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SENSIRION SFC5 Series Mass Flow Controller or Meter User Manual

Recalibration Tool – SFC5XXX / SFM5XXX – Mass Flow Controller / Meter

Summary
This document is a manual for the installation and usage of the "SFC5xxx Recalibration Tool" software for recalibration of Sensirion's mass flow controllers / meters.
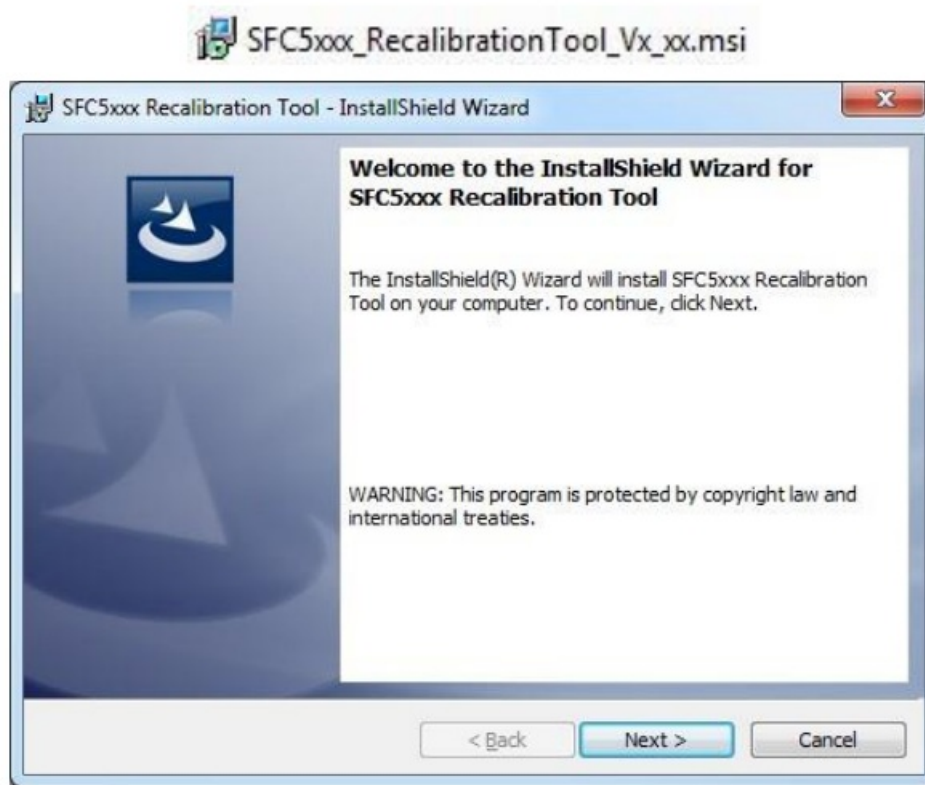
Software installation

1.1. SFC5XXX recalibration tool
• Double-click the SFC5xxx_RecalibrationTool_Vx_xx.msi file to start the installer and follow the onscreen instructions.

Note: This software requires Microsoft .Net Framework 3.5. On most computers with Windows XP or newer this software should be pre-installed. If not, you can download it from the Microsoft website.

1.2. Virtual com port driver

- Plug the RS485-to-USB adapter cable into the computer and wait for the automatic driver installation.
- If automatic installation does not take place you have to do this manually. The Virtual Com Port (VCP) driver can be downloaded here (be sure to choose the correct version: 64/32 bit operation system):
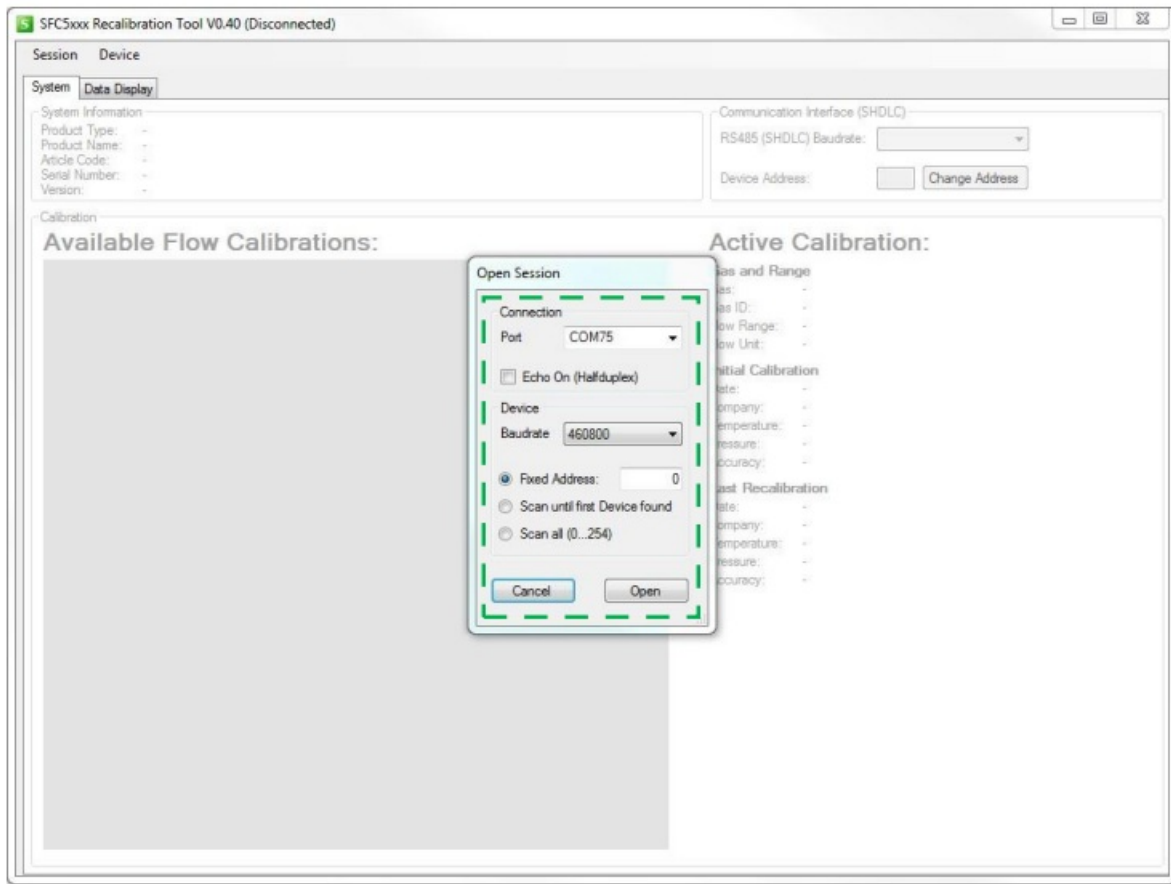 **http://www.ftdichip.com/Drivers/VCP.htm**

Software manual

2.1. Start recalibration tool
Start → All Programs → Sensirion AG → SFC5xxx Recalibration Tool

Sensirion AG
S SFC5xxx Recalibration Tool

2.2. Connect to the device

Make sure that the MFC is connected to the computer and powered correctly.

- Select the COM-Port/USB-Serial-Port that is connected to the Mass Flow Controller.
- Set an appropriate baud rate (default is 115200) and RS485 address (default value is 0).
- Click "Open".

Write down your settings if you have changed the connection parameters (see chapter):
Baudrate: ………………………….
Address: ………………………….
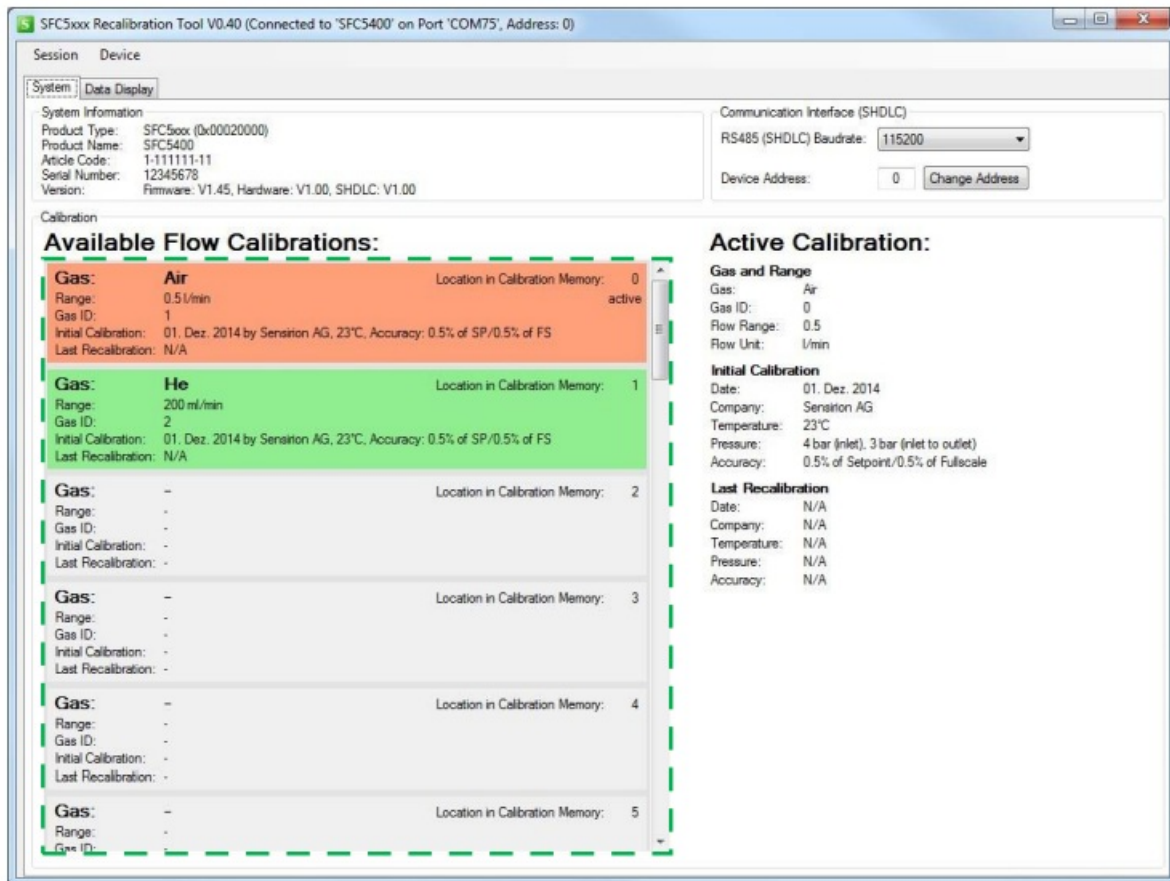
2.3. Main window
2.3.1. Select calibration
After you have successfully connected to the MFC, you should see a list of calibrations, as shown in the picture below.

Active calibration is highlighted in red.
If more than one calibration is stored on the MFC, all non-active calibrations are shown in green.
Unused calibration fields are grey.

- Above the list of calibrations, you can see system information from the MFC and on the right side you will find information about the calibration which is currently activated.
- You can select the appropriate gas calibration from the multigas selection "Available Flow Calibrations" by right clicking on the calibration → Load Calibration.

2.3.2. Change baud rate / device address

- To change the baud rate, select another baud rate from the drop down list. You will be asked if you want to change the baud rate. → Click "Yes".
- To change the address, enter the new address from 0 to 254 into the address field and click "Change Address".

Note: The new baud rate and address will persist after a reset or power down. You will need it next time to connect.
Therefore, please write down the new settings on page 5.
2.4. Menu
2.4.1. Device: get device error state

- The SFC5xxx has an internal error status register. You can show the "Device Error State" window by clicking on the menu item Device → Get Device Error State.

Flag #	State	Flag Description
0	OK	System booted nomally
1	OK	No error in command post processing
2	OK	Input supply within range
3	OK	Valve supply within range
4	OK	Signal processor successful initialized
5	OK	Sensor communication OK
6	OK	Setpoint input OK
7	OK	Actuator output OK
8	OK	Signal output OK
9	OK	Signal buffer OK
10	ERROR	Gas pressure is too small for given setpoint
11	OK	-
12	OK	-
13	OK	-
14	OK	-
15	OK	-
16	OK	-
17	OK	-
18	OK	-
19	OK	-

- If e.g. gas supply pressure drops down and MFC can't reach the setpoint, the correspondent error status will turn red in the "Device Error State" list.

2.4.2. Reset

- You can perform a device reset by clicking on the menu item Device → Reset. This reset has the same behavior as a power down.

2.4.3. Device → factory reset

- If you click the menu item Device → Factory Reset, all settings are set to the factory settings. The gas-specific settings such as calibration are not affected by the factory reset.

2.4.4. Device →firmware update

- To update the firmware on the device click on the menu item Device → Firmware Update.
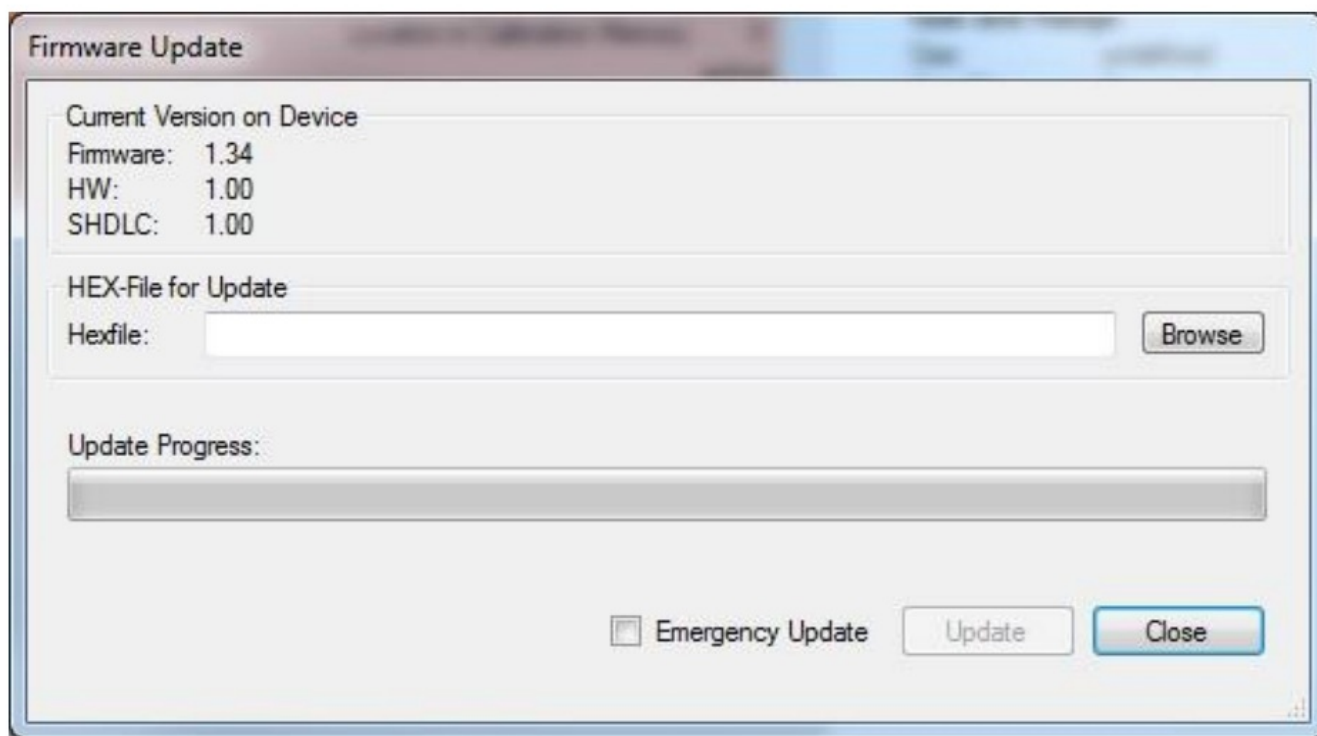
- Click Browse on the Firmware Update dialog window → open the firmware file (*.hex) → click Update. Do not unplug the device while the update is in progress!

Note: If the update process is interrupted by something and the device will no longer operate, there is one last chance.
You have to return to the firmware update dialog window (you may need to click away some error messages) → open the firmware file → select the Emergency Update check box → click Update.
Caution: Make sure that you load the correct firmware. The emergency update does not check if the firmware matches to the device. If an incorrect firmware is loaded, it is no longer possible to load another firmware.
### 2.4.5. Device → advanced settings/tools → user defined medium unit

- You can set the setpoint and read the current flow in your own unit. Here you can define this "User Defined

Medium Unit". When you set the setpoint or read the current flow value you can choose the flow scaling "User Defined Medium Unit".
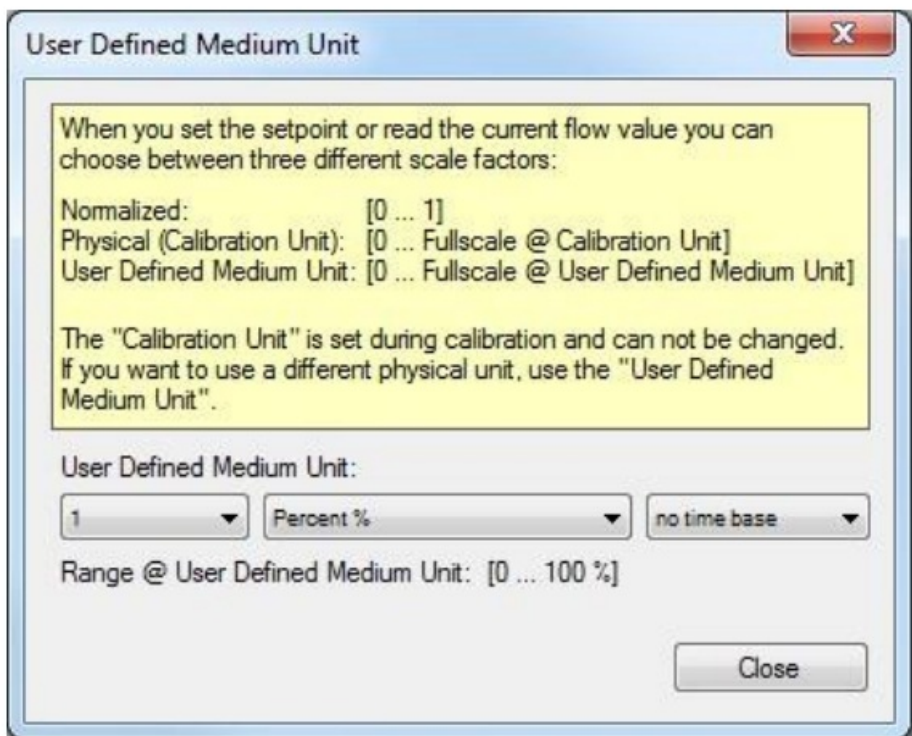
2.4.6. Device → advanced settings/tools → controller gain

- With the "User Gain" the speed of the controller can be adjusted.
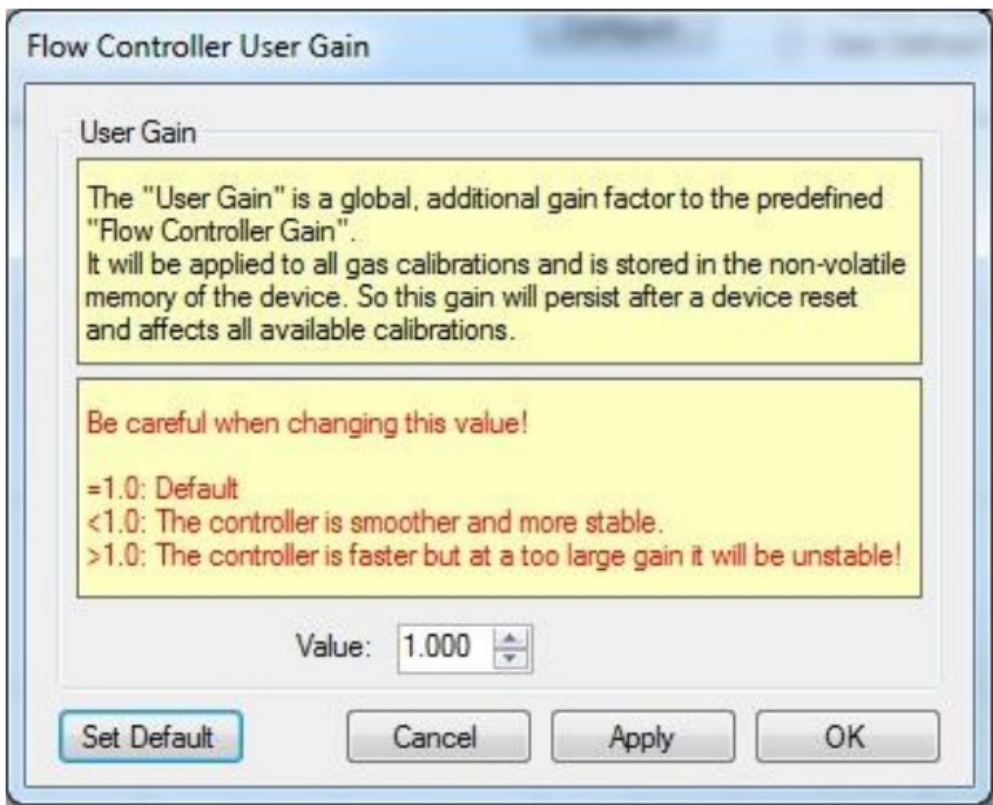

- The default value is 1.0.

- Use lower values for a smoother and more stable controller.
- Use higher values for a faster control behavior, but be careful as the controller may become unstable and start to oscillate!
- The gain parameter is global, so it will be applied to all available calibrations. It is saved in a non-volatile memory and preserved on reset/restart of the MFC device.

2.4.7. Device → advanced settings/tools → gas recognition tool

- The "Gas Recognition Tool" allows performing a check whether activated gas calibration is matching the media in the gas line. This is a safety feature which prevents wrong operation due to mistake of user etc.
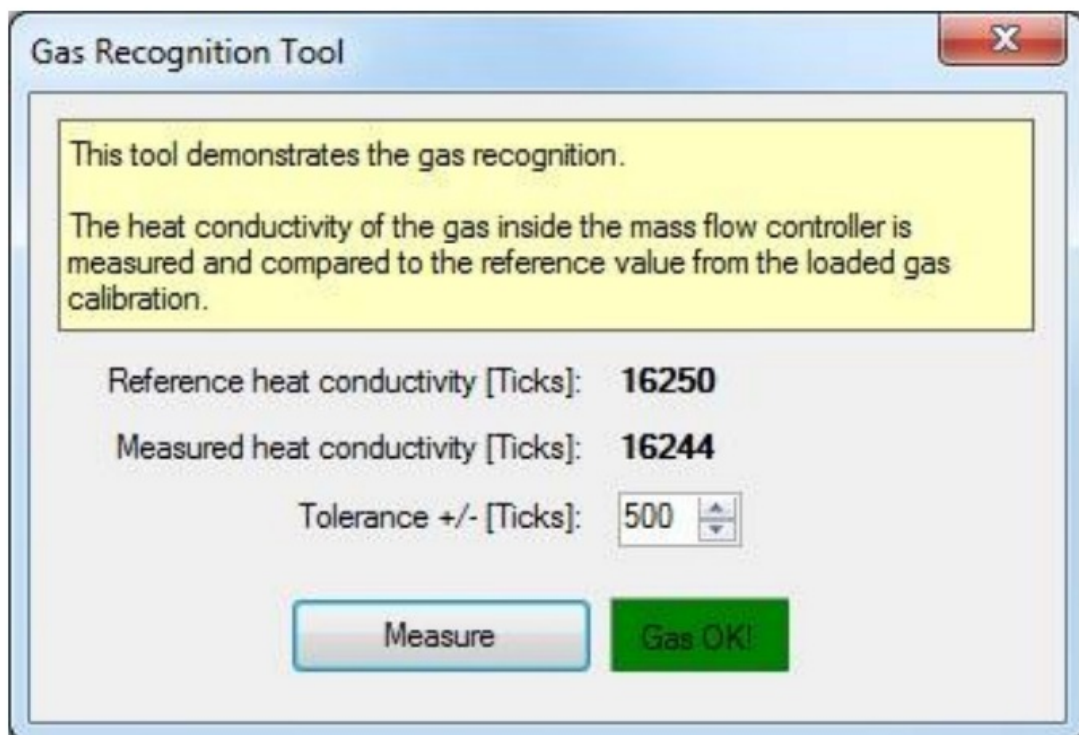
2.4.8. Device → advanced settings/tools → sensor temperature

- Displays the chip temperature of the flow sensor.
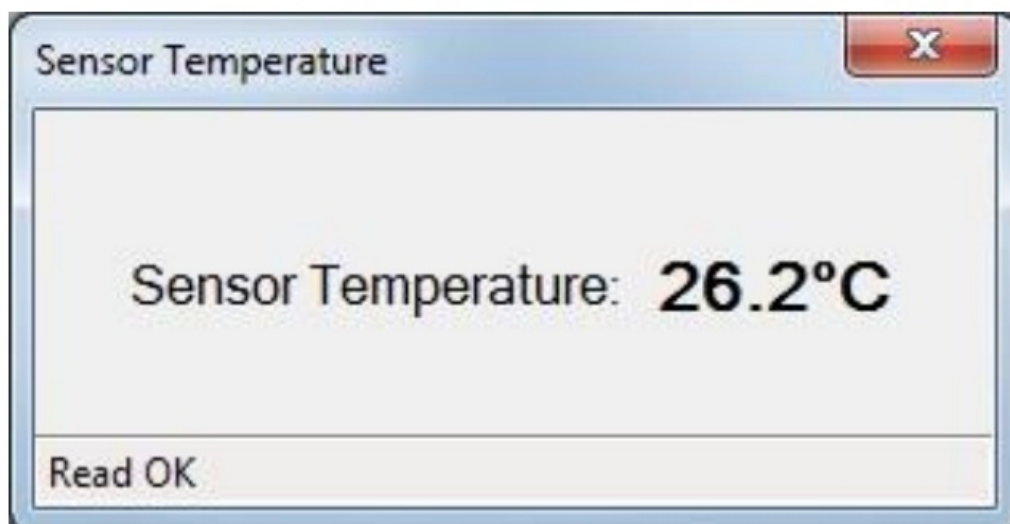
2.5. Create new calibration
You can create new gas calibrations based on existing calibration for a similar gas.

- To open the "Create new Calibration" window, right click in the main window on an empty, grey calibration field and choose from the context menu "Create new Calibration".
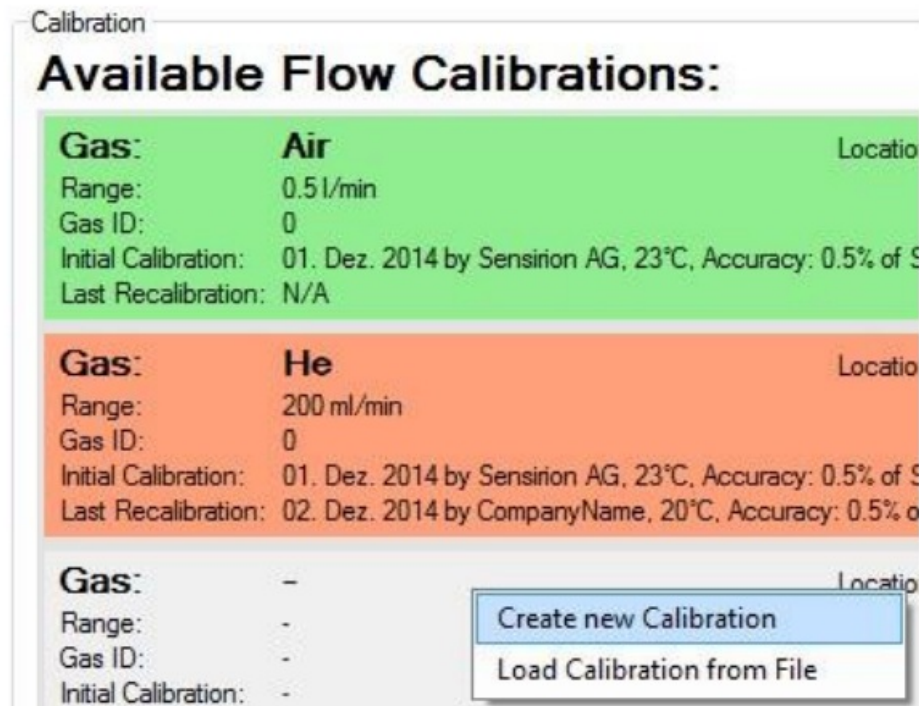
- Select an existing calibration with similar gas characteristics from the drop-down menu.

- Enter the calibration metadata and click "OK".
- Perform a recalibration to define a lookup table which translates the sensor measurements to the new gas calibration.

  → Please continue with chapter 2.6: Perform a Recalibration

2.6. Perform a recalibration

- Before starting the recalibration, you must make sure that the calibration which you want to recalibrate is activated (marked red). If it is not the case, right click on the desired calibration field and choose from the context menu "Load Calibration".

- To open the "Flow Recalibration" window, right click on the active (red) calibration field and choose from the context menu "Recalibrate".

The recalibration window, described in the next chapter, appears.

2.6.1. Recalibration window

If you open the "Flow Recalibration" window for the first time and selected a calibration that was not recalibrated before, "Flow Recalibration" window will look like the image below.
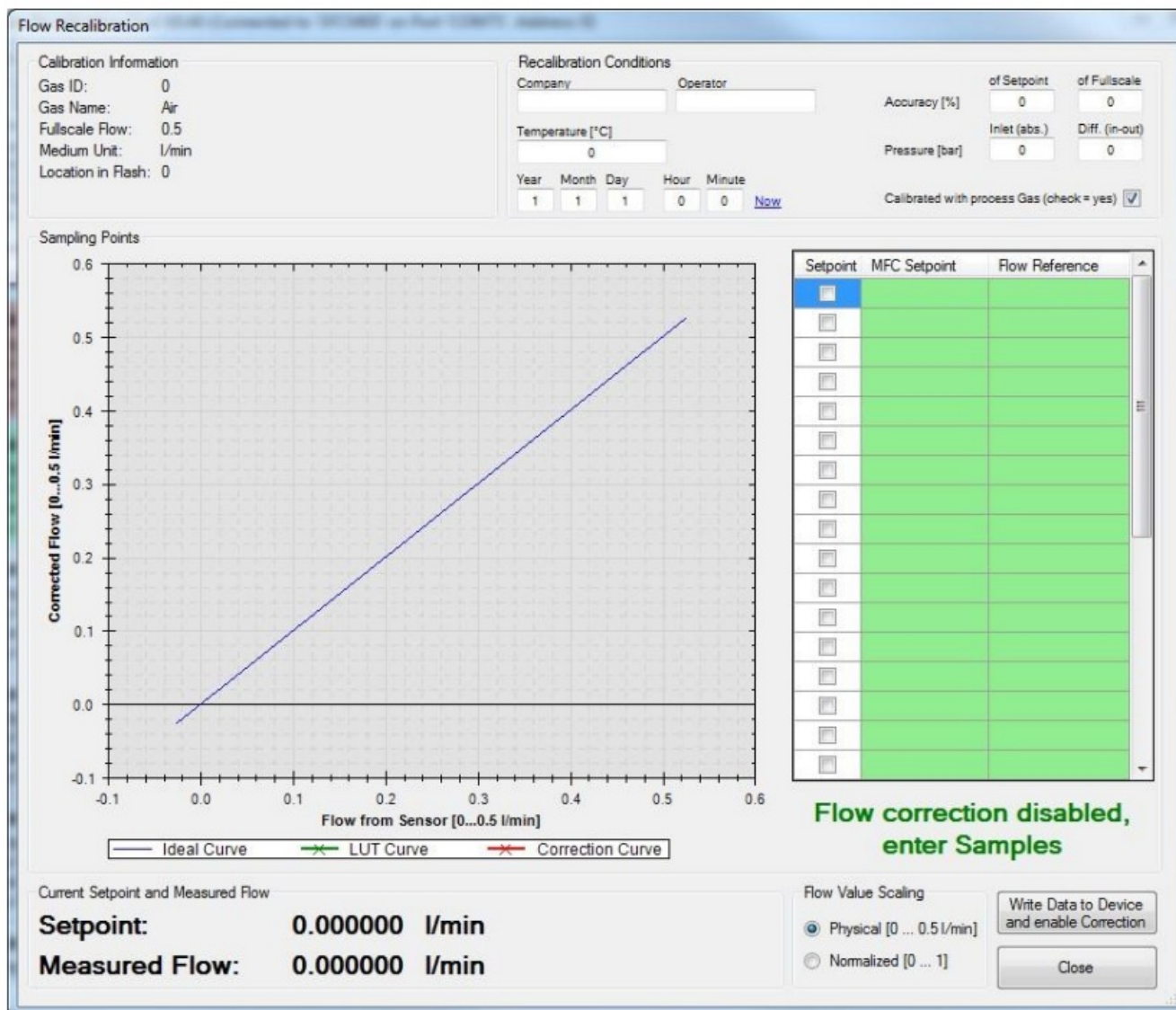
If the sensor has become inaccurate due to changes in environmental conditions or aging, the sensor readings can be corrected with an additional lookup table. With this tool you can find, set and verify the points for this lookup table. Instructions are described below in the document.
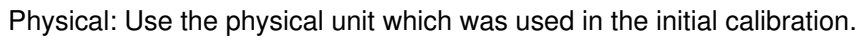
2.6.2. Recalibration metadata

On the top left part of the window, you can enter the metadata for the recalibration.

2.6.3. Physical/normalized flow values

- Choose the scaling for the flow values that you want to use to fill the lookup table.

Physical: Use the physical unit which was used in the initial calibration.

Normalized: Use values from 0 to 1 (1 corresponds to full-scale).

2.6.4. Fill lookup table

- Enter a series of setpoints in the green table to the column "MFC Setpoints".

- It is important that the process gas is connected to the MFC and the whole system including the reference flow meter is purged with it.
- Once the checkbox of the given setpoint is selected, MFC flow is set to the corresponding value. Measure the actual flow using a reference flow meter.

- Enter the reference reading in the column "Flow Reference".
- Repeat these steps for all setpoints (up to 31 points).
- When you have entered all the points of the lookup table, click the button "Write Data to Device and enable Correction".

Important:

- For the recalibration to be accurate, it is very important to include the measured reference flow (offset) at the 0 setpoint of the MFC in the lookup table.
  If you would like to recalibrate a mass flow meter (MFM), input the MFM flow reading in the left column of the lookup table, instead of the MFC setpoint. Insert the flow reference measurements in the right column.

2.6.5. Verify lookup table
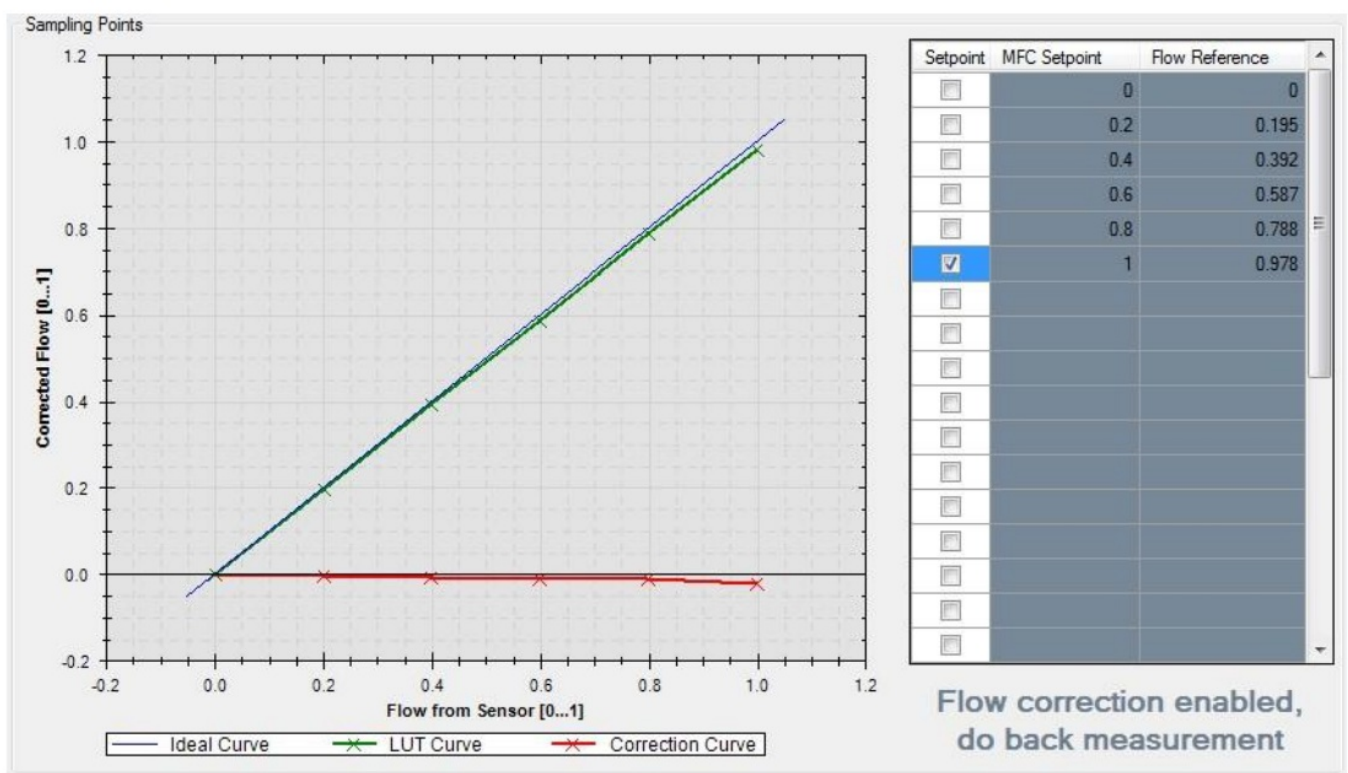
- The flow correction is activated and can be verified by selecting the setpoints again. Now, the mass flow controller reading and the reference flow meter reading should correspond to the selected setpoint.
- If no setpoint is selected, the setpoint is set to zero. The valve is then closed completely independent of the measured flow and flow correction.
- If any deviations are found, the recalibration procedure has to be repeated.
- If the result is good, the recalibration is complete and you can close the window using the "Close" button.

2.7. Edit calibration metadata

- To open the "Edit Calibration Metadata" window, right click on the main window on a calibration field and choose from the context menu "Edit Calibration Metadata".

Available Flow Calibrations:

- In this window you can change the metadata of a given calibration.

Important Notices

Warning, Personal Injury
Do not use this product as safety or emergency stop devices or in any other application where failure of the product could result in personal injury. Do not use this product for applications other than its intended and authorized use. Before installing, handling, using or servicing this product, please consult the data sheet and application notes. Failure to comply with these instructions could result in death or serious injury.

If the Buyer shall purchase or use SENSIRION products for any unintended or unauthorized application, Buyer shall defend, indemnify and hold harmless SENSIRION and its officers, employees, subsidiaries, affiliates and distributors against all claims, costs, damages and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if SENSIRION shall be allegedly negligent with respect to the design or the manufacture of the product.

ESD Precautions
The inherent design of this component causes it to be sensitive to electrostatic discharge (ESD). To prevent ESD-induced damage and/or degradation, take customary and statutory ESD precautions when handling this product. See application note "ESD, Latch up and EMC" for more information.

Warranty
SENSIRION warrants solely to the original purchaser of this product for a period of 12 months (one year) from the date of delivery that this product shall be of the quality, material and workmanship defined in SENSIRION's published specifications of the product. Within such period, if proven to be defective, SENSIRION shall repair and/or replace this product, in SENSIRION's discretion, free of charge to the Buyer, provided that:
• notice in writing describing the defects shall be given to SENSIRION within fourteen (14) days after their appearance;
• such defects shall be found, to SENSIRION's reasonable satisfaction, to have arisen from SENSIRION's faulty design, material, or workmanship;
• the defective product shall be returned to SENSIRION's factory at the Buyer's expense; and
• the warranty period for any repaired or replaced product shall be limited to the unexpired portion of the original period.

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Headquarters and Subsidiaries
Sensirion AG
Laubisruetistr. 50
CH-8712 Staefa ZH
Switzerland
phone: +41 44 306 40 00
fax: +41 44 306 40 30
info@sensirion.com
www.sensirion.com

Sensirion Taiwan Co. Ltd
phone: +886 3 5506701
info@sensirion.com

Documents / Resources

Recalibration Tool – SFC5XXX / SFM5XXX – Mass Flow Controller / Meter	**[SENSIRION SFC5 Series Mass Flow Controller or Meter](#)** [pdf] User Manual SFC5 Series, Mass Flow Controller or Meter, SFC5 Series Mass Flow Controller or Meter, Controller or Meter, Controller, Meter, SFM5 Series

References

- **[VCP Drivers - FTDI](#)**
- **[Smart sensor solutions](#)**
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