ICS SCHNEIDER MESSTECHNIK

SIEMENS

SITRANS F

Coriolis flowmeters
SITRANS FC430

Operating Instructions

7ME461 (Standard sensor)
7ME462 (Hygienic sensor)
7ME471 (NAMUR)

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.

Table of contents

Introduction 1

1.1 Purpose of this documentation

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

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

1.2 Document history

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

The most important changes in the documentation when compared with the respective previous edition are given in the following table.

Edition	Note
09/2019	Second edition • Chapter Technical data (Page 183) updated • Overall revision of chapters and contents
06/2017	First edition

1.3 Designated use

Use the device in accordance with the information on the nameplate and in the Technical data (Page 183).

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

1.4 Product compatibility

Edition	Remarks	Product compatibility	Compatibility of device integration package	
09/2019	Manual updated	Compact FW revision 4.xx.xx-xx Remote FW revision 4.xx.xx-xx	Service channel: SIMATIC PDM V8.2 Service Pack 1 or later	EDD: 5.00.01 or later
			Modbus: SIMATIC PDM V8.2 Service Pack 1 or later	EDD: 5.00.01 or later
			HART: SIMATIC PDM V8.2 Service Pack 1 or later	EDD: 5.00.01 or later
			HART: SITRANS DTM V4.1	DTM: 5.00.01 or later
			HART: AMS Device manager V12 or later	EDD: 5.00.01 or later
			PROFIBUS: SIMATIC PDM V8.2 Service Pack 1 or later	EDD: 1.00.01 or later
			PROFIBUS: SITRANS DTM V4.1	DTM: 1.00.01 or later
06/2017	First revision	HW revision 03 Compact FW revision 4.xx.xx-xx Remote FW revision 4.xx.xx-xx	Service channel: SIMATIC V8.2 Service Pack 1 or later	EDD: 5.00.xx-xx
			Modbus: SIMATIC V8.2 Service Pack 1 or later	EDD: 5.00.xx-xx
			HART: SIMATIC V8.2 Service Pack 1 or later	EDD: 5.00.xx-xx
			HART: SITRANS DTM V4.1	EDD: 5.00.xx-xx
			HART: AMS Device manager V12	EDD: 5.00.xx-xx
			PROFIBUS: SIMATIC V8.2 Service Pack 1 or later	EDD: 1.00.xx-xx
			PROFIBUS: SITRANS DTM V4.1	EDD: 1.00.xx-xx
05/2015	Aerated Flow parameters added	HW revision 02 Compact FW revision 3.02.02-01 Remote FW revision 2.02.02-01	SIMATIC PDM HART	EDD: 4.00.00-00
			SIMATIC PDM Service channel	EDD: 4.00.00-00
			AMS Device Manager HART	EDD: 4.00.00-02
			SITRANS DTM HART	EDD: 4.00.00-00
			375 Field Communicator HART	EDD: 4.00.00-02
05/2014	Description of new parameters for spare part replacement	HW revision 02 Compact FW revision 3.02.01 Remote FW revision 2.02.01	SIMATIC PDM AMS Device Manager SITRANS DTM 375 Field Communicator	EDD: 3.00.00-00
12/2013	Various LUI functions, for example wizards Various transmitter functionalities	HW revision 02 Compact FW revision 3.02.00 Remote FW revision 2.02.00	SIMATIC PDM AMS Device Manager SITRANS DTM 375 Field Communicator	EDD: 2.00.00

Edition	Remarks	Product compatibility	Compatibility of device integration package	
06/2012	CT chapter included	HW revision 01 Compact FW revision 3.00.00-10 Remote FW revision 2.00.00-30	SIMATIC PDM	EDD: 1.00.00
03/2012	First edition	HW revision 01 Compact FW revision 2.00.0x Remote FW revision 2.00.0x	SIMATIC PDM	EDD: 1.00.00

1.5 Items supplied

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

Compact system
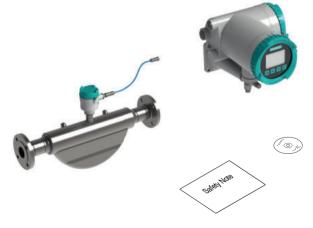
- SITRANS FC430 sensor and compact mounted transmitter
- DVD containing software, certificates and device manuals
- Safety note

Field mount system

Remote with M12 plug connection

- SITRANS FCS400 sensor
- SITRANS FCT030 transmitter with M12 socket assembled
- Mounting bracket and cushion pad
- Sensor cable
- DVD containing software, certificates and device manuals
- Safety note

Remote with sensor terminal enclosure

- SITRANS FCS400 sensor
- SITRANS FCT030 transmitter with terminal enclosure assembled
- Mounting bracket and cushion pad
- Sensor cable
- DVD containing software, certificates and device manuals
- Safety note

Wall mount enclosure

- SITRANS FCT030 wall mount enclosure transmitter
- DVD containing software, certificates and device manuals
- Safety note

Note

Supplementary information

Supplementary product and production specific certificates are included on the SensorFlash® SD card in the transmitter socket.

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.

1.6 Checking the consignment

1. Check the packaging and the delivered items for visible damages.

2. Report any claims for damages immediately to the shipping company.

3. Retain damaged parts for clarification.

4. Check the scope of delivery by comparing your order to the shipping documents for correctness and completeness.

> ⚠ **WARNING**
>
> **Using a damaged or incomplete device**
>
> Risk of explosion in hazardous areas.
> - Do not use damaged or incomplete devices.

1.7 Security information

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

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

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

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

Siemens' products and solutions undergo continuous development to make them more secure. Siemens strongly recommends that product updates are applied as soon as they are available and that the latest product versions are used. Use of product versions that are no longer supported, and failure to apply the latest updates may increase customer's exposure to cyber threats.

To stay informed about product updates, subscribe to the Siemens Industrial Security RSS Feed under
https://www.siemens.com/industrialsecurity.

1.8 Transportation and storage

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

● Keep the original packaging for subsequent transportation.

● Devices/replacement parts should be returned in their original packaging.

● If the original packaging is no longer available, ensure that all shipments are properly packaged to provide sufficient protection during transport. Siemens cannot assume liability for any costs associated with transportation damages.

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

Special conditions for storage and transportation of the device are listed in Technical data (Page 183).

1.9 Notes on warranty

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

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

Safety notes

<div style="text-align: right; font-size: 3em;">2</div>

2.1 Preconditions for use

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

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

Symbol	Explanation
⚠	Consult operating instructions

> **⚠ WARNING**
>
> **Improper device modifications**
>
> Risk to personnel, system and environment can result from modifications to the device, particularly in hazardous areas.
>
> - Only carry out modifications that are described in the instructions for the device. Failure to observe this requirement cancels the manufacturer's warranty and the product approvals.

2.2 Laws and directives

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

- National Electrical Code (NEC - NFPA 70) (USA)
- Canadian Electrical Code (CEC) (Canada)

Further provisions for hazardous area applications are for example:

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

2.2.1 FCC Conformity

US Installations only: Federal Communications Commission (FCC) rules

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Note

- This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment.

- This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the operating instructions, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference to radio communications, in which case the user will be required to correct the interference at his own expense.

2.2.2 Conformity with European directives

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

Electromagnetic compatibility EMC 2014/30/EU	Directive of the European Parliament and of the Council on the harmonisation of the laws of the Member States relating to electromagnetic compatibility
Low voltage directive LVD 2014/35/EU	Directive of the European Parliament and of the Council on the harmonisation of the laws of the Member States relating to the making available on the market of electrical equipment designed for use within certain voltage limits
Atmosphère explosible ATEX 2014/34/EU	Directive of the European Parliament and the Council on the harmonisation of the laws of the Member States relating to equipment and protective systems intended for use in potentially explosive atmospheres
Pressure equipment directive PED 2014/68/EU	Directive of the European Parliament and of the Council on the approximation of the laws of the Member States concerning pressure equipment
2011/65/EU RoHS	Directive of the European Parliament and the Council on the restriction of the use of certain hazardous substances in electrical and electronic equipment

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

Note

CE declaration

The CE declaration certificate is available on the SensorFlash SD card delivered with the device.

2.3 Requirements for special applications

Due to the large number of possible applications, each detail of the described device versions for each possible scenario during commissioning, operation, maintenance or operation in systems cannot be considered in the instructions. If you need additional information not covered by these instructions, contact your local Siemens office or company representative.

Note

Operation under special ambient conditions

We highly recommend that you contact your Siemens representative or our application department before you operate the device under special ambient conditions as can be encountered in nuclear power plants or when the device is used for research and development purposes.

2.4 Use in hazardous areas

Special conditions for safe use

In general, it is required that:

● EN/IEC 60079-14 is considered for installation in hazardous areas.

● Appropriate cable connectors are used.

● Sensor is connected to the potential equalization throughout the hazardous area.

● The device is not opened when energized and when an explosive gas or dust atmosphere may be present.

Further information and instructions including approval-specific special conditions for safe use in Ex applications can be found in the certificates on the documentation disk and at the product web page (www.siemens.com/FC430).

⚠ **WARNING**

Substitution of components

Substitution of components may impair Intrinsic Safety.

⚠ **WARNING**

Laying of cables

Risk of explosion in hazardous areas.

Cable for use in hazardous areas must satisfy the requirements for having a proof voltage of at least 500 V AC applied between the conductor/ground, conductor/shield and shield/ground.

Connect the devices that are operated in hazardous areas as per the stipulations applicable in the country of operation.

⚠ **WARNING**

Field wiring installation

Ensure that the national requirements of the country in which the devices are installed are met.

Qualified personnel for hazardous area applications

Persons who install, connect, commission, operate, and service the device in a hazardous area must have the following specific qualifications:

● They are authorized, trained or instructed in operating and maintaining devices and systems according to the safety regulations for electrical circuits, high pressures, aggressive, and hazardous media.

● They are authorized, trained, or instructed in carrying out work on electrical circuits for hazardous systems.

● They are trained or instructed in maintenance and use of appropriate safety equipment according to the pertinent safety regulations.

⚠ **WARNING**

Use in hazardous area

Risk of explosion.

● Only use equipment that is approved for use in the intended hazardous area and labeled accordingly.

● Do not use devices that have been operated outside the conditions specified for hazardous areas. If you have used the device outside the conditions for hazardous areas, make all Ex markings unrecognizable on the nameplate.

⚠ **WARNING**

Loss of safety of device with type of protection "Intrinsic safety Ex i"

If the device or its components have already been operated in non-intrinsically safe circuits or the electrical specifications have not been observed, the safety of the device is no longer ensured for use in hazardous areas. There is a risk of explosion.

● Connect the device with type of protection "Intrinsic safety" solely to an intrinsically safe circuit.

● Observe the specifications for the electrical data on the certificate and/or in Technical data (Page 183).

⚠ **WARNING**

Signal wiring

Input/output connections to the transmitter are required to be protected by intrinsic safe barriers at all times.

> ⚠ **WARNING**
>
> **Dust layers above 5 mm**
>
> Risk of explosion in hazardous areas.
>
> Device may overheat due to dust build up.
>
> - Remove dust layers in excess of 5 mm.

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

Installation variations

> **Note**
>
> **Requirements for safe installation**
>
> - Remote sensor FCS400 can be installed in Zone 1, Div. 1 as Intrinsically Safe or Flameproof.
> - Standard remote installation with FCT030 because the connection is certified Intrinsically Safe. however flameproof seals and conduit (for IS cable) can be used.
> - Requirement for IS circuit is that the maximum input voltage V_i to DSL is 20 VDC, I_i is maximum 484 mA, P_i < 2.3 W

Hazardous area approvals

The device is approved for use in hazardous area and has the approvals listed below. Special conditions for safe installation and operation specified by each approval authority are included in the relevant certificate.

See also

Certificates and approvals (Page 195)

> ⚠ **WARNING**
>
> **Improper device modifications**
>
> Risk to personnel, system and environment can result from modifications to the device, particularly in hazardous areas.
>
> - Only carry out modifications that are described in the instructions for the device. Failure to observe this requirement cancels the manufacturer's warranty and the product approvals.

Specific conditions of use

FCS400 remote sensor with DSL

The maximum dust layer shall be no greater than 5 mm (T5 85°C).

The apparatus housing shall be connected to the potential equalising conductor in the hazardous area.

Sensor/Adapter combinations apart from the Model SFCB450A1Y1-series Cor_B Coriolis Sensor and Pedestal Adapter. The maximum allowable process fluid temperatures with respect to the marked temperature class and maximum surface temperature for the device in the following maximum ambient temperatures are:

Ta (°C)	Maximum Process Temperature per Temperature Class (°C)			
	T6	T5	T4	T3
60	80	80	80	80
55	85	100	110	110
50	85	100	130	140
45	85	100	135	170
40	85	100	135	200
35	85	100	135	200
30	85	100	135	200

- If Tprocess ≤ 85°C, maximum surface temperature = 85°C

- If Tprocess > 85°C, maximum surface temperature = process temperature

Model SFCB450A1Y1-series Cor B Coriolis Sensor and Pedestal Adapter:

- Process temperature up to 100ºC: ambient temperature 58ºC, T4 temperature class

- Process temperature up to 150ºC: ambient temperature 38ºC, T3 temperature class

Temperature classes T6 and T5 are not applicable.

The maximum pressure associated with the process medium in the internal pipes shall be limited to 160 bar.

If the sensor is mounted remotely from the adapter, the wiring shall be given protection against torsional and tensile stresses (e.g. by the use of conduit).

The EPL marking Gb/Ga indicates that the equipment is for use in zone 1, but the sensor interfaces with the process fluid, which may be zone 0 inside the process pipe.

For installation in environment with dust, the maximum process temperatures shall be as follows:

Ta (°C)	Maximum Process Temperature per Temperature Class (°C)	
	Applications with up to 5 mm dust or isolation	Applications with up to 500 mm dust or isolation
60	70	-40
55	100	-10

Ta (°C)	Maximum Process Temperature per Temperature Class (°C)	
	Applications with up to 5 mm dust or isolation	Applications with up to 500 mm dust or isolation
50	130	20
45	160	50
40	190	80
35	200	110
30	200	140

Additionally, the maximum surface temperature of the overall device shall be:

● If Tprocess ≤ 85°C, maximum surface temperature = 85°C

● If Tprocess > 85°C, maximum surface temperature = process temperature

___

Note

Only installation as Ex ia can be used for installation in Zone 20.

___

FCT030 remote transmitter

Temperature classification with and without dust is as follows:

● Potentially explosive gases: T6 (85°C surface temperature)

● Dust environment (Zone 21): T85°C

FC430 compact flowmeter

The SITRANS FC430 shall only be electrically powered / connected to an overvoltage category II or better circuit as defined in IEC 60664-1 and required by Annex F of IEC 60079-11.

The quoted entity parameters of Co and Lo are applicable for the distributed capacitance and inductance in cables. Where there is circuit capacitance or inductance in the connected equipment (represented by Ci and Li) that both total more than 1% of quoted Co and Lo then the Co and Lo of the connected equipment shall not exceed 50% of the quoted Co and Lo values.

The maximum dust layer shall be no greater than 5 mm (T5 85°C).

The apparatus housing shall be connected to the potential equalising conductor in the hazardous area.

Sensor/adapter combinations apart from the Model SFCB450A1Y1-series Cor_B Coriolis Sensor and Pedestal Adapter. The maximum allowable process fluid temperatures with respect to the marked temperature class and maximum surface temperature for the device in the following maximum ambient temperatures are:

Ta (°C)	Maximum Process Temperature per Temperature Class (°C)			
	T6	T5	T4	T3
60	80	80	80	80
55	85	100	110	110
50	85	100	135	140
45	85	100	135	170

Ta (°C)	Maximum Process Temperature per Temperature Class (°C)			
	T6	T5	T4	T3
40	85	100	135	200
35	85	100	135	200
30	85	100	135	200

In case the equipment is placed in a "tb" environment (Zone 21), the following must be observed:

● If Tprocess ≤ 85°C, maximum surface temperature = 85°C

● If Tprocess > 85°C, maximum surface temperature = process temperature

Model SFCB450A1Y1-series Cor B Coriolis Sensor and Pedestal Adapter:

● Process temperature up to 100ºC: ambient temperature 53ºC, T4 temperature class

● Process temperature up to 150ºC: ambient temperature 33ºC, T3 temperature class

Temperature classes T6 and T5 are not applicable.

The maximum pressure associated with the process medium in the internal pipes shall be limited to 160 bar.

If the sensor is mounted remotely from the adapter, the wiring shall be given protection against torsional and tensile stresses (e.g. by the use of conduit).
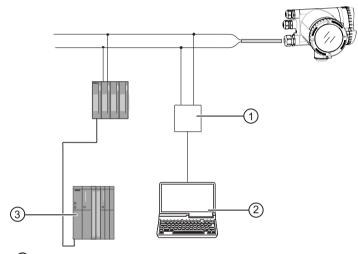
The EPL marking Gb/Ga indicates that the equipment is for use in zone 1, but the sensor interfaces with the process fluid, which may be zone 0 inside the process pipe.

Description 3

SITRANS Coriolis flowmeter systems consist of a transmitter and a sensor. The following table lists the available combinations of transmitters and sensors.

Transmitter	Sensor type
FCT030	FCS400
	DN 15 to DN 50 (0.5" to 2")

①   Communication modem
②   PC with SIMATIC PDM or similar application
③   SIMATIC PLC system with HART interface

The Coriolis flowmeter can be used in a number of system configurations:

● as a field mounted transmitter supplied with various optional inputs and outputs

● as part of a system environment, for example SIMATIC S7

3.1   Design

The flowmeter uses the Coriolis principle to measure flow and is available in a remote and a compact design.

- Compact design: The SITRANS FC430 is a single mechanical unit where the transmitter is directly mounted on the sensor.

Figure 3-1   **Compact design**

- Remote design: The SITRANS FCS400 sensor unit is remotely connected to a SITRANS FCT030 transmitter. Directly mounted on the sensor, its Digital Sensor Link (DSL) performs the signal processing of all measured signals in the sensor. The 4-wire connection between the transmitter and the sensor provides power and high-integrity digital communication between the DSL and the transmitter.

Figure 3-2   **Remote design - M12 connection**

Figure 3-3   **Remote design - sensor terminal enclosure**

Figure 3-4　　**Remote design - wall mount enclosure transmitter**

3.1.1　　Sensor design

All primary process measurement of mass flow, volume flow, density and process temperature are made in the DSL/sensor front end.

The sensor comprises two parallel bent tubes welded directly to the process connections at each end via a manifold. The sensor is available in an intrinsically safe (IS) design for hazardous area installations.

The sensors are available in AISI 316L stainless steel and nickel alloy C22. The enclosure is made of AISI 304 stainless steel which has a pressure rating of 20 bar (290 psi) for DN 15 to DN 50 and 17 bar (247 psi) for DN 80. The burst pressure for all sizes is in excess of 160 bar.
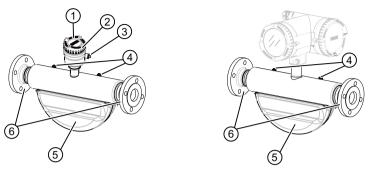
The sensor enclosure can be equipped with a pressure guard or flushed with dry inert gas at the threaded ports for non-hazardous applications only.

Note

Ex certification requires that the threaded ports always remain closed.

In the remote configuration, the sensor front end (DSL) is available in an painted aluminum, with an ingress protection grade of IP67/NEMA 4X. For communication and power supply a 4-wire connection can be made via M12 plug and socket or cable gland/conduit entry for cable termination.

Sensor overview

①	Sensor front end (DSL) (Remote configuration only)
②	Lid-lock
③	Cable feed-through (M12 socket or gland)
④	Plug and threaded port for e.g. pressure guard
⑤	Sensor enclosure
⑥	Process connections
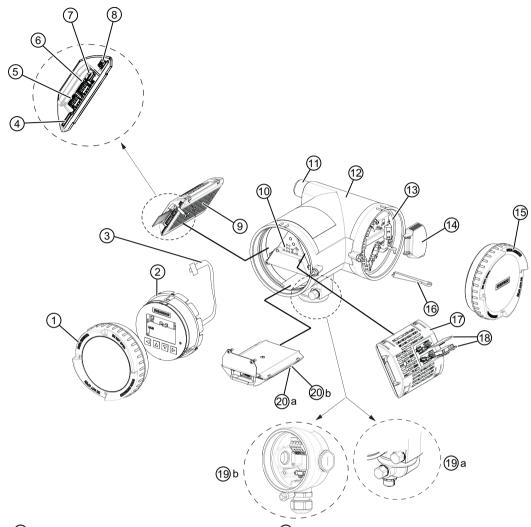
Figure 3-5   Overview, remote and compact configuration

3.1.2   Field mount transmitter design

The transmitter reads the primary values from the sensor and calculates derived values. It provides up to four configurable I/Os. On channel 1, HART communication, PROFIBUS DP, PROFIBUS PA or Modbus RTU RS-485 is possible. On channel 2, 3, 4 each I/O can be individually configured. A local display and four buttons are available for user interaction. The transmitter adds functionalities such as Standard volume flow, fractions, totalizers, dosing, access control, diagnostics, configuration and logging.

The transmitter has a modular design with discrete, replaceable electronic modules and connection boards to maintain separation between functions and facilitate field service. All modules are fully traceable and their provenance is included in the transmitter setup.

Transmitter exploded view

①	Display cover	⑫	Transmitter enclosure
②	Local display	⑬	Terminal compartment
③	Connector for local display	⑭	Power supply terminal protection cover
④	SD card (SensorFlash)	⑮	Lid for terminal compartment
⑤	DIP switch (for custody transfer)	⑯	Wiring tool
⑥	DIP switch (for HART and Modbus)	⑰	I/O cassette (optional)
⑦	Local display port	⑱	I/O configuration keys (optional)
⑧	USB service port	⑲a	M12 socket
⑨	Transmitter cassette	⑲b	Terminal enclosure
⑩	Heatsink cover for power supply module	⑳a	Sensor module (compact design)
⑪	Cable entry	⑳b	Barrier module (remote design)

Figure 3-6   Transmitter exploded view

3.1.3 Wall mount enclosure transmitter design

①	Display glass	⑩	Foam bottom
②	Power supply module (complete)	⑪	Hinge pin
③	SD card (SensorFlash)	⑫	Enclosure
④	Transmitter cassette	⑬	Ground connect set
⑤	I/O cassette (optional)	⑭	Backplane module
⑥	Local display module	⑮	Power supply connector cover
⑦	Foam top	⑯	Front cover enclosure
⑧	Foam plugs	⑰	Front cover mounting screws
⑨	Barrier module (digital version)		
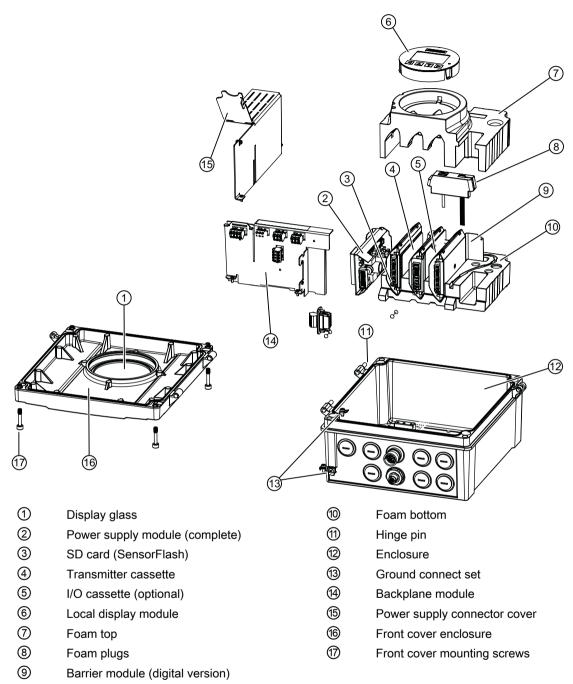
Figure 3-7   Wall mount enclosure transmitter exploded view

3.2   Nameplate layout

Each part of the FC430 Coriolis flowmeter has 3 nameplate types showing the following information:
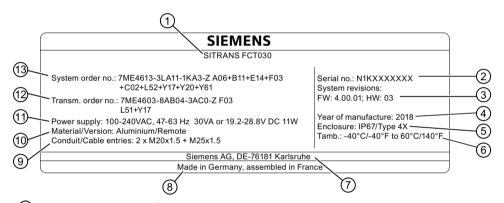
- product identification
- product specifications
- certificates and approvals

Note

Identification

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

FCT030 transmitter: Nameplate with general information

①	SITRANS FCT030[1]	Product name
②	Serial no.	Transmitter serial number
③	System revisions	System revision numbers; firmware (FW) and hardware (HW)
④	Year of manufacture	Manufacturing year
⑤	Enclosure	Degree of protection
⑥	Tamb.	Ambient temperature range
⑦	Manufacturer	Manufacturer name and location
⑧	Country	Manufacturing country
⑨	Conduit / cable entries	Type of conduit / cable entries
⑩	Material / Version	Transmitter housing material and version (compact/remote)
⑪	Power supply	Power supply
⑫	Transm. order no.	Device-specific transmitter order number
⑬	System order no.	Device-specific sensor order number (transmitter and sensor)
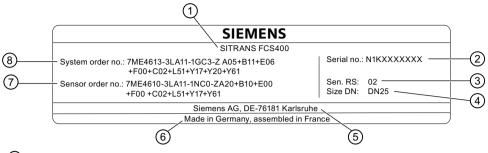
[1] With compact versions, the transmitter and sensor product identifications are both given as 'Coriolis flowmeter SITRANS FC430'.

With remote versions, the transmitter is identified as 'SITRANS FCT030' and the sensor as 'SITRANS FCS400'.

FCS400 sensor: Nameplate with general information

①	SITRANS FCS400[1]	Product name
②	Serial no.	Sensor serial number
③	Sen. RS	Mechanical sensor version number
④	Size DN	Size
⑤	Manufacturer	Manufacturer name and location
⑥	Country	Manufacturing country
⑦	Sensor order no.	Sensor replacement order number
⑧	System order no.	Flowmeter system order number (transmitter and sensor)

[1] With compact versions, the transmitter and sensor product identifications are both given as 'Coriolis flowmeter SITRANS FC430'.

With remote versions, the transmitter is identified as 'SITRANS FCT030' and the sensor as 'SITRANS FCS400'.

Flowmeter serial number construction

The flowmeter serial number is constructed as follows:

PPYMDDxxxxxx

where
PP = Production factory (Siemens Flow Instruments: N1)
Y = Production year (for encryption, see below)
M = Production month (for encryption, see below)
DD = Production day (for encryption, see below)
xxxxxx = Sequential number
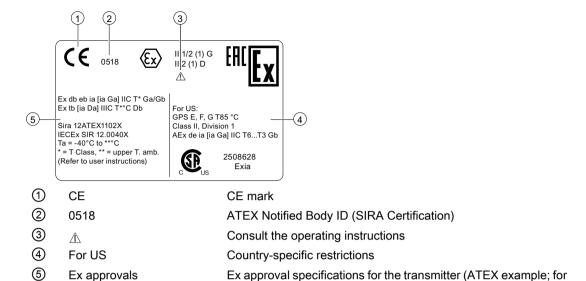
Encryption:

Calendar year (Y)	Code
1950, 1970, 1990, 2010	A
1951, 1971, 1991, 2011	B
1952, 1972, 1992, 2012	C
1953, 1973, 1993, 2013	D
1954, 1974, 1994, 2014	E
1955, 1975, 1995, 2015	F
1956, 1976, 1996, 2016	H (G)
1957, 1977, 1997, 2017	J
1958, 1978, 1998, 2018	K

1959, 1979, 1999, 2019	L
1960, 1980, 2000, 2020	M
1961, 1981, 2001, 2021	N
1962, 1982, 2002, 2022	P
1963, 1983, 2003, 2023	R
1964, 1984, 2004, 2024	S
1965, 1985, 2005, 2025	T
1966, 1986, 2006, 2026	U
1967, 1987, 2007, 2027	V
1968, 1988, 2008, 2028	W
1969, 1989, 2009, 2029	X
Month (M)	**Code**
January	1
February	2
March	3
April	4
May	5
June	6
July	7
August	8
September	9
October	O
November	N
December	D
Day (DD)	**Code**
Day 1 to 31	01 to 31 (corresponding to the actual date)

FCT030 transmitter: Nameplate with specific information

①	CE	CE mark
②	0518	ATEX Notified Body ID (SIRA Certification)
③	⚠	Consult the operating instructions
④	For US	Country-specific restrictions
⑤	Ex approvals	Ex approval specifications for the transmitter (ATEX example; for details on all approvals refer toCertificates and approvals (Page 195))
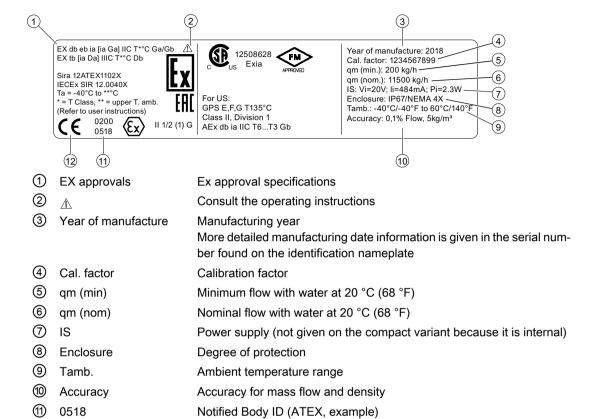
Note

Approval identifications

Approval certificates and notified body identifications are available for download at www.siemens.com (http://www.siemens.com/processinstrumentation/certificates).

FCS400 sensor: Nameplate with specific information

①	EX approvals	Ex approval specifications
②	⚠	Consult the operating instructions
③	Year of manufacture	Manufacturing year More detailed manufacturing date information is given in the serial number found on the identification nameplate
④	Cal. factor	Calibration factor
⑤	qm (min)	Minimum flow with water at 20 °C (68 °F)
⑥	qm (nom)	Nominal flow with water at 20 °C (68 °F)
⑦	IS	Power supply (not given on the compact variant because it is internal)
⑧	Enclosure	Degree of protection
⑨	Tamb.	Ambient temperature range
⑩	Accuracy	Accuracy for mass flow and density
⑪	0518	Notified Body ID (ATEX, example)
⑫	CE	CE mark

FCT030 transmitter: Nameplate with approval information

①	IC	Conformity with country-specific directives
②	QR code	Product-specific QR code
③	🗑	WEEE symbol, see Disposal (Page 153)
④	C✓	C-tick logo

FCS400 sensor: Nameplate with approval information

WARNING - DO NOT OPEN WHEN AN
EXPLOSIVE ATMOSPHERE IS PRESENT

AVERTISSEMENT - NE PAS OUVRIR DANS UN
ENVIRONNEMENT EXPLOSIF

①	QR code	Product-specific QR code
②	C✓	C-tick logo
③	🔨	WEEE symbol, see Disposal (Page 153)

Note

Logos and warnings

Logos and warnings are only shown on the product where applicable. The combination shown in the example above is relevant for a hygienic sensor installed in hazardous area in Canada.
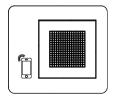
The Australian C-tick mark is mandatory on all products.

Sensor EHEDG nameplate

CERTIFIED
EHEDG
HYGIENIC ENGINEERING & DESIGN GROUP EUROPEAN
TYPE EL - CLASS I
MAY 2012

FC0042.01

This nameplate appears on all Hygienic sensors 7ME462.

QR code

With the use of a smart phone, the QR code provides a direct link to

- the product support portal, which includes access to the "How to Install" YouTube video

- the product and production-specific documentation maintained in the production database.

See also

Use in hazardous areas (Page 17)

3.3 Features

- The flowmeter can be used as HART, Modbus RTU RS-485 or PROFIBUS PA/DP slave in operation on SIEMENS SIMATIC S7/PCS 7 or third party automation systems

- Available in compact and remote version

- Full graphical local display (HMI) with 6 user views and trend curves

- SensorFlash (SD card) for memory backup, logging and documentation storage (certificates etc.)

- USB service interface

- HART communication interface (HART 7.5)

- PROFIBUS DP 12 Mbits/s

- PROFIBUS PA profile 4.0

- Modbus RTU RS-485

- High immunity against process noise

- Fast response to step changes in flow

- High update rate (100 Hz) on all process values

- Measurement of:

  – Volume flow

  – Mass flow

  – Standard volume flow

  – Density

  – Fraction A (mass flow or volume flow)

  – Fraction B (mass flow or volume flow)

  – Fraction A%

  – Fraction B%

  – Medium temperature

- Configurable upper and lower alarm and warning limits for process values

- Independent low flow cut-off settings for volume flow and mass flow

- Zero-point adjustment (initiated locally on local display panel or by host system)

- Process noise damping using digital signal processing (DSP)

- Three totalizers for summation of flow process values

- Empty tube monitoring

- Simulation of process values

- Simulation of outputs
- Simulation of alarms
- Enabling alarms for visibility on all outputs (local display, status and communication)
- Comprehensive diagnostics (NAMUR or Siemens standard) for troubleshooting and sensor checking
- Firmware update
- Use in hazardous areas according to specification
- USB mass storage (not available in the USA)
- Data logging of process values and parameter value change in SensorFlash
- Peak indicators - logging of min & max process peak values with time stamp information
- Alarm delay
- Damping filtering system for process values at local display or outputs
- Spare part replacement
- Selection of active or passive output signals in none hazardous areas
- Intelligent filtering system for aerated flow

- Up to four input/output channels:
  Channel 1: can be parameterized for:
  - Profibus DP
  - Profibus PA
  - Current HART output (4-20 mA)
  - Modbus RTU RS-485

  Channel 2: Signal output can be parameterized for:
  - Current output (0/4-20 mA)
  - Pulse output
  - Frequency output
  - Status output

  Channel 3 and 4: Signal output can be parameterized for:
  - Current output (0/4-20 mA)
  - Pulse output
  - Frequency output
  - Status output
  - Pulse or frequency redundancy mode (channel 2 together with channel 3)

  Channels 3 and 4: Relay output; can be parameterized as:
  - Status output

  Channels 3 and 4: Signal input; can be parameterized as:
  - Totalizer control
  - Dosing control
  - Zero point adjustment
  - Freezing of process values
  - Forcing of outputs
- Current, frequency, and pulse outputs with configurable fail safe mode
- Totalizer control (resetting of totalizers)
  - Zero point adjustment
  - Freezing of process values
  - Forcing of outputs
- Three totalizers for summation of mass flow, volume flow and standard volume flow, depending on setting of:
  - Mass flow measurement
  - Volume flow measurement
  - Fraction A and B measurement (mass flow or volume flow)
  - Standard volume flow

3.4　Applications

The main applications of the Coriolis flowmeter can be found in all industries, such as:

● Chemical & Pharma: detergents, bulk chemicals, acids, alkalis, pharmaceuticals, blood products, vaccines, insulin production

● Food & Beverage: dairy products, beer, wine, soft drinks, °Brix/°Plato, fruit juices and pulps, bottling, CO_2 dosing, CIP/SIP-liquids, mixture recipe control

● Automotive: fuel injection nozzle & pump testing, filling of AC units, engine consumption, paint robots

● Oil & Gas: filling of gas bottles, furnace control, test separators, bore-hole plasticizer dosing, water-cut metering

● Water & Waste Water: dosing of chemicals for water treatment

3.5　Approvals

Note

For further details see Certificates and approvals (Page 195).

The device is available with approvals for general purpose and for hazardous areas. In all cases, check the nameplate on your device, and confirm the approval rating.

Installing/mounting

4

This chapter gives detailed instructions on mounting the transmitter and sensor to take best advantage of the flexible arrangements built into the product, and to aid in planning the physical locations of the flowmeter parts.

With compact versions the transmitter can be rotated on the sensor pedestal up to 330°.

For remote versions, as well as 330° rotation on the support post, 360° rotation in the perpendicular plane is provided. The display can be rotated up to 360° in 30° steps. The remote mounted transmitter can therefore be oriented in practically any direction. It is advisable to mount the remote transmitter in a location convenient for using the display, with a firm backing from a wall, beam or post.

If the process piping is subjected to high vibration, remote installation is recommended to shield the electronics from shaking.

Flow direction should always be the same as that shown by the arrow on the pedestal if possible.

4.1 Basic safety notes

> ⚠ **CAUTION**
>
> **Hot surfaces resulting from hot process media**
>
> Risk of burns resulting from surface temperatures above 65 °C (149 °F).
> - Take appropriate protective measures, for example contact protection.
> - Make sure that protective measures do not cause the maximum permissible ambient temperature to be exceeded. Refer to the information in Technical data (Page 183).

> **Note**
>
> Hot surface is only an issue for media or ambient temperature above 50 °C.

> ⚠ **WARNING**
>
> **Wetted parts unsuitable for the process media**
>
> Risk of injury or damage to device.
>
> Hot, toxic and corrosive media could be released if the wetted parts are unsuitable for the process medium.
> - Ensure that the material of the device parts wetted by the process medium is suitable for the medium. Refer to the information in Technical data (Page 183).

Note

Material compatibility

Siemens can provide you with support concerning selection of sensor components wetted by process media. However, you are responsible for the selection of components. Siemens accepts no liability for faults or failures resulting from incompatible materials.

⚠ **WARNING**

Unsuitable connecting parts

Risk of injury or poisoning.

In case of improper mounting, hot, toxic, and corrosive process media could be released at the connections.

● Ensure that connecting parts (such as flange gaskets and bolts) are suitable for connection and process media.

⚠ **WARNING**

Exceeded maximum permissible operating pressure

Risk of injury or poisoning.

The maximum permissible operating pressure depends on the device version, pressure limit and temperature rating. The device can be damaged if the operating pressure is exceeded. Hot, toxic and corrosive process media could be released.

Ensure that maximum permissible operating pressure of the device is not exceeded. Refer to the information on the nameplate and/or in Technical data (Page 183).

⚠ **WARNING**

Unprotected cable ends

Risk of explosion through unprotected cable ends in hazardous areas.

● Protect unused cable ends in accordance with IEC/EN 60079-14.

⚠ **WARNING**

Loss of explosion protection

Risk of explosion in hazardous areas if the device is open or not properly closed.

● Close the device as described in Installing/mounting (Page 39).

> ⚠ **CAUTION**
>
> **External stresses and loads**
>
> Damage to device by severe external stresses and loads (e.g. thermal expansion or pipe tension). Process media can be released.
>
> - Prevent severe external stresses and loads from acting on the device.

> ⚠ **DANGER**
>
> **Pressure applications**
>
> Danger to personnel, system and environment will result from improper disassembly.
>
> - Never attempt to loosen, remove, or disassemble process connection while vessel contents are under pressure.

4.1.1 Installation location requirements

SITRANS F flowmeters with minimum IP67/NEMA 4X enclosure rating are suitable for indoor and outdoor installations.

Process pressure and medium temperature

If applicable, make sure that specifications for rated process pressure (PS) and medium temperature (TS) plus ambient temperature that are indicated on the nameplate will not be exceeded.

Aggressive atmospheres

Ensure that the device is suitable for the application and that it is installed where there is no risk of penetration of aggressive vapors.

Direct sunlight

Prevent the device from overheating or materials becoming brittle due to UV exposure by protecting it from direct sunlight. Make sure that the maximum permissible ambient temperature is not exceeded. Refer to the information in Operating conditions (Page 193).

> ⚠ **WARNING**
>
> **Equipment used in hazardous areas**
>
> Risk of explosion in hazardous areas.
>
> Special requirements apply to the location and installation of the device. See Use in hazardous areas (Page 17).

⚠ WARNING
Strong vibrations
Risk of explosion in hazardous areas.
• In plants with strong vibrations, mount the transmitter in a low vibration environment.

4.1.1.1 Strong vibrations

NOTICE
Strong vibrations
Damage to device.
• In installations with strong vibrations, mount the transmitter in a low vibration environment.

4.1.2 Proper mounting

NOTICE
Incorrect mounting
The device can be damaged, destroyed, or its functionality impaired through improper mounting.
• Before installing ensure there is no visible damage to the device.
• Make sure that process connectors are clean, and suitable gaskets and glands are used.
• Mount the device using suitable tools. Refer to the information in Construction (Page 189).

4.2 Installation instructions

4.2.1 Transmitter installation

⚠ CAUTION
Opening lid
Care must be taken when opening the lid to avoid the lid falling.

Note
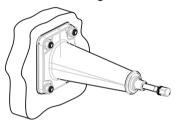
Hygienic applications

If the device is wall or pipe-mounted in a hygienic application, **always** use domed nuts.

4.2.1.1   Remote field mount

Mounting on wall

1. Prepare holes with aid of the mounting bracket, see Mounting bracket dimensions (Page 211).

2. Fasten mounting bracket with black cushion pad to wall (torque 10 Nm).

Mounting on pipe
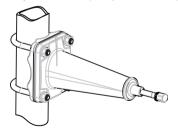
1. Mount mounting bracket with cushion pad on pipe using fastening brackets/U-bolts and supplied pipe adaptor.

   Note

   U-bolts and other miscellaneous hardware are not supplied with the flowmeter.
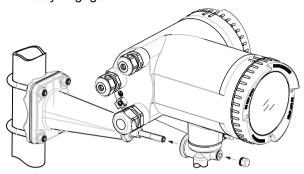
2. Tighten nuts (torque: 10 Nm).

Mounting the transmitter

M12 digital cable connection
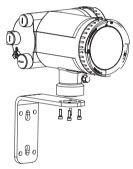
1. Remove locking cap from mounting bracket.

2. Mount transmitter on mounting bracket taking care that the flutes on the mating faces are correctly engaged.

3. Firmly tighten locking cap on mounting bracket (torque: 25 Nm).

M20 analog cable connection

1. Mount the transmitter on the mounting bracket using four screws.

4.2.1.2 Wall mount enclosure
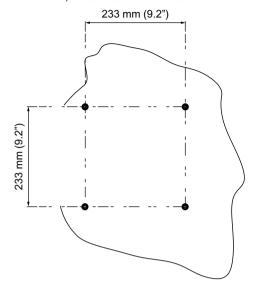
Mounting on wall

Note
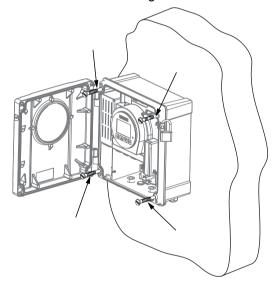
Mounting screws are not included

You will need four screws, able to support at least 55 lbs (25 kg). Siemens recommends M6x100 screws with appropriate anchors for the wall material.

---

1. Prepare holes for the four screws (M6x100 or equivalent). Screw head diameter: max. 13.5 mm; screw shaft diameter: max. 6 mm.

2. Mount transmitter and tighten screws.

Note

Mounting on pipe or in panel

For mounting on pipe or in panel see the installation instructions given in A5E45462317 Instructions "Pipe/panel mount kit" which is provided with the optional pipe/panel mount kit.

Mounting on pipe
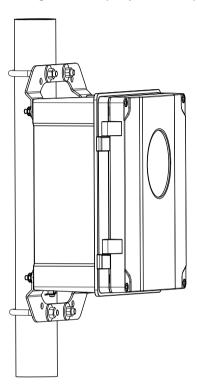
1. Mount mounting bracket on pipe using fastening brackets/U-bolts.

   ### Note

   U-bolts and other miscellaneous hardware are not supplied with the flowmeter.

2. Tighten nuts (torque: 10 Nm).

Mounting in front panel

1. Cut out a hole in panel as shown.
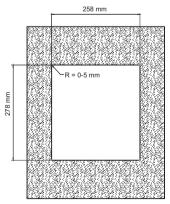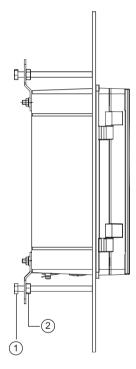
Figure 4-1   Panel cut-out dimensions

2. Remove lid from transmitter wall mount enclosure.

3. From the front of the panel:

    – Insert enclosure in cut-out hole.

4. From the back of the panel:

    – Mount mounting bracket on transmitter enclosure using four hex socket screws (M6 x 60 or equivalent), four hexagon nuts (M6) with flanges, a 5 mm Allen key, and a 10 mm wrench.

5. Use four hex head screws (M8 x 100), four hexagon nuts (M8), and two wrenches (13 mm); and repeat the following for each of the four mounting screws:

    – From front side of mounting bracket: Put screw ① into one of the outer holes.

    – From back side of mounting bracket: Screw nut ② on screw.

    – Bolt until screw lies against panel wall.
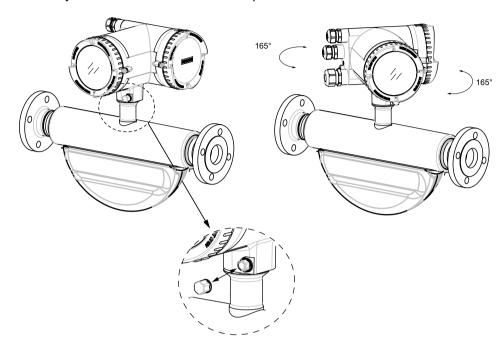
6. Tighten screws.

7. Remount lid.

4.2.1.3 Turning the transmitter (compact version)

Horizontal rotation

1. Unscrew cap from lock screw.

2. Loosen lock screw at transmitter pedestal using 5 mm Allen key.

3. Carefully rotate transmitter into desired position.

4. Firmly tighten lock screw (torque: 10 Nm).
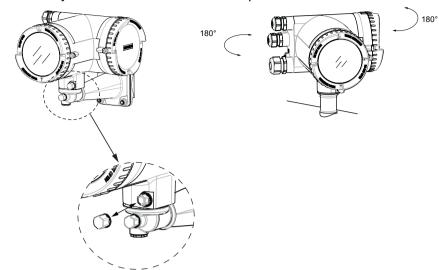
5. Replace cap onto lock screw (torque: 10 Nm).

4.2.1.4 Turning the transmitter (remote version)

In a configuration with external DSL the transmitter can be turned horizontally and tilted vertically.

Horizontal rotation

1. Unscrew cap from lock screw.

2. Loosen lock screw at transmitter pedestal using 5 mm Allen key.

3. Carefully rotate transmitter into desired position.
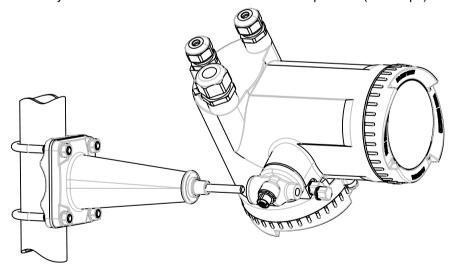
4. Firmly tighten lock screw (torque: 10 Nm).
5. Replace cap onto lock screw (torque: 10 Nm).

Vertical rotation

1. Loosen locking cap at end of mounting bracket by three turns.
2. Carefully loosen and rotate transmitter into desired position (15° steps).
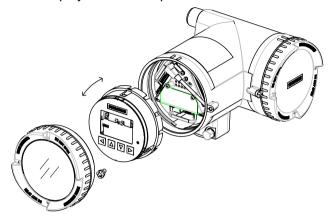
3. Firmly tighten locking cap (torque: 25 Nm).

4.2.1.5   Turning the local display
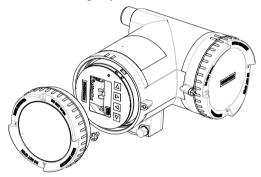
The local display can be turned in steps of 30° in order to optimize the viewing angle.

1. Remove lid lock screw of display cover.
2. Remove display cover.

3. Use a small screwdriver or blade to loosen the three retaining clips within the transmitter.

4. Carefully pull out local display.

5. Turn display into desired position.

6. Carefully push display back into enclosure. Use a small screwdriver or blade to open the three retaining clips within the transmitter when pushing the display back into place.

7. Remove O-ring from lid.

8. Reinstall display cover until mechanical stop. Wind back lid by one turn.

9. Mount O-ring by pulling it over the display cover and turn display cover until you feel friction from the O-ring on both sides. Wind display cover further by one quarter of a turn to seal on the O-ring.

10. Reinstall and tighten lid lock screw.

4.2.2 Sensor installation

4.2.2.1 Determining a location

⚠ CAUTION
Electromagnetic fields
Do not install the flowmeter in the vicinity of strong electromagnetic fields, for example near motors, variable frequency drives, transformers etc.

Upstream / downstream

- No pipe run requirements, that is straight inlet/outlet sections, are necessary.

- Avoid long drop lines downstream from the sensor to prevent process media separation causing air / vapor bubbles in the tube (min. back pressure: 0.2 bar).

- Avoid installing the flowmeter immediately upstream of a free discharge in a drop line.

Location in the system

The optimum location in the system depends on the application:

- Liquid applications
  Gas or vapor bubbles in the fluid may result in erroneous measurements, particularly in the density measurement.

  – Do not install the flowmeter at the highest point in the system, where bubbles will be trapped.

  – Install the flowmeter in low pipeline sections, at the bottom of a U-section in the pipeline.
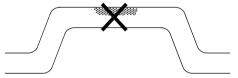
Figure 4-2   Liquid applications, wrong location with trapped air/gas

- Gas applications
  Vapor condensation or oil traces in the gas may result in erroneous measurements.

  – Do not install the flowmeter at the lowest point of the system.

  – Install a filter.
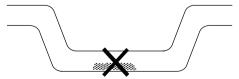
Figure 4-3   Gas applications, wrong location with trapped oil

4.2.2.2   Orientation of the sensor

Flow direction

The calibrated flow direction is indicated by the arrow on the sensor. Flow in this direction will be indicated as positive by default. The sensitivity and the accuracy of the sensor do not change with reverse flow.

The indicated flow direction (positive/negative) is configurable.

⚠ CAUTION
Accurate measurement
The sensor must always be completely filled with process media in order to measure accurately.

NOTICE
Orienting the sensor
To avoid water or moist ingress, transmitters should be oriented with cable entrances aiming downwards.

Orienting the sensor

The sensor operates in any orientation. The optimal orientation depends on the process fluid and the process conditions. Siemens recommends orienting the sensor in one of the following ways:

1. Vertical installation with an upwards flow (self-draining)

Figure 4-4   Vertical orientation, upwards flow

2. Horizontal installation, tubes down (recommended for liquid applications)
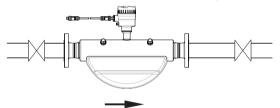
Figure 4-5   Horizontal orientation, tubes down

3. Horizontal installation, tubes up (recommended for gas applications)
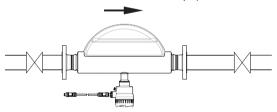
Figure 4-6   Horizontal orientation; tubes up

Note
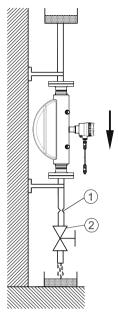
Hygienic applications

In 3A and EHEDG certified hygienic applications the flowmeter must be installed vertically as shown in 1 above.

4.2.2.3 Installation in a drop line

Installation in a drop line is only recommended if a pipeline reduction or orifice with a smaller cross-section can be installed to create back-pressure and prevent the sensor from being partially drained while measuring.

①   Back pressure orifice
②   On / off valve
Figure 4-7   Installation in drop line

4.2.2.4 Mounting the sensor

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

- Center the connecting pipelines axially in order to assure a stress-free installation. The flowmeter must not be used to bring the rest of the pipework into line. Make sure the pipework is aligned correctly before inserting the flow sensor.

- Install two supports or hangers symmetrically and stress-free on the pipeline closely to the process connections.

Note
Handling

Lift the flowmeter by the sensor body. Do not lift the flowmeter by the housing.

Avoid vibrations

- Make sure that any valves or pumps upstream of the sensor do not cavitate and do not send vibrations into the sensor.

- Decouple vibrating pipeline from the flow sensor using flexible tube or couplings.
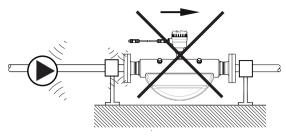
Figure 4-8　Non-flexible pipes not recommended in vibrating environment
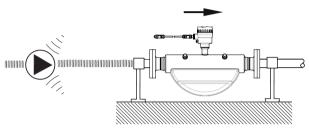
Figure 4-9　Flexible pipes recommended in vibrating environment

Avoid cross talk

When operating more than one flowmeter in one or multiple interconnected pipelines there is a risk of cross talk.

Prevent cross talk in one of the following ways:

- Mount sensors on separate frames
- Decouple the pipeline using flexible tubes or couplings
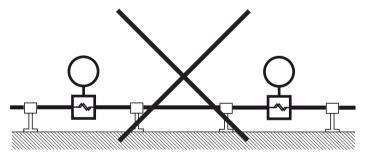
Figure 4-10　High risk of cross talk when using non-flexible pipes
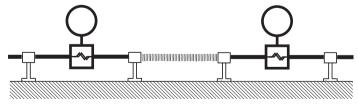
Figure 4-11　Low risk of cross talk when using flexible pipes and separate frames

4.2.2.5 Hydrostatic testing

The flowmeter is pressure-tested before delivery to 1.5 times the rated working pressure of the sensor.

● In the case of process connections pressure-rated less than 100 bar, the connection is the limiting component.

● In the case of process connections pressure-rated above 100 bar (stainless steel sensors) or above 160 bar (Hastelloy sensors), the sensor is the limiting component.

In all cases the maximum allowed hydrostatic test pressure (MATP) of the flowmeter is 1.5 times the marked MAWP (PS) at 20 °C.

Pressure test of a completed flow system with piping and other components can be done at pressures no higher than 1.5 times the marked MAWP (PS) at 20 °C of the lowest rated system component.

4.2.2.6 Installing with insulation

Insulation is added to pipes and equipment for two reasons:

● To protect personnel from exposure to hot or cold surfaces, thereby preventing burns and other injuries

● To prevent heat loss into or out of the process, thereby preserving the process temperature and process medium conditions.

In both cases, insulation can have the unexpected effect of shrouding other attached components not intended or designed for the process temperatures. When installing an FCS400 sensor with insulation, observe the following rules:

● Do not cover any part of the transmitter pedestal. The pedestal is designed to separate the process temperature from the ambient around the DSL or transmitter electronics housing.

● Form a 90° cone around the pedestal, as shown below. (add graphic)

● Allow free movement of air around the electronics housing to allow temperature equalisation to occur at all times.

Note

The pedestal has sufficient internal separation from the measuring tubes such that if the main body of the sensor is insulated, the process medium will not be unduly exposed by the cone around the pedestal.

4.2.2.7 Pressure guard

The sensor enclosure is supplied with two G½" (parallel thread) purge ports. These ports can for example be used for a pressure guard, which can be connected to an automatic shut off valve to stop the flow in case of sensor pipe fracture. Because sensor enclosure is rated Ex[d] for hazardous applications, the purge ports may not be removed from Ex version sensors.

The AISI 304 / EN 1.4301 exterior enclosure is rated to approximately 20 bar static pressure to contain spilt process media in the event of a tube break. However it is not intended to contain

high pressure or corrosive fluids and precautions must be taken in applications where vibrating tube failure is probable and may cause damage.

Pressure guard selection

Siemens does not supply the components of the pressure guard solution because the arrangement and components are closely related to individual safety and protection practices in each place.

The selection of pressure guard solution is the responsibility of the user, however Siemens recommends the following forms of pressure guard:

● A pressure switch screwed directly or piped into one of the purge ports and connected to an automatic shut-off valve will disable pressurized supply to the meter.

● A relief valve or bursting disc screwed directly or piped to one of the purge ports to carry any spilt fluid to drain after opening. Ensure the drain flow is safely contained away from personnel and other plant or equipment.

The pressure switch and relief valve set point should be 2-3 bar gauge. The pressure switch should be rated to withstand the full process pressure and temperature for a short time without rupture.

Mounting of pressure guard

All sensors are filled with argon to avoid condensation. Avoid ingress of moisture, liquids or particles into the sensor; it may influence the measurement and in worst case inhibit the measuring function.

Install a pressure guard as follows:

1. Place the sensor in a dry, clean place and leave it to acclimatize.

2. Orient the sensor with the purge ports uppermost.

3. Carefully remove the plug and mount the pressure guard.

4. Replace the soft metal sealing rings with new ones to obtain proper hemetic sealing.

5. Make sure that the pressure guard does NOT touch any of the parts inside the sensor.

6. Check that the pressure guard has been correctly mounted and thoroughly tightened (torque: 80 Nm).

4.3 Disassembly

⚠ WARNING
Incorrect disassembly
The following risks may result from incorrect disassembly:
- Injury through electric shock
- Risk through emerging media when connected to the process
- Risk of explosion in hazardous area
In order to disassemble correctly, observe the following:
• Before starting work, make sure that you have switched off all physical variables such as pressure, temperature, electricity etc. or that they have a harmless value.
• If the device contains hazardous media, it must be emptied prior to disassembly. Make sure that no environmentally hazardous media are released.
• Secure the remaining connections so that no damage can result if the process is started unintentionally.

Connecting 5

5.1 Basic safety notes

> ⚠️ **WARNING**
>
> **Energized devices**
>
> Risk of electric shock or explosion.
>
> When energized the device may be opened by qualified personnel only.

> ⚠️ **WARNING**
>
> **Mains supply from building installation overvoltage category 2**
>
> A switch or circuit breaker (max. 15 A) must be installed in close proximity to the equipment and within easy reach of the operator. It must be marked as the disconnecting device for the equipment.

> ⚠️ **WARNING**
>
> **Missing PE/ground connection**
>
> Risk of electric shock.
>
> Depending on the device version, connect the power supply as follows:
> - **Power plug**: Ensure that the used socket has a PE/ground conductor connection. Check that the PE/ground conductor connection of the socket and power plug match each other.
> - **Connecting terminals**: Connect the terminals according to the terminal connection diagram. First connect the PE/ground conductor.

> ⚠️ **WARNING**
>
> **Unsuitable cables, cable glands and/or plugs**
>
> Risk of explosion in hazardous areas.
> - Use only cable glands/plugs that comply with the requirements for the relevant type of protection.
> - Tighten the cable glands in accordance with the torques specified in Technical data (Page 183).
> - Close unused cable inlets for the electrical connections.
> - When replacing cable glands, only use cable glands of the same type.
> - After installation, check that the cables are seated firmly.

> ⚠ **WARNING**
>
> **Incorrect conduit system**
>
> Risk of explosion in hazardous areas as result of open cable inlet or incorrect conduit system.
> - In the case of a conduit system, mount a spark barrier at a defined distance from the device input. Observe national regulations and the requirements stated in the relevant approvals.

> ⚠ **WARNING**
>
> **Hazardous contact voltage**
>
> Risk of electric shock in case of incorrect connection.
> - For the electrical connection specifications, refer to the information in Technical data (Page 183).
> - At the mounting location of the device observe the applicable directives and laws for installation of electrical power installations with rated voltages below 1000 V.

> **NOTICE**
>
> **Condensation in the device**
>
> Damage to device through formation of condensation if the temperature difference between transportation or storage and the mounting location exceeds 20 °C (36 °F).
> - Before taking the device into operation, let the device adapt for several hours in the new environment.

> **NOTICE**
>
> **Ambient temperature too high**
>
> Damage to cable sheath.
> - At an ambient temperature ≥ 60 °C (140 °F), use heat-resistant cables suitable for an ambient temperature at least 20 °C (36 °F) higher.

5.1.1   Improper power supply

> ⚠ **WARNING**
>
> **Improper power supply**
>
> Risk of explosion in hazardous areas as result of incorrect power supply.
> - Connect the device in accordance with the specified power supply and signal circuits. The relevant specifications can be found in the certificates, in Technical data (Page 183) or on the nameplate.

> ⚠ **WARNING**
>
> **Lack of equipotential bonding**
>
> Risk of explosion through compensating currents or ignition currents through lack of equipotential bonding.
>
> ● Ensure that the device is potentially equalized.
>
> **Exception**: It may be permissible to omit connection of the equipotential bonding for devices with type of protection "Intrinsic safety Ex i".

> ⚠ **WARNING**
>
> **Unprotected cable ends**
>
> Risk of explosion through unprotected cable ends in hazardous areas.
>
> ● Protect unused cable ends in accordance with IEC/EN 60079-14.

> ⚠ **WARNING**
>
> **Improper laying of shielded cables**
>
> Risk of explosion through compensating currents between hazardous area and the non-hazardous area.
>
> ● Shielded cables that cross into hazardous areas should be grounded only at one end.
> ● If grounding is required at both ends, use an equipotential bonding conductor.

> ⚠ **WARNING**
>
> **Uncovered non-intrinsically safe circuits**
>
> Risk of explosion in hazardous areas or electric shock when working on non-intrinsically safe circuits.
>
> If intrinsically safe and non-intrinsically safe circuits are operated in an enclosure with the type of protection "Increased safety Ex e", the connections of the non-intrinsically safe circuits must be additionally covered.
>
> ● Ensure that the cover of the non-intrinsically safe circuits complies with degree of protection IP30 or higher according to IEC/EN 60529.
> ● Separate connections of the non-intrinsically safe circuits in accordance with IEC/ EN 60079-14.

> ⚠ **WARNING**
>
> **Insufficient isolation of intrinsically safe and non-intrinsically safe circuits**
>
> Risk of explosion in hazardous areas.
>
> - When connecting intrinsically safe and non-intrinsically safe circuits ensure that isolation is carried out properly in accordance with local regulations for example IEC 60079-14.
> - Ensure that you observe the device approvals applicable in your country.

> ⚠ **WARNING**
>
> **Connecting device in energized state**
>
> Risk of explosion in hazardous areas.
>
> - Connect devices in hazardous areas only in a de-energized state.
>
> **Exceptions**:
>
> - Devices having the type of protection "Intrinsic safety Ex i" may also be connected in energized state in hazardous areas.
> - Exceptions for type of protection "Increased safety ec" (Zone 2) are regulated in the relevant certificate.

> ⚠ **WARNING**
>
> **Incorrect selection of type of protection**
>
> Risk of explosion in areas subject to explosion hazard.
>
> This device is approved for several types of protection.
>
> 1. Decide in favor of one type of protection.
> 2. Connect the device in accordance with the selected type of protection.
> 3. In order to avoid incorrect use at a later point, make the types of protection that are not used permanently unrecognizable on the nameplate.

Note

Electromagnetic compatibility (EMC)

You can use this device in industrial environments, households and small businesses.

For metal housings there is an increased electromagnetic compatibility compared to high-frequency radiation. This protection can be increased by grounding the housing, see Connecting (Page 59).

Note

Improvement of interference immunity
- Lay signal cables separate from cables with voltages > 60 V.
- Use cables with twisted wires.
- Keep device and cables at a distance from strong electromagnetic fields.
- Take account of the conditions for communication specified in the Technical data (Page 183).
- Use shielded cables to guarantee the full specification according to HART/PA/FF/Modbus/ EIA-485/Profibus DP.

Use in hazardous areas

Before accessing the sensor terminal compartment and application terminal space check that:

- A safe access permission certificate has been issued by plant operations management
- The flow transmitter may not be opened if energized
- All connection leads are potential free

⚠ **WARNING**

Hazardous areas

Observe the type examination certificates or the test certifications applicable in your country if you use transmitters as category 1/2 equipment.

⚠ **WARNING**

Commissioning

Only apply power and commission the device after the device has been properly connected and, if required, closed.

5.2 Wiring

5.2.1 Wiring in hazardous areas

Hazardous area applications

Special requirements apply to the location and interconnection of sensor and transmitter. See Use in hazardous areas (Page 17).

⚠ WARNING
Transmitter enclosure
Before opening the terminal box check that:
• No explosion hazard exists
• All connection leads are potential free

⚠ WARNING
Signal wiring
Input/output connections to the transmitter are required to be protected by intrinsic safe barriers at all times.

5.2.2 Preparing the transmitter connections
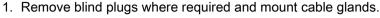
⚠ WARNING
Access to terminal compartment
As long as the device is energized, the lid of the enclosure on the sensor connection area may only be opened by qualified personnel.
Before removing the terminal cover, the auxiliary power must be switched off from all poles.
Following installation, the terminal cover must be screwed back on again.
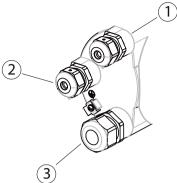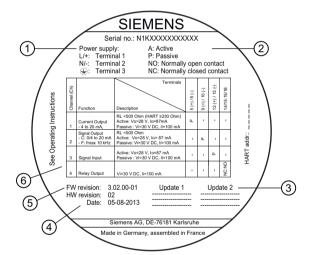
1. Remove blind plugs where required and mount cable glands.

① Input/output connection (channels 2 to 4)

② Power supply connection

③ Current output/communication outputs (channel 1)

2. Remove lid lock screw for terminal connections lid.

3. Remove lid for terminal connections.

A label showing the configuration is placed at the back of the terminal connections lid.
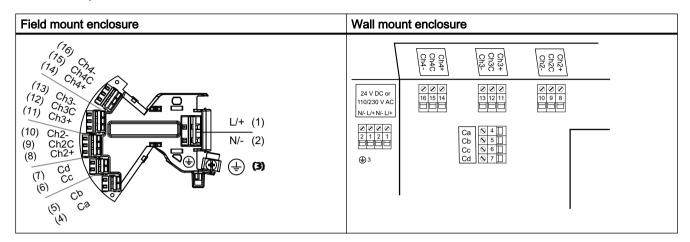
① Power supply con-   L/+   Terminal 1
  nections   N/-   Terminal 2
                    ⏚   Terminal 3

② Key to symbols   A   Configured as active input/output

                    P   Configured as passive input/output

                    NO   Connected as normally open contact

                    NC   Connected as normally closed contact

③ Updates (to be filled in on firmware and hardware updates)

④ Device configuration date

⑤ Initial firmware and hardware revisions

⑥ Configuration of channels 1, 2, 3 and 4

Figure 5-1   Configuration label

Terminal layout

Field mount enclosure	Wall mount enclosure

For configuration of the inputs/outputs, see table in section Connecting channels 2 to 4 (Page 74).

The following table shows:

- Which cable with which terminal
- Hardware and software configuration of the channels

HW configuration	SW configuration	Power Supply			Channel 1				Channel 2			Channel 3			Channel 4		
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Power Supply		L/+	N/-	⏚													
Channel 1 HART	Current output HART				+ Active	Common - Common +	- Passive										
Channel 1 Modbus					In - A	In - B Out - A	Out - B										
Channel 1 Profibus					In - A	In - B Out - A	Out - B										
Channel 2 Output	Current, Frequency, Pulse and Status								+ Active	Common - Common +	- Passive						
Channels 3 and 4 Input/output	Outputs: Current, Frequency, Pulse and status Inputs: Digital											+ Active	Common - Common +	- Passive	+ Active	Common - Common +	- Passive
Channels 3 and 4 Relay	Status output											NC		NO	NC		NO

Figure 5-2   Termination/configuration overview

5.2.3   Wiring tool

Use the wiring tool for connecting the cables in the compact enclosure transmitter.

The wiring tool is located in the application terminal compartment.
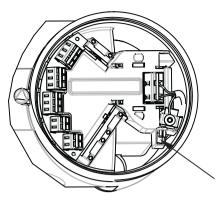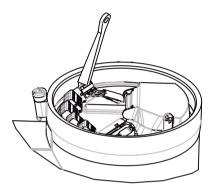
Figure 5-3   Wiring tool location

1. Insert wiring tool hook into receptor slot.

2. Press wiring tool wedge into top slot to spread clamp plates.

3. Insert wire.

4. Release wiring tool.

5.3   Connecting FC430

5.3.1   Cable requirements

- When installing sensor cable, use cable with at least same degree of protection as the sensors. It is recommended to use cables supplied by Siemens:

  – blue cables for installation of intrinsically safe circuits in hazardous areas

  – gray cables for installation of non-intrinsically safe circuits

  Further information on Siemens-supplied cables, see Technical data (Page 183).

- The wire length inside the connection compartment, from the cable gland to the terminals, must be kept as short as possible. Wire loops in the terminal compartment must be avoided.

- To guarantee the degree of ingress protection, ensure that both ends of the cables are given equivalent protection from ingress of moisture.

> ⚠️ **WARNING**
>
> **Cable requirements**
>
> Cables must be suitable for the temperature (at least 70 °C) and be flammability-rated to at least V-2.

Note

Output cables

If long cables are used in extreme EMC environments, it is recommended to use shielded cables.

See also

5.3.2 Transmitter power supply and I/Os connection

5.3.2.1 Connecting the DSL and the transmitter

The following only applies to remote configurations.

Wiring DSL (sensor) and transmitter (M12)

The DSL is provided with a preformed cable terminated with M12 style stainless steel weather-proof plugs.

The cable screen is physically and electrically terminated within the body of the plug.

Take care when handling the cable and passing it through cable ducting that the plug is not subjected to excessive tension (pulling) as the internal connections may be disengaged.

Note

Never pull the cable by the plug - only by the cable itself.

---

1. Connect DSL using the supplied 4-wire cable with M12 connectors.

   Note

   Grounding

   The DSL cable screen is mechanically connected to the grounding terminal (PE), only when the M12 plug is correctly tightened.

Wiring sensor and transmitter (sensor terminal compartment)

A: Prepare the cable by stripping it at both ends.
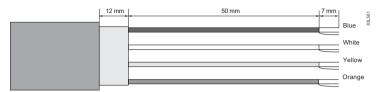
Figure 5-4   Cable end

B: Connecting sensor terminal compartment

1. Remove lock screw and remove lid.

2. Remove one of the blind plugs and fit cable gland.

3. Remove cap and ferrule from cable gland and slide onto cable.

4. Push cable through open gland; anchor cable with clamp bar.

5. Connect wires to terminals according to list below.

Terminal number	Description	Wire color (Siemens)
1	20 V	Orange
2	0 V	Yellow
3	RS-485 / B	White
4	RS-485 / A	Blue

6. Assemble and tighten cable gland

7. Remove O-ring from lid.

8. Reinstate lid and screw in until mechanical stop. Wind back lid by one turn.

9. Mount O-ring by pulling it over the lid and tighten lid until you feel friction from the O-ring on both sides. Wind lid further by one quarter of a turn to seal on the O-ring.

10. Reinstate and tighten lid lock screw

Connecting sensor DSL

1. Remove lock screw and remove DSL lid.

2. Undo the flexible strap.

3. Disconnect sensor connection from DSL cassette.

4. Loosen mounting screw using a TX10 Torx driver and remove DSL cassette from housing.

5. Remove cap and ferrule from cable gland and slide onto cable.

6. Push cable through open gland; anchor cable screen and wires with clamp bar.

7. Remove terminal block from DSL cassette.

8. Connect wires to terminals according to list below.

Terminal number	Description	Wire color (Siemens cable)
1	20 V	Orange
2	0 V	Yellow
3	RS-485 / B	White
4	RS-485 / A	Blue

9. Ensure the DIP switches are all set to OFF.

10. Reinstate DSL cassette including mounting screw.

11. Connect sensor connection and sensor cable plugs.

12. Restore flexible strap around all wires.

13. Assemble and tighten cable gland.

14. Remove O-ring from DSL lid.

15. Reinstate lid and screw in until mechanical stop. Wind back lid by one turn.

16. Mount O-ring by pulling it over the DSL lid and tighten lid until you feel friction from the O-ring on both sides. Wind lid further by one quarter of a turn to seal on the O-ring.

17. Reinstate and tighten lid lock screw.

18. Close and secure DSL lid including lock screw. Turn the lid until you can feel the friction of the O-ring. From this point turn the lid ¼ turn to be tight.

5.3.2.2   Connecting the current loop with or without HART communication (CH1)

Note

4 to 20 mA output

It is not required to use shielded cables for the pure 4 to 20 mA current output.

Note

HART communication

It is recommended by the FieldComm Group (FCG) to use shielded cables for the HART communication.

Note

Passive channels only

Channel 1 power supply must be separated from that for channels 2 to 4.
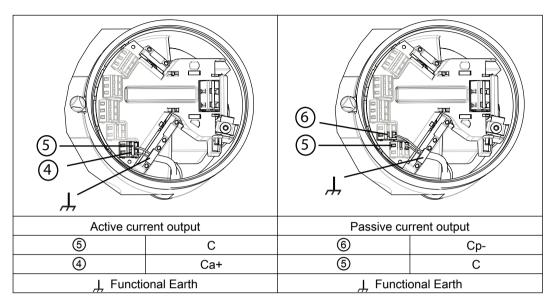
Signal return (or common) can be joined.
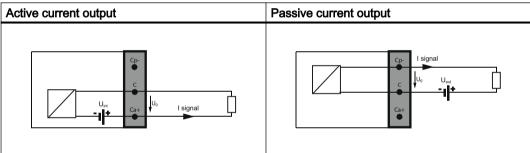
Procedure

1. Remove cap and ferrule from cable gland and slide onto cable.

2. Push cable through open gland and cable path.

3. Restore ferrule and tighten cap to lightly hold cable in place.

4. Signal cable screen is folded back over outer sheath and grounded beneath cable clamp.

5. Connect wires to terminals using wiring tool.

   – **Field mount transmitter:**

Active current output		Passive current output	
⑤	C	⑥	Cp-
④	Ca+	⑤	C
⏚ Functional Earth		⏚ Functional Earth	

Active current output	Passive current output

   – **Wall mount transmitter:**

Active current output		Passive current output	
4	Ca+	5	C
5	C	6	Cp-
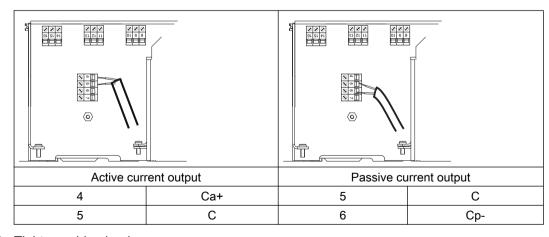
6. Tighten cable gland.

Note

For Ex versions active or passive current output is preselected at ordering and cannot be changed.

Non-Ex versions can be connected as either active or passive.

Note

Load

Signal output: < 500 Ω at 14 to 24 VDC (active), 14 to 30 VDC (passive)

Relay output: 30 VAC/VDC, 100 mA

Passive signal input: 15 to 30 VDC, 2 to 15 mA

5.3.2.3 Connecting the Modbus or PROFIBUS (CH1)

⚠ WARNING
Passive channels only
Channel 1 power supply must be separated from the power supply for channels 2 to 4.
Signal return (or common) can be joined.
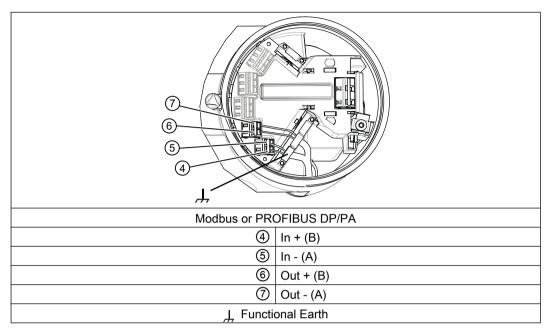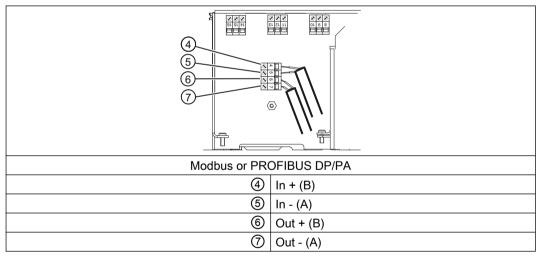
1. Remove cap and ferrule from cable gland and slide onto cable.

2. Push cable through open gland and cable path.

3. Restore ferrule and tighten cap to lightly hold cable in place.

4. Signal cable screen is folded back over outer sheath and grounded beneath cable clamp.

5. Connect wires to terminals using wiring tool.

    – **Field mount transmitter**:

Modbus or PROFIBUS DP/PA	
④	In + (B)
⑤	In - (A)
⑥	Out + (B)
⑦	Out - (A)
⏚ Functional Earth	

    – **Wall mount transmitter:**

Modbus or PROFIBUS DP/PA	
④	In + (B)
⑤	In - (A)
⑥	Out + (B)
⑦	Out - (A)

6. Tighten cable gland.

5.3.2.4 Connecting channels 2 to 4

Channel 2 is for output only and channels 3 to 4 can be connected as either inputs/outputs or relays, see Input/output configuration (Page 76).

Connect wires

1. Remove cap and ferrule from cable gland and slide onto cable.
   Wall mount enclosure: Remove blind plug and fit cable gland.

2. Push cable through open gland and cable path.

3. Restore ferrule and tighten cap to lightly hold cable in place.

4. Fold signal cable screen back over outer sheath and ground beneath cable clamp.
   In case of shielded cables, use metal cable glands for proper connection.

5. Connect wires to terminals using screwdriver.

6. Tighten cable gland.

The numbers in the graphics below refer to table Figure 5-2 Termination/configuration overview (Page 66).

If connected as input or output - Field mount

Active configuration		Passive configuration	
⑫	IO[3] (common)	⑬	IO[3]- (passive)
⑪	IO[3]+ (active)	⑫	IO[3] (common)
⏚	Functional Earth	⏚	Functional Earth
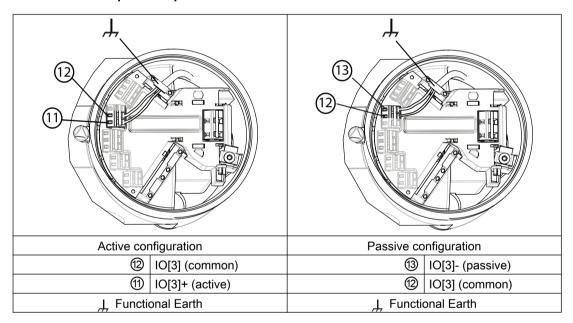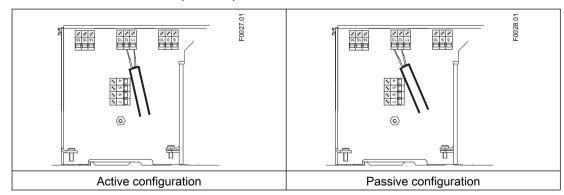
Table 5-1   If connected as input or output - Wall mount

Active configuration	Passive configuration
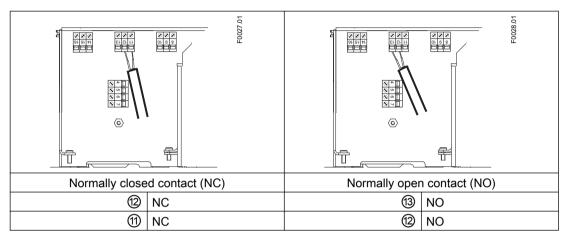
⑫	IO[3] (common)		⑬	IO[3]- (passive)
⑪	IO[3]+ (active)		⑫	IO[3] (common)

Termination example for channel 3

If connected as relay (channels 3 and 4 only)

Normally closed contact (NC)		Normally open contact (NO)	
⑫	NC	⑬	NO
⑪	NC	⑫	NO

Termination example for channel 3 - relay connection

5.3.2.5   Input/output configuration

All pressure values are handled as absolute pressure. If connected pressure transmitters measure the pressure in gauge pressure, then please convert to absolute pressure by using the scaling functionality of the flow transmitters current input channel.

Configura-tion	Software configuration	Channel			
		2	3	4	
Output Active	Current output Frequency output Pulse output Digital output • Alarm class • Alarm item • NAMUR status signals	X	X	X	 Active
Output Passive	Current output Frequency output Pulse output Digital output • Alarm class • Alarm item • NAMUR status signals	X	X	X	 Passive
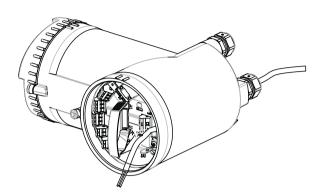
Configura-tion	Software configuration	Channel			
		2	3	4	
Input Active	Digital input • Reset totalizer 1 • Reset totalizer 2 • Reset totalizer 3 • Reset all totalizers • Force outputs • Freeze process values • Zero adjust		X	X	 Active
Input Passive	Digital input • Reset totalizer 1 • Reset totalizer 2 • Reset totalizer 3 • Reset all totalizers • Force outputs • Freeze process values • Zero adjust		X	X	 Passive
Relay output Normally open	Alarm class Alarm item NAMUR status signals		X	X	 Normally open
Relay output Normally closed	Alarm class Alarm item NAMUR status signals		X	X	 Normally closed

5.3.2.6 Connecting the power supply (field mount)
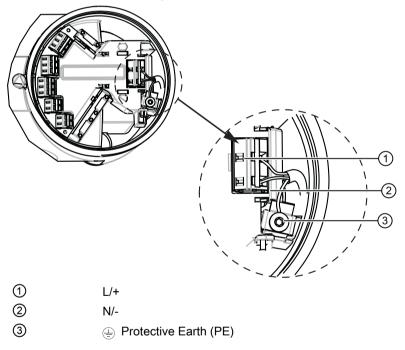
1. Open power supply terminal protection cover.
2. Remove cap and ferrule from cable gland and slide onto cable.

3. Push cable through open gland and cable path.

4. Restore ferrule and tighten cap to lightly hold cable in place.

5. Connect ground to terminal ⏚ and power to terminals L/+ and N/- using wiring tool in the manner shown below at right.

①	L/+
②	N/-
③	⏚ Protective Earth (PE)
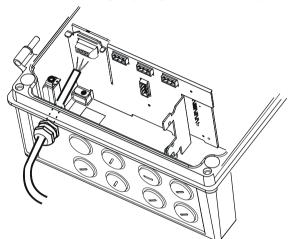
AC connection	DC connection
L/+ ← L N/- ← N ⏚ ⏚	L/+ ← + N/- ← - ⏚ ⏚
Power: 100 to 240 V AC, 47 to 63 Hz	Power: 19.2 to 28.8 V DC

6. Close and latch power supply terminal protection cover.

7. Tighten cable gland.

5.3.2.7   Connecting the power supply (wall mount)

1. Open enclosure lid.

2. Unscrew power supply terminal protection cover screw.

3. Remove protection cover.

4. Remove blind plug and fit cable gland.

5. Push cable through open gland and cable path.

6. Restore ferrule and tighten cap to lightly hold cable in place.
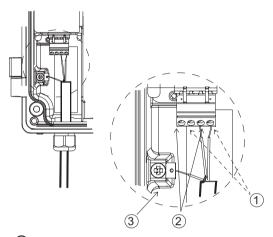
7. Connect ground to terminal ⏚ and power to terminals L/+ and N/- in the manner shown below at right using a screwdriver.

Note

The terminal box is detachable

For easier access unplug the terminal box. After connecting the wires, plug the terminal box back in.

① L/+

② N/-

③ ⏚ Protective Earth (PE)

AC connection	DC connection
Power: 100 to 240 V AC, 47 to 63 Hz	Power: 19.2 to 28.8 V DC

8. Tighten cable gland.

9. Mount power supply protection cover and fasten protection cover screw.
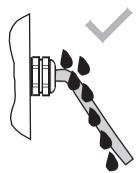
5.3.2.8 Finishing the transmitter connection (field mount)

Connection check-up

1. Check individual wire installation by tugging firmly.

2. Firmly tighten cable glands and insert blanking plugs in unused cable entries.

3. Remove O-ring from lid.

4. Reinstate lid and screw in until mechanical stop. Wind back lid by one turn.

5. Mount O-ring by pulling it over the lid and tighten lid cover until you feel friction from the O-ring on both sides. Wind lid further by one quarter of a turn to seal on the O-ring.

6. Reinstate and tighten lid lock screw.

7. Ensure that moisture does not penetrate the inside of electronics enclosure. Bend cables downward immediately before cable glands.

5.3.2.9 Finishing the transmitter connection (wall mount)

Connection check-up

1. Check individual wire installation by tugging firmly.

2. Firmly tighten cable glands and insert blanking plugs in unused cable entries.

3. Close lid.

4. Tighten the four spring screws.

5. Ensure that moisture does not penetrate to inside of electronics enclosure.

Commissioning   6

6.1   Basic safety notes

⚠ WARNING
Improper commissioning in hazardous areas
Device failure or risk of explosion in hazardous areas.
• Do not commission the device until it has been mounted completely and connected in accordance with the information in Installing/mounting (Page 39). • Before commissioning take the effect on other devices in the system into account.

⚠ WARNING
Hot surfaces
Risk of burns resulting from hot surfaces.
• Take corresponding protective measures, for example by wearing protective gloves.

Note

Hot surface is only an issue for media or ambient temperature above 50 °C.

⚠ WARNING
Hazardous contact voltage
Risk of injury through hazardous contact voltage when the device is open or not completely closed.
The degree of protection specified on the nameplate or in Technical data (Page 183) is no longer guaranteed if the device is open or not properly closed.
• Make sure that the device is securely closed.

⚠ DANGER
Toxic gases and liquids
Danger of poisoning when venting the device: if toxic process media are measured, toxic gases and liquids can be released.
• Before venting ensure that there are no toxic gases or liquids in the device, or take the appropriate safety measures.

> ⚠ **WARNING**
>
> **Loss of explosion protection**
>
> Risk of explosion in hazardous areas if the device is open or not properly closed.
>
> ● Close the device as described in Installing/mounting (Page 39).

> ⚠ **WARNING**
>
> **Opening device in energized state**
>
> Risk of explosion in hazardous areas
>
> ● Only open the device in a de-energized state.
>
> ● Check prior to commissioning that the cover, cover locks, and cable inlets are assembled in accordance with the directives.
>
> **Exception**: Devices having the type of protection "Intrinsic safety Ex i" may also be opened in energized state in hazardous areas.

> ⚠ **CAUTION**
>
> **Sensor and transmitter ordered separately**
>
> If the sensor and the transmitter are ordered separately, a "Set to default" routine must be performed. This can be done via SIMATIC PDM or via menu item 3.3.3 in local display.

> ⚠ **WARNING**
>
> **Dangerous high voltage**
>
> Certain parts inside the device carry dangerous high voltage. The enclosure must be closed and grounded before switching on the device.

> ⚠ **WARNING**
>
> **Improper handling**
>
> The sensor connected to this device can be operated with high pressure and corrosive media. Therefore improper handling of the device can lead to serious injuries and/or considerable material damage.

6.2 General requirements

Before commissioning it must be checked that:

● The device has been installed and connected in accordance with the guidelines provided in Installing/mounting (Page 39) and Connecting (Page 59).

● Device installed in hazardous areas meets the requirements described in Use in hazardous areas (Page 17).

6.3 Power up
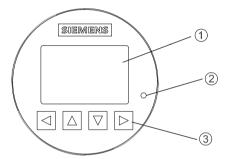
Power up the device. Devices with local display show a screen for initial startup (Page 85).

6.4 Local commissioning

6.4.1 Local display

The device is commissioned/operated with the touch keypad on the local display.

The elements are actuated by touching the glass panel on the appropriate key. The text display above the operating elements gives a menu-guided operation of the individual device function/ parameters. Successful operation of the key is confirmed by a small green LED next to the display.

①   Full graphical display

②   LED (for indication of key operation)

③   Touch keypad

Figure 6-1   Local display

Note

Calibration of the keypad

When the lid is closed, all keys are calibrated. During calibration the LED is on and the keys cannot be operated.

If one of the keys is pressed for more than 10 seconds, the calibration of this key begins which has a duration of less than 10 seconds. Release the key for further operation.

Note

Local display timeout

If no key is pressed for 10 minutes, the display switches to show operation view. If Backlight is set to Automatic, display backlight goes off automatically 30 seconds after the last keypress.

Note

Operation does not require opening of the device. This means that the high degree of protection of IP67 and safety in hazardous areas are guaranteed at all times.

The first time the device is powered up, you will be prompted to set the language. During the first start-up the device shows the menu in English. At every subsequent start-up the device will show the configured language. When the language has been set, you will be prompted to set the date and time.

After confirming/changing the date and time you will be asked if you want to start the Quick commissioning wizard. If you choose Yes (recommended), the Quick commissioning wizard will start. If you choose No, you accept the default values of the device, and the next view will be the operation view 1.

6.4.2 Zero point adjustment

The flowmeter system is optimized through a zero point adjustment which is performed via the Zero point adjustment wizard.
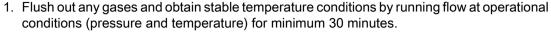
Performing a zero point adjustment

⚠ CAUTION
Gas application
Zero point adjusting the device is only recommended for liquid applications.

1. Flush out any gases and obtain stable temperature conditions by running flow at operational conditions (pressure and temperature) for minimum 30 minutes.
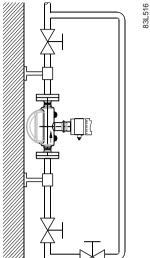
Figure 6-2   Best practice zero point adjustment with a by-pass line and two shut-off devices

2. Close the outlet shut-off valve while maintaining the system pressure. If bypass flow is necessary, open the bypass valve. If the pressure can be increased by 1 to 2 bars with stopped flow, this should be applied.

3. Wait 1 to 2 minutes for the system to settle, and then perform zero adjustment. Waiting longer can change the temperature.

4. During the process a progress bar is visible in the local display.

5. At the end of the zero adjustment, the outcome is displayed as an offset and a standard deviation.

Note

If you get an error message after the zero point adjustment, refer to Zero point adjustment (Page 112).

6.4.3   Wizards

In this chapter it is described how to commission the device via the local display using the wizards.

The first view in each wizard (About - view 1) is a description of what settings/actions can be performed using the specific wizard.

The last view in each wizard (Finished) shows that the last step of the wizard was completed.

Any parameter changes confirmed with ▷ are saved immediately.

At any time in any wizard selecting Exit will bring you back to the main wizard menu without discarding changes.

The wizard graphics show an overview of each wizard and of the keys used to navigate through the wizards. In the upper left corner of each view the wizard name (for example "Process values") and the step name (for example "Unit") of the wizard is shown. In the upper right corner the view number (for example 5 of 18 in the Process values wizard) is shown.

①   View number
②   Wizard name

The purpose of the wizards is to guide you through a quick set-up of various parameters.

The following HMI wizards are available:

- Quick commissioning
- Zero point adjustment
- Process values
- Inputs and outputs
- Gas application
- Pulsating flow
- Dosing application

Use the △ and ▽ keys to highlight the desired wizard and press right key to enter the wizard. The first view shows a short description of which settings can be done.

Key operation

Basic navigation in the wizards is shown in the graphics.

To change settings, use the △ and ▽ keys to highlight wanted setting, then press ▷ key to select. Confirm selection by pressing ▷ key again.

When you reach the end of the wizard, e.g. "Process values wizard is now finished", press ▷ key to go back to wizard list.

6.5   Remote commissioning with PDM

SIMATIC PDM monitors the process values, alarms and status signals of the device. It allows you to display, compare, adjust, verify, and simulate process device data; also to set schedules for calibration and maintenance.

See also

SIMATIC PDM (www.siemens.com/simatic-pdm)

Operating 7

7.1 Local operation

7.1.1 Display view structure

There are three view types:

- **Operation view**
  The operator view shows up to six operation views (Page 94). The operation views are fully configurable to show different process values in different operation view types. Depending on the operation view type configuration the view is either measurement view, alarm view , operating view or diagnostic view.

  – Measurement view: Displays the measurement values, see Measurement views (Page 96).

  – Alarm view: Displays the active alarms in a list, see Alarm views (Page 99).

  – Operating view: Enables the totalizer reset and the dosing control, see Operating views (Page 98).

  – Diagnostic view: Displays six configurable measurement/diagnostic values, see Diagnostic views (Page 101).

- **Navigation view**
  The Navigation view (Page 101) shows the menus and parameters. The navigation view is used to navigate through the menus and parameters in the device.
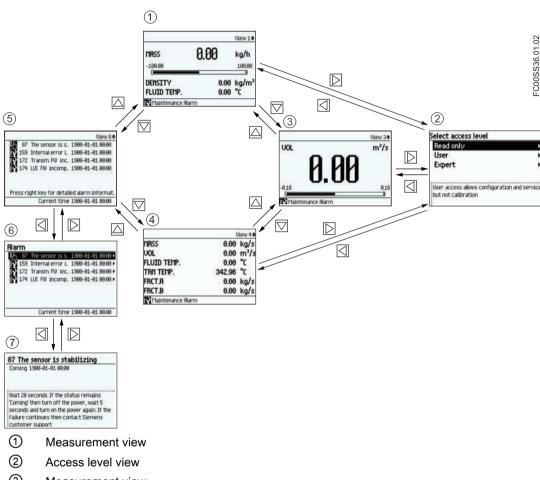
- **Parameter view**
  The Parameter view (Page 103) can be entered from the navigation view. The parameter view is used to view and edit the parameters.

Navigating in the views

The following graphic shows an example of how to navigate between measurement views and alarm views.

①   Measurement view
②   Access level view
③   Measurement view
④   Measurement view
⑤   Alarm view - level 1
⑥   Alarm view - level 2
⑦   Alarm view - level 3

Editing the parameters
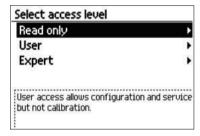
Table 7-1   Parameter edit view

Key	Function
◁	Select the next left position. If the most left position is selected, exit the parameter edit view without confirming the changes. Keep pressing the key to jump to the most left position.
△	Change the selected number/character. Numeric characters: increase the number by one (for example from 7 to 8) ASCII characters: select the previous character in the alphabet.
▽	Change the selected number/character. Numeric characters: decrease the number by one (for example from 8 to 7) ASCII characters: select the next character in the alphabet.
▷	Select the next right position. If most right position is selected, confirm the change and exit the parameter edit view. Keep pressing the key to jump to the most right position.

The exact structure of the operating menu is explained in the HMI menu structure (Page 237).

7.1.2 Access control

You can view all items in the HMI menu but the parameters are protected against changes through access level control. To gain access, select one of the following access levels:

- Read only
  Allows no configuration. The parameter values can be viewed only (indicated by a 🔒 symbol). No PIN code required.

- User
  Allows configuration and service of all parameters except calibration parameters. Default PIN code is 2457.

- Expert
  Allows configuration and service of all parameters including flow and density calibration parameters. Default PIN code is 2834.

PIN codes can be changed in **Security** (5).

Note

Lost PIN code

If the PIN code is lost, provide Siemens customer support with the transmitter serial number (see nameplate). Siemens customer support will provide a code to be entered in PIN recovery (5.3).

Disable access level control

If logged in as Expert you can **Deactivate user PIN**. As User you will not be prompted to enter the password. Enabling the access level control can be done in **Activate user PIN** and requires entering the Expert password.

Auto logout function

You will **not** be prompted for password for 10 minutes after the last key press.

NOTICE
Device restart
Whenever the device is restarted, the access level is reset to "Read only".

7.1.3 Operation view

- The operation view can be displayed in up to six user-configured views. Switch manually between the enabled views with the keys △ and ▽. The actual operator view number (1 to 6) is shown in the upper right corner of the figures below.
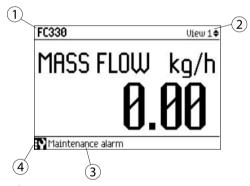
The view types including the number of process values shown in the operation view are configured in HMI menu structure (Page 237).

In view 1 only measurement or diagnostic views can be selected. In views 2 to 6 all view types can be selected.

Navigation view can only be accessed by pressing the right key in a measurement or a diagnostic view.

- Measurement views
  - Single value
  - Three values
  - One value and bargraph
  - One value and graph
  - Six values
- Operating views
  - Totalizer
  - Dosing
- Alarm view
  - Alarm List
- Diagnostic view
  - Six Diagnostic Values

In general, all of the local display views show the following:

①	Long tag	Describes the measurement point and is shown in all operation views. Can be changed via the menu "Long tag" (menu item 3.1.1).
②	View number	Shows the operation view number. The number refers to the view number configured in the menu "Setup" → "Local display" (menu item 2.8).
③	Alarm status text	Describes the alarm. Only shown if an alarm is active.
④	Alarm icon	Indicates an active alarm. Shows the alarm class, see Device status symbols (Page 155). Only shown if an alarm is active.
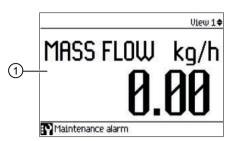
7.1.4 Measurement views
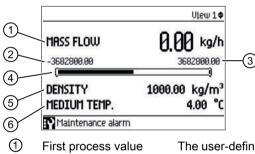
Single value

①	Process value	The user-defined process value to be displayed is configured in menu "View" (1-6) located at "Setup" → "Display" (menu item 2.8).

Three values

①	First process value	The user-defined process value to be displayed is configured in menu "View" (1-6) located at "Setup" → "Display" (menu item 2.8).
②	Lower alarm limit	The lower limit of the bar graph is defined by the lower alarm limit of the selected process value.
③	Upper alarm limit	The upper limit of the bar graph is defined by the upper alarm limit of the selected process value.
④	Bargraph	Shows the first process value in relation to its configured maximum and minimum limits (Upper Alarm Limit and Lower Alarm Limit) for the selected process value).
⑤	Second process value	The user-defined process value to be displayed is configured in menu "View" (1-6) located at "Setup" → "Display" (menu item 2.8).
⑥	Third process value	The user-defined process value to be displayed is configured in menu "View" (1-6) located at "Setup" → "Display" (menu item 2.8).
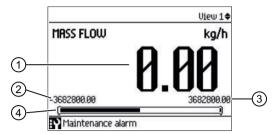
Note

Bargraph

The bargraph limits are defined as the lower and upper alarm limits.

One value and bargraph
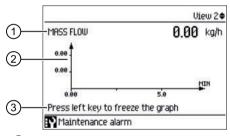
①	Process value	The user-defined process value to be displayed is configured in menu "View" (1-6) located at "Setup" → "Display" (menu item 2.8).
②	Lower alarm limit	The lower limit of the bar graph is defined by the lower alarm limit of the selected process value.
③	Upper alarm limit	The upper limit of the bar graph is defined by the upper alarm limit of the selected process value.
④	Bargraph	Shows "1st Process value" in relation to its configured maximum and minimum limits (Upper Alarm Limit and Lower Alarm Limit) for the selected process value).

One value and graph

①	Process value	The user-defined process value to be displayed is configured in menu "View" (1-6) located at "Setup" → "Display" (menu item 2.8).
②	Graph	
③	Instruction	Press ◁ to freeze/unfreeze display.

Six values

①	First process value	The user-defined process value to be displayed is configured in menu "View" (1-6) located at "Setup" → "Display" (menu item 2.8).
②	Second process value	The user-defined process value to be displayed is configured in menu "View" (1-6) located at "Setup" → "Display" (menu item 2.8).
③	Third process value	The user-defined process value to be displayed is configured in menu "View" (1-6) located at "Setup" → "Display" (menu item 2.8).
④	Fourth process value	The user-defined process value to be displayed is configured in menu "View" (1-6) located at "Setup" → "Display" (menu item 2.8).
⑤	Fifth process value	The user-defined process value to be displayed is configured in menu "View" (1-6) located at "Setup" → "Display" (menu item 2.8).
⑥	Sixth process value	The user-defined process value to be displayed is configured in menu "View" (1-6) located at "Setup" → "Display" (menu item 2.8).
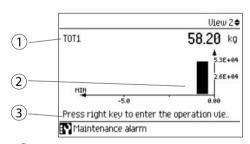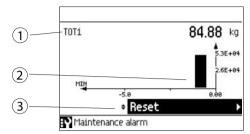
7.1.5 Operating views

Totalizer (level 1)

①	Process value	
②	Graph	
③	Instruction	Press ▷ to enter the operation view.

Totalizer (level 2)
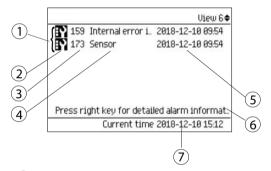
①	Process value
②	Graph
③	Control

7.1.6   Alarm views

Alarm list (level 1)

①	List of alarms	List of all active alarms in device.
②	Alarm icon	Shows the alarm class, see Device status symbols (Page 155).
③	Alarm identification number	Shows the alarm identification number, see Device status symbols (Page 155).
④	Alarm text	Short alarm name. The complete alarm text can be viewed in the detailed alarm information view.
⑤	Alarm time stamp	Timestamp with the actual date and time when the alarm occurred.
⑥	Instruction	Press right key for detailed alarm information.
⑦	Current time	Shows the current date and time.
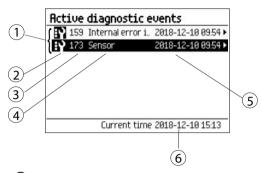
In the alarm list (level 1) the active alarms are listed. Press ▷ to access the alarm list (level 2).

Alarm list (level 2)

①	List of alarms	List of all active alarms in device. Each Alarm can be selected for detailed information.
②	Alarm icon	Shows the alarm class, see Device status symbols (Page 155).
③	Alarm identification number	Shows the alarm identification number, see Device status symbols (Page 155).
④	Alarm text	Short alarm name. The complete alarm text can be viewed in the detailed alarm information view.
⑤	Alarm time stamp	Timestamp with the actual date and time when the alarm occurred.
⑥	Current time	Shows the current date and time.
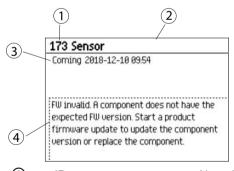
In the alarm list (level 2) it is possible to select any of the active alarms. Press △ or ▽ to scroll through the alarm list. Press ▷ to access detailed information of the highlighted alarm (level 3).

Alarm list (level 3)

①	ID	Alarm identification number.
②	Diagnostic	Describes possible causes.
③	Coming	Time stamp for alarm occurrence.
④	Action	Describes corrective action.

In the detailed alarm information view (level 3) the diagnostic and action texts are displayed. Press ◁ to exit the detailed information view.
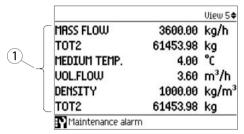
Alarm acknowledgement

There are two ways to have the alarms removed from the alarm list.

- Manual: The alarm remains in the alarm list until the alarm is manually acknowledged. The time of the acknowledgement is shown in the history log.

- Auto: The alarm is removed from the alarm list when the cause is removed.

7.1.7 Diagnostic views

Six diagnostic values

①	Process/diagnostic values	The user-defined process values to be displayed are configured in menu "View" (1-6) located at "Setup" → "Local display" (menu item 2.8).

7.1.8 Navigation view

The navigation views present the menu structure of the device. All menu items are uniquely identified with menu item number.

Level 1 of the navigation view (entered from the operation view) is standardized for all Siemens Process Instrumentation devices and covers the following groups:
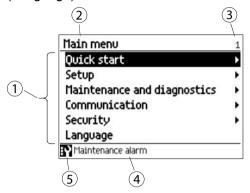
1. Quick start (menu): Lists the most important parameters for quick configuration of the device. All parameters in this view can be found elsewhere in the menu.

2. Setup (menu): Contains all parameters which are needed to configure the device.

3. Maintenance and diagnostics (menu): Contains parameters which affect the product behavior regarding maintenance, diagnostics and service.
Examples: Verification, failure prediction, device health, data logging, alarm logging, report, condition, monitoring, tests, etc.

4. Communication (menu): Contains parameters which describe the PROFIBUS PA/DP, HART and Modbus communication settings of the device.

5. Security (menu): Contains parameters which describe all security settings of the device.

6. Language (parameter): Parameter for changing the language of the local display. Regardless of the language setting, the term for this parameter is always the English term (Language).

①   List of menus and parameters
②   Name of the previously selected menu
③   Menu item number of highlighted menu
④   Alarm status text
⑤   Alarm icon

Figure 7-1   Example of display in navigation view

Menu item

In navigation view menus are identified by an arrow in the most right position.

When a menu is selected, the background turns black.

Figure 7-2   Menu in navigation view

For further information on how to gain access to the menus, see Access control (Page 93).

Parameter item

In navigation view parameters are shown without an arrow in the most right position except when the parameter is selected. When selected, the parameter is expanded into two lines. The second line shows the value of the parameter, a lock icon ($\oplus$) (if the parameter is read only), and an arrow in most right position.
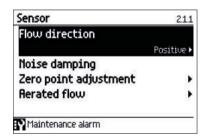
Figure 7-3   Navigation view Read & write

The selected parameter can be edited in the parameter view.
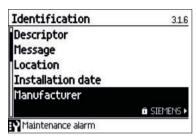
Figure 7-4   Navigation view Read only
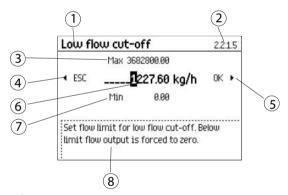
The selected parameter can only be viewed in the parameter view.

7.1.9   Parameter view

Depending on your access level, you can edit the value of the selected parameter or read the current value.

Numeric parameters edit view

Numeric parameters in edit view are displayed as shown below.

①   Parameter name

②   Parameter item number

③   Maximum value

④   Escape without saving (frame around ESC is only shown when cursor is in left-most position)

⑤   Confirm and save (frame around OK is only shown when cursor is in right-most position)

⑥   Value to be edited

⑦   Minimum value

⑧   Help text describing the parameter function. The help text appears if no key is pressed for three seconds.

Figure 7-5   Numeric parameter edit view

Note

signs in display

The display is unable to show the measured value. Change the measurement unit or the resolution.

Changing a value:

1. Select the digit to be changed by pressing ▷ and ◁ keys.

2. Use △ key to increase the value and ▽ key and decrease the values.

3. Press ▷ key in the rightmost position to confirm the changes, or press ◁ key in the leftmost position to escape the view without changing the value.

Note

Ensure that the new value is within the minimum/maximum range.

Changing the resolution:
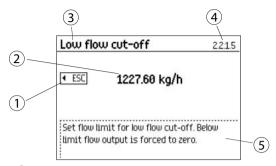
1. Select decimal point by pressing ▷ and ◁ keys.

2. Move decimal point by pressing △ key (moves decimal point to the left) or ▽ key (moves decimal point to the right).

In order to change the resolution of the process value shown in the operation view (for example mass flow), change the resolution of one configuration parameter for this process value (for example "Low Flow Cut-off" (menu item 2.2.1.5)). Any changes in resolution will change the resolution of all configuration parameters for this process value as well.

The resolution can also be changed by setting the decimal places parameter for the selected process value, for example the decimal places for process value mass flow is defined in parameter menu item 2.2.1.4.

Numeric parameter read only view

Numeric parameters in read only view are displayed as shown below.
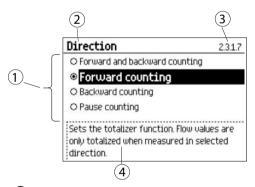
① Escape
② The set value
③ Parameter name
④ Parameter item number
⑤ Help text describing the parameter function.

Figure 7-6   Numeric parameter read only view

The read only view is shown if you do not have access to edit parameters. The view shows the set value. Press ◁ to escape the view.

Parameter list edit view

Lists of parameters in edit view are displayed as shown below.
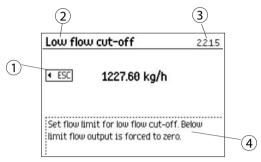
① Parameter list
② Parameter name
③ Parameter item number
④ Help text describing the parameter function. The help text appears if no key is pressed for three seconds.

Figure 7-7   List Selection edit view

Select the value by using △ and ▽ keys, and press ▷ to confirm changes. Press ◁ to escape the view without changing the value.

Parameter list read only view

Lists of parameters in read only view are displayed as shown below.
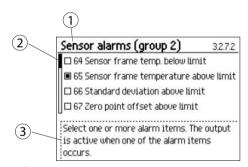
①	Parameter value selected
②	Parameter name
③	Parameter item number
④	Help text describing the parameter function. The help text appears if no key is pressed for three seconds.

Figure 7-8   List selection read only view

The read only view is shown if you do not have access to edit parameters. Press ◁ to escape the view.

Multiselection view

It is possible to select/deselect multiple alarms to be enabled under menu item 3.2.7 "Enable alarms".

①	Parameter name
②	Alarm list
③	Help text describing the parameter function. The help text appears if no key is pressed for three seconds.

Use △ and ▽ to scroll through the alarms. Use ▷ to select/deselect the alarm.

The marked alarms will NOT be suppressed.

Note

Save settings

To activate the selections, press ▷ to save settings before leaving the view.

7.2 Remote operation

You can operate the device using HART communication. The following is required for this purpose:

● A handheld (e.g. FC475) or PC software such as SIMATIC PDM.

● A HART modem to connect a PC with the device or a lead to connect the handheld with the device.

See also

SIMATIC PDM (Page 233)

Parameter assignment

<div style="text-align:right; font-size:2em;">8</div>

8.1 Upper scaling settings

Setting	The range is shown as minimum and maximum values in the local display.
Default	1600.0 [kg/m^3]

Process value (2.4.2.2) is set to Density

The Mass flow, Volume flow, Standard volume flow or Fraction range and default setting are dependent on the selected **Process value** (2.2), the selected process value **Unit** (2.2.1.1 for Mass flow, 2.2.2.1 for Volume flow, 2.2.3.1 for Standard volume flow, 2.2.7.2 for Fraction (Mass flow), or 2.2.7.3 for Fraction (Volume flow)) and the sensor size.

The Density or Fluid temperature range and default setting are dependent on the selected **Process value** (2.2) and the selected process value **Unit** (2.2.5.1 for Density and 2.2.6.1 for Medium temperature).

See also

HMI menu structure (Page 237)

8.2 Functions

8.2.1 Process values

The process values are updated every 10 ms (100 Hz update rate) synchronous with the DSP update cycle.

Process value parameters

The process values are:

- Mass flow
- Volume flow
- Standard volume flow
- Density
- Process media temperature
- Fraction

For SIL ordered flowmeters, mass flow, volume flow and density are available to be allocated to the current output on Channel 1.

For non SIL ordered flowmeters, all process values are available to be located to the current output, Modbus RTU RS-485 and PROFIBUS on Channel 1.

For Channel 2 to 4 all process values are available.

Limits and hysteresis

Limits

Alarm and warning limits can be assigned to all process values. The following limit parameters are available for each process value:

- Upper alarm limit

- Upper warning limit

- Lower warning limit

- Lower alarm limit

- Alarm hysteresis

The system reports a process alarm when the process value exceeds the Upper alarm limit or the Lower alarm limit. Likewise, the system reports a process warning when the process value exceeds the Upper warning limit or the Lower warning limit. Process value alarms and warnings are displayed in the local display as well as at the communication interfaces.

Hysteresis

The hysteresis functions as follows:
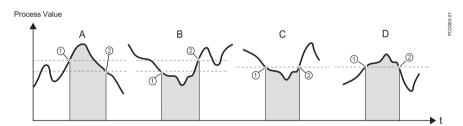
Figure 8-1   Hysteresis

A: Upper alarm limit with hysteresis
The alarm is triggered when the process value overshoots the Upper alarm limit (1). The alarm is cleared when the process value undershoots the Upper alarm limit minus hysteresis (2).

B: Lower alarm limit with hysteresis
The alarm is triggered when the process value undershoots the Lower alarm limit (1). The alarm is cleared when the process value overshoots the Lower alarm limit plus hysteresis (2).

C: Lower alarm limit without hysteresis
The alarm is triggered when the process value undershoots the Lower alarm limit (1). The alarm is cleared when the process value overshoots the Lower alarm limit (2).

D: Upper alarm limit without hysteresis
The alarm is triggered when the process value overshoots the Upper alarm limit (1). The alarm is cleared when the process value undershoots the Upper alarm limit (2).

Note

Flow direction warning

The limit function can be used to signal the flow direction by setting the Lower warning limit for the Process value to 0. A warning will occur in case of negative flow.

All alarms and warnings can be signaled on the output if Status mode is set to Individual alarms, see Digital output (Page 125).

Limit behavior on the outputs

Process alarms can trigger Fail Safe behavior on the Signal Output, whereas process warnings are only used as information available in local display and on the communication. Process value will bring the Signal output to Fail Safe mode if:

- Signal output is configured to Current, Pulse or Frequency

- Fail Safe Mode is configured to react on a failure

- Process alarm occurs on a process value selected on the output

The alarm behavior is described in detatail in Fault codes and corrective actions (Page 158).

Hysteresis is used to adjust the tolerance by undershooting or overshooting the limit as described below.

Process value derivations

The front-end of the device measures time and derives the values of certain process variables from those measurements. The time period of vibration of the two measuring tubes is inversely proportional to their frequency, which is used to determine density. The average difference in phase of the two measuring tubes is dependent upon the mass flow rate of the process medium. In this measurement context, phase difference is expressed not in degrees of rotation but as an absolute time measurement. For this reason the result of zero offset correction is displayed in µs, being the unit of the true measurement.

The process variables are interrelated and derived in the following fashions:

- Mass flow: proportional to the phase difference between pickup 1 and pickup 2, with compensations for changes in the metal characteristics due to tube and frame metal temperatures[1].

- Volume flow: derived directly from the ratio of mass flow and media density.

- Standard volume flow: derived from the ratio of mass flow and standard density[2].

- Density: derived from the average frequency of sensor tube vibration with compensation for changes in the metal characteristics with tube temperature. The relationship between density and vibration frequency is an inverse square-law curve which can be fitted to 3 reference points being the densities of air, hot water and cold water.

- Process media temperature: derived from the tube metal temperature. This is a legitimate measurement outcome since the tube walls are thin and they are within a sealed, protected environment, thereby giving similar sensitivity as an insertion thermometer.

- Frame temperature: Derived from the sensor frame temperature

- Fraction A (mass flow or volume flow): derived from the combination of media density and temperature, and compared with a stored table of fraction percentage against a wide range of both process values through a fifth-order polynomial[3]

- Fraction B (mass flow or volume flow): ditto but Fraction B is "Flow – A"

- Fraction A %: as for Fraction A quantity but A% is the ratio between Fraction A flow and Total flow

- Fraction B %: ditto but B% is "100% – A%"

[1] Metal temperatures are measured using precision Pt1000 sensors. The accuracy of the temperature measurement is ±0.5 °C.

[2] Standard density is the density of the media at reference conditions, normally atmospheric pressure and 20 °C. Standard density can be programmed into the flowmeter menu in two forms, either as a fixed reference or with a selection of linear or square-law temperature dependence. The choice of fixed or calculated standard density and of linear or square-law temperature dependency is according to the application and user preferences.

[3] The customer-specified density/temperature tables may be derived from the mass fraction or volume fraction of any two-part mixture. Fraction calculations are naturally performed in the ratio provided, or in mass ratio when using the built-in tables. Volume or mass ratios derived from the fraction table are calculated through the composite media density.

8.2.2 Zero point adjustment

In the following the automatic zero point adjustment function is described.

Note

Preconditions

Before a zero point adjustment is initiated, the pipe must be flushed, filled and at an absolute flowrate of zero preferably also at operating pressure and temperature. Refer to "Zero point adjustment" via local display (Page 86) or PDM (Page 88) for more details.

Note

Change of parameters during zero point adjustment

Do not change any other parameter during the zero point adjustment procedure.

Automatic zero point adjustment

The device measures and calculates the correct zero point automatically.

The automatic zero point adjustment of the flowmeter is set by the following parameters:

● Duration

● Start Zero Point Adjustment

When zero adjust is initiated by selecting "Start Zero Point Adjustment", the mass flow values are acquired and totalized for the configured period (Duration). The default zero point adjustment period (30 s.) is normally sufficient for a stable zero point measurement.

Note

Extremely low flow quantity

If the flow quantity is extremely small, extremely precise measurement is necessary. In this case, a long zero point adjustment period can be selected for improved zero point adjustment.

Zero point calculation

During zero point adjustment, an average value is automatically calculated using the following formula:

Zero Point Offset Value

Average of N flow values	$$\overline{x} \equiv \frac{\sum_{i=1}^{N} x_i}{N}$$	x_i is an instantaneous flow value sampled in the time domain N = Number of samples during zero point adjustment

---

The offset value must be within the determined " Offset limit" (menu item 2.1.3.6).

Note

Exceeded zero point offset limit

If the offset value is greater than the configured limit, proceed as follows:
● Check that the tube is completely filled and that the flowrate is absolute zero.
● Check the validity of the configured zero point offset limit.
● Repeat the zero point adjustment.

Zero point standard deviation

After completion of the procedure, the standard deviation is calculated in accordance with the following formula:

Zero point standard deviation

Standard deviation of N values	$$s \equiv \sqrt{\frac{\sum_{i=1}^{N}(x_i - \overline{x})^2}{N-1}} = \sqrt{\frac{-N\overline{x}^2 + \sum_{i=1}^{N} x_i^{2}}{N-1}}$$

The standard deviation contains important feedback on the homogeneity of the fluid, for example on the presence of bubbles or particles.

The standard deviation must be within the determined "Standard deviation limit" (menu item 2.1.3.4).

Note

Exceeded standard deviation limit

If the standard deviation is greater than the configured limit, proceed as follows:

● Check that the tube is completely filled and that the flow rate is absolute zero.

● Check that the installation is vibration-free.

● Check the validity of the configured standard deviation limit in menu item 2.1.3.4 "Standard deviation limit".

● Repeat the zero point adjustment.

Successful automatic zero point adjustment

If the new zero point offset value is valid, it is automatically stored as the new zero point for the sensor. It remains stored in case of a power failure.

Manual zero point adjustment

In case an automatic zero point adjustment cannot be performed, it is possible to do a manual zero point adjustment by entering the zero point offset value.

1. Select "Manual" in "Method of zero point adjustment" (menu item 2.1.3.1).

2. Enter the desired value in "Offset" (menu item 2.1.3.7).

8.2.3　Low flow cut-off

In certain applications, as for instance dosing applications, 0% flow signals below a certain flowrate are desired. In these applications, the flow signal can be forced to zero, when the flow is lower than a predefined flow value (Low flow cut-off).

The device provides two parameters for setting the low flow cut-off:

● Low mass flow cut-off

● Low volume flow cut-off

The low flow cut-off parameters influence all outputs of the device, for example Local User Interface, Channel 1 to 4, and bus communication outputs.

Depending on the process values selection of the output either Low Mass flow cut-off or Low Volume flow cut-off will influence the output.

8.2.4 Empty tube monitoring

The empty tube monitoring function uses the process density for detecting an empty tube. Use of this function is recommended for all standard applications.

Note

Gas applications

Deactivate the empty tube monitoring function.

Empty tube monitoring parameters

Two parameters for setting the empty tube monitoring function are available:

- Empty tube detection (menu item 2.2.5.7)
- Empty tube limit (menu item 2.2.5.8)

The empty tube monitoring is activated via the Empty tube detection parameter. When the empty tube monitoring function is on, the mass flow / volume flow value is forced to zero if the tube is empty.

The tube is defined as empty if the measured density value is lower than the value defined via the Empty tube limit parameter.

Note

Process media density

Risk of unintentionally forcing flow values to zero if the difference between the Empty tube limit density value and the density of the process media is not sufficient.

- Ensure sufficient difference between the Empty tube limit density value and the process media density.

8.2.5 Process noise damping

Noise damping function

The dynamic sensitivity of the flow measurement signal to rapid changes in process flows can be reduced by use of the process noise damping function. The function is typically used in environment with:
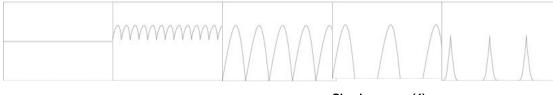
- Strongly pulsating flow
- Changing pump speeds
- Large pressure variations

Process noise damping settings

Reduce interfering process noise by increasing the setting of the parameter **Process Noise Damping**.

- Centrifugal pump (1: low)

- Triplex pump (2)

- Duplex pump (3)

- Simplex pump (4)

- Cam pump (5: high)

The default value is **Duplex pump**. The damping affects all functions and outputs of the sensor.

| Centrifugal pump (1, low) | Triplex pump (2) | Duplex pump (3; default setting) | Simplex pump (4) | Cam pump (5, high) |

Note

Increased reaction time

The reaction time of the sensor increases when the process noise is damped.

8.2.6 Inputs and outputs

The hardware functionality of input and output is fixed when ordering the product. The available configuration is described in the following table:

Channel	HW configuration (fixed when ordering)	SW configuration available to the user
1	Current output (4-20 mA) HART, Modbus, PROFIBUS DP, PROFIBUS PA	
2	Signal output	- Current (0/4-20 mA) - Frequency or pulse - Three-stage analog valve dosing control - Discrete one or two-valve dosing control - Operational and alarm status

Channel	HW configuration (fixed when ordering)	SW configuration available to the user
3	Signal output	• Current (0/4-20 mA) • Frequency or pulse • Redundant frequency or pulse (together with channel 2) • Three-stage analog valve dosing control • Discrete one or two-valve dosing control • Operational and alarm status
	Relay output	• Discrete one or two-valve dosing control • Operational and alarm status
	Signal input	• Dosing control • Totalizer reset • Remote zero adjust • Force or freeze output(s)
4	Signal output	• Current (0/4-20 mA) • Frequency or pulse • Three-stage analog valve dosing control • Discrete one or two-valve dosing control • Operational and alarm status
	Relay output	• Discrete one or two-valve dosing control • Operational and alarm status
	Signal input	• Dosing control • Totalizer reset • Remote zero adjust • Force or freeze output(s)

8.2.6.1 Current output

All four channels can be configured as current output.

Current output configuration
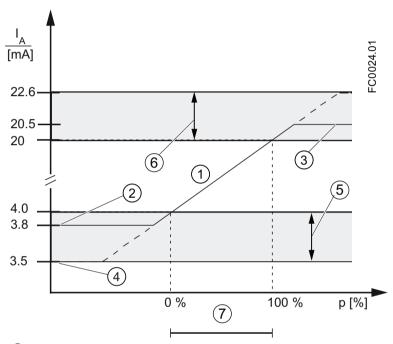
The following process values can be assigned to the current output:

• Mass flow

• Volume flow

• Standard volume flow

• Density

• Temperature

• Fraction A (Volume flow or Mass flow)

• Fraction B (Volume flow or Mass flow)

- Fraction A %

- Fraction B %

- Control valve *

The process variable listed above with * is not available to be allocated to the output on Channel 1. All process variables are available through bus communication (SV, TV and QV variables) and on all of Channels 2 to 4.

The accuracy specified for the analog output signal applies only within the range 4 to 20 mA. Lower limit (4 mA) and upper limit (20 mA) can be assigned to any specific flow values.

①	Linear control range
②	Measuring range lower limit
③	Measuring range upper limit
④	Lower fault current value
⑤	Recommended setting range for lower fault current
⑥	Recommended setting range for upper fault current
⑦	Measuring range

Figure 8-2   Current limits for NAMUR configuration
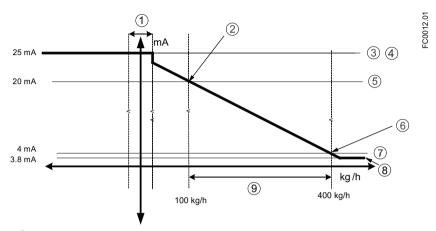
The fail safe current output signal can be selected to:

- Minimum current (defined in the Current mode selection)

- Maximum current (defined in the Current mode selection)

- Last reliable value (the last process value before the failure occurred)

- Current value (actual measured value)

- User defined (within the range of 0 to 25 mA [1])

[1] For channel 1 the range is 3.5 to 25 mA

In the alarms lists in Sensor diagnostics (Page 158) it is listed which alarms bring the output to fail safe current.

Positive flow with negative scaling (example)
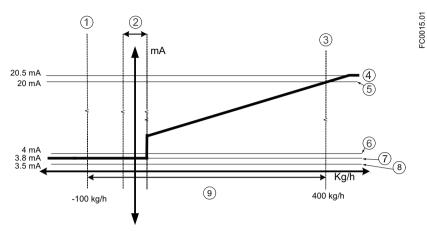
①	Low flow cut-off
②	Upper scaling
③	Maximum output current
④	Upper alarm current
⑤	Upper range
⑥	Lower scaling
⑦	Lower range
⑧	Minimum output current
⑨	Measurement range

Current output setting

- Process value = Mass flow

- Direction = Symmetric

- Current mode = 4 to 20 mA (maximum 25 mA)

- Upper scaling = 100 kg/h

- Lower scaling = 400 kg/h

- Fail-safe mode = Maximum current

- Low flow cut-off = 25 kg/h

Positive flow across zero with positive scaling (example)
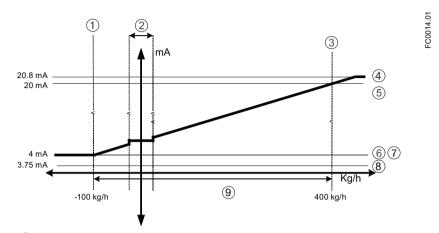
① Lower scaling
② Low flow cut-off
③ Upper scaling
④ Maximum measurement value
⑤ Upper range
⑥ Lower range
⑦ Minimum measurement value
⑧ Lower alarm value
⑨ Measurement range

Current output setting

● Process value = Mass flow

● Direction = Bidirectional

● Current mode = 4 to 20 mA NAMUR

● Upper scaling = 400 kg/h

● Lower scaling = -100 kg/h

● Fail-safe mode = Maximum current

● Low flow cut-off = 25 kg/h

Bidirectional flow across zero with positive scaling
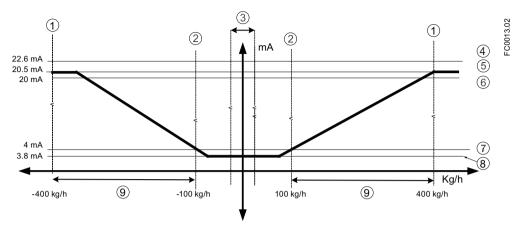
① Lower scaling
② Low flow cut-off
③ Upper scaling
④ Maximum measurement value
⑤ Upper range
⑥ Lower range
⑦ Minimum measurement value
⑧ Lower alarm value
⑨ Measurement range

Current output setting

- Process value = Mass flow

- Direction = Bidirectional

- Current mode = 4 to 20 mA US

- Upper scaling = 400 kg/h

- Lower scaling = -100 kg/h

- Fail-safe mode = Minimum current

- Low flow cut-off = 25 kg/h

Bidirectional flow with symmetrical scaling (example)

①	Upper scaling
②	Lower scaling
③	Low flow cut-off
④	Upper alarm value
⑤	Maximum measurement value
⑥	Upper range
⑦	Lower range
⑧	Minimum measurement value
⑨	Measurement range

Current output setting

- Process value = Mass flow

- Direction = Bidirectional (Symmetric)

- Current mode = 4 to 20 mA NAMUR

- Upper scaling = 400 kg/h

- Lower scaling = 100 kg/h

- Fail-safe mode = Maximum current

- Low flow cut-off = 25 kg/h

8.2.6.2 Pulse output

The pulse output function supplies pulses equivalent to a configured amount of accumulated volume or mass. The pulse width is configured and the pulse repetition is proportional to the selected flow rate.

Pulse repetition

Pulse repetition is calculated as follows:

$$\text{Pulse repetition} = \frac{\text{Amount per pulse}}{\text{Measured flow rate}}$$

FC0026.01

Note

Pulse width must be selected with the view that remaining time is always greater than pulse width at the highest measured flow.

Example

- Pulse output configuration (channels 2 to 4)
    - Operation mode = Pulse output
    - Process value = Mass flow
    - Amount = 1 kg
    - Pulse width = 1 ms
- Measured mass flow value = 10 kg/s (constant)

Result:

- Pulse repetition = 100 ms
- Output frequency = 10 pulses per second with a pulse width of 1 ms
- Remaining time between pulses is 99 ms

8.2.6.3 Frequency output

The frequency output function supplies a frequency (50% duty cycle) proportional to the selected process value.

Frequency is calculated as follows:

$$\text{Frequency} = \frac{\text{Measured massflow value}}{\text{Flow Value High - Flow Value Low}} \times (\text{Frequency Value High - Frequency Value Low})$$

FC0027.01

Example

This example shows how to calculate the output frequency for any measured flowrate:

Frequency output configuration:

- Operation mode = Frequency output (Channel 2 to 4)
- Process value = Mass flow
- Direction = Positive

- Upper frequency value = 12 kHz

- Lower frequency value = 2 kHz

- Flow value high = 15 kg/s

- Flow value low = 5 kg/s

Measured mass flow value = 7.5 kg/s (constant)

Result:

●Frequency = 4.5 kHz

Note

The connected equipment must be capable of registering the full range of frequencies configured.

8.2.6.4 Redundancy mode (frequency)

If both channel 2 and channel 3 are configured as frequency outputs, channel 3 can be configured for redundancy mode to follow channel 2 shifted by 90° or 180°. If set to redundancy mode, channel 3 inherits all channel 2 settings. The flow direction will determine whether channel 3 is shifted before or after channel 2 at 90° shift.

The following examples describe the frequency functionalities for channel 2 and 3 in redundancy mode:

Channel 2 configured as positive direction and channel 3 set to redundancy mode 90°
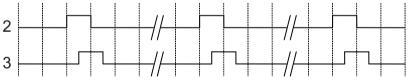
Figure 8-3   Positive flow - channel 3 leads by 90°
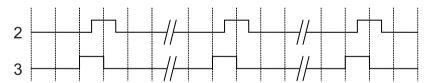
Figure 8-4   Negative flow - channel 3 lags by 90°

Channel 2 configured as positive direction and channel 3 set to redundancy mode 180˚
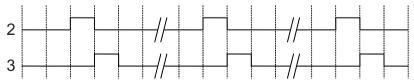
Figure 8-5   Positive flow - channel 3 leads by 180°
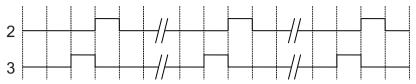
Figure 8-6   Negative flow - channel 3 lags by 180°

8.2.6.5   Digital output

The status output can be used to show alarm status or to control the dosing and it can be signaled on Signal Output or Relay Output.

Depending on the Alarm mode setting, multiple alarms can be signaled on the output and selected from the alarm class or the Individual alarms lists.

● Alarm class: Alarm will be signaled if alarm within the selected alarm class occurs.

● Individual alarms: Alarm will be signaled if selected Individual alarms occurs. It is possible to select more multiple alarms to be signaled.

Note
Alarm class

The alarm class options depend on the Status icons setting, either NAMUR or Standard (Siemens Standard), selected in menu item 2.8.11. Both NAMUR and Siemens Standard alarms and their messages are described in more detail in Sensor diagnostics (Page 158).

The control output can be used for controlling discrete valve dosing and analog valve dosing as described in Dosing (Page 126).

8.2.6.6   Input

If the input is activated with a logic signal (15 - 30 V DC), the meter carries out an activity selected in the menu.

The following input options are available:

● Start dosing

● Hold / continue dosing

– When this function is activated, it will pause the dosing. When it is deactivated, the dosing will continue

● Stop dosing

– Sets the digital output to "Off" and resets the dosing counter

● Zero adjust

– Starts the automatic zero point adjustment. This function employs the existing configurations and presumes that the process conditions are prepared for the zero point adjustment routine

● Reset totalizer

– Resets one of the internal totalizers 1, 2 or 3 (depending on configuration)

● Resets all totalizers simultaneously

● Freeze signal

– Freezes all currently measured values in the display and outputs

● Force signal

– Forces all outputs to adopt the value selected in the menu. If the value 100% is selected, the current output will show 20 mA and the frequency output will show 10.000 kHz when the external output is activated

> ⚠ **WARNING**
>
> **Changing polarity**
>
> Changing the polarity triggers the signal input to execute the set functionality.

8.2.7 Totalizers

The device has three independent totalizers that can be used to total the mass flow, volume flow, corrected volume flow, fraction A (volume flow or mass flow) or fraction B (volume flow or mass flow).

The totalizers can be configured to count balance (net flow), positive flow or negative flow.

In case of failure in the system, the totalizer fail safe mode can be set to:

● Hold (default): the totalizer holds the last value before the failure occurred

● Run: the totalizer continues counting the actual measured value

● Memory: the totalizer continues counting based on the last input value (for example mass flow) before the failure occurred.

The totalizers can be operated via the Local User Interface or bus communication (for example SIMATIC PDM). The totalizers can be reset or preset.

8.2.8 Dosing

8.2.8.1 Dosing

The dosing function controls the sequence of flow through one or two valves into a container. The user can set the amount and the sequence of controlling the valve(s). The dosing function then controls the valves to open and close in sequence to achieve the amount.

The process values for dosing control are updated with 100 Hz to ensure maximum response time of 10 ms to rapidly changing flows.

The flow sequence can be paused, resumed and ended by the user at any point in the flow sequence.

Transmitter outputs therefore change state according to the dosing sequence or operator commands. For optimal dosing control the minimum number of components between the flowmeter and the dosing valves must be employed.

Dosing is controlled with either one or two discrete valves or a single analog valve. The valve control is done using channels 2, 3 and 4. The selection of channels is fixed when ordering the system. The channels can be setup for dosing functionality in menu item 2.5.1 "Dosing mode".

Dosing control can be configured to:

- One on/off valve
- Two on/off valves
- Control valve

One on/off valve

Dosing controlled by a single discrete (open/closed) valve. The valve opens completely when the dosing begins, and closes completely when the dosing Amount is reached.

Use one Signal or one Relay output to control the one-stage dosing. Set the Operation mode of signal output to "Status". Assign Status mode to control the Primary valve. A Signal input can be assigned to start the dosing.

Two on/off valves

Dosing controlled by two discrete valves (a primary valve and a secondary valve). One valve opens at the beginning of the dosing; the other opens at a user defined amount. One valve stays open until the end of the dosing; the other closes at a user defined amount.

Use two Signal or two Relay outputs to control the two-stage dosing. Set the Operation mode of signal output to "Status". Assign one Status Mode to control the Primary valve and the other to control the Secondary valve. A Signal input can be assigned to start the dosing.

Control valve

Dosing controlled by an analog valve configured in three stages as fully open, partially closed, and fully closed.

Use one Signal output to control the Control valve. Set the Operation mode to "Current output". A Signal input can be assigned to start the dosing.

Process values

The following process values can be used for dosing control:

- Mass flow
- Volume flow
- Standard volume flow
- Fraction A
- Fraction B

Recipes

Five recipes can be configured individually, however only one of the recipes can be active at a time.

Dosing setup procedure

The dosing functionality is configured via local display. Menu item 2.4 "Inputs and outputs" determines how the transmitter will use the inputs and outputs for dosing control. Menu item 2.5 "Dosing" independently determines the sequencing of the outputs to achieve the user's desired result.

The dosing function provides:

- three dosing valve control mechanisms (One on/off valve, Two on/off valves or Control valve)
- dosing of mass flow, volume flow, standard volume flow or fraction (mass flow or volume flow)
- five independently configurable recipes
- flexible discrete or analog valve control
- fault handling – time and amount monitoring

Configure the dosing function as follows:

1. Basic dosing parameters common for all recipes in "Dosing" (menu item 2.5)
   - Select valve control functionality at parameter "Dosing mode"
   - Select measured process value for dosing at parameter "Process values"
2. Individual recipe(s) in menu items 2.5.5 to 2.5.9 as required
   - Setup dosing name, amount, unit and compensation
   - Select valve control sequence
   - Select fault handling configuration
3. Output(s) in "Inputs and outputs" (menu item 2.4).
4. Input for dosing control in "Inputs and outputs" (menu item 2.4).

8.2.8.2 Valve control configuration

Valve control dosing

Dosing is controlled with either one or two discrete valves or a single analog valve. The transmitter provides up to three input/output channels which can be used for dosing control. The selection of channels is fixed when ordering the system. The channels can be setup for dosing functionality in parameter 2.5.1 "Dosing mode" as shown in the table below. Allocation of the output to a specific dosing sequence element is performed in the software configuration as follows:

One on/off valve

Configuration of one valve (primary valve).

One of the following channels must be assigned to control the discrete primary valve.

Table 8-1   One on/off valve

Valve control	Channel HW con-figuration	Output channel	Channel SW configuration		
			Menu item		Value
Discrete valve con-trol - Primary Valve	Signal output	2	2.4.2.1	"Operation mode"	Status output
			2.4.2.27	"Status mode"	Primary Valve Dosing
		3	2.4.3.1	"Operation mode"	Status output
			2.4.3.29	"Status mode"	Primary Valve Dosing
		4	2.4.6.1	"Operation mode"	Status output
			2.4.6.27	"Status mode"	Primary Valve Dosing
	Relay output	3	2.4.4.1	"Status mode"	Primary Valve Dosing
		4	2.4.7.1	"Status mode"	Primary Valve Dosing

Two on/off valves

Configuration of two valves (primary and secondary valves)

One of the following channels must be assigned to control the discrete primary valve and one must be assigned to control the secondary discrete valve.

Table 8-2   Two on/off valves

Valve control	Channel HW con-figuration	Output channel	Channel SW configuration		
			Menu item		Value
Discrete valve con-trol - Primary Valve	Signal output	2	2.4.2.1	"Operation mode"	Status output
			2.4.2.27	"Status mode"	Primary Valve Dosing
		3	2.4.3.1	"Operation mode"	Status output
			2.4.3.29	"Status mode"	Primary Valve Dosing
		4	2.4.6.1	"Operation mode"	Status output
			2.4.6.27	"Status mode"	Primary Valve Dosing
	Relay output	3	2.4.4.1	"Status mode"	Primary Valve Dosing
		4	2.4.6.1	"Status mode"	Primary Valve Dosing
Discrete valve con-trol - Secondary Valve	Signal output	2	2.4.2.1	"Operation mode"	Status output
			2.4.2.27	"Status mode"	Secondary Valve Dosing
		3	2.4.3.1	"Operation mode"	Status output
			2.4.3.29	"Status mode"	Secondary Valve Dosing
		4	2.4.5.1	"Operation mode"	Status output
			2.4.5.27	"Status mode"	Secondary Valve Dosing
	Relay output	3	2.4.4.1	"Status mode"	Secondary Valve Dosing
		4	2.4.6.1	"Operation mode"	Secondary Valve Dosing

Control valve

Configuration of one analog valve.

One of the following channels must be assigned to control the analog valve.

Table 8-3   Control valve

Dosing mode	Valve control	Channel HW configuration	Output channel	Channel SW configuration		
				Menu item		Value
Control valve	Analog	Signal output	2	2.4.2.1	"Operation mode"	Current output
				2.4.2.2	"Process value"	Control valve
			3	2.4.3.1	"Operation mode"	Current output
				2.4.3.2	"Process value"	Control valve
			4	2.4.6.1	"Operation mode"	Current output
				2.4.6.2	"Process value"	Control valve

Note

If the output channels including current output are configured for valve control, they cannot report alarm status or fault levels.
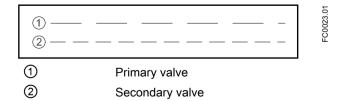
Table 8-4   Parameter settings for Two on/off valves valve control

Valve control parameter config- ured in each recipe	Default values	Description
Stage 1 Primary Open	0.00 % of Amount	The quantity or percent of the Amount at which the primary valve will open
Stage 1 Primary Close	80.00 % of Amount	The quantity or percent of the Amount at which the primary valve will close
Stage 2 Secondary Open	20.00 % of Amount	The quantity or percent of the Amount at which the secondary valve will open
Stage 2 Secondary Close	100.00 % of Amount	The quantity or percent of the Amount at which the secondary valve will close

Either Stage 1 Primary Open or Stage 2 Secondary Open must be set to 0. For controlling the valves via the outputs, two of channels 2, 3 and 4 must be assigned to Primary Valve Dosing Control and Secondary Valve Dosing control, respectively.

Either Stage 1 Primary Close or Stage 2 Secondary Close must be set to Amount.

In the examples below the primary valve, the secondary valve, and the flow are indicated as follows:

①   Primary valve

②   Secondary valve

Examples of valve control configuration

Example 1: Open primary valve at 0 %; close primary valve before closing secondary valve configured in recipe 1

Parameter configuration:

Menu 2.5 Dosing

- 2.5.1 Dosing mode = Two on/off valves

Menu 2.5.5.6 Valve control

- 2.5.5.6.1 Stage setup format = Relative

- 2.5.5.6.2 Value to open primary valve = 0 %

- 2.5.5.6.3 Value to close primary valve = 66 %

- 2.5.5.6.4 Value to open secondary valve = 33 %

- 2.5.5.6.5 Value to close secondary valve = 100 %
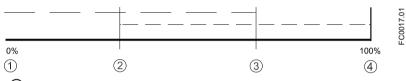
①	Open primary valve
②	Open secondary valve
③	Close primary valve
④	Close secondary valve

Example 2: Open primary valve at 0 %; close primary valve after closing secondary valve configured in recipe 1

Parameter configuration:

Menu 2.5 Dosing

- 2.5.1 Dosing mode = Two on/off valves

Menu 2.5.5.6 Valve control

- 2.5.5.6.1 Stage setup format = Relative

- 2.5.5.6.2 Value to open primary valve = 0 %

- 2.5.5.6.3 Value to close primary valve = 100 %

- 2.5.5.6.4 Value to open secondary valve = 33 %

- 2.5.5.6.5 Value to close secondary valve = 66 %

① Open primary valve
② Open secondary valve
③ Close secondary valve
④ Close primary valve
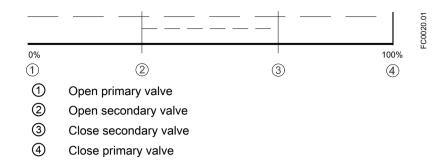
Example 3: Open secondary valve at 0 %; close primary valve before closing secondary valve configured in recipe 1

Parameter configuration:

Menu 2.5 Dosing

- 2.5.1 Dosing mode = Two on/off valves

Menu 2.5.5.6 Valve control

- 2.5.5.6.1 Stage setup format = Relative

- 2.5.5.6.2 Value to open primary valve = 33 %

- 2.5.5.6.3 Value to close primary valve = 66 %

- 2.5.5.6.4 Value to open secondary valve = 0 %

- 2.5.5.6.5 Value to close secondary valve = 100 %

① Open secondary valve
② Open primary valve
③ Close primary valve
④ Close secondary valve

Example 4: Open secondary valve at 0 %; close primary valve after closing secondary valve configured in recipe 1

Parameter configuration:

Menu 2.5 Dosing

- 2.5.1 Dosing mode = Two on/off valves

Menu 2.5.5.6 Valve control

- 2.5.5.6.1 Stage setup format = Relative

- 2.5.5.6.2 Value to open primary valve = 33 %

- 2.5.5.6.3 Value to close primary valve = 100 %

- 2.5.5.6.4 Value to open secondary valve= 0 %

- 2.5.5.6.5 Value to close secondary valve = 66 %

① Open secondary valve

② Open primary valve

③ Close secondary valve

④ Close primary valve
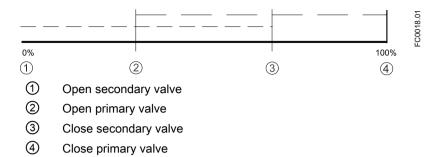
● Control valve:
  Dosing controlled by an analog valve configured in three stages as fully open (high flow), partially open, and fully closed. During the open stage the valve may be not fully open but controlled to a high flow condition.

Valve control parameter configured in each recipe	Default value	Description
Fully closed current level	0 mA	The output current which defines the closed valve state
Partial open current level	10 mA	The output current which defines the partially open valve state
Fully open current level	20 mA	The output current which defines the high flow valve state
Fully open	0.00 % of Amount	The quantity or percent of amount at which the valve will transition from partial to full flow
Partially closed	100.00 % of Amount	The quantity or percent of amount at which the valve will transition from full flow to partial flow

Three-positional Control valve configured in recipe 1

Parameter configuration:

Menu 2.5 Dosing

2.5.1 Dosing mode = Control valve

Menu 2.5.5.6 Valve control

2.5.5.6.1 Stage setup format = Relative
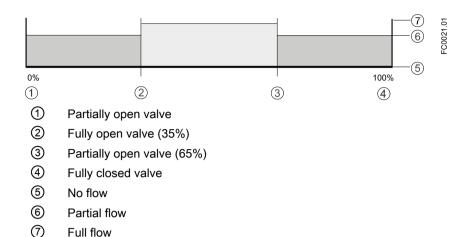
2.5.5.6.6 Current value to close = 0 mA

2.5.5.6.7 Current value to partially open = 10 mA

2.5.5.6.8 Current value to fully open = 20 mA

2.5.5.6.9 Amount for fully open = 35 %

2.5.5.6.10 Amount for partially open = 65 %

① Partially open valve
② Fully open valve (35%)
③ Partially open valve (65%)
④ Fully closed valve
⑤ No flow
⑥ Partial flow
⑦ Full flow

8.2.8.3 Dosing operation

When the transmitter recipes have been configured, the active recipe is selected in parameter 2.5.3 "Active recipe". The transmitter output changes according to the dosing operation and controls the valve in the dosing process. The digital input can be configured to start dosing. The local display provides dosing control via the dosing operating view, see Operating views (Page 98). All dosing setup and control can be performed via bus communication using SIMATIC PDM.

Dosing compensation

In static applications the flowrate is constant. Thus, the dosing compensation, if required, is fixed. Use the fixed compensation by entering the amount in menu item 2.5.5.5.2 (Fixed compensation).

8.2.8.4 Fault handling

The transmitter fault handling provides monitoring of both dosing time and amount. The configuration of the fault handling is done in Fault handling (menu item 2.5.5.7 for Recipe 1) .

Dosing timeout monitoring

The dosing timeout monitoring checks whether the dosing procedure has been finished within the configured Duration time (menu item 2.5.5.7.2 for Recipe 1). If the duration time is exceeded, an alarm will be triggered, see Fault codes and corrective actions (Page 158).

Dosing overrun monitoring

The dosing overrun monitoring checks if the flow amount exceeds the defined Overrun value (menu item 2.5.5.7.4 for Recipe 1). If the overrun value is exceeded, an alarm will be triggered, see Fault codes and corrective actions (Page 158).

This function can detect a valve malfunction (non-closure) caused by a blockage, wear, etc.

8.2.9 Audit trail logging

The audit trail includes any values or settings changed by users. The audit trail is automatically stored with information on the change as well as the time (real-time) and by which interface (display, bus communication or USB) the change was made.

Audit trail information is logged on the SensorFlash card, as a parameter and command change file which include below informations:

● Timestamp

● Modbus register

● Previous value

● New value

● Data type

● Interface ID

Example: 2017-06-08 13:48:05;9003;73;74;Uint8;HMI

The transmitter can log up to 100 entries in each of the audit trail log lists:

● "Parameter change log" (menu item 3.9.1)

● "FW update change log" (menu item 3.9.3)

Each audit trail list can be cleared by the user.

See also "Diagnostic log (Page 135)" (menu item 3.2.2).

8.2.10 Diagnostic log

All unacknowledged diagnostic information are listed in the "Diagnostic log" (menu item 3.2.2).

The diagnostic alarm list is default available in operating view 6.

There are two ways to have the alarms removed from the "Diagnostic log" (menu item 3.2.2).

● Manual: The alarm remains in the diagnostic list until the alarm is manually acknowledged (ack.).
The time of the acknowledgement is shown in the Diagnostic log as long as the log is not cleared.

● Auto: The alarm is removed from the Diagnostic log when the cause is removed (going).

8.2.11 Custom unit

Units can be defined/customized for all process values. This function can be used if the wanted unit cannot be found in the list of units.

Custom unit is defined under each process value, and is available for mass flow, volume flow, standard volume flow, density, fraction and medium temperature. Custom units menu is not available in Custody transfer mode (CT).

8.2.12 SensorFlash

SensorFlash is a high-performance micro SD card (4 GB) with the ability to be updated by inserting it in a PC. It is supplied with each sensor with the complete set of certification documents including a calibration report. Material, pressure test, factory testing and order conformance certificates are optional at ordering.

Further is contains parameter backup files, firmware logs, alarm history log, parameter change log and data logging of process values and parameters.

The Siemens SensorFlash memory unit offers a permanent database with backup of all parameter settings.

The SensorFlash supports copy and transfer of user settings from one flowmeter to another to simplify commissioning. Only setup parameters are copied; no data are changed in the receiving flowmeter.

Copying application setup from one device to another.

1. Remove the SensorFlash from the source device and insert the SensorFlash into the destination device. The destination device disables the backup and signals an alarm.

2. Enter Copy configuration (menu item 1.8) and press ▷ to execute the copying. Move all the application setup parameters from the SensorFlash to the device. Backup is still disabled and alarm signaled.

3. Remove the SensorFlash from the destination device and insert the original SensorFlash. The device synchronizes the parameters to the SensorFlash and the alarm is cleared.

4. If there is no SD-card inserted: Insert SD-Card with backup data. Press right key to continue.

5. Please wait.

6. Copy/restore parameterization - succeeded.   Press right key to continue.
   Or:
   Copy/restore parameterization - failed.   Press right key to continue.

8.2.13 Datalogging on SensorFlash

Datalogging of process values can be activated under SensorFlash (menu item 3.7).

Data logging can be selected in different logging intervals for Process values and for advanced logging of parameters.

Values with timestamp information is stored on the SensorFlash.

8.2.14 Process peak values on SensorFlash

Process peak values can be activated under "Peak values" (menu item 3.5).

Minimum and maximum process peak value is stored with timestamp information on the SensorFlash, and also under menu item 3.5.

8.2.15　Simulation

Simulation is used for testing purposes, typically for checking that the readings of the control system are correct.

The simulation can be activated in local display (menu item 3.8) or via SIMATIC PDM.

Inputs/outputs simulation

Depending on the configuration of each input/output the following values can be simulated:

HW configura-tion	Channel 1	Channel 2	Channel 3	Channel 4	Simulation value
Current output	●				4 to 20 mA
Relay output			●	●	0 (low) or 1 (high)
Signal input			●	●	0 (low) or 1 (high)
Signal output ● Current ● Pulse ● Frequency ● Status		●	●	●	 ● 0 to 25 mA ● 0 to 12.5 kHz ● 0 to 12.5 kHz ● 0 (low) or 1 (high)

Process value simulation

The following process values can be simulated:

- Mass flow
- Volume flow
- Standard volume flow
- Density
- Process media temperature
- Fraction A %
- Fraction B %

Enabling simulation for the process values sets the simulated value for all outputs.

Alarm simulation

It is possible to simulate either specific alarms (ID numbers) or alarm classes. The alarm classes are either Siemens or NAMUR depending on the configuration of Status icons, menu item 2.8.11.

Any simulated alarms will be time-stamped 1900-01-01 00:00 if the alarms have not previously appeared as real alarms. Any real alarms will be time-stamped with the actual date and time of each alarm occurrence.

All alarms can be simulated; except ID 50 (Malfunction in pickup amplitude) and ID 165 (Standard density simulated).

8.2.16   Maintenance

- Set date and time
  The device has a built-in real-time clock used for time stamps of various events (for example alarms and configuration changes). The date and time can be set in menu item 2.7.2.

- Factory reset
  The device can be reset to its default settings in menu item 3.11.1.

- Device restart
  The device can be restarted without disconnecting the power in menu item 3.11.2.

Service and maintenance 9

9.1 Basic safety notes

> **Note**
>
> The device is maintenance-free.

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

An inspection can include, for example, check of:

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

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

> ⚠ **WARNING**
>
> **Dust layers above 5 mm**
>
> Risk of explosion in hazardous areas.
>
> Device may overheat due to dust build up.
>
> - Remove dust layers in excess of 5 mm.

> **NOTICE**
>
> **Penetration of moisture into the device**
>
> Device damage
>
> - Make sure when carrying out cleaning and maintenance work that no moisture penetrates the inside of the device.

> ⚠ **WARNING**
>
> **Leaks in the sample gas path**
>
> Risk of poisoning.
>
> When measuring toxic process media, these can be released or collect in the device if there are leaks in the sample gas path.
>
> ● Purge the device as described in Commissioning (Page 83).
>
> ● Dispose of the toxic process media displaced by purging in an environmentally friendly manner.

> ⚠ **CAUTION**
>
> **Releasing button lock**
>
> Improper modification of parameters could influence process safety.
>
> ● Make sure that only authorized personnel may cancel the button locking of devices for safety-related applications.

> ⚠ **WARNING**
>
> **Use of a computer in a hazardous area**
>
> If the interface to the computer is used in the hazardous area, there is a risk of explosion.
>
> ● Ensure that the atmosphere is explosion-free (hot work permit).

9.2 Recalibration

Siemens offers to recalibrate the sensor. The following calibration types are offered as standard according to configuration (standard, density, °Brix/°Plato, fraction):

● Standard calibration

● Customer specified calibration

● Accredited Siemens ISO/IEC 17025 calibration

● Density calibration

● Witness calibration

Note

SensorFlash

For sensor recalibration the SensorFlash memory unit must always be returned with the sensor.

9.3 Cleaning

Cleaning the enclosure

- Clean the outside of the enclosure with the inscriptions and the display window using a cloth moistened with water or a mild detergent.

- Do not use any aggressive cleansing agents or solvents, e.g. acetone. Plastic parts or the painted surface could be damaged. The inscriptions could become unreadable.

⚠ WARNING
Electrostatic charge
Risk of explosion in hazardous areas if electrostatic charges develop, for example, when cleaning plastic surfaces with a dry cloth. ● Prevent electrostatic charging in hazardous areas.

9.4 Maintenance and repair work

⚠ WARNING
Impermissible repair of explosion protected devices
Risk of explosion in hazardous areas ● Repair must be carried out by Siemens authorized personnel only.

⚠ WARNING
Maintenance during continued operation in a hazardous area
There is a risk of explosion when carrying out repairs and maintenance on the device in a hazardous area. ● Isolate the device from power. - or - ● Ensure that the atmosphere is explosion-free (hot work permit).

⚠ WARNING
Impermissible accessories and spare parts
Risk of explosion in areas subject to explosion hazard. ● Only use original accessories or original spare parts. ● Observe all relevant installation and safety instructions described in the instructions for the device or enclosed with the accessory or spare part.

⚠ **WARNING**

Humid environment

Risk of electric shock.

- Avoid working on the device when it is energized.
- If working on an energized device is necessary, ensure that the environment is dry.
- Make sure when carrying out cleaning and maintenance work that no moisture penetrates the inside of the device.

⚠ **CAUTION**

Hot parts in the device

Temperatures that can burn unprotected skin may be present for some time after the device has been switched off.

- Observe the waiting time specified in Technical data (Page 183) or on the device before starting with maintenance work.

⚠ **WARNING**

Enclosure open

Risk of explosion in hazardous areas as a result of hot components and/or charged capacitors inside the device.

To open the device in a hazardous area:

1. Isolate the device from power.
2. Observe the wait time specified in Technical data (Page 183) or on the warning sign before opening the device.
3. Visually inspect sensor inlet and outlet.

Exception: Devices exclusively having Intrinsic safety (Ex i) may be opened in an energized state in hazardous areas.

⚠ **CAUTION**

Hazardous voltage at open device

Risk of electric shock when the enclosure is opened or enclosure parts are removed.

- Before you open the enclosure or remove enclosure parts, de-energize the device.
- If maintenance measures in an energized state are necessary, observe the particular precautionary measures. Have maintenance work carried out by qualified personnel.

> ⚠️ **WARNING**
>
> **Hot, toxic or corrosive process media**
>
> Risk of injury during maintenance work.
>
> When working on the process connection, hot, toxic or corrosive process media could be released.
>
> ● As long as the device is under pressure, do not loosen process connections and do not remove any parts that are pressurized.
>
> ● Before opening or removing the device ensure that process media cannot be released.

> ⚠️ **WARNING**
>
> **Improper connection after maintenance**
>
> Risk of explosion in areas subject to explosion hazard.
>
> ● Connect the device correctly after maintenance.
>
> ● Close the device after maintenance work.
>
> Refer to Cables and cable entries (Page 191).

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.

Maintenance information parameters

The basic maintenance information parameters are:

● Current date and time

● Operating time total

● Operating time

● Configuration counter

● Transmitter Hardware version

* HMI Hardware version

* Sensor Hardware version

9.4.1 Service information

Service information is information about the condition of the device used for diagnostics and service purposes.

Service information parameters

The basic service information parameters are:

* Driver current

* Pickup 1 amplitude

* Pickup 2 amplitude

* Sensor frequency

* Sensor frame temperature

* Medium temperature

* Zero point adjustment Auto/Manual

* Zero point Offset

* Manual Zero Point

* Zero Point Standard deviation

9.5 Replacing the device

If the equipment has been used for measuring corrosive substances there is a risk of chemical burns when disassembling.

⚠ **CAUTION**

Corrosive substances

Risk of chemical burns when replacing the sensor.

The sensor in the device contains corrosive substances that result in burns on unprotected skin.

* Make sure that the sensor enclosure is not damaged when replacing the sensor.

* If contact with the corrosive substances occurs, rinse the affected skin immediately with large amount of water to dilute substance.

9.6 Spare parts/Accessories

9.6.1 Ordering of spare parts

Ensure that your ordering data is not outdated. The latest ordering data is always available on the Internet: SIOS catalog Coriolis (https://support.industry.siemens.com/cs/products?dtp=Catalog&mfn=ps&pnid=17346&lc=de-DE)

9.6.2 Ex-approved products

Note

Repair of Ex-approved products

It is the customer's responsibility that repair of Ex-approved products fulfill national requirements.

9.6.3 Replaceable components

This table gives an overview of which components can be replaced.

Table 9-1 Overview of replaceable components

Component	Order number	Photo and position on Design (Page 24)		Hot swappable [1]
SITRANS FCS400 Remote version sensor	• Standard: 7ME4610-xxxx1-xxxx • Hygienic: 7ME4620-xxxx1-xxx • NAMUR: 7ME4710-xxxx1-xxxx			No
SITRANS FCS400 Compact version sensor	• Standard: 7ME4610-xxxx1-xxxx • Hygienic: 7ME4620-xxxx1-xxx • NAMUR: 7ME4710-xxxx1-xxxx			No

Component	Order number	Photo and position on Design (Page 24)		Hot swappable [1]
SITRANS FCT030 Compact version transmitter	7ME4603-2xxxx-xxx0			**No**
SITRANS FC Bag of loose parts for sensor Contents: Screws, O-rings, cable clamp parts	A5E03549324			**No**
SITRANS FCT030 Bag of loose spare parts	A5E03549396			**No**
SITRANS FCT030 Display lid in painted aluminium with glass window	A5E03549344		①	**Yes** Observe hazardous area access protocols!
SITRANS FCT030/DSL Blind lid small (⌀85 mm)	A5E03549295			**Yes** For DSL, observe hazardous area access protocols!
SITRANS FCT030 Blind lid large (⌀122 mm)	A5E03549429		⑮	**Yes** Observe hazardous area access protocols!
SITRANS FCT030 SensorFlash 4 GB micro SD card	A5E38288507		④	**Yes**
Sensor housing with cable entries in metric tread	A5E03549313			**No**
Sensor housing with cables entries in NPT tread	A5E03906080			**No**

Component	Order number	Photo and position on Design (Page 24)		Hot swappable [1]
SITRANS FCT030 Remote version Mounting bracket kit for wall and pipe mounting	A5E03906091			Yes
SITRANS FCS400 Remote version M12 option for DSL housing	A5E03906095			No
SITRANS FCT030 Remote version socket M12 pedestal	A5E03906104			No
SITRANS FCT030 Remote terminal house 1/2" NPT pedestal	A5E03906130			No

Component	Order number	Photo and position on Design (Page 24)		Hot swappable [1]
Transmitter cassette for firmware 4.0 4….20 mA output and HART 7.5 Ex	• Ch1: I/O and comm (active): A5E38012278 • Ch1: I/O and comm (passive): A5E38013025 • Ch1: I/O and comm (active/passive) Non-Ex: A5E38013040			**No.** **Firmware update needs to be done with original data from SD card.**
Transmitter cassette for firmware 4.0 Ch1: Communication Profibus DP Non-Ex	A5E41216042			**No.** **Firmware update needs to be done with original data from SD card.**
Transmitter cassette for firmware 4.0 Ch1: Communication Profibus PA Non-Ex and Ex	A5E41216315			**No.** **Firmware update needs to be done with original data from SD card.**
Transmitter cassette for firmware 4.0 Ch1: Communication Modbus RTU 485	• Ex: A5E38013054 • Non-Ex: A5E38013069			**No.** **Firmware update needs to be done with original data from SD card.**
I/O cassette for firmware 4.0 Ch2: Current/Frequency/Pulse Ch3: None Ch4: None F01, Non-Ex	A5E38006256			**No.** **Firmware update needs to be done with original data from SD card.**
I/O cassette for firmware 4.0 Ch2: Curent/Frequency/Pulse Ch3: Curent/Frequency/Pulse Ch4: None F02, Non-Ex	A5E38006558			**No.** **Firmware update needs to be done with original data from SD card.**
I/O cassette for firmware 4.0 Ch2: Curent/Frequency/Pulse Ch3: Curent/Frequency/Pulse Ch4: Curent/Frequency/Pulse F03, Non-Ex	A5E38006598			**No.** **Firmware update needs to be done with original data from SD card.**
I/O cassette for firmware 4.0 Ch2: Curent/Frequency/Pulse Ch3: Curent/Frequency/Pulse Ch4: Relay F04, Non-Ex	A5E38006896			**No.** **Firmware update needs to be done with original data from SD card.**
I/O cassette for firmware 4.0 Ch2: Curent/Frequency/Pulse Ch3: Relay Ch4: Relay F05, Non-Ex	A5E3800690			**No.** **Firmware update needs to be done with original data from SD card.**

Component	Order number	Photo and position on Design (Page 24)		Hot swappable [1]
I/O cassette for firmware 4.0 Ch2: Curent/Frequency/Pulse Ch3: Relay Ch4: None F06, Non-Ex	A5E38011432			**No.** **Firmware update needs to be done with original data from SD card.**
I/O cassette for firmware 4.0 Ch2: Curent/Frequency/Pulse Ch3: None Ch4: None F11, Ex - Passive	A5E38011478			**No.** **Firmware update needs to be done with original data from SD card.**
I/O cassette for firmware 4.0 Ch2: Curent/Frequency/Pulse Ch3: Curent/Frequency/Pulse Ch4: None F12, Ex - Passive	A5E38011509			**No.** **Firmware update needs to be done with original data from SD card.**
I/O cassette for firmware 4.0 Ch2: Curent/Frequency/Pulse Ch3: Curent/Frequency/Pulse Ch4: Curent/Frequency/Pulse F13, Ex - Passive	A5E38011541			**No.** **Firmware update needs to be done with original data from SD card.**
I/O cassette for firmware 4.0 Ch2: Curent/Frequency/Pulse Ch3: Curent/Frequency/Pulse Ch4: Relay F14, Ex - Passive	A5E38011600			**No.** **Firmware update needs to be done with original data from SD card.**
I/O cassette for firmware 4.0 Ch2: Curent/Frequency/Pulse Ch3: Relay Ch4: Relay F15, Ex - Active	A5E38011618			**No.** **Firmware update needs to be done with original data from SD card.**
I/O cassette for firmware 4.0 Ch2: Curent/Frequency/Pulse Ch3: Relay Ch4: None F16, Ex - Active	A5E38011908			**No.** **Firmware update needs to be done with original data from SD card.**
I/O cassette for firmware 4.0 Ch2: Curent/Frequency/Pulse Ch3: None Ch4: None F21, Ex - Active	A5E38012039			**No.** **Firmware update needs to be done with original data from SD card.**
I/O cassette for firmware 4.0 Ch2: Curent/Frequency/Pulse Ch3: Curent/Frequency/Pulse Ch4: None F22, Ex - Active	A5E38012056			**No.** **Firmware update needs to be done with original data from SD card.**
I/O cassette for firmware 4.0 Ch2: Curent/Frequency/Pulse Ch3: Curent/Frequency/Pulse	A5E38012121			**No.** **Firmware update needs to be done**

Component	Order number	Photo and position on Design (Page 24)		Hot swappable [1]
Ch4: Curent/Frequency/Pulse F23, Ex - Active				with original data from SD card.
I/O cassette for firmware 4.0 Ch2: Curent/Frequency/Pulse Ch3: Relay Ch4: Relay F24, Ex - Active	A5E38019235			No. Firmware update needs to be done with original data from SD card.
I/O cassette for firmware 4.0 Ch2: Curent/Frequency/Pulse Ch3: Curent/Frequency/Pulse Ch4: Relay F25, Ex - Passive	A5E38019263			No. Firmware update needs to be done with original data from SD card.
I/O cassette for firmware 4.0 Ch2: Curent/Frequency/Pulse Ch3: Relay Ch4: None F26, Ex - Passive	A5E38019378			No. Firmware update needs to be done with original data from SD card.

[1]   Components may be replaced while power is on

Table 9-2   Overview of replaceable components

Component	Article No.	Photo	Hot swappable [1]
Display and keypad assembly for wall mount enclosure, with Siemens logo	A5E37697615		Yes
Display and keypad assembly for wall mount enclosure, neutral version	A5E39844261		Yes
Power supply for wall mount enclosure 100 - 240 V AC, 47 - 63 Hz, 19,2 - 28,8 V DC	A5E38263021		No
Foam insert set for wall mount enclosure with connectors	A5E38287828		No

Component	Article No.	Photo	Hot swappable [1]
Wall mount enclosure with glass	A5E38288007		Yes
Wall mount enclosure bracket for pipe mounting	A5E38288020		No
Wall mount enclosure bracket for panel mounting	A5E38288032		No
Bag of loose spare parts for wall mount Contents: Cable strain relief components, mounting tool, seals and gasket, assorted screws and washers, hex cap nut, blind plugs, and O-rings	A5E38288072		No
Metal kit: PSU cover back pane for wall mount enclosure	A5E38415145		No
Power input cover plate for wall mount enclosure	A5E38415205		No

[1.] Components can be replaced while power is on

9.6.4 Field enclosure spareparts

Table 9-3   Overview of replaceable components

Component	Article No.	Photo	Hot swappable [1]
Display and keypad assembly for field mount enclosure with adapter cable to the transmitter module, with Siemens logo	A5E37705139		Yes
Display and keypad assembly for field mount enclosure with adapter cable to the transmitter module, neutral version	A5E39844362		Yes

Component	Article No.	Photo	Hot swappable [1]
Power supply for field mount enclosure, 100 - 240 V AC, 47 - 63 Hz, 24 - 90 V DC (HW version 2 and FW 4)	A5E38264471		**No**
Remote adapter for wall bracket M20 cable connection	• Ex: A5E42404417 • Non-Ex: A5E42846478		**No**
Compact adapter for DSL or FCT030 for upgrade from MASS2100 DI 3, 6, 15 with MASS6000 compact to DSL or FCT030	• Ex: A5E42846758 • Non-Ex: A5E42846760		**No**
SITRANS FCT030 Mounting bracket kit for wall and pipe mounting with MASS2100 and FC300 sensors for M20 analog cable connection	A5E42404426		**Yes**
Sensor cassette for systems without DSL (HW version 3, FW 4.0)	• Compact: A5E03549142 • Remote: A5E03549098		**No**

[1.] Components can be replaced while power is on

9.7 Transportation and storage

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

● Keep the original packaging for subsequent transportation.

● Devices/replacement parts should be returned in their original packaging.

● If the original packaging is no longer available, ensure that all shipments are properly packaged to provide sufficient protection during transport. Siemens cannot assume liability for any costs associated with transportation damages.

NOTICE

Insufficient protection during storage

The packaging only provides limited protection against moisture and infiltration.

● Provide additional packaging as necessary.

Special conditions for storage and transportation of the device are listed in Technical data (Page 183).

9.8   Return procedure

Enclose the bill of lading, return document and decontamination certificate in a clear plastic pouch and attach it firmly to the outside of the packaging.

Required forms

- Delivery note

- Return goods delivery note (https://www.siemens.com/processinstrumentation/returngoodsnote)
  with the following information:

  – Product (item description)

  – Number of returned devices/replacement parts

  – Reason for returning the item(s)

- Decontamination declaration (https://www.siemens.com/sc/declarationofdecontamination)
  With this declaration you warrant "that the device/replacement part has been carefully cleaned and is free of residues. The device/replacement part does not pose a hazard for humans and the environment."
  If the returned device/replacement part has come into contact with poisonous, corrosive, flammable or water-contaminating substances, you must thoroughly clean and decontaminate the device/replacement part before returning it in order to ensure that all hollow areas are free from hazardous substances. Check the item after it has been cleaned. Any devices/replacement parts returned without a decontamination declaration will be cleaned at your expense before further processing.

9.9   Disposal

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

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

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

Note

Special disposal required

The device includes components that require special disposal.

- Dispose of the device properly and environmentally through a local waste disposal contractor.

Diagnostics and troubleshooting

10

10.1 Device status symbols

Device status is shown using symbols and text on the local display. Additionally, the symbol and respective text message for each device status can be seen in remote engineering, asset management or process control systems.

Messages are shown on the display.

- In the operation view, alarms are shown as a combination of symbol and text in the lower line of the display. If several diagnostic messages are active at the same time, the most critical is shown.

- In the alarm list view all active alarms are shown as a list. The alarm list combines a symbol, text and an alarm ID number. The alarms are arranged according to the alarm ID numbers. The alarm list view can also be accessed via parameter "Active diagnostic events" (menu item 3.2.1).

- In the alarm history view the most recent alarms (up to 100) are listed. The alarm history log can be viewed in parameter "Diagnostic log" (menu item 3.2.2). The alarm history log can be reset in parameter "Clear diagnostic log" (menu item 3.2.3).

Device status characteristics

The following table provides possible cause of device status, and actions for the user or service.

The device provides two types of alarm formats; symbols used on the local display are based on NAMUR status signals or Siemens standard alarm classes, selected in parameter "Status icons" (menu item 2.8.11).

In SIMATIC PDM, symbols are based on Siemens standard alarm classes.

Note

Device status priority conflict - Namur vs Siemens standard

When more than one diagnostic event is active simultaneously, a conflict in priorities may arise. In this case, the Namur symbol on the local display will differ from that shown in SIMATIC PDM.

Be aware of the priority for each device status, depending on the interface used.

Device status symbols

Local display - NAMUR NE 107			Local display - Siemens standard			SIMATIC PDM/PLC			
Symbol	Device status	Priority *	Symbol	Device status	Priority **	Symbol		Device status	Priority **
	Failure	1		Maintenance alarm	1			Maintenance alarm	1
Cause: Output signal invalid due to fault in the field device or in the peripherals.									
Action: Maintenance is required immediately.									
	Maintenance required	3		Maintenance demanded	2			Maintenance demanded	2
Cause: Output signal is still valid, but wear reserve is almost exhausted and/or a function will be limited soon.									
Action: Maintenance is strongly recommended as soon as possible.									
	Maintenance required	3		Maintenance required	3			Maintenance required	3
Cause: Output signal is still valid. No functional restriction detected but end of wear reserve expected in next weeks.									
Action: Maintenance of device should be planned.									
	Function check	2		Simulation or substitute value	5			Simulation or substitute value	5
Cause: Output signal temporarily does not represent the process because output based on a simulation value.									
Action: Disable simulation mode via HMI or engineering system or restart device.									
	Out of specification	4		Process value alarm	8			Process value alarm	8
Cause: Deviations from permissible ambient or process conditions detected by the device (through self-monitoring, or warnings / faults in the device) indicate that the measured value is unreliable or deviations from the set value in the actuators is most likely greater than anticipated under normal operating conditions. Process or ambient conditions will damage the device or result in unreliable output.									
Action: Check ambient temperature or process conditions. If possible, install device at different location.									
	Function check	2		Configuration warning	9		(yellow)	Configuration warning	9

Local display - NAMUR NE 107			Local display - Siemens standard			SIMATIC PDM/PLC		
Symbol	Device status	Priority *	Symbol	Device status	Priority **	Symbol	Device status	Priority **
Cause: <<for SIL device>>Safety validation is not completed.								
Action: <<for SIL device>>Complete the functional test and confirm that the functional test has passed in the wizard Functional Safety.								
Cause: <<for non-SIL device>>Device can operate, but one or more parameters are incorrectly configured.								
Action: <<NO action for non-SIL device>>								
⚠?	Out of specifica-tion	4	⬍	Process value warning	10	⚠?	⬍	Process value warning	10
Cause: Deviations from permissible ambient or process conditions detected by the device (through self-monitoring, or warnings / faults in the device) indicate that the measured value is unreliable or deviations from the set value in the actuators is most likely greater than anticipated under normal operating conditions. Process or ambient conditions can damage the device or result in unreliable output.								
Action: Check ambient temperature or process conditions. If possible, install device at different location.								
no symbol shown			⬍	Process value tol-erance	11		⬍	Process value tol-erance	11
Cause: At least one process value has exceeded or fallen below a process tolerance limit parameter set in device.								
Action: Check that limit parameter settings are suitable for application.								
no symbol shown			no symbol shown	Configura-tion changed	12		no symbol shown	Configura-tion changed	12
Cause: The device configuration has changed due to a work process.								
Action: Reset configuration flag to clear diagnostic message.								
no symbol shown	Good - OK		no symbol shown	no assign-ment	13		no symbol shown	no assign-ment	13
Cause: Device status ok. No active diagnostic errors.								
Action: No action required.								

* Lowest priority number equals highest fault severity.

** Both the Siemens standard symbol and its corresponding Namur symbol (from device display) will be shown in SIMATIC PDM.

Information symbols

The following information symbols are also used on the local display and in SIMATIC PDM.

Local display	SIMATIC PDM/PLC	
Symbol	Symbol	Description
🔒	🔒	• Write access disabled • Indicate read only parameters
⇄	⇄	Data exchange via fieldbus Device is communicating.
CT	Not applicable	Custody transfer enabled
		Memory card Capacity is 25 % used.
		Memory card Capacity is 50 % used.
		Memory card Capacity is 75 % used.
		Memory card Capacity is 100 % used.
		Cyclic PROFIBUS communication enabled
SIL	Not applicable	Functional Safety enabled

10.2 Fault codes and corrective actions

10.2.1 Sensor diagnostics

ID	Symbols	Message	Cause/Action
36		Sensor supply volt. out of range	Contact your local Siemens representative.
37		Sensor supply volt. out of range	Contact your local Siemens representative.

ID	Sym-bols	Message	Cause/Action
38		Temperature measurement fault	Turn off the power, wait 5 seconds and turn on the power again. If the problem persists, contact your local Siemens representative.
39		Temperature measurement fault	Turn off the power, wait 5 seconds and turn on the power again. If the problem persists, contact your local Siemens representative.
40		Temperature measurement fault	Turn off the power, wait 5 seconds and turn on the power again. If the problem persists, contact your local Siemens representative.
41		Temperature measurement fault	Turn off the power, wait 5 seconds and turn on the power again. If the problem persists, contact your local Siemens representative.
42		Flow values not valid	Can be due to problems with measured fluid or hardware malfunction. If the problem persists, contact your local Siemens representative.
43		Flow values not valid	Can be due to problems with measured fluid or hardware malfunction. If the problem persists, contact your local Siemens representative.
44		Flow values not valid	Can be due to problems with measured fluid or hardware malfunction. If the problem persists, contact your local Siemens representative.
45		Flow values not valid	Can be due to problems with measured fluid or hardware malfunction. If the problem persists, contact your local Siemens representative.
46		Invalid calibration data	Contact your local Siemens representative for recalibration.

ID	Symbols	Message	Cause/Action
47		Invalid compensation data	Contact your local Siemens representative.
49		Malfunction in Pickup Amplitude	Contact your local Siemens representative.
50		Malfunction in Pickup Amplitude	Contact your local Siemens representative.
55		Malfunction in sensor driver	Contact your local Siemens representative.
56		Malfunction in sensor driver	Contact your local Siemens representative.
57		Malfunction in sensor driver	Contact your local Siemens representative.
58		Unstable driver oscillation	Contact your local Siemens representative.
59		Mass flow out of specification	Reduce the flow. If the problem persists, contact your local Siemens representative.
60		Volume flow out of specification	Reduce the flow. If the problem persists, contact your local Siemens representative.

ID	Symbols	Message	Cause/Action
61		Density out of specification	Contact your local Siemens representative.
62		Fluid temp. below limit	Increase the fluid temperature. If the problem persists, contact your local Siemens representative.
63		Fluid temp. above limit	Reduce the fluid temperature. If the problem persists, contact your local Siemens representative.
64		Frame temp. below limit	Increase fluid temperature and check that ambient temperature is within specified limits. If the problem persists, contact your local Siemens representative.
65		Frame temp. above limit	Reduce fluid temperature and check that ambient temperature is within specified limits. If the problem persists, contact your local Siemens representative.
66		Standard deviation above limit	Measurement continues with values from last successful zero point adjustment. Improve conditions for automatic zero point adjustment and repeat adjustment.
67		Zero point offset above limit	Measurement continues with values from last successful zero point adjustment. Improve conditions for automatic zero point adjustment and repeat adjustment.
68		Zero point adjustment failed	Measurement continues with values from last successful zero point adjustment. Improve conditions for automatic zero point adjustment and repeat adjustment.
69		Empty Tube Limit' exceeded	Make sure that the sensor is filled with liquid and that the liquid density is within the specified 'Empty Tube Limit'.

ID	Symbols	Message	Cause/Action
70		Too little fluid in tube	Make sure that the sensor is filled with liquid.
71		Parameter storage malfunction	Turn off the power, wait 5 seconds and turn on the power again. If the problem persists, contact your local Siemens representative.
72		Internal error in sensor	Contact your local Siemens representative.
73		Internal error in sensor	Contact your local Siemens representative.
74		Internal error in sensor	Contact your local Siemens representative.
75		Internal error in sensor	Contact your local Siemens representative
76		Internal error in sensor	Contact your local Siemens representative.
77		Internal error in sensor	Contact your local Siemens representative.
78		Unstable measurement condition	Check if air is present in the liquid and that the flowmeter is operated within its specifications.

ID	Symbols	Message	Cause/Action
79		Auto filtering	Check that the flowmeter is operated within its specifications. Check other alarms to rule out HW malfunction.
87		Sensor startup	Unplug and reconnect the sensor cable. If the diagnostic persists after the specified startup time, restart the device. If the problem persists, contact Technical Support.

10.2.2 Transmitter diagnostics

ID	Symbols	Message	Cause/Action
96		Mass flow above alarm limit	Check process conditions. Adjust the parameter value 'Upper alarm limit' to normal process conditions.
97		Mass flow above warning limit	Check process conditions. Adjust the parameter value 'Upper warning limit' to normal process conditions.
98		Mass flow below warning limit	Check process conditions. Adjust parameter value 'Lower warning limit' to normal process conditions.
99		Mass flow below alarm limit	Check process conditions. Adjust the parameter value 'Lower alarm limit' to normal process conditions.
100		Volume flow above alarm limit	Check process conditions. Adjust parameter value 'Upper alarm limit' to normal process conditions.

ID	Symbols	Message	Cause/Action
101		Volume flow above warning limit	Check process conditions. Adjust the parameter value 'Upper warning limit' to normal process conditions.
102		Volume flow below warning limit	Check process conditions. Adjust the parameter value 'Lower warning limit' to normal process conditions.
103		Volume flow below alarm limit	Check process conditions. Adjust the parameter value 'Lower alarm limit' to normal process conditions.
104		Density above alarm limit	Check process conditions. Adjust the parameter value 'Upper alarm limit' to normal process conditions.
105		Density above warning limit	Check process conditions. Adjust the parameter value 'Upper warning limit' to normal process conditions.
106		Density below warning limit	Check process conditions. Adjust the parameter value 'Lower warning limit' to normal process conditions.
107		Density below alarm limit	Check process conditions. Adjust the parameter value 'Lower alarm limit' to normal process conditions.
108		Medium temperature above alarm limit	Check process conditions. Adjust the parameter value 'Upper alarm limit' to normal process conditions.
109		Medium temperature above warning limit	Check process conditions. Adjust the parameter value 'Upper warning limit' to normal process conditions.

ID	Symbols	Message	Cause/Action
110		Medium temperature below warning limit	Check process conditions. Adjust the parameter value 'Lower warning limit' to normal process conditions.
111		Medium temperature below alarm limit	Check process conditions. Adjust the parameter value 'Lower alarm limit' to normal process conditions.
112		Fraction A % above alarm limit	Check process conditions. Adjust the parameter value 'Upper alarm limit' to normal process conditions.
113		Fraction A % above warning limit	Check process conditions. Adjust the parameter value 'Upper warning limit' to normal process conditions.
114		Fraction A % below warning limit	Check process conditions. Adjust the parameter value 'Lower warning limit' to normal process conditions.
115		Fraction A % below alarm limit	Check process conditions. Adjust the parameter value 'Lower alarm limit' to normal process conditions.
116		Fraction B % above alarm limit	Check process conditions. Adjust the parameter value 'Upper alarm limit' to normal process conditions.
117		Fraction B % above warning limit	Check process conditions. Adjust the parameter value 'Upper warning limit' to normal process conditions.
118		Fraction B % below warning limit	Check process conditions. Adjust the parameter value 'Lower warning limit' to normal process conditions.

ID	Symbols	Message	Cause/Action
119		Fraction B % below alarm limit	Check process conditions. Adjust the parameter value 'Lower alarm limit' to normal process conditions.
120		Fraction A above alarm limit	Check process conditions. Adjust the parameter value 'Upper alarm limit' to normal process conditions.
121		Fraction A above warning limit	Check process conditions. Adjust the parameter value 'Upper warning limit' to normal process conditions.
122		Fraction A below warning limit	Check process conditions. Adjust the parameter value 'Lower warning limit' to normal process conditions.
123		Fraction A below alarm limit	Check process conditions. Adjust the parameter value 'Lower alarm limit' to normal process conditions.
124		Fraction B above alarm limit	Check process conditions. Adjust the parameter value 'Upper alarm limit' to normal process conditions.
125		Fraction B above warning limit	Check process conditions. Adjust the parameter value 'Upper warning limit' to normal process conditions.
126		Fraction B below warning limit	Check process conditions. Adjust the parameter value 'Lower warning limit' to normal process conditions.
127		Fraction B below alarm limit	Check process conditions. Adjust the parameter value 'Lower alarm limit' to normal process conditions.

ID	Sym-bols	Message	Cause/Action
128		Standard density above alarm limit	Check process conditions. Adjust the parameter value 'Upper alarm limit' to normal process conditions.
129		Standard density above warning limit	Check process conditions. Adjust the parameter value 'Upper warning limit' to normal process conditions.
130		Standard density below warning limit	Check process conditions. Adjust the parameter value 'Lower warning limit' to normal process conditions.
131		Standard density below alarm limit	Check process conditions. Adjust the parameter value 'Lower alarm limit' to normal process conditions.
132		Standard volume flow above alarm limit	Check process conditions. Adjust the parameter value 'Upper alarm limit' to normal process conditions.
133		Standard volume flow above warning limit	Check process conditions. Adjust the parameter value 'Upper warning limit' to normal process conditions.
134		Standard volume flow below warning limit	Check process conditions. Adjust the parameter value 'Lower warning limit' to normal process conditions.
135		Standard volume flow below alarm limit	Check process conditions. Adjust the parameter value 'Lower alarm limit' to normal process conditions.
136		Totalizer 1 above alarm limit	Check process conditions. Adjust the parameter value 'Upper alarm limit' to normal process conditions.

ID	Symbols	Message	Cause/Action
137		Totalizer 1 above warning limit	Check process conditions. Adjust the parameter value 'Upper warning limit' to normal process conditions.
138		Totalizer 1 below warning limit	Check process conditions. Adjust the parameter value 'Lower warning limit' to normal process conditions.
139		Totalizer 1 below alarm limit	Check process conditions. Adjust the parameter value 'Lower alarm limit' to normal process conditions.
140		Totalizer 2 above alarm limit	Check process conditions. Adjust the parameter value 'Upper alarm limit' to normal process conditions.
141		Totalizer 2 above warning limit	Check process conditions. Adjust the parameter value 'Upper warning limit' to normal process conditions.
142		Totalizer 2 below warning limit	Check process conditions. Adjust the parameter value 'Lower warning limit' to normal process conditions.
143		Totalizer 2 below alarm limit	Check process conditions. Adjust the parameter value 'Lower alarm limit' to normal process conditions.
144		Totalizer 3 above alarm limit	Check process conditions. Adjust the parameter value 'Upper alarm limit' to normal process conditions.
145		Totalizer 3 above warning limit	Check process conditions. Adjust the parameter value 'Upper warning limit' to normal process conditions.

ID	Sym-bols	Message	Cause/Action
146		Totalizer 3 below warning limit	Check process conditions. Adjust the parameter value 'Lower warning limit' to normal process conditions.
147		Totalizer 3 below alarm limit	Check process conditions. Adjust the parameter value 'Lower alarm limit' to normal process conditions.
148		Transmitter electronics temperature too high	Decrease the ambient temperature. If possible, reposition the device in a different location. Inspect the device for heat-related damages.
149		Transmitter electronics temperature too low	Increase the ambient temperature. If possible, reposition the device in a different location. Inspect the device for cold-related damages.
150		Sensor signal disrupted	Turn off the power. Unplug and reconnect the sensor cable. If the error still exists, contact your local Siemens representative.
151		SensorFlash parameter backup disabled	A SensorFlash of another device has been inserted. Either copy the settings from the SensorFlash to the device or remove this SensorFlash and insert the original Sensor-Flash.
152		SensorFlash parameter backup disabled	A SensorFlash of another device has been inserted. Either copy the settings from the SensorFlash to the device or remove this SensorFlash and insert the original Sensor-Flash.
153		CH1 loop current in lower saturation	The process value is so low that the loop current reaches the lower saturation limit and cannot decrease any further. Check process conditions. Adjust parameter value 'Lower range value'.
154		CH1 loop current in upper saturation	The process value is so high that the loop current reaches the upper saturation limit and cannot increase any further. Check process conditions. Adjust parameter value 'Upper range value'.

ID	Symbols	Message	Cause/Action
155		CH1 loop current error	Invalid loop current deviation detected. Check current output cable connection. Passive operation: check external power supply.
158		CH1 cable break	Check current output cable connection. Passive operation: check external power supply.
159		Internal error	Internal error in transmitter. Turn off the power, wait 5 seconds and turn on the power again. If the error still exists, contact your local Siemens representative.
160		Mass flow simulated	Disable the simulation to return to normal operation.
161		Volume flow simulated	Disable the simulation to return to normal operation.
162		Density simulated	Disable the simulation to return to normal operation.
164		Fraction simulated	Disable the simulation to return to normal operation.
165		Standard density simulated	Disable the simulation to return to normal operation.
166		Standard volume flow simulated	Disable the simulation to return to normal operation.

ID	Symbols	Message	Cause/Action
167		Totalizer 1 simulated	Disable the simulation to return to normal operation.
168		Totalizer 2 simulated	Disable the simulation to return to normal operation.
169		Totalizer 3 simulated	Disable the simulation to return to normal operation.
170		Loop current simulated	Disable the simulation to return to normal operation.
172		Transmitter firmware incompatible	The component does not have the expected firmware version. Update the product firmware or replace the component.
173		Sensor firmware incompatible	The component does not have the expected firmware version. Update the product firmware or replace the component.
174		Firmware local operation incompatible	The component does not have the expected firmware version. Update the product firmware or replace the component.
175		I/O firmware incompatible	The component does not have the expected firmware version. Update the product firmware or replace the component.
177		Device startup	Wait until the startup is finished. The startup time is specified in the operating instructions. If the diagnostic persists after the specified startup time, restart the device. If the problem persists, contact Technical Support.

ID	Symbols	Message	Cause/Action
178		Transmitter firmware incompatible	The component does not have the expected firmware version. Update the product firmware or replace the component.
179	Icons depending on simulation	Alarm class simulated	Disable the simulation to return to normal operation.
180		Internal error in transmitter	Restart the device. If the problem persists, replace the component.
181		SensorFlash error	Replace the SensorFlash.
182		Transmitter firmware incompatible	The component does not have the expected firmware version. Update the product firmware or replace the component.
192		Dosing monitoring time exceeded	Check the dosing system. If it is ok, increase the parameter value 'Duration time'.
193		Dosing overrun limit exceeded	Check the dosing system. If it is ok, increase the parameter value 'Overrun value'.
194		Dosing possibly inaccurate	Invalid process value during dosing. For further information, check the diagnostic log.
195		CH2 loop current in lower saturation	The process value is so low that the loop current reaches the lower saturation limit and cannot decrease any further. Check process conditions. Adjust parameter value 'Lower range value'.

ID	Symbols	Message	Cause/Action
196		CH2 loop current in upper saturation	The process value is so high that the loop current reaches the upper saturation limit and cannot increase any further. Check process conditions. Adjust parameter value 'Upper range value'.
197		CH2 cable break	Check current output cable connection. Passive operation: check external power supply.
198		CH2 output frequency too low	The process value is below the parameter 'Lower range value'. The output frequency cannot decrease any further. Check process conditions. Adjust parameter value 'Lower range value'.
199		CH2 output frequency too high	The process value is above the parameter 'Upper range value'. The output frequency cannot increase any further. Check process conditions. Adjust parameter value 'Upper range value'.
200		CH2 pulse overflow	Pulse output has insufficient pulse separation. Increase Amount per pulse, or reduce Pulse width, or reduce Pulses per amount.
201		CH3 loop current in lower saturation	The process value is so low that the loop current reaches the lower saturation limit and cannot decrease any further. Check process conditions. Adjust parameter value 'Lower range value'.
202		CH3 loop current in upper saturation	The process value is so high that the loop current reaches the upper saturation limit and cannot increase any further. Check process conditions. Adjust parameter value 'Upper range value'.
203		CH3 cable break	Check current output cable connection. Passive operation: check external power supply.
204		CH3 output frequency too low	The process value is below the parameter 'Lower range value'. The output frequency cannot decrease any further. Check process conditions. Adjust parameter value 'Lower range value'.

ID	Symbols	Message	Cause/Action
205		CH3 output frequency too high	The process value is above the parameter 'Upper range value'. The output frequency cannot increase any further. Check process conditions. Adjust parameter value 'Upper range value'.
206		CH3 pulse overflow	Pulse output has insufficient pulse separation. Increase Amount per pulse, or reduce Pulse width, or reduce Pulses per amount.
207		CH4 loop current in lower saturation	The process value is so low that the loop current reaches the lower saturation limit and cannot decrease any further. Check process conditions. Adjust parameter value 'Lower range value'.
208		CH4 loop current in upper saturation	The process value is so high that the loop current reaches the upper saturation limit and cannot increase any further. Check process conditions. Adjust parameter value 'Upper range value'.
209		CH4 cable break	Check current output cable connection. Passive operation: check external power supply.
210		CH4 output frequency too low	The process value is below the parameter 'Lower range value'. The output frequency cannot decrease any further. Check process conditions. Adjust parameter value 'Lower range value'.
211		CH4 output frequency too high	The process value is above the parameter 'Upper range value'. The output frequency cannot increase any further. Check process conditions. Adjust parameter value 'Upper range value'.
212		CH4 pulse overflow	Pulse output has insufficient pulse separation. Increase Amount per pulse, or reduce Pulse width, or reduce Pulses per amount.
213		Invalid dosing settings	Correct settings.

ID	Symbols	Message	Cause/Action
214		CH2 simulated	Disable the simulation to return to normal operation.
215		CH3 simulated	Disable the simulation to return to normal operation.
216		CH4 simulated	Disable the simulation to return to normal operation.
217		Process values frozen	Freezing of the process values is enabled either via a digital input or the fieldbus. Disable the freezing of the process values to return to normal operation.
218		Output channels forced	Forcing is enabled either via a digital input or the fieldbus. Disable forcing to return to normal operation.
219		CH2 loop current error	Invalid loop current deviation detected. Check current output cable connection. Passive operation: check external power supply.
220		CH3 loop current error	Invalid loop current deviation detected. Check current output cable connection. Passive operation: check external power supply.
221		CH4 loop current error	Invalid loop current deviation detected. Check current output cable connection. Passive operation: check external power supply.
222		Invalid Modbus register mapping	At least one source register has been used multiple times. Correct the register mapping.

ID	Sym-bols	Message	Cause/Action
223		Invalid Modbus coil config-uration	A coil has multiple assignments. Correct the coil configu-rations.
285		Data logging, < 30 days remaining	Low available memory, which is full in 30 days at the latest. Save logged data and free up memory space on the Sen-sorFlash. Increase the parameter value 'Logging interval.
286		Data logging, < 7 days re-maining	Low available memory, which is full in 7 days at the latest. Save logged data and free up memory space on the Sen-sorFlash. Increase the parameter value 'Logging interval.
287		Data logging memory full	Save logged data and free up memory space on the Sen-sorFlash.
288		Sensor frame tempera-ture simulated	Disable the simulation to return to normal operation.

10.3 Operation troubleshooting

10.3.1 Copying the application setup from one device to another

1. Remove the SensorFlash from the source device and insert the SensorFlash into the destination device. The destination device disables the backup and signals an alarm.

2. Enter "Copy configuration" (menu item 1.8), select "OK" and press ▷ to execute the copying. All application setup parameters are moved from the SensorFlash to the device. Backup is still disabled and alarm signaled.

3. Remove the SensorFlash from the destination device and insert the original SensorFlash. The device synchronizes the parameters to the SensorFlash. The alarm is cleared.

10.3.2 Updating the firmware

1. Contact Technical Support (https://support.industry.siemens.com/cs/my/src?lc=en-WW) to receive the latest available firmware bundle.

2. Save the firmware bundle to the SensorFlash.

3. Access the flowmeter with access level Expert (the default PIN code is 2834).

4. Enter "Firmware update" (menu item 3.12), select the saved firmware bundle version and press ▷. The firmware update progress is shown in the display.

Note

Firmware update

FW update is to be done only by authorized and trained service personnel.

10.3.3 Troubleshooting sensor-related problems

Incorrect and unstable measurements, especially at low flows, are typically a result of an unstable zero point due to:

● Incorrect installation

● Bubbles in the liquid

● Vibrations or cross talk

● Solid particles settling in the liquid

Follow the 4-step guide to troubleshooting:

Step 1	Preliminary application inspection (Page 177)
Step 2	Zero point adjustment (Page 177)
Step 3	Measurement error calculation (Page 177)
Step 4	Application improvement (Page 177)

The guide enables you to trace the reason for incorrect measurements and to improve the application.

Ensure that:

1. The sensor is installed as described in Installing/mounting (Page 39).

2. The sensor is located in a vibration-free position. Vibrations can disturb the sensor and therefore cause measurement error.

Depending on application, you should furthermore ensure the following:

- Liquid application
Ensure that the sensor is filled with liquid and liquid only.
Air or gas bubbles in the liquid cause instability and can result in measurement errors.
Flush the pipe systems and the sensor for several minutes at maximum flowrate to remove any air bubbles which may be present.

Note

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

For pastes or process fluids with suspended solids always orient the sensor vertically with flow in upward direction to maintain solids suspension.

- Gas application
Ensure that the gas pressure/temperature conditions contain sufficient superheat to prevent dewing or precipitation. If the gas contains vapor or droplets then these may precipitate, causing instability.

The second step in the troubleshooting procedure is to zero point adjust the device. For further information on zero point adjustment, see Commissioning (Page 83).

The result of the zero point adjustment will show you if the zero point was set under good and stable conditions.

The lower the obtained value of the parameter **Zero point standard deviation**, the lower is the achievable measuring error. For a well-installed flowmeter, the Zero point standard deviation corresponds to the specified zero point stability for the sensor size, see Performance (Page 183).

The parameter **Zero point standard deviation** is located in the **Maintenance & Diagnostics** menu in the SIMATIC PDM.

- The error curve is plotted from the formula:

$$E = \pm \sqrt{(Cal)^2 + \left(\frac{z \times 100}{qm}\right)^2}$$

E   = Error [%]

Z   = Zero point [kg/h]

qm = Mass flow [kg/h]

Cal. = Calibrated flow accuracy: 0.10 or 0.15

Error in % of actual mass flow rate with 95% confidence (probability)
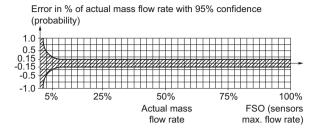
Table 10-1   **Reference conditions for flow calibrations (ISO 9104 and DIN/EN 29104)**

Flow conditions	Fully developed flow profile
Temperature, medium	20 °C ± 2 °C (68 °F ± 3.6 °F)
Temperature, ambient	20 °C ± 2 °C (68 °F ± 3.6 °F)
Liquid pressure	2 ± 1 bar
Density	0.997 g/cm3
Brix	40 °Brix
Supply voltage	Un ± 1 %
Warming-up time	30 min.
Cable length	5 m between transmitter and sensor

Table 10-2   **Additions in the event of deviations from reference conditions**

Current output	As pulse output ± (0.1% of actual flow +0.05 % FSO)
Effect of ambient temperature	• Display/frequency/pulse output: < ± 0.003%/K act. ± 3.6 °F) • Current output: < ± 0.005 %/ K act.
Effect of supply voltage	< 0.005 % of measuring value on 1 % alteration

In the following it is described how to find the causes of a high Zero point standard deviation and how to improve the installation.

Setting Low flow cut-off

In order to see if the zero point becomes more stable when making changes / adjustments, the Low Mass flow cut-off (MassFlowCutOff) must be set to 0.0 kg/s.

When Low flow cut-off has been set, it is possible to see the instability directly from the mass flow in the online window ("View → Process variables")

This information can be used to troubleshoot. For example, tightening the brackets which hold the sensor, or turning off the pump to check if vibrations from the pump are disturbing the sensor, etc.

Incorrect installation of the sensor

- Has the sensor been correctly installed, that is fastened to the floor / wall or frame with good mounting brackets as shown in the instructions?

Especially for low flowrates, that is flowrates less than 10% of the maximum capacity of the flowmeter, it is important that the sensor is correctly and stably installed.

If the sensor is not correctly fixed in place, the zero point of the sensor will change, leading to measuring errors.

Try to tighten up the sensor brackets to see whether the flow instability is reduced.

Vibrations and cross talk

Vibrations in the pipe system are normally generated by pumps.

Typically, cross talk is generated by two sensors of identical size and positioned in close proximity in the same pipe, or installed on the same rail or frame.

Vibrations / cross talk have a greater or lesser effect upon the zero point stability and therefore also the measurement accuracy.

1. Check whether there are vibrations.
   Turn off the pump and check whether the zero point stability improves, that is if the flowrate fluctuation in kg/h is reduced.
   If the sensor is disturbed by vibration from the pump or by pressure pulsations, the installation should be improved or the pump should be exchanged, for example to another type.

2. Check for cross talk.
   Turn off the power to the other flowmeter(s) and wait approximately 2 minutes, so the vibrating tubes in the sensor have stopped vibrating. Then check if the zero point stability has improved, that is that the fluctuation in kg/h has been reduced. If this is the case, the sensors disturb one another and the installation should be improved.

Air in the liquid

When air is present in the liquid, the zero point becomes unstable, which leads to a poor measurement accuracy.

Checking for air:

- Check the Driver current (View → Device diagnostics → Advanced diagnostic)

- Check if the Driver current varies more than ±1 mA. If this is the case, it is usually due to the presence of air or gas bubbles in the liquid.

- Increase the pressure in the sensor, creating a large back pressure upon the sensor by reducing the opening of the outlet valve or by increasing the pump pressure. Thereby the size of air bubbles inside the sensor will be minimized. If the Driver Current value increases and/or the stability of the Driver current decreases, it is proof that the liquid contains air or gas bubbles.

Typical causes of air in the liquid

- The entry pipe and sensor have not been properly filled with liquid.

- The pump cavitates, the rotary speed of the pump is too high in relation to the supply of liquid to the pump.

- The flow rate in the pipe is too high, so components sitting in front of the flowmeter can cause cavitation.

- If there is a filter installed before the flowmeter, it may be close to blocking, which also can cause cavitation.

- Liquid flashes to vapor bubbles while passing through partially open valves or orifices.

- The piping on the pump suction side, pump gaskets or the pump itself is not tight. Air gets sucked into the system due to a low pressure on the pump suction side.

- The piping on the pump suction side, pump gaskets or the pump itself is not tight. Air gets sucked into the system due to a low pressure on the pump suction side.

Solid particles in the liquid

If the solid particles in a liquid have a density higher than that of the liquid, they can precipitate inside the sensor and cause instability which leads to a measurement error.

If solid particles are present in the liquid, they must be homogeneously distributed and have similar density as the liquid. Otherwise they can cause relatively large measurement errors.

It is important that the sensor is installed so that solid particles can easily run out of the sensor.

1. Ensure that the sensor is installed vertically with an upwards flow.

2. Check if solid particles are present in the liquid:
   Take a sample of the liquid, fill a glass and see if the solids precipitate.

10.4 Diagnosing with PDM

Diagnosing with PDM

SIMATIC PDM is a suitable tool for diagnosing the device.

You can use SIMATIC PDM to read all available parameters 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:

- Installation of PDM and PDM device driver

- Connection of communications or digital communications interface

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Technical data 11

> **Note**
>
> **Device specifications**
>
> Siemens makes every attempt to ensure the accuracy of these specifications but reserves the right to change them at any time.

11.1 Power

Table 11-1   Power supply

Description	Specification
Supply voltage	• 100 to 240 V AC, 47 to 63 Hz 30 VA • 19,2 - 28,8 V DC 11 W
Environmental conditions:	• Transient over voltages up to the levels of overvoltage category II • Temporary over voltages occurring on mains supply only • POLLUTION DEGREE 2. • MAINS AC supply voltage fluctuations up to ±10 % of the nominal voltage. • Altitude up to 2 000 m
Reverse polarity protection	Yes
Galvanic isolation	2500 V AC

11.2 Performance

Table 11-2   Reference conditions

Description	Specification
Process media	Water
Process media temperature	20 °C (68 °F)
Ambient temperature	25 °C (77 °F)
Process media pressure	2 bar (29 psi)
Process media density	0.997 g/cm^3 (62.2 lb/ft^3)
Reference device orientation	Horizontal installation, tubes down, flow in direction of arrow on casing, see Installing/Mounting (Page 39).

Table 11-3   Mass flow accuracy

Specification	Unit	Sensor size		
		DN15	DN25	DN50
Qmin - minimum flowrate	kg/h	20	200	750
	(lb/min)	(0.735)	(7.35)	(27.6)
Qnom - nominal flowrate	kg/h	3700	11500	52000
	(lb/min)	(136)	(423)	(1910)
Qmax - maximum flowrate	kg/h	6400	17700	70700
	(lb/min)	(235)	(650)	(2598)
Max. zero point stability	kg/h	±0.2	±2.0	±7.5
Measuring accuracy	%	±0.1	±0.1	±0.1
Repeatability error	%	±0.05	±0.05	±0.05

Table 11-4   Density accuracy

Specification	Unit	Sensor size		
		DN15	DN25	DN50
Density accuracy, standard calibration	kg/m³	±5	±5	±5
Density accuracy, extended calibration	kg/m³	±0.5	±0.5	±0.5
Density repeatability	kg/m³	±0.25	±0.25	±0.25
Density, media pressure effect	(kg/m³)/bar	±0.5	±0.25	±0.25
Density, media temperature effect	(kg/m³)/°C	±0.1	±0.1	±0.1

Table 11-5   Media temperature accuracy

Specification	Unit	Sensor size		
		DN15	DN25	DN50
Media temperature accuracy	°C	±1	±1	±1
Media temperature repeatability	°C	±0.25	±0.25	±0.25

Table 11-6   Additional error by deviations from reference conditions

Specification	Unit	Sensor size		
		DN15	DN25	DN50
Effect of process pressure	% of actual flowrate per bar	<-0.015	<-0.015	<-0.015
Effect of process pressure at nominal flowrate	(kg/h) per bar	-0.56	-1.73	-7.8
Effect of ambient temperature: Display/Frequency/Pulse/Communication output	%/K actual flowrate	< ±0.003	< ±0.003	< ±0.003
Effect of power supply fluctuations			None	
Effect of media temperature	(kg/h)/°C	±0.0875	±0.175	±1.05

11.3   Interface

11.3.1   Modbus interface

Table 11-7

Description	Specification
Protocol version	Modbus RTU
Supported data rates	1200 bps
	2400 bps
	4800 bps
	9600 bps
	19200 bps (default)
	38400 bps
	57600 bps
	76800 bps
	115200 bps
Framing	Even parity: 1 stop bit (default)
	Odd parity, 1 stop bit
	No parity, 2 stop bits
Default device address	1

11.3.2   HART interface

Table 11-8

Description	Specification
HART revision	7.5
Burst mode	Not supported

Description	Specification
Device variables	Mass flow
	Volume flow
	Density
	Medium temperature
	Standard volume flow
	Fraction A
	Fraction B
	Fraction A %
	Fraction B %
	Reference Density
	Transmitter electronics temperature
	Totalized value 1
	Totalized value 2
	Totalized value 3
	Sensor frame temperature
	Dosing amount done
Physical layers supported	FSK (Frequency Shift Keyed)

11.3.3   PROFIBUS interface

Table 11-9   PROFIBUS DP/PA

Description	Specification
Profile version	V4.0

11.4   Inputs

Table 11-10   Digital input

Description	Channels 3 to 4
Load	15 to 30 VDC, R_{in} 7 kOhm
Functionality	• Start/stop/hold/continue dosing
	• Reset totalizer 1, 2 or 3
	• Reset all totalizers
	• Freeze output

11.5 Outputs

Table 11-11 Current output (Channel 1)

Description	Channel 1	
Signal range	4 to 20 mA	
Resolution	0.4 µA	
Load	• Ex i: <470 Ω (HART ≥ 230 Ω) • Non-Ex: <770 Ω (HART ≥ 230 Ω)	
Time constant (adjustable)	0.0 to 100 s	
Fault current Measurement range (mA) Lower fault current (mA) Upper fault current (mA)	4 - 20 NAMUR 3.8 - 20.5 3.5 22.6	4 - 20 US 4.0 - 20.8 3.75 22.6
Customized fail-safe mode	• Last reliable value • Lower fault current • Upper fault current • Fail-safe value • Current value	
Galvanic isolation	All inputs and outputs are galvanically isolated PELV circuits with 60 V DC isolation from each other and ground. Maximum test voltage: 500 V AC	
Cable	Standard industrial signal cable with up to 3 twisted pairs with overall screen can be connected between the transmitter and the control system. Individual pair or overall screen is optional depending on user requirements.	
Voltage range	Max. 24 V DC (active) 14 to 30 V DC (passive)	

Table 11-12 Current output (Channels 2 to 4)

Description	Channels 2 to 4					
Signal range	0/4 to 20 mA					
Resolution	0.4 µA					
Load	• Ex i: <470 Ω • Non-Ex: <770 Ω					
Time constant (adjustable)	0.0 to 100 s					
Fault current Measurement range (mA) Lower fault current (mA) Upper fault current (mA)	4-20 NAMUR 3.8 - 20.5 3.5 22.6	4-20 US 4.0 - 20.8 3.75 22.6	4-20 (fault = 0 mA) 4.0 - 20.5 0.0 22.0	4-24 4.0 - 24.0 2.0 25.0	0-20 0.0 - 20.5 0.0 22.0	0-24 0.0 - 24.0 0.0 25.0

Description	Channels 2 to 4
Customized fail-safe mode	• Last reliable value • Lower fault current • Upper fault current • Fail-safe value • Current value
Galvanic isolation	All inputs and outputs are galvanically isolated PELV circuits with 60 V DC isolation from each other and ground. Maximum test voltage: 500 V AC
Cable	Standard industrial signal cable with up to 3 twisted pairs with overall screen can be connected between the transmitter and the control system. Individual pair or overall screen is optional depending on user requirements.
Voltage range	Max. 24 V DC (active) 14 to 30 V DC (passive)

Table 11-13   Digital output

Description	Channels 2 to 4
Pulse	41.6 µs to 5 s pulse duration
Resolution	1 µs
Frequency	0 to 10 kHz, 50 % duty cycle, 120 % overscale provision
Resolution	0.2 Hz
Load	< 750 Ω
Time constant (adjustable)	0 to 100 s
Active	0 to 24 V DC, 87 mA, short-circuit-protected
Passive	3 to 30 V DC, 100 mA, short-circuit-protected
Functions	• Pulse • Frequency • Alarm class / NAMUR status • Individual alarms

Table 11-14   Relay output

Description	Channels 3 to 4
Type	Change-over voltage-free relay contact
Load	30 V AC, 100 mA
Functions	• Alarm class / NAMUR status • Individual alarms

11.6 Construction

11.6.1 Construction

Table 11-15   Designated use

Description	Specification
Measurement of process medium	• Fluid Group 1 (suitable for dangerous fluids) • Aggregate state: Paste/light slurry, liquid and gas

Table 11-16   System design

Description	Specification
Measuring principle	Coriolis
System architecture	Compact version Remote version

Device design

Table 11-17   Transmitter design

Description	Specification
Dimension and weight	See "Sensor dimensions" (Page 205)
Design	Compact or remote
Material	Aluminum with corrosion-resistant coating
Ingress protection	IP67/NEMA 4X to EN/IEC 60529 (1 mH_2O for 30 min.)
Mechanical load	18 to 1000 Hz random, 3.17 g RMS, in all directions, to IEC 68-2-36

Torques

Table 11-18   Installation torques

Description		Torque (Nm)
Pressure guard fittings G 1/4 inch		80
Wall bracket screws		10
Transmitter to wall bracket		25
Transmitter pedestal lock screw	Compact version:	10
	Remote version:	6
Pedestal lock screw cap		10
Cable gland to enclosure (Siemens supplied, metric)		10

Note

NPT glands

When using NPT glands, the user must take care to use the supplied NPT thread adaptors.

11.6.2   Sensor design

Description	Specification
Dimension and weight	See "Sensor dimensions" (Page 205)
Process connectors	• EN1092-1 B1, PN16, PN40, PN63, PN100, PN160
	• EN1092-1 D (gasket groove), PN40, PN63, PN100, PN160
	• ISO 228-1 G *
	• ASME B1.20.1 NPT *
	• ASME B16.5, Cl 150, Cl 300, Cl 600, Cl 900
	• DIN 11851 **
	• DIN 32676 *
	• DIN 11864-1A **, DIN 11864-2C (inch) **, DIN 11864-3A **
	• ISO 2852 **
	• ISO 2853 **
	• JIS B 2220, 10K, 20K, 40K, 62K
Electrical connection	• M12 connector with 4-wire cable
	• Standard cable with polymer / brass / stainless steel cable glands (metric or NPT)
	• Armored cable with stainless steel armored cable glands (metric or NPT)
	• Conduit entries (metric or NPT)
Material	
Measuring tubes	• AISI 316L / EN1.4404
	• Hastelloy C22 / UNS N06022
Process connectors	• Standard:
	– AISI 316L / EN1.4435 or EN1.4404
	– Hastelloy C22 / UNS N06022
	• Hygienic:
	– AISI 316L / EN1.4435
Sensor enclosure	AISI 304 / W1.4301
DSL enclosure	Aluminum with corrosion-resistant coating
Measuring tube design	Split flow through 2 parallel tubes with combined cross-section area 50% of the nominal pipe
	The measuring tubes are bent in a trapezoidal curve

Description	Specification
Measuring tube surface roughness	• Standard: 1.6 μm • Hygienic: 0.8 μm
Self-draining design	Yes, when mounted vertically

*: Pressure ratings depend on sensor material
**: Pressure ratings depend on process connection dimension

11.6.3 Cables and cable entries

Table 11-19   SSL cable, basic data

Description	Specification
Number of conductors	4
Square area [mm^2]	0.326 (AWG 22/7)
Screen	Yes
Outside color	• Standard version: gray (RAL 7001) • Ex version: light-blue (RAL 5015)
External diameter [mm]	6.5 (standard); 12 (armored)
Maximum length [m (ft.)]	150 (492)
Installation environment	Industrial including chemical processing plants
Insulation material	Special polyolefin
Halogen-free	Yes
RoHS compliant	Yes
Torsional strength	• >3 million cycles at ± 180° on 200 mm • Not adapted for garland mounting (festoon)
Permissible temperature range [°C (°F)]	-40 to +80 (-40 to +176)
Min. bending radius allowed	Single 5 X ø

Table 11-20   Signal cable recommendations

Description	Specification
Square area [mm^2]	0.5 (AWG 20)
Linear resistance [Ohm/km]	≤ 120
Max. length [Ohm] (depends on total linear resistance)	< 500
Signal run time [ns/m]	≤ 5.3
Insulation resistance [MOhm*km]	≥ 200
Characteristic impedance 1 – 100 MHz [Ohm]	100 (±5)
Attenuation @ 1 Mhz	< 2.9 dB/100 m
Operating voltage (peak) [V]	≤ 300
Test voltage (wire/wire/screen rms 50 Hz 1 min) [V]	= 700

Electrical data at reference temperature (20 °C)

Table 11-21   Power supply cable recommendations

Description	Specification
Square area [mm²]	1.3 (AWG 16)
Max. length [m]	300 (AWG 16)

Note

Size the cable length and diameter to provide 19.2 V DC at power terminals at load current of 0.75 A

Table 11-22   Transmitter cable glands and entries

Description	Specification
Glands	- Material - Nylon[1] - Brass/Ni plated - Stainless steel AISI 316/1.4404 - Cable cross section ∅ 8 to 17 mm (0.31" to 0.67") ∅ 5 to 13 mm (0.20" to 0.51")
Entries	9 x M20

[1]: If operating temperature is below -20 °C (-4 °F), use Brass/Ni plated or stainless steel cable glands.

Cable glands and fittings for use in Explosive Atmospheres

1. M20 to ½ NPT adaptors, M12 connector and plugs supplied by Siemens have been approved as part of the certification.

2. Cable glands shall be rated for a minimum ingress protection rating of IP54 and have an ambient temperature rating suitable for the installation with a safety factor of 5 °K above the maximum ambient.

3. The threads shall be M20 x 1.5. A sealing ring or gasket shall be used. Cable sizes of 5 to 14.3 mm may be used unless otherwise restricted by the manufacturer.

4. Cable glands for use in Zone 2 explosive atmospheres shall be rated Ex e as follows:

   – For use in US Zone 2 explosive atmospheres they shall be rated AEx ex or AEx eb. They shall also be rated for Enclosure Type 4.

   – For Canadian, IECEx or ATEX Zone 2 explosive atmospheres they shall be rated Ex ec or Ex eb.

11.7 Operating conditions

Table 11-23   Basic conditions

Description		Specification
Ambient temperature (°C[°F]) (Humidity max. 90 %)	Operation: Transmitter without display Transmitter with display	-40 to +60 [-40 to +140] -20 to +60 [-4 to +140]
Ambient temperature (°C[°F]) (Humidity max. 90 %)	Storage: Transmitter without display Transmitter with display	-40 to +70 [-40 to +158] -40 to +70 [-40 to +158]
Climate class		DIN 60721-3-4
Altitude		Up to 2000 m (6560 ft)
Relative humidity [%]		95
EMC performance	• Emission • Immunity	• EN 55011 / CISPR-11 • EN/IEC 61326-1 (Industry) NAMUR NE 21

Table 11-24   Cleaning and sterilizing conditions

Description	Specification
Cleaning method	• CIP • SIP
Cleaning temperature	On request
Cleaning frequency	On request
Cleaning duration	On request

Table 11-25   Process media conditions

Description	Specification
Process media temperature (T_s) (min to max) [°C (F)]	-50 to +200 (-58 to 492)
Process media density (min to max) [kg/m^3 (lb/ft^3]]	1 to 5000 (0.06 to 312)
Process media gauge pressure (min to max) [bar (psi)]	0 to 160 (0 to 2321)
Process media absolute pressure (min to max) [bar (psi)]	Stainless steel: 1 to 101 (14.5 to 1465) Hastelloy: 1 to 161 (14.5 to 2335)
Process media viscosity	Gases and non-compressible liquids
Pressure drop	See Pressure drop curves (Page 204)
Pressure temperature ratings	See Pressure temperature ratings (Page 201)

11.8 Bus communication

Table 11-26   HART, Modbus and PROFIBUS communication

Description	Specification	More information
Manufacturer ID	42 (2A Hex)	Manufacturer ID parameter
Device ID	34 (22 Hex)	Device type parameter
HART protocol revision	7.5	HART protocol revision parameter
PROFIBUS profile	4.0	PROFIBUS protocol revision parameter
Modbus RS-485 RTU	-	-
Number of device variables	11	Number of process values, both measured and derived
Physical layers supported	FSK	Frequency Shift Keyed
Loop-powered	No	4-wire device

11.9 Process variables

Table 11-27   Process variables

Description	Specification
Primary process variables	• Mass flow • Density • Fluid temperature
Derived process variables	• Volume flow • Corrected volume flow • Fraction A:B • Fraction % A:B

11.10 Approvals note

Note

Device-specific approvals

Always refer to nameplates on the device for device-specific approvals.

11.11 Certificates and approvals

FC430 compact system, FCS400 sensor, FCT030 transmitter	
EU Declaration of Conformity	A5E46799085A/001
Hygienic version	• 3A • EHEDG • 1935/2004/EC and 2023/2006/EC (food contact material: stainless steel)
Pressure equipment	• 2014/68/EU Pressure Equipment Directive (PED) • Canadian Registration Number (CRN)

FC430 compact system	
"Intrinsic safety" type of protection	
ATEX/IECEx Sira 12ATEX1102X	II 1/2 (1) G II 2 (1) D Ex db eb ia [ia Ga] IIC T* Ga/Gb Ta = -40°C to *°C Ex tb [ia Da] IIIC T*°C Db * Temperature class (dependent on the maximum process temperature)
FM FM18US0063X	Class I, II, III Division 1, Groups A, B, C, D, E, F, G Class I, Zone 1, AEx d e ia [ia Ga] IIC T3-T6 Zone 21, AEx tb [ia Da] IIIC T85°C-T200°C
cCSAus (Canada, USA) 2508628	**Canada**: Ex db eb ia [ia Ga] IIC T3-T6 Gb Ex tb [ia Da] IIC T 85°C **USA**: Class I, II, III, Division 1, Groups A, B, C, D, E, F, G Class I, Zone 1, AEx db eb ia [ia Ga] IIC T3-T6 Gb Zone 21, AEx tb [ia Da] IIIC T85°C

FCS400 sensor + DSL (can be installed in Zone 1 for gas and Zone 20/21 for dust)	
"Intrinsic safety" type of protection	
ATEX/IECEx Sira 11ATEX1341X	For gas: II 1/2 G Ex db ia IIC T* Ga/Gb II 1/2 G Ex db IIC T* Ga/Gb For dust: II 1 D Ex ia IIIC T*°C Da/Db II 2 D Ex tb tb IIIC T*°C Db Ta = -40°C to +*°C * Temperature class (dependent on the maximum process temperature and the maximum ambient temperature, see Special conditions for safe use (Page 17))

FCS400 sensor + DSL (can be installed in Zone 1 for gas and Zone 20/21 for dust)	
FM FM18US0063X	Class I, Division 1, Groups A, B, C, D
	Class II/III, Division 1, Groups E, F, G
	Class I, Zone 1, AEx d e ia IIC T*, AEx d IIC T*
	Zone 20, AEx ta IIIC T85°C-T200°C
	Zone 21, AEx tb IIIC T85°C-T200°C
cCSAus (Canada, USA) 2508644	**Canada**: Ex db ia IIC T6-T3 Gb Ex tb IIIC T135°C Db
	Ex ia IIIC T135°C Da
	USA:
	Class I, II, III, Division 1, Groups A, B, C, D, E, F, G
	Class I, Zone 1, AEx db ia IIC T6-T3 Gb
	Zone 21, AEx tb IIIC T135°C Db
	Zone 20, AEx ia IIIC T135°C Da

FCT030 field mount transmitter	
"Intrinsic safety" type of protection	
ATEX/IECEx Sira 11ATEX1342X	II 2(1) GD
	Ex db eb ia [ia Ga] IIC T6 Gb
	Ex tb [ia Da] IIIC T85°C Db
	Ta = -40°C to +60°C
FM FM18US0063X	Class I, II, III, Division 1, Groups A, B, C, D, E, F, G
	Class I Zone 1, AEx d e ia [ia Ga] IIC T3-T6
	Zone 21, AEx tb [ia Da] IIIC T85°C
cCSAus (Canada, USA) 2508628	**Canada**: Ex db eb ia [ia Ga] IIC T6 Gb Ex tb [ia Da] IIIC T85°C
	USA:
	Class I, II, III, Division 1, Groups A, B, C, D, E, F, G
	Class I Zone 1: AEx db eb ia [ia Ga] IIC T6 Gb
	Zone 21: AEx tb [ia Da] IIIC T85°C

11.12 SensorFlash

Table 11-28   SensorFlash

Description	Specification
	SD card
Capacity	4 GB
File system support	FAT32 / 8.3
Temperature range Operation: Storage:	 -40 to +85 °C (-40 to 185 °F) -40 to +100 °C (-40 to 212 °F)

Note

SensorFlash functions support

Only the supplied 4 GB SD cards are supported for backup, restore, logging, and firmware update.

11.13 PED

The pressure equipment directive 2014/68/EU applies to the alignment of the statutory orders of the European member states for pressure equipment. Such equipment in the sense of the directive includes vessels, pipelines and accessories with a maximum allowable pressure of more than 0.5 bar above atmospheric. Flowmeters are considered as piping.

A detailed risk analysis of the flowmeter has been performed in accordance with the PED 2014/68/EU. All risks are assessed to be "none" provided that the procedures and standards referenced in these operating instructions are observed.

Division according to the danger potential

Flowmeters which are categorized as piping are divided into categories according to danger potential (medium, pressure, nominal diameter). The flowmeters fall into the categories I to III or they are manufactured according to Paragraph 3 - Sound Engineering Practice (SEP).

The following criteria are decisive for assessment of the danger potential and are also shown in Diagrams 1 to 4, see Diagrams (Page 197).
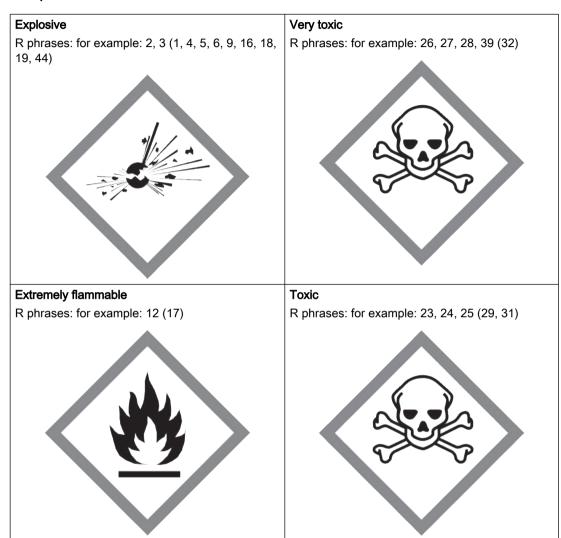
Fluid group	Group 1 or 2
• Aggregate state	Liquid or gaseous
• Type of pressurized equipment – Pipeline	Product of pressure and volume (PS * V [barL])
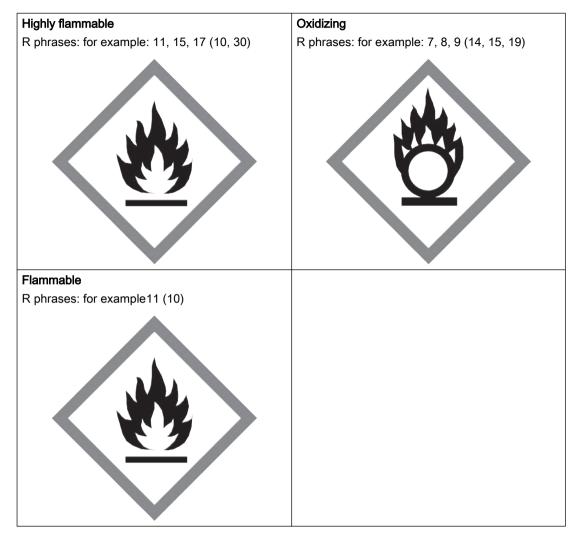
The maximum allowable temperature for the used liquids or gases is the maximum process temperature which can occur, as defined by the user. This must be within the limits defined for the equipment.

Division of media (liquid/gaseous) into the fluid groups

Fluids are divided according to Article 13 into the following fluid groups:

Group 1 fluids

Explosive	Very toxic
R phrases: for example: 2, 3 (1, 4, 5, 6, 9, 16, 18, 19, 44)	R phrases: for example: 26, 27, 28, 39 (32)
Extremely flammable	**Toxic**
R phrases: for example: 12 (17)	R phrases: for example: 23, 24, 25 (29, 31)

Highly flammable	Oxidizing
R phrases: for example: 11, 15, 17 (10, 30)	R phrases: for example: 7, 8, 9 (14, 15, 19)
Flammable R phrases: for example11 (10) 	

Group 2 fluids

All fluids not belonging to Group 1.

Also applies to fluids which are for example dangerous to the environment, corrosive, dangerous to health, irritant or carcinogenic (if not highly toxic).

Conformity assessment

Flowmeters of categories I to III comply with the safety requirements of the directive. They are affixed with the CE mark and an EC declaration of conformity is provided.

The flowmeters are subjected to the conformity assessment procedure - Module H.

Flowmeters according to Article 4 Paragraph 3 are designed and manufactured in accordance with sound engineering practice. PED conformity reference is not affixed to the CE mark.

Diagrams

Gases of fluid group 1

- Pipelines according to Article 4 (a) (i) First dash
- Exception: unstable gases belonging to Categories I and II must be included in Category III.
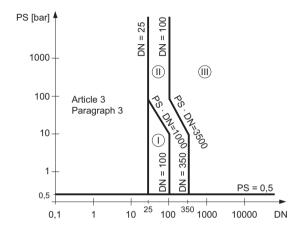
Figure 11-1   Diagram 1

Gases of fluid group 2

- Pipelines according to Article 4 (a) (i) Second dash
- Exception: liquids at temperatures > 350 °C belonging to Category II must be included in Category III.
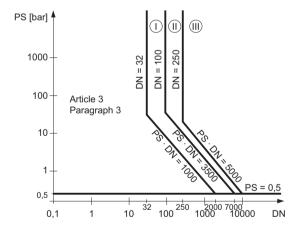
Figure 11-2   Diagram 2

Liquids of fluid group 1

● Pipelines according to Article 4 (a) (ii) First dash
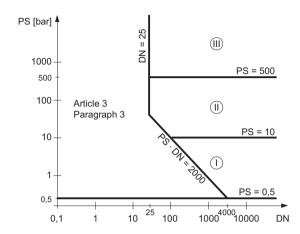
Figure 11-3   Diagram 3

Liquids of fluid group 2

● Pipelines according to Article 4 (a) (ii) Second dash
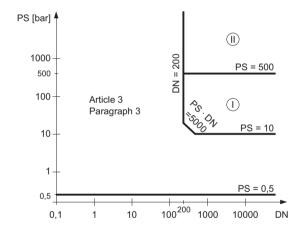
Figure 11-4   Diagram 4

11.14   Pressure - temperature ratings

Pressure - temperature ratings are determined by process connection material and applicable standards. The tables below detail the allowed maximum process pressure for sensor variants with stainless steel and Hastelloy measuring tubes.

With two major exceptions, the pressure rating of the flow sensors is independent of the process medium temperature. Design rules for flange connections in both the EN1092-1 and ASME B16.5 standards dictate pressure derating with increasing temperature. The charts below show the effect of process medium temperature on the pressure ratings for the flanges within the product program.

> **Note**
>
> **Maximum sensor operating pressure**
>
> The maximum sensor operating pressure is limited to 100 bar.

11.14.1 Stainless steel sensors

Table 11-29   EN1092-1 [bar]

PN (bar)	Temperature TS (°C)					
	-50	0	50	100	150	180
16	16.0	16.0	16.0	15.2	13.7	13.1
40	40.0	40.0	40.0	37.9	34.5	32.9
63	63.0	63.0	63.0	59.7	54.3	51.8
100	100.0	100.0	100.0	94.8	86.1	82.1
160	100 *(see Note "Maximum sensor operating pressure)*					

Table 11-30   ISO228-G and ASME B1.20.1 NPT [bar]

PN (bar)	Temperature TS (°C)					
	-50	0	50	100	150	200
110	100 *(see Note "Maximum sensor operating pressure)*					

Table 11-31   ASME B16.5 [bar]

Class / Group	Temperature TS (°C)					
	-50	0	50	100	150	200
150 / 2.2	19	19	18.4	16.2	14.8	13.7
300 / 2.2	49.6	49.6	48.1	42.2	38.5	35.7
600 / 2.2	99.3	99.3	96.2	84.4	77.0	71.3
900 / 2.2	100 *(see Note "Maximum sensor operating pressure)*					

Table 11-32   JIS [bar]

PN (bar)	Temperature TS (°C)					
	-50	0	50	120	150	200
10K	14	14	14	14	13.4	12.4
20K	34	34	34	34	33.1	31.6

PN (bar)	Temperature TS (°C)					
	-50	0	50	120	150	200
40K	68	68	68	68	66.2	63.2
63K	100	100	100	100	100	99

Table 11-33   DIN 11851 [bar]

PN (bar) / DN	Temperature TS (°C)				
	-50	0	50	100	140
25 / 50-100	25	25	25	25	25
40 / 10-40	40	40	40	40	40

Table 11-34   DIN 32676 & ISO 2852 [bar]

PN (bar) / DN	Temperature TS (°C)				
	-50	0	50	100	140
10 / 85-219.1	10	10	10	10	10
16 / 48.3-76.2	16	16	16	16	16
25 / 6.35-42.4	25	25	25	25	25

Table 11-35   ISO 2853 [bar]

PN (bar) / DN	Temperature TS (°C)				
	-50	0	50	100	140
25 / 50-100	25	25	25	25	25
40 / 10-40	40	40	40	40	40

Table 11-36   DIN 11864-1 [bar]

DN	Temperature TS (°C)				
	-50	0	50	100	140
50-80	25	25	25	25	25
15-25	40	40	40	40	40

Table 11-37   DIN 11864-2 [bar]

DN	Temperature TS (°C)				
	-50	0	50	100	140
50-80	16	16	16	16	16
15-25	25	25	25	25	25

Table 11-38   DIN 11864-3 [bar]

DN	Temperature TS (°C)				
	-50	0	50	100	140
80	16	16	16	16	16
50	25	25	25	25	25
15-25	40	40	40	40	40

Table 11-39   Swagelok SS-12-VCO-3 socket weld with SS-12-VCO-4 nut [bar]

PN (bar)	Temperature TS (°C)					
	-50	0	50	100	150	200
100	100.0	100.0	100.0	100.0	100.0	100.0

Note
Test pressure

Maximum allowable test pressure (MATP) for the flowmeter and process connection is 1.5 times the nominal pressure up to 150 bar (2176 psi).

11.14.2   Pressure drop curves

The pressure drop is dimension-dependent and influenced by process media viscosity and density. Sensors with undersized process connections experience higher pressure drop due to reduction in inlet/outlet dimensions.

Note
Pressure drop information

Pressure drop information is available on request.

Dimension drawings

12

12.1   Sensor dimensions
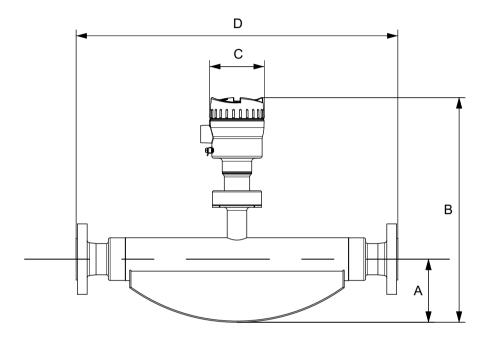
Table 12-1   Basic dimensions

Sensor DN	A in mm (inch)	B in mm (inch)	C in mm (inch)	Weight in kg (lb)
15 (½")	90 (3.54)	280 (11.0)	90 (3.54)	4.6 (10.1)
25 (1")	123 (4.84)	315 (12.4)	90 (3.54)	7.9 (17.4)
50 (2")	187 (7.36)	390 (15.4)	90 (3.54)	25.7 (56.7)

Note

The build in length (D) depends on the process connector.

12.2 316L stainless steel or nickel alloy - standard

Table 12-2 7ME461 - sensor sizes DN15, DN25 and DN50

Sensor	DN15 (½")					DN25 (1")			DN50 (2")	
Connection	DN6 (⅛")	DN10 (⅜")	DN15 (½")	DN20 (¾")	DN25 (1")	DN25 (1")	DN32 (1¼")	DN40 (1½")	DN40 (1½")	DN50 (2")
EN1092-1 B1, PN16			265 (10.4)		265 (10.4)	360 (14.2)		365 (14.4)	610 (24.0)	610 (24.0)
EN1092-1 B1, PN40			265 (10.4)		265 (10.4)	360 (14.2)		365 (14.4)	610 (24.0)	610 (24.0)
EN1092-1 B1, PN63			265 (10.4)			360 (14.2)			610 (24.0)	610 (24.0)
EN1092-1 B1, PN100			270 (10.6)		275 (10.8)	360 (14.2)		365 (14.4)	610 (24.0)	610 (24.0)
EN1092-1 B1, PN160			270 (10.6)			360 (14.2)				620 (24.4)
EN1092-1 D, PN40			265 (10.4)			360 (14.2)			610 (24.0)	610 (24.0)
EN1092-1 D, PN63			265 (10.4)			360 (14.2)			610 (24.0)	610 (24.0)
EN1092-1 D, PN100			270 (10.6)			360 (14.2)			610 (24.0)	610 (24.0)
EN1092-1 D, PN160			270 (10.6)			360 (14.2)				620 (24.4)
ANSI B16.5, Class 150			270 (10.6)	270 (10.6)		360 (14.2)		365 (14.4)		620 (24.4)
ANSI B16.5, Class 300			270 (10.6)	270 (10.6)		360 (14.2)		380 (15.0)		620 (24.4)
ANSI B16.5, Class 600			270 (10.6)	285 (11.2)		360 (14.2)		380 (15.0)		620 (24.4)
ANSI B16.5, Class 900			290 (11.4)			385 (15.2)				620 (24.4)
ISO 228-1 G Pipe thread	265 (10.4)		265 (10.4)			365 (14.4)				620 (24.4)
ANSI B1.20.1 NPT Pipe thread	265 (10.4)		270 (10.6)			365 (14.4)				620 (24.4)
DIN 11851 Hygienic screwed		265 (10.4)	265 (10.4)		270 (10.6)	360 (14.2)	360 (14.2)		610 (24.0)	610 (24.0)
DIN 32676-C Hygienic clamp			265 (10.4)	265 (10.4)		360 (14.2)		360 (14.2)		610 (24.0)
DIN 11864-1 Aseptic screwed			265 (10.4)			360 (14.2)			610 (24.0)	610 (24.0)
DIN 11864-2A Aseptic flanged			265 (10.4)			360 (14.2)			620 (24.4)	610 (24.0)
DIN 11864-3A Aseptic clamp			265 (10.4)			360 (14.2)			610 (24.0)	610 (24.0)

Sensor		DN15 (½")				DN25 (1")			DN50 (2")	
Connection	DN6 (⅛")	DN10 (⅜")	DN15 (½")	DN20 (¾")	DN25 (1")	DN25 (1")	DN32 (1¼")	DN40 (1½")	DN40 (1½")	DN50 (2")
ISO 2852 Hygienic clamp					265 (10.4)	360 (14.2)		360 (14.2)	610 (24.0)	610 (24.0)
ISO 2853 Hygienic screwed					265 (10.4)	360 (14.2)		360 (14.2)	630 (24.8)	610 (24.0)
SMS 1145 Hygienic screwed					265 (10.4)	360 (14.2)			610 (24.0)	610 (24.0)
12-VCO-4 Quick connect			285 (11.2)							
JIS B2220 10K			265 (10.4)			360 (14.2)			620 (24.4)	610 (24.0)
JIS B2220 20K			265 (10.4)			360 (14.2)			620 (24.4)	610 (24.0)
JIS B2220 40K			270 (10.6)			360 (14.2)			620 (24.4)	610 (24.0)
JIS B2220 63K			275 (10.8)			370 (14.6)				620 (24.4)

Dimensions in mm (inch)

12.3 316L stainless steel - NAMUR

Table 12-3   7ME471 - sensor sizes DN15, DN25 and DN50

Sensor		DN15 (½")				DN25 (1")			DN50 (2")	
Connection	DN6 (⅛")	DN10 (⅜")	DN15 (½")	DN20 (¾")	DN25 (1")	DN25 (1")	DN32 (1¼")	DN40 (1½")	DN40 (1½")	DN50 (2")
EN1092-1 B1, PN16			510 (20.1)		510 (20.1)	600 (23.6)		605 (23.8)	715 (28.1)	715 (28.12
EN1092-1 B1, PN40			510 (20.1)		510 (20.1)	600 (23.6)		605 (23.8)	715 (28.1)	715 (28.1)
EN1092-1 B1, PN63			510 (20.1)			600 (23.6)			715 (28.1)	715 (28.1)
EN1092-1 B1, PN100			515 (20.3)		520 (20.5)	600 (23.6)		605 (23.8)	715 (28.1)	715 (28.1)
EN1092-1 B1, PN160			515 (20.3)			600 (23.6)				725 (28.5)
EN1092-1 D, PN40			510 (20.1)			600 (23.6)			715 (28.1)	715 (28.1)
EN1092-1 D, PN63			510 (20.1)			600 (23.6)			715 (28.1)	715 (28.1)
EN1092-1 D, PN100			515 (20.3)			600 (23.6)			715 (28.1)	715 (28.1)

12.3 316L stainless steel - NAMUR

Sensor	DN15 (½")					DN25 (1")			DN50 (2")	
Connection	DN6 (⅛")	DN10 (⅜")	DN15 (½")	DN20 (¾")	DN25 (1")	DN25 (1")	DN32 (1¼")	DN40 (1½")	DN40 (1½")	DN50 (2")
EN1092-1 D, PN160			515 (20.3)			600 (23.6)				725 (28.5)
ANSI B16.5, Class 150			515 (20.3)	515 (20.3)		600 (23.6)		605 (23.8)		725 (28.5)
ANSI B16.5, Class 300			515 (20.3)	515 (20.3)		600 (23.6)		620 (24.4)		725 (28.5)
ANSI B16.5, Class 600			515 (20.3)	530 (20.9)		600 (23.6)		620 (24.4)		725 (28.5)
ANSI B16.5, Class 900			535 (21.1)			625 (24.6)				725 (28.5)
ISO228-1 G Pipe thread	510 (20.1)		510 (20.1)			605 (23.8)				725 (28.5)
ANSI B1.20.1 NPT Pipe thread	510 (20.1)		515 (20.3)			605 (23.8)				725 (28.5)
DIN 11851 Hygienic screwed		510 (20.1)	510 (20.1)		515 (20.3)	600 (23.6)	600 (23.6)		715 (28.1)	715 (28.1)
DIN 32676-C Hygienic clamp			510 (20.1)	510 (20.1)		600 (23.6)		600 (23.6)		715 (28.1)
DIN 11864-1 Aseptic screwed			510 (20.1)			600 (23.6)			715 (28.1)	715 (28.1)
DIN 11864-2A Aseptic flanged			510 (20.1)			600 (23.6)			725 (28.5)	715 (28.1)
DIN 11864-3A Aseptic clamp			510 (20.1)			600 (23.6)			715 (28.1)	715 (28.1)
ISO 2852 Hygienic clamp					510 (20.1)	600 (23.6)		600 (23.6)	715 (28.1)	715 (28.1)
ISO 2853 Hygienic screwed					510 (20.1)	600 (23.6)		600 (23.6)	735 (28.9)	715 (28.1)

Dimensions in mm (inch)

12.4   316L stainless steel - Hygienic versions

Table 12-4   7ME462 - sensor sizes DN15, DN25 and DN50

Sensor	DN15 (½")				DN25 (1")			DN50 (2")	
Connection	DN10 (3.8")	DN15 (½")	DN20 (¾")	DN25 (1")	DN25 (1")	DN32 (1¼")	DN40 (1½")	DN40 (1½")	DN50 (2")
DIN 11851 Hygienic screwed	265 (10.4)	265 (10.4)		270 (10.6)	360 (14.2)	360 (14.2)		610 (24.0)	610 (24.0)
DIN 32676-C Hygienic clamp		265 (10.4)	265 (10.4)		360 (14.2)		360 (14.2)		610 (24.0)
DIN 11864-1 Aseptic screwed		265 (10.4)			360 (14.2)			610 (24.0)	610 (24.0)
DIN 11864-2A Aseptic flanged		265 (10.4)			360 (14.2)			620 (24.4)	610 (24.0)
DIN 11864-3A Aseptic clamp		265 (10.4)			360 (14.2)			610 (24.0)	610 (24.0)
ISO 2852 Hygienic clamp				265 (10.4)	360 (14.2)		360 (14.2)	610 (24.0)	610 (24.0)
ISO 2853 Hygienic screwed				265 (10.4)	360 (14.2)		360 (14.2)	630 (24.8)	610 (24.0)
SMS 1145 Hygienic screwed				265 (10.4)	360 (14.2)			610 (24.0)	610 (24.0)

Dimensions in mm (inch)
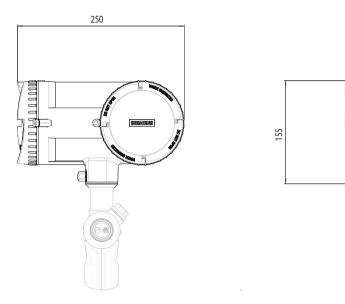
Note

3A

DIN 11851 and ISO 2853 are only 3A-approved if self-centering gaskets are used.
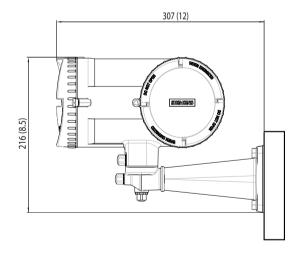
12.5 Transmitter dimensions

Compact version
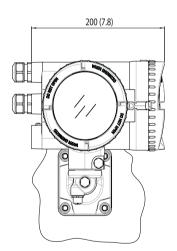
Dimensions in mm

Remote version

Dimensions in mm

Weight: 4.8 kg (10.6 lbs)

12.6 Wall mount enclosure dimensions

Wall mount enclosure
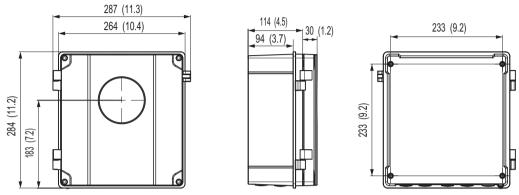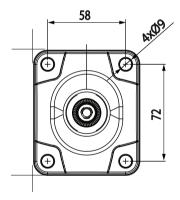
Figure 12-1   Transmitter dimensions in mm (")

12.7 Mounting bracket dimensions

Remote field enclosure

Dimensions in mm

Weight: 4.8 kg (10.6 lbs)

Product documentation and support

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A.1 Product documentation

Process instrumentation product documentation is available in the following formats:

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

- Downloads (firmware, EDDs, software) (http://www.siemens.com/processinstrumentation/downloads)

- Catalog and catalog sheets (http://www.siemens.com/processinstrumentation/catalogs)

- Manuals (http://www.siemens.com/processinstrumentation/documentation)
  You have the option to show, open, save, or configure the manual.

  - "Display": Open the manual in HTML5 format

  - "Configure": Register and configure the documentation specific to your plant

  - "Download": Open or save the manual in PDF format

  - "Download as html5, only PC": Open or save the manual in the HTML5 view on your PC

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

Product documentation by serial number

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

Entering a serial number

1. Open the PIA Life Cycle Portal (https://www.pia-portal.automation.siemens.com).

2. Select the desired language.

3. Enter the serial number of your device. The product documentation relevant for your device is displayed and can be downloaded.

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

Scanning a QR code

1. Scan the QR code on your device with a mobile device.

2. Click "PIA Portal".

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

Certification documents including calibration report are supplied with each sensor included on the SensorFlash. Material, pressure test, and factory conformance certificates are optional at ordering.

Note

EAC declaration

The EAC declaration is available on the SensorFlash SD card delivered with the device.

A.2 Technical support

Technical support

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

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

Service & support on the Internet

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

Contact

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

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

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

Technical reference

<div align="right">

B

</div>
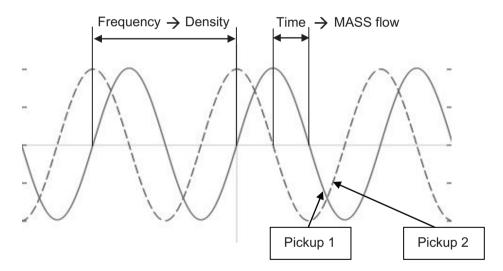
B.1 Theory of operation

The Coriolis principle of measurement

The flow measurement is based on the Coriolis law of motion. Particles moving in a rotating / oscillating system will resist imposed oscillations in a manner consistent with their mass and velocity (momentum).

The SITRANS F C sensors are energized by an electromagnetic driver circuit which oscillates the pipes at their resonant frequency. Two pickups are placed symmetrically on either side of the driver to provide position signals for digital processing.

When the media flows through the sensor, Coriolis force will act on the measuring tubes and cause deflection which can be measured as a phase shift between Pickup 1 and Pickup 2. The phase shift is proportional to the mass flowrate.

The frequency (or period) of the vibration is a direct function of the process media density.

The frequency and amplitude of the driver is regulated to ensure a stable output from the 2 pickups. The temperature of the sensor tubes is measured to provide accurate compensation for changes in the material stiffness. As a result the process media temperature is also accurately measured.

The flow proportional phase signal from the pickups, the temperature measurement and the driver frequency enable calculation and reporting of mass, density, volume, and temperature.

Digital signal processing (DSP)

The analog to digital conversion takes place in an ultra low noise sigma delta converter with high signal resolution. With fast digital signal processing mass flow and density values are calculated using a patented DFT technology (Discrete Fourier Transformation). The combination of this patented DFT technology and the fast DSP enables short response time (< 10 ms) to changes in the measured values.

The built-in noise filter is configurable and can be used for improving the performance of the flowmeter, in case the installation and application conditions are not ideal. Typical process noise such as gas bubbles (two-phase-flow) can be reduced through the filter functions.

B.2 Sensor dimension dependent default settings

B.2.1 Mass flow

Sensor size	Default value kg/s
Upper alarm limit and Upper warning limit	
DN 15	2.209
DN 25	6.136
DN 50	24.54
Lower alarm limit and Lower warning limit	
DN 15	-2.209
DN 25	-6.136
DN 50	-24.54

Sensor size	Default value kg/s	Default value kg/h
Low flow cut-off		
DN 15	0.0103	37.08
DN 25	0.0319	114.84
DN 50	0.1444	519.84

B.2.2 Volume flow

Sensor size	Default value m³/s
Upper alarm limit and Upper warning limit	
DN 15	0.0225
DN 25	0.0626
DN 50	0.250
Lower alarm limit and Lower warning limit	

Sensor size	Default value m³/s
DN 15	-0.0225
DN 25	-0.0626
DN 50	-0.250

Sensor size	Default value m³/s	Default value m³/h
Low flow cut-off		
DN 15	0.000010278	0.037
DN 25	0.000031944	0.115
DN 50	0.000144444	0.52

B.2.3   Standard volume flow

Sensor size	Default value m³/s
Upper alarm limit and Upper warning limit	
DN 15	0.0225
DN 25	0.0626
DN 50	0.250
Lower alarm limit and Lower warning limit	
DN 15	-0.0225
DN 25	-0.0626
DN 50	-0.250

Sensor size	Default value m³/s	Default value m³/h
Low flow cut-off		
DN 15	0.000010278	0.037
DN 25	0.000031944	0.115
DN 50	0.000144444	0.52

B.2.4   Fraction

Sensor size	Unit	Default value
Upper alarm limit and Upper warning limit		
DN 15	Mass flow kg/s	2.209
	Volume flow m³/s	0.0225
DN 25	Mass flow kg/s	6.136
	Volume flow m³/s	0.0626
DN 50	Mass flow kg/s	24.54
	Volume flow m³/s	0.250

Sensor size	Unit	Default value
Lower alarm limit and Lower warning limit		
DN 15	Mass flow kg/s	-2.209
	Volume flow m³/s	-0.0225
DN 25	Mass flow kg/s	-6.136
	Volume flow m³/s	-0.0626
DN 50	Mass flow kg/s	-24.54
	Volume flow m³/s	-0.250

B.2.5 Zero point adjustment

Sensor size	Default value kg/s	Default value kg/h
Standard deviation limit		
DN 15	0.0004	1.44
DN 25	0.004	14.4
DN 50	0.015	54

Sensor size	Default value kg/s	Default value kg/h
Zero offset limit		
DN 15	0.0103	37.08
DN 25	0.0319	114.84
DN 50	0.1444	519.84

Sensor size	Default value kg/s	Default value kg/h
Low flow cut-off		
DN 15	0.0103	37.08
DN 25	0.0319	114.84
DN 50	0.1444	519.84

HART communication

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Highway Addressable Remote Transducer, HART, is an industrial protocol. The HART protocol is an open standard. Full details about HART can be obtained from the HART communication website (https://fieldcommgroup.org/technologies/hart).

The device can be configured over the HART network using either a Field Communicator or a software package. The recommended software package is the SIMATIC Process Device Manager (PDM) (Page 233) by Siemens. Use HART Device Description (EDD) to integrate HART devices in engineering systems as SIMATIC PDM and AMS.

HART Communicator menu structures are available in HART Communication Foundation (https://fieldcommgroup.org/technologies/hart).

C.1 Mode of operation HART function

Note

Priority of operation and failure of power supply

- Operation at the positioner has priority over specifications from the HART communicator.
- Failure of the auxiliary power to the positioner also interrupts communications.

Function

The device is also available with built-in HART functionality. The HART protocol allows you to communicate with your device using a HART communicator, PC, or programming unit. You can do the following with your device:

- Convenient configuration
- Store configurations
- Call up diagnostic data
- Show online measured values

Communication takes place as frequency modulation on the existing signal lines for the setpoint of 4 to 20 mA.

The device is integrated into the following parameter assignment tools:

- HART communicator
- PDM (Process Device Manager)
- AMS (Asset Management System)

Configuration of the HART polling address

The HART address can be set either via hardware (DIP switch) or via software (HMI or SIMATIC PDM).

The DIP switch is located on the transmitter cassette.
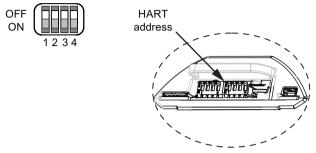
Figure C-1   HART address DIP switch

- **Configuration via DIP switch (HW polling address)**
  Set 1 to 15 on the DIP switch if you wish to set a fixed (hardware-defined) HART polling address (SW polling address will be ignored). The configured HW polling address can be read via HMI in menu item 4.2.2.

- **Configuration via HMI or SIMATIC PDM (SW polling address)**
  Disable the HW polling address by setting all switches to "OFF" on the HART DIP switch. The device starts up with default slave address = 0. The SW polling address can be changed to a value between 0 and 63 via HMI menu item 4.2.1 or SIMATIC PDM

DIP switch configuration

Table C-1   HW polling address

Address	Switch 1	Switch 2	Switch 3	Switch 4
"HW polling address"	Off	Off	Off	Off
1	On	Off	Off	Off
2	Off	On	Off	Off
3	On	On	Off	Off
4	Off	Off	On	Off
5	On	Off	On	Off
6	Off	On	On	Off
7	On	On	On	Off
8	Off	Off	Off	On
9	On	Off	Off	On
10	Off	On	Off	On
11	On	On	Off	On
12	Off	Off	On	On
13	On	Off	On	On
14	Off	On	On	On
15	On	On	On	On

See also

Download EDD Files (http://www.siemens.com/flowdocumentation)

C.2 Device Variables

All four dynamic variables PV, SV, TV and QV are supported. Except for PV, they can all be freely mapped to all dynamic device variables. The following table shows the possible mappings.

Default values:

PV = Mass flow

SV = Volume flow

TV = Density

QV = Media temperature

Table C-2   Device Variables

Device Varia-ble Number	Device Variable Name	PV	SV	TV	QV
0	Mass flow	X	X	X	X
1	Volume flow	X	X	X	X
2	Density	X	X	X	X
3	Fluid temperature	X	X	X	X
4	Standard volume flow	X	X	X	X
5	Fractional Flow A	X	X	X	X
6	Fractional Flow B	X	X	X	X
7	Fractional Percentage Flow A	X	X	X	X
8	Fractional Percentage Flow B	X	X	X	X
9	Reference Density	X	X	X	X
10	Electronics Temperature TRN	X	X	X	X
11	Totalized Value 1		X	X	X
12	Totalized Value 2		X	X	X
13	Totalized Value 3		X	X	X
14	Frame Temperature	X	X	X	X
15	Totalized batch amount		X	X	X

PROFIBUS communication

<div style="text-align: right; font-size: 3em; font-weight: bold;">D</div>

D.1 Cyclic data exchange

A central controller that cyclically exchanges data with slave devices on a PROFIBUS network is called a Master class 1 device. A GSD file is normally used when setting up the master to exchange data with the slave device. The order of the data in the cyclic message is the same as the order in the GSD file.

Each device supports three different GSD files. The manufacturer specific and the manufacturer independent Profile 3 GSD-files are described in the following.

Supported GSD files

The DP/ PA version of the SITRANS FCT030 supports the following GSD files

DP version		PA version	
GSD	Description	GSD	Description
si0181CB.gsd	SITRANS FC330 / FC430 / FCT030 manufacturer specific GSD for DP	si0181CC.gsd	SITRANS FC330 / FC430 / FCT030 manufacturer specific GSD for PA
si018127.gsd	SITRANS FC MASS6000 DP	si018128.gsd	SITRANS FC MASS6000 PA
pa05B333.gsd	PA Profile 4 Specific GSD for Coriolis flow devices DP (Mass flow, Density, Medium temperature, Totalizer 1 - Mass)	pa15B333.gsd	PA Profile 4 Specific GSD for Coriolis flow devices PA(Mass flow, Density, Medium temperature, Totalizer 1 - Mass)
pa039700.gsd	PA Profile 3 Specific GSD (1 Analog Input, DP)	pa139700.gsd	PA Profile 3 Specific GSD (1 Analog Input, PA)
pa039701.gsd	PA Profile 3 Specific GSD (2 Analog Inputs, DP)	pa039701.gsd	PA Profile 3 Specific GSD (2 Analog Inputs, DP)
pa039702.gsd	PA Profile 3 Specific GSD (3 Analog Inputs, 1 Totalizer, DP)	pa039702.gsd	PA Profile 3 Specific GSD (3 Analog Inputs, 1 Totalizer, DP)
pa039742.gsd	PA Profile 3 Specific GSD (3 Analog Inputs, 1 Totalizer, DP)	pa039742.gsd	PA Profile 3 Specific GSD (3 Analog Inputs, 1 Totalizer, DP)

Modules for cyclic data exchange, Manufacturer specific GSD

Table D-1   Manufacturer specific GSD

Slot	Module	Description		Output (from master to device)
		Input (from device to master)		
1	**Mass flow**	Byte 0....3	Mass flow	-
		Byte 4	Mass flow status	
2	**Density**	Byte 0....3	Density	-
		Byte 4	Density status	
3	**Medium temperature**	Byte 0....3	Medium temperature	-
		Byte 4	Medium temperature sta-tus	

Slot	Module	Description			
		Input (from device to master)		Output (from master to device)	
4	Totalizer 1 - selectable modules				
	Mass flow totalized:				
	Mass total	Byte 0....3	Mass total (float 32)	-	
		Byte 4	Mass total status		
	Mass total set	Byte 0....3	Mass total (float 32)	Byte 0	1: Reset
					2: Preset
		Byte 4	Mass total status		3: Hold
					4: Totalize
	Mass total (high res)	Byte 0....7	Mass total (float 64)	-	
		Byte 8	Mass total status		
	Mass total set (high res)	Byte 0....7	Mass total (float 64)	Byte 0	1: Reset
					2: Preset
		Byte 8	Mass total status		3: Hold
					4: Totalize
	Volume flow totalized:				
	Volume total	Byte 0....3	Volume total (float 32)	-	
		Byte 4	Volume total status		
	Volume total set	Byte 0....3	Volume total (float 32)	Byte 0	1: Reset
					2: Preset
		Byte 4	Volume total status		3: Hold
					4: Totalize
	Volume total (high res)	Byte 0....7	Volume total (float 64)	-	
		Byte 8	Volume total status		
	Volume total set (high res)	Byte 0....7	Volume total (float 64)	Byte 0	1: Reset
					2: Preset
		Byte 8	Volume total status		3: Hold
					4: Totalize
	Standard volume totalized:				
	Standard volume total	Byte 0....3	Standard volume total (float 32)	-	
		Byte 4	Standard volume total status		
	Standard volume total set	Byte 0....3	Standard volume total (float 32)	Byte 0	1: Reset
					2: Preset
		Byte 4	Standard volume total status		3: Hold
					4: Totalize
	Standard volume total (high res)	Byte 0....7	Standard volume total (float 64)	-	
		Byte 8	Standard volume total status		

Slot	Module	Description			
		Input (from device to master)		Output (from master to device)	
	Standard volume total set (high res)	Byte 0....7	Standard volume total (float 64)	Byte 0	1: Reset
					2: Preset
		Byte 8			3: Hold
			Standard volume total status		4: Totalize
	Fraction A totalized:				
	Fraction A total	Byte 0....3	Fraction A total (float 32)	-	
		Byte 4	Fraction A total status		
	Fraction A total set	Byte 0....3	Fraction A total (float 32)	Byte 0	1: Reset
					2: Preset
		Byte 4	Fraction A total status		3: Hold
					4: Totalize
	Fraction A total (high res)	Byte 0....7	Fraction A total (float 64)	-	
		Byte 8	Fraction A total status		
	Fraction A total set (high res)	Byte 0....7	Fraction A total (float 64)	Byte 0	1: Reset
					2: Preset
		Byte 8	Fraction A total status		3: Hold
					4: Totalize
	Fraction B totalized:				
	Fraction B total	Byte 0....3	Fraction B total (float 32)	-	
		Byte 4	Fraction B total status		
	Fraction B total set	Byte 0....3	Fraction B total (float 32)	Byte 0	1: Reset
					2: Preset
		Byte 4	Fraction B total status		3: Hold
					4: Totalize
	Fraction B total (high res)	Byte 0....7	Fraction B total (float 64)	-	
		Byte 8	Fraction B total status		
	Fraction B total set (high res)	Byte 0....7	Fraction B total (float 64)	Byte 0	1: Reset
					2: Preset
		Byte 8	Fraction B total status		3: Hold
					4: Totalize
5	Totalizer 2 (see slot 4 for configuration)				
6	Volume flow	Byte 0....3	Volume flow		
		Byte 4	Volume flow status		
7	Fraction A	Byte 0....3	Fraction A		
		Byte 4	Fraction A status		
8	Fraction B	Byte 0....3	Fraction B		
		Byte 4	Fraction B status		
9	Fraction A %	Byte 0....3	Fraction flow A %		
		Byte 4	Fraction flow A % status		

Slot	Module	Description			
		Input (from device to master)		Output (from master to device)	
10	Fraction B %	Byte 0....3	Fraction B %		
		Byte 4	Fraction B % status		
11	Standard volume flow	Byte 0....3	Standard volume flow		
		Byte 4	Standard volume flow status		
12	Frame temperature	Byte 0....3	Frame temperature		
		Byte 4	Frame temperature status		
13	Totalizer 2 (see slot 4 for configuration)				
14	Control commands	Byte 0	Status: Bit 0: Zero point adjustment running Bit 1: Process values frozen	Byte 0	Command Bit 0: 1 = Start zero adjustment Bit 1: 1 = Freeze process values 0 = Unfreeze process values Bit 2: 1 = Force outputs 0 = Unforce outputs
			Bit 2: Outputs forced	Byte 1	Command Validity Mask Bit coded information to indicate which bits of the Command byte are valid to be processed by the device. Bit 0: 1= "Start zero point adjustment" command enabled Bit 1: 1= "Freeze/ Unfreeze process values" command is enabled Bit 2: 1 = "Force outputs" command enabled
		Comment to Control Command output: If a command like Start zero point adjustment is requested, bit 0 in Byte 0 and bit 1 in Byte 1 has be to set to 1. When the status information Zero point adjustment running, bit 0 in Byte 0 and bit Byte 1 has to be set to 0			

Slot	Module	Description		
		Input (from device to master)		Output (from master to device)
15	**Dosing**			
	Digital dosing	Byte 0…3	Amount done	
		Byte 4	Amount done status	
		Byte 5	Dosing state: 0: batch stopped 1: batch running 2: batch paused	
		Byte 6	Digital output 1 0: close valve 1 1: open valve 1	Byte 0 — 1: Start batch 2: Stop batch 3: Pause batch 4: Resume batch 5: Start cleaning
		Byte 7	Digital output 1 status	
		Byte 8	Digital output 2 0: close valve 2 1: open valve 2	
		Byte 9	Digital output 2 status	
	Analog dosing	Byte 0…3	Amount done	
		Byte 4	Amount done status	
		Byte 5	Dosing state: 0: batch stopped 1: batch running 2: batch paused	Byte 0 — 1: Start batch 2: Stop batch 3: Pause batch 4: Resume batch 5: Start cleaning
		Byte 6…9	Analog output (4… 20 mA)	
		Byte 10	Analog output status	

D.2 Cyclic data configuration

Process values - 32 bit floating point format

Process values in slot 1, 2, 3, 6, 7, 8, 9, 10, 11 and 12 are represented with the first four bytes as floating point numbers, according to the IEEE 754 standard. Each value is followed by a status.

Process value 32 bit				Status code
Byte 1	Byte 2	Byte 3	Byte 4	Byte 5

Totalizers – 32 and 64 bit floating point format

Totalizers in slot 4, 5 and 13 can be represented in either 32 bit e.g. *Mass total* or *64 bit Mass total (high res)*.

32 bit totalizers:

Are represented with the first four bytes as floating point numbers, according to the IEEE 754 standard. Each value is followed by a status byte indicating the quality code.

Process value 32 bit				Status code
Byte 1	Byte 2	Byte 3	Byte 4	Byte 5

64 bit totalizers:

Are represented with the first eight bytes as floating point numbers, according to the IEEE 754 standard. Each value is followed by a status byte indicating the quality code.

Process value 64 bit								Status code
Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8	Byte 9

Status codes for cyclic parameters

The status shows the quality of the process value.

Bit								Hex value	Comment	According NAMUR NE107 signal status
7	6	5	4	3	2	1	0			
0	0	0	0	0	0	X	X	00	BAD - non specific	Failure (F)
0	0	1	0	0	1	X	X	24	BAD - maintenance alarm, more diagnosis available	Failure (F)
0	0	1	0	1	0	X	X	28	BAD - process related, no maintenance	Failure (F)
0	1	1	1	1	0	X	X	78	UNCERTAIN – process related, no maintenance	Out of specification (S)
1	0	1	0	1	0	X	X	A8	GOOD - maintenance demanded	Maintenance (M)
1	0	1	0	0	1	X	X	A4	GOOD - maintenance required	Maintenance (M)
1	0	1	1	1	1	X	X	BC	GOOD - function check	Check (C)
1	0	0	0	0	0	X	X	80	GOOD	
The following two bits could be additionally set parallel to the preceding quality codes:										
X	X	X	X	X	X	1	X	02	Update event. Parameter with attribute static was modified	
X	X	X	X	X	X	X	1	01	Simulation active	

D.3 Changing PROFIBUS termination at the transmitter cassette

The bus termination can be activated via a switch internal in the transmitter. The bus termination switch is set to off by default. If the internal switch is not used for termination, an external separate bus terminator must be installed. The internal switch is located on the transmitter PCBA module (9).

To change the termination of the PROFIBUS, it is required to remove the transmitter module out of the transmitter. This can be done following below instructions.

1. Isolate the device from power.

2. Use tool no. 9. Unscrew the locking screw of the display and remove the display lid using tool no. 3 as a wrench bar if necessary.

3. Carefully remove display and cable plug.

Note

Use a screwdriver, tool no. 11, to release the display as shown in photo below.

The display is held in place with three clips.

4. Remove the screw holding the transmitter cassette. Pull out the transmitter cassette.

5. Change termination at the transmitter cassette by changing the position of the dip switches as below.
All off: no termination
All on: termination activated

6. Reinstall the transmitter cassette.

7. Reinstall the display and display cable, incl. the O-ring.

8. Mount the O-ring by pulling it over the display lid.

Return the device to operation

1. Restore power to the device.

2. Check that the device starts up as expected. If possible, watch the display during startup and observe the device versions for consistency.

Remote operation

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E

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E.1 Overview of device configuration software

There are currently two competing technologies for configuring field devices:

- Electronic Device Description Language (EDDL)-based software
- Field Device Tool / Device Type Manager (FDT/DTM)-based software

From a practical point of view, both EDDL and FDT/DTM solutions do the same thing: provide a way of reading and writing configuration parameters to field devices and viewing advanced diagnostics.

Note

- SIMATIC PDM (an EDDL-based software) configures a field device using the Electronic Device Description (EDD) for that device.
- PACTware and Fieldcare (FDT-based software) use the DTM for that field device.

In addition, there is a new standard called Field Device Integration (FDI) which is a merger of these two technologies. Many of the major vendors have stated that their configuration software will evolve into being an FDI host. At the time this manual was written, Siemens had announced that SIMATIC PDM will become a FDI host system in the near future.

E.2 SIMATIC PDM

SIMATIC PDM (Process Device Manager) is a general-purpose, manufacturer-independent tool for the configuration, parameter assignment, commissioning, diagnostics and maintenance of intelligent field devices and field components. Follow-up installations and additional information on SIMATIC PDM are available on the Internet at SIMATIC PDM (www.siemens.com/simatic-pdm).

SIMATIC PDM monitors the process values, alarms and status signals of the device. It allows you to display, compare, adjust, verify, and simulate process device data; also to set schedules for calibration and maintenance.

For information on, for example, how to install and integrate devices, commission the software, see Operating Manual 'Help for SIMATIC PDM'. The manual is delivered with SIMATIC PDM software. Once the SIMATIC PDM is installed on your computer you find the manual under: Start > All programs > Siemens Automation > SIMATIC > Documentation. Link at our website:

'Help for SIMATIC PDM' (https://support.industry.siemens.com/cs/ww/de/view/109482406/en).

Note

Field device parameters

- For a list of parameters and additional information, consult section "Parameter assignment (Page 109)".

- The field device remains in measurement mode during the time you configure the field device.

E.2.1 Check SIMATIC PDM version

Procedure

1. Go to SIMATIC PDM Download (http://www.siemens.com/simaticpdm/downloads).

2. Check the support page to make sure you have:

    – The latest version of SIMATIC PDM

    – The most recent Service Pack (SP)

    – The most recent hot fix (HF)

E.2.2 Updating the Electronic Device Description (EDD)

Procedure

1. Check that the EDD revision match the Firmware revision in the device according to the table in section Product compatibility (Page 10).

2. Go to the support page Software downloads (http://www.siemens.com/processinstrumentation/downloads).

3. Enter the product name in the field "Enter search term...".

4. Download the most current EDD of your device.

5. Save files to your computer in an easily accessed location.

6. Launch SIMATIC PDM – Device Integration Manager.
   From the File menu, click "Read device descriptions from compressed source...".

7. Browse to the zipped EDD file, select and open it.

8. Use the "Integration" function to integrate the EDD into the device catalog. The EDD is now accessible via SIMATIC Manager.

See also

Mobile App "Industry Online Support" (https://support.industry.siemens.com/cs/ww/de/sc/2067)

E.2.3 Configuring a new device to SIMATIC PDM

Procedure

> **Note**
>
> If you click on "Cancel" during an upload from the device to SIMATIC PDM some parameters will be updated.

1. Check with table in Product compatibility (Page 10) if you have the most recent version of the EDD. If necessary, update the EDD as described in Updating the Electronic Device Description (EDD) (Page 234).

2. Set "Address" via handheld programmer (default for PROFIBUS PA is 126).
   – In "PROGRAM mode", navigate to your field device, for example to: "Product name" > Communication > Device Address.
   – Press RIGHT arrow twice, to open parameter view and enable "Edit mode".
   – If required, key in a new value and press RIGHT arrow to accept it.
     The display shows the new value.
   – Press "Mode" to return to "Measurement mode".

3. Launch SIMATIC Manager and create a new project.

4. Go to the menu "Device > Master Reset".

5. Click on "Factory Defaults".

6. After the reset is complete click on "Close".

7. Upload parameters to the PC/PG.

8. Configure the device via the Quick Start wizard.

E.2.4 Set address

Open in SIMATIC PDM the menu Device – Set Address, enter a value for New Address, and click on Assign Address.

HMI menu structure

<div style="text-align: right">

F

</div>

How to read the tables

In the following tables the menus are entered in **bold** text and the parameters in *italic*.

The first table shows the main menu, that is menu levels 1 and 2. The following tables show the submenus, that is menu levels 3 to 5.

The tables also give information about the default values, access levels and Modbus registers of the parameters.

Note

Further information available for download

If you require further information regarding descriptions, value ranges and data types of the parameters, you can download an overview here (https://support.industry.siemens.com/cs/de/en/view/109771832).

The visibility of some parameter/menu items depends on previous selections. For example, if Frequency is selected on the output, only the frequency setup parameter/menu items are visible. The parameter/menu items for setting the current output, pulse output, and status output are hidden.

F.1   Main menu

In the following table only the menus and parameters of the first two levels of the menu structure are listed.

Table F-1   Main menu

Level 1		Level 2		More information
Menu ID	Name	Menu ID	Name	
1	Quick start	1.1	Quick commissioning	
		1.2	Zero point adjustment	
		1.3	Process values	
		1.4	Inputs and outputs	
		1.5	Gas application	
		1.6	Pulsating flow	
		1.7	Dosing application	
		1.8	Copy configuration	Copying the application setup from one device to another (Page 176)
		1.9	Communication	

Level 1		Level 2		More information
Menu ID	Name	Menu ID	Name	
2	Setup	2.1	Sensor	Menu item 2.1: Sensor (Page 239)
		2.2	Process values	Menu item 2.2: Process values (Page 240)
		2.3	Totalizers	Menu item 2.3: Totalizers (Page 247)
		2.4	Inputs and outputs	Menu item 2.4: Inputs and outputs (Page 250)
		2.5	Dosing	Menu item 2.5: Dosing (Page 268)
		2.7	Date and time	Menu item 2.7: Date and time (Page 279)
		2.8	Local display	Menu item 2.8: Local display (Page 279)
3	Maintenance and diagnostics	3.1	Identification	Menu item 3.1: Identification (Page 282)
		3.2	Diagnostic events	Menu item 3.2: Diagnostic events (Page 283)
		3.3	Maintenance	Menu item 3.3: Maintenance (Page 285)
		3.4	Diagnostics	Menu item 3.4: Diagnostics (Page 285)
		3.5	Peak values	Menu item 3.5: Peak values (Page 289)
		3.6	Charateristics	Menu item 3.6: Characteristics (Page 289)
		3.7	SensorFlash	Menu item 3.7: SensorFlash (Page 290)
		3.8	Simulation	Menu item 3.8: Simulation (Page 292)
		3.9	Audit trail	Menu item 3.9: Audit trail (Page 295)
		3.10	Self test	Menu item 3.10: Self test (Page 296)
		3.11	Resets	Menu item 3.11: Resets (Page 296)
		3.12	Firmware update	Updating the firmware (Page 177)
4	Communication	4.1	USB (Service channel)	Menu item 4: Communication (Page 296)
		4.2	HART (CH1)	
		4.3	Modbus (CH1)	
		4.4	PROFIBUS DP/PA	
5	Security	5.1	Change user PIN	Menu item 5: Security (Page 301)
		5.2	Change expert PIN	
		5.3	Recovery ID	
		5.4	PIN recovery	
		5.5	Activate user PIN	
		5.6	Deactivate user PIN	
		5.7	Auto logout	
6	*Language*			Menu item 6: Language (Page 301)

F.2　　Menu item 2.1: Sensor

Table F-2　　Sensor

Level 3		Level 4		Default value [unit]	Access level	Modbus register
Menu ID	Name	Menu ID	Name			
2.1.1	Flow direction			Positive	User	2100
2.1.2	Noise damping			Duplex pump (3)	User	2130
2.1.3	Zero point adjustment	2.1.3.1	Method of zero point adjustment	Auto	User	2132
		2.1.3.2	Zero point adjustment			
		2.1.3.3	Duration	30 [s]	User	2135
		2.1.3.4	Standard deviation limit	product specific	User	2138
		2.1.3.5	Standard deviation		Read only	2136
		2.1.3.6	Offset limit	product specific	User	2140
		2.1.3.7	Offset		Read only	2142
2.1.4	Aerated flow	2.1.4.1	Aerated flow filter	product specific	User	2203
		2.1.4.2	Filter time constant	10 s	User	2204
		2.1.4.3	Alarm limit	product specific	Expert	2200
		2.1.4.4	Warning limit	product specific	Expert	2201
		2.1.4.5	Measurement sample time	product specific	Expert	2202
		2.1.4.6	Filter hysteresis	product specific	User	2205
		2.1.4.7	Minimum filter time	100 [cycles]	User	2207
		2.1.4.8	Filter iteration	3	User	2216
		2.1.4.9	Bandwidth factor	2	User	2217
		2.1.4.10	Filter pole shift	2	User	2218

F.3 Menu item 2.2: Process values

Table F-3 Process values

Level 3		Level 4		Level 5		Default value [unit]	Access level	Modbus register
Menu ID	Name	Menu ID	Name	Menu ID	Name			
2.2.1	Mass flow	2.2.1.1	*Units*			product specific	User	9003
		2.2.1.2	*Custom units*			Custom	User	8458
		2.2.1.3	*Custom conversion factor*			1.0	User	8456
		2.2.1.4	*Decimal places*			2	User	7550
		2.2.1.5	*Low flow cut-off*			product specific	User	7410
		2.2.1.6	**Alarm and warning limits**	2.2.1.6.1	*Upper alarm limit*	product specific	User	7401
				2.2.1.6.2	*Upper warning limit*	product specific	User	7403
				2.2.1.6.3	*Lower warning limit*	product specific	User	7405
				2.2.1.6.4	*Lower alarm limit*	product specific	User	7407
				2.2.1.6.5	*Hysteresis*	0 [kg/s]	User	7412
		2.2.1.7	**Flow adjustment**	2.2.1.7.1	*Adjustment factor*	1	User	2426
2.2.2	Volume flow	2.2.2.1	*Units*			product specific	User	8996
		2.2.2.2	*Custom units*			Custom	User	7518
		2.2.2.3	*Custom conversion factor*			1.0	User	7516
		2.2.2.4	*Decimal places*			2	User	7551
		2.2.2.5	*Low flow cut-off*			product specific	User	7510
		2.2.2.6	**Alarm and warning limits**	2.2.2.6.1	*Upper alarm limit*	product specific	User	7501
				2.2.2.6.2	*Upper warning limit*	product specific	User	7503
				2.2.2.6.3	*Lower warning limit*	product specific	User	7505
				2.2.2.6.4	*Lower alarm limit*	product specific	User	7507
				2.2.2.6.5	*Hysteresis*	0 [m³/s]	User	7512

Level 3		Level 4		Level 5		Default value [unit]	Access level	Modbus register
Menu ID	Name	Menu ID	Name	Menu ID	Name			
2.2.3	Standard volume flow	*2.2.3.1*	*Units*			product specific	User	9039
		2.2.3.2	*Custom units*			Custom	User	8470
		2.2.3.3	*Custom conversion factor*			1.0	User	8468
		2.2.3.4	*Decimal places*			2	User	7557
		2.2.3.5	**Alarm and warning limits**	*2.2.3.5.1*	*Upper alarm limit*	product specific	User	7952
				2.2.3.5.2	*Upper warning limit*	product specific	User	7954
				2.2.3.5.3	*Lower warning limit*	product specific	User	7956
				2.2.3.5.4	*Lower alarm limit*	product specific	User	7958
				2.2.3.5.5	*Hysteresis*	0 [normal m³/s]	User	7965
		2.2.3.6	*Standard density*	*2.2.3.6.1*	*Units*	product specific	User	9005
				2.2.3.6.2	*Standard density source*	Fixed reference density	User	7902
				2.2.3.6.3	*Fixed reference density*	1000 [kg/m³]	User	7903
				2.2.3.6.4	*Linear expansion coeff.*	0 [1/K]	User	7905
				2.2.3.6.5	*Square expansion coeff.*	0 [1/K²]	User	7907
				2.2.3.6.6	*Standard temperature*	20 [°C]	User	7909
				2.2.3.6.7	*Upper alarm limit standard density*	5000 [kg/m³]	User	7911
				2.2.3.6.8	*Upper warning limit standard density*	5000 [kg/m³]	User	7913
				2.2.3.6.9	*Lower warning limit standard density*	0 [kg/m³]	User	7915
				2.2.3.6.10	*Lower alarm limit standard density*	0 [kg/m³]	User	7917
				2.2.3.6.11	*Alarm hysteresis standard density*	0 [kg/m³]	User	7921

Level 3		Level 4		Level 5		Default value [unit]	Access level	Modbus register
Menu ID	Name	Menu ID	Name	Menu ID	Name			
2.2.5	Density	*2.2.5. 1*	*Units*			product specific	User	9005
		2.2.5. 2	*Custom units*			Custom	User	8464
		2.2.5. 3	*Custom conversion factor*			1.0	User	8462
		2.2.5. 4	*Decimal places*			2	User	7552
		2.2.5. 5	**Alarm and warning limits**	*2.2.5.5. 1*	*Upper alarm limit*	product specific	User	7601
				2.2.5.5. 2	*Upper warning limit*	product specific	User	7603
				2.2.5.5. 3	*Lower warning limit*	0.08 [kg/m³]	User	7605
				2.2.5.5. 4	*Lower alarm limit*	0.08 [kg/m³]	User	7607
				2.2.5.5. 5	*Hysteresis*	0 [kg/m³]	User	7612
		2.2.5. 6	**Density adjustment**	*2.2.5.6. 1*	*Adjustment factor*	1	Expert	2442
				2.2.5.6. 3	*Adjustment offset*	0 [kg/m³]	User	2444
		2.2.5. 7	*Empty tube detection*			Off	User	2129
		2.2.5. 8	*Empty tube limit*			500 [kg/m³]	User	2127
2.2.6	Medium temperature	*2.2.6. 1*	*Units*			product specific	User	9006
		2.2.6. 2	*Decimal places*			2	User	7553
		2.2.6. 3	**Alarm and warning limits**	*2.2.6.3. 1*	*Upper alarm limit*	product specific	User	7701
				2.2.6.3. 2	*Upper warning limit*	product specific	User	7703
				2.2.6.3. 3	*Lower warning limit*	product specific	User	7705
				2.2.6.3. 4	*Lower alarm limit*	product specific	User	7707
				2.2.6.3. 5	*Hysteresis*	0 [K]	User	7712

Level 3		Level 4		Level 5		Default value [unit]	Access level	Modbus register
Menu ID	Name	Menu ID	Name	Menu ID	Name			
2.2.7	**Sensor frame temperature**	*2.2.7. 1*	*Units*			product specific	User	9006
		2.2.7. 2	*Decimal places*			2	User	7553
		2.2.7. 3	**Alarm and warning limits**	*2.2.7.3. 1*	*Upper alarm limit*	200.0 [°C]	User	7715
				2.2.7.3. 2	*Upper warning limit*	200.0 [°C]	User	7717
				2.2.7.3. 3	*Lower warning limit*	-50.0 [°C]	User	7719
				2.2.7.3. 4	*Lower alarm limit*	-50.0 [°C]	User	7721
				2.2.7.3. 5	*Hysteresis*	0 [K]	User	7723

Level 3		Level 4		Level 5		Default value [unit]	Access level	Modbus register
Menu ID	Name	Menu ID	Name	Menu ID	Name			
2.2.8	Fraction (if available)	2.2.8. 1	*Active fraction table*			Off	User	7869
		2.2.8. 2	*Units*			product specific	User	7866
		2.2.8. 3	*Measurement mode*				Read only	7870
		2.2.8. 4	*Fraction name*				Read only	7730
		2.2.8. 5	*Fraction A*	2.2.8.5. 1	*Fraction A label*	FRACTION A	User	7750
				2.2.8.5. 2	*Upper alarm limit*	product specific	User	Volume flow: 7782 Mass flow: 7873
				2.2.8.5. 3	*Upper warning limit*	product specific	User	Volume flow: 7784 Mass flow: 7875
				2.2.8.5. 4	*Lower warning limit*	product specific	User	Volume flow: 7786 Mass flow: 7877
				2.2.8.5. 5	*Lower alarm limit*	product specific	User	Volume flow: 7788 Mass flow: 7879
				2.2.8.5. 6	*Alarm hysteresis*	Volume flow: 0 [m³/s] Mass flow: 0 [kg/s]	User	Volume flow: 7790 Mass flow: 7861
				2.2.8.5. 7	*Decimal places*	2	User	7556
		2.2.8. 6	*Fraction B*	2.2.8.6. 1	*Fraction B label*	FRACTION B	User	7766

Level 3		Level 4		Level 5		Default value [unit]	Access level	Modbus register
Menu ID	Name	Menu ID	Name	Menu ID	Name			
				2.2.8.6.2	*Upper alarm limit*	product specific	User	Volume flow: 7923 Mass flow: 7883
				2.2.8.6.3	*Upper warning limit*	product specific	User	Volume flow: 7925 Mass flow: 7885
				2.2.8.6.4	*Lower warning limit*	product specific	User	Volume flow: 7927 Mass flow: 7887
				2.2.8.6.5	*Lower alarm limit*	product specific	User	Volume flow: 7929 Mass flow: 7889
				2.2.8.6.6	*Alarm hysteresis*	Volume flow: 0 [m³/s] Mass flow: 0 [kg/s]	User	Volume flow: 7931 Mass flow: 7863
				2.2.8.6.7	*Decimal places*	2	User	7556
		2.2.8.7	Fraction A %	2.2.8.7.1	*Upper alarm limit*	100 [%]	User	7802
				2.2.8.7.2	*Upper warning limit*	100 [%]	User	7804
				2.2.8.7.3	*Lower warning limit*	0 [%]	User	7806
				2.2.8.7.4	*Lower alarm limit*	0 [%]	User	7808
				2.2.8.7.5	*Alarm hysteresis*	0 [%]	User	7857
				2.2.8.7.6	*Decimal places percent*	2	User	7554

Level 3		Level 4		Level 5		Default value [unit]	Access level	Modbus register
Menu ID	Name	Menu ID	Name	Menu ID	Name			
		2.2.8. 8	Fraction B %	2.2.8.8. 1	Upper alarm limit	100 [%]	User	7812
				2.2.8.8. 2	Upper warning limit	100 [%]	User	7814
				2.2.8.8. 3	Lower warning limit	0 [%]	User	7816
				2.2.8.8. 4	Lower alarm limit	0 [%]	User	7818
				2.2.8.8. 5	Alarm hysteresis percent	0 [%]	User	7859
				2.2.8.8. 6	Decimal places	2	User	7554
		2.2.8. 9	Fraction adjustment	2.2.8.9. 1	Adjustment factor	1	Expert	7820
				2.2.8.9. 2	Fraction offset	0	Expert	7822

F.4 Menu item 2.3: Totalizers

Table F-4 Totalizers

Level 3		Level 4		Level 5		Default value [unit]	Access level	Modbus register
Menu ID	Name	Menu ID	Name	Menu ID	Name			
2.3.1	**Totalizer 1**	*2.3.1. 1*	*Process value*			Mass flow	User	8305
		2.3.1. 2	*Units*			product specific	User	Volume flow: 9058 Mass flow: 9057 Standard volume flow: 9072
		2.3.1. 3	*Custom units*			Custom	User	7426
		2.3.1. 4	*Custom conversion factor*			1.0	User	7424
		2.3.1. 5	*Decimal places*			2	User	7559
		2.3.1. 6	*Direction*			Forward counting	User	8304
		2.3.1. 7	*Fail-safe behaviour*			Run	User	8302
		2.3.1. 8	*Reset*					
		2.3.1. 9	*Preset*					
		2.3.1. 10	**Alarm and warning limits**	*2.3.1. 10.1*	*Upper alarm limit*		User	8306
				2.3.1. 10.2	*Upper warning limit*		User	8308
				2.3.1. 10.3	*Lower warning limit*		User	8310
				2.3.1. 10.4	*Lower alarm limit*		User	8312
				2.3.1. 10.5	*Hysteresis*	0 [kg]		

Level 3		Level 4		Level 5		Default value [unit]	Access level	Modbus register
Menu ID	Name	Menu ID	Name	Menu ID	Name			
2.3.2	Totalizer 2	2.3.2. 1	*Process value*			Mass flow	User	8405
		2.3.2. 2	*Units*			product specific	User	Volume flow: 9060 Mass flow: 9059 Standard volume flow: 9073
		2.3.2. 3	*Custom units*			Custom	User	7426
		2.3.2. 4	*Custom conversion factor*			1.0	User	7424
		2.3.2. 5	*Decimal places*			2	User	7562
		2.3.2. 6	*Direction*			Forward counting	User	8404
		2.3.2. 7	*Fail-safe behaviour*			Run	User	8402
		2.3.2. 8	*Reset*					
		2.3.2. 9	*Preset*					
		2.3.2. 10	Alarm and warning limits	2.3.2. 10.1	*Upper alarm limit*		User	8406
				2.3.2. 10.2	*Upper warning limit*		User	8408
				2.3.2. 10.3	*Lower warning limit*		User	8410
				2.3.2. 10.4	*Lower alarm limit*		User	8412
				2.3.2. 10.5	*Hysteresis*	0 [kg]	User	8414

Level 3		Level 4		Level 5		Default value [unit]	Access level	Modbus register
Menu ID	Name	Menu ID	Name	Menu ID	Name			
2.3.3	Totalizer 3	2.3.3. 1	Process value			Mass flow	User	8505
		2.3.3. 2	Units			product specific	User	Volume flow: 9062 Mass flow: 9061 Standard volume flow: 9074
		2.3.3. 3	Custom units			Custom	User	7426
		2.3.3. 4	Custom conver- sion factor			1.0	User	7424
		2.3.3. 5	Decimal places			2	User	7565
		2.3.3. 6	Direction			Forward counting	User	8504
		2.3.3. 7	Fail-safe behav- iour			Run	User	8502
		2.3.3. 8	Reset					
		2.3.3. 9	Preset					
		2.3.3. 10	Alarm and warning limits	2.3.3. 10.1	Upper alarm limit		User	8506
				2.3.3. 10.2	Upper warning lim- it		User	8508
				2.3.3. 10.3	Lower warning lim- it		User	8510
				2.3.3. 10.4	Lower alarm limit		User	8512
				2.3.3. 10.5	Hysteresis	0 [kg]	User	8514
2.3.4	Reset All Totalizers							

F.5 Menu item 2.4: Inputs and outputs

F.5.1 Current output on CH1

Level 3		Level 4		Default value [unit]	Access level	Modbus register
Menu ID	Name	Menu ID	Name			
2.4.1	CH1 - output with HART	2.4.1.1	Loop current mode	Loop current, 4..20 mA	User	7110
		2.4.1.2	Active operation possible		Read only	7211
		2.4.1.3	PV selection	product specific	User	7200
		2.4.1.4	Flow direction	Positive	User	7210
		2.4.1.5	Loop current scale	4 ... 20 mA NAMUR	User	7216
		2.4.1.6	Upper range value	Standard volume flow, Temperature, Density, Volume flow, Mass flow: product specific Fraction %: 100.0 [%]	User	Standard volume flow: 7136 Temperature: 7124 Density: 7221 Volume flow: 7217 Mass flow: 7206 Fraction %: 7140
		2.4.1.7	Lower range value	Standard volume flow: 0 [normal m³/s] Temperature: product specific Density: 0.08 [kg/m³] Volume flow: 0 [m³/s] Mass flow: 0 [kg/s] Fraction %: 0.0 [%]	User	Standard volume flow: 7138 Temperature: 7134 Density: 7223 Volume flow: 7219 Mass flow: 7208 Fraction %: 7142
		2.4.1.8	Fail safe activation condition	Invalid process value	User	6297

Level 3		Level 4		Default value	Access level	Modbus register
Menu ID	Name	Menu ID	Name	[unit]		
		2.4.1.9	*Damping value*	0.0 [s]	User	7204
		2.4.1.10	*Fail-safe behaviour*	Lower fault current	User	7213
		2.4.1.11	*Fail-safe value*	3.5 [mA]	User	7214
		2.4.1.12	*Fail-safe minimum duration*	0 [s]	User	7167

F.5.2   Signal output on CH2

Note

Menu item visibility

The availability in the HMI of the menu items for channels 2, 3 and 4 depends on the I/O configuration.

Level 3		Level 4		Level 5		Default value [unit]	Access level	Modbus register
Menu ID	Name	Menu ID	Name	Menu ID	Name			
2.4.2	CH2 - output	2.4.2.1	*Operation mode*			Off	User	8801
		2.4.2.3	*Active operation possible*				Read only	7420
		2.4.2.4	*Fail-safe activation condition*			Invalid process value	User	9590
		2.4.2.5	Current output	2.4.2.5.1	*Process value*	product specific	User	8802
				2.4.2.5.2	*Flow direction*	Positive	User	8809
				2.4.2.5.3	*Loop current scale*	4 ... 20 mA NAMUR	User	8806
				2.4.2.5.4	*Upper range value*	Standard volume flow, Temperature, Density, Volume flow, Mass flow: product specific Fraction %: 100.0 [%]	User	Standard volume flow: 8878 Temperature: 8874 Density: 8870 Volume flow: 8866 Mass flow: 8810 Fraction %: 8882
				2.4.2.5.5	*Lower range value*	Standard volume flow: 0 [normal m³/s] Temperature: product specific Density: 0.08 [kg/m³] Volume flow: 0 [m³/s]	User	Standard volume flow: 8880 Temperature: 8876 Density: 8872 Volume flow: 8868 Mass flow: 8812

Level 3		Level 4		Level 5		Default value [unit]	Access level	Modbus register
Menu ID	Name	Menu ID	Name	Menu ID	Name			
						Mass flow: 0 [kg/s]		
				2.4.2.5.6	Damping value	0.0 [s]	User	8807
				2.4.2.5.7	Fail-safe behavior	Lower fault current	User	8814
				2.4.2.5.8	Fail-safe value	0 [mA]	User	8815
				2.4.2.5.9	Fail-safe minimum duration	0 [s]	User	8981
		2.4.2.6	Frequency output	2.4.2.6.1	Process value	product specific	User	8904
				2.4.2.6.2	Flow direction	Positive	User	8910
				2.4.2.6.3	Upper frequency value	10000.0 [Hz]	User	8935
				2.4.2.6.4	Lower frequency value	0.0 [Hz]	User	8937
				2.4.2.6.5	Upper range value	Standard volume flow, Temperature, Density, Volume flow, Mass flow: product specific Fraction %: 100.0 [%]	User	Standard volume flow: 8927 Temperature: 8923 Density: 8919 Volume flow: 8915 Mass flow: 8911 Fraction %: 8931
				2.4.2.6.6	Lower range value	Standard volume flow: 0 [normal m³/s] Temperature: product specific Density: 0.08 [kg/m³]	User	Standard volume flow: 8929 Temperature: 8925 Density: 8921 Volume flow: 8917

Level 3		Level 4		Level 5		Default value [unit]	Access level	Modbus register
Menu ID	Name	Menu ID	Name	Menu ID	Name			
						Volume flow: 0 [m³/s] Mass flow: 0 [kg/s] Fraction %: 0.0 [%]		Mass flow: 8913 Fraction %: 8933
				2.4.2.6.7	*Damping value*	0.0 [s]	User	8908
				2.4.2.6.8	*Fail-safe behavior*	Last reliable value	User	8939
				2.4.2.6.9	*Fail-safe value*	0.0 [Hz]	User	8940
				2.4.2.6.10	*Fail-safe minimum duration*	0 [s]	User	8981
		2.4.2.7	Pulse output	2.4.2.7.1	*Process value*	product specific	User	8960
				2.4.2.7.2	*Flow direction*	Positive	User	8962
				2.4.2.7.3	*Units*	product specific	User	Standard volume flow: 8991 Volume flow: 8990 Mass flow: 8989
				2.4.2.7.4	*Amount*	1.0 [normal m³]	User	8967
				2.4.2.7.5	*Pulses per amount*	1	User	10055
				2.4.2.7.6	*Pulse width units*	s	User	8995
				2.4.2.6.7	*Pulse width*	0.1 [s]	User	8974
				2.4.2.7.8	*Polarity*	Active high level	User	8977
				2.4.2.7.9	*Fail-safe behavior*	Last reliable value	User	8961
				2.4.2.7.10	*Fail-safe value*	1.0 [pulses/s]	User	7421
				2.4.2.7.11	*Fail-safe minimum duration*	0 [s]	User	8981
		2.4.2.8	Digital output	2.4.2.8.1	*Mode*	Alarm class	User	8841
				2.4.2.8.2	*Sensor alarms (group 1)*	0	User	8844
				2.4.2.8.3	*Sensor alarms (group 2)*	0	User	8846

Level 3		Level 4		Level 5		Default value [unit]	Access level	Modbus register
Menu ID	Name	Menu ID	Name	Menu ID	Name			
				2.4.2.8.4	*Process alarms (group 1)*	0	User	8848
				2.4.2.8.5	*Process alarms (group 2)*	0	User	8850
				2.4.2.8.8	*Totalizers alarms*	0	User	8850
				2.4.2.8.9	*Device alarms*	0	User	8850
				2.4.2.8.10	*CH1 alarms*	0	User	8850
				2.4.2.8.11	*Input/output alarms (group 1)*	0	User	8854
				2.4.2.8.13	*Simulation alarms (group 1)*	0	User	8852
				2.4.2.8.15	*Alarm class*	0	User	8858
				2.4.2.8.16	*NAMUR status signal*	0	User	8899
				2.4.2.8.17	*Polarity*	Active high level	User	8859
				2.4.2.8.18	*On-delay*	0.0 [s]	User	8860
				2.4.2.8.19	*Off-delay*	0.0 [s]	User	8862

F.5.3   Input/output on CH3

Note

Menu item visibility

The availability in the HMI of the menu items for channels 2, 3 and 4 depends on the I/O configuration.

Level 3		Level 4		Level 5		Default value [unit]	Access level	Modbus register
Menu ID	Name	Menu ID	Name	Menu ID	Name			
2.4.3	CH3 - input/output	2.4.3.1	*Operation mode*				Read only	9101
		2.4.3.2	*Change operation mode*				User	
		2.4.3.3	*Active operation possible*				Read only	7430
		2.4.3.4	*Fail-safe activation condition*			Invalid process value	User	9591
		2.4.3.5	Current output	2.4.3.5.1	*Process value*	product specific	User	9102
				2.4.3.5.2	*Flow direction*	Positive	User	9109
				2.4.3.5.3	*Loop current scale*	4 ... 20 mA NAMUR	User	9106
				2.4.3.5.4	*Upper range value*	Standard volume flow, Volume flow, Mass flow, Density, Temperature: product specific Fraction %: 100 [%]	User	Standard volume flow: 9178 Volume flow: 9166 Mass flow: 9110 Density: 9170 Temperature: 9174 Fraction %: 9182
				2.4.3.5.5	*Lower range value*	Standard volume flow: 0 [normal m³/s] Volume flow: 0 [m³/s] Mass flow: 0 [kg/s] Density:	User	Standard volume flow: 9180 Volume flow: 9168 Mass flow: 9112 Density: 9172

Level 3		Level 4		Level 5		Default value [unit]	Access level	Modbus register
Menu ID	Name	Menu ID	Name	Menu ID	Name			
						0.08 [kg/m³] Temperature: product specific Fraction %: 0 [%]		Temperature: 9176 Fraction %: 9184
				2.4.3.5.6	*Damping value*	0.0 [s]	User	9107
				2.4.3.5.7	*Fail-safe behavior*	Lower fault current	User	9114
				2.4.3.5.8	*Fail-safe value*	0 [mA]	User	9115
				2.4.3.5.9	*Fail-safe minimum duration*	0 [s]	User	9281
		2.4.3.6	Frequency output	2.4.3.6.1	*Redundancy mode*	Off	User	9299
				2.4.3.6.2	*Process value*	product specific	User	9204
				2.4.3.6.3	*Flow direction*	Positive	User	9210
				2.4.3.6.4	*Upper frequency value*	10000.0 [Hz]	User	9235
				2.4.3.6.5	*Lower frequency value*	0.0 [Hz]	User	9237
				2.4.3.6.6	*Upper range value*	Standard volume flow, Volume flow, Mass flow, Density, Temperature: product specific Fraction %: 100 [%]		Standard volume flow: 9227 Volume flow: 9215 Mass flow: 9211 Density: 9219 Temperature: 9223 Fraction %: 9231

Level 3		Level 4		Level 5		Default value [unit]	Access level	Modbus register
Menu ID	Name	Menu ID	Name	Menu ID	Name			
				2.4.3.6. 7	Lower range value	Standard volume flow: 0 [normal m³/s] Volume flow: 0 [m³/s] Mass flow: 0 [kg/s] Density: 0.08 [kg/m³] Tempera-ture: product specific Fraction %: 0 [%]		Standard volume flow: 9229 Volume flow: 9217 Mass flow: 9213 Density: 9221 Tempera-ture: 9225 Fraction %: 9233
				2.4.3.6. 8	Damping value	0.0 [s]	User	9208
				2.4.3.6. 9	Fail-safe behavior	Last relia-ble value	User	9239
				2.4.3.6. 10	Fail-safe value	0.0 [Hz]	User	9240
				2.4.3.6. 11	Fail-safe minimum du-ration	0 [s]	User	9281
		2.4.3. 7	Pulse output	2.4.3.7. 1	Redundancy mode	Off	User	9280
				2.4.3.7. 2	Process value	product specific	User	9260
				2.4.3.7. 3	Flow direction	Positive	User	9262
				2.4.3.7. 4	Units	product specific	User	Standard volume flow: 9291 Volume flow: 9290 Mass flow: 9289
				2.4.3.7. 5	Amount	1.0 [nor-mal m³]	User	9267

Level 3		Level 4		Level 5		Default value [unit]	Access level	Modbus register
Menu ID	Name	Menu ID	Name	Menu ID	Name			
				2.4.3.7. 6	*Pulses per amount*	1	User	10155
				2.4.3.7. 7	*Pulse width units*	s	User	9295
				2.4.3.7. 8	*Pulse width*	0.1 [s]	User	9274
				2.4.3.7. 9	*Polarity*	Active high level	User	9277
				2.4.3.7. 10	*Fail-safe behavior*	Last relia-ble value	User	9261
				2.4.3.7. 11	*Fail-safe value*	1.0 [pul-ses/s]	User	7431
				2.4.3.7. 12	*Fail-safe minimum du-ration*	0 [s]	User	9281
		2.4.3. 8	Digital output	2.4.3.8. 1	*Mode*	Alarm class	User	9141
				2.4.3.8. 2	*Sensor alarms (group 1)*	0	User	9144
				2.4.3.8. 3	*Sensor alarms (group 2)*	0	User	9146
				2.4.3.8. 4	*Process alarms (group 1)*	0	User	9148
				2.4.3.8. 5	*Process alarms (group 2)*	0	User	9150
				2.4.3.8. 8	*Totalizers alarms*	0	User	9150
				2.4.3.8. 9	*Device alarms*	0	User	9150
				2.4.3.8. 10	*CH1 alarms*	0	User	9150
				2.4.3.8. 11	*Input/output alarms (group 1)*	0	User	9154
				2.4.3.8. 13	*Simulation alarms (group 1)*	0	User	9152
				2.4.3.8. 15	*Alarm class*	0	User	9158
				2.4.3.8. 16	*NAMUR status signal*	0	User	9199
				2.4.3.8. 17	*Polarity*	Active high level	User	9159
				2.4.3.8. 18	*On-delay*	0.0 [s]	User	9160
				2.4.3.8. 19	*Off-delay*	0.0 [s]	User	9162
		2.4.3. 9	Digital input	2.4.3.9. 1	*Input function*	Off	User	9286

Level 3		Level 4		Level 5		Default value [unit]	Access level	Modbus register
Menu ID	Name	Menu ID	Name	Menu ID	Name			
				2.4.3.9. 2	*CH1 forced current value*	4.0 [mA]	User	6298
				2.4.3.9. 3	*CH2 forced current value*	Pulse output: 1.0 [pulses/s] Digital output: Off Current output: 4.0 [mA]	User	Pulse output: 7151 Digital output: 7148 Current output: 7146
				2.4.3.9. 4	*CH3 forced current value*	Pulse output: 1.0 [pulses/s] Frequency output: 1.0 [Hz] Digital output: Off Current output: 4.0 [mA]	User	Pulse output: 7165 Frequency output: 7163 Digital output: 7162 Current output: 7160
				2.4.3.9. 5	*CH4 forced current value*	Pulse output: 1.0 [pulses/s] Frequency output: 1.0 [Hz] Digital output: Off Current output: 4.0 [mA]	User	Pulse output: 7151 Frequency output: 7163 Digital output: 7148 Current output: 7146
				2.4.3.9. 6	*Debounce time*	0.0 [ms]	User	9139
				2.4.3.9. 7	*Polarity*	Active high level	User	9135

Level 3		Level 4		Level 5		Default value [unit]	Access level	Modbus register
Menu ID	Name	Menu ID	Name	Menu ID	Name			
2.4.4	CH3 - relay	2.4.4.1	Operation mode			Off	User	9101
		2.4.4.2	Mode			Alarm class	User	9141
		2.4.4.3	Sensor alarms (group 1)			0	User	9144
		2.4.4.4	Sensor alarms (group 2)				User	9146
		2.4.4.5	Process alarms (group 1)			0	User	9148
		2.4.4.6	Process alarms (group 2)			0	User	9150
		2.4.4.9	Totalizers alarms			0	User	9150
		2.4.4.10	Device alarms			0	User	9150
		2.4.4.11	CH1 alarms			0	User	9150
		2.4.4.12	Input/output alarms (group 1)			0	User	9154
		2.4.4.13	Input/output alarms (group 2)			0	User	9152
		2.4.4.14	Simulation alarms (group 1)			0	User	9152
		2.4.4.15	Simulation alarms (group 2)			0	User	10158
		2.4.4.16	Alarm class			0	User	9158
		2.4.4.17	NAMUR status signal			0	User	9199
		2.4.4.18	Polarity			Active high level	User	9159
		2.4.4.19	On-delay			0.0 [s]	User	9160
		2.4.4.20	Off-delay			0.0 [s]	User	9162

F.5.4　　Input/output on CH4

> **Note**
>
> **Menu item visibility**
>
> The availability in the HMI of the menu items for channels 2, 3 and 4 depends on the I/O configuration.

Level 3		Level 4		Level 5		Default value [unit]	Access level	Modbus register
Menu ID	Name	Menu ID	Name	Menu ID	Name			
2.4.5	CH4 - input/ output	2.4.5.1	*Operation mode*				Read only	9301
		2.4.5.2	*Change operation mode*				User	
		2.4.5.3	*Active operation possible*				Read only	7440
		2.4.5.4	*Fail-safe activation condition*			Invalid process value	User	9592
		2.4.5.5	Current output	2.4.5.5.1	*Process value*	product specific	User	9302
				2.4.5.5.2	*Flow direction*	Positive	User	9309
				2.4.5.5.3	*Loop current scale*	4 ... 20 mA NAMUR	User	9306
				2.4.5.5.4	*Upper range value*	Standard volume flow, Volume flow, Mass flow, Density, Temperature: product specific Fraction %: 100 [%]	User	Standard volume flow: 9378 Volume flow: 9366 Mass flow: 9310 Density: 9370 Temperature: 9374 Fraction %: 9382
				2.4.5.5.5	*Lower range value*	Standard volume flow: 0 [normal m³/s] Volume flow: 0 [m³/s] Mass flow: 0 [kg/s] Density: 0.08 [kg/m³]	User	Standard volume flow: 9380 Volume flow: 9368 Mass flow: 9312 Density: 9372 Temperature:

F.5 Menu item 2.4: Inputs and outputs

Level 3		Level 4		Level 5		Default value [unit]	Access level	Modbus register
Menu ID	Name	Menu ID	Name	Menu ID	Name			
						Temperature: product specific Fraction %: 0 [%]		9376 Fraction %: 9384
				2.4.5.5.6	*Damping value*	0.0 [s]	User	9307
				2.4.5.5.7	*Fail-safe behavior*	Lower fault current	User	9314
				2.4.5.5.8	*Fail-safe value*	0 [mA]	User	9315
				2.4.5.5.9	*Fail-safe minimum duration*	0 [s]	User	9481
		2.4.5.6	**Frequency output**	2.4.5.6.1	*Process value*	product specific	User	9404
				2.4.5.6.2	*Flow direction*	Positive	User	9410
				2.4.5.6.3	*Upper frequency value*	10000.0 [Hz]	User	9435
				2.4.5.6.4	*Lower frequency value*	0.0 [Hz]	User	9437
				2.4.5.6.5	*Upper range value*	Standard volume flow, Volume flow, Mass flow, Density, Temperature: product specific Fraction %: 100 [%]	User	Standard volume flow: 9427 Volume flow: 9415 Mass flow: 9411 Density: 9419 Temperature: 9423 Fraction %: 9431
				2.4.5.6.6	*Lower range value*	Standard volume flow: 0 [normal m³/s] Volume flow: 0 [m³/s]	User	Standard volume flow: 9429 Volume flow: 9417

Level 3		Level 4		Level 5		Default value [unit]	Access level	Modbus register
Menu ID	Name	Menu ID	Name	Menu ID	Name			
						Mass flow: 0 [kg/s] Density: 0.08 [kg/m³] Temperature: product specific Fraction %: 0 [%]		Mass flow: 9413 Density: 9421 Temperature: 9425 Fraction %: 9433
				2.4.5.6.7	*Damping value*	0.0 [s]	User	9408
				2.4.5.6.8	*Fail-safe behavior*	Last reliable value	User	9439
				2.4.5.6.9	*Fail-safe value*	0.0 [Hz]	User	9440
				2.4.5.6.10	*Fail-safe minimum duration*	0 [s]	User	9481
		2.4.5.7	Pulse output	2.4.5.7.1	*Process value*	product specific	User	9460
				2.4.5.7.2	*Flow direction*	Positive	User	9462
				2.4.5.7.3	*Units*	product specific	User	Standard volume flow: 9491 Volume flow: 9490 Mass flow: 9489
				2.4.5.7.4	*Amount*	1.0 [normal m³]	User	9467
				2.4.5.7.5	*Pulses per amount*	1	User	10255
				2.4.5.7.6	*Pulse width units*	s	User	9495
				2.4.5.7.7	*Pulse width*	0.1 [s]	User	9474
				2.4.5.7.8	*Polarity*	Active high level	User	9477
				2.4.5.7.9	*Fail-safe behavior*	Last reliable value	User	9461
				2.4.5.7.10	*Fail-safe value*	1.0 [pulses/s]	User	7441
				2.4.5.7.11	*Fail-safe minimum duration*	0 [s]	User	9481

Level 3		Level 4		Level 5		Default value [unit]	Access level	Modbus register
Menu ID	Name	Menu ID	Name	Menu ID	Name			
		2.4.5.8	**Digital output**	*2.4.5.8.1*	*Mode*	Alarm class	User	9341
				2.4.5.8.2	*Sensor alarms (group 1)*	0	User	9344
				2.4.5.8.3	*Sensor alarms (group 2)*	0	User	9346
				2.4.5.8.4	*Process alarms (group 1)*	0	User	9348
				2.4.5.8.5	*Process alarms (group 2)*	0	User	9350
				2.4.5.8.8	*Totalizers alarms*	0	User	9350
				2.4.5.8.9	*Device alarms*	0	User	9350
				2.4.5.8.10	*CH1 alarms*	0	User	9350
				2.4.5.8.11	*Input/output alarms (group 1)*	0	User	9354
				2.4.5.8.13	*Simulation alarms (group 1)*	0	User	9352
				2.4.5.8.15	*Alarm class*	0	User	9358
				2.4.5.8.16	*NAMUR status signal*	0	User	9399
				2.4.5.8.17	*Polarity*	Active high level	User	9359
				2.4.5.8.18	*On-delay*	0.0 [s]	User	9360
				2.4.5.8.19	*Off-delay*	0.0 [s]	User	9362
		2.4.5.9	**Digital input**	*2.4.5.9.1*	*Input function*	Off	User	9486
				2.4.5.9.2	*CH1 forced current value*	4.0 [mA]	User	6298
				2.4.5.9.3	*CH2 forced current value*	Pulse output: 1.0 [pulses/s] Digital output: Off Current output: 4.0 [mA]	User	Pulse output: 7151 Digital output: 7148 Current output: 7146
				2.4.5.9.4	*CH3 forced current value*	Pulse output: 1.0 [pulses/s]	User	Pulse output: 7158 Digital output:

Level 3		Level 4		Level 5		Default value [unit]	Access level	Modbus register
Menu ID	Name	Menu ID	Name	Menu ID	Name			
						Digital output: Off Current output: 4.0 [mA]		7155 Current output: 7153
				2.4.5.9.5	CH4 forced current value	Pulse output: 1.0 [pulses/s] Digital output: Off Current output: 4.0 [mA] Frequency output: 1.0 [Hz]	User	Pulse output: 7165 Digital output: 7162 Current output: 7160 Frequency output: 7163
				2.4.5.9.6	Debounce time	0.0 [ms]	User	7165
				2.4.5.9.7	Polarity	Active high level	User	9335

Level 3		Level 4		Level 5		Default value [unit]	Access level	Modbus register
Menu ID	Name	Menu ID	Name	Menu ID	Name			
2.4.6	CH4 - relay	2.4.6.1	Operation mode			Off	User	9301
		2.4.6.2	Mode			Alarm class	User	9341
		2.4.6.3	Sensor alarms (group 1)			0	User	9344
		2.4.6.4	Sensor alarms (group 2)			0	User	9346
		2.4.6.5	Process alarms (group 1)			0	User	9348
		2.4.6.6	Process alarms (group 2)			0	User	9350
		2.4.6.9	Totalizers alarms			0	User	9350
		2.4.6.1 0	Device alarms			0	User	9350
		2.4.6.1 1	CH1 alarms			0	User	9350
		2.4.6.1 2	Input/output alarms (group 1)			0	User	9354
		2.4.6.1 4	Simulation alarms (group 1)			0	User	9352
		2.4.6.1 5	Simulation alarms (group 2)			0	User	10258
		2.4.6.1 6	Alarm class			0	User	9358
		2.4.6.1 7	NAMUR status signal			0	User	9399
		2.4.6.1 8	Polarity			Active high level	User	9359
		2.4.6.1 9	On-delay			0.0 [s]	User	9360
		2.4.6.2 0	Off-delay			0.0 [s]	User	9362

F.6 Menu item 2.5: Dosing

Table F-5 Dosing

Level 3		Default value [unit]	Access level	Modbus register
Menu ID	Name			
2.5.1	Dosing mode	Off	User	8550
2.5.2	Process value	product specific	User	8551
2.5.3	Active recipe	Recipe 1	User	8595

Table F-6   Recipe 1

Level 3		Level 4		Level 5		Default value [unit]	Access level	Modbus register
Menu ID	Name	Menu ID	Name	Menu ID	Name			
2.5.5	Recipe 1	*2.5.5.1*	*Name*				User	8600
		2.5.5.2	*Units*			product specific	User	Mass flow: 8675 Volume flow: 8676 Standard volume flow: 8677
		2.5.5.3	*Amount*			1.0 [kg]	User	8608
		2.5.5.4	*Decimal places*			2	User	7583
		2.5.5.5	User calibration	*2.5.5.5.1*	*Compensation mode*	Fixed compensation	User	8614
				2.5.5.5.2	*Fixed compensation*	0 [kg]	User	8615
				2.5.5.5.3	*Lead constant*	0 [s]	User	8696
				2.5.5.5.4	*Offset adjustment*	0 [kg]	User	9560
		2.5.5.6	Valve control	*2.5.5.6.1*	*Stage setup format*	Relative	User	8691
				2.5.5.6.2	*Value to open primary valve*	Mass flow: 0 [kg] Volume flow: 0 [%] Standard volume flow: 0 [normal m³]	User	Mass flow: 8643 Volume flow: 8667 Standard volume flow: 8647
				2.5.5.6.3	*Value to close primary valve*	Mass flow: 1.0 [kg] Volume flow: 80 [%] Standard volume flow: 0.001 [normal m³]	User	Mass flow: 8649 Volume flow: 8669 Standard volume flow: 8653
				2.5.5.6.4	*Value to open secondary valve*	Mass flow: 0.2 [kg] Volume flow: 20 [%] Standard volume flow: 0.0002 [normal m³]	User	Mass flow: 8655 Volume flow: 8671 Standard volume flow: 8659

Level 3		Level 4		Level 5		Default value [unit]	Access level	Modbus register
Menu ID	Name	Menu ID	Name	Menu ID	Name			
				2.5.5.6.5	*Value to close secondary valve*	Mass flow: 0.8 [kg] Volume flow: 100 [%] Standard volume flow: 0.0008 [normal m³]	User	Mass flow: 8661 Volume flow: 8673 Standard volume flow: 8665
				2.5.5.6.6	*Current value to close*	0 [mA]	User	8685
				2.5.5.6.7	*Current value to partially open*	10 [mA]	User	8687
				2.5.5.6.8	*Current value to fully open*	20 [mA]	User	8689
				2.5.5.6.9	*Amount for fully open*	Mass flow: 0.0 [kg] Volume flow: 0.0 [%] Standard volume flow: 0.0 [normal m³]	User	Mass flow: 8631 Volume flow: 8681 Standard volume flow: 8635
				2.5.5.6.10	*Amount for partially open*	Mass flow: 1.0 [kg] Volume flow: 0.0 [%] Standard volume flow: 0.001 [normal m³]	User	Mass flow: 8637 Volume flow: 8683 Standard volume flow: 8641
		2.5.5.7	**Fault handling**	2.5.5.7.1	*Duration mode*	Off	User	8621
				2.5.5.7.2	*Duration time*	3600 [s]	User	8622
				2.5.5.7.3	*Overrun mode*	Off	User	8624
				2.5.5.7.4	*Overrun value*	0 [kg]	User	8625

Table F-7   Recipe 2

Level 3		Level 4		Level 5		Default value [unit]	Access level	Modbus register
Menu ID	Name	Menu ID	Name	Menu ID	Name			
2.5.6	Recipe 2	*2.5.6.1*	*Name*				User	8700
		2.5.6.2	*Units*			product specific	User	Mass flow: 8775 Volume flow: 8776 Standard volume flow: 8777
		2.5.6.3	*Amount*			1.0 [kg]	User	8708
		2.5.6.4	*Decimal places*			2	User	7586
		2.5.6.5	**User calibration**	*2.5.6.5.1*	*Compensation mode*	Fixed compensation	User	8714
				2.5.6.5.2	*Fixed compensation*	0 [kg]	User	8715
				2.5.6.5.3	*Lead constant*	0 [s]	User	8796
				2.5.6.5.4	*Offset adjustment*	0 [kg]	User	9566
		2.5.6.6	**Valve control**	*2.5.6.6.1*	*Stage setup format*	Relative	User	8791
				2.5.6.6.2	*Value to open primary valve*	Mass flow: 0 [kg] Volume flow: 0 [%] Standard volume flow: 0 [normal m³]	User	Mass flow: 8743 Volume flow: 8767 Standard volume flow: 8747
				2.5.6.6.3	*Value to close primary valve*	Mass flow: 1.0 [kg] Volume flow: 80 [%] Standard volume flow: 0.001 [normal m³]	User	Mass flow: 8749 Volume flow: 8769 Standard volume flow: 8753
				2.5.6.6.4	*Value to open secondary valve*	Mass flow: 0.2 [kg] Volume flow: 20 [%] Standard volume flow: 0.0002 [normal m³]	User	Mass flow: 8755 Volume flow: 8771 Standard volume flow: 8759

Level 3		Level 4		Level 5		Default value [unit]	Access level	Modbus register
Menu ID	Name	Menu ID	Name	Menu ID	Name			
				2.5.6.6.5	*Value to close secondary valve*	Mass flow: 0.8 [kg] Volume flow: 100 [%] Standard volume flow: 0.0008 [normal m³]	User	Mass flow: 8761 Volume flow: 8773 Standard volume flow: 8765
				2.5.6.6.6	*Current value to close*	0 [mA]	User	8785
				2.5.6.6.7	*Current value to partially open*	10 [mA]	User	8787
				2.5.6.6.8	*Current value to fully open*	20 [mA]	User	8789
				2.5.6.6.9	*Amount for fully open*	Mass flow: 0.0 [kg] Volume flow: 0.0 [%] Standard volume flow: 0.0 [normal m³]	User	Mass flow: 8731 Volume flow: 8781 Standard volume flow: 8735
				2.5.6.6.10	*Amount for partially open*	Mass flow: 1.0 [kg] Volume flow: 0.0 [%] Standard volume flow: 0.001 [normal m³]	User	Mass flow: 8737 Volume flow: 8783 Standard volume flow: 8741
		2.5.6.7	**Fault handling**	2.5.6.7.1	*Duration mode*	Off	User	8721
				2.5.6.7.2	*Duration time*	3600 [s]	User	8722
				2.5.6.7.3	*Overrun mode*	Off	User	8724
				2.5.6.7.4	*Overrun value*	0 [kg]	User	8725

Table F-8   Recipe 3

Level 3		Level 4		Level 5		Default value [unit]	Access level	Modbus register
Menu ID	Name	Menu ID	Name	Menu ID	Name			
2.5.7	Recipe 3	*2.5.7.1*	*Name*				User	9600
		2.5.7.2	*Units*			product specific	User	Mass flow: 9675 Volume flow: 9676 Standard volume flow: 9677
		2.5.7.3	*Amount*			1.0 [kg]	User	9608
		2.5.7.4	*Decimal places*			2	User	7589
		2.5.7.5	**User calibration**	*2.5.7.5.1*	*Compensation mode*	Fixed compensation	User	9614
				2.5.7.5.2	*Fixed compensation*	0 [kg]	User	9615
				2.5.7.5.3	*Lead constant*	0 [s]	User	9696
				2.5.7.5.4	*Offset adjustment*	0 [kg]	User	9572
		2.5.7.6	**Valve control**	*2.5.7.6.1*	*Stage setup format*	Relative	User	9691
				2.5.7.6.2	*Value to open primary valve*	Mass flow: 0 [kg] Volume flow: 0 [%] Standard volume flow: 0 [normal m³]	User	Mass flow: 9643 Volume flow: 9667 Standard volume flow: 9647
				2.5.7.6.3	*Value to close primary valve*	Mass flow: 1.0 [kg] Volume flow: 80 [%] Standard volume flow: 0.001 [normal m³]	User	Mass flow: 9649 Volume flow: 9669 Standard volume flow: 9653
				2.5.7.6.4	*Value to open secondary valve*	Mass flow: 0.2 [kg] Volume flow: 20 [%] Standard volume flow: 0.0002 [normal m³]	User	Mass flow: 9655 Volume flow: 9671 Standard volume flow: 9659

Level 3		Level 4		Level 5		Default value [unit]	Access level	Modbus register
Menu ID	Name	Menu ID	Name	Menu ID	Name			
				2.5.7.6.5	Value to close secondary valve	Mass flow: 0.8 [kg] Volume flow: 100 [%] Standard volume flow: 0.0008 [normal m³]	User	Mass flow: 9661 Volume flow: 9673 Standard volume flow: 9665
				2.5.7.6.6	Current value to close	0 [mA]	User	9685
				2.5.7.6.7	Current value to partially open	10 [mA]	User	9687
				2.5.7.6.8	Current value to fully open	20 [mA]	User	9689
				2.5.7.6.9	Amount for fully open	Mass flow: 0.0 [kg] Volume flow: 0.0 [%] Standard volume flow: 0.0 [normal m³]	User	Mass flow: 9631 Volume flow: 9681 Standard volume flow: 9635
				2.5.7.6.10	Amount for partially open	Mass flow: 1.0 [kg] Volume flow: 0.0 [%] Standard volume flow: 0.001 [normal m³]	User	Mass flow: 9637 Volume flow: 9683 Standard volume flow: 9641
		2.5.7.7	Fault handling	2.5.7.7.1	Duration mode	Off	User	9621
				2.5.7.7.2	Duration time	3600 [s]	User	9622
				2.5.7.7.3	Overrun mode	Off	User	9624
				2.5.7.7.4	Overrun value	0 [kg]	User	9625

Table F-9   Recipe 4

Level 3		Level 4		Level 5		Default value [unit]	Access level	Modbus register
Menu ID	Name	Menu ID	Name	Menu ID	Name			
2.5.8	Recipe 4	*2.5.8.1*	*Name*				User	9700
		2.5.8.2	*Units*			product specific	User	Mass flow: 9775 Volume flow: 9776 Standard volume flow: 9777
		2.5.8.3	*Amount*			1.0 [kg]	User	9708
		2.5.8.4	*Decimal places*			2	User	7592
		2.5.8.5	User calibration	*2.5.8.5.1*	*Compensation mode*	Fixed compensation	User	9714
				2.5.8.5.2	*Fixed compensation*	0 [kg]	User	9715
				2.5.8.5.3	*Lead constant*	0 [s]	User	9796
				2.5.8.5.4	*Offset adjustment*	0 [kg]	User	9578
		2.5.8.6	Valve control	*2.5.8.6.1*	*Stage setup format*	Relative	User	9791
				2.5.8.6.2	*Value to open primary valve*	Mass flow: 0 [kg] Volume flow: 0 [%] Standard volume flow: 0 [normal m³]	User	Mass flow: 9743 Volume flow: 9767 Standard volume flow: 9747
				2.5.8.6.3	*Value to close primary valve*	Mass flow: 1.0 [kg] Volume flow: 80 [%] Standard volume flow: 0.001 [normal m³]	User	Mass flow: 9749 Volume flow: 9769 Standard volume flow: 9753
				2.5.8.6.4	*Value to open secondary valve*	Mass flow: 0.2 [kg] Volume flow: 20 [%] Standard volume flow: 0.0002 [normal m³]	User	Mass flow: 9755 Volume flow: 9771 Standard volume flow: 9759

Level 3		Level 4		Level 5		Default value [unit]	Access level	Modbus register
Menu ID	Name	Menu ID	Name	Menu ID	Name			
				2.5.8.6.5	Value to close secondary valve	Mass flow: 0.8 [kg] Volume flow: 100 [%] Standard volume flow: 0.0008 [normal m³]	User	Mass flow: 9761 Volume flow: 9773 Standard volume flow: 9765
				2.5.8.6.6	Current value to close	0 [mA]	User	9785
				2.5.8.6.7	Current value to partially open	10 [mA]	User	9787
				2.5.8.6.8	Current value to fully open	20 [mA]	User	9789
				2.5.8.6.9	Amount for fully open	Mass flow: 0.0 [kg] Volume flow: 0.0 [%] Standard volume flow: 0.0 [normal m³]	User	Mass flow: 9731 Volume flow: 9781 Standard volume flow: 9735
				2.5.8.6.10	Amount for partially open	Mass flow: 1.0 [kg] Volume flow: 0.0 [%] Standard volume flow: 0.001 [normal m³]	User	Mass flow: 9737 Volume flow: 9783 Standard volume flow: 9741
		2.5.8.7	Fault handling	2.5.8.7.1	Duration mode	Off	User	9721
				2.5.8.7.2	Duration time	3600 [s]	User	9722
				2.5.8.7.3	Overrun mode	Off	User	9724
				2.5.8.7.4	Overrun value	0 [kg]	User	9725

Table F-10   Recipe 5

Level 3		Level 4		Level 5		Default value [unit]	Access level	Modbus register
Menu ID	Name	Menu ID	Name	Menu ID	Name			
2.5.9	Recipe 5	*2.5.9.1*	*Name*				User	9800
		2.5.9.2	*Units*			product specific	User	Mass flow: 9875 Volume flow: 9876 Standard volume flow: 9877
		2.5.9.3	*Amount*			0 [kg]	User	9808
		2.5.9.4	*Decimal places*			2	User	7595
		2.5.9.5	**User calibration**	*2.5.9.5.1*	*Compensation mode*	Fixed compensation	User	9814
				2.5.9.5.2	*Fixed compensation*	0 [kg]	User	9815
				2.5.9.5.3	*Lead constant*	0 [s]	User	9896
				2.5.9.5.4	*Offset adjustment*	0 [kg]	User	9584
		2.5.9.6	**Valve control**	*2.5.9.6.1*	*Stage setup format*	Relative	User	9891
				2.5.9.6.2	*Value to open primary valve*	Mass flow: 0 [kg] Volume flow: 0 [%] Standard volume flow: 0 [normal m³]	User	Mass flow: 9843 Volume flow: 9867 Standard volume flow: 9847
				2.5.9.6.3	*Value to close primary valve*	Mass flow: 1.0 [kg] Volume flow: 80 [%] Standard volume flow: 0.001 [normal m³]	User	Mass flow: 9849 Volume flow: 9869 Standard volume flow: 9853
				2.5.9.6.4	*Value to open secondary valve*	Mass flow: 0.2 [kg] Volume flow: 20 [%] Standard volume flow: 0.0002 [normal m³]	User	Mass flow: 9855 Volume flow: 9871 Standard volume flow: 9859

Level 3		Level 4		Level 5		Default value [unit]	Access level	Modbus register
Menu ID	Name	Menu ID	Name	Menu ID	Name			
				2.5.9.6.5	*Value to close secondary valve*	Mass flow: 0.8 [kg] Volume flow: 100 [%] Standard volume flow: 0.0008 [normal m³]	User	Mass flow: 9861 Volume flow: 9873 Standard volume flow: 9865
				2.5.9.6.6	*Current value to close*	0 [mA]	User	9885
				2.5.9.6.7	*Current value to partially open*	10 [mA]	User	9887
				2.5.9.6.8	*Current value to fully open*	20 [mA]	User	9889
				2.5.9.6.9	*Amount for fully open*	Mass flow: 0.0 [kg] Volume flow: 0.0 [%] Standard volume flow: 0.0 [normal m³]	User	Mass flow: 9831 Volume flow: 9881 Standard volume flow: 9835
				2.5.9.6.10	*Amount for partially open*	Mass flow: 1.0 [kg] Volume flow: 0.0 [%] Standard volume flow: 0.001 [normal m³]	User	Mass flow: 9837 Volume flow: 9883 Standard volume flow: 9841
		2.5.9.7	**Fault handling**	*2.5.9.7.1*	*Duration mode*	Off	User	9821
				2.5.9.7.2	*Duration time*	3600 [s]	User	9822
				2.5.9.7.3	*Overrun mode*	Off	User	9824
				2.5.9.7.4	*Overrun value*	0 [kg]	User	9825

F.7 Menu item 2.7: Date and time

Table F-11   Date and time

Level 3		Default value [unit]	Access level	Modbus regis-ter
Menu ID	Name			
2.7.1	*Current date and time*		Read only	6190
2.7.2	*Set date and time*			

F.8 Menu item 2.8: Local display

Table F-12   Local display

Level 3		Level 4		Default value [unit]	Access level	Modbus register
Menu ID	Name	Menu ID	Name			
2.8.1	*Bright-ness*				User	
2.8.2	*Backlight*				User	
2.8.3	*Contrast*				User	
2.8.4	**Damping**	*2.8.4.1*	*Damping value*	1.0 [s]	User	6409
		2.8.4.2	*Process values (1)*		User	6411
2.8.5	**View 1**	*2.8.5.1*	*Type*	Three val-ues	User	9007
		2.8.5.2	*1st value*	product specific	User	9018
		2.8.5.3	*2nd value*	product specific	User	9019
		2.8.5.4	*3rd value*	product specific	User	9020
		2.8.5.5	*4th value*	product specific	User	9075
		2.8.5.6	*5th value*	product specific	User	9076
		2.8.5.7	*6th value*	product specific	User	9077
		2.8.5.8	*Graph scale mode*	Auto	User	8050
		2.8.5.9	*Graph log time*	5 min	User	8051
		2.8.5.10	*Graph scale lower limit*	0	User	8052
		2.8.5.11	*Graph scale upper limit*	0	User	8054

Level 3		Level 4		Default value [unit]	Access level	Modbus register
Menu ID	Name	Menu ID	Name			
2.8.6	View 2	*2.8.6.1*	*Enable or disable*	Enabled	User	9013
		2.8.6.2	*Type*	Single value	User	9008
		2.8.6.3	*1st value*	product specific	User	9021
		2.8.6.4	*2nd value*	product specific	User	9022
		2.8.6.5	*3rd value*	product specific	User	9023
		2.8.6.6	*4th value*	product specific	User	9078
		2.8.6.7	*5th value*	product specific	User	9079
		2.8.6.8	*6th value*	product specific	User	9080
		2.8.6.9	*Graph scale mode*	Auto	User	8056
		2.8.6.10	*Graph log time*	5 min	User	8057
		2.8.6.11	*Graph scale lower limit*	0	User	8058
		2.8.6.12	*Graph scale upper limit*	0	User	8060
2.8.7	View 3	*2.8.7.1*	*Enable or disable*	Enabled	User	9014
		2.8.7.2	*Type*	One value and bar-graph	User	9009
		2.8.7.3	*1st value*	product specific	User	9024
		2.8.7.4	*2nd value*	product specific	User	9025
		2.8.7.5	*3rd value*	product specific	User	9026
		2.8.7.6	*4th value*	product specific	User	9081
		2.8.7.7	*5th value*	product specific	User	9082
		2.8.7.8	*6th value*	product specific	User	9083
		2.8.7.9	*Graph scale mode*	Auto	User	8062
		2.8.7.10	*Graph log time*	5 min	User	8063
		2.8.7.11	*Graph scale lower limit*	0	User	8064
		2.8.7.12	*Graph scale upper limit*	0	User	8066

Level 3		Level 4		Default value [unit]	Access level	Modbus register
Menu ID	Name	Menu ID	Name			
2.8.8	View 4	2.8.7.1	Enable or disable	Enabled	User	9015
		2.8.7.2	Type	Six values	User	9010
		2.8.7.3	1st value	product specific	User	9027
		2.8.7.4	2nd value	product specific	User	9028
		2.8.7.5	3rd value	product specific	User	9029
		2.8.7.6	4th value	product specific	User	9084
		2.8.7.7	5th value	product specific	User	9085
		2.8.7.8	6th value	product specific	User	9086
		2.8.7.9	Graph scale mode	Auto	User	8068
		2.8.7.10	Graph log time	5 min	User	8069
		2.8.8.11	Graph scale lower limit	0	User	8070
		2.8.8.12	Graph scale upper limit	0	User	8072
2.8.9	View 5	2.8.9.1	Enable or disable	Enabled	User	9016
		2.8.9.2	Type	Three values	User	9011
		2.8.9.3	1st value	product specific	User	9030
		2.8.9.4	2nd value	product specific	User	9031
		2.8.9.5	3rd value	product specific	User	9032
		2.8.9.6	4th value	product specific	User	9087
		2.8.9.7	5th value	product specific	User	9088
		2.8.9.8	6th value	product specific	User	9089
		2.8.9.9	Graph scale mode	Auto	User	8074
		2.8.9.10	Graph log time	5 min	User	8075
		2.8.9.11	Graph scale lower limit	0	User	8076
		2.8.9.12	Graph scale upper limit	0	User	8078

Level 3		Level 4		Default value [unit]	Access level	Modbus register
Menu ID	Name	Menu ID	Name			
2.8.10	View 6	2.8.10.1	Enable or disable	Enabled	User	9017
		2.8.10.2	Type	Alarm list	User	9012
		2.8.10.3	1st value	product specific	User	9033
		2.8.10.4	2nd value	product specific	User	9034
		2.8.10.5	3rd value	product specific	User	9035
		2.8.10.6	4th value	product specific	User	9090
		2.8.10.7	5th value	product specific	User	9091
		2.8.10.8	6th value	product specific	User	9092
		2.8.10.9	Graph scale mode	Auto	User	8080
		2.8.10.10	Graph log time	5 min	User	8081
		2.8.10.11	Graph scale lower limit	0	User	8082
		2.8.10.12	Graph scale upper limit	0	User	8084
2.8.11	Status icons			product specific	User	9040

F.9   Menu item 3.1: Identification

Table F-13   Identification

Level 3		Level 4		Default value [unit]	Access level	Modbus register
Menu ID	Name	Menu ID	Name			
3.1.1	Long tag				User	8120
3.1.2	Descriptor				User	8176
3.1.3	Message				User	8136
3.1.4	Location				User	8152
3.1.5	Installation date				User	8168
3.1.6	Manufacturer				Read only	6592
3.1.7	Product name				Read only	6104
3.1.8	Product variant				Read only	6020
3.1.9	Order number				Read only	
3.1.10	Serial number				Read only	6576
3.1.11	FW version				Read only	9500
3.1.12	HW version				Expert	6334
3.1.13	Final assembly number				User	6088

| Level 3 | | Level 4 | | Default value | Access level | Modbus reg- |
Menu ID	Name	Menu ID	Name	[unit]		ister
3.1.15	**Transmitter electronics**	*3.1.15.1*	*HW version*		Read only	6136
		3.1.15.2	*FW version*		Read only	6040
		3.1.15.3	*Serial number*		Read only	7326
		3.1.15.4	*Order number*		Read only	
		3.1.15.5	*Communication interface HW version*		Read only	7386
		3.1.15.6	*Communication interface serial number*		Read only	7358
3.1.16	**Local display**	*3.1.16.1*	*HW version*		Read only	9041
		3.1.16.2	*FW version*		Read only	9063
		3.1.16.3	*Local operation content version*		Read only	7475
3.1.17	**I/O electronics**	*3.1.17.1*	*HW version*		Read only	8193
		3.1.17.2	*FW version*		Read only	8184
		3.1.17.3	*Serial number*		Read only	7284
3.1.19	**Sensor**	*3.1.19.1*	*Type*		Read only	4025
		3.1.19.2	*Size*		Read only	4043
		3.1.19.3	*Order number*		Read only	
		3.1.19.4	*Serial number*		Read only	4033

F.10 Menu item 3.2: Diagnostic events

Table F-14   Diagnostic events

| Level 3 | | Level 4 | | Default value | Access level | Modbus reg- |
Menu ID	Name	Menu ID	Name	[unit]		ister
3.2.1	*Active diagnostic events*					
3.2.2	*Diagnostic log*					
3.2.3	*Clear diagnostic log*					
3.2.4	*Alarm acknowledge mode*			Auto	User	6248
3.2.5	*Transmitter detailed events*				Read only	6216
3.2.6	*Suppression time*			0 [s]	User	6749

Level 3		Level 4		Default value	Access level	Modbus register
Menu ID	Name	Menu ID	Name	[unit]		
3.2.7	Enable alarms	3.2.7.1	*Sensor alarms (group 1)*	product specific	User	6268
		3.2.7.2	*Sensor alarms (group 2)*	product specific	User	6270
		3.2.7.3	*Process alarms (group 1)*	product specific	User	6272
		3.2.7.4	*Process alarms (group 2)*	product specific	User	6274
		3.2.7.7	*Totalizers alarms*	product specific	User	6274
		3.2.7.8	*Device alarms*	product specific	User	6274
		3.2.7.9	*Simulation alarms (group 1)*	product specific	User	6276
		3.2.7.10	*Simulation alarms (group 2)*	product specific	User	7010
		3.2.7.11	*CH1 alarms*	product specific	User	6274
		3.2.7.12	*Input/output alarms (group 1)*	product specific	User	6278
		3.2.7.13	*Input/output alarms (group 2)*	product specific	User	6276
		3.2.7.14	*Dosing alarms*	product specific	User	6278
3.2.8	Alarm class assignment	3.2.8.8	*148 Transm. temp above alarm limit*	product specific	User	6329
		3.2.8.9	*149 Transm. temp below alarm limit*	product specific	User	6329

Note

Transmitter detailed events

Menu item 3.2.5 Transmitter detailed events is only visible in case an alarm with detailed alarm information is pending.

F.11   Menu item 3.3: Maintenance

Table F-15   Maintenance

Level 3		Level 4		Level 5		Default value [unit]	Access level	Modbus register
Menu ID	Name	Menu ID	Name	Menu ID	Name			
3.3.1	*Copy configuration*							
3.3.2	Spare part replace-ment	3.3.2.1	Transmitter	*3.3.2.1.1*	*Replace transmit-ter*		Expert	
				3.3.2.1.2	*Replace transmit-ter cassette*		Expert	
				3.3.2.1.3	*Replace sensor cassette*		Expert	
		3.3.2.2	Sensor	*3.3.2.2.1*	*Replace DSL*		Expert	
				3.3.2.2.2	*Replace sensor*		Expert	
3.3.3	Operating time	*3.3.3.1*	*Operating time*				Read only	6162
		3.3.3.2	*Operating time to-tal*				Read only	6160

F.12   Menu item 3.4: Diagnostics

Table F-16   Diagnostics

Level 3		Level 4		Level 5		Default value [unit]	Access level	Modbus register
Menu ID	Name	Menu ID	Name	Menu ID	Name			
3.4.1	Sensor	*3.4.1.1*	*Driver current*				Read only	2756
		3.4.1.2	*Pickup S1 am-plitude*				Read only	2758
		3.4.1.3	*Pickup S2 am-plitude*				Read only	2760
		3.4.1.4	*Max. Pickup Amplitude diff*				Read only	4208
		3.4.1.5	*Derived fre-quency*				Read only	2762
		3.4.1.6	*Offset*			0 [kg/s]	User	2133

Level 3		Level 4		Level 5		Default value [unit]	Access level	Modbus register
Menu ID	Name	Menu ID	Name	Menu ID	Name			
3.4.2	Temperature monitoring	3.4.2.1	Medium temperature	*3.4.2.1.1*	*Current value*		Read only	3010
		3.4.2.2	Transmitter electronics temperature	*3.4.2.2.1*	*Current value*		Read only	8200
				3.4.2.2.2	*Minimum*		Read only	10900
				3.4.2.2.3	*Timestamp at minimum*		Read only	10902
				3.4.2.2.4	*Maximum*		Read only	10918
				3.4.2.2.5	*Timestamp at maximum*		Read only	10920
		3.4.2.3	DSL temperature	*3.4.2.3.1*	*Current value*		Read only	3032
		3.4.2.4	Sensor frame temperature	*3.4.2.4.1*	*Current value*		Read only	3023

Level 3		Level 4		Level 5		Default value [unit]	Access level	Modbus register
Menu ID	Name	Menu ID	Name	Menu ID	Name			
3.4.3	Inputs and outputs	3.4.3.1	CH1 – output with HART	3.4.3.1.1	Loop current		Read only	6100
				3.4.3.1.2	Error status		Read only	7121
		3.4.3.2	CH2 – output	3.4.3.2.1	Operation mode		Read only	8801
				3.4.3.2.2	Totalized amount		Read only	8969
				3.4.3.2.2	Output frequency		Read only	8900
				3.4.3.2.2	Loop current		Read only	8803
				3.4.3.2.2	Digital output signal		Read only	8840
				3.4.3.2.3	Error status		Read only	Current output: 8828 Frequency output: 8903 Pulse output: 8972
				3.4.3.2.4	Pulse counter		Read only	8987
				3.4.3.2.5	Reset pulse counter			
		3.4.3.3	CH3 – input/ output	3.4.3.3.1	Operation mode		Read only	9101
				3.4.3.3.2	Output frequency		Read only	9200
				3.4.3.3.2	Digital output signal		Read only	9140
				3.4.3.3.2	Loop current		Read only	9103
				3.4.3.3.2	Current input value		Read only	10503
				3.4.3.3.2	Digital input value		Read only	9129
				3.4.3.3.2	Totalized amount		Read only	9269
				3.4.3.3.3	Error status		Read only	Current output: 9128 Current input: 10558 Frequency output: 9203 Pulse output:

Level 3		Level 4		Level 5		Default value [unit]	Access level	Modbus register
Menu ID	Name	Menu ID	Name	Menu ID	Name			
								9272
				3.4.3.3.4	*Pulse counter*		Read only	9287
				3.4.3.3.5	*Reset pulse counter*			
		3.4.3.4	**CH3 – relay**	*3.4.3.4.1*	*Digital output signal*		Read only	9140
		3.4.3.5	**CH4 – input/ output**	*3.4.3.5.1*	*Operation mode*		Read only	9301
				3.4.3.5.2	*Loop current*		Read only	9303
				3.4.3.5.2	*Digital output signal*		Read only	9340
				3.4.3.5.2	*Digital input value*		Read only	9329
				3.4.3.5.2	*Current input value*		Read only	10603
				3.4.3.5.2	*Totalized amount*		Read only	9469
				3.4.3.5.2	*Output frequency*		Read only	9400
				3.4.3.5.3	*Error status*		Read only	Current output: 9328 Current input: 10658 Frequency output: 9403 Pulse output: 9472
				3.4.3.5.4	*Pulse counter*		Read only	9487
				3.4.3.5.5	*Reset pulse counter*			
		3.4.3.6	**CH4 – relay**	*3.4.3.6.1*	*Digital output signal*		Read only	9340

F.13   Menu item 3.5: Peak values

Table F-17   Peak values

Level 3		Level 4		Default value [unit]	Access level	Modbus register
Menu ID	Name	Menu ID	Name			
3.5.1	Process value 1	*3.5.1.1*	*Process value*		User	11200
		3.5.1.2	*Minimum*		Read only	11208
		3.5.1.3	*Timestamp at minimum*		Read only	11210
		3.5.1.4	*Maximum*		Read only	11226
		3.5.1.5	*Timestamp at maximum*		Read only	11228
		3.5.1.6	*Reset*			
3.5.2	Process value 2	*3.5.2.1*	*Process value*		User	11201
		3.5.2.2	*Minimum*		Read only	11244
		3.5.2.3	*Timestamp at minimum*		Read only	11246
		3.5.2.4	*Maximum*		Read only	11262
		3.5.2.5	*Timestamp at maximum*		Read only	11264
		3.5.2.6	*Reset*			
3.5.3	Process value 3	*3.5.3.1*	*Process value*		User	11202
		3.5.3.2	*Minimum*		Read only	11280
		3.5.3.3	*Timestamp at minimum*		Read only	11282
		3.5.3.4	*Maximum*		Read only	11298
		3.5.3.5	*Timestamp at maximum*		Read only	11300
		3.5.3.6	*Reset*			
3.5.3	Process value 4	*3.5.4.1*	*Process value*		User	11203
		3.5.4.2	*Minimum*		Read only	11316
		3.5.4.3	*Timestamp at minimum*		Read only	11318
		3.5.4.4	*Maximum*		Read only	11334
		3.5.4.5	*Timestamp at maximum*		Read only	11336
		3.5.4.6	*Reset*			

F.14   Menu item 3.6: Characteristics

Table F-18   Characteristics

Level 3		Level 4		Default value [unit]	Access level	Modbus register
Menu ID	Name	Menu ID	Name			
3.6.1	*SIL variant*				Read only	6181
3.6.2	*Custody transfer (CT) variant*				Read only	6019
3.6.3	*Custody transfer (CT) active*				Read only	6199
3.6.4	Transmitter	*3.6.4.1*	*Composition*		Read only	
		3.6.4.2	*Hazardous area approval*		Read only	6144

Level 3		Level 4		Default value	Access level	Modbus register
Menu ID	Name	Menu ID	Name	[unit]		
3.6.6	Sensor	*3.6.6.1*	*Hazardous area approval*		Read only	4051
		3.6.6.2	*Maximum mass flow capacity*		Read only	2101
		3.6.6.3	*Calibration factor*		Read only	2402
		3.6.6.4	*Density calibration offset*		Read only	2428
		3.6.6.5	*Density calibration factor*		Read only	2430
		3.6.6.6	*Density compensation tube temperature*		Read only	2432
		3.6.6.7	*Density compensation sensor frame temperature*		Read only	2434
		3.6.6.8	*Material of wetted parts*		Read only	4078
3.6.7	Fraction order code				Read only	7746

Note

Menu item 3.6.7 "Fraction order code" is only visible if fraction has been ordered.

F.15 Menu item 3.7: SensorFlash

Table F-19   SensorFlash

Level 3		Level 4		Level 5		Default value [unit]	Access level	Modbus register
Menu ID	Name	Menu ID	Name	Menu ID	Name			
3.7.1	*Eject*							
3.7.2	*SensorFlash installed*						Read only	6164
3.7.3	*Capacity*						Read only	6564
3.7.4	*Free space*						Read only	6570

Level 3		Level 4		Level 5		Default value [unit]	Access level	Modbus register
Menu ID	Name	Menu ID	Name	Menu ID	Name			
3.7.5	**Data logging**	*3.7.5.1*	*Activation*			Off	User	11400
		3.7.5.2	*Data logging mode*			Log in-stantane-ous	User	11401
		3.7.5.3	*Logging interval*			5 [s]	User	11402
		3.7.5.4	**Process values**	*3.7.5.4. 1*	*Logging value 1*		User	11404
				3.7.5.4. 2	*Logging value 2*		User	11405
				3.7.5.4. 3	*Logging value 3*		User	11406
				3.7.5.4. 4	*Logging value 4*		User	11407
				3.7.5.4. 5	*Logging value 5*		User	11408
				3.7.5.4. 6	*Logging value 6*		User	11409
				3.7.5.4. 7	*Logging value 7*		User	11410
				3.7.5.4. 8	*Logging value 8*		User	11411
				3.7.5.4. 9	*Logging value 9*		User	11412
				3.7.5.4. 10	*Logging value 10*		User	11413
				3.7.5.4. 11	*Logging value 11*		User	11414
				3.7.5.4. 12	*Logging value 12*		User	11415
				3.7.5.4. 13	*Logging value 13*		User	11416
		3.7.5.5	**Advanced log-ging**	*3.7.5.5. 1*	*Register 1*		User	11404
				3.7.5.5. 2	*Register 2*		User	11405
				3.7.5.5. 3	*Register 3*		User	11406
				...	*...*		User	114..
				3.7.5.5. 90	*Register 90*		User	11493

F.16 Menu item 3.8: Simulation

Table F-20 Simulation

Level 3		Level 4		Level 5		Default value [unit]	Access level	Modbus register
Menu ID	Name	Menu ID	Name	Menu ID	Name			
3.8.1	Inputs and outputs	3.8.1.1	CH1 - output with HART	*3.8.1.1.1*	*Simulation*	Disabled	User	7114
				3.8.1.1.2	*Simulation value*	4.0 [mA]	User	7112
		3.8.1.2	CH2 - output	*3.8.1.2.1*	*Operation mode*		Read only	8801
				3.8.1.2.2	*Simulation*	Disabled	User	8973
				3.8.1.2.3	*Simulation value*	Current output: 0 [mA] Digital output: 0 Frequency output: 1.0 [Hz] Pulse output: 0.0 [pulses/s]	User	Current output: 8826 Digital output: 8865 Frequency output: 8906 Pulse output: 8978
		3.8.1.3	CH3 - input/output	*3.8.1.3.1*	*Operation mode*		Read only	9101
				3.8.1.3.2	*Simulation*	Disabled	User	9164
				3.8.1.3.3	*Simulated value*	Current input: 0 [mA] Digital input: 0 Digital output: 0 Frequency output: 1.0 [Hz]	User	Current input: 10506 Digital input: 9137 Digital output: 9165 Frequency output: 9206
		3.8.1.4	CH3 - relay	*3.8.1.4.1*	*Simulation*	Disabled	User	9164
				3.8.1.4.2	*Simulated value*	0	User	9165

Level 3		Level 4		Level 5		Default value [unit]	Access level	Modbus register
Menu ID	Name	Menu ID	Name	Menu ID	Name			
		3.8.1.5	CH4 - input/output	3.8.1.5.1	*Operation mode*		Read only	9301
				3.8.1.5.2	*Simulation*		User	9364
				3.8.1.6.3	*Simulation value*	Current input: 0 [mA] Current output: 0 [mA] Digital input: 0 Digital output: 0 Pulse output: 0.0 [pulses/s] Frequency output: 1.0 [Hz]	User	Current input: 10606 Current output: 9326 Digital input: 9337 Digital output: 9365 Pulse output: 9478 Frequency output: 9406
		3.8.1.6	CH4 - relay	3.8.1.6.1	*Simulation*	Disabled	User	9364
				3.8.1.6.2	*Simulated value*	0	User	9365

Level 3		Level 4		Level 5		Default value [unit]	Access level	Modbus register
Menu ID	Name	Menu ID	Name	Menu ID	Name			
3.8.2	Process values	3.8.2.3	Mass flow	3.8.2.3.1	*Simulation*		Read only	
				3.8.2.3.6	*Simulation value*	0 [kg/s]	User	2764
		3.8.2.4	Volume flow	3.8.2.4.1	*Simulation*		Read only	
				3.8.2.4.2	*Simulation value*	0 [m³/s]	User	2772
		3.8.2.5	Standard volume flow	3.8.2.5.1	*Simulation*	Disabled	User	7960
				3.8.2.5.2	*Simulation value*	0 [normal m³/s]	User	7961
		3.8.2.6	Density	3.8.2.6.1	*Simulation*		Read only	
				3.8.2.6.2	*Simulation value*	1000 [kg/m³]	User	2766
		3.8.2.7	Medium temperature	3.8.2.7.1	*Simulation*		Read only	
				3.8.2.7.4	*Simulation value*	0 [C]	User	2768
		3.8.2.9	Fraction	3.8.2.9.1	*Simulation*	Disabled	User	2768
				3.8.2.9.2	*Fraction A %*	0 [%]	User	7851
				3.8.2.9.3	*Fraction B %*	0 [%]	User	7853

Level 3		Level 4		Level 5		Default value [unit]	Access level	Modbus register
Menu ID	Name	Menu ID	Name	Menu ID	Name			
3.8.3	Alarms	3.8.3.1	Simulation mode			Off	User	6229
		3.8.3.2	Alarms	3.8.3.2.1	*Sensor alarms (group 1)*	0	User	6232
				3.8.3.2.2	*Sensor alarms (group 2)*	0	User	6234
				3.8.3.2.4	*Process alarms (group 1)*	0	User	6236
				3.8.3.2.5	*Process alarms (group 2)*	0	User	6238
				3.8.3.2.8	*Totalizers alarms*	0	User	6238
				3.8.3.2.9	*Device alarms*	0	User	6238
				3.8.3.2.10	*CH1 alarms*	0	User	6238
				3.8.3.2.11	*Input/output alarms (group 1)*	0	User	6242
				3.8.3.2.12	*Input/output alarms (group 2)*	0	User	6240
				3.8.3.2.13	*Dosing alarms*	0	User	6242
		3.8.3.3	NAMUR status signal			None	User	NAMUR: 6249 Standard: 6247

F.17 Menu item 3.9: Audit trail

Table F-21 Audit trail

Level 3	
Menu ID	Name
3.9.1	*Parameter change log*
3.9.2	*Clear parameter change log*
3.9.3	*FW update change log*
3.9.4	*Clear FW update change log*

F.18 Menu item 3.10: Self test

Table F-22   Self test

Level 3	
Menu ID	Name
3.10.1	*Display test*

F.19 Menu item 3.11: Resets

Table F-23   Resets

Level 3	
Menu ID	Name
3.11.1	*Factory reset*
3.11.2	*Device restart*

F.20 Menu item 4: Communication

Table F-24   Communication

Level 2		Level 3		Level 4		Default value [unit]	Access level	Modbus register
Menu ID	Name	Menu ID	Name	Menu ID	Name			
4.1	USB (Service channel)	*4.1.1*	*USB mode*				Read only	9594
		4.1.2	*Auto connection*			Enabled	User	9595
		4.1.3	*Mass storage access*					
				4.1.8.1	*Mass flow units*	product specific	User	7400
				4.1.8.2	*Volume flow units*	product specific	User	7500

Level 2		Level 3		Level 4		Default value [unit]	Access level	Modbus register
Menu ID	Name	Menu ID	Name	Menu ID	Name			
4.2	HART (CH1)	*4.2.1*	*Polling address (SW)*			0	User	8003
		4.2.2	*Polling address (HW)*				Read only	8005
		4.2.3	*Tag*				User	8100
		4.2.4	*HART device type*				Read only	8000
		4.2.5	*HART revision*				Read only	6018
		4.2.6	*Number of re- sponse pream- bles*			5	User	8004
		4.2.7	**Dynamic varia- ble mapping**	*4.2.7.1*	*SV selection*	product specific	User	7300
				4.2.7.2	*TV selection*	product specific	User	7301
				4.2.7.3	*QV selection*	product specific	User	7302
		4.2.8	**HART units**	*4.2.8.1*	*Mass flow units*	product specific	User	7400
				4.2.8.2	*Volume flow units comms*	product specific	User	7500
				4.2.8.3	*Standard vol- ume flow units comms*	product specific	User	7964
				4.2.8.4	*Fraction units*	product specific	User	Mass flow: 7865
				4.2.8.5	*Fraction units*	product specific	User	Volume flow: 7867
				4.2.8.8	*Density units*	product specific	User	7600
				4.2.8.11	*Temperature units*	product specific	User	7700
				4.2.8.13	*Totalizer 1 units*	product specific	User	Mass flow: 8320 Volume flow: 8321 Standard volume flow: 8322
				4.2.8.14	*Totalizer 2 units*	product specific	User	Mass flow: 8420 Volume flow:

Level 2		Level 3		Level 4		Default value [unit]	Access level	Modbus register
Menu ID	Name	Menu ID	Name	Menu ID	Name			
								8421
								Standard volume flow:
								8422
					4.2.8.15	*Totalizer 3 units*	product specific	User	Mass flow:
								8520
								Volume flow:
								8521
								Standard volume flow:
								8522
		4.2.9	Damping	*4.2.9.1*	*Damping value*	0.0 [s]	User	6403
				4.2.9.2	*Process values*		User	6405

Level 2		Level 3		Level 4		Default value [unit]	Access level	Modbus register
Menu ID	Name	Menu ID	Name	Menu ID	Name			
4.3	Modbus (CH1)	4.3.1	Slave address (SW)			1	User	8297
		4.3.2	Slave address (HW)				Read only	8005
		4.3.3	Change Modbus settings					
		4.3.4	Data rate				Read only	8298
		4.3.5	Parity and stop-bits				Read only	8299
		4.3.6	Floating point byte order				Read only	8296
		4.3.7	Integer byte order				Read only	8295
		4.3.8	Register mapping				Expert	
				4.3.8.1	Enable mapping		User	10448
				4.3.8.2	Source register 1	65535	User	10450
				4.3.8.3	Target register 1	65535	User	10451
				...	...		User	...
				4.3.8.40	Source register 20	65535	User	10488
				4.3.8.41	Target register 20	65535	User	10489
		4.3.9	Modbus units	4.3.9.1	Mass flow units	product specific	User	7400
				4.3.9.2	Volume flow units comms	product specific	User	7500
				4.3.9.3	Standard volume flow units comms	product specific	User	7964
				4.3.9.4	Fraction units	product specific	User	Mass flow: 7865
				4.3.9.5	Fraction units	product specific	User	Volume flow: 7867
				4.3.9.8	Density units	product specific	User	7600
				4.3.9.11	Temperature units	product specific	User	7700
				4.3.9.12	Totalizer 1 units	product specific	User	Mass flow: 8320 Volume flow: 8321

Level 2		Level 3		Level 4		Default value [unit]	Access level	Modbus register
Menu ID	Name	Menu ID	Name	Menu ID	Name			
								Standard volume flow: 8322
				4.3.9.13	*Totalizer 2 units*	product specific	User	Mass flow: 8420 Volume flow: 8421 Standard volume flow: 8422
				4.3.9.14	*Totalizer 3 units*	product specific	User	Mass flow: 8520 Volume flow: 8521 Standard volume flow: 8522
		4.3.10	**Damping**	*4.3.10.1*	*Damping value*	0.0 [s]	User	6403
				4.3.10.2	*Process values*		User	6405
4.4	**PROFIBUS DP/PA**	*4.4.1*	*Slave address*				User	10880
		4.4.2	*Configuration flag acknowledge mode*				Expert	11198
		4.4.3	*GSD (General Station Description)*				Expert	10983
		4.4.4	*Active GSD (General Station Description)*				Expert	10966

* = only visible with ordering option S30. Not available for US customers.

Note

Menu items 4.1.2 "Auto connection" and 4.1.3 "Mass storage access" are only visible with ordering option S30 (SD-card accessibility via USB). Not allowed in USA by Patent.

F.21 Menu item 5: Security

Table F-25　Security

Level 2		Default value [unit]	Access level	Modbus register
Menu ID	Name			
5.1	*Change user PIN*		User/Expert	
5.2	*Change expert PIN*		Expert	7326
5.3	*Recovery ID*			
5.4	*PIN recovery*			
5.5	*Activate user PIN*			
5.6	*Deactivate user PIN*		Expert	
5.7	*Auto logout*	Off	User	9095
5.8	*Logout*			

F.22 Menu item 6: Language

Table F-26　Language

Level 1		Default value [unit]	Access level	Modbus register
Menu ID	Name			
6	*Language*	English	User	9002

SITRANS FC430
Operating Instructions, 09/2019, A5E39789392-AB

Custody Transfer

<div style="text-align: right; font-size: 2em;">**G**</div>

The SITRANS FC430 flowmeter can be ordered with custody transfer measurement for liquids other than water according to OIML R 117-1 with accuracy class 0.3.

Note

Ordering

Only flowmeters with local display ordered with Z-option "B31" (Custody Transfer) can be set to this mode.

When "B31" is specified, the transmitter specification nameplate shows "SW Function" as "CT standard".

Available versions:

- Standard: 7ME4613-XXXXX-XXX3-Z AXX+B31+EXX+FXX
- Hygienic: 7ME4623-XXXXX-XXX3-Z AXX+B31+EXX+FXX
- NAMUR: 7ME4713-XXXXX-XXX3-Z AXX+B31+EXX+FXX

G.1 Operating conditions

The operating conditions stated in the evaluation certificate may be reduced compared to the operating conditions stated on the product nameplates. A copy of the certificate is included on the SensorFlash and can be downloaded from the product webpage (www.siemens.com/FC430).

Note

Operating conditions

Only the operating conditions stated in the evaluation certificate are valid.

For identification of custody transfer evaluated devices, see Nameplate layout (Page 29).

G.2 Verification

Custody transfer requirements

All custody transfer devices are verified on site using reference measurements.

The device may only be used for applications subject to legal metrology once it has been verified on site by the Verification Authority. The associated seals on the device ensure this status.

NOTICE
Verification requirements
All flowmeters used for invoicing in applications subject to legal metrology controls must be verified by the Verification Authorities. The corresponding approvals and the country-specific requirements and regulations must be observed. The owner / user of the instrument is obliged to conduct and maintain subsequent verifications.
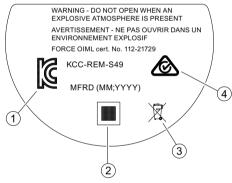
Verification process

The following description of the process for securing custody transfer operation of the flowmeter is general in nature and provided only for setup of the flowmeter in a separately approved flow application. Following these instructions alone does not constitute approved custody transfer operation. Refer to the relevant local authorities for requirements regarding custody transfer operation.

FCT030 transmitter: Nameplate with approval information

①	IC	Conformity with country-specific directives
②	QR code	Product-specific QR code
③	🗑	WEEE symbol, see Disposal (Page 153)
④	C✓	C-tick logo

Note

Custody transfer approval

Ensure that the "FORCE OIML cert. No." on the FCT030 transmitter approval nameplate is identical to the number on the evaluation certificate supplied with the flowmeter.

Ensure that the CT-approved flowmeter serial number is stated on both the sensor nameplate and on the transmitter nameplate ("Serial No.").

G.3 Setting up custody transfer mode

The device has to be operational and not yet set to custody transfer mode.

1. Configure the functions important for custody transfer measurement, such as the output setup (pulse, frequency), custody transfer variable and the measuring mode.

2. Once all the functions relevant to custody transfer have been configured, open the front lid and remove the display module to access the CT DIP switch group. The flowmeter is set to custody transfer mode by setting the DIP switch (4) in "ON" position as shown in the figure below.
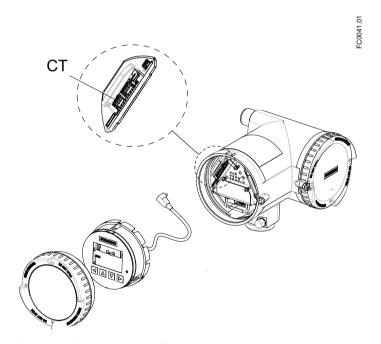
Figure G-1   CT switch (4) "ON"

Note

Protected parameters

Parameters protected in CT mode are listed in Parameter protection in custody transfer mode (Page 308).

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3. Remove lid lock screw of display lid.

4. Remove display lid.

5. Carefully pull out local display.

6. Set DIP switch to CT mode.

7. Carefully push display back into housing.

8. Remove O-ring from lid.

9. Reinstate display lid until mechanical stop. Wind back lid by one turn.

10. Mount O-ring by pulling it over the display lid and wind the lid in until you feel friction from the O-ring on both sides. Wind display lid by one quarter of a turn to seal on the O-ring.

11. Reinstate and tighten lid lock screw.

Sealing the flowmeter for CT operation

Seal device as shown in figures below. The seal should be crimped by the Approving Authority and may bear their mark.
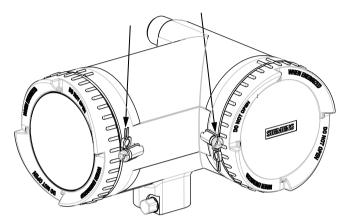
Figure G-2   Transmitter seals in place - compact version. Arrows indicate the seal points of the two lock screws
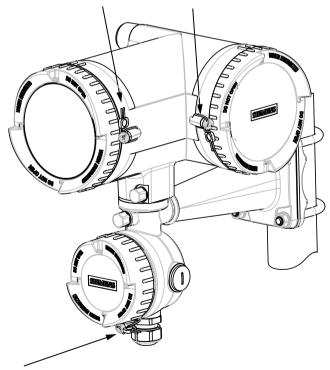
Figure G-3   Remote transmitter seals in place - termination variant. Arrows indicate the seal points of the three lock screws. The lock screw of the DSL must also be sealed
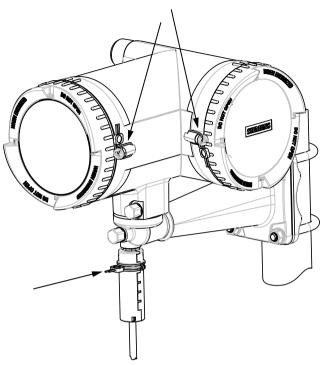
Figure G-4   Remote transmitter seals in place - M12 plug variant. Arrows indicate the seal points of the two lock screws and cable sealing
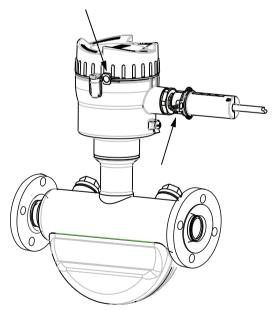
Figure G-5   Remote sensor seals in place - M12 variant. Arrows indicate the seal points of the lock screw and cable sealing

For remote variants with M12 plugs it is necessary to use the plug seals supplied with the flow sensor. The plug seal encases the M12 plug, preventing unauthorized removal of the sensor cable at either end.

The M12 plug is sealed in the following manner:

1. Make sure the M12 plug is correctly installed and tight in its socket.

2. Clip the two halves of the plug seal together around the plug and sensor cable as shown in the above figures.

3. Ensure that the plug seal is free to rotate without catching on the plug or cable. The seal assembly prevents unauthorized access by disabling any ability to unscrew the plug from its socket.

4. Close the seal with a seal wire and crimp the seal plumb.

The device is now prepared for custody transfer operation and may be used in applications subject to legal metrology controls.

G.4 Parameter protection in custody transfer mode

The CT mode provides an additional protection of set of parameters. These parameters are writable in non-CT mode but only readable in CT mode. In the following table the menus are entered in **bold** text and the parameters in *italic*.

For a complete list of parameters and description of levels, see appendix HMI menu structure (Page 237).

Table G-1   Parameters protected in CT mode

Level 2		Level 3		Level 4		Level 5	
No.	Name	No.	Name	No.	Name	No.	Name
2.1	**Sensor**	*2.1.1*	*Flow direction*				
		2.1.2	*Process noise damping*				
		2.1.3	**Zero point adjustment**	*All parameters*			
		2.1.4	**Aerated flow**	*2.1.4.1*	*Aerated flow filter*		
				2.1.4.2	*Filter time constant*		
				2.1.4.3	*Alarm limit*		
				2.1.4.4	*Warning limit*		
				2.1.4.5	*Measurement sample time*		
				2.1.4.6	*Filter start hysteresis*		
				2.1.4.7	*Minimum filtering Time*		
				2.1.4.8	*Filter iteration*		
				2.1.4.9	*Bandwidth factor*		
				2.1.4.10	*Filter pole shift*		

Level 2		Level 3		Level 4		Level 5	
No.	Name	No.	Name	No.	Name	No.	Name
2.2	**Process values**	**2.2.1**	**Mass flow**	*2.2.1.3*	*Custom conversion factor*		
				2.2.1.4	*Decimal places*		
				2.2.2.5	*Low flow cut-off*		
				2.2.1.7	*Flow adjustment*	*2.2.1.7.1*	*Flow adjustment factor*
		2.2.2	**Volume flow**	*2.2.2.3*	*Custom conversion factor*		
				2.2.2.5	*Low flow cut-off*		
		2.2.3	**Standard volume flow**	**2.2.3.6**	**Standard density**	*2.2.3.6.2*	*Standard density source*
						2.2.3.6.3	*Fixed reference density*
						2.2.3.6.4	*Linear expansion coeff.*
						2.2.3.6.5	*Square expansion coeff.*
						2.2.3.6.6	*Standard temperature*
		2.2.5	**Density**	*2.2.5.3*	*Custom conversion factor*		
				2.2.5.6	**Density adjustment**	*2.2.5.10.1*	*Adjustment factor*
						2.2.5.10.2	*Adjustment offset*
				2.2.5.7	Empty tube detection		
				2.2.5.8	Empty tube limit		
		2.2.7	**Fraction**	*2.2.7.1*	*Measurement mode*		
				2.2.7.2	*Unit*		
				2.2.7.3	*Active fraction*		
				2.2.7.4	*Fraction name*		
				2.2.7.5	**Fraction A**	*2.2.7.5.1*	*Fraction A label*
				2.2.7.6	**Fraction B**	*2.2.7.6.1*	*Fraction B label*
				2.2.7.9	**Fraction adjustment**	*2.2.7.9.1*	*Adjustment factor*
						2.2.7.9.2	*Fraction offset*

Level 2		Level 3		Level 4		Level 5	
No.	Name	No.	Name	No.	Name	No.	Name
2.3	**Totalizer**	**2.3.1**	**Totalizer 1**	*2.3.1.1*	*Process values*		
				2.3.1.2	*Units*		
				2.3.1.5	*Decimal places*		
				2.3.1.6	*Direction*		
				2.3.1.7	*Fail-safe mode*		
				2.3.1.8	*Reset*		
				2.3.1.9	*Preset*		
		2.3.2	**Totalizer 2**	*2.3.2.1*	*Process values*		
				2.3.2.2	*Units*		
				2.3.2.5	*Decimal places*		
				2.3.2.6	*Direction*		
				2.3.2.7	*Fail-safe mode*		
				2.3.2.8	*Reset*		
				2.3.2.9	*Preset*		
		2.3.3	**Totalizer 3**	*2.3.3.1*	*Process values*		
				2.3.3.2	*Units*		
				2.3.3.5	*Decimal places*		
				2.3.3.6	*Direction*		
				2.3.3.7	*Fail-safe mode*		
				2.3.3.8	*Reset*		
				2.3.3.9	*Preset*		
		2.3.4	*Reset all totalizers*				
2.4	**Inputs/ Outputs**	**2.4.1**	**Channel 1 – output with HART**	*All parameters*			
		2.4.2	**Channel 2 – output**	*All parameters*			
		2.4.3	**Channel 3 – Input/output**	*All parameters*			
		2.4.4	**Channel 3 – relay**	*All parameters*			
		2.4.5	**Channel 4 – Input/output**	*All parameters*			
		2.4.6	**Channel 4 – relay**	*All parameters*			
3.2	**Diagnostic events**	*3.2.3*	*Clear diagnostic log*				
3.3	**Mainte- nance**	**3.11**	**Resets**	*3.11.2*	*Device restart*		

Level 2		Level 3		Level 4		Level 5	
No.	Name	No.	Name	No.	Name	No.	Name
3.8	Simulation	3.7.1	Simulate Input/Outputs	3.8.1.1	Channel 1 – output with HART	*All parameters*	
				3.8.1.2	Channel 2 - output	*All parameters*	
				3.8.1.3	Channel 3 – input/ output	*All parameters*	
				3.8.1.4	Channel 3 relay	*All parameters*	
				3.8.1.5	Channel 4 – input/ output	*All parameters*	
				3.8.1.6	Channel 4 relay	*All parameters*	
				3.7.1.3	Signal output (3)	*3.7.1.3.1*	*Simulation*
						3.7.1.3.2	*Simulated Value*
						3.7.1.3.3	*Simulation*
						3.7.1.3.4	*Simulated Value*
						3.7.1.3.5	*Simulation*
						3.7.1.3.6	*Simulated Value*
						3.7.1.3.7	*Simulation*
						3.7.1.3.8	*Simulated Value*
		3.8.2	Simulation Process Values	*All parameters*			
		3.9.2	*Clear parameter change log*				
		3.9.4	*Clear FW update log*				
4.2	HART Units	*4.7.8*	*Totalizer 1 Unit*				
		4.7.9	*Totalizer 2 Unit*				
		4.7.10	*Totalizer 3 Unit*				

Note

Reset of totalizers

The reset functions (totalizer 1, totalizer 2, and all totalizers) are not available in CT mode.

G.5 Disabling custody transfer mode

The device has to be operational and already set to custody transfer mode.

1. Remove the custody transfer seals.

> ⚠ **WARNING**
>
> **Explosion-protected equipment**
>
> If handling explosion-protected equipment, observe a cooling or discharge time of 10 minutes before opening the device.

2. Remove lid lock screw of display lid.

3. Remove display lid.

4. Carefully pull out local display.

5. Set DIP switch (4) in "OFF" position to enable operation in non-CT mode.

OFF
ON

1 2 3 4

FC0033.01

Figure G-6   CT switch (4) "OFF"

6. Carefully push display back into housing.

7. Remove O-ring from lid.

8. Reinstate display lid until mechanical stop. Wind back lid by one turn.

9. Mount O-ring by pulling it over the display lid and wind lid in until you feel friction from the O-ring on both sides. Wind the lid further by one quarter of a turn to seal on the O-ring.

10. Reinstate and tighten lid lock screw. Do not install seals on the lid lock screws.

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