SIEMENS

SITRANS F
Coriolis Flowmeters
SITRANS FC410 flowmeter
Quick Start

Before installing, including in hazardous areas, refer to the Operating Instructions on the internet or on the SITRANS F documentation CD-ROM which is included in the product package. They contain detailed safety regulations, information and specifications which must be observed when installing. Documentation and approvals can be found on the internet:

Flow documentation (http://www.siemens.com/flowdocumentation)

⚠ **CAUTION**

Proper handling

Correct, reliable operation of the device requires proper transport, storage, positioning and assembly. The device must be carefully operated and maintained. Only qualified personnel should install or operate this device.

Items supplied

With M12 plug connection

- SITRANS FC410 flowmeter
- Sensor cable with M12 connector
- SD card with production certificates
- Quick Start guide
- CD containing software, certificates and device manuals
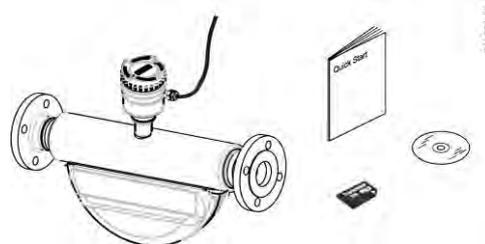
With sensor terminal housing

- SITRANS FC410 flowmeter
- Sensor cable
- Packet of cable glands
- SD card with production certificates
- Quick Start guide
- CD containing software, certificates and device manuals
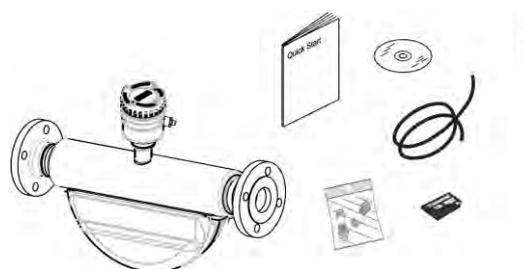
Note

Supplementary information

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

Note

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

How to install   1

Flowmeter overview
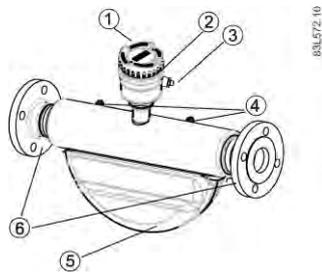
①   Mini Flow Link (MFL)
②   Lid-lock
③   Cable feed-through (M12 socket or gland)
④   Plug and threaded port for e.g. pressure guard
⑤   Sensor enclosure
⑥   Process connections

Installing/mounting

Location in the system

The optimum location in the system depends on the application:

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

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

  - Install the flowmeter in low pipeline sections, at the bottom of a U-section in the pipeline.
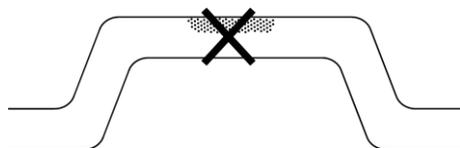
Figure 3-1   Liquid applications, wrong location with trapped air/gas

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

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

  - Install a filter.
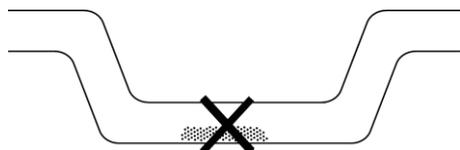
Figure 3-2   Gas applications, wrong location with trapped oil

Flow direction

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

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

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

Orienting the sensor

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

1. Vertical installation with an upwards flow (self-draining)
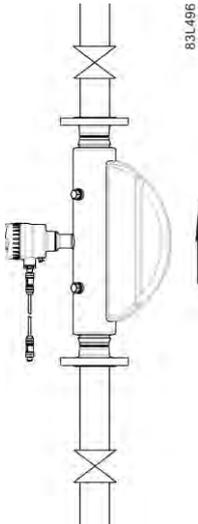
Figure 3-3   Vertical orientation, upwards flow

2. Horizontal installation, tubes down (recommended for liquid applications)
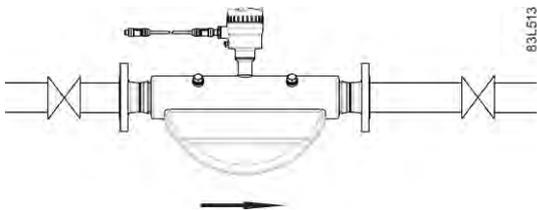
Figure 3-4   Horizontal orientation, tubes down

3. Horizontal installation, tubes up (recommended for gas applications)
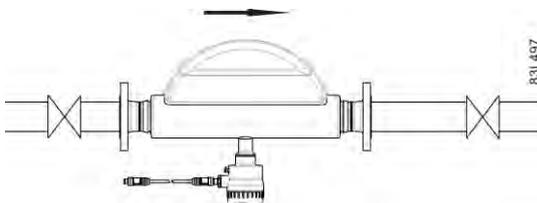
Figure 3-5   Horizontal orientation; tubes up

Installation in a drop line

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

①   Back pressure orifice
②   On / off valve

Figure 3-6   Installation in drop line

Mounting the device

NOTICE
Incorrect mounting
The device can be damaged, destroyed or its functionality impaired through improper mounting.
•   Before installing ensure there is no visible damage present on the device.
•   Make sure that process connectors are clean, and suitable gaskets and glands are used.
•   Mount the device using suitable tools.

⚠ WARNING
Unsuitable connecting parts
Danger of injury or poisoning.
In case of improper mounting hot, toxic and corrosive process media could be released at the connections.
•   Ensure that connecting parts (such as flange gaskets and bolts) are suitable for connection and process media.

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

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

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

Note

Handling

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

Avoid vibrations

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

- Decouple vibrating pipeline from the flow sensor using flexible tube or couplings.
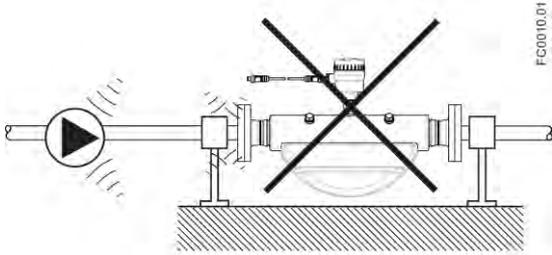
Figure 3-7   Non-flexible pipes not recommended in vibrating environment
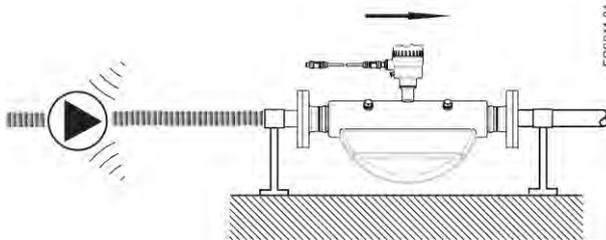
Figure 3-8   Flexible pipes recommended in vibrating environment

Avoid cross talk

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

Prevent cross talk in one of the following ways:

- Mount sensors on separate frames

- Decouple the pipeline using flexible tube or couplings
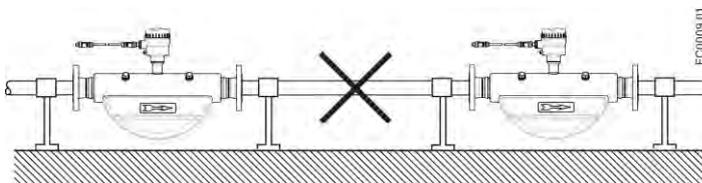
Figure 3-9   High risk of cross talk when using non-flexible pipes
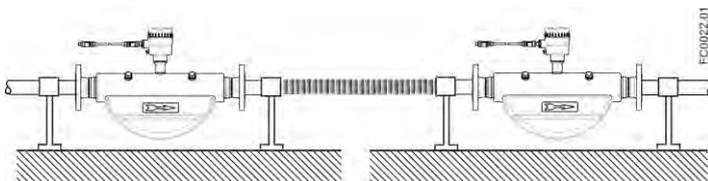
Figure 3-10   Low risk of cross talk when using flexible pipes and separate frames

Connecting

Note

End Of Line (EOL) termination

The FC410 EOL termination DIP switch is default set to EOL active. To change termination setting see Setting the EOL termination DIP switches (Page 8).

M12 version

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

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

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

Note

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

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

   Note

   Grounding

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

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

Cable termination version

A: Prepare the cable by stripping it at both ends.
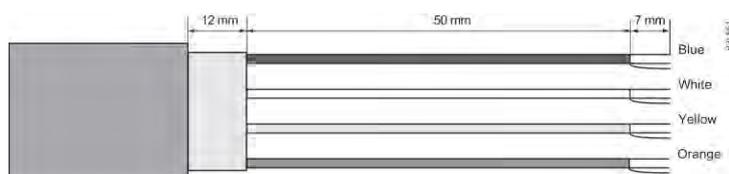
Figure 4-1   Cable end

B: Connect wires within the sensor terminal space

1. Remove the lock screw and remove the lid.

2. Undo the flexible strap.

3. Disconnect the sensor connection (white plug) from the electronic.

4. Loosen the mounting screw using a TX10 Torx driver and remove the electronic from the housing.

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

6. Push the cable through the open gland and anchor the cable shield and the wires with the clamp bar.

7. Remove the terminal block from the electronic.

8. Connect the wires to the terminals according to the list below and the label on the DSL lid.

Terminal number	Description	Wire color (Siemens cable)
1	24 VDC	Orange
2	0 VDC	Yellow
3	B	White
4	A	Blue
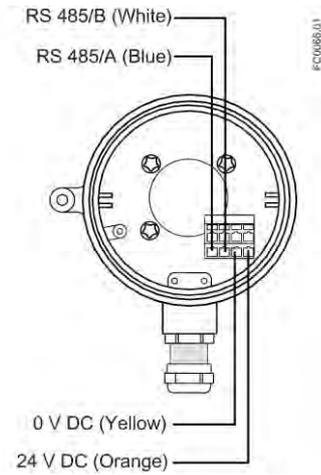
Figure 4-2   Sensor terminal space

Figure 4-3   Terminal 2

1. Reinstall the electronic including the mounting screw.

2. Connect the sensor connection and the sensor cable.

3. Restore the flexible strap around all wires.
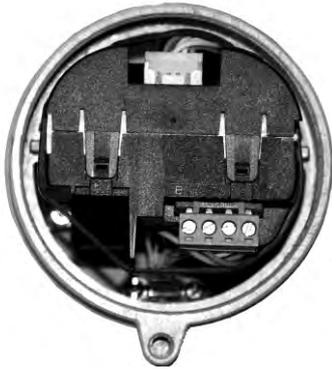
Figure 4-4   Terminal 1

4. Assemble and tighten the cable gland.

5. Remove the O-ring from lid.

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

7. Mount the O-ring by pulling it over the lid and tighten 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.

8. Reinstate and tighten the lid lock screw.

Setting the EOL termination DIP switches

It is important to terminate the Modbus RS 485 line correctly at the start and end of the bus segment since impedance mismatch results in reflections on the line which can cause faulty communication transmission.

If the device is at the end of the bus segment, it is recommended to terminate the device as shown in Auto hotspot. The table below shows the relation between the DIP switch settings and the permissible communication interface set-ups. Default configuration is EOL active.

Location of DIP switch

The DIP switch is located in the electronic as shown below.
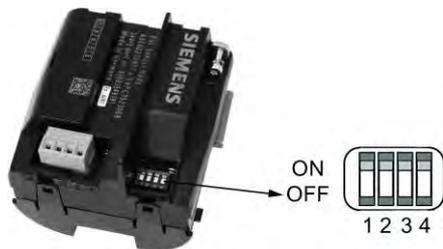
Figure 4-5   DIP switch location (all set to ON)

DIP switch settings for communication set-up

DIP switch Communication set-up	Switch 1	Switch 2	Switch 3	Switch 4
EOL not active	On	On	Off	Off
EOL active	On	On	On	On

NOTICE
Avoid DIP switch settings not mentioned in the table!
DIP switch settings not mentioned in the table above are not allowed and will cause a risk of reduction in communication interface reliability.

System configurations

Non-hazardous locations

The following figures show examples of installations in point-to-point and multidrop configurations in non-hazardous locations.
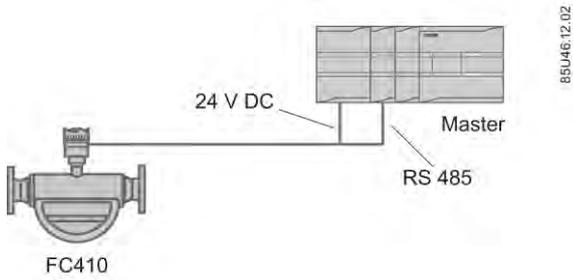
Figure 4-6   Point-to-point configuration in non-hazardous location
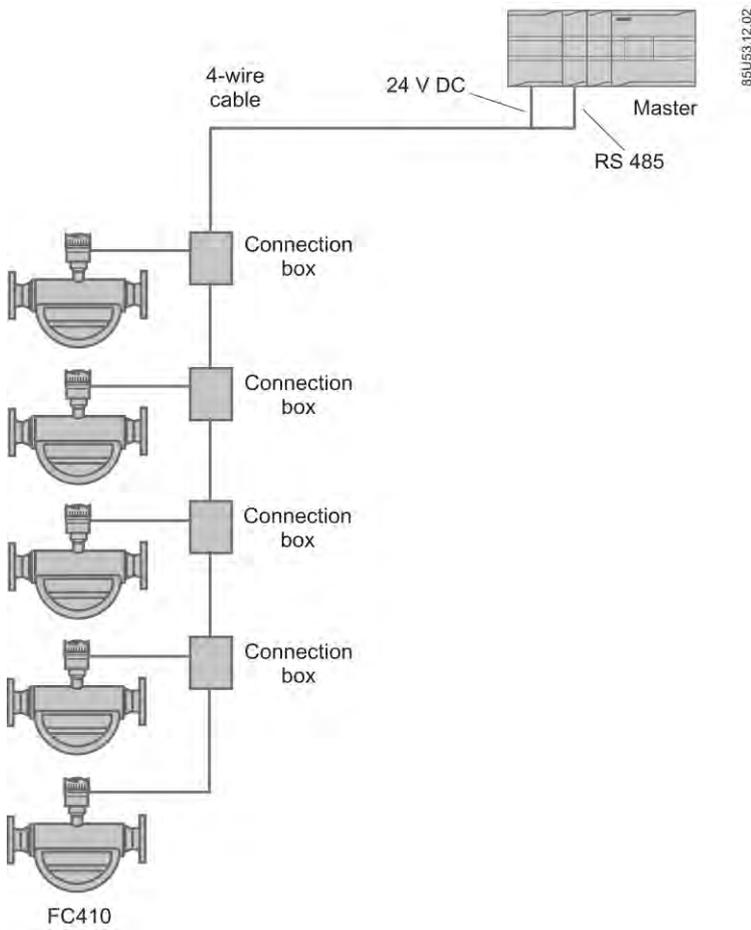
Figure 4-7   Multidrop configuration (branch) in non-hazardous location
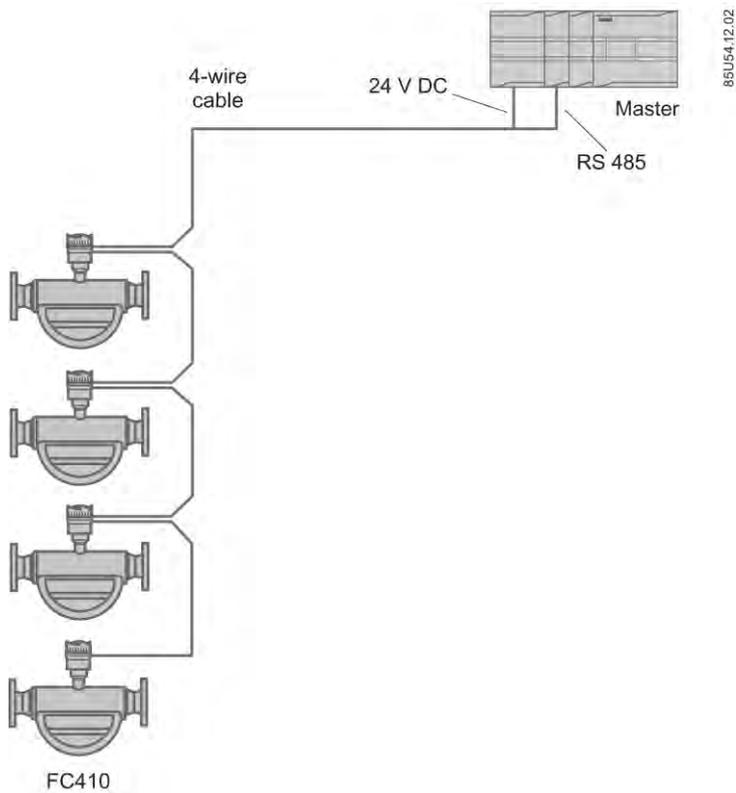
Figure 4-8   Multidrop configuration (Daisy chain) in non-hazardous location

Hazardous locations

The following figures show examples of installations in point-to-point and multidrop configurations in hazardous locations.
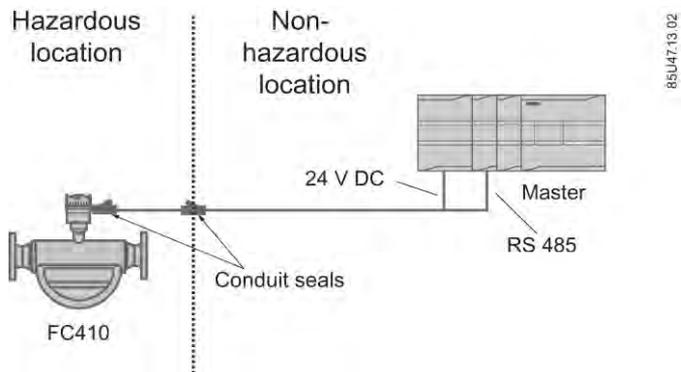
Figure 4-9   Point-to-point configuration in hazardous location
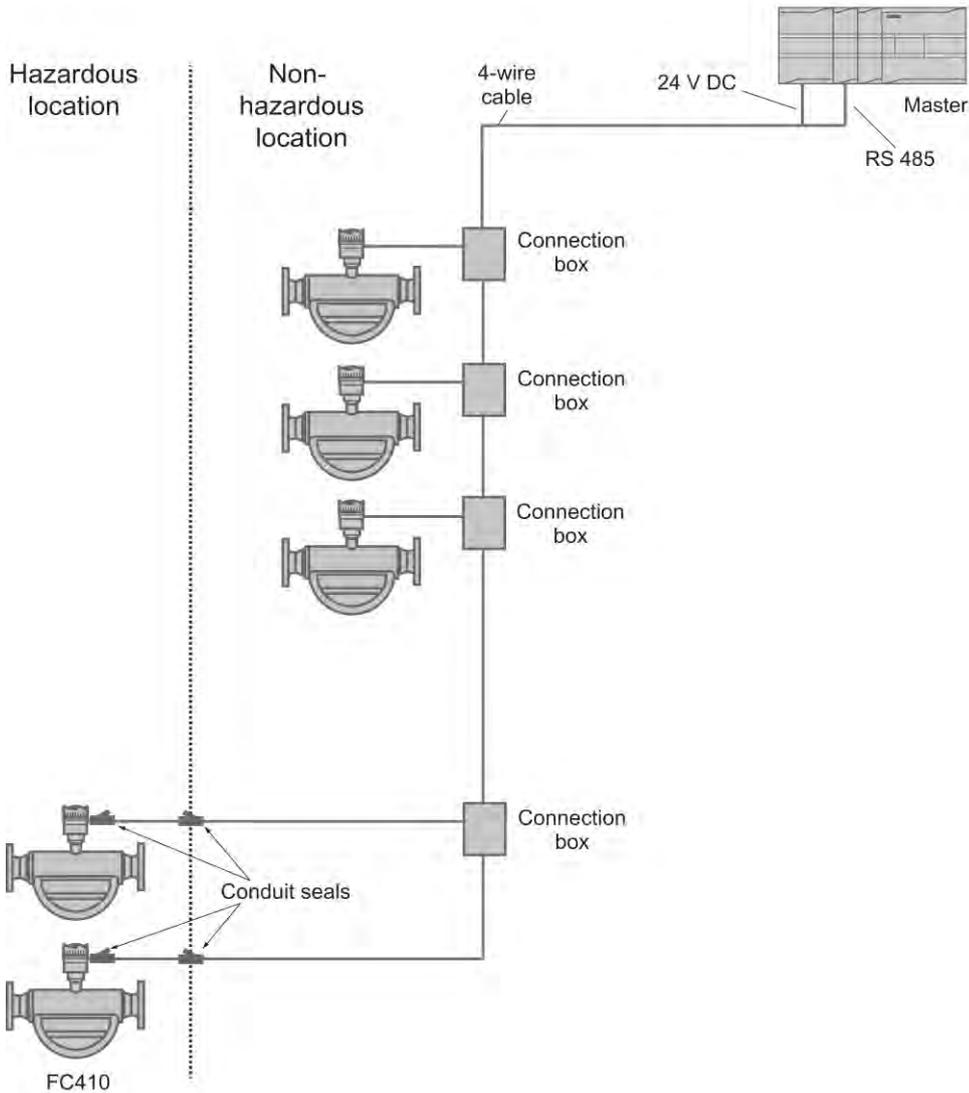
Figure 4-10   Multidrop configuration in hazardous location

NOTICE
Flameproof conduit seals
Two flameproof conduit seals are required for each device in hazardous area installations.

NOTICE
Equipment approved for hazardous locations
Ensure that the equipment is approved for installation in hazardous locations.

Wiring FC410 to the Modbus system

FC410 is slave in a 2-wire Modbus RTU RS 485 bus system where transmitter A must be connected to receiver A and transmitter B must be connected to receiver B. This corresponds to a half-duplex communication where the slave will only reply to a request from the master.

When joining the cables by short branch cables in a multidrop configuration, it is recommended to use EMC shielded enclosure to ensure proper signal installation.

- This example shows an EMC shielded enclosure for multidrop installation where the connection includes signal and power. Signal cable screen should be connected according to national requirements.
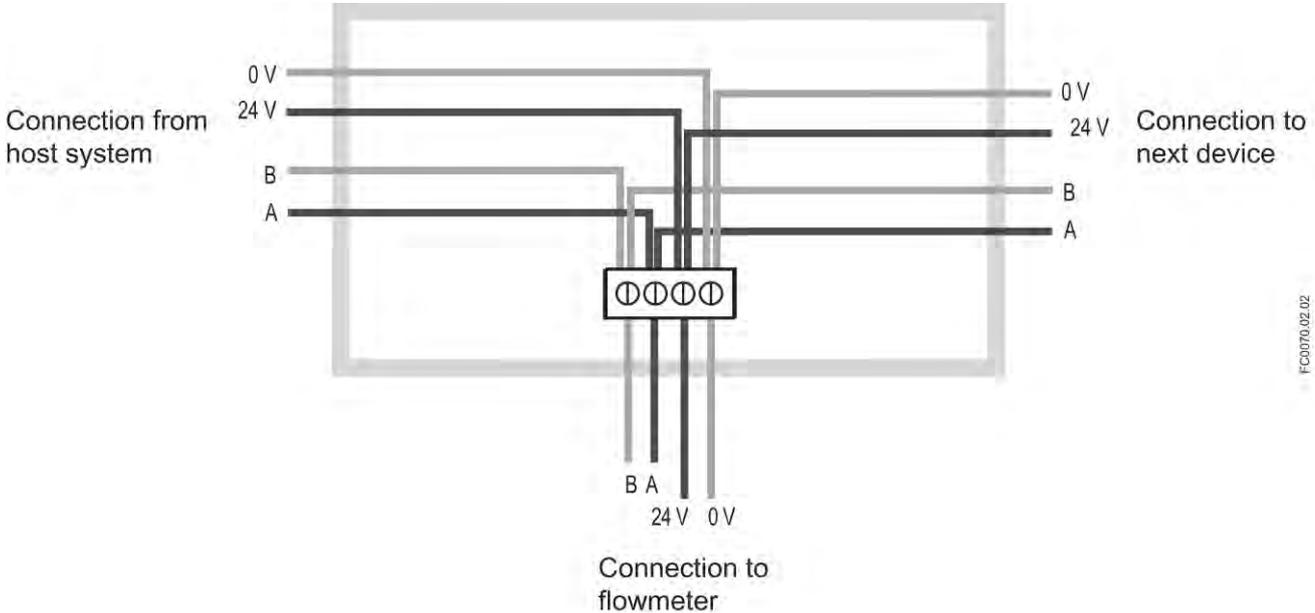
Wizard - Quick Start via PDM

Wizard - Quick Start via PDM

The graphic Quick Start Wizard provides an easy 5-step procedure that configures the device for a simple application.

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

1. If you have not already done so, check that you have the most up-to-date Electronic Device Description (EDD) for your instrument.
2. Launch SIMATIC Manager and create a new project for FC410. (Application Guides for setting up Modbus devices with SIMATIC PDM can be downloaded from the product page of our website at: www.siemens.com/FC410).

Access level control

The parameters are protected against changes by access level control. To gain access, select "Access Management" from the device menu, select "User" and enter the PIN code.

The default user PIN code is "2457".

Quick start

Note

- The Quick Start wizard settings are inter-related and changes apply only after you click on "Apply and Transfer" at the end of step 5 to save settings offline and transfer them to the device.
- Do not use the Quick Start Wizard to modify individual parameters.
- Click on "Back" to return and revise settings or "Cancel" to exit the Quick Start.

Launch SIMATIC PDM, open the menu "Device – Wizard - Quick Start", and follow steps 1 to 5.
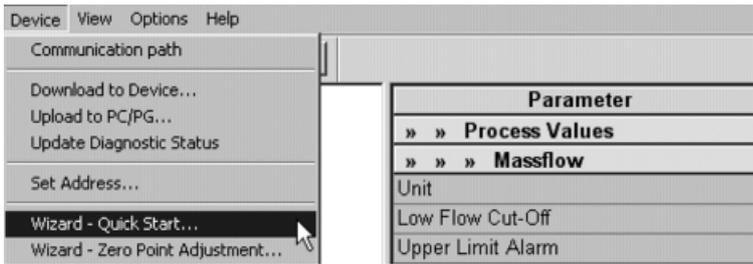
Step 1 - Identification

Note

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

1. Click on "Read Data from Device" to upload Quick Start parameter settings from the device to the PC/PG and ensure PDM is synchronized with the device.

2. If required, change the language for the local user interface.

3. Click on "Next" to accept the default values. ("Descriptor", "Message", and "Date" fields can be left blank.)
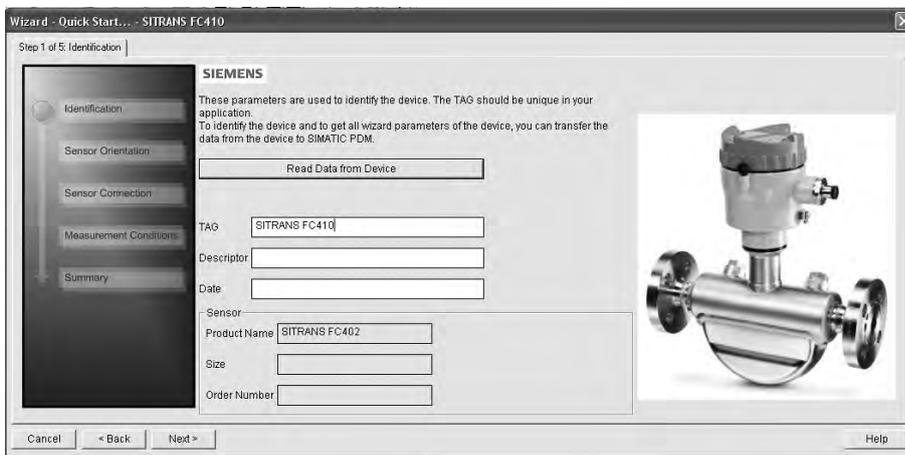
Figure 5-1   Quick start step 1

Step 2 - Sensor orientation

Select the application type (gas or liquid) and sensor orientation, then click on "Next".
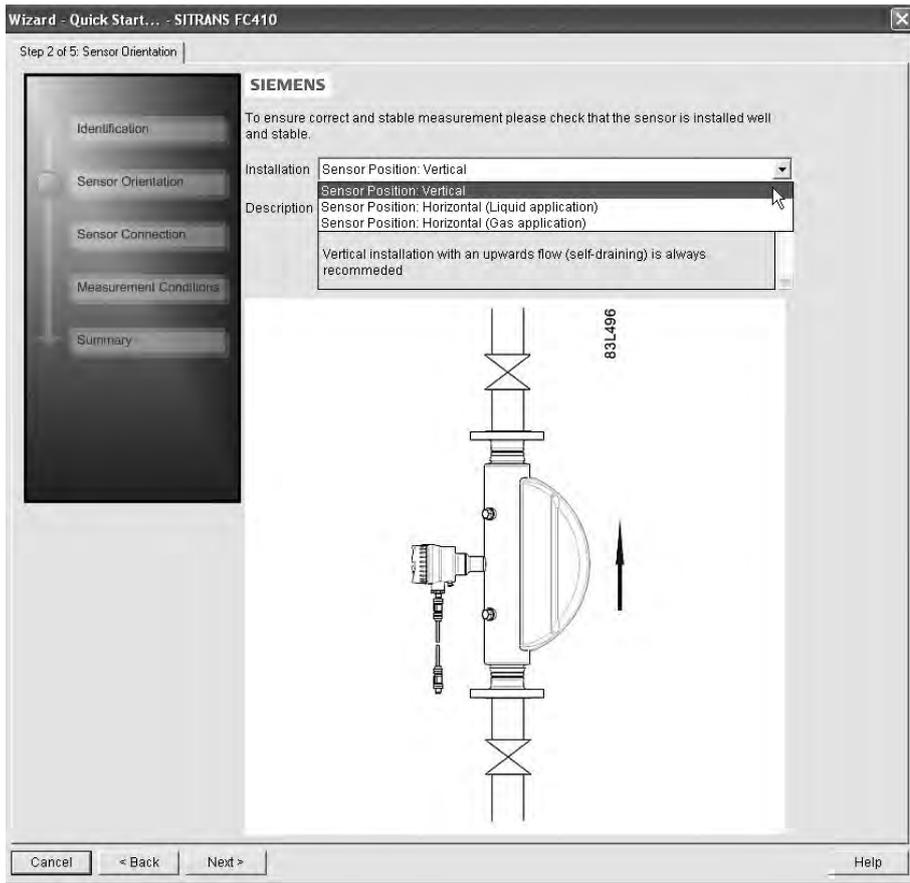
Figure 5-2　Quick start step 2

Step 3 - Sensor connection

An FC410 can be ordered with M12 connection or with terminated cable (for example conduit connections)

Terminal number	Description	Wire color (Siemens)
1	+15 V DC	Orange
2	0 V DC	Yellow
3	B	White
4	A	Blue
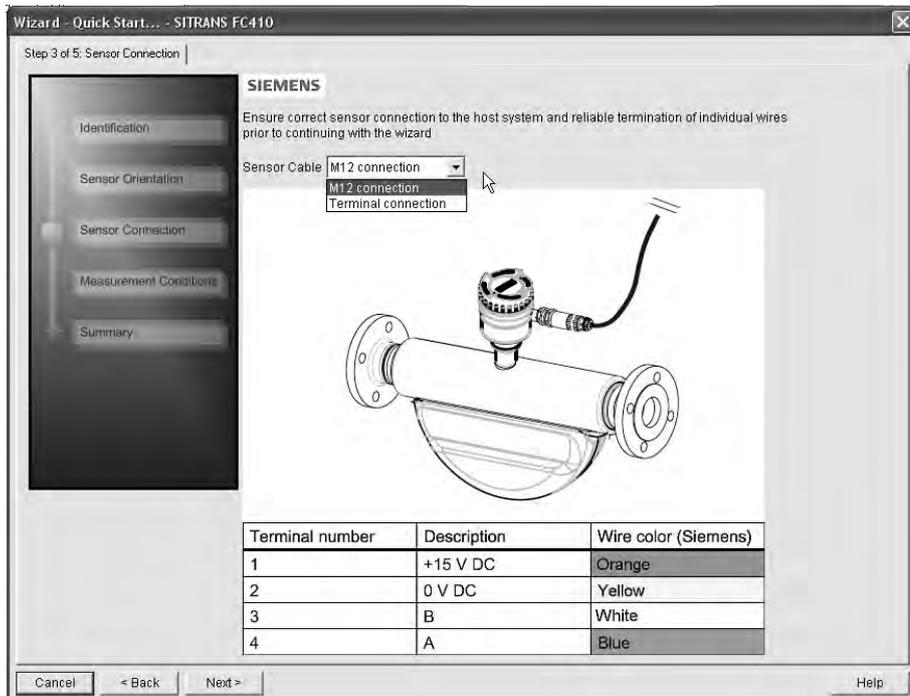
Figure 5-3　Quick start step 3

SITRANS FC410 flowmeter
A5E33120231-001, 12/2013

Step 4 - Measurement conditions

Configure the measurement conditions for the selected process variables. Change "Flow Direction" if necessary.
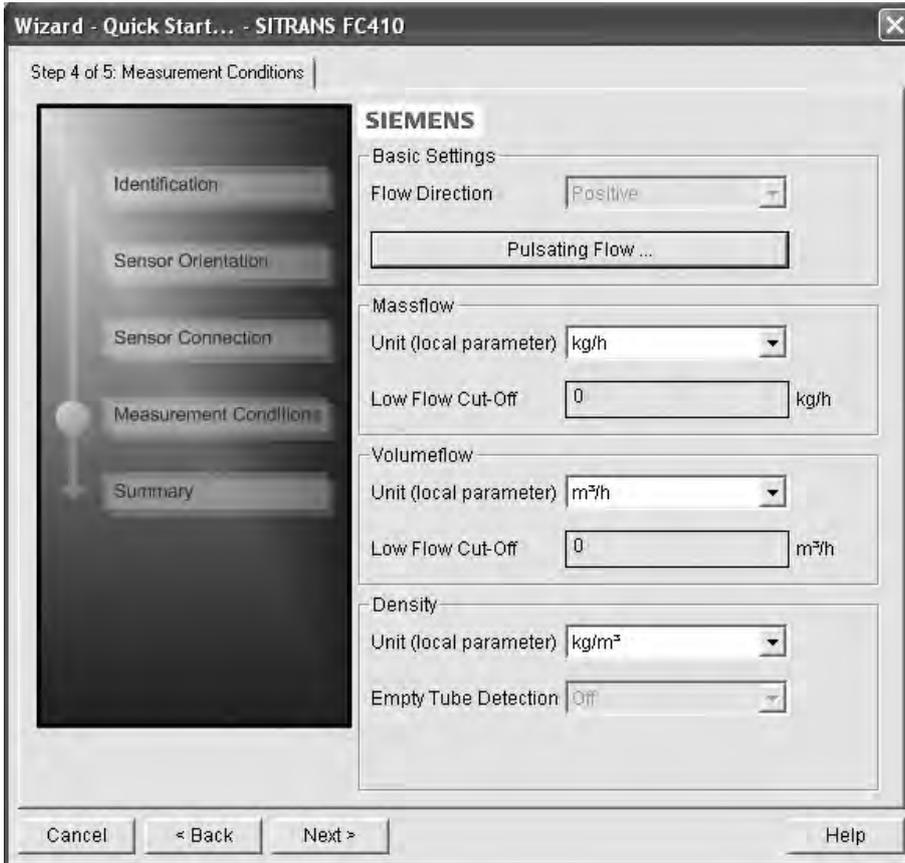
Figure 5-4   Quick start step 4

Reduce the sensitivity of the flow measurement signal by clicking on the "Pulsating Flow" button and selecting the appropriate filter.
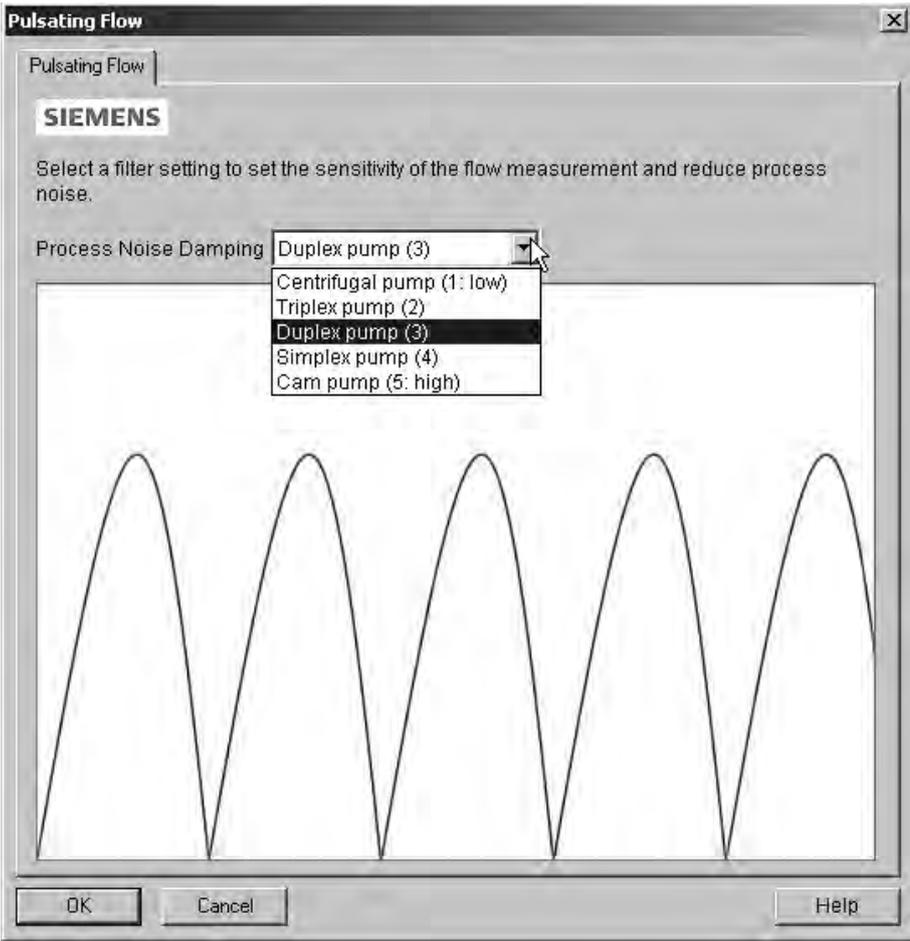
Figure 5-5   Filter setting selection

Step 5 - Summary

Check parameter settings, and click on "Back" to return and revise values, "Apply" to save settings offline, or "Apply and Transfer" to save settings offline and transfer them to the device.
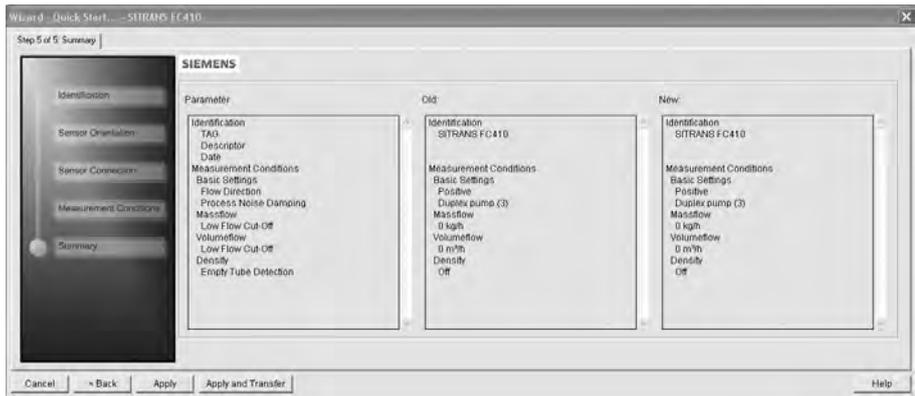
Figure 5-6   Quick start step 5

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

Zero point adjustment

The flowmeter system is optimized through a zero point adjustment.

Performing a zero point adjustment

Note

Preconditions

Before a zero point adjustment is initiated, the pipe must be flushed, filled and at an absolute flowrate of zero preferably also at operating pressure and temperature.

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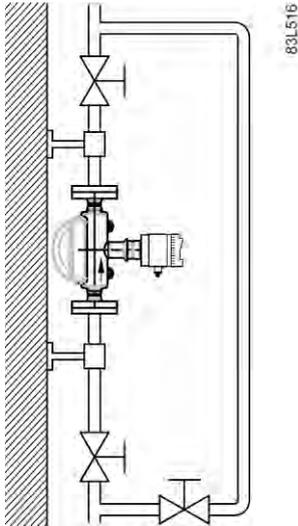
Figure 6-1   Best practice zero point adjustment with a by-pass line and two shut-off devices

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

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

4. Select "Device->Wizard - Zero Point Adjustment" from the main menu of SIMATIC PDM to perform an automatic zero point adjustment.
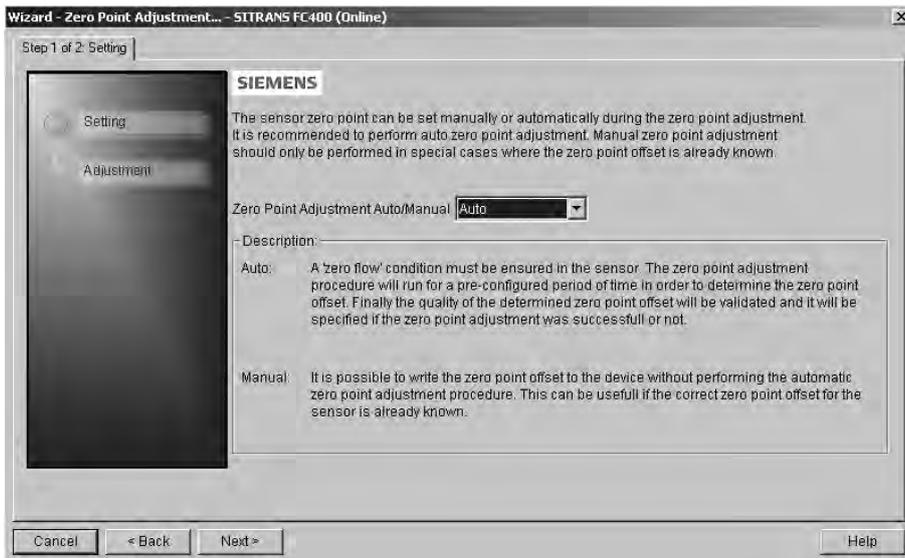
5. Click "Next" and then "Auto Zero Point Adjust".

6. During the process a progress bar is visible.

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

Note

If zero point adjustment cannot be successfully performed, an alarm message will be reported in PDM. Improve your zero point adjustment and repeat the procedure.

The system is now ready for normal operation.