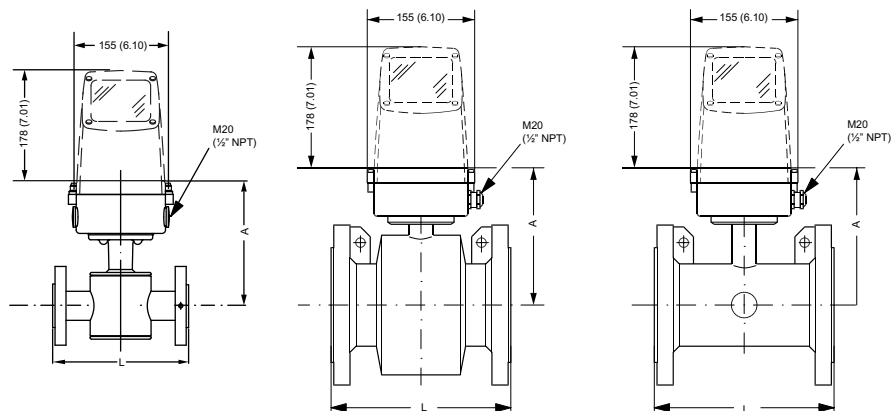


Figure 8-2 MAG 5100 W with MAG 5000 / 6000

Dimensions

Table 8-10 Nominal size A

| Nominal size | | A | | | |
|--------------|------|--|------|------------------------------------|------|
| | | Order no. 7ME6520 NBR or EPDM liner | | Order no. 7ME6580 Ebonite liner | |
| mm | inch | mm | inch | mm | inch |
| 15 | ½ | 177 | 7 | - | - |
| 25 | 1 | 187 | 7.4 | 187 | 7.4 |
| 40 | 1½ | 202 | 8 | 197 | 7.8 |
| 50 | 2 | 188 | 7.4 | 205 | 8.1 |
| 65 | 2½ | 194 | 7.6 | 212 | 8.3 |
| 80 | 3 | 200 | 7.9 | 222 | 8.7 |
| 100 | 4 | 207 | 8.1 | 242 | 9.5 |
| 125 | 5 | 217 | 8.5 | 255 | 10.0 |
| 150 | 6 | 232 | 9.1 | 276 | 10.9 |
| 200 | 8 | 257 | 10.1 | 304 | 12.0 |
| 250 | 10 | 284 | 11.2 | 332 | 13.1 |
| 300 | 12 | 310 | 12.2 | 357 | 14.1 |
| 350 | 14 | 382 | 15.0 | 362 | 14.3 |
| 400 | 16 | 407 | 16.0 | 387 | 15.2 |
| 450 | 18 | 438 | 17.2 | 418 | 16.5 |
| 500 | 20 | 463 | 18.2 | 443 | 17.4 |
| 600 | 24 | 514 | 20.2 | 494 | 19.4 |
| 700 | 28 | 564 | 22.2 | 544 | 21.4 |
| 750 | 30 | 591 | 23.3 | 571 | 22.5 |
| 800 | 32 | 616 | 24.3 | 606 | 23.9 |
| 900 | 36 | 663 | 26.1 | 653 | 25.7 |
| 1000 | 40 | 714 | 28.1 | 704 | 27.7 |
| 1050 | 42 | 714 | 28.1 | 704 | 27.7 |
| 1100 | 44 | 765 | 30.1 | 755 | 29.7 |
| 1200 | 48 | 820 | 32.3 | 810 | 31.9 |
| 1400 | 54 | N/A | N/A | 925 | 36.4 |
| 1500 | 60 | N/A | N/A | 972 | 38.2 |
| 1600 | 66 | N/A | N/A | 1025 | 40.4 |
| 1800 | 72 | N/A | N/A | 1123 | 44.2 |
| 2000 | 78 | N/A | N/A | 1223 | 48.1 |

Table 8-11 Nominal size L for 7ME6520

| Nominal size | | L | | | | | | | | | | | | | |
|--------------|------|-------|------|---------------------|------|-------|------|-----------|------|------------|------|-------|------|--------|------|
| | | PN 10 | | PN 16 ¹⁾ | | PN 40 | | Class 150 | | AWWA C-207 | | AS 16 | | JIS10K | |
| mm | inch | mm | inch | mm | inch | mm | inch | mm | inch | mm | inch | mm | inch | mm | inch |
| 15 | ½ | N/A | N/A | N/A | N/A | 200 | 7.9 | 200 | 7.9 | N/A | N/A | N/A | N/A | 200 | 7.9 |
| 25 | 1 | N/A | N/A | N/A | N/A | 200 | 7.9 | 200 | 7.9 | N/A | N/A | N/A | N/A | 200 | 7.9 |
| 40 | 1½ | N/A | N/A | N/A | N/A | 200 | 7.9 | 200 | 7.9 | N/A | N/A | N/A | N/A | 200 | 7.9 |
| 50 | 2 | N/A | N/A | 200 | 7.9 | N/A | N/A | 200 | 7.9 | N/A | N/A | 200 | 7.9 | 200 | 7.9 |
| 65 | 2½ | N/A | N/A | 200 | 7.9 | N/A | N/A | 200 | 7.9 | N/A | N/A | 200 | 7.9 | 200 | 7.9 |
| 80 | 3 | N/A | N/A | 200 | 7.9 | N/A | N/A | 200 | 7.9 | N/A | N/A | 200 | 7.9 | 200 | 7.9 |
| 100 | 4 | N/A | N/A | 250 | 9.8 | N/A | N/A | 250 | 9.8 | N/A | N/A | 250 | 9.8 | 250 | 9.8 |
| 125 | 5 | N/A | N/A | 250 | 9.8 | N/A | N/A | 250 | 9.8 | N/A | N/A | N/A | N/A | 250 | 9.8 |
| 150 | 6 | N/A | N/A | 300 | 11.8 | N/A | N/A | 300 | 11.8 | N/A | N/A | 300 | 11.8 | 300 | 11.8 |
| 200 | 8 | 350 | 13.8 | 350 | 13.8 | N/A | N/A | 350 | 13.8 | N/A | N/A | 350 | 13.8 | 350 | 13.8 |
| 250 | 10 | 450 | 17.7 | 450 | 17.7 | N/A | N/A | 450 | 17.7 | N/A | N/A | 450 | 17.7 | 450 | 17.7 |
| 300 | 12 | 500 | 19.7 | 500 | 19.7 | N/A | N/A | 500 | 19.7 | N/A | N/A | 500 | 19.7 | 500 | 19.7 |
| 350 | 14 | 550 | 21.7 | 550 | 21.7 | N/A | N/A | 550 | 21.7 | N/A | N/A | 550 | 21.7 | 550 | 21.7 |
| 400 | 16 | 600 | 23.6 | 600 | 23.6 | N/A | N/A | 600 | 23.6 | N/A | N/A | 600 | 23.6 | 600 | 23.6 |
| 450 | 18 | 600 | 23.6 | 600 | 23.6 | N/A | N/A | 600 | 23.6 | N/A | N/A | 600 | 23.6 | 600 | 23.6 |
| 500 | 20 | 600 | 23.6 | 600 | 23.6 | N/A | N/A | 600 | 23.6 | N/A | N/A | 600 | 23.6 | 600 | 23.6 |
| 600 | 24 | 600 | 23.6 | 600 | 23.6 | N/A | N/A | 600 | 23.6 | N/A | N/A | 600 | 23.6 | 600 | 23.6 |
| 700 | 28 | 700 | 27.6 | 700 | 27.6 | N/A | N/A | N/A | N/A | 700 | 27.6 | 700 | 27.6 | N/A | N/A |
| 750 | 30 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 750 | 29.5 | N/A | N/A | N/A | N/A |
| 800 | 32 | 800 | 31.5 | 800 | 31.5 | N/A | N/A | N/A | N/A | 800 | 31.5 | 800 | 31.5 | N/A | N/A |
| 900 | 36 | 900 | 35.4 | 900 | 35.4 | N/A | N/A | N/A | N/A | 900 | 35.4 | 900 | 35.4 | N/A | N/A |
| 1000 | 40 | 1000 | 39.4 | 1000 | 39.4 | N/A | N/A | N/A | N/A | 1000 | 39.4 | 1000 | 39.4 | N/A | N/A |
| 1050 | 42 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 1000 | 39.4 | N/A | N/A | N/A | N/A |
| 1100 | 44 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 1100 | 43.3 | N/A | N/A | N/A | N/A |
| 1200 | 48 | 1200 | 47.2 | 1200 | 47.2 | N/A | N/A | N/A | N/A | 1200 | 47.2 | 1200 | 47.2 | N/A | N/A |

1) > DN 700 are non-PED versions

Table 8-12 Nominal size L for 7ME6580

| Nominal size | | L | | | | | | | | | | | | | | | |
|--------------|------|------|------|-------|------|---------------------|------|-------|------|-----------|------|------------|------|-------|------|--------|------|
| | | PN 6 | | PN 10 | | PN 16 ¹⁾ | | PN 40 | | Class 150 | | AWWA C-207 | | AS 16 | | JIS10K | |
| mm | inch | mm | inch | mm | inch | mm | inch | mm | inch | mm | inch | mm | inch | mm | inch | mm | inch |
| 15 | ½ | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| 25 | 1 | N/A | N/A | N/A | N/A | N/A | N/A | 200 | 7.9 | 200 | 7.9 | N/A | N/A | N/A | N/A | 200 | 7.9 |
| 40 | 1½ | N/A | N/A | N/A | N/A | N/A | N/A | 200 | 7.9 | 200 | 7.9 | N/A | N/A | N/A | N/A | 200 | 7.9 |
| 50 | 2 | N/A | N/A | N/A | N/A | N/A | N/A | 200 | 7.9 | 200 | 7.9 | N/A | N/A | 200 | 7.9 | 200 | 7.9 |
| 65 | 2½ | N/A | N/A | N/A | N/A | 200 | 7.9 | N/A | N/A | 200 | 7.9 | N/A | N/A | 200 | 7.9 | 200 | 7.9 |
| 80 | 3 | N/A | N/A | N/A | N/A | 200 | 7.9 | N/A | N/A | 200 | 7.9 | N/A | N/A | 200 | 7.9 | 200 | 7.9 |

8.8 Dimensions and weight

| Nominal size | | L | | | | | | | | | | | | | | | |
|--------------|------|------|------|-------|------|---------------------|------|-------|------|-----------|------|------------|------|-------|------|--------|------|
| | | PN 6 | | PN 10 | | PN 16 ¹⁾ | | PN 40 | | Class 150 | | AWWA C-207 | | AS 16 | | JIS10K | |
| mm | inch | mm | inch | mm | inch | mm | inch | mm | inch | mm | inch | mm | inch | mm | inch | mm | inch |
| 100 | 4 | N/A | N/A | N/A | N/A | 250 | 9.8 | N/A | N/A | 250 | 9.8 | N/A | N/A | 250 | 9.8 | 250 | 9.8 |
| 125 | 5 | N/A | N/A | N/A | N/A | 250 | 9.8 | N/A | N/A | 250 | 9.8 | N/A | N/A | N/A | N/A | 250 | 9.8 |
| 150 | 6 | N/A | N/A | N/A | N/A | 300 | 11.8 | N/A | N/A | 300 | 11.8 | N/A | N/A | 300 | 11.8 | 300 | 11.8 |
| 200 | 8 | N/A | N/A | 350 | 13.8 | 350 | 13.8 | N/A | N/A | 350 | 13.8 | N/A | N/A | 350 | 13.8 | 350 | 13.8 |
| 250 | 10 | N/A | N/A | 450 | 17.7 | 450 | 17.7 | N/A | N/A | 450 | 17.7 | N/A | N/A | 450 | 17.7 | 450 | 17.7 |
| 300 | 12 | N/A | N/A | 500 | 19.7 | 500 | 19.7 | N/A | N/A | 500 | 19.7 | N/A | N/A | 500 | 19.7 | 500 | 19.7 |
| 350 | 14 | N/A | N/A | 550 | 21.7 | 550 | 21.7 | N/A | N/A | 550 | 21.7 | N/A | N/A | 550 | 21.7 | 550 | 21.7 |
| 400 | 16 | N/A | N/A | 600 | 23.6 | 600 | 23.6 | N/A | N/A | 600 | 23.6 | N/A | N/A | 600 | 23.6 | 600 | 23.6 |
| 450 | 18 | N/A | N/A | 600 | 23.6 | 600 | 23.6 | N/A | N/A | 600 | 23.6 | N/A | N/A | 600 | 23.6 | 600 | 23.6 |
| 500 | 20 | N/A | N/A | 600 | 23.6 | 600 | 23.6 | N/A | N/A | 600 | 23.6 | N/A | N/A | 600 | 23.6 | 600 | 23.6 |
| 600 | 24 | N/A | N/A | 600 | 23.6 | 600 | 23.6 | N/A | N/A | 600 | 23.6 | N/A | N/A | 600 | 23.6 | 600 | 23.6 |
| 700 | 28 | N/A | N/A | 700 | 27.6 | 700 | 27.6 | N/A | N/A | N/A | N/A | 700 | 27.6 | 700 | 27.6 | N/A | N/A |
| 750 | 30 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 750 | 29.5 | N/A | N/A | N/A | N/A |
| 800 | 32 | N/A | N/A | 800 | 31.5 | 800 | 31.5 | N/A | N/A | N/A | N/A | 800 | 31.5 | 800 | 31.5 | N/A | N/A |
| 900 | 36 | N/A | N/A | 900 | 35.4 | 900 | 35.4 | N/A | N/A | N/A | N/A | 900 | 35.4 | 900 | 35.4 | N/A | N/A |
| 1000 | 40 | N/A | N/A | 1000 | 39.4 | 1000 | 39.4 | N/A | N/A | N/A | N/A | 1000 | 39.4 | 1000 | 39.4 | N/A | N/A |
| 1050 | 42 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 1000 | 39.4 | N/A | N/A | N/A | N/A |
| 1100 | 44 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 1100 | 43.3 | N/A | N/A | N/A | N/A |
| 1200 | 48 | N/A | N/A | 1200 | 47.2 | 1200 | 47.2 | N/A | N/A | N/A | N/A | 1200 | 47.2 | 1200 | 47.2 | N/A | N/A |
| 1400 | 54 | 1400 | 55.1 | 1400 | 55.1 | 1400 | 55.1 | N/A | N/A | N/A | N/A | 1400 | 55.1 | N/A | N/A | N/A | N/A |
| 1500 | 60 | 1500 | 59.1 | 1500 | 59.1 | 1500 | 59.1 | N/A | N/A | N/A | N/A | 1500 | 59.1 | N/A | N/A | N/A | N/A |
| 1600 | 66 | 1600 | 63 | 1600 | 63 | 1600 | 63 | N/A | N/A | N/A | N/A | 1600 | 63 | N/A | N/A | N/A | N/A |
| 1800 | 72 | 1800 | 70.9 | 1800 | 70.9 | 1800 | 70.9 | N/A | N/A | N/A | N/A | 1800 | 70.9 | N/A | N/A | N/A | N/A |
| 2000 | 78 | 2000 | 78.7 | 2000 | 78.7 | 2000 | 78.7 | N/A | N/A | N/A | N/A | 2000 | 78.7 | N/A | N/A | N/A | N/A |

¹⁾ > DN 700 are non-PED versions

Weight

Table 8-13 Weight for 7ME6520

| Nominal size | | PN 10 | | PN 16 ¹⁾ | | PN 40 | | Class 150 | | AWWA C-207 | | AS 16 | | JIS10K | |
|--------------|------|-------|------|---------------------|------|-------|-----|-----------|-----|------------|------|-------|------|--------|-----|
| mm | inch | kg | lbs | kg | lbs | kg | lbs | kg | lbs | kg | lbs | kg | lbs | kg | lbs |
| 15 | ½ | N/A | N/A | N/A | N/A | 5 | 11 | 5 | 11 | N/A | N/A | N/A | N/A | 5 | 11 |
| 25 | 1 | N/A | N/A | N/A | N/A | 6 | 13 | 6 | 13 | N/A | N/A | N/A | N/A | 6 | 13 |
| 40 | 1½ | N/A | N/A | N/A | N/A | 9 | 20 | 9 | 20 | N/A | N/A | N/A | N/A | 9 | 20 |
| 50 | 2 | N/A | N/A | 10 | 22 | N/A | N/A | 10 | 22 | N/A | N/A | 10 | 22 | 10 | 22 |
| 65 | 2½ | N/A | N/A | 12 | 26 | N/A | N/A | 12 | 26 | N/A | N/A | 12 | 26 | 12 | 26 |
| 80 | 3 | N/A | N/A | 13 | 29 | N/A | N/A | 13 | 29 | N/A | N/A | 13 | 29 | 13 | 29 |
| 100 | 4 | N/A | N/A | 17 | 37 | N/A | N/A | 18 | 40 | N/A | N/A | 17 | 37 | 17 | 37 |
| 125 | 5 | N/A | N/A | 20 | 44 | N/A | N/A | 21 | 46 | N/A | N/A | N/A | N/A | 20 | 44 |
| 150 | 6 | N/A | N/A | 27 | 60 | N/A | N/A | 30 | 66 | N/A | N/A | 21 | 46 | 26 | 57 |
| 200 | 8 | 38 | 84 | 39 | 86 | N/A | N/A | 47 | 104 | N/A | N/A | 34 | 75 | 35 | 77 |
| 250 | 10 | 52 | 115 | 56 | 123 | N/A | N/A | 64 | 141 | N/A | N/A | 48 | 106 | 51 | 112 |
| 300 | 12 | 62 | 137 | 72 | 159 | N/A | N/A | 92 | 203 | N/A | N/A | 61 | 134 | 59 | 130 |
| 350 | 14 | 99 | 218 | 115 | 254 | N/A | N/A | 131 | 289 | N/A | N/A | 106 | 234 | 88 | 194 |
| 400 | 16 | 121 | 267 | 143 | 315 | N/A | N/A | 161 | 355 | N/A | N/A | 124 | 273 | 113 | 249 |
| 450 | 18 | 144 | 317 | 177 | 390 | N/A | N/A | 182 | 401 | N/A | N/A | 145 | 320 | 135 | 298 |
| 500 | 20 | 165 | 364 | 222 | 489 | N/A | N/A | 217 | 478 | N/A | N/A | 175 | 386 | 151 | 333 |
| 600 | 24 | 225 | 496 | 321 | 708 | N/A | N/A | 305 | 672 | N/A | N/A | 285 | 628 | 179 | 395 |
| 700 | 28 | 272 | 600 | 331 | 730 | N/A | N/A | N/A | N/A | 284 | 626 | 350 | 772 | N/A | N/A |
| 750 | 30 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 331 | 730 | N/A | N/A | N/A | N/A |
| 800 | 32 | 300 | 661 | 386 | 851 | N/A | N/A | N/A | N/A | 394 | 869 | 485 | 1069 | N/A | N/A |
| 900 | 36 | 372 | 820 | 482 | 1063 | N/A | N/A | N/A | N/A | 487 | 1074 | 645 | 1422 | N/A | N/A |
| 1000 | 40 | 454 | 1001 | 672 | 1482 | N/A | N/A | N/A | N/A | 589 | 1299 | 696 | 1534 | N/A | N/A |
| 1050 | 42 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 693 | 1528 | N/A | N/A | N/A | N/A |
| 1100 | 44 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 774 | 1706 | N/A | N/A | N/A | N/A |
| 1200 | 48 | 728 | 1605 | 1116 | 2460 | N/A | N/A | N/A | N/A | 916 | 2019 | 1116 | 2460 | N/A | N/A |

¹⁾ > DN 700 are non-PED versions

Table 8-14 Weight for 7ME6580

| Nominal size | | PN 6 | | PN 10 | | PN 16 ¹⁾ | | PN 40 | | Class 150 | | AWWA C-207 | | AS 16 | | JIS10K | |
|--------------|------|------|-----|-------|-----|---------------------|-----|-------|-----|-----------|-----|------------|-----|-------|-----|--------|-----|
| mm | inch | kg | lbs | kg | lbs | kg | lbs | kg | lbs | kg | lbs | kg | lbs | kg | lbs | kg | lbs |
| 15 | ½ | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| 25 | 1 | N/A | N/A | N/A | N/A | N/A | N/A | 6 | 13 | 5,5 | 12 | N/A | N/A | N/A | N/A | 5 | 11 |
| 40 | 1½ | N/A | N/A | N/A | N/A | N/A | N/A | 9 | 20 | 7,5 | 17 | N/A | N/A | N/A | N/A | 8 | 18 |
| 50 | 2 | N/A | N/A | N/A | N/A | 9 | 20 | 10 | 22 | 9 | 20 | N/A | N/A | 9 | 20 | 9 | 20 |
| 65 | 2½ | N/A | N/A | N/A | N/A | 12 | 26 | N/A | N/A | 10 | 22 | N/A | N/A | 12 | 26 | 12 | 26 |

Technical specifications

8.8 Dimensions and weight

| Nominal size | | PN 6 | | PN 10 | | PN 16 ¹⁾ | | PN 40 | | Class 150 | | AWWA C-207 | | AS 16 | | JIS10K | |
|--------------|------|------|------|-------|------|---------------------|------|-------|-----|-----------|-----|------------|------|-------|------|--------|-----|
| mm | inch | kg | lbs | kg | lbs | kg | lbs | kg | lbs | kg | lbs | kg | lbs | kg | lbs | kg | lbs |
| 80 | 3 | N/A | N/A | N/A | N/A | 13 | 29 | N/A | N/A | 15 | 33 | N/A | N/A | 13 | 29 | 13 | 29 |
| 100 | 4 | N/A | N/A | N/A | N/A | 16.5 | 36 | N/A | N/A | 20 | 44 | N/A | N/A | 16.5 | 36 | 16 | 35 |
| 125 | 5 | N/A | N/A | N/A | N/A | 22 | 48 | N/A | N/A | 24 | 53 | N/A | N/A | N/A | N/A | 20 | 44 |
| 150 | 6 | N/A | N/A | N/A | N/A | 27 | 59 | N/A | N/A | 28 | 62 | N/A | N/A | 29 | 64 | 27 | 59 |
| 200 | 8 | N/A | N/A | 42 | 92 | 42 | 92 | N/A | N/A | 49 | 108 | N/A | N/A | 42 | 92 | 41 | 90 |
| 250 | 10 | N/A | N/A | 58 | 128 | 66 | 145 | N/A | N/A | 75 | 165 | N/A | N/A | 66 | 145 | 58 | 128 |
| 300 | 12 | N/A | N/A | 72 | 159 | 81 | 178 | N/A | N/A | 98 | 216 | N/A | N/A | 81 | 178 | 72 | 158 |
| 350 | 14 | N/A | N/A | 99 | 218 | 115 | 254 | N/A | N/A | 131 | 289 | N/A | N/A | 106 | 234 | 88 | 194 |
| 400 | 16 | N/A | N/A | 121 | 267 | 143 | 315 | N/A | N/A | 161 | 355 | N/A | N/A | 124 | 273 | 113 | 249 |
| 450 | 18 | N/A | N/A | 144 | 317 | 177 | 390 | N/A | N/A | 182 | 401 | N/A | N/A | 145 | 320 | 135 | 298 |
| 500 | 20 | N/A | N/A | 165 | 364 | 222 | 489 | N/A | N/A | 217 | 478 | N/A | N/A | 175 | 386 | 151 | 333 |
| 600 | 24 | N/A | N/A | 225 | 496 | 321 | 708 | N/A | N/A | 305 | 672 | N/A | N/A | 285 | 628 | 179 | 395 |
| 700 | 28 | N/A | N/A | 272 | 600 | 314 | 692 | N/A | N/A | N/A | N/A | 284 | 626 | 350 | 772 | N/A | N/A |
| 750 | 30 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 331 | 730 | N/A | N/A | N/A | N/A |
| 800 | 32 | N/A | N/A | 300 | 661 | 396 | 873 | N/A | N/A | N/A | N/A | 394 | 869 | 485 | 1069 | N/A | N/A |
| 900 | 36 | N/A | N/A | 372 | 820 | 474 | 1043 | N/A | N/A | N/A | N/A | 487 | 1074 | 645 | 1422 | N/A | N/A |
| 1000 | 40 | N/A | N/A | 454 | 1001 | 600 | 1321 | N/A | N/A | N/A | N/A | 589 | 1299 | 696 | 1534 | N/A | N/A |
| 1050 | 42 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 693 | 1528 | N/A | N/A | N/A | N/A |
| 1100 | 44 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | 774 | 1706 | N/A | N/A | N/A | N/A |
| 1200 | 48 | N/A | N/A | 728 | 1605 | 885 | 1948 | N/A | N/A | N/A | N/A | 916 | 2019 | 1116 | 2460 | N/A | N/A |
| 1400 | 54 | 1338 | 2944 | 1592 | 3502 | 1890 | 4158 | N/A | N/A | N/A | N/A | 1592 | 3502 | N/A | N/A | N/A | N/A |
| 1500 | 60 | 1520 | 3344 | 1850 | 4070 | 2238 | 4924 | N/A | N/A | N/A | N/A | 1950 | 4290 | N/A | N/A | N/A | N/A |
| 1600 | 66 | 1696 | 3731 | 2110 | 4642 | 2525 | 5555 | N/A | N/A | N/A | N/A | 2110 | 4642 | N/A | N/A | N/A | N/A |
| 1800 | 72 | 2110 | 4642 | 2560 | 5632 | 3460 | 7612 | N/A | N/A | N/A | N/A | 2560 | 5632 | N/A | N/A | N/A | N/A |
| 2000 | 78 | 2564 | 5641 | 3640 | 8008 | 4205 | 9251 | N/A | N/A | N/A | N/A | 3640 | 8008 | N/A | N/A | N/A | N/A |

¹⁾ > DN 700 are non-PED versions

Product documentation and support

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 show, open, save, or configure the manual.
 - "Display": Open the manual in HTML5 format
 - "Configure": Register and configure the documentation specific to your plant
 - "Download": Open or save the manual in PDF format
 - "Download as html5, only PC": Open or save the manual in the HTML5 view on your PC

You can also find manuals with 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 QR code.

Product documentation by serial number

Using the PIA Life Cycle Portal, you can access the serial number-specific product information including technical specifications, spare parts, calibration data, or factory certificates.

Entering a serial number

1. Open the PIA Life Cycle Portal (<https://www.pia-portal.automation.siemens.com>).
2. Select the desired language.
3. Enter the serial number of your device. The product documentation relevant for your device is displayed and can be downloaded.

To display factory certificates, if available, log in to the PIA Life Cycle Portal using your login or register.

Scanning a QR code

1. Scan the QR code on your device with a mobile device.
2. Click "PIA Portal".

To display factory certificates, if available, log in to the PIA Life Cycle Portal using your login or register.

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.

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/service&support>).

Contact

If you have further questions about the device, contact your local Siemens representative at Personal Contact (<http://www.automation.siemens.com/partner>).

To find the contact for your product, go to "all products and branches" and select "Products & Services > Industrial automation > Process instrumentation".

Contact address for business unit:

Siemens AG
Digital Industries
Process Automation
Östliche Rheinbrückenstr. 50
76187 Karlsruhe, Germany

Appendix

B.1 Measuring ranges

MAG 5100 W (7ME6520) MI-001 is verified and labeled at a given Q3 and Q3/Q4 = 1.25 and Q2/Q1 = 1.6 measuring ranges:

| Order code: P11 | 50 (2") | 65 (2½") | 80 (3") | 100 (4") | 125 (5") | 150 (6") | 200 (8") | 250 (10") | 300 (12") |
|------------------|-----------|-----------|-----------|-----------|------------|------------|------------|------------|------------|
| "R" Q3/Q1 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 |
| Q4 [m³/h] | 20 | 31.25 | 50 | 78.75 | 125 | 200 | 312.5 | 500 | 787.5 |
| Q3 [m³/h] | 16 | 25 | 40 | 63 | 100 | 160 | 250 | 400 | 630 |
| Q2 [m³/h] | 0.64 | 1.0 | 1.6 | 2.52 | 4.0 | 6.4 | 10.0 | 16.0 | 25.2 |
| Q1 [m³/h] | 0.4 | 0.63 | 1.0 | 1.58 | 2.5 | 4.0 | 6.25 | 10.0 | 15.75 |

| Order code: P12 | 50 (2") | 65 (2½") | 80 (3") | 100 (4") | 125 (5") | 150 (6") | 200 (8") | 250 (10") | 300 (12") |
|------------------|-----------|-----------|-----------|-----------|------------|------------|------------|------------|------------|
| "R" Q3/Q1 | 63 | 63 | 63 | 63 | 63 | 63 | 63 | 63 | 63 |
| Q4 [m³/h] | 20 | 31.25 | 50 | 78.75 | 125 | 200 | 312.5 | 500 | 787.5 |
| Q3 [m³/h] | 16 | 25 | 40 | 63 | 100 | 160 | 250 | 400 | 630 |
| Q2 [m³/h] | 0.41 | 0.63 | 1.02 | 1.6 | 2.54 | 4.06 | 6.35 | 10.2 | 16.0 |
| Q1 [m³/h] | 0.25 | 0.40 | 0.63 | 1.00 | 1.59 | 2.54 | 3.97 | 6.35 | 10.0 |

| Order code: P13 | 50 (2") | 65 (2½") | 80 (3") | 100 (4") | 125 (5") | 150 (6") | 200 (8") | 250 (10") | 300 (12") |
|------------------|-----------|-----------|-----------|-----------|------------|------------|------------|------------|------------|
| "R" Q3/Q1 | 80 | 80 | 80 | 80 | 80 | 80 | 80 | 80 | 80 |
| Q4 [m³/h] | 20 | 31.25 | 50 | 78.75 | 125 | 200 | 312.5 | 500 | 787.5 |
| Q3 [m³/h] | 16 | 25 | 40 | 63 | 100 | 160 | 250 | 400 | 630 |
| Q2 [m³/h] | 0.32 | 0.5 | 0.8 | 1.26 | 2.0 | 3.2 | 5.0 | 8.0 | 12.6 |
| Q1 [m³/h] | 0.20 | 0.31 | 0.50 | 0.79 | 1.25 | 2.00 | 3.13 | 5.00 | 7.9 |

| Order code: P16 | 50 (2") | 65 (2½") | 80 (3") | 100 (4") | 125 (5") | 150 (6") | 200 (8") | 250 (10") | 300 (12") |
|------------------|-----------|-----------|------------|------------|------------|------------|------------|-------------|-------------|
| "R" Q3/Q1 | 160 | 160 | 160 | 160 | 160 | 160 | 160 | 160 | 160 |
| Q4 [m³/h] | 50 | 78.75 | 125 | 200 | 312.5 | 500 | 787.5 | 1250 | 2000 |
| Q3 [m³/h] | 40 | 63 | 100 | 160 | 250 | 400 | 630 | 1000 | 1600 |
| Q2 [m³/h] | 0.4 | 0.63 | 1.0 | 1.6 | 2.5 | 4.0 | 6.3 | 10.0 | 16.0 |
| Q1 [m³/h] | 0.25 | 0.39 | 0.63 | 1.0 | 1.56 | 2.5 | 3.94 | 6.3 | 10.0 |

| Order code: P17 | 50 (2") | 65 (2½") | 80 (3") | 100 (4") | 125 (5") | 150 (6") | 200 (8") | 250 (10") | 300 (12") |
|------------------|-----------|-----------|------------|------------|------------|------------|------------|-------------|-------------|
| "R" Q3/Q1 | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 |
| Q4 [m³/h] | 50 | 78.75 | 125 | 200 | 312.5 | 500 | 787.5 | 1250 | 2000 |
| Q3 [m³/h] | 40 | 63 | 100 | 160 | 250 | 400 | 630 | 1000 | 1600 |

Appendix

B.1 Measuring ranges

| Order code: P17 | 50 (2") | 65 (2½") | 80 (3") | 100 (4") | 125 (5") | 150 (6") | 200 (8") | 250 (10") | 300 (12") |
|-----------------|---------|----------|---------|----------|----------|----------|----------|-----------|-----------|
| Q2 [m³/h] | 0.32 | 0.50 | 0.80 | 1.28 | 2.0 | 3.2 | 5.0 | 8.0 | 12.8 |
| Q1 [m³/h] | 0.2 | 0.32 | 0.5 | 0.8 | 1.25 | 2.0 | 3.15 | 5.0 | 8.0 |

| Order code: P18 | 50 (2") | 65 (2½") | 80 (3") | 100 (4") | 125 (5") | 150 (6") | 200 (8") | 250 (10") | 300 (12") |
|------------------|-----------|-----------|------------|------------|------------|------------|------------|-------------|-------------|
| "R" Q³/Q1 | 250 | 250 | 250 | 250 | 250 | 250 | 250 | 250 | 250 |
| Q4 [m³/h] | 50 | 78.75 | 125 | 200 | 312.5 | 500 | 787.5 | 1250 | 2000 |
| Q3 [m³/h] | 40 | 63 | 100 | 160 | 250 | 400 | 630 | 1000 | 1600 |
| Q2 [m³/h] | 0.26 | 0.4 | 0.64 | 1.02 | 1.6 | 2.56 | 4.0 | 6.4 | 10.24 |
| Q1 [m³/h] | 0.16 | 0.25 | 0.4 | 0.64 | 1.0 | 1.6 | 2.52 | 4.0 | 6.4 |

| Order code: P24 | 350 (14") | 400 (16") | 450 (18") | 500 (20") | 600 (24") |
|------------------|-------------|-------------|-------------|-------------|-------------|
| "R" Q³/Q1 | 40 | 40 | 40 | 40 | 40 |
| Q4 [m³/h] | 1250 | 1250 | 2000 | 2000 | 3125 |
| Q3 [m³/h] | 1000 | 1000 | 1600 | 1600 | 2500 |
| Q2 [m³/h] | 40.0 | 40.0 | 64.0 | 64.0 | 100.0 |
| Q1 [m³/h] | 25.0 | 25.0 | 40.0 | 40.0 | 62.5 |

| Order code: P25 | 350 (14") | 400 (16") | 450 (18") | 500 (20") | 600 (24") |
|------------------|-------------|-------------|-------------|-------------|-------------|
| "R" Q³/Q1 | 63 | 63 | 63 | 63 | 63 |
| Q4 [m³/h] | 1250 | 2000 | 3125 | 3125 | 5000 |
| Q3 [m³/h] | 1000 | 1600 | 2500 | 2500 | 4000 |
| Q2 [m³/h] | 25.4 | 40.63 | 63.49 | 63.49 | 101.6 |
| Q1 [m³/h] | 15.9 | 25.4 | 39.7 | 39.7 | 63.49 |

| Order code: P26 | 350 (14") | 400 (16") | 450 (18") | 500 (20") | 600 (24") |
|------------------|-------------|-------------|-------------|-------------|-------------|
| "R" Q³/Q1 | 80 | 80 | 80 | 80 | 80 |
| Q4 [m³/h] | 2000 | 3125 | 5000 | 5000 | 7875 |
| Q3 [m³/h] | 1600 | 2500 | 4000 | 4000 | 6300 |
| Q2 [m³/h] | 32.0 | 50.0 | 80.0 | 80.0 | 126.0 |
| Q1 [m³/h] | 20 | 31.25 | 50.0 | 50.0 | 78.75 |

| Order code: P27 | 350 (14") | 400 (16") | 450 (18") | 500 (20") | 600 (24") |
|------------------|-------------|-------------|-------------|-------------|-------------|
| "R" Q³/Q1 | 100 | 100 | 100 | 100 | 100 |
| Q4 [m³/h] | 3125 | 3125 | 5000 | 5000 | 7875 |
| Q3 [m³/h] | 2500 | 2500 | 4000 | 4000 | 6300 |
| Q2 [m³/h] | 40.0 | 40.0 | 64.0 | 64.0 | 100.8 |
| Q1 [m³/h] | 25.0 | 25.0 | 40.0 | 40.0 | 63.0 |

B.2 Measuring range according to EN1434 (2007)

| Order code: P29 | 700 (28") | 750 (30") | 800 (32") | 900 (36") | 1000 (40") | 1200 (48") |
|-----------------------------|-------------|-------------|-------------|-------------|-------------|-------------|
| "R" Q ³ /Q1 | 40 | 40 | 40 | 40 | 40 | 40 |
| Q4 [m ³ /h] | 5000 | 5000 | 5000 | 7875 | 7875 | 7875 |
| Q3 [m³/h] | 4000 | 4000 | 4000 | 6300 | 6300 | 6300 |
| Q2 [m ³ /h] | 160.0 | 160.0 | 160.0 | 252.0 | 252.0 | 252.0 |
| Q1 [m ³ /h] | 100.0 | 100.0 | 100.0 | 157.5 | 157.5 | 157.5 |

| Order code: P30 | 700 (28") | 750 (30") | 800 (32") | 900 (36") | 1000 (40") | 1200 (48") |
|-----------------------------|-------------|-------------|-------------|-------------|-------------|------------|
| "R" Q ³ /Q1 | 63 | 63 | 63 | 63 | 63 | - |
| Q4 [m ³ /h] | 5000 | 5000 | 5000 | 7875 | 7875 | - |
| Q3 [m³/h] | 4000 | 4000 | 4000 | 6300 | 6300 | - |
| Q2 [m ³ /h] | 101.6 | 101.6 | 101.6 | 160.0 | 160.0 | - |
| Q1 [m ³ /h] | 63.5 | 63.5 | 63.5 | 100.0 | 100.0 | - |

| Order code: P30 | 700 (28") | 750 (30") | 800 (32") | 900 (36") | 1000 (40") | 1200 (48") |
|-----------------------------|-------------|-------------|-------------|-------------|-------------|------------|
| "R" Q ³ /Q1 | 80 | 80 | 80 | 80 | 80 | - |
| Q4 [m ³ /h] | 5000 | 5000 | 5000 | 7875 | 7875 | - |
| Q3 [m³/h] | 4000 | 4000 | 4000 | 6300 | 6300 | - |
| Q2 [m ³ /h] | 80.0 | 80.0 | 80.0 | 126.0 | 126.0 | - |
| Q1 [m ³ /h] | 50.0 | 50.0 | 50.0 | 78.75 | 78.75 | - |

B.2 Measuring range according to EN1434 (2007)

| DN | 15 | 25 | 40 | 50 | 65 | 80 | 100 | 125 | 150 | 200 | 250 | 300 |
|--|------|------|------|------|-------|-----|-------|-----|-----|-------|-----|-------|
| Q _p /Q1 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 |
| Q _s (1.25* Q _p) | 1.9 | 4.4 | 12.5 | 20 | 31.25 | 50 | 78.75 | 125 | 200 | 312.5 | 500 | 787.5 |
| Q _p | 1.5 | 3.5 | 10.0 | 16 | 25 | 40 | 63 | 100 | 160 | 250 | 400 | 630 |
| Q1 | 0.06 | 0.14 | 0.4 | 0.64 | 1 | 1.6 | 2.52 | 4 | 6.4 | 10 | 16 | 25.2 |

| DN | 15 | 25 | 40 | 50 | 65 | 80 | 100 | 125 | 150 | 200 | 250 | 300 |
|--|------|------|------|------|-------|-----|-------|-----|-----|-------|-----|-------|
| Q _p /Q1 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 |
| Q _s (1.25* Q _p) | 1.9 | 4.4 | 12.5 | 20 | 31.25 | 50 | 78.75 | 125 | 200 | 312.5 | 500 | 787.5 |
| Q _p | 1.5 | 3.5 | 10.0 | 16 | 25 | 40 | 63 | 100 | 160 | 250 | 400 | 630 |
| Q1 | 0.03 | 0.07 | 0.2 | 0.32 | 0.5 | 0.8 | 1.26 | 2 | 3.2 | 5 | 8 | 12.6 |

| DN | 15 | 25 | 40 | 50 | 65 | 80 | 100 | 125 | 150 | 200 | 250 | 300 |
|--|-----|-----|------|-----|-------|-----|-------|-----|-----|-------|-----|-------|
| Q _p /Q1 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| Q _s (1.25* Q _p) | 1.9 | 4.4 | 12.5 | 20 | 31.25 | 50 | 78.75 | 125 | 200 | 312.5 | 500 | 787.5 |

B.3 Flange mating dimensions (metric)

| DN | 15 | 25 | 40 | 50 | 65 | 80 | 100 | 125 | 150 | 200 | 250 | 300 |
|----------------|------|------|------|------|------|-----|------|-----|-----|-----|-----|-----|
| Q _p | 1.5 | 3.5 | 10.0 | 16 | 25 | 40 | 63 | 100 | 160 | 250 | 400 | 630 |
| Q1 | 0.02 | 0.04 | 0.1 | 0.16 | 0.25 | 0.4 | 1.63 | 1 | 1.6 | 2.5 | 4 | 6.3 |

| DN | 15 | 25 | 40 | 50 | 65 | 80 | 100 | 125 | 150 | 200 | 250 | 300 |
|--|------|------|-----|------|-------|-----|-----|-------|-----|-------|------|------|
| Q _p /Q1 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| Q _s (1.25* Q _p) | 5 | 11 | 31 | 50 | 78.75 | 125 | 200 | 312.5 | 500 | 787.5 | 1250 | 2000 |
| Q _p | 4 | 9 | 25 | 40 | 63 | 100 | 160 | 250 | 400 | 650 | 1000 | 1600 |
| Q1 | 0.04 | 0.09 | 0.3 | 0.64 | 0.63 | 1 | 1.6 | 2.5 | 4 | 6.3 | 10 | 16 |

B.3 Flange mating dimensions (metric)

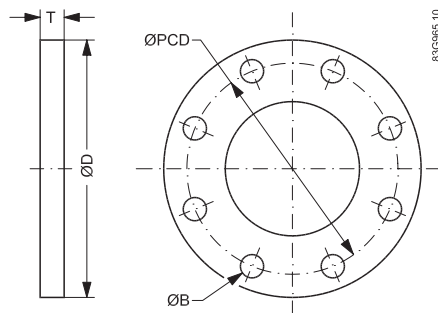


Figure B-1 Flange mating dimensions

Table B-1 Flange mating dimensions (metric) for 7ME6520

| DN mm | Dimensions (mm) | | | | Bolting | |
|-------------|-----------------|------|----|----|---------|-------|
| | D | PCD | T | B | Holes | Bolts |
| PN10 | | | | | | |
| 200 | 340 | 295 | 24 | 22 | 8 | M20 |
| 250 | 395 | 350 | 26 | 22 | 12 | M20 |
| 300 | 445 | 400 | 26 | 22 | 12 | M20 |
| 350 | 505 | 460 | 30 | 22 | 16 | M20 |
| 400 | 565 | 515 | 32 | 26 | 16 | M24 |
| 450 | 615 | 565 | 36 | 26 | 20 | M24 |
| 500 | 670 | 620 | 38 | 26 | 20 | M24 |
| 600 | 780 | 725 | 42 | 30 | 20 | M27 |
| 700 | 895 | 840 | 35 | 30 | 24 | M27 |
| 800 | 1015 | 950 | 38 | 33 | 24 | M30 |
| 900 | 1115 | 1050 | 38 | 33 | 28 | M30 |
| 1000 | 1230 | 1160 | 44 | 36 | 28 | M33 |
| 1200 | 1455 | 1380 | 55 | 39 | 32 | M36 |
| PN16 | | | | | | |
| 50 | 165 | 125 | 20 | 18 | 4 | M16 |

B.3 Flange mating dimensions (metric)

| DN mm | Dimensions (mm) | | | | Bolting | |
|---------------|-----------------|------|----|----|---------|-------|
| | D | PCD | T | B | Holes | Bolts |
| 65 | 185 | 145 | 20 | 18 | 8 | M16 |
| 80 | 200 | 160 | 20 | 18 | 8 | M16 |
| 100 | 220 | 180 | 22 | 18 | 8 | M16 |
| 125 | 250 | 210 | 22 | 18 | 8 | M16 |
| 150 | 285 | 240 | 24 | 22 | 8 | M20 |
| 200 | 340 | 295 | 26 | 22 | 12 | M20 |
| 250 | 405 | 355 | 30 | 26 | 12 | M24 |
| 300 | 460 | 410 | 36 | 26 | 12 | M24 |
| 350 | 520 | 470 | 37 | 26 | 16 | M24 |
| 400 | 580 | 525 | 41 | 30 | 16 | M27 |
| 450 | 640 | 585 | 46 | 30 | 20 | M27 |
| 500 | 715 | 650 | 50 | 33 | 20 | M30 |
| 600 | 840 | 770 | 56 | 36 | 20 | M33 |
| 700 | 910 | 840 | 40 | 36 | 24 | M33 |
| 800 | 1025 | 950 | 41 | 39 | 24 | M36 |
| 900 | 1125 | 1050 | 48 | 39 | 28 | M36 |
| 1000 | 1255 | 1170 | 59 | 42 | 28 | M39 |
| 1200 | 1485 | 1390 | 78 | 48 | 32 | M45 |
| PN40 | | | | | | |
| 15 | 95 | 65 | 14 | 14 | 4 | M12 |
| 25 | 115 | 85 | 16 | 14 | 4 | M16 |
| 40 | 150 | 110 | 18 | 18 | 4 | M16 |
| 150 lb | | | | | | |
| 15 | 89 | 60 | 12 | 16 | 4 | M12 |
| 25 | 108 | 79 | 16 | 16 | 4 | M12 |
| 40 | 127 | 98 | 19 | 16 | 4 | M12 |
| 50 | 150 | 121 | 21 | 19 | 4 | M16 |
| 65 | 180 | 140 | 24 | 19 | 4 | M16 |
| 80 | 190 | 152 | 26 | 19 | 4 | M16 |
| 100 | 230 | 191 | 27 | 19 | 8 | M16 |
| 125 | 255 | 216 | 28 | 22 | 8 | M20 |
| 150 | 279 | 241 | 31 | 22 | 8 | M20 |
| 200 | 343 | 298 | 34 | 22 | 8 | M20 |
| 250 | 406 | 362 | 38 | 25 | 12 | M24 |
| 300 | 483 | 432 | 42 | 25 | 12 | M24 |
| 350 | 535 | 476 | 35 | 29 | 12 | M27 |
| 400 | 595 | 540 | 37 | 29 | 16 | M27 |
| 450 | 635 | 578 | 40 | 32 | 16 | M30 |
| 500 | 700 | 635 | 43 | 32 | 20 | M30 |
| 600 | 815 | 749 | 48 | 35 | 20 | M33 |
| AWWA | | | | | | |
| 700 | 927 | 864 | 33 | 35 | 28 | M33 |

Appendix

B.3 Flange mating dimensions (metric)

| DN mm | Dimensions (mm) | | | | Bolting | |
|---------------------|-----------------|------|----|----|---------|-------|
| | D | PCD | T | B | Holes | Bolts |
| 750 | 984 | 914 | 35 | 35 | 28 | M33 |
| 800 | 1060 | 978 | 38 | 41 | 28 | M39 |
| 900 | 1168 | 1086 | 41 | 41 | 32 | M39 |
| 1000 | 1289 | 1200 | 41 | 41 | 36 | M39 |
| 1050 | 1346 | 1257 | 45 | 41 | 36 | M39 |
| 1100 | 1403 | 1315 | 45 | 41 | 40 | M39 |
| 1200 | 1511 | 1422 | 48 | 41 | 44 | M39 |
| AS 4087 PN16 | | | | | | |
| 50 | 150 | 114 | 20 | 18 | 4 | M16 |
| 65 | 165 | 127 | 20 | 18 | 4 | M16 |
| 80 | 185 | 146 | 20 | 18 | 4 | M16 |
| 100 | 215 | 178 | 20 | 18 | 4 | M16 |
| 150 | 280 | 235 | 23 | 18 | 8 | M16 |
| 200 | 335 | 292 | 24 | 18 | 8 | M16 |
| 250 | 405 | 356 | 30 | 22 | 8 | M20 |
| 300 | 455 | 406 | 33 | 22 | 12 | M20 |
| 350 | 525 | 470 | 30 | 26 | 12 | M24 |
| 400 | 580 | 521 | 30 | 26 | 12 | M24 |
| 450 | 640 | 584 | 30 | 26 | 12 | M24 |
| 500 | 705 | 641 | 38 | 26 | 16 | M24 |
| 600 | 825 | 756 | 48 | 30 | 16 | M27 |
| 700 | 910 | 845 | 56 | 30 | 20 | M27 |
| 800 | 1060 | 984 | 56 | 36 | 20 | M33 |
| 900 | 1175 | 1092 | 66 | 36 | 24 | M33 |
| 1000 | 1255 | 1175 | 66 | 36 | 24 | M33 |
| 1200 | 1490 | 1410 | 76 | 36 | 32 | M33 |
| K10 | | | | | | |
| 15 | 95 | 70 | 12 | 15 | 4 | M12 |
| 25 | 125 | 90 | 16 | 19 | 4 | M16 |
| 40 | 140 | 105 | 18 | 19 | 4 | M16 |
| 50 | 155 | 120 | 20 | 19 | 4 | M16 |
| 65 | 175 | 140 | 20 | 19 | 4 | M16 |
| 80 | 185 | 150 | 20 | 19 | 8 | M16 |
| 100 | 210 | 175 | 20 | 19 | 8 | M16 |
| 125 | 250 | 210 | 22 | 23 | 8 | M20 |
| 150 | 280 | 240 | 22 | 23 | 8 | M20 |
| 200 | 330 | 290 | 22 | 23 | 12 | M20 |
| 250 | 400 | 355 | 24 | 25 | 12 | M22 |
| 300 | 445 | 400 | 24 | 25 | 16 | M22 |
| 350 | 490 | 445 | 26 | 25 | 16 | M22 |
| 400 | 560 | 510 | 28 | 27 | 16 | M24 |
| 450 | 620 | 565 | 30 | 27 | 20 | M24 |

B.3 Flange mating dimensions (metric)

| DN | Dimensions (mm) | | | | Bolting | |
|-----|-----------------|-----|-----|----|---------|-------|
| | mm | D | PCD | T | B | Holes |
| 500 | 675 | 620 | 30 | 27 | 20 | M24 |
| 600 | 795 | 730 | 32 | 33 | 24 | M30 |

Table B-2 Flange mating dimensions (metric) for 7ME6580

| DN | Dimensions (mm) | | | | Bolting | |
|-------------|-----------------|------|-----|----|---------|-------|
| | mm | D | PCD | T | B | Holes |
| PN6 | | | | | | |
| 1400 | 1630 | 1560 | 56 | 36 | 36 | M33 |
| 1500 | 1730 | 1660 | 80 | 36 | 36 | M33 |
| 1600 | 1830 | 1760 | 63 | 36 | 40 | M33 |
| 1800 | 2045 | 1970 | 69 | 39 | 44 | M36 |
| 2000 | 2265 | 2180 | 74 | 42 | 48 | M39 |
| PN10 | | | | | | |
| 200 | 340 | 295 | 24 | 22 | 8 | M20 |
| 250 | 395 | 350 | 26 | 22 | 12 | M20 |
| 300 | 445 | 400 | 26 | 22 | 12 | M20 |
| 350 | 505 | 460 | 30 | 22 | 16 | M20 |
| 400 | 565 | 515 | 32 | 26 | 16 | M24 |
| 450 | 615 | 565 | 36 | 26 | 20 | M24 |
| 500 | 670 | 620 | 38 | 26 | 20 | M24 |
| 600 | 780 | 725 | 42 | 30 | 20 | M27 |
| 700 | 895 | 840 | 35 | 30 | 24 | M27 |
| 800 | 1015 | 950 | 38 | 33 | 24 | M30 |
| 900 | 1115 | 1050 | 38 | 33 | 28 | M30 |
| 1000 | 1230 | 1160 | 44 | 36 | 28 | M33 |
| 1200 | 1455 | 1380 | 55 | 39 | 32 | M36 |
| 1400 | 1675 | 1590 | 65 | 42 | 36 | M39 |
| 1500 | 1785 | 1700 | 105 | 42 | 36 | M39 |
| 1600 | 1915 | 1820 | 75 | 48 | 40 | M45 |
| 1800 | 2115 | 2020 | 85 | 48 | 44 | M45 |
| 2000 | 2325 | 2230 | 90 | 48 | 48 | M45 |
| PN16 | | | | | | |
| 65 | 185 | 145 | 20 | 18 | 8 | M16 |
| 80 | 200 | 160 | 20 | 18 | 8 | M16 |
| 100 | 220 | 180 | 22 | 18 | 8 | M16 |
| 125 | 250 | 210 | 22 | 18 | 8 | M16 |
| 150 | 285 | 240 | 24 | 22 | 8 | M20 |
| 200 | 340 | 295 | 26 | 22 | 12 | M20 |
| 250 | 405 | 355 | 29 | 26 | 12 | M24 |

Appendix

B.3 Flange mating dimensions (metric)

| DN mm | Dimensions (mm) | | | | Bolting | |
|---------------|-----------------|------|-----|----|---------|-------|
| | D | PCD | T | B | Holes | Bolts |
| 300 | 460 | 410 | 32 | 26 | 12 | M24 |
| 350 | 520 | 470 | 37 | 26 | 16 | M24 |
| 400 | 580 | 525 | 41 | 30 | 16 | M27 |
| 450 | 640 | 585 | 46 | 30 | 20 | M27 |
| 500 | 715 | 650 | 50 | 33 | 20 | M30 |
| 600 | 840 | 770 | 56 | 36 | 20 | M33 |
| 700 (WN) | 910 | 840 | 40 | 36 | 24 | M33 |
| 800 | 1025 | 950 | 41 | 39 | 24 | M36 |
| 900 | 1125 | 1050 | 48 | 39 | 28 | M36 |
| 1000 | 1255 | 1170 | 59 | 42 | 28 | M39 |
| 1200 | 1485 | 1390 | 78 | 48 | 32 | M45 |
| 1400 | 1685 | 1590 | 84 | 48 | 36 | M45 |
| 1500 | 1820 | 1710 | 130 | 56 | 36 | M52 |
| 1600 | 1930 | 1820 | 102 | 56 | 40 | M52 |
| 1800 | 2130 | 2020 | 110 | 56 | 44 | M52 |
| 2000 | 2345 | 2230 | 124 | 62 | 48 | M56 |
| PN40 | | | | | | |
| 25 | 115 | 85 | 16 | 14 | 4 | M12 |
| 40 | 150 | 110 | 18 | 18 | 4 | M16 |
| 50 | 165 | 125 | 20 | 18 | 4 | M16 |
| 150 lb | | | | | | |
| 25 | 110 | 79 | 16 | 16 | 4 | M12 |
| 40 | 125 | 98 | 20 | 16 | 4 | M12 |
| 50 | 150 | 121 | 21 | 19 | 4 | M16 |
| 65 | 180 | 140 | 24 | 19 | 4 | M16 |
| 80 | 190 | 152 | 26 | 19 | 4 | M16 |
| 100 | 230 | 191 | 26 | 19 | 8 | M16 |
| 125 | 255 | 216 | 26 | 22 | 8 | M20 |
| 150 | 280 | 241 | 27 | 22 | 8 | M20 |
| 200 | 345 | 299 | 31 | 22 | 8 | M20 |
| 250 | 405 | 362 | 32 | 25 | 12 | M24 |
| 300 | 485 | 432 | 34 | 25 | 12 | M24 |
| 350 | 535 | 476 | 37 | 29 | 12 | M27 |
| 400 | 595 | 540 | 37 | 29 | 16 | M27 |
| 450 | 635 | 578 | 42 | 32 | 16 | M30 |
| 500 | 700 | 635 | 45 | 32 | 20 | M30 |
| 600 | 815 | 749 | 50 | 35 | 20 | M33 |
| AWWA | | | | | | |
| 700 | 927 | 864 | 33 | 35 | 28 | M33 |
| 750 | 984 | 914 | 35 | 35 | 28 | M33 |
| 800 | 1061 | 978 | 38 | 41 | 28 | M39 |
| 900 | 1168 | 1086 | 41 | 41 | 32 | M39 |

B.3 Flange mating dimensions (metric)

| DN mm | Dimensions (mm) | | | | Bolting | |
|---------------------|-----------------|------|----|----|---------|-------|
| | D | PCD | T | B | Holes | Bolts |
| 1000 | 1289 | 1200 | 41 | 41 | 36 | M39 |
| 1050 | 1346 | 1257 | 45 | 41 | 36 | M39 |
| 1100 | 1403 | 1316 | 45 | 41 | 40 | M39 |
| 1200 | 1511 | 1422 | 48 | 41 | 44 | M39 |
| 1400 | 1683 | 1594 | 54 | 48 | 44 | M45 |
| 1500 | 1854 | 1759 | 57 | 48 | 52 | M45 |
| 1600 | 2032 | 1930 | 64 | 48 | 52 | M45 |
| 1800 | 2197 | 2096 | 67 | 48 | 60 | M45 |
| 2000 | 2362 | 2261 | 70 | 54 | 64 | M52 |
| AS 4087 PN16 | | | | | | |
| 50 | 150 | 114 | 11 | 18 | 4 | M16 |
| 65 | 165 | 127 | 11 | 18 | 4 | M16 |
| 80 | 185 | 146 | 11 | 18 | 4 | M16 |
| 100 | 215 | 178 | 13 | 18 | 4 | M16 |
| 150 | 280 | 235 | 13 | 18 | 8 | M16 |
| 200 | 335 | 292 | 19 | 18 | 8 | M16 |
| 250 | 405 | 356 | 19 | 22 | 8 | M20 |
| 300 | 455 | 406 | 23 | 22 | 12 | M20 |
| 350 | 525 | 470 | 30 | 26 | 12 | M24 |
| 400 | 580 | 521 | 30 | 26 | 12 | M24 |
| 450 | 640 | 584 | 30 | 26 | 12 | M24 |
| 500 | 705 | 641 | 38 | 26 | 16 | M24 |
| 600 | 825 | 756 | 48 | 30 | 16 | M27 |
| 700 | 910 | 845 | 56 | 30 | 20 | M27 |
| 800 | 1060 | 984 | 56 | 36 | 20 | M33 |
| 900 | 1175 | 1092 | 66 | 36 | 24 | M33 |
| 1000 | 1255 | 1175 | 66 | 36 | 24 | M33 |
| 1200 | 1490 | 1410 | 76 | 36 | 32 | M33 |
| K10 | | | | | | |
| 25 | 125 | 90 | 14 | 19 | 4 | M16 |
| 40 | 140 | 105 | 16 | 19 | 4 | M16 |
| 50 | 155 | 120 | 16 | 19 | 4 | M16 |
| 65 | 175 | 140 | 18 | 19 | 4 | M16 |
| 80 | 185 | 150 | 18 | 19 | 8 | M16 |
| 100 | 210 | 175 | 18 | 19 | 8 | M16 |
| 125 | 250 | 210 | 20 | 23 | 8 | M20 |
| 150 | 280 | 240 | 22 | 23 | 8 | M20 |
| 200 | 330 | 290 | 22 | 23 | 12 | M20 |
| 250 | 400 | 355 | 24 | 25 | 12, | M22 |
| 300 | 445 | 400 | 24 | 25 | 16 | M22 |
| 350 | 490 | 445 | 26 | 25 | 16 | M22 |
| 400 | 560 | 510 | 28 | 27 | 16 | M24 |

| DN mm | Dimensions (mm) | | | | Bolting | |
|----------|-----------------|-----|----|----|---------|-------|
| | D | PCD | T | B | Holes | Bolts |
| 450 | 620 | 565 | 30 | 27 | 20 | M24 |
| 500 | 675 | 620 | 30 | 27 | 20 | M24 |
| 600 | 795 | 730 | 32 | 33 | 24 | M30 |

B.4 Factory settings

Dimension-dependent factory settings

Table B-3 50 Hz version

| DN | | Fac settings | Qmax | | Unit | Volume/ pulse | Pulse unit | Totaliz- er unit | |
|------|------|--------------|-------------------|-------------------|--------|------------------|---------------|---------------------|----|
| mm | Inch | | Order no. 7ME6520 | Order no. 7ME6580 | | | | | |
| | | | Min. | Max. | Min. | Max. | | | |
| 15 | ½ | 2000 | 159 | 6361 | - | - | l/h | 1 | l |
| 25 | 1 | 5000 | 441 | 17671 | 441 | 17671 | l/h | 10 | l |
| 40 | 1½ | 12 | 1.1 | 45 | 1.1 | 45 | m³/h | 10 | l |
| 50 | 2 | 20 | 1.7 | 63 | 1.7 | 70 | m³/h | 10 | l |
| 65 | 2½ | 30 | 2.9 | 100 | 2.9 | 119 | m³/h | 100 | l |
| 80 | 3 | 50 | 4.0 | 160 | 4.5 | 180 | m³/h | 100 | l |
| 100 | 4 | 120 | 6.2 | 250 | 7 | 282 | m³/h | 100 | l |
| 125 | 5 | 180 | 10.0 | 400 | 11 | 441 | m³/h | 100 | l |
| 150 | 6 | 250 | 15.7 | 629 | 15.9 | 636 | m³/h | 100 | l |
| 200 | 8 | 400 | 24.9 | 997 | 28.2 | 1130 | m³/h | 1 | m³ |
| 250 | 10 | 700 | 40.0 | 1600 | 44.1 | 1767 | m³/h | 1 | m³ |
| 300 | 12 | 1000 | 62.5 | 2500 | 63.6 | 2544 | m³/h | 1 | m³ |
| 350 | 14 | 1200 | 86.5 | 3463 | 86.5 | 3463 | m³/h | 1 | m³ |
| 400 | 16 | 1800 | 113 | 4523 | 113 | 4523 | m³/h | 1 | m³ |
| 450 | 18 | 2000 | 143.1 | 5725 | 143.1 | 5725 | m³/h | 1 | m³ |
| 500 | 20 | 3000 | 176.7 | 7068 | 176.7 | 7068 | m³/h | 1 | m³ |
| 600 | 24 | 4000 | 254.4 | 10178 | 254.4 | 10178 | m³/h | 10 | m³ |
| 700 | 28 | 5000 | 346.3 | 13854 | 346.3 | 13854 | m³/h | 10 | m³ |
| 750 | 30 | 6000 | 397.6 | 15904 | 397.6 | 15904 | m³/h | 10 | m³ |
| 800 | 32 | 7000 | 452.3 | 18095 | 452.3 | 18095 | m³/h | 10 | m³ |
| 900 | 36 | 9000 | 572.5 | 22902 | 572.5 | 22902 | m³/h | 10 | m³ |
| 1000 | 40 | 12000 | 706.8 | 28274 | 706.8 | 28274 | m³/h | 10 | m³ |
| 1050 | 42 | 12000 | 706.8 | 28274 | 706.8 | 28274 | m³/h | 10 | m³ |
| 1100 | 44 | 14000 | 855.2 | 34211 | 855.2 | 34211 | m³/h | 10 | m³ |
| 1200 | 48 | 15000 | 1017.8 | 40715 | 1017.8 | 40715 | m³/h | 10 | m³ |

| DN | | | Qmax | | | | Unit | Volume/ pulse | Pulse unit | Totaliz- er unit |
|------|----|--------------|-------------------|---|-------------------|--------|-------------------|------------------|----------------|---------------------|
| | | | Order no. 7ME6520 | | Order no. 7ME6580 | | | | | |
| 1400 | 54 | 25000 | - | - | 1385.4 | 55417 | m ³ /h | 10 | m ³ | m ³ |
| 1500 | 60 | 30000 | - | - | 1590.4 | 63617 | m ³ /h | 10 | m ³ | m ³ |
| 1600 | 66 | 35000 | - | - | 1809.5 | 72382 | m ³ /h | 10 | m ³ | m ³ |
| 1800 | 72 | 40000 | - | - | 2290.2 | 91608 | m ³ /h | 10 | m ³ | m ³ |
| 2000 | 78 | 45000 | - | - | 2827.4 | 113097 | m ³ /h | 10 | m ³ | m ³ |

Table B-4 60 Hz version

| DN | | | Qmax | | | | Unit | Volume/ pulse | Pulse unit | Totaliz- er unit |
|------|------|--------------------|-------------------|----------|-------------------|----------|--------|------------------|---------------|---------------------|
| | | | Order no. 7ME6520 | | Order no. 7ME6580 | | | | | |
| mm | Inch | Fac. set- tings | Min. | Max. | Min. | Max. | | | | |
| 15 | ½ | 9 | 0.7 | 28 | - | - | US GPM | 1 | US G | US G |
| 25 | 1 | 22 | 1.9 | 77.8 | 1.9 | 77.8 | US GPM | 1 | US G | US G |
| 40 | 1½ | 52 | 4.9 | 199.1 | 4.9 | 199.1 | US GPM | 1 | US G | US G |
| 50 | 2 | 88 | 6.9 | 277.2 | 7.7 | 311.2 | US GPM | 1 | US G | US G |
| 65 | 2½ | 132 | 11.0 | 440.2 | 13.1 | 525.9 | US GPM | 1 | US G | US G |
| 80 | 3 | 220 | 17.6 | 705.1 | 19.9 | 796.7 | US GPM | 1 | US G | US MG |
| 100 | 4 | 528 | 27.5 | 1101 | 31.1 | 1244.8 | US GPM | 1 | US G | US MG |
| 125 | 5 | 793 | 44.0 | 1762.2 | 48.6 | 1945.1 | US GPM | 1 | US G | US MG |
| 150 | 6 | 1101 | 69.3 | 2772.9 | 70 | 2800.9 | US GPM | 1 | US G | US MG |
| 200 | 8 | 1761 | 109.7 | 4391.9 | 124.4 | 4979.5 | US GPM | 1 | US G | US MG |
| 250 | 10 | 3082 | 176.1 | 7045.2 | 194.5 | 7780.5 | US GPM | 1 | US G | US MG |
| 300 | 12 | 4402 | 275.1 | 11007.8 | 280 | 11203.9 | US GPM | 1 | US G | US MG |
| 350 | 14 | 5283 | 381.2 | 15249.7 | 381.2 | 15249.7 | US GPM | 1 | US G | US MG |
| 400 | 16 | 7925 | 497.9 | 19918.1 | 497.9 | 19918.1 | US GPM | 1 | US G | US MG |
| 450 | 18 | 8806 | 630.2 | 25208.8 | 630.2 | 25208.8 | US GPM | 1 | US G | US MG |
| 500 | 20 | 13209 | 778 | 31122 | 778 | 31122 | US GPM | 1 | US G | US MG |
| 600 | 24 | 17611 | 1120.3 | 44815.7 | 1120.3 | 44815.7 | US GPM | 10 | US G | US MG |
| 700 | 28 | 19812 | 1524.9 | 60999.1 | 1524.9 | 60999.1 | US GPM | 10 | US G | US MG |
| 750 | 30 | 22014 | 1750.6 | 70024.5 | 1750.6 | 70024.5 | US GPM | 10 | US G | US MG |
| 800 | 32 | 30820 | 1991.8 | 79672.4 | 1991.8 | 79672.4 | US GPM | 10 | US G | US MG |
| 900 | 36 | 39626 | 2522.8 | 100835.3 | 2522.8 | 100835.3 | US GPM | 10 | US G | US MG |
| 1000 | 40 | 52834 | 3112.2 | 124488.1 | 3112.2 | 124488.1 | US GPM | 10 | US G | US MG |
| 1050 | 42 | 52834 | 3431.2 | 137248.1 | 3431.2 | 137248.1 | US GPM | 10 | US G | US MG |
| 1100 | 44 | 61640 | 3765.7 | 150630.6 | 3765.7 | 150630.6 | US GPM | 10 | US G | US MG |
| 1200 | 48 | 66043 | 4481 | 179262.9 | 4481 | 179262.9 | US GPM | 10 | US G | US MG |
| 1400 | 54 | 110072 | - | - | 6099.9 | 243993.7 | US GPM | 1000 | US G | US MG |
| 1500 | 60 | 132086 | - | - | 7002.4 | 280098.3 | US GPM | 1000 | US G | US MG |
| 1600 | 66 | 154100 | - | - | 7967.2 | 318689.6 | US GPM | 1000 | US G | US MG |

| DN | | | Qmax | | | | Unit | Volume/ pulse | Pulse unit | Totaliz- er unit |
|------|----|--------|-------------------|---|-------------------|----------|--------|------------------|---------------|---------------------|
| | | | Order no. 7ME6520 | | Order no. 7ME6580 | | | | | |
| 1800 | 72 | 176115 | - | - | 10083.5 | 403341.5 | US GPM | 1000 | US G | US MG |
| 2000 | 78 | 198129 | - | - | 12448.8 | 497952.5 | US GPM | 1000 | US G | US MG |

B.5 Coil resistance

Table B-5 Coil resistance [Ω]

| DN | Inch | MAG 1100, MAG 1100 F | | MAG 3100, MAG 3100 P, MAG 5100 W (Order no. 7ME6580) | | MAG 5100 W (Order no. 7ME6520) | |
|------------------|-------|----------------------|-----------|--|-----------|-----------------------------------|-----------|
| | | Resistance | Tolerance | Resistance | Tolerance | Resistance | Tolerance |
| 2 | 1/12 | 104 | +/- 5 | 104 | | | |
| 3 | 1/8 | 104 | +/- 5 | 104 | | | |
| 6 | 1/4 | 99 | +/- 17 | 104 | | | |
| 10 | 3/8 | 99 | +/- 17 | 104 | | | |
| 15 ¹⁾ | 1/2 | 91 | +/- 9 | 104 | | | |
| 25 | 1 | 91 | +/- 17 | 104 | +/- 2 | 104 | +/- 10 |
| 40 | 1 1/2 | 91 | +/- 9 | 92 | +/- 2 | 92 | +/- 10 |
| 50 | 2 | 91 | +/- 9 | 92 | +/- 2 | 119.4 | +/- 10 |
| 65 | 2 1/2 | 99 | +/- 17 | 100 | +/- 2 | 127 | +/- 10 |
| 80 | 3 | 91 | +/- 17 | 94 | +/- 2 | 126 | +/- 10 |
| 100 | 4 | 91 | +/- 9 | 92 | +/- 2 | 125 | +/- 10 |
| 125 | 5 | 92 | +/- 2 | 126 | +/- 10 | | |
| 150 | 6 | 94 | +/- 2 | 116 | +/- 10 | | |
| 200 | 8 | 90 | +/- 2 | 109 | +/- 10 | | |
| 250 | 10 | 92 | +/- 2 | 104 | +/- 10 | | |
| 300 | 12 | 100 | +/- 2 | 108 | +/- 10 | | |
| 350 | 14 | 112 | +/- 2 | 100 | +/- 6 | | |
| 400 | 16 | 100 | +/- 4 | 100 | +/- 6 | | |
| 450 | 18 | 108 | +/- 4 | 100 | +/- 6 | | |
| 500 | 20 | 122 | +/- 4 | 100 | +/- 6 | | |
| 600 | 24 | 115 | +/- 4 | 98 | +/- 6 | | |
| 700 | 28 | 128 | +/- 4 | 98 | +/- 6 | | |
| 750 | 30 | 133 | | | | | |
| 800 | 32 | 128 | +/- 4 | 98 | +/- 6 | | |
| 900 | 36 | 131 | +/- 4 | 98 | +/- 6 | | |
| 1000 | 40 | 131 | +/- 4 | 88 | +/- 6 | | |
| 1100 | 44 | 126 | | | | | |
| 1200 | 48 | 130 | +/- 4 | 88 | +/- 6 | | |
| 1400 | 54 | 130 | | | | | |
| 1500 | 60 | 124 | | | | | |

| | | MAG 1100, MAG 1100 F | MAG 3100, MAG 3100 P, MAG 5100 W (Order no. 7ME6580) | MAG 5100 W (Order no. 7ME6520) |
|------|----|----------------------|--|-----------------------------------|
| 1600 | 66 | 133 | | |
| 1800 | 72 | 133 | | |
| 2000 | 78 | 147 | | |





¹⁾ On MAG 1100 DN 15 produced as of May 1999 the coil resistance must be 86 ohm, +8/-4 ohm.



Note

Reference values

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

Spare parts

| Description | |
|---|---|
| Cable glands, 2 pcs. M20 1/2" NPT |  |
| Sealing screws for sensor/transmitter, 2 pcs. |  |
| Terminal box, in polyamide, inclusive of lid M20 1/2" NPT |  |
| Terminal box lid, in polyamide |  |

| Description | |
|---|---|
| Terminal box, in stainless steel, inclusive of lid M20 1/2" NPT |  A small, rectangular, stainless steel terminal box with a lid and two electrical terminals on the side. |
| Potting kit for terminal box of MAG sensors for I P68/NEMA 6P (not for EX) |  Two cylindrical metal cans, one above the other, representing the potting kit components. The top can is slightly larger than the bottom one. |

Glossary

ASIC

Application-Specific Integrated Circuit is an integrated circuit (IC) customized for a particular use, rather than intended for general-purpose use.

Elex V

EMC

Electromagnetic compatibility (EMC) is the branch of electrical sciences which studies the unintentional generation, propagation and reception of electromagnetic energy with reference to the unwanted effects (Electromagnetic Interference, or EMI) that such energy may induce. The goal of EMC is the correct operation, in the same electromagnetic environment, of different equipment which use electromagnetic phenomena, and the avoidance of any interference effects.

IP

An IP (Ingress Protection) number is used to specify the environmental protection of enclosures around electronic equipment. These ratings are determined by specific tests. The IP number is composed of two numbers, the first referring to the protection against solid objects and the second against liquids. The higher the number, the better the protection. For example, in IP67 the first Number (6) means that the device is totally protected against dust, and the second (7) that it is protected against the effect of immersion between 15cm and 1m

PED

The Pressure Equipment Directive (97/23/EC) is the legislative framework on European level for equipment subject to a pressure hazard. It was adopted by the European Parliament and the European Council in May 1997 and has been obligatory throughout the European Union since May 2002.

SENSORPROM

All sensor related settings/data saved on an EPROM. SENSORPROM technology automatically configures the transmitter at start up providing calibration data, pipe size, sensor type, and output settings. The SENSORPROM automatically stores values or settings changed by users, and automatically re-programs any new transmitter without loss of accuracy.

USM

USM II is a Communication Platform. The Siemens USM II concept enables fitting of add-on bus modules without loss of functionality:

1. All modules can be fitted as true "plug & play"
2. Module and transmitter are automatically configured through the SENSORPROM

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