SIEMENS

SITRANS F

Coriolis flowmeters

SITRANS FC430 with HART

Operating Instructions

Edition 05/2015

Answers for industry.

SIEMENS

SITRANS F

Coriolis Flowmeters FC430 with HART

Operating Instructions

These Operating Instructions apply to Siemens products SITRANS FC430 with order codes commencing 7ME4613, 7ME4623 and 7ME4713

05/2015

A5E03361511-AF

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.

Siemens AG
Division Process Industries and Drives
Postfach 48 48
90026 NÜRNBERG
GERMANY

Order number: A5E03361511
℗ 05/2015 Subject to change

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Introduction 1

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

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

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

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

1.1 History

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

Edition	Remarks	EDD version	FW revision
03/2012	• First edition	• SIMATIC PDM driver 1.00.00	
06/2012	• CT chapter included	• SIMATIC PDM driver 1.00.00	• Standard version: – Compact: 3.00.00-10 – Remote: 2.00.00-30 • CT version: – Compact: 3.00.00-11 – Remote: 2.00.00-31
12/2013	• Various LUI functions, for example wizards • Various transmitter functionalities	• SIMATIC PDM driver 2.00.00-** • AMS Device Manager 2.00.00-** • SITRANS DTM 2.00.00-** • 375 Field Communicator 2.00.00-**	• Compact version: 3.02.0*-** • Remote version: 2.02.0*-**

Edition	Remarks	EDD version	FW revision
05/2014	• Description of new parameters for spare part replacement	• SIMATIC PDM driver 3.00.00-** • AMS Device Manager 3.00.00-** • SITRANS DTM 3.00.00-** • 375 Field Communicator 3.00.00-**	• Compact version: 3.02.01-** • Remote version: 2.02.01-**
05/2015	• Aerated Flow parameters added	• SIMATIC PDM driver HART EDD: 4.00.00-00 ** • SIMATIC PDM driver MODBUS: 4.00.00-00 ** • AMS Device driver HART: 4.00.00-02 ** • SITRANS DTM HART: 4.00.00-00 ** • 375 Field Communicator HART: 4.00.00-02 **	• Compact version: 3.02.02-01 ** • Remote version: 2.02.02-01 **

1.2 Compatibility

FW/HW revisions and EDD versions compatibility

Table 1- 1 Remote version

FW revision	HW revision	HART EDDs (PDM/AMS/DTM/HCF)
2.00.0x-xx	01	V 1.00.00-xx, Revision 1
2.02.00-xx	02	V 2.00.00-xx, Revision 2
2.02.02-xx	02	V 4.00.00-xx, Revision 3

Table 1- 2 Compact version

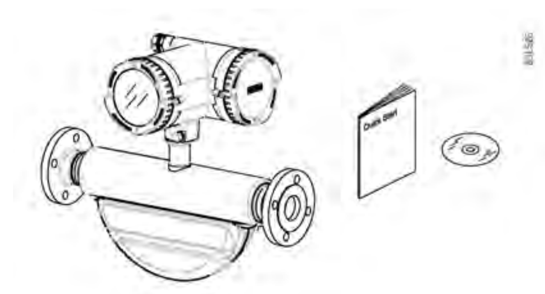
FW revision	HW revision	HART EDDs (PDM/AMS/DTM/HCF)
3.00.0x-xx	01	V 1.00.00-xx, Revision 1
3.02.00-xx	02	V 2.00.00-xx, Revision 2
3.02.02-xx	02	V 4.00.00-xx, Revision 3

1.3 Items supplied

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

Compact system

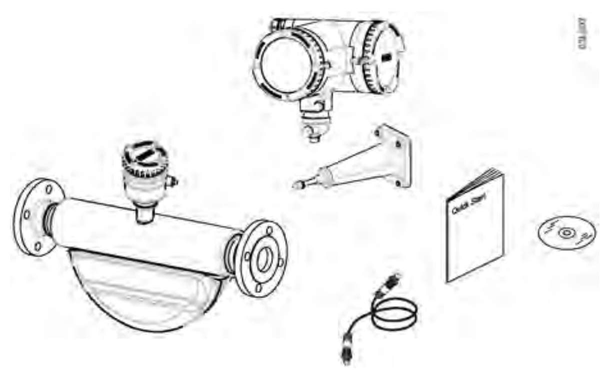
- SITRANS FC430 sensor and compact mounted transmitter
- Packet of cable glands
- Quick Start guide
- CD containing software, certificates and device manuals



Remote system

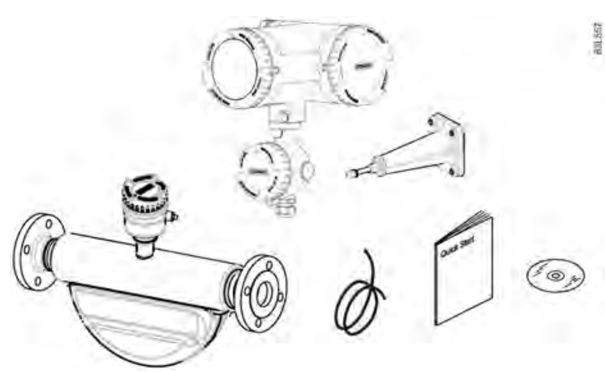
Remote with M12 plug connection

- SITRANS FCS400 sensor
- SITRANS FCT030 transmitter with M12 socket assembled
- Mounting bracket and cushion pad
- Sensor cable with M12 connector
- Packet of cable glands
- Quick Start guide
- CD containing software, certificates and device manuals



Remote with sensor terminal housing

- SITRANS FCS400 sensor
- SITRANS FCT030 transmitter with terminal housing assembled
- Mounting bracket and cushion pad
- Sensor cable
- Packet of cable glands
- Quick Start guide
- CD containing software, certificates and device manuals



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.

1.4 Checking the consignment

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

Danger of explosion in hazardous areas.

- Do not use damaged or incomplete devices.

1.5 Device identification

Each part of the FC430 Coriolis flowmeter has three nameplate types showing the following information:

- product identification
- product specifications
- certificates and approvals

Note

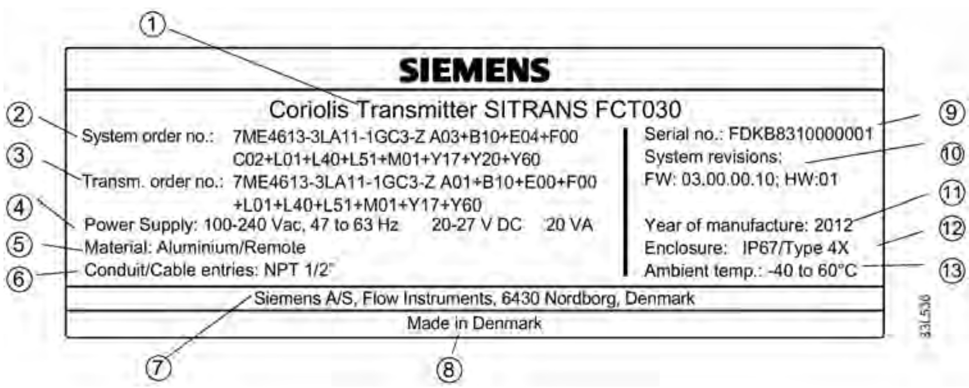
Identification

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

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 'Coriolis transmitter SITRANS FCT030' and the sensor as 'Coriolis sensor SITRANS FCS400'.

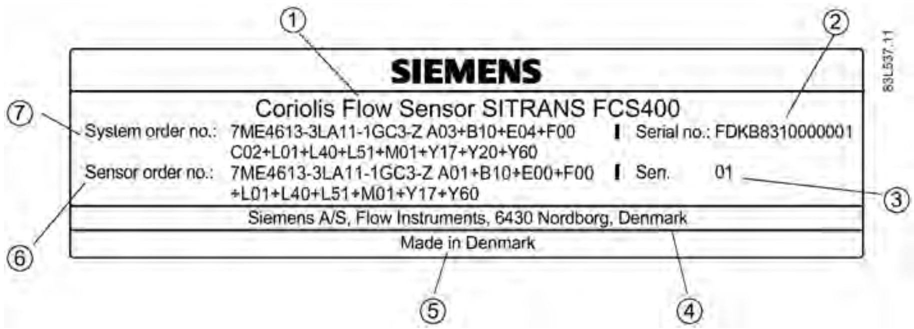
FCT030 transmitter identification nameplate



①	Product name	Transmitter product name
②	System order no.	Device-specific system order number (transmitter and sensor)
③	Transm. order no.	Transmitter replacement order number
④	Power Supply	Power supply
⑤	Material	Transmitter housing material and style (compact/remote)
⑥	Conduit / cable entries	Type of conduit / cable entries
⑦	Manufacturer	Manufacturer name and location
⑧	Country	Manufacturing country
⑨	Serial no.	Transmitter serial number
⑩	System revisions	System revision numbers; firmware (FW) and hardware (HW)
⑪	Year of Manufacture	Manufacturing year More detailed manufacturing date information is given in the serial number (see sensor identification nameplate above)
⑫	Enclosure IP	Degree of protection
⑬	Ambient temp.	Ambient temperature

Figure 1-1 FCT030 identification nameplate example

FCS400 sensor identification nameplate



①	Product name	Sensor product name
②	Serial no.	Sensor serial number
③	Sen.	Mechanical sensor version number
④	Manufacturer	Manufacturer name and location
⑤	Country	Manufacturing country
⑥	Sensor order no.	Sensor replacement order number
⑦	System order no.	Flowmeter system order number (transmitter and sensor)

Figure 1-2 FCS400 identification nameplate example

Flowmeter serial number construction

The flowmeter serial number is constructed as follows:

PPPYMDDxxxxxx

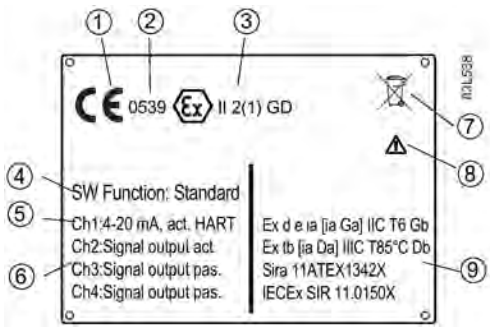
where
PPP = Production factory (Siemens Flow Instruments: FDK)
Y = Production year (for encryption, see below)
M = Production month (for encryption, see below)
DD = Production date (for encryption, see below)
xxxxxx = Sequential number

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
Date (DD)	**Code**
Day 1 to 31	01 to 31 (corresponding to the actual date)

FCT030 transmitter specification nameplate



①	CE	CE mark
②	0539	ATEX Notified Body ID (UL-DEMKO)
③	Ex	Ex mark Installation in hazardous locations (Page 23)
④	SW Function	Software function ("Standard" or "CT standard")
⑤	Ch1	Communication interface on channel 1 (always 4-20 mA with HART, active or passive)
⑥	Ch2 Ch3 Ch4	Input/output setup of channels 2 to 4, if ordered
⑦		WEEE symbol, see Return and disposal (Page 185)
⑧	⚠	Consult the operating instructions
⑨	Ex approvals	Ex approval specifications for the transmitter (ATEX example; for details on all approvals refer to Certificates and approvals HART (Page 209))

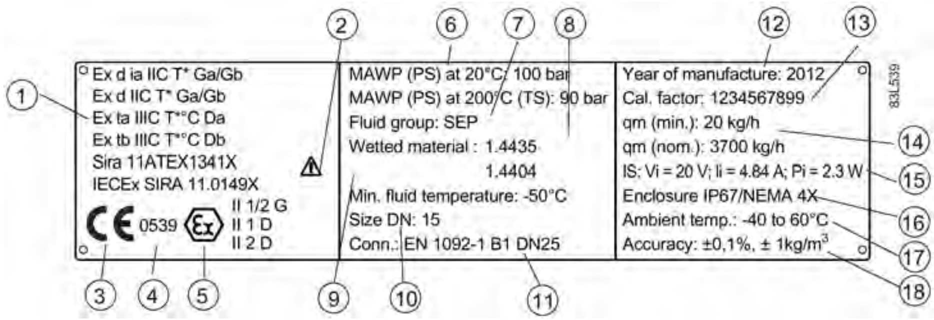
Figure 1-3 FCT030 specification nameplate example

Note

Approval identifications

Approval certificates and notified body identifications are available for download at www.siemens.com (http://support.automation.siemens.com/WW/view/en/60666565/134200).

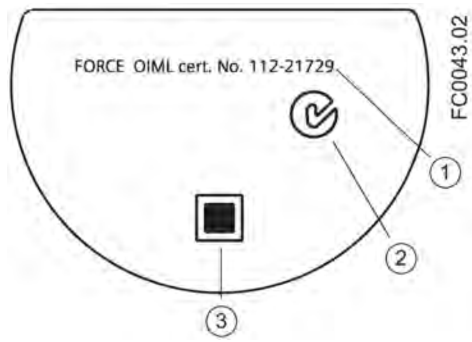
FCS400 sensor specification nameplate



①	Ex approvals	Ex approval specifications for the sensor (ATEX example; for details on all approvals refer to Certificates and approvals HART (Page 209))
②	⚠	Consult the operating instructions
③	CE	CE mark
④	0539	Notified Body ID (ATEX example)
⑤	Ex	Ex mark, Installation in hazardous locations (Page 23)
⑥	MAWP	Maximum allowable working pressures at 20 °C (68 °F) and 200 °C (392 °F) (max. temperature (TS))
⑦	Fluid group	Fluid group statement required by PED
⑧	Wetted material	Measuring tube/process connection materials
⑨	Min. fluid temperature	Minimum fluid temperature
⑩	Size DN	Nominal size
⑪	Conn.	Process connection type and size
⑫	Year of Manufacture	Manufacturing year More detailed manufacturing date information is given in the serial number found on the identification nameplate
⑬	Cal. Factor	Calibration factor
⑭	Qm (min) Qm (nom)	Minimum and nominal massflows with water at 20 °C (68 °F)
⑮	Power Supply	Power supply (not given on the compact variant because it is internal)
⑯	Enclosure IP	Degree of protection
⑰	Ambient Temp.	Ambient temperature range
⑱	Accuracy	Massflow, density calibration accuracy

Figure 1-4 FCS400 specification nameplate example

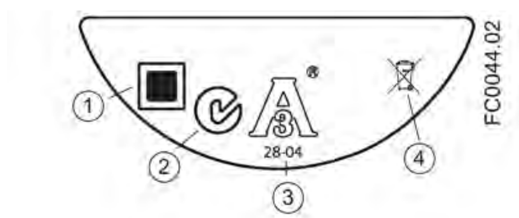
FCT030 transmitter approval nameplate



①	FORCE OIML	Custody Transfer evaluation certificate number
②	C✓	C-tick logo
③	QR code	Product-specific QR code

Figure 1-5 FCT030 approval nameplate example

FCS400 sensor approval nameplate



①	QR code	Product-specific QR code
②	C✓	C-tick logo
③	3A	3A logo
④		WEEE symbol, see Return and disposal (Page 185)

Figure 1-6 FCS400 approval nameplate example

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 location in Canada.

The Australian C-tick mark is mandatory on all products.

FCS400 EHEDG nameplate

FC0042.01

Figure 1-7 EHEDG nameplate

This nameplate appears on all Hygienic sensors 7ME462.

Other label

Figure 1-8 How to install

The QR code provides direct internet connection to

- The product support portal, which includes access to the "How to Install" YouTube video. (This example provides that function.)
- Product and production-specific documentation maintained in the production database.

1.6 Further Information

Product information on the Internet

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

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

Worldwide contact person

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

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

Safety notes 2

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

---

Note

Functional safety applications (SIL)

In case the device is used in a functional safety application, refer to the functional safety manual.

2.1 Laws and directives

Observe the test certification, 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 (EC)

Conformity with European directives

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

Electromagnetic compatibility EMC 2004/108/EC	Directive of the European Parliament and of the Council on the approximation of the laws of the Member States relating to electromagnetic compatibility and repealing Directive 89/336/EEC.
Low voltage directive LVD 2006/95/EC	Directive of the European Parliament and of the Council on the harmonisation of the laws of Member States relating to electrical equipment designed for use within certain voltage limits.
Atmosphère explosible ATEX 94/9/EC	Directive of the European Parliament and the Council on the approximation of the laws of the Member States concerning equipment and protective systems intended for use in potentially explosive atmospheres.
Pressure equipment directive PED 97/23/EC	Directive of the European Parliament and of the Council on the approximation of the laws of the Member States concerning pressure equipment.

The applicable directives can be found in the EC conformity declaration of the specific device. Further country or region-specific code conformity information is available on request.

WARNING

Improper device modifications

Danger 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.

Note

CE declaration

The CE declaration certificate is required to be included with each flowmeter. The certificate is therefore available on the SensorFlash SD card delivered with the device.

2.2 Installation in hazardous locations

WARNING

Equipment used in hazardous locations

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

Hazardous area approvals

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

ATEX:

FCT030 transmitter (can be installed in Zone 1 for gas and Zone 21 for dust):
Certificate: SIRA 11ATEX1342X

II 2(1) GD
Ex d e [ia Ga] IIC T6 Gb Ta = -40°C to +60°C
Ex tb [ia Da] IIIC T85°C Db

FCS400 sensor + DSL (can be installed in Zone 1 for gas and Zone 20/21 for dust):
Certificate: SIRA 11ATEX1341X

II 1/2 G
1D
2D

For gas:
Ex d ia IIC T* Ga/Gb
Ex d IIC T* Ga/Gb
(Ga/Gb: Zone 20 in pipe and Zone 21 in environment)

For dust:
Ex ta IIIC T* °C Da
Ex tb IIIC T* °C Db
(Zone 20 ("ta") process and ambient temperature limited in comparison with Zone 21 ("tb")

Ta = -40°C to +60°C

* Temperature class (dependent on the process temperature and the ambient temperature")

FC430 compact system (can be installed in Zone 1 for gas and Zone 21 for dust):
Certificate: SIRA 12ATEX1102X

II 1/2 (1) G

II 2 D

Ex d e ia [ia GA] IIC T* Ga/Gb Ta = -40°C to ** °C
Ex tb [ia Da] IIIC T**°C Db
(Ga/Gb: Zone 20 in pipe and Zone 21 in environment)

* Temperature class (dependent on the "Maximum Process Temperature")
** Upper ambient temperature (dependent on the "Maximum Process Temperature")

IECEx:

FCT030 transmitter (can be installed in Zone 1 for gas and Zone 21 for dust):
Certificate: IECEx SIR 11.0150X
Ex d e ia [ia Ga] IIC T6 Gb Ta = -40°C to +60°C.
Ex tb [ia Da] IIIC T85°C Db

FCS400 sensor + DSL (can be installed in Zone 1 for gas and Zone 20/21 for dust):
Certificate: IECEx SIR 11.0149X

For gas:
Ex d ia IIC T* Ga/Gb
Ex d IIC T* Ga/Gb
(Ga/Gb: Zone 20 in pipe and Zone 21 in environment)

For dust:
Ex ta IIIC T* °C Da
Ex tb IIIC T* °C Db
(Zone 20 ("ta") process and ambient temperature limited in comparison with Zone 21 ("tb")

Ta = -40°C to +60°C

* Temperature class (dependent on the process temperature and the ambient temperature")

FC430 compact system (can be installed in Zone 1 for gas and Zone 21 for dust):
Certificate: IECEx SIR 12.0040X
Ex d e ia [ia Da] IIC Ga/Gb Ta= -40 to ** °C
Ex tb [ia Da] IIIC T ** °C Db

* Temperature class (dependent on the "Maximum Process Temperature")
** Upper ambient temperature (dependent on the "Maximum Process Temperature")

FM:

Transmitter (FCT030), Sensor with DSL (FCS400) and Compact (FC430):

Class I Division 1 Groups A,B,C,D T* (XP, IS)

Class II Division 1 Groups E,F,G

Class III Division 1 Group H (granulates)

Class I Zone 1 and Zone 21

Class 1 Zone 1 and Zone 20 (FCS400 remote)

Note

Control drawing

* See Control drawing: A5E31205486A

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 Vi to DSL is 20 VDC, Ii is maximum 484 mA, Pi < 2.3 W
- In Ex d installation Um is 24 VDC

Maximum temperature specifications for Ex use

FCS400 remote sensor with DSL

Temperature classification with and without dust is related to the process temperature and ambient temperature as listed below.

The maximum allowable process fluid temperatures with respect to temperature class for the device when used with potentially explosive gases in a maximum ambient temperature of +60°C are:

Ta (°C)	Maximum Process Temperature per Temperature Class (°C)			
	T6	T5	T4	T3
60	70	70	70	70
55	85	100	100	100
50	85	100	130	130
45	85	100	135	160
40	85	100	135	190
35	85	100	135	200
30	85	100	135	200

If the equipment is placed in a "tb" environment (Zone 21), the maximum process temperatures shall be as follows:

Ta (°C)	Maximum Process Temperature per Temperature Class (°C)
60	70
55	100
50	130
45	160
40	190
35	200
30	200

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.

If the equipment is placed in a "ta" environment (Zone 20), the maximum process temperature shall be as follows:

Ta (°C)	Maximum Process Temperature per Temperature Class (°C)
60	-40
55	-10
50	20
45	50
40	80
35	110
30	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 = Tprocess.

FC430 compact flowmeter

Temperature classification with and without dust is related to the process temperature and ambient temperature as listed below:

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
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.

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

Special conditions for safe use

In general, it is required that:

- The transmitter electronic space shall not be opened when energized and when an explosive gas or dust atmosphere may be present.
- The terminal space may be opened when an explosive gas or dust atmosphere may be present at any time. Access power terminals by lifting the cover only when de-energized.
- Appropriate cable connectors are used.
- Substitution of components may impair Intrinsic Safety.
- Sensor and transmitter are connected to the potential equalization throughout the hazardous area.
- EN/IEC 60079-14 is considered for installation in hazardous areas.

Further information and instructions including approval-specific special conditions for safe use in Ex applications can be found in the certificates on the accompanying literature CD and at www.siemens.com/FC430 (www.siemens.com/FC430).

WARNING

Laying of cables
Explosion hazard

Cable for use in hazardous locations 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.

WARNING

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

If the device has 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 danger 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 Chapter "Technical data (Page 193)".

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

2.3 Certificates

Certificates are posted on the online support portal (http://www.siemens.com/processinstrumentation/certificates) and can also be found on the documentation disk shipped with the device.

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.

Description

3

3.1 Applications

Measurement of liquids and gases

SITRANS F C Coriolis mass flowmeters are designed for measurement of a variety of liquids and gases. The flowmeters are multi-parameter devices offering accurate measurement of massflow, volumeflow, density, temperature and, depending on product variants, fraction, including industry-specific fractions.

Main 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

---

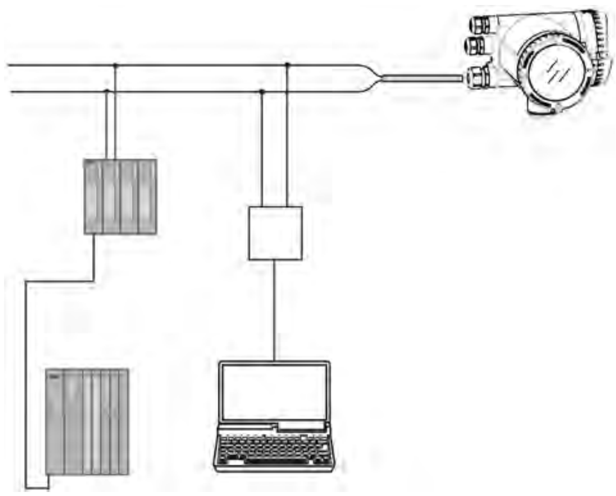
Note

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.

3.2 System configuration



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

- as a field mounted transmitter and display supplied only with the necessary auxiliary power
- as part of a complex system environment, for example SIMATIC S7

3.3 Design

Versions

The SITRANS FC430 flowmeter uses the Coriolis principle to measure flow and is available in a remote and a compact version.

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

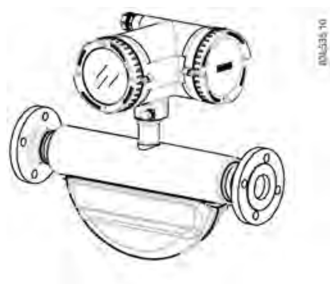


Figure 3-1 Compact version

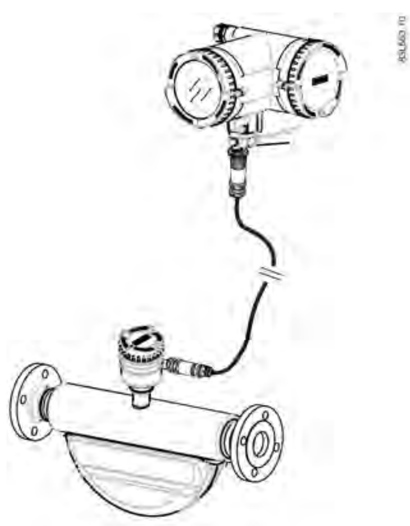


Figure 3-2 Remote version - M12 connection

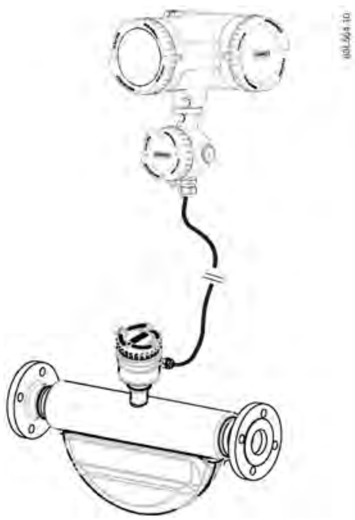


Figure 3-3 Remote version - terminated cable

Sensor design

All primary process measurement of massflow, volumeflow, 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 Hastelloy 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.

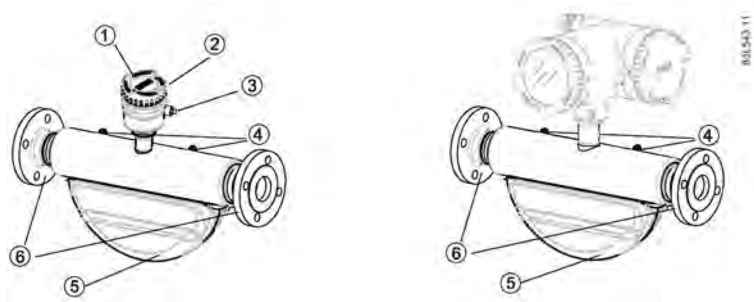
The sensor enclosure can be equipped with a pressure guard or flushed with dry inert gas at the threaded ports for non-hazardous applications only.

Note

Ex certification requires that the threaded ports always remain closed.

In the remote configuration, the sensor front end (DSL) is available in an aluminum enclosure 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

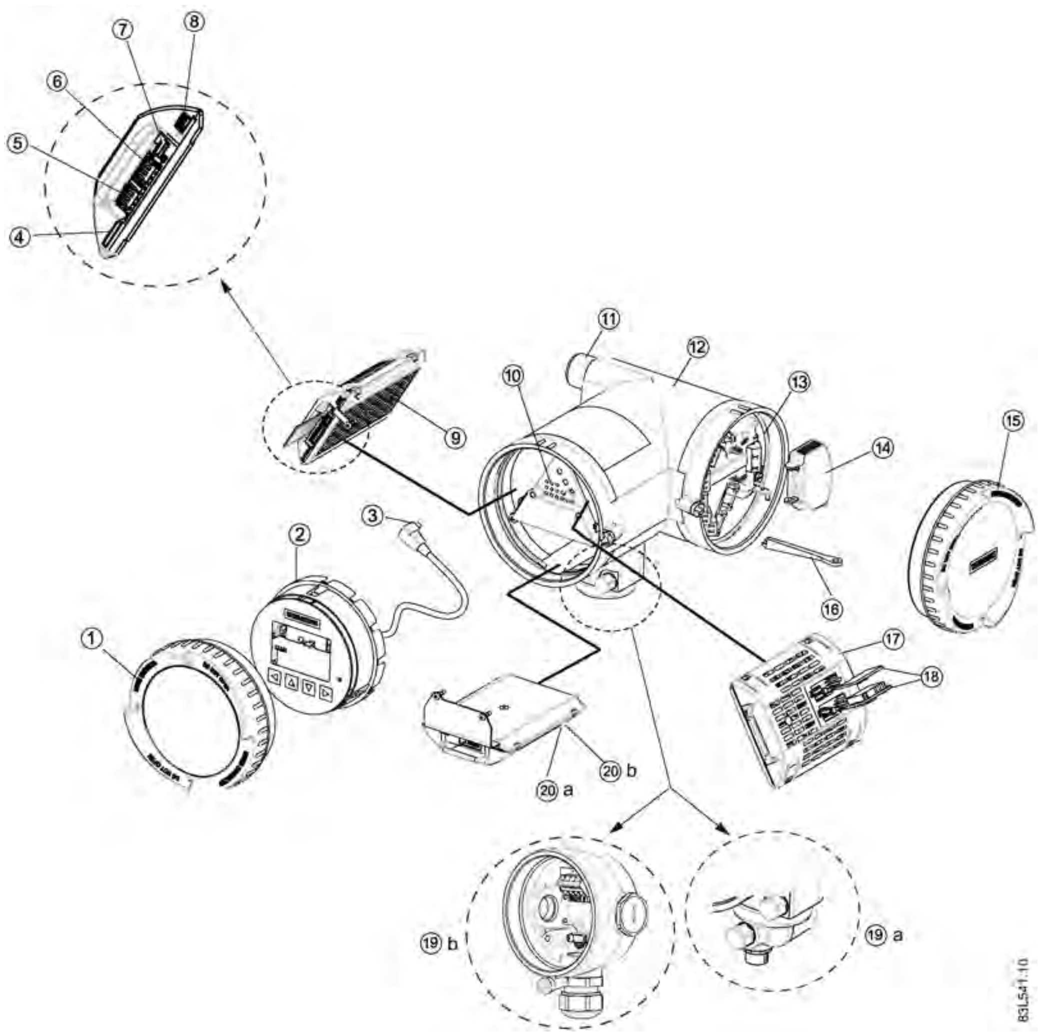
Figure 3-4 Overview, remote and compact configuration

Transmitter design

The transmitter reads the primary values from the sensor and calculates derived values. It provides four configurable I/Os, HART communication, and a local display (human machine interface - HMI). It also adds functionalities such as corrected volume flow, fractions, totalizers, dosing, access control, diagnostics, and configuration. The local user interface consists of a display and four buttons for user interaction.

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

Figure 3-5 Transmitter exploded view

3.4 Features

- The SITRANS FC430 can be used as HART slave in operation on SIEMENS SIMATIC S7/PCS7 or third party automation systems
- Available in compact and remote design
- Full graphical local display (HMI)
- SensorFlash (SD card) for memory backup and documentation storage (certificates etc.)
- One current output
  - Channel 1: Current output with HART (can be used for safety critical applications level SIL 2 with one flowmeter or SIL 3 with dual-redundant flowmeters, compact variant only)
- Three optional input/output channels:
  - Channel 2: Signal output; can be parameterized for:

    Current output (0/4-20 mA)

    Pulse output

    Frequency output

    One-stage dosing output

    Two-stage dosing output

    Alarm, status, flow direction
  - Channels 3 and 4: Signal output (as channel 2)

    Pulse or frequency redundancy mode (only channel 3)
  - Channels 3 and 4: Relay output; can be parameterized as:

    One-stage dosing output

    Two-stage dosing output

    Alarm, status, flow direction
  - Channels 3 and 4: Signal input; can be parameterized as:

    Dosing control

    Totalizer control (resetting of totalizers)

    Zero adjustment

    Setting or freezing a frequency at the digital outputs if these are set to 'Frequency'
- Current, frequency, and pulse outputs with configurable fail safe mode
- HART communication interface (HART 7.2)
- High immunity against process noise
- Fast response to step changes in flow
- High update rate (100 Hz) on all process values

- Measurement of:
  - Massflow
  - Volumeflow
  - Corrected volumeflow (including normalized gas flows)
  - Density
  - Process media temperature
  - Fraction A (massflow or volumeflow)
  - Fraction B (massflow or volumeflow)
  - Fraction A %
  - Fraction B %
- Configurable upper and lower alarms and warning limits for all process values
- Independent low flow cut-off settings for massflow and volumeflow
- Automatic zero-point adjustment (initiated by host system)
- Process noise damping using digital signal processing (DSP).
- Three totalizers for summation of massflow, volumeflow and corrected volumeflow, depending on setting, of:
  - Massflow measurement
  - Volumeflow measurement
  - Fraction A and B measurement (massflow or volumeflow)
  - Corrected volumeflow
- Empty tube monitoring
- Simulation of process values:
  - Massflow
  - Volumeflow
  - Corrected volumeflow
  - Density
  - Process media temperature
  - Fraction A %
  - Fraction B %
  - Frame temperature
- Simulation of all outputs
- Simulation and suppression of alarms
- Comprehensive diagnostics (NAMUR or Siemens standard) for troubleshooting and sensor checking
- Firmware update
- Use in hazardous locations according to specification

3.5 HART Communication Interface

System communication

Table 3- 1 HART protocol identification data

Manufacturer ID	42 (2A Hex)	Manufacturer ID parameter
Device type	34 (22 Hex)	Device type parameter
HART protocol revision	7.2	HART protocol revision parameter
Device revision	2	Device revision parameter

Note: Version numbers and other references shown above are typical or example values.

Device description files

Available EDD drivers:

- SIMATIC PDM
- FDT/DTM
- AMS suite
- 375 Field Communicator

The drivers can be downloaded here:

Download EDD drivers (http://www.siemens.com/flowdocumentation)

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, see position ⑥ in Figure 3-5 Transmitter exploded view (Page 34).

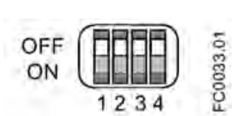


Figure 3-6 HART slave address switch

- 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.

- 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 4.1) or SIMATIC PDM

DIP switch configuration

Table 3- 2 HW polling address

Address	Switch 1	Switch 2	Switch 3	Switch 4
0	0	0	0	0
1	1	0	0	0
2	0	1	0	0
3	1	1	0	0
4	0	0	1	0
5	1	0	1	0
6	0	1	1	0
7	1	1	1	0
8	0	0	0	1
9	1	0	0	1
10	0	1	0	1
11	1	1	0	1
12	0	0	1	1
13	1	0	1	1
14	0	1	1	1
15	1	1	1	1

0: OFF; 1: ON

Mapping of measured process variables

The assignment of the measured process values to HART device variables (PV - primary variable; SV - secondary variable; TV - tertiary variable; and QV - quaternary variable) can be modified and assigned as desired via local user interface or via HART interface using SIMATIC PDM.

PV: The process value assigned to current output 1 (HMI menu item 2.4.1.1) is automatically assigned to PV.

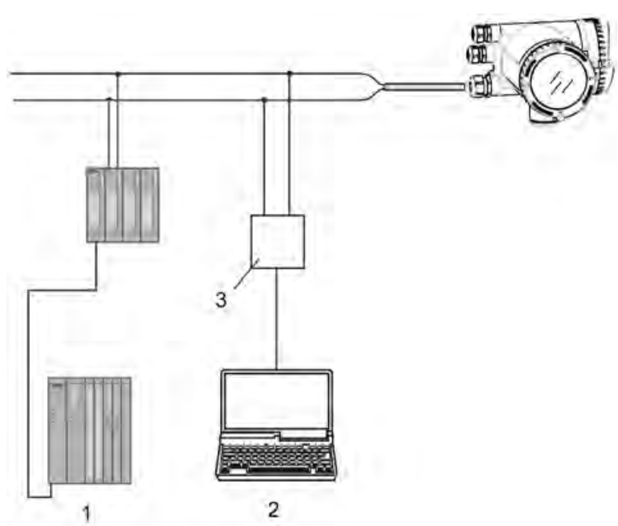
- Measured values for PV
  - Mass flow
  - Volume flow
  - Density

SV, TV, QV: Freely selectable (HMI menu item 4.6) from the list below.

- Measured values for SV, TV and QV
  - Massflow
  - Volumeflow
  - Density
  - Process media temperature
  - Corrected volumeflow
  - Fraction A massflow
  - Fraction A volumeflow
  - Fraction B massflow
  - Fraction B volumeflow
  - Fraction A %
  - Fraction B %
  - Reference density
  - Totalized value of totalizers 1, 2 or 3

Communication is via the HART protocol, using:

- HART Communicator (load 230 to 500 Ω)
- PC with HART modem, on which appropriate software is installed, for example SIMATIC PDM (load 230 to 500 Ω)
- Control system which can communicate via the HART protocol, for example SIMATIC PCS7



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

Figure 3-7 Possible system configurations

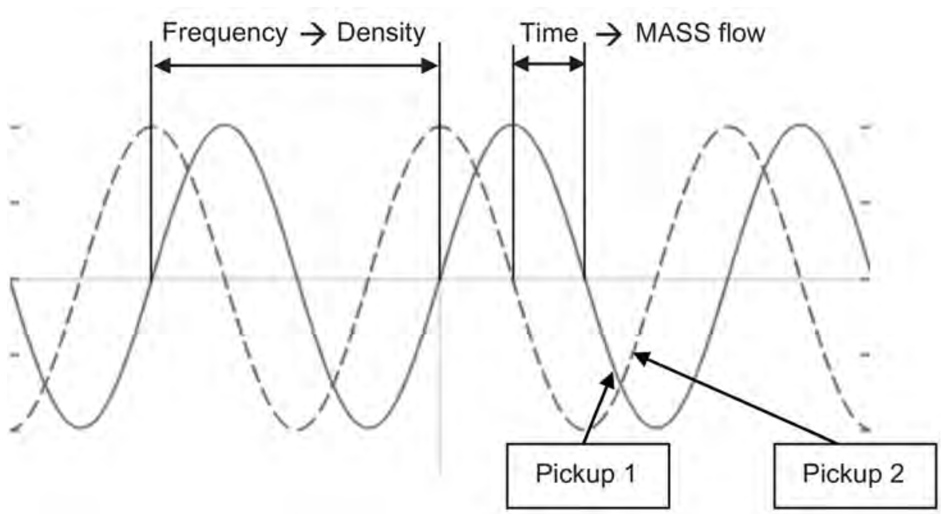
3.6 Theory of operation

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). Oscillation produced by a Coriolis flowmeter where the process media is accelerated around bends results in phase distortions of the measuring tubes.

The SITRANS F C sensors are energized by an electromagnetic (voice coil) 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 massflow 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.

Installing/mounting 4

4.1 Introduction

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

- Make sure that specifications for rated process pressure (PS) and media temperature (TS) plus ambient temperature that are indicated on the device nameplate / label will not be exceeded.

> **WARNING**
>
> **Installation in hazardous location**
>
> Special requirements apply to the location and installation of the device. See Installation in hazardous locations (Page 23).

4.2 Strong vibrations

> **CAUTION**
>
> **Damage to device**
>
> In plants with strong vibrations, mount the transmitter in a low vibration environment away from the sensor.

4.3 Transmitter installation

This chapter describes how to install the transmitter on a wall or pipe (remote configurations only). The chapter further describes how to turn the transmitter or the local display in order to optimize the viewing angle.

The following installation steps must be carried out:

1. Install the mounting bracket (Page 42) on a wall or pipe.
2. Install the transmitter on the mounting bracket (Page 43).
3. Turn the transmitter (Page 43) and/or turn the local display (Page 45) (optional).

> **CAUTION**
>
> **Aggressive atmospheres**
>
> Damage to device through penetration of aggressive vapors.
>
> - Ensure that the device is suitable for the application.

CAUTION

Direct sunlight

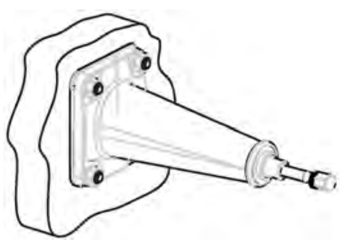
Device damage.

The device can overheat or materials become brittle due to UV exposure.

- Protect the device from direct sunlight.
- Make sure that the maximum permissible ambient temperature is not exceeded. Refer to the information in Chapter "Technical data (Page 196)".

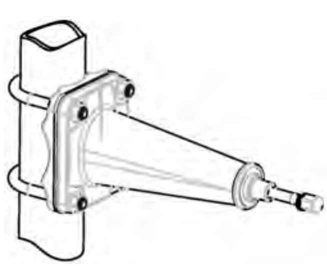
4.3.1 Wall mounting

1. Prepare holes with aid of mounting bracket, see Mounting bracket (Page 230).
2. Fasten mounting bracket with black cushion pad to wall (torque 10 Nm).



4.3.2 Pipe mounting

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).



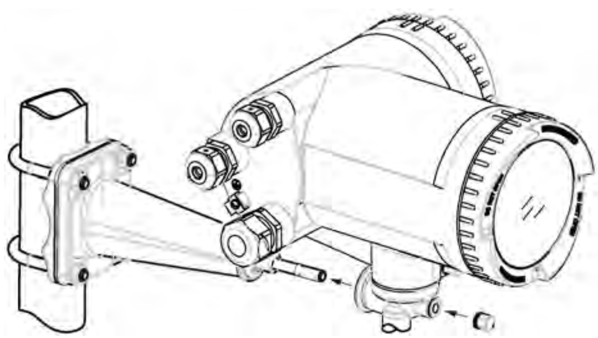
Note

Hygienic applications

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

4.3.3 Mounting the transmitter

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



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

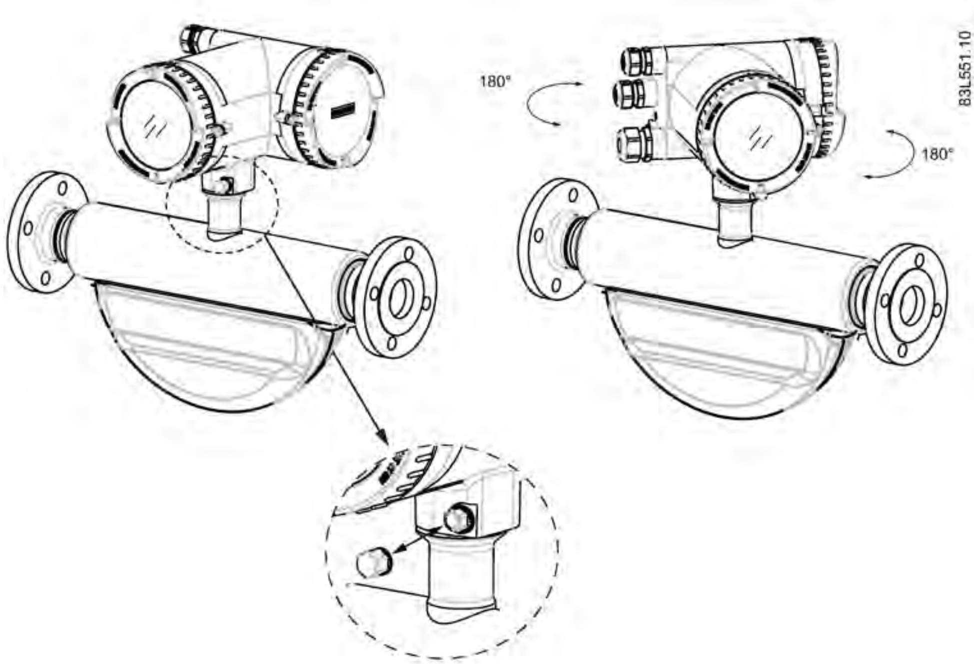
4.3.4 Turning the transmitter

In a remote configuration, the transmitter can be turned horizontally and tilted vertically. In a compact configuration, the transmitter can be turned horizontally only.

Horizontal rotation

1. Unscrew cap from lock screw.
2. Loosen lock screw at transmitter pedestal using 5 mm Allen key.

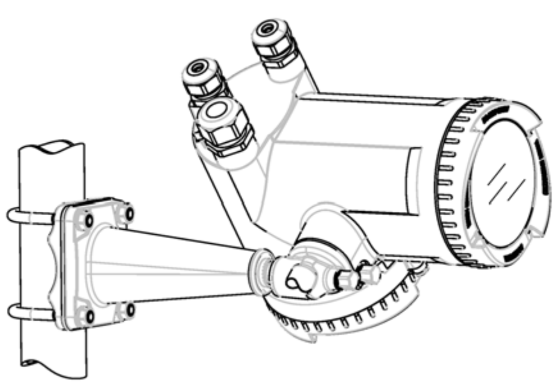
3. Carefully rotate transmitter into desired position.



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).

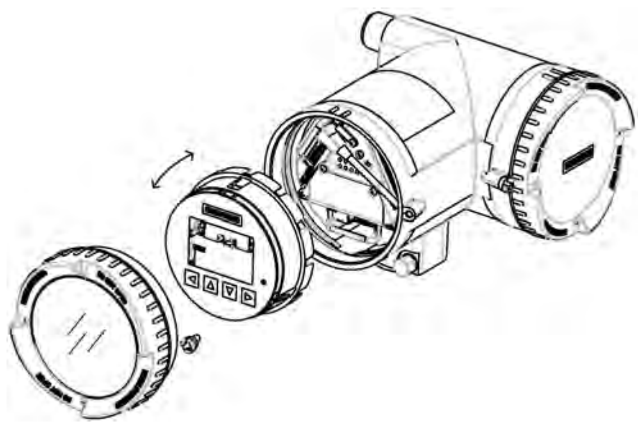


3. Firmly tighten locking cap (torque: 25 Nm).

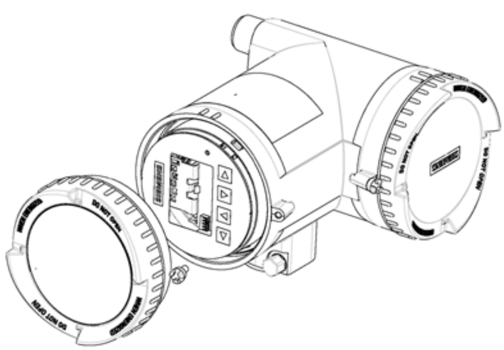
4.3.5 Turning the local display

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 housing. Use a small screwdriver or blade to open the three retaining clips within the transmitter when pushing the display home.



7. Remove O-ring from lid.
8. Reinstate 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. Reinstate and tighten lid lock screw.

4.4 Sensor installation

4.4.1 Installation safety precautions

WARNING

High pressure hazard

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

WARNING

Exceeded maximum permissible operating pressure

Danger of injury or poisoning.

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

- Make sure that the device is suitable for the maximum permissible operating pressure of your system. Refer to the information on the nameplate and/or in "Rated operating conditions (Page 196)".

CAUTION

Hot surfaces resulting from hot process media

Danger of burns resulting from surface temperatures above 70 °C (155 °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 Chapter "Rated operating conditions (Page 196)".

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.

WARNING

Wetted parts unsuitable for the process media

Danger of injury or damage to device.

Hot, toxic and corrosive media could be released if the process medium is unsuitable for the wetted parts.

- 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 201).

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.

4.4.2 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 not 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.

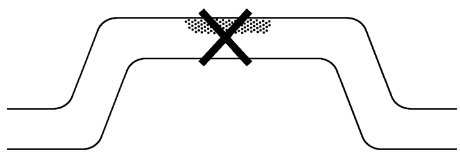


Figure 4-1 Liquid applications, wrong location with trapped air/gas

- 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.

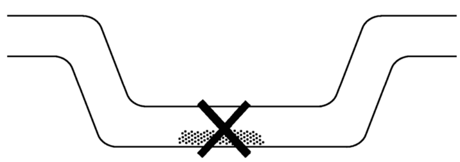


Figure 4-2 Gas applications, wrong location with trapped oil

4.4.3 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.

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)

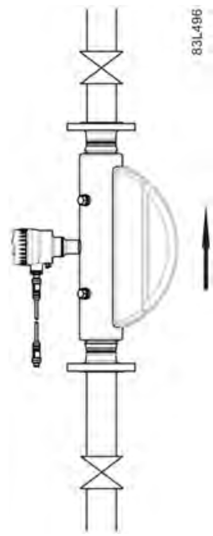


Figure 4-3 Vertical orientation, upwards flow

2. Horizontal installation, tubes down (recommended for liquid applications)

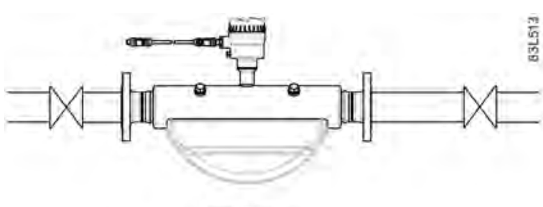


Figure 4-4 Horizontal orientation, tubes down

3. Horizontal installation, tubes up (recommended for gas applications)

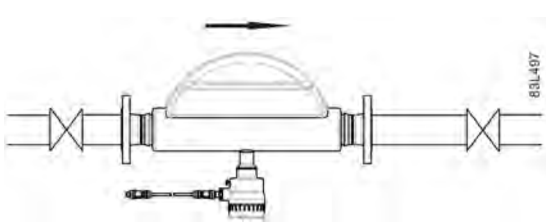


Figure 4-5 Horizontal orientation; tubes up

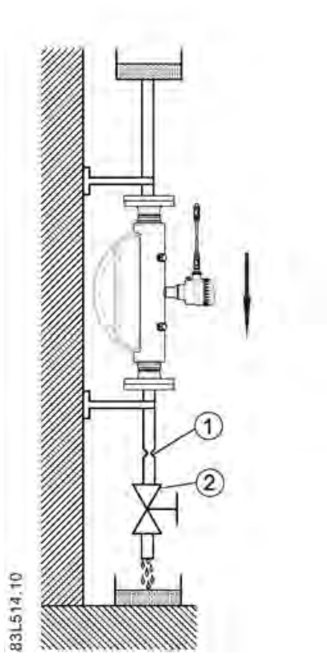
Note

Hygienic applications

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

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 4-6 Installation in drop line

4.4.4 Mounting the sensor

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 Installation torques (Page 207) for installation torque requirements.

WARNING
Unsuitable connecting parts
Danger 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.

- 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 correctly aligned before inserting the flow sensor.
- Install two supports or hangers symmetrically and stress-free on the pipeline in close proximity to the process connections.

Note

Handling

Never lift the flowmeter using the housing, that is always lift the sensor body.

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.

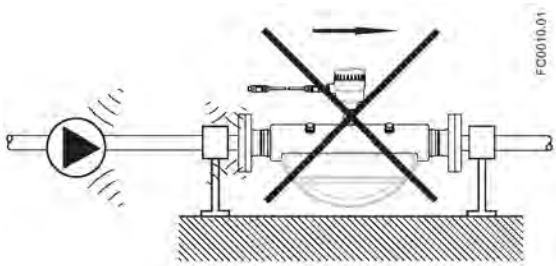


Figure 4-7 Non-flexible pipes not recommended in vibrating environment

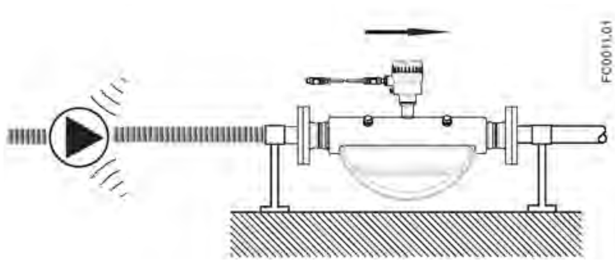


Figure 4-8 Flexible pipes recommended in vibrating environment

Avoid cross talk

If 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 tube or couplings

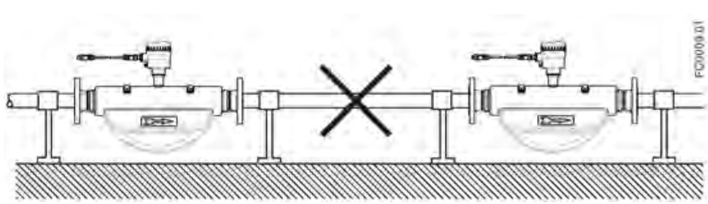


Figure 4-9 High risk of cross talk when using non-flexible pipes

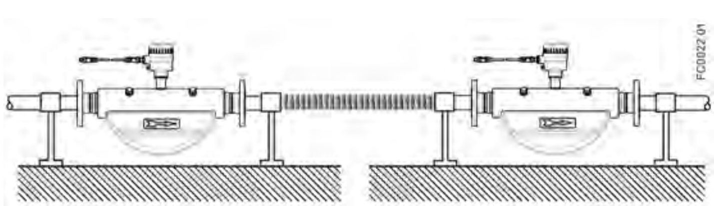


Figure 4-10 Low risk of cross talk when using flexible pipes and separate frames

4.4.5 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.

4.4.6 Mounting a 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.

Note

Non-hazardous locations only

A pressure guard can be applied only in non-hazardous locations.

Note

Avoid opening purge ports

Opening either of the purge ports will void any Ex rating for the sensor.

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.

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.

CAUTION

Drain flow

Ensure the drain flow is safely contained away from personnel and other plant or equipment.

Mounting of pressure guard

CAUTION

Moisture, liquids or particles getting into the sensor enclosure

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

- Avoid moisture, liquids or particles getting into the sensor enclosure

Install a pressure guard as follows:

1. Place the sensor in a dry, clean place and leave it to acclimatize until it reaches ambient temperature, preferred 20°C (68°F) with low humidity (at least below 50% RH).
2. Orient the sensor with the purge ports uppermost to minimize loss of the argon gas filling.
3. Carefully remove the plug and mount the pressure guard.
   Use replacement soft metal sealing rings for proper sealing.

   CAUTION

   Lack of proper sealing

   Soft metal sealing rings only maintain a hermetic seal within the enclosure with single use.

   - Ensure that soft metal sealing rings are not reused.

4. Make sure that the pressure guard does NOT touch any of the parts inside the sensor. Maximum of 20 mm (0.79") insertion can be accommodated.
5. Check that the pressure guard has been correctly mounted and thoroughly tightened (torque: 80 Nm).

   WARNING

   Operation in proximity with pressure guards

   Prevent personal injuries by assuring that operation in close proximity with pressure guards cannot take place.

Connecting 5

This chapter describes how to wire up the device.

The following steps must be carried out:

- Step 1: Connecting the DSL and the transmitter (Page 57) (only remote version)
- Step 2: Preparing for the transmitter connections (Page 61)
- Step 3: Connecting the power supply (Page 66)
- Step 4a: Connecting the current output HART (channel 1) (Page 68)
- Step 4b: Connecting the inputs and outputs (channels 2 to 4) (Page 69)
- Step 5: Finishing the transmitter connection (Page 72)

5.1 General safety requirements

⚠ WARNING

The pertinent regulations must be observed for electrical installation.

- Never install the device with the mains voltage switched on!
- Danger of electric shock!
- If the housing is under voltage (power supply), the cover may be unscrewed by qualified personnel only, except in classified hazardous locations.

⚠ 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

Wire insulation

Required cable: minimum AWG16 or 1.5 mm^2 Cu wire.

The insulation between the connected mains supply and 24 V AC/DC supply for the flowmeter must at least be rated with double or reinforced insulation at mains voltage.

5.2 Wiring in hazardous locations

Hazardous area applications

Special requirements apply to the location and interconnection of sensor and transmitter. See Installation in hazardous locations (Page 23).

WARNING

Terminal box

Before opening the terminal box check that:

- No explosion hazard exists
- All connection leads are potential free

WARNING

Grounding

The mains protective earth wire must be connected to the PE terminal.

5.3 Cable requirements

Cable specifications

- Only use cables with at least the same degree of protection as the sensor to install the sensor. It is recommended to use cables supplied by Siemens A/S, Flow Instruments:
  - blue cables for installation in hazardous areas
  - gray cables for installation in non-hazardous areas

  Further information on Siemens-supplied cables, see Cables and cable entries (Page 205).
- The wire length inside the terminal box, from the cable gland to the terminals, must be kept as short as possible. Wire loops in the terminal box must be avoided.
- To guarantee the IP67 degree of 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 noisy environments, it is recommended to use screened cables.

WARNING

Unprotected cable ends

Danger of explosion through unprotected cable ends in hazardous areas.

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

5.4 Safety notes for connecting

Use in hazardous locations

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

- No explosion hazard exists
- A safe access permission certificate has been issued by plant operations management
- All connection leads are potential free

WARNING

Hazardous locations

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.

5.5 Step 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 spaces)

A: Prepare the cable by stripping it at both ends.

Figure 5-1 Cable end

B: Connecting sensor terminal space

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. Ensure that the clamp does not earth the screen. Apply heat-shrink sleeve to make sure the screen is only earthed at the sensor end.

5. Connect wires to terminals according to list below.

Terminal number	Description	Wire color (Siemens)
1	+15 VDC	Orange
2	0 VDC	Yellow
3	B	White
4	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

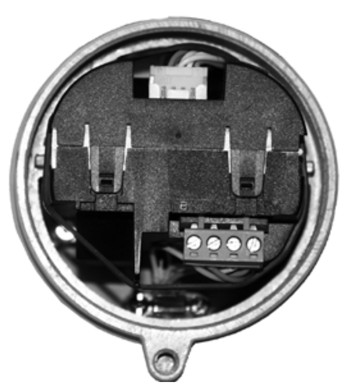
Connecting sensor DSL

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	+15 VDC	Orange
2	0 VDC	Yellow
3	B	White
4	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.

WARNING

Insufficient isolation of non-intrinsically safe and intrinsically safe circuits

Danger of explosion in hazardous areas.

- When connecting intrinsically safe and non-intrinsically safe circuits ensure that isolation is carried out properly in accordance with IEC/EN 60079-14.
- Make sure that you observe the device approvals applicable in your country.

5.6 Lack of equipotential bonding

WARNING

Lack of equipotential bonding

Danger of explosion through compensating currents or ignition currents through lack of equipotential bonding.

- Ensure that the device is potentially equalized.

5.7 Step 2: Preparing for the transmitter connections

WARNING

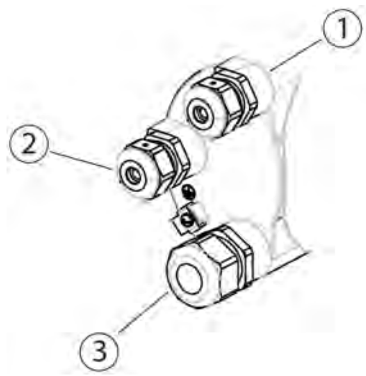
Access to terminal space

As long as the device is energized, the lid of the housing 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.

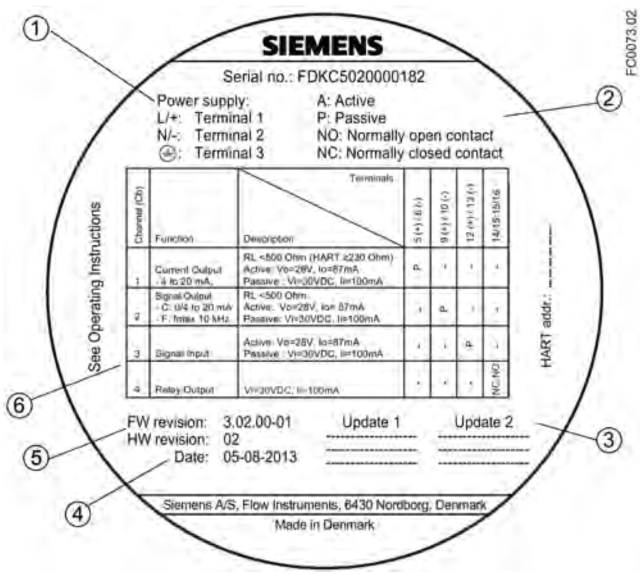
1. Remove blind plugs where required and mount cable glands.



① Input/output connection (channels 2 to 4)
② Power supply connection
③ Current output/HART connection (channel 1)

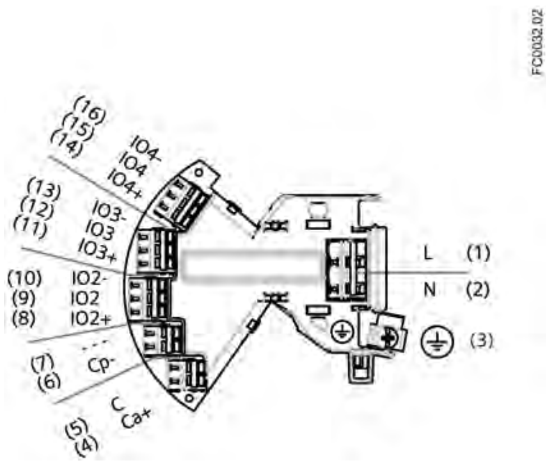
2. Remove lid lock screw for terminal connections lid.
3. Remove lid for terminal connections.

A label showing the configuration is placed at the back of the terminal connections lid.



①	Power supply connections	L/+	Terminal 1
		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 5-2 Configuration label



(1)	L/+	Line
(2)	N/-	Neutral
(3)	⏚	Ground
(4)	Ca+	Used in current output active configuration
(5)	C	Used in current output active and passive configuration
(6)	Cp-	Used in current output passive configuration
(7)	---	Not used
(8)	IO2+	Signal output channel 2 positive
(9)	IO2	Signal output channel 2 common
(10)	IO2-	Signal output channel 2 negative
(11)	IO3+	Input/output channel 3 positive
(12)	IO3-	Input/output channel 3 common
(13)	IO3	Input/output channel 3 negative
(14)	IO4+	Input/output channel 4 positive
(15)	IO4	Input/output channel 4 common
(16)	IO4-	Input/output channel 4 negative

Figure 5-3 Terminal layout

For configuration of the inputs/outputs, see table in section Step 4b: Connecting the inputs and outputs (channels 2 to 4) (Page 69). Only two terminals are available (active or passive) for any ordered configuration except relay output, where the changeover contact connection can be made.

WARNING

Unsuitable cables and/or cable glands

Danger of explosion in hazardous areas.

- Only use suitable cables and cable glands complying with the requirements specified in Chapter "Technical data (Page 205)".
- Tighten the cable glands in accordance with the torques specified in Chapter "Technical data (Page 207)".
- When replacing cable glands use only cable glands of the same type.
- After installation check that the cables are seated firmly.

WARNING

Open cable inlet or incorrect cable gland

Danger of explosion in hazardous areas.

- Close the cable inlets for the electrical connections. Only use cable glands or plugs which are approved for the relevant type of protection.

See also

Cables and cable entries (Page 205)

WARNING

Incorrect conduit system

Danger 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.

Wiring tool

Use the wiring tool for connecting the cables.

The wiring tool is located in the application terminal space.

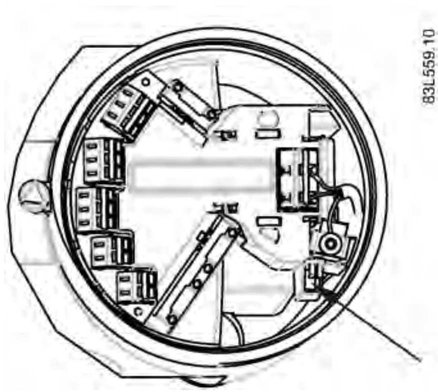
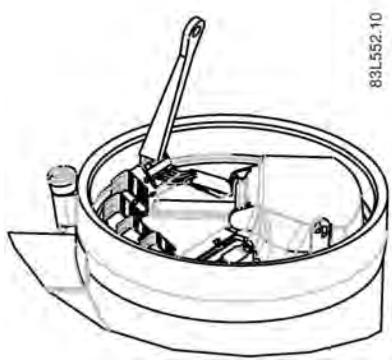


Figure 5-4 Wiring tool location

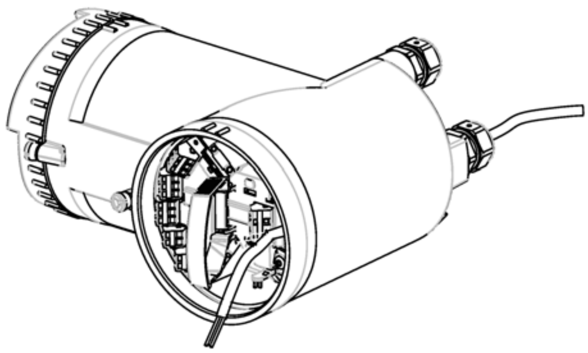


1. Insert wiring tool hook into receptor slot.
2. Press wiring tool wedge into top slot to spread clamp plates.
3. Insert wire.
4. Release wiring tool.

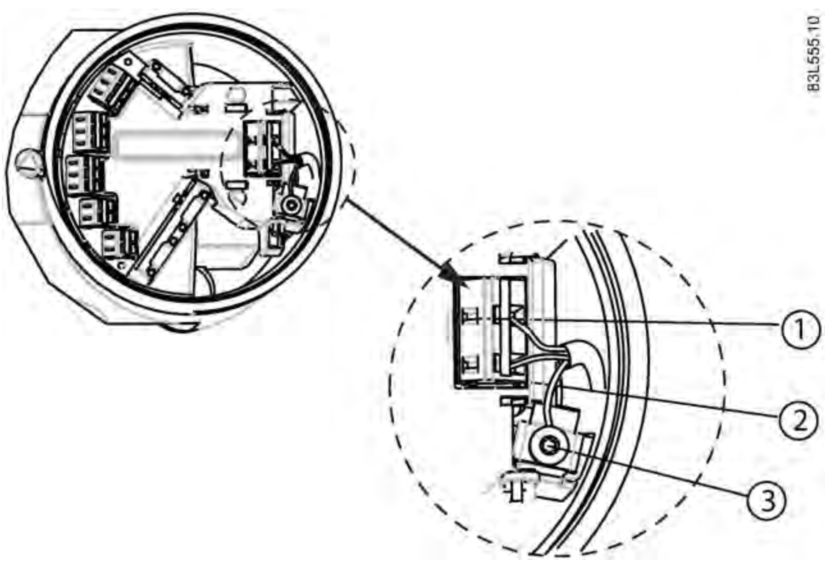
5.8 Step 3: Connecting the power supply

1. Flip open power supply terminal protection cover.
2. Remove cap and ferrule from cable gland and slide onto cable.

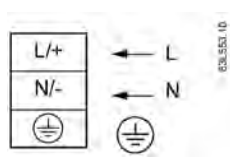
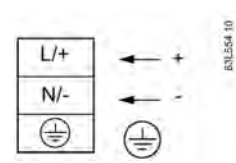
3. Push cable through open gland and cable path.



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	⏚

AC connection	DC connection
	
Power: 100 to 240 V AC +10/-15%, 47 to 63 Hz	Power: 20 to 27 V DC +10/-10%

6. Close and latch power supply terminal protection cover.
7. Tighten cable gland.

WARNING

Missing PE/ground connection

Danger of electric shock. Ensure the PE/ground connection is secure before applying power.

5.9 Step 4a: Connecting the current output HART (channel 1)

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 HART Communication Foundation (HCF) to use shielded cables for the HART communication.

WARNING

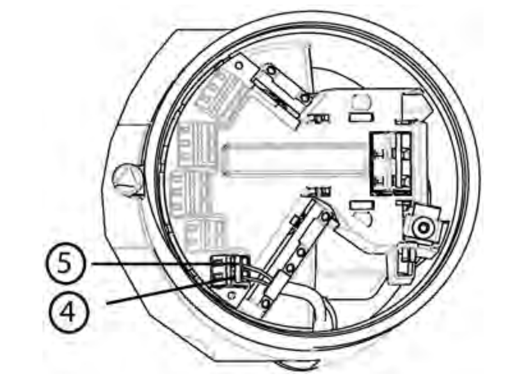
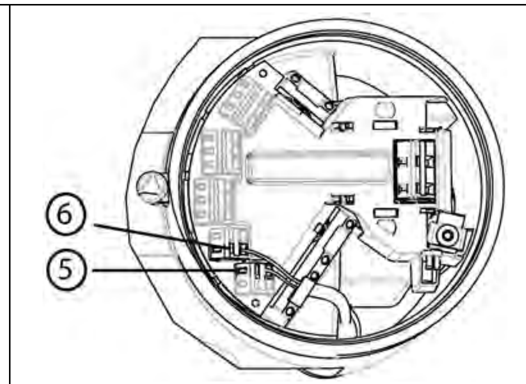
Passive channels only

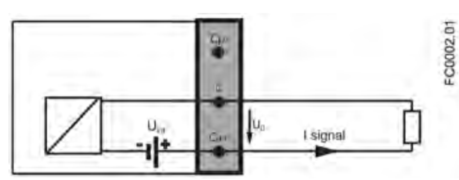
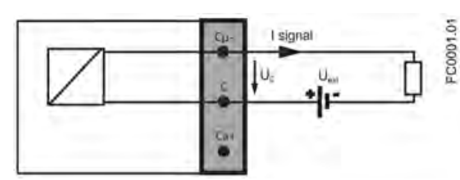
Channel 1 power supply must be separated from that for channels 2 to 4.

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.

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

Active current output	**Passive current output**
	

6. Tighten cable gland.

Note

Active or passive current output is preselected at ordering.

Note

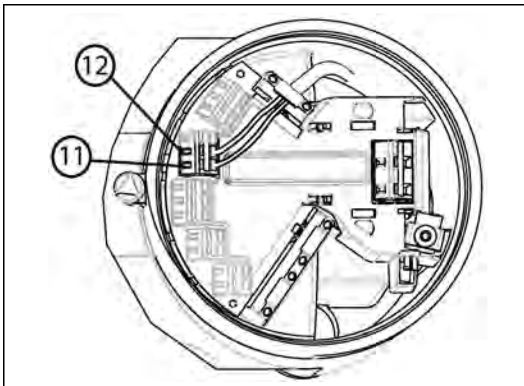
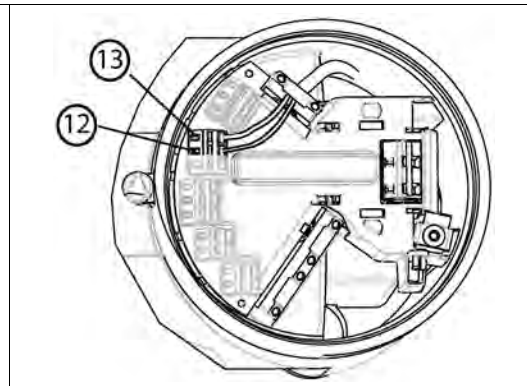
Load

Current output (channel 1): < 500 Ω (HART ≥ 230 Ω)

5.10 Step 4b: Connecting the inputs and outputs (channels 2 to 4)

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. Fold signal cable screen back over outer sheath and ground beneath cable clamp.

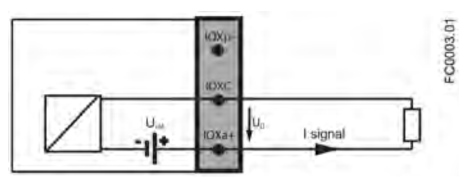
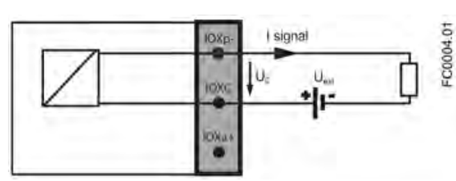
5. Connect wires to terminals using wiring tool.

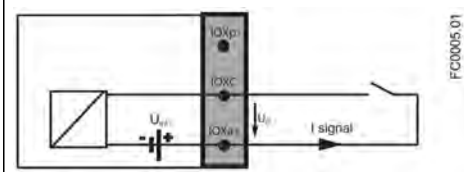
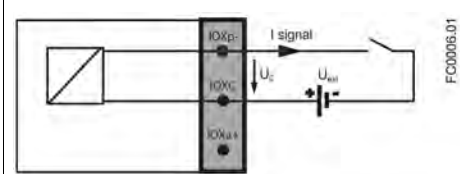
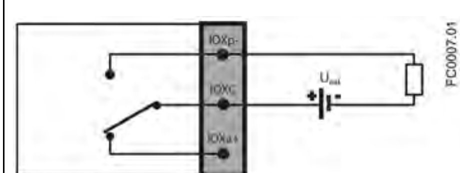
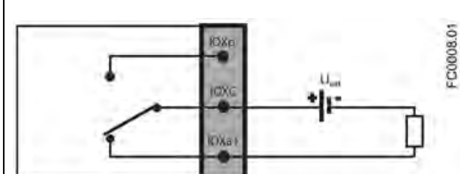
			
Active current output		Passive current output	
⑫	IO[3] (common)	⑬	IO[3]- (passive)
⑪	IO[3]+ (active)	⑫	IO[3] (common)
Termination example for channel 3			

6. Tighten cable gland.

Note

Active or passive current output is preselected at ordering.

Factory configu-ration	Software configuration	Channel 2	Channel 3, Channel 4	
Signal output Active	Current Output Pulse Output Frequency Output Status Output If Status Output: Alarm Class Alarm Item Primary Valve Dosing Control Secondary Valve Dosing Control	X	X	
Signal output Passive	Current Output Pulse Output Frequency Output Status Output If Status Output: Alarm Class Alarm Item One Stage Dosing Two Stage Dosing	X	X	

Factory configuration	Software configuration	Channel 2	Channel 3, Channel 4	
Signal input Active	Start Dosing Stop Dosing Reset Totalizer 1 Reset Totalizer 2 Reset Totalizer 3 Reset All Totalizers Start Zero Point Adjustment Pause/Resume dosing Force Output Freeze Output		X	
Signal input Passive	Start Dosing Stop Dosing Reset Totalizer 1 Reset Totalizer 2 Reset Totalizer 3 Reset All Totalizers Start Zero Point Adjustment Pause/Resume dosing Force Output Freeze Output		X	
Relay output	Alarm Class Alarm Item One Stage Dosing Two Stage Dosing		X	 Normally open
Relay output	Alarm Class Alarm Item One Stage Dosing Two Stage Dosing		X	 Normally closed

Load

Ensure the total load connected to the output is sufficient to obtain the voltage level required by the module.

Load [Ω]	Voltage (active) [V]	Voltage (passive) [V]
100	4.74	17.95
200	7.79	19.73
500	12.70	20.98
1000	16.08	21.43
2000	18.54	21.66

Load [Ω]	Voltage (active) [V]	Voltage (passive) [V]
5000	20.42	21.80
10000	21.13	21.85
20000	21.51	21.88
50000	21.74	21.89
100000	21.82	21.90

Note

Load

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

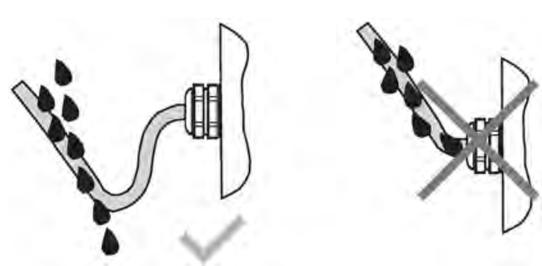
Relay output: 30 VAC/VDC, 100 mA

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

5.11 Step 5: Finishing the transmitter connection

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 to inside of electronics housing by creating a drip loop (bend cables downward) immediately before cable glands.



CAUTION

Loss of degree of protection

Damage to device if the enclosure is open or not properly closed. The degree of protection specified on the nameplate or in Chapter "Design (Page 201)" is no longer guaranteed.

- Make sure that the device is securely closed.

Commissioning 6

6.1 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 41) and Connecting (Page 55).
- Device installed in hazardous area meets the requirements described in Installation in hazardous locations (Page 23).

6.2 Warnings

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 HMI.

WARNING

Dangerous high voltage

Certain parts inside the device carry dangerous high voltage. The housing 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.

WARNING

Commissioning and operation with pending error

If an error message appears, correct operation in the process is no longer guaranteed.

- Check the gravity of the error.
- Correct the error.
- If the error still exists:
  - Take the device out of operation.
  - Prevent renewed commissioning.

6.3 Commissioning via HMI

6.3.1 Wizard introduction

In this chapter it is described how to commission the device via the local display (HMI) using the Quick Commissioning wizard.

For further information on how to navigate the wizards, refer to Wizards (Page 78).

In the wizard graphics below, the HMI view numbers are stated to the left.

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

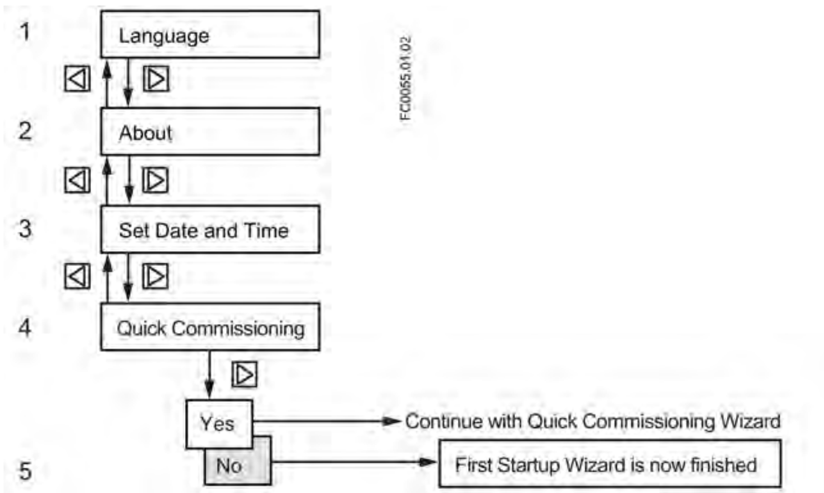
The last view in each wizard (Finished) shows that the last step of the wizard was completed.

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 first time the device is powered up, you will be prompted to set the language. The device always starts up showing Language in English. 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 HMI view will be the operation view 1.



View no.	Text	Options/description
1	Language	Set the language: English, Deutsch, Français, Italiano, Español, Português, РУССКИЙ, 汉语, Polski, Dansk, Svenska, Suomeksi
2	"About"	Information about the Quick Commissioning wizard
3	Set Date and Time	The set date and time (real time clock) is used for all time stamps of logged information
4	Quick Commissioning	The Quick Commissioning wizard comprises the most important parameters/menus for quick configuration of the flowmeter

6.3.2 Quick Commissioning wizard (menu item 1.1)

The Quick Commissioning wizard will guide you through configuration of parameters essential for your application. You configure parameters essential for your application by selecting the configuration path and subwizards appropriate for your application.

See also

Process Values wizard (menu item 1.3) (Page 80)

Gas Application wizard (menu item 1.5) (Page 85)

Pulsating Flow wizard (menu item 1.6) (Page 86)

Dosing Application wizard (menu item 1.7) (Page 87)

Zero Point Adjustment wizard (menu item 1.2) (Page 77)

Inputs/Outputs wizard (menu item 1.4) (Page 81)

6.3.3 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.

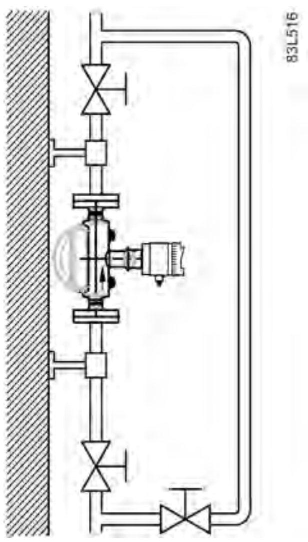


Figure 6-1 Best practice zero point adjustment with a by-pass line and two shut-off devices

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

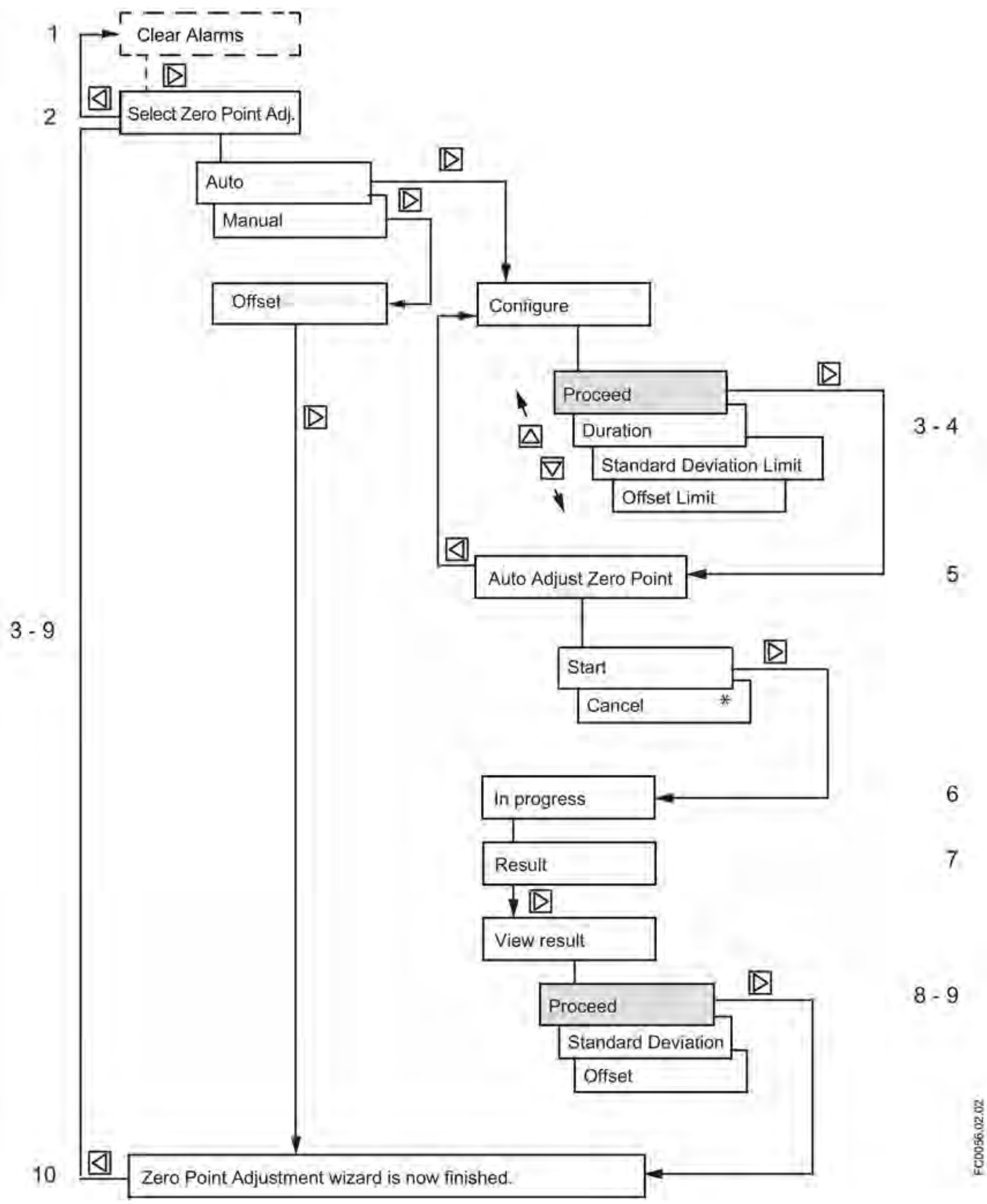
Note

Offset and standard deviation

Write down the offset and standard deviation figures for use in case of a manual zero point adjustment.

6.3.4 Zero Point Adjustment wizard (menu item 1.2)

The flowmeter system is optimized through an automatic zero point adjustment. Before you start the zero point adjustment flush the pipe and keep it filled at an absolute flowrate of zero. Ensure that the sensor has the same temperature as the process media. Perform at operating pressure or at least 0.2 barg.



View no.	Text	Options/Description
1	Clear alarms	"Clear Alarms" and alarm list are only shown if alarms are present.
2	Select zero point adjustment type	Auto, Manual
3-4	Configure	Configure duration and limits
5	Auto Adjust Zero point	Cancel, Start (progress, result, standard deviation and offset)
6	In progress	The progress bar is shown
7	Result	Information on success or failure of zero point adjustment
8-9	View result	Standard Deviation and Offset values

*: Pressing Cancel will bypass the Zero Point Adjustment and go to view 10.

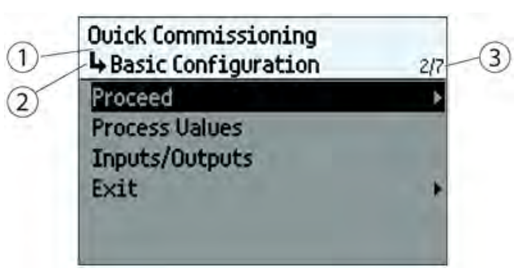
Note

View result

Standard Deviation and Offset values are only updated if the zero point adjustment was completed successfully. Otherwise the previous values are used.

6.3.5 Wizards

The HMI wizard graphics show an overview of each HMI 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 Wizard name
② Step name / Parameter name
③ View number / Total views in wizard

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

The following HMI wizards are available:

- Quick Commissioning
- Process Values
- Zero Point Adjustment
- Inputs/Outputs

- Gas Application
- Pulsating Flow
- Dosing Application

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

Key operation

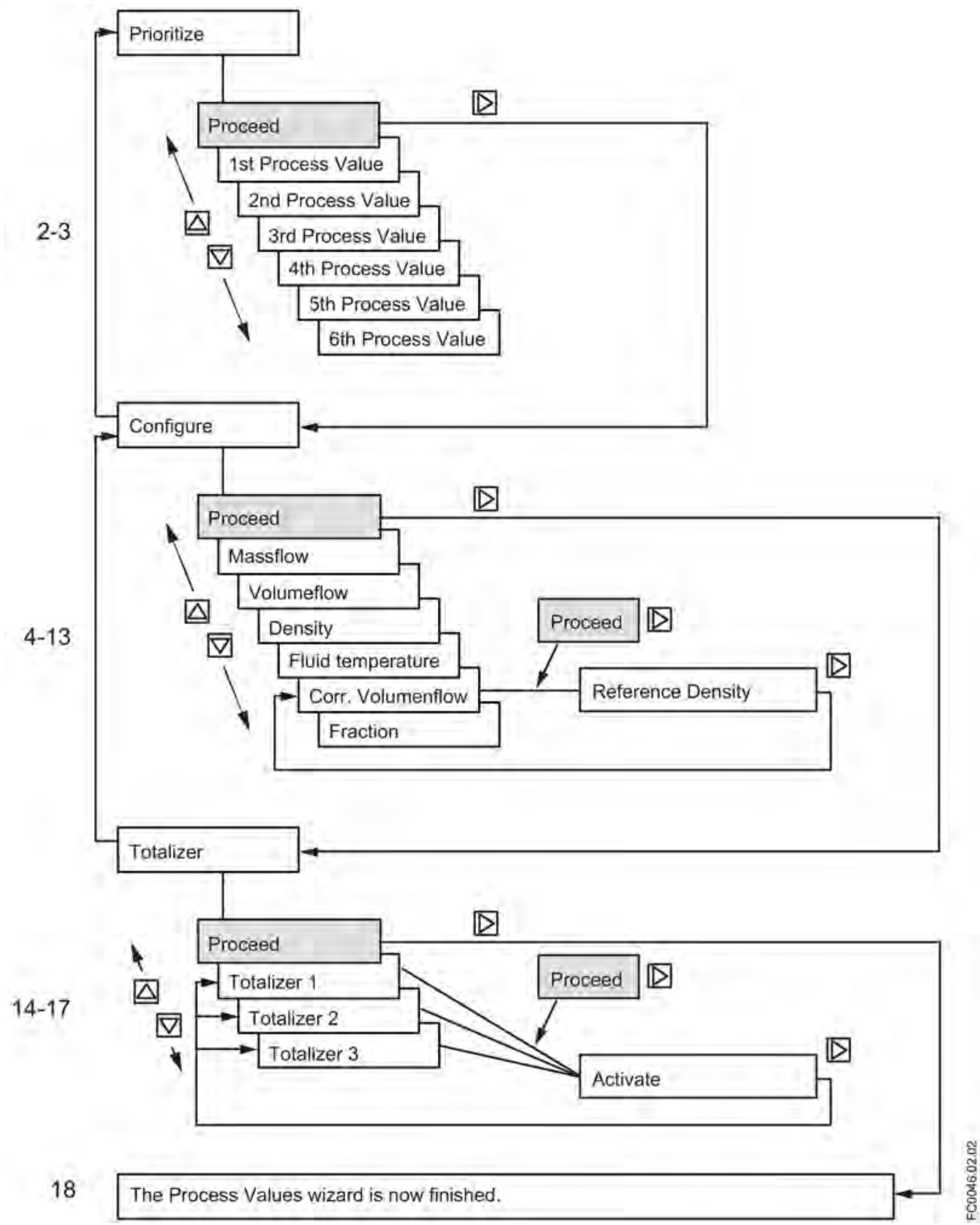
Basic navigation in the HMI wizards is shown in the graphics.

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.

6.3.5.1 Process Values wizard (menu item 1.3)

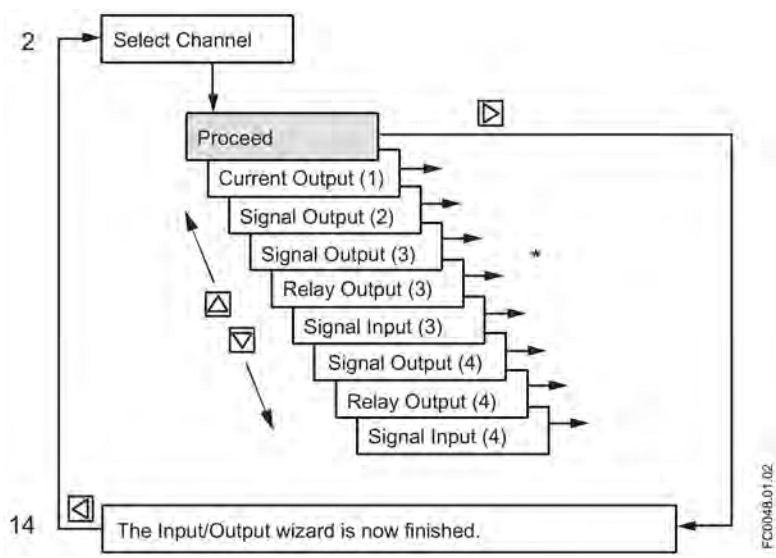
The Process Values wizard will guide you through setup of process values for your application. The prioritizing of the process values automatically configures the measurement views on the display. The process value configured as 1st Process Value is set as first display view.



View no.	Text	Options/Description
2-3	Prioritize	Prioritize the process values
4-13	Configure	Configure the process values (unit, low flow cut-off, limits, and hysteresis)
14-17	Totalizer	Configure totalizers (if activated in operating view, it is possible to reset totalizer without password access)

6.3.5.2 Inputs/Outputs wizard (menu item 1.4)

The Input/Output wizard will guide you through setup of inputs and outputs on channels 1 to 4. The availability of channels 2 to 4 depends on the product configuration.

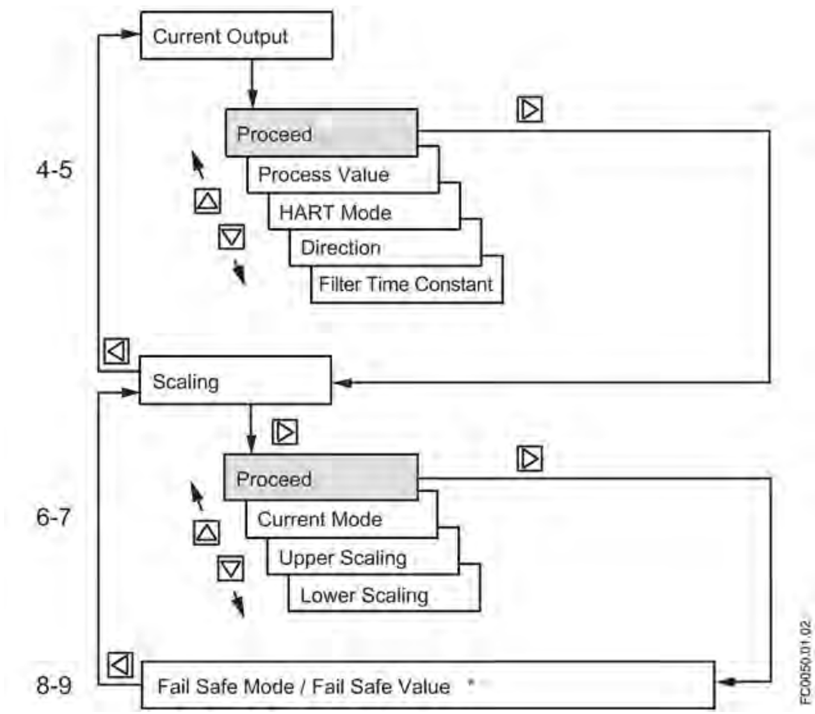


View no.	View text	Options/Description
2	Select Channel	Select the channel to be configured
3-14	Configuration	Configure selected channel (*: see appropriate graphic for configuration of the input/output function)

Channels 3 and 4 can only be assigned to one function (signal output, relay output or signal input).

Current output - channel 1

The Current Output on Channel 1 is a 4 to 20 mA output with HART communication. Channel 1 can be used in Functional Safety applications if ordered with SIL option.

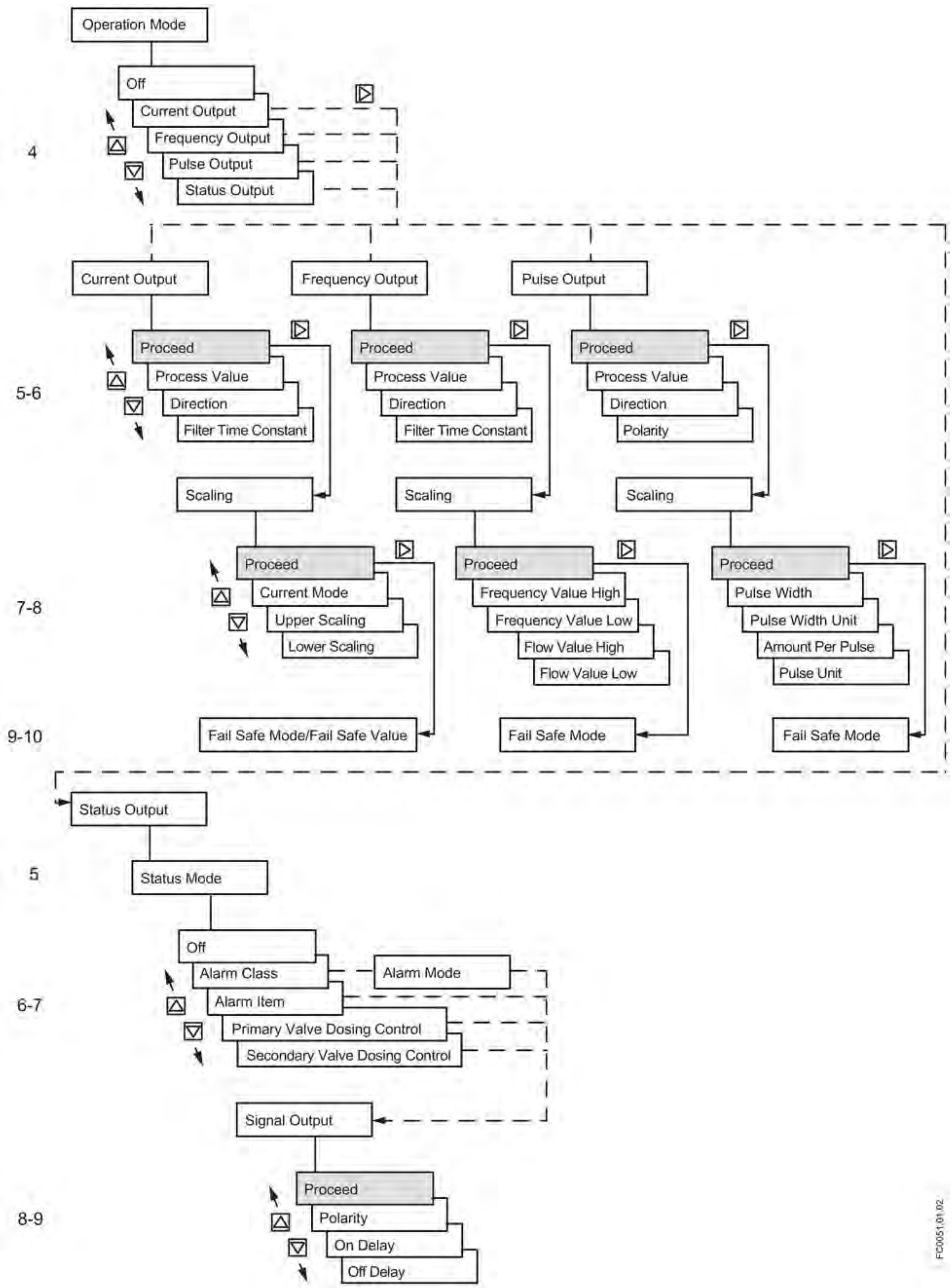


View no.	Text	Options/Description
4-5	Current Output	Configure current output basic settings
6-7	Scaling	Configure current mode, upper and lower scaling
8-9	Fail Safe Mode / Fail Safe Value	Select current output reaction in case of a fault

*: When pressing ▷ you will return to view "Select Channel".

Signal output - channels 2 to 4

The signal output can be configured to either current (0/4-20 mA), frequency, pulse, three-stage analog valve dosing control, discrete one or two-valve dosing control or alarm/status.


Operation Mode
Off
Current Output
Frequency Output
Pulse Output
Status Output
4
Current Output
Frequency Output
Pulse Output
5-6
Proceed
Process Value
Direction
Filter Time Constant
Proceed
Process Value
Direction
Filter Time Constant
Proceed
Process Value
Direction
Polarity
Scaling
Scaling
Scaling
7-8
Proceed
Current Mode
Upper Scaling
Lower Scaling
Proceed
Frequency Value High
Frequency Value Low
Flow Value High
Flow Value Low
Proceed
Pulse Width
Pulse Width Unit
Amount Per Pulse
Pulse Unit
9-10
Fail Safe Mode/Fail Safe Value
Fail Safe Mode
Fail Safe Mode
Status Output
5
Status Mode
6-7
Off
Alarm Class
Alarm Mode
Alarm Item
Primary Valve Dosing Control
Secondary Valve Dosing Control
Signal Output
8-9
Proceed
Polarity
On Delay
Off Delay
FC0051.01.02

Current/Frequency/Pulse

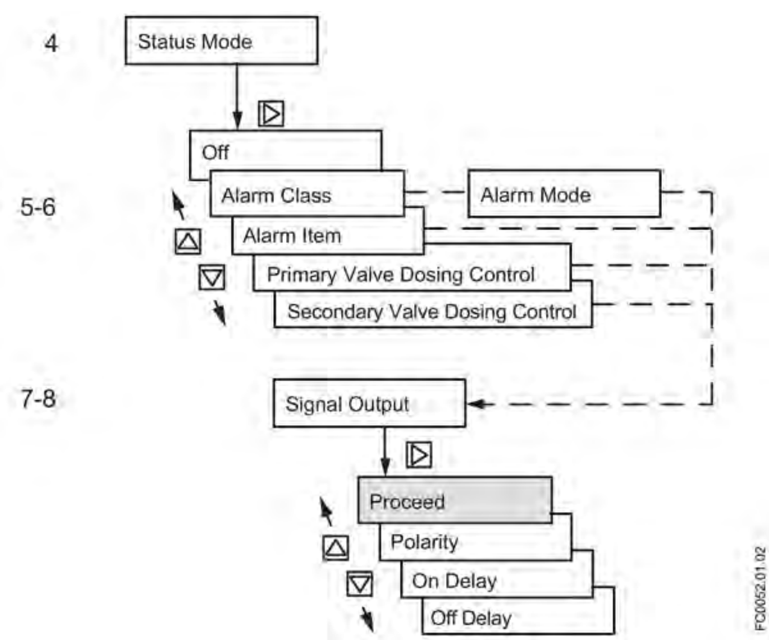
View no.	Text	Options/Description
4	Operation Mode	Select the output functionality
5-6	Output function	Configure the output basic settings
7-8	Scaling	Configure the output scaling
9-10	Fail Safe Mode / Fail Safe Value	Select the signal output reaction in case of a fault

Status

View no.	Text	Options/Description
5	Status Mode	Select the status output functionality
6-7	Configuration	Configure the alarm (only if Alarm Class or Alarm Item is selected)
8-9	Output polarity and delay	Set the output polarity and delay

Relay output - channels 3 to 4

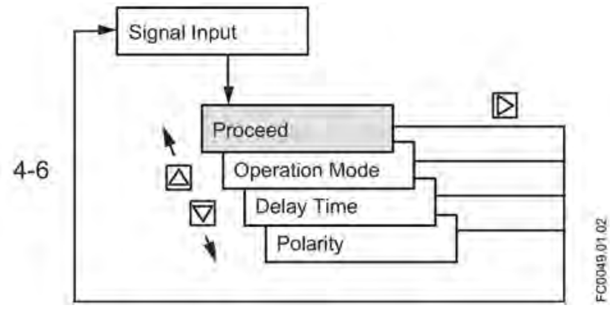
The Relay Output can be configured to either discrete one or two-valve dosing control or alarm/status.



View no.	Text	Options/Description
4	Status Mode	Select the status output functionality
5-6	Configuration	Configure the alarm (only if Alarm Class or Alarm Item is selected)
7-8	Output polarity and delay	Set the output polarity and delay

Signal input - channels 3 to 4

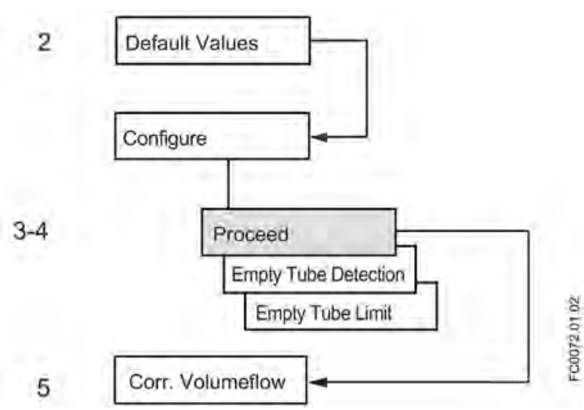
The Signal Input can be configured to either Dosing control, Totalizer reset, Remote zero adjust or Force/Freeze output(s).



View no.	Text	Options/Description
4	Operation Mode	Select the signal input functionality
5	Delay Time	Set the signal input delay time
6	Polarity	Set the signal input polarity

6.3.5.3 Gas Application wizard (menu item 1.5)

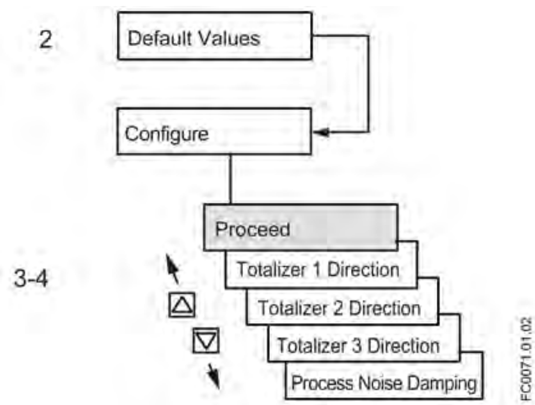
The Gas Application wizard will guide you through configuration of essential parameters for measuring gas flow. As default Low Flow Cut-Off and Empty Tube Detection are disabled. Actual volume flow is difficult to use with low pressure; hence we recommend to use Corrected Volumeflow.



View no.	Text	Options/Description
2	Default Values	Select whether or not to use the default values
3-4	Configure	Configure empty tube detection and limit
5	Corr. Volumeflow	Configure settings for corrected volumeflow

6.3.5.4 Pulsating Flow wizard (menu item 1.6)

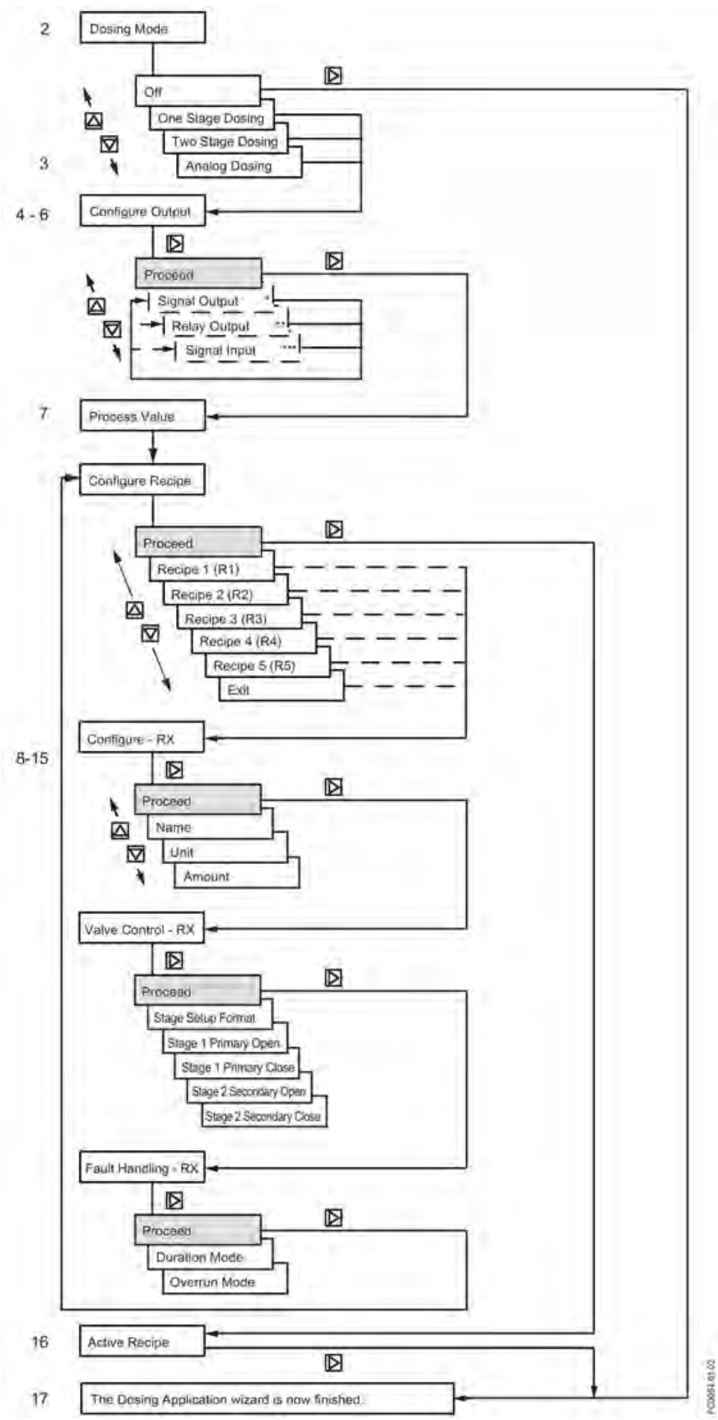
The Pulsating Flow wizard will guide you through configuration of essential parameters for applications with pulsating flow. As default the Totalizer will be set to Balanced, the Process Noise Damping is set to 4 and the Low Flow Cut-Off value will be raised.



View no.	Text	Options/Description
2	Default Values	Select whether or not to use the default values
3-4	Configure	Configure totalizer direction

6.3.5.5 Dosing Application wizard (menu item 1.7)

The Dosing Application wizard will guide you through configuration of each recipe for dosing control including valve control (discrete/analog) and fault handling. The valve control is done using channels 2, 3 and 4.



View no.	Text	Options/Description
2	Dosing Mode	Select the dosing mode to control the valve(s) on the output
3	Dosing options	Setup instructions for the selected dosing mode
4-6	Configure Output	Configure the output to control the valves
7	Process Value	Select the process value
8-15	Configure recipe	Configure the recipe (valve control and fault handling)
16	Active Recipe	Select a dosing recipe

*: Set Operation Mode to Status Mode and set Status Mode to control Primary Valve or Secondary Valve.

**: Set Status Mode to Primary Valve or Secondary Valve.

***: Set Operation Mode to Dosing Control.

For dosing setup, see Valve control configuration (Page 151).

6.4 Commissioning with PDM

This chapter describes how to commission the device via SIMATIC PDM.

6.4.1 Operating via SIMATIC PDM

SIMATIC PDM is a software package used to commission and maintain process devices. Further information can be found at: www.siemens.com/simatic-pdm (www.siemens.com/simatic-pdm).

6.4.2 Functions in SIMATIC PDM

Note

- For a complete list of parameters, see HMI menu structure (Page 231).

- While the device is in PROGRAM mode the output remains fixed and does not respond to changes in the device.

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.

Parameters are identified by name and organized into function groups. See HMI menu structure (Page 231) for a table [1)] and Changing parameter settings using SIMATIC PDM (Page 102) for more details.

See Parameters accessed via drop-down menus (Page 103) for parameters that do not appear in the menu structure in SIMATIC PDM.
[1)]: The menu structure for SIMATIC PDM is almost identical to that for the HMI.

Note

Supported SIMATIC PDM versions

The EDD supporting this product is compatible with SIMATIC PDM v. 6.0 + SP5 + HF5 through 8.0 + SP2.

6.4.3 Initial setup

To ensure that SIMATIC PDM connects properly, please complete the two processes outlined below:

1. Deactivating buffers
2. Updating the Electronic Device Description (EDD)

Deactivating buffers for RS 232 com port

This deactivation is required to align SIMATIC PDM with the HART modem for Windows® operating systems.

Note

Support for Windows operating systems can be found here: support.automation.siemens.com (http://support.automation.siemens.com/WW/view/en/21005263)

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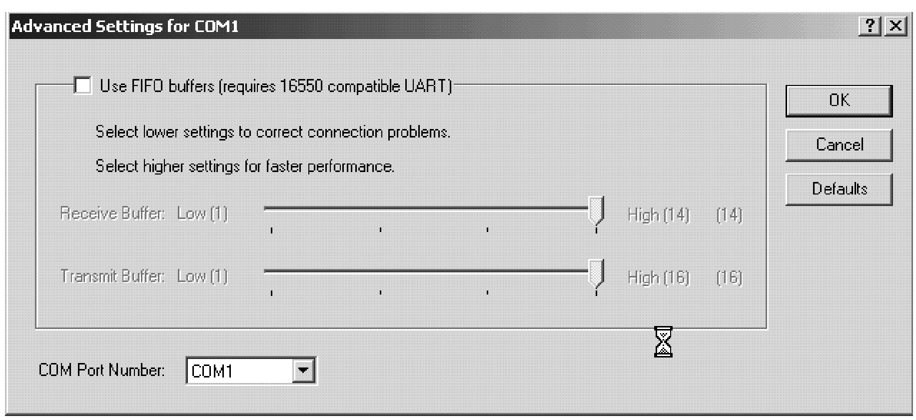
1. Click "Start/Settings/Control Panel" to begin configuration.
2. Double click "System", select the "Hardware" tab, and click the "Device Manager" button.
3. Open "Ports" folder and double click the COM Port used by the system to open the "Communications Port Properties" window.
4. Select the "Port Settings" tab and double click the "Advanced" button.
5. If the "Use FIFO buffers" check box is selected, click to deselect.



6. Click "OK" to close out. Close all screens and then reboot.

Updating the Electronic Device Description (EDD)

You can locate the EDD in Device Catalog, under "Sensors/Flow/Coriolis/Siemens AG/SITRANS FC430". Check the product page of our website at: www.siemens.com/FC430, under Downloads, to make sure you have the latest version of SIMATIC PDM, the most recent Service Pack (SP) and the most recent hot fix (HF).

Installing a new EDD:

1. Download the EDD from the product page of our website at: www.siemens.com/FC430 and save the files to your computer.
2. Extract the zipped file to an easily accessed location.
3. Launch "SIMATIC PDM – Manage Device Catalog", browse to the unzipped EDD file and select it.

6.4.4 Adding device to communication network

Before setting the parameters, it is necessary to configure the FC430 project in PDM.

1. Add the device to SIMATIC HART network:
   - Select "File"->"New"
     Type in a project name, for example FC430 commissioning.
   - Right click on "Net" and select "Insert New Object"->"HART Modem".
     Your PC is now added to the HART network, for example "My computer".
   - Right click on "HART Modem" and select "Insert New Object"->"HART Device".
   - Click on "Assign", assign the HART device to FC430 (Sensors->Flow->Coriolis->SIEMENS AG->SITRANS FC430 Dev Rev 2) and click "ok".

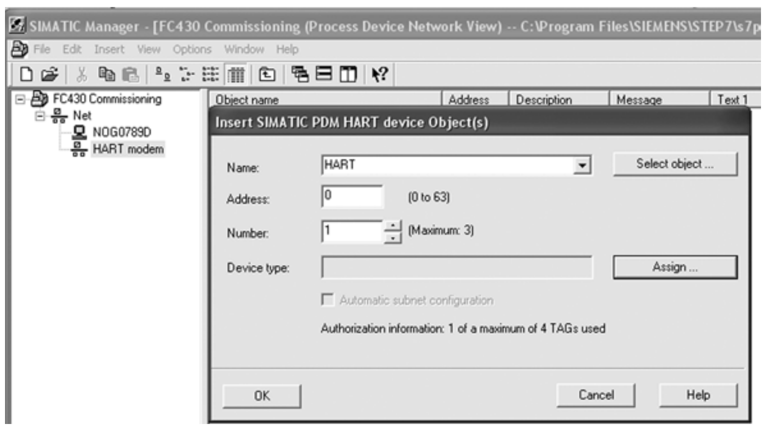


Figure 6-2 Assigning HART device to network

2. Set up the COM interface:
   - Select "Net" → and double-click on the computer name, for example "My computer".
   - Right-click on "COM interface" and select "Object Properties"
   - Select "Network" and ensure it is set to "HART modem".
   - Select "Connection" and configure the COM port.

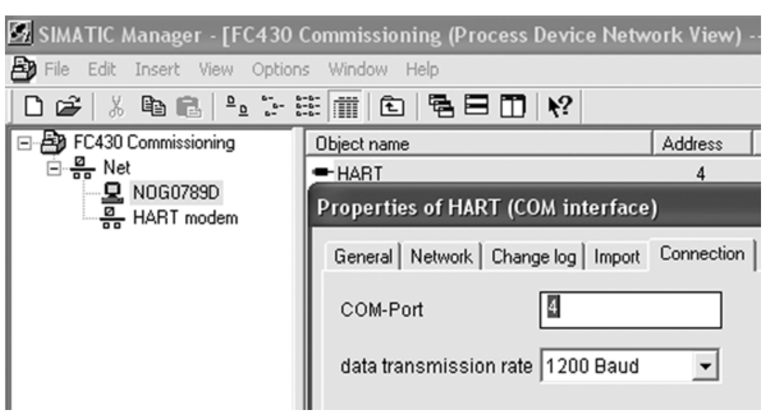


Figure 6-3 Set COM port

6.4.5 Configuring a new device

Note

Clicking on "Cancel" during an upload from device to SIMATIC PDM will result in some parameters NOT being updated.

1. Check that you have the most recent EDD, and if necessary update it, see "Updating the Electronic Device Description (EDD)" in Initial setup (Page 89).
2. Launch "SIMATIC PDM – Manager Device Catalog", browse to the unzipped EDD file and select it.
3. Launch SIMATIC Manager and create a new project for the device.
4. After the reset is complete upload parameters to the PC/PG.
5. Configure the device via the Wizard Quick Start.

6.4.6 Wizard - Quick Start via PDM

The graphic Quick Start Wizard provides an easy 7-step procedure that configures the device for a simple application.

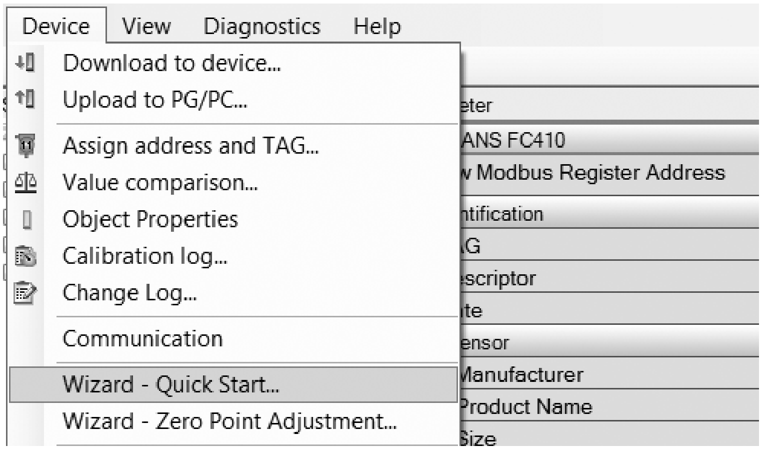
Please consult the SIMATIC PDM operating instructions or online help for details on using SIMATIC PDM.

Quick start

Note

- The Quick Start wizard settings are inter-related and changes apply only after you click on "Apply and Transfer" at the end of step 7 to save settings offline and transfer them to the device.
- Do not use the Quick Start Wizard to modify individual parameters.
- Click on "Back" to return and revise settings or "Cancel" to exit the Quick Start.

Launch SIMATIC PDM, open the menu "Device – Wizard - Quick Start", and follow steps 1 to 7.



Step 1 - Identification

Note

The layout of the dialog boxes shown may vary according to the resolution setting for your computer monitor. The recommended resolution is 1280 x 960.

---

1. Click on "Read Data from Device" to upload Quick Start parameter settings from the device to the PC/PG and ensure PDM is synchronized with the device.
2. If required, change the language for the local user interface.
3. Click on "Next" to accept the default values. ("Descriptor", "Message", and "Date" fields can be left blank.)

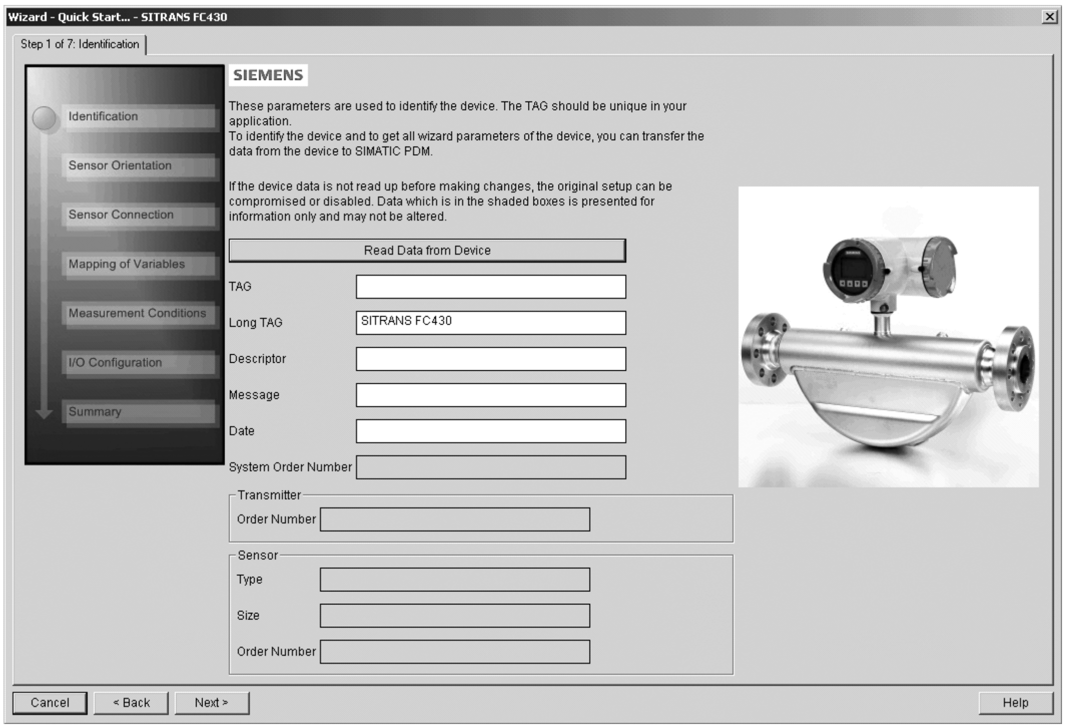


Figure 6-4 Quick start step 1

Step 2 - Sensor orientation

Select the application type (gas or liquid) and sensor orientation, then click on "Next".

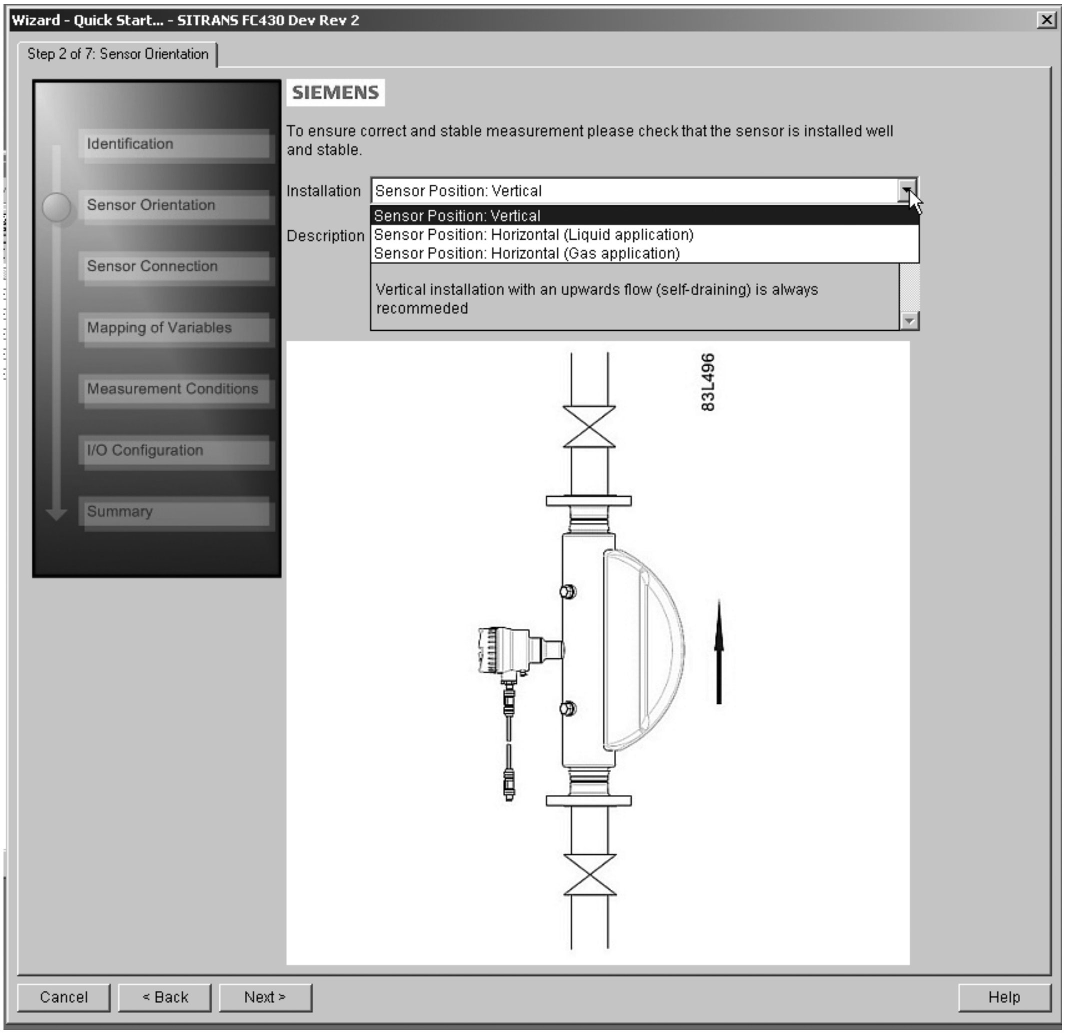


Figure 6-5 Quick start step 2

Step 3 - Sensor connection (remote version only)

A remote system can be ordered with M12 connection or with terminated cable (for example conduit connections)

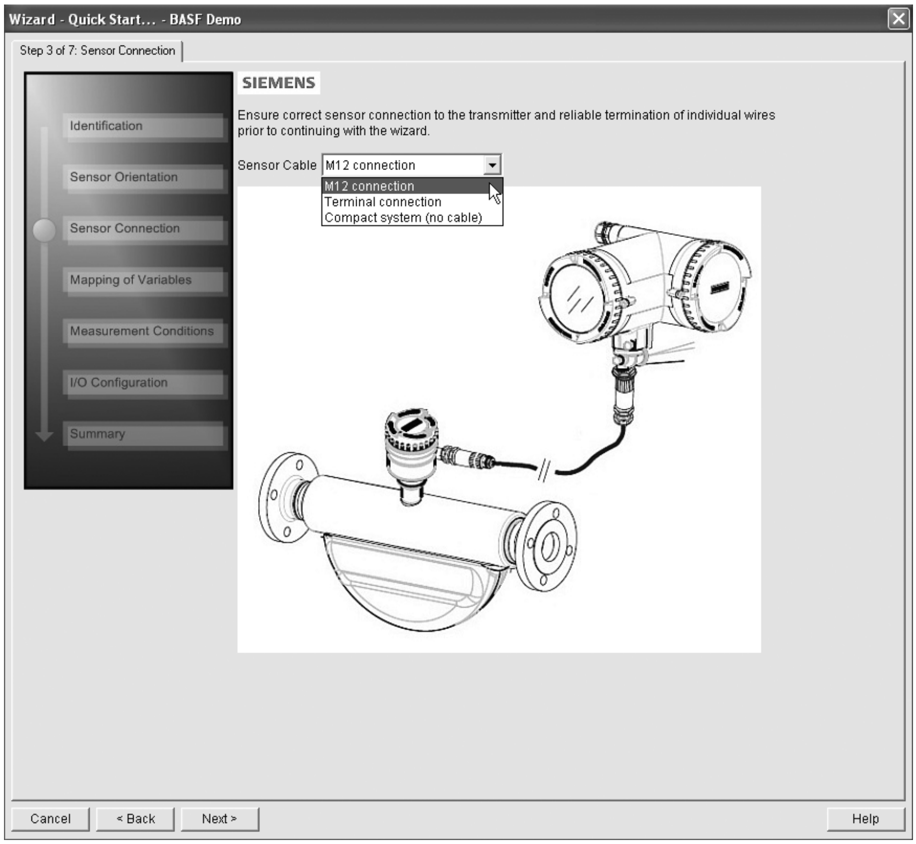


Figure 6-6 Quick start step 3

Step 4 - Mapping of variables

Set the process values (PV, SV, TV, and QV) to be used in the HART system integration and click on "Next".

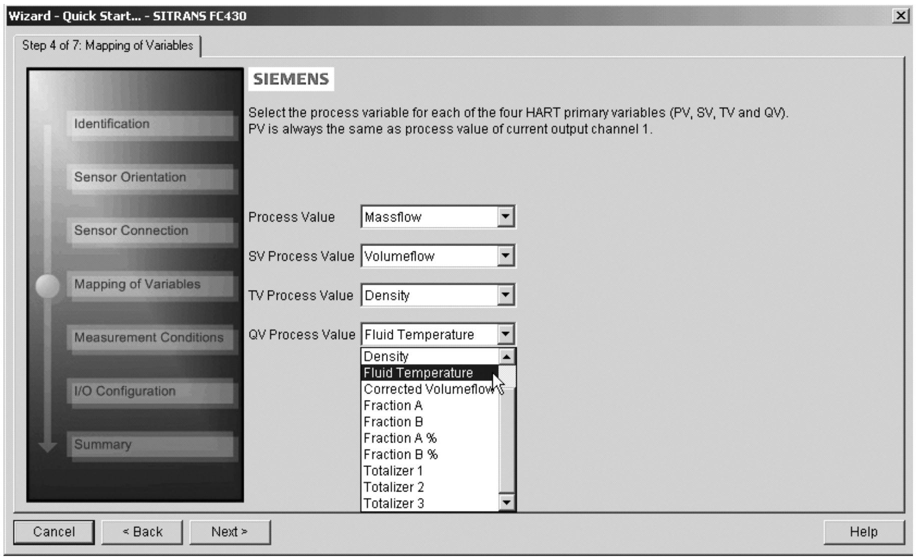


Figure 6-7 Quick start step 4

Step 5 - Measurement conditions

Configure the measurement conditions for the selected process variables. Change "Flow Direction" if necessary.

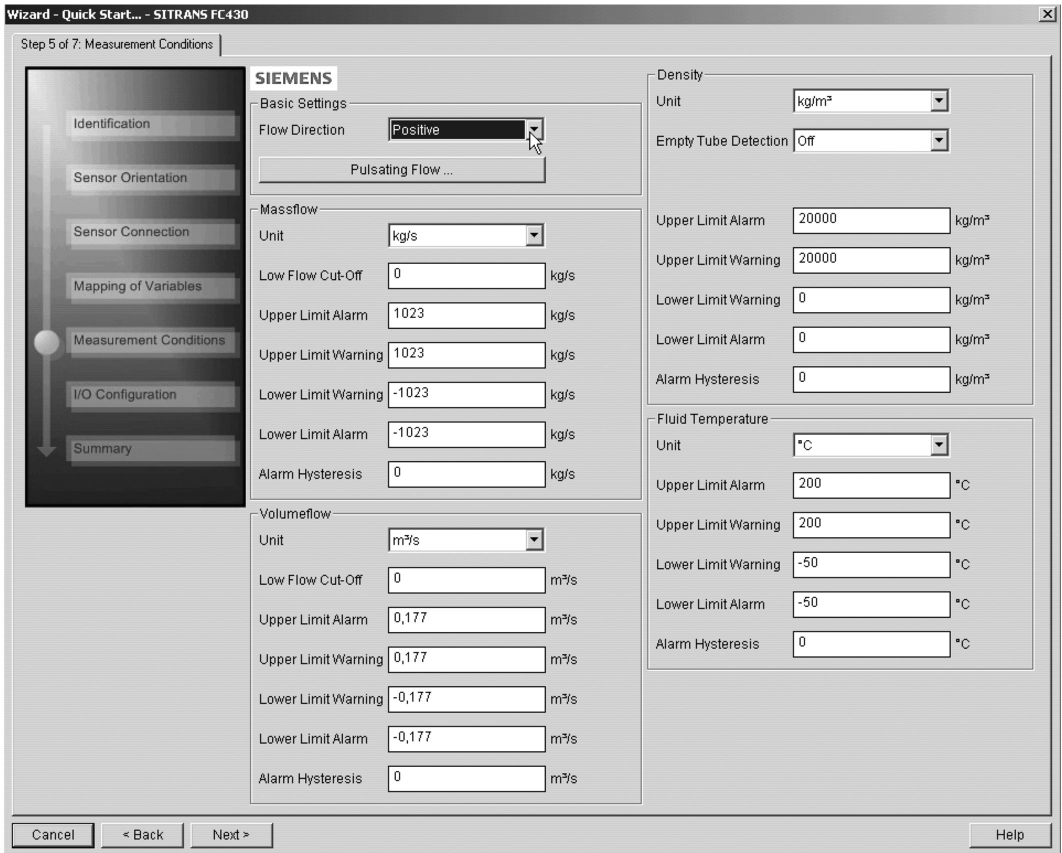


Figure 6-8 Quick start step 5

Reduce the sensitivity of the flow measurement signal by clicking on the "Pulsating Flow" button and selecting the appropriate filter.

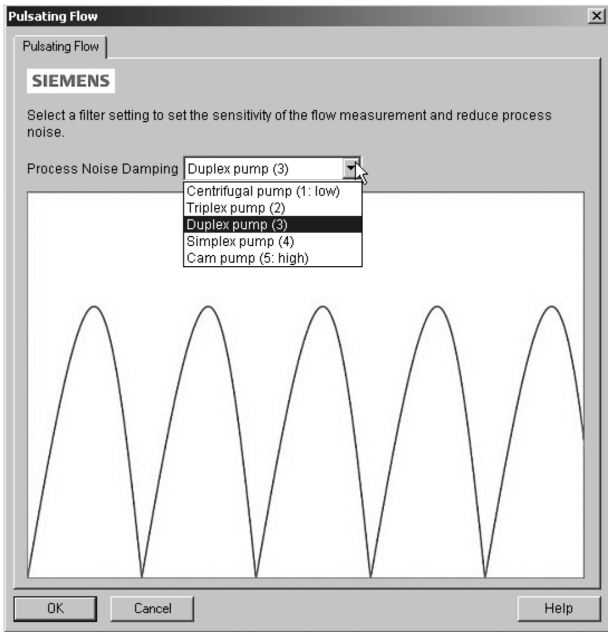


Figure 6-9 Filter setting selection

Step 6 - I/O configuration

Configure the current output (channel 1). The process value is selected as PV in step 4 "Mapping of variables".

Configure channels 2, 3 and 4, if ordered. For each channel: Select the "Operation Mode" and click on the button below for detailed configuration.

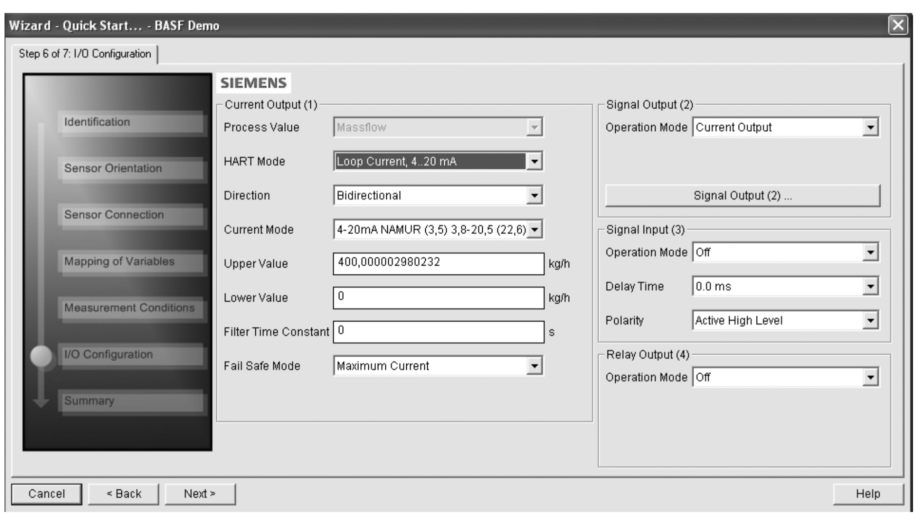


Figure 6-10 Quick start step 6

Step 7 - Summary

Check parameter settings, and click on "Back" to return and revise values, "Apply" to save settings offline, or "Apply and Transfer" to save settings offline and transfer them to the device.

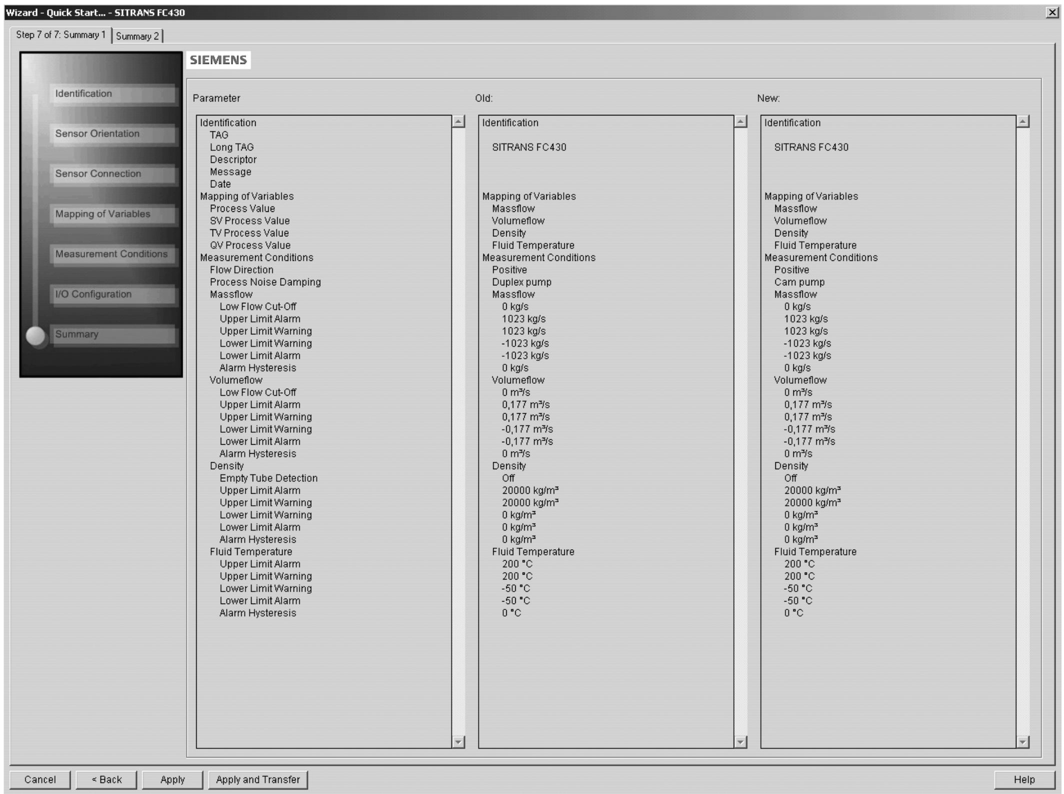


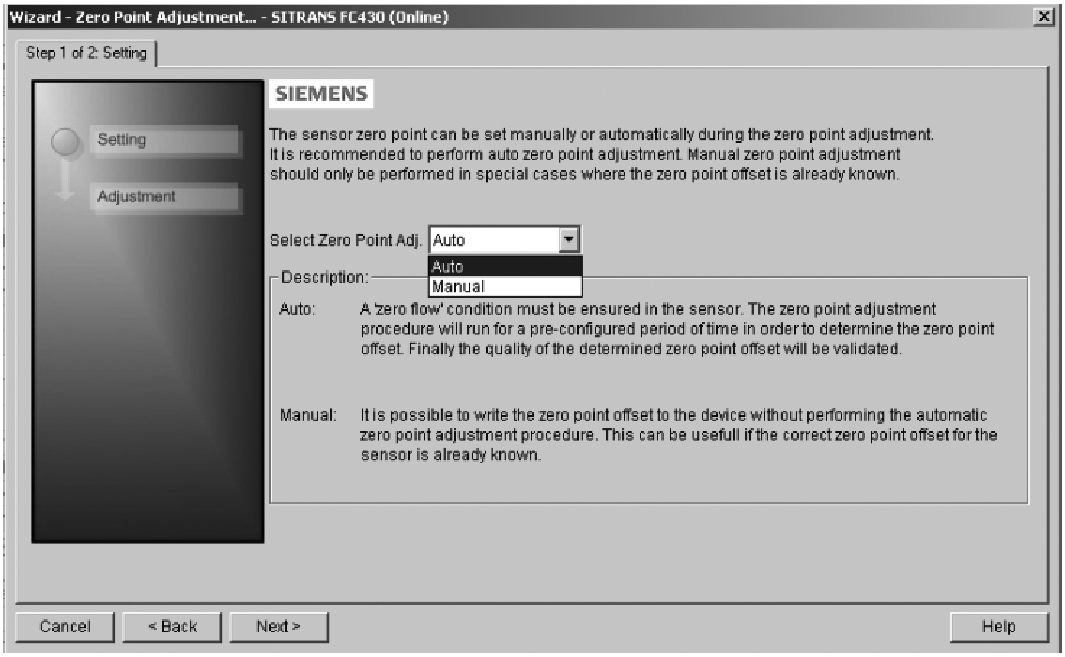
Figure 6-11 Quick start step 7

The message "Quick Start was successful" will appear. Click on "OK".

6.4.7 Wizard - Zero Point adjustment

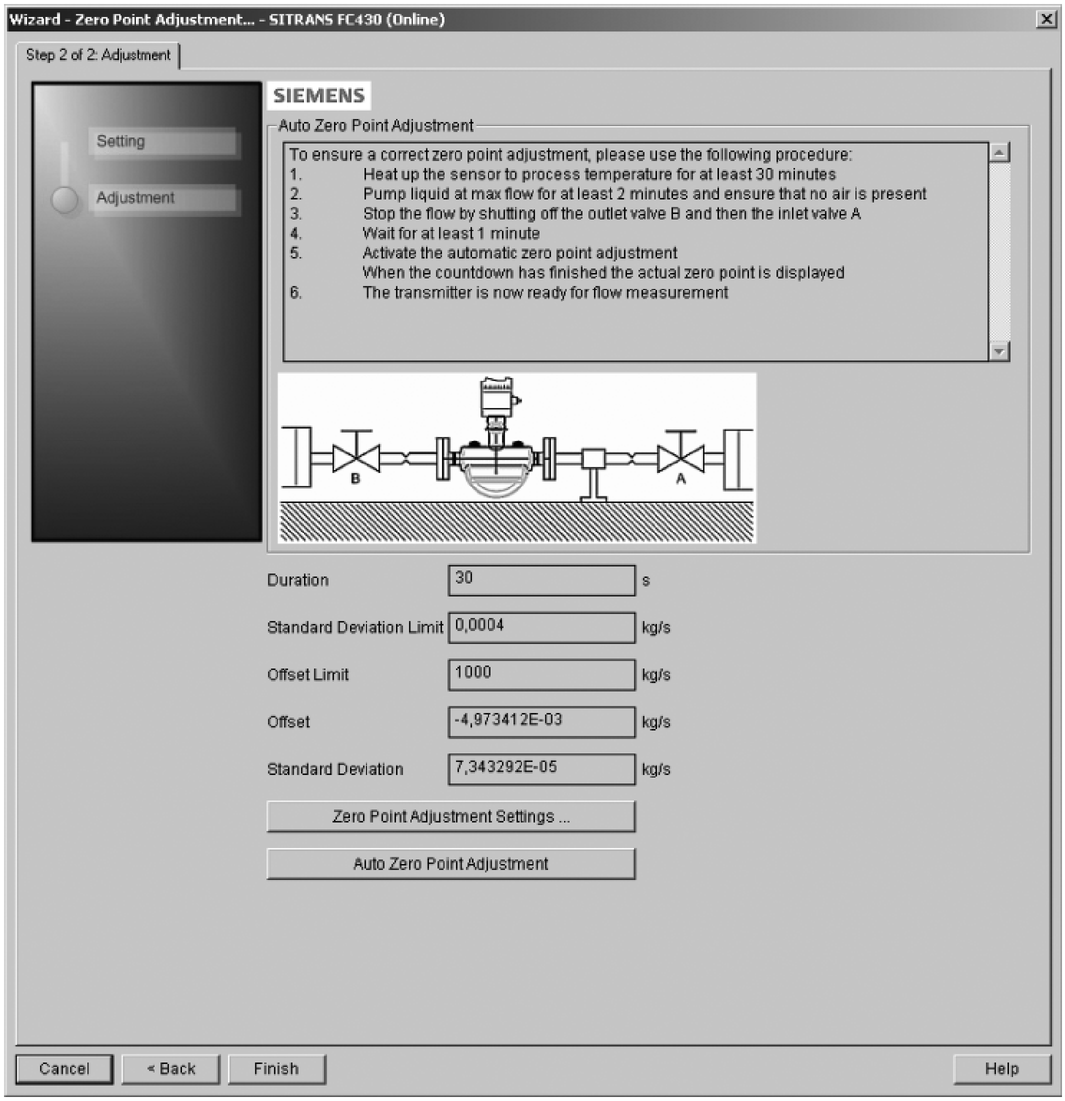
Open the menu Device – Wizard - Zero Point Adjustment.

Select "Auto". Click on "Next".



It is recommended to use the default settings. Change the "Zero Point Adjustments Settings", if necessary.

Click on "Auto Zero Point Adjustment".



6.4.8 Changing parameter settings using SIMATIC PDM

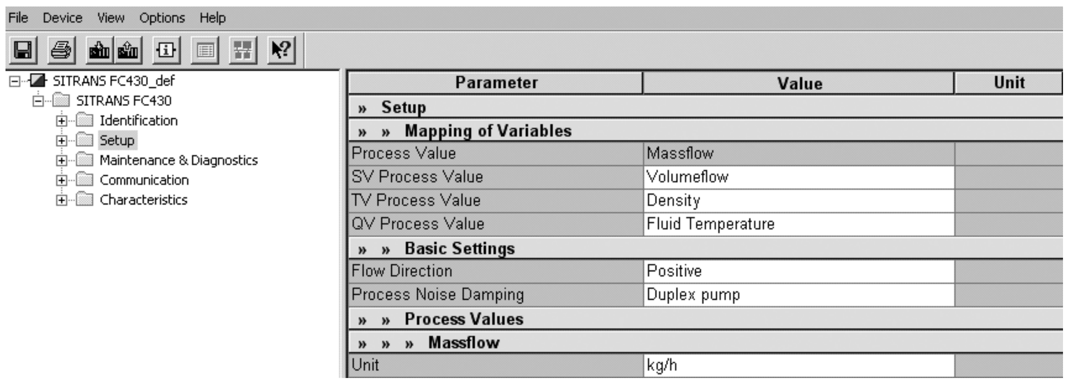
Note

For a complete list of parameters, see the HMI menu structure (Page 231).

Clicking on "Cancel" during an upload from device to SIMATIC PDM will result in some parameters NOT being updated.

Many parameters are accessed via the online menus in PDM, see "Parameters accessed via drop-down menus" for the others.

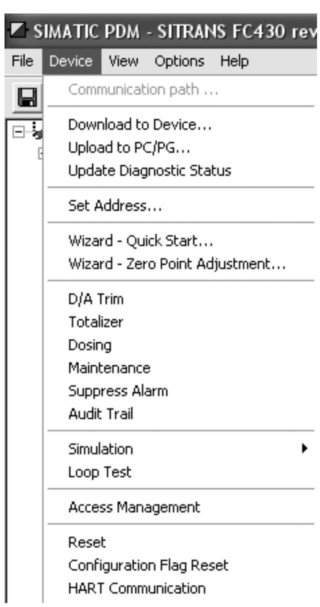
1. Launch SIMATIC PDM, connect to the appropriate device and upload data.
2. Adjust parameter values in the parameter value field then click on "Enter". The status fields read "Changed".
3. Open the "Device" menu, click on "Download to device", then use "File – Save" to save settings offline. The status fields are cleared.



6.4.9 Parameters accessed via drop-down menus

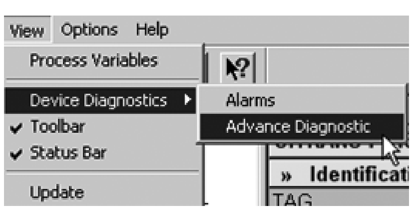
Click on "Device" or "View" to open the associated drop-down menus.

Device drop-down menus



Menu	Description
Communication Path	Shows the communication interface (HART modem)
Download to Device	Downloads all writable parameters to the device
Upload to PC/PG	Uploads all parameters from the device to the parameter table
Update Diagnostic Status	Reads current diagnostic status from the device and updates the diagnostic status icon
Set Address	Sets the HART polling address
Wizard - Quick Start	Guide for a quick commissioning
Wizard - Zero Point Adjustment	Guide for zero point adjustment (automatic and manual)
D/A Trim (online dialog)	Calibration of current output (channel 1)
Trim Signal Output (online dialog)	Calibration of current output (channels 2 to 4)
Totalizer (online dialog)	Controlling totalizers 1, 2 and 3
Dosing (online dialog)	Controlling the dosing function
Maintenance (online dialog)	Setup of maintenance functions
Suppress Alarms	Suppresses individual alarms
Audit Trail	Lists parameter changes, FW updates, and alarm history logs
Simulation (online dialog)	Simulation of process values, alarms, and inputs/outputs (channels 2 to 4)
Loop Test (online dialog)	Simulation of current output (channel 1)
Access Management	Possibility to upgrade access level from "user" to "expert" and to change PIN code for "expert" level
Reset (online dialog)	Resets device to default settings or restarts device
Configuration Flag Reset (online dialog)	Commands reset the configuration flag
HART Communication (online dialog)	Number of preamples

View drop-down menus



Menu	Description
Process Variables (online dialog)	Shows all process values
Device Diagnostic (online dialog)	Shows all diagnostics information (alarms and advanced diagnostic parameters)
Toolbar (online dialog)	Shows/hides the toolbar
Status Bar	Shows/hides the status bar
Update	Updates the content of the active window

6.4.10 Zero point adjustment

The flowmeter system is optimized through a zero point adjustment.

Performing a zero point adjustment

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.

1. Flush out the flowmeter until a homogenous flow is established and the tubes completely filled.

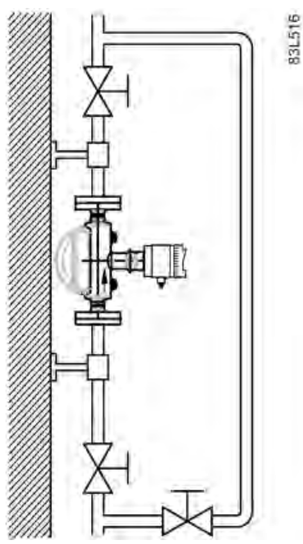
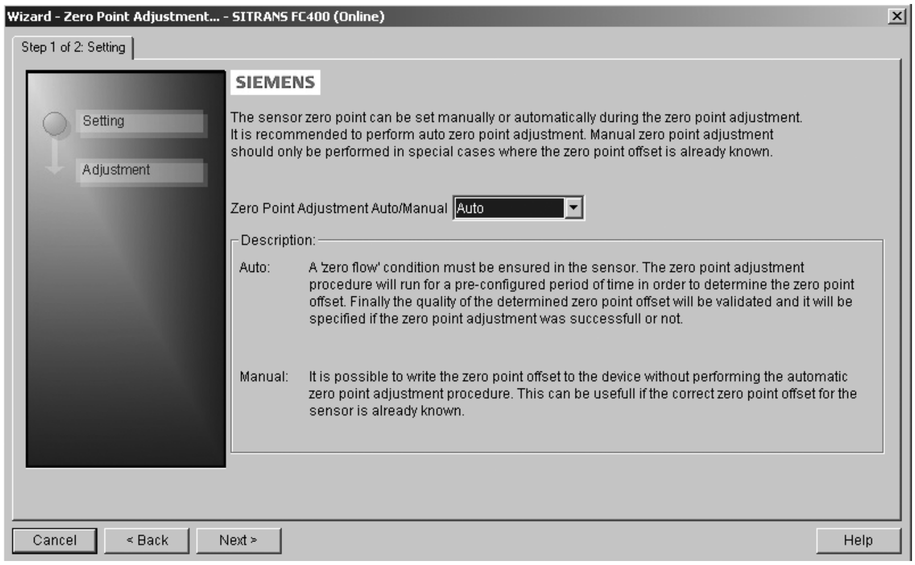


Figure 6-12 Best practice zero point adjustment with a by-pass line and two shut-off devices

2. Establish zero flow for example by closing the shut off-valves.
3. Wait 1 to 2 minutes, for the system to settle, and then perform zero adjustment as described in the following steps.

4. Select **Device → Wizard → Zero Point Adjustment...** from the main menu of SIMATIC PDM to perform an automatic zero point adjustment.



5. Click **Next** and then **Auto Zero Point Adjust**.
6. During the process a progress bar is visible.
7. 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 Alarms and system messages (Page 171).

The system is now ready for normal operation.

6.4.11 Process variables

1. To compare outputs in real time select "View->Process variables" to see all process values, totalizers and loop current.
2. Verify that the process values show the expected values.

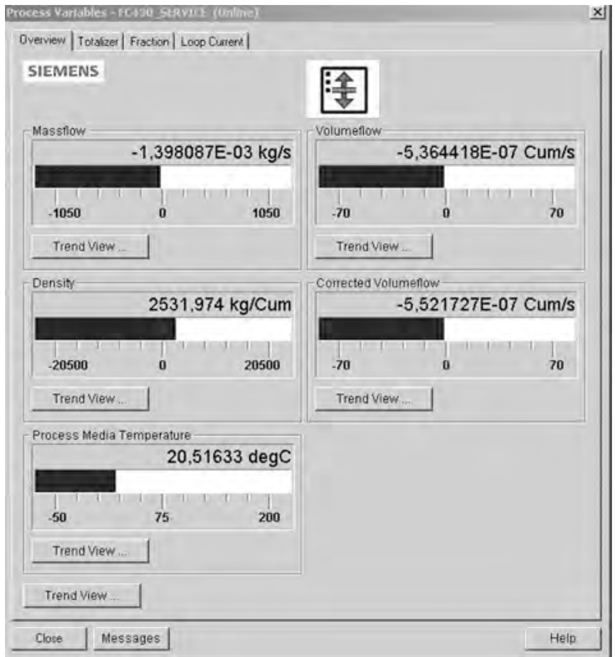


Figure 6-13 View process variables

Trend view

Open the menu "View->Process variables" and click on a "Trend view" button to monitor the trend of one or all process values available at each tab.

Operating 7

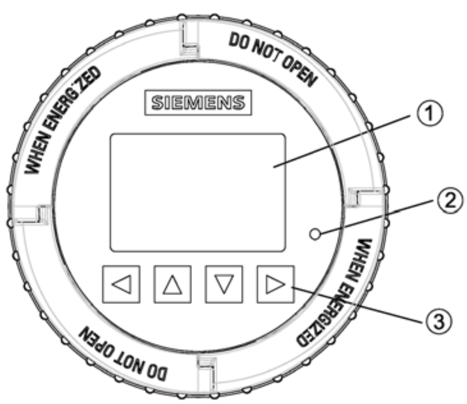
A considerable amount of information regarding the operation and status of the flowmeter is available to the user via the local display (HMI) and SIMATIC PDM.

7.1 Local display (HMI)

Operation via local user interface

The device is operated with the capacitive proximity keypad on the local user interface.

The elements are actuated by touching the glass panel above the appropriate key. The glass is 10 mm (3/8") thick. Pressing harder will not activate the key, but using a thumb instead of a finger tip will help. 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 at the right of the display.



① Full graphical display

② LED (for indication of key operation)

③ Capitance proximity keypad

Figure 7-1 Local user interface

Note

Recalibration of the keypad

When the lid is mounted, all keys are recalibrated (approximately 40 seconds). During recalibration the LED is on and the keys cannot be operated.

If one of the keys is pressed for more than 10 seconds, this key is recalibrated (duration less than 10 seconds). Release the key for further operation.

Note

HMI timeout

If no key is pressed for 10 minutes, the display switches to show operation view.

Note

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

Note

Motor fuel dispensers

The Local User Interface is not suitable as an indication device for motor fuel dispensers.

Note

Display backlight

The display backlight goes off automatically 30 seconds after the last keypress.

7.1.1 Display view structure

There are three view types:

- **Operation view**
  The operator view shows up to six operation views (Page 116). 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 or alarm view.
  - Measurement view: Displays the measurement values, see Operation view (Page 116).
  - Alarm view: Displays the active alarms in a list, see Operation view (Page 116).
  - Operating view: Enables the totalizer reset and the dosing control, see Operation view (Page 116).
  - Diagnostic view: Displays six configurable measurement/diagnostic values, see Operation view (Page 116).
- **Navigation view**

  The Navigation view (Page 125) 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 127) can be entered from the navigation view. The parameter view is used to view and edit the parameters.

Navigating the operation view

Browse the operation views and menu items using the control buttons as follows:

Table 7- 1 Measurement view

Key	Function
◁	No functionality
△	Go to the previous menu in the operation view
▽	Go to the next menu in the operation view
▷	Enter the navigation view

Table 7- 2 Alarm view level 1

Key	Function
◁	No functionality
△	Go to the previous menu in the operation view
▽	Go to the next menu in the operation view
▷	Enter alarm view level 2

Table 7- 3 Alarm view level 2

Key	Function
◁	Enter alarm view level 1
△	Select the item above in the list; keep pressing the key to accelerate scrolling up the selection list
▽	Select the item below in the list; keep pressing the key to accelerate scrolling down the selection list
▷	Enter alarm view level 3

Table 7- 4 Alarm view level 3

Key	Function
◁	Enter alarm view level 2
△	No functionality
▽	No functionality
▷	No functionality

Table 7- 5 Operating view level 1

Key	**Function**
◁	No functionality
△	Previous view
▽	Next view
▷	Enter operating view level 2

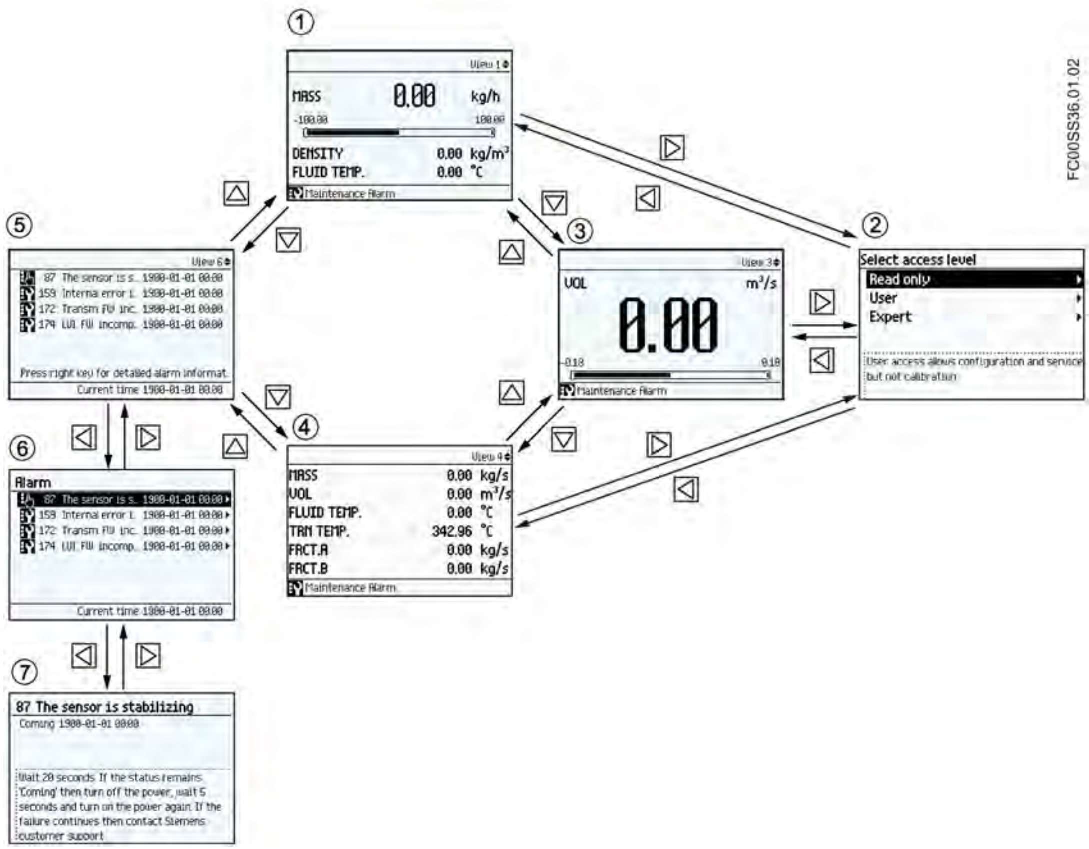
Table 7- 6 Operating view level 2

Key	**Function**
◁	Enter operating view level 1
△	Select action to perform
▽	Select action to perform
▷	Perform selected action

Table 7- 7 Diagnostic view

Key	**Function**
◁	No functionality
△	Go to the previous menu in the operation view
▽	Go to the next menu in the operation view
▷	Enter the navigation view

The following graphic shows an example of how to navigate between measurement views and alarm views with measurement views 1, 3, and 4 as well as alarm view 5 enabled.



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

Navigating the navigation view

Browse the navigation view and menu items using the control buttons as follows:

Table 7- 8 Navigation view

Key	Function
◁	Enter the next higher level of the navigation view (for example from level 2 to level 1). If located on level 1 in the navigation view then enter the operation view.
△	Select the item above in the list; keep pressing the key to accelerate scrolling up the selection list. If the key is pressed when the top item is selected, the bottom item will be highlighted.

Key	Function
▽	Select the item below in the list; keep pressing the key to accelerate scrolling down the selection list. If the key is pressed when the bottom item is selected, the top item will be highlighted.
▷	Enter the next lower level of the navigation view (for example from level 1 to level 2). If a parameter is selected in the navigation view then enter the parameter view.

Editing the parameters

When this symbol ✥ is shown in the graphics, the four buttons on the HMI are used for changing the parameters as described below.

Table 7- 9 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.

Table 7- 10 Parameter read only view

Key	Function
◁	Exit parameter edit view
△	No functionality
▽	No functionality
▷	No functionality

7.1.2 Access control

The user can view all parameters in the HMI menu but the parameters are protected against changes with access level control. The user gains access when entering the navigation view by selecting one of the following access levels.

- Read Only

  Allows no configuration. The user is only able to view the parameter values. No PIN code required.

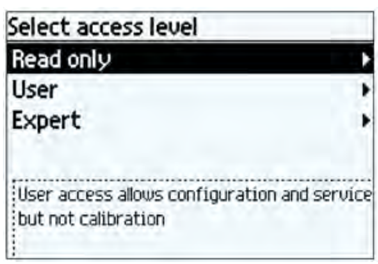
- User

  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 menu 5 "Security".



The exact structure of the operating menu is explained in the HMI menu structure (Page 231).

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 Reset PINs (menu item 5.1.3).

Disable access level control

If logged in as "Expert" you can "Disable Access Level Control" meaning that you will always be logged in as "User" and will not be prompted to enter the password. Enabling the access level control requires entering the "Expert" password.

Auto Log Off function

With the "Auto Log Off" function enabled (default), you will be prompted to enter the password if no keys have been pressed for ten minutes before operating the display again. With the "Auto Log Off" function disabled, you will **not** be prompted to enter the password before operating the HMI.

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.

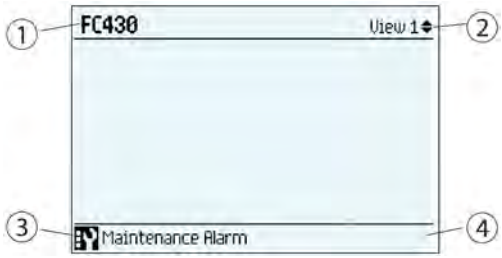
The view types including the number of process values shown in the operation view are configured in HMI menu structure (Page 231).

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
  - 1 Value and Bargraph
  - 1 Value and Graph
  - Six Values
- Operating views
  - Totalizer
  - Dosing
- Alarm view
  - Alarm List
- Diagnostic view
  - Six Diagnostic Values

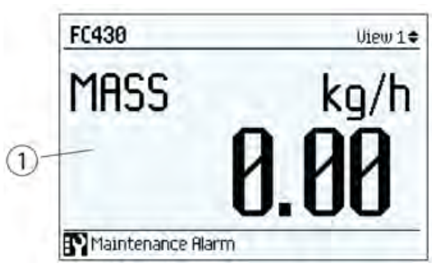
In general, all of the HMI views show the following:



①	Long TAG	Describes the measurement point and is shown in all operation views. Can be changed via the menu "Long TAG" (3.1.1).
②	View number	Shows the operation view number. The number refers to the view number configured in the menu "Setup" → "Display".
③	Alarm icon	Indicates an active alarm. Shows the alarm class, see Alarm messages (Page 172). Only shown if an alarm is active.
④	Alarm status text	Describes the alarm. Only shown if an alarm is active.

Measurement views

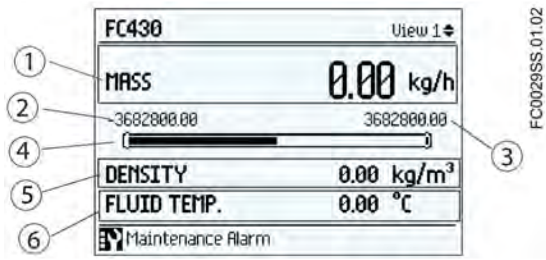
Single Value



FC0030SS.01.02

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

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"
②	Lower Limit Alarm	The lower limit of the bar graph is defined by the lower alarm limit of the selected process value.
③	Upper Limit Alarm	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"
⑥	Third process value	The user-defined process value to be displayed is configured in menu "View" (1-6) located at "Setup" → "Display"

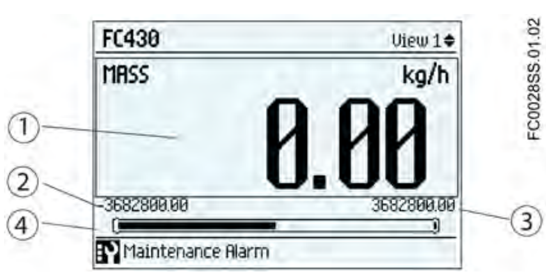
Note

Bargraph

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

---

1 Value and Bargraph



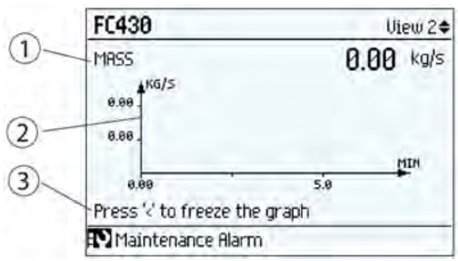
①	Process value	The user-defined process value to be displayed is configured in menu "View" (1-6) located at "Setup" → "Display"
②	Lower Limit Alarm	The lower limit of the bar graph is defined by the lower alarm limit of the selected process value.
③	Upper Limit Alarm	The upper limit of the bar graph 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).

Note

Bargraph

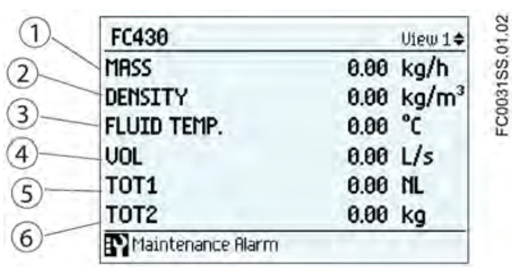
The bargraph limits are defined as the lower and upper alarm values.

1 Value and Graph



①	Process Value	
②	Graph	
③	Instruction	Press ◁ to freeze/unfreeze display

Six Values



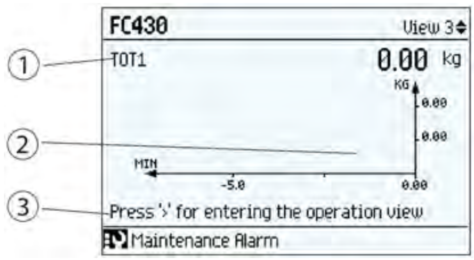
①	First process value	The user-defined process value to be displayed is configured in menu "View" (1-6) located at "Setup" → "Display"
②	Second process value	The user-defined process value to be displayed is configured in menu "View" (1-6) located at "Setup" → "Display"
③	Third process value	The user-defined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

See also

Alarms and system messages (Page 171)

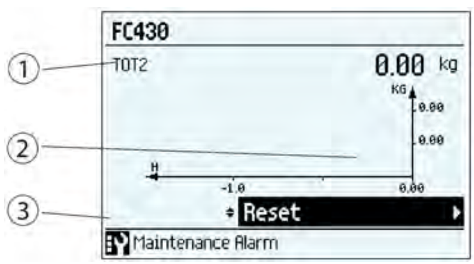
Operating Views

Totalizer (level 1)



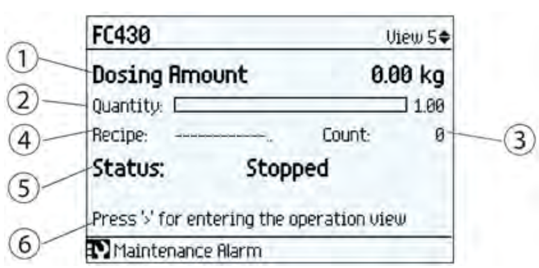
①	Process value	
②	Graph	
③	Instruction	Press ▷ to enter the operation view.

Totalizer (level 2)



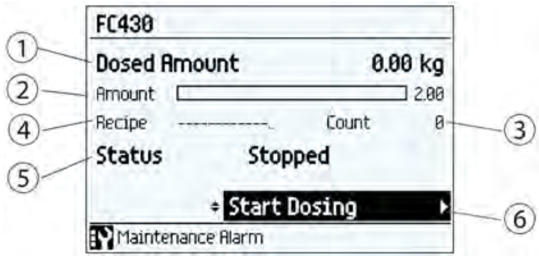
①	Process value	
②	Graph	
③	Control	

Dosing (level 1)



①	Dosed amount	Actual dosed amount
②	Quantity	Set dosing amount
③	Count	Number of dosings
④	Recipe	Name of the selected recipe
⑤	Status	Dosing status
⑥	Instruction	Press ▷ to enter the operation view.

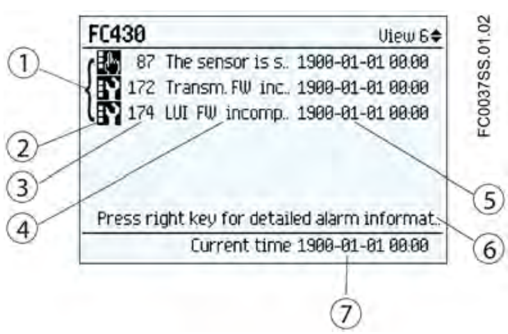
Dosing (level 2)



①	Dosed amount	Actual dosed amount
②	Amount	Dosing progress
③	Count	Number of dosings
④	Recipe	Name of the selected recipe
⑤	Status	Dosing status
⑥	Control	Dosing control

Alarm views

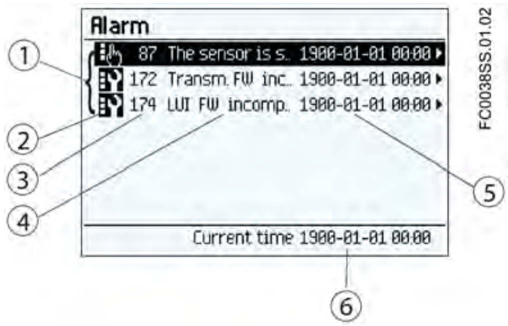
Alarm List (level 1)



①	List of alarms	List of all active alarms in device.
②	Alarm icon	Shows the alarm class, see Alarms and system messages (Page 171).
③	Alarm identification number	Shows the alarm identification number, see Alarms and system messages (Page 171).
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).

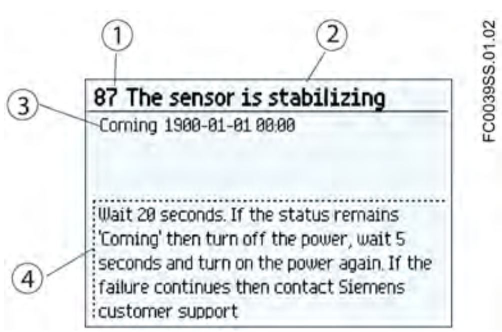
Alarm List (level 2)



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 Alarms and system messages (Page 171).
③	Alarm identification number	Shows the alarm identification number, see Alarms and system messages (Page 171).
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.

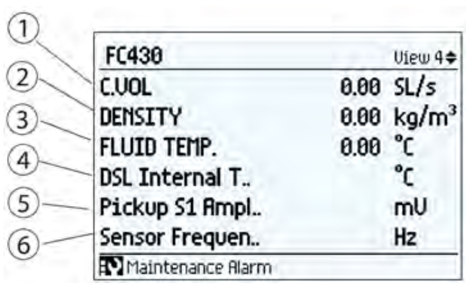
Alarm acknowledgement

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 (ack.). 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 (going)

Diagnostic view

Six Diagnostic Values



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

Fixed display texts

The following table lists the fixed display texts for the process value names available on the operation view.

Table 7- 11 Process values

Fixed display text	Process value name
MASS	Massflow
VOL	Volumeflow
C.VOL	Corrected Volumeflow
R.DENS.	Reference Density
DENSITY	Density
FLUID TEMP.	Fluid Temperature

Fixed display text	Process value name
FRACTION A	Fraction A
FRACTION B	Fraction B
FRCT.A %	Fraction A %
FRCT.B %	Fraction B %
TOT1	Totalizer 1
TOT2	Totalizer 2
TOT3	Totalizer 3

Table 7- 12 Diagnostic values

Fixed display text	Diagnostic value name
DRIV.CURR.	Driver current
FRAME TEMP.	Frame temperature
MASS RAW	Raw massflow
PICKUP S1	Pickup S1
PICKUP S2	Pickup S2
SENSOR FREQ.	Sensor frequency
TRANSM. TEMP.	Transmitter temperature
VOL RAW	Raw volumeflow
CURRENT (CH1)	Current (channel 1)
CURRENT (CH2)	Current (channel 2)
CURRENT (CH3)	Current (channel 3)
CURRENT (CH4)	Current (channel 4)
FREQ. (CH2)	Frequency (channel 2)
FREQ. (CH3)	Frequency (channel 3)
FREQ. (CH4)	Frequency (channel 4)
PULSE (CH2)	Pulse (channel 2)
PULSE (CH3)	Pulse (channel 3)
PULSE (CH4)	Pulse (channel 4)
STATUS (CH2)	Status (channel 2)
STATUS (CH3)	Status (channel 3)
STATUS (CH4)	Status (channel 4)
INPUT (CH3)	Input (channel 3)
INPUT (CH4)	Input (channel 4)

7.1.4 Navigation view

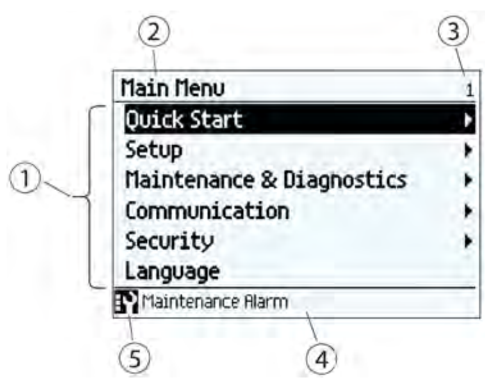
Navigation view

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 & 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 HART 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 HMI. 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 7-2 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 7-3 Menu in navigation view
"Quick start" selected "Setup" not selected.

For further information on how to gain access to the menus, see Access control (Page 115).

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 (🔒) (only for read access level of the parameter), and an arrow in most right position.

Figure 7-4 Navigation view ReadWrite

The selected parameter can be edited in the parameter view.

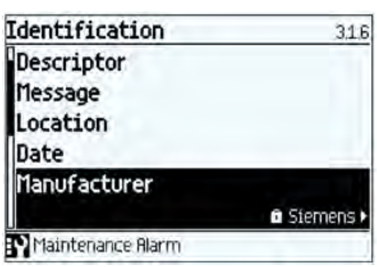


Figure 7-5 Navigation view ReadOnly

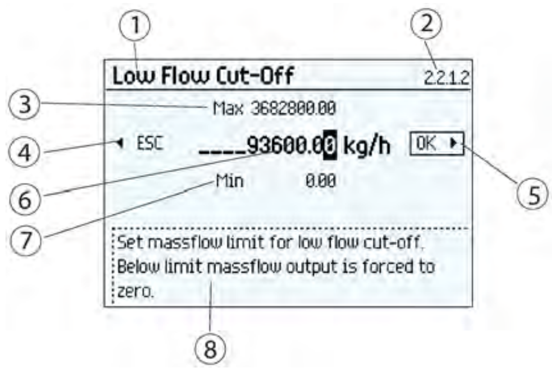
The selected parameter can only be viewed in the parameter view

7.1.5 Parameter view

Depending upon 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 here.



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 7-6 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:

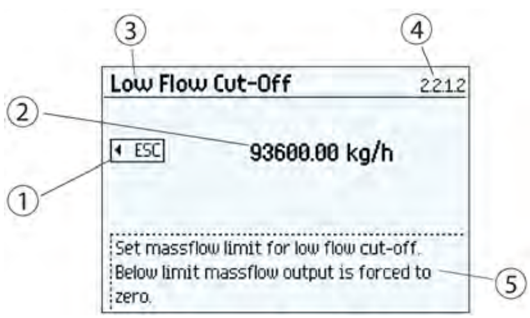
1. Select decimal point by pressing and keys.
2. Move decimal point by pressing key (moves decimal point to the left) or key (moves decimal point to the right).

In order to change the resolution of the process value shown in the operation view (for example massflow), change the resolution of one configuration parameter for this process value (for example "Low Flow Cut-off" (menu item 2.2.1.2)). 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 Massflow is defined in parameter menu item 2.2.1.8.

Numeric parameter read only view

Numeric parameters in read only view are displayed as shown here.



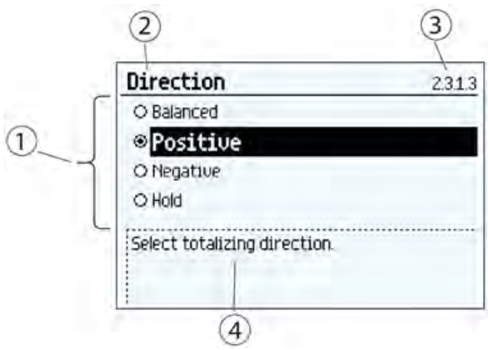
① Escape
② The set value
③ Parameter name
④ Parameter item number
⑤ Help text describing the parameter function.

Figure 7-7 Numeric parameter read only view

The read only view is shown if you don't 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 here.



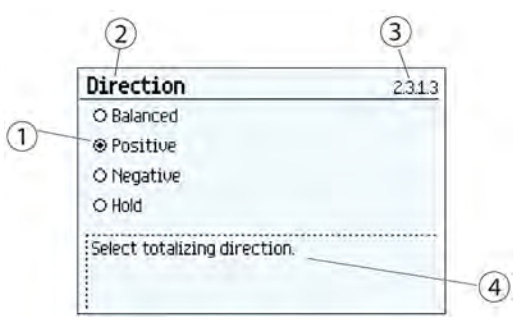
① Parameter list
② Parameter name
③ Parameter item number
④ Help text describing the parameter function. The help text appears if no key is pressed for three seconds.

Figure 7-8 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 here.



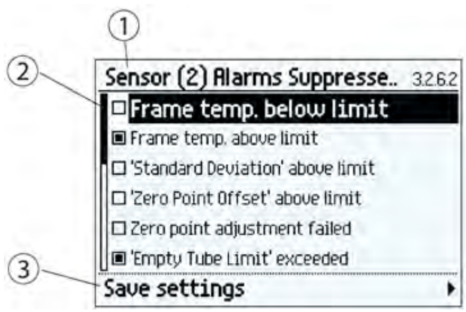
① Parameter value selected
② Parameter name
③ Parameter item number
④ Help text describing the parameter function. The help text appears if no key is pressed for three seconds.

Figure 7-9 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 suppressed.



① Parameter name
② Alarm list
③ Save settings (select and press right key to save settings)

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.

Functions 8

In the following the main functionalities of the device are described in detail.

For overview of all functions and parameters, refer to the parameter tables in the appendix HMI menu structure (Page 231).

8.1 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[1)] are:

- Massflow *
- Volumeflow *
- Corrected volumeflow
- Density *
- Process media temperature
- Fraction A (massflow or volumeflow)
- Fraction B (massflow or volumeflow)
- Fraction A %
- Fraction B %

[1)] Only the process variables listed above with * are available to be allocated to the 4-20 mA output on Channel 1 (HART PV variable). All process variables are available through HART (SV, TV and QV variables) and on all of Channels 2 to 4.

Limits and hysteresis

Limits

Limit alarms and warnings can be assigned to all process values. The following limit parameters are available for each process value:

- Upper Limit Alarm
- Upper Limit Warning
- Lower Limit Warning

- Lower Limit Alarm
- Alarm Hysteresis

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

Hysteresis

The hysteresis functions as follows:

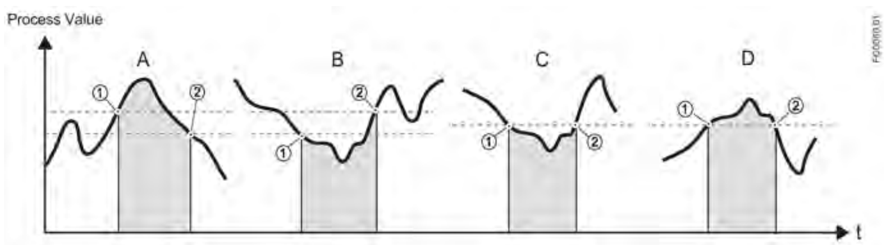


Figure 8-1 Hysteresis

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 Limit Warning 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 Alarm Item, see Status output (Page 147).

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 HMI 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 configure to react on a failure

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

The alarm behavior is described in detail below.

Detail alarm behavior is described in Alarms and system messages (Page 171).

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 flowrate 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:

- Massflow: 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)].
- Volumeflow: derived directly from the ratio of massflow and media density.
- Corrected volumeflow: derived from the ratio of massflow and reference 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.
- Fraction A (massflow or volumeflow): 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 (massflow or volumeflow): 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 ±1.0 °C.

[2] Reference density is the density of the media at reference conditions, normally atmospheric pressure and 20 °C. Reference 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 reference 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 Zero point adjustment

In the following the automatic zero point adjustment function is described. For further details, see the appendix Zero point adjustment (Page 379).

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 HMI (Page 76) or PDM (Page 105) 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 massflow 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 from a large number of samples. The resultant flow value represents an offset from true zero flow. The standard deviation is also calculated which represents the stability of the zero offset value.

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 the 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 "Select Zero Point Adj." (menu item 2.6.1).
2. Enter the desired value in "Offset" (menu item 2.6.8).

8.3 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 HART.

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.

8.4 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 (Modbus address 2129)
- Empty Tube Limit (Modbus address 2127)

The empty tube monitoring is activated via the Empty Tube Detection parameter. When the empty tube monitoring function is on, the massflow / volumeflow 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

---

8.5 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.

Figure 8-2 Centrifugal pump (1: low)

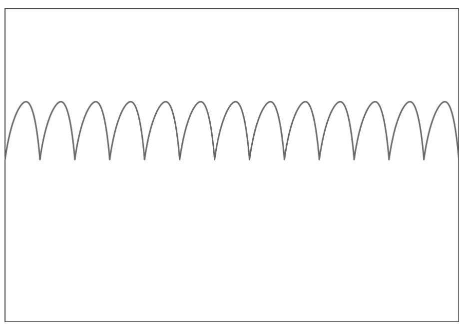


Figure 8-3 Triplex pump (2)

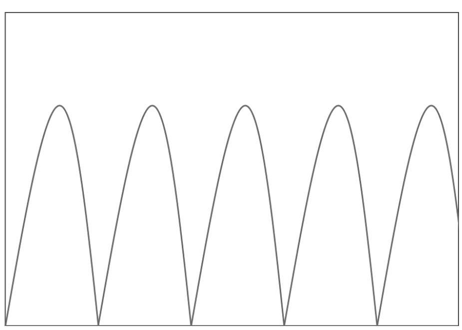


Figure 8-4 Duplex pump (3; default setting)

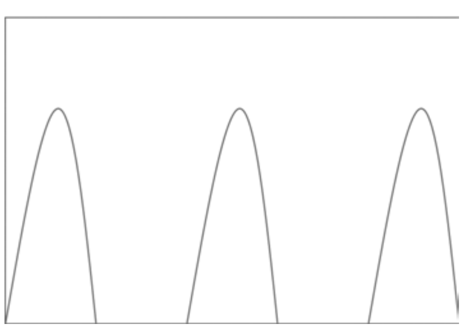


Figure 8-5 Simplex pump (4)

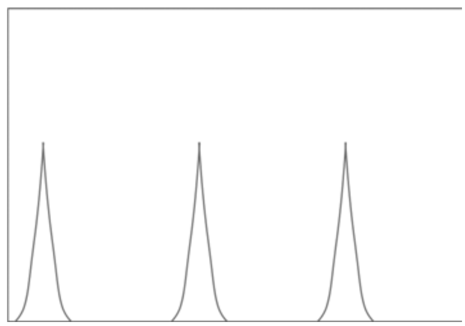


Figure 8-6 Cam pump (5: high)

Note

Increased reaction time

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

8.6 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	Current (4-20 mA) HART
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
3	Signal output	• Current (0/4-20 mA) • Frequency or pulse • Redundant 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)

Channel	HW configuration (fixed when ordering)	SW configuration available to the user
	Current input	
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)
	Current input	

8.6.1 Current output

All four channels can be configured as current output. As the 4 to 20 mA output on channel 1 is Functional Safety approved (the element complies with SIL 2 in single-channel Safety Instrumented Systems and with SIL 3 in dual-channel Safety Instrumented Systems implementing a compare function to validate the output of the two redundant units).

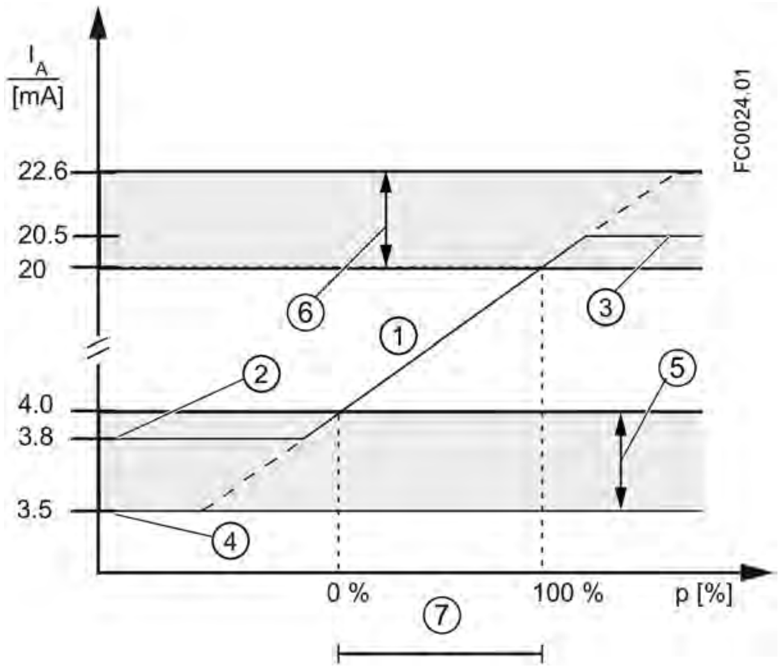
Current output configuration

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

- Massflow *
- Volumeflow *
- Corrected Volumeflow
- Density *
- Fluid Temperature
- Fraction A (Volumeflow or Massflow)
- Fraction B (Volumeflow or Massflow)
- Fraction A %
- Fraction B %
- Analog Dosing

Only the process variables listed above with * are available to be allocated to the 4-20 mA output on Channel 1 (HART PV variable). All process variables are available through HART (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 8-7 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 Good Value (the last process value before the failure occurred)
- Current Value (actual measured value)
- User Defined Value (within the range of 0 mA to 25 mA [1)])

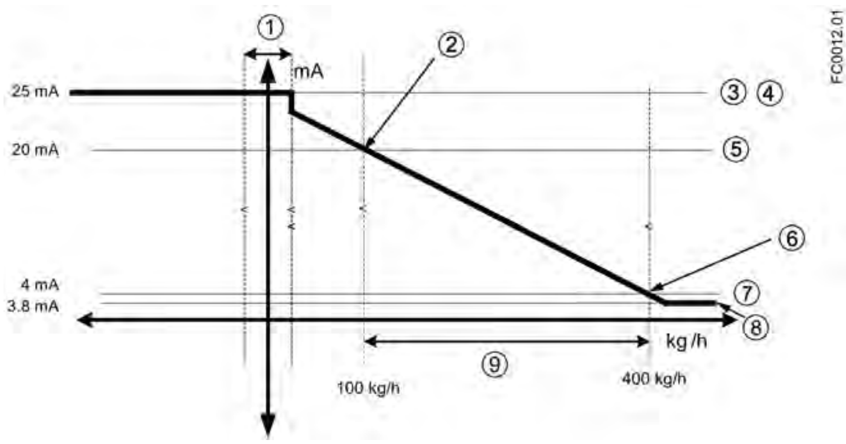
[1)] For channel 1 the range is 3.5 mA to 25 mA

In the alarms lists in Alarm messages (Page 172) it is listed which alarms bring the output to fail safe current.

Output scaling configuration

Below are four examples describing configuration possibilities for a current output.

Positive flow with negative scaling

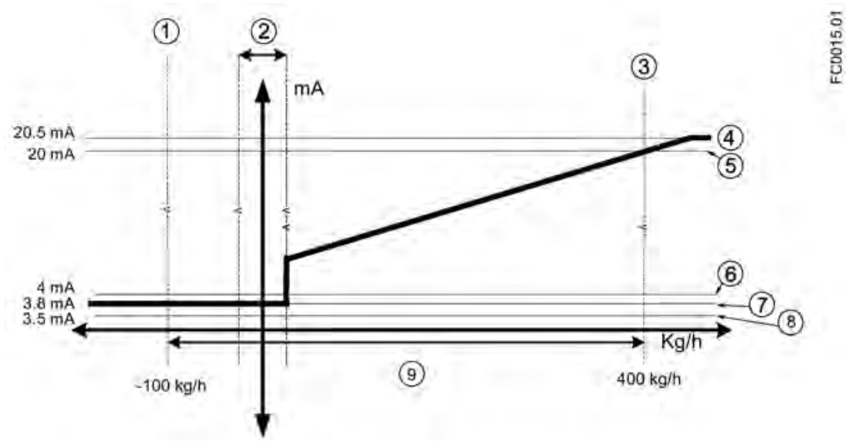


① Low-flow cut-off
② Upper scaling
③ Maximum output current
④ Upper alarm current
⑤ Upper range
⑥ Lower scaling
⑦ Lower range
⑧ Minimum output current
⑨ Measurement range

Current output setting

- Process value = Massflow
- Direction = Positive
- Current Mode = 4-20 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

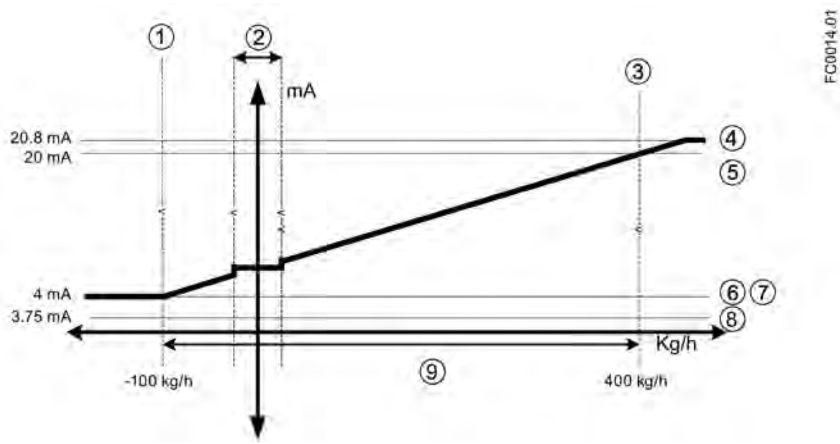


①	Lower scaling
②	Low-flow cut-off
③	Upper scaling
④	Maximum measurement value
⑤	Upper range
⑥	Lower range
⑦	Minimum measurement value
⑧	Lower alarm value
⑨	Measurement range

Current output setting

- Process value = Massflow
- Direction = Bidirectional
- Current Mode = 4-20 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

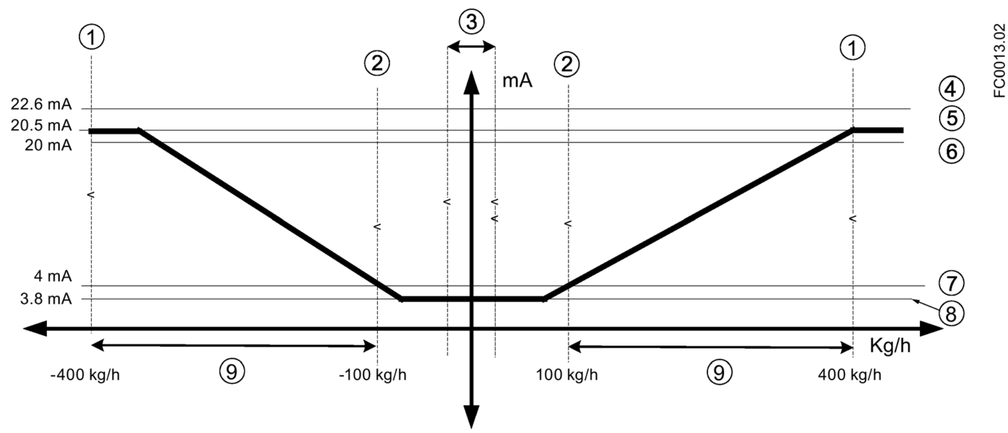


①	Lower scaling
②	Low-flow cut-off
③	Upper scaling
④	Maximum measurement value
⑤	Upper range
⑥	Lower range
⑦	Minimum measurement value
⑧	Lower alarm value
⑨	Measurement range

Current output setting

- Process value = Massflow
- Direction = Bidirectional
- Current Mode = 4-20 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



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 = Massflow
- Direction = Bidirectional (Symmetric)
- Current Mode = 4-20 mA NAMUR
- Upper Scaling = 400 kg/h
- Lower Scaling = 100 kg/h
- Fail Safe Mode = Maximum current
- Low-Flow Cut-Off = 25 kg/h

8.6.2 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 = Massflow
  - Amount Per Pulse = 1 kg
  - Pulse Width = 1 ms
- Measured massflow 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

8.6.3 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 = Massflow

- Direction = Positive
- Frequency Value High = 12 kHz
- Frequency Value Low = 2 kHz
- Flow Value High = 15 kg/s
- Flow Value Low = 5 kg/s

Measured massflow 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.

8.6.4 Redundancy mode

If both channel 2 and channel 3 are configured as either pulse outputs or frequency outputs, channel 3 can be configured for redundancy mode to follow channel 2 shifted by 90˚or 180˚ of the functional width of the pulse. If set to redundancy mode, channel 3 inherits all channel 2 settings. The functional width of the pulse is two times the pulse "On" duration. The flow direction will determine whether channel 3 is shifted before or after channel 2.

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

Channel 2 configured as positive direction and channel 3 set to redundancy mode 90°

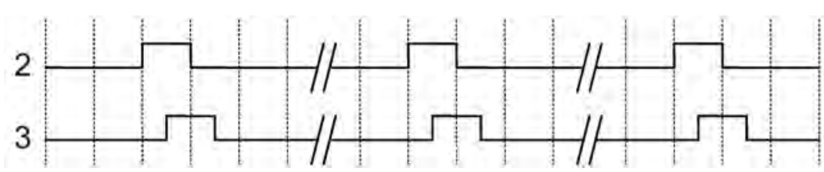


Figure 8-8 Positive flow - channel 3 leads by 90°

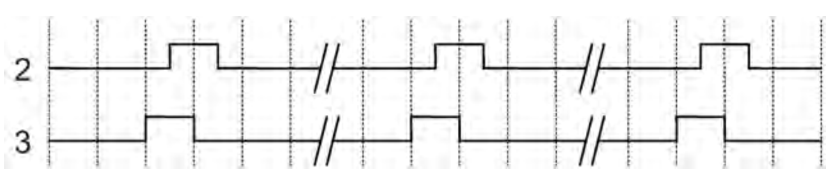


Figure 8-9 Negative flow - channel 3 lags by 90°

Channel 2 configured as positive direction and channel 3 set to redundancy mode 180˚

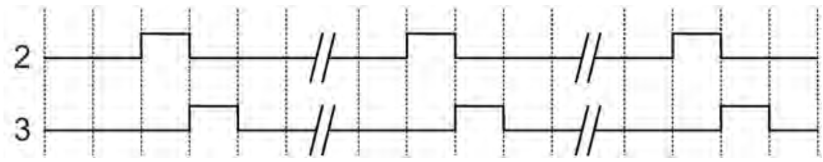


Figure 8-10 Positive flow - channel 3 leads by 180°

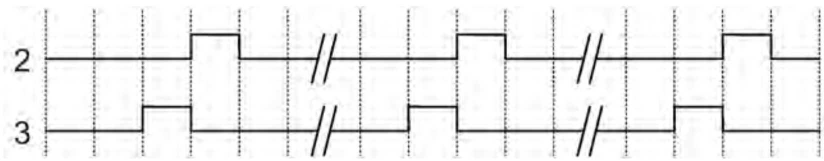


Figure 8-11 Negative flow - channel 3 lags by 180°

8.6.5 Status 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 alarm item lists.

- Alarm Class: Alarm will be signaled if alarm within the selected alarm class occurs.
- Alarm Item: Alarm will be signaled if selected alarm item occurs. It is possible to select more multiple alarms to be signaled.

Note

Alarm class

The alarm class options depend on the Alarm Mode setting, either NAMUR or Standard (Siemens Standard), selected in menu item 3.2.1. Both NAMUR and Siemens Standard alarms and their messages are described in more detail in Alarms and system messages (Page 171).

The control output can be used for controlling discrete valve dosing and analog valve dosing as described in Dosing (Page 149).

8.6.6 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.

8.7 Totalizers

Totalizer functions

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

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 massflow) before the failure occurred.

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

8.8 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. The dosing function must be configured for the type of valve used for dosing:

- One Stage Dosing:
  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.
- Two Stage Dosing:
  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. See examples below (Page 151) of some different opening and closing options.
- Analog Dosing:
  Dosing controlled by an analog valve configured in three stages as fully open, partially closed, and fully closed. See example below (Page 151) of the three-positional analog dosing.

Dosing setup procedure

The dosing functionality is configured via HMI. Menu 2.4 "Inputs/Outputs" determines how the transmitter will use the inputs and outputs for dosing control. Menu 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 Stage Dosing, Two Stage Dosing or Analog Dosing)
- dosing of massflow, volumeflow, corrected volumeflow or fraction flow (mass or volume)
- 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 menu 2.5 "Dosing"
   – Select valve control functionality at parameter "Dosing Mode"
   – Select measured process value for dosing at parameter "Process Values"
2. Individual recipe(s) in menus 2.5.4 to 2.5.8 as required
   – Setup dosing name, amount, unit and compensation
   – Select valve control sequence
   – Select fault handling configuration
3. Output(s) in menu 2.4 "Inputs/Outputs" (see table below).
4. Input for dosing control in menu 2.4 "Inputs/Outputs"

8.8.1 Dosing control configuration

Dosing control includes valve control (discrete/analog) and fault handling. The valve control is done using channels 2, 3 and 4. Dosing control can be configured to:

- One Stage Dosing
- Two Stage Dosing
- Analog Dosing

One Stage Dosing

Use one Signal or one Relay output to control the one-stage dosing. Set the Operating 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 Stage Dosing

Use two Signal or two Relay outputs to control the two-stage dosing. Set the Operating 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.

Analog Dosing

Use one Signal output to control the analog dosing. Assign the Operating 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:

- Massflow
- Volumeflow
- Corrected Volumeflow* Fraction A
- Fraction B

Recipes

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

8.8.2 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 stage dosing

Configuration of one valve (primary valve).

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

Table 8- 1 One Stage Dosing

Valve control	Channel HW configuration	Output channel	Channel SW configuration		
			Menu item		Value
Discrete valve control - 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 stage dosing

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 Stage Dosing

Valve control	Channel HW configuration	Output channel	Channel SW configuration		
			Menu item		Value
Discrete valve control - 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
Discrete valve control - 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	2.4.6.1	"Operation Mode"	Status Output
			2.4.6.27	"Status Mode"	Secondary Valve Dosing
	Relay output	3	2.4.4.1	"Status Mode"	Secondary Valve Dosing
		4	2.4.7.1	"Status Mode"	Secondary Valve Dosing

Analog Dosing

Configuration of one analog valve.

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

Table 8- 3 Analog Dosing

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

Note

If the output channels including current output are configured for valve control, they cannot report alarm status or fault levels.

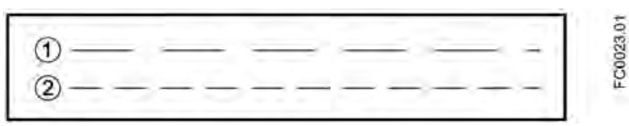
Table 8- 4 Parameter settings for Two Stage Dosing valve control

Valve control parameter configured 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

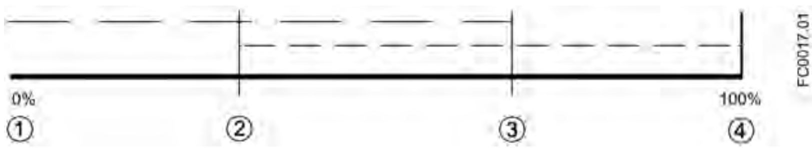
Parameter configuration:

Menu 2.5 Dosing

- 2.5.1 Dosing Mode = Two Stage Dosing

Menu 2.5.5.6 Valve Control

- 2.5.5.6.1 Stage Setup Format = Relative
- 2.5.5.6.2 Stage 1 Primary Open = 0 %
- 2.5.5.6.3 Stage 1 Primary Close = 66 %
- 2.5.5.6.4 Stage 2 Secondary Open = 33 %
- 2.5.5.6.5 Stage 2 Secondary Close = 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 Stage Dosing

Menu 2.5.5.6 Valve Control

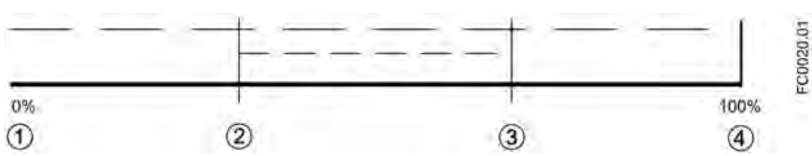
- 2.5.5.6.1 Stage Setup Format = Relative

- 2.5.5.6.2 Stage 1 Primary Open = 0 %

- 2.5.5.6.3 Stage 1 Primary Close = 100 %

- 2.5.5.6.4 Stage 2 Secondary Open = 33 %

- 2.5.5.6.5 Stage 2 Secondary Close = 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 Stage Dosing

Menu 2.5.5.6 Valve Control

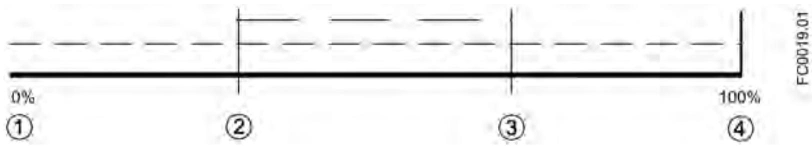
- 2.5.5.6.1 Stage Setup Format = Relative

- 2.5.5.6.2 Stage 1 Primary Open = 33 %

- 2.5.5.6.3 Stage 1 Primary Close = 66 %

- 2.5.5.6.4 Stage 2 Secondary Open = 0 %

- 2.5.5.6.5 Stage 2 Secondary Close = 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 Stage Dosing

Menu 2.5.5.6 Valve Control

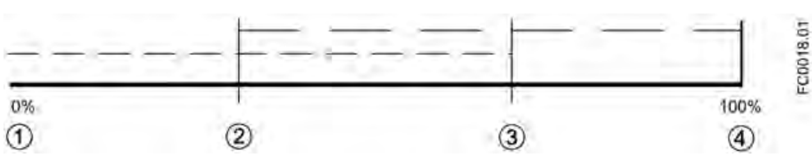
- 2.5.5.6.1 Stage Setup Format = Relative

- 2.5.5.6.2 Stage 1 Primary Open = 33 %

- 2.5.5.6.3 Stage 1 Primary Close = 100 %

- 2.5.5.6.4 Stage 2 Secondary Open = 0 %

- 2.5.5.6.5 Stage 2 Secondary Close = 66 %



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

- Analog Dosing:
  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

Valve control parameter configured in each recipe	Default value	Description
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 analog dosing configured in recipe 1

Parameter configuration:

Menu 2.5 Dosing

2.5.1 Dosing Mode = Analog Dosing

Menu 2.5.4.5 Valve Control

2.5.4.5.1 Stage Setup Format = Relative

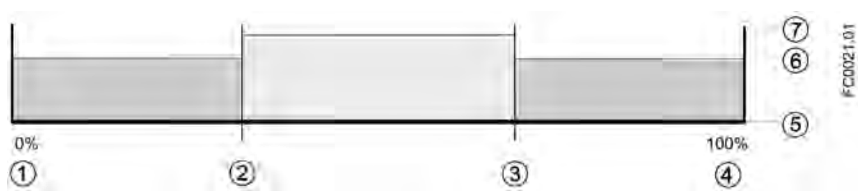
2.5.4.5.6 Fully Closed Current Level = 0 mA

2.5.4.5.7 Partial Open Current Level = 10 mA

2.5.4.5.8 Fully Open Current Level = 20 mA

2.5.4.5.9 Fully Open = 35 %

2.5.4.5.10 Partially Closed = 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

8.8.3 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. HMI provides dosing control via the dosing operating view, see Operation view (Page 116). All dosing setup and control can be performed via HART interface 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).

8.8.4 Fault handling

The transmitter fault handling provides monitoring of both dosing time and amount. The configuration of the fault handling is done in menu 2.5.4.6 Fault Handling.

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 Alarms and system messages (Page 171).

Dosing overrun monitoring

The dosing overrun monitoring checks if the flow amount exceeds the defined Overrun Value (menu item 2.5.5.7.3 for Recipe 1). If the overrun value is exceeded, an alarm will be triggered, see Alarms and system messages (Page 171).

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

8.9 Audit trail

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, HART or USB) the change was made.

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

- "Parameter Change Log" (menu item 3.8.1)
- "FW Update Change Log" (menu item 3.8.3)

Each audit trail list can be cleared by the user.

See also "Alarm History Log" (menu item 3.2.4)

8.10 Alarm acknowledgement

All unacknowledged alarms are listed in alarm log list "Alarm" menu item 3.2.3. The alarm list is default available in operating view 6.

There are two ways to have the alarms removed from the alarm list (menu item 3.2.2).

- Manual: The alarm remains in the alarm list until the alarm is manually acknowledged (ack.).

The time of the acknowledgement is shown in the Alarm History Log (menu item 3.2.4) as long as the history log is not cleared.

- Auto: The alarm is removed from the alarm list when the cause is removed (going)

8.11 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 in menu 2.8.1X.1 and the unit text and factor are defined in menu items 2.8.1X.1.1 and 2.8.10.1.2.

The unit factor for volumeflow is based on m^3/s and the unit factor for volume totalizer is based on m^3.

The custom unit can be selected in the unit parameter menu item 2.2.2.1 for volumeflow and in menu items 2.3.1.2, 2.3.2.2 and 2.3.3.2 for totalizers.

8.12 SensorFlash

SensorFlash is a high-performance micro SD card (1 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 calibration report. Material, pressure test, factory testing and order conformance certificates are optional at ordering.

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.

Copy settings from the SensorFlash to the flowmeter in menu item 3.3.6 (Copy Setups). The new settings are automatically stored on the original SensorFlash when it is replaced in the transmitter, see How do I copy application setup from one device to another? (Page 192).

8.13 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 HMI (menu item 3.7) or via SIMATIC PDM in the parameter "Enable Simulation".

Inputs/outputs simulation

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

Table 8- 5 Inputs/outputs simulation

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:

- Massflow
- Volumeflow
- Corrected Volumeflow
- Density
- Process Media Temperature
- Frame 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 Alarm Mode, menu item 3.2.1.

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 mentioned in Alarm messages (Page 172) can be simulated; except ID 51 (Malfunction in Pickup Amplitude) and ID 165 (Ref. density simulated).

8.14 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 3.3.2.
- Set To Default

  The device can be reset to its default settings in menu item 3.3.3.
- Restart Device

  The device can be restarted without disconnecting the power in menu item 3.3.4.

Custody Transfer 9

The SITRANS FC430 flowmeter is suitable for 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

9.1 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 www.siemens.com/FC430 (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 Figure 1-5 FCT030 approval nameplate example (Page 18).

9.2 Verification

Custody transfer requirements

All custody transfer devices are verified on site using reference measurements.

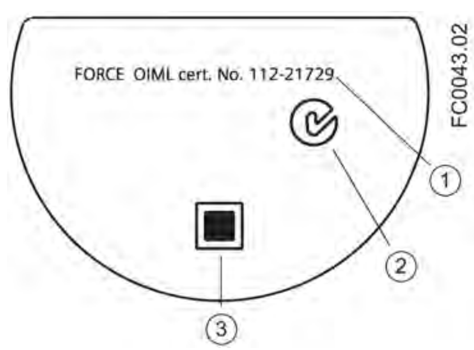
The device may only be used for applications subject to legal metrology once it has been verified on site by the Verification Authority. The associated seals on the device ensure this status.

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 approval nameplate



① FORCE OIML		Custody Transfer evaluation certificate number
② C✓		C-tick logo
③ Barcode		Product-specific barcode

Figure 9-1 FCT030 approval nameplate example

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 identification nameplate and on the transmitter identification nameplate ("Serial No.").

9.3 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.

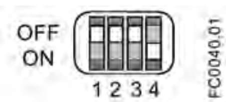
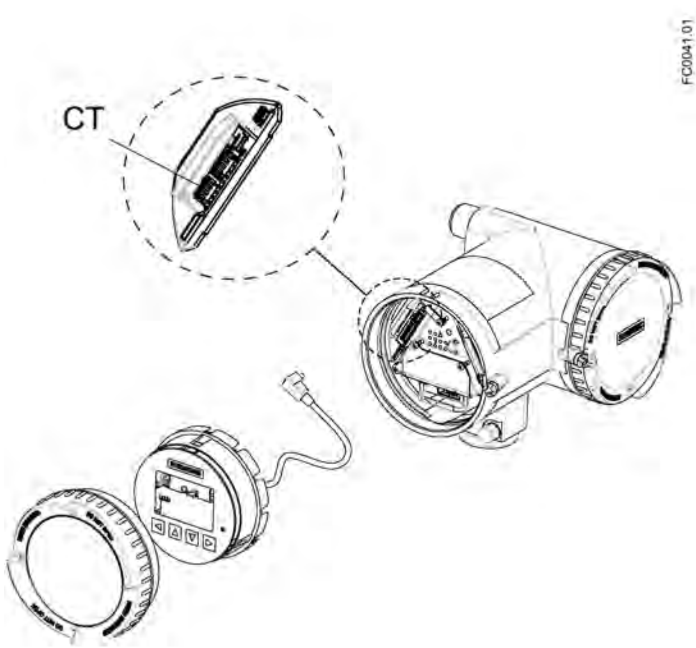


Figure 9-2 CT switch (4) "ON"

Note

Protected parameters

Parameters protected in CT mode are listed in Parameter protection in custody transfer mode (Page 166).



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.

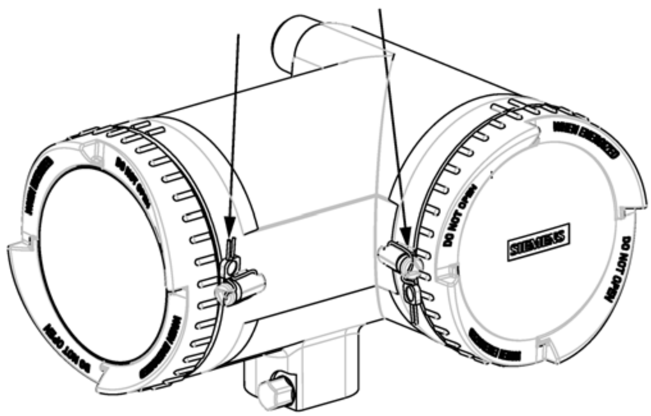


Figure 9-3 Transmitter seals in place - compact version. Arrows indicate the seal points of the two lock screws

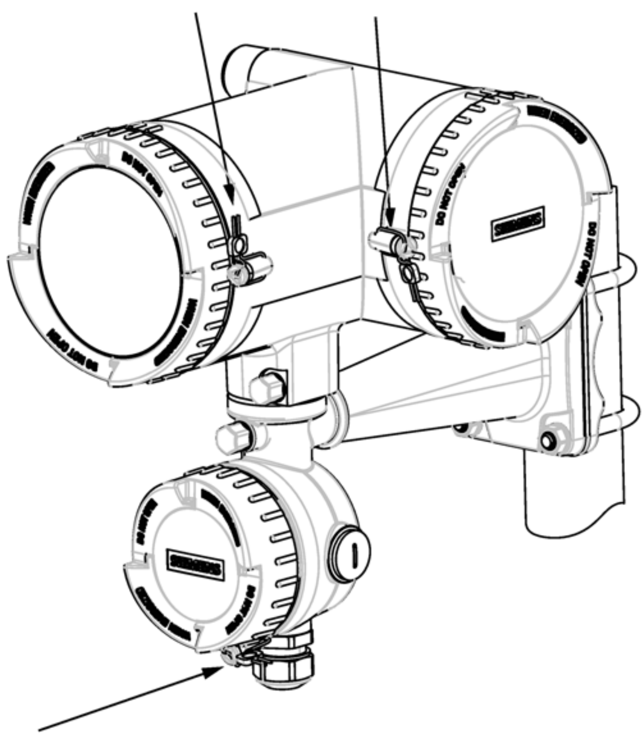


Figure 9-4 Remote transmitter seals in place - termination variant. Arrows indicate the seal points of the three lock screws. The lock screw of the DSL must also be sealed

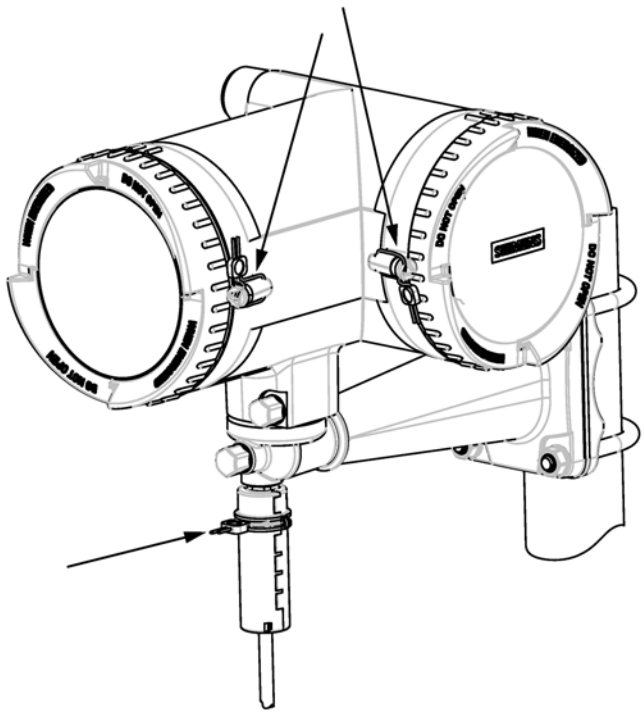


Figure 9-5 Remote transmitter seals in place - M12 plug variant. Arrows indicate the seal points of the two lock screws and cable sealing

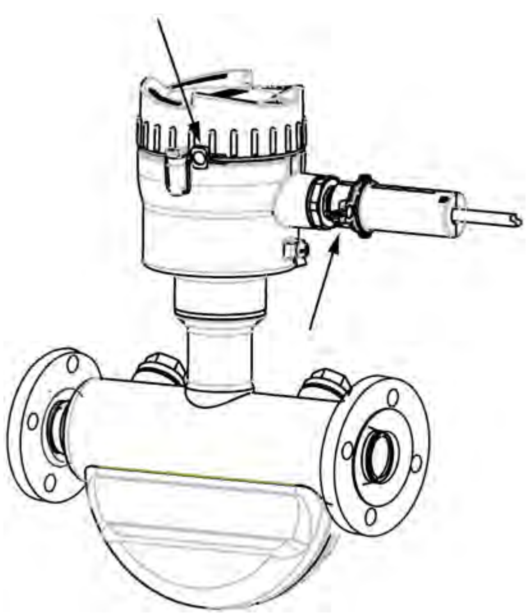


Figure 9-6 Remote sensor seals in place - M12 variant. Arrows indicate the seal points of the lock screw and cable sealing

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.

9.4 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 231).

Table 9- 1 Parameters protected in CT mode

Level 2		**Level 3**		**Level 4**		**Level 5**	
No.	**Name**	**No.**	**Name**	**No.**	**Name**	**No.**	**Name**
2.1	**Basic settings**	*2.1.1*	*Flow Direction*				
		2.1.2	*Process Noise Damping*				
2.2	**Process Values**	**2.2.1**	**Massflow**	*2.2.1.2*	*Low Flow Cut-Off*		
		2.2.2	**Volumeflow**	*2.2.2.2*	*Low Flow Cut-Off*		
		2.2.3	**Corrected Volumeflow**	**2.2.3.8**	**Reference Density**	*2.2.3.8.2*	*Corrected Volumeflow Mode*
						2.2.3.8.3	*Fixed Reference Density*
						2.2.3.8.4	*Linear Expansion Coeff.*
						2.2.3.8.5	*Square Expansion Coeff.*
						2.2.3.8.6	*Reference Temperature*
		2.2.4	**Flow Adjustment**	*2.2.4.1*	*Adjustment Factor*		
		2.2.5	**Density**	*2.2.5.2*	*Empty Tube Detection*		
				2.2.5.3	*Empty Tube Limit*		
				2.2.5.10	**Density Adjustment**	*2.2.5.10.1*	*Adjustment Factor*
						2.2.5.10.2	*Adjustment Offset*

Level 2		Level 3		Level 4		Level 5	
No.	Name	No.	Name	No.	Name	No.	Name
		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 Text*
				2.2.7.6	Fraction B	*2.2.7.6.1*	*Fraction B Text*
				2.2.7.9	Fraction Adjustment	*2.2.7.9.1*	*Adjustment Factor*
						2.2.7.9.2	*Adjustment Factor*
2.3	Totalizer	2.3.1	Totalizer 1	*2.3.1.1*	*Process Values*		
				2.3.1.2	*Unit*		
				2.3.1.3	*Direction*		
				2.3.1.4	*Fail Safe Mode*		
				2.3.1.10	*Reset*		
				2.3.1.11	*Preset*		
				2.3.1.12	*Decimal Places*		
		2.3.2	Totalizer 2	*2.3.2.1*	*Process Values*		
				2.3.2.2	*Unit*		
				2.3.2.3	*Direction*		
				2.3.2.4	*Fail Safe Mode*		
				2.3.2.10	*Reset*		
				2.3.2.11	*Preset*		
				2.3.2.12	*Decimal Places*		
		2.3.3	Totalizer 3	*2.3.3.1*	*Process Values*		
				2.3.3.2	*Unit*		
				2.3.3.3	*Direction*		
				2.3.3.4	*Fail Safe Mode*		
				2.3.3.10	*Reset*		
				2.3.3.11	*Preset*		
				2.3.3.12	*Decimal Places*		
		2.3.4	*Reset all totalizers*				
2.4	Inputs/Outputs	2.4.2	Signal Output (2)	*All parameters*			
		2.4.3	Signal Output (3)	*All parameters*			
		2.4.4	Relay Output (3)	*All parameters*			
		2.4.5	Signal Input (3)	*All parameters*			
		2.4.6	Signal Ouput (4)	*All parameters*			
		2.4.7	Relay Output (4)	*All parameters*			
		2.4.8	Signal Input (4)	*All parameters*			
2.6	Zero point adjustment	*2.6.1*	*Select Zero Point Adj.*				
		2.6.2	*Zero Point Adjustment*				
		2.6.3	*Duration*				

Level 2		Level 3		Level 4		Level 5	
No.	Name	No.	Name	No.	Name	No.	Name
		2.6.4	*Standard Deviation Limit*				
		2.6.6	*Offset Limit*				
		2.6.8	*Offset*				
2.8	Display	2.8.10	Custom Units	2.8.10.2	Totalizer Unit	*2.8.10.2.1*	*Custom Text*
						2.8.10.2.2	*Custom Factor*
3.2	Alarms	*3.2.5*	*Reset History*				
3.3	Maintenance	*3.3.4*	*Restart Device*				
3.4	Diagnostics	3.4.2	Sensor	*3.4.2.6*	*Offset*		
3.5	Characteris-tics	*3.5.2*	*CT Variant*				
		3.5.6	Sensor	*3.5.6.3*	*Calibration Factor*		
				3.5.6.4	*Density Calibration Offset*		
				3.5.6.5	*Density Calibration Factor*		
				3.5.6.6	*Density Comp. Tube Temp.*		
				3.5.6.7	*Density Comp. Frame Temp.*		
3.7	Simulate	3.7.1	Simulate Input/Outputs	3.7.1.2	Signal Output (2)	*3.7.1.2.1*	*Simulation*
						3.7.1.2.2	*Simulated Value*
						3.7.1.2.3	*Simulation*
						3.7.1.2.4	*Simulated Value*
						3.7.1.2.5	*Simulation*
						3.7.1.2.6	*Simulated Value*
						3.7.1.2.7	*Simulation*
						3.7.1.2.8	*Simulated Value*
				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*
				3.7.1.4	Relay Output (3)	*3.7.1.4.1*	*Simulation*
						3.7.1.4.2	*Simulated Value*
				3.7.1.5	Signal Input (3)	*3.7.1.5.1*	*Simulation*
						3.7.1.5.2	*Simulated Value*
				3.7.1.6	Signal Output (4)	*3.7.1.6.1*	*Simulation*
						3.7.1.6.2	*Simulated Value*

Level 2		Level 3		Level 4		Level 5	
No.	Name	No.	Name	No.	Name	No.	Name
						3.7.1.6.3	*Simulation*
						3.7.1.6.4	*Simulated Value*
						3.7.1.6.5	*Simulation*
						3.7.1.6.6	*Simulated Value*
						3.7.1.6.7	*Simulation*
						3.7.1.6.8	*Simulated Value*
				3.7.1.7	Relay Output (4)	*3.7.1.7.1*	*Simulation*
						3.7.1.7.2	*Simulated Value*
				3.7.1.8	Signal Input (4)	*3.7.1.8.1*	*Simulation*
						3.7.1.8.2	*Simulated Value*
		3.7.2	Simulation Process Values	3.7.2.1	Massflow	*3.7.2.1.1*	*Simulation*
						3.7.2.1.2	*Massflow Value*
				3.7.2.2	Volumeflow	*3.7.2.2.1*	*Simulation*
						3.7.2.2.2	*Volumeflow Value*
				3.7.2.3	Corrected Volumeflow	*3.7.2.3.1*	*Simulation*
						3.7.2.3.2	*Corrected Volumeflow Value*
				3.7.2.4	Density	*3.7.2.4.1*	*Simulation*
						3.7.2.4.2	*Density Value*
				3.7.2.5	Fluid Temperature	*3.7.2.5.1*	*Simulation*
						3.7.2.5.2	*Fluid Temperature Value*
				3.7.2.6	Frame Temperature	*3.7.2.6.1*	*Simulation*
						3.7.2.6.2	*Frame Temperature Value*
				3.7.2.7	Fraction	*3.7.2.7.1*	*Simulation*
						3.7.2.7.2	*Fraction A % Value*
						3.7.2.7.3	*Fraction B % Value*
3.8	Audit Trail	*3.8.2*	*Clear Parameter Change Log*				
		3.8.4	*Clear FW Update Log*				
3.9	Aerated Flow	*3.9.1*	*Aerated Flow Filter*				
		3.9.2	*Filter Time Constant*				
		3.9.3	*Alarm Limit*				
		3.9.4	*Warning Limit*				
		3.9.5	*Measurement Sample time*				
		3.9.6	*Filter Start Hysteresis*				
		3.9.7	*Minimum Filtering Time*				
		3.9.8	*Filter Iteration*				

Level 2		Level 3		Level 4		Level 5	
No.	Name	No.	Name	No.	Name	No.	Name
		3.9.9	*Bandwidth Factor*				
		3.9.10	*Filter Pole Shift*				
4.7	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.

9.5 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.

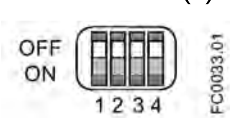


Figure 9-7 CT switch (4) "OFF"

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.

Alarms and system messages 10

10.1 Overview of messages and symbols

This section describes alarm messages shown in the local display.

Display behavior on local display

Messages are shown in the operation view of the display.

- Operation view shows the alarms 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 always shown.
- Alarm list view shows all active alarms on a list. The alarm list combines a symbol, text and an alarm ID number. The most recent alarm is shown on top of the list. The alarm list view can also be accessed via menu item 3.3.2 Alarm.
- Alarm history view lists the most recent alarms (up to 100). The alarm history log can be viewed in menu item 3.2.3. The alarm history log can be reset in menu item 3.2.4.

Characteristics of messages

The device provides two types of alarm classes, NAMUR and Siemens standard, selected in menu item 3.2.1 Alarm Mode.

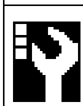
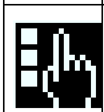
The following tables summarize the two types of alarm classes in an overview.

The sequence of the symbols corresponds to the priority of the messages, beginning with the most critical.

Siemens standard alarm classes

The number of dots assigned to the symbol defines the importance level of the message.

Table 10- 1 Siemens standard icons

Icon	Alarm classes	Definition
	Maintenance alarm	The device outputs fault current. Service the device immediately.
	Function check	Output signal temporarily invalid (for example frozen) due to on-going work on the device.

	Process value alarm	The device outputs a fault current or is at the limit of the saturation range.
	Process value warning	There is a problem with one or more process values. Thus the device is still measuring process values, but these may be unreliable. Example: A process value exceeds the device specification.

NAMUR alarm classes

Table 10- 2 NAMUR icons

Icon	Alarm classes	Definition
	Failure	Output signal invalid due to malfunction in the field device or its peripherals.
	Out of specification	"Off-spec" means that the device is operating outside its specified range (for example measuring or temperature range) or that internal diagnoses indicate deviations from measured or set values due to internal problems in the device or process characteristics (for example compressible emulsions in the process medium).
	Function check	Output signal temporarily invalid (for example frozen) due to on-going work on the device.

10.2 Alarm messages

Alarms and system messages support both Siemens standard and NAMUR.

In the following tables the alarm ID (identification number) can be found along with possible causes and directions for corrective action. The alarm may affect the output depending on the process value selected to be signaled on the output as listed in the tables below.

- Yes: The output is affected if the process value to be signaled is: Massflow (and Corrected Volumeflow), Volumeflow, Density or Temperature.
- Yes*: The output is affected if the process value to be signaled is: Massflow (and Corrected Volumeflow), Volumeflow, or Density.

Alarm classes: Maintenance alarm (Siemens standard), Failure (NAMUR)

ID	Diagnostic	Action	Effect on output
32 33 34 35	SIL parameters not validated	Run the "Safety Validation" wizard to validate the safety-critical parameters. The device can be put into Safe Operation mode after validation	
36 37	Sensor supply volt. out of range	Contact Siemens customer support	Yes

ID	Diagnostic	Action	Effect on output
38 39 40 41	Temperature measurement fault	Turn off the power, wait 5 seconds and turn on the power again. If the failure continues, then contact Siemens customer support	Yes
46	Invalid calibration data	Contact Siemens customer support for recalibration	Yes*
47	Invalid compensation data	Contact Siemens customer support	Yes*
49 50 51	Malfunction in Pickup Amplitude	Contact Siemens customer support	Yes*
55 56 57	Malfunction in sensor driver	Contact Siemens customer support	Yes*
58	Unstable driver oscillation	Contact Siemens customer support	Yes*
71	Parameter storage malfunction	Turn off the power, wait 5 seconds and turn on the power again. If the failure continues then contact Siemens customer support	
72 73 74 75 76 77	Internal error in sensor	Contact Siemens customer support	Yes
150	Sensor signal disrupted	Turn off the power. Unplug and reconnect the sensor cable. Restore power. If the failure continues, then contact Siemens customer support	
157	Safety alarms	The system has detected a safety-related alarm in Safe Operation. The device is in safety alarm state. All alarms must be cleared to bring the unit to Safe Operation mode.	
158	HART cable break	Check channel 1 current output cable connection	
159	Internal error in transmitter	Turn off the power, wait 5 seconds and turn on the power again. If the failure continues, contact Siemens customer support	
171	Product FW incompatible	Firmware update failed	
172	Transm. FW incompatible	Update rejected - transmitter FW incompatible	
173	Sensor FW incompatible	Update rejected - sensor FW incompatible	
174	HMI FW incompatible	Update rejected - HMI FW incompatible	
197	Current output cable break	Check channel 2 current output cable connection	
203	Current output cable break	Check channel 3 current output cable connection	
209	Current output cable break	Check channel 4 current output cable connection	
213	Invalid dosing configuration	The Two Stage Dosing controls two valves with use of two Signal Outputs. To ensure valid configuration either Stage 1 Primary Open or Stage 2 Secondary Open must be set to 0 and either Stage 1 Primary Close or Stage 2 Secondary Close must be set to Amount	

Alarm classes: Process value alarm (Siemens standard), Out of specification (NAMUR)

ID	Diagnostic	Action	Effect on output
42 43 44 45	Flow values not valid	Can be due to problems with measured fluid or hardware malfunction. If the failure continues then contact Siemens customer support	
59	Massflow out of specification	Reduce the flow. If the failure continues then contact Siemens customer support	
60	Volumeflow out of specification	Reduce the flow. If the failure continues then contact Siemens customer support	
61	Density out of specification	Contact Siemens customer support	
62	Fluid temp. below limit	Increase the fluid temperature. If the failure continues then contact Siemens customer support	
63	Fluid temp. above limit	Reduce the fluid temperature. If the failure continues then contact Siemens customer support	
64	Frame temp. below limit	Increase fluid temperature and check that ambient temperature is within specified limits. If the failure continues then contact Siemens customer support	
65	Frame temp. above limit	Reduce fluid temperature and check that ambient temperature is within specified limits. If the failure continues then contact Siemens customer support	
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"	
70	Too little fluid in tube	Make sure that the sensor is filled with liquid	
96	Massflow above alarm limit	Check process conditions or align limit to normal operation. Adjust parameter "Upper Limit Alarm"	
99	Massflow below alarm limit	Check process conditions or align limit to normal operation. Adjust parameter "Lower Limit Alarm"	
100	Volumeflow above alarm limit	Check process conditions or align limit to normal operation. Adjust parameter "Upper Limit Alarm"	
103	Volumeflow below alarm limit	Check process conditions or align limit to normal operation. Adjust parameter "Lower Limit Alarm"	
104	Density above alarm limit	Check process conditions or align limit to normal operation. Adjust parameter "Upper Limit Alarm"	
107	Density below alarm limit	Check process conditions or align limit to normal operation. Adjust parameter "Lower Limit Alarm"	

ID	Diagnostic	Action	Effect on output
108	Fluid temp. above alarm limit	Check process conditions or align limit to normal operation. Adjust parameter "Upper Limit Alarm"	
111	Fluid temp. below alarm limit	Check process conditions or align limit to normal operation. Adjust parameter "Lower Limit Alarm"	
112	Fraction A % above alarm limit	Check process conditions or align limit to normal operation. Adjust parameter "Upper Limit Alarm"	
115	Fraction A % below alarm limit	Check process conditions or align limit to normal operation. Adjust parameter "Lower Limit Alarm"	
116	Fraction B % above alarm limit	Check process conditions or align limit to normal operation. Adjust parameter "Upper Limit Alarm"	
119	Fraction B % below alarm limit	Check process conditions or align limit to normal operation. Adjust parameter "Lower Limit Alarm"	
120	Fract. A flow above alarm limit	Check process conditions or align limit to normal operation. Adjust parameter "Upper Limit Alarm"	
123	Fract. A flow below alarm limit	Check process conditions or align limit to normal operation. Adjust parameter "Lower Limit Alarm"	
124	Fract. B flow above alarm limit	Check process conditions or align limit to normal operation. Adjust parameter "Upper Limit Alarm"	
127	Fract. B flow below alarm limit	Check process conditions or align limit to normal operation. Adjust parameter "Lower Limit Alarm"	
128	Ref. density above alarm limit	Check process conditions or align limit to normal operation. Adjust parameter "Upper Limit Alarm"	
131	Ref. density below alarm limit	Check process conditions or align limit to normal operation. Adjust parameter "Lower Limit Alarm"	
132	Corr. vol. above limit	Check process conditions or align limit to normal operation. Adjust parameter "Upper Limit Alarm"	
135	Corr. vol below alarm limit	Check process conditions or align limit to normal operation. Adjust parameter "Lower Limit Alarm"	
136	Totalizer 1 above alarm limit	Check process conditions or align limit to normal operation. Adjust parameter "Upper Limit Alarm"	
139	Totalizer 1 below alarm limit	Check process conditions or align limit to normal operation. Adjust parameter "Lower Limit Alarm"	

ID	Diagnostic	Action	Effect on output
140	Totalizer 2 above alarm limit	Check process conditions or align limit to normal operation. Adjust parameter "Upper Limit Alarm"	
143	Totalizer 2 below alarm limit	Check process conditions or align limit to normal operation. Adjust parameter "Lower Limit Alarm"	
144	Totalizer 3 above alarm limit	Check process conditions or align limit to normal operation. Adjust parameter "Upper Limit Alarm"	
147	Totalizer 3 below alarm limit	Check process conditions or align limit to normal operation. Adjust parameter "Lower Limit Alarm"	
148	Transm. temp. above alarm limit	Check process conditions or align limit to normal operation. Adjust parameter "Upper Limit Alarm"	
149	Transm. temp. below alarm limit	Check process conditions or align limit to normal operation. Adjust parameter "Lower Limit Alarm"	
153	Current output below Scaling	Check process conditions or align limit to normal operation. Adjust channel 1 parameter "Lower Scaling"	
154	Current output above Scaling	Check process conditions or align limit to normal operation. Adjust channel 1 parameter "Upper Scaling"	
192	Dosing time overrun	Check installation. If ok, increase "Duration Time"	
193	Dosing quantity overrun	Check installation. If ok, decrease "Overrun Value"	
194	Invalid proc. val. during dosing	Check installation for abnormal operating conditions. If the failure continues for several dosings, contact Siemens customer support	
195	Current output below Scaling	Check process conditions or align limit to normal operation. Adjust channel 2 parameter "Lower Scaling"	
196	Current output above Scaling	Check process conditions or align limit to normal operation. Adjust channel 2 parameter "Upper Scaling"	
198	Frequency output below Scaling	Check process conditions or align limit to normal operation. Adjust channel 2 parameter "Flow Value Low"	
199	Frequency output above Scaling	Check process conditions or align limit to normal operation. Adjust channel 2 parameter ""Flow Value High"	
200	Pulse overflow	Pulse output insufficient pulse separation. Increase "Amount Per Pulse" or reduce "Pulse Width" on channel 2	
201	Current output below Scaling	Check process conditions or align limit to normal operation. Adjust channel 3 parameter "Lower Scaling"	

ID	Diagnostic	Action	Effect on output
202	Current output above Scaling	Check process conditions or align limit to normal operation. Adjust channel 3 parameter "Upper Scaling"	
204	Frequency output below Scaling	Check process conditions or align limit to normal operation. Adjust channel 3 parameter "Flow Value Low"	
205	Frequency output above Scaling	Check process conditions or align limit to normal operation. Adjust channel 3 parameter ""Flow Value High"	
206	Pulse overflow	Pulse output insufficient pulse separation. Increase "Amount Per Pulse" or reduce "Pulse Width" on channel 3	
207	Current output below Scaling	Check process conditions or align limit to normal operation. Adjust channel 4 parameter "Lower Scaling"	
208	Current output above Scaling	Check process conditions or align limit to normal operation. Adjust channel 4 parameter "Upper Scaling"	
210	Frequency output below Scaling	Check process conditions or align limit to normal operation. Adjust channel 4 parameter "Flow Value Low"	
211	Frequency output above Scaling	Check process conditions or align limit to normal operation. Adjust channel 4 parameter ""Flow Value High"	
212	Pulse overflow	Pulse output insufficient pulse separation. Increase "Amount Per Pulse" or reduce "Pulse Width" on channel 4	

Alarm class: Process value warning (Siemens standard), Out of specification (NAMUR)

ID	Diagnostic	Action	Effect on output
66	"Standard Deviation" above limit (shown for only 2 seconds)	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 (shown for only 2 seconds)	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 (shown for only 2 seconds)	Measurement continues with values from last successful zero point adjustment. Improve conditions for automatic zero point adjustment and repeat adjustment.	
78	Unstable measurement condition	Check if air is present in the liquid and that the flowmeter is operated within its specifications	
79	Auto filtering	Check that the flowmeter is operated within its specifications. Check other alarms to rule out HW malfunction	

ID	Diagnostic	Action	Effect on output
97	Massflow above warning limit	Check process conditions or align limit to normal operation. Adjust parameter "Upper Limit Warning"	
98	Massflow below warning limit	Check process conditions or align limit to normal operation. Adjust parameter "Lower Limit Warning"	
101	Volumeflow above warning limit	Check process conditions or align limit to normal operation. Adjust parameter "Upper Limit Warning"	
102	Volumeflow below warning limit	Check process conditions or align limit to normal operation. Adjust parameter "Lower Limit Warning"	
105	Density above warning limit	Check process conditions or align limit to normal operation. Adjust parameter "Upper Limit Warning"	
106	Density below warning limit	Check process conditions or align limit to normal operation. Adjust parameter "Lower Limit Warning"	
109	Fluid temp. above warning limit	Check process conditions or align limit to normal operation. Adjust parameter "Upper Limit Warning"	
110	Fluid temp. below warning limit	Check process conditions or align limit to normal operation. Adjust parameter "Lower Limit Warning"	
113	Fraction A % above warning limit	Check process conditions or align limit to normal operation. Adjust parameter "Upper Limit Warning"	
114	Fraction A % below warning limit	Check process conditions or align limit to normal operation. Adjust parameter "Lower Limit Warning"	
117	Fraction B % above warning limit	Check process conditions or align limit to normal operation. Adjust parameter "Upper Limit Warning"	
118	Fraction B % below warning limit	Check process conditions or align limit to normal operation. Adjust parameter "Lower Limit Warning"	
121	Fract. A flow above warning limit	Check process conditions or align limit to normal operation. Adjust parameter "Upper Limit Warning"	
122	Fract. A flow below warning limit	Check process conditions or align limit to normal operation. Adjust parameter "Lower Limit Warning"	
125	Fract. B flow above warning limit	Check process conditions or align limit to normal operation. Adjust parameter "Upper Limit Warning"	
126	Fract. B flow below warning limit	Check process conditions or align limit to normal operation. Adjust parameter "Lower Limit Warning"	

ID	Diagnostic	Action	Effect on output
129	Ref. density above warning limit	Check process conditions or align limit to normal operation. Adjust parameter "Upper Limit Warning"	
130	Ref. density below warning limit	Check process conditions or align limit to normal operation. Adjust parameter "Lower Limit Warning"	
133	Corr. vol. above warning limit	Check process conditions or align limit to normal operation. Adjust parameter "Upper Limit Warning"	
134	Corr. vol. below warning limit	Check process conditions or align limit to normal operation. Adjust parameter "Lower Limit Warning"	
137	Totalizer 1 above warning limit	Check process conditions or align limit to normal operation. Adjust parameter "Upper Limit Warning"	
138	Totalizer 1 below warning limit	Check process conditions or align limit to normal operation. Adjust parameter "Lower Limit Warning"	
141	Totalizer 2 above warning limit	Check process conditions or align limit to normal operation. Adjust parameter "Upper Limit Warning"	
142	Totalizer 2 below warning limit	Check process conditions or align limit to normal operation. Adjust parameter "Lower Limit Warning"	
145	Totalizer 3 above warning limit	Check process conditions or align limit to normal operation. Adjust parameter "Upper Limit Warning"	
146	Totalizer 3 below warning limit	Check process conditions or align limit to normal operation. Adjust parameter "Lower Limit Warning"	

Alarm class: Function check (Siemens standard), Function check (NAMUR)

ID	Diagnostic	Action	Effect on output
87	The sensor is stabilizing	Check sensor cable connection. Wait 20 seconds. If the status remains "Coming" then turn off the power, wait 5 seconds and turn on the power again. If the failure continues then contact Siemens customer support.	Yes
151	Sensor serial number mismatch	SensorFlash backup is disabled due to mismatch of serial numbers between sensor front-end and SensorFlash. Contact Siemens customer support	
152	Transm. serial number mismatch	SensorFlash backup is disabled due to mismatch of serial numbers between transmitter and SensorFlash. Contact Siemens customer support	
160	Massflow simulated	Disable "Simulation" before returning to normal operation	
161	Volumeflow simulated	Disable "Simulation" before returning to normal operation	

ID	Diagnostic	Action	Effect on output
162	Density simulated	Disable "Simulation" before returning to normal operation	
163	Fluid temp. simulated	Disable "Simulation" before returning to normal operation	
164	Fraction simulated	Disable "Simulation" before returning to normal operation	
165	Ref. density simulated	Disable "Simulation" before returning to normal operation	
166	Corr. volumeflow simulated	Disable "Simulation" before returning to normal operation	
167	Totalizer 1 simulated	Disable "Simulation" before returning to normal operation	
168	Totalizer 2 simulated	Disable "Simulation" before returning to normal operation	
169	Totalizer 3 simulated	Disable "Simulation" before returning to normal operation	
170	Loop current simulated	Disable "Simulation" before returning to normal operation	
214	Simulation on channel 2 is active	Disable "Simulation" before returning to normal operation	
215	Simulation on channel 3 is active	Disable "Simulation" before returning to normal operation	
216	Simulation on channel 4 is active	Disable "Simulation" before returning to normal operation	

11 Service and maintenance

11.1 Maintenance

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

An inspection can include check of:

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

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

Note

Siemens defines flow sensors as non-repairable products.

Maintenance information parameters

The basic maintenance information parameters are:

- Current Date and Time
- Operating Time Total
- Operating Time
- Configuration Counter
- Transmitter Hardware Revision
- HMI Hardware Revision
- Sensor Hardware Revision

11.2 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
- Frame Temperature
- Process Media Temperature
- Zero Point Adjustment Auto/Manual
- Zero Point Offset Value
- Manual Zero Point
- Zero Point Standard Deviation

11.3 Recalibration

Siemens A/S, Flow Instruments offers to recalibrate the sensor at our works in Denmark. 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 (incl. fraction setup if requested)
- Witness calibration

Note

SensorFlash

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

11.4 Technical support

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

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

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

Service & Support on the Internet

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

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

There you will find:

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

Additional Support

Please contact your local Siemens representative and offices if you have additional questions about the device.

Find your local contact partner at: http://www.automation.siemens.com/partner (http://www.automation.siemens.com/partner)

11.5 Transportation and storage

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

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

> **CAUTION**
>
> **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 196).

11.6 Cleaning

Cleaning the enclosure

- Clean the outside of the enclosure and the display window using a cloth moistened with water or a mild detergent.
- Do not use aggressive cleaning agents or solvents. Plastic components or painted surfaces could be damaged.

11.7 Repair

> **WARNING**
>
> **Impermissible repair of explosion protected devices**
>
> Danger of explosion in areas subject to explosion hazard.
>
> - Repair must be carried out by Siemens authorized personnel only.

WARNING

Impermissible accessories and spare parts

Danger 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.

11.8 Return and disposal

WARNING

Incorrect disassembly

The following dangers may result through incorrect disassembly:

- Injury through electric shock

- Danger through emerging media when connected to the process

- Danger 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 dangerous 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.

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

Required forms

- **Delivery Note**
- **Cover Note for Return Delivery** with the following information

  Cover note (http://support.automation.siemens.com/WW/view/en/16604370)

  – product (ordering number)

  – number of devices or spare parts returned

  – reason for the return
- **Declaration of Decontamination**

  Declaration of Decontamination (http://www.automation.siemens.com/w1/efiles/automation-technology/pi/Service/declaration_of_decontamination_en.pdf)

  With this declaration you certify *that the returned products/spare parts have been carefully cleaned and are free from any residues.*

  If the device has been operated together with toxic, caustic, flammable or water-damaging products, clean the device before return by rinsing or neutralizing. Ensure that all cavities are free from dangerous substances. Then, double-check the device to ensure the cleaning is completed.

  We shall not service a device or spare part unless the declaration of decontamination confirms proper decontamination of the device or spare part. Shipments without a declaration of decontamination shall be cleaned professionally at your expense before further proceeding.

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

Devices identified by this symbol may not be disposed of in the municipal waste disposal services under observance of the Directive 2002/96/EC on waste electronic and electrical equipment (WEEE).

They can be returned to the supplier within the EC or to a locally approved disposal service. Observe the specific regulations valid in your country.

Troubleshooting/FAQs 12

12.1 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 HART interface

Refer to "Commissioning with PDM" (Page 88).

Diagnosing with PDM

Online process values are available under menu "View->Process Values".

Online diagnostic information is available under menu "View->Device Status"

12.2 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/Cross talk
- Solid particles settling in the liquid

In the following a 4-step guide to troubleshooting is provided:

Step 1	Preliminary application inspection
Step 2	Zero point adjustment
Step 3	Measurement error calculation
Step 4	Application improvement

The guide will enable you to trace the reason for incorrect measurements and to improve the application.

Step 1: Inspecting the application

Ensure that:

1. The sensor is installed as described in Installing/mounting (Page 41).
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.

Step 2: Performing a zero point adjustment

The second step in the troubleshooting procedure is to zero point adjust the device. For further information on zero point adjustment, see Commissioning (Page 73).

Step 3: Calculating the measurement error

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 195).

The parameter **Zero Point Standard Deviation** is located in the **Maintenance & Diagnostics** menu in the SIMATIC PDM.

Calculating the measurement error

Given the Zero Point Standard Deviation, the error expected for different flow rates can be calculated, without performing time-consuming measurements. So using this formula, one can assess if the application can be used as–is, or whether to use more time improving the installation.

E = Z x 100 % / Qm

Where:

E	=	measurement error in % of flowrate
Z	=	zero point standard deviation value in kg/h
Qm	=	current flowrate in (kg/h)

Example 1: Low flow application

- DN 15 sensor. The sensor's nominal flowrate is specified to 3700 kg/h
- Zero point error (Zero Point Standard Deviation) value is specified as 0.2 kg/h
- Flow: Min. 10 kg/h - Max. 100 kg/h

After the zero point adjustment, the Zero Point Standard Deviation value 'Z' is read as 1 kg/h, that is 5 times greater than that specified for the sensor.

The error for a flowrate of 10 kg/h is estimated as:

- E = 1 kg/h x 100% / 10 kg/h = 10%.

For a flowrate of 100 kg/h the error is estimated as:

- E = 1 kg/h x 100% / 100 kg/h = 1%

For this application it is necessary to investigate more closely what the cause of the relatively high Zero Point Standard Deviation value is, in order to establish what needs to be done to improve the measurement accuracy.

Example 2: High flow application

DN 15 sensor. The sensor flowrate is specified as max. 3700 kg/h

- The zero point error/ Zero Point Standard Deviation value is specified as 0.2 kg/h
- Flowrate: Min. 1000 kg/h - Max. 3000 kg/h

After the zero point adjustment, the Zero Point Standard Deviation value 'Z' is read as 1 kg/h, that is 5 times greater than specified for the sensor !

The error at a flowrate of 1000 kg/h is estimated as:

- E = 1 kg/h x 100% / 1000 kg/h = 0.1%

At a flowrate of 3000 kg/h the error is estimated to be:

- E = 1 kg/h x 100% / 3000 kg/h = 0.03%

In all of the above examples, the linearity error of ±0.1% must be added to the calculated error.

As can be seen, in this case it is not so important that the standard deviation is 1 kg/h. The error due to the zero point is only 0.1% for a flowrate of 1000 kg/h, and even less for a higher flowrate.

So for this installation with the given flowrate and zero point error (Zero Point Standard Deviation value), you should typically choose not to spend more time finding ways to improve the application.

Step 4: Improving the application

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 massflow 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 flow meter, 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 flow meter(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 such 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.

12.3 How do I copy 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 menu item 3.3.6 (Copy Setups), select "OK" and press to execute the copying and 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.

12.4 How do I update the firmware?

1. Download the new firmware bundle from www.siemens.com/FC430 and save it to the SensorFlash. An instruction is also available at this site.
2. Access the flowmeter with access level Expert (the default PIN code is 2834).
3. Enter menu item 3.3.5 (FW Update), 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 prsonnel.

Technical data 13

13.1 Function and system design

Table 13- 1 Designated use

Description	Specification
Measurement of process media	• Fluid Group 1 (suitable for dangerous fluids) • Aggregate state: Paste/light slurry, liquid and gas

Table 13- 2 Function and system design

Description	Specification
Measuring principle	Coriolis
System architecture	• Compact configuration • Remote configuration (up to 225 m (738 ft))

13.2 SensorFlash

Table 13- 3 SensorFlash

Description	Specification
Capacity	SensorFlash: 4 GB
File system support	FAT32

Note

SensorFlash functions support

Only the supplied 4GB SD cards are supported for Backup, Restore, Logging, and Firmware update.

13.3 Process variables

Table 13- 4 Process variables

Description	Specification
Primary process variables	• Massflow • Density • Fluid temperature
Derived process variables	• Volumeflow • Corrected volumeflow • Fraction A:B • Fraction % A:B

13.4 Bus communication

Table 13- 5 HART communication

Description	Specification	More information
Manufacturer ID	42 (2A Hex)	Manufacturer ID parameter
Device ID	34 (22 Hex)	Device type parameter
HART protocol revision	7.2	HART protocol revision parameter
Device revision	1	Device revision parameter
Number of device variables	12	Number of process values, both measured and derived
Physical layers supported	FSK	Frequency Shift Keyed
Loop-powered	No	4-wire device
SIMATIC PDM SW	6.0 SP2 and higher	Software version

13.5 Performance

Table 13- 6 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/cm³ (62.2 lb/ft³)
Reference device orientation	Horizontal installation, tubes down, flow in direction of arrow on casing, see Installing/Mounting (Page 48).

Table 13- 7 Massflow accuracy

Description	Specification			
Sensor size	**DN 15**	**DN 25**	**DN 50**	**DN 80**
Qmin - minimum flowrate [kg/h] (lb/m)	20 (0.735)	200 (7.35)	750 (27.6)	900 (33.1)
Qnom - nominal flowrate [kg/h] (lb/m)	3700 (136)	11 500 (422.6)	52 000 (1 911)	136 000 (4 997)
Qmax - maximum flowrate [kg/h] (lb/m)	6 400 (14 110)	17 700 (39 022)	70 700 (155 867)	181 000 (399 036)
Max. zero point stability [kg/h]	±0.2	±2.0	±7.5	±18.0
Measuring accuracy [%]	±0.10			
Repeatability error [%]	±0.05			

Table 13- 8 Density accuracy

Description	Specification
Density accuracy, standard calibration [kg/m³]	±5
Density accuracy, extended calibration [kg/m³]	±1
Density repeatability [kg/m³]	±0.25
Density, media pressure effect [(kg/m³)/Bar]	±0.5
Density, media temperature effect [(kg/m³)/°C]	±0.1

Table 13- 9 Media temperature accuracy

Description	Specification
Media temperature accuracy [°C]	±1
Media temperature repeatability [°C]	±0.25

Table 13- 10 Additional error by deviations from reference conditions

Description	Specification			
Sensor size	**DN 15**	**DN 25**	**DN 50**	**DN 80**
Effect of process pressure [% of actual flowrate per bar]	±0.015	±0.015	±0.015	±0.015
Effect of process pressure at nominal flowrate [(kg/h) per bar]	0.56	1.73	7.8	20.4
Effect of ambient temperature [% / K actual flowrate] Display/Frequency/Pulse output:	< ±0.003	< ±0.003	< ±0.003	< ±0.003
Effect of power supply fluctuations	None	None	None	None
Effect of media temperature [(kg/h)/°C]	±0.0875	±0.175	±1.05	±3.15

13.6 Rated operating conditions

Table 13- 11 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)

Description	Specification
Relative humidity [%]	95
Bump resistance	On request
Shock resistance	On request
Thermal shock	On request
Vibration resistance	On request
EMC performance	EN/IEC 61326-1 (Industry)

Table 13- 12 Cleaning and sterilizing conditions

Description	Specification
Cleaning method	• CIP • SIP
Cleaning temperature	On request
Cleaning frequency	On request
Cleaning duration	On request

Table 13- 13 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/m³ (lb/ft³]	1 to 5000 (0.06 to 312)
Process media gauge max pressure [bar (psi)]	160 (2321)
Pressure drop	See "Pressure drop curves" (Page 197)
Pressure temperature ratings	See "Pressure - temperature ratings" (Page 198)

13.7 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.

13.8 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.

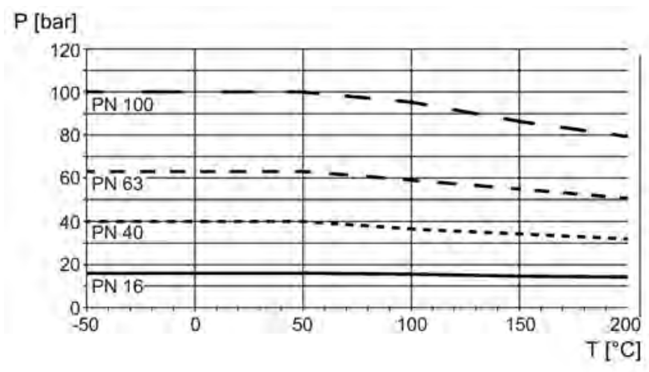


Figure 13-1 Metric flange ratings, EN 1092-1 (P: Process pressure; T: Process temperature)

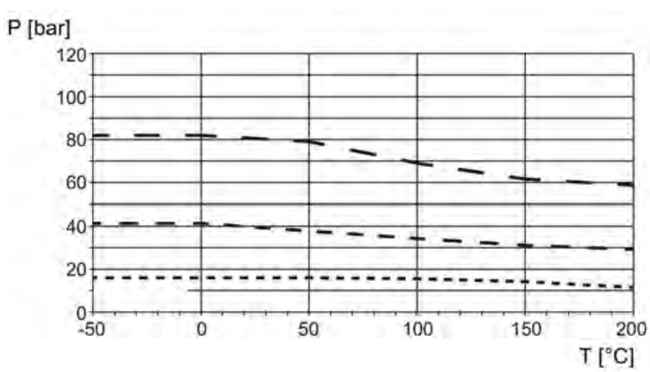


Figure 13-2 ANSI flange ratings, ASME B16.5 (P: Process pressure; T: Process temperature)

Table 13- 14 EN1092-1 [bar]

PN (bar)	Temperature TS (°C)					
	-50	0	50	100	150	200
16	16.0	16.0	16.0	15.2	13.8	12.7
40	40.0	40.0	40.0	37.9	34.5	31.8
63	63.0	63.0	63.0	59.7	54.3	50.1
100	100.0	100.0	100.0	94.8	86.2	79.5
160	100.0	100.0	100.0	100.0	100.0	100.0

Table 13- 15 ISO228-G and ASME B1.20.1 NPT [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

Table 13- 16 ASME B16.5 [bar]

Class / Group	Temperature TS (°C)					
	-50	0	50	100	150	200
150 / 2.3	15.8	15.8	15.3	13.3	12.1	11.1
300 / 2.3	41.3	41.3	39.8	34.8	31.4	29.0
600 / 2.3	82.6	82.6	79.7	69.6	62.9	58.1
900 / 2.3	100	100	100	100	94.2	87.5

Table 13- 17 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
40K	68	68	68	68	66.2	63.2
63K	100	100	100	100	100	99

Table 13- 18 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 13- 19 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 13- 20 DIN 11864 & 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 13- 21 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).

Table 13- 22 EN1092-1 [bar]

PN (bar)	Temperature TS (°C)					
	-50	0	50	100	150	200
16	16.0	16.0	16.0	16.0	16.0	16.0
40	40.0	40.0	40.0	40.0	40.0	40.0
63	63.0	63.0	63.0	63.0	63.0	63.0
100	100.0	100.0	100.0	100.0	100.0	100.0
160	160.0	160.0	153.0	145.0	134.0	125.0

Table 13- 23 ISO228-G and ASME B1.20.1 NPT [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
160	160.0	160.0	153.0	145.0	134.0	125.0

Table 13- 24 ASME B16.5 [bar]

Class	Temperature TS (°C)					
	-50	0	50	100	150	200
150	20.0	20..	19.5	17.7	15.8	13.8
300	51.7	51.7	51.7	51.5	50.3	48.6
600	103.4	103.4	103.4	103.0	100.3	97.2
900	155.1	155.1	153.0	145.0	134.0	125.0

Table 13- 25 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

13.9 Design

Sensor design

Table 13- 26 Sensor design

Description	Specification
Dimension and weight	See "Dimensions and weight" (Page 223)
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

Description	Specification
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 / W1.4404 • Hastelloy C22 / UNS N06022
Process connectors	• Standard: – AISI 316L / W1.4435 or W1.4404 – Hastelloy C22 / UNS N06022 • Hygienic: – AISI 316L / W1.4435
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
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

Transmitter design

Table 13- 27 Transmitter design

Description	Specification
Dimension and weight	See "Dimensions and weight" (Page 223)
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

13.10 Inputs and outputs

Table 13- 28 Current output

Description	Channel 1		Channels 2 to 4	
Signal range	4 to 20 mA		0/4 to 20 mA	
Resolution	0.4 µA		0.4 µA	
Load	< 500 Ω (HART ≥ 230 Ω)		< 500 Ω	
Time constant (adjustable)	0.0 to 100 s		0.0 to 100 s	
Fault current	NAMUR:	US:	NAMUR:	US:
Measurement range (mA)	3.8 to 20.5	4 to 20.8	3.8 to 20.5	4 to 20.8
Minimum alarm (mA)	3.5	3.75	3.5	3.75
Maximum alarm (mA)	22.6	22.6	22.6	22.6
Customized failsafe mode	N/A		• Last good value • User-specific	
Galvanic isolation	All inputs and outputs are galvanically isolated PELV circuits with 60 VDC isolation from each other and ground. Maximum test voltage: 500 V AC		All inputs and outputs are galvanically isolated PELV circuits with 60 VDC isolation from each other and ground. Maximum test voltage: 500 V AC	
Cable	Standard industrial signal cable with 1 twisted pair can be connected between the transmitter and the control system. Screen is recommended if the HART connection is to be frequently used, for example for logging.		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)		Max. 24 V DC (active) 14 to 30 V DC (passive)	
Accuracy	Maximal error is ±0.1% of actual reading +0.05% full scale flow (16 ma)		Maximal error is ±0.1% of actual reading +0.05% full scale flow (16 ma)	

Table 13- 29 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/voltage	Load [Ω]	Voltage (active) [V]	Voltage (passive) [V]
	100	4.74	17.95
	200	7.79	19.73
	500	12.70	20.98
	1000	16.08	21.43
	2000	18.54	21.66
	5000	20.42	21.80

Description	Channels 2 to 4		
	10000	21.13	21.85
	20000	21.51	21.88
	50000	21.74	21.89
	100000	21.82	21.90
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 level • Alarm number • Valve dosing control		

Table 13- 30 Relay output

Description	Channels 3 to 4
Type	Change-over voltage-free relay contact
Load	30 V AC, 100 mA
Functions	• Alarm level • Alarm number • Valve dosing control

Table 13- 31 Digital input

Description	Channels 3 to 4
Load	15 to 30 V DC, R_{in} 7 kOhm
Functionality	• Start/stop/hold/continue dosing • Reset totalizer 1, 2 or 3 • Reset all totalizers • Freeze output

13.11 Local display (HMI)

Table 13- 32 HMI

Description	Specification
Display	Full graphical Resolution: 240 x 160 pixels Size: 60.0 x 41.4 mm (2.36" x 1.63")
Ambient temperature	Storage: -40 to +60 °C (-40 to +140 °F) Operation: -20 to +60 °C (-4 to +140 °F) The readability of the display may be impaired at temperatures outside the permitted operating temperature range

13.12 Power supply

Table 13- 33 Power supply

Description	Specification
Supply voltage	• 100 to 240 VAC +10/-10%, 47 to 63 Hz • 20 to 27 VDC +10/-10%
Power consumption	15 VA/7.5 W
Fluctuation	• Transient overvoltages up to the levels of overvoltage category II • Temporary overvoltages occurring on mains supply only
Reverse polarity protection (y / n)	Y
Galvanic isolation	2500 VAC

13.13 Cables and cable entries

Table 13- 34 Sensor cable, basic data

Description	Specification
Number of conductors	4
Square area [mm²]	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)

Description	Specification
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 13- 35 Signal cable recommendations

Description	Specification
Square area [mm^2]	0.5 (AWG 20)
Lnear 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 13- 36 Power supply cable recommendations

Description	Specification
Square area [mm^2]	1.3 (AWG 16)
Max. length [m]	300 (AWG 16)

Table 13- 37 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	1 x M25 (for current output/communication, channel 1) and 2 x M20 (for supply and channels 2 to 4) or 1 x ½" NPT (for current output/communication, channel 1) and 2 x ½" NPT (for supply and channels 2 to 4)

[1)]: If operating temperature is below -20 °C (-4 °F), use Brass/Ni plated or stainless steel cable glands.

Note

For hygienic applications (3A & EHEDG) the cable glands and blind plugs must be made from corrosion resistant material like nickel brass, stainless steel or plastic, the exposed threads must be minimized when they are tightened up on the cable and they must have a seal (plastic or rubber) under the threads where they screw into the terminal housing or enclosure.

13.14 Installation torques

Table 13- 38 Installation torques

Description		Torque (Nm)
Pressure guard fittings		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 housing (Siemens supplied, metric)		10

Note

NPT glands

When using NPT glands, user must take care when packing threads and installing cables that sufficient tightness is obtained to prevent ingress of moisture.

13.15 Certificates and approvals HART

Table 13- 39 Certificates and approvals

Description	Specification
ATEX	FCT030 transmitter (can be installed in Zone 1 for gas and Zone 21 for dust): Certificate SIRA 11ATEX1342X: II 2(1) GD Ex d e [ia Ga] IIC T6 Gb Ta = -40°C to +60°C Ex tb [ia Da] IIIC T85°C Db
	FCS400 sensor + DSL (can be installed in Zone 1 for gas and Zone 20/21 for dust): ATEX Certificate: SIRA 11ATEX1341X II 1/2 G 1D 2D
	For gas: Ex d ia IIC T* Ga/Gb Ex d IIC T* Ga/Gb
	For dust: Ex ta IIIC T* °C Da Ex tb IIIC T* °C Db
	Ta = -40°C to +60°C
	* Temperature class (dependent on the process temperature and the ambient temperature, see Special Conditions for Safe Use, Section 2.3)
	FC430 compact system (can be installed in Zone 1 for gas and Zone 21 for dust): ATEX certificate SIRA 12ATEX1102X II 1/2 (1) G
	II 2 D Ex d e 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") ** Upper ambient temperature (dependent on the "Maximum Process Temperature")

Description	Specification
IECEx	FCT030 transmitter (can be installed in Zone 1 for gas and Zone 21 for dust): Certificate: IECEx SIR 11.0150X Ex d e ia [ia Ga] IIC T6 Gb Ta = -40°C to +60°C. Ex tb [ia Da] IIIC T85°C Db FCS400 sensor + DSL (can be installed in Zone 1 for gas and Zone 20/21 for dust): Certificate: IECEx SIR 11.0149X For gas: Ex d ia IIC T* Ga/Gb Ex d IIC T* Ga/Gb For dust: Ex ta IIIC T* °C Da Ex tb IIIC T* °C Db (Ta = -40°C to +60°C) * Temperature class (dependent on the process temperature and the ambient temperature, see Conditions of Certification, Section 2.3) FC430 compact system (can be installed in Zone 1 for gas and Zone 21 for dust): Certificate: IECEx SIR 12.0040X Ex d e ia [ia Da] IIC Ga/Gb Ta= -40 to ** °C Ex tb [ia Da] IIIC T ** °C Db * Temperature class (dependent on the "Maximum Process Temperature") ** Upper ambient temperature (dependent on the "Maximum Process Temperature")
FM	Transmitter (FCT030), Sensor with DSL (FCS400) and Compact (FC430): Class I Division 1 Groups A,B,C,D T* (XP, IS) Class II Divison 1 Groups E,F,G Class III Division 1 Group H (granulates) Class I Zone 1 and Zone 21 Class 1 Zone 1 and Zone 20/21 (FCS400 remote) *: See Control drawing: A5E31205486A
Custody Transfer	FC430 compact and remote systems: OIML R 117-1 accuracy class 0.3 for liquids other than water 2004/22/EC MID 005. For information regarding tested liquids, contact Siemens
Hygienic version	3A EHEDG EC1935:2004 and 2023:2006 (food contact material: stainless steel)
Pressure equipment	97/23/EC Pressure Equipment Directive (PED) Canadian Registration Number (CRN)

13.16 PED

The pressure equipment directive 97/23/EC 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 97/23/EC. 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 Article 3 Paragraph 3 - Sound Engineering Practice (SEP).

The following criteria are decisive for assessment of the danger potential, and are also shown in Diagrams 6 to 9.

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 9 into the following fluid groups:

Group 1 fluids

Explosive R phrases: for example: 2, 3 (1, 4, 5, 6, 9, 16, 18, 19, 44) 	**Very toxic** R phrases: for example: 26, 27, 28, 39 (32) 
Extremely flammable R phrases: for example: 12 (17) 	**Toxic** R phrases: for example: 23, 24, 25 (29, 31) 

Highly flammable R phrases: for example: 11, 15, 17 (10, 30) 	**Oxidizing** 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 3 Paragraph 3 are designed and manufactured in accordance with sound engineering practice in Denmark. PED conformity reference is not affixed to the CE mark.

Diagrams

- Gases of fluid group 1
- Pipelines according to Article 3 Number 1.3 Letter a) First dash
- Exception: unstable gases belonging to Categories **I** and **II** must be included in Category **III**.

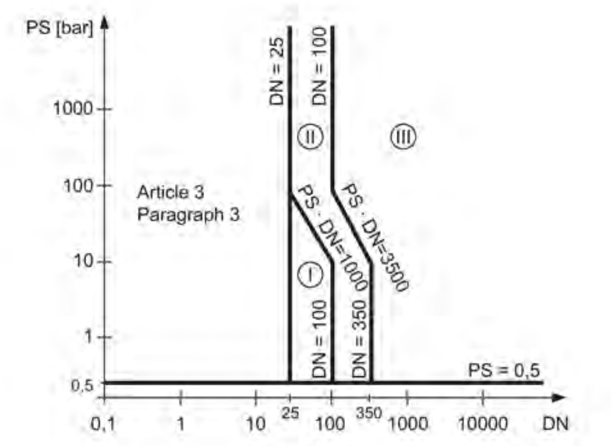


Figure 13-3 Diagram 6

- Gases of fluid group 2
- Pipelines according to Article 3 Number 1.3 Letter a) Second dash
- Exception: liquids at temperatures > 350 °C belonging to Category **II** must be included in Category **III**.

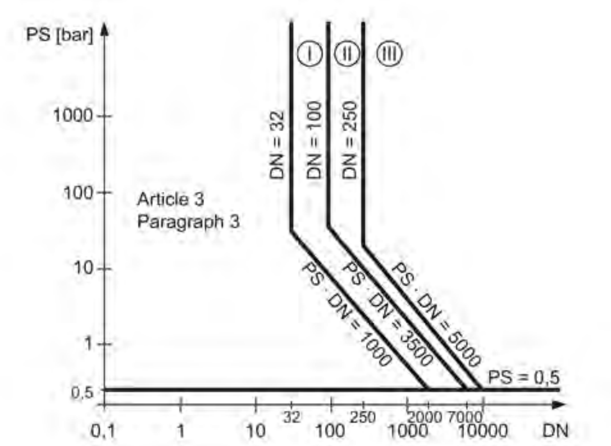


Figure 13-4 Diagram 7

- Liquids of fluid group 1

- Pipelines according to Article 3 Number 1.3 Letter b) First dash

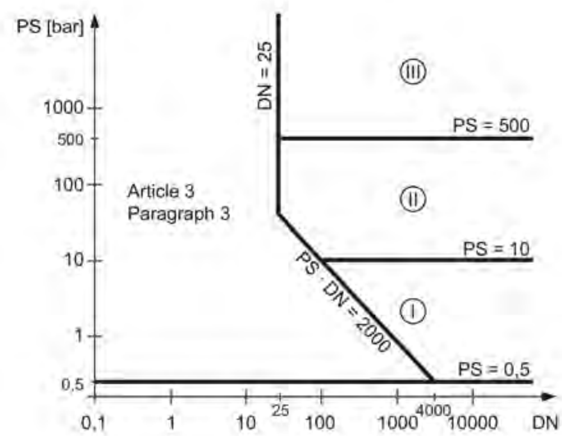


Figure 13-5 Diagram 8

- Liquids of fluid group 2
- Pipelines according to Article 3 Number 1.3 Letter b) Second dash

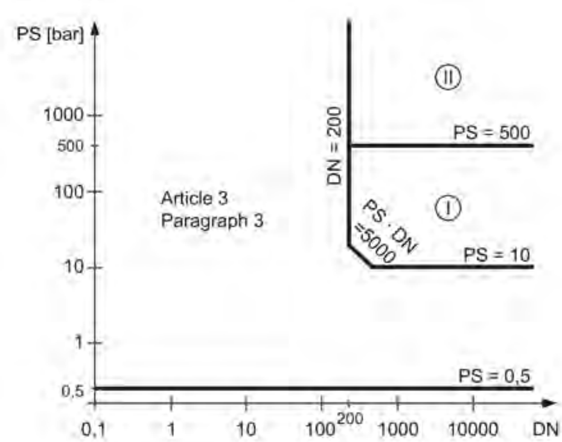


Figure 13-6 Diagram 9

Spare parts/Accessories 14

14.1 Ordering

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

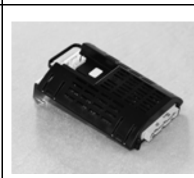
14.2 Ex approved products

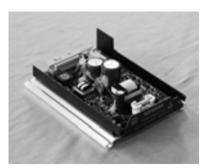
WARNING
Repair of Ex-approved products
It is the customer's responsibility that repair of Ex-approved products fulfill national requirements.

14.3 Replaceable components

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

Table 14- 1 Overview of replaceable components

Component	Order number	Photo and position on Figure 3-5 Transmitter exploded view (Page 34)		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
SITRANS FCT030 Compact version transmitter	7ME4603-2xxxx-xxx0			No
SITRANS FCT030 Remote version sensor	7ME4603-2xxxx-xxx0			No
SITRANS FCS400 Remote version DSL cassette (might need firmware update)	A5E03549191			No
SITRANS FCT030 Compact version Sensor interface cassette (might need firmware update)	A5E03549142		20b	No

Component	Order number	Photo and position on Figure 3-5 Transmitter exploded view (Page 34)		Hot swappable [1]
SITRANS FCT030 Transmitter interface cassette HART (Active) (might need firmware update)	A5E03549357		9	**No**
SITRANS FCT030 Transmitter interface cassette HART (Passive) (might need firmware update)	A5E03549383		9	**No**
SITRANS FCT030 Remote version Sensor interface cassette	A5E03549098		20b	**No**
SITRANS FCT030 I/O Cassette (Quote F.. option from product code)	A5E03939114		17	**No**
SITRANS FCT030 Power supply 85-264 V AC (50/60 Hz) 18.5-100 V DC	A5E03549413			**No**
CT plug for M12 plugs	A5E31478498	 Closed  Open		**No**

Component	Order number	Photo and position on Figure 3-5 Transmitter exploded view (Page 34)		Hot swappable [1]
SITRANS FCT030 Display and keypad (might need firmware update)	A5E03548971		②	**Yes**
SITRANS FCT030 Display lid	A5E03549344		①	**Yes** Observe hazard-ous area access protocols!
SITRANS FCT030 Bag of loose spare parts	A5E03549396			
SITRANS FCT030 Blind lid large (∅122 mm)	A5E03549429		⑮	**Yes** Observe hazard-ous area access protocols!
SITRANS FCT030 SensorFlash 1 GB micro SD card	A5E03915258		④	**Yes**
SITRANS FCT030/DSL Blind lid small (∅85 mm)	A5E03549295			**Yes** For DSL, observe hazardous area access protocols!
SITRANS FCS400 Remote version Sensor housing metric	A5E03549313			**No**
SITRANS FCS400 Remote version Sensor housing NPT	A5E03906080			**No**

Component	Order number	Photo and position on Figure 3-5 Transmitter exploded view (Page 34)		Hot swappable [1]
SITRANS FCS400 Bag of loose parts for sensor	A5E03549324	Contents: Screws, O-rings, cable clamp parts		
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 version Terminal house 1/2" NPT pedestal	A5E03906130			No

1. Components may be replaced while power is on

Dimensions and weight 15

15.1 Sensor dimensions

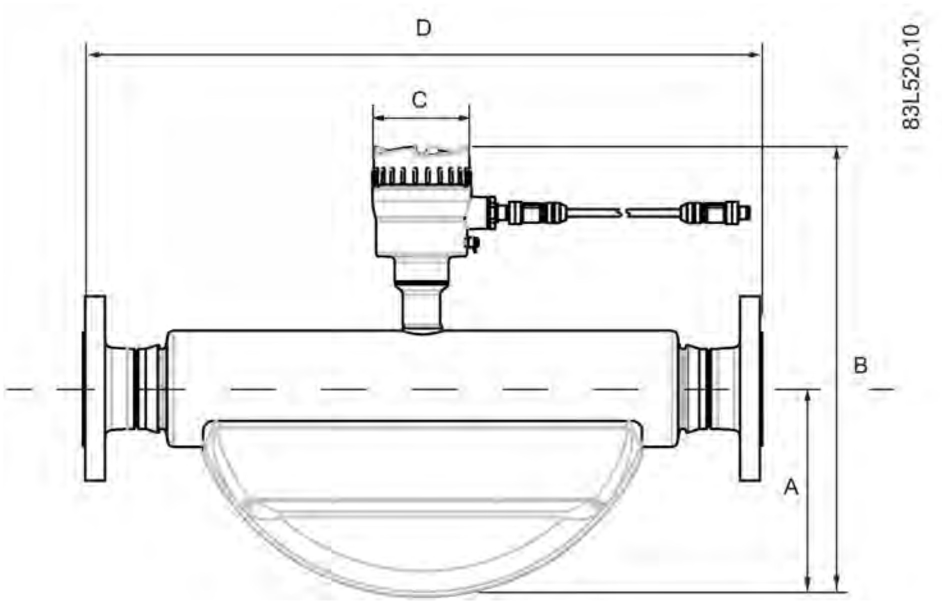


Table 15- 1 Basic dimensions

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)
80 (3")	294 (11.6)	504 (19.8)	90 (3.54)	66.5 (147)

Note

The build in length (D) depends on the process connector.

15.2 Lengths matrix

316L stainless steel or Hastelloy - standard

Table 15- 2 7ME461 - sensor sizes DN15 and DN25

Sensor	DN15					DN25		
Connection	DN6	DN10	DN15	DN20	DN25	DN25	DN32	DN40
EN1092-1 B1, PN16			265 (10.4)		265 (10.4)	360 (14.2)		365 (14.4)
EN1092-1 B1, PN40			265 (10.4)		265 (10.4)	360 (14.2)		365 (14.4)
EN1092-1 B1, PN63			265 (10.4)			360 (14.2)		
EN1092-1 B1, PN100			270 (10.6)		275 (10.8)	360 (14.2)		365 (14.4)
EN1092-1 B1, PN160			270 (10.6)			360 (14.2)		
EN1092-1 D, PN40			265 (10.4)			360 (14.2)		
EN1092-1 D, PN63			265 (10.4)			360 (14.2)		
EN1092-1 D, PN100			270 (10.6)			360 (14.2)		
EN1092-1 D, PN160			270 (10.6)			360 (14.2)		
ANSI B16.5, Class 150			270 (10.6)	270 (10.6)		360 (14.2)		365 (14.4)
ANSI B16.5, Class 300			270 (10.6)	270 (10.6)		360 (14.2)		380 (15.0)
ANSI B16.5, Class 600			270 (10.6)	285 (11.2)		360 (14.2)		380 (15.0)
ANSI B16.5, Class 900			290 (11.4)			385 (15.2)		
ISO 228-1 G Pipe thread	265 (10.4)		265 (10.4)			365 (14.4)		
ANSI B1.20.1 NPT Pipe thread	265 (10.4)		270 (10.6)			365 (14.4)		
DIN 11851 Hygienic screwed		265 (10.4)	265 (10.4)		270 (10.6)	360 (14.2)	360 (14.2)	
DIN 32676-C Hygienic clamp			265 (10.4)	265 (10.4)		360 (14.2)		360 (14.2)
DIN 11864-1 Aseptic screwed			265 (10.4)			360 (14.2)		
DIN 11864-2A Aseptic flanged			265 (10.4)			360 (14.2)		
DIN 11864-3A Aseptic clamp			265 (10.4)			360 (14.2)		

ISO 2852 Hygienic clamp					265 (10.4)	360 (14.2)		360 (14.2)
ISO 2853 Hygienic screwed					265 (10.4)	360 (14.2)		360 (14.2)
SMS 1145 Hygienic screwed					265 (10.4)	360 (14.2)		
12-VCO-4 Quick connect			285 (11.2)					
JIS B2220 10K			265 (10.4)			360 (14.2)		
JIS B2220 20K			265 (10.4)			360 (14.2)		
JIS B2220 40K			270 (10.6)			360 (14.2)		
JIS B2220 63K			275 (10.8)			370 (14.6)		

Dimensions in mm (inch)

Table 15- 3 7ME461 - sensor sizes DN50 and DN80

Sensor	DN50		DN80		
Connection	DN40	DN50	DN65	DN80	DN100
EN1092-1 B1, PN16	610 (24.0)	610 (24.0)	915 (36.0)	840 (33.1)	840 (33.1)
EN1092-1 B1, PN40	610 (24.0)	610 (24.0)	915 (36.0)	840 (33.1)	840 (33.1)
EN1092-1 B1, PN63	610 (24.0)	610 (24.0)	915 (36.0)	915 (36.0)	915 (36.0)
EN1092-1 B1, PN100	610 (24.0)	610 (24.0)	915 (36.0)	915 (36.0)	915 (36.0)
EN1092-1 B1, PN160		620 (24.4)		915 (36.0)	
EN1092-1 D, PN40	610 (24.0)	610 (24.0)		840 (33.1)	
EN1092-1 D, PN63	610 (24.0)	610 (24.0)		915 (36.0)	
EN1092-1 D, PN100	610 (24.0)	610 (24.0)		915 (36.0)	
EN1092-1 D, PN160		620 (24.4)		915 (36.0)	
ANSI B16.5, Class 150		620 (24.4)	915 (36.0)	875 (34.4)	
ANSI B16.5, Class 300		620 (24.4)	915 (36.0)	875 (34.4)	
ANSI B16.5, Class 600		620 (24.4)	915 (36.0)	875 (34.4)	
ANSI B16.5, Class 900		620 (24.4)		875 (34.4)	
ISO 228-1 G Pipe thread		620 (24.4)			
ANSI B1.20.1 NPT pipe thread		620 (24.4)			
DIN 11851 Hygienic screwed	610 (24.0)	610 (24.0)	840 (33.1)	840 (33.1)	
DIN 32676-C Hygienic clamp		610 (24.0)		875 (34.4)	
DIN 11864-1 Aseptic screwed	610 (24.0)	610 (24.0)		875 (34.4)	
DIN 11864-2A Aseptic flanged	620 (24.4)	610 (24.0)		875 (34.4)	
DIN 11864-3A Aseptic clamp	610 (24.0)	610 (24.0)		840 (33.1)	
ISO 2852 Hygienic clamp	610 (24.0)	610 (24.0)		840 (33.1)	
ISO 2853 Hygienic screwed	630 (24.8)	610 (24.0)		860 (33.9)	

SMS 1145 Hygienic screwed	610 (24.0)	610 (24.0)		875 (34.4)	
12-VCO-4 Quick connect					
JIS B2220 10K	620 (24.4)	610 (24.0)		840 (33.1)	
JIS B2220 20K	620 (24.4)	610 (24.0)		860 (33.9)	
JIS B2220 40K	620 (24.4)	610 (24.0)		875 (34.4)	
JIS B2220 63K		620 (24.4)		875 (34.4)	

Dimensions in mm (inch)

316L stainless steel - NAMUR

Table 15- 4 7ME471 - sensor sizes DN15 and DN25

Sensor	DN15					DN25		
Connection	DN6	DN10	DN15	DN20	DN25	DN25	DN32	DN40
EN1092-1 B1, PN16			510 (20.1)		510 (20.1)	600 (23.6)		605 (23.8)
EN1092-1 B1, PN40			510 (20.1)		510 (20.1)	600 (23.6)		605 (23.8)
EN1092-1 B1, PN63			510 (20.1)			600 (23.6)		
EN1092-1 B1, PN100			515 (20.3)		520 (20.5)	600 (23.6)		605 (23.8)
EN1092-1 B1, PN160			515 (20.3)			600 (23.6)		
EN1092-1 D, PN40			510 (20.1)			600 (23.6)		
EN1092-1 D, PN63			510 (20.1)			600 (23.6)		
EN1092-1 D, PN100			515 (20.3)			600 (23.6)		
EN1092-1 D, PN160			515 (20.3)			600 (23.6)		
ANSI B16.5, Class 150			515 (20.3)	515 (20.3)		600 (23.6)		605 (23.8)
ANSI B16.5, Class 300			515 (20.3)	515 (20.3)		600 (23.6)		620 (24.4)
ANSI B16.5, Class 600			515 (20.3)	530 (20.9)		600 (23.6)		620 (24.4)
ANSI B16.5, Class 900			535 (21.1)			625 (24.6)		
ISO228-1 G Pipe thread	510 (20.1)		510 (20.1)			605 (23.8)		
ANSI B1.20.1 NPT Pipe thread	510 (20.1)		515 (20.3)			605 (23.8)		
DIN 11851 Hygienic screwed		510 (20.1)	510 (20.1)		515 (20.3)	600 (23.6)	600 (23.6)	

DIN 32676-C Hygienic clamp			510 (20.1)	510 (20.1)		600 (23.6)		600 (23.6)
DIN 11864-1 Aseptic screwed			510 (20.1)			600 (23.6)		
DIN 11864-2A Aseptic flanged			510 (20.1)			600 (23.6)		
DIN 11864-3A Aseptic clamp			510 (20.1)			600 (23.6)		
ISO 2852 Hygienic clamp					510 (20.1)	600 (23.6)		600 (23.6)
ISO 2853 Hygienic screwed					510 (20.1)	600 (23.6)		600 (23.6)

Dimensions in mm (inch)

Table 15- 5 7ME471 - sensor sizes DN50 and DN80

Sensor	DN50		DN80		
Connection	DN40	DN50	DN65	DN80	DN100
EN1092-1 B1, PN16	715 (28.1)	715 (28.12	915 (36.0)	915 (36.0)	915 (36.0)
EN1092-1 B1, PN40	715 (28.1)	715 (28.1)	915 (36.0)	915 (36.0)	915 (36.0)
EN1092-1 B1, PN63	715 (28.1)	715 (28.1)	915 (36.0)	915 (36.0)	915 (36.0)
EN1092-1 B1, PN100	715 (28.1)	715 (28.1)	915 (36.0)	915 (36.0)	915 (36.0)
EN1092-1 B1, PN160		725 (28.5)		915 (36.0)	
EN1092-1 D, PN40	715 (28.1)	715 (28.1)		915 (36.0)	
EN1092-1 D, PN63	715 (28.1)	715 (28.1)		915 (36.0)	
EN1092-1 D, PN100	715 (28.1)	715 (28.1)		915 (36.0)	
EN1092-1 D, PN160		725 (28.5)		915 (36.0)	
ANSI B16.5-2009, Class 150		725 (28.5)	915 (36.0)	950 (37.4)	
ANSI B16.5-2009, Class 300		725 (28.5)	915 (36.0)	950 (37.4)	
ANSI B16.5-2009, Class 600		725 (28.5)	915 (36.0)	950 (37.4)	
ANSI B16.5-2009, Class 900		725 (28.5)		950 (37.4)	
ISO228-1 G pipe thread		725 (28.5)			
ANSI B1.20.1 NPT pipe thread		725 (28.5)			
DIN 11851 Hygienic screwed	715 (28.1)	715 (28.1)	915 (36.0)	915 (36.0)	
DIN 32676-C Hygienic clamp		715 (28.1)		950 (37.4)	
DIN 11864-1 Aseptic screwed	715 (28.1)	715 (28.1)		950 (37.4)	
DIN 11864-2A Aseptic flanged	725 (28.5)	715 (28.1)		950 (37.4)	
DIN 11864-3A Aseptic clamp	715 (28.1)	715 (28.1)		915 (36.0)	
ISO 2852 Hygienic clamp	715 (28.1)	715 (28.1)		915 (36.0)	
ISO 2853 Hygienic screwed	735 (28.9)	715 (28.1)		860 (33.9)	

Dimensions in mm (inch)

316L stainless steel - hygienic version

Table 15- 6 7ME462 - sensor sizes DN15 and DN25

Sensor	DN15					DN25		
Connection	DN6	DN10	DN15	DN20	DN25	DN25	DN32	DN40
DIN 11851 Hygienic screwed		265 (10.4)	265 (10.4)		270 (10.6)	360 (14.2)	360 (14.2)	
DIN 32676-C Hygienic clamp			265 (10.4)	265 (10.4)		360 (14.2)		360 (14.2)
DIN 11864-1 Aseptic screwed			265 (10.4)			360 (14.2)		
DIN 11864-2A Aseptic flanged			265 (10.4)			360 (14.2)		
DIN 11864-3A Aseptic clamp			265 (10.4)			360 (14.2)		
ISO 2852 Hygienic clamp					265 (10.4)	360 (14.2)		360 (14.2)
ISO 2853 Hygienic screwed					265 (10.4)	360 (14.2)		360 (14.2)
SMS 1145 Hygienic screwed					265 (10.4)	360 (14.2)		

Dimensions in mm (inch)

Table 15- 7 7ME462 - sensor sizes DN50 and DN80

Sensor	DN50		DN80		
Connection	DN40	DN50	DN65	DN80	
DIN 11851 Hygienic screwed	610 (24.0)	610 (24.0)	840 (33.1)	840 (33.1)	
DIN 32676-C Hygienic clamp		610 (24.0)		875 (34.4)	
DIN 11864-1 Aseptic screwed	610 (24.0)	610 (24.0)		875 (34.4)	
DIN 11864-2A Aseptic flanged	620 (24.4)	610 (24.0)		875 (34.4)	
DIN 11864-3A Aseptic clamp	610 (24.0)	610 (24.0)		840 (33.1)	
ISO 2852 Hygienic clamp	610 (24.0)	610 (24.0)		840 (33.1)	
ISO 2853 Hygienic screwed	630 (24.8)	610 (24.0)		860 (33.9)	
SMS 1145 Hygienic screwed	610 (24.0)	610 (24.0)		875 (34.4)	

Dimensions in mm (inch)

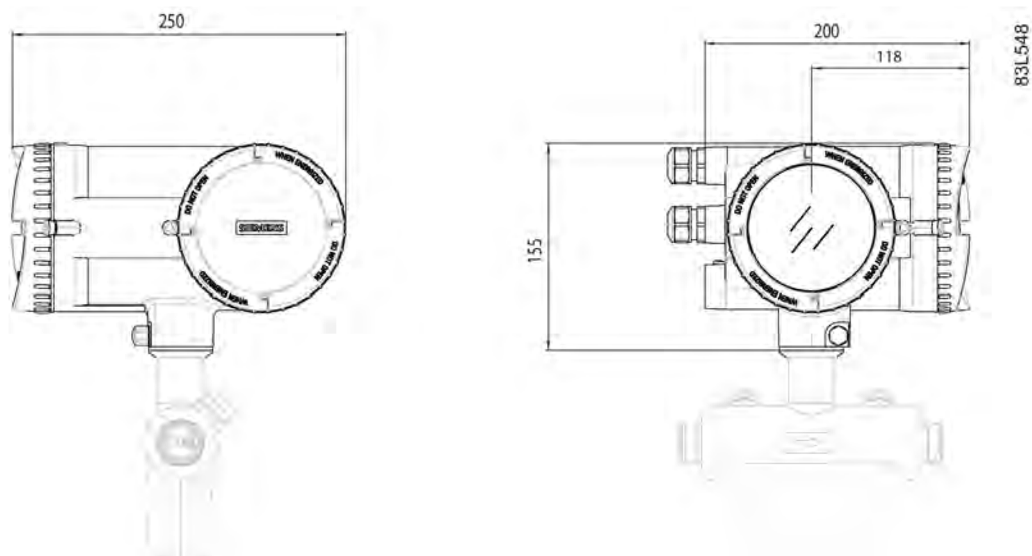
Note

3A

DIN 11851 and ISO 2853 are only 3A-approved if self-centering gaskets are used.

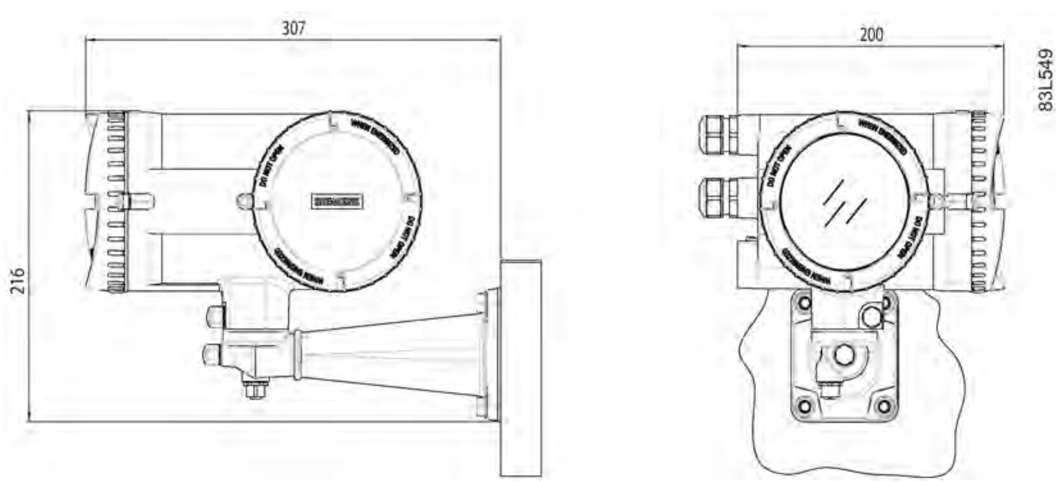
15.3 Transmitter dimensions

Compact version



Dimensions in mm

Remote version



Dimensions in mm

Weight: 4.8 kg (10.6 lbs)

15.4 Mounting bracket

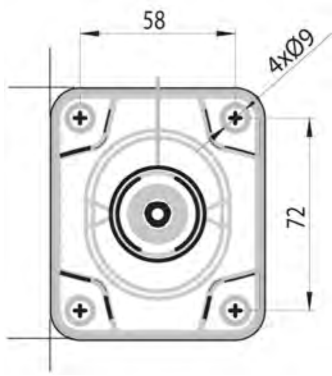


Figure 15-1 Mounting bracket dimensions

HMI menu structure

A

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 HMI menu, that is HMI menu levels 1 and 2. The following tables show the HMI submenus, that is HMI menu levels 3 to 5.

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, and the current, pulse, and status output setup parameter/menu items are hidden.

A.1 Main menu

In the following table only the menus and parameters of the first two levels of the HMI menu structure are listed.

Table A- 1 Main menu

Level 1		Level 2		More information
No.	Name	No.	Name	
1	**Quick Start**	1.1	**Quick Commissioning**	Quick Commissioning wizard (menu item 1.1) (Page 75)
		1.2	**Zero Point Adjustment**	Zero Point Adjustment wizard (menu item 1.2) (Page 77)
		1.3	**Process Values**	Process Values wizard (menu item 1.3) (Page 80)
		1.4	**Inputs/Outputs**	Inputs/Outputs wizard (menu item 1.4) (Page 81)
		1.5	**Gas Application**	Gas Application wizard (menu item 1.5) (Page 85)
		1.6	**Pulsating Flow**	Pulsating Flow wizard (menu item 1.6) (Page 86)
		1.7	**Dosing Application**	Dosing Application wizard (menu item 1.7) (Page 87)
2	**Setup**	2.1	**Basic Settings**	Menu item 2.1: Basic Settings (Page 232)
		2.2	**Process Values**	Menu item 2.2: Process Values (Page 233)
		2.3	**Totalizer**	Menu item 2.3: Totalizer (Page 235)
		2.4	**Inputs/Outputs**	Menu item 2.4: Inputs/Outputs (Page 236)
		2.5	**Dosing**	Menu item 2.5: Dosing (Page 241)

Level 1		Level 2		More information
No.	**Name**	**No.**	**Name**	
		2.6	**Zero Point Adjustment**	Menu item 2.6: Zero Point Adjustment (Page 245)
		2.7	**Safe Operation**	Menu item 2.7: Safe Operation (Page 245)
		2.8	**Display**	Menu item 2.8: Display (Page 246)
3	**Maintenance & Diagnostics**	**3.1**	**Identification**	Menu item 3.1: Identification (Page 248)
		3.2	**Alarms**	Menu item 3.2: Alarms (Page 249)
		3.3	**Maintenance**	Menu item 3.3: Maintenance (Page 250)
		3.4	**Diagnostics**	Menu item 3.4: Diagnostics (Page 251)
		3.5	**Characteristics**	Menu item 3.5: Characteristics (Page 251)
		3.6	**SensorFlash**	Menu item 3.6: SensorFlash (Page 252)
		3.7	**Simulate**	Menu item 3.7: Simulate (Page 252)
		3.8	**Audit Trail**	Menu item 3.8: Audit Trail (Page 254)
		3.9	**Aerated Flow**	Menu item 3.9: Aerated Flow (Page 254)
		3.10	**Self Test**	Menu item 3.10: Self Test (Page 255)
4	**Communication**	*4.1*	*Polling Address (SW)*	
		4.2	*Polling Address (HW)*	
		4.3	*TAG*	
		4.4	*HART Device Type*	
		4.5	*HART Revision*	
		4.6	**Mapping of Variables**	Menu item 4.6: Mapping of Variables (Page 255)
		4.7	**HART Units**	Menu item 4.7: HART units (Page 255)
5	**Security**	**5.1**	**Access Management**	Menu item 5.1: Access Management (Page 256)
6	*Language*			

A.2 Menu item 2.1: Basic Settings

Table A- 2 Basic settings

Level 3		Level 4		Level 5	
No.	**Name**	**No.**	**Name**	**No.**	**Name**
2.1.1	*Flow Direction*				
2.1.2	*Process Noise Damping*				

A.3 Menu item 2.2: Process Values

Table A- 3 Process values

Level 3		Level 4		Level 5	
No.	**Name**	**No.**	**Name**	**No.**	**Name**
2.2.1	**Massflow**	*2.2.1.1*	*Unit*		
		2.2.1.2	*Low Flow Cut-Off*		
		2.2.1.3	*Upper Limit Alarm*		
		2.2.1.4	*Upper Limit Warning*		
		2.2.1.5	*Lower Limit Warning*		
		2.2.1.6	*Lower Limit Alarm*		
		2.2.1.7	*Alarm Hysteresis*		
		2.2.1.8	*Decimal Places*		
2.2.2	**Volumeflow**	*2.2.2.1*	*Unit*		
		2.2.2.2	*Low Flow Cut-Off*		
		2.2.2.3	*Upper Limit Alarm*		
		2.2.2.4	*Upper Limit Warning*		
		2.2.2.5	*Lower Limit Warning*		
		2.2.2.6	*Lower Limit Alarm*		
		2.2.2.7	*Alarm Hysteresis*		
		2.2.2.8	*Decimal Places*		
2.2.3	**Corrected Volumeflow**	*2.2.3.1*	*Unit*		
		2.2.3.2	*Upper Limit Alarm*		
		2.2.3.3	*Upper Limit Warning*		
		2.2.3.4	*Lower Limit Warning*		
		2.2.3.5	*Lower Limit Alarm*		
		2.2.3.6	*Alarm Hysteresis*		
		2.2.3.7	*Decimal Places*		
		2.2.3.8	**Reference Density**	*2.2.3.8.1*	*Unit*
				2.2.3.8.2	*Corrected Volumeflow Mode*
				2.2.3.8.3	*Fixed Reference Density*
				2.2.3.8.4	*Linear Expansion Coeff.*
				2.2.3.8.5	*Square Expansion Coeff.*
				2.2.3.8.6	*Reference Temperature*
				2.2.3.8.7	*Upper Limit Alarm*
				2.2.3.8.8	*Upper Limit Warning*
				2.2.3.8.9	*Lower Limit Warning*
				2.2.3.8.10	*Lower Limit Alarm*
				2.2.3.8.11	*Alarm Hysteresis*

Level 3		Level 4		Level 5	
No.	Name	No.	Name	No.	Name
2.2.4	Flow Adjustment	*2.2.4.1*	*Adjustment Factor*		
2.2.5	Density	*2.2.5.1*	*Unit*		
		2.2.5.2	*Empty Tube Detection*		
		2.2.5.3	*Empty Tube Limit*		
		2.2.5.4	*Upper Limit Alarm*		
		2.2.5.5	*Upper Limit Warning*		
		2.2.5.6	*Lower Limit Warning*		
		2.2.5.7	*Lower Limit Alarm*		
		2.2.5.8	*Alarm Hysteresis*		
		2.2.5.9	*Decimal Places*		
		2.2.5.10	Density Adjustment	*2.2.5.10.1*	*Adjustment Factor*
				2.2.5.10.2	*Adjustment Offset*
2.2.6	Fluid Temperature	*2.2.6.1*	*Unit*		
		2.2.6.2	*Upper Limit Alarm*		
		2.2.6.3	*Upper Limit Warning*		
		2.2.6.4	*Lower Limit Warning*		
		2.2.6.5	*Lower Limit Alarm*		
		2.2.6.6	*Alarm Hysteresis*		
		2.2.6.7	*Decimal Places*		
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 Text*
				2.2.7.5.2	*Upper Limit Alarm*
				2.2.7.5.3	*Upper Limit Warning*
				2.2.7.5.4	*Lower Limit Warning*
				2.2.7.5.5	*Lower Limit Alarm*
				2.2.7.5.6	*Alarm Hysteresis*
				2.2.7.5.7	*Decimal Places*
		2.2.7.6	Fraction B	*2.2.7.6.1*	*Fraction B Text*
				2.2.7.6.2	*Upper Limit Alarm*
				2.2.7.6.3	*Upper Limit Warning*
				2.2.7.6.4	*Lower Limit Warning*
				2.2.7.6.5	*Lower Limit Alarm*
				2.2.7.6.6	*Alarm Hysteresis*
				2.2.7.6.7	*Decimal Places*
		2.2.7.7	Fraction A %	*2.2.7.7.1*	*Upper Limit Alarm*
				2.2.7.7.2	*Upper Limit Warning*
				2.2.7.7.3	*Lower Limit Warning*
				2.2.7.7.4	*Lower Limit Alarm*

Level 3		Level 4		Level 5	
No.	Name	No.	Name	No.	Name
				2.2.7.7.5	*Alarm Hysteresis*
				2.2.7.7.6	*Decimal Places*
		2.2.7.8	Fraction B %	*2.2.7.8.1*	*Upper Limit Alarm*
				2.2.7.8.2	*Upper Limit Warning*
				2.2.7.8.3	*Lower Limit Warning*
				2.2.7.8.4	*Lower Limit Alarm*
				2.2.7.8.5	*Alarm Hysteresis*
				2.2.7.8.6	*Decimal Places*
		2.2.7.9	Fraction Adjustment	*2.2.7.9.1*	*Adjustment Factor*
				2.2.7.9.2	*Adjustment Offset*

A.4 Menu item 2.3: Totalizer

Table A- 4 Totalizers

Level 3		Level 4		Level 5	
No.	Name	No.	Name	No.	Name
2.3.1	Totalizer 1	*2.3.1.1*	*Process Value*		
		2.3.1.2	*Unit*		
		2.3.1.3	*Direction*		
		2.3.1.4	*Fail Safe Mode*		
		2.3.1.5	*Upper Limit Alarm*		
		2.3.1.6	*Upper Limit Warning*		
		2.3.1.7	*Lower Limit Warning*		
		2.3.1.8	*Lower Limit Alarm*		
		2.3.1.9	*Alarm Hysteresis*		
		2.3.1.10	*Reset*		
		2.3.1.11	*Preset*		
		2.3.1.12	*Decimal Places*		
2.3.2	Totalizer 2	*2.3.2.1*	*Process Value*		
		2.3.2.2	*Unit*		
		2.3.2.3	*Direction*		
		2.3.2.4	*Fail Safe Mode*		
		2.3.2.5	*Upper Limit Alarm*		
		2.3.2.6	*Upper Limit Warning*		
		2.3.2.7	*Lower Limit Warning*		
		2.3.2.8	*Lower Limit Alarm*		
		2.3.2.9	*Alarm Hysteresis*		
		2.3.2.10	*Reset*		
		2.3.2.11	*Preset*		

Level 3		Level 4		Level 5	
No.	Name	No.	Name	No.	Name
		2.3.2.12	*Decimal Places*		
2.3.3	Totalizer 3	*2.3.3.1*	*Process Value*		
		2.3.3.2	*Unit*		
		2.3.3.3	*Direction*		
		2.3.3.4	*Fail Safe Mode*		
		2.3.3.5	*Upper Limit Alarm*		
		2.3.3.6	*Upper Limit Warning*		
		2.3.3.7	*Lower Limit Warning*		
		2.3.3.8	*Lower Limit Alarm*		
		2.3.3.9	*Alarm Hysteresis*		
		2.3.3.10	*Reset*		
		2.3.3.11	*Preset*		
		2.3.3.12	*Decimal Places*		
2.3.4	*Reset All Totalizers*				

A.5 Menu item 2.4: Inputs/Outputs

Table A- 5 Current output on channel 1

Level 3		Level 4		Level 5	
No.	Name	No.	Name	No.	Name
2.4.1	Current Output (1)	*2.4.1.1*	*Process Value*		
		2.4.1.2	*HART Mode*		
		2.4.1.3	*Direction*		
		2.4.1.4	*Current Mode*		
		2.4.1.5	*Upper Scaling*		
		2.4.1.6	*Lower Scaling*		
		2.4.1.7	*Filter Time Constant*		
		2.4.1.8	*Fail Safe Mode*		
		2.4.1.9	*Fail Safe Value*		
		2.4.1.10	Decimal Places	*2.4.1.10.1*	*Current (mA)*
				2.4.1.10.2	*Time (s)*

Note

Menu item visibility

The availability in the HMI of the menu items for channels 2, 3 and 4 depend on the I/O configuration.

Table A- 6 Signal output on channel 2

Level 3		Level 4		Level 5	
No.	Name	No.	Name	No.	Name
2.4.2	Signal Output (2)	*2.4.2.1*	*Operation Mode*		
		2.4.2.2	*Process Value*		
		2.4.2.3	*Direction*		
		2.4.2.4	*Current Mode*		
		2.4.2.5	*Upper Scaling*		
		2.4.2.6	*Lower Scaling*		
		2.4.2.7	*Filter Time Constant*		
		2.4.2.8	*Fail Safe Mode*		
		2.4.2.9	*Fail Safe Value*		
		2.4.2.10	*Process Value*		
		2.4.2.11	*Direction*		
		2.4.2.12	*Frequency Value High*		
		2.4.2.13	*Frequency Value Low*		
		2.4.2.14	*Flow Value High*		
		2.4.2.15	*Flow Value Low*		
		2.4.2.16	*Filter Time Constant*		
		2.4.2.17	*Fail Safe Mode*		
		2.4.2.18	*Fail Safe Value*		
		2.4.2.19	*Process Value*		
		2.4.2.20	*Direction*		
		2.4.2.21	*Pulse Width*		
		2.4.2.22	*Pulse Width Unit*		
		2.4.2.23	*Pulse Unit*		
		2.4.2.24	*Amount Per Pulse*		
		2.4.2.25	*Polarity*		
		2.4.2.26	*Fail Safe Mode*		
		2.4.2.27	*Status Mode*		
		2.4.2.28	*Sensor (1) Alarms*		
		2.4.2.29	*Sensor (2) Alarms*		
		2.4.2.30	*Process (1) Alarms*		
		2.4.2.31	*Process (2) Alarms*		
		2.4.2.32	*Simulation Alarms*		
		2.4.2.33	*Input/Output Alarms*		
		2.4.2.34	*Alarm Class*		
		2.4.2.35	*Alarm Class*		
		2.4.2.36	*Polarity*		
		2.4.2.37	*On Delay*		
		2.4.2.38	*Off Delay*		
		2.4.2.39	Decimal Places	*2.4.2.39.1*	*Amount Per Pulse*
				2.4.2.39.2	*Pulse Width (s)*

Level 3		Level 4		Level 5	
No.	Name	No.	Name	No.	Name
				2.4.2.39.3	*Current (mA)*
				2.4.2.39.4	*Time (s)*

Table A- 7 Signal output on channel 3

Level 3		Level 4		Level 5	
No.	Name	No.	Name	No.	Name
2.4.3	Signal Output (3)	*2.4.3.1*	*Operation Mode*		
		2.4.3.2	*Process Value*		
		2.4.3.3	*Direction*		
		2.4.3.4	*Current Mode*		
		2.4.3.5	*Upper Scaling*		
		2.4.3.6	*Lower Scaling*		
		2.4.3.7	*Filter Time Constant*		
		2.4.3.8	*Fail Safe Mode*		
		2.4.3.9	*Fail Safe Value*		
		2.4.3.10	*Redundancy Mode*		
		2.4.3.11	*Process Value*		
		2.4.3.12	*Direction*		
		2.4.3.13	*Frequency Value High*		
		2.4.3.14	*Frequency Value Low*		
		2.4.3.15	*Flow Value High*		
		2.4.3.16	*Flow Value Low*		
		2.4.3.17	*Filter Time Constant*		
		2.4.3.18	*Fail Safe Mode*		
		2.4.3.19	*Fail Safe Value*		
		2.4.3.20	*Redundancy Mode*		
		2.4.3.21	*Process Value*		
		2.4.3.22	*Direction*		
		2.4.3.23	*Pulse Width*		
		2.4.3.24	*Pulse Width Unit*		
		2.4.3.25	*Pulse Unit*		
		2.4.3.26	*Amount Per Pulse*		
		2.4.3.27	*Polarity*		
		2.4.3.28	*Fail Safe Mode*		
		2.4.3.29	*Status Mode*		
		2.4.3.30	*Sensor (1) Alarms*		
		2.4.3.31	*Sensor (2) Alarms*		
		2.4.3.32	*Process (1) Alarms*		
		2.4.3.33	*Process (2) Alarms*		

Level 3		Level 4		Level 5	
No.	**Name**	**No.**	**Name**	**No.**	**Name**
		2.4.3.34	*Simulation Alarms*		
		2.4.3.35	*Input/Output Alarms*		
		2.4.3.36	*Alarm Class*		
		2.4.3.37	*Alarm Class*		
		2.4.3.38	*Polarity*		
		2.4.3.39	*On Delay*		
		2.4.3.40	*Off Delay*		
		2.4.3.41	**Decimal Places**	*2.4.3.41.1*	*Amount Per Pulse*
				2.4.3.41.2	*Pulse Width (s)*
				2.4.3.41.3	*Current (mA)*
				2.4.3.41.4	*Time (s)*

Table A- 8 Relay output on channel 3

Level 3		Level 4		Level 5	
No.	**Name**	**No.**	**Name**	**No.**	**Name**
2.4.4	**Relay Output (3)**	*2.4.4.1*	*Status Mode*		
		2.4.4.2	*Sensor (1) Alarms*		
		2.4.4.3	*Sensor (2) Alarms*		
		2.4.4.4	*Process (1) Alarms*		
		2.4.4.5	*Process (2) Alarms*		
		2.4.4.6	*Simulation Alarms*		
		2.4.4.7	*Input/Output Alarms*		
		2.4.4.8	*Alarm Class*		
		2.4.4.9	*Alarm Class*		
		2.4.4.10	*Polarity*		
		2.4.4.11	*On Delay*		
		2.4.4.12	*Off Delay*		

Table A- 9 Signal Input on channel 3

Level 3		Level 4		Level 5	
No.	**Name**	**No.**	**Name**	**No.**	**Name**
2.4.5	**Signal Input (3)**	*2.4.5.1*	*Operation Mode*		
		2.4.5.2	*Delay Time*		
		2.4.5.3	*Polarity*		

Table A- 10 Signal output on channel 4

Level 3		Level 4		Level 5	
No.	Name	No.	Name	No.	Name
2.4.6	Signal Output (4)	*2.4.6.1*	*Operation Mode*		
		2.4.6.2	*Process Value*		
		2.4.6.3	*Direction*		
		2.4.6.4	*Current Mode*		
		2.4.6.5	*Upper Scaling*		
		2.4.6.6	*Lower Scaling*		
		2.4.6.7	*Filter Time Constant*		
		2.4.6.8	*Fail Safe Mode*		
		2.4.6.9	*Fail Safe Value*		
		2.4.6.10	*Process Value*		
		2.4.6.11	*Direction*		
		2.4.6.12	*Frequency Value High*		
		2.4.6.13	*Frequency Value Low*		
		2.4.6.14	*Flow Value High*		
		2.4.6.15	*Flow Value Low*		
		2.4.6.16	*Filter Time Constant*		
		2.4.6.17	*Fail Safe Mode*		
		2.4.6.18	*Fail Safe Value*		
		2.4.6.19	*Process Value*		
		2.4.6.20	*Direction*		
		2.4.6.21	*Pulse Width*		
		2.4.6.22	*Pulse Width Unit*		
		2.4.6.23	*Pulse Unit*		
		2.4.6.24	*Amount Per Pulse*		
		2.4.6.25	*Polarity*		
		2.4.6.26	*Fail Safe Mode*		
		2.4.6.27	*Status Mode*		
		2.4.6.28	*Sensor (1) Alarms*		
		2.4.6.29	*Sensor (2) Alarms*		
		2.4.6.30	*Process (1) Alarms*		
		2.4.6.31	*Process (2) Alarms*		
		2.4.6.32	*Simulation Alarms*		
		2.4.6.33	*Input/Output Alarms*		
		2.4.6.34	*Alarm Class*		
		2.4.6.35	*Alarm Class*		
		2.4.6.36	*Polarity*		
		2.4.6.37	*On Delay*		
		2.4.6.38	*Off Delay*		
		2.4.6.39	Decimal Places	*2.4.6.39.1*	*Amount Per Pulse*
				2.4.6.39.2	*Pulse Width (s)*

Level 3		Level 4		Level 5	
No.	Name	No.	Name	No.	Name
				2.4.6.39.3	*Current (mA)*
				2.4.6.39.4	*Time (s)*

Table A- 11 Relay output on channel 4

Level 3		Level 4		Level 5	
No.	Name	No.	Name	No.	Name
2.4.7	Relay Output (4)	*2.4.7.1*	*Status Mode*		
		2.4.7.2	*Sensor (1) Alarms*		
		2.4.7.3	*Sensor (2) Alarms*		
		2.4.7.4	*Process (1) Alarms*		
		2.4.7.5	*Process (2) Alarms*		
		2.4.7.6	*Simulation Alarms*		
		2.4.7.7	*Input/Output Alarms*		
		2.4.7.8	*Alarm Class*		
		2.4.7.9	*Alarm Class*		
		2.4.7.10	*Polarity*		
		2.4.7.11	*On Delay*		
		2.4.7.12	*Off Delay*		

Table A- 12 Signal Input on channel 4

Level 3		Level 4		Level 5	
No.	Name	No.	Name	No.	Name
2.4.8	Signal Input (4)	*2.4.8.1*	*Operation Mode*		
		2.4.8.2	*Delay Time*		
		2.4.8.3	*Polarity*		

A.6 Menu item 2.5: Dosing

Table A- 13 Dosing

Level 3		Level 4		Level 5	
No.	Name	No.	Name	No.	Name
2.5.1	*Dosing Mode*				
2.5.2	*Process Value*				
2.5.3	*Active Recipe*				

Table A- 14 Recipe 1

Level 3		Level 4		Level 5	
No.	**Name**	**No.**	**Name**	**No.**	**Name**
2.5.5	**Recipe 1**	*2.5.5.1*	*Name*		
		2.5.5.2	*Unit*		
		2.5.5.3	*Amount*		
		2.5.5.4	*Decimal Places*		
		2.5.5.5	**Calibration**	*2.5.5.5.2*	*Fixed Compensation*
		2.5.5.6	**Valve Control**	*2.5.5.6.1*	*Stage Setup Format*
				2.5.5.6.2	*Stage 1 Primary Open*
				2.5.5.6.3	*Stage 1 Primary Close*
				2.5.5.6.4	*Stage 2 Secondary Open*
				2.5.5.6.5	*Stage 2 Secondary Close*
				2.5.5.6.6	*Fully Closed Current Level*
				2.5.5.6.7	*Partially Open Current Level*
				2.5.5.6.8	*Fully Open Current Level*
				2.5.5.6.9	*Fully Open*
				2.5.5.6.10	*Partially Closed*
		2.5.5.7	**Fault Handling**	*2.5.5.7.1*	*Duration Mode*
				2.5.5.7.2	*Duration Time*
				2.5.5.7.3	*Overrun Mode*
				2.5.5.7.4	*Overrun Value*

Table A- 15 Recipe 2

Level 3		Level 4		Level 5	
No.	**Name**	**No.**	**Name**	**No.**	**Name**
2.5.6	**Recipe 2**	*2.5.6.1*	*Name*		
		2.5.6.2	*Unit*		
		2.5.6.3	*Amount*		
		2.5.6.4	*Decimal Places*		
		2.5.6.5	**Calibration**	*2.5.6.5.2*	*Fixed Compensation*
		2.5.6.6	**Valve Control**	*2.5.6.6.1*	*Stage Setup Format*
				2.5.6.6.2	*Stage 1 Primary Open*
				2.5.6.6.3	*Stage 1 Primary Close*
				2.5.6.6.4	*Stage 2 Secondary Open*
				2.5.6.6.5	*Stage 2 Secondary Close*

Level 3		Level 4		Level 5	
No.	**Name**	**No.**	**Name**	**No.**	**Name**
				2.5.6.6.6	*Fully Closed Current Level*
				2.5.6.6.7	*Partially Open Current Level*
				2.5.6.6.8	*Fully Open Current Level*
				2.5.6.6.9	*Fully Open*
				2.5.6.6.10	*Partially Closed*
		2.5.6.7	**Fault Handling**	*2.5.6.7.1*	*Duration Mode*
				2.5.6.7.2	*Duration Time*
				2.5.6.7.3	*Overrun Mode*
				2.5.6.7.4	*Overrun Value*

Table A- 16 Recipe 3

Level 3		Level 4		Level 5	
No.	**Name**	**No.**	**Name**	**No.**	**Name**
2.5.7	**Recipe 3**	*2.5.7.1*	*Name*		
		2.5.7.2	*Unit*		
		2.5.7.3	*Amount*		
		2.5.7.4	*Decimal Places*		
		2.5.7.5	**Calibration**	*2.5.7.5.2*	*Fixed Compensation*
		2.5.7.6	**Valve Control**	*2.5.7.6.1*	*Stage Setup Format*
				2.5.7.6.2	*Stage 1 Primary Open*
				2.5.7.6.3	*Stage 1 Primary Close*
				2.5.7.6.4	*Stage 2 Secondary Open*
				2.5.7.6.5	*Stage 2 Secondary Close*
				2.5.7.6.6	*Fully Closed Current Level*
				2.5.7.6.7	*Partially Open Current Level*
				2.5.7.6.8	*Fully Open Current Level*
				2.5.7.6.9	*Fully Open*
				2.5.7.6.10	*Partially Closed*
		2.5.7.7	**Fault Handling**	*2.5.7.7.1*	*Duration Mode*
				2.5.7.7.2	*Duration Time*
				2.5.7.7.3	*Overrun Mode*
				2.5.7.7.4	*Overrun Value*

Table A- 17 Recipe 4

Level 3		Level 4		Level 5	
No.	**Name**	**No.**	**Name**	**No.**	**Name**
2.5.8	**Recipe 4**	*2.5.8.1*	*Name*		
		2.5.8.2	*Unit*		
		2.5.8.3	*Amount*		
		2.5.8.4	*Decimal Places*		
		2.5.8.5	**Calibration**	*2.5.8.5.2*	*Fixed Compensation*
		2.5.8.6	**Valve Control**	*2.5.8.6.1*	*Stage Setup Format*
				2.5.8.6.2	*Stage 1 Primary Open*
				2.5.8.6.3	*Stage 1 Primary Close*
				2.5.8.6.4	*Stage 2 Secondary Open*
				2.5.8.6.5	*Stage 2 Secondary Close*
				2.5.8.6.6	*Fully Closed Current Level*
				2.5.8.6.7	*Partially Open Current Level*
				2.5.8.6.8	*Fully Open Current Level*
				2.5.8.6.9	*Fully Open*
				2.5.8.6.10	*Partially Closed*
		2.5.8.7	**Fault Handling**	*2.5.8.7.1*	*Duration Mode*
				2.5.8.7.2	*Duration Time*
				2.5.8.7.3	*Overrun Mode*
				2.5.8.7.4	*Overrun Value*

Table A- 18 Recipe 5

Level 3		Level 4		Level 5	
No.	**Name**	**No.**	**Name**	**No.**	**Name**
2.5.9	**Recipe 5**	*2.5.9.1*	*Name*		
		2.5.9.2	*Unit*		
		2.5.9.3	*Amount*		
		2.5.9.4	*Decimal Places*		
		2.5.9.5	**Calibration**	*2.5.9.5.4*	*Offset Adjustment*
		2.5.9.6	**Valve Control**	*2.5.9.6.1*	*Stage Setup Format*
				2.5.9.6.2	*Stage 1 Primary Open*
				2.5.9.6.3	*Stage 1 Primary Close*
				2.5.9.6.4	*Stage 2 Secondary Open*
				2.5.9.6.5	*Stage 2 Secondary Close*

Level 3		Level 4		Level 5	
No.	**Name**	**No.**	**Name**	**No.**	**Name**
				2.5.9.6.6	*Fully Closed Current Level*
				2.5.9.6.7	*Partially Open Current Level*
				2.5.9.6.8	*Fully Open Current Level*
				2.5.9.6.9	*Fully Open*
				2.5.9.6.10	*Partially Closed*
		2.5.9.7	Fault Handling	*2.5.9.7.1*	*Duration Mode*
				2.5.9.7.2	*Duration Time*
				2.5.9.7.3	*Overrun Mode*
				2.5.9.7.4	*Overrun Value*

A.7 Menu item 2.6: Zero Point Adjustment

Table A- 19 Zero point adjustment

Level 3		Level 4		Level 5	
No.	**Name**	**No.**	**Name**	**No.**	**Name**
2.6.1	*Select Zero Point Adj.*				
2.6.2	*Zero Point Adjustment*				
2.6.3	*Duration*				
2.6.4	*Standard Deviation Limit*				
2.6.5	*Standard Deviation*				
2.6.6	*Offset Limit*				
2.6.7	*Offset*				
2.6.8	*Offset*				

A.8 Menu item 2.7: Safe Operation

Table A- 20 Safe Operation

Level 3		Level 4		Level 5	
No.	**Name**	**No.**	**Name**	**No.**	**Name**
2.7.1	*Safety Mode*				
2.7.2	*Enter Safe Configuration*				
2.7.3	*Start Safety Validation*				
2.7.4	*Safety Validation*				
2.7.6	*Modify Safe Configuration*				

Level 3		Level 4		Level 5	
No.	Name	No.	Name	No.	Name
2.7.7	*Enter Non-Safe Operation*				
2.7.8	*Acknowledge Safety Alarms*				
2.7.9	*Safety Transition Errors*				
2.7.10	*Safety Error Reasons*				

A.9 Menu item 2.8: Display

Table A- 21 Display

Level 3		Level 4		Level 5	
No.	Name	No.	Name	No.	Name
2.8.1	*Brightness*				
2.8.2	*Backlight Operation*				
2.8.3	*Contrast Level*				
2.8.4	**View 1**	*2.8.4.1*	*View*		
		2.8.4.2	*1st Process Value*		
		2.8.4.3	*2nd Process Value*		
		2.8.4.4	*3rd Process Value*		
		2.8.4.5	*4th Process Value*		
		2.8.4.6	*5th Process Value*		
		2.8.4.7	*6th Process Value*		
		2.8.4.8	*Trend Scale Mode*		
		2.8.4.9	*Trend Log Time Window*		
		2.8.4.10	*Trend Scale Lower Limit*		
		2.8.4.11	*Trend Scale Upper Limit*		
2.8.5	**View 2**	*2.8.5.1*	*Enable or disable*		
		2.8.5.2	*View*		
		2.8.5.3	*1st Process Value*		
		2.8.5.4	*2nd Process Value*		
		2.8.5.5	*3rd Process Value*		
		2.8.5.6	*4th Process Value*		
		2.8.5.7	*5th Process Value*		
		2.8.5.8	*6th Process Value*		
		2.8.5.9	*Trend Scale Mode*		
		2.8.5.10	*Trend Log Time Window*		
		2.8.5.11	*Trend Scale Lower Limit*		
		2.8.5.12	*Trend Scale Upper Limit*		
2.8.6	**View 3**	*2.8.6.1*	*Enable or disable*		

Level 3		Level 4		Level 5	
No.	Name	No.	Name	No.	Name
		2.8.6.2	*View*		
		2.8.6.3	*1st Process Value*		
		2.8.6.4	*2nd Process Value*		
		2.8.6.5	*3rd Process Value*		
		2.8.6.6	*4th Process Value*		
		2.8.6.7	*5th Process Value*		
		2.8.6.8	*6th Process Value*		
		2.8.6.9	*Trend Scale Mode*		
		2.8.6.10	*Trend Log Time Window*		
		2.8.6.11	*Trend Scale Lower Limit*		
		2.8.6.12	*Trend Scale Upper Limit*		
2.8.7	View 4	*2.8.7.1*	*Enable or disable*		
		2.8.7.2	*View*		
		2.8.7.3	*1st Process Value*		
		2.8.7.4	*2nd Process Value*		
		2.8.7.5	*3rd Process Value*		
		2.8.7.6	*4th Process Value*		
		2.8.7.7	*5th Process Value*		
		2.8.7.8	*6th Process Value*		
		2.8.7.9	*Trend Scale Mode*		
		2.8.7.10	*Trend Log Time Window*		
		2.8.7.11	*Trend Scale Lower Limit*		
		2.8.7.12	*Trend Scale Upper Limit*		
2.8.8	View 5	*2.8.8.1*	*Enable or disable*		
		2.8.8.2	*View*		
		2.8.8.3	*1st Process Value*		
		2.8.8.4	*2nd Process Value*		
		2.8.8.5	*3rd Process Value*		
		2.8.8.6	*4th Process Value*		
		2.8.8.7	*5th Process Value*		
		2.8.8.8	*6th Process Value*		
		2.8.8.9	*Trend scale mode*		
		2.8.8.10	*Trend Log Time Window*		
		2.8.8.11	*Trend Scale Lower Limit*		
		2.8.8.12	*Trend Scale Upper Limit*		
2.8.9	View 6	*2.8.9.1*	*Enable or disable*		
		2.8.9.2	*View*		
		2.8.9.3	*1st Process Value*		
		2.8.9.4	*2nd Process Value*		
		2.8.9.5	*3rd Process Value*		
		2.8.9.6	*4th Process Value*		

Level 3		Level 4		Level 5	
No.	**Name**	**No.**	**Name**	**No.**	**Name**
		2.8.9.7	*5th Process Value*		
		2.8.9.8	*6th Process Value*		
		2.8.9.9	*Trend Scale Mode*		
		2.8.9.10	*Trend Log Time Window*		
		2.8.9.11	*Trend Scale Lower Limit*		
		2.8.9.12	*Trend Scale Upper Limit*		
2.8.10	Custom Units	2.8.10.1	Volumeflow Unit	*2.8.10.1.1*	*Custom Text*
				2.8.10.1.2	*Custom Factor*
		2.8.10.2	Totalizer Unit	*2.8.10.2.1*	*Custom Text*
				2.8.10.2.2	*Custom Factor*

Note

Custom Units

Menu item 2.8.10 (Custom Units) is not available in CT devices.

A.10 Menu item 3.1: Identification

Table A- 22 Identification

Level 3		Level 4		Level 5	
No.	**Name**	**No.**	**Name**	**No.**	**Name**
3.1.1	*Long TAG*				
3.1.2	*Descriptor*				
3.1.3	*Message*				
3.1.4	*Location*				
3.1.5	*Startup Date*				
3.1.6	*Manufacturer*				
3.1.7	*Product Name*				
3.1.8	*Version*				
3.1.9	*System Order Number*				
3.1.10	*Firmware Revision*				
3.1.11	*Hardware Revision*				
3.1.12	*Final Assembly Number*				
3.1.13	Transmitter	*3.1.13.1*	*Order Number*		
		3.1.13.2	*Serial Number*		
3.1.14	Sensor	*3.1.14.1*	*Type*		
		3.1.14.2	*Size*		
		3.1.14.3	*Order Number*		

Level 3		**Level 4**		**Level 5**	
No.	**Name**	**No.**	**Name**	**No.**	**Name**
		3.1.14.4	*Serial Number*		

A.11 Menu item 3.2: Alarms

Table A- 23 Alarms

Level 3		**Level 4**		**Level 5**	
No.	**Name**	**No.**	**Name**	**No.**	**Name**
3.2.1	*Alarm Mode*				
3.2.2	*Alarm Acknowledgment*				
3.2.3	*Alarm*				
3.2.4	*Alarm History Log*				
3.2.5	*Reset History*				
3.2.6	**Suppress Alarm**	*3.2.6.1*	*Sensor (1) Alarms Suppressed*		
		3.2.6.2	*Sensor (2) Alarms Suppressed*		
		3.2.6.3	*Process (1) Alarms Suppressed*		
		3.2.6.4	*Process (2) Alarms Suppressed*		
		3.2.6.5	*Simulation Alarms Suppressed*		
		3.2.6.6	*Input/Output Alarms Suppressed*		
3.2.7	*Transmitter Detail Alarms*				

Note

Transmitter Detail Alarms

Menu item 3.2.7 (Transmitter Detail Alarms) is only visible in case an alarm with detailed alarm information is pending.

A.12 Menu item 3.3: Maintenance

Table A- 24 Maintenance

Level 3		Level 4		Level 5	
No.	**Name**	**No.**	**Name**	**No.**	**Name**
3.3.1	*Current Date and Time*				
3.3.2	*Set Date and Time*				
3.3.3	*Set To Default*				
3.3.4	*Restart Device*				
3.3.5	*FW Update*				
3.3.6	*Copy Setups*				
3.3.7	Spare Part Replacement	3.3.7.1	Transmitter / Sensor Spareparts	*3.3.7.1.1*	*Replace Sensor (Remote)*
				3.3.7.1.2	*Replace Sensor (Compact)*
				3.3.7.1.3	*Replace Transmitter (Remote)*
				3.3.7.1.4	*Replace Transmitter (Compact)*
		3.3.7.2	Electronic Spareparts	*3.3.7.2.1*	*Replace DSL (Remote)*
				3.3.7.2.2	*Replace Sensor Cassette*
				3.3.7.2.3	*Replace Transmitter Cassette*
		3.3.7.3	*Prepare for Safe Operation*		
3.3.8	Transmitter	*3.3.8.1*	*Operating Time Total*		
		3.3.8.2	*Operating Time*		
		3.3.8.3	*Hardware Revision*		
		3.3.8.4	*HMI Hardware revision*		
		3.3.8.5	*Firmware Revision*		
		3.3.8.6	*HMI Firmware Revision*		
3.3.9	Sensor	*3.3.9.1*	*Hardware Revision*		
		3.3.9.2	*Firmware Revision*		

Note

Spare part replacement

Menu item 3.3.7 (Spare Part Replacement) is only visible if access level is Expert.

A.13 Menu item 3.4: Diagnostics

Table A- 25 Diagnostics

Level 3		Level 4		Level 5	
No.	**Name**	**No.**	**Name**	**No.**	**Name**
3.4.2	Sensor	*3.4.2.1*	*Driver Current*		
		3.4.2.2	*Pickup S1 Amplitude*		
		3.4.2.3	*Pickup S1 Amplitude*		
		3.4.2.4	*Max. Pickup Amplitude Diff*		
		3.4.2.5	*Sensor Frequency*		
		3.4.2.6	*Offset*		
3.4.3	Temperature	*3.4.3.1*	*Fluid Temperature*		
		3.4.3.2	*Frame Temperature*		
		3.4.3.3	*Transm. Internal Temp.*		
		3.4.3.4	*DSL Internal Temp.*		
3.4.4	Inputs/Outputs	*3.4.4.1*	*Current Output Value (1)*		
		3.4.4.2	*Current Value (2)*		
		3.4.4.3	*Pulse Value (2)*		
		3.4.4.4	*Frequency Value (2)*		
		3.4.4.5	*Status Value (2)*		
		3.4.4.6	*Input Value (3)*		
		3.4.4.7	*Current Value (3)*		
		3.4.4.8	*Pulse Value (3)*		
		3.4.4.9	*Frequency Value (3)*		
		3.4.4.10	*Status Value (3)*		
		3.4.4.11	*Input Value (4)*		
		3.4.4.12	*Current Value (4)*		
		3.4.4.13	*Pulse Value (4)*		
		3.4.4.14	*Frequency Value (4)*		
		3.4.4.15	*Status Value (4)*		

A.14 Menu item 3.5: Characteristics

Table A- 26 Characteristics

Level 3		Level 4		Level 5	
No.	**Name**	**No.**	**Name**	**No.**	**Name**
3.5.1	*SIL Variant*				
3.5.2	*CT Variant*				
3.5.3	*CT Active*				
3.5.4	*Fraction Order Code*				

Level 3		Level 4		Level 5	
No.	**Name**	**No.**	**Name**	**No.**	**Name**
3.5.5	**Transmitter**	*3.5.5.1*	*Design*		
		3.5.5.2	*Hazardous Area Approval*		
3.5.6	**Sensor**	*3.5.6.1*	*Hazardous Area Approval*		
		3.5.6.2	*Maximum Massflow Capacity*		
		3.5.6.3	*Calibration Factor*		
		3.5.6.4	*Density Calibration Offset*		
		3.5.6.5	*Density Calibration Factor*		
		3.5.6.6	*Dens. Comp. Tube Temp.*		
		3.5.6.7	*Dens. Comp. Frame Temp.*		
		3.5.6.8	*Wetted Materials*		

A.15 Menu item 3.6: SensorFlash

Table A- 27 SensorFlash

Level 3		Level 4		Level 5	
No.	**Name**	**No.**	**Name**	**No.**	**Name**
3.6.1	*Installed*				
3.6.2	*Capacity Total*				
3.6.3	*Capacity Available*				

A.16 Menu item 3.7: Simulate

Table A- 28 Input/Outputs

Level 3		Level 4		Level 5	
No.	**Name**	**No.**	**Name**	**No.**	**Name**
3.7.1	**Simulate Input/Outputs**	**3.7.1.1**	**Current Output (1)**	*3.7.1.1.1*	*Simulation*
				3.7.1.1.2	*Simulated Value*
		3.7.1.2	**Signal Output (2)**	*3.7.1.2.1*	*Simulation*
				3.7.1.2.2	*Simulated Value*
				3.7.1.2.3	*Simulation*
				3.7.1.2.4	*Simulated Value*
				3.7.1.2.5	*Simulation*
				3.7.1.2.6	*Simulated Value*
				3.7.1.2.7	*Simulation*
				3.7.1.2.8	*Simulated Value*
		3.7.1.3	**Signal Output (3)**	*3.7.1.3.1*	*Simulation*

Level 3		Level 4		Level 5	
No.	Name	No.	Name	No.	Name
				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*
		3.7.1.4	Relay Output (3)	*3.7.1.4.1*	*Simulation*
				3.7.1.4.2	*Simulated Value*
		3.7.1.5	Signal Input (3)	*3.7.1.5.1*	*Simulation*
				3.7.1.5.2	*Simulated Value*
		3.7.1.6	Signal Output (4)	*3.7.1.6.1*	*Simulation*
				3.7.1.6.2	*Simulated Value*
				3.7.1.6.3	*Simulation*
				3.7.1.6.4	*Simulated Value*
				3.7.1.6.5	*Simulation*
				3.7.1.6.6	*Simulated Value*
				3.7.1.6.7	*Simulation*
				3.7.1.6.8	*Simulated Value*
		3.7.1.7	Relay Output (4)	*3.7.1.7.1*	*Simulation*
				3.7.1.7.2	*Simulated Value*
		3.7.1.8	Signal Input (4)	*3.7.1.8.1*	*Simulation*
				3.7.1.8.2	*Simulated Value*

Table A- 29 Process Values

Level 3		Level 4		Level 5	
No.	Name	No.	Name	No.	Name
3.7.2	Simulation Process Values	3.7.2.1	Massflow	*3.7.2.1.1*	*Simulation*
				3.7.2.1.2	*Massflow Value*
		3.7.2.2	Volumeflow	*3.7.2.2.1*	*Simulation*
				3.7.2.2.2	*Volumeflow Value*
		3.7.2.3	Corrected Volumeflow	*3.7.2.3.1*	*Simulation*
				3.7.2.3.2	*Corrected Volumeflow Value*
		3.7.2.4	Density	*3.7.2.4.1*	*Simulation*
				3.7.2.4.2	*Density Value*
		3.7.2.5	Fluid Temperature	*3.7.2.5.1*	*Simulation*
				3.7.2.5.2	*Fluid Temperature Value*
		3.7.2.6	Frame Temperature	*3.7.2.6.1*	*Simulation*
				3.7.2.6.2	*Frame Temperature Value*

Level 3		Level 4		Level 5	
No.	Name	No.	Name	No.	Name
		3.7.2.7	Fraction	*3.7.2.7.1*	*Simulation*
				3.7.2.7.2	*Fraction A % Value*
				3.7.2.7.3	*Fraction B % Value*

Table A- 30 Alarm

Level 3		Level 4		Level 5	
No.	Name	No.	Name	No.	Name
3.7.3	Simulate Alarm	*3.7.3.1*	*Simulation*		
		3.7.3.2	Alarm	*3.7.3.2.1*	*Sensor (1) Alarms*
				3.7.3.2.2	*Sensor (2) Alarms*
				3.7.3.2.3	*Process (1) Alarms*
				3.7.3.2.4	*Process (2) Alarms*
				3.7.3.2.5	*Simulation Alarms*
				3.7.3.2.6	*Input/Output Alarms*
		3.7.3.3	*Alarm Class*		
		3.7.3.4	*Alarm Class*		

A.17 Menu item 3.8: Audit Trail

Table A- 31 Audit Trail

Level 3		Level 4		Level 5	
No.	Name	No.	Name	No.	Name
3.8.1	*Parameter Change Log*				
3.8.2	*Clear Parameter Change Log*				
3.8.3	*FW Update Change Log*				
3.8.4	*Clear FW Update Log*				

A.18 Menu item 3.9: Aerated Flow

Table A- 32 Aerated Flow

Level 3		Level 4		Level 5	
No.	Name	No.	Name	No.	Name
3.9.1	*Aerated Flow Filter*				
3.9.2	*Filter Time Constant*				

Level 3		Level 4		Level 5	
No.	Name	No.	Name	No.	Name
3.9.3	*Alarm Limit*				
3.9.4	*Warning Limit*				
3.9.5	*Measurement Sample Time*				
3.9.6	*Filter Start Hysteresis*				
3.9.7	*Minimum Filtering Time*				
3.9.8	*Filter Iteration*				
3.9.9	*Bandwidth Factor*				
3.9.10	*Filter Pole Shift*				

A.19 Menu item 3.10: Self Test

Table A- 33 Self Test

Level 3		Level 4		Level 5	
No.	Name	No.	Name	No.	Name
3.10.1	*Display Test*				

A.20 Menu item 4.6: Mapping of Variables

Table A- 34 Mapping of Variables

Level 3		Level 4		Level 5	
No.	Name	No.	Name	No.	Name
4.6.1	*SV Process Value*				
4.6.2	*TV Process Value*				
4.6.3	*QV Process Value*				

A.21 Menu item 4.7: HART units

Table A- 35 HART Units

Level 3		Level 4		Level 5	
No.	Name	No.	Name	No.	Name
4.7.1	*Massflow Unit*				
4.7.2	*Volumeflow Unit*				
4.7.3	*Corr. Volumeflow Unit*				

Level 3		Level 4		Level 5	
No.	Name	No.	Name	No.	Name
4.7.4	*Density Unit*				
4.7.5	*Fluid Temperature Unit*				
4.7.6	*Fraction Unit*				
4.7.7	*Fraction Unit*				
4.7.8	*Totalizer 1 Unit*				
4.7.9	*Totalizer 2 Unit*				
4.7.10	*Totalizer 3 Unit*				

A.22 Menu item 5.1: Access Management

Table A- 36 Access Management

Level 3		Level 4		Level 5	
No.	Name	No.	Name	No.	Name
5.1.1	*Change User PIN Code*				
5.1.2	*Change Expert PIN Code*				
5.1.3	*Reset PINs*				
5.1.4	*PUK*				
5.1.5	*Enable Access Level Control / Disable Access Level Control*				
5.1.6	*Auto Log Off*				
5.1.7	*Logout*				

HART commands

B

B.1 Universal commands

The device supports the following universal commands:

Table B- 1 Universal commands

Command number	Function
0	Read Unique Identifier
1	Read Primary Variable
2	Read Loop Current And Percent Of Range
3	Read Dynamic Variables And Loop Current
6	Write Polling Address
7	Read Loop Configuration
8	Read Dynamic Variable Classifications
9	Read Device Variables With Status
11	Read Unique Identifier Associated With Tag
12	Read Message
13	Read Tag, Descriptor, Date
14	Read Primary Variable Transducer Information
15	Read Device Information
16	Read Final Assembly Number
17	Write Message
18	Write Tag, Descriptor, Date
19	Write Final Assembly Number
20	Read Long Tag
21	Read Unique Identifier Associated With Long Tag
22	Write Long Tag
38	Reset Configuration Changed Flag
48	Read Additional Device Status

B.2 Common practice commands

The device supports the following common practice commands:

Table B- 2 Common practice commands

Command number	Function
33	Read Device Variables
34	Write Primary Variable Damping Value

Command number	Function
35	Write Primary Variable Range Values
36	Set Primary Variable Upper Range Value
37	Set Primary Variable Lower Range Value
40	Enter/Exit Fixed Current Mode
42	Perform Device Reset
44	Write Primary Variable Units
45	Trim Loop Current Zero
46	Trim Loop Current Gain
50	Read Dynamic Variable Assignments
51	Write Dynamic Variable Assignments
53	Write Device Variables Units
54	Read Device Variables Information
59	Write Number Of Response Preambles
60	Read Analog Channel And Percent Of Range
63	Read Analog Channel Information
70	Read Analog Channel Endpoint Values
95	Read Device Communications Statistics

Default settings

C

The following tables show the default settings as well as the range for various parameters.

The parameters can be accessed on three levels.

- Read Only
  Allows no configuration. The user is only able to view the parameter values. 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.

C.1 Basic Settings

Table C- 1 Basic Settings

HMI menu ID	Parameter	Description	Default value [unit]	Value range	Access level
2.1.1	Flow Direction	Select pos/neg flow. Default pos flow is indicated by arrow on sensor.	Positive	• Negative • Positive	User
2.1.2	Process Noise Damping	Select process noise damping level. * 1: Low … 5: High	Duplex pump (3)	• Centrifugal pump (1) • Triplex pump (2) • Duplex pump (3) • Simplex pump (4) • Cam pump (5)	User

C.2 Process Values

Table C- 2 Massflow

HMI menu ID	Parameter	Description	Default value [unit]	Value range	Access level
2.2.1.1	Unit	Select unit for displayed mass flow rate. Unit is not applied at communication interface.	kg/s	g/s, g/min, g/h, kg/s, kg/min, kg/h, kg/d, t/min, t/h, t/d, lb/s, lb/min, lb/h, lb/d, STon/min, STon/h, STon/d, T/h, T/d	User
2.2.1.2	Low Flow Cut-Off	Set massflow limit for low flow cut-off. Below limit massflow output is forced to zero.	1)	1)	User
2.2.1.3	Upper Limit Alarm	Set upper limit alarm. Alarm is displayed if massflow value is above the limit.	1)	1)	User
2.2.1.4	Upper Limit Warning	Set upper limit warning. Warning is displayed if massflow value is above the limit.	1)	1)	User
2.2.1.5	Lower Limit Warning	Set lower limit warning. Warning is displayed if massflow value is below the limit.	1)	1)	User
2.2.1.6	Lower Limit Alarm	Set lower limit alarm. Alarm is displayed if massflow value is below the limit.	1)	1)	User
2.2.1.7	Alarm Hysteresis	Enter the hysteresis to avoid unwanted rapid switching.	1)	1)	User
2.2.1.8	Decimal Places	Define the decimal point for the process value displayed in the Local User Interface.	2	• 0 • 1 • 2 • 3 • 4 • 5 • 6	User

1): See Sensor dimension dependent default settings (Page 373)

Table C- 3 Volumeflow

HMI menu ID	Parameter	Description	Default value [unit]	Value range	Access level
2.2.2.1	Unit	Select unit for displayed volume flow rate. Unit is not applied at communication interface.	m^3/s	L/s, L/min, L/h, L/d, ML/d, hL/s, hL/min, hL/h, hL/d, m^3/s, m^3/min, m^3/h, m^3/d, Ugal/s, Ugal/min, Ugal/h, Ugal/d, Mgal/d, BBPS, BBPM, BBPH, BBPD, BOPS, BOPM, BOPH, BOPD, ft^3/s, ft^3/min, ft^3/h, ft^3/d, gal/s, gal/min, gal/h, gal/d, in^3/s, in^3/min, in^3/h, in^3/d, BLPS, BLPM, BLPH, BLPD, bush/s, bush/min, bush/h, bush/d, yd^3/s, yd^3/min, yd^3/h, yd^3/d	User
2.2.2.2	Low Flow Cut-Off	Set volumeflow limit for low flow cut-off. Below limit volumeflow output is forced to zero.	[1)]	[1)]	User
2.2.2.3	Upper Limit Alarm	Set upper limit alarm. Alarm is displayed if volumeflow value is above the limit.	[1)]	[1)]	User
2.2.2.4	Upper Limit Warning	Set upper limit warning. Warning is displayed if volumeflow value is above the limit.	[1)]	[1)]	User
2.2.2.5	Lower Limit Warning	Set lower limit warning. Warning is displayed if volumeflow value is below the limit.	[1)]	[1)]	User
2.2.2.6	Lower Limit Alarm	Set lower limit alarm. Alarm is displayed if volumeflow value is below the limit.	[1)]	[1)]	User

HMI menu ID	Parameter	Description	Default value [unit]	Value range	Access level
2.2.2.7	Alarm Hysteresis	Enter the hysteresis to avoid unwanted rapid switching.	1)	1)	User
2.2.2.8	Decimal Places	Define the decimal point for the process value displayed in the Local User Interface.	2	• 0 • 1 • 2 • 3 • 4 • 5 • 6	User

1): See Sensor dimension dependent default settings (Page 373)

Table C- 4 Corrected Volumeflow

HMI menu ID	Parameter	Description	Default value [unit]	Value range	Access level
2.2.3.1	Unit	Select unit for displayed corrected volume flow rate. Unit is not applied at communication interface.	normal m^3/s (Nm^3/s)	NL/s, NL/min, NL/h, NL/d, Nm^3/s, Nm^3/min, Nm^3/h, Nm^3/d, SL/s, SL/min, SL/h, SL/d, Sft^3/s, Sft^3/min, Sft^3/h, Sft^3/d, Sm^3/s, Sm^3/min, Sm^3/h, Sm^3/d	User
2.2.3.2	Upper Limit Alarm	Set upper limit alarm. Alarm is displayed if corrected volumeflow value is above the limit.	1)	1)	User
2.2.3.3	Upper Limit Warning	Set upper limit warning. Warning is displayed if corrected volumeflow value is above the limit.	1)	1)	User
2.2.3.4	Lower Limit Warning	Set lower limit warning. Warning is displayed if corrected volumeflow value is below the limit.	1)	1)	User
2.2.2.5	Lower Limit Alarm	Set lower limit alarm. Alarm is displayed if corrected volumeflow value is below the limit.	1)	1)	User
2.2.3.6	Alarm Hysteresis	Enter the hysteresis to avoid unwanted rapid switching.	1)	1)	User

HMI menu ID	Parameter	Description	Default value [unit]	Value range	Access level
2.2.3.7	Decimal Places	Define the decimal point for the process value displayed in the Local User Interface.	2	• 0 • 1 • 2 • 3 • 4 • 5 • 6	User
2.2.3.8	**Reference Density**				
2.2.3.8.1	Unit	Select unit for displayed density. Unit is not applied at communication interface.	kg/m³	µg/L, µg/m³, mg/L, g/mL, g/cm³, g/L, kg/L, kg/m³, lb/in³, lb/gal, lb/ft³, STon/yd³	User
2.2.3.8.2	Corrected Volumeflow Mode	Select method for calculating the corrected volumeflow.	Fixed Reference Density	• Fixed Reference Density • Calculated Reference Density	User
2.2.3.8.3	Fixed Reference Density	Enter a value for fixed reference density correction.	1000 [kg/m³]	0 to 5000	User
2.2.3.8.4	Linear Expansion Coeff.	Enter a value for linear expansion density correction.	0 [1/K]		User
2.2.3.8.5	Square Expansion Coeff.	Enter a value for squared expansion density correction.	0 [1/K²]		User
2.2.3.8.6	Reference Temperature	Enter a temperature value for calculated reference density correction.	20 [°C]	-50 to 200	User
2.2.3.8.7	Upper Limit Alarm	Set upper limit alarm. Alarm is displayed if reference density value is above the limit.	5000 [kg/m³]	0 to 5000	User
2.2.3.8.8	Upper Limit Warning	Set upper limit warning. Warning is displayed if reference density value is above the limit.	5000 [kg/m³]	0 to 5000	User
2.2.3.8.9	Lower Limit Warning	Set lower limit warning. Warning is displayed if reference density value is below the limit.	0 [kg/m³]	0 to 5000	User
2.2.3.8.10	Lower Limit Alarm	Set lower limit alarm. Alarm is displayed if reference density value is below the limit.	0 [kg/m³]	0 to 5000	User
2.2.3.8.11	Alarm Hysteresis	Enter the hysteresis to avoid unwanted rapid switching.	0 [kg/m³]	0 to 5000	User

[1)]: See Sensor dimension dependent default settings (Page 373)

Table C- 5 Flow Adjustment

HMI menu ID	Parameter	Description	Default value [unit]	Value range	Access level
2.2.4.1	Adjustment Factor	Adjust displayed flow. Eliminates inaccuracies caused by process conditions.	1		Expert

Table C- 6 Density

HMI menu ID	Parameter	Description	Default value [unit]	Value range	Access level
2.2.5.1	Unit	Select unit for displayed density. Unit is not applied at communication interface.	kg/m³	µg/L, µg/m³, mg/L, g/mL, g/cm³, g/L, kg/L, kg/m³, lb/in³, lb/gal, lb/ft³, STon/yd³	User
2.2.5.2	Empty Tube Detection	"Activate empty tube detection. ""On"": Density value below empty tube limit triggers alarm. All flow rate values are forced to zero %.	Off	• Off • On	User
2.2.5.3	Empty Tube Limit	"Set density value for empty tube limit. Density value below limit triggers an alarm."	500 [kg/m³]		User
2.2.5.4	Upper Limit Alarm	Set upper limit alarm. Alarm is displayed if density value is above the limit.	5000 [kg/m³]	0 to 5000	User
2.2.5.5	Upper Limit Warning	Set upper limit warning. Warning is displayed if density value is above the limit.	5000 [kg/m³]	0 to 5000	User
2.2.5.6	Lower Limit Warning	Set lower limit warning. Warning is displayed if density value is below the limit.	0 [kg/m³]	0 to 5000	User
2.2.5.7	Lower Limit Alarm	Set lower limit alarm. Alarm is displayed if density value is below the limit.	0 [kg/m³]	0 to 5000	User
2.2.5.8	Alarm Hysteresis	Enter the hysteresis to avoid unwanted rapid switching.	0 [kg/m³]	0 to 5000	User
2.2.5.9	Decimal Places	Define the decimal point for the process value displayed in the Local User Interface	2	• 0 • 1 • 2 • 3 • 4 • 5 • 6	User

HMI menu ID	Parameter	Description	Default value [unit]	Value range	Access level
2.2.5.10	**Density Adjustment**				
2.2.5.10.1	Adjustment Factor	Set compensation factor to adjust density calculation.	1		Expert
2.2.5.10.2	Adjustment Offset	Enter the displayed density adjustment offset.	0 [kg/m³]		Expert

Table C- 7 Fluid Temperature

HMI menu ID	Parameter	Description	Default value [unit]	Value range	Access level
2.2.6.1	Unit	Select unit for displayed temperature. Unit is not applied at communication interface.	°C	• °C • °F • °R • K	User
2.2.6.2	Upper Limit Alarm	Set upper limit alarm. Alarm is displayed if temperature value is above the limit.	200 [°C]	-50 to 200	User
2.2.6.3	Upper Limit Warning	Set upper limit warning. Warning is displayed if temperature value is above the limit.	200 [°C]	-50 to 200	User
2.2.6.4	Lower Limit Warning	Set lower limit warning. Warning is displayed if temperature value is below the limit.	-50 [°C]	-50 to 200	User
2.2.6.5	Lower Limit Alarm	Set lower limit alarm. Alarm is displayed if temperature value is below the limit.	-50 [°C]	-50 to 200	User
2.2.6.6	Alarm Hysteresis	Enter the hysteresis to avoid unwanted rapid switching.	0	0 to 200	User
2.2.6.7	Decimal Places	Define the decimal point for the process value displayed in the Local User Interface.	2	• 0 • 1 • 2 • 3 • 4 • 5 • 6	User

Table C- 8 Fraction

HMI menu ID	Parameter	Description	Default value [unit]	Value range	Access level
2.2.7.1	Measurement Mode	Select between mass fraction and volume fraction measurement.	Massflow	• Massflow • Volumeflow	User
2.2.7.2	Unit	Select unit for displayed fraction massflow rate. Unit is not applied at communication interface.	kg/h	g/s, g/min, g/h, kg/s, kg/min, kg/h, kg/d, t/min, t/h, t/d, lb/s, lb/min, lb/h, lb/d, STon/min, STon/h, STon/d, T/h, T/d	User
2.2.7.2	Unit	Select unit for displayed fraction volume flow rate. Unit is not applied at communication interface.	m³/h	L/s, L/min, L/h, m³/s, m³/min, m³/h, m³/d, ML/d, Ugal/s, Ugal/min, Ugal/h, Ugal/d, BBPS, BBPM, BBPH, BBPD, BOPS, BOPM, BOPH, BOPD, ft³/s, ft³/min, ft³/h, ft³/d, gal/s, gal/min, gal/h, gal/d, Mgal/d	User

HMI menu ID	Parameter	Description	Default value [unit]	Value range	Access level
2.2.7.3	Active Fraction	Select the Fraction A / Fraction B or ° Concentration	°Brix	• American Petroleum Institute (API) number • Balling • °Baumé light • °Baumé heavy • °Brix • °Oechsle • °Plato • Specific Gravity • °Twaddell • %HFCS42 • %HFCS55 • %HFCS90 • Ethanol-Water 0% to 20% • Ethanol-Water 15% to 35% • Ethanol-Water 30% to 55% • Ethanol-Water 50% to 100%	User
2.2.7.4	Fraction Name	Name of the selected fraction or concentration of two-part mixtures or solutions.			Read Only
2.2.7.5	**Fraction A**				
2.2.7.5.1	Fraction A Text	Enter a text to describe the Fraction A.			User

HMI menu ID	Parameter	Description	Default value [unit]	Value range	Access level
2.2.7.5.2	Upper Limit Alarm	Set upper limit alarm. Alarm is displayed if fraction A value is above the limit.	1)	1)	User
2.2.7.5.3	Upper Limit Warning	Set upper limit warning. Warning is displayed if fraction A value is above the limit.	1)	1)	User
2.2.7.5.4	Lower Limit Warning	Set lower limit warning. Warning is displayed if fraction A value is below the limit.	1)	1)	User
2.2.7.5.5	Lower Limit Alarm	Set lower limit alarm. Alarm is displayed if fraction A value is below the limit.	1)	1)	User
2.2.7.5.6	Alarm Hysteresis	Enter the hysteresis to avoid unwanted rapid switching.	1)	1)	User
2.2.7.5.7	Decimal Places	Define the decimal point for the process value displayed in the Local User Interface.	2	• 0 • 1 • 2 • 3 • 4 • 5 • 6	User
2.2.7.6	**Fraction B**				
2.2.7.6.1	Fraction B Text	Enter a text to describe the Fraction B.			User
2.2.7.6.2	Upper Limit Alarm	Set upper limit alarm. Alarm is displayed if fraction B value is above the limit.	1)	1)	User
2.2.7.6.3	Upper Limit Warning	Set upper limit warning. Warning is displayed if fraction B value is above the limit.	1)	1)	User
2.2.7.6.4	Lower Limit Warning	Set lower limit warning. Warning is displayed if fraction B value is below the limit.	1)	1)	User
2.2.7.6.5	Lower Limit Alarm	Set lower limit alarm. Alarm is displayed if fraction B value is below the limit.	1)	1)	User
2.2.7.6.6	Alarm Hysteresis	Enter the hysteresis to avoid unwanted rapid switching.	1)	1)	User
2.2.7.6.7	Decimal Places	Define the decimal point for the process value displayed in the Local User Interface.	2	• 0 • 1 • 2 • 3 • 4 • 5 • 6	User

HMI menu ID	Parameter	Description	Default value [unit]	Value range	Access level
2.2.7.7	**Fraction A %**				
2.2.7.7.1	Upper Limit Alarm	Set upper limit alarm. Alarm is displayed if fraction A % value is above the limit.	100 [%]	0.0 to 100.0	User
2.2.7.7.2	Upper Limit Warning	Set upper limit warning. Warning is displayed if fraction A % value is above the limit.	100 [%]	0.0 to 100.0	User
2.2.7.7.3	Lower Limit Warning	Set lower limit warning. Warning is displayed if fraction A % value is below the limit.	0 [%]	0.0 to 100.0	User
2.2.7.7.4	Lower Limit Alarm	Set lower limit alarm. Alarm is displayed if fraction A % value is below the limit.	0 [%]	0.0 to 100.0	User
2.2.7.7.5	Alarm Hysteresis	Enter the hysteresis to avoid unwanted rapid switching.	0 [%]	0.0 to 100.0	User
2.2.7.7.6	Decimal Places	Define the decimal point for the process value displayed in the Local User Interface.	2	• 0 • 1 • 2 • 3 • 4 • 5 • 6	User
2.2.7.8	**Fraction B %**				
2.2.7.8.1	Upper Limit Alarm	Set upper limit alarm. Alarm is displayed if fraction B % value is above the limit.	100 [%]	0.0 to 100.0	User
2.2.7.8.2	Upper Limit Warning	Set upper limit warning. Warning is displayed if fraction B % value is above the limit.	100 [%]	0.0 to 100.0	User
2.2.7.8.3	Lower Limit Warning	Set lower limit warning. Warning is displayed if fraction B % value is below the limit.	0 [%]	0.0 to 100.0	User
2.2.7.8.4	Lower Limit Alarm	Set lower limit alarm. Alarm is displayed if fraction B % value is below the limit.	0 [%]	0.0 to 100.0	User
2.2.7.8.5	Alarm Hysteresis	Enter the hysteresis to avoid unwanted rapid switching.	0 [%]	0.0 to 100.0	User
2.2.7.8.6	Decimal Places	Define the decimal point for the process value displayed in the Local User Interface.	2	• 0 • 1 • 2 • 3 • 4 • 5 • 6	User

HMI menu ID	Parameter	Description	Default value [unit]	Value range	Access level
2.2.7.9	**Fraction Adjustment**				
2.2.7.9.1	Adjustment Factor	Enter the displayed fraction flow adjustment factor.	1		Expert
2.2.7.9.2	Adjustment Offset	Enter the displayed fraction flow adjustment offset.	0		Expert

[1]): See Sensor dimension dependent default settings (Page 373)

C.3 Totalizer

Table C- 9 Totalizer 1

HMI menu ID	Parameter	Description	Default value [unit]	Value range	Access level
2.3.1.1	Process Value	Select process value for totalization.	Massflow	• Massflow • Volumeflow • Corrected Volumeflow • Fraction A • Fraction B	User
2.3.1.2	Unit [1])	Select unit for displayed Totalizer 1. Unit is not applied at communication interface.	kg	g, kg, t, lb, STon, oz, T	User
2.3.1.2	Unit [2])	Select unit for displayed Totalizer 1. Unit is not applied at communication interface.	L	L, hL, m^3, Ugal, BL, BB, BO, in^3, ft^3, yd^3, gal, bush	User
2.3.1.2	Unit [3])	Select unit for displayed Totalizer 1. Unit is not applied at communication interface.	NL	NL, Nm^3, SL, Sft^3, Sm^3	User
2.3.1.3	Direction	Select totalizing direction.	Positive	• Balanced • Positive • Negative • Hold	User
2.3.1.4	Fail Safe Mode	Select reaction of the totalizer function in case of unreliable process flow value.	Run	• Run • Hold • Memory	User
2.3.1.5 [1])	Upper Limit Alarm	Set upper limit alarm. Alarm is displayed if totalizer 1 value is above the limit.	[kg]		User

HMI menu ID	Parameter	Description	Default value [unit]	Value range	Access level
2.3.1.6 1)	Upper Limit Warning	Set upper limit warning. Waning is displayed if totalizer 1 value is above the limit.	[kg]		User
2.3.1.7 1)	Lower Limit Warning	Set lower limit alarm. Warning is displayed if totalizer 1 value is above the limit.	[kg]		User
2.3.1.8 1)	Lower Limit Alarm	Set lower limit warning. Alarm is displayed if totalizer 1 value is above the limit.	[kg]		User
2.3.1.9 1)	Alarm Hysteresis	Enter the hysteresis to avoid unwanted rapid switching.	0 [kg]		User
2.3.1.5 2)	Upper Limit Alarm	Set upper limit alarm. Alarm is displayed if totalizer 1 value is above the limit.	[m^3]		User
2.3.1.6 2)	Upper Limit Warning	Set upper limit warning. Waning is displayed if totalizer 1 value is above the limit.	[m^3]		User
2.3.1.7 2)	Lower Limit Warning	Set lower limit alarm. Warning is displayed if totalizer 1 value is above the limit.	[m^3]		User
2.3.1.8 2)	Lower Limit Alarm	Set lower limit warning. Alarm is displayed if totalizer 1 value is above the limit.	[m^3]		User
2.3.1.9 2)	Alarm Hysteresis	Enter the hysteresis to avoid unwanted rapid switching.	0 [m^3]		User
2.3.1.5 3)	Upper Limit Alarm	Set upper limit alarm. Alarm is displayed if totalizer 1 value is above the limit.	[normal m^3]		User
2.3.1.6 3)	Upper Limit Warning	Set upper limit warning. Waning is displayed if totalizer 1 value is above the limit.	[normal m^3]		User
2.3.1.7 3)	Lower Limit Warning	Set lower limit alarm. Warning is displayed if totalizer 1 value is above the limit.	[normal m^3]		User
2.3.1.8 3)	Lower Limit Alarm	Set lower limit warning. Alarm is displayed if totalizer 1 value is above the limit.	[normal m^3]		User
2.3.1.9 3)	Alarm Hysteresis	Enter the hysteresis to avoid unwanted rapid switching.	0 [normal m^3]		User
2.3.1.12	Decimal Places 1) 2) 3)	Define the decimal point for the process value displayed in the Local User Interface.	2	• 0 • 1 • 2 • 3 • 4 • 5 • 6	User

1) Process Value is set to Massflow
2) Process Value is set to Volumeflow
3) Process Value is set to Corrected Volumeflow

Table C- 10 Totalizer 2

HMI menu ID	Parameter	Description	Default value [unit]	Value range	Access level
2.3.2.1	Process Value	Select process value for totalization.	Massflow	• Massflow • Volumeflow • Corrected Volumeflow • Fraction A • Fraction B	User
2.3.2.2	Unit [1)]	Select unit for displayed Totalizer 2. Unit is not applied at communication interface.	kg	g, kg, t, lb, STon, oz, T	User
2.3.2.2	Unit [2)]	Select unit for displayed Totalizer 2. Unit is not applied at communication interface.	L	L, hL, m^3, Ugal, BL, BB, BO, in^3, ft^3, yd^3, gal, bush	User
2.3.2.2	Unit [3)]	Select unit for displayed Totalizer 2. Unit is not applied at communication interface.	NL	NL, Nm^3, SL, Sft^3, Sm^3	User
2.3.2.3	Direction	Select totalizing direction.	Positive	• Balanced • Positive • Negative • Hold	User
2.3.2.4	Fail Safe Mode	Select reaction of the totalizer function in case of unreliable process flow value.	Run	• Run • Hold • Memory	User
2.3.2.5 [1)]	Upper Limit Alarm	Set upper limit alarm. Alarm is displayed if totalizer 2 value is above the limit.	[kg]		User
2.3.2.6 [1)]	Upper Limit Warning	Set upper limit warning. Waning is displayed if totalizer 2 value is above the limit.	[kg]		User
2.3.2.7 [1)]	Lower Limit Warning	Set lower limit alarm. Warning is displayed if totalizer 2 value is above the limit.	[kg]		User
2.3.2.8 [1)]	Lower Limit Alarm	Set lower limit warning. Alarm is displayed if totalizer 2 value is above the limit.	[kg]		User
2.3.2.9 [1)]	Alarm Hysteresis	Enter the hysteresis to avoid unwanted rapid switching.	0 [kg]		User
2.3.2.5 [2)]	Upper Limit Alarm	Set upper limit alarm. Alarm is displayed if totalizer 2 value is above the limit.	[m^3]		User

HMI menu ID	Parameter	Description	Default value [unit]	Value range	Access level
2.3.2.6 2)	Upper Limit Warning	Set upper limit warning. Waning is displayed if totalizer 2 value is above the limit.	[m³]		User
2.3.2.7 2)	Lower Limit Warning	Set lower limit alarm. Warning is displayed if totalizer 2 value is above the limit.	[m³]		User
2.3.2.8 2)	Lower Limit Alarm	Set lower limit warning. Alarm is displayed if totalizer 1 value is above the limit.	[m³]		User
2.3.2.9 2)	Alarm Hysteresis	Enter the hysteresis to avoid unwanted rapid switching.	0 [m³]		User
2.3.2.5 3)	Upper Limit Alarm	Set upper limit alarm. Alarm is displayed if totalizer 2 value is above the limit.	[normal m³]		User
2.3.2.6 3)	Upper Limit Warning	Set upper limit warning. Waning is displayed if totalizer 2 value is above the limit.	[normal m³]		User
2.3.2.7 3)	Lower Limit Warning	Set lower limit alarm. Warning is displayed if totalizer 2 value is above the limit.	[normal m³]		User
2.3.2.8 3)	Lower Limit Alarm	Set lower limit warning. Alarm is displayed if totalizer 2 value is above the limit.	[normal m³]		User
2.3.2.9 3)	Alarm Hysteresis	Enter the hysteresis to avoid unwanted rapid switching.	0 [normal m³]		User
2.3.2.12	Decimal Places 1) 2) 3)	Define the decimal point for the process value displayed in the Local User Interface.	2	• 0 • 1 • 2 • 3 • 4 • 5 • 6	User

1) Process Value is set to Massflow

2) Process Value is set to Volumeflow

3) Process Value is set to Corrected Volumeflow

Table C- 11 Totalizer 3

HMI menu ID	Parameter	Description	Default value [unit]	Value range	Access level
2.3.3.1	Process Value	Select process value for totalization.	Massflow	• Massflow • Volumeflow • Corrected Volumeflow • Fraction A • Fraction B	User
2.3.3.2	Unit 1)	Select unit for displayed Totalizer 1. Unit is not applied at communication interface.	kg	g, kg, t, lb, STon, oz, T	User
2.3.3.2	Unit 2)	Select unit for displayed Totalizer 1. Unit is not applied at communication interface.	L	L, hL, m^3, Ugal, BL, BB, BO, in^3, ft^3, yd^3, gal, bush	User
2.3.3.2	Unit 3)	Select unit for displayed Totalizer 1. Unit is not applied at communication interface.	NL	NL, Nm^3, SL, Sft^3, Sm^3	User
2.3.3.3	Direction	Select totalizing direction.	Positive	• Balanced • Positive • Negative • Hold	User
2.3.3.4	Fail Safe Mode	Select reaction of the totalizer function in case of unreliable process flow value.	Run	• Run • Hold • Memory	User
2.3.3.5 1)	Upper Limit Alarm	Set upper limit alarm. Alarm is displayed if totalizer 1 value is above the limit.	[kg]		User
2.3.3.6 1)	Upper Limit Warning	Set upper limit warning. Waning is displayed if totalizer 1 value is above the limit.	[kg]		User
2.3.3.7 1)	Lower Limit Warning	Set lower limit alarm. Warning is displayed if totalizer 1 value is above the limit.	[kg]		User
2.3.3.8 1)	Lower Limit Alarm	Set lower limit warning. Alarm is displayed if totalizer 1 value is above the limit.	[kg]		User
2.3.3.9 1)	Alarm Hysteresis	Enter the hysteresis to avoid unwanted rapid switching.	0 [kg]		User
2.3.3.5 2)	Upper Limit Alarm	Set upper limit alarm. Alarm is displayed if totalizer 1 value is above the limit.	[m^3]		User

HMI menu ID	Parameter	Description	Default value [unit]	Value range	Access level
2.3.3.6 2)	Upper Limit Warning	Set upper limit warning. Waning is displayed if totalizer 1 value is above the limit.	[m^3]		User
2.3.3.7 2)	Lower Limit Warning	Set lower limit alarm. Warning is displayed if totalizer 1 value is above the limit.	[m^3]		User
2.3.3.8 2)	Lower Limit Alarm	Set lower limit warning. Alarm is displayed if totalizer 1 value is above the limit.	[m^3]		User
2.3.3.9 2)	Alarm Hysteresis	Enter the hysteresis to avoid unwanted rapid switching.	0 [m^3]		User
2.3.3.5 3)	Upper Limit Alarm	Set upper limit alarm. Alarm is displayed if totalizer 1 value is above the limit.	[normal m^3]		User
2.3.3.6 3)	Upper Limit Warning	Set upper limit warning. Waning is displayed if totalizer 1 value is above the limit.	[normal m^3]		User
2.3.3.7 3)	Lower Limit Warning	Set lower limit alarm. Warning is displayed if totalizer 1 value is above the limit.	[normal m^3]		User
2.3.3.8 3)	Lower Limit Alarm	Set lower limit warning. Alarm is displayed if totalizer 1 value is above the limit.	[normal m^3]		User
2.3.3.9 3)	Alarm Hysteresis	Enter the hysteresis to avoid unwanted rapid switching.	0 [normal m^3]		User
2.3.3.12	Decimal Places 1) 2) 3)	Define the decimal point for the process value displayed in the Local User Interface.	2	• 0 • 1 • 2 • 3 • 4 • 5 • 6	User

1) Process Value is set to Massflow

2) Process Value is set to Volumeflow

3) Process Value is set to Corrected Volumeflow

C.4 Inputs/Outputs

Table C- 12 Current Output (1)

HMI menu ID	Parameter	Description	Default value [unit]	Value range	Access level
2.4.1.1	Process Value	Select process value for current output.	Massflow	• Massflow • Volumeflow • Density	User
2.4.1.2	HART Mode	Select for single point or multi-drop HART communication.	Loop Current, 4..20 mA	• Loop Current, 4..20 mA • Multidrop mode, 4 mA	User
2.4.1.3	Direction	Select measured flow direction. The flowmeter will only output current when flow value is measured in selected direction.	Positive	• Positive • Negative • Bidirectional • Bidirectional (Symmetric)	User
2.4.1.4	Current Mode	Select current output scaling according to desired measurement range and fail-safe mode.	4-20mA NAMUR (3.5) 3.8-20.5 (22.6)	• 4-20mA NAMUR (3.5) 3.8-20.5 (22.6) • 4-20mA US (3.75) 4.0-20.8 (22.6)	User
2.4.1.5 [2)]	Upper Scaling	Assign process value to upper output current (20mA).	[1)]	[1)]	User
2.4.1.6 [2)]	Lower Scaling	Assign process value to lower output current (4mA).	[1)]	[1)]	User
2.4.1.5 [3)]	Upper Scaling	Assign process value to upper output current (20mA).	[1)]	[1)]	User
2.4.1.6 [3)]	Lower Scaling	Assign process value to lower output current (4mA).	[1)]	[1)]	User
2.4.1.5 [4)]	Upper Scaling	Assign process value to upper output current (20mA).	1600.0 [kg/m³]	0 to 5000	User
2.4.1.6 [4)]	Lower Scaling	Assign process value to lower output current (4mA).	600.0 [kg/m³]	0 to 5000	User
2.4.1.7	Filter Time Constant	Set filter time constant. Defines the damping of the current output signal.	0.0 [s]		User

HMI menu ID	Parameter	Description	Default value [unit]	Value range	Access level
2.4.1.8	Fail Safe Mode	Select current output reaction in case of a fault.	Minimum Current	• Minimum Current • Maximum Current • Last Good Value • Current Value • User Defined Value	User
2.4.1.9	Fail Safe Value	Define fail-safe current output value if "Fail Safe Mode" parameter is set to 'User Defined Value'.	3.5 [mA]	3.5 to 25	User
2.4.1.10	**Decimal Places**				
2.4.1.10.1	Current (mA)	Define the decimal point displayed for the process value.	2	• 0 • 1 • 2 • 3 • 4 • 5 • 6	User
2.4.1.10.2	Time (s)	Define the decimal point displayed for the process value.	2	• 0 • 1 • 2 • 3 • 4 • 5 • 6	User

[1]: See Sensor dimension dependent default settings (Page 373)

[2] Process Value is set to Massflow

[3] Process Value is set to Volumeflow

[4] Process Value is set to Density

Table C- 13 Signal Output (2)

HMI menu ID	Parameter	Description	Default value [unit]	Value range	Access level
2.4.2.1	Operation Mode	Set the output functionality.	Off	• Off • Current Output • Frequency Output • Pulse Output • Status Output	User
2.4.2.2	Process Value	Select process value for current output.	Massflow	• Massflow • Volumeflow • Density • Fluid Temperature • Corrected Volumeflow • Fraction A • Fraction B • Fraction A % • Fraction B % • Analog Dosing	User
2.4.2.3	Direction	Select measured flow direction. The flowmeter will only output current when flow value is measured in selected direction.	Positive	• Positive • Negative • Bidirectional • Bidirectional (Symmetric)	User

HMI menu ID	Parameter	Description	Default value [unit]	Value range	Access level
2.4.2.4	Current Mode	Select current output scaling according to desired measurement range and fail-safe mode.	4-20mA NAMUR (3.5) 3.8-20.5 (22.6)	• 4-20 mA NAMUR (3.5 mA) 3.8 mA - 20.5 mA (22.6 mA) • 4-20 mA US (3.75 mA) 4 mA -20.8 mA (22.6 mA) • 4-20 mA (0 mA) 4 mA-20.5 mA (22 mA) • 4-20 mA (2 mA) 4 mA-24 mA (25 mA) • 0-20 mA (0 mA) 0 mA-20.5 mA (22 mA) • 0-20 mA (0 mA) 0 mA-24 mA (25 mA)	User
2.4.2.5 [2)]	Upper Scaling	Assign process value to upper output current (20mA).	[1)]	[1)]	User
2.4.2.6 [2)]	Lower Scaling	Assign process value to lower output current (4mA).	[1)]	[1)]	User
2.4.2.5 [3)]	Upper Scaling	Assign process value to upper output current (20mA).	[1)]	[1)]	User
2.4.2.6 [3)]	Lower Scaling	Assign process value to lower output current (4mA).	[1)]	[1)]	User
2.4.2.5 [4)]	Upper Scaling	Assign process value to upper output current (20mA).	1600.0 [kg/m³]	0 to 5000	User
2.4.2.6 [4)]	Lower Scaling	Assign process value to lower output current (4mA).	600.0 [kg/m³]	0 to 5000	User
2.4.2.5 [5)]	Upper Scaling	Assign process value to upper output current (20mA).	200 [°C]	-50 to +200	User
2.4.2.6 [5)]	Lower Scaling	Assign process value to lower output current (4mA).	-50 [°C]	-50 to +200	User
2.4.2.5 [6)]	Upper Scaling	Assign process value to upper output current (20mA).	[1)]	[1)]	User
2.4.2.6 [6)]	Lower Scaling	Assign process value to lower output current (4mA).	[1)]	[1)]	User
2.4.2.5 [7)]	Upper Scaling	Assign process value to upper output current (20mA).	100.0 [%]	0.0 to 100.0	User
2.4.2.6 [7)]	Lower Scaling	Assign process value to lower output current (4mA).	0.0 [%]	0.0 to 100.0	User

HMI menu ID	Parameter	Description	Default value [unit]	Value range	Access level
2.4.2.7	Filter Time Constant	Set filter time constant. Defines the damping of the current output signal.	0.0 [s]	0.0 to 100.0	User
2.4.2.8	Fail Safe Mode	Select current output reaction in case of a fault.	Minimum Current	• Minimum Current • Maximum Current • Last Good Value • Current Value • User Defined Value	User
2.4.2.9	Fail Safe Value	Define fail-safe current output value if "Fail Safe Mode" parameter is set to ’User Defined Value’.	0.0[mA]	3.5 to 25	User
2.4.2.10	Process Value	Select process value for frequency output.	Massflow	• Massflow • Volumeflow • Density • Fluid • Temperature • Corrected Volumeflow • Fraction A • Fraction B • Fraction A % • Fraction B %	User
2.4.2.11	Direction	Select measured flow direction. The flowmeter will only output frequency when flow value is measured in selected direction.	Positive	• Positive • Negative • Bidirectional • Bidirectional (Symmetric)	User
2.4.2.12	Frequency Value High	Assign maximum frequency value.	10000.0 [Hz]	0.0 to 12500.0	User
2.4.2.13	Frequency Value Low	Assign minimum frequency value.	0.0 [Hz]	0.0 to 12500.0	User
2.4.2.14 [2)]	Flow Value High	Assign process value to upper output frequency "Frequency Value Low".	[1)]	[1)]	User
2.4.2.15 [2)]	Flow Value Low	Assign process value to upper output frequency "Frequency Value High".	[1)]	[1)]	User

HMI menu ID	Parameter	Description	Default value [unit]	Value range	Access level
2.4.2.14 [3)]	Flow Value High	Assign process value to upper output frequency "Frequency Value Low".	[1)]	[1)]	User
2.4.2.15 [3)]	Flow Value Low	Assign process value to upper output frequency "Frequency Value High".	[1)]	[1)]	User
2.4.2.14 [4)]	Flow Value High	Assign process value to upper output frequency "Frequency Value Low".	1600.0 [kg/m³]	0 to 5000	User
2.4.2.15 [4)]	Flow Value Low	Assign process value to upper output frequency "Frequency Value High".	600.0 [kg/m³]	0 to 5000	User
2.4.2.14 [5)]	Flow Value High	Assign process value to upper output frequency "Frequency Value Low".	200 [°C]	-50 to +200	User
2.4.2.15 [5)]	Flow Value Low	Assign process value to upper output frequency "Frequency Value High".	-50 [°C]	-50 to +200	User
2.4.2.14 [6)]	Flow Value High	Assign process value to upper output frequency "Frequency Value Low".	[1)]	[1)]	User
2.4.2.15 [6)]	Flow Value Low	Assign process value to upper output frequency "Frequency Value High".	[1)]	[1)]	User
2.4.2.14 [7)]	Flow Value High	Assign process value to upper output frequency "Frequency Value Low".	100.0 [%]	0.0 to 100.0	User
2.4.2.15 [7)]	Flow Value Low	Assign process value to upper output frequency "Frequency Value High".	0.0 [%]	0.0 to 100.0	User
2.4.2.16	Filter Time Constant	Set filter time constant. Defines the damping of the frequency output signal.	0.0 [s]	0.0 to 100.0	User
2.4.2.17	Fail Safe Mode	Select frequency output reaction in case of a fault.	Last Good Value	• Minimum Frequency • Maximum Frequency • Last Good Value • User Defined Value	User
2.4.2.18	Fail Safe Value	Define fail-safe frequency output value if "Fail Safe Mode" parameter is set to 'User Defined Value'.	0.0 [Hz]	0.0 to 12500.0	User

HMI menu ID	Parameter	Description	Default value [unit]	Value range	Access level
2.4.2.19	Process Value	Select process value for pulse output.	Massflow	• Massflow • Volumeflow • Corrected • Volumeflow • Fraction A • Fraction B	User
2.4.2.20	Direction	Select measured flow direction. The flowmeter will only output pulses when flow value is measured in selected direction.	Positive	• Positive • Negative • Bidirectional	User
2.4.2.21	Pulse Width	Define the pulse duration. Long duration pulses can overlap at high flow rate.	0.1 [s]	0.00004 to 4.0	User
2.4.2.22	Pulse Width Unit	Set the time unit for configuring pulse width.	s	• s • ms • µs	User
2.4.2.23	Pulse Unit	Select unit for pulse output. Unit is not applied at communication interface.	kg	• g • kg • t • lb • STon • oz • T	User
2.4.2.23	Pulse Unit	Select unit for pulse output. Unit is not applied at communication interface.	L	L, hL, m³, Ugal, BL, BB, BO, in³, ft³, yd³, gal, bush	User
2.4.2.23	Pulse Unit	Select unit for pulse output. Unit is not applied at communication interface.	NL	• NL • Nm³ • SL • Sft³ • Sm³	User
2.4.2.24	Amount Per Pulse	Define the quantity represented by each pulse.	1.0 [kg]		User
2.4.2.24	Amount Per Pulse	Define the quantity represented by each pulse.	0.001 [m³]		User
2.4.2.24	Amount Per Pulse	Define the quantity represented by each pulse.	1.0 [normal m³]		User
2.4.2.25	Polarity	Set the level of an active pulse.	Active High Level	• Active High Level • Active Low Level	User

HMI menu ID	Parameter	Description	Default value [unit]	Value range	Access level
2.4.2.26	Fail Safe Mode	Select pulse output reaction in case of a fault.	Memory	• Memory • Hold	User
2.4.2.27	Status Mode	Select the functionality for status output. Only applicable when "Operation Mode" is set to 'Status'.	Alarm Class	• Alarm Class • Alarm Item • Primary Valve Dosing Control • Secondary Valve Dosing Control	User
2.4.2.28	Sensor (1) Alarms				User
2.4.2.29	Sensor (2) Alarms				User
2.4.2.30	Process (1) Alarms				User
2.4.2.31	Process (2) Alarms				User
2.4.2.32	Simulation Alarms				User
2.4.2.33	Input/Output Alarms				User
2.4.2.34	Alarm Class	Select one or more Siemens alarm classes. The output is active when alarm in selected alarm class occurs.		• Maintenance Alarm • Function check • Process Value Alarm • Process Value Warning • Maintenance Warning • Maintenance Required	User
2.4.2.35	Alarm Class	Select one or more NAMUR alarm classes. The output is active when alarm in selected alarm class occurs.		• Failure • Function check • Out of specification • Maintenance Required	User
2.4.2.36	Polarity	Set the level of an active pulse.	Active High Level	• Active High Level • Active Low Level	User

HMI menu ID	Parameter	Description	Default value [unit]	Value range	Access level
2.4.2.37	On Delay	Set the time delay between alarm condition and activating the output. Allows to ignore transient fault conditions.	0.0 [s]	0 to 100.0	User
2.4.2.38	Off Delay	Set the time delay between resetting alarm condition and de-activating the output. Allows to ignore transient fault conditions.	0.0 [s]	0.0 to 100.0	User
2.4.2.39	**Decimal Places**				
2.4.2.39.1	Amount Per Pulse	Set the number of places after the decimal point displayed for the process value.	0.0 [s]	0.0 to 100.0	User
2.4.2.39.1	Amount Per Pulse	Set the number of places after the decimal point displayed for the process value.	2	• 0 • 1 • 2 • 3 • 4 • 5 • 6	User
2.4.2.39.1	Amount Per Pulse	Set the number of places after the decimal point displayed for the process value.	2	• 0 • 1 • 2 • 3 • 4 • 5 • 6	User
2.4.2.39.2	Pulse Width (s)	Set the number of places after the decimal point displayed for the process value.	2	• 0 • 1 • 2 • 3 • 4 • 5 • 6	User

HMI menu ID	Parameter	Description	Default value [unit]	Value range	Access level
2.4.2.39.3	Current (mA)	Define the decimal point displayed for the process value.	2	• 0 • 1 • 2 • 3 • 4 • 5 • 6	User
2.4.2.39.4	Time (s)	Define the decimal point displayed for the process value.	2	• 0 • 1 • 2 • 3 • 4 • 5 • 6	User

1): See Sensor dimension dependent default settings (Page 373)

2) Process Value is set to Massflow

3) Process Value is set to Volumeflow

4) Process Value is set to Density

5) Process Value is set to Fluid Temperature

6) Process Value is set to Corrected Volumeflow

7) Process Value is set to Fraction A % / Fraction B %

Table C- 14 Signal Output (3)

HMI menu ID	Parameter	Description	Default value [unit]	Value range	Access level
2.4.3.1	Operation Mode	Set the output functionality.	Off	• Off • Current Output • Frequency Output • Pulse Output • Status Output	User
2.4.3.2	Process Value	Select process value for current output.	Massflow	• Massflow • Volumeflow • Density • Fluid Temperature • Corrected Volumeflow • Fraction A • Fraction B • Fraction A % • Fraction B % • Analog Dosing	User
2.4.3.3	Direction	Select measured flow direction. The flowmeter will only output current when flow value is measured in selected direction.	Bidirectional	• Positive • Negative • Bidirectional • Bidirectional (Symmetric)	User

HMI menu ID	Parameter	Description	Default value [unit]	Value range	Access level
2.4.3.4	Current Mode	Select current output scaling according to desired measure-ment range and fail-safe mode.	4-20mA NAMUR (3.5) 3.8-20.5 (22.6)	• 4-20 mA NAMUR (3.5 mA) 3.8 mA - 20.5 mA (22.6 mA) • 4-20 mA US (3.75 mA) 4 mA -20.8 mA (22.6 mA) • 4-20 mA (0 mA) 4 mA-20.5 mA (22 mA) • 4-20 mA (2 mA) 4 mA-24 mA (25 mA) • 0-20 mA (0 mA) 0 mA-20.5 mA (22 mA) • 0-20 mA (0 mA) 0 mA-24 mA (25 mA)	User
2.4.3.5 2)	Upper Scaling	Assign process value to upper output current (20mA).	1)	1)	User
2.4.3.6 2)	Lower Scaling	Assign process value to lower output current (4mA).	1)	1)	User
2.4.3.5 3)	Upper Scaling	Assign process value to upper output current (20mA).	1)	1)	User
2.4.3.6 3)	Lower Scaling	Assign process value to lower output current (4mA).	1)	1)	User
2.4.3.5 4)	Upper Scaling	Assign process value to upper output current (20mA).	1600.0 [kg/m³]	0 to 5000	User
2.4.3.6 4)	Lower Scaling	Assign process value to lower output current (4mA).	600.0 [kg/m³]	0 to 5000	User
2.4.3.5 5)	Upper Scaling	Assign process value to upper output current (20mA).	200 [°C]	-50 to +200	User
2.4.3.6 5)	Lower Scaling	Assign process value to lower output current (4mA).	-50 [°C]	-50 to +200	User
2.4.3.5 6)	Upper Scaling	Assign process value to upper output current (20mA).	1)	1)	User
2.4.3.6 6)	Lower Scaling	Assign process value to lower output current (4mA).	1)	1)	Expert
2.4.3.5 7)	Upper Scaling	Assign process value to upper output current (20mA).	100 [%]	0.0 to 100.0	User
2.4.3.6 7)	Lower Scaling	Assign process value to lower output current (4mA).	0 [%]	0.0 to 100.0	User

HMI menu ID	Parameter	Description	Default value [unit]	Value range	Access level
2.4.3.7	Filter Time Constant	Set filter time constant. Defines the damping of the current output signal.	0.0 [s]	0.0 to 100.0	User
2.4.3.8	Fail Safe Mode	Select current output reaction in case of a fault.	Minimum Current	• Minimum Current • Maximum Current • Last Good Value • Current Value • User Defined Value	User
2.4.3.9	Fail Safe Value	Define fail-safe current output value if "Fail Safe Mode" parameter is set to 'User Defined Value'.	0 [mA]	0 to 25	User
2.4.3.10	Redundancy Mode	Set the Redundancy Mode. The frequency on channel 3 will follow frequency on channel 2 with 90 or 180 deg. shift.	Off	• Off • 90 ° • 180 °	User
2.4.3.11	Process Value	Select process value for frequency output.	Massflow	• Massflow • Volumeflow • Density • Fluid • Temperature • Corrected Volumeflow • Fraction A • Fraction B • Fraction A % • Fraction B %	User
2.4.3.12	Direction	Select measured flow direction. The flowmeter will only output frequency when flow value is measured in selected direction.	Bidirectional	• Positive • Negative • Bidirectional • Bidirectional (Symmetric)	User
2.4.3.13	Frequency Value High	Assign maximum frequency value.	1000.0 [Hz]	0.0 to 12500.0	User
2.4.3.14	Frequency Value Low	Assign minimum frequency value.	0.0 [Hz]	0.0 to 12500.0	User

HMI menu ID	Parameter	Description	Default value [unit]	Value range	Access level
2.4.3.15 2)	Flow Value High	Assign process value to upper output frequency "Frequency Value Low".	1)	1)	User
2.4.3.14 2)	Flow Value Low	Assign process value to upper output frequency "Frequency Value High".	1)	1)	User
2.4.3.15 3)	Flow Value High	Assign process value to upper output frequency "Frequency Value Low".	1)	1)	User
2.4.3.14 3)	Flow Value Low	Assign process value to upper output frequency "Frequency Value High".	1)	1)	User
2.4.3.15 4)	Flow Value High	Assign process value to upper output frequency "Frequency Value Low".	1600.0 [kg/m³]	0 to 5000	User
2.4.3.14 4)	Flow Value Low	Assign process value to upper output frequency "Frequency Value High".	600.0 [kg/m³]	0 to 5000	User
2.4.3.15 5)	Flow Value High	Assign process value to upper output frequency "Frequency Value Low".	200 [°C]	-50 to +200	User
2.4.3.14 5)	Flow Value Low	Assign process value to upper output frequency "Frequency Value High".	-50 [°C]	-50 to +200	User
2.4.3.15 6)	Flow Value High	Assign process value to upper output frequency "Frequency Value Low".	1)	1)	User
2.4.3.14 6)	Flow Value Low	Assign process value to upper output frequency "Frequency Value High".	1)	1)	User
2.4.3.15 7)	Flow Value High	Assign process value to upper output frequency "Frequency Value Low".	100 [%]	0.0 to 100.0	User
2.4.3.16 7)	Flow Value Low	Assign process value to upper output frequency "Frequency Value High".	0 [%]	0.0 to 100.0	User
2.4.3.17	Filter Time Constant	Set filter time constant. Defines the damping of the frequency output signal.	0.0 [s]	0.0 to 100.0	User
2.4.3.18	Fail Safe Mode	Select frequency output reaction in case of a fault.	Last Good Value	• Minimum Frequency • Maximum Frequency • Last Good Value • User Defined Value	User

HMI menu ID	Parameter	Description	Default value [unit]	Value range	Access level
2.4.3.19	Fail Safe Value	Define fail-safe frequency output value if "Fail Safe Mode" parameter is set to 'User Defined Value'.	0.0 [Hz]	0.0 to 12500.0	User
2.4.3.20	Redundancy Mode	Set the Redundancy Mode. The pulses on channel 3 will follow pulses on channel 2 with 90 or 180 deg. shift.	Off	• Off • 90 ° • 180 °	User
2.4.3.21	Process Value	Select process value for pulse output.	Massflow	• Massflow • Volumeflow • Corrected • Volumeflow • Fraction A • Fraction B	User
2.4.3.22	Direction	Select measured flow direction. The flowmeter will only output pulses when flow value is measured in selected direction.	Bidirectional	• Positive • Negative • Bidirectional	User
2.4.3.23	Pulse Width	Define the pulse duration. Long duration pulses can overlap at high flow rate.	0.1 [s]	0.00004 to 4.0	User
2.4.3.23	Pulse Width Unit	Set the time unit for configuring pulse width.	s	• s • ms • µs	User
2.4.3.23	Pulse Unit	Select unit for pulse output. Unit is not applied at communication interface.	kg	• g • kg • t • lb • STon • oz • T	User
2.4.3.24	Pulse Unit	Select unit for pulse output. Unit is not applied at communication interface.	L	L, hL, m^3, Ugal, BL, BB, BO, in^3, ft^3, yd^3, gal, bush	User
2.4.3.24	Pulse Unit	Select unit for pulse output. Unit is not applied at communication interface.	NL	• NL • Nm^3 • SL • Sft^3 • Sm^3	User
2.4.3.24	Amount Per Pulse	Define the quantity represented by each pulse.	0.1 [kg]		User

HMI menu ID	Parameter	Description	Default value [unit]	Value range	Access level
2.4.3.25	Amount Per Pulse	Define the quantity represented by each pulse.	0.0001 [m³]		User
2.4.3.26	Amount Per Pulse	Define the quantity represented by each pulse.	0.0001 [normal m³]		User
2.4.3.27	Polarity	Set the level of an active pulse.	Active High Level	• Active High Level • Active Low Level	User
2.4.3.28	Fail Safe Mode	Select pulse output reaction in case of a fault.	Memory	• Memory • Hold	User
2.4.3.29	Status Mode	Select the functionality for status output. Only applicable when "Operation Mode" is set to 'Status'.	Alarm Class	• Alarm Class • Alarm Item • Primary Valve Dosing Control • Secondary Valve Dosing Control	User
2.4.3.30	Sensor (1) Alarms				User
2.4.3.31	Sensor (2) Alarms				User
2.4.3.32	Process (1) Alarms				User
2.4.3.33	Process (2) Alarms				User
2.4.3.34	Simulation Alarms				User
2.4.3.35	Input/Output Alarms				User
2.4.3.36	Alarm Class	Select one or more Siemens alarm classes. The output is active when alarm in selected alarm class occurs.	Process Value Alarm	• Maintenance Alarm • Function check • Process Value Alarm • Process Value Warning • Maintenance Warning • Maintenance Required	User

HMI menu ID	Parameter	Description	Default value [unit]	Value range	Access level
2.4.3.37	Alarm Class	Select one or more NAMUR alarm classes. The output is active when alarm in selected alarm class occurs.	Out of specifica-tion	• Failure • Function check • Out of specifi-cation • Maintenance Required	User
2.4.3.38	Polarity	Set the level of an active pulse.	Active High Level	• Active High Level • Active Low Level	User
2.4.3.39	On Delay	Set the time delay between alarm condition and activating the output. Allows to ignore transient fault conditions.	0.0 [s]	0 to 100.0	User
2.4.3.40	Off Delay	Set the time delay between resetting alarm condition and de-activating the output. Allows to ignore transient fault condi-tions.	0.0 [s]	0.0 to 100.0	User
2.4.3.41	**Decimal Places**				
2.4.3.41.1	Amount Per Pulse	Set the number of places after the decimal point displayed for the process value.	2	• 0 • 1 • 2 • 3 • 4 • 5 • 6	User
2.4.3.41.1	Amount Per Pulse	Set the number of places after the decimal point displayed for the process value.	2	• 0 • 1 • 2 • 3 • 4 • 5 • 6	User
2.4.3.41.1	Amount Per Pulse	Set the number of places after the decimal point displayed for the process value.	2	• 0 • 1 • 2 • 3 • 4 • 5 • 6	User

HMI menu ID	Parameter	Description	Default value [unit]	Value range	Access level
2.4.3.41.2	Pulse Width (s)	Set the number of places after the decimal point displayed for the process value.	2	• 0 • 1 • 2 • 3 • 4 • 5 • 6	User
2.4.3.41.3	Current (mA)	Define the decimal point displayed for the process value.	2	• 0 • 1 • 2 • 3 • 4 • 5 • 6	User
2.4.3.41.4	Time (s)	Define the decimal point displayed for the process value.	2	• 0 • 1 • 2 • 3 • 4 • 5 • 6	User

1): See Sensor dimension dependent default settings (Page 373)

2) Process Value is set to Massflow

3) Process Value is set to Volumeflow

4) Process Value is set to Density

5) Process Value is set to Fluid Temperature

6) Process Value is set to Corrected Volumeflow

7) Process Value is set to Fraction A % / Fraction B %

Table C- 15 Relay Output (3)

HMI menu ID	Parameter	Description	Default value [unit]	Value range	Access level
2.4.4.1	Operation Mode	Set the output functionality	Off	• Off • Status Output	User
2.4.4.2	Status Mode	Select the functionality for status output. Only applicable when "Operation Mode" is set to 'Status Output'.	Off	• Off • Alarm Class • Alarm Item • Primary Valve Dosing Control • Secondary Valve Dosing Control	User
2.4.4.3	Sensor (1) Alarms		Alarm Class		User
2.4.4.4	Sensor (2) Alarms		Alarm Class		User
2.4.4.5	Process (1) Alarms		Alarm Class		User
2.4.4.6	Process (2) Alarms		Alarm Class		User
2.4.4.7	Simulation Alarms		Alarm Class		User
2.4.4.8	Input/Output Alarms		Alarm Class		User
2.4.4.9	Alarm Class	Select one or more Siemens alarm classes. The output is active when alarm in selected alarm class occurs.	Process Value Alarm	• Maintenance Alarm • Function check • Process Value Alarm • Process Value Warning • Maintenance Warning • Maintenance Required	User
2.4.4.10	Alarm Class	Select one or more NAMUR alarm classes. The output is active when alarm in selected alarm class occurs.	Out of specification	• Failure • Function check • Out of specification • Maintenance Required	User
2.4.4.11	Polarity	Set the level of an active pulse.	Active High Level	• Active High Level • Active Low Level	User

HMI menu ID	Parameter	Description	Default value [unit]	Value range	Access level
2.4.4.12	On Delay	Set the time delay between alarm condition and activating the output. Allows to ignore transient fault conditions.	0.0 [s]	0 to 100.0	User
2.4.4.13	Off Delay	Set the time delay between resetting alarm condition and de-activating the output. Allows to ignore transient fault conditions.	0.0 [s]	0.0 to 100.0	User

Table C- 16 Signal Input (3)

HMI menu ID	Parameter	Description	Default value [unit]	Value range	Access level
2.4.5.1	Operation Mode Delay Time	Select the signal input functionality.	Off	• Off • Reset totalizer 1 • Reset totalizer 2 • Reset totalizer 3 • Reset All Totalizers • Start Zero Point Adjustment • Start Dosing • Stop Dosing • Resume Dosing • Force Output • Freeze Output	User
2.4.5.2	Delay Time	Select debounce time used to delay the hardware input signal.	0 ms	• 0 ms • 0.5 ms • 1 ms • 1.5 ms • 2 ms • 2.5 ms • 3 ms • 3.5 ms • 4 ms • 4.5 ms • 5 ms • 5.5 ms • 6 ms • 6.5 ms • 7 ms • 7.5 ms	User
2.4.5.3	Polarity	Set the level of an active pulse.	Active High Level	• Active High Level • Active Low Level	User

Table C- 17 Signal Output (4)

HMI menu ID	Parameter	Description	Default value [unit]	Value range	Access level
2.4.6.1	Operation Mode	Set the output functionality.	Off	• Off • Current Output • Frequency Output • Pulse Output • Status Output	User
2.4.6.2	Process Value	Select process value for current output.	Massflow	• Massflow • Volumeflow • Density • Fluid Temperature • Corrected Volumeflow • Fraction A • Fraction B • Fraction A % • Fraction B % • Analog Dosing	User
2.4.6.3	Direction	Select measured flow direction. The flowmeter will only output current when flow value is measured in selected direction.	Bidirectional	• Positive • Negative • Bidirectional • Bidirectional (Symmetric)	User

HMI menu ID	Parameter	Description	Default value [unit]	Value range	Access level
2.4.6.4	Current Mode	Select current output scaling according to desired measurement range and fail-safe mode.	4-20mA NAMUR (3.5) 3.8-20.5 (22.6)	• 4-20 mA NAMUR (3.5 mA) 3.8 mA - 20.5 mA (22.6 mA) • 4-20 mA US (3.75 mA) 4 mA -20.8 mA (22.6 mA) • 4-20 mA (0 mA) 4 mA-20.5 mA (22 mA) • 4-20 mA (2 mA) 4 mA-24 mA (25 mA) • 0-20 mA (0 mA) 0 mA-20.5 mA (22 mA) • 0-20 mA (0 mA) 0 mA-24 mA (25 mA)	User
2.4.6.5 [2)]	Upper Scaling	Assign process value to upper output current (20mA).	[1)]	[1)]	User
2.4.6.6 [2)]	Lower Scaling	Assign process value to lower output current (4mA).	[1)]	[1)]	User
2.4.6.5 [3)]	Upper Scaling	Assign process value to upper output current (20mA).	[1)]	[1)]	User
2.4.6.6 [3)]	Lower Scaling	Assign process value to lower output current (4mA).	[1)]	[1)]	User
2.4.6.5 [4)]	Upper Scaling	Assign process value to upper output current (20mA).	1600.0 [kg/m³]	0 to 5000	User
2.4.6.6 [4)]	Lower Scaling	Assign process value to lower output current (4mA).	600.0 [kg/m³]	0 to 5000	User
2.4.6.5 [5)]	Upper Scaling	Assign process value to upper output current (20mA).	200 [°C]	-50 to +200	User
2.4.6.6 [5)]	Lower Scaling	Assign process value to lower output current (4mA).	-50 [°C]	-50 to +200	User
2.4.6.5 [6)]	Upper Scaling	Assign process value to upper output current (20mA).	[1)]	[1)]	User
2.4.6.6 [6)]	Lower Scaling	Assign process value to lower output current (4mA).	[1)]	[1)]	User
2.4.6.5 [7)]	Upper Scaling	Assign process value to upper output current (20mA).	100 [%]	0.0 to 100.0	User
2.4.6.6 [7)]	Lower Scaling	Assign process value to lower output current (4mA).	0 [%]	0.0 to 100.0	User

HMI menu ID	Parameter	Description	Default value [unit]	Value range	Access level
2.4.6.7	Filter Time Constant	Set filter time constant. Defines the damping of the current output signal.	0.0 [s]	0.0 to 100.0	User
2.4.6.8	Fail Safe Mode	Select current output reaction in case of a fault.	Minimum Current	• Minimum Current • Maximum Current • Last Good Value • Current Value • User Defined Value	User
2.4.6.9	Fail Safe Value	Define fail-safe current output value if "Fail Safe Mode" parameter is set to 'User Defined Value'.	0 [mA]	0 to 25	User
2.4.6.10	Process Value	Select process value for frequency output.	Massflow	• Massflow • Volumeflow • Density • Fluid • Temperature • Corrected Volumeflow • Fraction A • Fraction B • Fraction A % • Fraction B %	User
2.4.6.11	Direction	Select measured flow direction. The flowmeter will only output frequency when flow value is measured in selected direction.	Bidirectional	• Positive • Negative • Bidirectional • Bidirectional (Symmetric)	User
2.4.6.12	Frequency Value High	Assign maximum frequency value.	1000.0 [Hz]	0.0 to 12500.0	User
2.4.6.13	Frequency Value Low	Assign minimum frequency value.	0.0 [Hz]	0.0 to 12500.0	User
2.4.6.14 [2)]	Flow Value High	Assign process value to upper output frequency "Frequency Value Low".	[1)]	[1)]	User
2.4.6.15 [2)]	Flow Value Low	Assign process value to upper output frequency "Frequency Value High".	[1)]	[1)]	User

HMI menu ID	Parameter	Description	Default value [unit]	Value range	Access level
2.4.6.14 3)	Flow Value High	Assign process value to upper output frequency "Frequency Value Low".	1)	1)	User
2.4.6.15 3)	Flow Value Low	Assign process value to upper output frequency "Frequency Value High".	1)	1)	User
2.4.6.14 4)	Flow Value High	Assign process value to upper output frequency "Frequency Value Low".	1600.0 [kg/m³]	0 to 5000	User
2.4.6.15 4)	Flow Value Low	Assign process value to upper output frequency "Frequency Value High".	600.0 [kg/m³]	0 to 5000	User
2.4.6.14 5)	Flow Value High	Assign process value to upper output frequency "Frequency Value Low".	200 [°C]	-50 to +200	User
2.4.6.15 5)	Flow Value Low	Assign process value to upper output frequency "Frequency Value High".	-50 [°C]	-50 to +200	User
2.4.6.14 6)	Flow Value High	Assign process value to upper output frequency "Frequency Value Low".	1)	1)	User
2.4.6.15 6)	Flow Value Low	Assign process value to upper output frequency "Frequency Value High".	1)	1)	User
2.4.6.14 7)	Flow Value High	Assign process value to upper output frequency "Frequency Value Low".	100 [%]	0.0 to 100.0	User
2.4.6.15 7)	Flow Value Low	Assign process value to upper output frequency "Frequency Value High".	0 [%]	0.0 to 100.0	User
2.4.6.16	Filter Time Constant	Set filter time constant. Defines the damping of the frequency output signal.	0.0 [s]	0.0 to 100.0	User
2.4.6.17	Fail Safe Mode	Select frequency output reaction in case of a fault.	Last Good Value	• Minimum Frequency • Maximum Frequency • Last Good Value • User Defined Value	User
2.4.6.18	Fail Safe Value	Define fail-safe frequency output value if "Fail Safe Mode" parameter is set to 'User Defined Value'.	0.0 [Hz]	0.0 to 12500.0	User

HMI menu ID	Parameter	Description	Default value [unit]	Value range	Access level
2.4.6.19	Process Value	Select process value for pulse output.	Massflow	• Massflow • Volumeflow • Corrected • Volumeflow • Fraction A • Fraction B	User
2.4.6.20	Direction	Select measured flow direction. The flowmeter will only output pulses when flow value is measured in selected direction.	Bidirectional	• Positive • Negative • Bidirectional	User
2.4.6.21	Pulse Width	Define the pulse duration. Long duration pulses can overlap at high flow rate.	0.1 [s]	0.00004 to 4.0	User
2.4.6.22	Pulse Width Unit	Set the time unit for configuring pulse width.	s	• s • ms • µs	User
2.4.6.23	Pulse Unit	Select unit for pulse output. Unit is not applied at communication interface.	kg	• g • kg • t • lb • STon • oz • T	User
2.4.6.23	Pulse Unit	Select unit for pulse output. Unit is not applied at communication interface.	L	L, hL, m^3, Ugal, BL, BB, BO, in^3, ft^3, yd^3, gal, bush	User
2.4.6.23	Pulse Unit	Select unit for pulse output. Unit is not applied at communication interface.	NL	• NL • Nm^3 • SL • Sft^3 • Sm^3	User
2.4.6.24	Amount Per Pulse	Define the quantity represented by each pulse.	0.1 [kg]	0.0 to	User
2.4.6.24	Amount Per Pulse	Define the quantity represented by each pulse.	0.0001 [m^3]	0.0 to	User
2.4.6.24	Amount Per Pulse	Define the quantity represented by each pulse.	0.0001 [normal m^3]	0.0 to	User
2.4.6.25	Polarity	Set the level of an active pulse.	Active High Level	• Active High Level • Active Low Level	User

HMI menu ID	Parameter	Description	Default value [unit]	Value range	Access level
2.4.6.26	Fail Safe Mode	Select pulse output reaction in case of a fault.	Memory	• Memory • Hold	User
2.4.6.27	Status Mode	Select the functionality for status output. Only applicable when "Operation Mode" is set to 'Status'.	Alarm Class	• Alarm Class • Alarm Item • Primary Valve Dosing Control • Secondary Valve Dosing Control	User
2.4.6.28	Sensor (1) Alarms				User
2.4.6.29	Sensor (2) Alarms				User
2.4.6.30	Process (1) Alarms				User
2.4.6.31	Process (2) Alarms				User
2.4.6.32	Simulation Alarms				User
2.4.6.33	Input/Output Alarms				User
2.4.6.34	Alarm Class	Select one or more Siemens alarm classes. The output is active when alarm in selected alarm class occurs.	Process Value Alarm	• Maintenance Alarm • Function check • Process Value Alarm • Process Value Warning • Maintenance Warning • Maintenance Required	User
2.4.6.35	Alarm Class	Select one or more NAMUR alarm classes. The output is active when alarm in selected alarm class occurs.	Out of specification	• Failure • Function check • Out of specification • Maintenance Required	User
2.4.6.36	Polarity	Set the level of an active pulse.	Active High Level	• Active High Level • Active Low Level	User

HMI menu ID	Parameter	Description	Default value [unit]	Value range	Access level
2.4.6.37	On Delay	Set the time delay between alarm condition and activating the output. Allows to ignore transient fault conditions.	0.0 [s]	0 to 100.0	User
2.4.6.38	Off Delay	Set the time delay between resetting alarm condition and de-activating the output. Allows to ignore transient fault conditions.	0.0 [s]	0.0 to 100.0	User
2.4.6.39	**Decimal Places**				
2.4.6.39.1	Amount Per Pulse	Set the number of places after the decimal point displayed for the process value.	2	• 0 • 1 • 2 • 3 • 4 • 5 • 6	User
2.4.6.39.1	Amount Per Pulse	Set the number of places after the decimal point displayed for the process value.	2	• 0 • 1 • 2 • 3 • 4 • 5 • 6	User
2.4.6.39.1	Amount Per Pulse	Set the number of places after the decimal point displayed for the process value.	2	• 0 • 1 • 2 • 3 • 4 • 5 • 6	User
2.4.6.39.2	Pulse Width (s)	Set the number of places after the decimal point displayed for the process value.	2	• 0 • 1 • 2 • 3 • 4 • 5 • 6	User

HMI menu ID	Parameter	Description	Default value [unit]	Value range	Access level
2.4.6.39.3	Current (mA)	Define the decimal point displayed for the process value.	2	• 0 • 1 • 2 • 3 • 4 • 5 • 6	User
2.4.6.39.4	Time (s)	Define the decimal point displayed for the process value.	2	• 0 • 1 • 2 • 3 • 4 • 5 • 6	User

1): See Sensor dimension dependent default settings (Page 373)

2) Process Value is set to Massflow

3) Process Value is set to Volumeflow

4) Process Value is set to Density

5) Process Value is set to Fluid Temperature

6) Process Value is set to Corrected Volumeflow

7) Process Value is set to Fraction A % / Fraction B %

Table C- 18 Relay Output (4)

HMI menu ID	Parameter	Description	Default value [unit]	Value range	Access level
2.4.7.1	Operation Mode	Set the output functionality	Off	• Off • Status Output	User
2.4.7.2	Status Mode	Select the functionality for status output. Only applicable when "Operation Mode" is set to 'Status Output'.	Off	• Off • Alarm Class • Alarm Item • Primary Valve Dosing Control • Secondary Valve Dosing Control	User
2.4.7.3	Sensor (1) Alarms		Alarm Class		User
2.4.7.4	Sensor (2) Alarms		Alarm Class		User

HMI menu ID	Parameter	Description	Default value [unit]	Value range	Access level
2.4.7.5	Process (1) Alarms		Alarm Class		User
2.4.7.6	Process (2) Alarms		Alarm Class		User
2.4.7.7	Simulation Alarms		Alarm Class		User
2.4.7.8	Input/Output Alarms		Alarm Class		User
2.4.7.9	Alarm Class	Select one or more Siemens alarm classes. The output is active when alarm in selected alarm class occurs.	Process Value Alarm	• Maintenance Alarm • Function check • Process Value Alarm • Process Value Warning • Maintenance Warning • Maintenance Required	User
2.4.7.10	Alarm Class	Select one or more NAMUR alarm classes. The output is active when alarm in selected alarm class occurs.	Out of specification	• Failure • Function check • Out of specification • Maintenance Required	User
2.4.7.11	Polarity	Set the level of an active pulse.	Active High Level	• Active High Level • Active Low Level	User
2.4.7.12	On Delay	Set the time delay between alarm condition and activating the output. Allows to ignore transient fault conditions.	0.0 [s]	0 to 100.0	User
2.4.7.13	Off Delay	Set the time delay between resetting alarm condition and de-activating the output. Allows to ignore transient fault conditions.	0.0 [s]	0.0 to 100.0	User

Table C- 19 Signal Input (4)

HMI menu ID	Parameter	Description	Default value [unit]	Value range	Access level
2.4.8.1	Operation Mode Delay Time	Select the signal input functionality.	Off	• Off • Reset totalizer 1 • Reset totalizer 2 • Reset totalizer 3 • Reset All Totalizers • Start Zero Point Adjustment • Resume Dosing • Force Output • Freeze Output	User
2.4.8.2	Delay Time	Select debounce time used to delay the hardware input signal.	0 ms	• 0 ms • 0.5 ms • 1 ms • 1.5 ms • 2 ms • 2.5 ms • 3 ms • 3.5 ms • 4 ms • 4.5 ms • 5 ms • 5.5 ms • 6 ms • 6.5 ms • 7 ms • 7.5 ms	User
2.4.8.3	Polarity	Set the level of an active pulse.	Active High Level	• Active High Level • Active Low Level	User

C.5 Dosing

Table C- 20 Dosing

HMI menu ID	Parameter	Description	Default value [unit]	Value range	Access level
2.5.1	Dosing Mode	Select the dosing mode to control the valve(s) on the output.	Off	• Off • One Stage Dosing • Two Stage Dosing • Analog Dosing	User
2.5.2	Process Value	Select process value for dosing application.	Massflow	• Massflow • Volumeflow • Corrected Volumeflow • Fraction A • Fraction B	User
2.5.3	Active Recipe	Select dosing recipe.			User

Table C- 21 Recipe 1

HMI menu ID	Parameter	Description	Default value [unit]	Value range	Access level
2.5.5.1	Name	Define the name of the recipe. Switching between recipes is done in dosing operating view.			User
2.5.5.2	Unit	Select unit for the recipe. Unit is not applied at communication interface.	kg	• g • kg • t • lb • STon • oz • T	User
2.5.5.2	Unit	Select unit for the recipe. Unit is not applied at communication interface.			User

HMI menu ID	Parameter	Description	Default value [unit]	Value range	Access level
2.5.5.2	Unit	Select unit for the recipe. Unit is not applied at communication interface.	NL	• NL • Nm^3 • SL • Sft^3 • Sm^3	User
2.5.5.3	Amount	Define the filling amount. The valve will be closed and filling stopped when defined amount is reached.	1.0 [kg]		User
2.5.5.3	Amount	Define the filling amount. The valve will be closed and filling stopped when defined amount is reached.	0.001 [m^3]		User
2.5.5.3	Amount	Define the filling amount. The valve will be closed and filling stopped when defined amount is reached.	0.001 [normal m^3]		User
2.5.5.4	Decimal Places	Define the decimal point for the process value displayed in the Local User Interface.	2	• 0 • 1 • 2 • 3 • 4 • 5 • 6	User
2.5.5.4	Decimal Places	Define the decimal point for the process value displayed in the Local User Interface.	2	• 0 • 1 • 2 • 3 • 4 • 5 • 6	User
2.5.5.4	Decimal Places	Define the decimal point for the process value displayed in the Local User Interface.	2	• 0 • 1 • 2 • 3 • 4 • 5 • 6	User
2.5.5.5	**Calibration**				

HMI menu ID	Parameter	Description	Default value [unit]	Value range	Access level
2.5.5.5.2	Fixed Compensation	Define the fixed pre-stop value. The value is subtracted from "Amount" to compensate for application delays in closing the valves.	[kg]		User
2.5.5.5.2	Fixed Compensation	Define the fixed pre-stop value. The value is subtracted from "Amount" to compensate for application delays in closing the valves.	[m³]		User
2.5.5.5.2	Fixed Compensation	Define the fixed pre-stop value. The value is subtracted from "Amount" to compensate for application delays in closing the valves.	[normal m³]		User
2.5.5.6	**Valve Control**				
2.5.5.6.1	Stage Setup Format	Specify if valve control parameters are defined as absolute or relative values (% of dosing amount).	Relative	• Relative • Absolute	User
2.5.5.6.2	Stage 1 Primary Open	Define the dosing amount value to open the primary valve. The value is in % of defined dosing amount.	0 [%]	0.0 to 100.0	User
2.5.5.6.3	Stage 1 Primary Close	Define the dosing amount value to close the primary valve. The value is in % of defined dosing amount.	80 [%]	0.0 to 100.0	User
2.5.5.6.4	Stage 2 Secondary Open	Define the dosing amount value to open the secondary valve. The value is in % of defined dosing amount.	20 [%]	0.0 to 100.0	User
2.5.5.6.5	Stage 2 Secondary Close	Define the dosing amount value to close the secondary valve. The value is in % of defined dosing amount.	100 [%]	0.0 to 100.0	User
2.5.5.6.2	Stage 1 Primary Open	Define the dosing amount value to open the primary valve. The value is in % of defined dosing amount.	0 [kg]		User
2.5.5.6.3	Stage 1 Primary Close	Define the dosing amount value to close the primary valve. The value is in % of defined dosing amount.	1.0 [kg]		User
2.5.5.6.4	Stage 2 Secondary Open	Define the dosing amount value to open the secondary valve. The value is in % of defined dosing amount.	0.2 [kg]		User

HMI menu ID	Parameter	Description	Default value [unit]	Value range	Access level
2.5.5.6.5	Stage 2 Secondary Close	Define the dosing amount value to close the secondary valve. The value is in % of defined dosing amount.	0.8 [kg]		User
2.5.5.6.2	Stage 1 Primary Open	Define the dosing amount value to open the primary valve. The value is in % of defined dosing amount.	0 [m³]		User
2.5.5.6.3	Stage 1 Primary Close	Define the dosing amount value to close the primary valve. The value is in % of defined dosing amount.	0.001 [m³]		User
2.5.5.6.4	Stage 2 Secondary Open	Define the dosing amount value to open the secondary valve. The value is in % of defined dosing amount.	0.0002 [m³]		User
2.5.5.6.5	Stage 2 Secondary Close	Define the dosing amount value to close the secondary valve. The value is in % of defined dosing amount.	0.0008 [m³]		User
2.5.5.6.2	Stage 1 Primary Open	Define the dosing amount value to open the primary valve. The value is in % of defined dosing amount.	0 [normal m³]		User
2.5.5.6.3	Stage 1 Primary Close	Define the dosing amount value to close the primary valve. The value is in % of defined dosing amount.	0.001 [normal m³]		User
2.5.5.6.4	Stage 2 Secondary Open	Define the dosing amount value to open the secondary valve. The value is in % of defined dosing amount.	0.0002 [normal m³]		User
2.5.5.6.5	Stage 2 Secondary Close	Define the dosing amount value to close the secondary valve. The value is in % of defined dosing amount.	0.0008 [normal m³]		User
2.5.5.6.6	Fully Closed Current Level	Define current level to fully close the analog valve.	0 [mA]	0 to 20	User
2.5.5.6.7	Partially Open Current Level	Define current level to partly close the analog valve.	10 [mA]	0 to 20	User
2.5.5.6.8	Fully Open Current Level	Define current level to fully open the analog valve.	20 [mA]	0 to 20	User
2.5.5.6.9	Fully Open	Define the dosing amount value at which the valve will transition from partial flow to full flow.	0.0 [%]	0.0 to100.0	User
2.5.5.6.10	Partially Closed	Define the dosing amount value at which the valve will transition from full flow to partial flow.	0.0 [%]	0.0 to100.0	User

HMI menu ID	Parameter	Description	Default value [unit]	Value range	Access level
2.5.5.6.9	Fully Open	Define the dosing amount value at which the valve will transition from partial flow to full flow.	0.0 [kg]		User
2.5.5.6.10	Partially Closed	Define the dosing amount value at which the valve will transition from full flow to partial flow.	1.0 [kg]		User
2.5.5.6.9	Fully Open	Define the dosing amount value at which the valve will transition from partial flow to full flow.	0.0 [m^3]		User
2.5.5.6.10	Partially Closed	Define the dosing amount value at which the valve will transition from full flow to partial flow.	0.001 [m^3]		User
2.5.5.6.9	Fully Open	Define the dosing amount value at which the valve will transition from partial flow to full flow.	0.0 [normal m^3]		User
2.5.5.6.10	Partially Closed	Define the dosing amount value at which the valve will transition from full flow to partial flow.	0.001 [normal m^3]		User
2.5.5.7	**Fault Handling**				
2.5.5.7.1	Duration mode	Enable or disable dosing time supervision. An alarm is raised and valve(s) closed if dosing time is exceeded.	Off	• Off • On	User
2.5.5.7.2	Duration time	Define the supervision time. An alarm is raised and valve(s) closed if dosing time is exceeded.	3600	1 to 360000	User
2.5.5.7.3	Overrun mode	Enable or disable dosing amount supervision. An alarm is raised and valve(s) closed if dosing amount is exceeded.	Off	• Off • On	User
2.5.5.7.4	Overrun value	Define the dosing overrun amount. An alarm is raised and valve(s) closed if dosing amount is exceeded.	0		User
2.5.5.7.4	Overrun value	Define the dosing overrun amount. An alarm is raised and valve(s) closed if dosing amount is exceeded.	0		User
2.5.5.7.4	Overrun value	Define the dosing overrun amount. An alarm is raised and valve(s) closed if dosing amount is exceeded.	0		User

Table C- 22 Recipe 2

HMI menu ID	Parameter	Description	Default value [unit]	Value range	Access level
2.5.6.1	Name	Define the name of the recipe. Switching between recipes is done in dosing operating view.			User
2.5.6.2	Unit	Select unit for the recipe. Unit is not applied at communication interface.	kg	• g • kg • t • lb • STon • oz • T	User
2.5.6.2	Unit	Select unit for the recipe. Unit is not applied at communication interface.			User
2.5.6.2	Unit	Select unit for the recipe. Unit is not applied at communication interface.	NL	• NL • Nm^3 • SL • Sft^3 • Sm^3	User
2.5.6.3	Amount	Define the filling amount. The valve will be closed and filling stopped when defined amount is reached.	1.0 [kg]		User
2.5.6.3	Amount	Define the filling amount. The valve will be closed and filling stopped when defined amount is reached.	0.001 [m^3]		User
2.5.6.3	Amount	Define the filling amount. The valve will be closed and filling stopped when defined amount is reached.	0.001 [normal m^3]		User
2.5.6.4	Decimal Places	Define the decimal point for the process value displayed in the Local User Interface.	2	• 0 • 1 • 2 • 3 • 4 • 5 • 6	User

HMI menu ID	Parameter	Description	Default value [unit]	Value range	Access level
2.5.6.4	Decimal Places	Define the decimal point for the process value displayed in the Local User Interface.	2	• 0 • 1 • 2 • 3 • 4 • 5 • 6	User
2.5.6.4	Decimal Places	Define the decimal point for the process value displayed in the Local User Interface.	2	• 0 • 1 • 2 • 3 • 4 • 5 • 6	User
2.5.6.5	**Calibration**				
2.5.6.5.2	Fixed Compensation	Define the fixed pre-stop value. The value is subtracted from "Amount" to compensate for application delays in closing the valves.	[kg]		User
2.5.6.5.2	Fixed Compensation	Define the fixed pre-stop value. The value is subtracted from "Amount" to compensate for application delays in closing the valves.	[m^3]		User
2.5.6.5.2	Fixed Compensation	Define the fixed pre-stop value. The value is subtracted from "Amount" to compensate for application delays in closing the valves.	[normal m^3]		User
2.5.6.6	**Valve Control**				
2.5.6.6.1	Stage Setup Format	Specify if valve control parameters are defined as absolute or relative values (% of dosing amount).	Relative	• Relative • Absolute	User
2.5.6.6.2	Stage 1 Primary Open	Define the dosing amount value to open the primary valve. The value is in % of defined dosing amount.	0 [%]	0.0 to 100.0	User
2.5.6.6.3	Stage 1 Primary Close	Define the dosing amount value to close the primary valve. The value is in % of defined dosing amount.	80 [%]	0.0 to 100.0	User

HMI menu ID	Parameter	Description	Default value [unit]	Value range	Access level
2.5.6.6.4	Stage 2 Secondary Open	Define the dosing amount value to open the secondary valve. The value is in % of defined dosing amount.	20 [%]	0.0 to 100.0	User
2.5.6.6.5	Stage 2 Secondary Close	Define the dosing amount value to close the secondary valve. The value is in % of defined dosing amount.	100 [%]	0.0 to 100.0	User
2.5.6.6.2	Stage 1 Primary Open	Define the dosing amount value to open the primary valve. The value is in % of defined dosing amount.	0 [kg]		User
2.5.6.6.3	Stage 1 Primary Close	Define the dosing amount value to close the primary valve. The value is in % of defined dosing amount.	1.0 [kg]		User
2.5.6.6.4	Stage 2 Secondary Open	Define the dosing amount value to open the secondary valve. The value is in % of defined dosing amount.	0.2 [kg]		User
2.5.6.6.5	Stage 2 Secondary Close	Define the dosing amount value to close the secondary valve. The value is in % of defined dosing amount.	0.8 [kg]		User
2.5.6.6.2	Stage 1 Primary Open	Define the dosing amount value to open the primary valve. The value is in % of defined dosing amount.	0 [m^3]		User
2.5.6.6.3	Stage 1 Primary Close	Define the dosing amount value to close the primary valve. The value is in % of defined dosing amount.	0.001 [m^3]		User
2.5.6.6.4	Stage 2 Secondary Open	Define the dosing amount value to open the secondary valve. The value is in % of defined dosing amount.	0.0002 [m^3]		User
2.5.6.6.5	Stage 2 Secondary Close	Define the dosing amount value to close the secondary valve. The value is in % of defined dosing amount.	0.0008 [m^3]		User
2.5.6.6.2	Stage 1 Primary Open	Define the dosing amount value to open the primary valve. The value is in % of defined dosing amount.	0 [normal m^3]		User
2.5.6.6.3	Stage 1 Primary Close	Define the dosing amount value to close the primary valve. The value is in % of defined dosing amount.	0.001 [normal m^3]		User

HMI menu ID	Parameter	Description	Default value [unit]	Value range	Access level
2.5.6.6.4	Stage 2 Secondary Open	Define the dosing amount value to open the secondary valve. The value is in % of defined dosing amount.	0.0002 [normal m^3]		User
2.5.6.6.5	Stage 2 Secondary Close	Define the dosing amount value to close the secondary valve. The value is in % of defined dosing amount.	0.0008 [normal m^3]		User
2.5.6.6.6	Fully Closed Current Level	Define current level to fully close the analog valve.	0 [mA]	0 to 20	User
2.5.6.6.7	Partially Open Current Level	Define current level to partly close the analog valve.	10 [mA]	0 to 20	User
2.5.6.6.8	Fully Open Current Level	Define current level to fully open the analog valve.	20 [mA]	0 to 20	User
2.5.6.6.9	Fully Open	Define the dosing amount value at which the valve will transition from partial flow to full flow.	0.0 [%]	0.0 to100.0	User
2.5.6.6.10	Partially Closed	Define the dosing amount value at which the valve will transition from full flow to partial flow.	0.0 [%]	0.0 to100.0	User
2.5.6.6.9	Fully Open	Define the dosing amount value at which the valve will transition from partial flow to full flow.	0.0 [kg]		User
2.5.6.6.10	Partially Closed	Define the dosing amount value at which the valve will transition from full flow to partial flow.	1.0 [kg]		User
2.5.6.6.9	Fully Open	Define the dosing amount value at which the valve will transition from partial flow to full flow.	0.0 [m^3]		User
2.5.6.6.10	Partially Closed	Define the dosing amount value at which the valve will transition from full flow to partial flow.	0.001 [m^3]		User
2.5.6.6.9	Fully Open	Define the dosing amount value at which the valve will transition from partial flow to full flow.	0.0 [normal m^3]		User
2.5.6.6.10	Partially Closed	Define the dosing amount value at which the valve will transition from full flow to partial flow.	0.001 [normal m^3]		User
2.5.6.7	**Fault Handling**				
2.5.6.7.1	Duration mode	Enable or disable dosing time supervision. An alarm is raised and valve(s) closed if dosing time is exceeded.	Off	• Off • On	User
2.5.6.7.2	Duration time	Define the supervision time. An alarm is raised and valve(s) closed if dosing time is exceeded.	3600	1 to 360000	User

HMI menu ID	Parameter	Description	Default value [unit]	Value range	Access level
2.5.6.7.3	Overrun mode	Enable or disable dosing amount supervision. An alarm is raised and valve(s) closed if dosing amount is exceeded.	Off	• Off • On	User
2.5.6.7.4	Overrun value	Define the dosing overrun amount. An alarm is raised and valve(s) closed if dosing amount is exceeded.	0		User
2.5.6.7.4	Overrun value	Define the dosing overrun amount. An alarm is raised and valve(s) closed if dosing amount is exceeded.	0		User
2.5.6.7.4	Overrun value	Define the dosing overrun amount. An alarm is raised and valve(s) closed if dosing amount is exceeded.	0		User

Table C- 23 Recipe 3

HMI menu ID	Parameter	Description	Default value [unit]	Value range	Access level
2.5.7.1	Name	Define the name of the recipe. Switching between recipes is done in dosing operating view.			User
2.5.7.2	Unit	Select unit for the recipe. Unit is not applied at communication interface.	kg	• g • kg • t • lb • STon • oz • T	User
2.5.7.2	Unit	Select unit for the recipe. Unit is not applied at communication interface.			User
2.5.7.2	Unit	Select unit for the recipe. Unit is not applied at communication interface.	NL	• NL • Nm^3 • SL • Sft^3 • Sm^3	User
2.5.7.3	Amount	Define the filling amount. The valve will be closed and filling stopped when defined amount is reached.	1.0 [kg]		User

HMI menu ID	Parameter	Description	Default value [unit]	Value range	Access level
2.5.7.3	Amount	Define the filling amount. The valve will be closed and filling stopped when defined amount is reached.	0.001 [m^3]		User
2.5.7.3	Amount	Define the filling amount. The valve will be closed and filling stopped when defined amount is reached.	0.001 [normal m^3]		User
2.5.7.4	Decimal Places	Define the decimal point for the process value displayed in the Local User Interface.	2	• 0 • 1 • 2 • 3 • 4 • 5 • 6	User
2.5.7.4	Decimal Places	Define the decimal point for the process value displayed in the Local User Interface.	2	• 0 • 1 • 2 • 3 • 4 • 5 • 6	User
2.5.7.4	Decimal Places	Define the decimal point for the process value displayed in the Local User Interface.	2	• 0 • 1 • 2 • 3 • 4 • 5 • 6	User
2.5.7.5	**Calibration**				
2.5.7.5.2	Fixed Compensation	Define the fixed pre-stop value. The value is subtracted from "Amount" to compensate for application delays in closing the valves.	[kg]		User
2.5.7.5.2	Fixed Compensation	Define the fixed pre-stop value. The value is subtracted from "Amount" to compensate for application delays in closing the valves.	[m^3]		User

HMI menu ID	Parameter	Description	Default value [unit]	Value range	Access level
2.5.7.5.2	Fixed Compensation	Define the fixed pre-stop value. The value is subtracted from "Amount" to compensate for application delays in closing the valves.	[normal m^3]		User
2.5.7.6	**Valve Control**				
2.5.7.6.1	Stage Setup Format	Specify if valve control parameters are defined as absolute or relative values (% of dosing amount).	Relative	• Relative • Absolute	User
2.5.7.6.2	Stage 1 Primary Open	Define the dosing amount value to open the primary valve. The value is in % of defined dosing amount.	0 [%]	0.0 to 100.0	User
2.5.7.6.3	Stage 1 Primary Close	Define the dosing amount value to close the primary valve. The value is in % of defined dosing amount.	80 [%]	0.0 to 100.0	User
2.5.7.6.4	Stage 2 Secondary Open	Define the dosing amount value to open the secondary valve. The value is in % of defined dosing amount.	20 [%]	0.0 to 100.0	User
2.5.7.6.5	Stage 2 Secondary Close	Define the dosing amount value to close the secondary valve. The value is in % of defined dosing amount.	100 [%]	0.0 to 100.0	User
2.5.7.6.2	Stage 1 Primary Open	Define the dosing amount value to open the primary valve. The value is in % of defined dosing amount.	0 [kg]		User
2.5.7.6.3	Stage 1 Primary Close	Define the dosing amount value to close the primary valve. The value is in % of defined dosing amount.	1.0 [kg]		User
2.5.7.6.4	Stage 2 Secondary Open	Define the dosing amount value to open the secondary valve. The value is in % of defined dosing amount.	0.2 [kg]		User
2.5.7.6.5	Stage 2 Secondary Close	Define the dosing amount value to close the secondary valve. The value is in % of defined dosing amount.	0.8 [kg]		User
2.5.7.6.2	Stage 1 Primary Open	Define the dosing amount value to open the primary valve. The value is in % of defined dosing amount.	0 [m^3]		User
2.5.7.6.3	Stage 1 Primary Close	Define the dosing amount value to close the primary valve. The value is in % of defined dosing amount.	0.001 [m^3]		User

HMI menu ID	Parameter	Description	Default value [unit]	Value range	Access level
2.5.7.6.4	Stage 2 Secondary Open	Define the dosing amount value to open the secondary valve. The value is in % of defined dosing amount.	0.0002 [m^3]		User
2.5.7.6.5	Stage 2 Secondary Close	Define the dosing amount value to close the secondary valve. The value is in % of defined dosing amount.	0.0008 [m^3]		User
2.5.7.6.2	Stage 1 Primary Open	Define the dosing amount value to open the primary valve. The value is in % of defined dosing amount.	0 [normal m^3]		User
2.5.7.6.3	Stage 1 Primary Close	Define the dosing amount value to close the primary valve. The value is in % of defined dosing amount.	0.001 [normal m^3]		User
2.5.7.6.4	Stage 2 Secondary Open	Define the dosing amount value to open the secondary valve. The value is in % of defined dosing amount.	0.0002 [normal m^3]		User
2.5.7.6.5	Stage 2 Secondary Close	Define the dosing amount value to close the secondary valve. The value is in % of defined dosing amount.	0.0008 [normal m^3]		User
2.5.7.6.6	Fully Closed Current Level	Define current level to fully close the analog valve.	0 [mA]	0 to 20	User
2.5.7.6.7	Partially Open Current Level	Define current level to partly close the analog valve.	10 [mA]	0 to 20	User
2.5.7.6.8	Fully Open Current Level	Define current level to fully open the analog valve.	20 [mA]	0 to 20	User
2.5.7.6.9	Fully Open	Define the dosing amount value at which the valve will transition from partial flow to full flow.	0.0 [%]	0.0 to100.0	User
2.5.7.6.10	Partially Closed	Define the dosing amount value at which the valve will transition from full flow to partial flow.	0.0 [%]	0.0 to100.0	User
2.5.7.6.9	Fully Open	Define the dosing amount value at which the valve will transition from partial flow to full flow.	0.0 [kg]		User
2.5.7.6.10	Partially Closed	Define the dosing amount value at which the valve will transition from full flow to partial flow.	1.0 [kg]		User
2.5.7.6.9	Fully Open	Define the dosing amount value at which the valve will transition from partial flow to full flow.	0.0 [m^3]		User
2.5.7.6.10	Partially Closed	Define the dosing amount value at which the valve will transition from full flow to partial flow.	0.001 [m^3]		User

HMI menu ID	Parameter	Description	Default value [unit]	Value range	Access level
2.5.7.6.9	Fully Open	Define the dosing amount value at which the valve will transition from partial flow to full flow.	0.0 [normal m^3]		User
2.5.7.6.10	Partially Closed	Define the dosing amount value at which the valve will transition from full flow to partial flow.	0.001 [normal m^3]		User
2.5.7.7	**Fault Handling**				
2.5.7.7.1	Duration mode	Enable or disable dosing time supervision. An alarm is raised and valve(s) closed if dosing time is exceeded.	Off	• Off • On	User
2.5.7.7.2	Duration time	Define the supervision time. An alarm is raised and valve(s) closed if dosing time is exceeded.	3600	1 to 360000	User
2.5.7.7.3	Overrun mode	Enable or disable dosing amount supervision. An alarm is raised and valve(s) closed if dosing amount is exceeded.	Off	• Off • On	User
2.5.7.7.4	Overrun value	Define the dosing overrun amount. An alarm is raised and valve(s) closed if dosing amount is exceeded.	0		User
2.5.7.7.4	Overrun value	Define the dosing overrun amount. An alarm is raised and valve(s) closed if dosing amount is exceeded.	0		User
2.5.7.7.4	Overrun value	Define the dosing overrun amount. An alarm is raised and valve(s) closed if dosing amount is exceeded.	0		User

Table C- 24 Recipe 4

HMI menu ID	Parameter	Description	Default value [unit]	Value range	Access level
2.5.8.1	Name	Define the name of the recipe. Switching between recipes is done in dosing operating view.			User
2.5.8.2	Unit	Select unit for the recipe. Unit is not applied at communication interface.	kg	• g • kg • t • lb • STon • oz • T	User

HMI menu ID	Parameter	Description	Default value [unit]	Value range	Access level
2.5.8.2	Unit	Select unit for the recipe. Unit is not applied at communication interface.			User
2.5.8.2	Unit	Select unit for the recipe. Unit is not applied at communication interface.	NL	• NL • Nm³ • SL • Sft³ • Sm³	User
2.5.8.3	Amount	Define the filling amount. The valve will be closed and filling stopped when defined amount is reached.	1.0 [kg]		User
2.5.8.3	Amount	Define the filling amount. The valve will be closed and filling stopped when defined amount is reached.	0.001 [m³]		User
2.5.8.3	Amount	Define the filling amount. The valve will be closed and filling stopped when defined amount is reached.	0.001 [normal m³]		User
2.5.8.4	Decimal Places	Define the decimal point for the process value displayed in the Local User Interface.	2	• 0 • 1 • 2 • 3 • 4 • 5 • 6	User
2.5.8.4	Decimal Places	Define the decimal point for the process value displayed in the Local User Interface.	2	• 0 • 1 • 2 • 3 • 4 • 5 • 6	User
2.5.8.4	Decimal Places	Define the decimal point for the process value displayed in the Local User Interface.	2	• 0 • 1 • 2 • 3 • 4 • 5 • 6	User
2.5.8.5	**Calibration**				

HMI menu ID	Parameter	Description	Default value [unit]	Value range	Access level
2.5.8.5.2	Fixed Compensation	Define the fixed pre-stop value. The value is subtracted from "Amount" to compensate for application delays in closing the valves.	[kg]		User
2.5.8.5.2	Fixed Compensation	Define the fixed pre-stop value. The value is subtracted from "Amount" to compensate for application delays in closing the valves.	[m³]		User
2.5.8.5.2	Fixed Compensation	Define the fixed pre-stop value. The value is subtracted from "Amount" to compensate for application delays in closing the valves.	[normal m³]		User
2.5.8.6	**Valve Control**				
2.5.8.6.1	Stage Setup Format	Specify if valve control parameters are defined as absolute or relative values (% of dosing amount).	Relative	• Relative • Absolute	User
2.5.8.6.2	Stage 1 Primary Open	Define the dosing amount value to open the primary valve. The value is in % of defined dosing amount.	0 [%]	0.0 to 100.0	User
2.5.8.6.3	Stage 1 Primary Close	Define the dosing amount value to close the primary valve. The value is in % of defined dosing amount.	80 [%]	0.0 to 100.0	User
2.5.8.6.4	Stage 2 Secondary Open	Define the dosing amount value to open the secondary valve. The value is in % of defined dosing amount.	20 [%]	0.0 to 100.0	User
2.5.8.6.5	Stage 2 Secondary Close	Define the dosing amount value to close the secondary valve. The value is in % of defined dosing amount.	100 [%]	0.0 to 100.0	User
2.5.8.6.2	Stage 1 Primary Open	Define the dosing amount value to open the primary valve. The value is in % of defined dosing amount.	0 [kg]		User
2.5.8.6.3	Stage 1 Primary Close	Define the dosing amount value to close the primary valve. The value is in % of defined dosing amount.	1.0 [kg]		User
2.5.8.6.4	Stage 2 Secondary Open	Define the dosing amount value to open the secondary valve. The value is in % of defined dosing amount.	0.2 [kg]		User

HMI menu ID	Parameter	Description	Default value [unit]	Value range	Access level
2.5.8.6.5	Stage 2 Secondary Close	Define the dosing amount value to close the secondary valve. The value is in % of defined dosing amount.	0.8 [kg]		User
2.5.8.6.2	Stage 1 Primary Open	Define the dosing amount value to open the primary valve. The value is in % of defined dosing amount.	0 [m³]		User
2.5.8.6.3	Stage 1 Primary Close	Define the dosing amount value to close the primary valve. The value is in % of defined dosing amount.	0.001 [m³]		User
2.5.8.6.4	Stage 2 Secondary Open	Define the dosing amount value to open the secondary valve. The value is in % of defined dosing amount.	0.0002 [m³]		User
2.5.8.6.5	Stage 2 Secondary Close	Define the dosing amount value to close the secondary valve. The value is in % of defined dosing amount.	0.0008 [m³]		User
2.5.8.6.2	Stage 1 Primary Open	Define the dosing amount value to open the primary valve. The value is in % of defined dosing amount.	0 [normal m³]		User
2.5.8.6.3	Stage 1 Primary Close	Define the dosing amount value to close the primary valve. The value is in % of defined dosing amount.	0.001 [normal m³]		User
2.5.8.6.4	Stage 2 Secondary Open	Define the dosing amount value to open the secondary valve. The value is in % of defined dosing amount.	0.0002 [normal m³]		User
2.5.8.6.5	Stage 2 Secondary Close	Define the dosing amount value to close the secondary valve. The value is in % of defined dosing amount.	0.0008 [normal m³]		User
2.5.8.6.6	Fully Closed Current Level	Define current level to fully close the analog valve.	0 [mA]	0 to 20	User
2.5.8.6.7	Partially Open Current Level	Define current level to partly close the analog valve.	10 [mA]	0 to 20	User
2.5.8.6.8	Fully Open Current Level	Define current level to fully open the analog valve.	20 [mA]	0 to 20	User
2.5.8.6.9	Fully Open	Define the dosing amount value at which the valve will transition from partial flow to full flow.	0.0 [%]	0.0 to100.0	User
2.5.8.6.10	Partially Closed	Define the dosing amount value at which the valve will transition from full flow to partial flow.	0.0 [%]	0.0 to100.0	User

HMI menu ID	Parameter	Description	Default value [unit]	Value range	Access level
2.5.8.6.9	Fully Open	Define the dosing amount value at which the valve will transition from partial flow to full flow.	0.0 [kg]		User
2.5.8.6.10	Partially Closed	Define the dosing amount value at which the valve will transition from full flow to partial flow.	1.0 [kg]		User
2.5.8.6.9	Fully Open	Define the dosing amount value at which the valve will transition from partial flow to full flow.	0.0 [m^3]		User
2.5.8.6.10	Partially Closed	Define the dosing amount value at which the valve will transition from full flow to partial flow.	0.001 [m^3]		User
2.5.8.6.9	Fully Open	Define the dosing amount value at which the valve will transition from partial flow to full flow.	0.0 [normal m^3]		User
2.5.8.6.10	Partially Closed	Define the dosing amount value at which the valve will transition from full flow to partial flow.	0.001 [normal m^3]		User
2.5.8.7	**Fault Handling**				
2.5.8.7.1	Duration mode	Enable or disable dosing time supervision. An alarm is raised and valve(s) closed if dosing time is exceeded.	Off	• Off • On	User
2.5.8.7.2	Duration time	Define the supervision time. An alarm is raised and valve(s) closed if dosing time is exceed-ed.	3600	1 to 360000	User
2.5.8.7.3	Overrun mode	Enable or disable dosing amount supervision. An alarm is raised and valve(s) closed if dosing amount is exceeded.	Off	• Off • On	User
2.5.8.7.4	Overrun value	Define the dosing overrun amount. An alarm is raised and valve(s) closed if dosing amount is exceeded.	0		User
2.5.8.7.4	Overrun value	Define the dosing overrun amount. An alarm is raised and valve(s) closed if dosing amount is exceeded.	0		User
2.5.8.7.4	Overrun value	Define the dosing overrun amount. An alarm is raised and valve(s) closed if dosing amount is exceeded.	0		User

Table C- 25 Recipe 5

HMI menu ID	Parameter	Description	Default value [unit]	Value range	Access level
2.5.9.1	Name	Define the name of the recipe. Switching between recipes is done in dosing operating view.			User
2.5.9.2	Unit	Select unit for the recipe. Unit is not applied at communication interface.	kg	• g • kg • t • lb • STon • oz • T	User
2.5.9.2	Unit	Select unit for the recipe. Unit is not applied at communication interface.			User
2.5.9.2	Unit	Select unit for the recipe. Unit is not applied at communication interface.	NL	• NL • Nm^3 • SL • Sft^3 • Sm^3	User
2.5.9.3	Amount	Define the filling amount. The valve will be closed and filling stopped when defined amount is reached.	1.0 [kg]		User
2.5.9.3	Amount	Define the filling amount. The valve will be closed and filling stopped when defined amount is reached.	0.001 [m^3]		User
2.5.9.3	Amount	Define the filling amount. The valve will be closed and filling stopped when defined amount is reached.	0.001 [normal m^3]		User
2.5.9.4	Decimal Places	Define the decimal point for the process value displayed in the Local User Interface.	2	• 0 • 1 • 2 • 3 • 4 • 5 • 6	User

HMI menu ID	Parameter	Description	Default value [unit]	Value range	Access level
2.5.9.4	Decimal Places	Define the decimal point for the process value displayed in the Local User Interface.	2	• 0 • 1 • 2 • 3 • 4 • 5 • 6	User
2.5.9.4	Decimal Places	Define the decimal point for the process value displayed in the Local User Interface.	2	• 0 • 1 • 2 • 3 • 4 • 5 • 6	User
2.5.9.5	**Calibration**				
2.5.9.5.2	Fixed Compensation	Define the fixed pre-stop value. The value is subtracted from "Amount" to compensate for application delays in closing the valves.	[kg]		User
2.5.9.5.2	Fixed Compensation	Define the fixed pre-stop value. The value is subtracted from "Amount" to compensate for application delays in closing the valves.	[m^3]		User
2.5.9.5.2	Fixed Compensation	Define the fixed pre-stop value. The value is subtracted from "Amount" to compensate for application delays in closing the valves.	[normal m^3]		User
2.5.9.6	**Valve Control**				
2.5.9.6.1	Stage Setup Format	Specify if valve control parameters are defined as absolute or relative values (% of dosing amount).	Relative	• Relative • Absolute	User
2.5.9.6.2	Stage 1 Primary Open	Define the dosing amount value to open the primary valve. The value is in % of defined dosing amount.	0 [%]	0.0 to 100.0	User
2.5.9.6.3	Stage 1 Primary Close	Define the dosing amount value to close the primary valve. The value is in % of defined dosing amount.	80 [%]	0.0 to 100.0	User

HMI menu ID	Parameter	Description	Default value [unit]	Value range	Access level
2.5.9.6.4	Stage 2 Secondary Open	Define the dosing amount value to open the secondary valve. The value is in % of defined dosing amount.	20 [%]	0.0 to 100.0	User
2.5.9.6.5	Stage 2 Secondary Close	Define the dosing amount value to close the secondary valve. The value is in % of defined dosing amount.	100 [%]	0.0 to 100.0	User
2.5.9.6.2	Stage 1 Primary Open	Define the dosing amount value to open the primary valve. The value is in % of defined dosing amount.	0 [kg]		User
2.5.9.6.3	Stage 1 Primary Close	Define the dosing amount value to close the primary valve. The value is in % of defined dosing amount.	1.0 [kg]		User
2.5.9.6.4	Stage 2 Secondary Open	Define the dosing amount value to open the secondary valve. The value is in % of defined dosing amount.	0.2 [kg]		User
2.5.9.6.5	Stage 2 Secondary Close	Define the dosing amount value to close the secondary valve. The value is in % of defined dosing amount.	0.8 [kg]		User
2.5.9.6.2	Stage 1 Primary Open	Define the dosing amount value to open the primary valve. The value is in % of defined dosing amount.	0 [m^3]		User
2.5.9.6.3	Stage 1 Primary Close	Define the dosing amount value to close the primary valve. The value is in % of defined dosing amount.	0.001 [m^3]		User
2.5.9.6.4	Stage 2 Secondary Open	Define the dosing amount value to open the secondary valve. The value is in % of defined dosing amount.	0.0002 [m^3]		User
2.5.9.6.5	Stage 2 Secondary Close	Define the dosing amount value to close the secondary valve. The value is in % of defined dosing amount.	0.0008 [m^3]		User
2.5.9.6.2	Stage 1 Primary Open	Define the dosing amount value to open the primary valve. The value is in % of defined dosing amount.	0 [normal m^3]		User
2.5.9.6.3	Stage 1 Primary Close	Define the dosing amount value to close the primary valve. The value is in % of defined dosing amount.	0.001 [normal m^3]		User

HMI menu ID	Parameter	Description	Default value [unit]	Value range	Access level
2.5.9.6.4	Stage 2 Secondary Open	Define the dosing amount value to open the secondary valve. The value is in % of defined dosing amount.	0.0002 [normal m³]		User
2.5.9.6.5	Stage 2 Secondary Close	Define the dosing amount value to close the secondary valve. The value is in % of defined dosing amount.	0.0008 [normal m³]		User
2.5.9.6.6	Fully Closed Current Level	Define current level to fully close the analog valve.	0 [mA]	0 to 20	User
2.5.9.6.7	Partially Open Current Level	Define current level to partly close the analog valve.	10 [mA]	0 to 20	User
2.5.9.6.8	Fully Open Current Level	Define current level to fully open the analog valve.	20 [mA]	0 to 20	User
2.5.9.6.9	Fully Open	Define the dosing amount value at which the valve will transition from partial flow to full flow.	0.0 [%]	0.0 to100.0	User
2.5.9.6.10	Partially Closed	Define the dosing amount value at which the valve will transition from full flow to partial flow.	0.0 [%]	0.0 to100.0	User
2.5.9.6.9	Fully Open	Define the dosing amount value at which the valve will transition from partial flow to full flow.	0.0 [kg]		User
2.5.9.6.10	Partially Closed	Define the dosing amount value at which the valve will transition from full flow to partial flow.	1.0 [kg]		User
2.5.9.6.9	Fully Open	Define the dosing amount value at which the valve will transition from partial flow to full flow.	0.0 [m³]		User
2.5.9.6.10	Partially Closed	Define the dosing amount value at which the valve will transition from full flow to partial flow.	0.001 [m³]		User
2.5.9.6.9	Fully Open	Define the dosing amount value at which the valve will transition from partial flow to full flow.	0.0 [normal m³]		User
2.5.9.6.10	Partially Closed	Define the dosing amount value at which the valve will transition from full flow to partial flow.	0.001 [normal m³]		User
2.5.9.7	**Fault Handling**				
2.5.9.7.1	Duration mode	Enable or disable dosing time supervision. An alarm is raised and valve(s) closed if dosing time is exceeded.	Off	• Off • On	User
2.5.9.7.2	Duration time	Define the supervision time. An alarm is raised and valve(s) closed if dosing time is exceeded.	3600	1 to 360000	User

HMI menu ID	Parameter	Description	Default value [unit]	Value range	Access level
2.5.9.7.3	Overrun mode	Enable or disable dosing amount supervision. An alarm is raised and valve(s) closed if dosing amount is exceeded.	Off	• Off • On	User
2.5.9.7.4	Overrun value	Define the dosing overrun amount. An alarm is raised and valve(s) closed if dosing amount is exceeded.	0		User
2.5.9.7.4	Overrun value	Define the dosing overrun amount. An alarm is raised and valve(s) closed if dosing amount is exceeded.	0		User
2.5.9.7.4	Overrun value	Define the dosing overrun amount. An alarm is raised and valve(s) closed if dosing amount is exceeded.	0		User

C.6 Zero Point Adjustment

Table C- 26 Zero Point Adjustment

HMI menu ID	Parameter	Description	Default value [unit]	Value range	Access level
2.6.1	Select Zero Point Adj.	Selected zero-point adjustment method. Automatic zero point adjustment is recommended.	Auto	• Auto • Manual	User
2.6.2	Start Zero Point Adjustment				User
2.6.3	Duration	Define zero-point adjustment duration.	30 [s]	1 to 999	User
2.6.4	Standard Deviation Limit	Set limit for zero-point adjustment "Standard Deviation" value.	1)	0 to 1023	User
2.6.5	Standard Deviation	Standard deviation during auto zero-point adjustment.	0		Read only
2.6.6	Offset Limit	Set limit for "Zero Offset".	1)		User
2.6.7	Offset	Zero-point offset compensates for sensor variation due to process conditions.	0		Read only
2.6.8	Offset	Enter agreed zero-point offset value.	0	-1023 to 1023	User

1): See Sensor dimension dependent default settings (Page 373)

C.7 Safe Operation

Table C- 27 Safe Operation

HMI menu ID	Parameter	Description	Default value [unit]	Value range	Access level
2.7.1	Safety Mode	Operation mode for safety critical applications.			Read only
2.7.2	Enter Safe Configuration	Setup parameters {refer to Safety Manual}. Safe output is fixed at 3.6 mA	Non-Safe Operation		User
2.7.3	Start Safety Validation	Validate listed "Safety Parameters" according to operating values {refer to Safety Manual}.			User
2.7.4	Safety Validation	Validate listed "Safety Parameters" according to operating values {refer Safety Manual}. Safe output is fixed at 3.6 mA.			User
2.7.4	Low Flow Cut-Off	Validate parameter {refer to Safety Manual}			Read only
2.7.4	Filter Time Constant	Validate parameter {refer to Safety Manual}			Read only
2.7.4	Upper Scaling	Validate parameter {refer to Safety Manual}			Read only
2.7.4	Lower Scaling	Validate parameter {refer to Safety Manual}			Read only
2.7.4	Direction	Validate parameter {refer to Safety Manual}			Read only
2.7.4	Flow Direction	Validate parameter {refer to Safety Manual}			Read only
2.7.4	Massflow Adjust.Factor	Validate parameter {refer to Safety Manual}			Read only
2.7.4	Density Adjust. Factor	Validate parameter {refer to Safety Manual}			Read only
2.7.4	Density Adjust. Offset	Validate parameter {refer to Safety Manual}			Read only
2.7.4	Process Noise Damping	Validate parameter {refer to Safety Manual}			Read only
2.7.6	Modify Safe Configuration	Modify parameters {refer Safety Manual}. Safe output is fixed at 3.6 mA			User
2.7.7	Enter Non-Safe Operation	Start None-Safe Operation. Output 4-20 mA reflects selected process value			User
2.7.8	Acknowledge Safety Alarms	Check process conditions, acknowledge alarms to return to safe operation			User

HMI menu ID	Parameter	Description	Default value [unit]	Value range	Access level
2.7.9	Safety transition errors	Safety transition error number {refer to Safety Manual}			Read only
2.7.10	Safety error reasons	Safety error number {refer to Safety Manual}			Read only

C.8 Display

Table C- 28 Display

HMI menu ID	Parameter	Description	Default value [unit]	Value range	Access level
2.8.1	Brightness		50%	• 0% • 10% • 20% • 30% • 40% • 50% • 60% • 70% • 80% • 90% • 100%	User
2.8.2	Backlight Operation		Automatic (30 s)	• Automatic • Always on	User
2.8.3	Contrast Level		80	• 0% • 10% • 20% • 30% • 40% • 50% • 60% • 70% • 80% • 90% • 100%	User

Table C- 29 View 1

HMI menu ID	Parameter	Description	Default value [unit]	Value range	Access level
2.8.4.1	View	Select the view type.	Three Values	• Single Value • Three Values • 1 Value and Bar-graph • 1 Value and Graph • Six Val-ues • Six Diag-nostic Values	User
2.8.4.2	1st Process Value	Select the first process value for the view.	Massflow	• Massflow • Volume-flow • Density • Fluid Tempera-ture • Corrected Volume-flow • Fraction A • Fraction B • Fraction A % • Fraction B % • Reference Density • Totalizer 1 • Totalizer 2 • Totalizer 3	User

HMI menu ID	Parameter	Description	Default value [unit]	Value range	Access level
2.8.4.3	2nd Process Value	Select the second process value for the view.	Density	• Massflow • Volume-flow • Density • Fluid Tempera-ture • Corrected Volume-flow • Fraction A • Fraction B • Fraction A % • Fraction B % • Reference Density • Totalizer 1 • Totalizer 2 • Totalizer 3	User
2.8.4.4	3rd Process Value	Select the third process value for the view.	Fluid Tempera-ture	• Massflow • Volume-flow • Density • Fluid Tempera-ture • Corrected Volume-flow • Fraction A • Fraction B • Fraction A % • Fraction B % • Reference Density • Totalizer 1 • Totalizer 2 • Totalizer 3	User

HMI menu ID	Parameter	Description	Default value [unit]	Value range	Access level
2.8.4.5	4th Process Value	Select the fourth process value for the view.	Volumeflow	• Massflow • Volume-flow • Density • Fluid Tempera-ture • Corrected Volume-flow • Fraction A • Fraction B • Fraction A % • Fraction B % • Reference Density • Totalizer 1 • Totalizer 2 • Totalizer 3	User
2.8.4.6	5th Process Value	Select the fifth process value for the view.	Totalizer 1	• Massflow • Volume-flow • Density • Fluid Tempera-ture • Corrected Volume-flow • Fraction A • Fraction B • Fraction A % • Fraction B % • Reference Density • Totalizer 1 • Totalizer 2 • Totalizer 3	User

HMI menu ID	Parameter	Description	Default value [unit]	Value range	Access level
2.8.4.7	6th Process Value	Select the sixth process value for the view.	Totalizer 2	• Massflow • Volume-flow • Density • Fluid Tempera-ture • Corrected Volume-flow • Fraction A • Fraction B • Fraction A % • Fraction B % • Reference Density • Totalizer 1 • Totalizer 2 • Totalizer 3	User
2.8.4.8	Trend Scale Mode	Select the scaling mode. Auto-matic scaling or fixed scaling using “Trend Scale Lower Limit” and “Trend Scale Upper Limit”.	Auto	• Auto • Fixed	User
2.8.4.9	Trend log time window	Select the logging period (time axis length).	5 Minutes	• 1 Minute • 5 Minutes • 15 Minutes • 30 Minutes • 1 Hour • 2 Hours • 3 Hours	User
2.8.4.10	Trend Scale Lower Limit	Define the scaling upper limit of the value axis for fixed mode.	0		User
2.8.4.11	Trend Scale Upper Limit	Define the scaling lower limit of the value axis for fixed mode.	0		User

Table C- 30 View 2

HMI menu ID	Parameter	Description	Default value [unit]	Value range	Access level
2.8.5.1	Enable or disable	Select whether the view is visible.	Enabled	• Disable • Enabled	User
2.8.5.2	View	Select the view type.	Single Value	• Single Value • Three Values • 1 Value and Bargraph • 1 Value and Graph • Six Values • Six Diagnostic Values • Alarm List	User
2.8.5.3	1st Process Value	Select the first process value for the view.	Density	• Massflow • Volumeflow • Density • Fluid Temperature • Corrected Volumeflow • Fraction A • Fraction B • Fraction A % • Fraction B % • Reference Density • Totalizer 1 • Totalizer 2 • Totalizer 3	User

HMI menu ID	Parameter	Description	Default value [unit]	Value range	Access level
2.8.5.4	2nd Process Value	Select the second process value for the view.	Massflow	• Massflow • Volume-flow • Density • Fluid Tempera-ture • Corrected Volume-flow • Fraction A • Fraction B • Fraction A % • Fraction B % • Reference Density • Totalizer 1 • Totalizer 2 • Totalizer 3	User
2.8.5.5	3rd Process Value	Select the third process value for the view.	Fluid Tempera-ture	• Massflow • Volume-flow • Density • Fluid Tempera-ture • Corrected Volume-flow • Fraction A • Fraction B • Fraction A % • Fraction B % • Reference Density • Totalizer 1 • Totalizer 2 • Totalizer 3	User

HMI menu ID	Parameter	Description	Default value [unit]	Value range	Access level
2.8.5.6	4th Process Value	Select the fourth process value for the view.	Volumeflow	• Massflow • Volume-flow • Density • Fluid Tempera-ture • Corrected Volume-flow • Fraction A • Fraction B • Fraction A % • Fraction B % • Reference Density • Totalizer 1 • Totalizer 2 • Totalizer 3	User
2.8.5.7	5th Process Value	Select the fifth process value for the view.	Totalizer 1	• Massflow • Volume-flow • Density • Fluid Tempera-ture • Corrected Volume-flow • Fraction A • Fraction B • Fraction A % • Fraction B % • Reference Density • Totalizer 1 • Totalizer 2 • Totalizer 3	User

HMI menu ID	Parameter	Description	Default value [unit]	Value range	Access level
2.8.5.8	6th Process Value	Select the sixth process value for the view.	Totalizer 2	• Massflow • Volume-flow • Density • Fluid Tempera-ture • Corrected Volume-flow • Fraction A • Fraction B • Fraction A % • Fraction B % • Reference Density • Totalizer 1 • Totalizer 2 • Totalizer 3	User
2.8.5.9	Trend Scale Mode	Select the scaling mode. Auto-matic scaling or fixed scaling using "Trend Scale Lower Limit" and "Trend Scale Upper Limit".	Auto	• Auto • Fixed	User
2.8.5.10	Trend log time window	Select the logging period (time axis length).	5 Minutes	• 1 Minute • 5 Minutes • 15 Minutes • 30 Minutes • 1 Hour • 2 Hours • 3 Hours	User
2.8.5.11	Trend Scale Lower Limit	Define the scaling upper limit of the value axis for fixed mode.	0		User
2.8.5.12	Trend Scale Upper Limit	Define the scaling lower limit of the value axis for fixed mode.	0		User

Table C- 31 View 3

HMI menu ID	Parameter	Description	Default value [unit]	Value range	Access level
2.8.6.1	Enable or disable	Select whether the view is visible.	Enabled	• Disable • Enabled	User
2.8.6.2	View	Select the view type.	1 Value and Bargraph	• Single Value • Three Values • 1 Value and Bargraph • 1 Value and Graph • Six Values • Six Diagnostic Values • Alarm List • Totalizer • Dosing	User
2.8.6.3	1st Process Value	Select the first process value for the view.	Volumeflow	• Massflow • Volumeflow • Density • Fluid Temperature • Corrected Volumeflow • Fraction A • Fraction B • Fraction A % • Fraction B % • Reference Density • Totalizer 1 • Totalizer 2 • Totalizer 3	User

HMI menu ID	Parameter	Description	Default value [unit]	Value range	Access level
2.8.6.4	2nd Process Value	Select the second process value for the view.	Density	• Massflow • Volume-flow • Density • Fluid Tempera-ture • Corrected Volume-flow • Fraction A • Fraction B • Fraction A % • Fraction B % • Reference Density • Totalizer 1 • Totalizer 2 • Totalizer 3	User
2.8.6.5	3rd Process Value	Select the third process value for the view.	Fluid Tempera-ture	• Massflow • Volume-flow • Density • Fluid Tempera-ture • Corrected Volume-flow • Fraction A • Fraction B • Fraction A % • Fraction B % • Reference Density • Totalizer 1 • Totalizer 2 • Totalizer 3	User

HMI menu ID	Parameter	Description	Default value [unit]	Value range	Access level
2.8.6.6	4th Process Value	Select the fourth process value for the view.	Volumeflow	• Massflow • Volume-flow • Density • Fluid Tempera-ture • Corrected Volume-flow • Fraction A • Fraction B • Fraction A % • Fraction B % • Reference Density • Totalizer 1 • Totalizer 2 • Totalizer 3	User
2.8.6.7	5th Process Value	Select the fifth process value for the view.	Totalizer 1	• Massflow • Volume-flow • Density • Fluid Tempera-ture • Corrected Volume-flow • Fraction A • Fraction B • Fraction A % • Fraction B % • Reference Density • Totalizer 1 • Totalizer 2 • Totalizer 3	User

HMI menu ID	Parameter	Description	Default value [unit]	Value range	Access level
2.8.6.8	6th Process Value	Select the sixth process value for the view.	Totalizer 2	• Massflow • Volume-flow • Density • Fluid Tempera-ture • Corrected Volume-flow • Fraction A • Fraction B • Fraction A % • Fraction B % • Reference Density • Totalizer 1 • Totalizer 2 • Totalizer 3	User
2.8.6.9	Trend Scale Mode	Select the scaling mode. Auto-matic scaling or fixed scaling using “Trend Scale Lower Limit” and “Trend Scale Upper Limit”.	Auto	• Auto • Fixed	User
2.8.6.10	Trend log time window	Select the logging period (time axis length).	5 Minutes	• 1 Minute • 5 Minutes • 15 Minutes • 30 Minutes • 1 Hour • 2 Hours • 3 Hours	User
2.8.6.11	Trend Scale Lower Limit	Define the scaling upper limit of the value axis for fixed mode.	0		User
2.8.6.12	Trend Scale Upper Limit	Define the scaling lower limit of the value axis for fixed mode.	0		User

Table C- 32 View 4

HMI menu ID	Parameter	Description	Default value [unit]	Value range	Access level
2.8.7.1	Enable or disable	Select whether the view is visible.	Enabled	• Disable • Enabled	User
2.8.7.2	View	Select the view type.	Six Values	• Single Value • Three Values • 1 Value and Bargraph • 1 Value and Graph • Six Values • Six Diagnostic Values	User
2.8.7.3	1st Process Value	Select the first process value for the view.	Massflow	• Massflow • Volumeflow • Density • Fluid Temperature • Corrected Volumeflow • Fraction A • Fraction B • Fraction A % • Fraction B % • Reference Density • Totalizer 1 • Totalizer 2 • Totalizer 3	User

HMI menu ID	Parameter	Description	Default value [unit]	Value range	Access level
2.8.7.4	2nd Process Value	Select the second process value for the view.	Density	• Massflow • Volume-flow • Density • Fluid Tempera-ture • Corrected Volume flow • Fraction A • Fraction B • Fraction A % • Fraction B % • Reference Density • Totalizer 1 • Totalizer 2 • Totalizer 3	User
2.8.7.5	3rd Process Value	Select the third process value for the view.	Fluid Tempera-ture	• Massflow • Volume-flow • Density • Fluid Tempera-ture • Corrected Volume-flow • Fraction A • Fraction B • Fraction A % • Fraction B % • Reference Density • Totalizer 1 • Totalizer 2 • Totalizer 3	User

HMI menu ID	Parameter	Description	Default value [unit]	Value range	Access level
2.8.7.6	4th Process Value	Select the fourth process value for the view.	Volumeflow	• Massflow • Volume-flow • Density • Fluid Tempera-ture • Corrected Volume-flow • Fraction A • Fraction B • Fraction A % • Fraction B % • Reference Density • Totalizer 1 • Totalizer 2 • Totalizer 3	User
2.8.7.7	5th Process Value	Select the fifth process value for the view.	Totalizer 1	• Massflow • Volume-flow • Density • Fluid Tempera-ture • Corrected Volume-flow • Fraction A • Fraction B • Fraction A % • Fraction B % • Reference Density • Totalizer 1 • Totalizer 2 • Totalizer 3	User

HMI menu ID	Parameter	Description	Default value [unit]	Value range	Access level
2.8.7.8	6th Process Value	Select the sixth process value for the view.	Totalizer 2	• Massflow • Volume-flow • Density • Fluid Tempera-ture • Corrected Volume-flow • Fraction A • Fraction B • Fraction A % • Fraction B % • Reference Density • Totalizer 1 • Totalizer 2 • Totalizer 3	User
2.8.7.9	Trend Scale Mode	Select the scaling mode. Auto-matic scaling or fixed scaling using “Trend Scale Lower Limit” and “Trend Scale Upper Limit”.	Auto	• Auto • Fixed	User
2.8.7.10	Trend log time window	Select the logging period (time axis length).	5 Minutes	• 1 Minute • 5 Minutes • 15 Minutes • 30 Minutes • 1 Hour • 2 Hours • 3 Hours	User
2.8.7.11	Trend Scale Lower Limit	Define the scaling upper limit of the value axis for fixed mode.	0		User
2.8.7.12	Trend Scale Upper Limit	Define the scaling lower limit of the value axis for fixed mode.	0		User

Table C- 33 View 5

HMI menu ID	Parameter	Description	Default value [unit]	Value range	Access level
2.8.8.1	Enable or disable	Select whether the view is visible.	Enabled	• Disable • Enabled	User
2.8.8.2	View	Select the view type.	Three Values	• Single Value • Three Values • 1 Value and Bargraph • 1 Value and Graph • Six Values • Six Diagnostic Values	User
2.8.8.3	1st Process Value	Select the first process value for the view.	Fraction A	• Massflow • Volumeflow • Density • Fluid Temperature • Corrected Volumeflow • Fraction A • Fraction B • Fraction A % • Fraction B % • Reference Density • Totalizer 1 • Totalizer 2 • Totalizer 3	User

HMI menu ID	Parameter	Description	Default value [unit]	Value range	Access level
2.8.8.4	2nd Process Value	Select the second process value for the view.	Fraction B	• Massflow • Volume-flow • Density • Fluid Tempera-ture • Corrected Volume-flow • Fraction A • Fraction B • Fraction A % • Fraction B % • Reference Density • Totalizer 1 • Totalizer 2 • Totalizer 3	User
2.8.8.5	3rd Process Value	Select the third process value for the view.	Fraction A %	• Massflow • Volume-flow • Density • Fluid Tempera-ture • Corrected Volume-flow • Fraction A • Fraction B • Fraction A % • Fraction B % • Reference Density • Totalizer 1 • Totalizer 2 • Totalizer 3	User

HMI menu ID	Parameter	Description	Default value [unit]	Value range	Access level
2.8.8.6	4th Process Value	Select the fourth process value for the view.	Volumeflow	• Massflow • Volume-flow • Density • Fluid Tempera-ture • Corrected Volume-flow • Fraction A • Fraction B • Fraction A % • Fraction B % • Reference Density • Totalizer 1 • Totalizer 2 • Totalizer 3	User
2.8.8.7	5th Process Value	Select the fifth process value for the view.	Totalizer 1	• Massflow • Volume-flow • Density • Fluid Tempera-ture • Corrected Volume-flow • Fraction A • Fraction B • Fraction A % • Fraction B % • Reference Density • Totalizer 1 • Totalizer 2 • Totalizer 3	User

HMI menu ID	Parameter	Description	Default value [unit]	Value range	Access level
2.8.8.8	6th Process Value	Select the sixth process value for the view.	Totalizer 2	• Massflow • Volume-flow • Density • Fluid Tempera-ture • Corrected Volume-flow • Fraction A • Fraction B • Fraction A % • Fraction B % • Reference Density • Totalizer 1 • Totalizer 2 • Totalizer 3	User
2.8.8.9	Trend Scale Mode	Select the scaling mode. Auto-matic scaling or fixed scaling using “Trend Scale Lower Limit” and “Trend Scale Upper Limit”.	Auto	• Auto • Fixed	User
2.8.8.10	Trend log time window	Select the logging period (time axis length).	5 Minutes	• 1 Minute • 5 Minutes • 15 Minutes • 30 Minutes • 1 Hour • 2 Hours • 3 Hours	User
2.8.8.11	Trend Scale Lower Limit	Define the scaling upper limit of the value axis for fixed mode.	0		User
2.8.8.12	Trend Scale Upper Limit	Define the scaling lower limit of the value axis for fixed mode.	0		User

Table C- 34 View 6

HMI menu ID	Parameter	Description	Default value [unit]	Value range	Access level
2.8.9.1	Enable or disable	Select whether the view is visible.	Enabled	• Disable • Enabled	User
2.8.9.2	View	Select the view type.	Alarm List	• Single Value • Three Values • 1 Value and Bargraph • 1 Value and Graph • Six Values • Six Diagnostic Values	User
2.8.9.3	1st Process Value	Select the first process value for the view.	Massflow	• Massflow • Volumeflow • Density • Fluid Temperature • Corrected Volumeflow • Fraction A • Fraction B • Fraction A % • Fraction B % • Reference Density • Totalizer 1 • Totalizer 2 • Totalizer 3	User

HMI menu ID	Parameter	Description	Default value [unit]	Value range	Access level
2.8.9.4	2nd Process Value	Select the second process value for the view.	Density	• Massflow • Volume-flow • Density • Fluid Tempera-ture • Corrected Volume-flow • Fraction A • Fraction B • Fraction A % • Fraction B % • Reference Density • Totalizer 1 • Totalizer 2 • Totalizer 3	User
2.8.9.5	3rd Process Value	Select the third process value for the view.	Fluid Tempera-ture	• Massflow • Volume-flow • Density • Fluid Tempera-ture • Corrected Volume-flow • Fraction A • Fraction B • Fraction A % • Fraction B % • Reference Density • Totalizer 1 • Totalizer 2 • Totalizer 3	User

HMI menu ID	Parameter	Description	Default value [unit]	Value range	Access level
2.8.9.6	4th Process Value	Select the fourth process value for the view.	Volumeflow	• Massflow • Volume-flow • Density • Fluid Tempera-ture • Corrected Volume-flow • Fraction A • Fraction B • Fraction A % • Fraction B % • Reference Density • Totalizer 1 • Totalizer 2 • Totalizer 3	User
2.8.9.7	5th Process Value	Select the fifth process value for the view.	Totalizer 1	• Massflow • Volume-flow • Density • Fluid Tempera-ture • Corrected Volu-meflow • Fraction A • Fraction B • Fraction A % • Fraction B % • Reference Density • Totalizer 1 • Totalizer 2 • Totalizer 3	User

HMI menu ID	Parameter	Description	Default value [unit]	Value range	Access level
2.8.9.8	6th Process Value	Select the sixth process value for the view.	Totalizer 2	• Massflow • Volume-flow • Density • Fluid Tempera-ture • Corrected Volume-flow • Fraction A • Fraction B • Fraction A % • Fraction B % • Reference Density • Totalizer 1 • Totalizer 2 • Totalizer 3	User
2.8.9.9	Trend Scale Mode	Select the scaling mode. Auto-matic scaling or fixed scaling using “Trend Scale Lower Limit” and “Trend Scale Upper Limit”.	Auto	• Auto • Fixed	User
2.8.9.10	Trend log time window	Select the logging period (time axis length).	5 Minutes	• 1 Minute • 5 Minutes • 15 Minutes • 30 Minutes • 1 Hour • 2 Hours • 3 Hours	User
2.8.9.11	Trend Scale Lower Limit	Define the scaling upper limit of the value axis for fixed mode.	0		User
2.8.9.12	Trend Scale Upper Limit	Define the scaling lower limit of the value axis for fixed mode.	0		User

Table C- 35 Custom Units

HMI menu ID	Parameter	Description	Default value [unit]	Value range	Access level
2.8.10.1	**Volumeflow Unit**				
2.8.10.1.1	Custom Text	Define a name for the custom volumeflow unit. The custom unit can then be selected in Volumeflow unit list.	--------		User
2.8.10.1.2	Custom Factor	Define a volumeflow factor for the custom unit. The factor is based on SI volumeflow unit m^3/s	1.0		User
2.8.10.2	**Totalizer Unit**				
2.8.10.2.1	Custom Text	Define a name for the custom volume unit. The custom unit can then be selected in Totalizer unit list.	--------		User
2.8.10.2.2	Custom Factor	Define a volume factor for the custom unit. The factor is based on SI volume unit m^3.	1.0		User

C.9 Maintenance & Diagnostics

Table C- 36 Identification

HMI menu ID	Parameter	Description	Default value [unit]	Value range	Access level
3.1.1	Long TAG	Enter a unique TAG name for the device (up to 32 characters).			User
3.1.2	Descriptor	Enter a unique description for the measurement point (up to 16 characters).			User
3.1.3	Message	Enter message (up to 32 characters).			User
3.1.4	Location	Enter device location (up to 32 characters).			User
3.1.5	Startup Date	Enter the installation date of the device.	2012-01-01 00:00		User
3.1.6	Manufacturer	Device manufacturer	Siemens		Read only
3.1.7	Product Name	Also shown on the device nameplate.	SITRANS FC430		Read only
3.1.8	Version	Product version. Also shown on the device nameplate.			Read only
3.1.9	System Order Number	System order number (MLFB). Also shown on the nameplate.			Read only
3.1.10	Firmware Revision	System firmware version.			Read only

HMI menu ID	Parameter	Description	Default value [unit]	Value range	Access level
3.1.11	Hardware Revision	System hardware version.			Expert
3.1.12	Final Assembly Number	Materials and components used in the final assembly.	0		User

Table C- 37 Transmitter

HMI menu ID	Parameter	Description	Default value [unit]	Value range	Access level
3.1.13.1	Order Number	Replacement transmitter order number (MLFB). Also shown on the device nameplate.			Read only
3.1.13.2	Serial Number	Unique transmitter serial num- ber. Also shown on the device nameplate.			Read only
3.1.13.3	Firmware Revision	Transmitter firmware version.			Read only
3.1.13.4	HMI Firmware Revision	HMI firmware version.			Read only

Table C- 38 Sensor

HMI menu ID	Parameter	Description	Default value [unit]	Value range	Access level
3.1.14.1	Type	Sensor type. Also shown on the device nameplate.			Read only
3.1.14.2	Size	Nominal sensor diameter (DN).			Read only
3.1.14.3	Order Number	Replacement sensor order number (MLFB). Also shown on the device nameplate.			Read only
3.1.14.4	Serial Number	Unique sensor serial number. Also shown on the device nameplate.			Read only
3.1.14.5	Firmware Revision	Firmware version of the sensor.			Read only

Table C- 39 Alarms

HMI menu ID	Parameter	Description	Default value [unit]	Value range	Access level
3.2.1	Alarm Mode	Select the series of status icons shown in local display.			User
3.2.2	Alarm Acknowledgment	Select manual or automatic acknowledge of alarms			User
3.2.3	Alarm				
3.2.4	Alarm History Log				
3.2.5	Reset History				User
3.2.6	Suppress Alarm				

HMI menu ID	Parameter	Description	Default value [unit]	Value range	Access level
3.2.6.1	Sensor (1) Alarms Suppressed		Auto		User
3.2.6.2	Sensor (2) Alarms Suppressed		Auto		User
3.2.6.3	Process (1) Alarms Suppressed		Auto		User
3.2.6.4	Process (2) Alarms Suppressed		Auto		User
3.2.6.5	Simulation Alarms Suppressed		Auto		User
3.2.6.6	Input/Output Alarms Suppressed		Auto		User
3.2.7	Transmitter Detail Alarms		Auto		Read only

Table C- 40 Maintenance

HMI menu ID	Parameter	Description	Default value [unit]	Value range	Access level
3.3.1	Current Date and Time	Show actual date and time of the device. This date and time is used for all time stamps of logged information.			Read only
3.3.2	Set Date and Time	Set current date and time of the device. This date and time is used for all time stamps of logged information			User
3.3.3	Set To Default	Reset all parameters to factory settings.			User
3.3.4	Restart Device	Restart the device without disconnecting the power.			Read only
3.3.5	FW Update				Expert
3.3.6	Copy Setups	Copy configuration from the SensorFlash to the device.			User
3.3.8	**Transmitter**				
3.3.8.1	Operating Time Total	Total operating time of the transmitter since first power up.			Read only
3.3.8.2	Operating Time	Operating time of the transmitter since last power up.			Read only
3.3.8.3	Hardware Revision	Transmitter hardware version.			Read only
3.3.8.4	HMI Hardware Revision	HMI hardware version.			Read only
3.3.9	**Sensor**				
3.3.9.1	Hardware Revision	Hardware version of the sensor.			Read only

Table C- 41 Diagnostics

HMI menu ID	Parameter	Description	Default value [unit]	Value range	Access level
3.4.1	Sensor HW Diagnostic		Off	• Off • On	
3.4.2	**Sensor**				
3.4.2.1	Driver Current	The actual current value that excites the sensor. High current: check process conditions.	[A]		Read only
3.4.2.2	Pickup S1 Amplitude	Measured signal level at pick-up 1. The amplitude on pick-up 1 and pick-up 2 should not differentiate more than 2 mV.	[V]		Read only
3.4.2.3	Pickup S2 Amplitude	Measured signal level at pick-up 2. The amplitude on pick-up 1 and pick-up 2 should not differentiate more than 2 mV.	[V]		Read only
3.4.2.4	Max. Pickup Amplitude diff	Maximum allowed difference between Pickup S1 and Pickup S2.	[V]		Read only
3.4.2.5	Sensor Frequency	The resonant frequency of the sensor. The frequency depends on sensor size and liquid density.	[Hz]		Read only
3.4.2.6	Offset	Zero-point offset compensates for sensor variation due to process conditions.	[kg/s]		Read only
3.4.2.6	Offset	Enter agreed zero-point offset value.	0 [kg/s]		User
3.4.3	**Temperature**				
3.4.3.1	Fluid Temperature	The measured fluid temperature in the tube.	[°C]		Read only
3.4.3.2	Frame Temperature	The measured temperature of the sensor frame.	[°C]		Read only
3.4.3.3	Transm. Internal Temp.	The measured internal temperature of the transmitter.	[°C]		Read only
3.4.3.4	DSL Internal Temp.	The measured internal temperature of the DSL.	[°C]		Read only
3.4.4	**Inputs/Outputs**				
3.4.4.1	Current Output Value (1)	Actual value of current output 1.	[mA]		Read only
3.4.4.2	Current Value (2)	Actual value of current output 2.	[mA]		Read only
3.4.4.3	Pulse Value (2)	Actual value of pulse output 2.			Read only
3.4.4.4	Frequency Value (2)	Actual value of frequency output 2.	[Hz]		Read only
3.4.4.5	Status Value (2)	Actual status of status output 2.			Read only
3.4.4.6	Input Value (3)	Actual status of discrete input 3			Read only
3.4.4.7	Current Value (3)	Actual value of current output 3.	[mA]		Read only

HMI menu ID	Parameter	Description	Default value [unit]	Value range	Access level
3.4.4.8	Pulse Value (3)	Actual value of pulse output 3.			Read only
3.4.4.9	Frequency Value (3)	Actual value of frequency output 3.	[Hz]		Read only
3.4.4.10	Status Value (3)	Actual status of status output 3.			Read only
3.4.4.11	Input Value (4)	Actual status of discrete input 4.			Read only
3.4.4.12	Current Value (4)	Actual value of current output 4.	[mA]		Read only
3.4.4.13	Pulse Value (4)	Actual value of pulse output 4.			Read only
3.4.4.14	Frequency Value (4)	Actual value of frequency output 4.	[Hz]		Read only
3.4.4.15	Status Value (4)	Actual status of status output 4.			Read only

Table C- 42 Characteristics

HMI menu ID	Parameter	Description	Default value [unit]	Value range	Access level
3.5.1	SIL Variant	Specifies whether the device is allowed to be used in Safety applications	Yes or No	• Yes • No	Read only
3.5.2	CT Variant	Specifies whether the device is allowed to be used in Custody Transfer applications	Yes or No	• Yes • No	Read only
3.5.3	CT Active	Specifies whether the device is in Custody Transfer mode			Read only
3.5.4	Fraction Order Code	Order code of the active fraction.			Read only
3.5.5	**Transmitter**				
3.5.5.1	Design	Describes the main design feature of the transmitter.			Read only
3.5.5.2	Hazardous Area Approval	Describes the hazardous area approval for the transmitter. The text can also be found on the label of the product.			Read only
3.5.6	**Sensor**				
3.5.6.1	Hazardous Area Approval	Defines gas classes and hazardous zones applicable for the sensor.			Read only
3.5.6.2	Maximum Massflow Capacity	Maximum massflow measurement capacity of the sensor.	[kg/h]		Read only
3.5.6.3	Calibration Factor	Factory-set calibration factor.			Read only
3.5.6.4	Density Calibration Offset	Factory-set density calibration offset.			Read only
3.5.6.5	Density Calibration Factor	Factory-set density calibration factor.			Read only
3.5.6.6	Dens. Comp. Tube Temp.	Factory-set tube temperature compensation for density calculation.			Read only

HMI menu ID	Parameter	Description	Default value [unit]	Value range	Access level
3.5.6.7	Dens. Comp. Frame Temp.	Factory-set frame temperature compensation for density calculation.			Read only
3.5.6.8	Wetted Materials	Type of wetted material of the sensor.			Read only

Table C- 43 SensorFlash

HMI menu ID	Parameter	Description	Default value [unit]	Value range	Access level
3.6.1	Installed	SensorFlash is installed in the transmitter. SensorFlash includes backup data for transmitter and sensor.			Read only
3.6.2	Capacity Total	Total capacity of installed SensorFlash.			Read only
3.6.3	Capacity Available	Available capacity of installed SensorFlash.			Read only

Table C- 44 Simulate Input/Outputs

HMI menu ID	Parameter	Description	Default value [unit]	Value range	Access level
3.7.1.1	**Current Output (1)**				
3.7.1.1.1	Simulation	Enable or disable simulation of the current output.	Disable	• Disable • Enabled	User
3.7.1.1.2	Simulated Value	Enter the current output value for simulation.	4.0 [mA]	3.5 to 25	User
3.7.1.2	**Signal Output (2)**				
3.7.1.2.1	Simulation	Enable or disable simulation of the current output.	Disable	• Disable • Enabled	User
3.7.1.2.2	Simulated Value	Enter the current output simulation value.	0 [mA]	0 to 25	User
3.7.1.2.3	Simulation	Enable or disable simulation of frequency output.	Disable	• Disable • Enabled	User
3.7.1.2.4	Simulated Value	Enter the frequency output simulation value.	1.0 [Hz]	0.0 to 12500.0	User
3.7.1.2.5	Simulation	Enable or disable simulation of pulse output.	Disable	• Disable • Enabled	User
3.7.1.2.6	Simulated Value	Enter the pulse output simulation value.	0.0 [Hz]	0.0 to 12500.0	User
3.7.1.2.7	Simulation	Enable or disable simulation of status output.	Disable	• Disable • Enabled	User

HMI menu ID	Parameter	Description	Default value [unit]	Value range	Access level
3.7.1.2.8	Simulated Value	Enter the status output simulation value.	0	• 0 • 1	User
3.7.1.3	**Signal Output (3)**				
3.7.1.3.1	Simulation	Enable or disable simulation of the current output.	Disable	• Disable • Enabled	User
3.7.1.3.2	Simulated Value	Enter the current output simulation value.	0 [mA]	0 to 25	User
3.7.1.3.3	Simulation	Enable or disable simulation of frequency output.	Disable	• Disable • Enabled	User
3.7.1.3.4	Simulated Value	Enter the frequency output simulation value.	1.0 [Hz]	0.0 to 12500.0	User
3.7.1.3.5	Simulation	Enable or disable simulation of pulse output.	Disable	• Disable • Enabled	User
3.7.1.3.6	Simulated Value	Enter the pulse output simulation value.	0.0 [Hz]	0.0 to 12500.0	User
3.7.1.3.7	Simulation	Enable or disable simulation of status output.	Disable	• Disable • Enabled	User
3.7.1.3.8	Simulated Value	Enter the status output simulation value.	0	• 0 • 1	User
3.7.1.4	**Relay Output (3)**				
3.7.1.4.1	Simulation	Enable or disable simulation of status output.	Disable	• Disable • Enabled	User
3.7.1.4.2	Simulated Value	Enter the status output simulation value.	0	• 0 • 1	User
3.7.1.5	**Signal Input (3)**				
3.7.1.5.1	Simulation	Enable or disable simulation of status output.	Disable	• Disable • Enabled	User
3.7.1.5.2	Simulated Value	Enter the status output simulation value.	0	• 0 • 1	User
3.7.1.6	**Signal Output (4)**				
3.7.1.6.1	Simulation	Enable or disable simulation of the current output.	Disable	• Disable • Enabled	User
3.7.1.6.2	Simulated Value	Enter the current output simulation value.	0 [mA]	0 to 25	User
3.7.1.6.3	Simulation	Enable or disable simulation of frequency output.	Disable	• Disable • Enabled	User
3.7.1.6.4	Simulated Value	Enter the frequency output simulation value.	1.0 [Hz]	0.0 to 12500.0	User

HMI menu ID	Parameter	Description	Default value [unit]	Value range	Access level
3.7.1.6.5	Simulation	Enable or disable simulation of pulse output.	Disable	• Disable • Enabled	User
3.7.1.6.6	Simulated Value	Enter the pulse output simulation value.	0.0 [Hz]	0.0 to 12500.0	User
3.7.1.6.7	Simulation	Enable or disable simulation of status output.	Disable	• Disable • Enabled	User
3.7.1.6.8	Simulated Value	Enter the status output simulation value.	0	• 0 • 1	User
3.7.1.7	**Relay Output (4)**				
3.7.1.7.1	Simulation	Enable or disable simulation of status output.	Disable	• Disable • Enabled	User
3.7.1.7.2	Simulated Value	Enter the status output simulation value.	0	• 0 • 1	User
3.7.1.8	**Signal Input (4)**				
3.7.1.8.1	Simulation	Enable or disable simulation of status output.	Disable	• Disable • Enabled	User
3.7.1.8.2	Simulated Value	Enter the status output simulation value.	0	• 0 • 1	User

Table C- 45 Simulate Process Values

HMI menu ID	Parameter	Description	Default value [unit]	Value range	Access level
3.7.2.1	**Massflow**				
3.7.2.1.1	Simulation	Enable or disable simulation.	Disable	• Disable • Enabled	User
3.7.2.1.2	Massflow Value	Set massflow simulation value for all outputs.	0 [kg/s]		User
3.7.2.2	**Volumeflow**				
3.7.2.2.1	Simulation	Enable or disable simulation.	Disable	• Disable • Enabled	User
3.7.2.2.2	Volumeflow Value	Set volumeflow simulation value for all outputs.	0 [m^3/h]		User
3.7.2.3	**Corrected Volumeflow**				
3.7.2.3.1	Simulation	Enable or disable simulation.	Disable	• Disable • Enabled	User
3.7.2.3.2	Corrected Volumeflow Value	Set corrected volumeflow simulation value for all outputs.	0 [normal m^3/h]	-20 to +20	User
3.7.2.4	**Density**				

HMI menu ID	Parameter	Description	Default value [unit]	Value range	Access level
3.7.2.4.1	Simulation	Enable or disable simulation.	Disable	• Disable • Enabled	User
3.7.2.4.2	Density Value	Set density simulation value for all outputs.	1000 [kg/m³]		User
3.7.2.5	**Fluid Temperature**				
3.7.2.5.1	Simulation	Enable or disable simulation.	Disable	• Disable • Enabled	User
3.7.2.5.2	Fluid Temperature Value	Set tube temperature simulation value for all outputs.	0 [°C]		User
3.7.2.6	**Frame Temperature**				
3.7.2.6.1	Simulation	Enable or disable simulation.	Disable	• Disable • Enabled	User
3.7.2.6.2	Frame Temperature Value	Set frame temperature simulation value for all outputs.	0 [°C]		User
3.7.2.7	**Fraction**				
3.7.2.7.1	Simulation	Enable or disable simulation.	Disable	• Disable • Enabled	User
3.7.2.7.2	Fraction A % Value	Set fraction A simulation value for all outputs.	0 [%]	0.0 to 100.0	User
3.7.2.7.3	Fraction B % Value	Set fraction B simulation value for all outputs.	0 [%]	0.1 to 100.0	User

Table C- 46 Simulate Alarm

HMI menu ID	Parameter	Description	Default value [unit]	Value range	Access level
3.7.3.1	Simulation		Off	• Off • Simulate Alarm (ID number) • Simulate Alarm Class	User
3.7.3.2	**Alarm**				
3.7.3.2.1	Sensor (1) Alarms	Simulate single or multiple alarms. Select from alarm lists, see Alarm messages (Page 172).			User
3.7.3.2.2	Sensor (2) Alarms	Simulate single or multiple alarms. Select from alarm lists, see Alarm messages (Page 172).			User

HMI menu ID	Parameter	Description	Default value [unit]	Value range	Access level
3.7.3.2.3	Process (1) Alarms	Simulate single or multiple alarms. Select from alarm lists, see Alarm messages (Page 172).			User
3.7.3.2.4	Process (2) Alarms	Simulate single or multiple alarms. Select from alarm lists, see Alarm messages (Page 172).			User
3.7.3.2.5	Simulation Alarms	Simulate single or multiple alarms. Select from alarm lists, see Alarm messages (Page 172).			User
3.7.3.2.6	Input/Output Alarms	Simulate single or multiple alarms. Select from alarm lists, see Alarm messages (Page 172).			User
3.7.3.3	Alarm Class	Select Siemens standard alarm class. Alarm status is activated on all outputs.	Process Value Alarm	• Maintenance Alarm • Function check • Process Value Alarm • Process Value Warning • Maintenance Warning • Maintenance Required	User
3.7.3.4	Alarm Class	Select NAMUR standard alarm class. Alarm status is activated on all outputs.	Out of specification	• Failure • Function check • Out of specification • Maintenance Required	User

Table C- 47 Aerated Flow

HMI menu ID	Parameter	Description	Default value [unit]	Value range	Access level
3.9.1	Aerated Flow Filter	Set the process value filter for aerated flow. Auto means that filtering starts automatically when measuring aerated flow.	Auto (non-SIL variants) Off (SIL variants)	• Off • On • Auto	User
3.9.2	Filter Time Constant	"Select process value filter level. * 0.5: Low … 30: High"	10 seconds	• 10 seconds • 20 second • 30 seconds • User defined value	User
3.9.3	Alarm Limit	Set alarm limit in percent of accepted bad measurements.	80 [%]	0 to 99	Expert
3.9.4	Warning Limit	Set warning limit in percent of accepted bad measurements.	0 [%]	0 to 99	Expert
3.9.5	Measurement Sample Time	Set the time period over which the actual percentage of unstable measurements is calculated	5 [s]	1 to 10	Expert
3.9.6	Filter Start Hysteresis	Set the hysteresis value. The filter is active when the hysteresis value is exceeded.	0.02 [mV]	0 to 0.124	Expert
3.9.7	Minimum Filtering Time	Set the filtering time. The filtering time is reset each time hysteresis band is exceeded.	100 [cycles]	0 to 65535	Expert
3.9.8	Filter Iteration	Set the number of times to repeat the same filter. Increasing the number will increase the damping.	3	1 to 5	Expert
3.9.9	Bandwidth Factor	Increase the Bandwidth Factor to reduce the LP (low pass) bandwidth filtering.	2	0 to 4	Expert
3.9.10	Filter Pole Shift	Configure the bandwidth and damping in the stop band. A high number will give a small bandwidth and an increased damping in the stop band.	2	1 to 5	Expert

Table C- 48 Self test

HMI menu ID	Parameter	Description	Default value [unit]	Value range	Access level
3.10.1	Display Test				User

C.10 Communication

Table C- 49 Communication

HMI menu ID	Parameter	Description	Default value [unit]	Value range	Access level
4.1	Polling Address (SW)	Enter the device HART address. HW address device address overwrites the SW device address.	0	0 to 63	User
4.2	Polling Address (HW)	Hardware device HART address. The HW device address is configured by DIP switch in the device.	0	0 to 16	Read only
4.3	TAG	Enter a unique Short TAG name for the device / measurement point.			User
4.4	HART Device Type	Device Identification: Uniquely identifies the Field Device when combined with the Manufacturer Identification and Device Type.	34		Read only
4.5	HART Revision	Device Revision Level defined in HART protocol.	2		Read only

Table C- 50 Mapping of Variables

HMI menu ID	Parameter	Description	Default value [unit]	Value range	Access level
4.6.1	SV Process Value	Select the Secondary HART process value.	Volumeflow	• Massflow • Volume-flow • Density • Fluid Tempera-ture • Corrected Volume-flow • Fraction A • Fraction B • Fraction A % • Fraction B % • Totalizer 1 • Totalizer 2 • Totalizer 3	User
4.6.2	TV Process Value	Select the Tertiary HART pro-cess value.	Density	• Massflow • Volume-flow • Density • Fluid Tempera-ture • Corrected Volume-flow • Fraction A • Fraction B • Fraction A % • Fraction B % • Totalizer 1 • Totalizer 2 • Totalizer 3	User

HMI menu ID	Parameter	Description	Default value [unit]	Value range	Access level
4.6.3	QV Process Value	Select the Quaternary HART process value.	Fluid Tempera-ture	• Massflow • Volume-flow • Density • Fluid Tempera-ture • Corrected Volume-flow • Fraction A • Fraction B • Fraction A % • Fraction B % • Totalizer 1 • Totalizer 2 • Totalizer 3	User

Table C- 51 HART Units

HMI menu ID	Parameter	Description	Default value [unit]	Value range	Access level
4.7.1	Massflow Unit	Select massflow unit for the communication interface (mass/time).	kg/h	g/s, g/min, g/h, kg/s, kg/min, kg/h, kg/d, t/min, t/h, t/d, lb/s, lb/min, lb/h, lb/d, STon/min, STon/h, STon/d, T/h, T/d	User
4.7.2	Volumeflow Unit	Select volumeflow unit for the communication interface (volume/time).	m³/h	L/s, L/min, L/h, m³/s, m³/min, m³/h, m³/d, ML/d, Ugal/s, Ugal/min, Ugal/h, Ugal/d, BBPS, BBPM, BBPH, BBPD, BOPS, BOPM, BOPH, BOPD, ft³/s, ft³/min, ft³/h, ft³/d, gal/s, gal/min, gal/h, gal/d, Mgal/d	User
4.7.3	Corr. Volumeflow Unit	Select corrected volumeflow unit for the communication interface (volume/time).	Nm³/h	NL/s, NL/min, NL/h, NL/d, Nm³/s, Nm³/min, Nm³/h, Nm³/d, SL/s, SL/min, SL/h, SL/d, Sft³/s, Sft³/min, Sft³/h, Sft³/d, Sm³/s, Sm³/min, Sm³/h, Sm³/d	User
4.7.4	Density Unit	Select density unit for the communication interface (mass/volume).	kg/m³	µg/L, µg/m³, mg/L, g/mL, g/cm³, g/L, kg/L, kg/m³, lb/in³, lb/gal, lb/ft³, STon/yd³	User

HMI menu ID	Parameter	Description	Default value [unit]	Value range	Access level
4.7.5	Fluid Temperature Unit	Select temperature unit for the communication interface.	°C	°C, °F, °R, K	User
4.7.6	Fraction Unit	Select fraction unit for the communication interface. Unit is not applied at Local User Interface.	kg/h	g/s, g/min, g/h, kg/s, kg/min, kg/h, kg/d, t/min, t/h, t/d, lb/s, lb/min, lb/h, lb/d, STon/min, STon/h, STon/d, T/h, T/d	User
4.7.7	Fraction Unit	Select fraction unit for the communication interface. Unit is not applied at Local User Interface.	m^3/h	L/s, L/min, L/h, m^3/s, m^3/min, m^3/h, m^3/d, ML/d, Ugal/s, Ugal/min, Ugal/h, Ugal/d, BBPS, BBPM, BBPH, BBPD, BOPS, BOPM, BOPH, BOPD, ft^3/s, ft^3/min, ft^3/h, ft^3/d, gal/s, gal/min, gal/h, gal/d, Mgal/d	User
4.7.8	Totalizer 1 Unit	Select Totalizer 1 unit for the communication interface. Unit is not applied at Local User Interface.	kg	g, kg, t, lb, STon, oz, T	User
4.7.8	Totalizer 1 Unit	Select Totalizer 1 unit for the communication interface. Unit is not applied at Local User Interface.	L	L, hL, m^3, Ugal, BL, BB, BO, in^3, ft^3, yd^3, gal, bush	User
4.7.8	Totalizer 1 Unit	Select Totalizer 1 unit for the communication interface. Unit is not applied at Local User Interface.	NL	NL, Nm^3, SL, Sft^3, Sm^3	User
4.7.9	Totalizer 2 Unit	Select Totalizer 2 unit for the communication interface. Unit is not applied at Local User Interface.	kg	g, kg, t, lb, STon, oz, T	User
4.7.9	Totalizer 2 Unit	Select Totalizer 2 unit for the communication interface. Unit is not applied at Local User Interface.	L	L, hL, m^3, Ugal, BL, BB, BO, in^3, ft^3, yd^3, gal, bush	User

HMI menu ID	Parameter	Description	Default value [unit]	Value range	Access level
4.7.9	Totalizer 2 Unit	Select Totalizer 2 unit for the communication interface. Unit is not applied at Local User Interface.	NL	NL, Nm³, SL, Sft³, Sm³	User
4.7.10	Totalizer 3 Unit	Select Totalizer 3 unit for the communication interface. Unit is not applied at Local User Interface.	kg	g, kg, t, lb, STon, oz, T	User
4.7.10	Totalizer 3 Unit	Select Totalizer 3 unit for the communication interface. Unit is not applied at Local User Interface.	L	L, hL, m³, Ugal, BL, BB, BO, in³, ft³, yd³, gal, bush	User
4.7.10	Totalizer 3 Unit	Select Totalizer 3 unit for the communication interface. Unit is not applied at Local User Interface.	NL	NL, Nm³, SL, Sft³, Sm³	User

C.11 Security

Table C- 52 Access Management

HMI menu ID	Parameter	Description	Default value [unit]	Value range	Access level
5.1.1	Change User PIN Code				Expert
5.1.2	Change Expert PIN Code				Expert
5.1.3	Reset PINs	Reset user and expert PIN to factory default. The default PINs can be found in Operating instructions.			Expert
5.1.4	PUK				Read only
5.1.5	Enable Access Level Control / Disable Access Level Control	Enable/disable access level control.	Enabled	• Disable • Enabled	Expert
5.1.6	Auto Log Off	Set Auto Log Off. When Disabled you will not be prompted for password for 10 minutes after the last key press.	On	• Off • On	Expert
5.1.7	Logout				

C.12 Language

Table C- 53 Language

HMI menu ID	Parameter	Description	Default value [unit]	Value range	Access level
6	Language	Select the local display language	English	• English • Deutsch • Italiano • Français • Español • Português • РУССКИЙ • 汉语 • Polski • Dansk • Svenska • Suomeksi	User

C.13 Sensor dimension dependent default settings

Massflow

Sensor dimension	Default value	Unit	Range
Upper Limit Alarm and Upper Limit Warning			
DN 15	8.84	kg/s	-8.84 to +8.84
DN 25	24.5	kg/s	-24.5 to +24.5
DN 50	98.2	kg/s	-98.2 to +98.2
DN 80	251	kg/s	-251 to +251
Lower Limit Alarm and Lower Limit Warning			
DN 15	-8.84	kg/s	-8.84 to +8.84
DN 25	-24.5	kg/s	-24.5 to +24.5
DN 50	-98.2	kg/s	-98.2 to +98.2
DN 80	-251	kg/s	-251 to +251
Alarm Hysteresis			
DN 15	0	kg/s	0 to +8.84
DN 25	0	kg/s	0 to +24.5
DN 50	0	kg/s	0 to +98.2
DN 80	0	kg/s	0 to +251
Low Flow Cut-Off			
DN 15	0.00884	kg/s	0 to +8.84

Sensor dimension	Default value	Unit	Range
DN 25	0.0245	kg/s	0 to +24.5
DN 50	0.0982	kg/s	0 to +98.2
DN 80	0.251	kg/s	0 to +251

Volumeflow

Sensor dimension	Default value	Unit	Range
Upper Limit Alarm and Upper Limit Warning			
DN 15	0.005	m^3/s	-0.005 to +0.005
DN 25	0.015	m^3/s	-0.015 to +0.015
DN 50	0.059	m^3/s	-0.059 to +0.059
DN 80	0.249	m^3/s	-0.249 to +0.249
Lower Limit Alarm and Lower Limit Warning			
DN 15	-0.005	m^3/s	-0.005 to +0.005
DN 25	-0.015	m^3/s	-0.015 to +0.015
DN 50	-0.059	m^3/s	-0.059 to +0.059
DN 80	-0.249	m^3/s	-0.249 to +0.249
Alarm Hysteresis			
DN 15	0	m^3/s	0 to +0.005
DN 25	0	m^3/s	0 to +0.015
DN 50	0	m^3/s	0 to +0.059
DN 80	0	m^3/s	0 to +0.249
Low Flow Cut-Off			
DN 15	0.000005	m^3/s	0 to +0.005
DN 25	0.000015	m^3/s	0 to +0.015
DN 50	0.000059	m^3/s	0 to +0.059
DN 80	0.000249	m^3/s	0 to +0.249

Corrected Volumeflow

Sensor dimension	Default value	Unit	Range
Upper Limit Alarm and Upper Limit Warning			
DN 15	8.84	normal m^3/s	-8.84 to +8.84
DN 25	24.5	normal m^3/s	-24.5 to +24.5
DN 50	98.2	normal m^3/s	-98.2 to +98.2
DN 80	251	normal m^3/s	-251 to +251
Lower Limit Alarm and Lower Limit Warning			
DN 15	-8.84	normal m^3/s	-8.84 to +8.84
DN 25	-24.5	normal m^3/s	-24.5 to +24.5
DN 50	-98.2	normal m^3/s	-98.2 to +98.2
DN 80	-251	normal m^3/s	-251 to +251

Sensor dimension	Default value	Unit	Range
Alarm Hysteresis			
DN 15	0	normal m³/s	0 to +8.84
DN 25	0	normal m³/s	0 to +24.5
DN 50	0	normal m³/s	0 to +98.2
DN 80	0	normal m³/s	0 to +251
Low Flow Cut-Off			
DN 15	0.00884	normal m³/s	0 to +8.84
DN 25	0.0245	normal m³/s	0 to +24.5
DN 50	0.0982	normal m³/s	0 to +98.2
DN 80	0.251	normal m³/s	0 to +251

Fraction

Sensor dimension	Default value		Unit	Range
Upper Limit Alarm and Upper Limit Warning				
DN 15	Massflow	8.84	kg/s	-8.84 to +8.84
	Volumeflow	0.005	m³/s	-0.005 to +0.005
DN 25	Massflow	24.5	kg/s	-24.5 to +24.5
	Volumeflow	0.015	m³/s	-0.015 to +0.015
DN 50	Massflow	98.2	kg/s	-98.2 to +98.2
	Volumeflow	0.059	m³/s	-0.059 to +0.059
DN 80	Massflow	251	kg/s	- 251 to +251
	Volumeflow	0.249	m³/s	-0.249 to +0.249
Lower Limit Alarm and Lower Limit Warning				
DN 15	Massflow	-8.84	kg/s	-8.84 to +8.84
	Volumeflow	-0.005	m³/s	-0.005 to +0.005
DN 25	Massflow	-24.5	kg/s	-24.5 to +24.5
	Volumeflow	-0.015	m³/s	-0.015 to +0.015
DN 50	Massflow	-98.2	kg/s	-98.2 to +98.2
	Volumeflow	-0.059	m³/s	-0.059 to +0.059
DN 80	Massflow	-251	kg/s	- 251 to +251
	Volumeflow	-0.249	m³/s	-0.249 to +0.249
Alarm Hysteresis				
DN 15	Massflow	0	kg/s	0 to +8.84
	Volumeflow	0	m³/s	0 to +0.005
DN 25	Massflow	0	kg/s	0 to +24.5
	Volumeflow	0	m³/s	0 to +0.015
DN 50	Massflow	0	kg/s	0 to +98.2
	Volumeflow	0	m³/s	0 to +0.059
DN 80	Massflow	0	kg/s	0 to +251
	Volumeflow	0	m³/s	0 to +0.249

Zero Point Adjustment

Sensor dimension	Default value	Unit	Range
Standard Deviation Limit			
DN 15	0.0004	kg/s	
DN 25	0.004	kg/s	
DN 50	0.015	kg/s	
DN 80	0.019	kg/s	
Offset Limit			
DN 15	0.031944444	kg/s	
DN 25	0.010277778	kg/s	
DN 50	0.144444444	kg/s	
DN 80	0.377777778	kg/s	

Table C- 54 Current output (channel 1)

Sensor dimension	Default value		Unit	Range
Upper scaling				
DN 15	Massflow	1.768	kg/s	-8.84 to +8.84
	Volumeflow	0.0000336	m^3/s	-0.005 to +0.005
DN 25	Massflow	4.9	kg/s	-24.5 to +24.5
	Volumeflow	0.000098	m^3/s	-0.015 to +0.015
DN 50	Massflow	19.64	kg/s	-98.2 to +98.2
	Volumeflow	0.0003928	m^3/s	-0.059 to +0.059
DN 80	Massflow	50.2	kg/s	- 251 to +251
	Volumeflow	0.001004	m^3/s	-0.249 to +0.249
Lower scaling				
DN 15	Massflow	0	kg/s	-8.84 to +8.84
	Volumeflow	0	m^3/s	-0.005 to +0.005
DN 25	Massflow	0	kg/s	-24.5 to +24.5
	Volumeflow	0	m^3/s	-0.015 to +0.015
DN 50	Massflow	0	kg/s	-98.2 to +98.2
	Volumeflow	0	m^3/s	-0.059 to +0.059
DN 80	Massflow	0	kg/s	- 251 to +251
	Volumeflow	0	m^3/s	-0.249 to +0.249

Table C- 55 Signal output (channels 2, 3 and 4)

Sensor dimension	Default value		Unit	Range
Upper scaling; Flow value high				
DN 15	Massflow	1.768	kg/s	-8.84 to +8.84
	Volumeflow	0.00003536	m^3/s	-0.005 to +0.005
	Corrected Volumeflow	0.00003536	normal m^3/s	-0.005 to +0.005

Sensor dimension	Default value		Unit	Range
DN 25	Massflow	4.9	kg/s	-24.5 to +24.5
	Volumeflow	0.000098	m³/s	-0.015 to +0.015
	Corrected Volumeflow	0.000098	normal m³/s	-0.015 to +0.015
DN 50	Massflow	19.64	kg/s	-98.2 to +98.2
	Volumeflow	0.0003928	m³/s	-0.059 to +0.059
	Corrected Volumeflow	0.0003928	normal m³/s	-0.059 to +0.059
DN 80	Massflow	50.2	kg/s	- 251 to +251
	Volumeflow	0.001004	m³/s	-0.249 to +0.249
	Corrected Volumeflow	0.001004	normal m³/s	-0.249 to +0.249
Lower scaling; Flow value low				
DN 15	Massflow	0	kg/s	-8.84 to +8.84
	Volumeflow	0	m³/s	-0.005 to +0.005
	Corrected Volumeflow	0	normal m³/s	-0.005 to +0.005
DN 25	Massflow	0	kg/s	-24.5 to +24.5
	Volumeflow	0	m³/s	-0.015 to +0.015
	Corrected Volumeflow	0	normal m³/s	-0.015 to +0.015
DN 50	Massflow	0	kg/s	-98.2 to +98.2
	Volumeflow	0	m³/s	-0.059 to +0.059
	Corrected Volumeflow	0	normal m³/s	-0.059 to +0.059
DN 80	Massflow	0	kg/s	- 251 to +251
	Volumeflow	0	m³/s	-0.249 to +0.249
	Corrected Volumeflow	0	normal m³/s	-0.249 to +0.249

Zero point adjustment D

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

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 HMI (Page 76) or PDM (Page 105) for instructions.

Note

Change of parameters during zero point adjustment

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

Automatic zero point adjustment

SITRANS FC430 measures and calculates the correct zero point automatically.

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

- Zero Point Adjustment Period
- Start Zero Point Adjustment

When zero adjust is initiated by selecting "Start Zero Point Adjustment", the massflow values are acquired and totalized for the configured period (Zero Point Adjustment Period). 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 number 2.6.6).

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 "Zero Point Standard Deviation Limit" (menu item number 2.6.4).

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 parameter 2.6.4 "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 the case of a power failure.

Glossary

BRIX

Degrees Brix (symbol °Brix) is a measurement of the mass ratio of dissolved sugar to water in a liquid. A 25 °Bx solution is 25% (w/w), with 25 grams of sugar per 100 grams of solution.

Coriolis

The Coriolis effect is an apparent deflection of moving objects from a straight path when they are viewed from a rotating frame of reference. The effect is named after Gaspard-Gustave Coriolis, a French scientist who described it in 1835. The Coriolis effect is caused by the Coriolis force, which appears in the equation of motion of an object in a rotating frame of reference.

EHEDG

European Hygienic Engineering & Design Group was founded in 1989 to promote hygienic engineering in the European food industry. EHEDG provides practical guidance on hygienic engineering aspects of manufacturing safe and whole some foods.

EMC

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

Fraction

Fraction designates a proportional relation between an object part and the object whole. For example, the fraction 3⁄4 represents three equal parts of a whole object, divided into four equal parts.

IP

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

NAMUR

Normenarbeitsgemeinschaft für Meß- und Regeltechnik in der Chemischen Industrie (NAMUR). NAMUR is a group representing the interests of the chemical industry which create standards for instrumentation and electrical devices used in industrial plants.

PED

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

Plato

Plato is a measure of the weight of sucrose dissolved in water. It is expressed in degrees (% by mass).

Zero point adjustment

In order to measure accurately with a measuring instrument it is important that zero and gain have been calibrated. All Coriolis sensors are calibrated before they are sent out to customers. However, Coriolis sensors are very sensitive, and several factors might move the zero point, e.g installation, pressure, temperature and even very small vibrations coming from the process. All these factors are customer specific and can’t be simulated at the factory. Therefore Siemens recommends to carry out a zero point adjustment before use.

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For more information

www.siemens.com/flow

Siemens A/S
Flow Instruments
Nordborgvej 81
DK-6430 Nordborg

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