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sG 06.01 CT Manual A4 V2.0 (en)			
Edition	Date	Firmware	Comment
1.0	2021-03-02		Initial Version
1.1	2021-10-03		Updated Manual
1.2	2022-09-03	EVO V5.51 CT V1.12	Update EVO Firmware Version 5.51 Calibration Tool V1.12
2.0	2023-04-03	EVO V5.52 Connect V1.52 CT V1.21	Update EVO Firmware Version 5.52 and Connect Interface V1.52 Calibration Tool V1.21

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1 For your safety

- Read the instructions carefully before using the product.
- Follow the instructions. The user must fully understand and follow the instructions. The product may only be used according to its purpose.
- Regulatory regulations and directives concerning this product must be observed.
- When using gases, the relevant safety data sheets must be observed.

Meaning of the characters used

The following character is used in this document to identify related information or key information.



NOTE

Information on the use of the product.

2 About smartGAS Calibration Tool

2.1 What is the smartGAS Calibration Tool meant for?

The smartGAS Calibration Tool simplifies the commissioning of smartGAS sensors. With the smartGAS Calibration Tool, you are able to read out the state of the sensor and the current measured values. The Modbus address of the sensor can also be changed.

The smartGAS Calibration Tool also allows you to readjust the Zero and the Span of smartGAS sensors in order to adapt them to changed ambient conditions. The function and the high measuring performance of smartGAS sensors can be ensured by a regular adjustment with the smartGAS calibration tool. The adjustment will be documented by an automatically generated service report.

2.2 Which sensors are supported?

The smartGAS Calibration Tool supports the smartGAS sensors of the EVO series from firmware version 5.17. The smartGAS Calibration Tool can also be used in conjunction with the CONNECT INTERFACE.

2.3 System Requirements

The smartGAS Calibration Tool requires a Windows PC with the following specifications:

- Windows 10 (x86 or x64)
- 1GHz dual-core processor, 2GB RAM, 200MB free space
- The application is based on Microsoft .NET Framework 4.6.1¹

2.4 Connection with sensors / accessories

For an optimal result of the calibration of a smartGAS sensor, smartGAS Mikrosensorik recommends using the corresponding accessories. For the electrical connection of a smartGAS sensor to your computer, please use:

- Z6-000025: USB service adapter for EVO series sensors
- Z6-000031: USB service adapter when using CONNECT INTERFACE / TRANSMITTER

¹ In case that Microsoft .NET Framework 4.6.1 isn't on your Computer, it will be installed if necessary. For this reason an internet connection is required.

3 Installation & Getting started

3.1 Installation

- (1) Run the installation setup by clicking on "Setup.exe".
- (2) Optional: If there is no Microsoft .NET Framework, you will be informed and prompted to download the appropriate package and agree to the license agreement.
- (3) The installation wizard will guide you through the setup until the installation is completed.

3.2 Start smartGAS Calibration Tool

Start the smartGAS Calibration Tool via the **desktop shortcut** or via **Start > smartGAS (folder) > smartGAS Calibration Tool**.



3.3 Product activation

The first use of the smartGAS Calibration Tool requires product activation. This requires a license key, for the first 14 days you can use the 14-day *trial license*. Simply type your license key into the provided field and click "**OK**" to activate the smartGAS Calibration Tool.



To activate the *trial license*, click on "**Activate trial**".



After the *trial license* has expired, a license key is required. Simply enter your license key in the field provided and click "**OK**" to activate the smartGAS Calibration Tool.



NOTE

If you do not have a license key, you can request it via "*request a key*" or contact your sales partner directly.

Note that the license key has a limited runtime. After expiration you need a new license key for a new activation.

On our smartGAS YouTube channel and on our homepage you will find a video that shows you how to use the calibration tool.

<https://www.smartgas.eu/en/products/software/smartgas-calibration-tool>

4 Using smartGAS Calibration Tool

4.1 Welcome / Authentication

When you start the smartGAS Calibration Tool, you have to authenticate yourself with a username and a PIN. The PIN is: **2408**. The user name is freely selectable and is used for the service report. The smartGAS Calibration Tool can be used after correct entry.



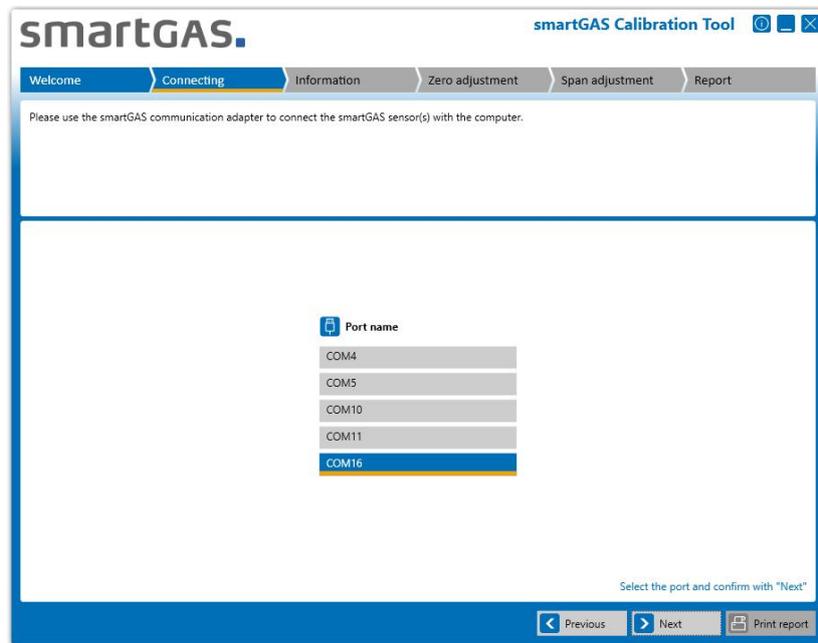
NOTE

The username has to contain at least two characters.
The authentication PIN is: **2408**

4.2 Connecting

4.2.1 Port name

To connect the smartGAS Calibration Tool to a sensor, first select the appropriate port name and click **"Next"**. Now search for the connected sensors.

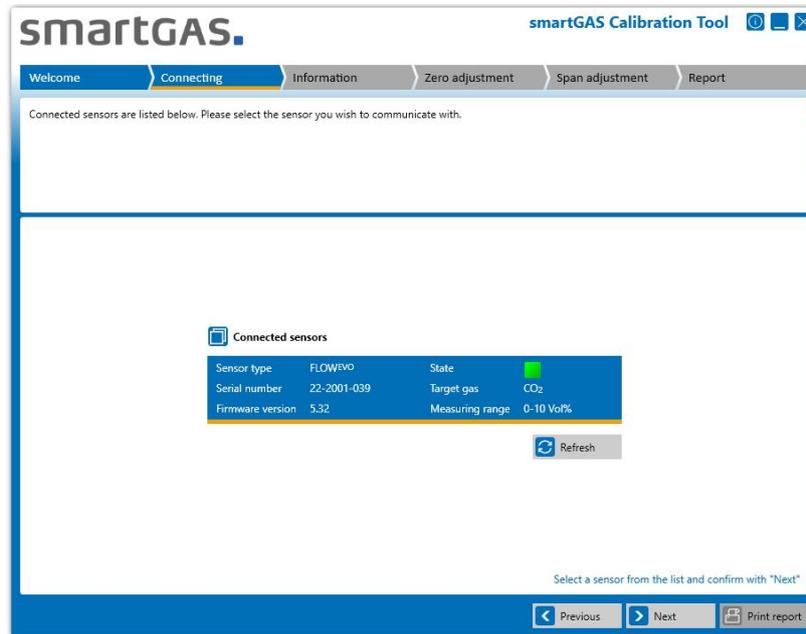


NOTE

If no port name is displayed, check the connection between USB service adapter and computer. Also check if the USB service adapter is recognized by Windows and the driver has been installed correctly. You can check this using the Windows Device Manager.

4.2.2 Connected sensors

Select one of the displayed sensors and click on **"Next"** to get more information about the sensor.

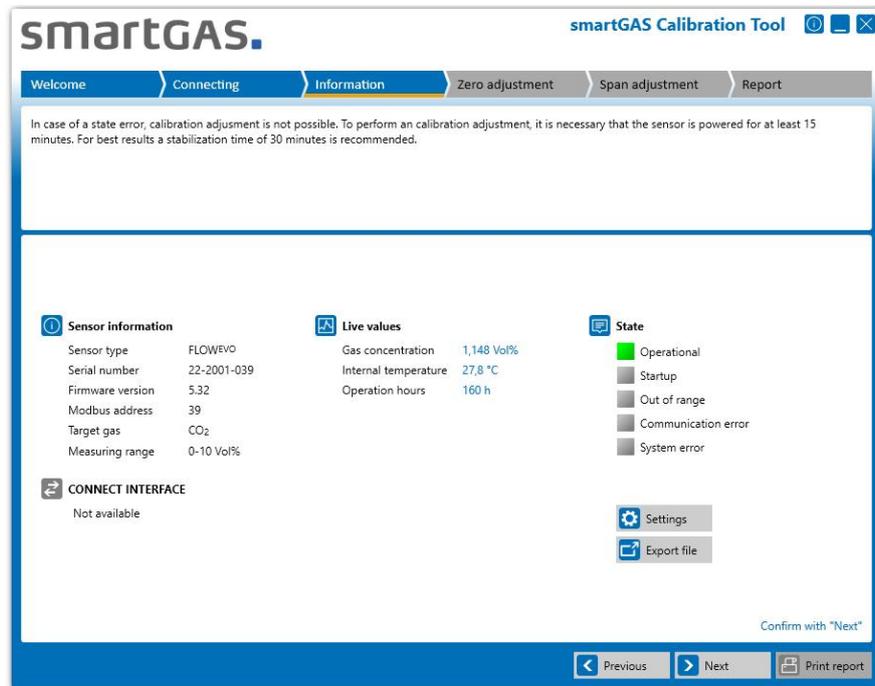


NOTE

If your sensor is not displayed, check the physical connection of the sensor. If necessary, restart the sensor by interrupting the power supply and search again.

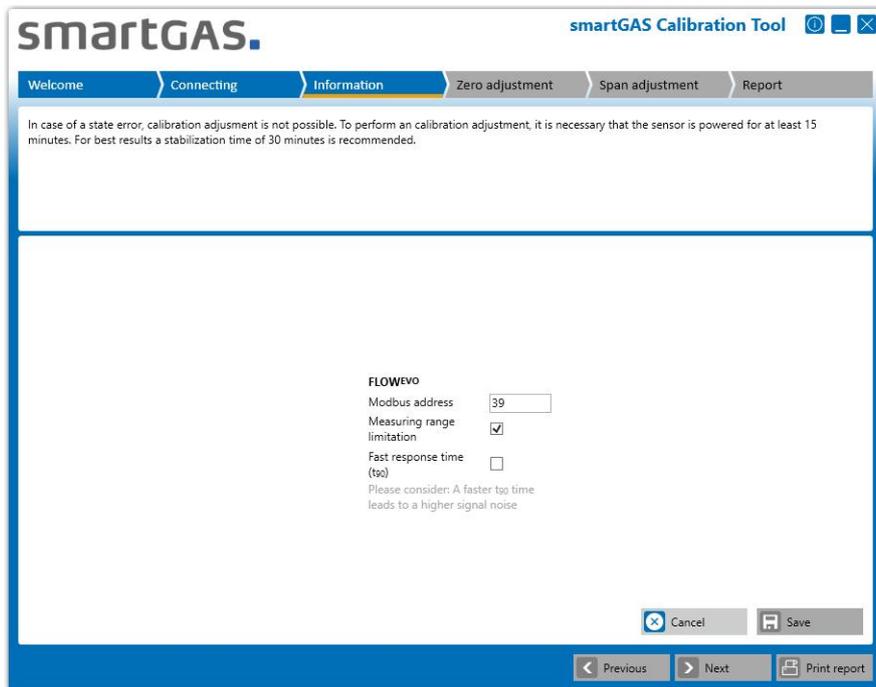
4.3 Information

Here you get a detailed overview about the sensor information, the sensor status as well as the corresponding measured values in real time. If a CONNECT INTERFACE is used, the information is extended accordingly.



The **"Settings"** button allows you to change the device settings. Click the **"Next"** button to go to Zero adjustment.

4.4 Device settings



Click the **"Save"** button to apply performed changes.

4.4.1 Device settings for FLOW^{EVO}

Modbus address	<input type="text" value="55"/>
Measuring range limitation	<input type="checkbox"/>
Moving average filter	<input checked="" type="checkbox"/>
Biquad filter	<input checked="" type="checkbox"/>

Moving average	Biquad	Noise	Time response
OFF	OFF	high	fast
OFF	ON	reduced	slow*
ON	OFF	reduced	slow
ON	On	strongly reduced	very slow

*varies on signal shape

Modbus address The Modbus address can be selected from 1 to 247.

Measuring range limitation The calculated gas concentration is limited from -10% to +110% of full scale.

Moving average filter Please make note of the document „Application Note F3 Digital Filter 230327“. If necessary, please ask your sales contact for further information.

Biquad filter



NOTE

The device settings „Moving average filter“ and „Biquad filter“ are only supported by FLOW^{EVO} sensors since firmware version 5.52 and higher. To make this filter settings, connect your sensor directly with PC. If necessary, disconnect your sensor from CONNECT INTERFACE.

4.4.2 Device settings for BASIC^{EVO}

Modbus address	<input type="text" value="55"/>
Fade in measuring value	<input checked="" type="checkbox"/>
Measuring range limitation	<input type="checkbox"/>

Modbus address	The Modbus address can be selected from 1 to 247.
Fade in measuring value	The calculated concentration output will be delayed during the warm-up phase, which prevents a concentration jump after switching on the device.
Measuring range limitation	The calculated gas concentration is limited from -10% to +110% of full scale.



NOTE

The device settings „Fade in measuring value“ is only supported by BASIC^{EVO} sensors. To make this setting, connect your sensor directly with PC. If necessary, disconnect your sensor from CONNECT INTERFACE.

4.4.3 Device settings for CONNECT INTERFACE

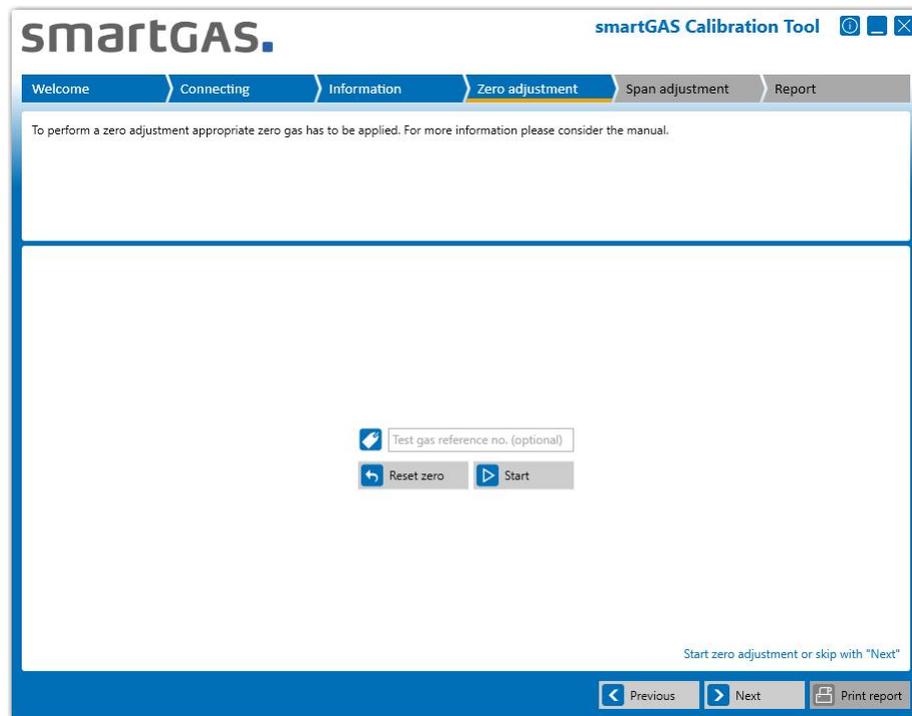
Current limitation acc. NAMUR	<input checked="" type="checkbox"/>
Error current	<input type="text" value="3.5 mA"/>
Pressure compensation	<input type="checkbox"/>

Current limitation acc. NAMUR	NAMUR output on CONNECT INTERFACE can be switched on or off. Please make note of the information about NAMUR in the CONNECT INTERFACE manual.
Error current	Output current, that is given out in case of a device error by using of NAMUR. Please make note of the information about NAMUR in the CONNECT INTERFACE manual.
Pressure compensation	Switches the pressure compensation of CONNECT INETRFACE on or off. Please make note of the information in the manuals of FLOW ^{EVO} /BASIC ^{EVO} and CONNECT INTERFACE.

4.5 Zero adjustment

Before starting the Zero adjustment, you can optionally enter a reference number for the zero-gas bottle. Use the **"Start"** button to start the Zero adjustment.

Use the **"Next"** button to skip the Zero adjustment and go to the Span adjustment.



NOTE

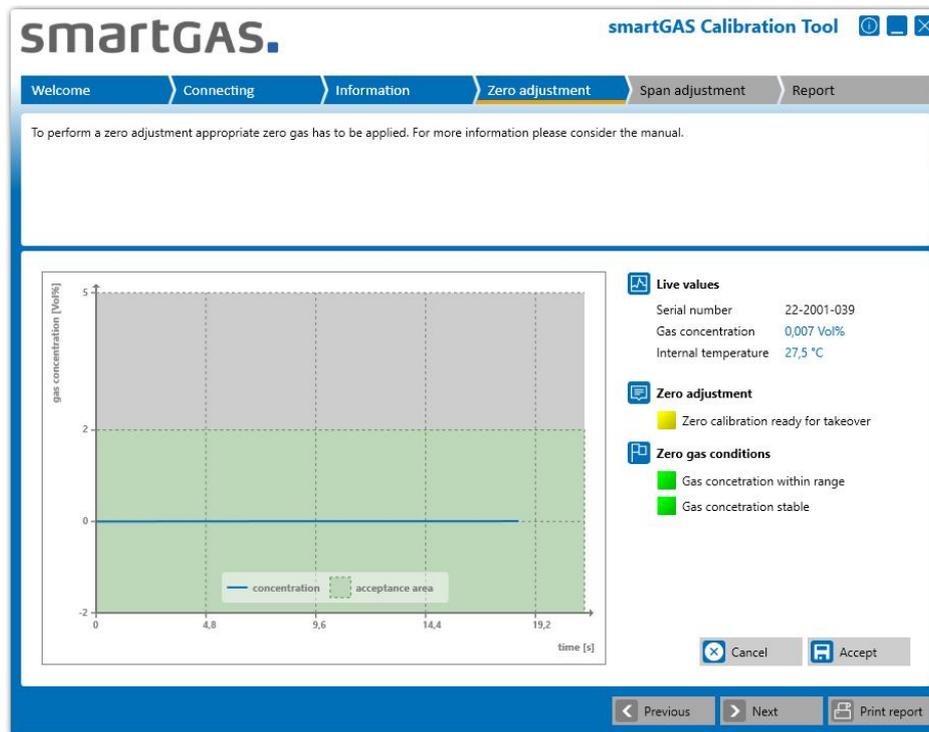
Always use dry test gas for adjusting smartGAS sensors.
A high purity of the test gas increases the accuracy of the adjustment.



NOTE

Always carry out a Zero adjustment with your smartGAS sensor first.

During the Zero adjustment, the serial number of the sensor and its measured values are displayed in real time in the right half of the window. The status of the Zero adjustment and the operating conditions are displayed in the right half of the window. A diagram is shown on the left-hand side, on which you can see the concentration curve.



Status of Zero adjustment:

-  Initialisation (flashing yellow):
The measuring signal is checked to meet the conditions for adjustment.
-  The adjustment is ready for takeover
-  The adjustment is not ready for takeover. One or more criteria are not met. (flashing red)
-  The adjustment is accepted and re-validated. (flashing green)
-  The adjustment is successful and completed.
-  The adjustment is not successful.

Please confirm the Zero adjustment with the **"Accept"** button. After that the Zero adjustment is completed with the new Zero point. You will then get the message: "Result 00: Successfully adopted". The Zero adjustment was thus successful.



NOTE

The other results or error codes can be found in the FAQs.

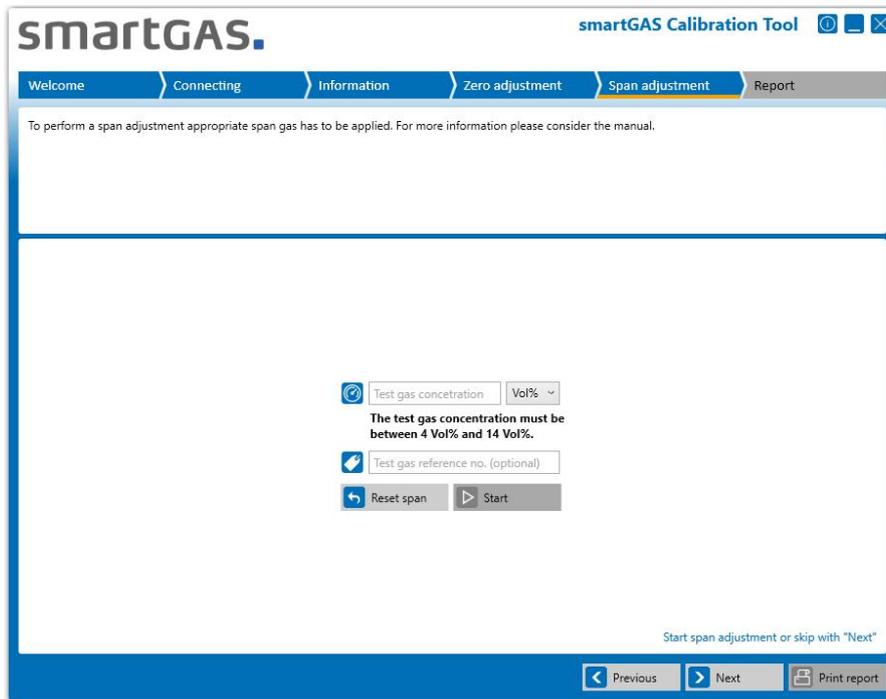
The "Cancel" button can be used to cancel the Zero adjustment..

4.6 Span adjustment

Before beginning the end point adjustment, the concentration of the test gas must be entered. A reference for the test gas can optionally be entered.

Use the **"Start"** button to start Span adjustment.

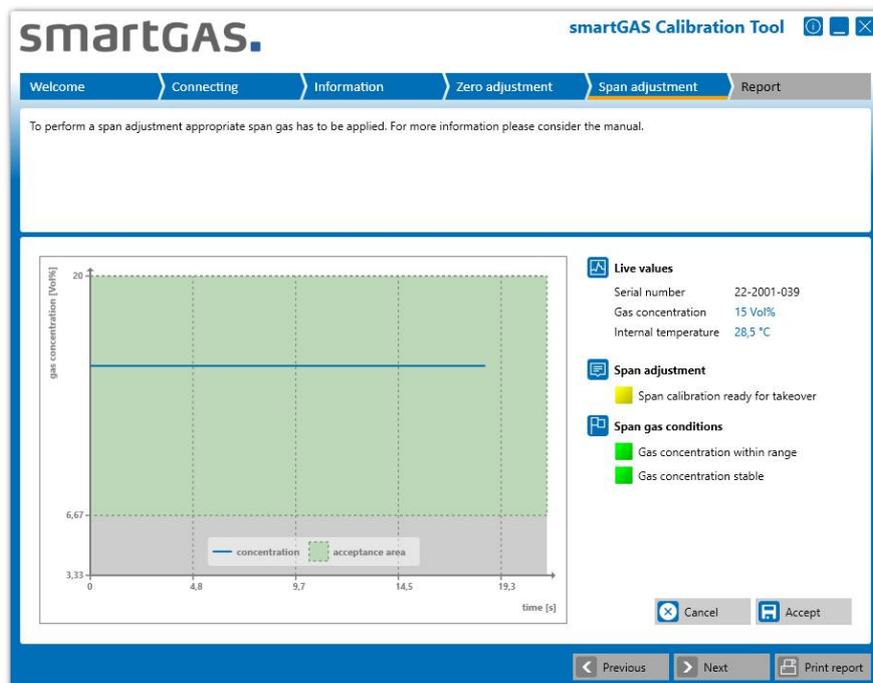
Use the **"Next"** button to skip the Span adjustment and go to the report.



NOTE

The **"Reset span"** button can be used to reset the Span of the sensor to the factory setting. Nevertheless, a new Span adjustment is recommended then.

During the Span adjustment, the serial number of the sensor and its measured values are displayed in real time in the right half of the window. The status of the Span adjustment and the operating conditions are displayed in the right half of the window. A diagram is shown on the left-hand side, on which you can see the concentration curve.



Status of Span adjustment:

-  Initialisation (flashing yellow):
The measuring signal is checked to meet the conditions for adjustment.
-  The adjustment is ready for takeover
-  The adjustment is not ready for takeover. One or more criteria are not met. (flashing red)
-  The adjustment is accepted and re-validated. (flashing green)
-  The adjustment is successful and completed.
-  The adjustment is not successful.

Please confirm the Span adjustment with the **"Accept"** button. After that, the Span adjustment is completed with the new Span point. You will then get the message: "Result 00: Successfully adopted". The Span adjustment was thus successful.

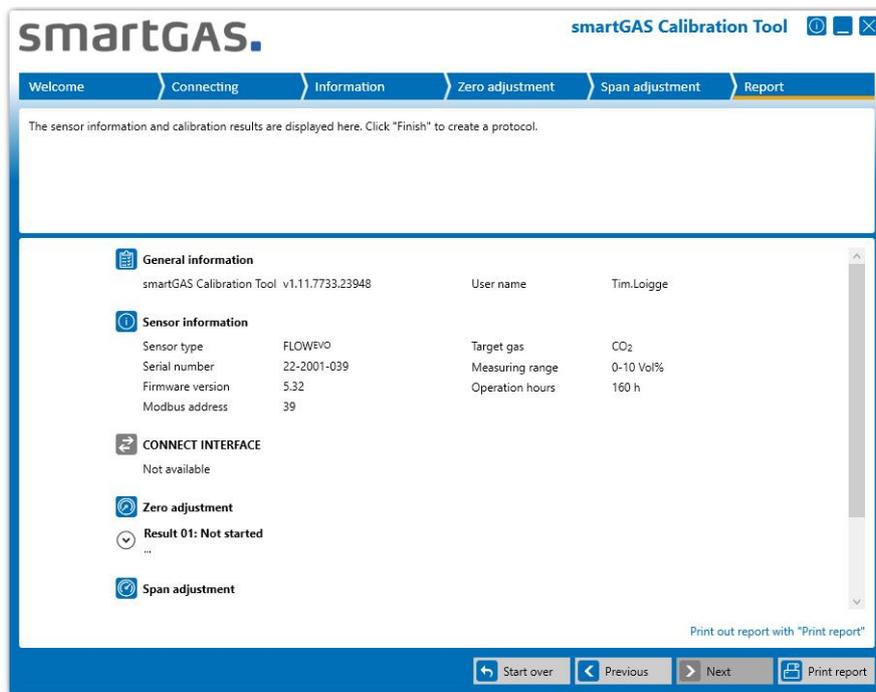
**NOTE**

The other results or error codes can be found in the FAQs.

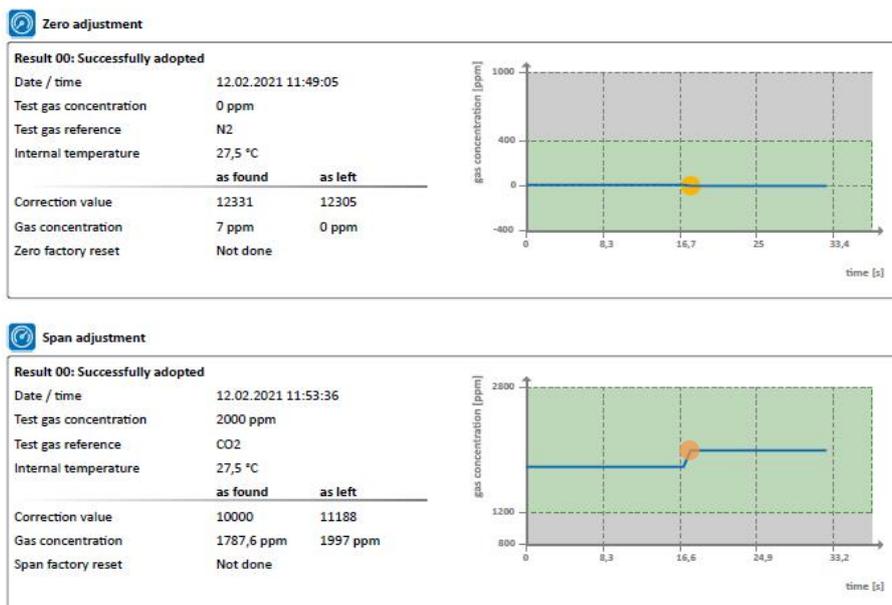
The **"Cancel"** button can be used to cancel the Span adjustment.

5 Report

Here you find all important information about the adjustment and settings of your smartGAS sensor. The window contains general information about the software version and the user, the sensor information as well as information about the applied sensor adjustments. In addition, you have the option to enter individual comments.



By clicking on the "arrow key" on the left side you can extend the display to the results of the Zero and Span adjustment and check again for completeness.



Click the "Print report" button to go to the print options to print the service report. With the button "Start over" you come back to point 4.2.2.

6 Appendix

6.1 FAQs

(1) Where can I get a license key?

Use the "[request a key](#)" link for product activation or contact your sales partner.

(2) The smartGAS Calibration Tool does not find a COM-Port.

Ensure that the service adapter is properly connected to the PC and is recognized by Windows (see Windows Device Manager). Make sure you have correctly installed the driver for the service adapter. If not, reinstall it. A CD with the driver is included with the accessories.

(3) The smartGAS Calibration Tool does not find a sensor.

Make sure the smartGAS sensor is properly connected to the service adapter. Make sure that no other program accesses the COM port you are using. If the sensor cannot be found even after a restart, contact your sales partner to help you.

(4) I used the wrong calibration gas during calibration, can I calibrate the sensor again?

Yes you can perform the calibration again. The smartGAS sensors can be calibrated at any time. smartGAS always recommends the use of dry test gas with high quality. For a good result, the concentration of the test gas should correspond as precisely as possible to the maximum concentration of the smartGAS sensor. If the deviation is too high, the accuracy of the sensor can be reduced.

(5) Error Codes / Results at Zero & Span adjustment

Adjustment can end with the following results:

"Result 01: Not started"

The Zero or Span adjustment was not performed.

"Result 02: Canceled by user"

The zero or Span adjustment has been canceled by the user.

"Result 03: Canceled because of timeout"

Due to a timeout, the Zero or Span adjustment was exited.

"Result 04: Interrupted by communication error"

The Zero or Span adjustment was interrupted because of a communication error with the sensor.

"Result 05: Access denied - wrong serial number"

The Zero or Span adjustment could not be performed. Access to the sensor was denied because of the use of an incorrect serial number.

"Result 06: Gas concentration was outside the tolerance limit when tested"

The Zero or Span adjustment has not been carried out because the concentration of the zero or test gas is outside the permissible limits.

"Result 07: The span adjustment is rejected. The correction value was out of the valid range. The previous correction value is retained."

Span adjustment is out of range.

"Result 08: Adjustment cannot be started during warmup phase"

The Zero or Span adjustment was not carried out since the sensor is still in the warm-up phase.

"Result 09: Adjustment cannot be started because of sensor system error"

The Zero or Span adjustment could not be performed because the sensor is in an error condition.

"Result 0A: Adjustment cannot be started because firmware version must be at least 5.17 or higher"

The Zero or Span adjustment could not be started since the firmware version of the sensor is too low. Only sensors with firmware version 5.17 or higher are supported.

"Result 0B: Adjustment cannot be started because firmware version must be lower than 6.00"

The Zero or Span adjustment could not be started because the firmware version of the sensor is too high.

6.2 Service report



smartGAS Calibration Tool service report



General information

smartGAS Calibration Tool	v1.10.7703.15455	Creation date time	12.02.2021 11:53:50
User name	TL	Page count	1 of 1



Sensor information

Sensor type	FLOWEVO	Target gas	CO ₂
Serial number	20-2000-036	Measuring range	0-2000 ppm
Firmware version	5.32	Operation hours	156 h
Modbus address	36		



CONNECT INTERFACE

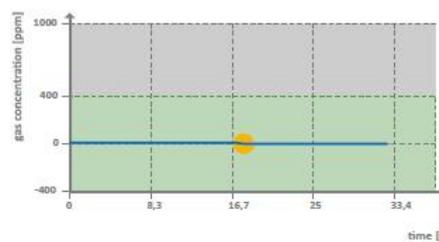
Not available



Zero adjustment

Result 00: Successfully adopted

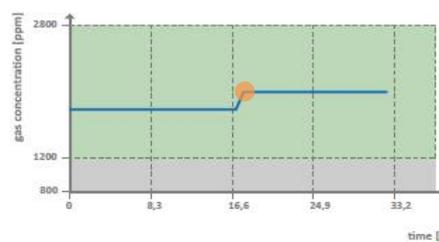
Date / time	12.02.2021 11:49:05	
Test gas concentration	0 ppm	
Test gas reference	N ₂	
Internal temperature	27,5 °C	
	as found	as left
Correction value	12331	12305
Gas concentration	7 ppm	0 ppm
Zero factory reset	Not done	



Span adjustment

Result 00: Successfully adopted

Date / time	12.02.2021 11:53:36	
Test gas concentration	2000 ppm	
Test gas reference	CO ₂	
Internal temperature	27,5 °C	
	as found	as left
Correction value	10000	11188
Gas concentration	1787,6 ppm	1997 ppm
Span factory reset	Not done	



Comment