SIEMENS

SITRANS F

Coriolis Flowmeters

SITRANS FC430 with HART

Service Manual

Edition 12/2013

Answers for industry.

SIEMENS

SITRANS F

Coriolis flowmeters SITRANS FC430 with HART

Service Manual

This Service Manual applies to Siemens products SITRANS FC430 with order codes commencing 7ME4613, 7ME4603, 7ME4623, and 7ME4713

12/2013

A5E03736884-02

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.

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Note the following:

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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.

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Disclaimer of Liability

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

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Introduction

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1.1 Purpose of this documentation

This Service manual contains all information that you will require to replace components and to upgrade software and refresh SensorFlash.

For information about safe usage of the system, refer to the Operating Instructions and safety related manuals all available on product CD and on the Internet at Technical support (http://www.siemens.com/flowdocumentation)

Read this Service manual carefully before you start any service and maintenance work. In order to use the device correctly, first make yourself acquainted with its principle of operation.

The Service manual is targeted at service and maintenance technicians.

1.2 History

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

Edition	Remarks	SW version	FW revision
05/2012	First edition	• SIMATIC PDM driver 1.00.00	• Compact version: – System: 03.00.00 – Transmitter: 02.00.09 – LUI: 01.02.15 – Sensor: 03.00.00 • Remote version: – System: 02.00.02 – Transmitter: 02.00.09 – LUI: 01.02.15 – Sensor: 02.00.00
12/2013	• General update • SensorFlash concept added • Troubleshooting chapter improved • Spare part replacement chapter improved	• SIMATIC PDM driver 2.00.00-**	• Compact version: 03.02.00-** • Remote version: 02.02.00-**

1.3 Safety instructions

Before carrying out any repair work, the instructions for safe handling of the device must be read and understood. See the Operating Instructions.

1.4 Notes on warranty

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

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

1.5 Product information

The Service manual is available from the Intranet at the Siemens Industry Online Support site http://support.automation.siemens.com/Flow.

SITRANS FC430 comes with a USB service port to enable easy service through SIMATIC PDM software. The SIMATIC PDM driver is available for download from the Siemens Industry Online Support site http://support.automation.siemens.com/flow

1.6 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)

Description

2

2.1 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: One single mechanical unit where the transmitter is directly mounted on the sensor.
- Remote version: Transmitter and sensor installed separately. The remote system is composed of SITRANS FCS400 sensor unit with a front end with Digital Sensor Link (DSL) directly mounted on the sensor and remotely connected to a SITRANS FCT030 transmitter. The DSL performs the signal processing of all measured signals in the sensor. The connection between transmitter and sensor is 4-wire providing power and high-integrity digital communication between DSL and the transmitter.

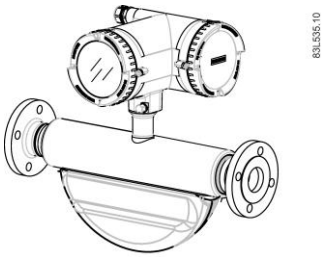


Figure 2-1 Compact versions

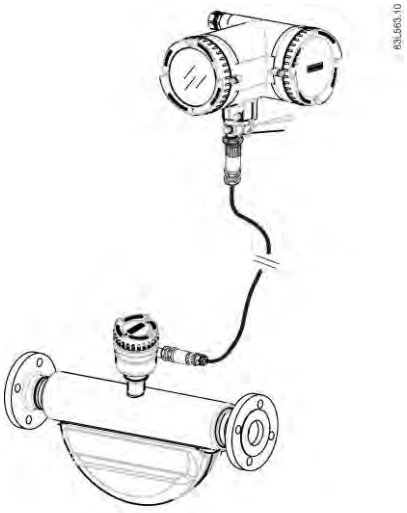


Figure 2-2 Remote version with M12 connection

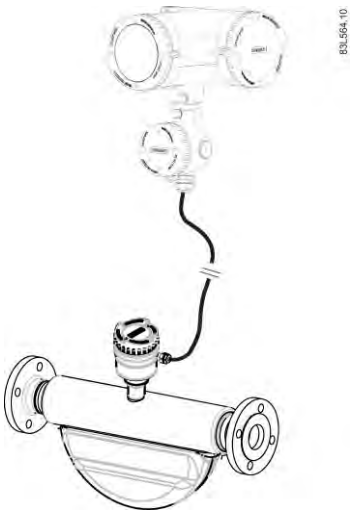


Figure 2-3 Remote version with terminated cable

Sensor design

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

The FCS400 sensor is provided with two parallel bent tubes welded directly to the process connections at each end through a manifold. The FCS400 sensor is available in a non-safe and an intrinsically safe (IS) design.

The sensors are available in AISI 304 stainless steel. The enclosure is made of AISI 316L stainless steel and has a pressure rating of 20 bar (290 psi) for DN 15 to DN 50 and 17 bar (247 psi) for DN 80.

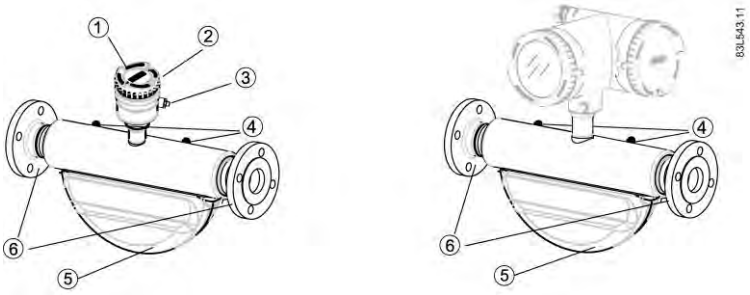
The sensor enclosure can be equipped with a pressure guard or flushed with dry inert gas at the threaded ports for non-hazardous applications only.

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. It has a 4-wire M12 cable connection for communication and power supply.

Sensor overview



① Lid-lock
② Cable feed-through (M12 socket or gland)
③ Sensor front end (DSL) (Remote configuration only)
④ Plug and threaded port for for example pressure guard
⑤ Sensor enclosure
⑥ Process connections

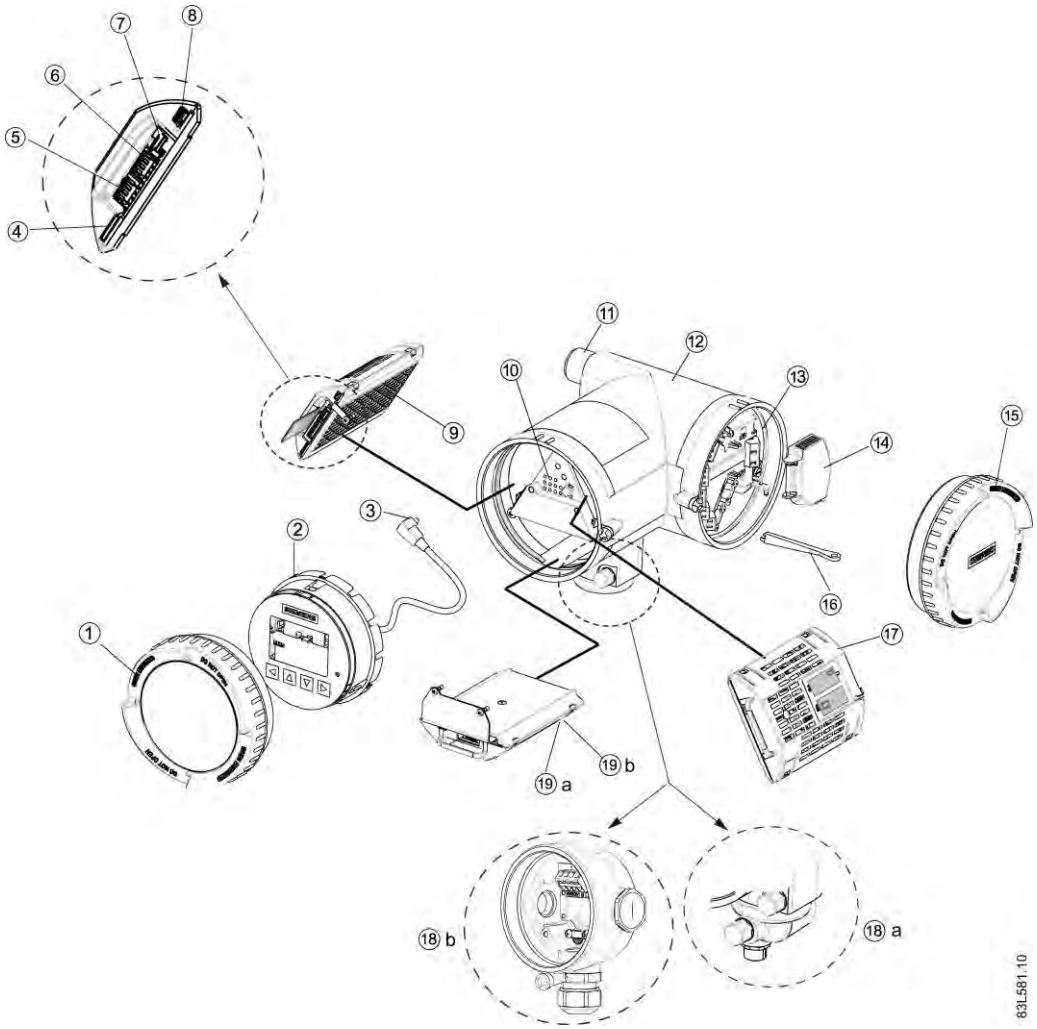
Figure 2-4 Overview, remote and compact configuration

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 user interface (LUI). It also adds functionalities such as corrected volume flow, density, 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 user interface (LUI)	⑬	Terminal space
③	Connector for LUI	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	LUI port	⑱a	M12 socket
⑧	USB service port	⑱b	Terminal housing
⑨	Transmitter cassette	⑲a	Sensor module (compact version)
⑩	Heatsink cover for power supply module	⑲b	Sensor module (remote version)
⑪	Cable entry		

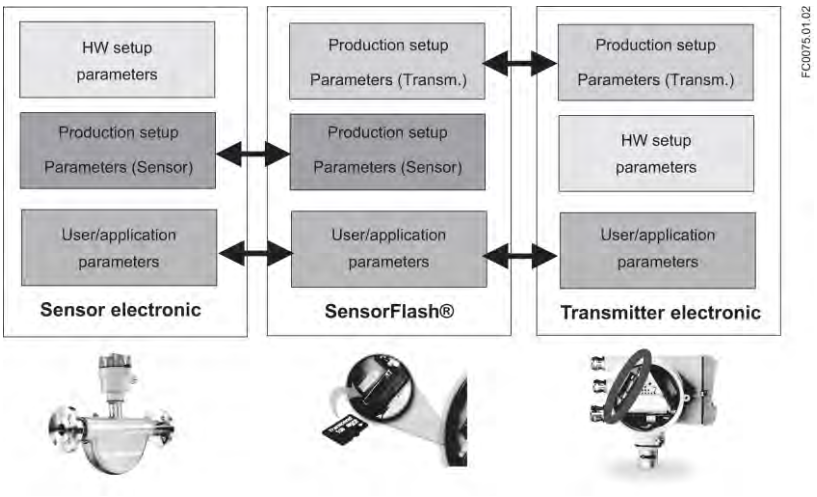
2.2 SensorFlash concept

System parameters are divided into four main groups.

- Hardware setup parameters
- Production setup parameters for sensor
- Production setup parameters for transmitter
- User / Application parameters

The parameters are available in sensor and transmitter electronics.

This graphic gives an overview of which parameter groups are available in which devices, and which groups are backed up in the SensorFlash.



SensorFlash parameter groups

The following tables show the availability of the different parameter groups and whether they are automatically backed up or not.

Table 2- 1 Parameter groups

Parameter group	Description	Automatic backup to SensorFlash?
Hardware setup parameters	The parameters are uniqe to the specific hardware, for example calibration setup of the PCBa's.	No
Production setup parameters for sensor	The parameters are set up in production. They are valid for the specific sensor that they are attached to and include for example calibration parameters.	Yes

Parameter group	Description	Automatic backup to SensorFlash?
Production setup parameters for transmitter	The parameters are set up in production. They include system configuration parameters, for example product name.	Yes
User / Application parameters	The parameters are for the user to configure the device, for example setting of empty tube (sensor) and output scaling (transmitter). The parameters are protected by user or expert access level.	Yes

SensorFlash data

The SensorFlash data is structured on the SD card as shown here:

Figure 2-5 SensorFlash files

Table 2- 2 This table shows the individual data groups contained on the SensorFlash.

SensorFlash data group	Description
Certificates	Contains all certificates that belong to the product: Subfolders Product: Contains product related certificates Project: Contains production related certificates
SEN_0.BAK,	The SensorFlash holds three sensor parameter backup files to which data is written continuously. This ensures that if the device is powered down in an unfortunate moment, there is always one valid copy of the backup.
SEN_1.BAK	
SEN_2.BAK:	
TRN_0.BAK	The SensorFlash holds three transmitter parameter backup files to which data is written continuously. This ensures that if the device is powered down in an unfortunate moment, there is always one valid copy of the backup.
TRN_1.BAK	
TRN_2.BAK	
md-3.02.00-03.fwb	FW bundle version delivered with the product

2.3 Firmware update

Via SIMATIC PDM

1. Download the new firmware bundle from www.siemens.com/FC430 (www.siemens.com/FC430) and save it to the SensorFlash. An instruction is also available at this site.
2. Go to "Access Management" in the "Device" dropdown menu. Sign in as "Expert" (default password is 2834).
3. Go to "Firmware Update" in the "Device" dropdown menu and click "Install FW Version" in order to install appropriate FW. A progress bar is shown in PDM, the device restarts and a communication failure is reported in PDM.
4. Shut down the PDM driver and open again. Ensure to open the PDM driver compatible with the new FW.

Note

Communication problem

If communication cannot be established after FW update, then disconnect the USB cable from the PC and connect again.

Via LUI

1. Download the new firmware bundle from www.siemens.com/FC430 (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 LUI displays the firmware update progress.

Note

Firmware update

FW update is to be done only by authorized and trained service personal

Troubleshooting

3

Initial checking of the application

If an error or unexpected event occurs, first check that installation and commissioning including zero point adjustment are performed as described in the Operating Instructions.

If the error persists, then go through the steps of the troubleshooting flowchart. The flowchart and the subsections referred to in the flowchart will enable you to trace the reason for alarms and operational instabilities.

Typical causes of incorrect measurements

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

3.1 Troubleshooting overview

This flowchart offers and overview of the necessary procedure to identify and remedy errors. Follow the steps in the flowchart and find more information in the sections referred to in the gray boxes marked A1 etc.

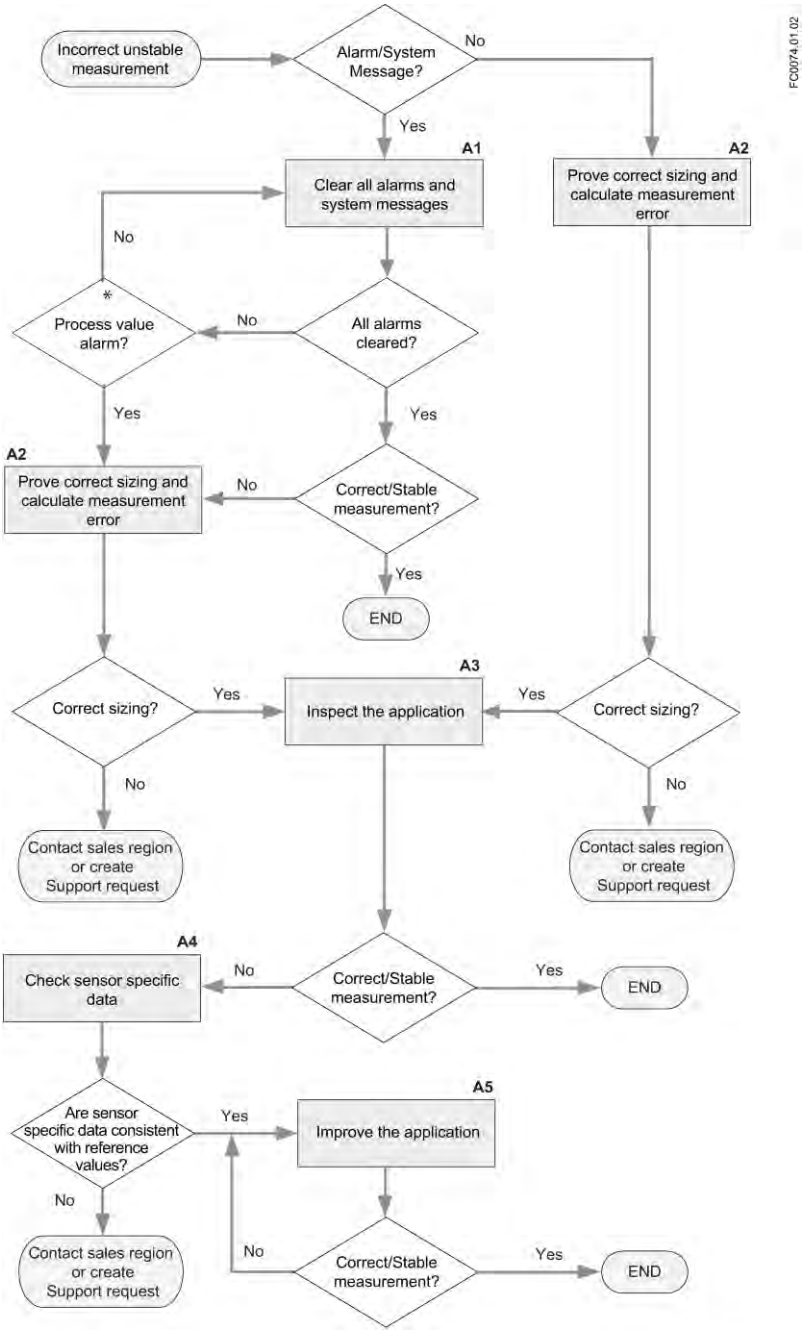


Figure 3-1 * "Process value" alarms correspond to "Out of specification" alarms if the display is set to NAMUR standard.

3.2 Clear alarms and system messages (A1)

Take action to clear alarms and system messages as described in Alarms and system messages (Page 29)

The alarms should be cleared in a sequence according to the alarm class. Depending on alarm standard, Siemens or NAMUR, the sequence is as follows:

Table 3- 1 Sequence of alarms

Alarm class	Siemens standard	NAMUR standard
Function check: alarms including incompatible firmware or hardware	 Configuration changed	 Check function
Failure or Maintenance alarm	 Maintenance alarm	 Failure
Process value alarm/warning or Out of specification	 Process value alarm	 Out of specification
	 Process value warning	

3.3 Prove correct sizing and calculate measurement error (A2)

If the flowmeter gives unstable measurements and there are no alarms or the alarms are of the type "Process Value alarms", then sizing of the application must be proven. This is done two steps:

1. Prove correct sizing (Page 18)
2. Calculate measurement error (Page 19)

3.3.1 Prove correct sizing

Use the sizing program to check if the coriolis sensor is sized correctly. The sizing program is available for download or for online use from the PIA Lifecycle Portal at https://www.pia-portal.automation.siemens.com/default.htm (https://www.pia-portal.automation.siemens.com/default.htm).Select language and click the tab "Sizing" followed by "Start".

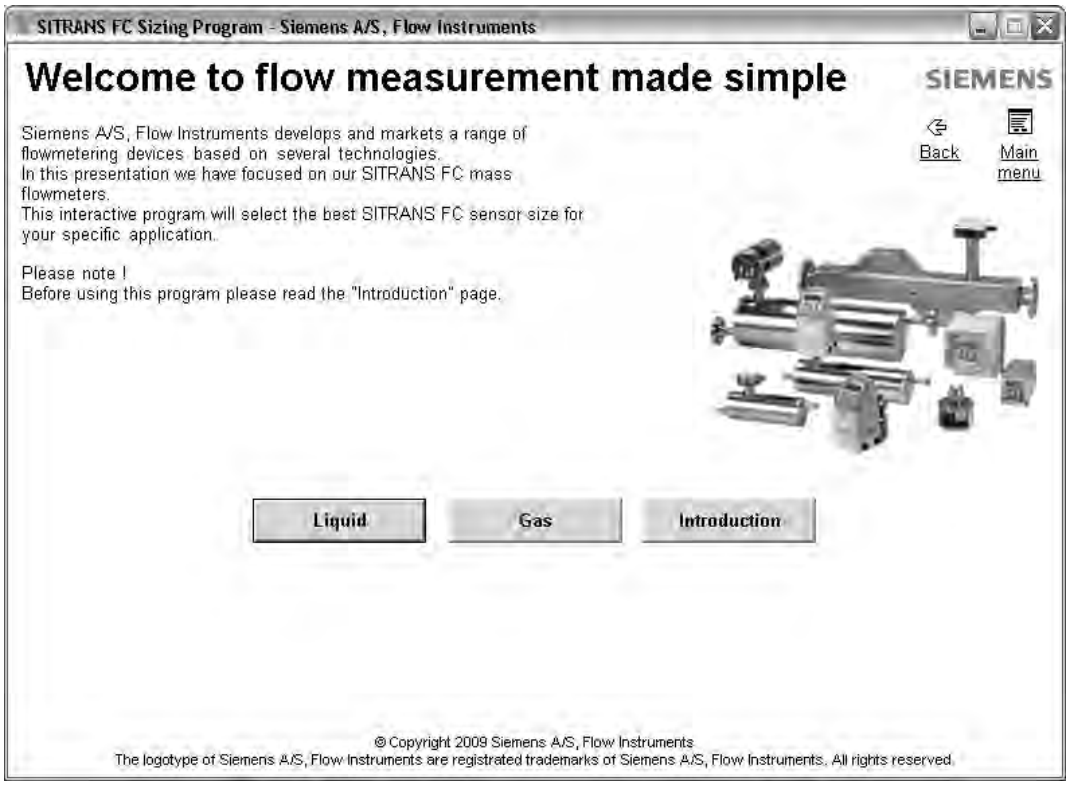


Figure 3-2 SITRANS FC Sizing Program

Checking the sizing

Using the sizing program, examine if the coriolis sensor is sized correctly by checking the flow velocity. The range should be within 0.01 to 20 m/s.

- If the flow velocity is very low, consider replacing the sensor with a smaller size.
- If the flow velocity very high, consider cavitation or bubble release within the sensor. Increase the process pressure.

3.3.2 Calculate 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 Technical specifications in the Operating instructions.

The parameter "Zero Point Standard Deviation" is located in the "Maintenance & Diagnostics" menu in the SIMATIC PDM and the LUI display. If the flowmeter still gives wrong or unstable measurements, the next step is to perform a mass balance calculation.

Calculation formula

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%
  Plus the linearity error of 0.1%

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.

3.4 Inspect the application (A3)

If the flowmeter still gives unstable measurements or process value alarm(s) persist, then go through the following inspection steps or see if you can find help in the examples shown in the table First of all ensure that:

1. The sensor is installed as described in the Operating Instructions.
2. The sensor is located in a vibration-free position. Vibrations can disturb the sensor and therefore cause measurement errors.

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.

- 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.

Application inspection examples

The following examples, possible causes and suggestions for corrective action may give the answer to why the application is unstable.

Problem	Possible causes	Remedy
The flowmeter indicates higher or significantly lower values than actual flow rate	• Cavitation • Build-up of foreign material in flowmeter bore • Gas in the liquid	• Increase back pressure. • Clean flowmeter. • Install gas eliminator ahead of flowmeter.
Unstable flow signal - with closed valve, i.e. zero flow and/or - abort of zero point adjustment / zero point adjustment not possible	• Mechanical vibrations effect oscillation of coriolis flowmeter at zero flow. • Leak • Gas in liquid • Wrong installation	• Make sure that the shut-off valve is completely closed. • Make sure that the sensor has been correctly built in. • Check the driver signal to ensure that the medium does not contain air bubbles. • Check for vibrations, cross-talk and physical stress.
System works perfect except indicates lower flow over the entire range	• By-pass flow • Leak	• Repair or replace by-pass valves, or faulty solenoid valves.
Display shows temperature of approximately -240 °C, however, the media temperature is approximately 20 °C	• Temperature sensor has failed	• Check resistance of PT1000 sensors at the sensor connector of wiring to the PT1000 sensor, see PT1000 resistance table.
The display shows negative density, however the medium is gas with a density of approximately 5 kg/m^3	• Wrong order code or calibration	• Make sure that the sensor has been calibrated for density. If yes, check the sensor frequency. Too high sensor frequency will result in negative density readings. Contact Siemens.
The flowmeter fails to measure	• Solid particles are settling in the tubes • High concentration of solutions precipitation	• The flowmeter must be installed in vertical position with flow upwards to ensure that the tubes are properly cleared.

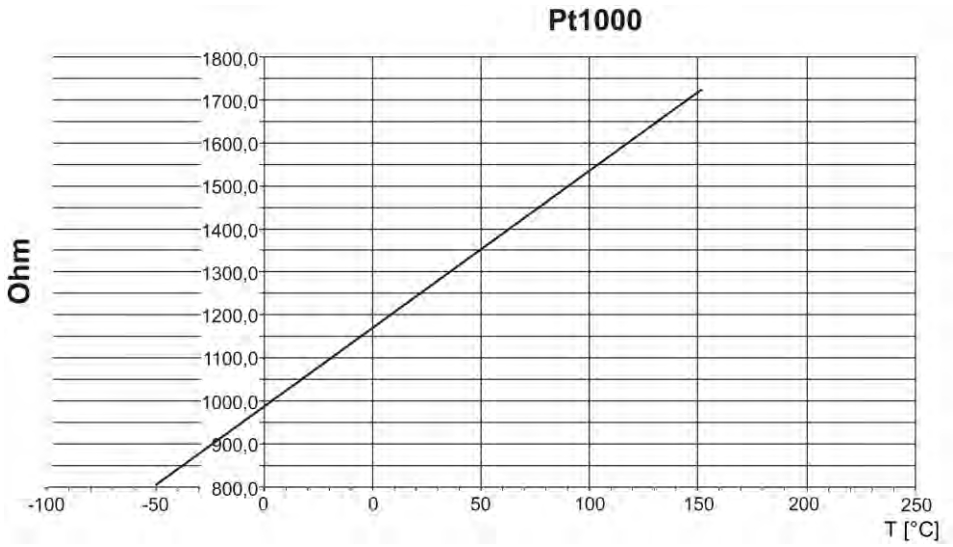


Figure 3-3 PT1000 resistance table

3.5 Check sensor specific data (A4)

If the measurements are still unsatisfactory, the sensor diagnostic values should be checked. This is done in two steps:

1. Verify sensor diagnostic parameters (Page 22)
2. Measure resistance on sensor connector (Page 25)

3.5.1 Verify sensor diagnostic parameters

The diagnostic values of the sensor are shown in the LUI diagnostic view. The LUI provides six configurable measurement/diagnostic values that are updated dynamically.

Figure 3-4 Diagnostic view

Diagnostic and process values may also be checked through PDM in a bar graph or on a trend curve.

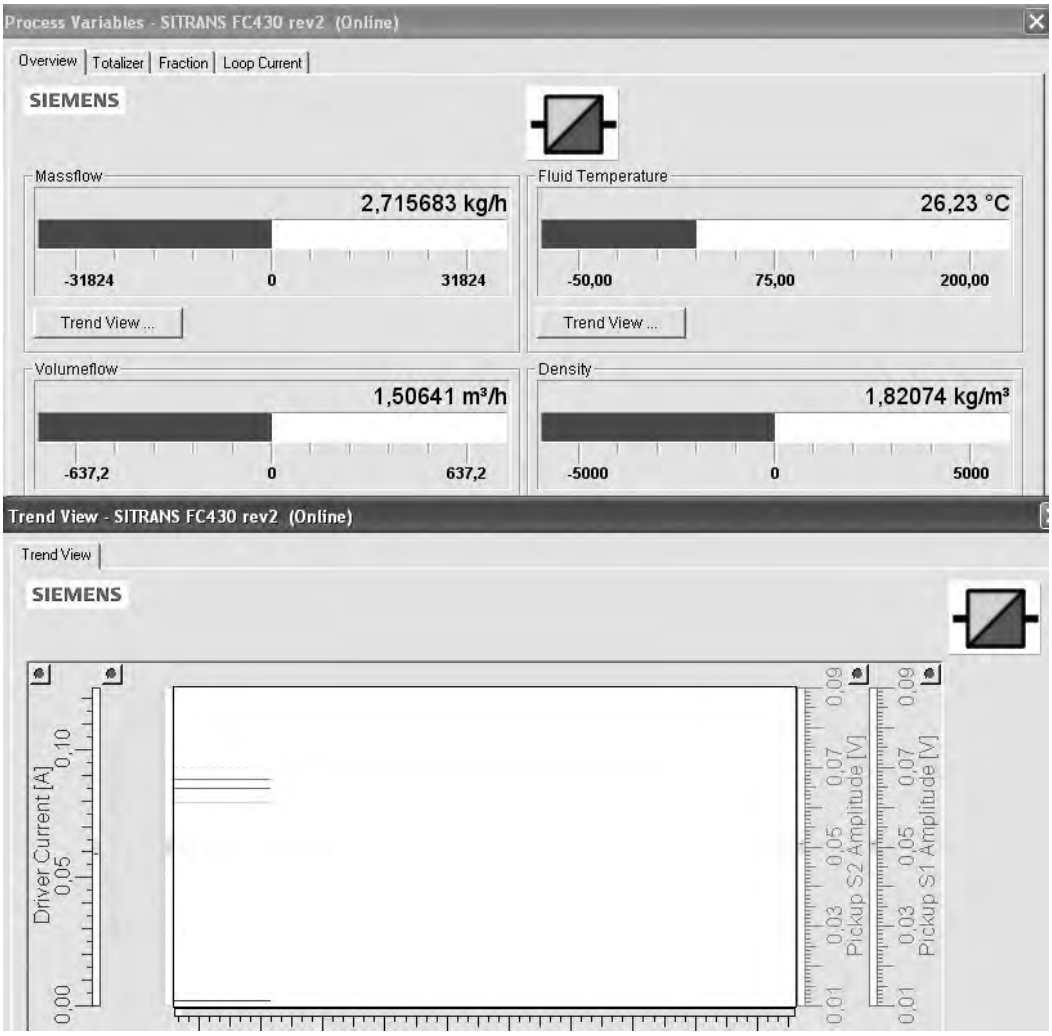


Figure 3-5 PDM graphic view

Diagnostic values

The values (except the pickup amplitude) are dependent on the media density. The values listed in the table are nominal values (for air and water).

Check if the values shown in PDM under "Maintenance and Diagnostics" → "Diagnostics" are within range of the values shown in the table.

Table 3- 2 Diagnostic values

Size	Driver current [mA]	Pick-up voltage [mV]	Sensor frequency		Standard deviation [kg/h]
			Empty (air) [Hz]	Filled with water [Hz]	
DN15*	2.5-3.7	60-70	690	605	± 0.2
DN25*	2.1-3.1	60-70	720	615	± 0.2
DN50*	2.3-3.2	60-70	580	480	± 0.2
DN80*	1.9-2.2	60-70	370	310	± 0.2

* Driver current can be up till:

- Release 1: 15 mA rms
- Release 2: 30-35 mA rms

Examples of diagnostic values that are out of range

The following examples show sensor diagnostic parameters that are out of range and suggest corrective action.

Example 1: (DN 15)

1. Driver current: 12 mA
2. Pick-up 1 voltage: 35 mV
3. Pick-up 2 voltage: 34 mV
4. Sensor frequency: 400 Hz

Conclusion: Pick-up voltage is low due to high density or small bubbles releasing in the fluid.

Action: Improve application (Page 26)

Example 2: (DN 25)

1. Driver current: 3-6 mA
2. Pick-up 1 voltage: 65 mV
3. Pick-up 2 voltage: 65 mV
4. Sensor frequency: 580-615 Hz

Further information: Sensor and frequency fluctuate regularly

Conclusion: Slug flow caused by poor mixing, for example oil-water-oil-water flowing in sequence

Action: Relocate flowmeter to position where fluid is already mixed.

See also

Measure resistance on sensor connector (Page 25)

Check sensor specific data (A4) (Page 22)

3.5.2 Measure resistance on sensor connector

Checking the sensor resistance will indicate if the sensor is in good working condition. The sensor resistance values can be measured directly on the connector.

Connector pins

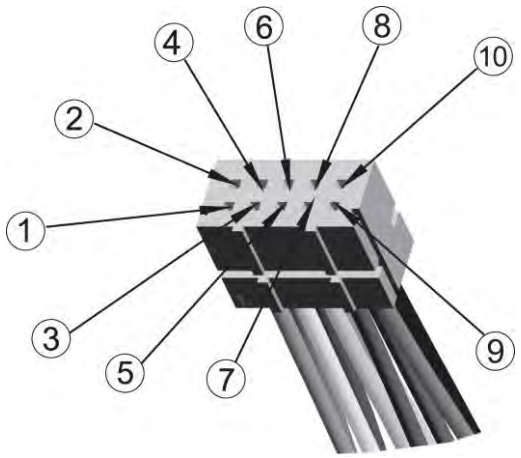


Figure 3-6 Sensor cable connector pins

This table shows the designations of the 10 pins of the sensor connector

Table 3- 3 Connector pins

Pin		Color	Description
PIN 1	P1+	Orange	Pick-up 1
PIN 2	P1-	Green	
PIN 3	P2+	White	Pick-up 2
PIN 4	P2-	Blue	
PIN 5	T1	Yellow	Tube temperature PT1000
PIN 6	T2	Yellow	
PIN 7	T3	Red	Frame temperature PT1000
PIN 8	T4	Red	
PIN 9	D1+	Brown	Driver
PIN 10	D1-	Black	

Sensor resistance values

Check if the measured resistance values are within range of the values shown in this table.

Table 3- 4 Sensor resistance values

Size	Driver resistance at 20 °C [Ω]	Driver resistance at 200 °C [Ω]	Pick-up resistance at 20 °C [Ω]	Pick-up resistance at 200 °C [Ω]
DN15	3.1±0.06	~4.5	95.9±3	157.2±16
DN25	23.7±0.35	~36.9	95.9±3	157.2±16
DN50	44.9±0.73	~72.2	95.9±3	157.2±16
DN80	37.1±0.69	~60.8	95.9±3	157.2±16

3.6 Improve the application (A5)

If the application still gives unstable or incorrect measurements, a number of measures can be taken to improve the installation. In the following it is described how to find the causes of a high Zero Point Standard Deviation and other measures that will 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%.

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 the same size positioned in close proximity in the same pipe, or installed upon 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, 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 Status → Amplitude / Frequency (menu item 3.4.2.1))
- 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. The Driver Current stability will increase with reduced air bubble size or amount in the liquid.

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 installed upstream of the flowmeter can cause cavitation.
- If there is a filter installed upstream of 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.

Solid particles in the liquid

If the solid particles in a liquid have a density higher than that of the liquid, they may precipitate inside the sensor and cause instability leading to a measurement error. However, if the solid particles are small in size and the flowrate is high, the particles may simply be flushed through the sensor, even if their density is larger than the fluid density.

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.

Alarms and system messages

4

4.1 Overview of messages and symbols

This section describes alarm messages shown on the LUI display.

Display behavior on local user interface

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 4- 1 Siemens standard icons

Icon	Alarm class	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 4- 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.

4.2 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 following tables.

- 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	Sensor external supply volt. out of range	Replace the power supply unit in the transmitter, see Replaceable components (Page 45)	Yes

ID	Diagnostic	Action	Effect on output
37	Sensor analog supply volt. out of range	Replace the sensor electronic (remote version DSL cassette or compact version sensor interface cassette), see Replaceable components (Page 45)	Yes
38 39 40 41	Temperature measurement fault	Go through one or more of the following steps until the error is corrected and the alarm disappears: 1. Turn off the power, wait 5 seconds and turn on the power again. If the alarm continues, the sensor electronic may be defective. 2. Replace the sensor electronic (remote version DSL cassette or compact version sensor interface cassette), see Replaceable components (Page 45)	Yes
46 47	Invalid calibration data	Check if customer calibration settings are out of range for the application. Note down current parameter values before you change any of the values. Go through one or more of the following steps until the error is corrected and the alarm disappears: 1. If manual zero point adjustment is enabled (Menu item 2.6.1), then set Offset to zero (menu item 2.6.8). 2. Log in as Expert, and reconfigure the following user calibration parameters: – In menu item 2.2.4."Flow Adjustment", set "Adjustment Factor" to "1". – In menu item 2.2.5.10 "Density Adjustment", set "Adjustment Factor" to "1" and "Adjustment Offset" to "0". 3. Check if calibration factor (menu item 3.5.6.3) matches the calibration factor from the calibration certificate. If not, then recalibrate the sensor by restoring sensor calibration parameters from the SensorFlash 4. If the error continues, send the device to factory for recalibration.	Yes*
49 50 51	Malfunction in Pickup Amplitude	The sensor electronic is defective or a pickup is damaged. Replace the sensor electronic (remote version DSL cassette or compact version sensor interface cassette). If the alarm continues, then replace the sensor, see Replaceable components (Page 45).	Yes*
55 56 57	Malfunction in sensor driver	The circuitry may be damaged resulting in high amplitude. Replace the sensor electronic (remote version DSL cassette or compact version sensor interface cassette), see Replaceable components (Page 45).	Yes*
58	Unstable driver oscillation	If operation is within specifications and no other alarms are signaled, the sensor electronic may be defective. Go through one or more of the following steps until the error is corrected and the alarm disappears: 1. Check the connection between driver and sensor electronic. 2. Replace the sensor mechanic.	Yes*

ID	Diagnostic	Action	Effect on output
71	Parameter storage malfunction	Go through one or more of the following steps until the error is corrected and the alarm disappears: 1. Turn off the power, wait 5 seconds and turn on the power again. If the alarm continues, the sensor electronic may be defective. 2. Replace the sensor electronic (remote version DSL cassette or compact version sensor interface cassette), see Replaceable components (Page 45).	
72 73 74 75 76	Internal error in sensor	Replace the sensor electronic (remote version DSL cassette or compact version sensor interface cassette), see Replaceable components (Page 45)	Yes
87	The sensor is stabilizing	Go through one or more of the following steps until the error is corrected and the alarm disappears. Remote variant 1. Turn off the power. Unplug and reconnect the sensor cable. Restore power and wait 20 seconds. 2. Power failure: Check if the voltage at DSL connector within range (9-16 V DC). If yes, go to step 3. If not one or more of the following actions should be taken: – Replace power cable. – Replace sensor interface module – Replace power supply – See Replaceable components (Page 45) 3. Communication failure: – Check for cable break or bad connection on the AB Modbus connection – Measure between AB and housing (ground) 4. Replace sensor electronics, see Replaceable components (Page 45) Compact variant 1. Turn off the power. Unplug and reconnect the sensor cable. Restore power and wait 20 seconds. 2. Replace sensor interface module. 3. Replace power supply. See Replaceable components (Page 45)	Yes
150	Sensor signal disrupted	Turn off the power. Unplug and reconnect the sensor cable. Restore power and wait 20 seconds. If the alarm continues, the sensor electronic may be defective. Replace the sensor electronic (remote version DSL cassette or compact version sensor interface cassette), see Replaceable components (Page 45).	

ID	Diagnostic	Action	Effect on output
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. See manual "Functional Safety for SITRANS FC430"	
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 alarm continues, then check if other alarms are signaled. If operation is within specifications and no other alarms are signaled, a systematic error may have occurred in the transmitter electronic. Contact factory service and support and provide alarm ID found in submenu of Internal error in transmitter.	
171	Product FW incompatible	Update rejected - product firmware update failed. Check firmware revision in Replaceable components (Page 45)	
172	Transm. FW incompatible	Update rejected - transmitter FW incompatible. Firmware update failed. Check firmware revision in Compatibility check mechanic spare parts (Page 51)	
173	Sensor FW incompatible	Update rejected - sensor FW incompatible. Firmware update failed. Check firmware revision in Compatibility check mechanic spare parts (Page 51)	
174	LUI FW incompatible	Update rejected - sensor FW incompatible. Firmware update failed. Check firmware revision in Compatibility check mechanic spare parts (Page 51)	
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 operation is within specifications and no other alarms are signaled, then contact factory service and support.	
59	Massflow out of specification	If operation is within specifications and no other errors are signaled, the sensor electronic or the mechanical sensor may be defective. Go through one or more of the following steps until the error is corrected and the alarm disappears: 1. Reduce the flow. 2. Fix other errors. 3. Replace the sensor electronic (remote version DSL cassette or compact version sensor interface cassette) 4. Replace the sensor mechanic. See Replaceable components (Page 45)	
60	Volumeflow out of specification	If operation is within specifications and no other errors are signaled, the sensor electronic or the mechanical sensor may be defective. Go through one or more of the steps below until the error is corrected and the alarm disappears: 1. Reduce the flow. 2. Fix other errors. 3. Replace the sensor electronic (remote version DSL cassette or compact version sensor interface cassette) 4. Replace the sensor mechanic. See Replaceable components (Page 45)	
61	Density out of specification	If operation is within specifications and no other alarms are signaled, the sensor electronic or the mechanical sensor may be defective. Go through one or more of the steps below until the error is corrected and the alarm disappears: 1. Reduce the flow. 2. Fix other errors. 3. Replace the sensor electronic (remote version DSL cassette or compact version sensor interface cassette) 4. Replace the sensor mechanic. See Replaceable components (Page 45)	

ID	Diagnostic	Action	Effect on output
62	Fluid temp. below limit	If operation is within specifications and no other errors are signaled, the sensor electronic or the mechanical sensor may be defective. Go through one or more of the steps below until the error is corrected and the alarm disappears: 1. Increase the fluid temperature. 2. Fix other errors. 3. Replace the sensor electronic (remote version DSL cassette or compact version sensor interface cassette) 4. Replace the sensor mechanic. See Replaceable components (Page 45)	
63	Fluid temp. above limit	If operation is within specifications and no other errors are signaled, the sensor electronic or the mechanical sensor may be defective. Go through one or more of the steps below until the error is corrected and the alarm disappears: 1. Reduce the fluid temperature. 2. Fix other errors. 3. Replace the sensor electronic (remote version DSL cassette or compact version sensor interface cassette) 4. Replace the sensor mechanic. See Replaceable components (Page 45)	
64	Frame temp. below limit	If operation is within specifications and no other errors are signaled, the sensor electronic or the mechanical sensor may be defective. Go through one or more of the steps below until the error is corrected and the alarm disappears: 1. Increase fluid temperature and check that ambient temperature is within specified limits. 2. Fix other errors. 3. Replace the sensor electronic (remote version DSL cassette or compact version sensor interface cassette) 4. Replace the sensor mechanic. See Replaceable components (Page 45)	
65	Frame temp. above limit	If operation is within specifications and no other errors are signaled, the sensor electronic or the mechanical sensor may be defective. Go through one or more of the steps below until the error is corrected and the alarm disappears: 1. Reduce fluid temperature and check that ambient temperature is within specified limits. 2. Fix other errors. 3. Replace the sensor electronic (remote version DSL cassette or compact version sensor interface cassette) 4. Replace the sensor mechanic. See Replaceable components (Page 45)	

ID	Diagnostic	Action	Effect on output
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"	
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.	
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".	
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".	

ID	Diagnostic	Action	Effect on output
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".	
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 factory service and 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".	
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".	

ID	Diagnostic	Action	Effect on output
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.	
97	Massflow above warning limit	Check process conditions or align limit to normal operation. Adjust parameter "Upper Limit Warning".	
98	Massflow below warning alarm 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".	

ID	Diagnostic	Action	Effect on output
121	Fraction A flow above warning limit	Check process conditions or align limit to normal operation. Adjust parameter "Upper Limit Warning".	
122	Fraction A flow below warning limit	Check process conditions or align limit to normal operation. Adjust parameter "Lower Limit Warning".	
125	Fraction B flow above warning limit	Check process conditions or align limit to normal operation. Adjust parameter "Upper Limit Warning".	
126	Fraction B flow below warning limit	Check process conditions or align limit to normal operation. Adjust parameter "Lower Limit Warning".	
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. volumeflow above warning limit	Check process conditions or align limit to normal operation. Adjust parameter "Upper Limit Warning".	
134	Corr. volumeflow 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
151	Sensor serial number mismatch	SensorFlash backup is disabled due to mismatch of serial numbers between sensor electronic and SensorFlash. • Check firmware and hardware revision numbers in Compatibility check • The error will appear when you replace sensor or sensor electronic until synchronization of hardware and firmware is carried out. Find the relevant spare part in Replaceable components (Page 45) and follow the instructions to remove the error message.	
152	Transm. serial number mismatch	SensorFlash backup is disabled due to mismatch of serial numbers between transmitter electronic and SensorFlash. • Check firmware and hardware revision numbers in Compatibility check • The error will appear when you replace sensor or sensor electronic until synchronization of hardware and firmware is carried out. Find the relevant spare part in Replaceable components (Page 45) and follow the instructions to remove the error message.	
160	Massflow simulated	Disable "Simulation" before returning to normal operation.	
161	Volumeflow simulated	Disable "Simulation" before returning to normal operation.	
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	Ref. density 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	

Service and maintenance 5

5.1 Diagnostics tools

SITRANS FC430 comes with a USB service port to enable easy service through SIMATIC PDM software. The SIMATIC PDM driver together with a PDM instruction guide is available for download from Product Support (https://support.automation.siemens.com/WW/llisapi.dll?func=cslib.csinfo&lang=en&siteid=csius&aktprim=0&extranet=standard&viewreg=WW&objid=60666565&treeLang=en).

The SIMATIC PDM is a software tool designed to aid service personnel and must be applied to perform certain service actions such as firmware update, copying of parameter setup, and for replacement of certain spare parts.

A standard USB cable with mini plug for the device is used to connect the transmitter to a PC. See pos. 8 in exploded view.

5.2 Maintenance work

⚠ CAUTION

Hot surfaces

Danger of burns during maintenance work on parts having surface temperatures exceeding 70 °C (158 °F).

- Take corresponding protective measures, for example by wearing protective gloves.
- After carrying out maintenance, remount touch protection measures.

⚠ WARNING

Humid environment

Danger of electric shock.

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

⚠ CAUTION

Dangerous voltage at open device

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

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

⚠ WARNING

Hot, toxic or corrosive process media

Danger of injury during maintenance work.

When working on the process connection, hot, toxic or corrosive process media could be released.

- As long as the device is under pressure, do not loosen process connections and do not remove any parts that are pressurized.
- Before opening or removing the device ensure that process media cannot be released.

5.3 Regular maintenance

The frequency of maintenance by trained service personnel depends upon the operational and safety requirements of the plant in which the flowmeter is installed.

Check parts for wear, dirt etc. at regular intervals.

Table 5- 1 Maintenance of parts

Part	Maintenance check
Soft parts	Check following parts for tightness and wear: • O-rings of – display lid – transmitter termination space lid – sensor terminal box lid – DSL lid • Seal ring (pedestal) • Cable glands
Flame paths	Check that all threads turn freely, clear of dust and dirt • Lids of – display – transmitter termination space – sensor terminal box

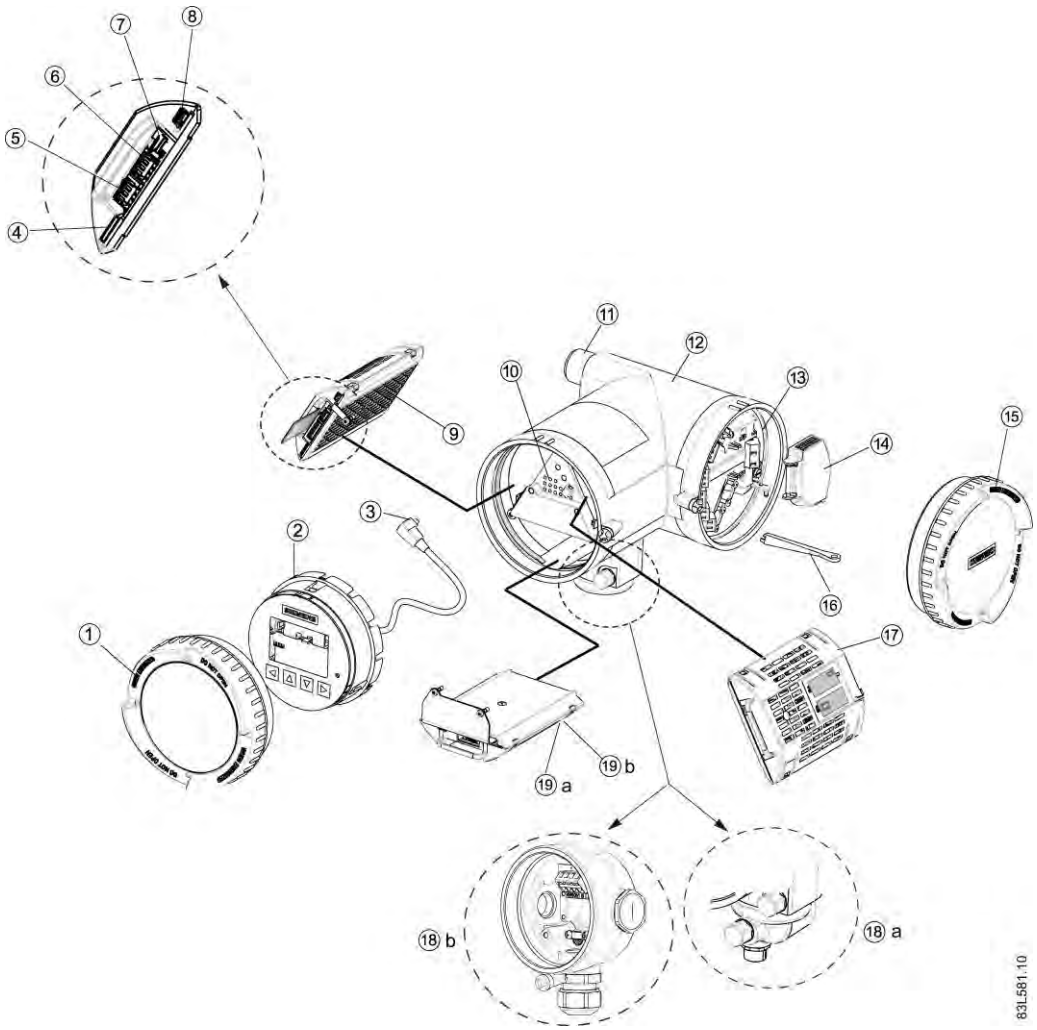
5.4 Spare parts overview

The device consists of different components depending on the customer's order.

A total overview of which parts can be replaced is found in Spare parts replacement with SensorFlash synchronization (Page 49)

Some spare parts require synchronization with SensorFlash data. The spare part replacement instructions are therefore grouped into the following two subchapters:

- Spare parts replacement with SensorFlash synchronization (Page 49)
- Spare parts replacement without SensorFlash synchronization (Page 69)



①	Display cover	⑫	Transmitter housing
②	Local user interface (LUI)	⑬	Terminal space
③	Connector for LUI	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	LUI port	⑱a	M12 socket
⑧	USB service port	⑱b	Terminal housing
⑨	Transmitter cassette	⑲a	Sensor module (compact version)
⑩	Heatsink cover for power supply module	⑲b	Sensor module (remote version)
⑪	Cable entry		

See also

Replaceable components (Page 45)

5.4.1 Replaceable components

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

Table 5- 2 Overview of replaceable components

Component	Order number	Photo and position on Spare parts replacement with SensorFlash synchronization (Page 49)	Hot swappable [1]	SensorFlash synchronization required [2]
SITRANS FCS400 Remote version sensor	• Standard: 7ME4610-xxxx1-xxxx • Hygienic: 7ME4620-xxxx1-xxx • NAMUR: 7ME4710-xxxx1-xxxx		**No**	**Yes**
SITRANS FCS400 Compact version sensor	• Standard: 7ME4610-xxxx1-xxxx • Hygienic: 7ME4620-xxxx1-xxx • NAMUR: 7ME4710-xxxx1-xxxx		**No**	**Yes**
SITRANS FCT030 Compact version transmitter	7ME4603-2xxxx-xxx0		**No**	**Yes**
SITRANS FCT030 Remote version transmitter	7ME4603-2xxxx-xxx0		**No**	**Yes**
SITRANS FCS400 Remote version DSL cassette (might need firmware update)	A5E03549191		**No**	**Yes**

Component	Order number	Photo and position on Spare parts replacement with SensorFlash synchronization (Page 49)		Hot swappable [1]	SensorFlash synchronization required [2]
SITRANS FCT030 Compact version Sensor interface cassette (might need firmware update)	A5E03549142		⑳b	**No**	**Yes**
SITRANS FCT030 Transmitter interface cassette HART (Active) (might need firmware update)	A5E03549357		⑨	**No**	**Yes**
SITRANS FCT030 Transmitter interface cassette HART (Passive) (might need firmware update)	A5E03549383		⑨	**No**	**Yes**
SITRANS FCT030 Remote version Sensor interface cassette	A5E03549098		⑳b	**No**	**No**
SITRANS FCT030 I/O Cassette (Quote F.. option from product code)	A5E03939114		⑰	**No**	**No**
SITRANS FCT030 Power supply 85-264 V AC (50/60 Hz) 18.5-100 V DC	A5E03549413			**No**	**No**
CT plug for M12 plugs	A5E31478498	 Closed		**No**	**No**

Component	Order number	Photo and position on Spare parts replacement with SensorFlash synchronization (Page 49)		Hot swappable [1]	SensorFlash synchronization required [2]
		 Open			
SITRANS FCT030 Display and keypad (might need firmware update)	A5E03548971		②	**Yes**	**No**
SITRANS FCT030 Display lid	A5E03549344		①	**Yes** Observe hazardous area access protocols!	**No**
SITRANS FCT030 Bag of loose spare parts	A5E03549396				**No**
SITRANS FCT030 Blind lid large (∅122 mm)	A5E03549429		⑮	**Yes** Observe hazardous area access protocols!	**No**
SITRANS FCT030 SensorFlash 1 GB micro SD card	A5E03915258		④	**Yes**	**No**
SITRANS FCT030/DSL Blind lid small (∅85 mm)	A5E03549295			**Yes** For DSL, observe hazardous area access protocols!	**No**

Component	Order number	Photo and position on Spare parts replacement with SensorFlash synchronization (Page 49)		Hot swappable [1]	SensorFlash synchronization required [2]
SITRANS FCS400 Remote version Sensor housing metric	A5E03549313			No	No
SITRANS FCS400 Remote version Sensor housing NPT	A5E03906080			No	No
SITRANS FCS400 Bag of loose parts for sensor	A5E03549324	Contents: Screws, O-rings, cable clamp parts			No
SITRANS FCT030 Remote version Mounting bracket kit for wall and pipe mounting	A5E03906091			Yes	No
SITRANS FCS400 Remote version M12 option for DSL housing	A5E03906095			No	No
SITRANS FCT030 Remote version Socket, M12 pedestal	A5E03906104			No	No
SITRANS FCT030 Remote version Terminal house 1/2" NPT pedestal	A5E03906130			No	No

1. Components may be replaced while power is on
2. See “Spare parts replacement with SensorFlash synchronization”

5.4.2 Toolkit

The toolkit contains all mechanical tools necessary to replace components.

- Service toolkit, order no. A5E03722877

① Point nose pliers
② Adjustable wrench
③ Plain screwdriver 1.6x10
④ Phillps screwdriver PH2
⑤ Socket driver SW7
⑥ Ratchet spanner (6 mm) and socket 13 mm
⑦ Torx screwdriver TX20
⑧ Torx screwdriver TX10
⑨ Hexagonal driver SW5
⑩ Torx screwdriver TX9
⑪ Plain screwdriver 0.6x3.5
⑫ Unbraco top bit 4 with 50 mm extension (6 mm)
⑬ Wago tool

5.5 Spare parts replacement with SensorFlash synchronization

Before replacing mechanic and electronic parts that require SensorFlash synchronization, compatibility between hardware and firmware revision numbers must be ensured.

A FC430 PDM driver must be installed and prepared for communication. The SIMATIC PDM driver together with a PDM instruction guide is available for download from Product support (https://support.automation.siemens.com/WW/llisapi.dll?func=cslib.csinfo&lang=en&siteid=csius&aktprim=0&extranet=standard&viewreg=WW&objid=60666565&treeLang=en).

5.5.1 Removing SensorFlash

1. Using tool no. 9, unscrew the locking screw of the display. Remove the display lid using tool no. 3 as a wrench bar if necessary.

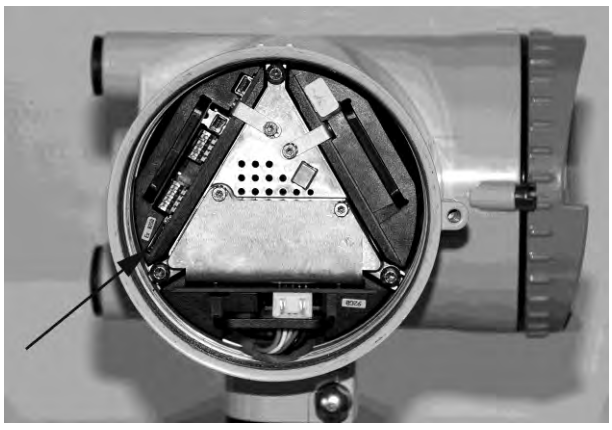
2. Carefully remove display and cable plug.

Note

Use a screwdriver, tool no. 11, to release the display as shown in the following photo.

The display is held in place with three clips.

3. Remove the SensorFlash by pressing and releasing it.



5.5.2 Replacement of transmitter/sensor spare parts

5.5.2.1 Compatibility check mechanic spare parts

Follow these steps to ensure compatibility:

1. Identify firmware and hardware revision numbers found on the product label and in PDM under "Identification → Device" on the system to replace.

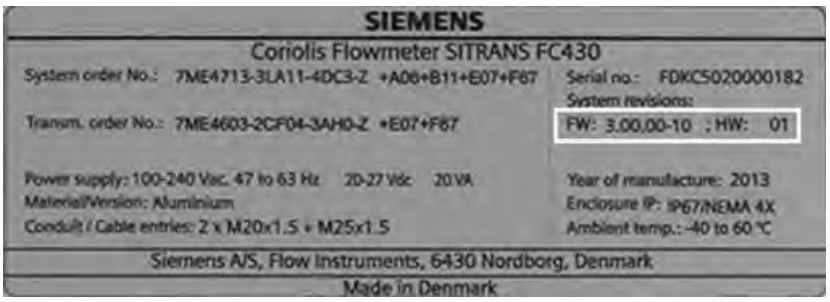


Figure 5-1 HW and FW revision on product label

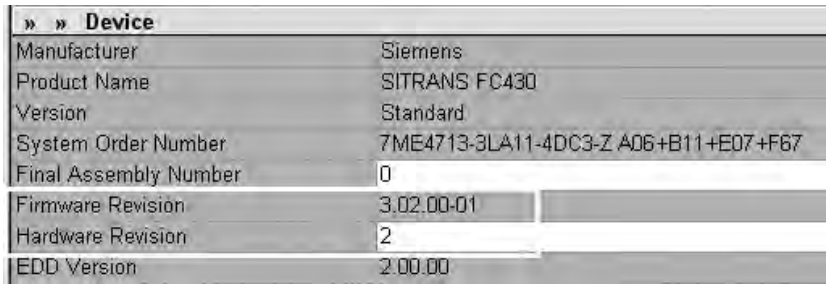


Figure 5-2 FW and HW revision in PDM

2. Check compatibility matrix remote or compact as shown in the two following tables. New spare parts are always delivered with the latest firmware and hardware revisions.

Note

Keeping hardware revision 1 in the system

Contact factory service and support if the customer wishes to continue running the system with hardware revision 1.

It is highly recommended to upgrade to hardware revision 2 when replacing remote transmitter/sensor or compact transmitter on revision 1 systems.

Compatibility for compact variants:

Firmware Revision (bundle version)	Firmware Revision (bundle version)	Service channel EDD
3.00.0*-**	1	1.00.00-06 (Rev 1)
3.02.00-**	2	2.00.00-08 (Rev 2)

Note

Replacement of compact sensor in hardware revision 1 systems

Replacement of a compact sensor does not require a compatibility check. Existing hardware and firmware revisions may be kept.

Compatibility for remote variants:

Firmware Revision (bundle version)	Firmware Revision (bundle version)	Service channel EDD
2.00.0*-**	1	1.00.00-06 (Rev 1)
2.02.00-**	2	2.00.00-08 (Rev 2)

Note

Replacement of remote transmitter in hardware revision 1 systems

Replacement of a remote transmitter requires a new DSL and a system upgrade to hardware revision 2.

Contact factory service and support for replacement of a remote sensor.

3. Follow the relevant replacement instruction to replace the spare part:

- Replacing sensor (remote version) (Page 52)
- Replacing sensor (compact version) (Page 54)
- Replacing transmitter (compact version) (Page 55)
- Replacing transmitter (remote version) (Page 56)

See also

Firmware update (Page 13)

5.5.2.2 Replacing sensor (remote version)

Figure 5-3 Sensor (remote version)

- Sensor (standard), order no. 7ME4610-xxxx1-x(N/Q)xx
- Sensor (hygienic), order no. 7ME4620-xxxx1-x(N/Q)xx
- Sensor (NAMUR), order no. 7ME4710-xxxx1-x(N/Q)xx

Check compatibility

Follow the instructions in Compatibility check mechanic spare parts (Page 51) to ensure compatibility between hardware and firmware revisions.

Replace sensor

1. Isolate the device from power.
2. Remove the SensorFlash (SD card) from the transmitter, see Removing SensorFlash (Page 50). Insert the card in a PC and make a backup of all files.
   Notice: Do not re-insert the SensorFlash.
3. Replace the sensor.
4. Return power to the device
5. Insert the SensorFlash into the transmitter.
   Alarms 151 "Sensor serial number mismatch" will appear in the display. SensorFlash backup is not possible due to serial number mismatch between sensor electronic and SensorFlash.
6. Connect the USB cable from PC to the USB port of the device and open PDM on the PC:
   - Go to "Access Management" in the "Device" dropdown menu. Sign in as "Expert" (default password 2834).
   - Go to "Maintenance" in the "Device" dropdown menu, select the "Spare Parts Replacement" tab and click "Replace Remote Sensor".

   This will execute the synchronization between SensorFlash and device electronics as follows:
   - User/application data from the SensorFlash to the sensor electronic

   Alarm 151 disappears and all parameters are backed up in the SensorFlash.
7. Verify the data synchronization as follows:
   - Select "Upload to PG/PC" on the "Device" dropdown menu.
   - Read the sensor serial number and ensure that it matches the sensor serial number on the sensor product label.

Note

In case of serial number mismatch

If the two serial numbers don't match, Alarm 151"Sensor Serial Number Mismatch" will appear. Copy data from the backup file created at the beginning of the process to the SensorFlash. Repeat steps 5-7 in "Replace Sensor".

See also

SensorFlash concept (Page 11)

5.5.2.3 Replacing sensor (compact version)

Figure 5-4 Sensor (compact version)

- Sensor (standard), order no. 7ME4610-xxxx1-xAxx
- Sensor (hygienic), order no. 7ME4620-xxxx1-xAxx
- Sensor (NAMUR), order no. 7ME4710-xxxx1-xAxx

Check compatibility

Follow the instructions in Compatibility check mechanic spare parts (Page 51) to ensure compatibility between hardware and firmware revisions.

Replace transmitter

1. Isolate the device from power.
2. Remove the SensorFlash (SD card) from the transmitter, see Removing SensorFlash (Page 50). Insert the card in a PC and make a backup of all files.
   The old SensorFlash will not be used with the replacement sensor.
3. Replace the sensor.
4. Return power to the device
5. Insert the new SensorFlash supplied with the replacement sensor into the transmitter. Alarm 151 "Sensor serial number mismatch" will appear in the display. SensorFlash backup is not possible due to serial number mismatch between sensor electronic and SensorFlash.
6. Connect the USB cable from PC to the USB port of the device and open PDM on the PC:
   – Go to "Access Management" in the "Device" dropdown menu. Sign in as "Expert" (default password 2834).
   – Go to "Maintenance" in the "Device" dropdown menu, select the "Spare Parts Replacement" tab and click "Replace Compact Sensor".

   This will execute the synchronization between SensorFlash and device electronics as follows:
   – Production setup data from the SensorFlash to the sensor electronic

   Alarm 151 disappears and all parameters are backed up in the SensorFlash.

7. Verify the data synchronization as follows:
   – Select "Upload to PG/PC" on the "Device" dropdown menu.
   – Read the sensor serial number and ensure that it matches the sensor serial number on the sensor product label.

Note

In case of serial number mismatch

If the two serial numbers don't match, Alarm 151"Sensor Serial Number Mismatch" will appear. Copy data from the backup file created at the beginning of the process to the SensorFlash. Repeat steps 5-7 in "Replace transmitter".

See also

SensorFlash concept (Page 11)

5.5.2.4 Replacing transmitter (compact version)

- Transmitter, order no. 7ME4603-2xx04-xAx0

Check compatibility

Follow the instructions in Compatibility check mechanic spare parts (Page 51) to ensure compatibility between hardware and firmware revisions.

Replace transmitter

1. Isolate the device from power.
2. Remove the SensorFlash (SD card) from the defective transmitter, see Removing SensorFlash (Page 50). Insert the card in a PC and make a backup of all files.
3. Discard the SensorFlash from the new transmitter.
4. Replace the transmitter.
5. Return power to the device.
6. Insert the SensorFlash from the old transmitter into the new transmitter.
   Alarms 151 "Sensor serial number mismatch" and 152 "Transmitter serial number mismatch" will appear in the display. SensorFlash backup is not possible due to serial number mismatch between transmitter and sensor electronics and SensorFlash.

7. Connect the USB cable from PC to the USB port of the device and open PDM on the PC.
   - Go to "Access Management" in the "Device" dropdown menu. Sign in as "Expert" (default password is 2834).
   - Go to "Maintenance" in the "Device" dropdown menu, select the "Spare Parts Replacement" tab and click "Replace transmitter (Compact)".

   This will execute the synchronization between SensorFlash and device electronics as follows:
   - Production setup data from the SensorFlash to the sensor electronic
   - User/application data from the SensorFlash to the sensor electronic and transmitter electronic.

   Alarms 151 and 152 disappear and all parameters are backed up in the SensorFlash.
8. Verify the data synchronization as follows:
   - Select "Upload to PG/PC" on the "Device" dropdown menu.
   - Read the transmitter and sensor serial numbers and ensure that they match the transmitter and sensor serial numbers on the transmitter product label.

Note

In case of serial number mismatch

If the serial numbers don't match, Alarms 151"Sensor Serial Number Mismatch" and 152 "Transmitter Serial Number Mismatch" will appear. Copy data from the backup file created at the beginning of the process to the SensorFlash. Repeat steps 6-8 in "Replace Transmitter".

See also

SensorFlash concept (Page 11)

5.5.2.5 Replacing transmitter (remote version)

Figure 5-5 Transmitter remote

- Transmitter, order no. 7ME4603-(5/8)xx04-xAx0

Check compatibility

Follow the instructions in Compatibility check mechanic spare parts (Page 51) to ensure compatibility between hardware and firmware revisions.

Replace transmitter

1. Isolate the device from power.
2. Remove the SensorFlash (SD card) from the defective transmitter, see Removing SensorFlash (Page 50). Insert the card in a PC and make a backup of all files.
3. Discard the SensorFlash from the new transmitter.
4. Replace the transmitter.
5. Return power to the device.
6. Insert the SensorFlash from the old transmitter into the new transmitter.
   Alarm 152 "Transmitter serial number mismatch" will appear in the display. SensorFlash backup is not possible due to mismatch of serial numbers between transmitter electronic and SensorFlash.
7. Connect the USB cable from PC to the USB port of the device and open PDM on the PC.
   - Go to "Access Management" in the "Device" dropdown menu. Sign in as "Expert" (default password is 2834).
   - Go to "Maintenance" in the "Device" dropdown menu, select the "Spare Parts Replacement" tab and click "Replace transmitter (Remote)".

   This will execute the synchronization between SensorFlash and device electronics as follows:
   - User/application data from the SensorFlash to the transmitter electronic.

   Alarm 152 disappears and all parameters are backed up in the SensorFlash.

Verify the data synchronization as follows:

- Select "Upload to PG/PC" on the "Device" dropdown menu.
- Read the transmitter serial number and ensure that it matches the transmitter serial number on the sensor product label.

Note

In case of serial number mismatch

If the two serial numbers don't match, Alarm 152 "Transmitter Serial Number Mismatch" will appear. Copy data from the backup file created at the beginning of the process to the SensorFlash. Repeat steps 6-8 in "Replace Transmitter".

See also

SensorFlash concept (Page 11)

5.5.3 Replacement of electronic parts

5.5.3.1 Compatibility check electronic spare parts

Follow these steps to ensure compatibility:

1. Identify firmware and hardware revision numbers found on the product label and in PDM under "Identification → Device".

Figure 5-6 The revision no. is stated on the product label. The "X" marks the revision state. In this example the revision state is "ES AA".

» » » Spare Parts		
» » » » Transmitter Electronic (Spare part no: A5E03549357 (active) / A5E03549383 (passive))		
Firmware Revision	3.00.10-20	Loaded
Hardware Revision	ES09/AS13	Loaded
Serial Number	544961	Loaded
» » » » Sensor Electronic (Spare part no: A5E03549191 (Remote) / A5E03549142 (Compact))		
Firmware Revision	3.03.02-01	Loaded
Hardware Revision	AA/013	Loaded
Serial Number	VPD4601711	Loaded
» » » » LUI Electronic (Spare part no: A5E03548971)		
Firmware Revision	1.03.13-38	Loaded
Hardware Revision		Loaded

Figure 5-7 Spare parts HW revision in PDM. In this example the revision states are ES09 and RSAA

2. Check compatibility matrix remote or compact as shown in the two following tables. New spare parts are always delivered with the latest firmware and hardware revisions.

Note

Keeping hardware revision 1 in the system

Contact factory service and support if the customer wishes to continue running the system with hardware revision 1.

It is highly recommended to upgrade to hardware revision 2 when replacing remote transmitter/sensor or compact transmitter on revision 1 systems.

FW bundle revision	HW bundle revision	LUI HW Spare part number / revision number	Transmitter HW (active) Spare part number / revision number	Transmitter HW (passive) Spare part number / revision number	Sensor HW Spare part number / revision number
2.00.0*-**	1	A5E03548971 / ES01	A5E03549357 / ES05	A5E03549383 / ES04	A5E03549191 / ES03
2.02.00-**	2				A5E03549357 / RSAA

Compatibility for compact variants

FW bundle revision	HW bundle revision	LUI HW Spare part number / revision number	Transmitter HW (active) Spare part number / revision number	Transmitter HW (passive) Spare part number / revision number	Sensor HW Spare part number / revision number
3.00.0*-**	1	A5E03548971 / ES01	A5E03549357 / ES05	A5E03549383 / ES04	A5E03549142 / ES03
3.02.00-**	2				A5E03549142 / RSAA

Compatibility for remote variants

3. Follow the relevant replacement instruction to replace the spare part:

- Replacing the DSL cassette (Page 60).
- Replacing the sensor interface cassette (compact version) (Page 64).
- Replacing the transmitter cassette (Page 67).

Note

The following spare part replacement instructions are for hardware revision 2 only.

For hardware revision 1 systems, contact factory service and support.

5.5.3.2 Replacing the DSL cassette

- DSL cassette (remote), order no.: A5E03549191
- Tools: SIMATIC PDM, USB cable, mechanic tools: nos. 3, 8, see Toolkit (Page 49)

Check compatibility

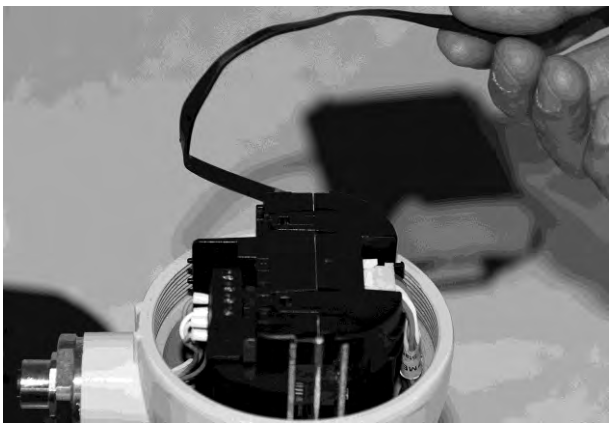
Follow the instructions in Compatibility check electronic spare parts (Page 58) to ensure compatibility between hardware and firmware revisions.

Remove SensorFlash

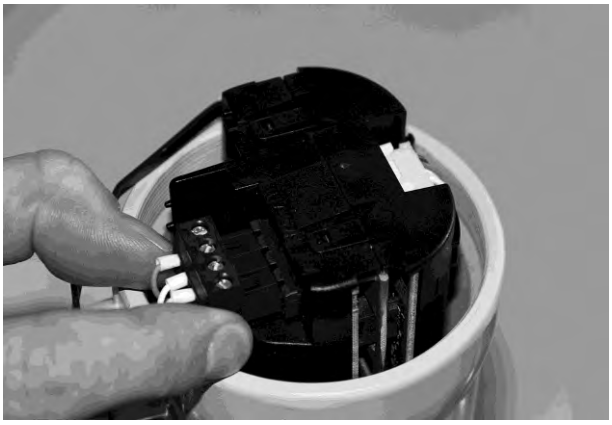
1. Isolate the device from power.
2. Remove the SensorFlash (SD card) from the transmitter, see Removing SensorFlash (Page 50). Insert the card in a PC and make a backup of all files.

Remove DSL cassette

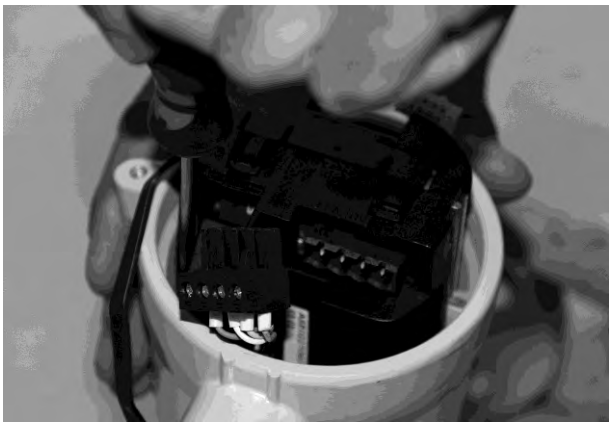
1. Using tool no. 9, unscrew the locking screw of the blind lid and remove it using tool no. 3 as a wrench bar if necessary.
2. Release the rubber band by lifting it off the small hook next to the cable plug.



3. Disconnect the cable plug as shown in the photo.



4. Using tool no. 8 remove the screw that holds the DSL cassette.



5. Carefully remove DSL cassette from housing.

Terminal number	Description	Wire color (Siemens cable)
1	24 V DC	Orange
2	0 V	Yellow
3	B	White
4	A	Blue

Install new DSL cassette

1. Insert the new DSL cassette into housing.
2. Fasten the screw holding the DSL, and reconnect the cable plug until the catch clicks.
3. Fasten the rubber band to the hook.
4. Remove the O-ring from the lid.
5. Reinstate the lid until mechanical stop. Wind back the lid by one turn.
6. Mount O-ring by pulling it over the lid and turn the lid until you feel friction from the O-ring on both sides. Wind the lid by one quarter of a turn to seal on the O-ring and tighten the fixing screw.

Re-insert SensorFlash and synchronize data

1. Return power to the device.

NOTICE
FW incompatibility If alarm 173 "Sensor FW incompatible" occurs, FW update must be performed, see Firmware update (Page 13).

2. Re-insert the SensorFlash into the transmitter.
   Alarm 151 "Sensor serial number mismatch" will appear in the display. SensorFlash backup is not possible due to serial number mismatch between sensor electronic and SensorFlash.
3. Connect the USB cable from PC to the USB port of the device and open PDM on the PC:
   - Go to "Access Management" in the "Device" dropdown menu. Sign in as "Expert" (Default password 2834).
   - Go to "Maintenance" in the "Device" dropdown menu and click "Replace DSL (Remote)".

   This will execute the synchronization between SensorFlash and device electronics as follows:
   - Production setup and User/Application data from the SensorFlash to the sensor electronic.

   Alarm 151 disappears and all parameters are backed up in the SensorFlash.
4. Verify the data synchronization as follows:
   - Select "Upload to PG/PC" on the "Device" dropdown menu.
   - Read the sensor serial number and ensure that it matches the sensor serial number on the sensor product label.

Note

In case of serial number mismatch

If the two serial numbers don't match, Alarm 151 "Sensor Serial Number Mismatch" will appear. Copy data from the backup file created at the beginning of the process to the SensorFlash. Repeat steps 2-4 in "Re-insert SensorFlash and synchronize data".

Re-install display and display cover

1. Reconnect display cable and carefully push display back into housing.

Note

Use a plain screwdriver to fix the three clips of the display correctly into the retaining track as shown in the photo.

2. Remove the O-ring from the lid.
3. Reinstate the display cover until mechanical stop. Wind back the lid by one turn.
4. Mount the O-ring by pulling it over the display cover; then turn the display cover until you feel friction from the O-ring on both sides.
5. Wind the display cover by one quarter of a turn to seal on the O-ring and tighten the fixing screw.

See also

SensorFlash concept (Page 11)

5.5.3.3 Replacing the sensor interface cassette (compact version)

- Sensor interface cassette (compact), order no.:A5E03549142
- Exploded view: position 20, see Spare parts overview (Page 43)
- Mechanic tools: nos. 3, 8, 9, 11, see Toolkit (Page 49)

Check compatibility

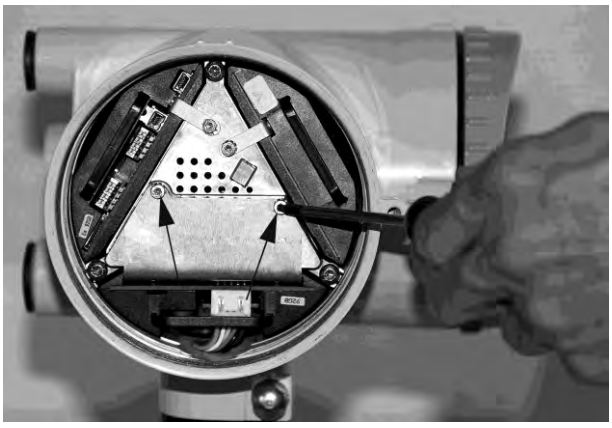
Follow the instructions in Compatibility check electronic spare parts (Page 58) to ensure compatibility between hardware and firmware revisions.

Remove SensorFlash

1. Isolate the device from power.
2. Remove the SensorFlash (SD card) from the transmitter, see Removing SensorFlash (Page 50). Insert the card in a PC and make a backup of all files.

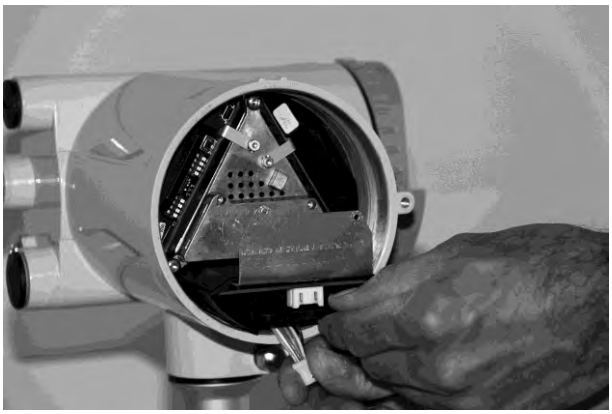
Remove sensor interface cassette

1. Using tool no. 8, remove the two screws that hold the sensor interface cassette.



2. Pull out the sensor interface module to the position shown in the photo.

3. Disconnect the cable plug while lifting the catch.



4. Remove the sensor interface cassette.

Install new sensor interface cassette

Proceed as follows to insert new sensor interface cassette:

1. Hold down the cable while pushing the new electronic to the position shown in the photo.

2. Reconnect cassette cable plug until the catch clicks. Push the cassette in place, and tighten the two screws.

Re-insert SensorFlash and synchronize data

1. Return power to the device.

NOTICE
FW incompatibility If alarm 173 "Sensor FW incompatible" occurs, FW update must be performed, see Firmware update (Page 13).

2. Re-insert the SensorFlash into the transmitter.
   Alarm 151 "Sensor serial number mismatch" will appear in the display. SensorFlash backup is not possible due to serial number mismatch between sensor electronic and SensorFlash.
3. Connect the USB cable from PC to the USB port of the device and open PDM on the PC:
   - Go to "Access Management" in the "Device" dropdown menu. Sign in as "Expert" (Default password 2834).
   - Go to "Maintenance" in the "Device" dropdown menu and click "Replace Sensor Cassette (Compact)".

   This will execute the synchronization between SensorFlash and device electronics as follows:
   - Production setup and User/application data from the SensorFlash to the sensor electronic.
   - Alarm 151 disappears and all parameters are backed up in the SensorFlash.
4. Verify the data synchronization as follows:
   - Select "Upload to PG/PC" on the "Device" dropdown menu.
   - Read the sensor serial number and ensure that it matches the sensor serial number on the sensor product label.

   Note
   In case of serial number mismatch
   If the two serial numbers don't match, Alarm 151"Sensor Serial Number Mismatch" will appear. Copy data from the backup file created at the beginning of the process to the SensorFlash. Repeat steps 2-4 in "Re-insert SensorFlash and synchronize data".
5. Reinstate the display and the display lid, see Replacing the DSL cassette (Page 60).

See also

SensorFlash concept (Page 11)

5.5.3.4 Replacing the transmitter cassette

- Transmitter cassette, order no. A5E03549357 (Active), A5E03549383 (Passive)
- Exploded view: position 9, see Spare parts overview (Page 43)
- Mechanic tools: nos. 3, 8, 9, 11, see Toolkit (Page 49)

Check compatibility

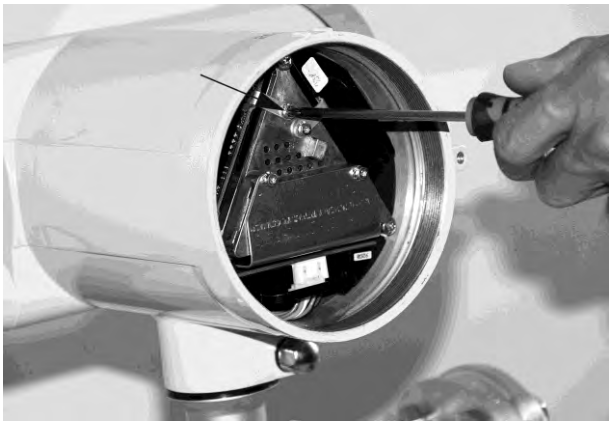
Follow the instructions in Compatibility check electronic spare parts (Page 58) to ensure compatibility between hardware and firmware revisions.

Remove SensorFlash

1. Isolate the device from power.
2. Remove the SensorFlash (SD card) from the transmitter, see Removing SensorFlash (Page 50). Insert the card in a PC and make a backup of all files.

Remove transmitter cassette

1. Using tool no. 8, remove the screw holding the transmitter cassette.



2. Pull out the transmitter cassette.

Install new transmitter cassette

1. Insert the new transmitter cassette.
2. Push the cassette in place and tighten the screw.

Re-insert SensorFlash and synchronize data

1. Return power to the device.

NOTICE
FW incompatibility If alarm 173 "Sensor FW incompatible" occurs, FW update must be performed, see Firmware update (Page 13).

2. Re-insert the SensorFlash into the transmitter. Alarm 152 "Transmitter serial number mismatch" will appear in the display. SensorFlash backup is not possible due to serial number mismatch between sensor electronic and SensorFlash.
3. Connect the USB cable from PC to the USB port of the device and open PDM on the PC:
   - Go to "Access Management" in the "Device" dropdown menu. Sign in as "Expert" (Default password 2834).
   - Go to "Maintenance" in the "Device" dropdown menu and click "Replace Transmitter Cassette".

   This will execute the synchronization between SensorFlash and device electronics as follows:
   - Production setup and User/application data from the SensorFlash to the transmitter electronic.
   - Alarm 152 disappears and all parameters are backed up in the SensorFlash.
4. Verify the data synchronization as follows:
   - Select "Upload to PG/PC" on the "Device" dropdown menu.
   - Read the transmitter serial number and ensure that it matches the transmitter serial number on the transmitter product label.

   Note
   In case of serial number mismatch

   If the two serial numbers don't match, Alarm 152 "Transmitter Serial Number Mismatch" will appear. Copy data from the backup file created at the beginning of the process to the SensorFlash. Repeat steps 2-4 in "Re-insert SensorFlash and synchronize data"
5. Reinstate the display and the display lid, see Replacing the DSL cassette (Page 60) .

See also

SensorFlash concept (Page 11)

5.6 Spare parts replacement without SensorFlash synchronization

Replacement of the following parts does not require SensorFlash synchronization.

5.6.1 Replacing the sensor interface cassette (remote version)

- Sensor interface cassette (Remote), order no.: A5E03549098
- Exploded view: position 20, see
- Mechanic tools: nos. 3, 8, 9, 11, see Toolkit (Page 49)

Remove sensor interface cassette

1. Isolate the device from power.
2. Using tool no 9, unscrew the locking screw of the display and remove the display lid using tool no. 3 as a wrench bar if necessary.

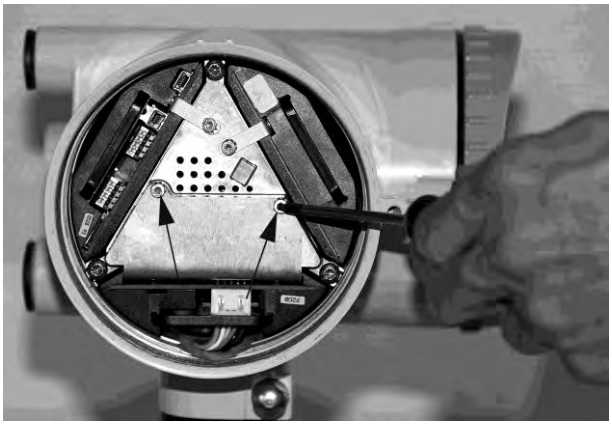
3. Carefully remove display and cable plug.

Note

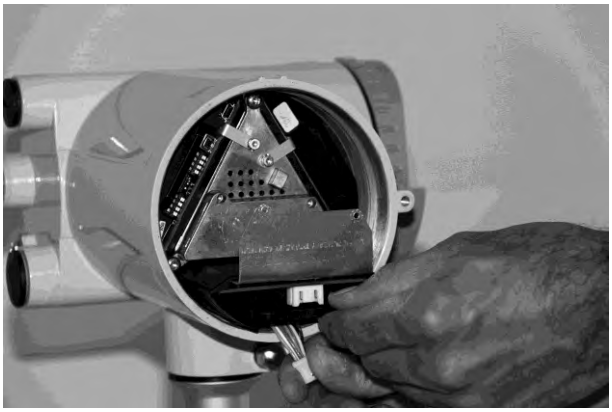
Use a screwdriver, tool no. 11, to release the display as shown in photo below.

The display is held in place with three clips.

4. Using tool no. 8, remove the two screws that hold the sensor interface cassette.



5. Pull out the sensor interface module to the position shown in the photo, and disconnect the cable plug while lifting the catch.



6. Remove the sensor interface cassette.

Install new sensor interface cassette

1. Hold down the cable while pushing the new application electronic to the position shown in the photo.

2. Reconnect cassette cable plug until the catch clicks. Push the cassette back in place, and tighten the two screws.
3. Reinstate the display and the display lid, see Replacing the DSL cassette (Page 60) .

Return the device to operation

1. Restore power to the device.
2. Check that the device starts up as expected. If possible watch the display during startup and observe the device versions for consistency.

5.6.2 Replacing the I/O cassette

- I/O cassette, order no. A5E03939114
- Exploded view: position 17, see
- Tools: SIMATIC PDM, USB cable, mechanic tools: no[s]. 3, 8, 9, 11, see Toolkit (Page 49)

Remove sensor I/O cassette

1. Isolate the device from power.
2. Using tool no. 9, unscrew the locking screw of the display and remove the display lid using tool no. 3 as a wrench bar if necessary.

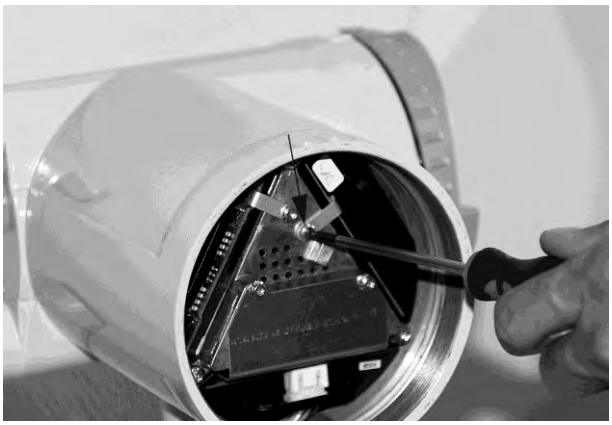
3. Carefully remove display and cable plug.

Note

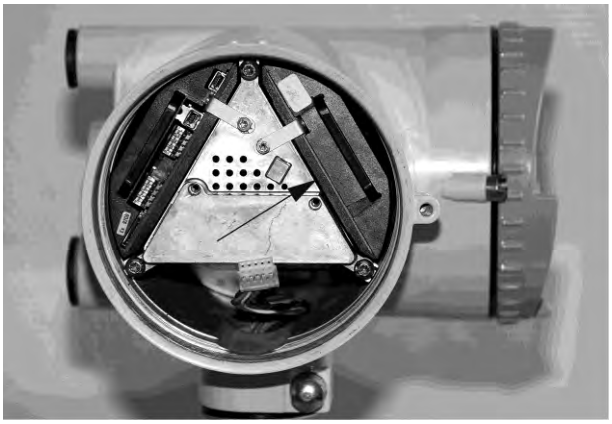
Use a screwdriver, tool no. 11, to release the display as shown in photo below.

The display is fixed with three clips.

4. Using tool no. 8, remove the screw holding the I/O cassette.



5. Pull out the I/O cassette.



Install new I/O cassette

Proceed as follows to insert new I/O cassette:

1. Insert new I/O cassette and tighten the screw.
2. Reinstate the display and the display lid, see Replacing the DSL cassette (Page 60).

Return the device to operation

1. Restore power to the device.
2. Check that the device starts up as expected. If possible watch the display during startup and observe the device versions for consistency.

5.6.3 Replacing the power supply

- Power supply module, order no.: A5E03549413
- Exploded view: position 10, see
- Mechanic tools: nos. 1, 3, 7, 8, 9, 11, see Toolkit (Page 49)

Remove power supply cassette

1. Isolate the device from power.
2. Using tool no. 9, unscrew the locking screw of the display and remove the display.

3. Carefully remove display and cable plug.

Note

Use a screwdriver, tool no. 11, to release the display as shown in photo below.

The display is held in place with three clips.

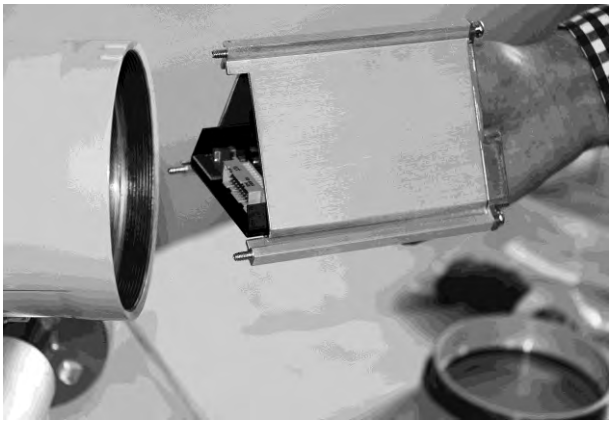
4. Remove the sensor interface cassette, see Replacing the sensor interface cassette (remote version) (Page 69) or Replacing the sensor interface cassette (compact version) (Page 64)
5. Remove transmitter cassette, see Replacing the transmitter cassette (Page 67)
6. Remove I/O cassette, see Replacing the I/O cassette (Page 72)
7. Using tool no. 7, unscrew three fixing screws for power supply cover and pull out the cover.

8. Using tool no. 1, pull out the triangular housing with the power supply cassette.

Installing the new power supply cassette

Proceed as follows to insert new sensor interface cassette:

1. Place the new power supply in the triangular housing and carefully reinsert it into the transmitter.



2. Reinstall I/O cassette, transmitter cassette and sensor interface cassette, see corresponding instructions.
3. Reinstate the display and the display lid, see Replacing the DSL cassette (Page 60) .

Return the device to operation

1. Restore power to the device.
2. Check that the device starts up as expected. If possible watch the display during startup and observe the device versions for consistency.

5.7 Upgrading the application from hardware revision 1 to 2

Contact factory service and support for instructions on upgrade from hardware revision 1 to hardware revision 2 (sales release 1 to sales release 2).

5.8 Ordering

In order to ensure that the ordering data you are using is not outdated, the latest ordering data is always available on the Internet:
http://www.siemens.com/processinstrumentation/catalogs
(http://www.siemens.com/processinstrumentation/catalogs)

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For more information

www.siemens.com/flow

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Nordborgvej 81
DK-6430 Nordborg

Subject to change without prior notice
Order No.: A5E03736884
Lit. No.: A5E03736884-002

A5E03736884

www.siemens.com/processautomation