

# SIEMENS

## SITRANS F

### Ultrasonic flowmeters SITRANS FUS380/FUE380

#### Operating Instructions

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7ME340 (FUS380)  
7ME341 (FUE380)

## 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.

<b>! DANGER</b>
indicates that death or severe personal injury <b>will</b> result if proper precautions are not taken.

<b>! WARNING</b>
indicates that death or severe personal injury <b>may</b> result if proper precautions are not taken.

<b>! CAUTION</b>
indicates that minor personal injury can result if proper precautions are not taken.

<b>NOTICE</b>
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:

<b>! WARNING</b>
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

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.

## 1.1 Document History

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

Edition	Remarks	FW version	EDD version
05/2018	<ul style="list-style-type: none"> <li>• Restructure this document</li> <li>• Updates in transmitter and sensor connection</li> <li>• Adding current output option module</li> <li>• Adding Accuracy to Technical Data</li> <li>• Responsibility transfer to Siemens AG</li> </ul>	2.04	1.02.09
09/2016	<ul style="list-style-type: none"> <li>• Restructure this document</li> <li>• Updates for SIMATIC PDM 8.2</li> </ul>	2.03	1.02.08-01
09/2013	<ul style="list-style-type: none"> <li>• Restructure this document</li> <li>• Adding transmitter information</li> </ul>	2.03	1.02.07
09/2011	Update with FW 2.03	2.03	1.02.07
10/2010	Update with FW 1.05	1.05	1.01.04
12/2009	Update with FW 1.04	1.04	1.01.04
2003	First edition with product release	1.02	1.01.04

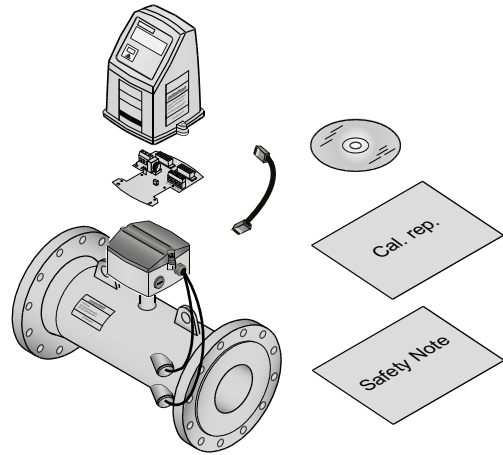
The FUS080 is configured in a combination of hardware (HW) and firmware (FW). For communication and parametrization via SIMATIC PDM the correct version of the EDD driver for FUS/FUE 380 is needed. The various relations are listed above.

## 1.2 Items supplied

The device can be delivered as either a compact or a remote system.

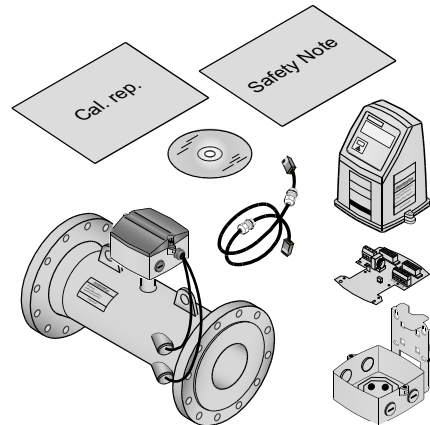
### Compact system

- Sensor SITRANS FUS300
- Transmitter SITRANS FUS080 or FUE080
- Connection PCB
- DVD with documentation and certificates
- Safety note
- Calibration report
- Short Siemens sensor link cable
- Connection accessories



### Remote system

- Sensor SITRANS FUS300
- Transmitter SITRANS FUS080 or FUE080
- Connection PCB
- DVD with documentation and certificates
- Safety note
- Calibration report
- Mounting kit with bracket and terminal box
- Long Siemens sensor link cable
- Connection accessories



#### Note


Scope of delivery may vary, depending on version and add-ons. Make sure the scope of delivery and the information on the nameplate correspond to your order and the delivery note.

## 1.3 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.

 <b>WARNING</b>
<b>Using a damaged or incomplete device</b>
Risk of explosion in hazardous areas.
<ul style="list-style-type: none"><li>• Do not use damaged or incomplete devices.</li></ul>

## 1.4 Device identification

The FUS380 or FUE380 flowmeter is delivered with different labels (nameplates) on the transmitter and sensor. The transmitter and sensor are matched paired.

The transmitter has two nameplates. One (silver) is placed on the front of the transmitter. The transmitter system nameplate (white) is placed on the right side of the transmitter. Both provide valuable information about the device and system. The sensor has one nameplate. The sensor system nameplate (white) is placed on the middle of the sensor.

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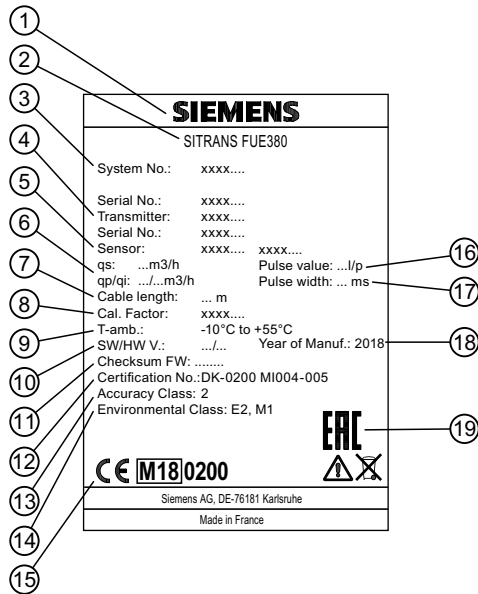
### Note

#### Identification

Identify your device by comparing your ordering data with the information on the product and specification nameplates.

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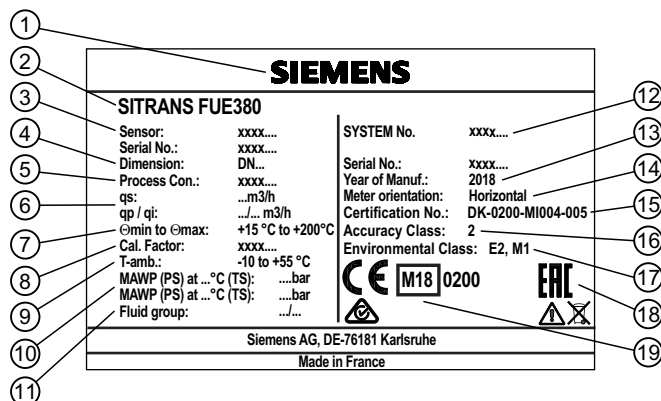
Transmitter system nameplate



- ① Manufacturer
- ② Product type
- ③ System number and system serial number
- ④ Transmitter number and serial number
- ⑤ Sensor number and serial number
- ⑥ Maximum flow value (qs), Nominal flow value (qp), Minimum flow value (qi)
- ⑦ Cable length (empty for compact version)
- ⑧ Calibration factor
- ⑨ Ambient temperature range
- ⑩ Software version/Hardware version
- ⑪ Checksum firmware number
- ⑫ Type approval number (shown on FUE380 versions only)
- ⑬ Accuracy class (shown on FUE380 versions only)
- ⑭ Environmental class (shown on FUE380 versions only)
- ⑮ Verification markings (shown on MID-verified FUE380 versions only)
- ⑯ Pulse value (output A)
- ⑰ Pulse width (output A)
- ⑱ Year of manufacture
- ⑲ Conformity with country-specific directives

Figure 1-1 Transmitter system nameplate, FUE380 example

## Sensor system nameplate



- ① Manufacturer
- ② Product type
- ③ Sensor number and serial number
- ④ Dimension (nominal size ordered)
- ⑤ Process connections
- ⑥ Maximum flow value (qs), Nominal flow value (qp), Minimum flow value (qi)
- ⑦ Water temperature range
- ⑧ Calibration factor
- ⑨ Ambient temperature range
- ⑩ Maximum allowable working pressures at 15 °C (59 °F) and 200°C (392 °F) (max. temperature (TS))
- ⑪ Fluid group
- ⑫ System number and system serial number
- ⑬ Year of manufacture
- ⑭ Meter orientation
- ⑮ Type approval number (shown on FUE380 versions only)
- ⑯ Accuracy class (shown on FUE380 versions only)
- ⑰ Environmental class (shown on FUE380 versions only)
- ⑱ Conformity with country-specific directives
- ⑲ Verification and PED markings (verification marking shown on MID-verified FUE380 versions only)

Figure 1-2 Sensor system nameplate, FUE380 example

**Note**

**The matched paired transmitter and sensor shall be mounted together**

At installation, please check that the system nameplates of transmitter and sensor have the same system serial number.

## 1.5 Further Information

### Product information on the Internet

The Operating Instructions are available on the documentation disk shipped with the device, and on the Internet on the Siemens homepage, where further information on the range of SITRANS F flowmeters may also be found:

Product information on the internet (<http://www.siemens.com/flow>)

### Worldwide contact person

If you need more information or have particular problems not covered sufficiently by these Operating Instructions, get in touch with your contact person. You can find contact information for your local contact person on the Internet:

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

## 1.6 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 only form one element of such a concept.

Customer is responsible to prevent unauthorized access to its plants, systems, machines and networks. Systems, machines and components should only be connected to the enterprise network or the internet if and to the extent necessary and with appropriate security measures (e.g. use of firewalls and network segmentation) in place.

Additionally, Siemens' guidance on appropriate security measures should be taken into account. You can find more information about industrial security by visiting:  
<https://www.siemens.com/industrialsecurity>.

Siemens' products and solutions undergo continuous development to make them more secure. Siemens strongly recommends you apply product updates as soon as available and always use the latest product versions. Use of product versions that are no longer supported, and failure to apply 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>.

## 1.7 Transportation and storage

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

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

<b>NOTICE</b>
<b>Insufficient protection during storage</b>
The packaging only provides limited protection against moisture and infiltration.
<ul style="list-style-type: none"><li>• Provide additional packaging as necessary.</li></ul>



Special conditions for storage and transportation of the device are listed in Technical data (Page 87).

## 1.8 Notes on warranty


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

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



## Safety notes

### 2.1 General safety instructions

 <b>CAUTION</b>
<b>Correct, reliable operation of the product requires proper transport, storage, positioning and assembly as well as careful operation and maintenance.</b>
Only qualified personnel should install or operate this instrument.

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#### 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.

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### 2.2 Manufacturer's design and safety statement

- Responsibility for the choice of flowmeter pipe material as regards abrasion and corrosion resistance lies with the purchaser. The effect of any change in process medium during operation of the meter should be taken into account. Incorrect selection of flowmeter pipe material could lead to failure of the flowmeter.
- Stresses and loading caused by earthquakes, traffic, high winds and fire damage are not taken into account during flowmeter design.
- Do not install the flowmeter such that it acts as a focus for pipeline stresses. External loading is not taken into account during flowmeter design.
- Please be aware of the risk of installing the sensor in a highly vibrating environment. Parts may shake loose and the complete system must be monitored in that case.
- Flanges and joints as well as related pressure/temperature (p/t) classification has been described in EN 1092-1. See ferrite steel group 1E1: table 15.
- During operation do not exceed the pressure and/or temperature ratings indicated on the data label or in these operating instructions.
- It is recommended that all installations include an appropriate safety valve and adequate means for draining.
- Under the „Pressure Equipment Directive" (PED), this product is a pressure accessory and not approved for use as a safety accessory, as defined by the PED.

### Environmental conditions according MID (Directive 2014/32/EU)

- Environment class: E2 (electromagnetic), M1 (mechanical)
- Climatic class: -10°C - +55°C, condensing, closed

## 2.3 Safety note for bronze sensors

 <b>WARNING</b>
<b>Hot water or steam</b>
Potential risk of burns.
Do NOT unscrew bronze sensor during operation (DN 50 to DN 80).

## 2.4 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
Radio equipment directive RED 2014/53/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 radio equipment and repealing Directive 1999/5/EC
Measuring instruments directive MID 2014/32/EU	Directive of the European Parliament and the Council on the harmonisation of the laws of the Member States relating to the making available on the market of measuring instruments
Restriction of Hazardous Substances RoHS 2011/65/EU	Directive of the European Parliament and the Council on the restriction of the use of certain hazardous substances in electrical and electronic equipment

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





## 2.5 Lithium batteries

Lithium batteries are primary power sources with high energy content designed to provide the highest possible degree of safety.

 <b>WARNING</b>
<b>Potential hazard</b> Lithium batteries may present a potential hazard if they are abused electrically or mechanically. Observe the following precautions when handling and using lithium batteries: <ul style="list-style-type: none"><li>• Do not short-circuit, recharge or connect with false polarity.</li><li>• Do not expose to temperatures beyond the specified temperature range.</li><li>• Do not incinerate.</li><li>• Do not crush, puncture or open cells or disassemble.</li><li>• Do not weld or solder to the battery's body.</li><li>• Do not expose contents to water.</li></ul>

## 2.6 Installation in hazardous area

 <b>WARNING</b>
<b>NOT allowed for use in hazardous areas!</b> Equipment used in hazardous areas must be Ex-approved and marked accordingly! This device is NOT approved for use in hazardous areas!

 <b>WARNING</b>
<b>500 V insulation test</b> The device is not capable of withstanding the 500 V insulation test required by Clause 6.3.12 of EN60079-11. This must be taken into account when installing the device.

*2.6 Installation in hazardous area*

## Description

### 3.1 Overview

The SITRANS F US ultrasonic flowmeter systems consist of a sensor and a transmitter. This system consists of sensor type FUS300 or SONOKIT and the transmitters type FUS080 or FUE080. The transmitter type FUS080 is for the standard flowmeter series SITRANS FUS380 or SONOKIT series. The transmitter type FUE080 is for the type-approved flowmeter series SITRANS FUE380 with the custody transfer approval for use in energy metering systems. The transmitters are designed to measure flow in water applications.

The ultrasonic flowmeter transmitter comes as battery or mains-powered version.

The following table shows the ultrasonic flowmeter systems with these transmitter types:

Sensor type	Transmitter	Flowmeter system
FUS300 (2-path) DN 50 – DN 1200	FUS080	FUS380 (2-path)
FUS300 (2-path) DN 50 – DN 1200 (with custody transfer approval for use with heatmeters)	FUE080	FUE380 (2-path)
SONOKIT (1- or 2-path) DN 100 – DN 1200	FUS080	SONOKIT (1-path / 2-path)

These Operating Instructions are only for the FUS380 and FUE380 flowmeter systems. The FUS080 for SONOKIT and the SONOKIT sensors have separate Operating Instructions.

### 3.2 System components

The flowmeter system includes:

- Battery or mains-powered transmitter (FUS080 or FUE080)
- Sensor FUS300 as 2-path inline sensor with flanges, wet-calibrated from factory together with the transmitter (DN 50 (2") to DN 1200 (48"))  
or the retrofitting set SONOKIT (1-path for pipe diameters from DN 100 (4") up to DN 1200 (48") or for 2-path from DN 200 (8") up to DN 1200 (48")).

### 3.3 Design

The transmitter type SITRANS FUS080 is designed with fiberglass reinforced polyamide enclosure for remote or compact installation in normal areas. The remote versions are available with up to 30 meter distance from flowmeter to transmitter. In the FUS380 and FUE380 series the sensor cables are already mounted at the sensor.



SITRANS FUS080 transmitter



SITRANS FUS080 display

The transmitter is available in an IP67/NEMA 4X/6 enclosure and is designed for use in the flowmeters series:

- SONOKIT (1-path or 2-path)
- FUS380 (2-path)
- FUE380 (2-path)

For spare part cases the transmitter is always ordered as part of a complete flowmeter system, it can be ordered preprogrammed with the given sensor data (system serial number).

### 3.4 Features

The following features are available:

- Battery or mains-powered transmitter
- Battery-powered with 3.6 V Lithium dual D-cell batteries
- Suitable for sensor pipe diameters from DN 50 (2") up to DN 1200 (48")
- IP67 (NEMA 4X/6) rated polyamid transmitter enclosure
- Factory preset to the nominal dimensions of pipe type and pipe size
- Programming via SIMATIC PDM
- Local control panel with single push button, 8-digit display and IrDA optical interface for communication with SIMATIC PDM
- Display showing accumulated volume as well as instantaneous flow rate. The displayed units are  $m^3$  and  $m^3/h$
- Two digital outputs for volume pulse or alarm
- 4-20 mA output (optional)

## Applications

The main application for flowmeters type SITRANS FUS380 / SONOKIT and the type-approved version FUE380 is measurement of water flow in district heating plants, local networks, boiler stations, substations, chiller plants, irrigations plants, and other general water applications.

## Integration

The flowmeter pulse output is often used as input for an energy meter or as input for digital systems for remote reading. The transmitter has two pulse outputs, with functions that can be individually selected, and integrated IrDA (optical eye) communication interface (Modbus RTU).

The settings of the transmitter, for example flow and pulse output rate, are defined when ordering the complete flowmeter. If the flowmeter forms part of an energy meter system for custody transfer, no further approvals are needed, except eventually local approvals on the flowmeter.

## Transmitter communication solutions

The parametrization of the device is done with an device specific Electronic Device Description (EDD) which is part of the product delivery. The EDD can be loaded by the the SIMATIC PDM software. The communication protocol between SIMATIC PDM and the device is MODBUS RTU. The communication goes through the IrDA interface of the device. To connect the IrDA interface with a PC an IrDA adapter is needed. The following table shows the compatibility between the firmware (FW) and the EDD.

FW version	EDD version
1.02 to 1.05	1.01.04 (with SIMATIC PDM 6 versions)
2.03	1.02.07 (with SIMATIC PDM 6 versions)
2.03	1.02.08-01 (min. SIMATIC PDM 8 versions)
2.04	1.02.09 (min. SIMATIC PDM 8 versions)

## 3.5 Principle of operation

### Physical principle

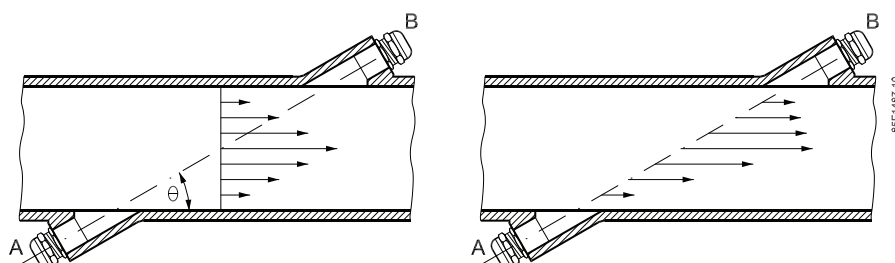


Figure 3-1 Velocity distribution along sound path

3.5 Principle of operation

A sound wave travelling in the same direction as the liquid flow arrives at point B from point A in a shorter time than the sound wave travelling against the flow direction (from point B to A).

The difference in sound travel time indicates the flow velocity in the pipe.

Since delay time is measured at short intervals both in and against flow direction, temperature has no influence on measurement accuracy.

SITRANS F US flowmeters

In SITRANS F US flowmeters the ultrasonic transducers are placed at an angle  $\theta$  in relation to the pipe axis. The transducers function as transmitters and receivers of the ultrasonic signals. Measurement is performed by determining the time the ultrasonic signal takes to travel with and against the flow. The principle can be expressed as follows:

$$v = K \times (t_{B,A} - t_{A,B}) / (t_{A,B} \times t_{B,A}) = K \times \Delta t / t^2$$

where

v = Average flow velocity

t = Travel time

K = Proportional flow factor

This measuring principle offers the advantage that it is independent of variations in the actual sound velocity of the liquid, i.e. independent of the temperature.

The mechanical/geometrical pipe data is transducer angle ( $\theta$ ), distance between sensors ( $L$ ) and pipe dimension ( $D_i$  and  $D_u$ ) shown in the figure below.

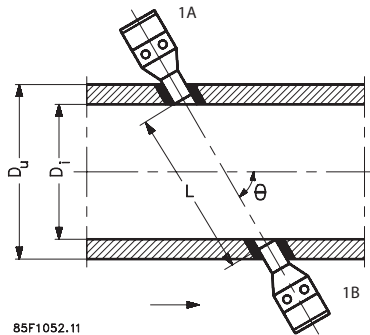


Figure 3-2 Measuring principle

The ultrasonic signal is sent directly between the transducers. The advantage gained by sending signals from point to point is an extremely good signal strength.

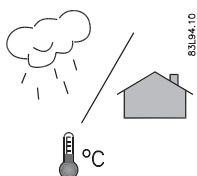
## Installing/Mounting

### 4.1 Flowmeter installation

The flowmeter installation is done in two steps:


1. Sensor installation
2. Transmitter installation

#### Environment



SITRANS F flowmeters are suitable for indoor and outdoor installations.

- Make sure that temperature and ambient specifications indicated on the device type plate/label are not exceeded.

 <b>CAUTION</b>
<p><b>Direct sunlight and mechanical forces</b></p> <p>Device damage.</p> <p>The device and its cables can overheat or materials become brittle due to UV exposure.</p> <p>Protect the device and its cables from direct sunlight and mechanical forces.</p> <p>Make sure that the maximum permissible ambient temperature is not exceeded.</p> <p>Refer to the technical data in FUS380 and FUE380 systems (Page 88).</p>

Ambient temperatures for FUS080:

- MID version: -10 to +55 °C (14 to 131 °F)
- Non-MID version: -10 to +60 °C (14 to 140 °F)

See also Insulation (Page 28).

The enclosure rating of the transmitter is IP67 (NEMA 4X/6) or better.

### 4.2 Sensor installation

#### 4.2.1 Inlet/outlet conditions

##### Requirement for straight inlet before flowmeter

In order to maximize performance it is necessary to have straight inlet and outlet flow conditions before and after the flowmeter.

4.2 Sensor installation

Furthermore, a minimum distance between flowmeter and pumps and valves must be observed.

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

Make sure that the flowmeter is positioned as low as possible to prevent air from being trapped in the flowmeter at the transducers.

Find a position on the pipeline where the inlet pipe to the flowmeter has a straight length as specified below.

---

**Note**

**MID-approved FUE380 systems**

Minimum straight inlet pipe: 10 x pipe diameter, minimum 1 m. See further recommendations below.

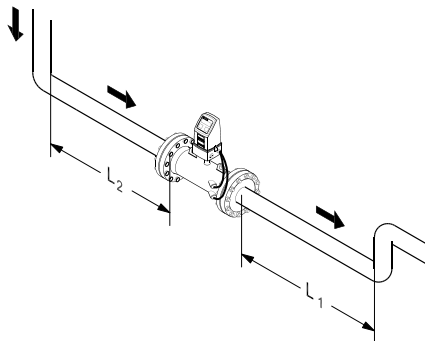
---

**Single bend**

**1 x 90° bend**

L2: Min. 10 x pipe diameter

L1: 3 x pipe diameter



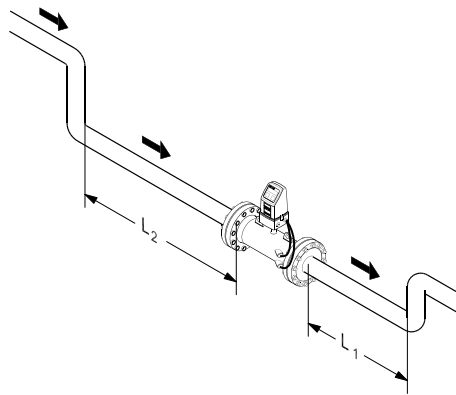
**Dual bend**

**2 x 90° bends in the same plane**

L2: Min. 10 x pipe diameter

L1: 3 x pipe diameter



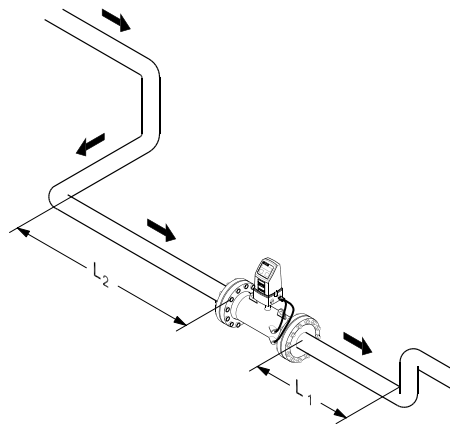


### Triple bend

**3 x 90° bends in two planes**

L2: Min. 20 x pipe diameter

L1: 3 x pipe diameter



### Valves and pumps

#### Valves

L2: Min. 10 x pipe diameter, fully open valve

L1: 3 x pipe diameter

#### Partially opened valves

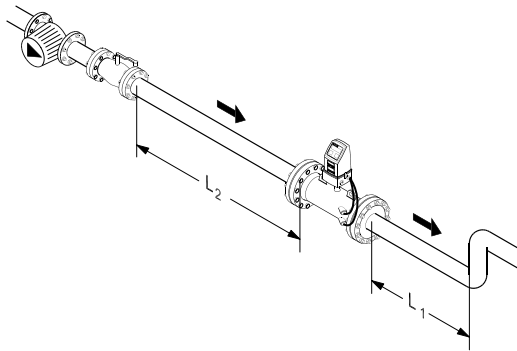
L2: Min. 40 x pipe diameter, partially opened valves (or equal valves design)

#### Pumps

L2: Min. 40 x pipe diameter

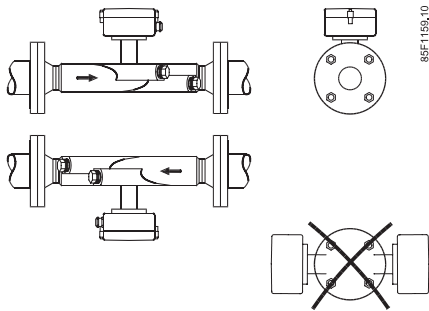
L1: 3 x pipe diameter

4.2 Sensor installation

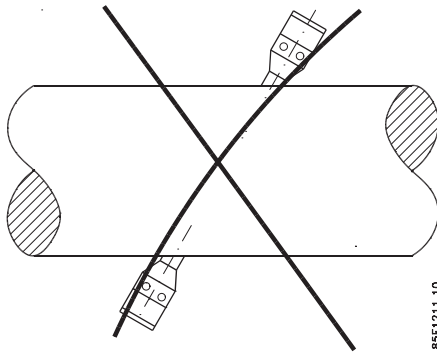
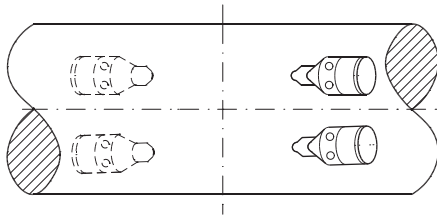


Orienting the sensor

Horizontal orientation: sensors must be mounted with the terminal box in upwards or downwards position.



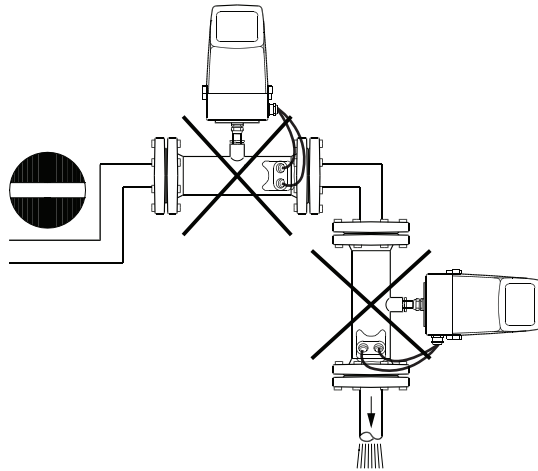
In horizontal installation avoid any upward/downward position of the transducers.



## Precautions

Avoid installation at the highest point in the system because air bubbles will be trapped in the flowmeter.

Avoid installation at a point where there is a free outlet after the flowmeter.



The flowmeter pipe section may be installed in either a horizontal or vertical position.

---

### Note

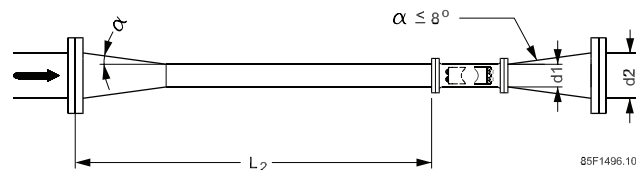
To obtain maximum battery lifetime of the Lithium Thionyl Chloride battery pack, Siemens recommends installing the flowmeter transmitter in an upright position.

---

## 4.2.2 Reduction

### Installation in large pipes

The flowmeter can be installed between two reducers as shown. At  $8^\circ$  reducing angles the below pressure drop curve applies.

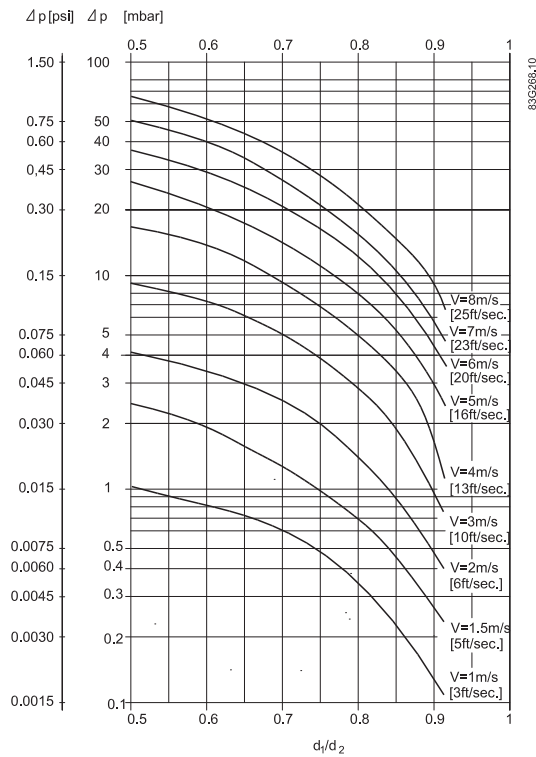


### Delta-P example:

A water flow velocity of 3 m/s (V) in a sensor with a diameter reduction from DN 200 to DN 100 ( $D_1/D_2 = 0.5$ ) gives a pressure drop of 9 mbar.

L2: Min. 10 x pipe diameter

4.2 Sensor installation



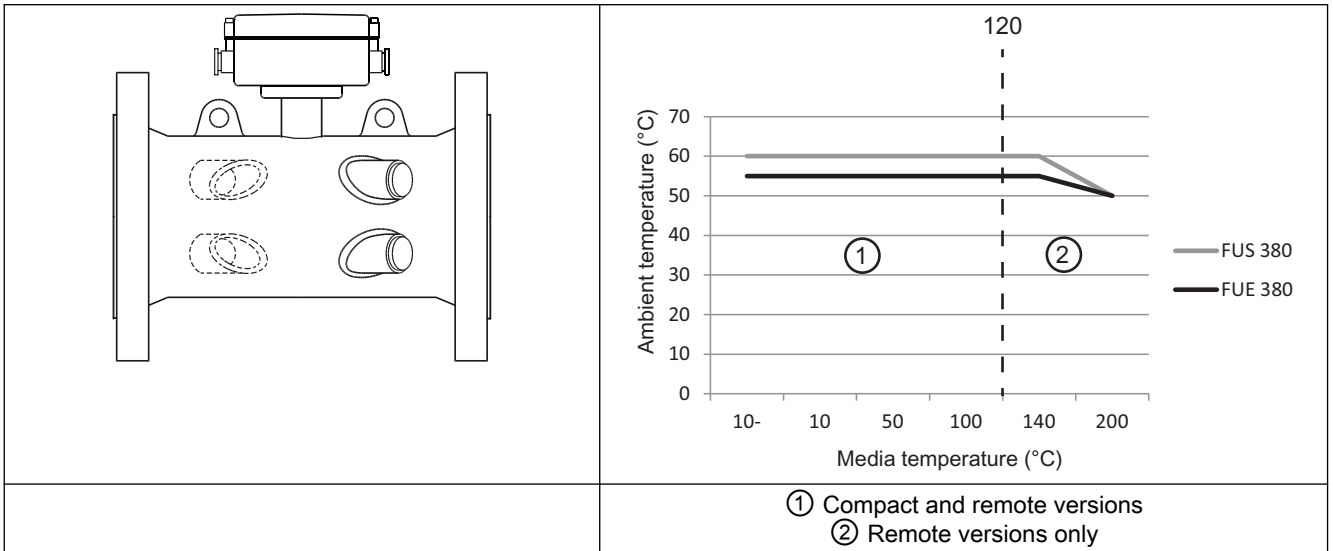
4.2.3 Insulation

Siemens always recommends insulation of the sensor in both the compact and the remote versions. This recommendation applies to both battery-powered and mains-powered versions. The insulation will prevent heat transfer to the transmitter (compact versions) or terminal box (remote versions).

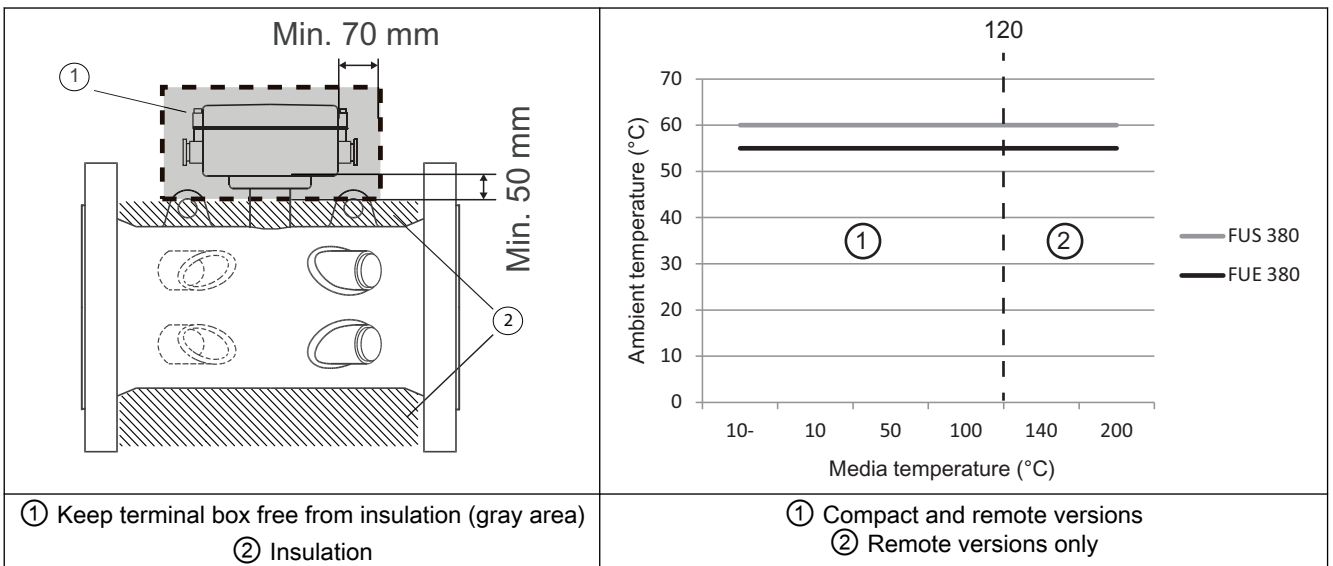
For media temperatures above 120 °C (248 °F) only remote installation is allowed.

4.3 Transmitter installation (compact/remote versions)

Temperatur specifications for non-insulated sensors



Temperatur specifications for insulated sensors



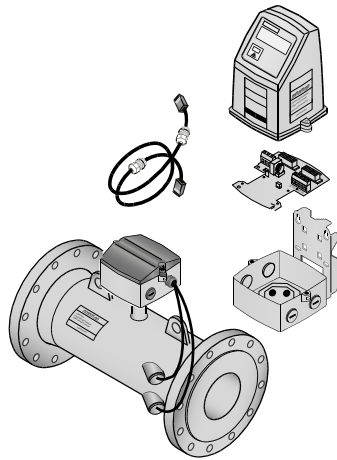
4.3 Transmitter installation (compact/remote versions)

The transmitter is packed separately - ready for plug-in into base part.

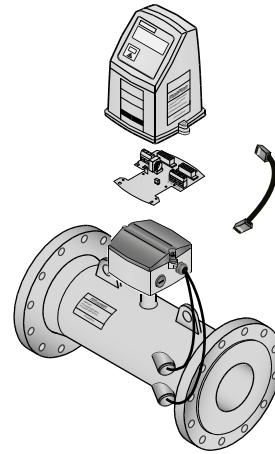
There are two mounting versions of the transmitter (as shown in figures below):

- remote transmitter
- compact transmitter

4.3 Transmitter installation (compact/remote versions)



Remote transmitter



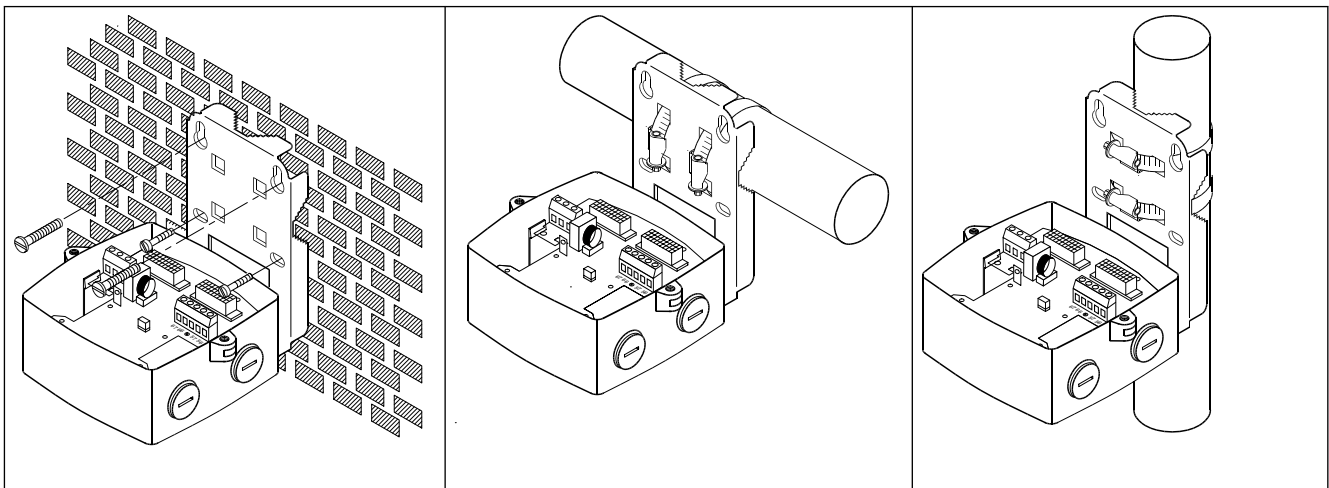
Compact transmitter

**Note**

The matched paired transmitter and sensor must be mounted together. At installation, please check that the system nameplates of transmitter and sensor have the same system serial number.

**4.3.1 Installation wall mounting kit (remote transmitter)**

Mount wall/pipe mounting bracket in an appropriate place.



**Note**

Take the Siemens sensor link cable length into consideration, and allow adequate space for the cable inlets.

## Connecting

SITRANS FUS380 and FUE380 is delivered in one of the three versions:

- Battery-powered only
- Mains-powered
- Mains-powered with battery back-up

Determine the transmitter power source type by reading the label or via the product code.

### NOTICE

#### Verification sealing

SITRANS FUE380 systems are protected by a verification sealing. The verification sealing must only be broken by the user with the acceptance of the local authorities.

### Note

#### Power supply

A transmitter ordered as only battery-powered cannot be updated with additional mains power, as no mains power supply circuits are installed in this transmitter type.

### WARNING

#### Skills

Only qualified personnel may carry out work on the electrical connections.

### WARNING

#### Danger of electric shock!

Never install the device with the mains voltage switched on!

## 5.1 Mains-powered transmitter

The mains-powered transmitter can be ordered with a pre-mounted single back-up lithium battery. In the event of power failure, the battery will take over the power supply of the unit.

The battery is not rechargeable; it must be replaced after maximum 6 years.

### Note

The male battery plug is not connected upon delivery. This connection must be made to enable the back-up battery power supply.

## 5.2 Battery-powered transmitter

The battery-powered transmitter is prepared for one battery pack of 2 lithium 3.6 V D-cell batteries. The battery lifetime depends on the use of the different functions, for example the use of Modbus IrDA communication or higher pulse output frequency will decrease the lifetime significantly. Under normal temperature and working conditions a battery can have an operation lifetime of up to 6 years. The typical lifetime of a dual battery pack with nominal working pulse output frequency of 20 Hz is approximately 4.2 years.

Siemens recommends replacing batteries after maximum 6 years. For the replacement, see Battery replacement (Page 69). Every time a battery plug is reconnected, the unit runs a start-up routine, see Start-up routine (Page 51).

---

### Note

The male battery plug is not connected upon delivery. This connection must be made to enable the back-up battery power supply.

---

### Note

Changing the battery does not influence the settings and accumulated values.

---

## 5.3 Compact system

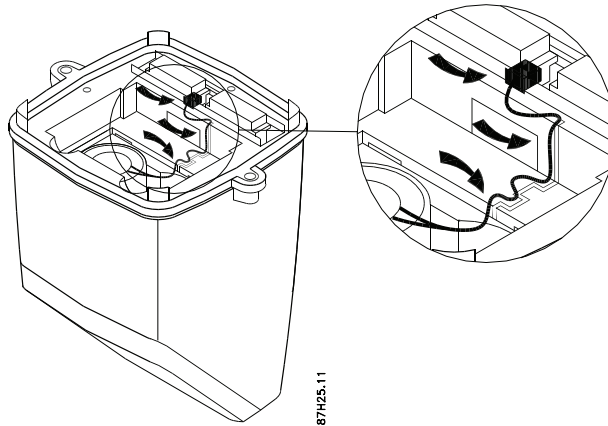
The following chapters describe how to connect a compact system. If you want to connect a remote system proceed with chapter Remote system (Page 37).

1. Connecting battery (battery-powered versions and mains-powered versions with back-up battery) (Page 33)
2. Connecting Siemens sensor link cable (Page 33)
3. Connecting power supply cable (main-powered systems only) (Page 34)
4. Connecting pulse output signal cable(s) (Page 35)
5. Finishing connection (Page 37)



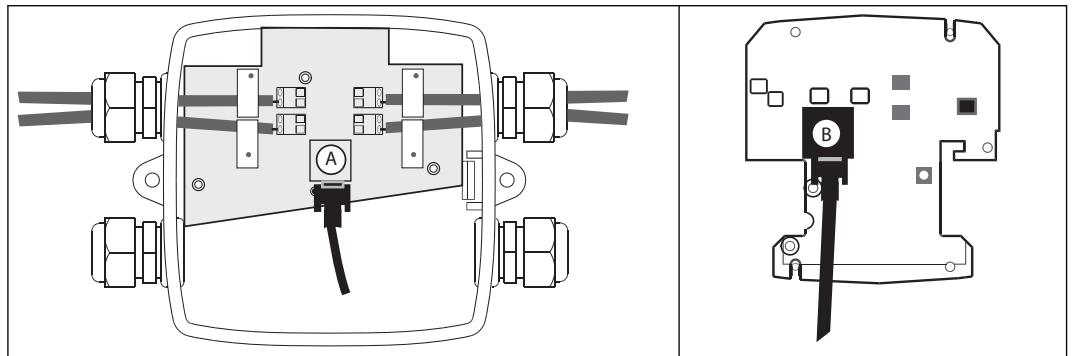
### 5.3.1 Connecting battery (battery-powered versions and mains-powered versions with back-up battery)

Plug in male battery plug. Ensure that the wire is inserted into the small channel leading from plug to battery.

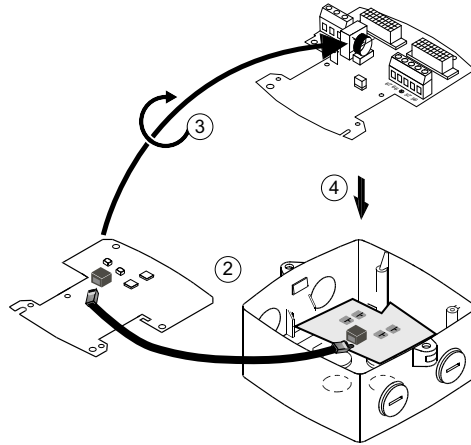


### 5.3.2 Connecting Siemens sensor link cable

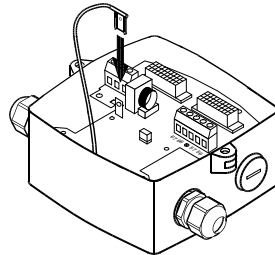
1. Remove the plastic lid from the terminal box.
2. Click the Siemens sensor link cable onto sensor connection board (A) and onto transmitter connection board (B).



3. Turn the transmitter connection board so that the connection cable is facing downwards.



4. Click the transmitter connection board into the terminal box.
5. Connect protective earth wire.



### 5.3.3 Connecting power supply cable (main-powered systems only)

<b>⚠ WARNING</b>
<b>Power supply requirements</b>
Make sure the power supply requirements stated on the nameplates are met!

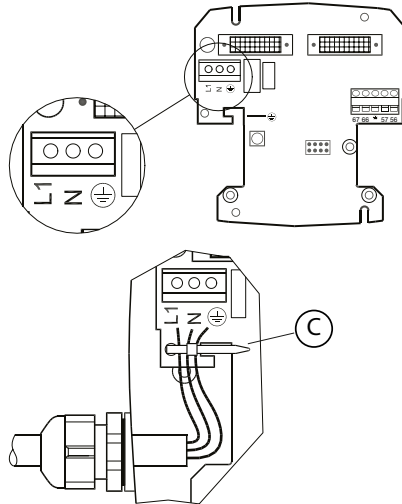
<b>⚠ WARNING</b>
<b>Wire insulation</b>
The insulation between the connected mains supply and the low voltage supply for the flowmeter must be rated with at least double or reinforced insulation at mains voltage.
For field wiring installation: Ensure that the <b>National Installation Code</b> of the country in which the flowmeters are installed is met.

#### Note

##### Conductor terminal

The wire size for the output terminals are AWG24 to AWG16 or 0.205 mm<sup>2</sup> to 1.500 mm<sup>2</sup>.

1. Replace blind plug with cable gland.
2. Push power supply cable through open gland.
3. Connect power supply to L1, N and protective earth (PE) and tighten cable strap (C).



4. Tighten cable gland for power supply cable (approx. 20 Nm).

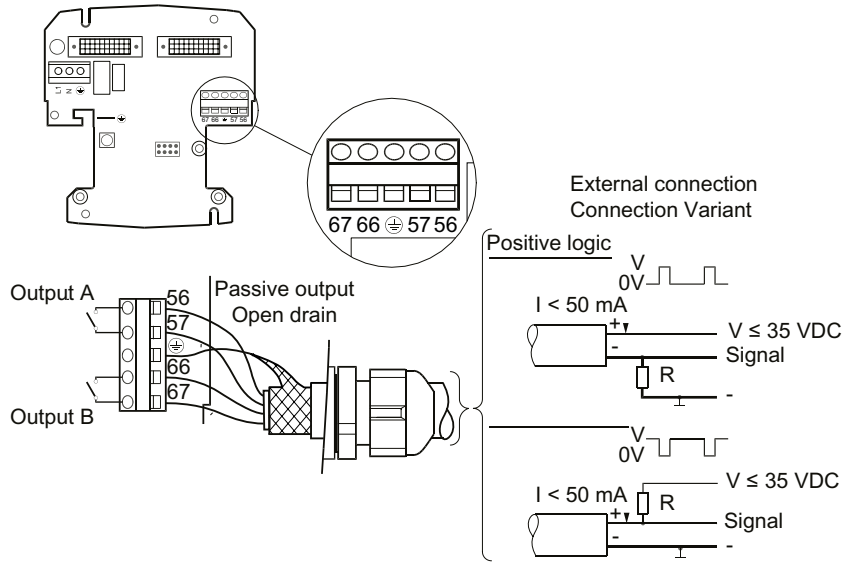
### 5.3.4 Connecting pulse output signal cable(s)

If no output signals are needed, proceed with "Finishing connection".

<b>⚠ CAUTION</b>
<b>Pulse output</b>
The pulse output must be connected to equipment complying with Low-Voltage Directive in order to be considered safe. The isolation within FUS080 pulse output is only a functional isolation.

1. Replace blind plug with cable gland (if two output signals are required, use a double entry cable gland).
2. Push output cable(s) through open gland.

3. Connect output cable(s).



4. Tighten cable gland for output cable(s) (approx. 20 Nm).

**Note**

**Cables with voltage**

Keep the output signal cable(s) separated from cables with voltages > 60 V.

**Note**

**Ingress protection**

To guarantee the IP67 (NEMA 4X/6) degree of protection, use cables with the required specifications.

**Note**

**Protected terminal**

The wire size for the mains-powered terminals are AWG24 to AWG16 or 0.205 mm<sup>2</sup> to 1.500 mm<sup>2</sup>.

**Note**

**EMC performance**

Incorrect fixing of the output cable shield will affect the EMC performance.

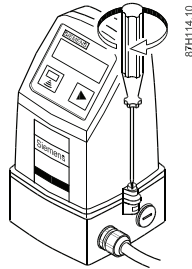
**Note**

**Optional current output module**

If you want to install the optional current output module, proceed with chapter Installing and connecting optional current output module (Page 44) before mounting the transmitter.

### 5.3.5 Finishing connection

Mount the transmitter.



---

#### Note

##### Grounding

To ensure identical potential for sensor and transmitter, a direct grounding of transmitter and sensor is recommended.

---

#### Note

##### Aligning the gasket

Please ensure that the gasket between terminal box and transmitter is well aligned before tightening the screw (Min. torque 0.5 Nm).

---

## 5.4 Remote system

The following chapters describe how to connect a remote system. If you want to connect a compact system proceed with chapter Compact system (Page 32).

On sensor side:

1. Connecting Siemens sensor link cable (Page 38)
2. Finishing connection (Page 38)

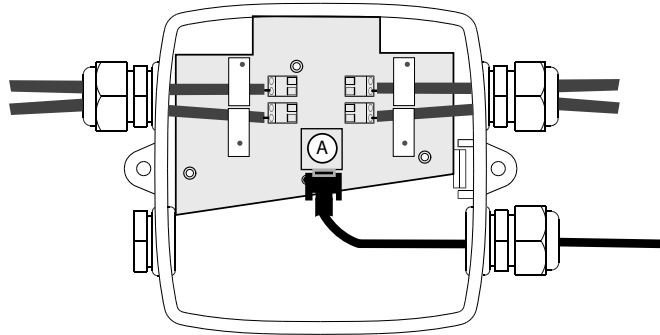
On transmitter side:

1. Connecting battery (battery-powered versions and mains-powered versions with back-up battery) (Page 39)
2. Connecting Siemens sensor link cable (Page 39)
3. Connecting power supply cable (main-powered systems only) (Page 40)
4. Connecting pulse output signal cable(s) (Page 41)
5. Finishing connection (Page 43)

## 5.4.1 Sensor side

### 5.4.1.1 Connecting Siemens sensor link cable

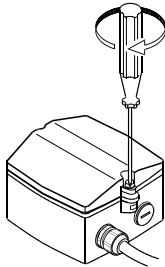
1. Remove terminal box lid.
2. Remove a blind plug.
3. Push connection cable through opening.
4. Click connection cable onto sensor connection board (A).



5. Mount and tighten cable gland (approx. 20 Nm).

### 5.4.1.2 Finishing connection

Remount terminal box lid.



---

#### Note

#### Hot surfaces

Ensure that the connection cable does not come into contact with a hot sensor/metering tube.

---

#### Note

#### Grounding

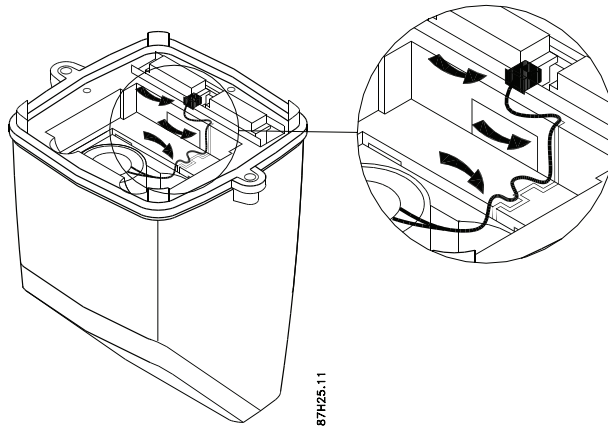
To ensure identical potential for sensor and transmitter, a direct grounding of transmitter and sensor is recommended.

---

## 5.4.2 Transmitter Side

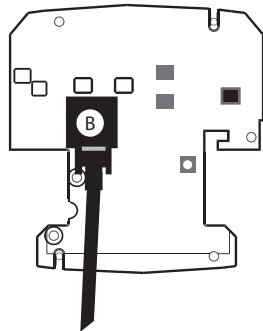
### 5.4.2.1 Connecting battery (battery-powered versions and mains-powered versions with back-up battery)

Plug in male battery plug. Ensure that the wire is inserted into the small channel leading from plug to battery.



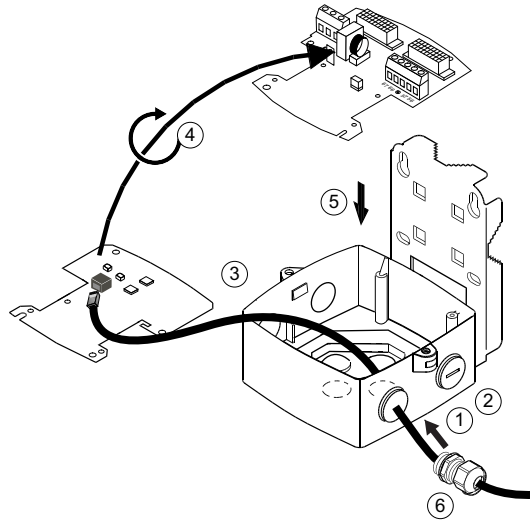
### 5.4.2.2 Connecting Siemens sensor link cable

1. Remove blind plug.
2. Push the Siemens sensor link cable through the opening.
3. Click the Siemens sensor link cable onto transmitter connection board (B).



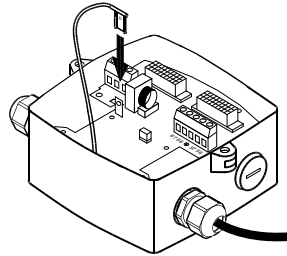
4. Turn transmitter connection board so connection cable is facing downwards.

5. Click transmitter connection board into terminal box.



6. Mount and tighten cable gland (approx. 20 Nm).

7. Connect protective earth wire.



**Note**

**Cables with voltage**

Keep the connection cable separated from cables with voltages > 60 V.

**5.4.2.3 Connecting power supply cable (main-powered systems only)**

**⚠ WARNING**

**Power supply requirements**

Make sure the power supply requirements stated on the nameplates are met!



**⚠ WARNING**

**Wire insulation**

The insulation between the connected mains supply and the low voltage supply for the flowmeter must be rated with at least double or reinforced insulation at mains voltage.

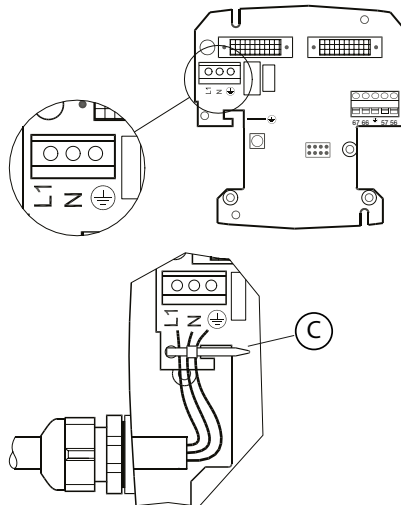
For field wiring installation: Ensure that the **National Installation Code** of the country in which the flowmeters are installed is met.

**Note**

**Conductor terminal**

The wire size for the output terminals are AWG24 to AWG16 or 0.205 mm<sup>2</sup> to 1.500 mm<sup>2</sup>.

1. Replace blind plug with cable gland.
2. Push power supply cable through open gland.
3. Connect power supply to L1, N and protective earth (PE) and tighten cable strap (C).



4. Tighten cable gland for power supply cable (approx. 20 Nm).

#### 5.4.2.4 Connecting pulse output signal cable(s)

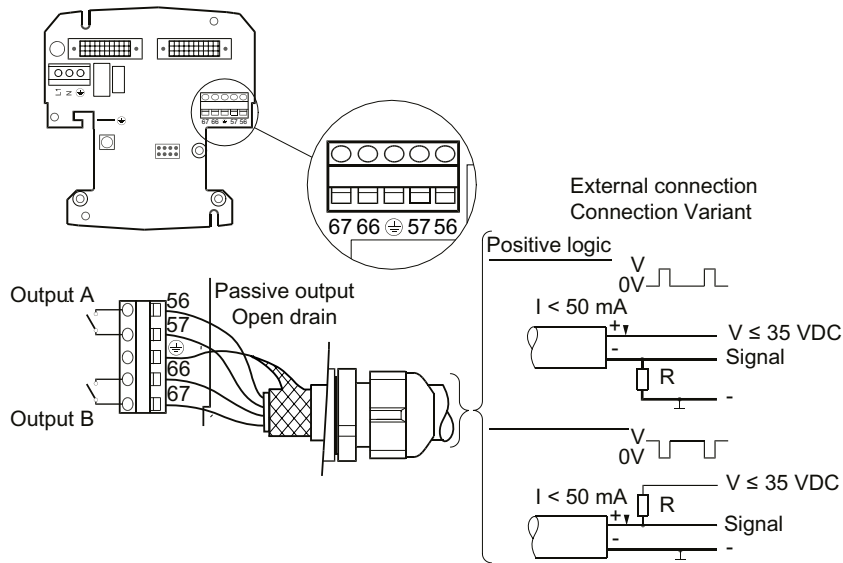
If no output signals are needed, proceed with "Finishing connection".

**⚠ CAUTION**

**Pulse output**

The pulse output must be connected to equipment complying with Low-Voltage Directive in order to be considered safe. The isolation within FUS080 pulse output is only a functional isolation.

1. Replace blind plug with cable gland (if two output signals are required, use a double entry cable gland).
2. Push output cable(s) through open gland.
3. Connect output cable(s).



4. Tighten cable gland for output cable(s) (approx. 20 Nm).

**Note**

**Cables with voltage**

Keep the output signal cable(s) separated from cables with voltages > 60 V.

**Note**

**Ingress protection**

To guarantee the IP67 (NEMA 4X/6) degree of protection, use cables with the required specifications.

**Note**

**Protected terminal**

The wire size for the mains-powered terminals are AWG24 to AWG16 or 0.205 mm<sup>2</sup> to 1.500 mm<sup>2</sup>.

**Note**

**EMC performance**

Incorrect fixing of the output cable shield will affect the EMC performance.

---

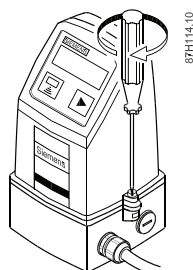
**Note****Optional current output module**

If you want to install the optional current output module, proceed with chapter Installing and connecting optional current output module (Page 44) before mounting the transmitter.

---

**5.4.2.5 Finishing connection**

Mount the transmitter.



---

**Note****Grounding**

To ensure identical potential for sensor and transmitter, a direct grounding of transmitter and sensor is recommended.

---

**Note****Aligning the gasket**

Please ensure that the gasket between terminal box and transmitter is well aligned before tightening the screw (Min. torque 0.5 Nm).

---

---

**Note****Remote connection cable**

If the Siemens sensor link cable is shortened, the factory set "Cable length" setting must be corrected.

This setting can only be changed if the HW key is mounted, which requires demounting of the transmitter. In case the FUE380 is protected by a physical verification sealing, this must be broken which may only be done with the acceptance of the authorities.

---

**5.5 Optional current output module**

The optional current output module converts the flow signal into a 4-20 mA output signal. The 4 mA always equals 0 flow rate and the 20 mA equals the Qp value selected via the order code. The default Qp can be found on the transmitter nameplate.

The current output module is passive and therefore needs an external power supply.

---

**Note**

**Current output range during start up**

When the current output module is enabled (default setting) the output is 3.6 mA during start up. When the current output module is disabled the output is fixed to 4 mA.

---

**Note**

**Restricted use of the optional current output module**

The module can be used with all mains-powered FUS/FUE380 versions, but the output signal is not approved for custody transfer use.

---

### 5.5.1 Installing and connecting optional current output module

 <b>WARNING</b>
--------------------------------------------------------------------------------------------------

<b>Danger of electric shock!</b>
----------------------------------

Never install the device with the mains voltage switched on!
--------------------------------------------------------------

 <b>CAUTION</b>
----------------------------------------------------------------------------------------------------

<b>EMC performance</b>
------------------------

Current output cable shield must be connected. Incorrect fixing of the cable shield may affect the EMC performance!
---------------------------------------------------------------------------------------------------------------------

---

**Note**

**Power supply**

The current output module is a passive module and should only be used with external power supply.

---

**Note**

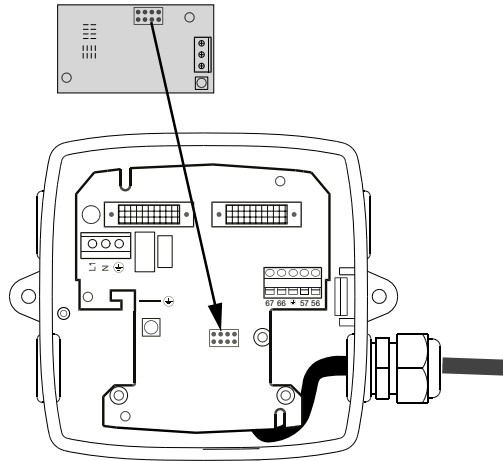
**Current output module**

To support the function with current output module the default communication settings for the transmitter is recommended. See Factory settings for Modbus communication (Page 112).

---

## Installing

1. Remove transmitter/terminal box lid.
2. Carefully mount current output module on the eight pins.



3. Fasten module to transmitter connection board by use of a M3x5 screw (0.5 Nm).

### **⚠ CAUTION**

#### **Protective earth**

The M3x5 screw also functions as earth conductor (EMC).

## See also

Optional current output module (Page 89)

## 5.5.2 Connecting

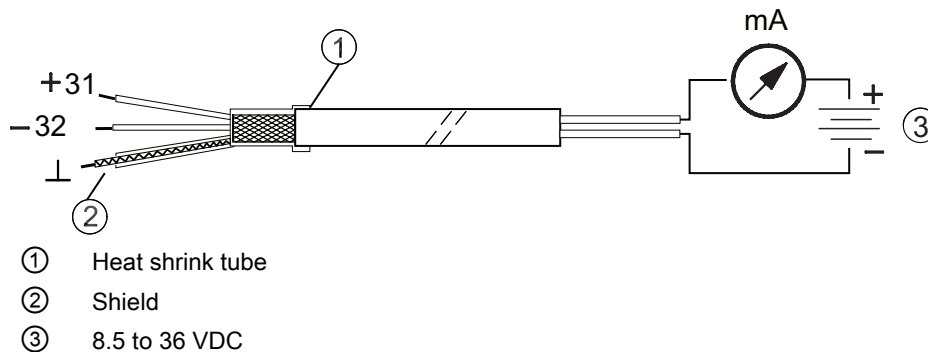
The output terminals are marked 31 and 32 with corresponding polarity + and - on the terminal strip. The connector  $\oplus$  is for shielding.

The requirements for the current output cable, for example max. load can be found in AUTOHOTSPOT.

1. Replace blind plug with cable gland (if two output signals are required, use a double entry cable gland).
2. Push output cable through open gland.

5.6 Wiring energy calculator

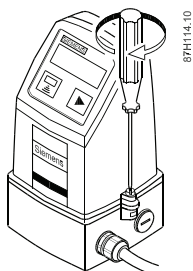
3. Connect output cable to terminals 31, 32 and  $\oplus$ .



4. Tighten cable gland for current output cable (approx. 20 Nm).

5.5.3 Finishing connection

Mount the transmitter.



**Note**

**Grounding**

To ensure identical potential for sensor and transmitter, a direct grounding of transmitter and sensor is recommended.

**Note**

**Aligning the gasket**

Please ensure that the gasket between terminal box and transmitter is well aligned before tightening the screw (Min. torque 0.5 Nm).

5.6 Wiring energy calculator

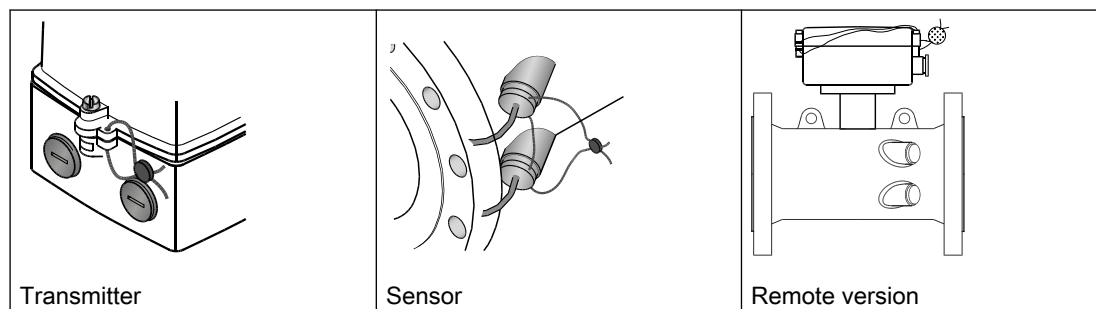
An energy calculator is typically connected via the pulse output A (terminals 56 and 57) of the transmitter.

For example, connection to the energy calculator SITRANS FUE950 can be found in the operating instruction of the FUE950.

## 5.7 Sealing of FUE380

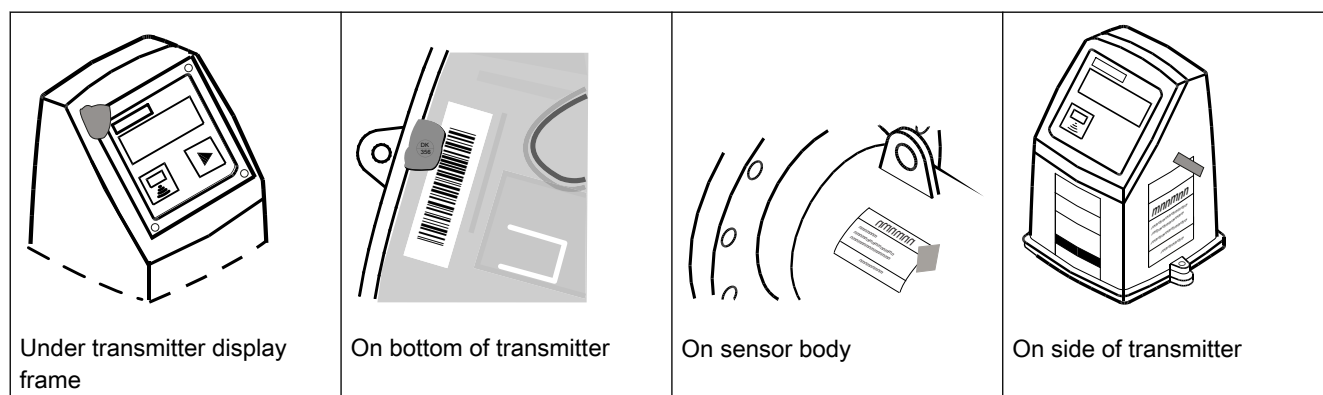
### 5.7.1 User sealing

After finishing the installation and electrical connection of SITRANS FUE380 types, it is recommended to seal the flowmeter as shown. Drill through marked drilling holes in terminal box and transmitter/lid. Seal the transmitter on both sides with either one or two wires.



### 5.7.2 Verification sealing

These illustrations show how the device is verification sealed.



#### Note

#### For type-approved and verified FUE380 flowmeters

The HW key is located behind the display and is thereby protected by the display sealing.

The verification sealing may only be broken with the acceptance of the local authorities.





## Commissioning

### 6.1 Introduction

Commissioning the device includes the following steps:

1. Resetting the battery lifetime (see Start-up routine (Page 51)).
2. Checking values in the service menu.
3. Configuring the device via SIMATIC PDM (see Commissioning via PDM (Page 52)).

Before commissioning, a basic guide to the local display and the menu structure is offered in the chapters: Operating the local display (Page 49) and Navigating the menu structure (Page 50).

### 6.2 Operating the local display

The local display is divided into 3 areas:

- Top area with symbols for status information
- Mid area with actual readings
- Lower area with index number of the shown menu or the service menu symbol (🔧).

Activate the push button to go the next index menu and related information. The service menu is accessible from all menus by pressing the push button for minimum 2 seconds.

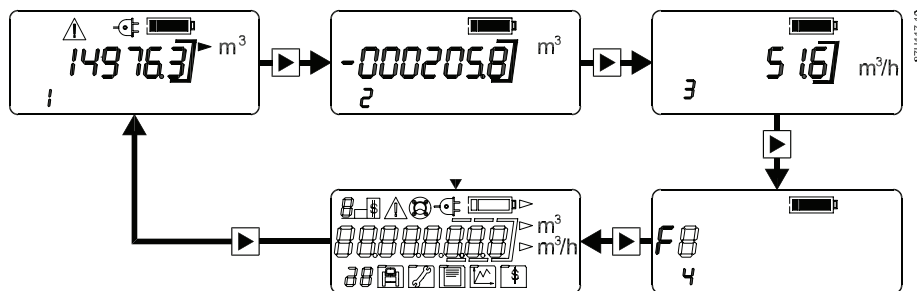


Figure 6-1 Operating the local display

Table 6-1 Status information symbols

Symbol	Description
	Mains power supply connected
	Battery charge status
	Warning
	Service menu

**Battery status**



There are two symbols for battery charge status:

- "Battery full" indicates battery charge above the warning level (6-year hour counter).
- "Battery low" indicates battery charge below the warning level and that the battery should be replaced.

**Note**

"Battery low" only indicates that battery charge is below a pre-set level, not that charge is zero. Flow measurement continues uninterrupted until the battery is completely drained.

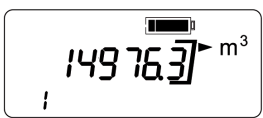
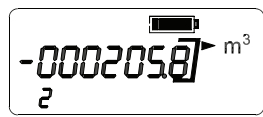
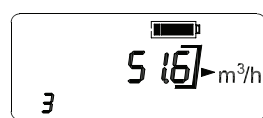
Table 6-2 Battery status information symbols

Symbol	Description
	Battery status, full
	Battery status, low

### 6.3 Navigating the menu structure

Press the push button briefly (less than 2 seconds) to navigate between the following menu items:

Table 6-3 Menu items

Menu	Parameter	Display example	Comments
Menu 1	Flow volume totalizer 1		Factory preset is forward volume flow. The battery symbol shows full.
Menu 2	Flow volume totalizer 2		Factory preset for reverse flow. Negative values indicate reverse flow calculation.
Menu 3	Actual flow rate		Negative values indicate reverse flow calculation.


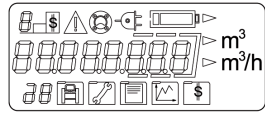

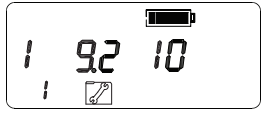
Menu	Parameter	Display example	Comments
Menu 4	Alarm codes		Each code refers to a specific alarm.
Menu 5	Display test		Check of all segments. Display toggles between all segments on/off.

Table 6-4 Service menu

Menu	Parameter	Display example	Comments
	Service menu		The service menu is accessible from all menus by pressing push button for minimum 2 seconds. For more information on the complete service menu, see Service menu (Page 72).

## 6.4 Start-up routine

1. Power-up device.
2. Reset battery status indicator as described below (battery-powered versions only).

### Resetting the battery counter

---



#### Note

The reset can also be carried out via SIMATIC PDM.

---

When a new battery is installed and the plug is connected, the transmitter start-up routine begins. The display shows the actual software version, e.g. 2.04.

After ten seconds the message *reset.bat* will appear.

1. Press push button within six seconds to reset the internal battery counter. The message *accept* will appear.
2. Press push button again within six seconds in order to reset the internal battery counter. The battery indicator now shows . If the push button is not pressed again, the battery indicator will show .

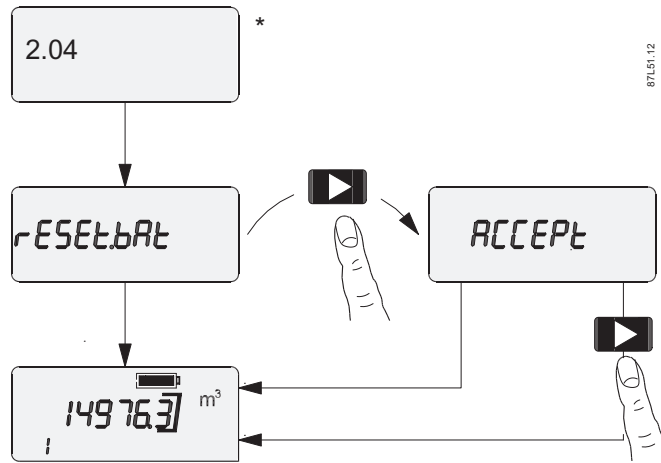


Figure 6-2 Reset internal battery counter

\* Firmware version

## 6.5 Commissioning via PDM

SIMATIC PDM (Process Device Manager) is a software package for configuring, parameterizing, commissioning, and maintaining field devices.

Among other features, SIMATIC PDM contains a simple process for monitoring process values, interrupts and status/diagnosis signals of a field device.

---

### Note

For instructions on installation and operation of SIMATIC PDM, refer to the SIMATIC PDM Getting Started (included in the documentation package that comes with PDM).

---

### Note

#### PDM requirements

Minimum PDM version required is SIMATIC PDM V8.2 + SP1. The required operating system to install SIMATIC PDM is Windows 7.

---

### Note

#### Default password

Any data changes in PDM require a password. The default password is 1000. For further information, see Password-protected data (Page 66).

---

**Note****Hardware (HW) key protected parameters**

For type-approved and verified FUE380 flowmeter the settings are HW key protected and can be only read, but not changed via PDM. The HW key is located behind the display and is thereby protected by the display sealing. The verification sealing may only be broken with the acceptance of the authorities.

---

In the following it is described how the device is commissioned using SIMATC PDM.

The commissioning is divided into the following steps:

1. Installing and connecting the IrDA interface adapter (Page 53)
2. Installing the device driver (Page 54)
3. Adding the device to the network (Page 56)
4. Configuring the device (Page 57)
5. Optimizing the system (Page 58)
6. Checking the operation readiness (Page 63)

### 6.5.1 Installing and connecting the IrDA interface adapter

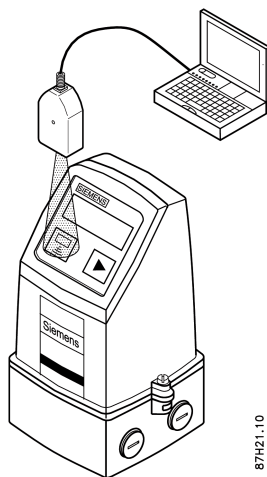
---

**Note****IrDA driver installation**

For installation of the IrDA driver, refer to the instructions delivered with the adapter. The required operating system to install SIMATIC PDM and the IrDA driver is Windows 7.

---

1. Connect IrDA adapter to PC



2. Mount adapter on FUS080

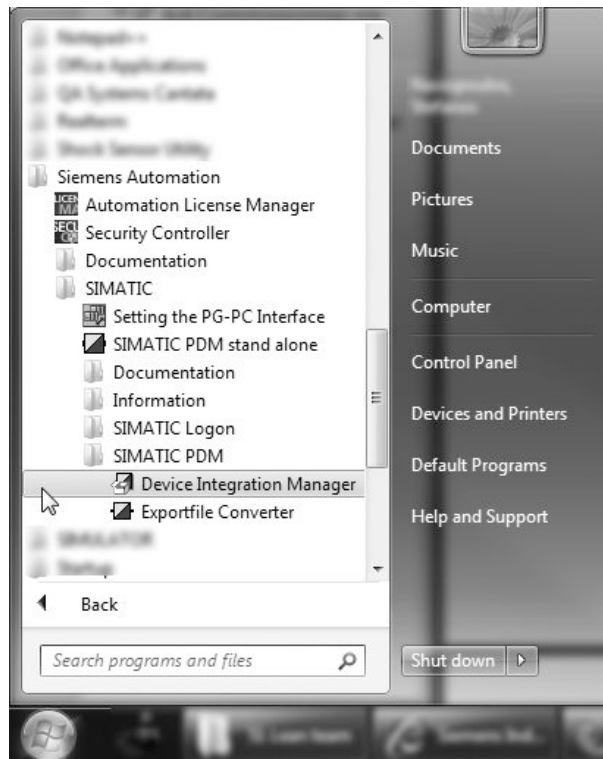
When the IrDA adapter is connected correctly, a small icon appears on the taskbar of your PC. When the mouse is placed on this icon, the device information will be shown (e.g. [FUS080 SN1033 is in range]).



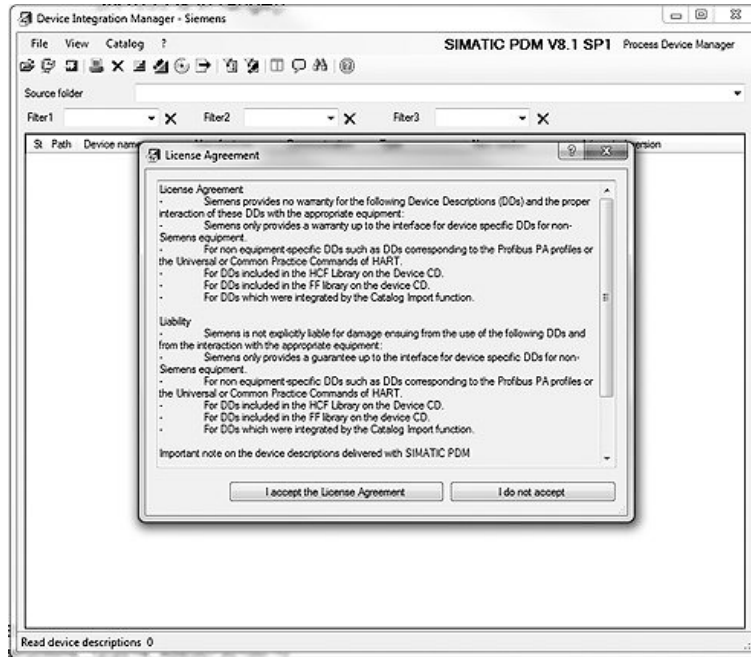
### 6.5.2 Installing the device driver




Install the PDM device driver as follows:

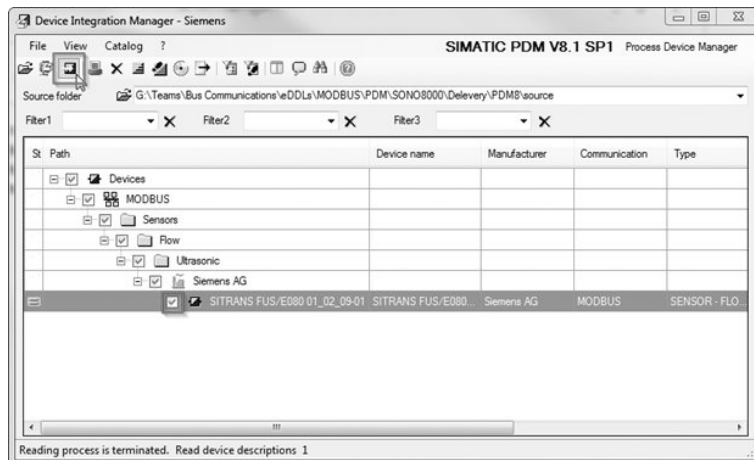
1. Close SIMATIC PDM (if already open).
2. Open **Device Integration Manager** from [Start → All Programs → Siemens Automation → SIMATIC → SIMATIC PDM].



3. Click on [I accept the License Agreement].



4. Click on  or  depending on whether the source is zipped or not.
5. Browse to the folder where the source files are located and click on the folder.
6. The device will show up in a tree view. Mark the device to be installed and click on  to install the driver on the PC.



### Note

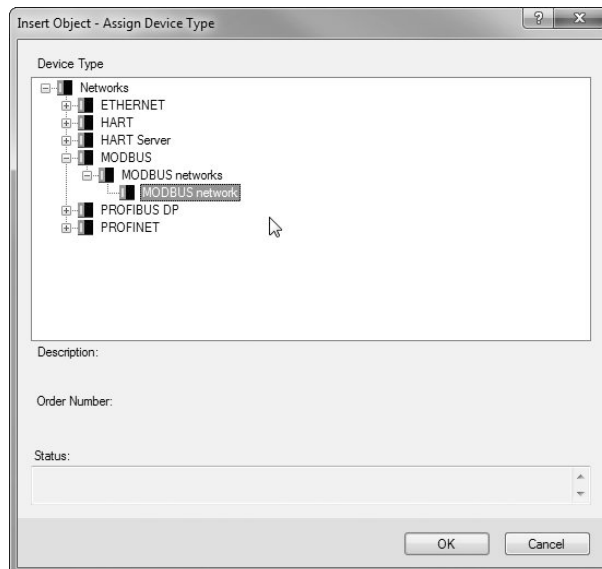
Please use for the firmware FW 2.03 the related EDD 1.02.08-01.

### 6.5.3 Adding the device to the network

It is recommended to configure the FUS080 project in PDM before setting the parameters.

Add device to SIMATIC Modbus network:

1. Select [**File** → **New**]  
Type in a project name.
2. Right click on your new project, select [**Insert New Object** → **Networks**].
3. Right click on your **Networks**, select [**Insert New Object** → **Communication Network**].
4. Click on [Assign Device Type] and select **Networks** → **MODBUS** → **MODBUS networks** → **MODBUS network**.



5. Click [OK] and click [OK] again.
6. Right click on **MODBUS network** and select [**Insert New Object** → **Object**]
7. Click on [Assign Device Type] and assign the MODBUS device to SITRANS FUS/E080 [**Devices** → **MODBUS** → **Sensors** → **Flow** → **Ultrasonic** → **SIEMENS AG** → **SITRANS FUS/E080**] and click [OK].  
Name device according to application requirements (max. 32 characters) and click [OK].  
Set up communication parameters for SIMATIC MODBUS network.
8. Select **Networks** → **MODBUS network**.
9. Right click on **Modbus network** and select **Object Properties**.
10. On the **Communication** tab, select **MODBUS communication** to activate IrDA.



## 6.5.4 Configuring the device

In the following it is described how to configure the device by defining all sensor specific parameters.

---

### Note



#### Measurement accuracy

A correct flowmeter installation is required to ensure optimum measurement accuracy.

---

### Read all parameters

Before any parameterization is done it is necessary to read all parameters from the device into the offline table of SIMATIC PDM. The offline table merely contains default data.

1. Open PDM device driver.
2. Select **Upload to PG/PC ..** and click [Start] to read all parameters to the offline table. After closing the dialog box, all loaded parameters should show  (Loaded) in the status of the PDM table; except date and time formats, they show  (Changed).
3. Store factory set default values on your local PC [**File** → **Export**] in order to be able to retrieve default settings.



### Read, write device data

Only parameters (data) shown with white background can be changed.


---

### Note

#### Status field

-  indicates changed off-line data not yet stored in the device.
  -  indicates actual data downloaded to the device.
-

Parameter	Value	Unit	Status
[-] SITRANS FUS080			
DD-Version	01.02.09		
[-] Identification			
[-] Device			
5 Sensor size	DN500 Q2		↕
8 Totalizer unit	m3		↕
9 Flowrate unit	m3/h		↕
10 Qmax (105% of Qs)	3097.500000	m3/h	↕
373 Low flow cut-off	0.238095	%	↕
20 Vendor name	Siemens		↕
21 Module type	FUE380		↕
22 Software version	2.04P12		↕
23 Product code number	7ME34103KD526BS5-Z		↕
24 System Serial number	778905H172		↕
25 Transmitter serial number	028009H172		↕
26 Sensor serial number	837810H222		↕
505 Device Product ID	Vendor id: 042; Product id: 028		↕
1 Application identifier	Identity		↕
2 Application location	Location		↕
[-] Output			
[-] Operation			
100 Actual date and time	10/5/2014 1:08:25 AM		↗
101 Totalizer 1	0.000000	m3	↕
102 Totalizer 2	0.000000	m3	↕
103 Customer totalizer 3	0.000000	m3	↕
105 Customer totalizer 3 reset date	9/28/2014 3:05:05 AM		↗
106 Flow rate	0.000000	m3/h	↕
107 Relative flow rate	0.0	%	↕
108 Actual velocity for track 1	0.0	m/s	↕
109 Actual velocity for track 2	0.0	m/s	↕
110 Track 1 gain step	4		↕
111 Track 2 gain step	3		↕

Load the parameters to the device by clicking on . Check the option [Load changed parameters only] to speed up the communication and avoid errors.

For overview of the parameters see Parameter lists.

### 6.5.5 Optimizing the system

After storage of the settings, the parameters can be set according to use.

The following shows how to set Pulse Output A and Qmax. For other parameters, refer to "Parameter list" in the appendix.

## Setting Pulse Output and Maximum Flow ( $Q_{max}$ ) via SIMATIC PDM

- In SIMATIC PDM navigate to menu [Device → Pulse guide].  
The "guide" calculates the pulse-frequency at the max flow condition and tells you how close you are on over-speeding the pulse-output.  
The volume per pulse is freely scalable from 0.000001 to 10000 units per pulse. It also calculates the minimum volume per pulse you can choose to avoid pulse over-speeding.  
The maximum output frequency depends on the pulse selected; e.g. maximum output frequency at 5 ms is 100 Hz. Increasing the pulse width lowers the maximum output frequency.
- Select maximum flow rate (never to be exceeded).
- Select an appropriate pulse width, e.g. 5 ms.
- Enter a value in *Amount per pulse A*, e.g. 100, to define the volume/pulse with respect to the *Minimum amount per pulse value*.
- Press [Apply Change of Pulse] to apply the settings.
- If needed, proceed with setting Pulse Output B according to application specific requirements (Default setting = Alarm).

## Output A and B setting

For FUS380 and FUE380, output A and B settings depend on the ordering: Recommended settings, see the following table. Settings for FUS380 can be read out and changed via SIMATIC PDM (Process device manager). The FUE380 settings cannot be changed according approval requirements, and are therefore read only.

	FUS380	FUE380
Output A	Forward or reverse pulses Preset: Forward	Forward or reverse pulses Preset: Forward setting is HW locked
Output B	Forward or reverse pulses, alarm, call-up Preset: Alarm	Forward or reverse pulses, alarm, call-up Preset: Alarm setting is HW locked
Pulse value A & B (depending on DN value)	Preset: Depending on ordered configuration. Setting is noted on nameplate. Available settings: 0.1 l/p; 0.25 l/p; 0.5 l/p; 1 l/p; 2.5 l/p; 10 l/p; 25 l/p; 50 l/p; 100 l/p; 250 l/p; 500 l/p; 1 m <sup>3</sup> /p; 2.5 m <sup>3</sup> /p; 5 m <sup>3</sup> /p; 10 m <sup>3</sup> /p; 25 m <sup>3</sup> /p; 50 m <sup>3</sup> /p; 100 m <sup>3</sup> /p; 250 m <sup>3</sup> /p; 500 m <sup>3</sup> /p; 1000 m <sup>3</sup> /p	Preset: Depending on ordered configuration. Setting is noted on the nameplate. Setting is HW key locked. Note: The setting shall be equal to the connected energy calculator.
Pulse width	Setting options: 5; 10; 20; 50; 100; 200; 500 ms Preset: Depending on ordered configuration. Setting is noted on the nameplate.	Setting: Depending on ordered configuration. Setting is noted on the nameplate. Typical preset: 5 ms. Setting is HW key locked.

**Note**

**HW key protected parameters**

For type-approved and verified FUE380 flowmeter the settings are HW key protected and can be only read, but not changed via PDM. The HW key is located behind the display and is thereby protected by the display sealing. The verification sealing may only be broken with the acceptance of the authorities.

**6.5.6 Output A, terminals 56/57:**

The pulse rate can be seen on transmitter side label (system nameplate).

The settings are dependig on the ordering. The following table shows the typical recommended pulse output settings (pulse width 5 ms) for the energy calculator SITRANS FUE950

For optimal benefit, the pulse value and pulse length must be selected as low as possible. The following calculation formula can be used for determining the lowest pulse value at a pulse length of 5 ms:

$$L/\text{pulse} > Q_s (\text{m}^3/\text{h})/360$$

For example  $Q_s = 300 \text{ m}^3/\text{h}$ ;  $L/\text{pulse} > 300/360$ ;  $L/\text{pulse} > 0.83$ ; therefore the pulse value must be 1 l/pulse (nearest possible ordering selection).

See also the pulse guide in PDM [**Device** → **Pulse guide (offline)**].

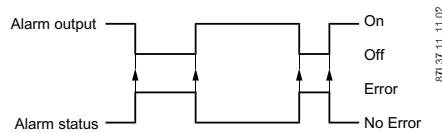
Table 6-5 Recommended pulse values for FUE950

DN	Pulse setting (liter/pulse) with 5 ms pulse length
50	1
65	1
80	2.5
100	2.5
125	2.5
150	10
200	10
250	10
300	50
350	50
400	50
500	100
600	100
700	100
800	100
900	100
1000	100
1200	100

### 6.5.7 Output B, terminals 66/67:

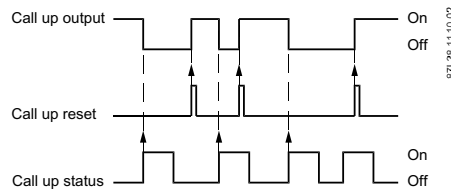
The output B setting must be selected according to application specific requirements (default setting = Alarm).

#### Preset to alarm indication:



Example: If track 1 is not measuring, a appears on display. Failure code F1 appears in display menu 4, and relay output terminals switch to Off.

#### Call up indication:



When output B is configured as Call-up, the output is activated by an alarm condition and remains on until it is manually reset via communication interface and the PDM program (or via manually power down of the device).

A new alarm will not activate a Call-up function if the Call-up function is still active from a previous alarm.

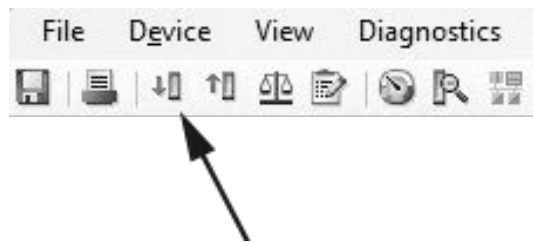
### 6.5.8 Optional current output, terminals 31/32

1. In SIMATIC PDM navigate to [Output → Option module] in the structure tree.
2. Set *Selection of option module* to Current output.
3. Make sure that *Enable* is set to Yes.

Parameter	Value	Unit	Status	Name
[-] Option module - <Tab_s_outp_option_module>				
900 Selection of option module	Current output			Option_module
905 SW version				MOD1_ModuleVersion
906 Enable	Yes			CUR_Enable
907 Scaling	60	m3/h		CUR_Scaling
908 Direction	Positive			CUR_Direction
910 Fixed mode	No			CUR_FixedMode
911 Fixed value	4.0	mA		CUR_FixedValue
912 Alarm level	3.6 mA			CUR_AlarmLevel

Figure 6-3 PDM Example

4. Set required parameters.
5. Click on [Download to device] icon to apply settings.



See also parameters listed in Output (Page 98).

---

**Note**

**Default settings**

The 4 mA always equals 0 flow rate and the 20 mA (parameter 907) equals the Qp value selected via the order code. The default Qp can be found on the transmitter nameplate.

---

**Note**

**IrDA communication**

The IrDA communication has higher priority than the communication on the output signals. During IrDA communication with the transmitter, the transmitter will keep measuring, but the signal from the current output module will show the last value received from the transmitter for up to 40 seconds. After that the signal will show the selected error signal (default 3.6 mA) even if *Alarm* [912] is set to Off.

---

**Note**

**Alarm signal**

The alarm signal has higher priority than the *Fixed flow mode enable* (510) and *Fixed flow value* (511). To use this fixed flow (for example during a test where an alarm signal may appear) the alarm signal for current output module (912) must be disabled (set to [Off]).

---

**Note**

**Power off**

The settings for *Fixed mode* (910) and *Fixed value* (911) will not be reset at power off.

---

**Note**

**Start-up**

During system start-up the current output signal is 3.6 mA (4 mA if the output function setting is disabled).

---

## 6.5.9 Checking the operation readiness

All parameters are now set and defined according to the application.

1. Select: [**Device** → **Download to device...**] to download the parameters to the device.

### Note

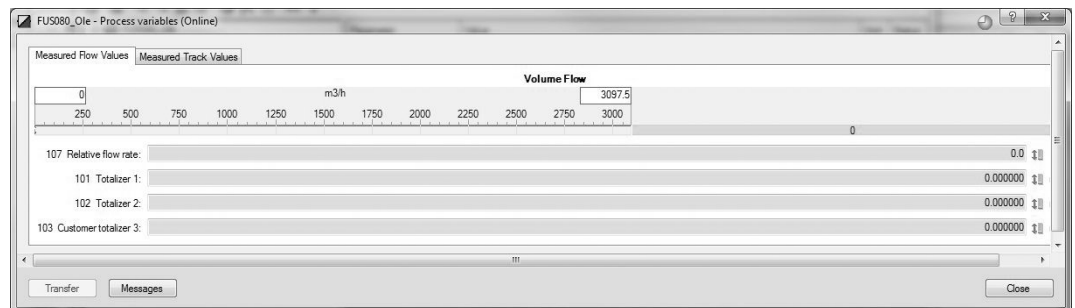
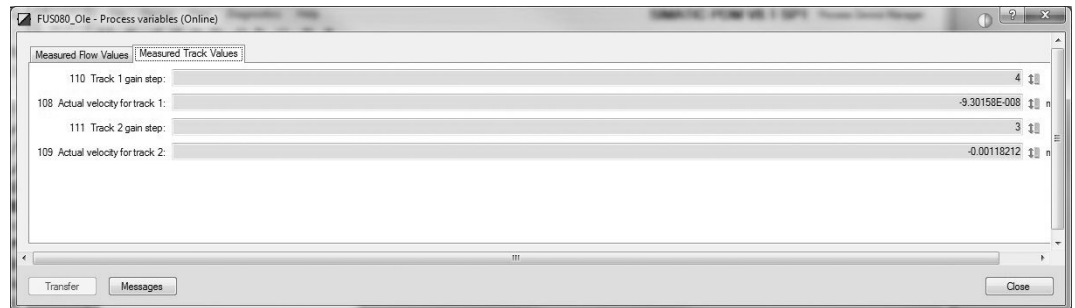
Before downloading the parameters, check that all listed data are loaded or changed and in accordance with the application requirements.

2. Click [Start] to download all changes from the table to the device.

## View process values

The system is now ready for normal operation.

1. Select [**View** → **Process Variables**] to see all measured process values.
2. Verify that the fields show the expected values.



### Note

#### Measured Track Values

The **Measured Track Values** should show stable values within the normal range, i.e. the gains should be stable values between 3 and 12 (smaller sizes low values and larger sizes high values) and the actual velocities for the paths should be stable, constant and smoothly changing values between 0 and 10 m/s.

### **Store settings on the PC**

Store the device settings after verifying the values.

- Choose: [**Device** → **Upload to PG/PC**] to get all the settings.
- Store the complete settings on your PC via [**File** → **Export**].



## Functions

### 7.1 Unit selection

The device is delivered with totalizer and flow rate units in m and m<sup>3</sup>/h, respectively, as standard. However, it is possible to manually configure the device to operate with other units.

#### Changing the units

Go via PDM menu [Device → Unit guide (offline)]. Select the new unit from the list and click on [Apply Change of Units].

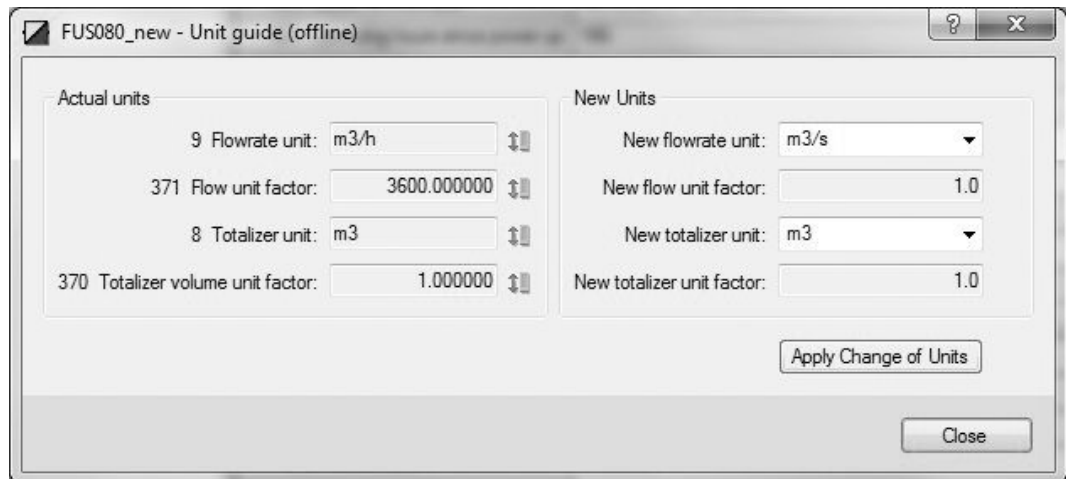
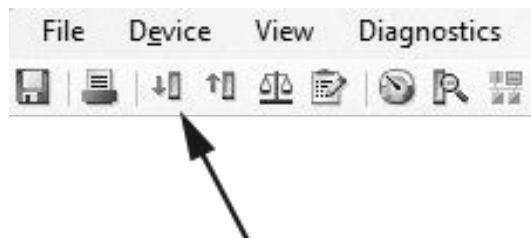


Figure 7-1 Unit selection

Click on the [Download to device] icon to apply the changes.



#### Note

The display is only able to show m<sup>3</sup> and m<sup>3</sup>/h

If the units are changed to units other than m<sup>3</sup> and m<sup>3</sup>/h, the display will not show any unit indication after the measured value on the display. To show the new customer unit on the display, a sticker can be used to show units. This sticker should be affixed to the transmitter display.

## 7.2 Number of decimal digits

For the display values (totalizers in menu 1 and 2 and flow in menu 3) Auto adjust decimal point is the default setting. This means that the number of digits after the decimal point automatically will be reduced with increasing number of digits before the decimal point.

## 7.3 Password-protected data

In the Modbus communication via SIMATIC PDM, the flowmeter information is protected by a password. The default password is "1000" and it can be changed after gaining access to the flowmeter or via the PDM menu [**Device** → **Change Password (Online)**]. The password can be changed without the use of the HW key.



Figure 7-2 Change password

Click [Write the new password to the device] and [Close].

## 7.4 Hardware key

### Hardware (HW) key

To gain access to protected parameters of the transmitter, a hardware jumper (HW key) must be installed as shown below. The HW key place is located internally on the right top part of PCB behind the display as shown.

---

#### Note

For type-approved and verified FUE380 flowmeter the HW key is protected by a verification sealing on the display frame (see Sealing of FUE380). The verification sealing can only be opened by the user with the acceptance of the local authorities.

---



Figure 7-3 HW key behind the display (placed on the right pins)

---

**Note****Important**

In this mode, with the HW key installed, many parameters in PDM are opened. If these parameters are changed, it can seriously affect the meter accuracy and operation. Be careful when writing new parameters.

---

### Changing the HW-protected parameters

1. Disconnect the power supply from the transmitter, i.e. battery plug and the mains power supply
2. Remove the frame and the display from the transmitter.
3. Insert the HW key vertically on right pins as shown in figure above.
4. Remount the display and frame on transmitter.
5. Restart the device.
6. Make parameter changes through PDM.
7. Download parameter changes to the device.
8. Remove the HW key by following the preceding steps.



## Service and maintenance

### 8.1 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

<b>NOTICE</b>
Repair and service must be carried out by Siemens authorized personnel only.

**Note**

Siemens defines flow sensors as non-repairable products.

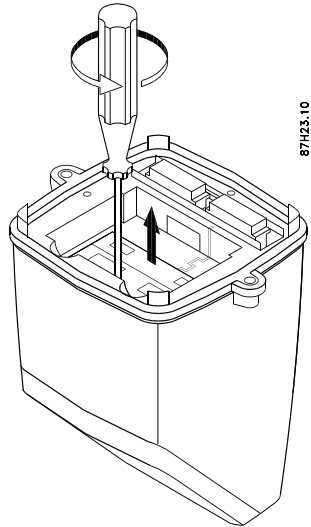
### 8.2 Battery replacement

<b>NOTICE</b>
<b>Battery replacement interval</b> - Only for devices with backup battery - It is recommended to replace the battery pack at the latest after 6 years.

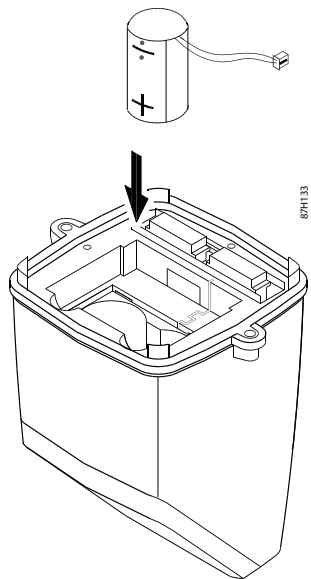
**Battery lifetime**

The battery lifetime depends on the frequency of mains supply failure. Under normal temperature and working conditions a battery can have an operation lifetime of up to 6 years.

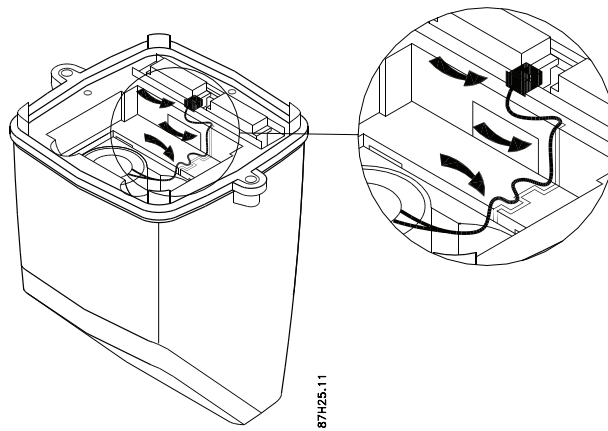
1. Unscrew battery cover and remove old battery pack.



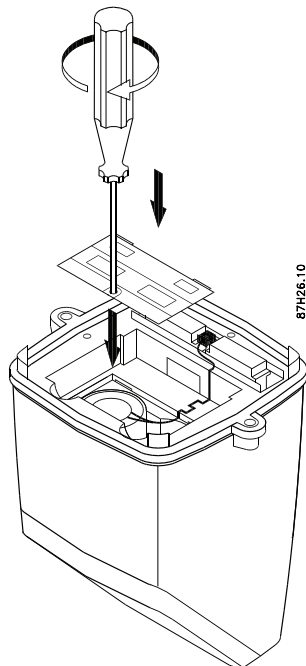
2. Fit new battery pack in transmitter.



3. Connect battery.  
Ensure that wire is inserted into small channel leading from plug to battery.



4. Remount battery cover.



---

**Note**

Every time a battery is fitted and connected, the unit runs a start-up routine.

A battery replacement does not influence the transmitter settings and accumulated process values.

---

### Resetting the internal battery counter

After replacing the batteries, reset the internal battery counter in order to indicate the power capacity correctly.

**Note**

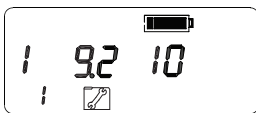
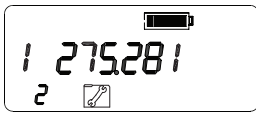
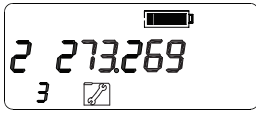

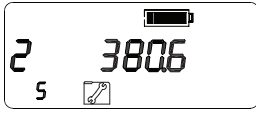
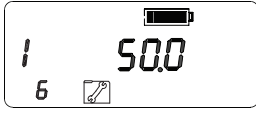
**Battery capacity**

The transmitter setting for the battery capacity is pre-configured by the ordered version. To ensure the correct battery status calculation the replacement battery shall be the same type and have the specific capacity.

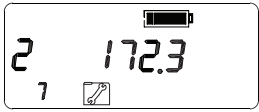
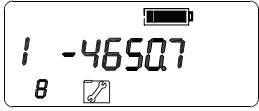
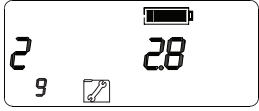

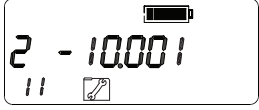
## 8.3 Service menu

The service menu (🔧) is accessible from all menus by pressing the push button for minimum 2 seconds. To return back to the main menu you need to press the push button for a minimum of 2 seconds again. If no action is taken you will be taken back to the main menu after 10 min if back-up battery powered or after 2 min if mains-powered.

Table 8-1 Service menu

Menu	Parameter	Display example	Comments
1	Gain path 1 and path 2		Gain for path 1 and path 2 ranging from 0 to 15. The optimal gain values are explained in Figure 9-2 SITRANS FUS080 Gain step vs. Sensor distance (Page 84).
2	Signal level AB and BA of path 1		Signal level for Downstream and Upstream Sensor for path 1 typically between 230 and 380
3	Signal level AB and BA of path 2		Signal level for Downstream and Upstream Sensor for path 2 typically between 230 and 380
4	Transition time (µs) AB of path 1		Time of Flight Downstream, from Sensor A to B for path 1
5	Transition time (µs) AB of path 2		Time of Flight Downstream, from Sensor A to B for path 2
6	Transition time (µs) BA of path 1		Time of Flight Upstream, from Sensor B to A for path 1



Menu	Parameter	Display example	Comments
7	Transition time ( $\mu$ s) BA of path 2		Time of Flight Upstream from Sensor B to A for path 2
8	Delta time (ns) of path 1		Delta Time Of Flight for path 1, difference between Down and upstream TOF Positive value equals positive flow
9	Delta time (ns) of path 2		Delta Time Of Flight for path 2, difference between Down and upstream TOF Positive value equals positive flow
10	Velocity (m/s) path 1		Measured flow velocity for path 1
11	Velocity (m/s) path 2		Measured flow velocity for path 2

**See also**

Diagnosing with PDM (Page 82)

**8.4 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>)

### 8.5 Application-specific data - Qualification certificate

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:

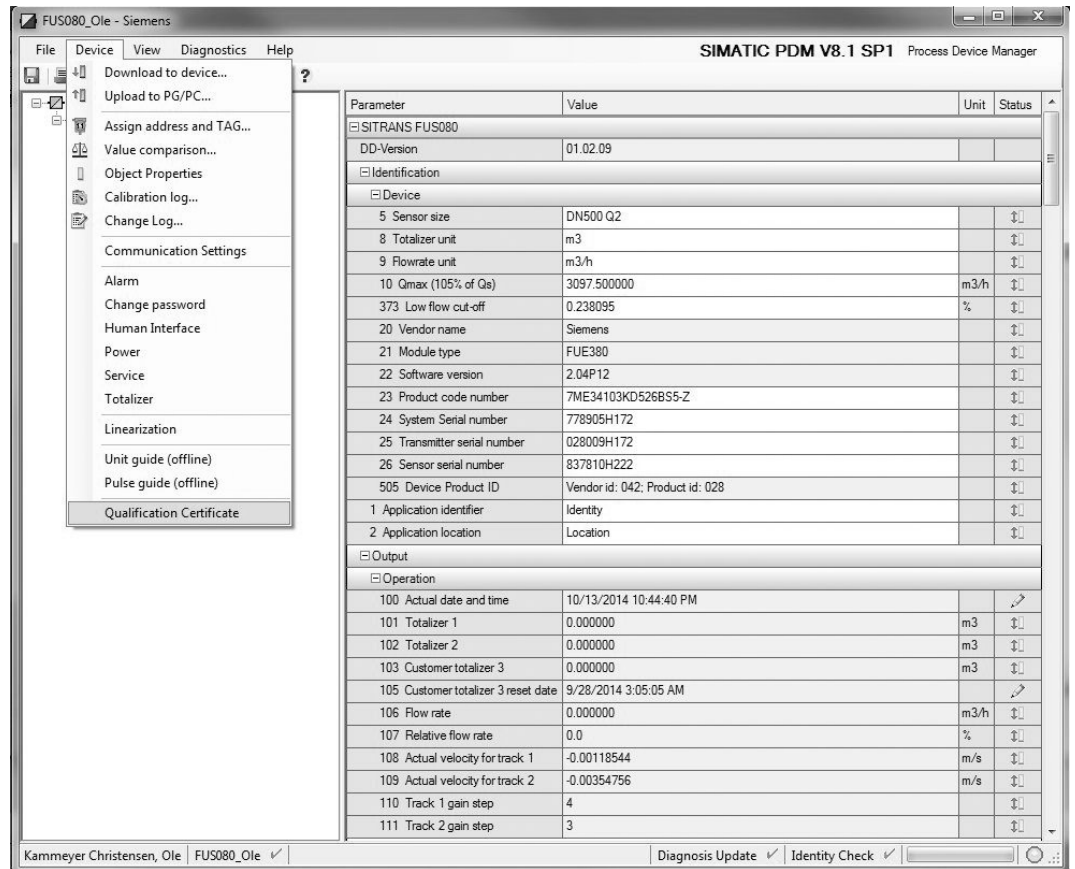
Local contact person (<http://www.automation.siemens.com/partner>)

## 8.5 Application-specific data - Qualification certificate

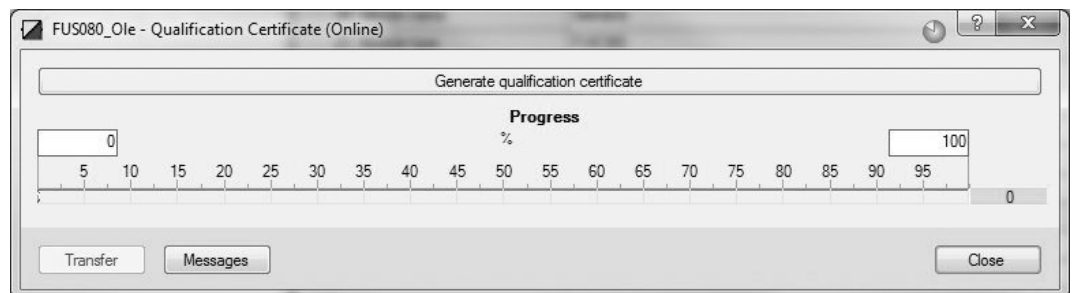
In case the device needs service, the technical support team will typically request information about the application and the flowmeter.

- Prepare a sketch of the installation/application.
- For your convenience you may create a qualification certificate via SIMATIC PDM

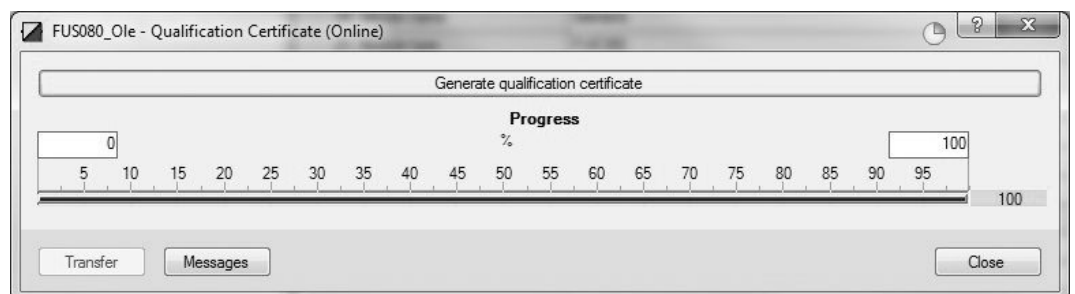
1. In PDM click on [Device → Qualification Certificate].



2. Click on [Generate qualification certificate].



3. Click on [Close].



*8.5 Application-specific data - Qualification certificate*

The Qualification Certificate is now available via Microsoft Word. Add the required application information in the document (see Figure 8-1 Qualification certificate (page 1) (Page 77), Figure 8-2 Qualification certificate (page 2) (Page 78) and Figure 8-3 Qualification certificate (page 3) (Page 79)).

**SIEMENS****Qualification Certificate SITRANS FUS/E080 based flowmeter**

<p><b>Application / Customer:</b></p> <p>Name _____  Address _____  _____  _____  Phone _____  Email _____</p> <p>Measured liquid: Water  Process temperature: Min. _____ °C  Max. _____ °C</p>	<p><b>FUS080 Transmitter Identification</b></p> <p>Type (module type): SONOKIT/FUS880  Software Version: 2.04P15  Product Code No.: 7ME32202FA111VA1  Product Code No.: _____ (transm. label)  System Serial No.: 123456H123  System Serial No.: _____ (transm. label)  System Serial No.: _____ (sensor label)</p> <p>Are the PDM and nameplate data shall the same?  Passed : _____ (Date and signature)  <input type="checkbox"/> Yes <input type="checkbox"/> No _____</p>
<p><b>General System Settings</b></p> <p>Qmax: 2200.0 m3/h  Low flow cut-off: 0.25 per cent of Qmax</p> <p>Settings of transmitter label:  Qi (Qmin): _____ m3/h (transmitter label)  Qp (Qnom): _____ m3/h (transmitter label)  Qs (Qmax): _____ m3/h (transmitter label)</p> <p>Calibration factor: 0.95602  Calibration factor: _____ (transmitter label)  Adjustment factor: 1.0 (should be 1.0)</p> <p>Are the PDM and nameplate data shall the same?  Passed : _____ (Date and signature)  <input type="checkbox"/> Yes <input type="checkbox"/> No _____</p>	<p><b>Sensor Details</b></p> <p>Sensor size: DN200  Pipe diameter: 0.464 m  No. of tracks: 2  Rn of track 1: 1.01055  Rn of track 2: 1.01055  Inlet pipe: _____ m</p> <p><u>For remote transmitter only:</u>  Sensor cable length: 15.0 m  Sensor cable length: _____ m (real length +/- 0.5 m)</p> <p>Sensor check: Is the installation and the sensor ok?  Passed : _____ (Date and signature)  <input type="checkbox"/> Yes <input type="checkbox"/> No _____</p>
<p><b>Totalizer values</b></p> <p>Totalizer 1: 0.0 m3  Totalizer 2: 0.0 m3  Customer Totalizer 3: 0.0 m3  Customer Totalizer 3 reset: 7/11/2017</p> <p>Customer Totalizer 3 reset done?  _____  (Date and signature)  <input type="checkbox"/> Yes <input type="checkbox"/> No _____</p>	<p><b>Power Supply Status</b></p> <p>Power supply: Battery only  Battery installation date: 7/11/2017  Battery consumed power: 0.0707087 Ah  Battery capacity: 25.0 Ah  (Default: 12,5 Ah single- or 25 Ah double -pack battery)  Battery alarm limit: 80.0 per cent  Battery change and capacity calculation reset done?  _____  (Date and signature)  <input type="checkbox"/> Yes <input type="checkbox"/> No _____</p>
<p><b>Transmitter output A (pulse output)</b></p> <p>Output enable: Yes  Pulse direction: Forward  Amount per pulse: 1.0 m3  Pulse width: 5 ms  Amount per pulse: _____ m3 (transmitter label)  Pulse width: _____ ms (transmitter label)</p> <p>Are the PDM and nameplate data shall the same?  Passed : _____ (Date and signature)  <input type="checkbox"/> Yes <input type="checkbox"/> No _____</p>	<p><b>Transmitter output B</b></p> <p>Output enable: Yes  Output function: Alarm  Pulse direction: _____ (pulse function only)  Amount per pulse: _____ (pulse function only)  Pulse width: _____ (pulse function only)  Amount per pulse: _____ m3 (transmitter label)  Pulse width: _____ ms (transmitter label)</p> <p>Are the PDM and nameplate data shall the same?  Passed : _____ (Date and signature)  <input type="checkbox"/> Yes <input type="checkbox"/> No _____</p>

Figure 8-1 Qualification certificate (page 1)



**Qualification Certificate SITRANS FUS/E080 based flowmeter**

<p><b>Measurement Function, Operation and Diagnostic:</b>                  Flow rate: 0.0 m3/h                  Flow rate: _____ m3/h (transm. display)                  Relative flow rate: 0.0 per cent of Qmax                  (shall be below 100SONOKIT/FUS880)                   Actual velocity track 1: 0.0 m/s                  Actual velocity track 2: 0.0 m/s                  (values must be the same for both tracks, +/- 0.05 m/s ok)                   Track 1 gain step: 15.0                  Track 2 gain step: 15.0                  (values must be the same for both tracks, +/- 1 ok)                  Refer to chapter in the operating instructions ('Diagnosing').                   Passed : _____ (Date and signature)  <input type="checkbox"/> Yes <input type="checkbox"/> No</p>	<p><b>Faults / Alarms</b>                  Transmitter fault status: 1,2                   Are any alarms / faults or warnings on the display?  <input type="checkbox"/> Yes <input type="checkbox"/> No                   If yes, which codes are shown:  <input type="checkbox"/>F1 <input type="checkbox"/>F2 <input type="checkbox"/>F3 <input type="checkbox"/>F4 <input type="checkbox"/>F5 <input type="checkbox"/>F6 <input type="checkbox"/>F7 <input type="checkbox"/>F8 <input type="checkbox"/>F9                   For code check refer to the related chapter in the operating instructions ('Troubleshooting/FAQs').                   Passed : _____ (Date and signature)  <input type="checkbox"/> Yes <input type="checkbox"/> No</p>
------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

<p><b>Service / Diagnostic</b>                  Fixed flow mode enable: No                  Fixed flow value: 0.0 m3/h                  (max. allowed value is Qmax = 2200.0 m3/h)                   Output A controlling Auto                  Output B controlling Auto                   Check: The fixed flow shall be 'No' and outputs 'Auto'.                   Passed : _____ (Date and signature)  <input type="checkbox"/> Yes <input type="checkbox"/> No</p>	<p><b>Add-on module (optional):</b>                  Enabled: Yes                  Scaling : 380.0 m3/h                  Direction: Positive                  Filter time constant: 5.0 s                  Alarm level: 3.6 mA                  Fixed mode: No                  (Default: The fixed mode shall be 'No')                   Measured output value: _____ mA                   Are the option module data as expected?                  Passed : _____ (Date and signature)  <input type="checkbox"/> Yes <input type="checkbox"/> No</p>
---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

**Comments**

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Final Qualification Passed:  Yes  No

The values were verified of (name) \_\_\_\_\_

Date and signature \_\_\_\_\_

Figure 8-2 Qualification certificate (page 2)

# SIEMENS

## **Qualification Certificate      SITRANS FUS/E080 based flowmeter**

Information for the executing service specialist:

1. Generate the certificate via the SIMATIC PDM and the connected transmitter (PDM = Process Device Manager).
2. The system data in the certificate will be automatically uploaded from the transmitter into this report.
3. Fill in the application / customer information in top left field.
4. Print out the Qualification Certificate generated from PDM.
5. Compare the values of the Qualification Certificate with the recommended reference values of the operating instructions. Tick “Yes” if parameter values are within accepted range and “No” if out of range.
6. Enter date and sign each of the checked items.
  - If all parameter values have passed, the Qualification Certificate is ready for the customer.
  - If one or more parameter value did not pass, please verify it by contact our specialists of the Siemens Customer Support

### NOTES

1. These Qualification Certificate supporting transmitter types FUS/E080 with FW version 2.04
2. Execution of the Qualification Certificate feature requires that there is filled sensor and flow in the tube. In case an empty pipe situation is present, some values will be outside the normal range and alarms are indicated (f. e. F 1 and 2 alarm).
3. For any additional help please contact for it your local Siemens Customer Support

Figure 8-3    Qualification certificate (page 3)

## 8.6      **Return procedures**

Enclose the delivery note, the cover note for return delivery together with the declaration of decontamination form on the outside of the package in a well-fastened clear document pouch.

## Required forms

- **Delivery Note**
- **Cover Note for Return Delivery** with the following information  
Return delivery form (<http://support.automation.siemens.com/WW/view/en/16604370>)
  - product (ordering number)
  - number of devices or spare parts returned
  - reason for the return
- **Declaration of Decontamination**  
Decontamination declaration ([http://pia.khe.siemens.com/efiles/feldg/files/Service/declaration\\_of\\_decontamination\\_en.pdf](http://pia.khe.siemens.com/efiles/feldg/files/Service/declaration_of_decontamination_en.pdf))  
*With this declaration you certify that the returned products/spare parts have been carefully cleaned and are free from any residues.*  
If the device has been operated together with toxic, caustic, flammable or water-damaging products, clean the device before return by rinsing or neutralizing. Ensure that all cavities are free from dangerous substances. Then, double-check the device to ensure the cleaning is completed.  
We will not service a device or spare part unless the declaration of decontamination confirms proper decontamination of the device or spare part. Shipments without a declaration of decontamination will be cleaned professionally at your expense before further proceeding.

You can find the forms on the Internet and on the DVD delivered with the device.

---

### Note

#### Return of products with Lithium batteries

Lithium batteries are certified as dangerous goods according to the Regulation of Dangerous Goods, UN 3090 and UN 3091. Special transport documentation is required to observe these regulations.

Therefore it is recommended to remove lithium batteries prior to shipment

If the battery is important for the examination of the product and it cannot be removed, the product has to be returned according to the Regulation of Dangerous goods.

---

## 8.7



## Battery disposal

In accordance with EU directive 2006/66/EC, batteries are not to be disposed of via municipal waste disposal services.

Waste industrial batteries from our products are accepted back by Siemens and by the local Siemens representatives. Please follow the return procedures of Siemens or talk to your local Siemens partner (<http://www.automation.siemens.com/partner>).



## Troubleshooting/FAQs

### 9.1 Error codes

A list of error codes is available in SIMATIC PDM (active errors are check-marked). Access to this list is gained via [Diagnostics → Device Status] in parameter 200 *Fault status*.. In the figure below, error code F 5 is active.

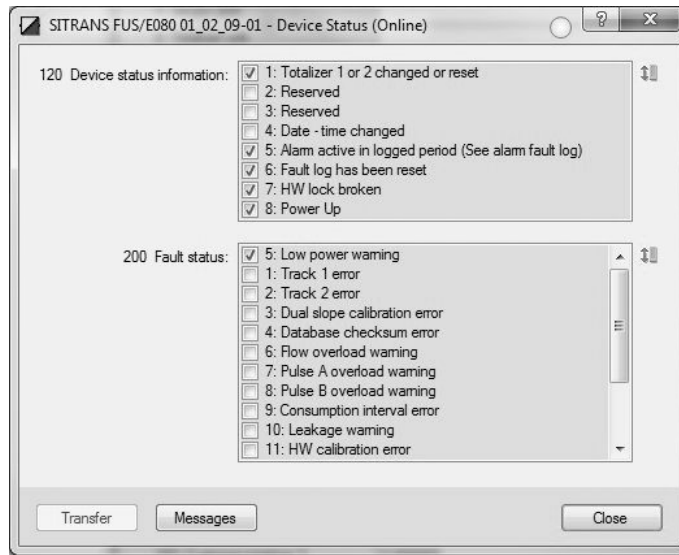


Figure 9-1 List of error codes shown in PDM

Table 9-1 Error codes shown in the display and in PDM

Error code	Error	Remedy/Cause
Blank display	Battery plug not connected, or battery empty, mains power interrupted	<ul style="list-style-type: none"> <li>• Check flowmeter version. Battery version not able to run on mains power</li> <li>• Battery empty: Replace battery pack</li> <li>• Battery plug not plugged into the transmitter, see Battery replacement (Page 69)</li> </ul>
F 1	Path 1 (upper path) not measuring	No water in upper part of pipe and/or cables or sensor 1A or 1B defective
F 2	Path 2 (lower path) not measuring	No water in lower part of pipe and/or cables or sensor 2A or 2B defective
F 3	Internal software failure	Contact Siemens customer support
F 4	Internal software failure	Contact Siemens customer support
F 5	Power supply warning	<ul style="list-style-type: none"> <li>• Mains power fails (only mains-powered versions with battery back-up)</li> <li>• Replace battery pack (battery-powered versions only)</li> </ul>

Error code	Error	Remedy/Cause
F 6	Flow exceeds preset flow rate in unit (max. speed 10 m/s)	Flowrate too high
F 7	Pulse output A overflow	Pulse output exceeds 100 Hz or 50% duty cycle
F 8	Pulse output B overflow	Pulse output exceeds 100 Hz or 50% duty cycle
F 9	Datalogger warning/alarm	Datalogger warning monitors whether actual consumption on Totalizer 1 is on end of log interval or above/below the limit settings. The warning has no influence on the flowmetering. Check data logger values and consumption limit (via PDM parameter 602)

Errors "F 1" to "F 4" affect the performance of the meter and the flowmeter may stop measuring. Errors "F 1" and "F 2" disappear when the alarm condition is corrected.

Errors "F 5" to "F 9" are only warnings and do not affect the measurement, but they will influence the outputs.

The error indications disappear when the alarm conditions are corrected and a reset via the communication interface has been carried out.

### Example

Error code "F 1 2" in the display indicates a combination of error codes "F 1" and "F 2".

Possible causes:

- Empty pipe
- Path 1 and path 2 cables defective
- Path 1 and path 2 cables not connected
- Sensors defective

## 9.2 Diagnosing with PDM

SIMATIC PDM is a suitable tool for diagnosing the device. You can use SIMATIC PDM to read all parameters available in FUS080 to a table for analyzing offline, view online/actual process values and online/actual diagnostic information.

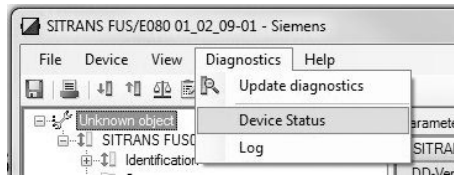
### Requirements

The following procedure must be completed before diagnosing:

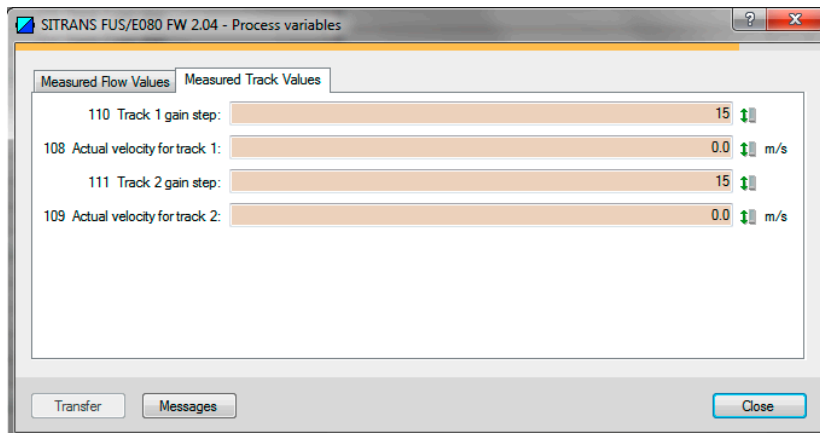
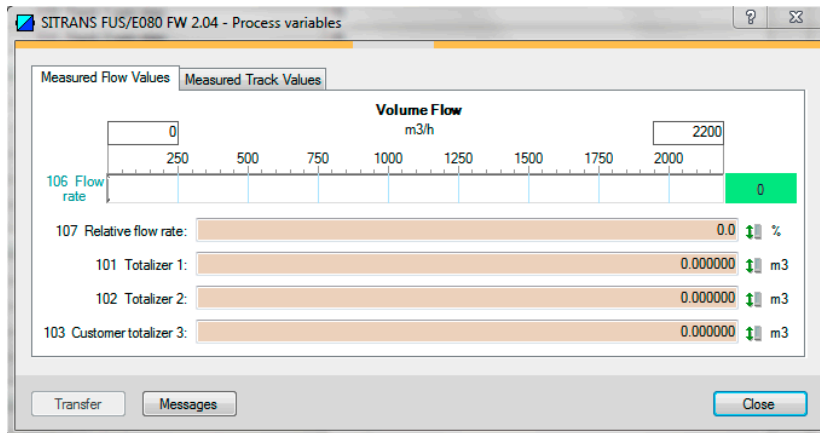
- Connection of Modbus interface via PC and IrDA, see also Commissioning via PDM (Page 52)
- Installation of PDM and FUS080 PDM driver, see also Installing the device driver (Page 54)

## Diagnosing with PDM

Access the device status via [Diagnostic → Device Status].



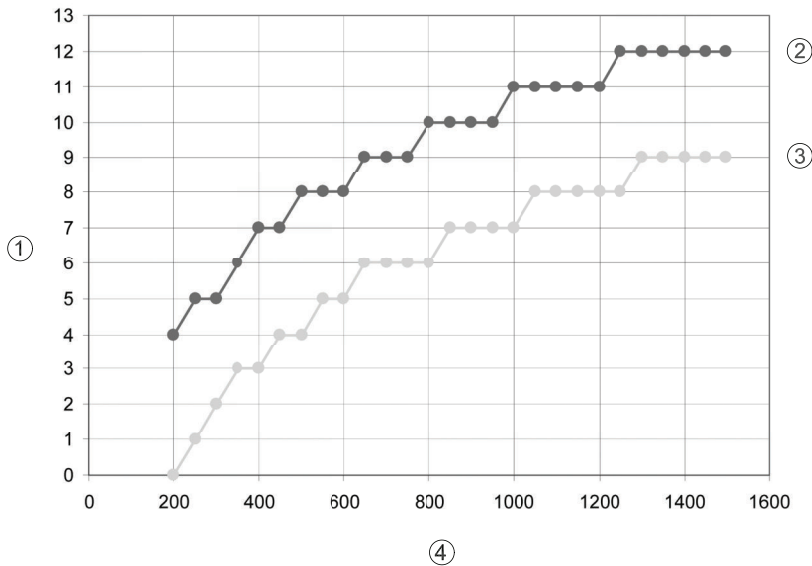
Online process values are available under menu [View → Display].



The **Measured Track Values** tab shows the gain steps and the flow velocities for path 1 and path 2. For 1-path applications the values for path 2 (track 2) are 0.

The gain steps depend on the pipe size and the conditions of the measuring media.

The flow velocities depend on the flow in the pipe.



- ① Gain step
- ② Gain step max
- ③ Gain step min
- ④ Sensor distance [mm]

Figure 9-2 SITRANS FUS080 Gain step vs. Sensor distance

**Gain step**

The graph above shows which gain step to expect for a particular sensor distance (face to face distance). The upper curve indicates the upper limit and the lower curve indicates the lower limit.

The graph applies to perfectly aligned sensors in clean water, but takes into account the expected variance from the converter and the sensors.

**Gain step error conditions**

Condition	Cause
15	<ul style="list-style-type: none"> <li>• No sensor (e.g. defective cable)</li> <li>• Empty pipe</li> </ul>
High values	<ul style="list-style-type: none"> <li>• High damping (e.g. inhomogeneous media)</li> <li>• Unsuitable medium</li> <li>• Path angular misalignment</li> </ul>
Unstable/fluctuating values	<ul style="list-style-type: none"> <li>• Air bubbles or solids in medium</li> <li>• Bad inlet conditions</li> </ul>
$\Delta$ gain step between path 1 and path 2 > 1 (2-path systems only)	<ul style="list-style-type: none"> <li>• Bad inlet conditions</li> <li>• Inhomogeneous medium</li> <li>• Path angular misalignment</li> </ul>

In case of angular misalignment between sensor faces, the gain step will increase as shown in the table below:

Angular misalignment	Gain step increase
2°	1
3°	2
4°	3
5°	5

#### Flow velocity error conditions

Condition	Cause
$\Delta$ flow velocity values (between path 1 and path 2) > 1 (2-path systems only)	<ul style="list-style-type: none"> <li>• Bad inlet conditions (the higher the delta, the worse the inlet conditions)</li> <li>• Disturbances in the pipe (bad flow profile)</li> </ul>
Unstable/fluctuating values	<ul style="list-style-type: none"> <li>• Air bubbles or solids in media</li> <li>• Bad inlet conditions</li> </ul>

The actual velocities for the paths should be stable, constant and smoothly changing values between 0 and 10 m/s.



## Technical data

### 10.1 Accuracy

Typical accuracy SITRANS FUS380:

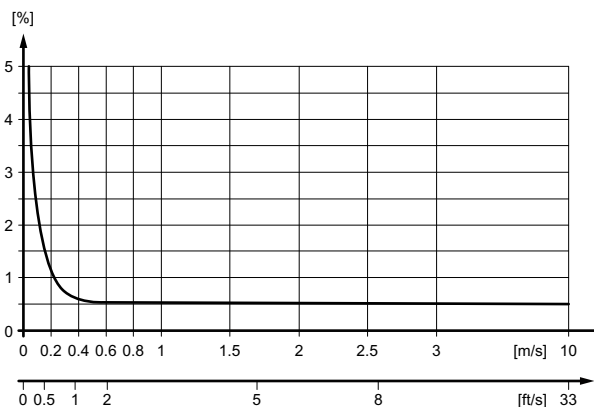
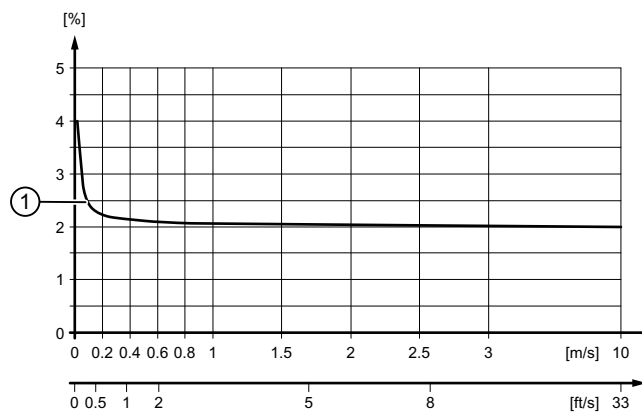


Figure 10-1 Accuracy SITRANS FUS380

$\pm 0.5\%$  for  $0.5\text{ m/s} < v < 10\text{ m/s}$  and  $\pm 0.25 N_{\text{act.}} [\%]$  below  $0.5\text{ m/s}$

Typical accuracy SITRANS FUE380:



① FUE380 - Admissible limits according to EN 1434 class 2 and OIML R 75 class 2  
Figure 10-2 Accuracy SITRANS FUE380

$\pm (0.5 + 0.02 Q_p/Q) [\%]$

$Q_p$  according to EN 1434/OIML requirements

SITRANS FUE380 fulfills the requirements:

$E_f = \pm (2 + 0.02 Q_p/Q) \text{ max. } \pm 5\%$ , according to EN 1434 and OIML R 75, class 2 or MID class 2 requirements

Example: DN100,  $Q_p = 60\text{m}^3/\text{h}$  and  $Q = 1.2\text{ m}^3/\text{h}$   
 $E_f = \pm (2 + 0.02 Q_p/Q) = \pm (2 + 0.02 (60/1.2)) = \pm (2 + 1) = \pm 3\%$

## 10.2 FUS380 and FUE380 systems

Table 10-1 Technical data SITRANS FUS380 and FUE380

Description	Specification
Enclosure design/material	Fiber glass reinforced polyamide in light-gray color
Enclosure	IP67 according to EN 60529 and DIN 40050 (NEMA 4X/6)
Wall mounting kit	Terminal box made of fiber glass reinforced polyamide in light-gray color with cable glands and a stainless steel bracket for wall or pipe mounting
Cable glands	In wall mounting kit: 3 x M20 PA plastic cable glands (1 for mains power supply cable, and 2 for output cables)
Ambient temperature	<ul style="list-style-type: none"> <li>MID version: -10 °C to +55 °C (14 °F to 131 °F)</li> <li>Non-MID version: -10 °C to +60 °C (14 °F to 140 °F)</li> </ul>
Storage temperature	-40 °C to + 85 °C (-40 °F to +185 °F)
Sensor cables	Coaxial cable, impedance 75 Ohm, $\varnothing$ app. 6 mm
Connection cable	Cable length: Max. 30 meter between transmitter and sensor terminal box (5 m (16.4 ft), 10 m (32.8 ft), 20 m (65.6 ft), or 30 m (98.4 ft) available)
Mechanical vibration	2 g, 1 to 800 Hz sinusoidal in all directions according to IEC 68-2-6
Power supply	Battery <sup>1)</sup> : <ul style="list-style-type: none"> <li>Replaceable 3.6 V LiSOCl (Lithium Thionyl Chloride)</li> <li>Double battery pack 33 Ah or single back-up battery 16.5 Ah;</li> <li>Battery change interval: 4.2 / 6 years at 60 °C (140 °F) operation</li> </ul> Mains: <ul style="list-style-type: none"> <li>87 to 265 V AC (50 to 60 Hz)</li> </ul>
Display	<ul style="list-style-type: none"> <li>LCD, 8 digits, additional 2 digits and symbols for status information</li> <li>Units: Volume unit: <math>\text{m}^3</math> (default display unit), Flow unit: <math>\text{m}^3/\text{h}</math> (default display unit)</li> <li>Alarm codes (F 1 to F 9) for: path 1 or 2 not measuring, internal failure, power supply failure, flow overload, pulse output frequency overload, data logger warning</li> </ul>
Push button	One push button for toggling between display information
Measuring function	<ul style="list-style-type: none"> <li>0.5 Hz battery mode</li> </ul> or <ul style="list-style-type: none"> <li>15 Hz mains-powered</li> </ul>
Communication	IrDA on display panel (Modbus RTU protocol)



Description	Specification
Outputs (standard)	<ul style="list-style-type: none"> <li>Two passive, galvanically isolated open drain-mos outputs (output A and B)</li> <li>Max. <math>\pm 35</math> V, 50 mA</li> <li>Output A: Preset to pulse output for forward flow (default: 100 l/pulse)</li> <li>Output B: Preset to alarm for present failure</li> <li>Pulse width: 5, 10, 20, 50, 100, 200, 500 ms (default: 5 ms)</li> <li>Max. pulse frequency: 100 Hz at Qmax setting (105 % of Qs)</li> </ul>
EMC	EN/IEC 61326-1 (Industry)
Transmitter weight	1.5 kg (3 lb)

<sup>1)</sup> Waste industrial batteries are accepted back by Siemens or by the local Siemens representative. Please talk to your local Siemens contact or follow the return procedures of Siemens Flow Instruments.

Table 10-2 Pulse output / Cable specification

Description	Specification
Outer diameter	6 to 12 mm (0.24" to 0.47")
Number of wires	Min. two
Wire size	0.2 to 1.5 mm <sup>2</sup>
Cable type	Single shielded
Temperature	Ambient: -20 to +60 °C (-4 to +140 °F) Storage: -40 to +85 °C (-40 to +185 °F)

## 10.3 Optional current output module

Table 10-3 Technical data for optional current output module

Description	Specification
Type	Passive current output
Output range	4 to 20 mA (4 mA: Represents no flow; 20 mA scaling: Assigned to Qp, defined by order code 20 mA scaling range can be between cut off and Qmax) Flow functions up to 20.5 mA, in the range of 3.6 mA to 22.6 mA
Alarm limit	3.6 mA or 22.6 mA (Default setting: 3.6 mA)
Accuracy	0.1 % of full scale, drift 50 ppm/K
Dimensions	L x W x H: 78 x 43 x 15 mm (3.07" x 1.69" x 0.59")
Ambient temperature	Operation: -20 to +60 °C (-4 to +140 °F) Storage: -40 to +85 °C (-40 to +185 °F)
Power supply	Passive module External supply voltage: 8.5 to 36 VDC

10.4 Output characteristics

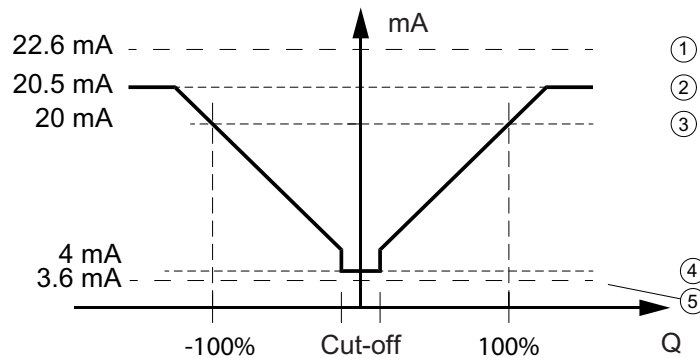
Description	Specification
Max. load	$R_{\max} = (U \text{ ext. supply} - 8.5 \text{ V}) / 25 \text{ mA}$
Update time	< 0.3 seconds
Output stabilization	90 % within 0.2 seconds
Initialization value	3.6 mA (output value during system start up when the current output module is enabled)
Fixed value	4 mA (output value when the current output module is disabled)
Galvanic isolation	Yes

Table 10-4 Requirements for current output cable

Description	Specification
Outer diameter	6 to 12 mm (0.24" to 0.47")
Number of wires	Min. two
Wire size	0.2 to 1.5 mm <sup>2</sup>
Cable type	Single shielded
Temperature	Ambient: -20 to +60 °C (-4 to +140 °F) Storage: -40 to +85 °C (-40 to +185 °F)

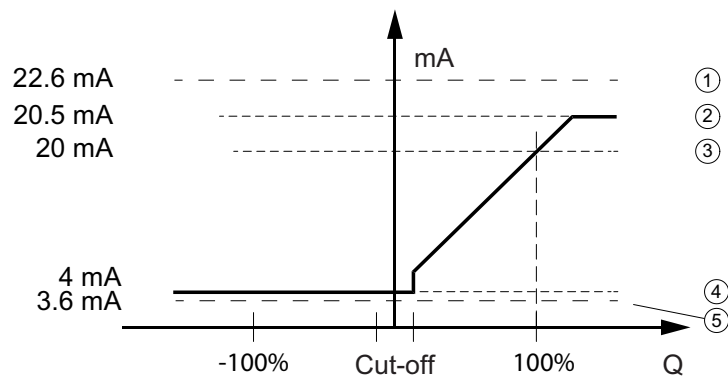
## 10.4 Output characteristics

### Current output



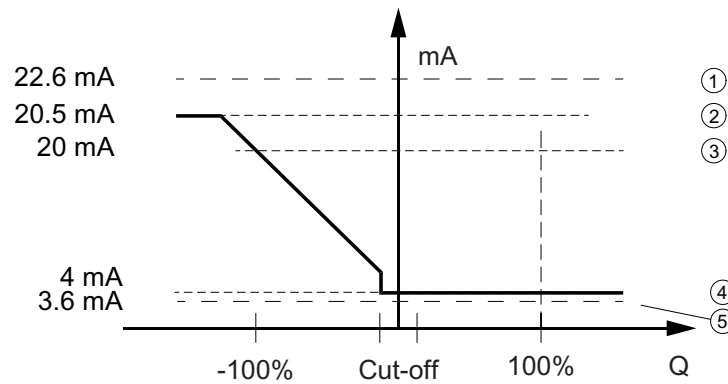
- ① Upper alarm limit
- ② Upper current limit
- ③ Upper current scaling point
- ④ Lower current scaling point
- ⑤ Lower alarm limit

Figure 10-3 Bidirectional flow



- ① Upper alarm limit
- ② Upper current limit
- ③ Upper current scaling point
- ④ Lower current scaling point
- ⑤ Lower alarm limit

Figure 10-4 Positive flow



- ① Upper alarm limit
- ② Upper current limit
- ③ Upper current scaling point
- ④ Lower current scaling point
- ⑤ Lower alarm limit

Figure 10-5 Negative flow

## 10.5 Battery

Table 10-5 Battery types

Description	Specifications
Main battery (for battery-powered versions)	Replaceable 3.6 V LiSOCl (Lithium Thionyl Chloride) dual battery pack 34 Ah of two D-cell types
Back-up battery (for mains-powered versions)	Single battery 17 Ah of one D-cell type

### Note

The batteries are not rechargeable; they should be replaced after maximum 6 years.

### Consumption and battery operation time calculation

For battery versions, the battery operation time depends on the connected battery pack as well as the operation conditions of device.

Every 5 minutes the advanced power management system of the transmitter calculates the battery consumption and the remaining battery operation time.

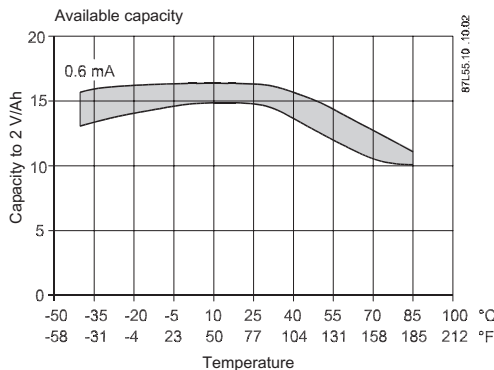
For battery versions, only the internal battery pack has a nominal capacity of 34 Ah giving a typical operation time up to 6 years in a revenue application.

The ambient temperature of the transmitter also influences the battery capacity.

The typical operation time up to 6 years is based on only 80% battery capacity, low pulse output frequency, seldom use of communication and an operation time/temperature profile of 5% at 0 °C (32 °F), 80% at 15 °C (59 °F) and 15% at 50 °C (122 °F).

The effect of other temperatures is shown in the figure below.

A variation in temperature from 15 °C to 55 °C (59 °F to 131 °F) reduces the capacity by 17% (in the figure from 15 Ah to 12½ Ah).



**Note**

The installation orientation of the battery pack may influence the battery capacity. Optimal battery capacity is achieved with the battery pack in an upright position.

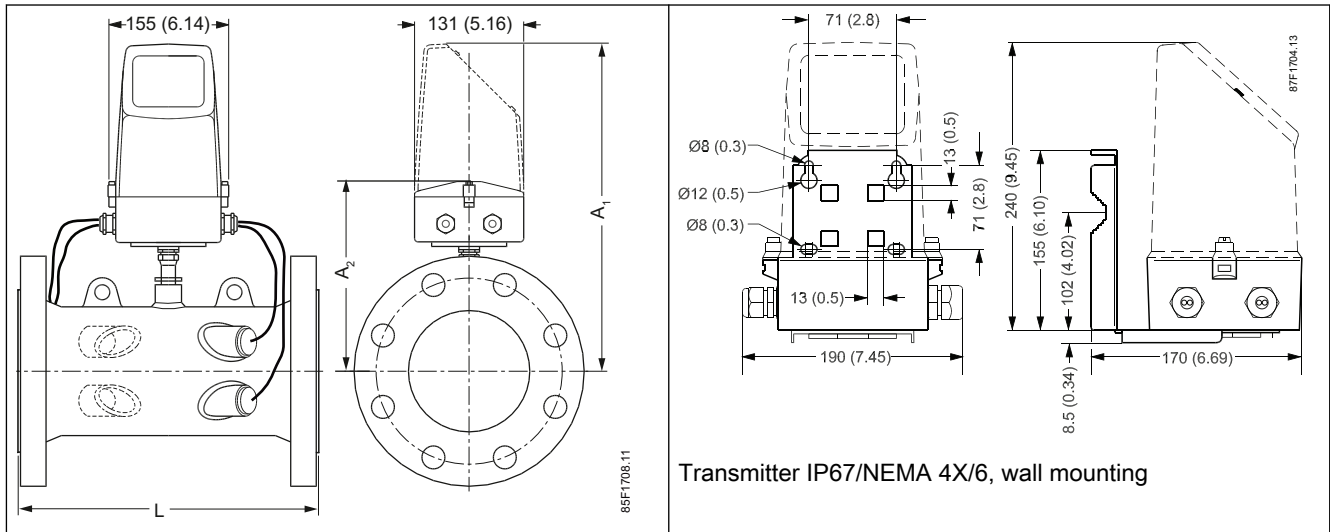
## 10.6 Sensor for FUS380 and FUE380

Table 10-6 Technical data

Description	Specification
Pipe design	2-track sensor with flanges and integrated sensors wet-calibrated from factory
Nominal size	DN 50, 65, 80, 100, 125, 150, 200, 250, 300, 350, 400, 500, 600, 700, 800, 900, 1000, 1200
Pressure rate	PN 16, PN 25, PN 40 EN 1092-1 flanges: <ul style="list-style-type: none"> <li>• type 01: DN 100 to DN 125</li> <li>• type 11: DN 150 to DN 1200</li> <li>• type 11 'design': DN 50 to DN 80</li> </ul>
Pipe materials	<ul style="list-style-type: none"> <li>• DN 100 to 1200: Carbon Steel EN 1.0345 / p235 GH, painted in light gray</li> <li>• DN 50 to DN 80: Die-cast bronze G-CuAn 10/W2.1050.01 (EN1982)</li> </ul>
Sensor design	<ul style="list-style-type: none"> <li>• DN 100 to 1200: Integrated version and welded onto the pipe</li> <li>• DN 50 to 80: Screwed into the pipe</li> </ul>
Sensor material	Stainless steel (AISI 316 / 1.4404) / brass (CuZn36Pb2As)
Medium temperature	DN 100 to 1200: <ul style="list-style-type: none"> <li>• Remote: 2 to 200 °C (35.6 to 392 °F) <sup>1)</sup></li> </ul> DN 50 to 80: <ul style="list-style-type: none"> <li>• Remote: 2 to 150 °C (35.6 to 302 °F) <sup>1)</sup></li> </ul> DN 50 to 1200: <ul style="list-style-type: none"> <li>• Compact: 2 to 120 °C (35.6 to 248 °F) <sup>1)</sup></li> </ul>
Measured media	Heating water, according to VDI-2035 (pH 8.2 - 10.5), industrial VdTÜV information sheet 1466 and AGFW information sheet FW 510

<sup>1)</sup> MID: minimum temperature 15 °C (59 °F)

### 10.7 Dimensional drawings for FUS380 and FUE380



### 10.8 Sensor dimensions for FUS380 and FUE 380

Size	PN 16		PN 25		PN 40		Material	A <sub>1</sub>	A <sub>2</sub>	Lift hug
	L	Weight	L	Weight	L	Weight				
DN	mm	kg	mm	kg	mm	kg	mm	mm		
50	-	-	-	-	300 +0/-2	10	Bronze	350	196	No
65	-	-	-	-	300 +0/-2	15	Bronze	363	206	No
80	-	-	-	-	350 +0/-2	18	Bronze	370	216	No
100	350 +0/-2	15	-	-	350 +0/-2	18	Steel	372	221	No
125	350 +0/-2	18	-	-	350 +0/-2	24	Steel	385	226	No
150	500 +0/-3	28	-	-	500 +0/-3	34	Steel	399	236	No
200	500 +0/-3	38	500 +0/-3	47	500 +0/-3	55	Steel	425	260	Yes
250	600 +0/-3	60	600 +0/-3	76	600 +0/-3	91	Steel	452	286	Yes
300	500 +0/-3	66	500 +0/-3	81	-	-	Steel	478	312	Yes
350	550 +0/-3	94	550 +0/-3	121	-	-	Steel	495	341	Yes
400	600 +0/-3	124	600 +0/-3	153	-	-	Steel	520	353	Yes
500	625 +0/-3	194	625 +0/-3	231	-	-	Steel	570	404	Yes
600	750 +0/-3	303	750 +0/-3	365	-	-	Steel	622	455	Yes
700	875 +0/-3	361	875 +0/-3	565	-	-	Steel	673	506	Yes
800	1000 +0/-3	494	1000 +0/-3	770	-	-	Steel	724	556	Yes
900	1230 +0/-6	535	1300 +0/-6	835	-	-	Steel	775	606	Yes
1000	1300 +0/-6	594	1370 +0/-6	1078	-	-	Steel	826	656	Yes
1200	1360 +0/-6	732	-	-	-	-	Steel	928	756	Yes

10.8 Sensor dimensions for FUS380 and FUE 380

Size	PN 16		PN 25		PN 40		Material	A <sub>1</sub>	A <sub>2</sub>	Lift hug
	L	Weight	L	Weight	L	Weight				
inch	inch	lb	inch	lb	inch	lb	inch	inch		
2	-	-	-	-	11.81 +0/-0.08	22	Bronze	13.78	7.72	No
2 1/2	-	-	-	-	11.81 +0/-0.08	33	Bronze	14.30	8.11	No
3	-	-	-	-	13.78 +0/-0.08	40	Bronze	14.57	8.50	No
4	13.78 +0/-0.08	33	-	-	13.78 +0/-0.08	40	Steel	14.65	8.70	No
5	13.78 +0/-0.08	40	-	-	13.78 +0/-0.08	53	Steel	15.16	8.90	No
6	19.68 +0/-0.12	62	-	-	19.68 +0/-0.08	75	Steel	15.71	9.29	No
8	19.68 +0/-0.12	84	19.68 +0/-0.12	104	19.68 +0/-0.12	121	Steel	16.74	10.24	Yes
10	23.62 +0/-0.12	132	23.62 +0/-0.12	168	23.62 +0/-0.12	201	Steel	17.80	11.26	Yes
12	19.68 +0/-0.12	146	19.68 +0/-0.12	179	-	-	Steel	18.82	12.28	Yes
14	21.65 +0/-0.12	207	21.65 +0/-0.12	267	-	-	Steel	19.49	13.43	Yes
16	23.62 +0/-0.12	273	23.62 +0/-0.12	337	-	-	Steel	20.48	13.90	Yes
20	24.61 +0/-0.12	428	24.61 +0/-0.12	509	-	-	Steel	22.45	15.91	Yes
24	29.53 +0/-0.12	668	29.53 +0/-0.12	805	-	-	Steel	24.49	17.91	Yes
28	34.45 +0/-0.12	796	34.45 +0/-0.12	1246	-	-	Steel	26.50	19.92	Yes
32	39.37 +0/-0.12	1089	39.37 +0/-0.12	1698	-	-	Steel	28.51	21.89	Yes
36	48.43 +0/-0.24	1179	51.18 +0/-0.24	1841	-	-	Steel	30.52	23.86	Yes
40	51.18 +0/-0.24	1310	53.94 +0/-0.24	2205	-	-	Steel	32.52	25.83	Yes
48	53.54 +0/-0.24	1614	-	-	-	-	Steel	36.54	29.76	Yes

Weight for transmitter/electronics 1.5 kg (3.3 lb) (compact version) or approximately 5 kg (11 lb) (remote version including 10 m (32.8 ft) cable set).

For flange values - see norm EN 1092-1.

- means not available.

All weights are **approximate**.





## Parameter lists

The following tables show the various parameters available via PDM.

The parameters are accessible at three different levels:

- Read: Maintenance level
- Read/Write (R/W): Specialist level (write access is only permitted after entering the user password; default password is 1000)
- Hardware locked (HW key): The parameter is only accessible when a HW key is mounted

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### Note

For type-approved and verified FUE380 flowmeter the settings are HW key protected and therefore read only. This HW key is protected via the verification sealing. The verification sealing can only be opened by the user with the acceptance of the local authorities.

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## A.1 Identification

Table A-1 Identification parameters (FW 2.04 and EDD 1.02.09-08)

Parameter		Default value	Value range	Access level	Description
1	Application identifier	Identity		R/W	Customer application identification information (max 16 characters)
2	Application location	Location		R/W	Customer application location information (max 16 characters)
<b>Device</b>					
5	Sensor size	Product dependent		R/W	Pipe diameter of the sensor. It is only a text field for measurement system information. The value has no influence on the measurement. Please see inner diameter at pipe date in parameter 306
8	Totalizer unit	m <sup>3</sup>	See Table A-6 Totalizer units (Page 108)	R/W	Totalizer unit as text for volume. Change the unit in parameter table if the device menu "Unit guide (offline)" does not list the wanted unit. <b>Note:</b> The device display can show "m <sup>3</sup> " unit only - other units cannot be shown on the display, but will be used and shown online via PDM

A.2 Output

Parameter		Default value	Value range	Access level	Description
9	Flow unit	m <sup>3</sup> /h	See Table A-7 Flow rate units (Page 109)	R/W	Flow unit as text for actual flowrate. Change the unit in parameter table if the device menu "Unit guide (offline)" does not list the wanted unit.  Note: The device display can show "m <sup>3</sup> /s" unit only - other units cannot be shown on the display, but will be used and shown on-line via PDM.
10	Maximum flow	Qmax	1000000 m <sup>3</sup> /h	R/W	Maximum flow
20	Vendor name	Siemens AG		Read	Siemens AG Flow Instruments, Germany
21	Module type	Product dependent	<ul style="list-style-type: none"> <li>• FUE380</li> <li>• FUS380</li> </ul>	Read	Type of flowmeter, depending on ordered system
22	Software version	2.03		Read	Software version of the flowmeter
23	Product code number	Product dependent		Read	Siemens production sales code number (the first part of the system number on the nameplate)
24	System Serial number	Product dependent		R/W	Siemens production number (the second part of the system number on the nameplate)
25	Transmitter serial number	Product dependent		HW key	Serial number of the electronics
26	Sensor serial number	Product dependent		Read	Serial number of the sensor

## A.2 Output

Table A-2 Output parameters

Parameter		Default value	Value range	Access level	Description
100	Actual date and time	Product dependent		R/W	Actual date and time (day-month-year and hours:minutes:seconds)
101	Totalizer 1	0	-2000000001 to +2000000001	Read	Volume for totalization register 1
102	Totalizer 2	0	-2000000001 to +2000000001	Read	Volume for totalization register 2
103	Customer totalizer 3	0		Read	Customer totalizer 3 based on totalizer 1 set up
104	Reset customer totalizer 3	No	No, Yes	R/W	Reset of customer totalizer
105	Customer totalizer 3 reset date	Last reset date	dd-mm-yyyy, hh:mm:ss	Read	Date and time when customer totalizer has been reset
106	Flow rate			Read	Actual flow value
107	Relative flow	0		Read	Actual flow value in relation to Qmax
108	Actual flow velocity for path 1	0		Read	The actual flow velocity for path 1 in m/s (SI-unit)

Parameter		Default value	Value range	Access level	Description
109	Actual flow velocity for path 2	0		Read	The actual flow velocity for path 2 in m/s (SI-unit). Valid for 2-path solutions only
110	Path 1 gain step	15	1 to 15	Read	Amplifier setting when measuring path 1
111	Path 2 gain step	15	1 to 15	Read	Amplifier setting when measuring path 2. Valid for 2-path solutions only
<b>Pulse A B</b>					
430	Output A enable	Product dependent	No, Yes	R/W	Select "Yes" to enable output A
431	Pulse A direction	Forward	Forward, Reverse, Forward net, Reverse net	R/W	Pulse output calculation on pure forward flow or pure reverse flow - or net flow for forward and reverse pulse flow. Valid if pulse output A is enabled
432	Amount per pulse A	Product dependent	0.000001 to 100000000	R/W	Volume per pulse and selected unit Valid if pulse output A is enabled.
433	Pulse width for pulse A	Product dependent	5, 10, 20, 50, 100, 200, 500 ms	R/W	Pulse length when the pulse is active. Valid if pulse output A is enabled
440	Output B enable	Product dependent	No, Yes	R/W	Select "Yes" to enable output B
441	Pulse B function	Product dependent	Pulse, Alarm, Call up	R/W	Configuration of output B as pulse - alarm or call up function. Valid if pulse output B is enabled
442	Pulse B direction	Reverse	Forward, Reverse, Forward net, Reverse net.	R/W	Pulse output calculation on pure forward flow or pure reverse flow - or net flow for forward and reverse pulse flow. Valid if pulse output B is enabled and pulse function selected
443	Amount per pulse B	Product dependent	0.000001 to 100000000	R/W	Volume per pulse. Valid if pulse output B is enabled and pulse function selected
444	Pulse width for pulse B	Product dependent	5, 10, 20, 50, 100, 200, 500 ms	R/W	Pulse length when the pulse is active. Valid if pulse output B is enabled and pulse function selected
<b>Communication</b>					
For editing the communication settings, use PDM device menu "Communication Setting"					
591	Device Communication Address	1	1 to 247	Read	Meter has default address value 1 with selectable address up to 247
592	Baud rate	4	0 to 5	Read	Communication port speed
593	Parity	0	0 to 3	Read	Communication port parity
594	Interframe space	35	35 to 255	Read	Minimum space between two messages (bytes x 10)
595	Response delay	5	1 to 50	Read	Minimum time from receiving a request to its response
<b>Data logger</b>					
600	Log interval	Monthly	Daily, Weekly, Monthly	R/W	Log interval

Parameter lists

A.2 Output

Parameter		Default value	Value range	Access level	Description
601	Day of week, if weekly log	Sunday	Monday to Sunday	R/W	When log interval is set to weekly logging, this parameter defines what weekday the logging is performed. Valid if weekly log interval is activated
602	Limit for too high consumption	1E+09	-3.4E+38 to +3.4E+38	R/W	Limit for too high consumption during current log interval. Based on totalizer 1 and the selected unit
603	Limit for too low consumption	-1E+09	-3.4E+38 to +3.4E+38	R/W	Limit for too low consumption during current log interval. Based on totalizer 1 and the selected unit
604	Reset log	No	No, Yes	HW key	Reset data logger
610	Date of latest log period	1/1/2000 12:00:00 AM		Read	
611	Latest Log period totalized (1)	0.000000		Read	
612	Latest Log period totalized (2)	0.000000		Read	
613	Latest Log period fault status	no faults		Read	
614	Latest Log period status information	no flags		Read	
...	...	...	...	...	...
735	Date of log period 26	1/1/2000 12:00:00 AM		Read	
736	Log period 26 totalized (1)	0.000000		Read	
737	Log period 26 totalized (2)	0.000000		Read	
738	Log period 26 fault status	no faults		Read	
739	Log period 26 status information	no flags		Read	
<b>Periodic log Totalizer 1</b>					
160	Next setting date	01-01-2000	dd-mm-yyyy	R/W	Next setting date where actual value of totalizer 1 is stored
161	Latest setting date	01-01-2000	dd-mm-yyyy	Read	Latest setting date where value of totalizer 1 was stored
162	Latest totalizer 1 value	0		Read	Latest stored value of totalizer 1
163	Previous setting date	01-01-2000	dd-mm-yyyy	Read	Previous setting date where value of totalizer 1 was stored
164	Previous totalizer 1 value	0	dd-mm-yyyy	Read	Previously stored value of totalizer 1
<b>Option module</b>					
900	Selection of option module	None	None, Current output	R/W	Selection of output module type
905	SW version			Read	SW version of the module
906	Enable	Yes	No, Yes	R/W	Turn on/off current output
907	Scaling	Qp	Cut-off to Qmax	R/W	Scaling flow to 20 mA
908	Direction	Positive	Positive, Negative, Bidirectional	R/W	Selection of flow direction for 4-20mA

Parameter		Default value	Value range	Access level	Description
910	Fixed mode	No	No, Yes	R/W	Turn on/off fixed current
911	Fixed value	4	3 to 24 mA	R/W	Fixed current value on output
912	Alarm level	3.6 mA	Off, 3.6 mA, 22.6 mA	R/W	Selection of alarm level on current out in case of alarm

## A.3 Diagnostics

Table A-3 Diagnostic

Parameter		Default value	Value range	Access level	Description
<b>Diagnostic</b>					
500	Latest service date	01-01-2000	dd-mm-yyyy	R/W*	Latest service date (can also be used for date of installation)
501	Operating time	0	3.4E+38 h	Read	Total operation hours since last power up
503	Number of startups	0	0 to 65535	Read	Total number of power-ups since first power-up.
<b>Alarm</b>					
200	Fault status		One or more of the following values: 1, 2, 3, 4, ... up to 16	Read	Fault status 1: Path 1 error 2: Path 2 error 3: Dual slope calibration error 4: Database checksum error 5: Low power warning 6: Flow overload warning 7: Pulse A overload warning 8: Pulse B overload warning 9: Consumption interval error 10: Leakage error (not used) 11: Hardware calibration error 12: Not used 13: Not used 14: Not used 15: Not used 16: Not used
202	Date of fault log reset	Last reset date	dd-mm-yyyy, hh:mm:ss	Read	Date of last fault log reset
204	Reset the fault log and faults	No	No, Yes	R/W	Reset the fault log and faults
205	Call up acknowledge	No	No, Yes	R/W	Select "Yes" to reset active call-up
209	Reset consumption log fault	No	No, Yes	R/W	Reset the consumption fault. Caused by too low or too high consumption in the log interval

Parameter lists

A.3 Diagnostics

Parameter		Default value	Value range	Access level	Description
210	Path 1 alarm output enable	Yes	No, Yes	R/W	Select "Yes" to enable current alarm on alarm output / call-up
211	Path 1 fault hours	e.g. 36 h	Read;	Read	Total hours fault active
212	Path 1 fault counter	e.g. 4	0 to 65535	Read	Total number of faults. Valid only if alarm is enabled
213	Path 1 fault appears	Last fault appear date	dd-mm-yyyy, hh:mm:ss	Read	Last time the fault appeared. Valid only if alarm is enabled
214	Path 1 fault disappears	Last fault disappear date	dd-mm-yyyy, hh:mm:ss	Read	Last time the fault disappeared. Valid only if alarm is enabled
215	Path 2 alarm output enable	Yes	No, Yes	R/W	Select "Yes" to enable active alarm on alarm output / call-up. Valid only for 2-path solutions
216	Path 2 fault hours	e.g. 36 h	Read;	Read	Total hours fault active. Valid only for 2-path solutions and if alarm is enabled
217	Path 2 fault counter	e.g. 4	0 to 65535	Read	Total number of faults. Valid only for 2-path solutions and if alarm is enabled
218	Path 2 fault appears	Last fault appear date	dd-mm-yyyy, hh:mm:ss	Read	First time the fault appeared. Valid only for 2-path solutions and if alarm is enabled
219	Path 2 fault disappears	Last fault disappear date	dd-mm-yyyy, hh:mm:ss	Read	Last time the fault disappeared. Valid only for 2-path solutions and if alarm is enabled
220	Dual slope alarm output enable	Yes	No, Yes	R/W	Select "Yes" to enable active alarm on alarm output / call-up
221	Dual slope fault hours	e.g. 0 h	0 to 65535	Read	Total hours fault active. Valid only if alarm is enabled
222	Dual slope fault counter	e.g. 0	0 to 65535	Read	Total number of faults. Valid only if alarm is enabled
223	Dual slope fault appears	Last fault appear date	dd-mm-yyyy, hh:mm:ss	Read	First time the fault appeared. Valid only if alarm is enabled
224	Dual slope fault disappears	Last fault disappear date	dd-mm-yyyy, hh:mm:ss	Read	Last time the fault disappeared. Valid only if alarm is enabled
225	Parameter checksum alarm output enable	Yes	No, Yes	R/W	Select "Yes" to enable active alarm on alarm output / call-up
226	Parameter checksum fault hours	e.g. 0 h	0 ... 65535	Read	Total hours fault active. Valid only if alarm is enabled
227	Parameter checksum fault counter	e.g. 0	0 ... 65535	Read	Total number of faults. Valid only if alarm is enabled

Parameter		Default value	Value range	Access level	Description
228	Parameter checksum fault appears	Last fault appear date	dd-mm-yyyy, hh:mm:ss	Read	First time the fault appeared. Valid only if alarm is enabled
229	Parameter checksum fault disappears	Last fault disappear date	dd-mm-yyyy, hh:mm:ss	Read	Last time the fault disappeared. Valid only if alarm is enabled
230	Low power alarm output enable	Yes	No, Yes	R/W	Select "Yes" to enable active alarm on alarm output / call-up
231	Low power fault hours	e.g. 0 h	0 to 65535	Read	Total hours fault active. Valid only if alarm is enabled
232	Low power fault counter	e.g. 0	0 to 65535	Read	Total number of faults. Valid only if alarm is enabled
233	Low power fault appears	Last fault appear date	dd-mm-yyyy, hh:mm:ss	Read	First time the fault appeared. Valid only if alarm is enabled
234	Low power fault disappears	Last fault disappear date	dd-mm-yyyy, hh:mm:ss	Read	Last time the fault disappeared. Valid only if alarm is enabled
235	Flow overflow alarm output enable	Yes	No, Yes	R/W	Select "Yes" to enable active alarm on alarm output / call-up
236	Overflow fault hours	e.g. 0 h	0 to 65535	Read	Total hours fault active. Valid only if alarm is enabled
237	Overflow fault counter	e.g. 0	0 to 65535	Read	Total number of faults. Valid only if alarm is enabled
238	Overflow fault appears	Last fault appear date	dd-mm-yyyy, hh:mm:ss	Read	First time the fault appeared. Valid only if alarm is enabled
239	Overflow fault disappears	Last fault disappear date	dd-mm-yyyy, hh:mm:ss	Read	Last time the fault disappeared. Valid only if alarm is enabled
240	Pulse A overload alarm output enable	Yes	No, Yes	R/W	Select "Yes" to enable active alarm on alarm output / call-up
241	Pulse A overload fault hours	e.g. 0 h	0 to 65535	Read	Total hours fault active. Valid only if alarm is enabled
242	Pulse A overload fault counter	e.g. 0	0 to 65535	Read	Total number of faults. Valid only if alarm is enabled
243	Pulse A overload fault appears	Last fault appear date	dd-mm-yyyy, hh:mm:ss	Read	First time the fault appeared. Valid only if alarm is enabled
244	Pulse A overload fault disappears	Last fault disappear date	dd-mm-yyyy, hh:mm:ss	Read	Last time the fault disappeared. Valid only if alarm is enabled
245	Pulse B overload alarm output enable	Yes	No, Yes	R/W	Select "Yes" to enable active alarm on alarm output / call-up
246	Pulse B overload fault hours	e.g. 0 h	0 to 65535	Read	Total hours fault active. Valid only if alarm is enabled

Parameter lists

A.3 Diagnostics

Parameter		Default value	Value range	Access level	Description
247	Pulse B overload fault counter	e.g. 0	0 to 65535	Read	Total number of faults. Valid only if alarm is enabled
248	Pulse B overload fault appears	Last fault appear date	dd-mm-yyyy, hh:mm:ss	Read	First time the fault appeared. Valid only if alarm is enabled
249	Pulse B overload fault disappears	Last fault disappear date	dd-mm-yyyy, hh:mm:ss	Read	Last time the fault disappeared. Valid only if alarm is enabled
250	Consumption alarm output enable	Yes	No, Yes	R/W	Select "Yes" to enable active alarm on alarm output / call-up
251	Consumption fault hours	e.g. 0 h	0 to 65535	Read	Total hours fault active. Valid only if alarm is enabled
252	Consumption fault counter	e.g. 0	0 to 65535	Read	Total number of faults. Valid only if alarm is enabled
253	Consumption fault appears	Last fault appear date	dd-mm-yyyy, hh:mm:ss	Read	First time the fault appeared. Valid only if alarm is enabled
254	Consumption fault disappears	Last fault disappear date	dd-mm-yyyy, hh:mm:ss	Read	Last time the fault disappeared. Valid only if alarm is enabled
255	Leakage alarm output enable	Yes	No, Yes	R/W	Select "Yes" to enable active alarm on alarm output / call-up
256	Leakage fault hours	e.g. 0 h	0 to 65535	Read	Total hours fault active. Valid only if alarm is enabled
257	Leakage fault counter	e.g. 0	0 to 65535	Read	Total number of faults. Valid only if alarm is enabled
258	Leakage fault appears	Last fault appear date	dd-mm-yyyy, hh:mm:ss	Read	First time the fault appeared. Valid only if alarm is enabled
259	Leakage fault disappears	Last fault disappear date	dd-mm-yyyy, hh:mm:ss	Read	Last time the fault disappeared. Valid only if alarm is enabled
260	Empty pipe alarm output enable	Yes	No, Yes	R/W	Select "Yes" to enable active alarm on alarm output / call-up
261	Empty pipe fault timer	e.g. 0 h	0 to 65535	Read	Total hours fault active. Valid only if alarm is enabled
262	Empty pipe fault counter	e.g. 0	0 to 65535	Read	Total number of faults. Valid only if alarm is enabled
263	Empty pipe fault appears	Last fault appear date	dd-mm-yyyy, hh:mm:ss	Read	First time the fault appeared. Valid only if alarm is enabled
264	Empty pipe fault disappears	Last fault disappear date	dd-mm-yyyy, hh:mm:ss	Read	Last time the fault disappeared. Valid only if alarm is enabled
<b>Service</b>					



Parameter		Default value	Value range	Access level	Description
510	Fixed flow mode enable	Yes	No, Yes	R/W	Select "Yes" to force the device to show a fixed flow value Default must be "No" Always manually reset the value to "No"
511	Fixed flow value	0	-1E+09 to 1E+09	R/W	Fixed flow value for enabled fixed flow
515	Controlling output A and B	Auto	Auto, Forced	HW key	Control of output A and B is used to stop or force the output A and/or B. For editing, use device menu "Service". Valid if pulse output is enabled
<b>Power</b>					
130	Consumed battery capacity	e.g. 2.054239 Ah		Read	The amount of energy consumed since last time the battery was replaced. Valid only for battery-powered versions
501	Operating hours since power up	1105 h	3.4 E+38	Read	Total operation hours since first power up
503	Numbers of power up	e.g. 4	0 to 65535	Read	Total number of power-ups since first power-up.
540	Battery change enable	No	No, Yes	R/W	Select "Yes" to set battery installation date to current date and reset remaining battery operation capacity to maximum. Valid only for battery-powered versions
541	Battery installation date	last battery installation date	dd-mm-yyyy; hh:mm:ss	Read	Latest installation date of batteries. Valid only for battery-powered versions
542	Power supply mode	Product dependent	Battery only, Mains only, Mains with back-up battery.	Read	The flowmeter is either powered by battery only, mains only or by mains with battery backup. The type is defined by the order code and cannot be changed.
543	Actual battery capacity	Product dependent	0 to 50	R/W**	The capacity of the battery in Ah - Single 16.5 Ah - Dual battery pack 33.0 Ah Valid only for battery-powered versions
544	Battery alarm limit	80	0 to 90	R/W	Present an alarm when the consumed energy superceeds this percentage of the battery capacity. Valid only for battery-powered versions

\* Not supported for FUS080

\*\* Maintenance = Read only

## A.4 Meter setup

Table A-4 Meter setup parameters

Parameter	Default value	Value range	Access level	Description	
<b>Meter Setup</b>					
307	Flow velocity offset	0 m/s	-10 to 10 m/s	HW key	Velocity added to measured flow velocity
310	Calibration factor	1.0	0 to 2	R/W	This calibration factor will be calculated at the factory with wet-calibration. For FUS080-SONOKIT (retrofit) installations this parameter should be calculated by the pipe geometric tool (see "Pipe geo. assistant" in "Device" menu)
311	Adjustment Factor	1	- 2 to 2	R/W	Meter correction factor for customer adjustment of the calculated flow value. Can be used at installations where a reference meter is used to get reference to the true flow rate
312	Sensor cable length	Product dependent	0 to 200 m	R/W	Cable length (m) from sensor to transmitter
372	Filter time constant	Product dependent	0 to 100 s	R/W	General time filter for flow measurement. Filter constant is the time that must pass before the filter's output value is at 70% of the change of its input value. Higher number gives a slower and more stable flow signal.
373	Low flow cut-off	Product dependent	0 to 10	R/W	If the flow comes below this percentage of Qmax, then the flow value is set to zero
374	Creep lock max number	10	0 to 20	R/W	Alternative cut-off for totalizing and pulsing. If the totalized flow within this number (N) of samples exceeds $[(N \times Q_{max} \times \text{low flow cut off})/100]$ , the amount is accepted for pulsing. $\Sigma Q > N \times Q_{max} \times \text{low flow cut-off}/100$ <ul style="list-style-type: none"> <li>• <math>\Sigma Q</math>: totalized flow within N samples</li> <li>• N: Creep lock max number</li> </ul>
380	Protect linearization from user access.	No	No, Yes	Read	Protection of the linearization parameters. It is decided by the order number and cannot be changed.  The linearization parameters are listed in the device menu "Linearization"
<b>Totalizer</b>					
400	Flow direction totalizer 1	Forward	Forward, Reverse, Net	R/W	Calculation principle on flow direction for forward, reverse or net flow
401	Totalizer 1 change date	Last change date	dd-mm-yyyy; hh:mm:ss	Read	Date and time when totalizer 1 function was changed
410	Flow direction totalizer 2	Reverse	Forward, Reverse, Net	R/W	Calculation principle on flow direction for forward - reverse or net flow

Parameter		Default value	Value range	Access level	Description
411	Totalizer 2 change date	Last change date	dd-mm-yyyy; hh:mm:ss	Read	Date and time when totalizer 2 function was changed
<b>Pipe data</b>					
300	Number of paths	Product dependent	2	R/W	Number of paths on the sensor
302	Max sample frequency	15	15	Read	The maximum frequency for flow measurement
303	Sample frequency	0.5	15	HW key	The frequency at which the flow is measured
304	Rn for path 1	Product dependent	3.4E+38 m	Read	R-factor for path 1. For FUS080/SONOKIT (retrofit) installations this parameter will automatically be calculated by the pipe geometric tool (see "Pipe geo. assistant" in "Device" menu).
305	Rn for path 2	Product dependent	3.4E+38 m	Read	R-factor for path 2. For FUS080/SONOKIT (retrofit) installations this parameter will automatically be calculated by the pipe geometric tool (see "Pipe geo. assistant" in "Device" menu). Valid only for 2-path solutions
306	Inner pipe diameter	Product dependent	0.050 to 1.200 m	Read	Inner pipe diameter in meters. For FUS080/SONOKIT (retrofit) installations this parameter will automatically be calculated by the pipe geometric tool (see "Pipe geo. assistant" in "Device" menu).

## A.5 Human Interface

Table A-5 Human Interface parameters

Parameter		Default value	Value range	Access level	Description
420	Decimal point	Automatic point adjust	No point; One digit after point; Two digits after point; Three digits after point; Automatic point adjust.	R/W	Decimal numbers for displayed totalized value
422	Operator Menu 1	All	1 to 5	Read	Menu setup 1. Totalizer 1 2. Totalizer 2 3. Actual flow rate 4. Error menu 5. Display test menu For editing, use device menu "Human Interface"

## A.6 Unit conversion table

The following tables show examples of typical totalizer and flow rate units. More units are available via SIMATIC PDM tool. The device display can show "m<sup>3</sup>/s" unit only. Other units cannot be shown on the display, but will be used and shown online via PDM.

Table A-6 Totalizer units

Unit	Correction factor
Default (display supported)	1 m <sup>3</sup>
m <sup>3</sup> *100	0.01
Gallon (US)	264.1721
G*100 (100*Gallon)	2.641721
G*1000 (1000*Gallon)	0.2641721
MG (1000000*Gallon)	0.0002641721
AI (Acre Inches)	0.009728558
AF (Acre ft)	0.0008107132
CF*100 (100*ft <sup>3</sup> )	0.3531467
CF*1000 (1000*ft <sup>3</sup> )	0.03531467
l*100 (liter)	10
kl (1000*liter)	1
MI (Mega liter)	0.001

Table A-7 Flow rate units

Flow rate	Correction factor parameter
Default (display supported)	1 m <sup>3</sup> /s
m <sup>3</sup> /min (m <sup>3</sup> /minute)	60
m <sup>3</sup> /h (m <sup>3</sup> /hour)	3600
m <sup>3</sup> /d (m <sup>3</sup> /day)	86400
GPS (Gallon/second)	264.1721
GPM (Gallon/minute)	15850.32
GPH (Gallon/hour)	951019.4
GPD (Gallon/day)	22824465
MGPD (1000000*Gallon/day)	22.824465
CFS (ft <sup>3</sup> /second)	35.31467
CFM (ft <sup>3</sup> /minute)	2118.882
CFH (ft <sup>3</sup> /hour)	127132.8
l/s (liter/second)	1000
l/min (liter/minute)	60000
l/h (liter/hour)	3600000
MI/d (1000000lLiter/day)	86.4



## Settings

### B.1 Factory settings

The transmitter is configured at the factory according to the order specification.

For the calibration / configuration of the flowmeter the application specific pipe dimensions and the specific sensor locations can require an update (for example transmitter is used with the SONOKIT sensor system).

---

#### Note

For type-approved and verified FUE380 flowmeter the settings are HW key protected and therefore read only. This HW key is protected via the verification sealing. The verification sealing can only be opened by the user with the acceptance of the local authorities.

---

Table B-1 Factory settings for 2-path sensor (DN 50 to DN 1200)

Parameter	Factory settings	Possible settings
Meter identification	-	Free text 15 characters
Application location	-	Free text 15 characters
Display menu	Menu 1 – 5 (all)	Menu 1 – 5, minimum one of the five
<b>Pipe data</b>		
Number of paths	2	1 or 2
Inner pipe diameter (m)	for FUE380 and FUS380 factory pre-configured according order code	May not be changed
Q max	Qmax is 105% of Qs (Qs is shown on the system nameplate). For FUE380 and FUS380 factory pre-configured according the selection via order code.	Adjustable
Low flow cut-off (% of Qmax)	0.25 % For FUE380 and FUS380 factory pre-configured. It is %-value related to the Qmax setting. The %-value is equal to 50% of Qi (Qi is shown on the system nameplate).	Adjustable (0 to 10%)
Fliter time	Factory pre-configured to typical 5 s (for larger pipe size higher values are used)	Adjustable (0 to 100 s)
Path 1 geometry	For FUE380 and FUS380 factory pre-configured according order code	Auto set from pipe geometry help program in PDM
Path 2 geometry	For FUE380 and FUS380 factory pre-configured according order code	Auto set from pipe geometry help program in PDM
<b>Correction factor</b>		
Customer correction factor	1	0.5 to 1.5
<b>Measuring unit and factors</b>		

## Settings

### B.2 Factory settings for Modbus communication

Parameter	Factory settings	Possible settings
Flow unit factor	3600 (for flow unit m <sup>3</sup> /h)	Auto set from unit guide
Totalizer volume unit factor	1	Auto set from unit guide
Flow unit text	m <sup>3</sup> /h	Auto set from unit guide, but only m <sup>3</sup> /h can be shown on display
Totalizer unit text	m <sup>3</sup>	Auto set from unit guide, but only m <sup>3</sup> can be shown on display
<b>Totalizer directions</b>		
Totalizer 1 direction	Forward	Forward/Reverse/Forward net/Reverse net
Totalizer 2 direction	Reverse	Forward/Reverse/Forward net/Reverse net
<b>Output A</b>		
Active	On	On/off
Direction	Factory pre-configured according order code. Preset: Forward	Forward/Reverse/Forward net/Reverse net
Amount per pulse	Factory pre-configured according order code, i.e. 0.1 m <sup>3</sup>	Unit: The same as Totalizer unit Value freely selectable
Pulse width	Factory pre-configured according order code. Typically 5 ms	5, 10, 20, 50, 100, 200, 500 ms
<b>Output B</b>		
Active	On	On/Off
Function	Alarm	Pulse/Alarm/Call up
Direction	No influence, while "Alarm"	Forward/Reverse/Forward net/Reverse net
Amount per pulse	No influence, while "Alarm"	Unit: The same as Totalizer unit Value freely selectable
Pulse width	No influence, while "Alarm"	5, 10, 20, 50, 100, 200, 500 ms
<b>Current output (optional add-on module)</b>		
Enable	Yes	Yes/No
Scaling	4 mA: always equals 0 flow rate 20 mA: equals the Qp value (product dependent)	Low flow cut-off (parameter 373) to Qmax (parameter 10)
Direction	Forward	Forward, Reverse, Bidirectional
Fixed mode	No	Yes/No
Fixed value	4 mA	3 to 24 mA
Alarm level	3.6 mA	3.6 mA, 22.5 mA, Off

## B.2 Factory settings for Modbus communication

Parameter	Default setting
Slave device address	1
Data transmission rate	19 200 baud



Parameter	Default setting
Parity	Even
Stop bit	1
Response timeout	10000 ms
Response delay	5 ms
Interframe space	35 bits

The settings can be changed by way of SIMATIC PDM or through the Modbus communication. To support the option with current output module the s in the preceding table are recommended.

## B.3 Ordering of spare parts

Ensure that your ordering data is not outdated. The latest ordering data is always available on the Internet: Process instrumentation catalog (<http://www.siemens.com/processinstrumentation/catalogs>)



## Appendix A

### C.1 Technical support

#### Technical Support

If this documentation does not provide complete answers to any technical questions you may have, contact Technical Support at:

- Support request (<http://www.siemens.com/automation/support-request>)
- More information about our Technical Support is available at Technical Support (<http://www.siemens.com/automation/csi/service>)

#### Internet Service & Support

In addition to our documentation, Siemens provides a comprehensive support solution at:

- Services & Support (<http://www.siemens.com/automation/service&support>)

#### Personal contact

If you have additional questions about the device, please contact your Siemens personal contact at:

- Partner (<http://www.automation.siemens.com/partner>)

To find the personal contact for your product, go to "All Products and Branches" and select "Products & Services > Industrial Automation > Process Instrumentation".

#### Documentation

You can find documentation on various products and systems at:

- Instructions and manuals (<http://www.siemens.com/processinstrumentation/documentation>)

### C.2 Certificates

You can find certificates on the Internet at Certificates (<http://www.siemens.com/processinstrumentation/certificates>) or on an included DVD.



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