Calibrating the SIWAREX FTC Weighing Module

Keywords: SIWAREX FTC calibration, STEP 7 programming, calibration, zero, range, adjustment

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1- Q: How is the SIWAREX FTC calibrated with SIWATOOL FTC?

A: Following hardware parts and software are required to integrate a scale in SIMATIC: 24V Power supply, S7-300 CPU or ET200M Station, memory card for CPU, SIWAREX FTC front connector for SIWAREX FTC, shield contact element, shield connection terminal, SIWATOOL FTC software, RS232 cable, computer with Windows XP or higher and a calibration weight bigger than 5% of the sum of the nominal value of all load cells.

Requested parts:

24V PS  S7-3xx PLC  or  ET 200M  SIWAREX FTC
7MH4900-3AA01

SIWATOOL RS232 Cable: 7MH4702-8CA

Configuration Package for SIWAREX FTC 7MH4900-3AK01
The operating environment shown below includes the following: PS207 2A power supply, ET200M Station or CPU3xx, SIWAREX FTC weighing module, SIWATOOL cable.
### Connection and signal designations

<table>
<thead>
<tr>
<th>Connection and signal designations</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>SEN+</td>
<td>Sensor line +</td>
</tr>
<tr>
<td>SEN-</td>
<td>Sensor line -</td>
</tr>
<tr>
<td>SIG+</td>
<td>Measurement line +</td>
</tr>
<tr>
<td>SIG-</td>
<td>Measurement line -</td>
</tr>
<tr>
<td>EXC+</td>
<td>Load cell supply output +</td>
</tr>
<tr>
<td>EXC-</td>
<td>Load cell supply output -</td>
</tr>
</tbody>
</table>

### Termination Clamp

<table>
<thead>
<tr>
<th>Termination Clamp</th>
<th>Signal</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>X1.9</td>
<td>Cl+</td>
<td>Counter input +</td>
</tr>
<tr>
<td>X1.10</td>
<td>Cl-</td>
<td>Counter input -</td>
</tr>
</tbody>
</table>

Pulse encoder connection
Software: SIWATOOL FTC

Start SIWATOOL FTC.

On the SIWATOOL FTC interface, select the desired interface, which should be the COM used on your computer.

Click Online.
When the communication is established, **Online** turns grey.

Before calibrating, set the service mode to on (1).

Once the setting is successful, this icon appears.
Enter the adjustment weight (e.g. "20.0") and set the characteristic value range.
Set parameters “Min/Max weighing range” and the “resolution unit” in register “Calibration parameter 2”.

“Resolution range 1”: Resolution of range 1. It is the minimum change of the displayed weight. The unit is the same as the “Weight unit” selected under the “Calibration param. 3” tab.

Example:

“Resolution range 1” is set to 0.05 kg, so the minimum change is 0.05 kg.

“Resolution range 1” is set to 1.0 kg, so the minimum change is 1 kg.

Note that resolution is related to weight display and is different from precision.
The determination time is used for the calibration and zeroing.
The belt may have been repaired and has splices. These mechanical splices create a heavy section that must be taken into account. Also the belt may be not uniform and have a light section.

**The determination time**

This is why the calibration point is not instantly valid. The mean value out of a time period is calculated.
The **determination time** is the time needed for the belt to make one revolution.

Then click button **Send**
DR5 Register Belt speed

The speed at nominal conditions, i.e. at nominal load on the belt. LU (length units) per second e.g. 1.7 m/sec.

The measuring time of the pulse input is set in ms e.g. 2000 ms. That means that the speed value output is updated every 2 seconds, the value will still be defined in LU per second however.

The pulse constant of the speed sensor indicates the number of pulses per LU of the belt. SIWAREX FTC calculates the current belt speed on this basis.

Constant speed must be defined if no speed sensor is connected. The calculation of the flow-rate is then performed using this value. When a speed sensor is connected, the value must be set to 0.

Min/Max belt speed is a limit value in % of the nominal speed. The entry of the number e.g. 800 corresponds with 80.0 %. After this value has been undercut/exceeded, SIWAREX FTC sets a status bit (scale status...).

Monitoring the belt speed is only activated after this delay time when the belt is started.

When the minimum belt speed is undercut, the message or status bit is only activated after this delay time has elapsed.

Nominal flow-rate in WU (weight units) / sec corresponds with the flow-rate that the belt is equipped for.

The effective belt length corresponds with half of the distance between the belt rollers which are found before and after the roller with the belt scale.

A material test can be performed to compare the material quantity with the total calculated by SIWAREX FTC. A correction factor can be defined for the calculation of the flow-rate quantity for small deviations.

Min/Max flow-rate are limit values in % of the nominal flow-rate. The entry of the number e.g. 800 corresponds with 80.0 %. After this value has been undercut/exceeded, SIWAREX FTC sets a status bit.
Then click button **Send**

Set display to weight

![Image of the Adjustment parameters menu](image1)

Ensure that the scale is empty (not loaded) and click **Adjustment zero valid (3)**.

![Image of the Adjustment zero valid menu](image2)

After the determination time has elapsed, see statusbit in DR 30 the displayed value is as follows:

![Image of the displayed value](image3)
Add a weight of 20 kg for example (the display may contain some error), and then click **Adjustment weight 1 valid** (4). After the determination time has elapsed, see statusbit in DR 30 the weight becomes the set weight, and the adjustment is complete.

Set the service mode to off (2)
Eventually you may save the calibration data’s into a file

Receive all data’s from the SIWAREX FTC to the PC

During the transmission from the Siwarex FTC module to the PC, the following message-window appears:

Save the data as a SIWATOOL FTC File:
2. Calibration with STEP 7 Programming

The following example is based on the sample program, which is available in internet click www.siemens.com/weighing then select support > Tools and Download > Weighing Components for Automation Systems > and choose SIWAREX FTC

For detailed programming, see SIWAREX FTC Operating Guide.

Example:
The hardware configuration is as shown below. Note that CPU315-2PN is used here.

![Hardware Configuration Diagram]

Note that 256 is the address of the module to be used by calling FB43
Access DB15 to add the corresponding parameters and other valid parameters (A data block must be defined for each scale, which must contain the parameters of SIWAREX FTC and their actual values. Select the data block No. as required. In the software package used in this example, DB15 is already defined as a scale data block.) The process values of DB15.DBD 22 and the adjustment weight of DB15.DBD 90 are used to facilitate the corresponding operations.
Some commands are listed below, see more in chapter 6 of the manual:

<table>
<thead>
<tr>
<th>Code</th>
<th>Command code</th>
<th>Command explanation</th>
<th>Executable in following operating states</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Service and adjustment commands</td>
<td>The SIWAREX must be switched to service operation to perform the adjustment. A non-adjusted scale cannot get out of service operation.</td>
<td>No weighing cycle</td>
</tr>
<tr>
<td>2</td>
<td>Switch off service mode</td>
<td>After the adjustment, service operation can be switched off. Only then can the scale accept weighing commands.</td>
<td>Service operation</td>
</tr>
<tr>
<td>3</td>
<td>Adjustment zero valid</td>
<td>The beginning of the characteristic curve - zero point of the scale - is defined with the momentary dead-load.</td>
<td>Service operation</td>
</tr>
<tr>
<td>4</td>
<td>Adjustment weight 1 valid</td>
<td>The first adjustment weight is assigned with the momentary weight.</td>
<td>Service operation</td>
</tr>
</tbody>
</table>

Type command code “1” into DB15.DBW40 to set the service mode to ON. and type triggering instruction “true” into DB15.DBX42.0.
It is advised to accept the default values of other parameters for this first use command “203” to read the calibration data value in DR3. The command list is shown below:

<table>
<thead>
<tr>
<th>Command Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>203...245...399</td>
<td>Read a data record 3...45. The numbers 246...399 are reserved for expansions.</td>
</tr>
<tr>
<td>403...445...599</td>
<td>Write a data record 3...45. The numbers 446...599 are reserved for expansions.</td>
</tr>
</tbody>
</table>

After reading the calibration parameter from DR3 it is possible to modify its content and to send the new values to the SIWAREX FTC in the same manner with order 403.

Finally, use command “2” to set service mode to OFF.

After range calibration is complete, you can view the real-time process weight value through DB15.DBD22.

For other operations, see the sample program or the operating guide.

If you have any problems or suggestions regarding the related products or documents, please feel free to contact:

Technical support for SIWAREX
Tel: +49 721 595 2811
Fax: +49 721 595 2901
E-mail: siwarex.hotline.aud@siemens.com
Website: www.siwarex.com

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