SIEMENS

SITRANS F

Ultrasonic Flowmeters FUS380/FUE380

Operating Instructions

09/2016
A5E00730100-AB

Legal information

Warning notice system

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

⚠ DANGER

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

⚠ WARNING

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

⚠ CAUTION

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

NOTICE

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

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

Qualified Personnel

The product/system described in this documentation may be operated only by **personnel qualified** for the specific task in accordance with the relevant documentation, in particular its warning notices and safety instructions. Qualified personnel are those who, based on their training and experience, are capable of identifying risks and avoiding potential hazards when working with these products/systems.

Proper use of Siemens products

Note the following:

⚠ WARNING

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

Trademarks

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

Disclaimer of Liability

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

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Table of contents

Introduction 1

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.

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.

1.1 Preface

These instructions contain all the information you need for using the device.

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

Note

It is the responsibility of the customer that the instructions and directions provided in the operating instructions are read, understood, and followed by the relevant personnel before installing the device.

1.2 History

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

Edition	Remarks	FW version	EDD version
2003	First edition with product release	1.02	1.01.04
12/2009	Update with FW 1.04	1.04	1.01.04
10/2010	Update with FW 1.05	1.05	1.01.04
09/2011	Update with FW 2.03	2.03	1.02.07

Edition	Remarks	FW version	EDD version
09/2013	• Restructure this document • Adding transmitter information	2.03	1.02.07
09/2016	• Restructure this document • Updates for SIMATIC PDM 8.2	2.03	1.02.08-01

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.

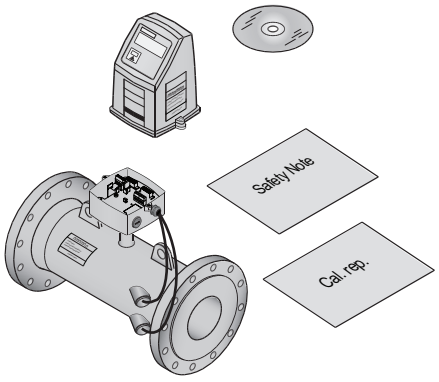
These Operating Instructions describe FW version 2.03 and EDD version 1.02.08-01 (with min. SIMATIC PDM V8.2).

1.3 Items supplied

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

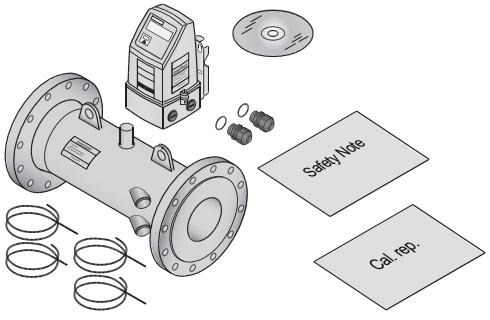
Compact system

- Sensor SITRANS FUS300
- Transmitter SITRANS FUS080 or FUE080
- Siemens Process Instrumentation documentation disk containing certificates, and manuals
- Safety note
- Calibration report



Remote system

- Sensor SITRANS FUS300
- Transmitter SITRANS FUS080 or FUE080
- Siemens Process Instrumentation documentation disk containing certificates, and manuals
- Safety note
- Calibration report
- Wall/pipe mounting kit with bracket and terminal box
- 4 Transducer coaxial cables



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.

1.4 Checking the consignment

1. Check the packaging and the device for visible damage caused by inappropriate handling during shipping.
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.

1.5 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.

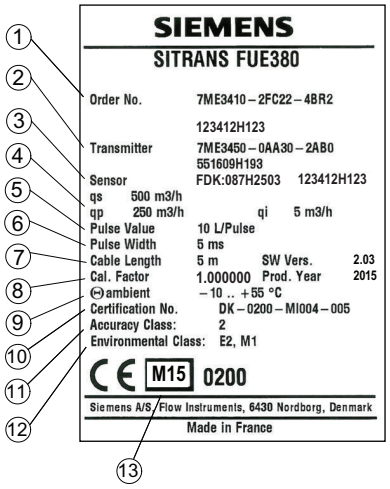
The transmitter has two nameplates. One (silver) is placed on the front of the transmitter. The transmitter system nameplate (white) is placed on the right side of the transmitter. Both provide valuable information about the device and system. The sensor system nameplate (white) is placed on middle of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

Note

Identification

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

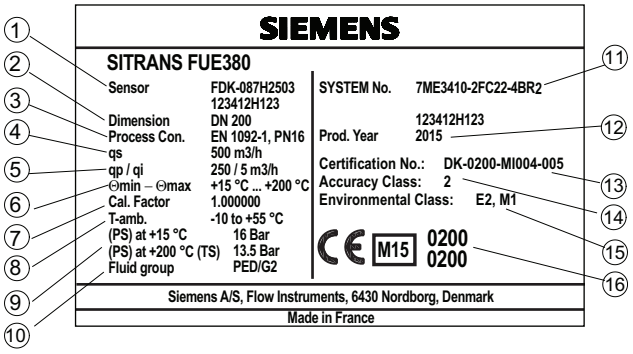
Transmitter system nameplate



① System number (order code identifying selected options and system serial number)
② Transmitter production code and serial number
③ Sensor production code and serial number
④ Maximum flow value (qs), Nominal flow value (qp), Minimum flow value (qi)
⑤ Pulse value (output A)
⑥ Pulse width (output A)
⑦ Cable length (one transducer cable); Software version
⑧ Calibration factor; Production year
⑨ Ambient temperature range
⑩ Type approval number (shown on FUE380 versions only)
⑪ Accuracy class (shown on FUE380 versions only)
⑫ Environmental class (shown on FUE380 versions only)
⑬ Verification markings (shown on MID-verified FUE380 versions only)

Figure 1-1 Transmitter system nameplate, FUE380 example

Sensor system nameplate



① Sensor production code and serial number
② Dimension (nominal size ordered)
③ Process connections
④ Maximum flow value (qs)
⑤ Nominal flow value (qp), Minimum flow value (qi)
⑥ Water temperature range
⑦ Calibration factor
⑧ Ambient temperature range
⑨ Maximum allowable working pressures at 15 °C (59 °F) and 200°C (392 °F) (max. temperature (TS))
⑩ Fluid group
⑪ System number (order code identifying selected options and system serial number)
⑫ Production year
⑬ Certification number (shown on FUE380 versions only)
⑭ Accuracy class (shown on FUE380 versions only)
⑮ Environmental class (shown on FUE380 versions only)
⑯ 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.

1.6 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)

Safety notes

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2.1 General safety instructions

⚠ CAUTION

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

Only qualified personnel should install or operate this instrument.

Note

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

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

2.2 Lithium batteries

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

⚠ WARNING

Potential hazard

Lithium batteries may present a potential hazard if they are abused electrically or mechanically. Observe the following precautions when handling and using lithium batteries:

- Do not short-circuit, recharge or connect with false polarity.
- Do not expose to temperatures beyond the specified temperature range.
- Do not incinerate.
- Do not crush, puncture or open cells or disassemble.
- Do not weld or solder to the battery’s body.
- Do not expose contents to water.

2.3 Laws and directives

General requirements

Installation of the equipment must comply with national regulations. For example EN 60079-14 for the European Community.

Instrument safety standards

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

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

CE-marked equipment

The CE mark symbolizes the compliance of the device with the following directives:

- EMC-directive 2004/108/EC
- Low voltage directive 2006/95/EC
- Pressure equipment directive (PED/DGRL) 93/23/EC
- ATEX Directive 94/9/EG

2.4 Installation in hazardous area

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

⚠ WARNING
500 V insulation test 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.

2.5 Certificates

You can find certificates on the Internet at online support portal (http://www.siemens.com/processinstrumentation/certificates) or on an included DVD.

Description

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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
FUS300 (2-path) DN 50 – DN 1200 (with custody transfer approval for use with heatmeters)	FUE080	FUE380
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 system. 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 sensor with flanges and inline transducers 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. When ordered as a compact version in the series FUS380 and FUE380 the transducer cables are pre-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

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 transmitter supports Modbus RTU communication via the optical IrDA interface at the display, enabling the change of different transmitter settings using the SIMATIC PDM software tool.

The FUS080 is configured in a combination of hardware (HW) and firmware (FW). For the communication and parametrization via SIMATIC PDM a firmware-specific electronic device description (EDD) is needed. The various relations are listed below:

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)

This operating instruction is about the FW 2.03 and related EDD 1.02.08-01 (with min. SIMATIC PDM 8.2).

3.5 Principle of operation

Physical principle

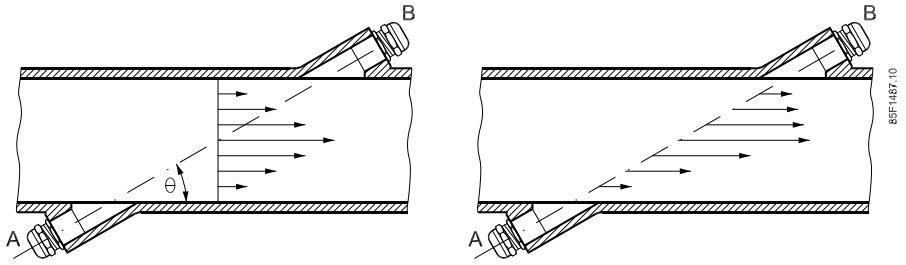

Figure 3-1 Velocity distribution along sound path

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 transit 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 θ 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 = Transit 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 (θ), distance between sensors (L) and pipe dimension (D_i and D_u) shown in the figure below.

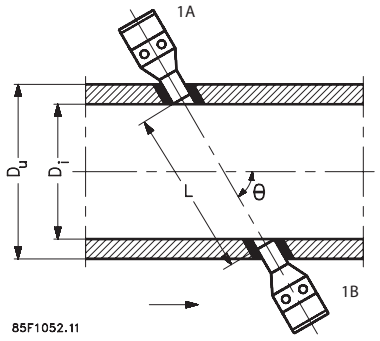

Figure 3-2 Measuring principle

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

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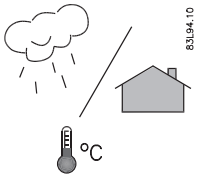
4.1 Flowmeter installation

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.

⚠ CAUTION
Direct sunlight Device damage. The device can overheat or materials become brittle due to UV exposure. Protect the device from direct sunlight. Make sure that the maximum permissible ambient temperature is not exceeded. Refer to the technical data in FUS380 and FUE380 systems (Page 79).

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 26).

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.

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

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 tothe flowmeter has a straight length as specified below.

Note

MID-approved FUE380 systems

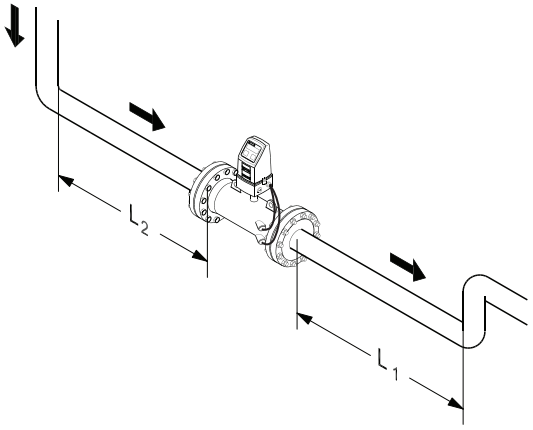
Minimum straight inlet pipe: 1.5 m. See further recommendations below.

Single bend

1 x 90° bend

L2: Min. 10 x pipe diameter

L1: 3 x pipe diameter

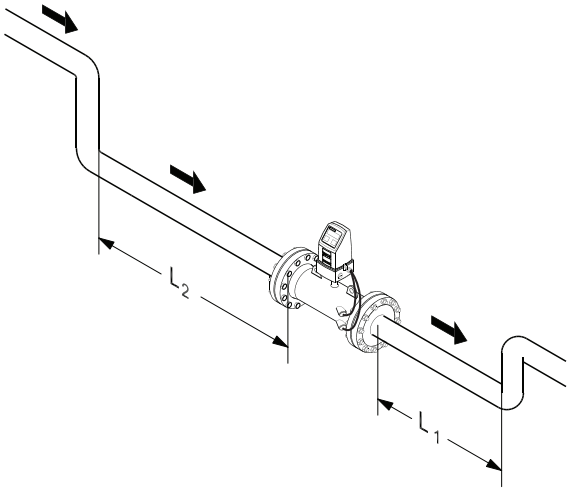


Dual bend

2 x 90° bends in the same plane

L2: Min. 10 x pipe diameter

L1: 3 x pipe diameter

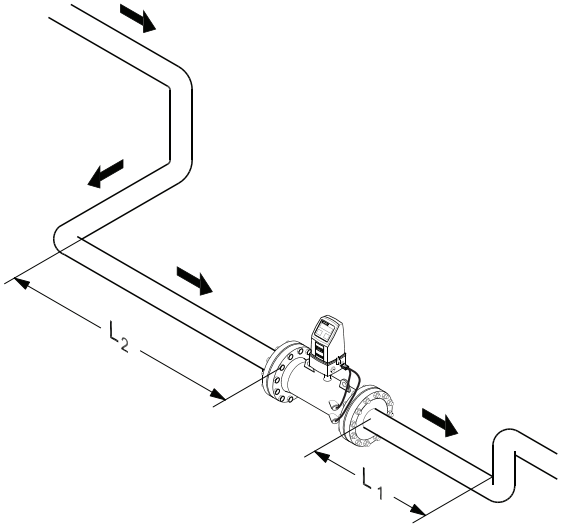


Triple bend

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

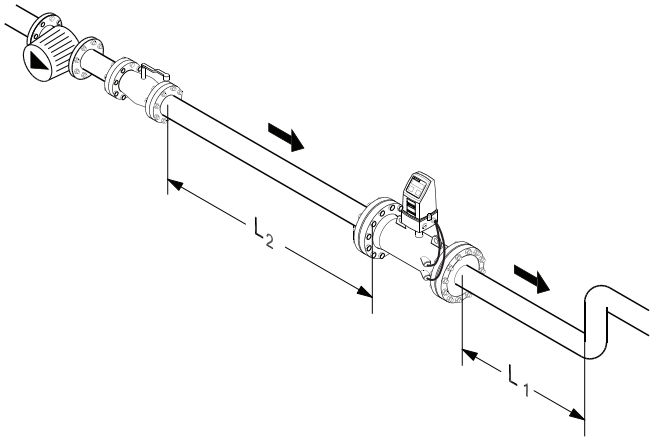
Partially opened valves

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

Pumps

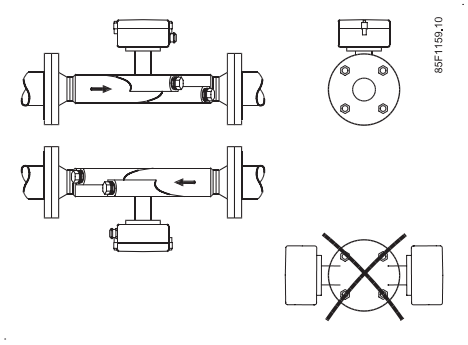
L2: Min. 20 x pipe diameter

L1: 3 x pipe diameter

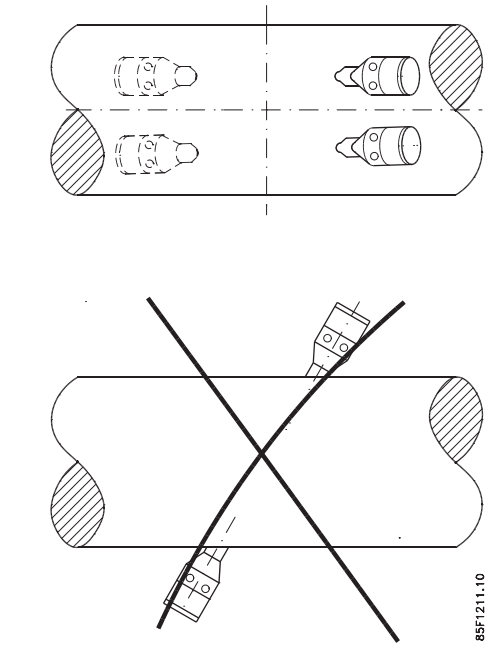


Orienting the sensor

Horizontal orientation: sensors with terminal box must be mounted with the terminal box in upwards or downwards position. Sensor without terminal box (remote versions) must be mounted with the transducers in the vertical plane.



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



Precautions

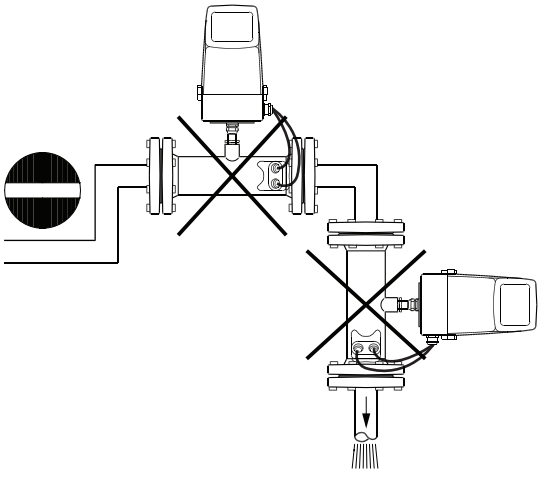
Avoid installation at the highest point in the system because air bubbles will be trapped in the flowmeter.

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

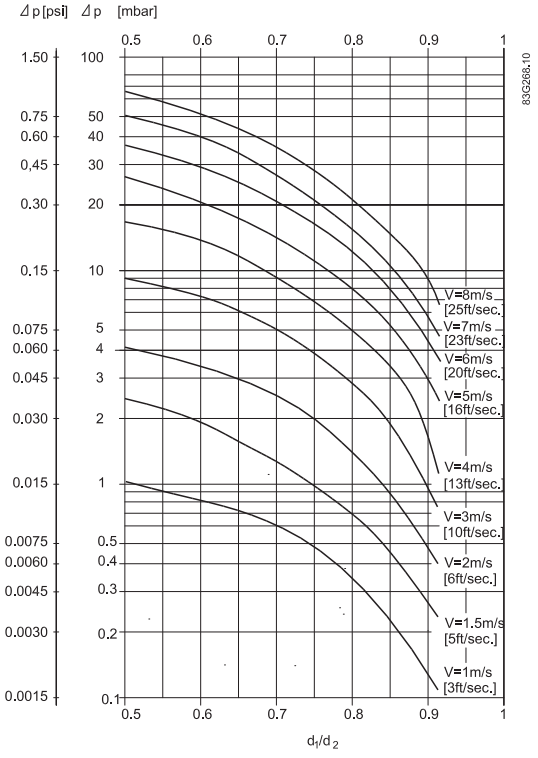
The flowmeter pipe section may be installed in either a horizontal or vertical position.

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

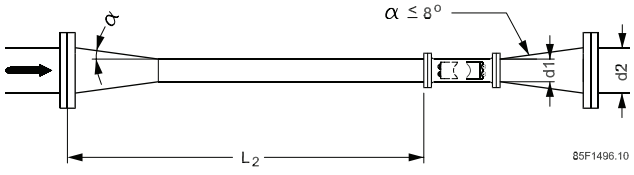


Installation in large pipes

The flowmeter can be installed between two reducers as shown. At 8° 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.



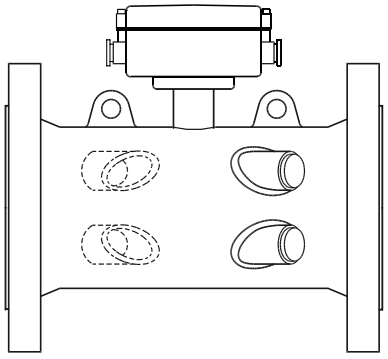
L2: Min. 10 x pipe diameter

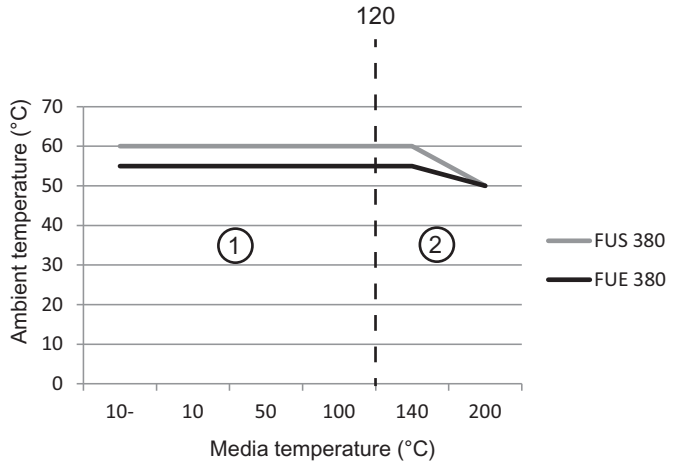
4.2.3 Insulation

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.

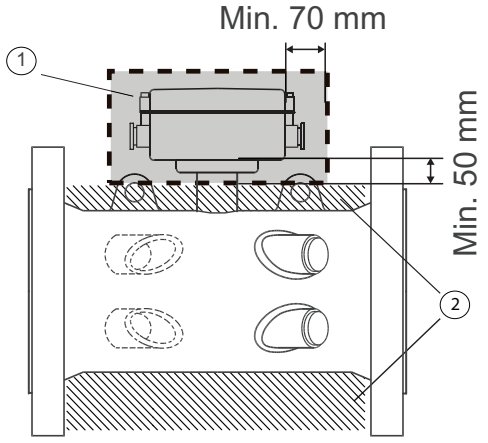
Temperatur specifications for non-insulated sensors



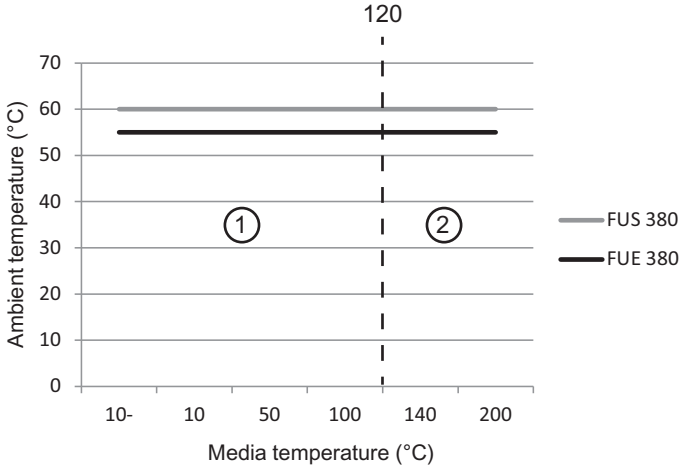


① Compact and remote versions
② Remote versions only

Temperatur specifications for insulated sensors



① Keep terminal box free from insulation (gray area)
② Insulation



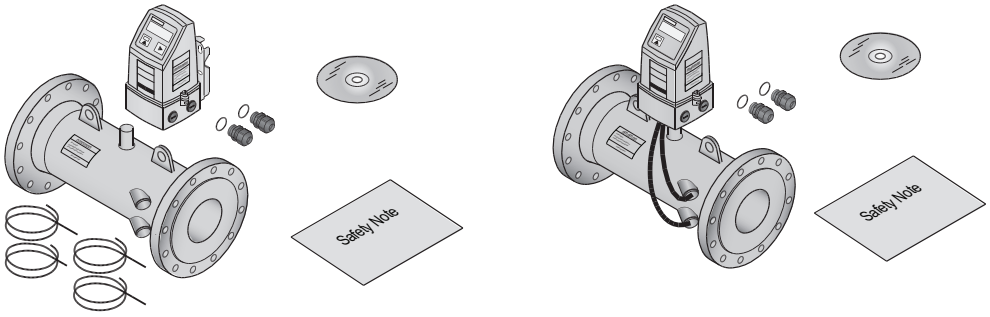
① Compact and remote versions
② Remote versions only

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

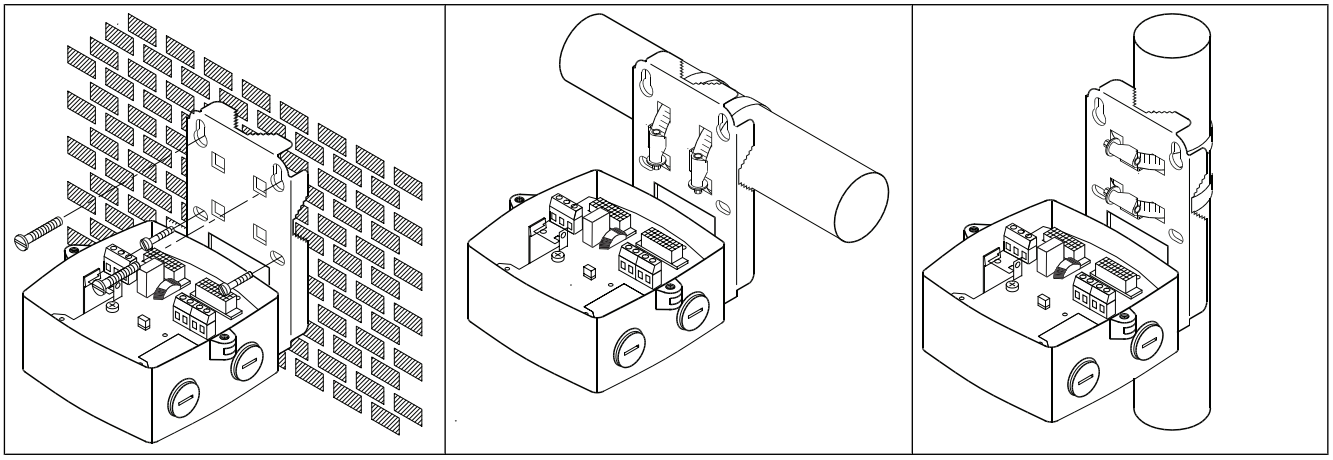


Note

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.

4.3.1 Installation wall mounting kit (remote transmitter)

Mount wall/pipe mounting bracket in an appropriate place.



Note

Take the connection cable length into consideration, and allow adequate space for the cable inlets.

4.3.2 Battery-powered transmitter

The battery-powered transmitter is prepared for one battery pack of 2 lithium 3.6 V D-cell batteries and a single backup battery. 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 liftetime 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 63) and Start-up routine (Page 47). Every time a battery plug is reconnected, the unit runs a start-up routine, see Start-up routine (Page 47).

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.

Connecting

5

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

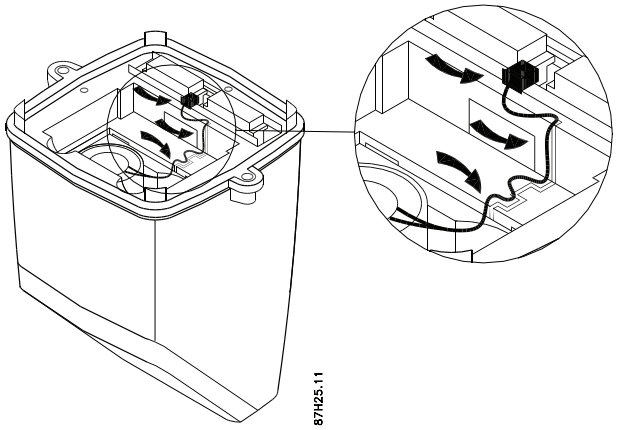
The male battery plug is not connected upon delivery. This connection must be made to enable the back-up battery power supply.

5.2 Compact system

Connect the compact flowmeter using the following steps.

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.



Preparing connection

Remove protection cover carton from the terminal box.

Connecting power supply cable (mains-powered versions 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.

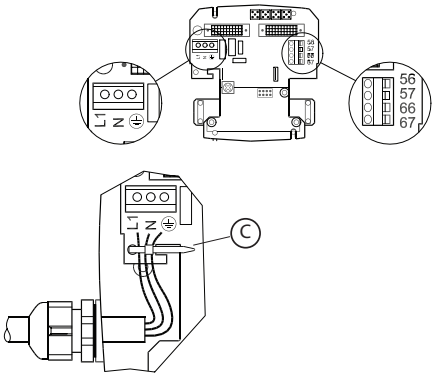
For field wiring installation: Ensure that the **National Installation Code** of the country in which the flowmeters are installed is met.

Note

Conductor terminal

The wire size for the output terminals are AGW24 to AGW14 or 0.205 mm^2 to 2.080 mm^2.

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).

Connecting output signal cable(s)

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

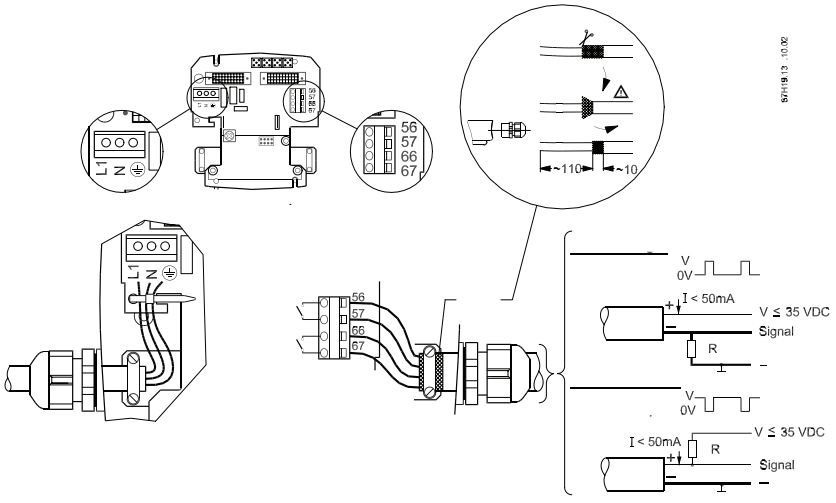
CAUTION

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 output terminals are AGW24 to AGW14 or 0.205 mm^2 to 2.080 mm^2.

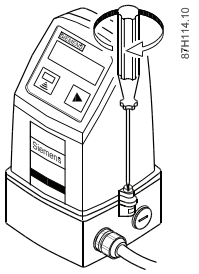
Note

EMC performance

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

Finishing connection

Mount the transmitter.



Note

Grounding

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

5.3 Remote system

Connect the remote flowmeter using the following steps.

5.3.1 Sensor side

Preparing connection

Remove the four transducer protection cups.

Preparing connection

Note

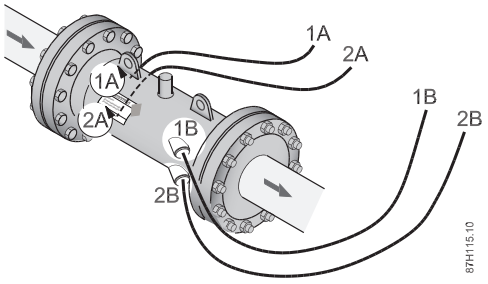
Shortened cables

Due to given settings and nameplate data, it is recommended not to shorten the cables. If the cables are required to be shortened, all cables must be shortened equally, and the factory set cable length must be changed accordingly in the transmitter.

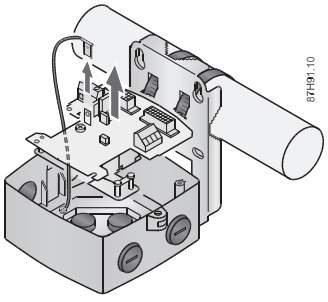
NOTICE
Verification sealing For SITRANS FUE380 systems, the cable length setting is protected by a verification sealing. The verification sealing must only be broken by the user with the acceptance of the local authorities.

Connecting transducer cables

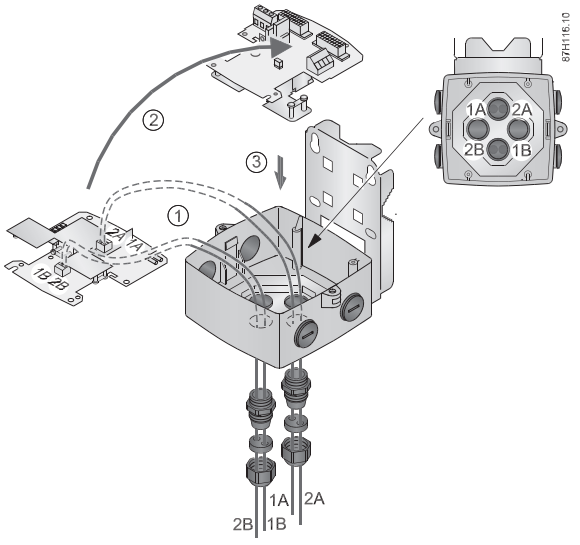
1. Wiring the transducer cables.
   The system SITRANS FUE380/FUS380 transmitter is supplied with 4 separate transducer coaxial cables for 2 paths.
   The cables can be used on all transducers, but can be marked for a specific transducer (cables are not paired with a specific transducer). The cables are manufactured with crimp on the cable ends for the connection board.
   Connect each transducer cable to the sensor. Tighten the transducer cable glands to ensure they are firmly sealed! Recommended torque for each sensor gland is approx. 20 Nm.



2. Snap out the connection plate and loosen the grounding wire.



3. Smoothly push the cables one by one from underneath the base through the glands and adjust all cable ends approximately 100 mm from the upper frame of base.



Note

Make sure that the right cable gland entries are used:

- Terminal 2A is connected to transducer 2A
- Terminal 2B is connected to transducer 2B

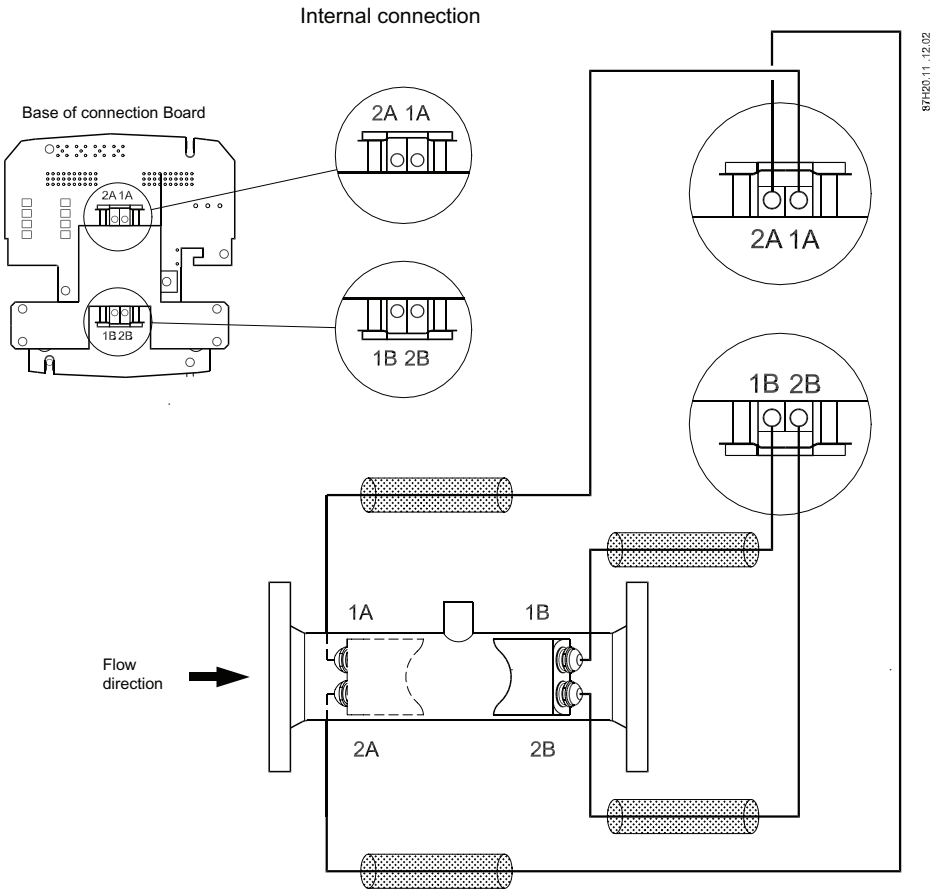
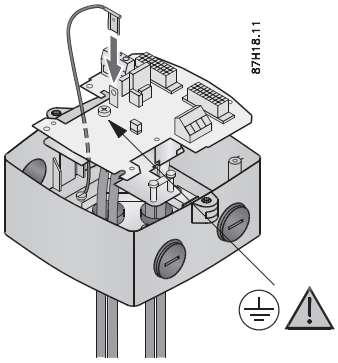
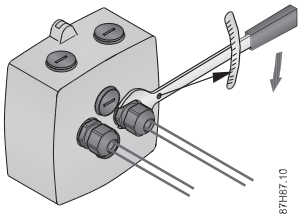


Figure 5-1 Wiring diagram, base of connection board

4. Mount the connection board back in wall mounting kit and connect the grounding wire plug to the grounding terminal (PE) on the PCB.



5. Tighten both transducer cable glands to ensure they are firmly sealed (recommended torque: approx. 20 Nm)



Finishing sensor connection

If required, make user sealing at the ransducer glants (typically for FUE380).

Note

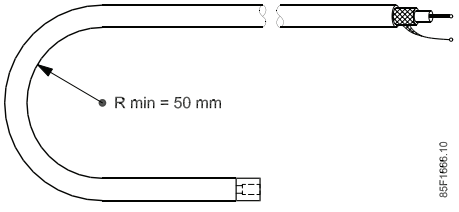
Hot surfaces

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

Note

Grounding

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



Note

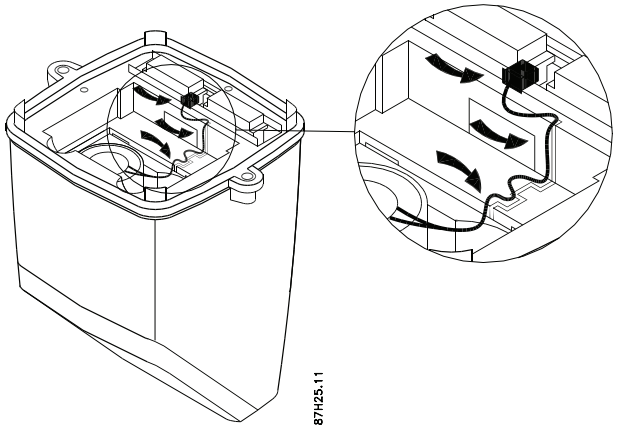
Bending transducer cables

Make sure that the transducer cables are not overbent. Minimum cable bend radius is 50 mm.

5.3.2 Transmitter side

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.



Connecting power supply cable (mains-powered versions only)

⚠ WARNING

Power supply requirements

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

Note

Conductor terminal

The wire size for the output terminals are AGW24 to AGW14 or 0.205 mm^2 to 2.080 mm^2.

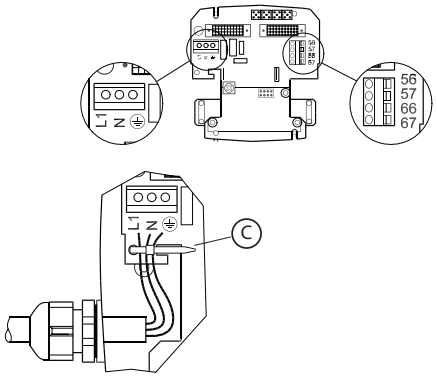
⚠ WARNING

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.

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).

Connecting output signal cable(s)

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

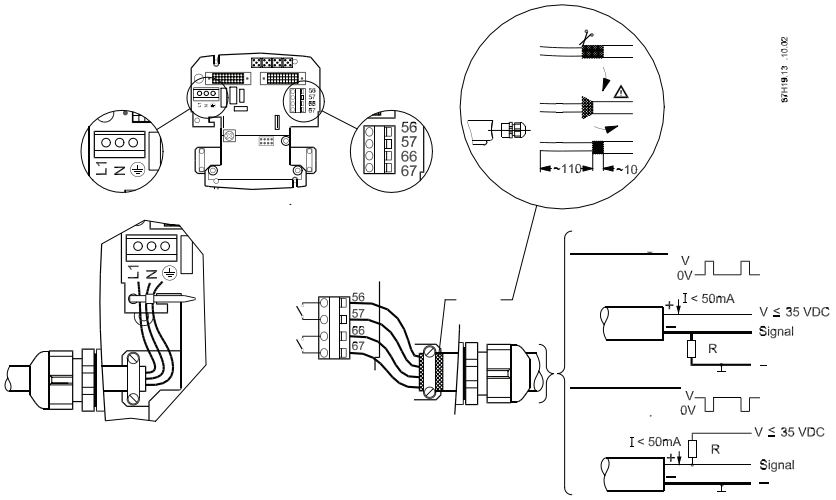
⚠ CAUTION

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.

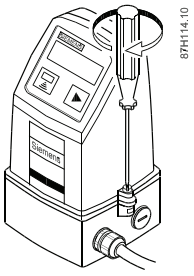
Note

Protected terminal

The wire size for the output terminals are AGW24 to AGW14 or 0.205 mm^2 to 2.080 mm^2.

Finishing connection

Mount the transmitter.



Note

Grounding

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

5.3.3 Wiring energy calculator

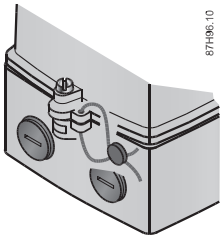
An energy calculator is typically connected via the pulse output A (terminals 56 and 57) of the transmitter.

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

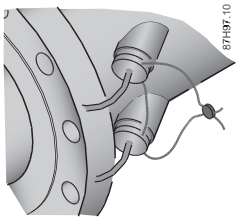
5.4 Sealing of FUE380

5.4.1 User sealing

After finishing the installation and electrical connection of SITRANS FUE380 types, it is recommended to seal the flowmeter as shown.



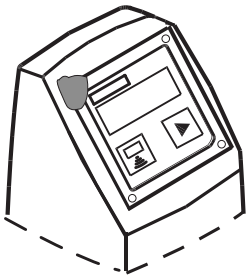
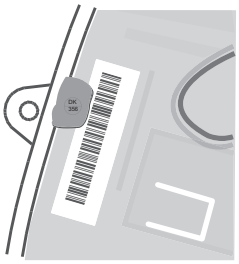
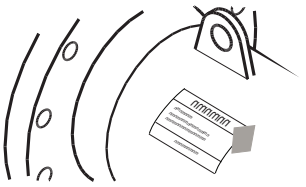
Transmitter



Sensor

5.4.2 Verification sealing

These illustrations show how the device is verification sealed.

		
Under transmitter display frame	In transmitter bottom	On sensor body

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

Commissioning the device:

Resetting the battery lifetime, see Start-up routine (Page 47).

It is recommended to read the basic guide to the local display and the menu structure in Operating the local display (Page 45) and Commissioning via PDM (Page 48) before commissioning the device.

6.1 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.

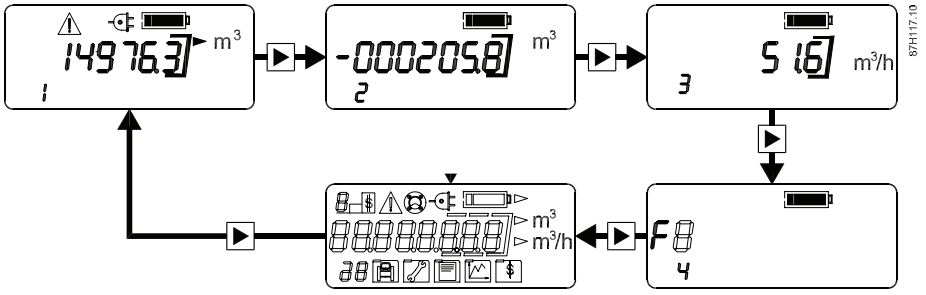


Figure 6-1 Operating the local display

Table 6-1 Status information symbols

Symbol	Description
	Mains power supply connected
	Battery charge status
⚠	Warning

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.

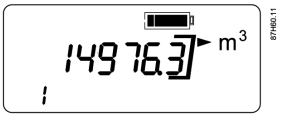
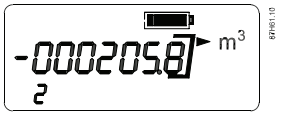
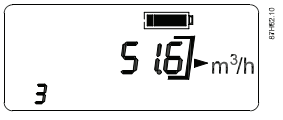
Table 6-2 Battery status information symbols

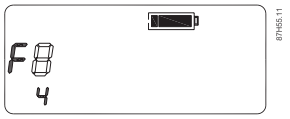
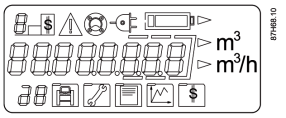
Symbol	Description
	Battery status, full
	Battery status, low

6.2 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		FUS380 - The menu 2 is activated and shows totalizer 2 for the reverse accumulated volume. FUE380 - The menu 2 is deactivated, but with ordered Z-option E21 the menu 2 shows totalizer 2 for the reverse accumulated volume.
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.

6.3 Start-up routine

1. Power-up device.
2. Reset battery status indicator as described below.

Resetting the battery counter

When a new battery is installed and the plug is connected, the transmitter start-up routine begins. The display shows the active software version, e.g. 2.03.

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 full. If the push button is not pressed again, the battery indicator will show "Low".

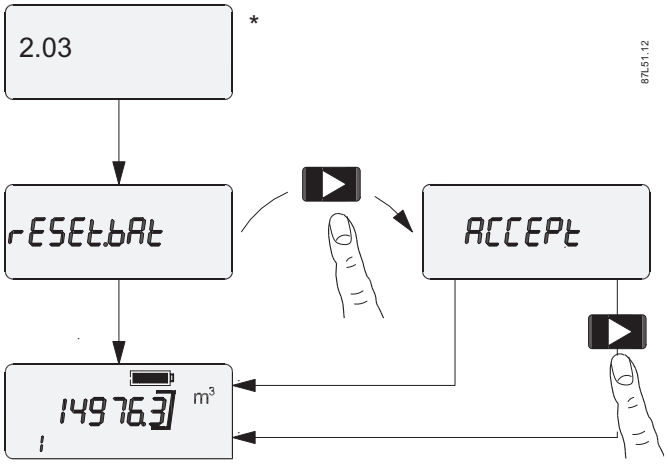


Figure 6-2 Reset internal battery counter

* Firmware version, here version 2.03

6.4 Commissioning via PDM

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

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

Note

Default password

Any data changes in PDM requires a password. The default password is 1000. For further information, see Password-protected data (Page 60).

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.

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 49)
2. Installing the device driver (Page 50)
3. Adding the device to the network (Page 52)
4. Configuring the device (Page 53)
5. Optimizing the system (Page 54)
6. Checking the operation readiness (Page 57)

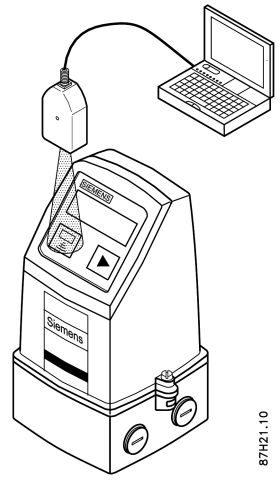
6.4.1 Installing and connecting the IrDA interface adapter

Note

IrDA driver installation

For installation of the IrDA driver, refer to the instructions delivered with the adapter.

1. Connect IrDA adapter to PC



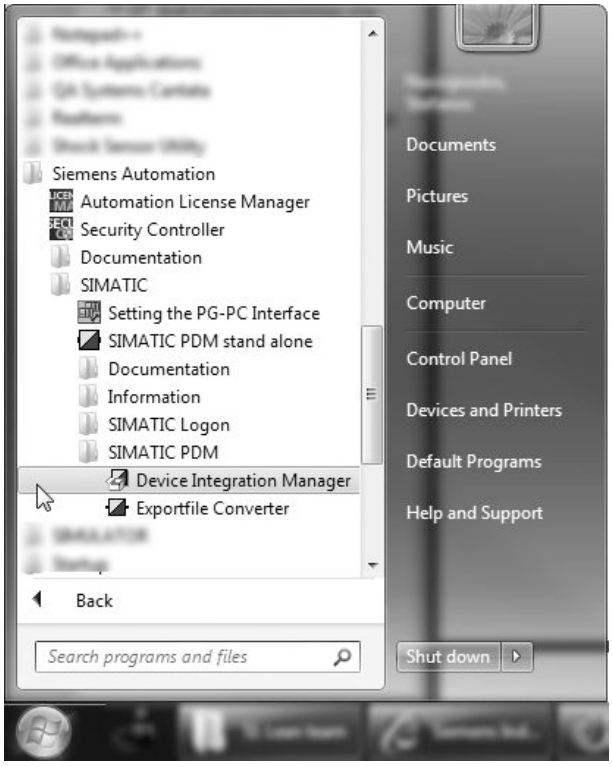
2. Mount adapter on FUS080

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]).

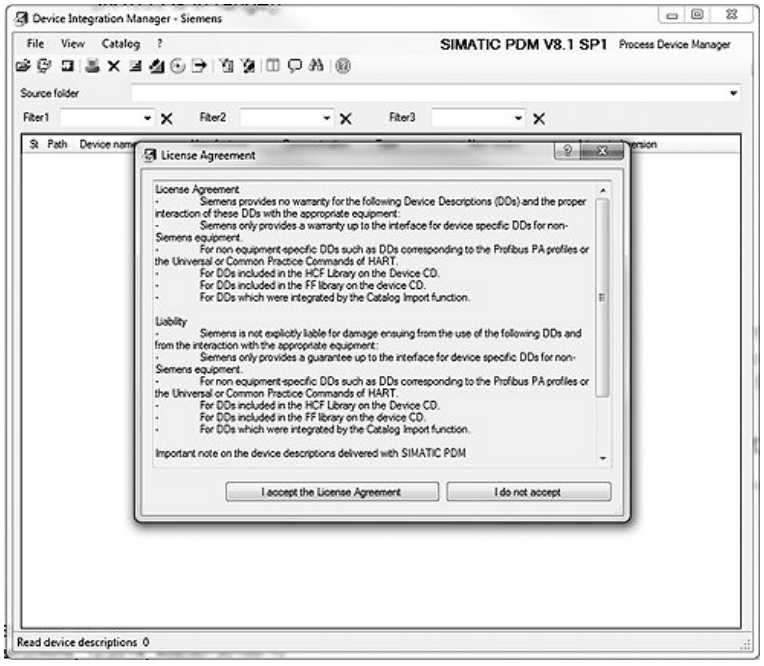
6.4.2 Installing the device driver

Install the PDM device driver as follows:

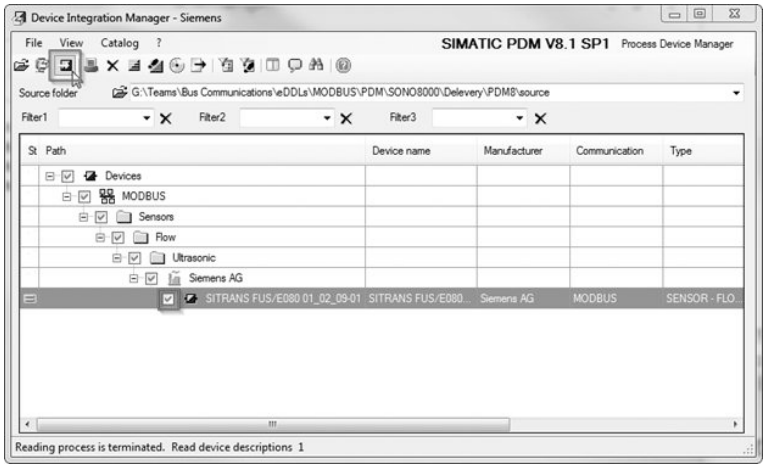
1. Close SIMATIC PDM (if already open).
2. Open **Device Integration Manager** from [**Start** → **All Programs** → **Siemens Automation** → **SIMATIC** → **SIMATIC PDM**].



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

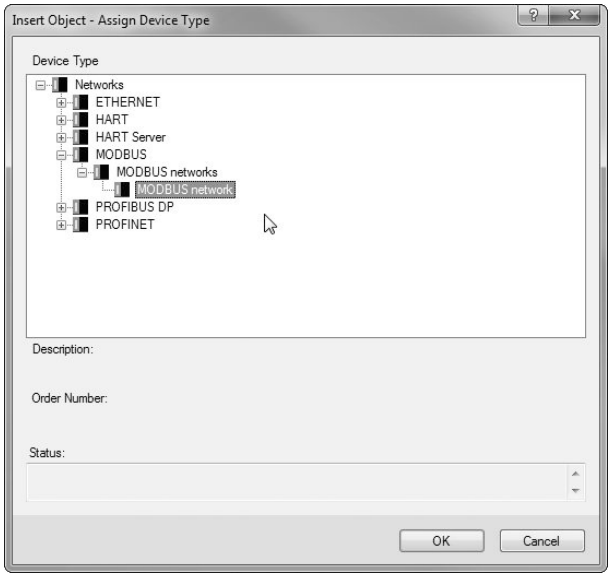
Please use for the firmware FW 2.03 the related EDD 1.02.08-01.

6.4.3 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.

6.4.4 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.

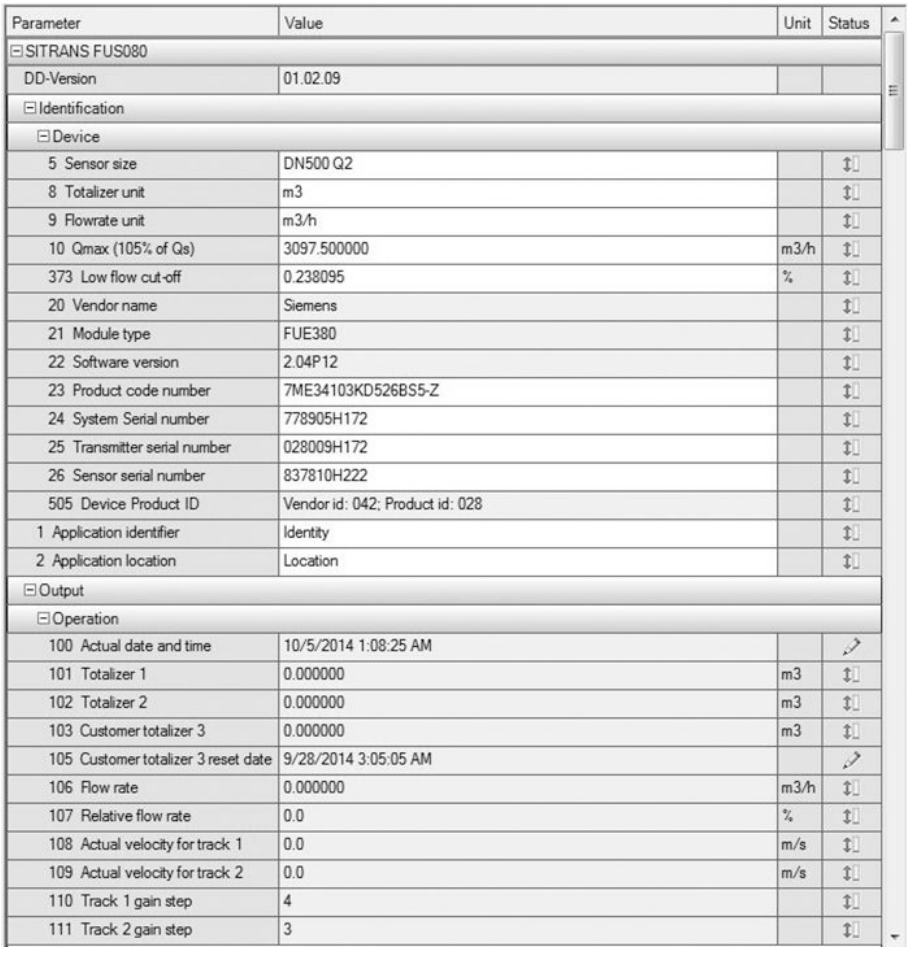
Read, write device data

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.

6.4.5 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

1. 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.
2. Select maximum flow rate (never to be exceeded).
3. Select an appropriate pulse width, e.g. 5 ms.
4. 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*.
5. Press [Apply Change of Pulse] to apply the settings.
6. 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^3/p; 2.5 m^3/p; 5 m^3/p; 10 m^3/p; 25 m^3/p; 50 m^3/p; 100 m^3/p; 250 m^3/p; 500 m^3/p; 1000 m^3/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.

6.4.6 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/pulse > Qs (m^3/h)/360

For example Qs = 300 m^3/h; L/pulse > 300/360; L/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)**].

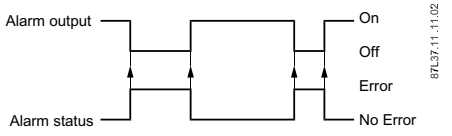
Table 6-4 Recommended pules values for FUE950

DN	Pulse setting (liter/pulse)
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

6.4.7 Output B, terminals 66/67:

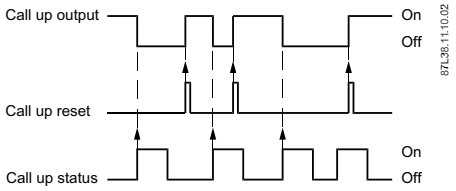
The output B setting must be selected according to application specific requirements (default setting = Alarm).

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.

6.4.8 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

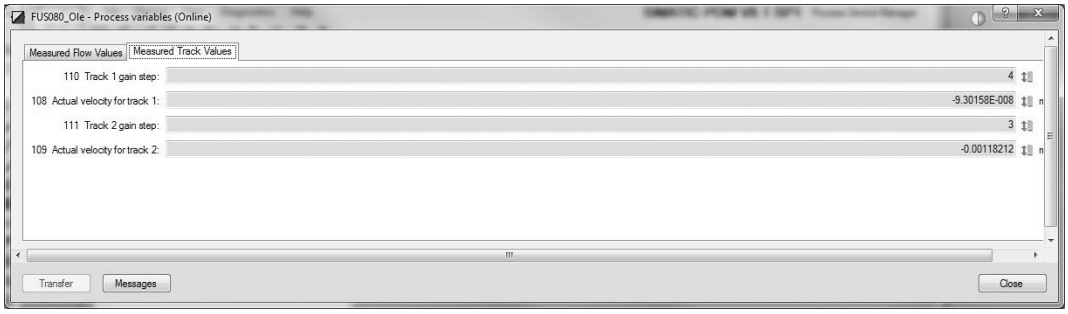
   Before downloading the parameters, check that all listed data are loaded or changed and in accordance with the application requirements.

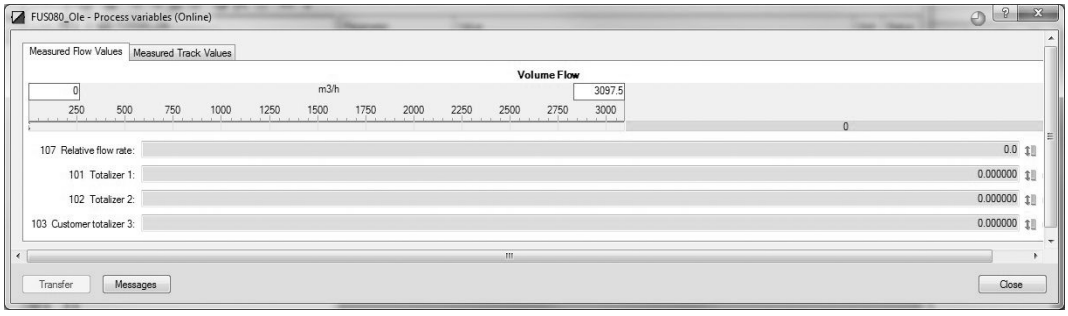
2. Click [Start] to download all changes from the table to the device.

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

7.1 Unit selection

The device is delivered with totalizer and flow rate units in m and m^3/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].

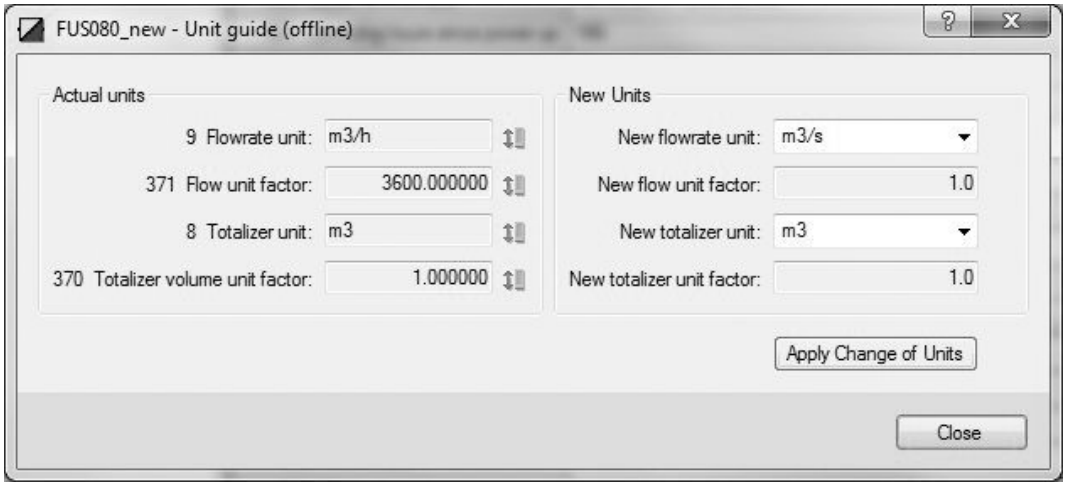
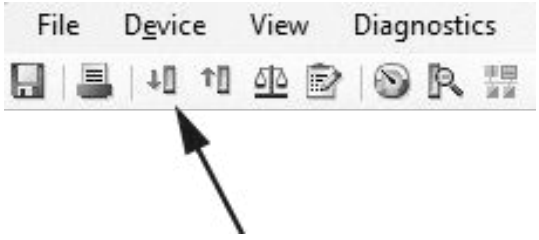


Figure 7-1 Unit selection

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



Note

The display is only able to show m^3 and m^3/h

If the units are changed to units other than m^3 and m^3/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.

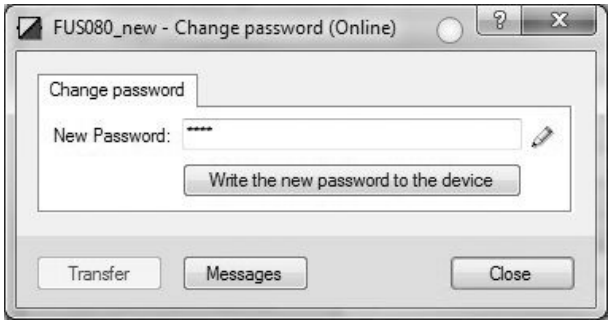


Figure 7-2 Change password

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

7.4 Hardware key

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

Service and maintenance

8

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

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

Note

Siemens defines flow sensors as non-repairable products.

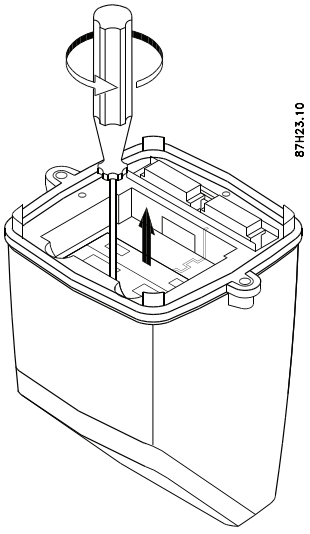
8.2 Battery replacement

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

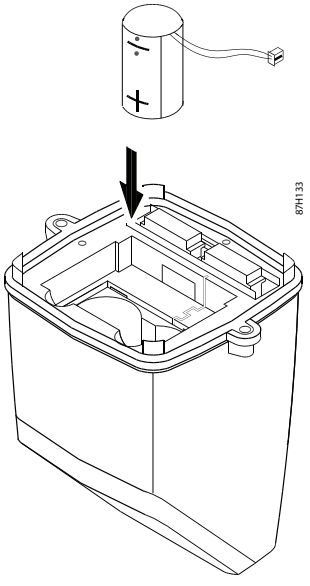
Battery lifetime

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.

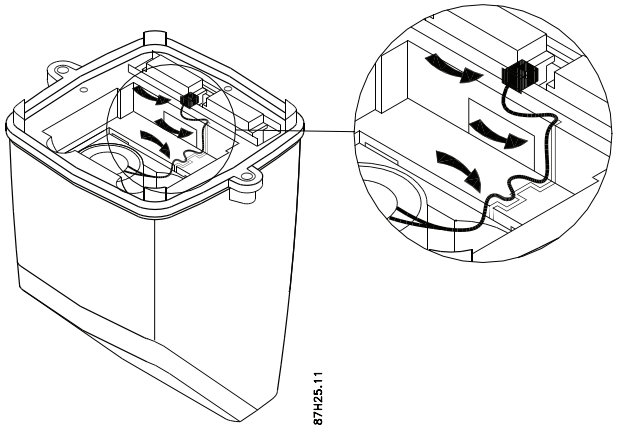
1. Unscrew battery cover and remove old battery pack.



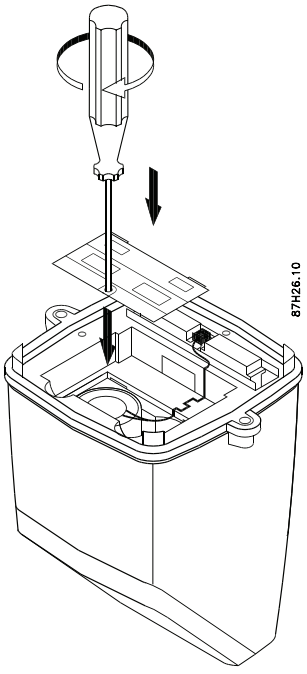
2. Fit new battery pack in transmitter.



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 Technical support

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

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

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

Service & Support on the Internet

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

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

There you will find:

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

Additional Support

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

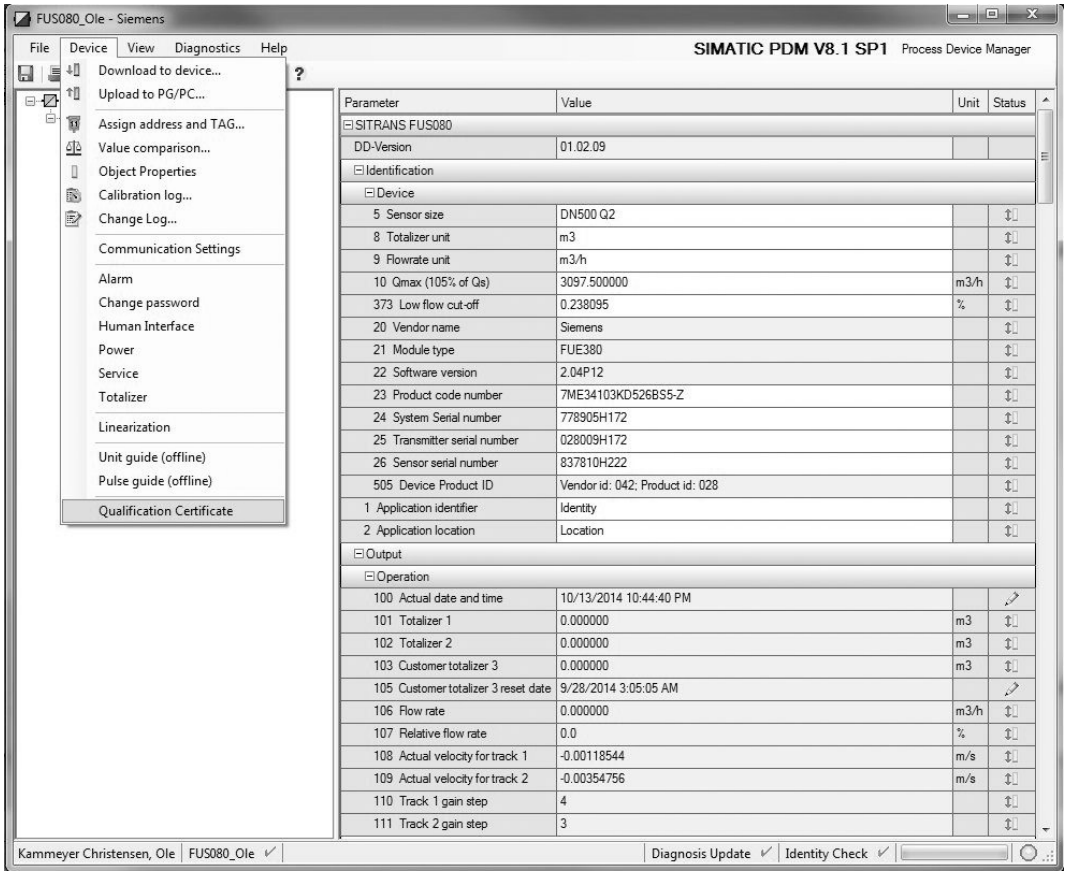
Local contact person (http://www.automation.siemens.com/partner)

8.4 Application-specific data - Qualification certificate

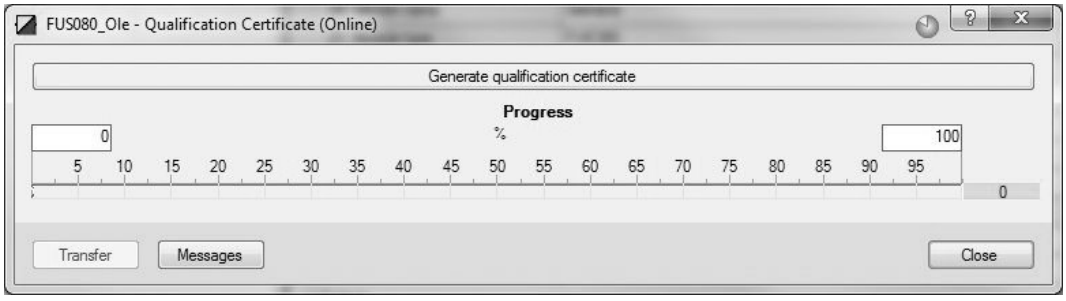
In case the device needs service, the technical support team will typically request information about the application and the flowmeter.

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

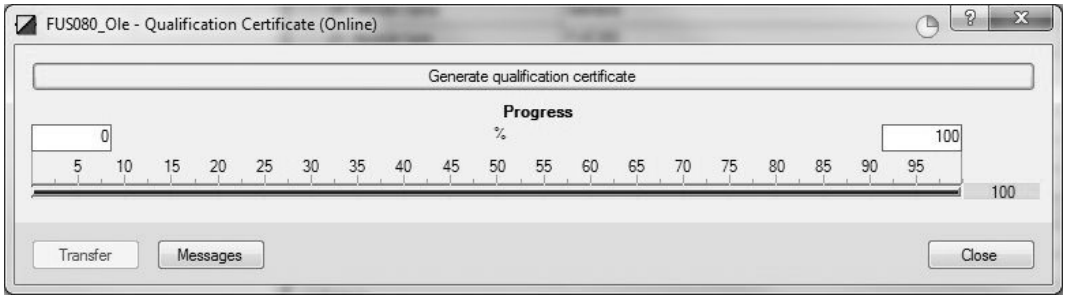
1. In PDM click on [**Device → Qualification Certificate**].



2. Click on [Generate qualification certificate].



3. Click on [Close].



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 69), Figure 8-2 Qualification certificate (page 2) (Page 70) and Figure 8-3 Qualification certificate (page 3) (Page 71)).

SIEMENS

Qualification Certificate SITRANS F FUS/E080 based flowmeter

Please upload the data of the FUS/E080 transmitter via IrDA and PC adapter by using the software tool SIMATIC PDM (PDM = Process Device Manager). The data will be automatically uploaded into this report. The information of the transmitter system label should be noted also. A print of the uploaded parameter list (e.g. as PDF-format) should be added to this certificate and also a copy of the original calibration certificate (if available).
The help tools are: PDM 6ES7658-3HX06-0YA5, PC adapter FDK-087L4163 and IrDA-holder A5E00695277; please contact for it your local Siemens Company.

Application / Customer:

Name _____
Address _____
_____
_____
Phone _____
Email _____

Measured liquid: Water
Process temperature: Min. _____ ° C
Max. _____ ° C

FUS080 Transmitter Identification

Type (module type): SONOKIT/FUS880
SW Version: 2.03
Product Code No.: 7ME32202FA111VA1
Product Code No.: _____(transm. label)
System Serial No.: 000000N000
System Serial No.: _____(transm. label)
System Serial No.: _____(sensor label)

The PDM- and label data must be the same:
Passed : (Date and signature)
☐ Yes ☐ No _____

General System Settings

Qmax: 399 m3/h
Low flow cut-off: 0,25 per cent of Qmax

Settings of transmitter label:
Qi, Qmin: _____ m3/h (transmitter label)
Qp, Qnom: _____ m3/h (transmitter label)
Qs, Qmax: _____ m3/h (transmitter label)

Transducer cable length: 15 m
Transducer cable length: _____ m (used length +/- 0.5 m)

Calibration factor: 1
Calibration factor: _____ (transmitter label)
Adjustment factor: 1 (should be 1.0)

The PDM-, label and data must be the same:
Passed : (Date and signature)
☐ Yes ☐ No _____

Sensor Details

Sensor size: DN200
Pipe diameter: 0,2031 m
No. of tracks: 2
Rn of track 1: 0,4603736
Rn of track 2: 0,4603736

Sensor check: Is the installation and the sensor ok?
Passed : (Date and signature)
☐ Yes ☐ No _____

Figure 8-1 Qualification certificate (page 1)

SIEMENS

Qualification Certificate SITRANS F FUS/E080 based flowmeter

Totalizer values

Totalizer 1: 0,4444444 m3
Totalizer 2: 0 m3
Customer Totalizer 3: 0,4444444 m3

Customer Totalizer 3 reset: 18-03-2011 10:18:08

Customer Totalizer 3 reset done:
(Date and signature)
☐ Yes ☐ No

Power Supply Status

Power supply: Battery only
Battery installation date: 18-03-2011 10:06:04
Battery consumed power: 2,049692 Ah
Battery capacity: 25 Ah
(12.5 Ah single bat. or 25 Ah double pack bat.)
Battery alarm limit: 80 per cent

Battery change and capacity calculation reset done:
(Date and signature)
☐ Yes ☐ No

Transmitter output A (pulse output)

Output enable: Yes
Pulse direction: Forward
Amount per pulse: 1 m3
Pulse width: 5 ms

Amount per pulse: _____ m3 (transmitter label)
Pulse width: _____ ms (transmitter label)

The PDM- and label must be the same:
Passed : (Date and signature)
☐ Yes ☐ No

Transmitter output B

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)

The PDM- and label must be the same:
Passed : (Date and signature)
☐ Yes ☐ No

Measurement Function, Operation and Diagnostic:

Flow rate: 0 m3/h
Flow rate: _____ m3/h (transm. display)
Relative flow rate: 0 per cent of Qmax
(must be below 100)

Actual velocity track 1: 0 m/s
Actual velocity track 2: 0 m/s
(values must be the same for both tracks, +/- 0.05 m/s ok)

Track 1 gain step: 15
Track 2 gain step: 15
(values must be the same for both tracks, +/- 1 ok)
(good between 1 – 8, typical 3 – 5, depends on pipe size.
If > 8, then it is not ok and max. bad value is 15)

Passed : (Date and signature)
☐ Yes ☐ No

Faults / Alarms

Transmitter fault status: Faults: 1 2

Alarm / faults or warnings on the display?:
☐ Yes ☐ No

If yes, which are shown:
☐F1 ☐F2 ☐F3 ☐F4 ☐F5 ☐F6 ☐F7 ☐F8 ☐F9

Passed : (Date and signature)
☐ Yes ☐ No

Figure 8-2 Qualification certificate (page 2)

SIEMENS

Qualification Certificate SITRANS F FUS/E080 based flowmeter

Service / Diagnostic	
Fixed flow mode enable: No Fixed flow value: 100 m3/h (max. allowed value is Qmax = 399 m3/h) Output A controlling Auto Output B controlling Auto Check: The fixed flow must be 'No'and outputs 'Auto'. Passed : (Date and signature) ☐ Yes ☐ No	

Comments

Complete Qualification Passed: ☐ Yes ☐ No

The values were verified of (name) _____

Date and signature _____

Figure 8-3 Qualification certificate (page 3)

8.5 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)
  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.

8.6 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

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 [**Device → Device Status**] in parameter 200 *Fault status*.. In the figure below, error code F 5 is active.

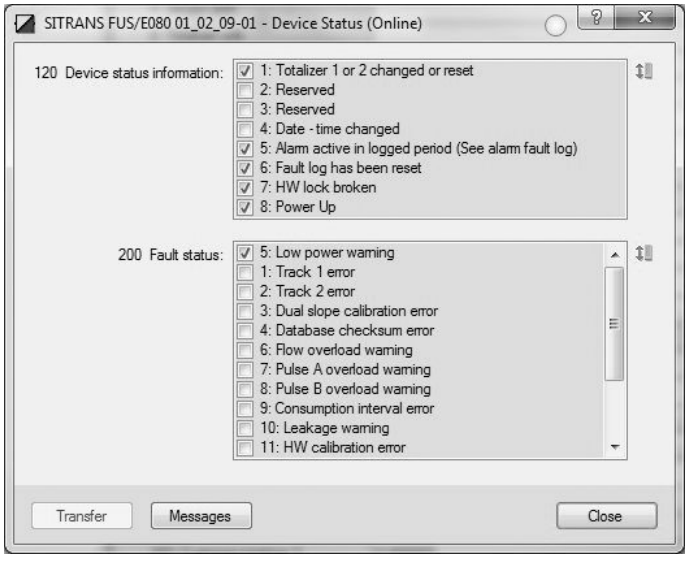


Figure 9-1 List of error codes shown in PDM

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	• Check flowmeter version. Battery version not able to run on mains power • Battery empty: Replace battery pack • Battery plug not plugged into the transmitter, see Battery replacement (Page 63)
F 1	Path 1 (upper path) not measuring	No water in upper part of pipe and/or cables or transducer 1A or 1B defective
F 2	Path 2 (lower path) not measuring	No water in lower part of pipe and/or cables or transducer 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	• Mains power fails (only mains-powered versions with battery back-up) • Replace battery pack (battery-powered versions only)

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
- Transducers 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.

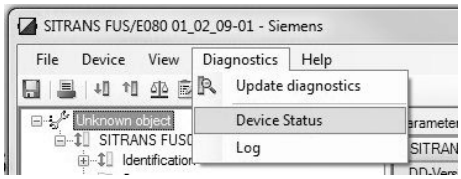
Requirements

The following procedure must be completed before diagnosing:

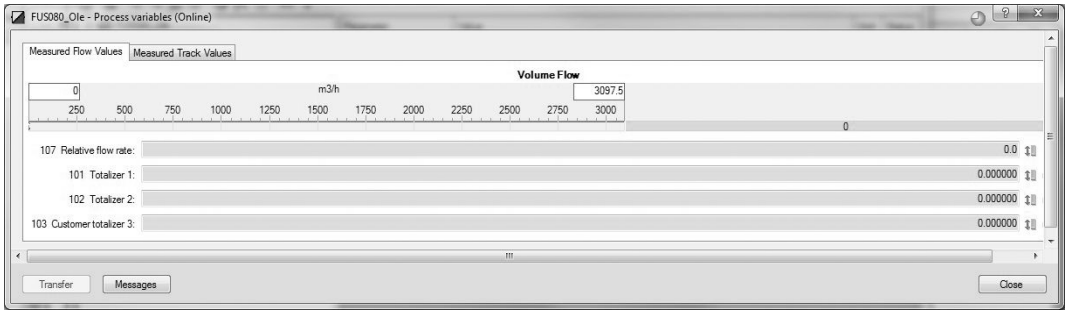
- Connection of Modbus interface via PC and IrDA, see also Commissioning via PDM (Page 48)
- Installation of PDM and FUS080 PDM driver, see also Installing the device driver (Page 50)

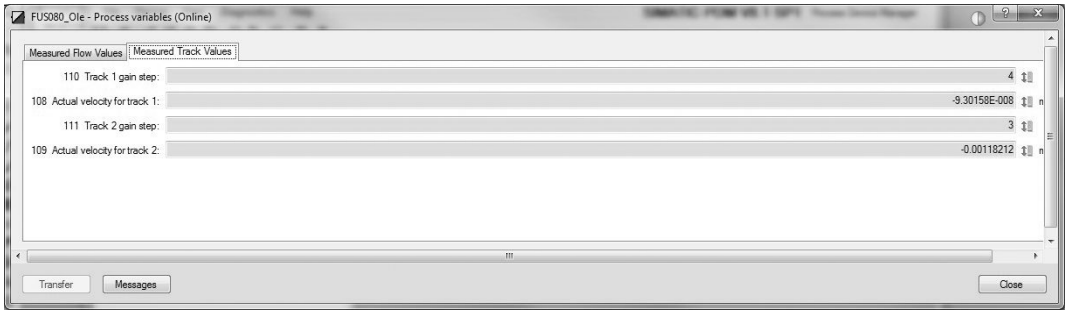
Diagnosing with PDM

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



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

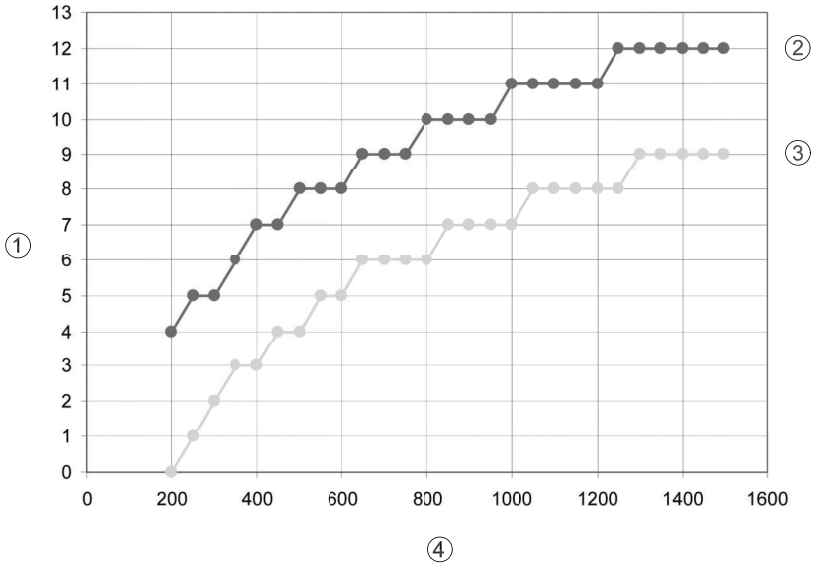




The **Measured Track Values** tab shows the gain steps and the flow velocities for path 1 and path 2. For 1-path applications the values for path 2 (track 2) are 0.

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 Transducer distance [mm]

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

Gain step

The graph above shows which gain step to expect for a particular transducer 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 transducers in clean water, but takes into account the expected variance from the converter and the transducers.

Gain step error conditions

Condition	Cause
15	• No transducer (e.g. defective cable) • Empty pipe
High values	• High damping (e.g. inhomogeneous media) • Unsuitable medium • Path angular misalignment
Unstable/fluctuating values	• Air bubbles or solids in medium • Bad inlet conditions
Δ gain step between path 1 and path 2 > 1 (2-path systems only)	• Bad inlet conditions • Inhomogeneous medium • Path angular misalignment

In case of angular misalignment between transducer 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
Δ flow velocity values (between path 1 and path 2) > 1 (2-path systems only)	• Bad inlet conditions (the higher the delta, the worse the inlet conditions) • Disturbances in the pipe (bad flow profile)
Unstable/fluctuating values	• Air bubbles or solids in media • Bad inlet conditions

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

Technical data

10

10.1 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 2 + 2 cable glands (output, supply and transducer cables) and a stainless steel bracket for wall or pipe mounting
Cable glands	In wall mounting kit: • 4 x M20 PA plastic cable glands (2 for mains and output cable, 2 for the transducer coaxial cables)
Ambient temperature	-10 °C to +55 °C (14 °F to 131 °F) [1]
Storage temperature	−40 °C to + 85 °C (−40 °F to +185 °F)
Transducer/sensor cables	• Coaxial cable, impedance 75 Ohm, ∅ app. 6 mm; • Remote version cable length: Max. 30 meter between transmitter and transducer (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 [2]: • Replacable 3.6 V LiSOCl (Lithium Thionyl Chloride) • Double battery pack 34 Ah or single backup battery 17 Ah; • Battery exchange interval: 4.2 (6) years at 60°C (140°F) operation Mains: • 87 to 265 V AC (50 to 60 Hz)
Display	• LCD, 8 digits, additional 2 digits and symbols for status information • Units: Volume unit: m^3 (default display unit), Flow unit: m^3/h (default display unit) • 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
Push button	One push button for toggling between display information
Measuring function	• 0.5 Hz (battery mode) • 15 Hz (mains-powered)

Description	Specification
Outputs (standard)	• Two passive, galvanically isolated open drain-mos outputs (output A and B) • Max. ±35 V, 50 mA • Output A: Preset to pulse output for forward flow (default: 100 l/ pulse) • Output B: Preset to alarm for present failure • Pulse with: 5, 10, 20, 50, 100, 200, 500 ms (default: 5 ms) • Max. pulse frequency: 100 Hz at Qmax setting (105% of Qs)
EMC performance	• Emitted interference to EN 55011/CISPR-11 • Immunity to EN/IEC 61326-1 (Industry) • MID approved (FUE380 series): Environment class E2 and M1
Transmitter weight	1.5 kg (3 lb)
Communication	IrDA on display panel (Modbus RTU protocol)
Approvals	• Approval standards: EN 1434 and OIML R 75 Class 2 • Type approval: MID, MI-004, class 2 approval and certification (according to EN 1434) • CPA/CMC (China)

[1] MID: environment class -10°C to +55°C (14°F to 131°F)

[2] Waste industrial batteries are accepted back by the producer or importer, who has originally marketed the battery, or by the producer or importer, where the new industrial battery is purchased.

10.2 Battery

Table 10-2 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.

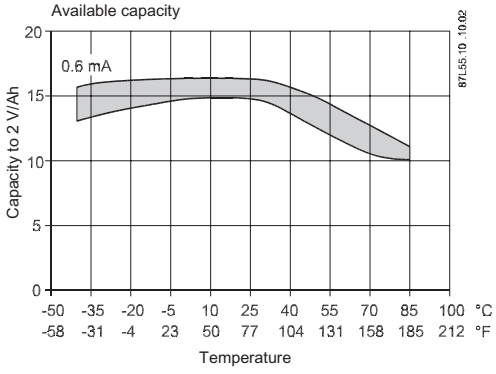
For battery versions, only the internal battery pack has a nominal capacity of 34 Ah giving a typical operation time up to 6 years in a revenue application.

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.

10.3 Sensor for FUS380 and FUE380

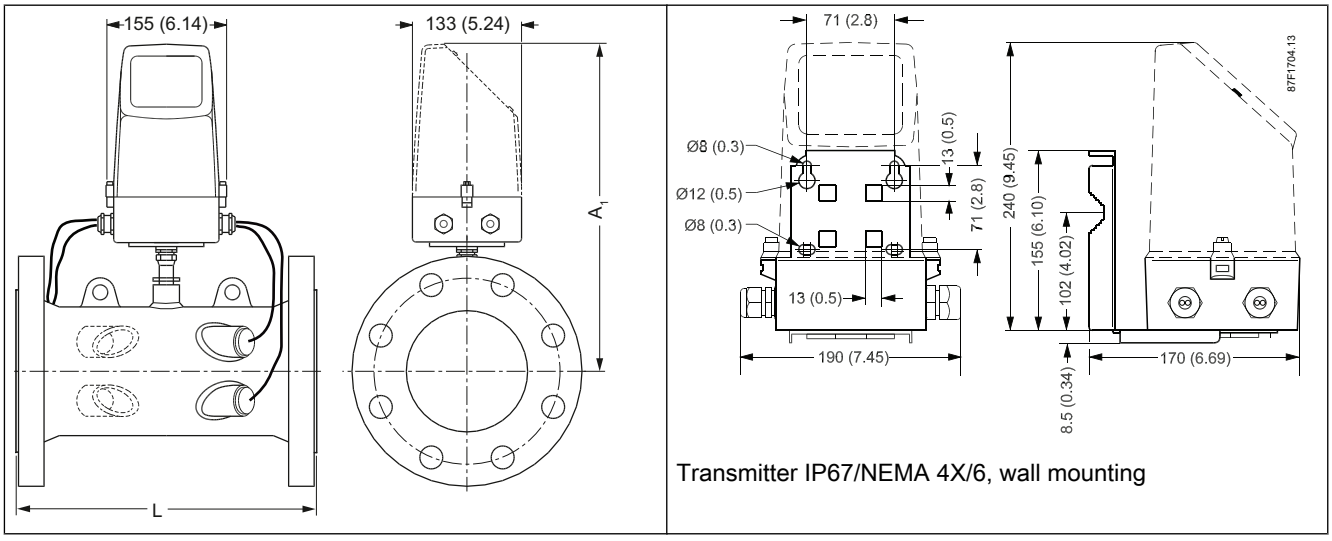
Table 10-3 Technical data

Description	Specification
Pipe design	2-track sensor with flanges and integrated transducers 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: • type 01: DN 100 to DN 125 • type 11: DN 150 to DN 1200 • type 11 'design': DN 50 to DN 80

Description	Specification
Pipe materials	• DN 100 to 1200: Carbon Steel EN 1.0345 / p235 GH, painted in light gray • DN 50 to DN 80: Die-cast bronze G-CuAn 10/W2.1050.01 (EN1982)
Transducer design	• DN 100 to 1200: Integrated version and welded onto the pipe • DN 50 to 80: Screwed into the pipe
Transducer material	Stainless steel (AISI 316 / 1.4404) / brass (CuZn36Pb2As)
Media temperature	DN 100 to 1200: • Remote: 2 to 200 °C (35.6 to 392 °F) [1)] DN 50 to 80: • Remote: 2 to 150 °C (35.6 to 302 °F) [1)] DN 50 to 1200: • Compact: 2 to 120 °C (35.6 to 248 °F) [1)]
Measured media	Heating water, according to VDI-2035 (pH 8.2 - 10.5), industrial VdTÜV information sheet 1466 and AGFW information sheet FW 510

[1)] MID: minimum temperature 15 °C (59 °F)

10.4 Dimensional drawings for FUS380 and FUE380



Transmitter IP67/NEMA 4X/6, wall mounting

10.5 Sensor dimensions for FUS380 and FUE 380

Size	PN 16		PN 25		PN 40				
	L	Weight	L	Weight	L	Weight	Material	A_1	Lift hug
DN	mm	kg	mm	kg	mm	kg		mm	
50	-			-	300 +0/-2	10	Bronze	350	No
65	-			-	300 +0/-2	15	Bronze	363	No

Size	PN 16		PN 25		PN 40				
	L	Weight	L	Weight	L	Weight	Material	A_1	Lift hug
DN	mm	kg	mm	kg	mm	kg		mm	
80	-			-	350 +0/-2	18	Bronze	370	No
100	350 +0/-2	15		-	350 +0/-2	18	Steel	372	No
125	350 +0/-2	18			350 +0/-2	24	Steel	385	No
150	500 +0/-3	28			500 +0/-3	34	Steel	399	No
200	500 +0/-3	38	500 +0/-3	47	500 +0/-3	55	Steel	425	Yes
250	600 +0/-3	60	600 +0/-3	76	600 +0/-3	91	Steel	452	Yes
300	500 +0/-3	66	500 +0/-3	81	-	-	Steel	478	Yes
350	550 +0/-3	94	550 +0/-3	121	-	-	Steel	495	Yes
400	600 +0/-3	124	600 +0/-3	153	-	-	Steel	520	Yes
500	625 +0/-3	194	625 +0/-3	231	-	-	Steel	570	Yes
600	750 +0/-3	303	750 +0/-3	365	-	-	Steel	622	Yes
700	875 +0/-3	361	875 +0/-3	565	-	-	Steel	673	Yes
800	1000 +0/-3	494	1000 +0/-3	770	-	-	Steel	724	Yes
900	1230 +0/-6	535	1300 +0/-6	835	-		Steel	775	Yes
1000	1300 +0/-6	594	1370 +0/-6	1000	-	-	Steel	826	Yes
1200	1360 +0/-6	732	-		-		Steel	928	Yes

Size	PN 16		PN 25		PN 40					
	L	Weight	L	Weight	L	Weight	Material	A_1	A_2	Lift hug
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

Size	PN 16		PN 25		PN 40					
	L	Weight	L	Weight	L	Weight	Material	A_1	A_2	Lift
inch	inch	lb	inch	lb	inch	lb		inch	inch	hug
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

A

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

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.

A.1 Identification

Table A-1 Identification parameters (FW 2.03 and EDD 1.02.08-01)

Modbus Address	Parameter		Default value	Value range	Access level	Description
40049	1	Application identifier	Identity		R/W	Customer application identification information (max 16 characters)
40057	2	Application location	Location		R/W	Customer application location information (max 16 characters)
Device						
40032	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
40141	8	Totalizer unit	m^3	See Table A-6 Totalizer units (Page 96)	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. **Note:** The device display can show "m^3" unit only - other units cannot be shown on the display, but will be used and shown online via PDM

Modbus Address	Parameter		Default value	Value range	Access level	Description
40135	9	Flowrate unit	m^3/h	See Table A-7 Flow rate units (Page 96)	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^3/s" unit only - other units cannot be shown on the display, but will be used and shown online via PDM.
40129	10	Maximum flow	Qmax		R/W	Maximum flow
40008	20	Vendor name	Siemens A/S		Read	Siemens A/S Flow Instruments, Denmark
40001	21	Module type	Product dependent	0 to 14	Read	Type of flowmeter
40002	22	Software version	2.03			Software version of the flowmeter
40022	23	Product code number	Product dependent			Siemens production sales code number (the first part of the system number on the nameplate)
40014	24	System Serial number	Product dependent		R/W	Siemens production number (the s econd part of the system number on the nameplate
40065	25	Transmitter serial number	Product dependent		HW key	Serial number of the electronics
40073	26	Sensor serial number	Product dependent			Serial number of the sensor

A.2 Output

Table A-2 Output parameters

Modbus Address	Parameter		Default value	Value range	Access level	Description
43023	100	Actual date and time	Product dependent		R/W	Actual date and time (day-month-year and hours:minutes:seconds)
43006	101	Totalizer 1	0	-2000000001 to +2000000001	Read	Volume for totalization register 1
43010	102	Totalizer 2	0	-2000000001 to +2000000001	Read	Volume for totalization register 2
43014	103	Customer totalizer 3	0		Read	Customer totalizer 3 based on totalizer 1 set up
19	104	Reset customer totalizer 3	No	No, Yes	R/W	Reset of customer totalizer
40732	105	Customer totalizer 3 reset date	Last reset date	dd-mm-yyyy, hh:mm:ss		Date and time when customer totalizer has been reset

Modbus Address	Parameter		Default value	Value range	Access level	Description
43001	106	Flow rate			Read	Actual flow value
43136	107	Relative flow rate	0		Read	Actual flow value in relation to Qmax
43035	108	Actual velocity for path 1	0		Read	The actual flow velocity for path 1 in m/s (SI-unit)
43046	109	Actual velocity for path 2	0			The actual flow velocity for path 2 in m/s (SI-unit). Valid for 2-path solutions only
43026	110	Path 1 gain step	15	1 to 15	Read	Amplifier setting when measuring path 1
43037	111	Path 2 gain step	15	1 to 15	Read	Amplifier setting when measuring path 2. Valid for 2-path solutions only
Pulse A B						
40817	430	Output A enable	Product dependent	No, Yes	R/W	Select "Yes" to enable output A
40818	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
40819	432	Amount per pulse A	Product dependent	0.000001 to 1000000000	R/W	Volume per pulse and selected unit Valid if pulse output A is enabled.
40821	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
40822	440	Output B enable	Product dependent	No, Yes	R/W	Select "Yes" to enable output B
40823	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
40824	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
40825	443	Amount per pulse B	Product dependent	0.000001 to 1000000000	R/W	Volume per pulse. Valid if pulse output B is enabled and pulse function selected
40827	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

Modbus Address	Parameter		Default value	Value range	Access level	Description
Communication For editing the communication settings, use PDM device menu "Communication Setting"						
40833	591	Device Communication Address	1	1 to 247	Read	Meter has default address value 1 with selectable address up to 247
40834	592	Baudrate	4	0 to 5	Read	Communication port speed
40835	593	Parity	0	0 to 3	Read	Communication port parity
40836	594	Interframe space	35	35 to 255	Read	Minimum space between two messages (bytes x 10)
40837	595	Response delay	5	1 to 50	Read	Minimum time from receiving a request to its response
Data logger						
40619	600	Log interval	Monthly	Daily, Weekly, Monthly	R/W	Log interval
40620	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
40621	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
40623	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
22	604	Reset log	No	No, Yes	HW key	Reset data logger
Periodic log Totalizer 1						
40770	160	Next settling date	01-01-2000	dd-mm-yyyy	R/W	Next settling date where actual value of totalizer 1 is stored
40773	161	Latest settling date	01-01-2000	dd-mm-yyyy	Read	Latest settling date where value of totalizer 1 was stored
40776	162	Latest totalizer 1 value	0		Read	Latest stored value of totalizer 1
40780	163	Previous settling date	01-01-2000		Read	Previous settling date where value of totalizer 1 was stored
40783	164	Previous totalizer 1 value	0	dd-mm-yyyy	Read	Previously stored value of totalizer 1

A.3 Diagnostic

Table A-3 Diagnostic

Modbus Address	Parameter		Default value	Value range	Access level	Description
Diagnostic						
40804	500	Latest service date	01-01-2000	dd-mm-yyyy	R/W*	Latest service date (can also be used for date of installation)

Modbus Address	Parameter		Default value	Value range	Access level	Description
40808	501	Operating hours since power up	0	3.4E+38 h	Read	Total operation hours since last power up
40807	503	Numbers of power up	0	0 to 65535	Read	Total number of power-ups since first power-up.
Alarm						
43005	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
40346	202	Date of fault log reset	Last reset date	dd-mm-yyyy, hh:mm:ss	Read	Date of last fault log reset
14	204	Reset the fault log and faults	No	No, Yes	R/W	Reset the fault log and faults
15	205	Call up acknowledge	No	No, Yes	R/W	Select "Yes" to reset active call-up
21	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
3	210	Path 1 alarm output enable	Yes	No, Yes	R/W	Select "Yes" to enable current alarm on alarm output / call-up
40257	211	Path 1 fault hours	e.g. 36 h	Read;		Total hours fault active
40258	212	Path 1 fault counter	e.g. 4	0 to 65535	Read	Total number of faults. Valid only if alarm is enabled
40259	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
40262	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
4	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

Modbus Address	Parameter		Default value	Value range	Access level	Description
40265	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
40266	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
40267	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
40270	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
5	220	Dual slope alarm output enable	Yes	No, Yes	R/W	Select "Yes" to enable active alarm on alarm output / call-up
40273	221	Dual slope fault hours	e.g. 0 h	0 to 65535	Read	Total hours fault active. Valid only if alarm is enabled
40274	222	Dual slope fault counter	e.g. 0	0 to 65535	Read	Total number of faults. Valid only if alarm is enabled
40275	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
40278	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
6	225	Parameter checksum alarm output enable	Yes	No, Yes	R/W	Select "Yes" to enable active alarm on alarm output / call-up
40281	226	Parameter checksum fault hours	e.g. 0 h	0 ... 65535	Read	Total hours fault active. Valid only if alarm is enabled
40282	227	Parameter checksum fault counter	e.g. 0	0 ... 65535	Read	Total number of faults. Valid only if alarm is enabled
40283	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
40286	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
7	230	Low power alarm output enable	Yes	No, Yes	R/W	Select "Yes" to enable active alarm on alarm output / call-up
40289	231	Low power fault hours	e.g. 0 h	0 to 65535	Read	Total hours fault active. Valid only if alarm is enabled
40290	232	Low power fault counter	e.g. 0	0 to 65535	Read	Total number of faults. Valid only if alarm is enabled
40291	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

Modbus Address	Parameter		Default value	Value range	Access level	Description
40294	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
8	235	Flow overflow alarm output enable	Yes	No, Yes	R/W	Select "Yes" to enable active alarm on alarm output / call-up
40297	236	Overflow fault hours	e.g. 0 h	0 to 65535	Read	Total hours fault active. Valid only if alarm is enabled
40298	237	Overflow fault counter	e.g. 0	0 to 65535	Read	Total number of faults. Valid only if alarm is enabled
40299	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
40302	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
9	240	Pulse A overload alarm output enable	Yes	No, Yes	R/W	Select "Yes" to enable active alarm on alarm output / call-up
40305	241	Pulse A overload fault hours	e.g. 0 h	0 to 65535	Read	Total hours fault active. Valid only if alarm is enabled
40306	242	Pulse A overload fault counter	e.g. 0	0 to 65535	Read	Total number of faults. Valid only if alarm is enabled
40307	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
40310	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
10	245	Pulse B overload alarm output enable	Yes	No, Yes	R/W	Select "Yes" to enable active alarm on alarm output / call-up
40313	246	Pulse B overload fault hours	e.g. 0 h	0 to 65535	Read	Total hours fault active. Valid only if alarm is enabled
40314	247	Pulse B overload fault counter	e.g. 0	0 to 65535	Read	Total number of faults. Valid only if alarm is enabled
40315	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
40318	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
11	250	Consumption alarm output enable	Yes	No, Yes	R/W	Select "Yes" to enable active alarm on alarm output / call-up
40321	251	Consumption fault hours	e.g. 0 h	0 to 65535	Read	Total hours fault active. Valid only if alarm is enabled
40322	252	Consumption fault counter	e.g. 0	0 to 65535	Read	Total number of faults. Valid only if alarm is enabled

Modbus Address	Parameter		Default value	Value range	Access level	Description
40323	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
40326	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
12*	255	Leakage alarm output enable	Yes	No, Yes	R/W	Select "Yes" to enable active alarm on alarm output / call-up
40329	256	Leakage fault hours	e.g. 0 h	0 to 65535	Read	Total hours fault active. Valid only if alarm is enabled
40330	257	Leakage fault counter	e.g. 0	0 to 65535	Read	Total number of faults. Valid only if alarm is enabled
40331	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
40334	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
13*	260	Empty pipe alarm output enable	Yes	No, Yes	R/W	Select "Yes" to enable active alarm on alarm output / call-up
40337	261	Empty pipe fault timer	e.g. 0 h	0 to 65535	Read	Total hours fault active. Valid only if alarm is enabled
40338	262	Empty pipe fault counter	e.g. 0	0 to 65535	Read	Total number of faults. Valid only if alarm is enabled
40339	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
40342	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
Service						
17	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"
40801	511	Fixed flow value	0	-1E+09 to 1E+09	R/W	Fixed flow value for enabled fixed flow
40803	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
Power						
43120	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

Modbus Address	Parameter		Default value	Value range	Access level	Description
40808	501	Operating hours since power up	1105 h	3.4 E+38	Read	Total operation hours since first power up
40807	503	Numbers of power up	e.g. 4	0 to 65535	Read	Total number of power-ups since first power-up.
18	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
40881	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
40880	542	Power supply mode	Product dependent	Battery only, Mains only, Mains with backup 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.
40849	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
40851	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

Modbus Address	Parameter		Default value	Value range	Access level	Description
Meter Setup						
40179	307	Flow velocity offset	0 m/s	-10 to 10 m/s	HW key	Velocity added to measured flow velocity
40182	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)

Modbus Address	Parameter		Default value	Value range	Access level	Description
40151	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
40196	312	Transducer cable length	Product dependent	0 to 200 m	R/W	Cable length (m) from sensor to transmitter
40173	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 ouput value is at 70% of the change of its input value. Higher number gives a slower and more stable flow signal.
40162	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
40164	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 x Qmax x low flow cut off)/100], the amount is accepted for pulsing. ΣQ > N x Qmax x low flow cut-off/100 • ΣQ: totalized flow within N samples • N: Creep lock max number
40184	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"
Totalizer						
40673	400	Flow direction totalizer 1	Forward	Forward, Reverse, Net	R/W	Calculation principle on flow direction for forward, reverse or net flow
40675	401	Totalizer 1 change date	Last change date	dd-mm-yyyy; hh:mm:ss	Read	Date and time when totalizer 1 function was changed
40674	410	Flow direction totalizer 2	Reverse	Forward, Reverse, Net	R/W	Calculation principle on flow direction for forward - reverse or net flow
40678	411	Totalizer 2 change date	Last change date	dd-mm-yyyy; hh:mm:ss	Read	Date and time when totalizer 2 function was changed
Pipe data						
40181	300	Number of paths	Product dependent	2	R/W	Number of paths on the sensor
40149	302	Max sample frequency	15	15	Read	The maximum frequency for flow measurement

Modbus Address	Parameter		Default value	Value range	Access level	Description
40147	303	Sample frequency	0.5	15	HW key	The frequency at which the flow is measured
40167	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).
40169	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
40171	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

Modbus Address	Parameter		Default value	Value range	Access level	Description
40757	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
40753	422	Operator Menu 1	All	1 to 5	Read only	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 totalizer and flow rate units. More are available via SIMATIC PDM tool

Table A-6 Totalizer units

Unit	Correction factor
Default	1 m^3
m^3*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*ft3)	0.3531467
CF*1000 (1000*ft^3)	0.03531467
l*100 (liter)	10
kl (1000*liter)	1
Ml (Mega liter)	0.001

Table A-7 Flow rate units

Flow rate	Correction factor parameter
Default	1 m^3/s
m^3/min (m^3/minute)	60
m^3/h (m^3/hour)	3600
m^3/d (m^3/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^3/second)	35.31467
CFM (ft^3/minute)	2118.882
CFH (ft^3/hour)	127132.8
l/s (liter/second)	1000
l/min (liter/minute)	60000
l/h (liter/hour)	3600000
Ml/d (1000000lLiter/day)	86.4

Settings

B

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 transducer 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
Pipe data		
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 constant	Factory pre-configured to typical 5 s (for larger pipe size higher values are used)	Adjustable (5 to 1000 s)
Geometry factor path 1	For FUE380 and FUS380 factory pre-configured according order code	Auto set from pipe geometry help program in PDM
Geometry factor path 2	For FUE380 and FUS380 factory pre-configured according order code	Auto set from pipe geometry help program in PDM
Correction factor		
Customer correction factor	1	0.5 to 1.5
Measuring unit and factors		

Parameter	Factory settings	Possible settings
Flow unit factor	3600 (for flow unit m^3/h)	Auto set from unit guide
Totalizer volume unit factor	1	Auto set from unit guide
Flow unit text	m^3/h	Auto set from unit guide, but only m^3/h can be shown on display
Totalizer unit text	m^3	Auto set from unit guide, but only m^3 can be shown on display
Totalizer directions		
Totalizer 1 direction	Forward	Forward/Reverse/Forward net/Reverse net
Totalizer 2 direction	Reverse	Forward/Reverse/Forward net/Reverse net
Output A		
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^3	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
Output 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.2 Factory settings for Modbus communication

Parameter	Default setting
Slave device address	1
Data transmission rate	19 200 baud
Vertical parity position	Even 1 stop
Response timeout	10000 ms
Response delay	5 ms
Interframe space	35 bits

The settings can be changed via SIMATIC PDM or via the Modbus.

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)

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