SIEMENS

SIWAREX® FTC

Device manual

Status: 10/2010



This manual contains instructions you must observe for your own safety and to avoid material damage. The instructions are signaled by a warning triangle and are presented as follows according to the degree of danger:

Danger
Means that failure to take the necessary safety precautions **will** result in death, serious injury or significant material damage.

Warning
Means that failure to take the necessary safety precautions **may** result in death, serious injury or significant material damage.

Caution
Means that failure to take the necessary safety precautions may result in minor injury or material damage.

Caution
Means that failure to take the necessary safety precautions may result in material damage.

Attention
Refers to important information about the product, the handling of the product or the respective part of the documentation to which special attention should be given.

Qualified personnel
The commissioning and operation of a device may only be performed by **qualified personnel**. In the context of the safety instructions in this manual, qualified personnel means persons who have the authorization to commission, ground and identify devices, systems and power circuits in accordance with the applicable safety standards.

Intended use

Warning
The device may only be used for the applications described in the catalog and the technical description and only in conjunction with external devices and components that are approved or recommended by Siemens.
Fault-free and safe operation of the product depends on proper transport, storage, assembly and installation, as well as careful operation and maintenance.

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Siemens AG
Industry branch
SIWAREX weighing systems
I IA SC PS1 WT
Östliche Rheinbrückenstr. 50
76187 Karlsruhe, Germany

Disclaimer
We have tested the contents of this document for compatibility with the hardware and software described. This does not exclude the possibility of discrepancies, in which case we do not guarantee the full compatibility of this document. The information contained in this document is assessed regularly and any necessary corrections are included in the next revision.
We are grateful for any suggestions for improvements.

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SIWAREX FTC

Module for loss-in-weight scale, bulk flow measurement device and force measurement

Device manual

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1 Preface

1.1 Purpose of the manual

This manual contains all information required to set up and operate the SIWAREX FTC.

1.2 Required basic knowledge

In order to be able to understand the manual, a general knowledge of SIMATIC automation technology is required. In addition, knowledge of weighing technology is beneficial.

1.3 Scope of this manual

This manual applies to the SIWAREX FTC module:

Model	Name:	Order number	From product revision (version)	
SIWAREX FTC	SIWAREX **Flexible Technology** **Continuous** Weighing	7MH4900-3AA01	**HW** **V1.0.0**	**FW** **V.5.3.1**

Table 1-1 Validity of this manual

Note

The functionality of the loss-in-weight scale has been comprehensively extended. Firmware V 5.3.1 is not compatible with firmware up to 4.x. For this reason various adjustments must be made before the update. See *3.8*

Note

This manual contains the description of all modules that are valid at the time of publication.

We reserve the right to attach product information containing up-to-date information about the module to new modules or modules in a later version.

The structure of the manual is oriented toward activities which have to be performed as part of configuration, commissioning and servicing.

1.4 Further support

Do you have any further questions on using the SIWAREX FTC? If so, please contact your Siemens representative in the department or branch responsible for your area, or contact technical support for SIWAREX (Tel.: +49 (0)721 595 2811).

Up-to-date information on SIWAREX weighing technology can be found on the Internet.

http://www.siemens.de/siwarex

2 Scope of delivery

2.1 Scope of delivery

A bus connector for the SIMATIC bus, the conformity details from the manufacturer and a sheet of additional, current product information are included as standard with SIWAREX FTC.

- To configure the SIWAREX FTC as a non-automatic weighing machine, force measurement, loss-in-weight scale and bulk flow measurement device, the following configuration packages are required (which must be ordered separately):
- SIWAREX FTC_L configuration package for SIMATIC S7, or
- SIWAREX FTC_L configuration package for SIAMTIC PCS7

The configuration package for SIMATIC S7 is made up of the following components:

- SIWATOOL FTC_L commissioning program for Windows
- Hardware Support Package (HSP) for installing the module in the hardware catalog of the SIMATIC Manager
- Device manuals in several languages
- SIWAREX FTC_L Getting started for loss-in-weight scale and bulk flow measurement device.

The introductory application software SIWAREX FTC "Getting started" is very helpful during the first steps in programming.

The configuration package for SIMATIC PCS7 is made up of the following components:

- SIWATOOL FTC_L commissioning program for Windows
- Hardware Support Package (HSP) for installing the module in the hardware catalog of the SIMATIC Manager
- Device manuals in several languages
- Setup for PCS7 library

- The required or optional accessories are compiled in chapter *14 Accessories*.

3 Product overview

3.1 General information

SIWAREX FTC (**F**lexible **T**echnology **C**ontinuous Weighing) is a versatile and flexible weighing module.

The function module (FM) SIWAREX FTC is integrated in SIMATIC and uses all features of the modern automation system such as integrated communication, diagnostics system and project configuration tools to its advantage.

3.2 Advantages and benefits

SIWAREX FTC is characterized by a few clear advantages:

- Uniform structure and universal communication through integration in SIMATIC S7 and SIMATIC PCS7
- Standardized configuration with SIMATC
- Direct application in the SIMATIC automation system
- Application in the decentralized system concept through connection to PROFIBUS-DP or PROFINET via ET 200M
- Weight measurement or force measurement with high resolution of 16 million parts
- Characteristic curve linearization
- High accuracy 3 x 6000d, R76 (0.5 µV pro e)
- High sample rate of 10 ms
- PID controller with extensive setting options (loss-in-weight scale)
- Integrated filter functions
- Parameterizable function for inputs and outputs
- Flexible adaptation to different requirements with SIMATIC
- Simple parameter definition with the SIWATOOL FTC_L program through the RS 232 interface
- Exchange of module possible without readjusting the scale
- Weighing process logging - extensive optimization options
- Intrinsically safe load cell supply for Ex zone 1 (optional)
- Application in Ex zone 2.

- Extensive monitoring and diagnostics functions

3.3 Area of application

SIWAREX FTC is the optimal solution wherever weighing technology requires high speed and accuracy. The high resolution of up to 16 million parts allows loss-in-weight scales to be constructed for use in numerous areas.

3.4 Structure

SIWAREX FTC is a function module (FM) of the SIMATIC S7-300 and can be read directly on the SIMATIC S7-300 or ET 200M backplane bus. The installation/cabling process for the 80 mm-wide module is simplified considerably with the profile rail assembly (snap-in technology).

Connection of the load cells is performed using a 40-pin standard front terminal strip, the power supply with a 2-pin plug and the serial interface by a 9-pin sub-D plug.

Operation of the SIWAREX FTC in SIMATIC guarantees complete integration of the weighing technology into the automation system.

3.5 Function

The primary task of the SIWAREX FTC is highly accurate measurement of the current weight and exact determination of the material quantity.

There are different weighing or measurement procedures, for which the SIWAREX FTC can be optimally configured by defining parameters.

SIWAREX FTC monitors and controls a number of functions during the weighing procedures. The optimized internal system data exchange enables direct evaluation of the scale signals and statuses in the PLC program.

The weighing procedure influence on the PLC enables flexible adaptation to the system characteristics.

SIWAREX FTC is already adjusted in-house. Therefore, the scale can be adjusted to theoretical settings without using any adjustment weights, and modules can be exchanged without readjusting the scale.

The SIWAREX FTC has two serial interfaces. The RS 485 interface is used to connect digital remote displays (for operation as a non-automatic weighing machine) or digital load cells WM and WMH from Mettler Toledo or a load cell with a vibrating wire. A PC can be connected to the RS 232 interface for setting SIWAREX FTC parameters.

The SIWAREX FTC weighing module can also be used in areas where there is a risk of explosion (Zone 2). The load cells are fed securely for Zone 1 applications via an optional Ex interface SIWAREX IS.

3.6 System integration into SIMATIC

SIWAREX FTC is fully integrated into SIMATIC S7 and SIMATIC PCS7. The user has a free hand to configure its automation solution - including the weighing application - as it sees fit. Optimal solutions can be found for small, medium-sized and large systems by means of a relevant combination of the SIMATIC components. The configuration package and the SIWAREX FTC "Getting started" example applications can be used for developing customer-specific or industry-specific solutions very quickly. The following illustration shows a typical combination for a medium-sized system.

For configuration with SIMATIC PCS 7, the completed function block FB SIWA is used for the automation system and the graphic blocks for the operator station.

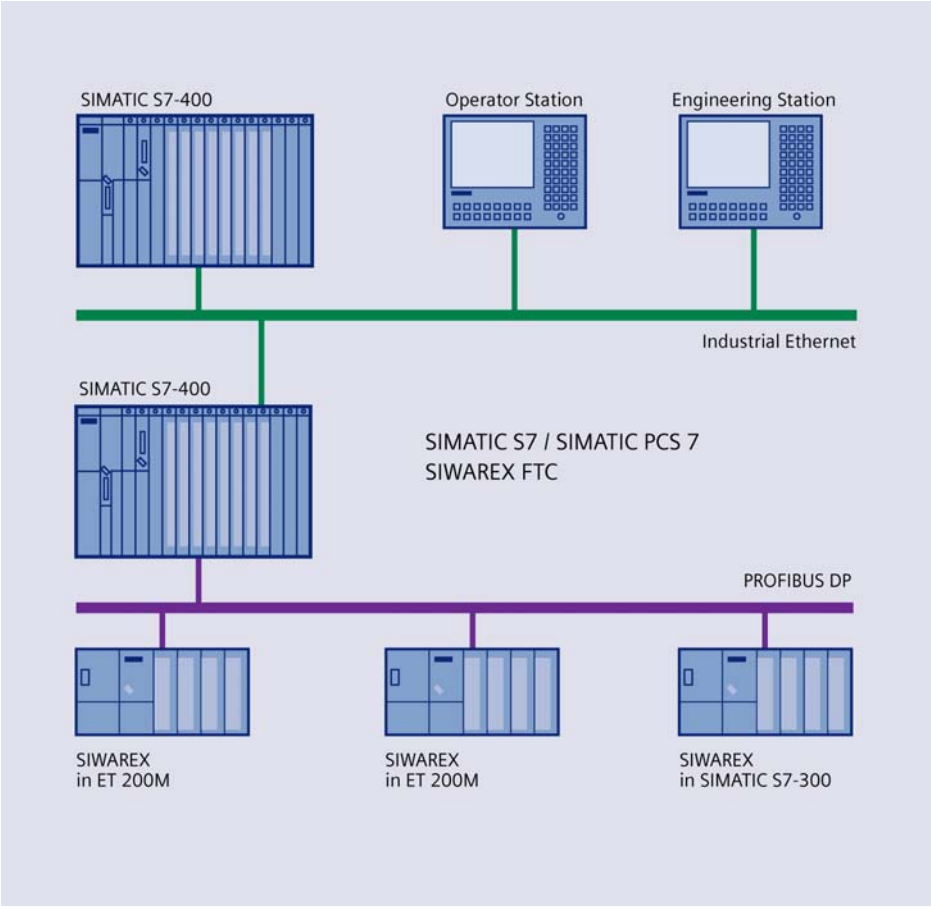


Figure 3-1 Configuration of SIMATIC S7/PCS7 with SIWAREX FTC

3.7 SIWATOOL FTC_L PC program

A special program, SIWATOOL FTC_L, for commissioning and service of loss-in-weight scales or bulk flow measurement devices is available for Windows operating systems.

The program enables commissioning of the scale without having to understand automation technology. During a service procedure, you can analyze the processes in the scale and test them with the help of a PC. Reading the diagnostics buffer from the SIWAREX FTC is very helpful in analyzing events.

In addition to complete access to all parameters, memory or print-outs of the weighing file, the program can also create dosing graphs.

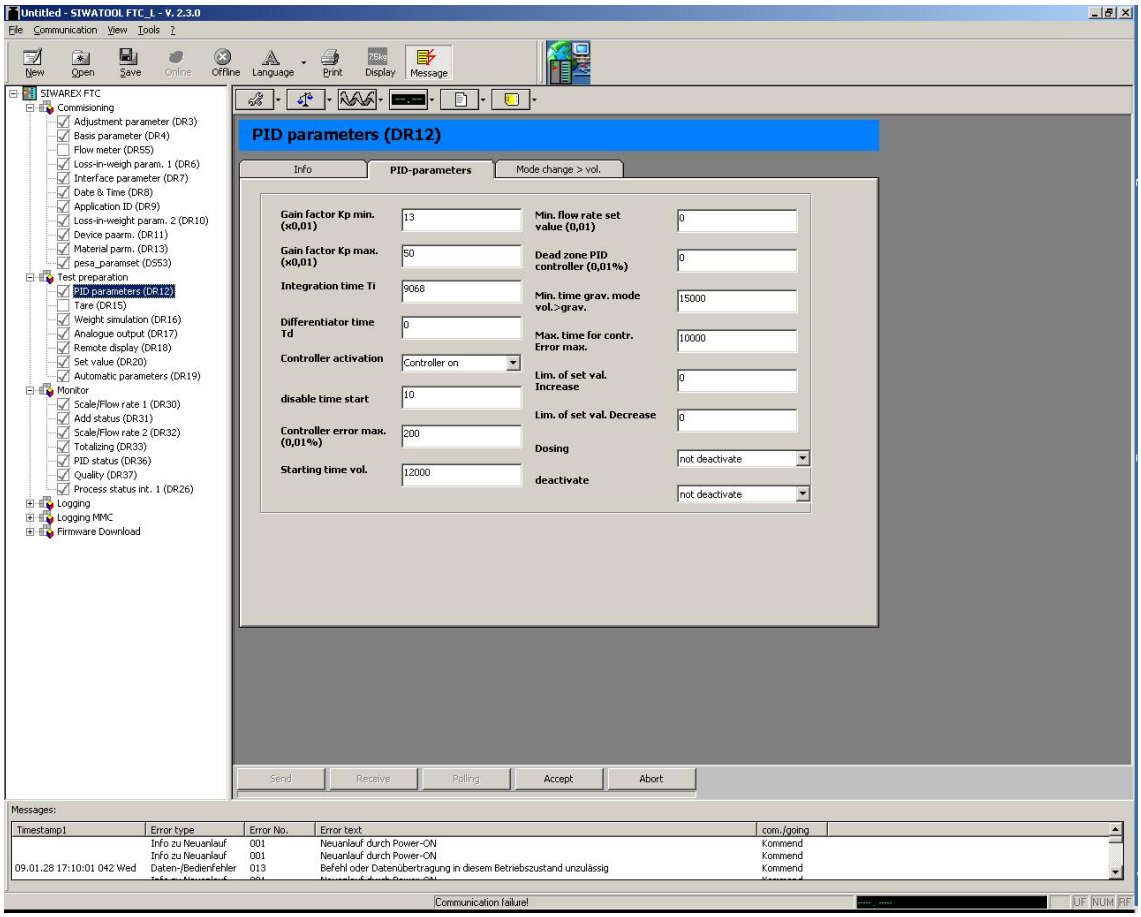


Figure 3-2 SIWATOOL FTC_L Overview

A trace mode exists in the SIWAREX FTC module for optimizing weighing procedures. The recorded data can be displayed in a graph diagram using MS Excel. These records can then be used to analyze and optimize the material flow rate - for example of a shift.

Another feature of the SIWATOOL FTC_L program helps in loading a new version of firmware onto the SIWAREX FTC on-site. It allows upgrades or function enhancements for the firmware at any time and from anywhere.

3.8 Notes on firmware versions up to 4.x.x and from 5.1.3

Firmware versions from 5.1.3 contain significant improvements in flow rate measurement, monitoring and suppression of dosage faults, automatic parameter detection and signal filtering functions. In addition, dosage devices with digital load cells can be connected. The functional improvements have been largely compatible in terms of the use of previous parameters. This chapter lists the minor differences that must be noted when performing a firmware upgrade. Upgrading is in no way mandatory, although from around 2/2009 modules containing the new firmware will be delivered from the warehouse. In line with the new firmware, the "Getting Started“ package and the configuration package for PCS7 have been revised. Most data structures (scale data components) are identical to those in previous versions, although some are similar but not identical.

We recommend that the new software packages only be used in new systems, and that existing systems only be upgraded where a concrete need to do so exists.

4 Hardware configuration and installation



Warning notices

This chapter contains information required for hardware planning, assembly and preparations for operation.

It is imperative to observe the safety instructions.



Warning

Unqualified interventions in the device/system or a failure to observe the warning notices can result in serious injury or material damage. Therefore, only qualified personnel are permitted to perform interventions on this device/system.



Warning

The device was developed, manufactured, tested, and documented observing the relevant safety standards. The device itself will not cause any danger to equipment or personal health under normal circumstances.



Danger

Commissioning is not permitted until it has been established that the machine in which these components are to be installed meets the requirements of Directive 89/392/EEC.

4.1 Configuring the hardware in SIMATIC

SIWAREX FTC is a function module (FM) in the SIMATIC S7 300 automation system. It can be installed in any position designated for function modules.

Use in SIMATIC S7 300 can take place in central operation, in the extension device or peripherally in the ET 200M system.

Operation with SIMATIC S7 400 can only take place peripherally in the ET 200M system. In this case, the active backplane bus can also be used.

In estimating the maximum number of SIWAREX FTCs that can be integrated within one system, the following information may be helpful.

Overall width	Power requirements (5 V) from the SIMATIC backplane bus	Main memory requirements in the SIMATIC CPU
n x 80 mm	n x 50 mA	4100 bytes + n x 1500 bytes

Table 4-1 Requirements for n SIWAREX FTCs

Max. number in central operation - 8 SIWAREX FTCs

Max. number with multi-line expansion - 8 SIWAREX FTCs per line

Max. number in system ET 200M - 7 SIWAREX FTCs per station

Selecting the suitable SIMATIC CPU, the SIMATIC HMI (Human Machine Interface) and the communication modules does not only depend on SIWAREX FTC requirements, but also on the overall job that the automation system has to perform.

4.2 EMC-compliant design

SIWAREX FTC is a highly accurate measuring device that has to reliably measure the slightest signal. Proper assembly and wiring are therefore absolutely essential for fault-free operation.

4.2.1 Definition: EMC

EMC (electromagnetic compatibility) describes the ability of an electrical device to function fault-free in a specific electromagnetic environment without either being influenced by the environment or unduly influencing the environment.

4.2.2 Introduction

Although SIWAREX FTC was developed for use in industrial environments and meets high EMC specifications, you should carry out EMC planning before installing your controller to determine and take into account any possible sources of interference.

4.2.3 Potential interference

Electromagnetic interference can influence the automation system and the SIWAREX FTC in various ways:

- Electromagnetic fields that have a direct influence on the system
- Interference that infiltrates the environment through bus signals (PROFIBUS DP etc.)
- Interference through process cabling (e.g. measurement lines)
- Interference infiltrating the system through the power supply and/or protective ground

Interference can impair the fault-free functioning of the SIWAREX FTC.

4.2.4 Coupling mechanisms

Depending on the means of distribution (conductive or non-conductive) and the distance between the source of interference and the device, interference gets into the automation system via four different coupling mechanisms:

Conductive coupling

Capacitive coupling

Inductive coupling

Radiation coupling

4.2.5 Five basic rules for ensuring EMC

If you follow these five basic rules, EMC can be guaranteed in most cases.

Rule 1: Extensive grounding

When installing the automation devices, ensure the inactive metal parts are grounded well and extensively (see following sections).

Connect all inactive metal parts extensively and with low impedance to ground (large cross-sections).

Perform bolt connections on lacquered or anodized metal parts either with special contact disks or remove the insulating protective layers at the contact points.

Do not use aluminum components for ground connections if at all possible. Aluminum oxidizes slightly and is therefore less suitable for grounding.

Find a central location for connections between the grounding point and the ground wiring system.

Rule 2: Proper wiring

Divide the wiring up into wire groups (high-voltage lines, power supply lines, signal lines, measuring lines, data lines).

Always lay the high-voltage lines and measuring/data lines in separate channels or bundles.

Lead the measuring lines as close as possible to ground planes (e.g. support beams, metal rails, cabinet panels).

Rule 3: Attaching the cable shields

Ensure the cable shields are attached properly.

Only use shielded data lines. The shielding must be fastened to ground using a large surface area on both ends.

The shielding of measurement lines must be fastened to ground on both ends.

Run cable shielding directly under the SIWAREX FTC on the shielding channeling. The shielding is to be run to the connection terminal.

The connection between the shielding rail/ground rail and the cabinet/housing must be low impedance.

Only use a metallic or metalized plug housing for shielded data lines.

Rule 4: Special EMC measures

Wire all inductivities which are controlled with quenching circuits.

Use interference-suppressed fluorescent lighting or incandescent lamps for illuminating cabinets or housings in the immediate vicinity of your controls.

Rule 5: Uniform reference potential

Create a uniform reference potential and ground all electrical equipment.

Lay sufficiently dimensioned potential equalization conductors when there are potential differences between parts in your system or where these are anticipated. For explosion applications, potential equalization is imperative.

4.3 Installation on the profile rail

When assembling the SIMATIC components and the SIWAREX FTC, the assembly regulations must be completely fulfilled for the SIMATIC S7.

SIWAREX FTC is assembled in the following steps:

1. Check that the SIMATIC bus connector is connected to the left of the SIWAREX FTC in the module.
2. Connect the SIMATIC bus connector for the following module in the SIWAREX if necessary.
3. Install the shielding contact rail under the SIWAREX.
4. Mount the SIWAREX FTC in its place.

5. Using the 2 screws, fasten the SIWAREX FTC in the lower area of the module.
6. Label the SIWAREX FTC according to your identification system.

4.4 Connection and wiring

4.4.1 Connection areas for SIWAREX FTC

The following connection areas are located on the front:

- Screw-in connector for 24 V power supply
- 40-pin connector for load cell connection, digital input and output, RS 485, analog output, counter input
- 9-pin Sub-D socket for RS 232 to PC or printer connection

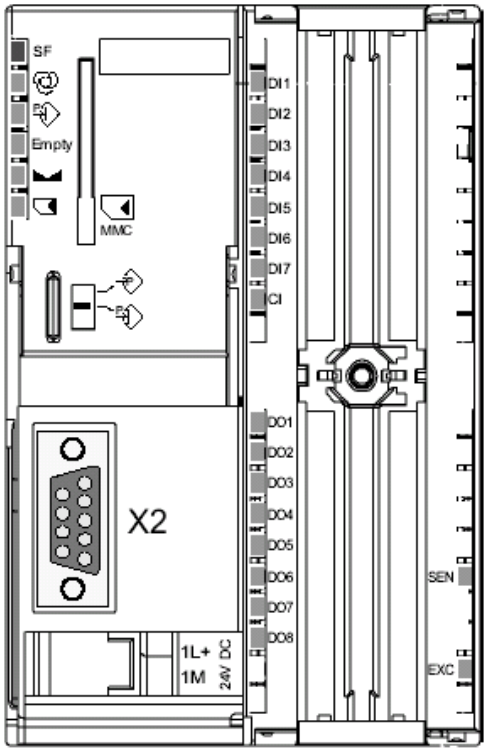


Figure 4-1 SIWAREX FTC front view

4.4.2 Shield connection

Special attention must be given to the shield support for the shielded lines. Only correct assembly will ensure that the system is immune from interference.

A line is shielded in order to weaken the effect of magnetic, electrical and electromagnetic interference on the line. Interference on cable shielding is routed to ground through a shield rail that is conductively connected to the housing. To ensure that this interference does not become a source of interference, a low impedance connection to ground is especially important.

Only use cables with braided shielding. The cover density of the shield should be at least 80%.

To attach the braided shielding, only use metal cable clips. The clips must envelop the shield extensively and make good contact.

The shield clamps must be ordered separately to the shield connection element. The size of the shield clamp is to be chosen according to the cable diameter.

To attach a cable with the shield clamp, approx. 1.5 cm of the cable insulation is to be cut out of the place which is to be laid. The bare shield is then to be pressed tight against the shield connection element with the shield clamp.

The following illustration shows the assembly of the shield clamps:

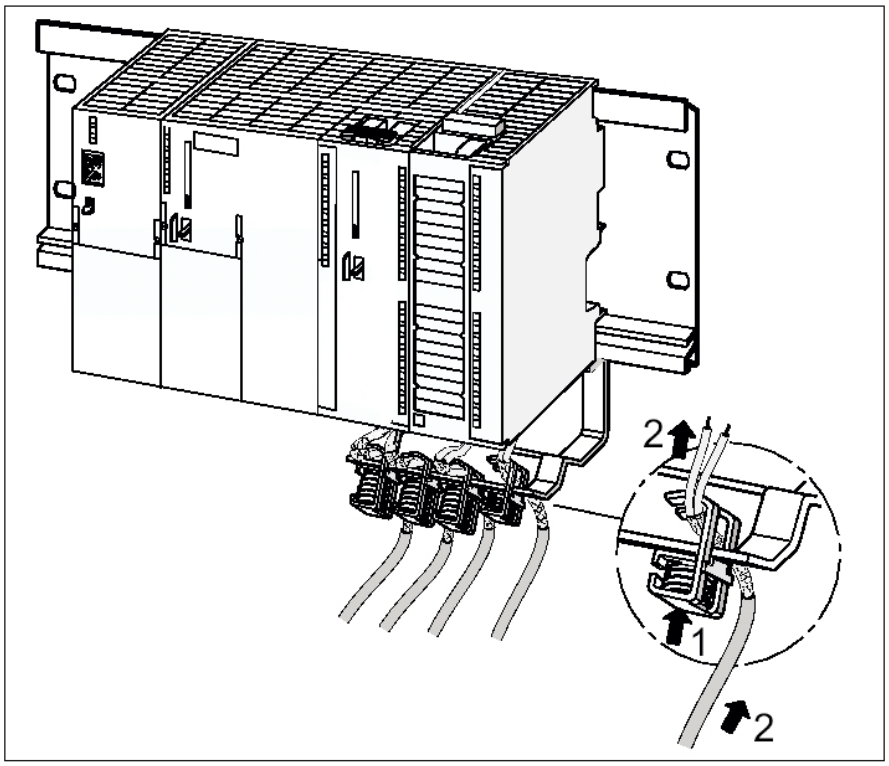


Figure 4-2 Shield clamp assembly

The shield should be pressed against the shield rail by means of the shield clamp.

4.4.3 Connection of 24 V power supply

The 24 V supply voltage is connected with a screw connector.
The connection is located in the lower area of the modules next to the sub-D connector for RS 232.

Note

In the S7 300 or ET200M system, the SIMATIC CPU or IM 153 and SIWAREX FTC must be connected to the same 24 V power supply.

Terminal	Signal name	Remarks
1L+	24 V DC 1L+	Power supply +
1M	24 V DC 1M	Power supply M

Table 4-2 Power supply connection

4.4.4 Connections to front terminal

The SIMATIC construction guidelines apply for connecting the 40-pin connector.

You can use flexible lines with a cross-section of 0.25 to 1.5 mm^2.
The stripping length is 6 mm, the lines should be provided with wire-end sleeves.

4.4.5 Load cell connection

Sensors that are equipped with strain gauges and that meet the following conditions can be connected to the SIWAREX FTC:

- Characteristic value 1....4 mV/V
- Supply voltage of 10.2 V is permitted

The connection is made to the 40-pin front connector. The connection should be made using the cable described in the *Accessories* chapter.

Terminal	Signal name	Remarks
X1.34	AGND	Analog ground (is normally not connected, only where required, e.g. with additional load cell power requirement)
X1.35	SEN+	Sensor line +

Terminal	Signal name	Remarks
X1.36	SEN-	Sensor line -
X1.37	SIG+	Measurement line +
X1.38	SIG-	Measurement line -
X1.39	EXC+	Load cell supply voltage +
X1.40	EXC-	Load cell supply voltage -

Table 4-3 Load cell connections

The following rules are to be observed when connecting load cells (LC):

1. The use of a junction box (JB) becomes necessary when more than one LC is connected (the LCs must be connected in parallel). If the distance from LC to SIWAREX FTA is greater than the existing length of the LC connection cable, then the extension box EB is to be used.

2. The cable shielding is normally run on the cable guide supports of the junction box.

Where there is a danger of potential equalization currents on the cable shielding, a potential equalization conductor is to be run parallel to the load cell cable or the shield clamp is to be used in the junction box to the shield strip. Using the potential equalization conductor is a preferable method as regards EMC (electromagnetic compatibility).

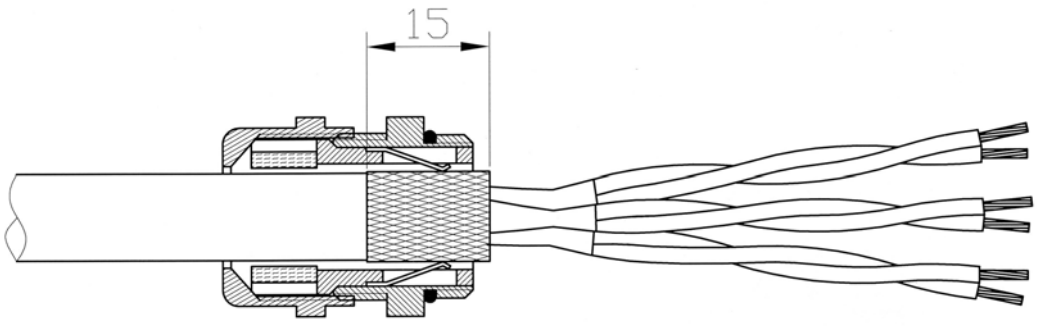


Figure 4-3 Shielding in the screw gland

3. Twisted pairs of conductors are necessary for the specified lines:

- Sensor line (+) and (-)

- Measurement voltage line (+) and (-)
- Supply voltage line (+) and (-)

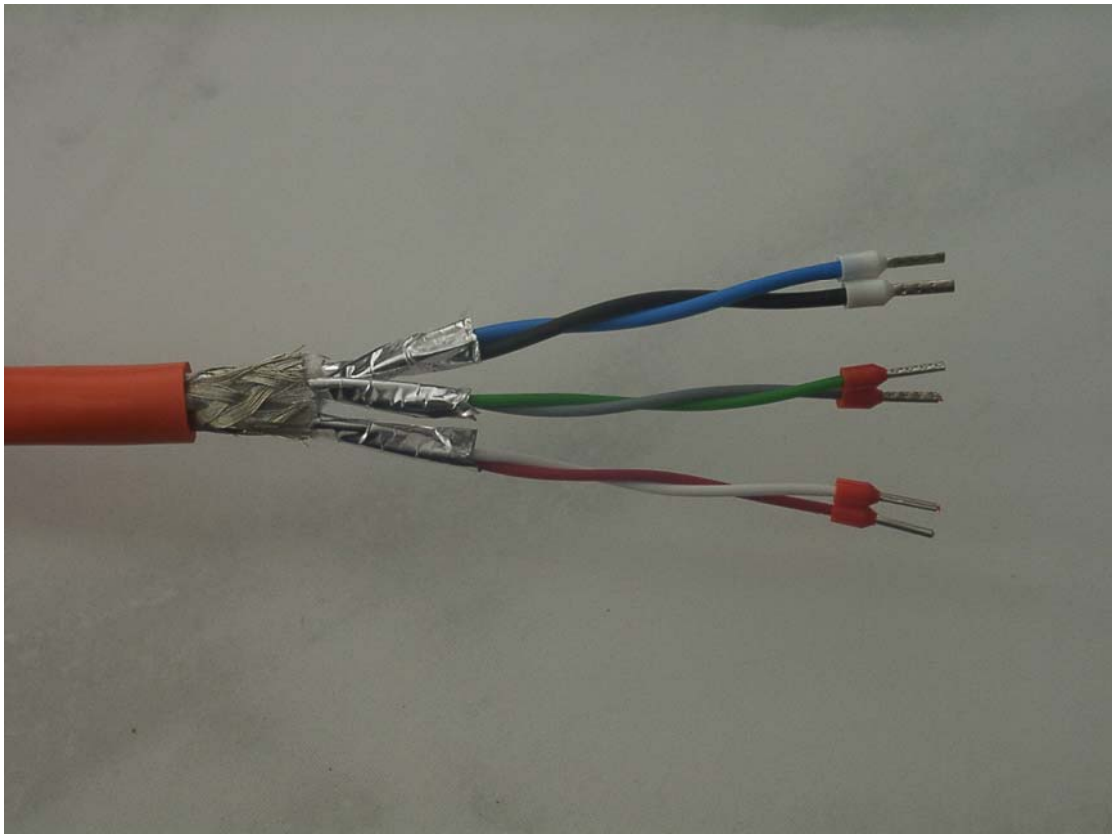


Figure 4-4 Pairs of conductors in the shielded cable

4. The shielding must be attached to the shielding connection element on the SIWAREX FTA.

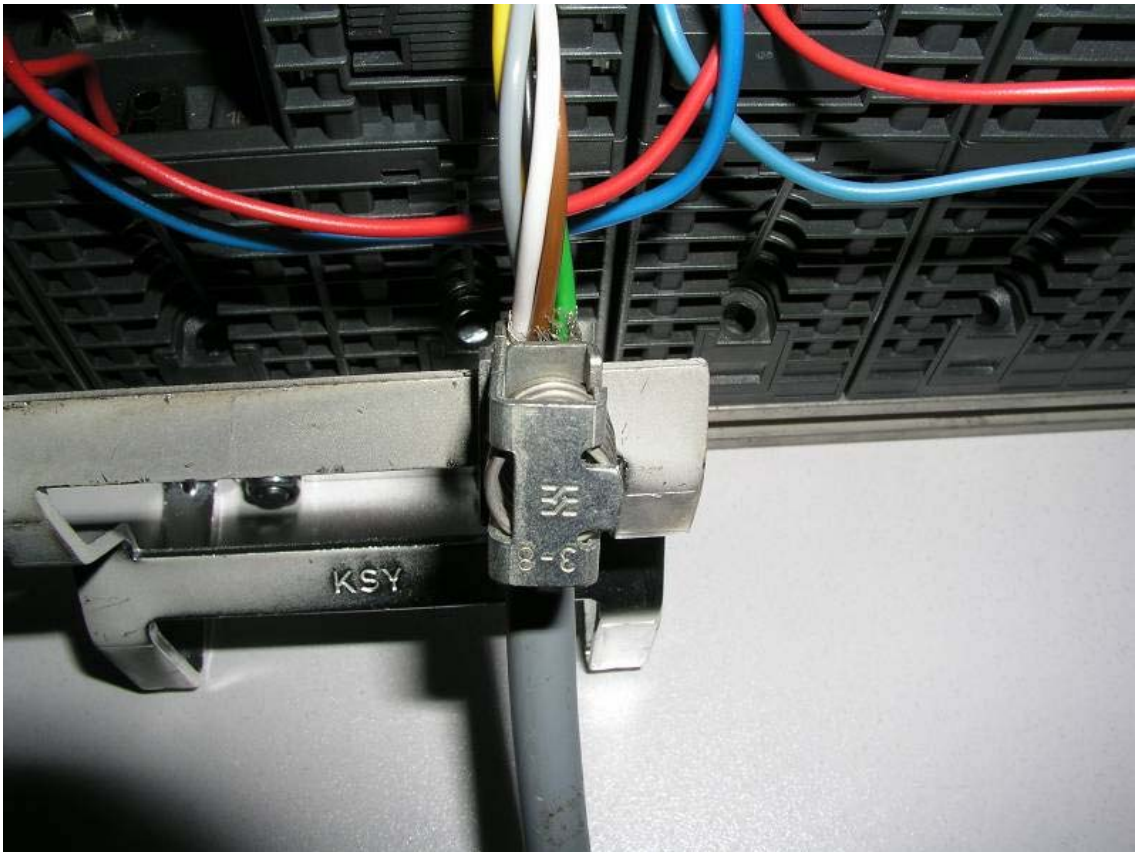


Figure 4-5 Example - Mounting of shield clamps on module

The two images below show load cell connection using 4-wire and 6-wire systems.

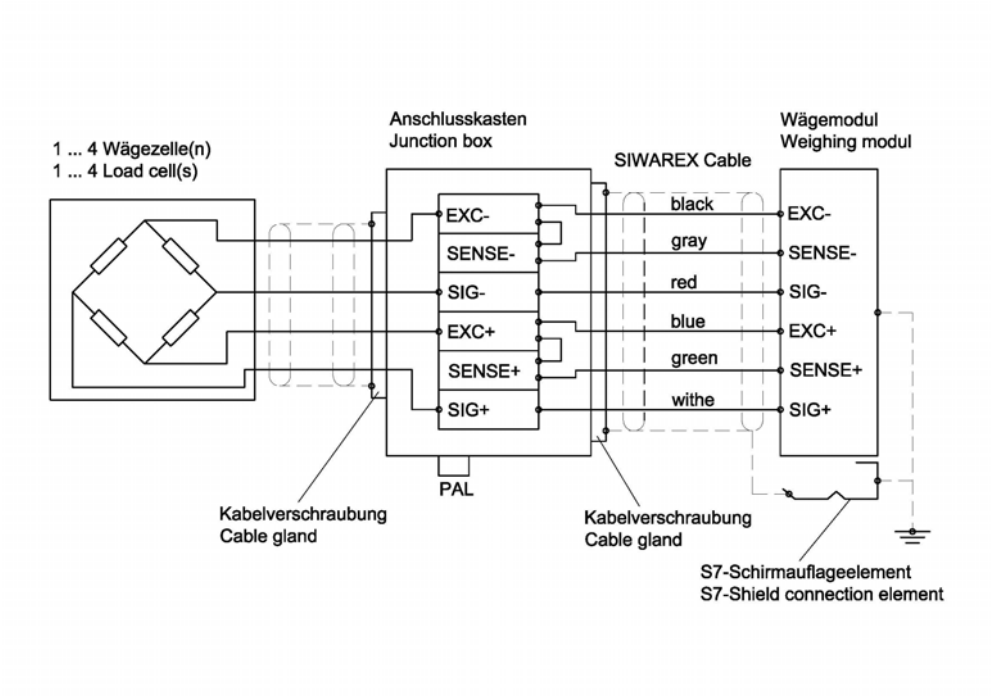


Figure 4-6 Load cell connection in 4-wire system

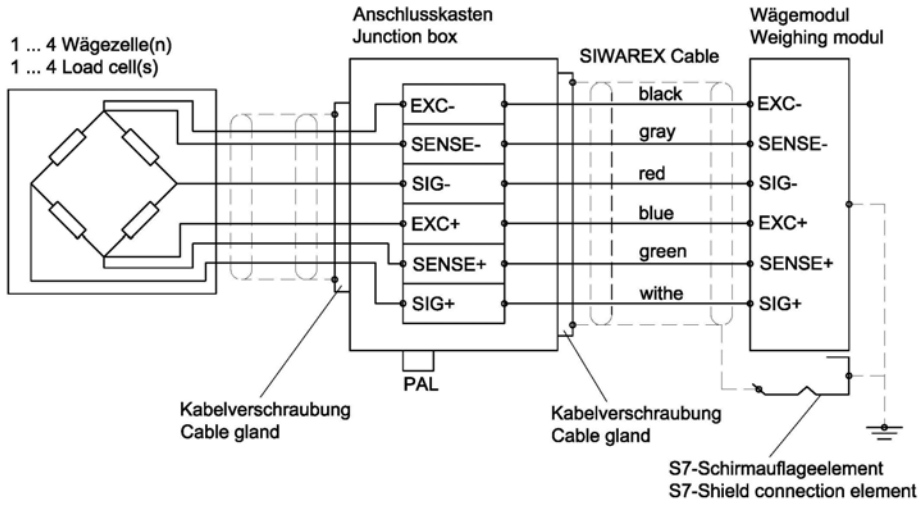


Figure 4-7 Load cell connection in 6-wire system

4.4.6 Digital inputs

SIWAREX FTC has 7 digital inputs. These inputs are isolated from the module. They have a common reference point (M).

The functionality of each input can be defined with parameters.

The DI status is indicated with an LED on the front of the SIWAREX FTC.



Warning

The inputs may only be activated if your functional allocation is known and the activation will not cause any harm.

Terminal	Signal name	Remarks
X1.1	DI 1	Parameter-definable function
X1.2	DI 2	Parameter-definable function
X1.3	DI 3	Parameter-definable function
X1.4	DI 4	Parameter-definable function
X1.5	DI 5	Parameter-definable function
1.6	DI 6	Parameter-definable function
X1.7	DI 7	Parameter-definable function
X1.8	2M	Reference ground for digital inputs

Table 4-4 Digital input connections

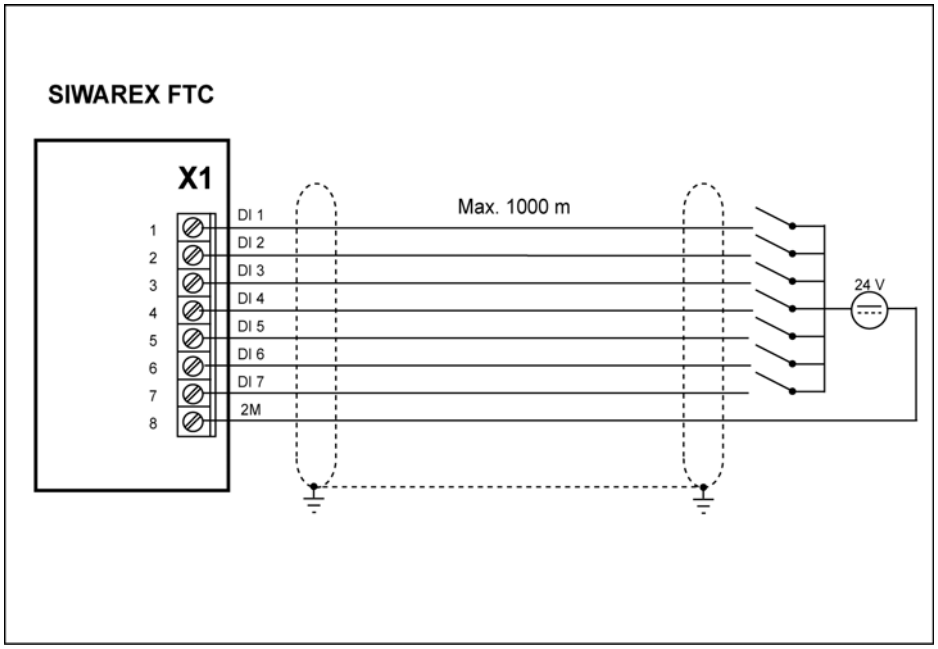


Figure 4-8 Digital inputs

4.4.7 Counter input

The counter input is used for connecting a pulse encoder which is required when using a conveyor scale in continuous operation. Twisted pair wiring should be used for the connections.

Terminal	Signal name	Remarks
X1.9	CI+	Counter input +
X1.10	CI-	Counter input -

Table 4-5 Pulse encoder connection

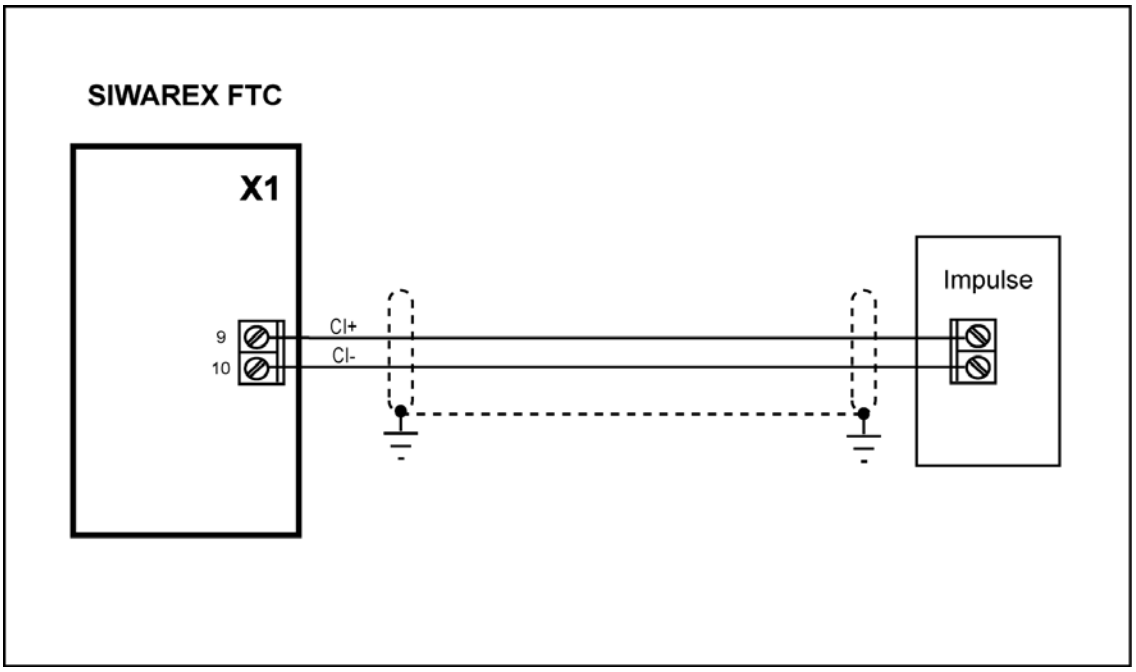


Figure 4-9 Counter input

4.4.8 Digital outputs

The SIWAREX FTC has eight isolated digital outputs (DO) with a nominal voltage of + 24 V and an output current of maximum 0.5 A per output (max. total current 2 A).

These outputs are isolated from the module. The outputs share common potential. They have a common ground and a secure 24 V supply. They are short-circuit and overload protected.

The DO status is indicated with an LED on the front of the SIWAREX FTC.

When connecting inductive consumers, the digital output that is used must be equipped with a free-wheeling diode.



Warning

The outputs may only be activated if their functional allocation is known and the activation will not cause any harm.

Terminal	Signal name	Remarks
X1.11	DO 1	Parameter-definable function
X1.12	DO 2	Parameter-definable function
X1.13	DO 3	Parameter-definable function

Terminal	Signal name	Remarks
X1.14	DO 4	Parameter-definable function
X1.15	DO 5	Parameter-definable function
X1.16	DO 6	Parameter-definable function
X1.17	DO 7	Parameter-definable function
X1.18	DO 8	Parameter-definable function
X1.19	3L+	24 V for digital outputs
X1.20	3M	Ground for digital outputs

Table 4-6 Digital output connections

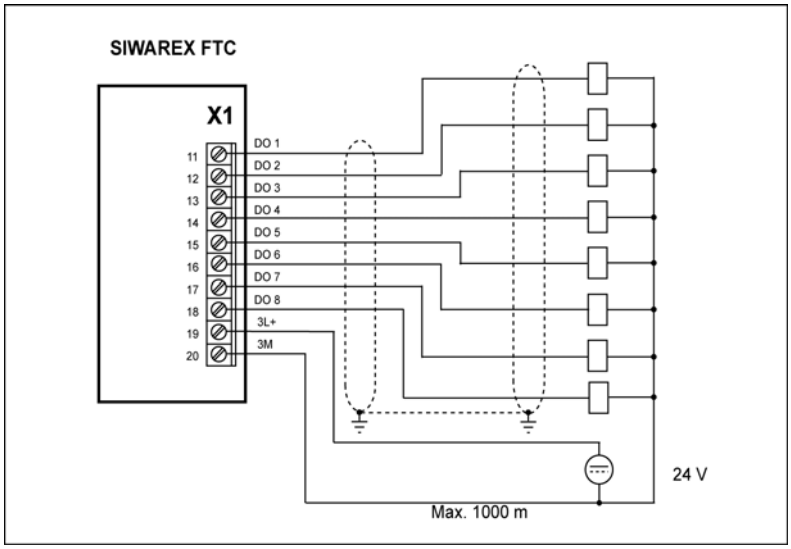


Figure 4-10 Digital outputs

4.4.9 Analog output

Terminal	Signal name	Remarks
X1.29	IOUT+	Analog output +
X1.30	IOUT-	Analog output -

Table 4-7 Analog output connection

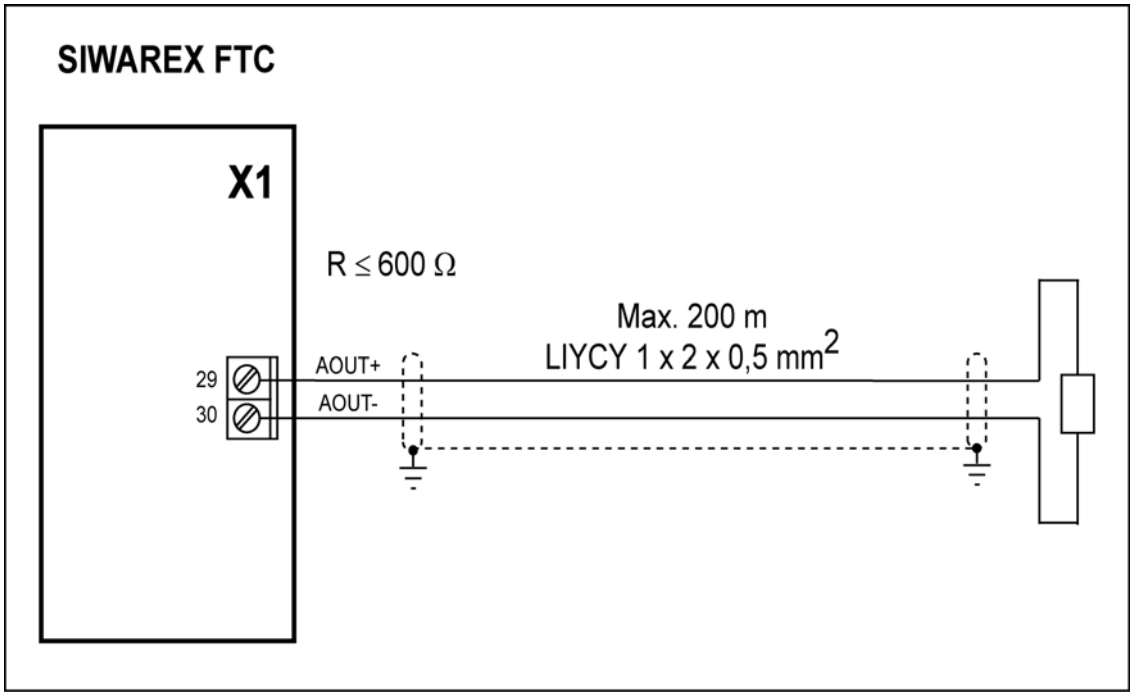


Figure 4-11 Analog output

4.4.10 RS 485 interface for METTLER TOLEDO sensor, type WM or WMH

Type WM or WMH sensors from METTLER TOLEDO can be connected to the SIWAREX. Data records 3 and 7 must contain settings for the following parameters:

(DS 3) Load cell type: METTLER TOLEDO, type WM or WMH

(DS 7) RS485 baud rate: 38400

(DS 7) RS485 character parity: even

(DS 7) RS485 data bits: 7

(DS 7) RS485 stop bits: 1

Terminal	Signal name	Remarks
X1.21	485a	Input Ta
X1.22	485b	Input Tb
X1.23	485a	Output Ta
X1.24	485a	Output Tb
X1.25	RTa	Terminating resistance RTa
X1.26	RTb	Terminating resistance RTb
X1.11	DO 1	Send Start instruction (SIR)
X1.12	DO 2	Send Stop instruction (SI)

Table 4-8 RS 485 connection

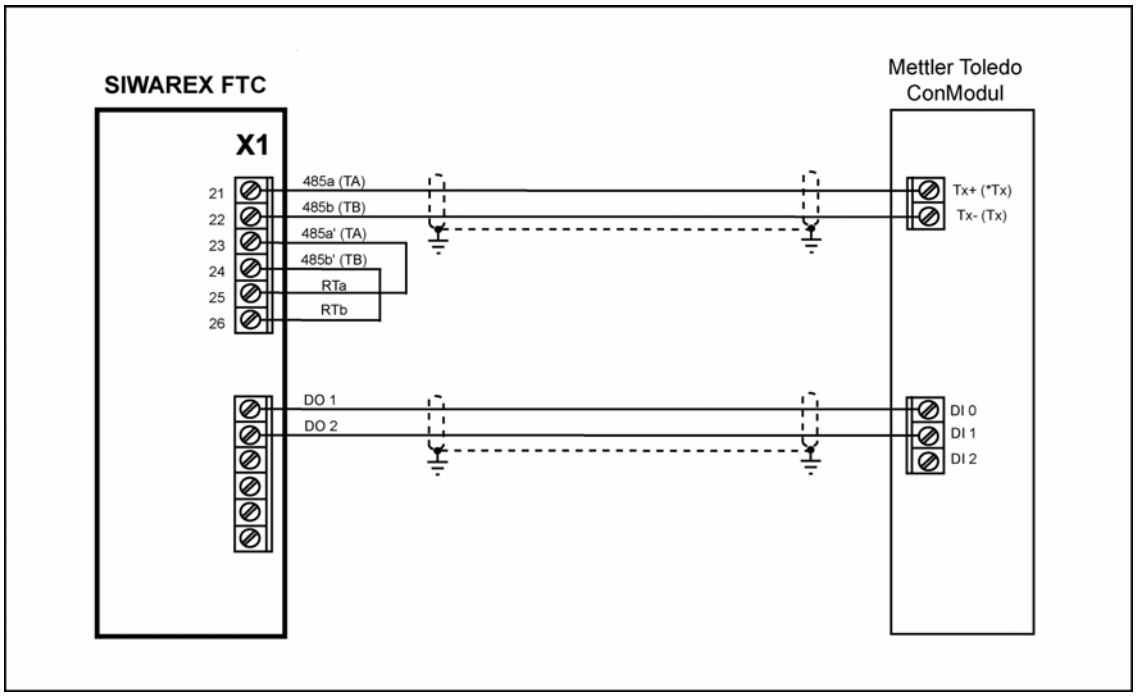


Figure 4-12 METTLER TOLEDO type WM or WMH sensors on RS 485

When connecting METTLER TOLEDO type WM or WMH sensors, the appropriate settings must be made when commissioning.

4.4.11 RS 485 interface for sensor with vibrating wire (PESA)

PESA sensors can be connected to the SIWAREX. Data records 3 and 7 must contain settings for the following parameters:

(DS 3) load cell type: PESA

(DS 7) RS485 baud rate: 9600

(DS 7) RS485 character parity: even

(DS 7) RS485 data bits: 7

(DS 7) RS485 stop bits: 1

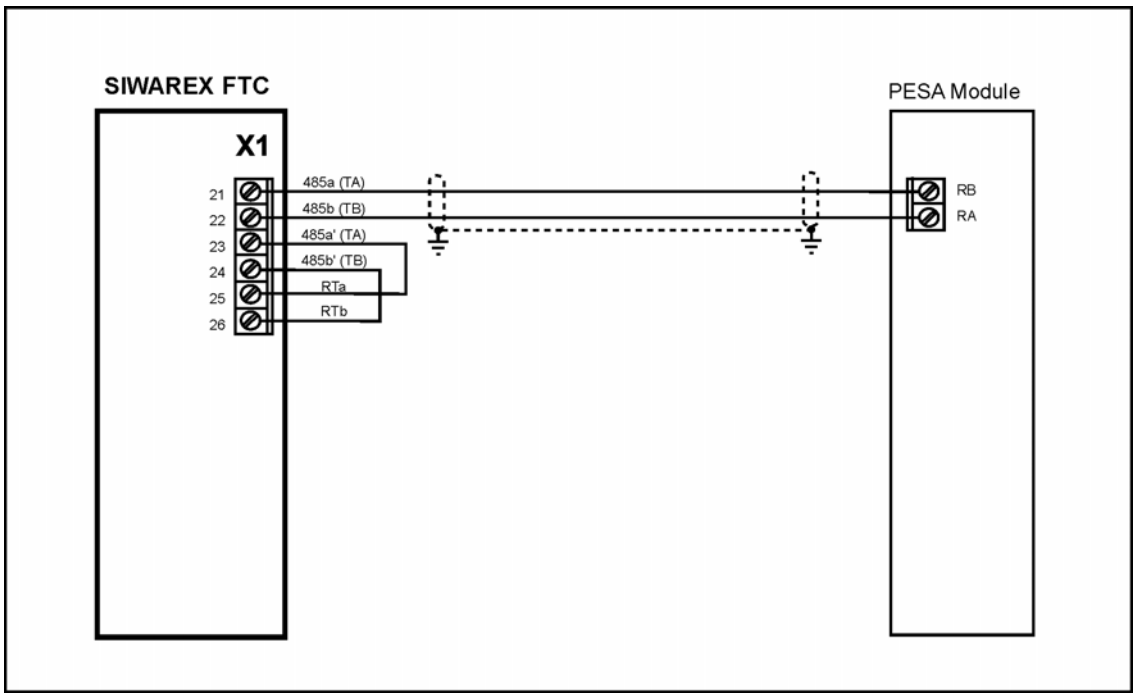


Figure 4-13 Connecting a PESA sensor

When connecting a PESA sensor, the appropriate settings must be made when commissioning.

Protocol: Low-level protocol

Baud rate: 9600

Start bits: 1

Data bits: 7

Parity: even

Stop bits: 1 stop bit

Interface: 2-wire connection/half duplex

In addition, the content of data record DS 53 must be sent to the load cell with multiple commands (command 42):

Load cell with one wire: A125 W003 F03 F10 F20 F30

Load cell with two wires: A125 W003 F03 F10 F20 F30 F40

4.4.12 RS 485 Interface

Terminal	Signal name	Remarks
X1.21	485a	Input Ta
X1.22	485b	Input Tb
X1.23	485a	Output Ta
X1.24	485a	Output Tb
X1.25	RTa	Terminating resistance RTa
X1.26	RTb	Terminating resistance RTb

Table 4-9 RS 485 connection

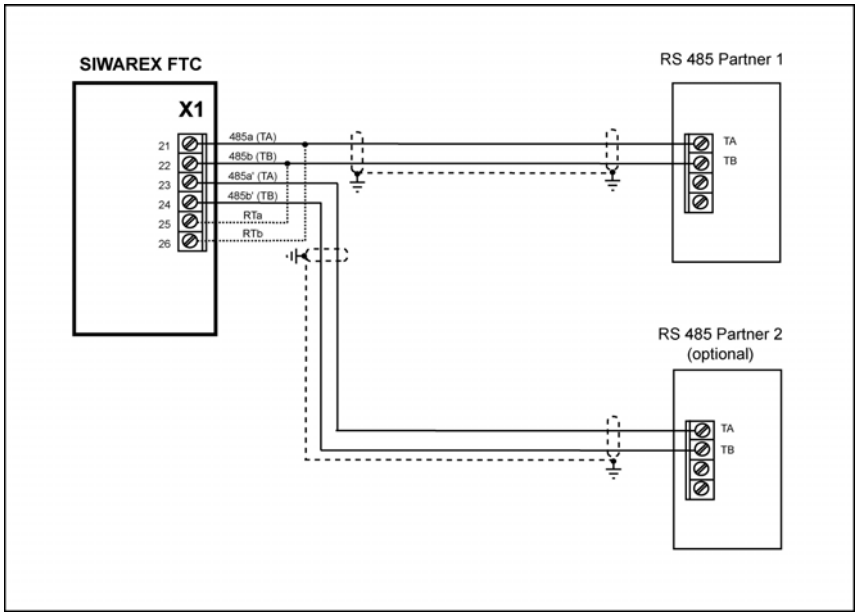


Figure 4-14 RS 485 connection

4.4.13 Connecting the Siebert remote display

One or more Siebert type S102 displays can be connected to the RS 485 interface. The displays can only be used for displaying weights in "non-automatic weighing machine" operating mode.

When connecting a single display, ensure that the RTa and RTb bridges are wired. When installing the S102 for operation, the same parameters that have been set by the SIWATOOL FTC for RS 485 are to be defined.

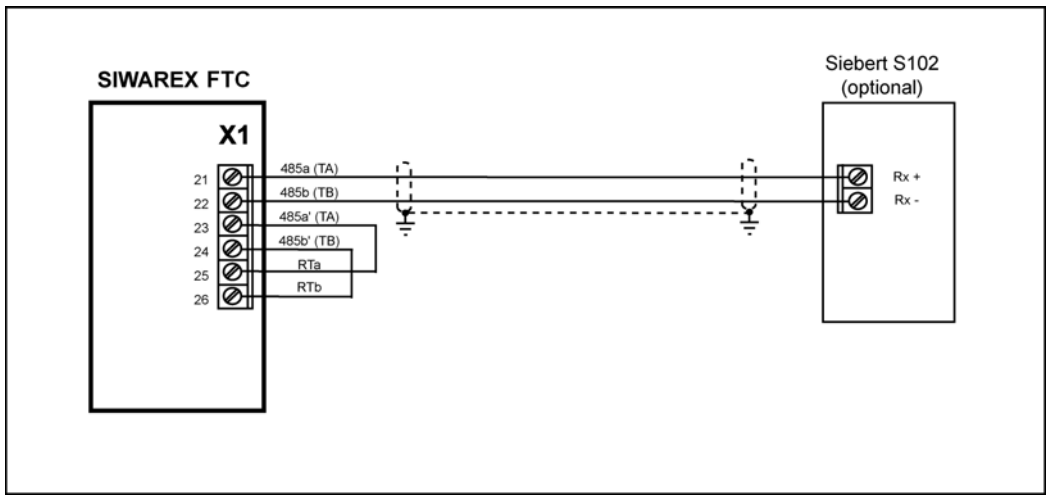


Figure 4-15 Connecting the S102 display

4.4.14 Connecting the PC for SIWATOOL FTC

Table RS 232 interface

Terminal	Signal name	Remarks
X2	Sub-D, 9-pin	RS 232 interface

Table 4-10 Connecting the PC

Ready-made cables are available for connecting the PC (see *Accessories*)

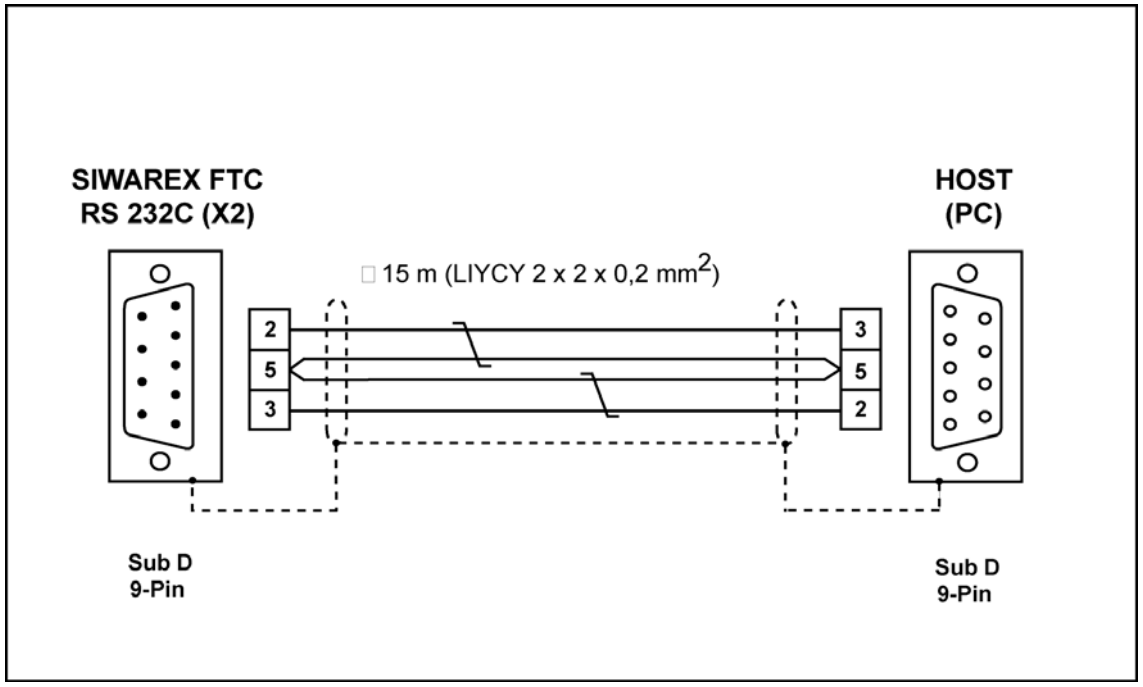


Figure 4-16 Connecting the PC

4.4.15 LED display elements

Label	LED color	LED	Explanation
SF	Red	LED 1 upper left	System fault Hardware fault
	Green	LED 2	Continuous operation active (flashing)
	Green	LED 3	Write protect for calibration data activated
	Green	LED 4	Scale is in empty range
	Green	LED 5	Scale is at stand-still
	Green	LED 6	Micro Memory Card is operation-ready
EXC	Green	LED 7	Load cell supply
SEN	Green	LED 8	Supply voltage feedback from load cells

Table 4-11 Display elements (LED)

4.4.16 Using the Micro Memory Card

Only a SIMATIC Micro Memory Card can be used for saving the logs or recording weighing states. Approximately 16 MB of data can be stored with the MMC described in the *Accessories* chapter.



Warning notice

After formatting the MMC with SIWAREX FTC, it can no longer be used in the SIMATIC-CPU! The MMC should therefore be marked or labeled accordingly.

4.5 Preparing for operation

Introduction

After assembling the module and making all connections, the next part of the commissioning process is to perform a partial functionality check on the SIWAREX FTC and all connected components.
The individual steps of the partial test are to be performed in the following sequence:

Visual check

Check all previously performed steps for proper execution, i.e.:

- Is there any external damage to the module?
- Are the modules located properly?
- Are all fastening screws properly tightened?
- Are all connecting cables connected and secured properly?
- Is the front connection made properly?
- Are all shields attached to the shielding conductor?
- Is the profile rail connected to the ground conductor?
- Have all tools, materials and parts that do not belong to S7 or to SIWAREX FTC been removed from the profile rail and the modules?

24 V to SIWAREX FTC connection

Switch on power supply.
Proper initialization of the SIWAREX FTC in the SIMATIC can only be guaranteed if:

- the S7-CPU (IM 153-1 in the case of decentralized connection) is first switched on together with the SIWAREX FTC
  or
- the SIWAREX FTC is switched on first.

LED checks on the SIWAREX FTC

After applying the 24 V supply voltage and a short initialization phase (internal tests - indicated by running lights for all LEDs), the SIWAREX FTC goes into operating status. The following LEDs must have the status that is indicated below if the unit is operating correctly:

LED (EXC)	-->	ON status
LED (SEN)	-->	ON status
LED (SF)	-->	OFF status

4.6 Usage in areas with risk of explosion



Danger

Failure to observe the setup instructions can result in
D A N G E R O F E X P L O S I O N!

⚠ The system may only be set up in an area with a risk of explosion by observing the commissioning and safety instructions as per the system manual "SIMATIC explosion protection principles" A5E00206200.

Below you will find important notes on installation of the SIWAREX FTC in areas where there is a risk of explosion.

The SIWAREX FTC may only be used in accordance with the conditions specified in the associated certificate.

The SIWAREX FTC can be used in Ex zone 2 (in accordance with IEC/CENELEC, Directive 94/9/EC).

Some details on the certificates ATEX (Europe) and UL (USA, Canada) are described below.

ATEX certificate:

Test number: ATEX no. KEMA 08ATEX0002 X

⚠ Always observe the relevant safety instructions. They can be accessed on the Internet at http://support.automation.siemens.com/WW/view/de/29443327

Certificate: c-UL-us haz. loc.

UL file number USA: NRAG.E239877

UL file number Canada: NRAG7.E239877

Note on c-UL-us haz.loc:

Danger of explosion - the electrical connections must not be undone while live where it is not certain that the area is not explosive.

Danger of explosion - replacement of components can impair suitability for use in class I, division 2.

The device can be used in class I, division 2, groups A, B, C, D or non-Ex areas.

Connecting load cells to SIWAREX FTC:

Load cells in zone 1 or zone 2 can be connected to SIWAREX FTC.

For connecting load cells in zone 2, it is sufficient when the load cells also have an authorization for zone 2 and all relevant guidelines and assembly instructions are observed.

For connecting load cells in zone 1, the load cells require the relevant authorizations, and relevant measures must ensure safe operation pursuant to the guidelines. For example, connecting SIWAREX R load cells via the Ex interface SIWAREX IS is intrinsically safe. The instructions for the Ex interface, the load cells, and from the ATEX and c-UL-CSA guidelines must be observed here.

Installation and maintenance:

The necessary connection and installation work may only be performed by qualified personnel.

Repairs may only be carried out at the place of manufacture of the module.

5 Functionality of the loss-in-weight scale

5.1 Dosing functionality

The loss-in-weight scale detects the current weight of the container, and calculates and regulates the flow rate according to the defined setpoint.

The dosing container filled with the product and the dosing organ are weighed completely and the product flow rate leaves the dosing organ. The SIWAREX FTC weighing electronics measure the weight of the entire dosing station at fixed time intervals. The weight reduction per time unit is calculated from the difference in weight measurement values, taking into consideration the time difference. The following controller uses the determined flow rate and compares it with the set flow rate (gravimetric phase). If there are deviations, the output signals are output to the dosing organ to achieve the desired product discharge.

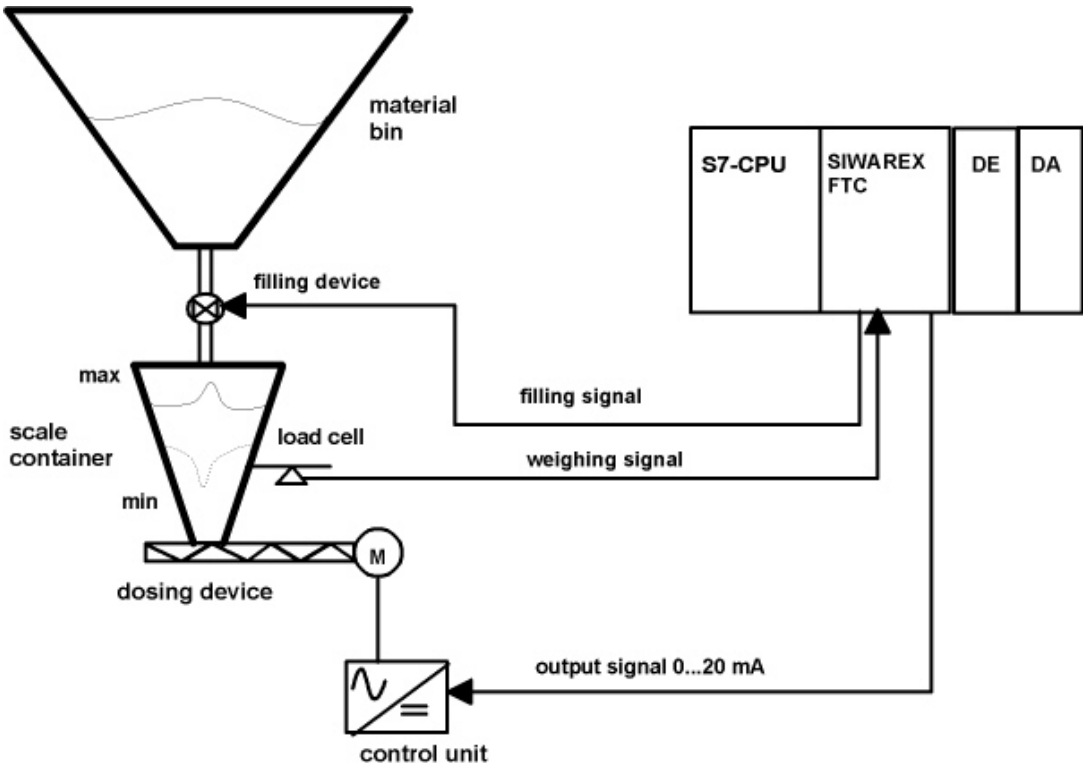


Figure 5-1 Fundamental structure of a loss-in-weight scale

In a specific application, various types of interference affect the system, such as vibration or shaking, which produce incorrect measurements in the

weighing procedure. Consequently, there are several filters available for suppressing the interference.

5.2 Refilling

In addition, problem situations must be handled, such as refilling the weighing container. The supply of product for the dosing station is continually reduced. If the minimum weight is achieved, the weighing container must be filled again. During refilling, the product continues to be taken by the dosing organ. Since regulating the flow rate during this time is not possible, the material discharge is volumetric (no flow rate measurement).

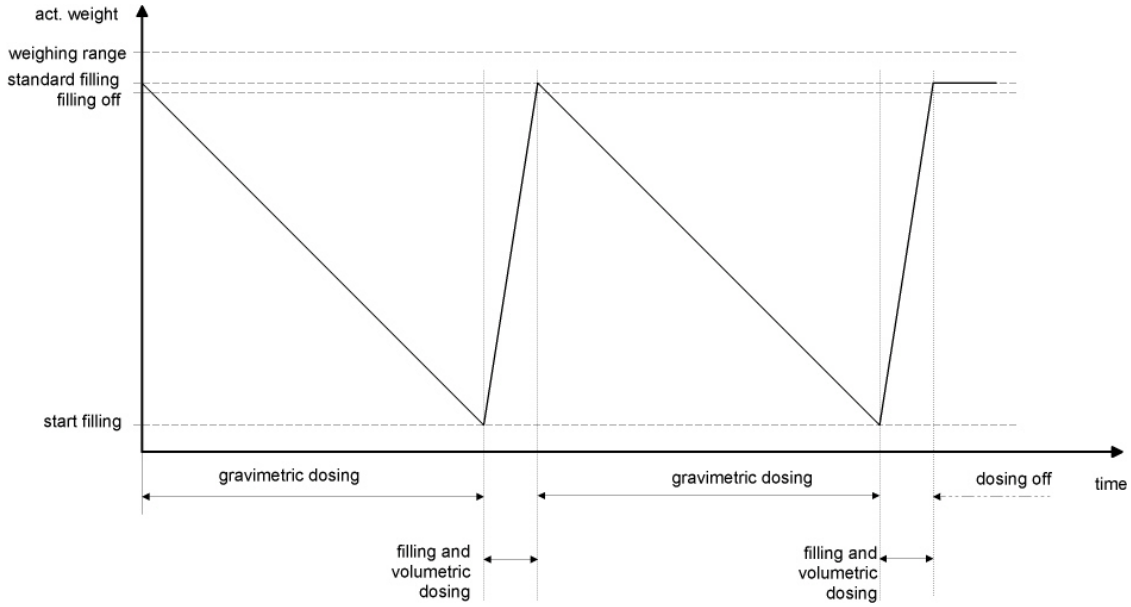


Figure 5-2 Weighing process of the loss-in-weight scale

A loss-in-weight scale which is also a component of an automation system (like the SIWAREX FTC module) offers many options for optimizing the process in combination with the automation components.

Directly embedding the weighing electronics in the automation system and therefore optimizing cooperation with the central processing unit enables functions to be defined with parameters and activated based on the requirements from the control program. Highly accurate dosing is achieved by high measuring technology resolution, real-time signal processing, determination and filtering of signals in the weighing electronics.

For correct flow rate calculations, the weight signal must be filtered. SIWAREX can filter the weight value for display of the filling level and

for determination of the flow rate value separately. Separate filters are available for each task.

5.3 Limit values

The following figure shows the limit values that exist with the SIWAREX FTC in relation to filling the supply container.

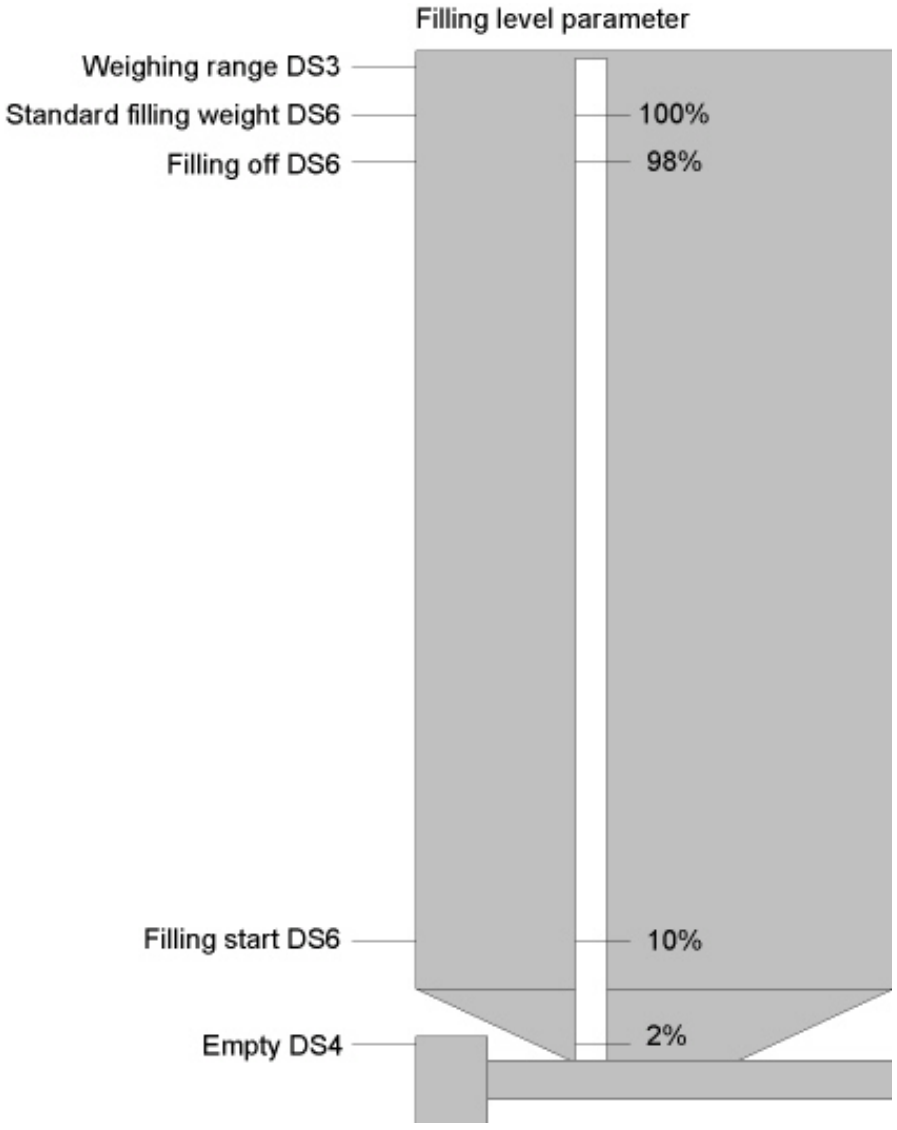


Figure 5-3 Fill quantities of a loss-in-weight scale

The SIWAREX FTC recognizes automatic mode and manual mode in operating mode "Loss-in-weight scale."

In general, manual mode is used for testing individual system components. All functions are switched on and off with individual instructions in manual mode. This means that all functions can be individually tested during commissioning (without automatic activation of help functions).

Automatic mode is used in normal operation. In automatic mode, the functions are linked for continuous operation, e.g. refilling switches on automatically if the respective limit value has not been reached. This switches automatically to volumetric mode.

5.4 Function blocks

The following diagram shows the function blocks of the loss-in-weight scale.

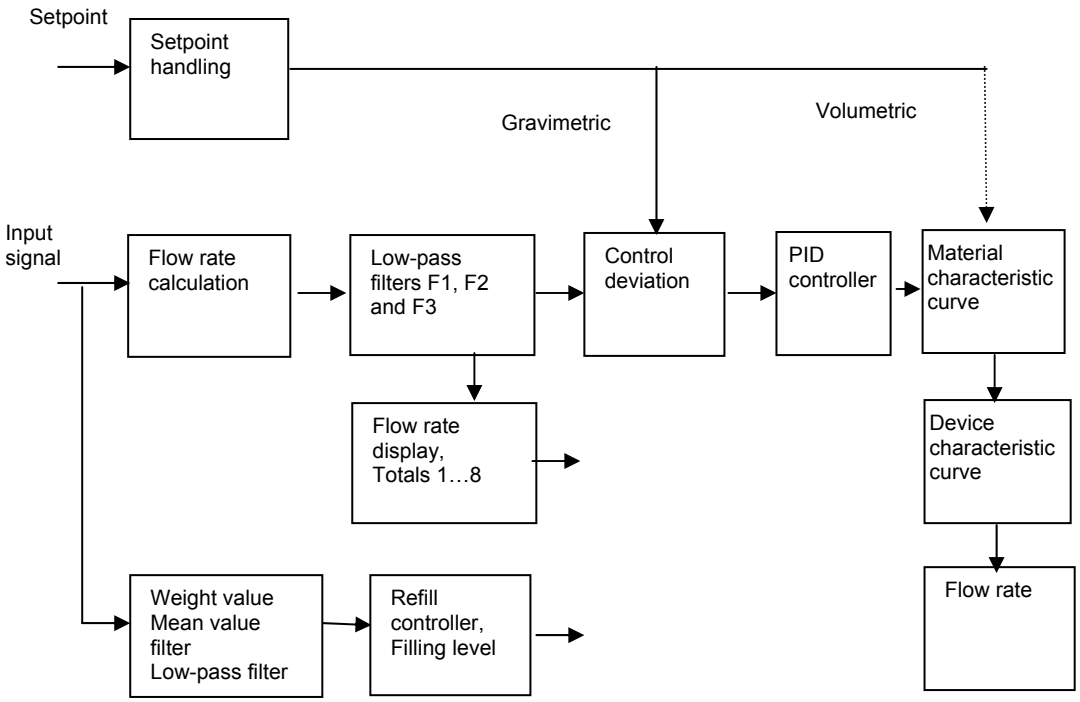


Figure 5-4 Function blocks of the loss-in-weight scale

6 Installation of the Getting Started program

6.1 General

The SIWAREX FTC Getting Started software provides support for configuring applications. A scale can be controlled by the operator using a SIMATIC HMI control unit, e.g. TP177. The software is open and provided with commentary, so that the user can amend and upgrade the software and easily adapt it to accommodate customer requirements.

6.2 Preparing the Getting Started software

In addition to the SIWAREX FB43 function block, the scale data block and the vector data block, the Getting Started demo software shows an example of configuring the SIWAREX FTC in SIMATIC S7. This demo software may be modified, copied or extended. Any claims resulting from use of the demo software are excluded.

6.3 System prerequisites

The project is set up for the CPU 315 and Touch Panel TP177, and therefore consists of two components:

- STEP7 software for the SIMATIC CPU 315
- WinCC flexible software for the TP177 from version 2007 HF3.

Both components can be used with other devices:

- STEP7 software with all CPUs of series S7-300 or S7-400.
- WinCC flexible software can be converted to different TP/OP/MPs.

The messaging system based on ALARM_S or the bit message procedure is also used. In this way, messages from the SIWAREX FTC are displayed to the operator.

For configuration you will also need the basic equipment - configuration package SIWAREX FTC for SIMATIC S7 (order number 7MH4900-3AK02).

This configuration package consists of the following components:

- SIWATOOL FTC commissioning program for Windows
- HSP (Hardware Support Package) for installing the module in the hardware catalog.
- Getting Started software for operating the SIWAREX FTC in SIMATIC S7
- Device manuals in several languages

The system prerequisites for using SIWAREX Getting Started:

- SIMATIC STEP7 from version 5.4 onwards
- WinCC flexible 2007 HF3

6.4 Structure

The project is made up of two components:

- STEP7 software for the SIMATIC CPU
- WinCC flexible project (integrated into SIMATIC Manager)

The messaging system is also used. In this way, messages from the SIWAREX FTC are displayed to the operator. In this messaging system (FB1, FC1), messages are generated based on ALARM S or via the bit message procedure with FC2. The customer can, of course, replace the messaging system with its own system.

6.5 Function

SIWAREX FTC Getting Started takes over the job of a standardized sequencing program in the SIMATIC S7. In SIWAREX FTC Getting Started, the scale FB is called, the commands and set values are transferred to the scales in accordance with the process, and the scale data is prepared for visualization.

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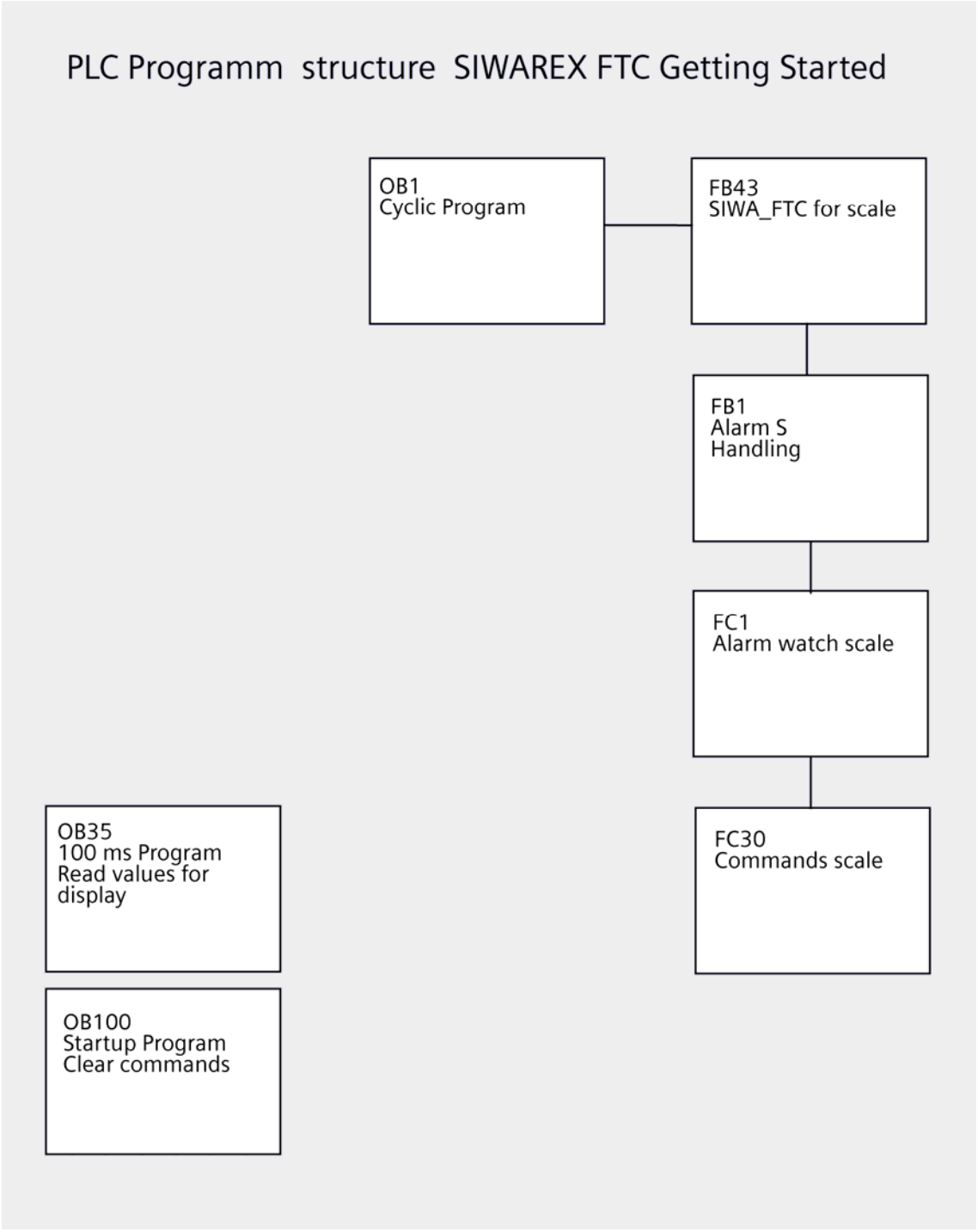


Figure 6-1 Program structure STEP7 for Getting Started with ALARM_S

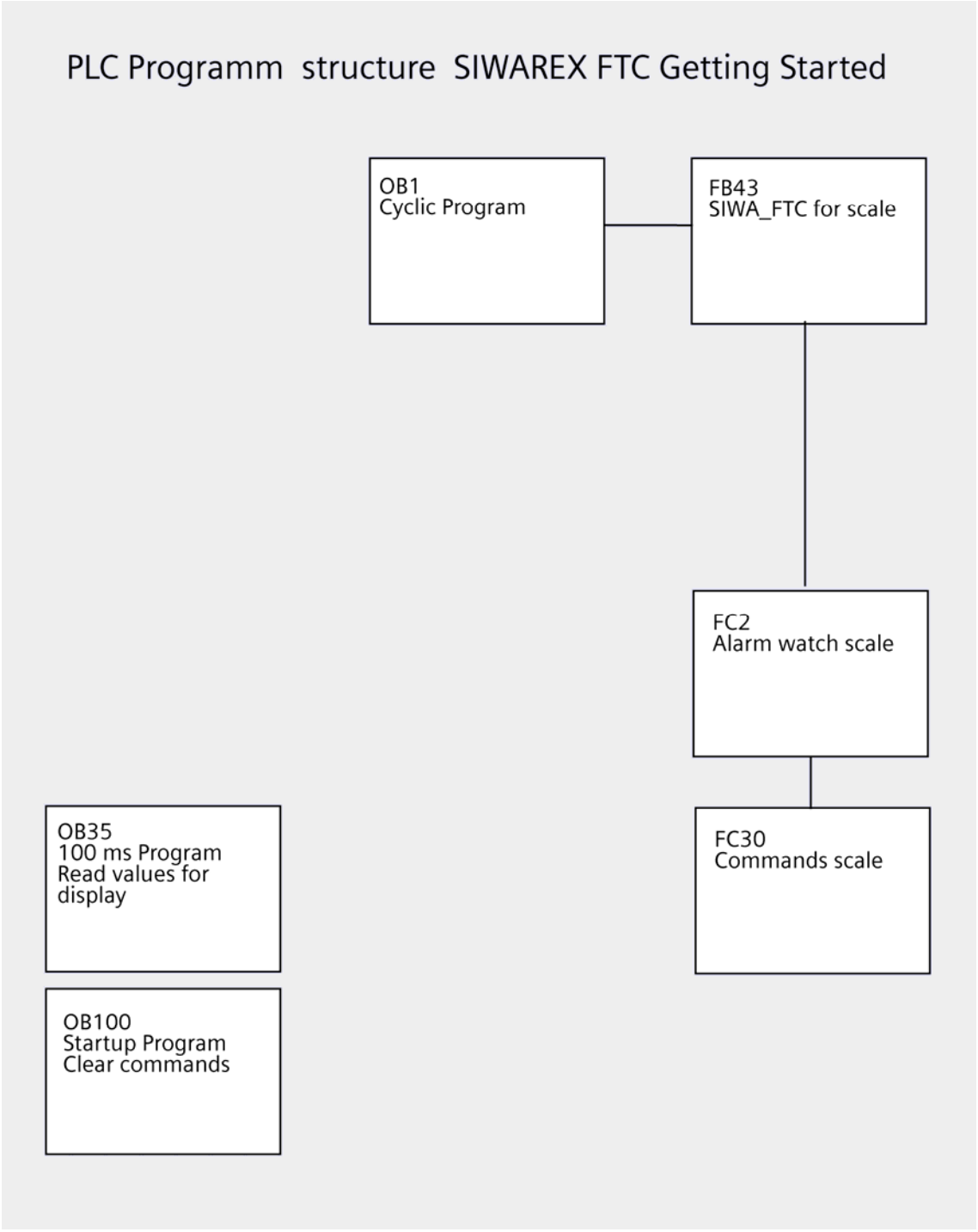


Figure 6-2 Program structure STEP7 for Getting Started with bit message procedure

6.6 Program structure

The SIWAREX FTC Getting Started software is parameterized for operation with a scale. The project is set up for the CPU 315 and TP177.

6.7 Program installation in STEP 7

If you are using the same SIMATIC CPU 315, you can simply load the modules from the project into the CPU. The program can be run immediately afterwards.

If you are using a different CPU, the hardware must first be configured in the HW config. The CPU 315 must first be deleted and replaced by the new CPU. When asked whether the program should also be deleted, enter "No."

Then transfer the program modules (FBs, FCs, OBs, DBs but not the SDB) to the module folder in the new CPU.

For ALARM_S, you will receive a warning that the message block (FB1) must be generated again. You can generate the FB1 in the new project in OB1 as follows:

Delete the instance data block of FB1 (DB1) and call the FB1 again. Generation of the new message numbers can then take several minutes.

6.8 SIWAREX FTC in HW config.

Planning the hardware configuration in SIMATIC Manager involves definition of the basic properties of the module:

- the peripheral address of the module
- release of the diagnostic alarm
- release of the process alarms
- CPU stop behavior

SIWAREX FTC requires 16 bytes in the input and output areas.

- Additional scale-specific parameters that are also modified at control program runtime.

6.9 Command Manager FC30

The commands of a scale are controlled by the associated function FC30. Using function FC30, the commands can be executed on the scale by three different job slots with different priorities.

CMD1 has the highest priority, CMD3 the lowest.

Command Manager is called in OB1. The commands are actuated at various points in the program:

- by the operator at OP/TP with priority 2 or 1
- by time OB35 with priority 3

```
CALL "Fc Execute command" (
           iCmdInput                := "DB_SCALE".i_CMD_INPUT,
           boCmdEnable              := "DB_SCALE".bo_CMD_ENABLE,
           boCmdInProgress          := "DB_SCALE".bo_CMD_IN_PROGRESS,
           boCmdFinishedOk          := "DB_SCALE".bo_CMD_FINISHED_OK,
           boCmdErr                 := "DB_SCALE".bo_CMD_ERR,
           sCmd_1                   := DB18.DBD   40,
           sCmd_2                   := DB18.DBD   44,
           sCmd_3                   := DB18.DBD   48);
```

Figure 6-3 Calling FC Command Manager

The input variable s_CMD1 contains the command code and the control bits for command handling.

If FC30 is used as a Command Manager, the commands must not be transferred directly to SIWAREX by calling FB43, but rather via the structure CMD1, CMD2, CMD3.

s_CMD1	**STRUCT**		**Command input 1**
i_CMD1_Code	INT	0	Command code
bo_CMD1_Trigger	BOOL	FALSE	Command trigger
bo_CMD1_InProgress	BOOL	FALSE	Command in progress
bo_CMD1_FinishedOk	BOOL	FALSE	Command finished ok
bo_CMD1_FinishedError	BOOL	FALSE	Command finished with error

Figure 6-4 Calling FC Command Manager

6.10 Scale call

FB_SIWA_FTC is called in OB1. The FB is called with the following parameters:

```
CALL "SIWA_FTC" , DB    16 (
           ADDR                     := 256,
           DB_SCALE                 := 18,
           DB_VECTOR                := 17,
           CMD_IN                   := "DB_SCALE".i_CMD_INPUT,
           SIM_VAL                  := "DB_SCALE".r_SIM_VALUE,
           ANA_OUT                  := "DB_SCALE".r_ANALOG_OUT_VALUE,
           DO_FORCE                 := "DB_SCALE".b_DIG_OUTPUT_FORCE,
```

```
TRANSITION              := "DB_SCALE".b_Reserve,
CMD_INPR                := "DB_SCALE".bo_CMD_IN_PROGRESS,
CMD_FOK                 := "DB_SCALE".bo_CMD_FINISHED_OK,
CMD_ERR                 := "DB_SCALE".bo_CMD_ERR,
CMD_ERR_C               := "DB_SCALE".b_CMD_ERR_CODE,
REF_COUNT               := "DB_SCALE".b_INFO_REFRESH_COUNT,
PROC_VAL1               := "DB_SCALE".r_PROCESS_VALUE1,
PROC_VAL2               := "DB_SCALE".dw_PROCESS_VALUE2,
SC_STATUS               := "DB_SCALE".dw_SCALE_STATUS,
ERR_MSG                 := "DB_SCALE".bo_ERR_MSG,
ERR_MSG_TYPE            := "DB_SCALE".b_ERR_MSG_TYPE,
ERR_MSG_C               := "DB_SCALE".b_ERR_MSG_CODE,
FB_ERR                  := "DB_SCALE".bo_FB_ERR,
FB_ERR_C                := "DB_SCALE".b_FB_ERR_CODE,
START_UP                := "DB_SCALE".bo_START_UP_IN_PROGRESS,
CMD_EN                  := "DB_SCALE".bo_CMD_ENABLE,
ERR_MSG_Q               := "DB_SCALE".bo_ERR_MSG_QUIT);
```

Figure 6-5 Calling the scale in OB1

6.11 Alarms

The alarms for the scale are decoded using FC1.

ALARM_S:

With ALARM_S, messages are forwarded to FB1 for generation of an alarm using ALARM_S.

Alarm generation is supported by the systematics of the ALARM_S blocks SFC18 and SFC19. The scale messages are monitored as available. Monitoring the display word INDW from the scale call using the FB_SIWA_FTC block is not included in the "Getting Started" package.



Note

When using the "Getting Started“ package, it should be borne in mind that after removing the display device, e.g. TP177 from the system in online operation, no more alarms are generated. After reconnecting the TP177 to the system, the SIMATIC-CPU must be restarted in RUN.

Bit message processes with FC2:

With bit message processes, individual bits in a bit field are set if a message is to be generated. Message texts for up to four scales can be stored in the WinCC flexible project.

The user can, of course, delete these program sections and use its own message system.

6.12 SIWA_FTC - FB43 in cyclical STEP 7 program

SIWAREX FTC communicates with the SIMATIC CPU with the function block FB SIWA_ FTC. While programming the call, an instance data block is created for the FB SIWA_FTC. In addition to the instance data block, **a scale DB** in which the scale parameters are stored is required **for every SIWAREX FTC scale**. To create the scale_DB, the UDT supplied can be used.

In addition, the vector DB must be loaded in the SIMATIC CPU.
A vector DB can be used by several SIWAREX FTC modules.

The FB SIWA_FTC function block and the data blocks can be found on the CD for the SIWAREX FTC configuration package in the Getting Started project.

```
CALL "SIWA_FTC" , DB    15 (
           ADDR                    := 256,
           DB_SCALE                := 18,
           DB_VECTOR               := 17,
           CMD_IN                  := "DB_SCALE".i_CMD_INPUT,
           SIM_VAL                 := "DB_SCALE".r_SIM_VALUE,
           ANA_OUT                 := "DB_SCALE".r_ANALOG_OUT_VALUE,
           DO_FORCE                := "DB_SCALE".b_DIG_OUTPUT_FORCE,
           TRANSITION              := "DB_SCALE".b_Reserve
           CMD_INPR                := "DB_SCALE".bo_CMD_IN_PROGRESS,
           CMD_FOK                 := "DB_SCALE".bo_CMD_FINISHED_OK,
           CMD_ERR                 := "DB_SCALE".bo_CMD_ERR,
           CMD_ERR_C               := "DB_SCALE".b_CMD_ERR_CODE,
           REF_COUNT               := "DB_SCALE".b_INFO_REFRESH_COUNT,
           PROC_VAL1               := "DB_SCALE".r_PROCESS_VALUE1,
           PROC_VAL2               := "DB_SCALE".dw_PROCESS_VALUE2,
           SC_STATUS               := "DB_SCALE".dw_SCALE_STATUS,
           ERR_MSG                 := "DB_SCALE".bo_ERR_MSG,
           ERR_MSG_TYPE            := "DB_SCALE".b_ERR_MSG_TYPE,
           ERR_MSG_C               := "DB_SCALE".b_ERR_MSG_CODE,
           FB_ERR                  := "DB_SCALE".bo_FB_ERR,
           FB_ERR_C                := "DB_SCALE".b_FB_ERR_CODE,
           START_UP                := "DB_SCALE".bo_START_UP_IN_PROGRESS,
           CMD_EN                  := "DB_SCALE".bo_CMD_ENABLE,
           ERR_MSG_Q               := "DB_SCALE".bo_ERR_MSG_QUIT);
```

Figure 6-6 Call parameters for FB SIWA_FTC

6.13 Call parameters for FB SIWA_FTC

The call parameters of the FB SIWA_FTC are described in the following section. The call parameters were defined as variables in the scale DB at the time of delivery. It is possible to define the call parameters with other variables of the same type.

The number of the instance DB to be generated must be defined when the FB SIWA_FTC is called.

6.13.1 ADDR:= 256, input, INT

SIWAREX FTC requires 16 bytes in the input and output range of the SIMATIC CPU for operation. The ADDR parameter must correspond to the definition in the HW configuration.

6.13.2 DB_SCALE:= 18, input, INT

A scale DB containing the parameters for the SIWAREX FTC and the current actual values must exist for every scale. The number of the DB can be freely selected. DB15 has been defined as the scale DB in the configuration package. In addition, the UDT15 is provided as a template for creating blocks.

6.13.3 DB_VECTOR:= 17, input, INT

The content of the vector DB must not be changed by the user. It must be loaded once only per SIMATIC CPU, regardless of the number of SIWAREX FTC modules used. The number of the DB can be freely selected.

6.13.4 CMD_IN:= "DB_SCALE".i_CMD_INPUT, input, INT

The user controls all commands using this input variable, whether transferring a data record or executing a weighing task. The commands are described in chapter *12*. The user prepares the command number using this variable and triggers the command using variable CMD_EN:= "DB_SCALE".bo_CMD_ENABLE. The FB SIWA_FTC does not delete the command number, it resets the trigger variable CMD_EN:= "DB_SCALE".bo_CMD_ENABLE after executing the command.

6.13.5 SIM_VAL:= "DB_SCALE".r_SIM_VALUE, input, REAL

If simulation has been enabled (see chapter *11.8.1*), the value to be simulated can be defined using this input. The value should be located in the scale's weighing range.

6.13.6 ANA_OUT:= "DB_SCALE".r_ANALOG_OUT_VALUE, input, REAL

If control of the analog output has been enabled (see chapter *11.8.11*), the value to be controlled can be defined using this input. The value should be within the scale's parameterized range.

6.13.7 DO_FORCE:= "DB_SCALE".b_DIG_OUTPUT_FORCE, input, BYTE

If forced control of the digital outputs has been enabled (see chapter *11.8.3*), the value to be controlled can be defined using this input. Bit 0 corresponds to digital output 0, bit 1 to digital output 1 etc.

6.13.8 CMD_INPR:= "DB_SCALE".bo_CMD_IN_PROGRESS, output, BOOL

The bit informs the user that a command is currently being processed.

6.13.9 CMD_INPR:= "DB_SCALE".bo_CMD_FOK, output, BOOL

The bit informs the user that its command has been executed with no errors (command complete without errors).

6.13.10 CMD_ERR:= "DB_SCALE".bo_CMD_ERR, output, BOOL

This bit informs the user that a command has not been executed. The bit is set for one cycle (edge) only. The cause can be evaluated in the same cycle with variable CMD_ERR_C:= "DB_SCALE".b_CMD_ERR_CODE. The number is decoded in the table "Data and Operating Errors" in the chapter. Where no error code is entered, the error must be evaluated in "DB_SCALE".b_FB_ERR_CODE.

6.13.11 CMD_ERR_C:= "DB_SCALE".b_CMD_ERR_CODE, output, BYTE

For a command that is not executed (finished with errors), the error number is output here. The number that is output is decoded in the table "Data and Operating Errors" in chapter . The value remains in the output until the next command is triggered. The evaluation is to be performed if the set bit CMD_ERR:= "DB_SCALE".bo_CMD_ERR appears. If no error code is specified, the error must be evaluated in "DB_SCALE".b_FB_ERR_CODE.

6.13.12 REF_COUNT:= "DB_SCALE".b_INFO_REFRESH_COUNT, output, BYTE

The current output values which are prepared as output variables of the FB SIWA_FTC are read cyclically by the FB through the peripheral range. SIWAREX FTC updates the values internally on a 10 ms cycle. Every update is assigned a number which can be used in the SIMATIC CPU like a time stamp.

6.13.13 PROC_VAL1:= "DB_SCALE".r_PROCESS_VALUE1, output, REAL

The selected process value is output using this variable (see chapter *11.8.4*). Normally, the conveyor load is output here.

6.13.14 PROC_VAL2:= "DB_SCALE".w_PROCESS_VALUE2, output, DWORD

The selected process value is output using this variable (see chapter *11.8.5*). The status of the continuous weighing is normally output here (see chapter *11.21.2*).

6.13.15 SC_STATUS:= "DB_SCALE".dw_SCALE_STATUS, output, DWORD

The status of the non-automatic scale NAWI (see chapter *11.21.1*) is always output through this variable.

6.13.16 ERR_MSG:= "DB_SCALE".bo_ERR_MSG, output, BOOL

All messages that SIWAREX FTC provides are prepared in an output buffer on the module. If a new message appears, this bit is set. The user can evaluate the meaning using variables ERR_MSG_TYPE:= "DB_SCALE".b_ERR_MSG_TYPE and ERR_MSG_C:= "DB_SCALE".b_ERR_MSG_CODE. After the user has acknowledged the message (ERR_MSG_Q:= "DB_SCALE".bo_ERR_MSG_QUIT), the bit is reset by the block.

6.13.17 ERR_MSG_TYPE:= "DB_SCALE".b_ERR_MSG_TYPE, output, BYTE

The variable tells the user which message exists:

bit 0 - operating message (fault)

bit 1 - technology error

bit 2 - data or operating error

6.13.18 ERR_MSG_C:= "DB_SCALE".b_ERR_MSG_CODE, output, BYTE

The user is informed of the message number with this variable (suitable for ERR_MSG_TYPE:= "DB_SCALE".b_ERR_MSG_TYPE). After evaluation of the message, the user indicates to the FB that the message has been evaluated (with variable ERR_MSG_Q:= "DB_SCALE".bo_ERR_MSG_QUIT) and the FB SIWA_FTC is ready to output the next message if one exists.

6.13.19 FB_ERR:= "DB_SCALE".bo_FB_ERR, output, BOOL

If an error has occurred in the processing of the block itself, this is reported via this variable.



Warning

If a processing error occurs for FB SIWA_FTC, it must be assumed that the variables that have been output do not correspond to the actual status in the module.

6.13.20 FB_ERR_C:= "DB_SCALE".b_FB_ERR_CODE

The error number of the FB SIWA_FTC is output through this variable.

The following messages can be output:

Bit 0 - DB_SCALE or DB_VECTOR are missing or have incorrect lengths

Bit 1 - Error with internal call for SFC58 or SFC59, the value RET_VAL is entered in DW4 in the scale DB for one cycle

Bit 2 - Error interpreting a data record/command, specified data record or command number is incorrect.

Bit 3 - Life bit error, SIWAREX FTC not responding

Bit 4 - Unable to read peripheral data in this cycle

Bit 5 - Activated command aborted at restart

Bit 6 - Reserve

Bit 7 - Reserve



Warning

If a processing error occurs for FB SIWA_FTC, it must be assumed that the variables that have been output do not correspond to the actual status in the module.

6.13.21 START_UP:= "DB_SCALE".bo_START_UP_IN_PROGRESS

Communication between the SIWAREX FTC and the FB SIWA_FTC is synchronized when the SIWAREX FTC module is restarted (normally when the SIMATIC CPU is started). The bit can be output for more than one cycle.

6.13.22 CMD_EN:= "DB_SCALE".bo_CMD_ENABLE

After entering the command number in the CMD_IN:= "DB_SCALE".i_CMD_INPUT variable, execution of the command is triggered with this bit. To prevent the command from being triggered more than once, the bit should be created as an edge. After execution of the command, the FB SIWA_FTC resets the trigger variable CMD_EN:= "DB_SCALE".bo_CMD_ENABLE.

6.13.23 ERR_MSG_Q:= "DB_SCALE".bo_ERR_MSG_QUIT

After evaluating a message with variable ERR_MSG_C:= "DB_SCALE".b_ERR_MSG_CODE, the user acknowledges this message. FB SIWA_FTC can then output the next message if necessary.

6.14 Allocation of scale DB

The scale FB contains variables that are available in the SIMATIC.
The structure corresponds to the data record structure. The variable names are in English.

6.15 Configuration using WinCC flexible

The software is configured for showing a scale in TP177.

Conversion to other SIMATIC HMI devices is possible.

WinCC flexible offers a selection of target devices for conversion.

6.16 Program installation in WinCC flexible

If you are using the CPU 315 and TP177, the program is immediately ready for operation after loading onto the TP177. When loading via the MPI interface, use MPI address=1 for the TP270 and MPI address=2 for the CPU.

6.17 Program scope

The memory requirement for the bit message process is considerably less.

OB /FB/FC	Approx. 9.5 KB
DB	Approx. 4 KB

Table 6-1 Required memory

6.18 Cycle time

Cycle time example: CPU315	Approx. 4 ms

Table 6-2 Cycle time

7 15-minute commissioning with SIMATIC HMI

A display of the loss-in-weight scale appears first. This screen contains function keys for controlling the scale (start, stop, empty, fill). A menu screen can be selected from this screen which will provide various parameter overviews.

7.1 Start screen

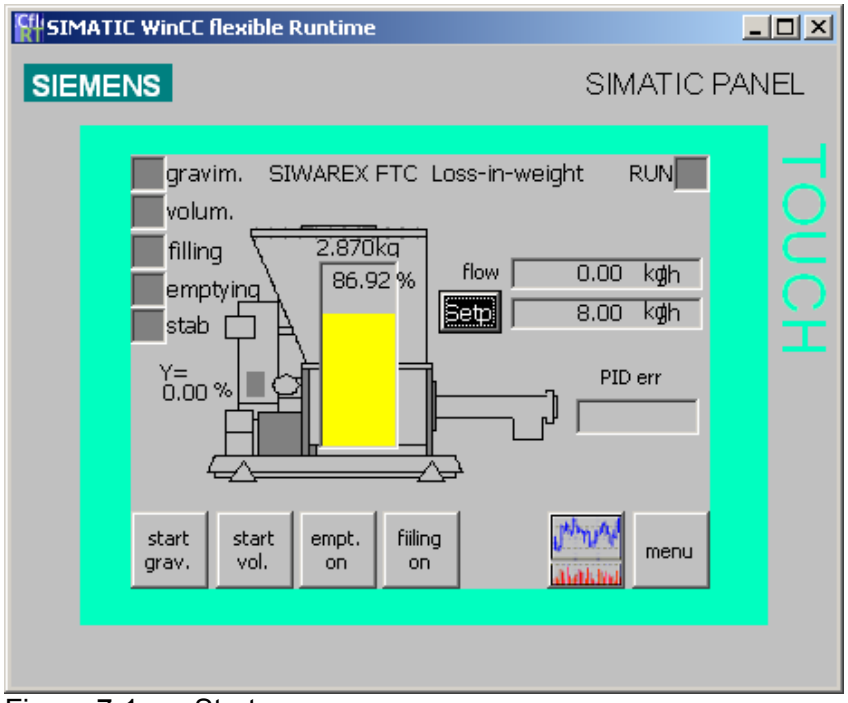


Figure 7-1 Start screen

Start grav. (command) - starts automatic operation (start-up of volumetric operation and switch to gravimetric operation after expiry of start-up time).
Start volum. (command) - starts volumetric operation
Fill on/off (command) - manual activation of the fill signal
Empty on/off (command) - activates the container emptying process (dosing must be started)
Menu - screen selection, with additional selection options for parameterization
Graph symbol - displays current dosage graph

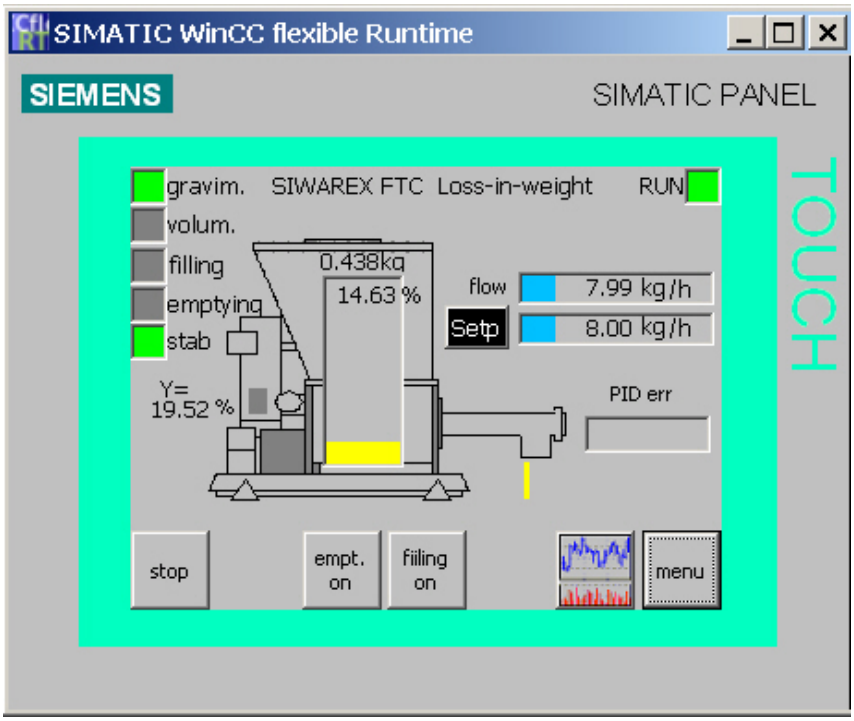


Figure 7-2 Start screen during dosage operation

Stop (command) - stops dosage operation

7.2 Menu screen

The menu screen provides a facility for different levels of parameter entry (flow rate setpoint, evaluation of dosage quality, display of overall quantity, automatic start-up and service area).

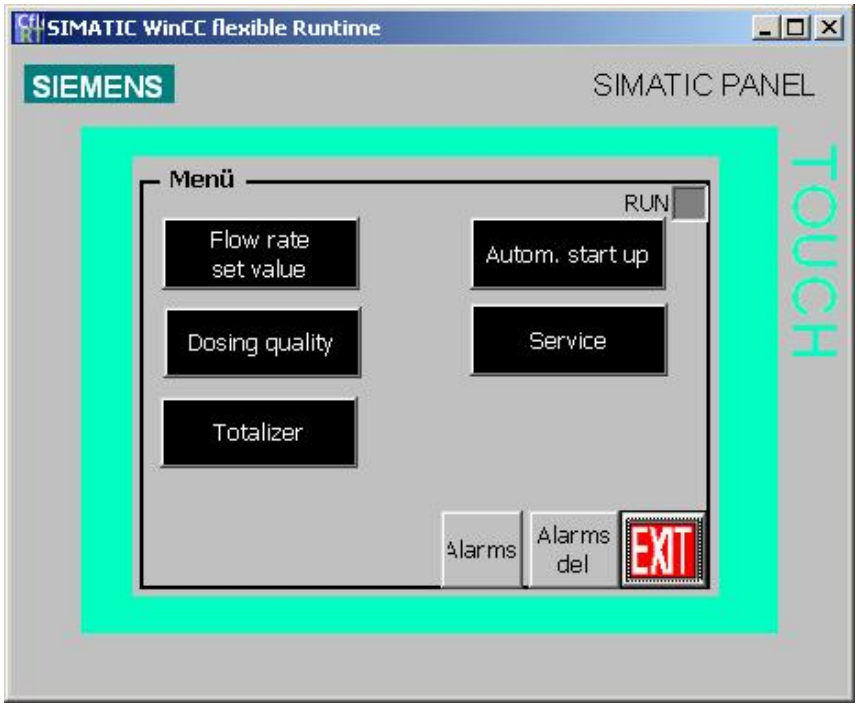


Figure 7-3 Menu screen for operator

7.3 Service screen

The service screen can be used to process the scale and dosage parameters.

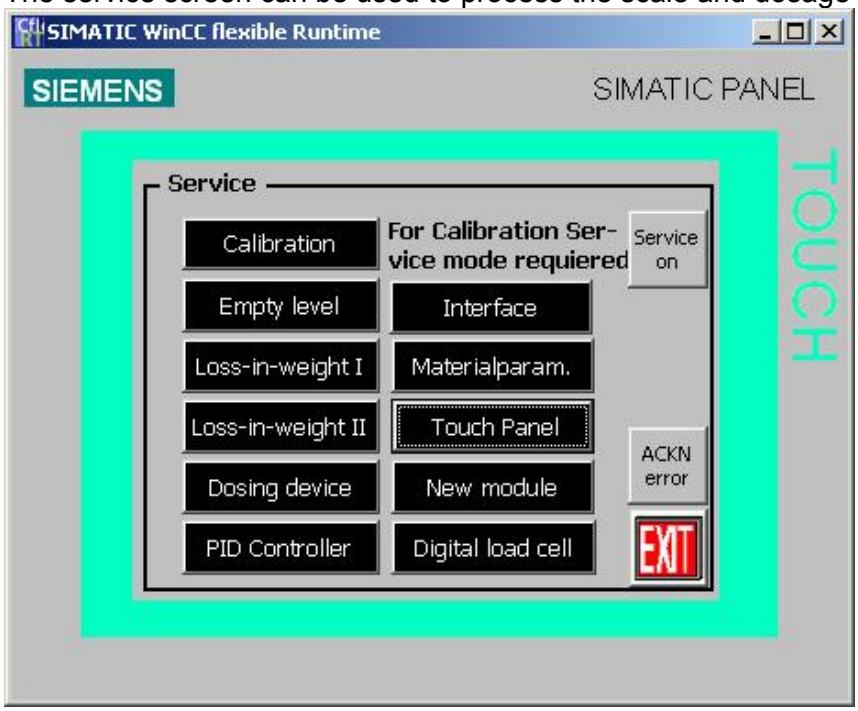
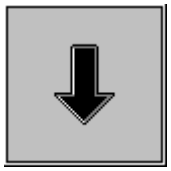


Figure 7-4 Selection for commissioning and service

Once an operating window has been selected, e.g. "Scale adjustment," the associated parameters are automatically read from SIWAREX to create the display on the new screen. After entering a parameter, the Enter key must be used to send the new values from the touchpanel to the SPS. After entering all parameters on a screen, the on-screen parameters must be sent from the SPS to SIWAREX using the Send key. Most function keys are labeled. The function keys with symbols have the following meaning:



Next page



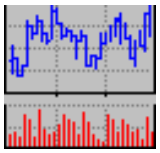
Previous page



Fetch associated data record from SIWAREX FTC



Send associated data record to SIWAREX FTC



Graph display

Dosage graph

The dosage graph provides an overview of flow rate progress.

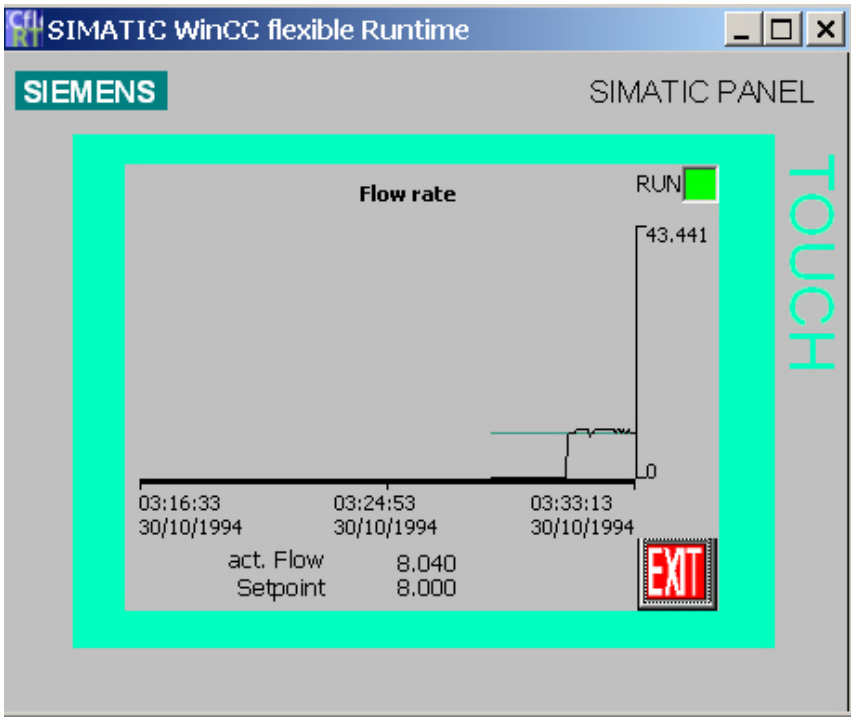


Figure 7-5 Dosage progress

Commissioning of the loss-in-weight scale generally occurs in three stages:

1. Scale adjustment (calibration of the bin scale)
2. Setting parameters for control and filtering
3. Optimization of parameters in test mode

Each section consists of multiple subsections, which are described individually.
The adjustment and dosage parameters can be selected from the service screen.

The parameters are preassigned with appropriate values in the factory. As a result, it is not necessary to enter all parameters upon initial commissioning.
This brief introduction describes only those parameters which it is imperative that the user adapts for the system.

After the first switch-on, the electronics should be set to "Ex factory" state. To do this, the "New module" screen should be selected in the service screen. After activating service operation, the command "Factory setting" can be executed. Service operation can then be switched off, or the scale can remain in service operation if it is to be calibrated subsequently.

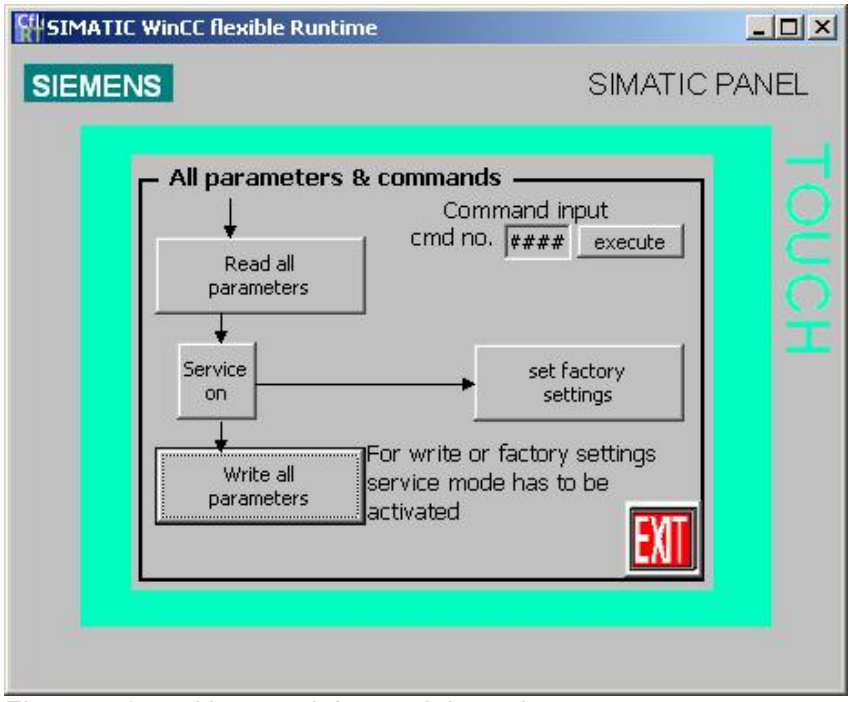


Figure 7-6 New module, module replacement

7.4 Scale adjustment (calibration of the bin scale)

The adjustment and dosage parameters can be selected from the service screen.

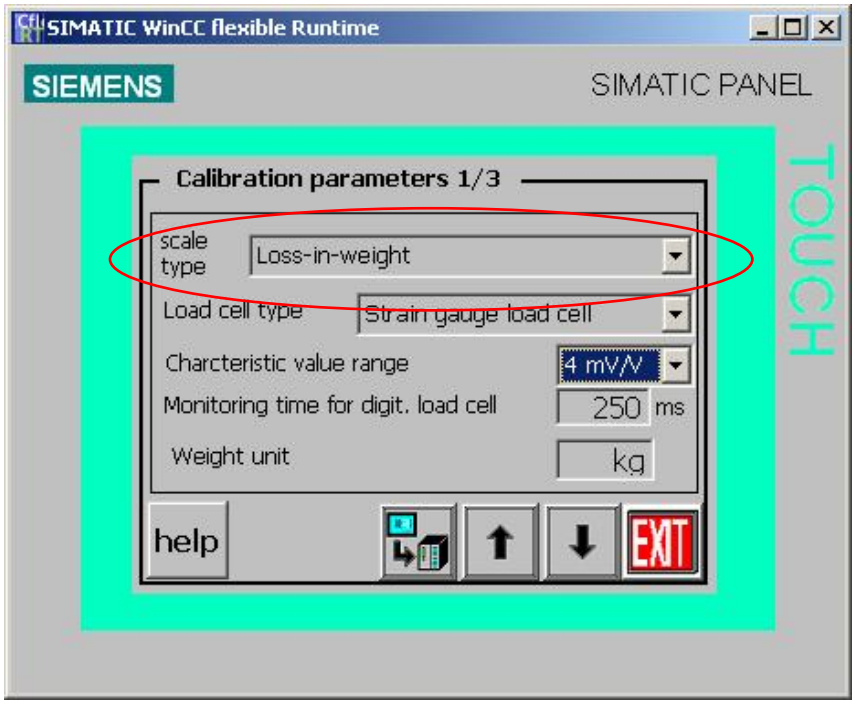


Figure 7-7 Adjustment data 1/3

The loss-in-weight scale should be set as the operating mode. The load cell type and the characteristic value range should be entered according to the load cells used. Similarly, the weight unit can be specified. Conversion of parameters is not performed.

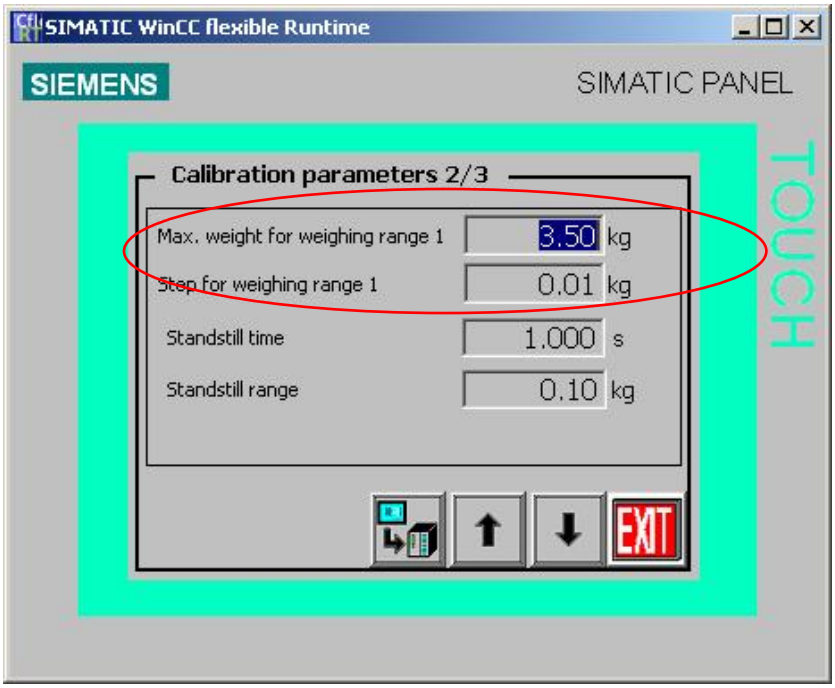


Figure 7-8 Adjustment data 2/3

The weighing range should be adjusted to the maximum container weight. The numeral step describes the smallest display value for the contents of the container.

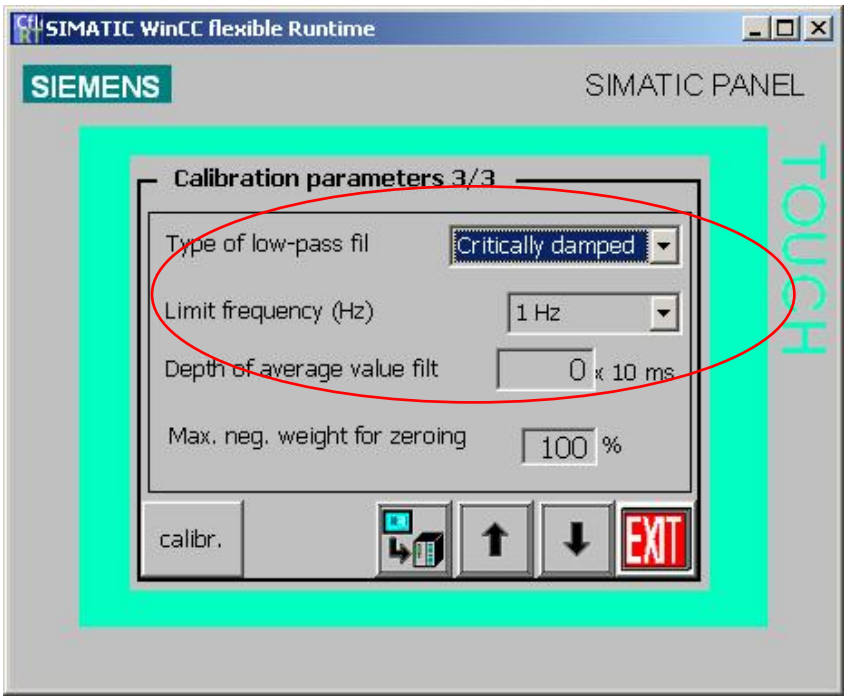


Figure 7-9 Adjustment data 3/3

At initial commissioning, the default values should be changed to values as displayed. Call up the adjustment screen from the screen "Adjustment data 3/3" using the "Adjustment" button.

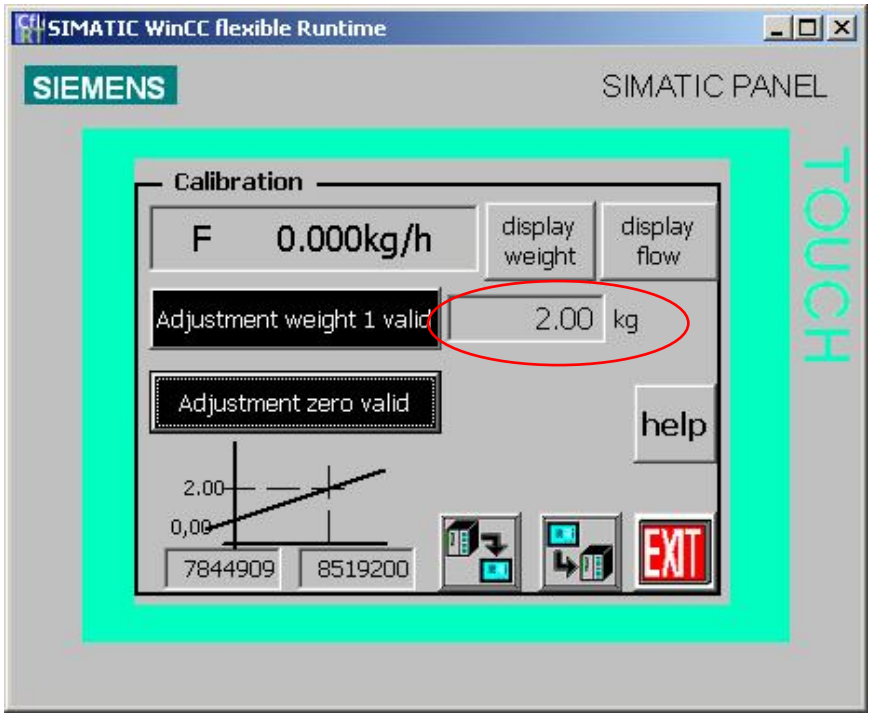


Figure 7-10 Performing the adjustment

The actual adjustment (calibration) of the scale is performed using this screen. First, the test weight (adjustment weight/calibration weight) must be determined (enter this value in the appropriate field in the screen). The data must then be sent to SIWAREX and the adjustment weight stored.
Adjustment of the zero point with an empty weighing container is then performed ("Zero point valid" button).
The adjustment weight must be declared valid after being added ("Adjustment weight 1 valid" button). The weight display then moves to this value.
The adjustment is now complete. Service operation can now be switched off in the "Service" screen.

If the scale has already been filled, a theoretical adjustment (see manual) can be performed instead of an adjustment using an adjustment weight.

7.5 Setting parameters for control

The empty range must be set to allow the scale to recognize it is empty and to end the dosing after being emptied.

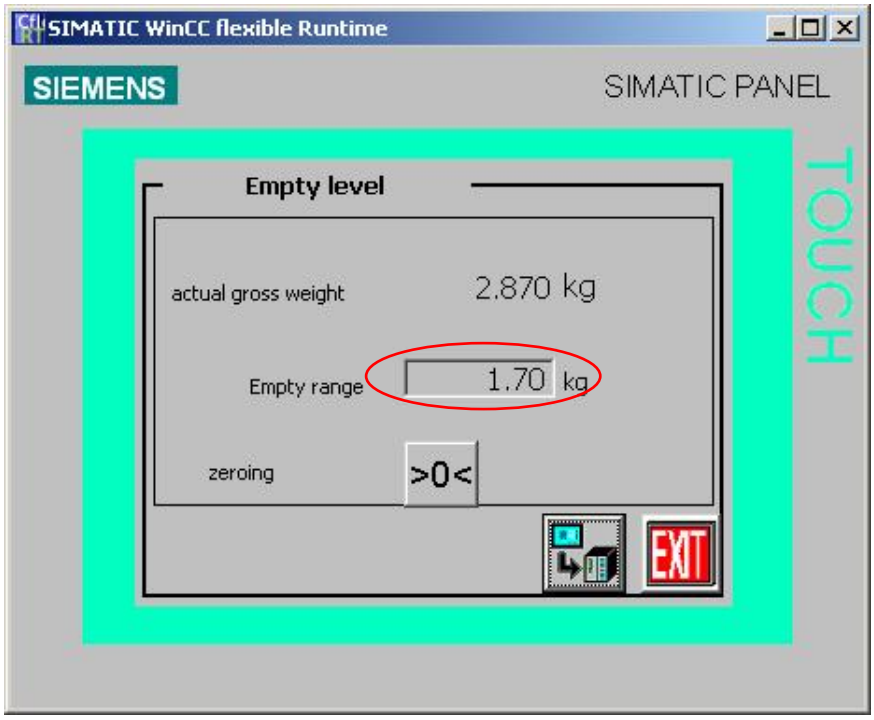


Figure 7-11 Entering the empty range

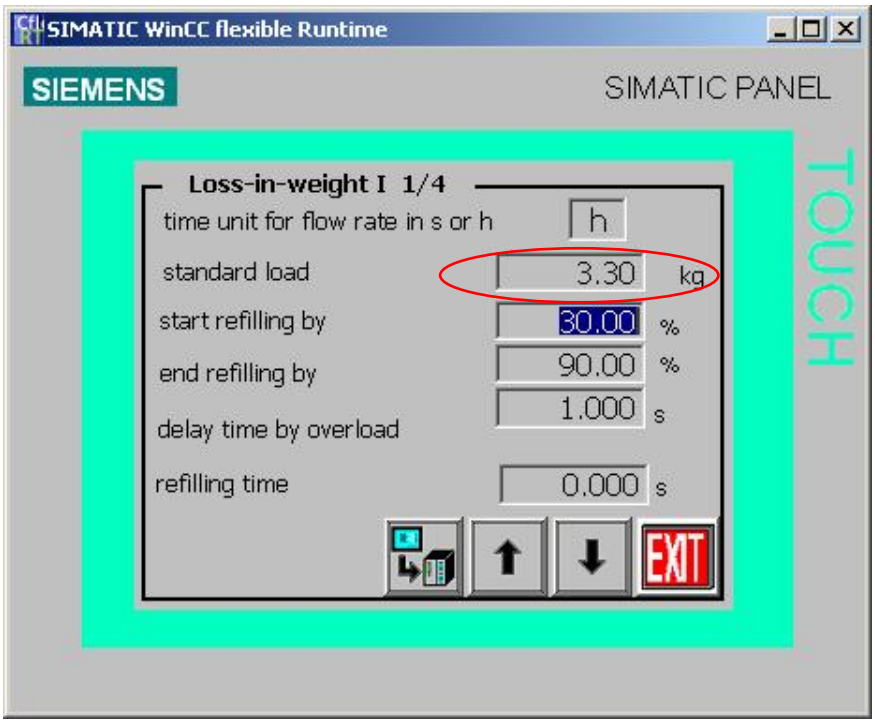


Figure 7-12 Loss-in-weight scale I page 1/4

The time unit for flow rate measurement generally remains on a per hour basis.
It is also possible to enter "s" for seconds.
The nominal filling weight must be adjusted to the actual fill quantity.

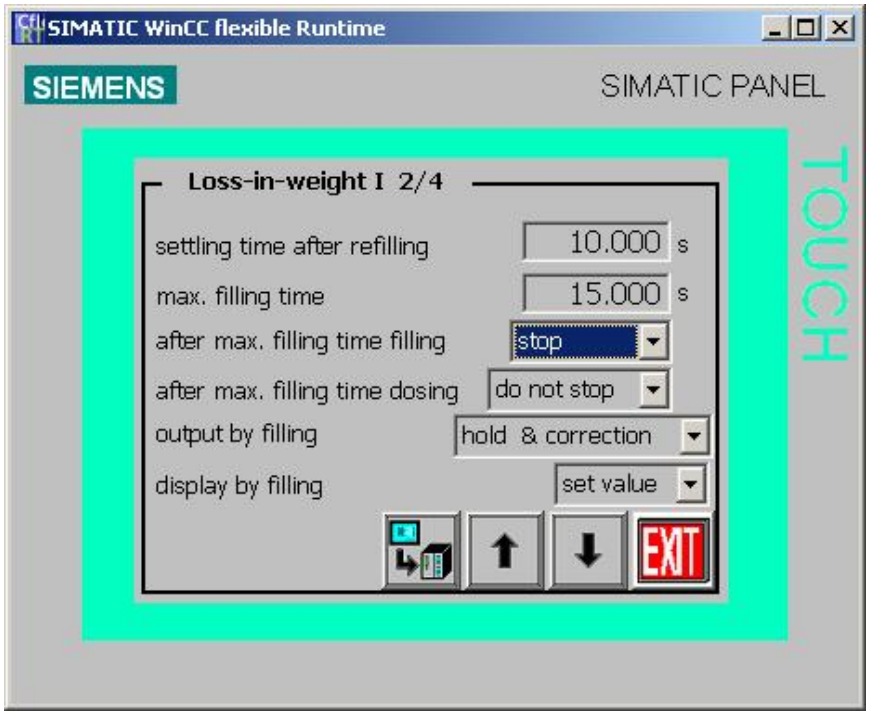


Figure 7-13 Loss-in-weight scale I page 2/4

At initial commissioning, the parameters in the screen Loss-in-weight scale I page 2/4 can be left as set in the factory.

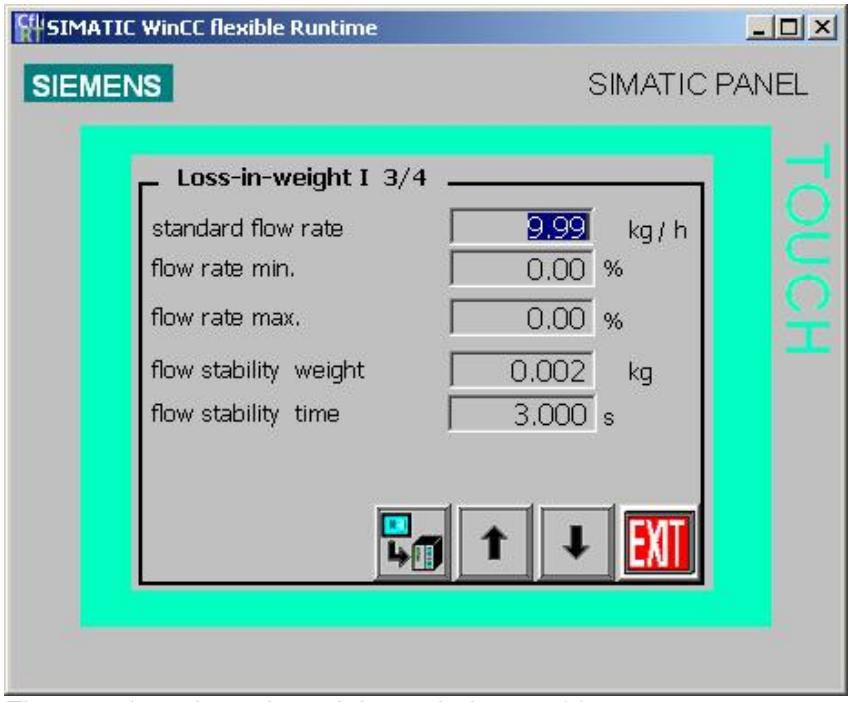


Figure 7-14 Loss-in-weight scale I page 3/4

At initial commissioning, the parameters in the screen Loss-in-weight scale I page 1/4 can be left as set in the factory. They are automatically determined by SIWAREX in a later step.

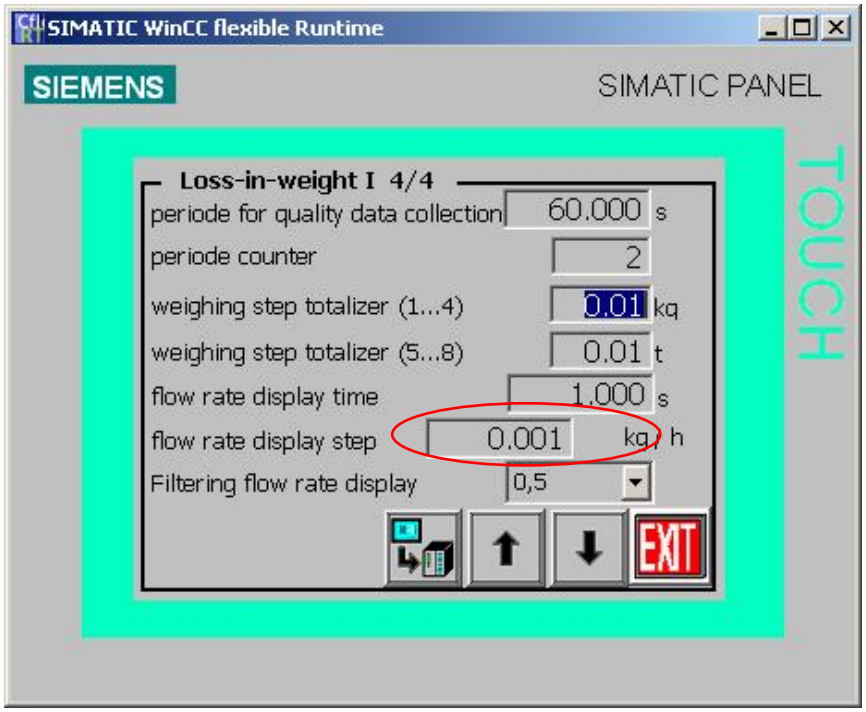


Figure 7-15 Loss-in-weight scale I page 4/4

At initial commissioning, the parameters in the screen Loss-in-weight scale I page 3/4 can be left as set in the factory. If necessary, the numeral step for display can be adjusted to local requirements (e.g. 0.010)

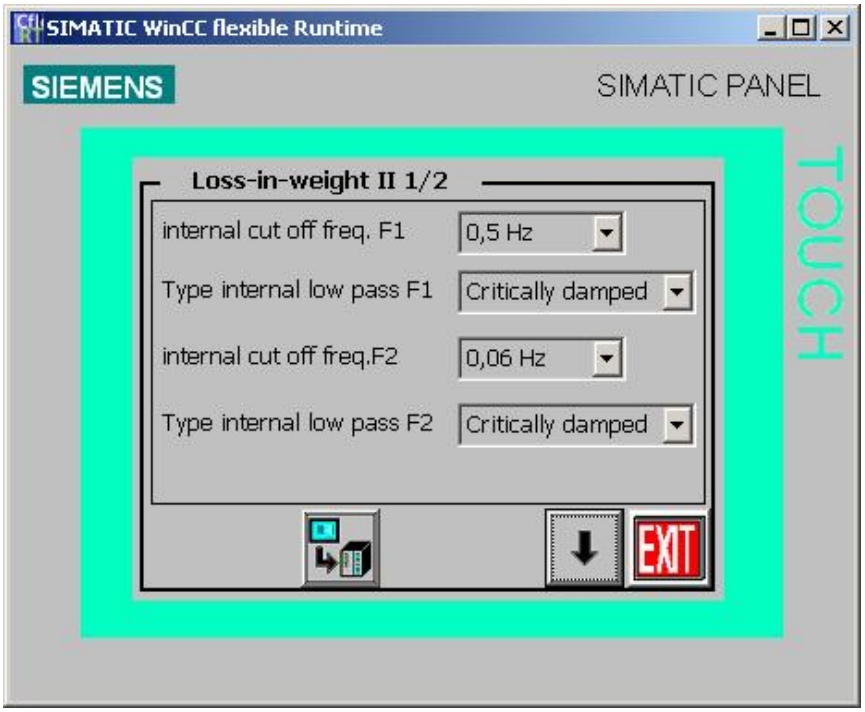


Figure 7-16 Loss-in-weight scale II page 1/2

At initial commissioning, the parameters in the screen Loss-in-weight scale II page 1/2 can be left as set in the factory. They are automatically determined by SIWAREX in a later step.

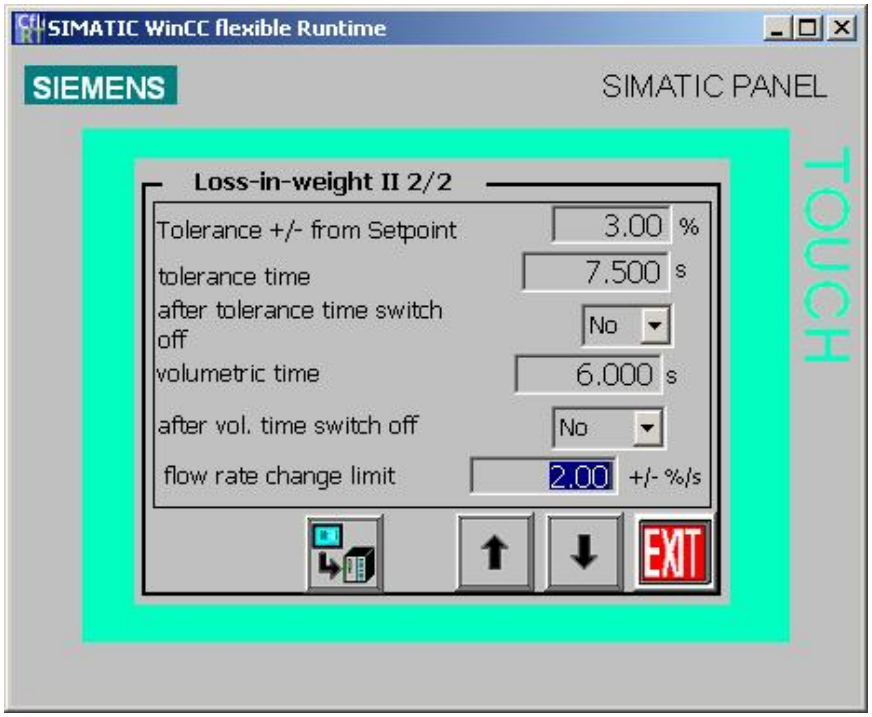


Figure 7-17 Loss-in-weight scale II page 2/2

At initial commissioning, the parameters in the screen Loss-in-weight scale II page 2/2 can be left as set in the factory. They are automatically determined by SIWAREX in a later step.

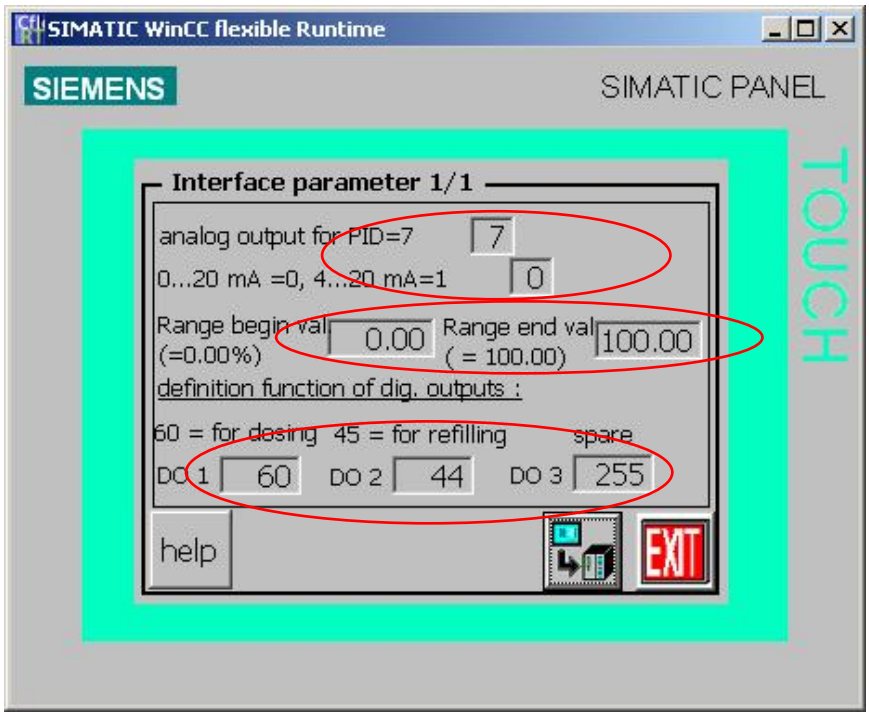


Figure 7-18 Determining the interface

This screen describes the parameterization required for the SIWAREX interfaces for operating the loss-in-weight scale. The values to be entered are displayed in the screen.

The Autosetup screen is entered from the menu screen. This is used to specify the parameters for automatic determination of the dosage characteristics of the system.

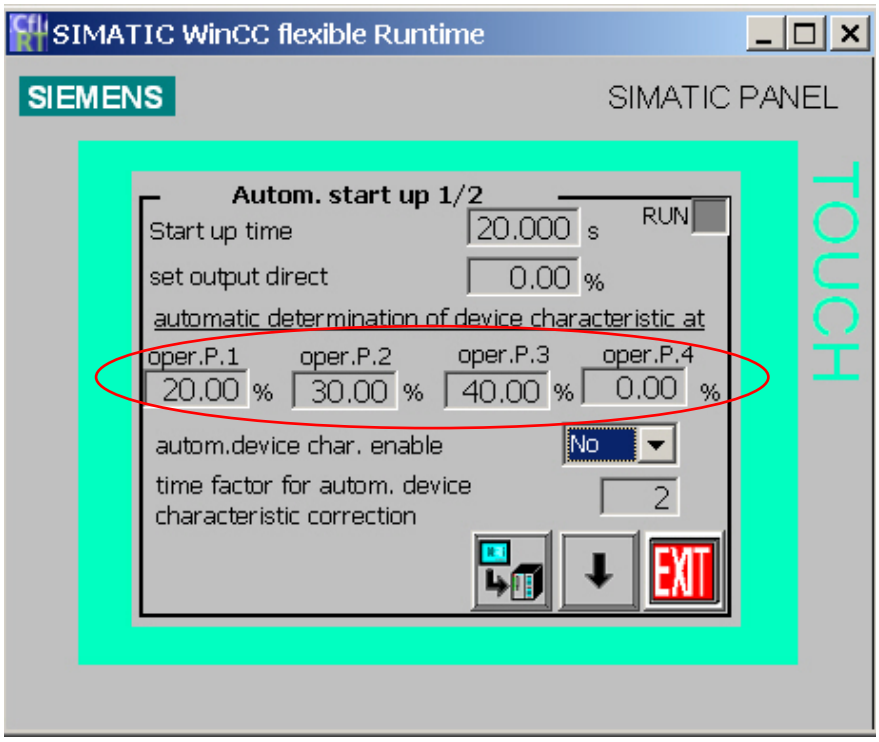


Figure 7-19 Autosetup 1/2

At initial commissioning, the parameters in the screen Autosetup page 1/2 can be left as set in the factory. The dosage characteristics are then created at two points: at 20% and at 60% of the output value. Where required, the characteristic can be created for up to 4 operating points. The full measurement time for the start-up operation is required for each point.
Determination of the parameters should be performed when the weighing container is full (90% - 100%).
Automatic determination is performed in two steps. First, the dosage characteristic of the dosage device is determined using "Start Auto 1."
For this, the device runs through multiple setpoints and stores the corresponding operating points.
In the second step, the command "Auto Para" is used to specify the filter setting, the monitoring functions and the controller setting for the system
(thereby generally creating usable parameterization and automatic setting of the dosage system).

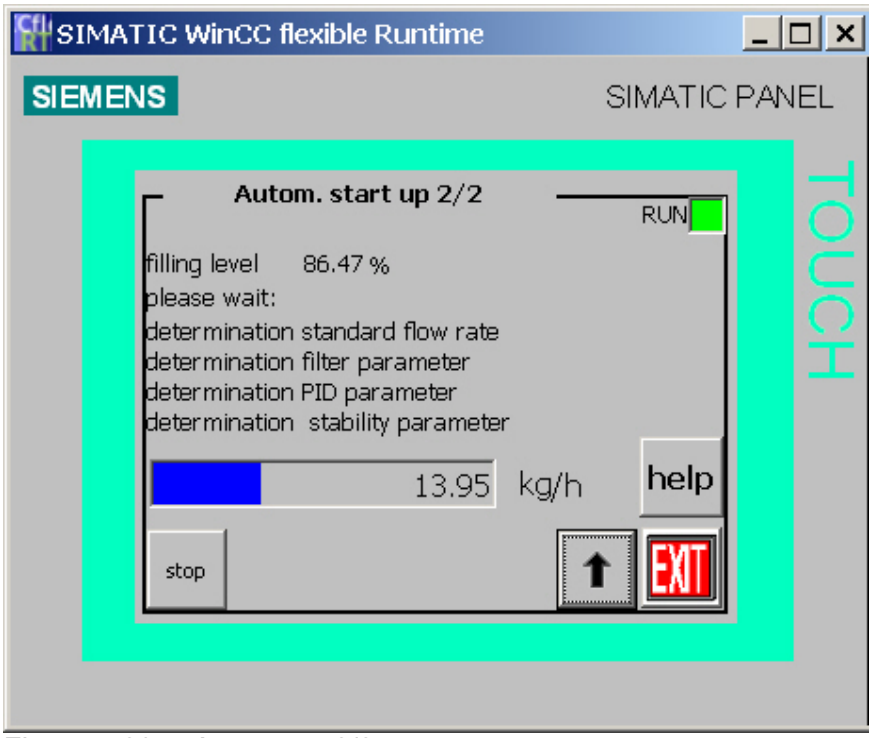


Figure 7-20 Autosetup 2/2

At initial commissioning, the parameters in the screen Dosage device page 1/2 can be left as set in the factory.

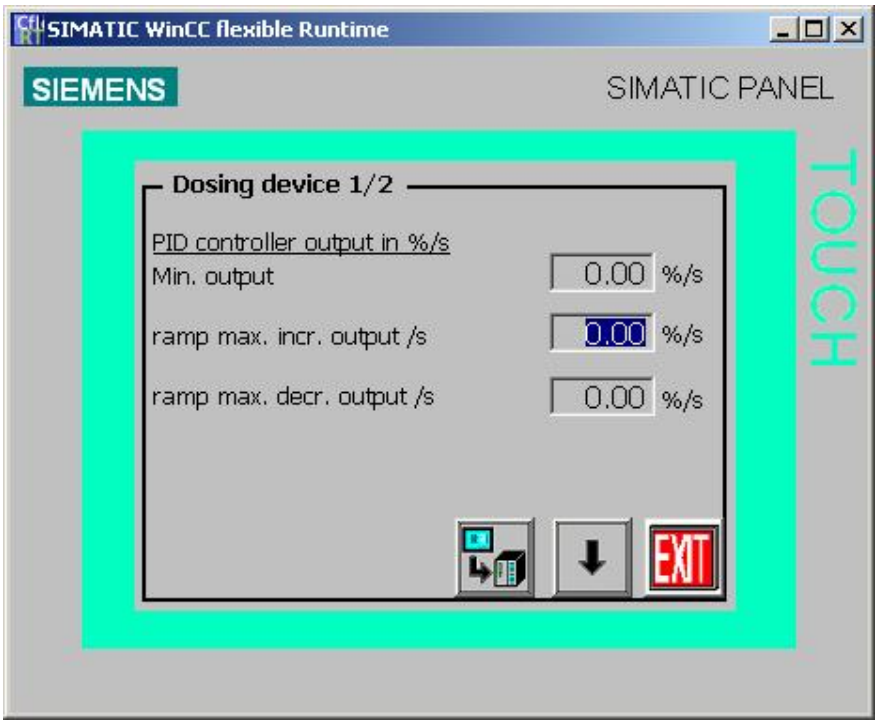


Figure 7-21 Dosage device 1/2

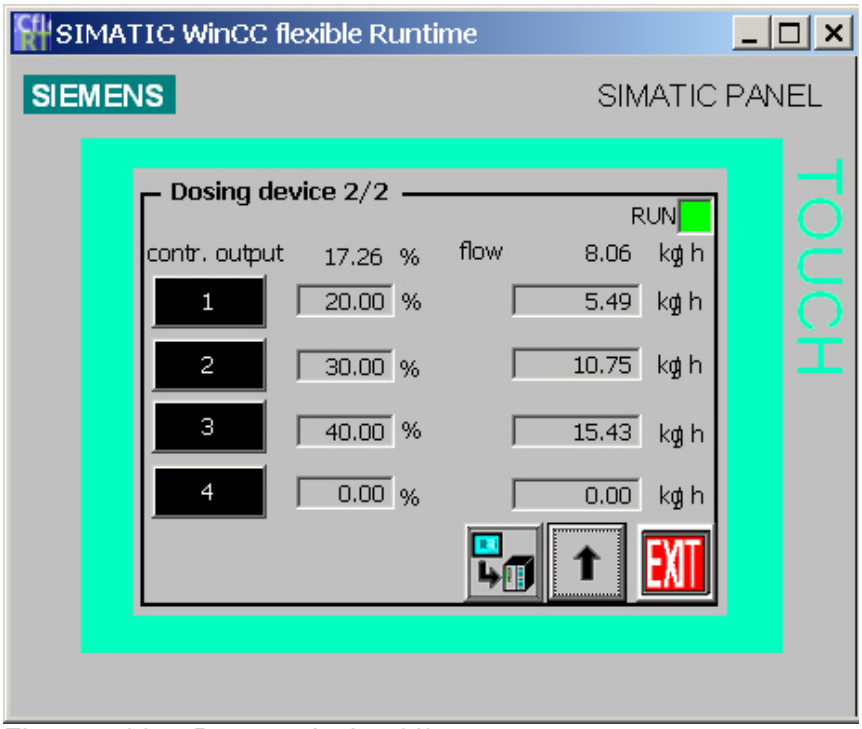


Figure 7-22 Dosage device 2/2

The parameters in the screen Dosage device page 2/2 were defined during the automatic specification process.

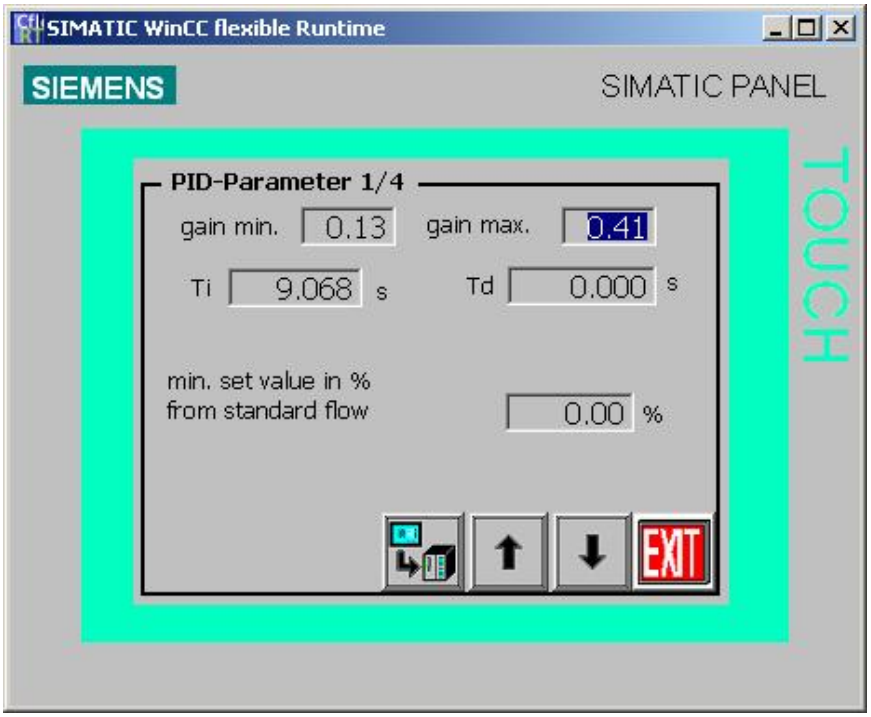


Figure 7-23 PID controller 1/4

The parameters in the screen PID parameters page 1/4 were defined during the automatic specification process.

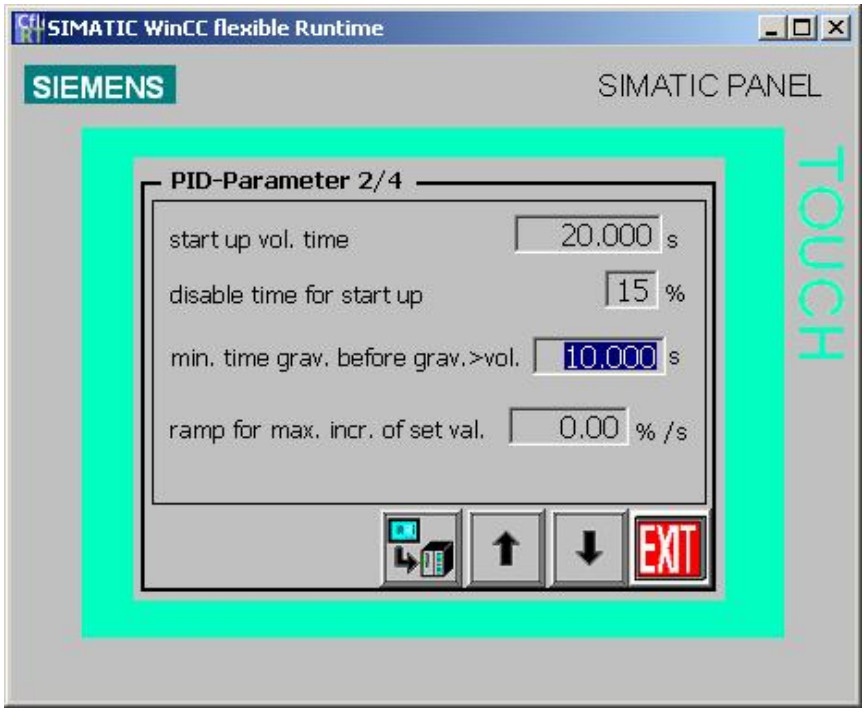


Figure 7-24 PID controller 2/4

The parameters determined automatically can be changed manually as part of additional controller optimization.

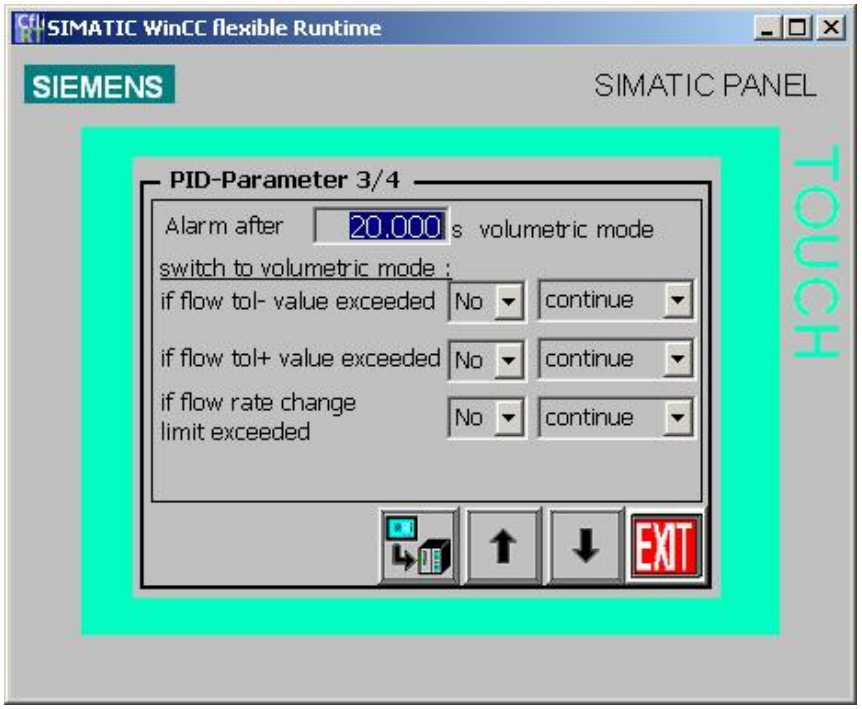


Figure 7-25 PID controller 3/4

At initial commissioning, the parameters in the screen PID parameters page 3/4 can be left as set in the factory.

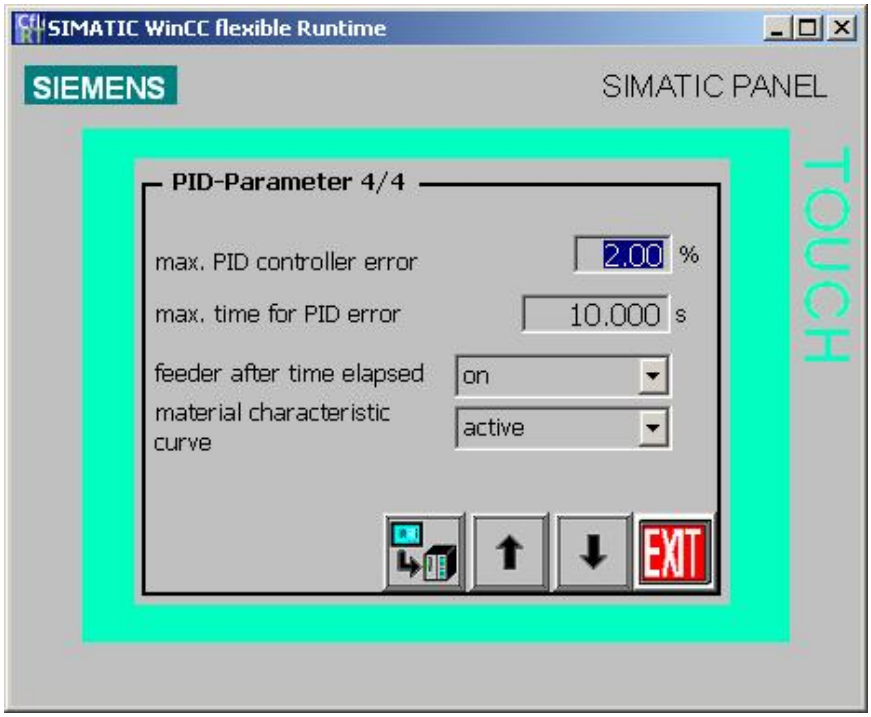


Figure 7-26 PID controller 4/4

At initial commissioning, the parameters in the screen PID parameters page 4/4 can be left as set in the factory.

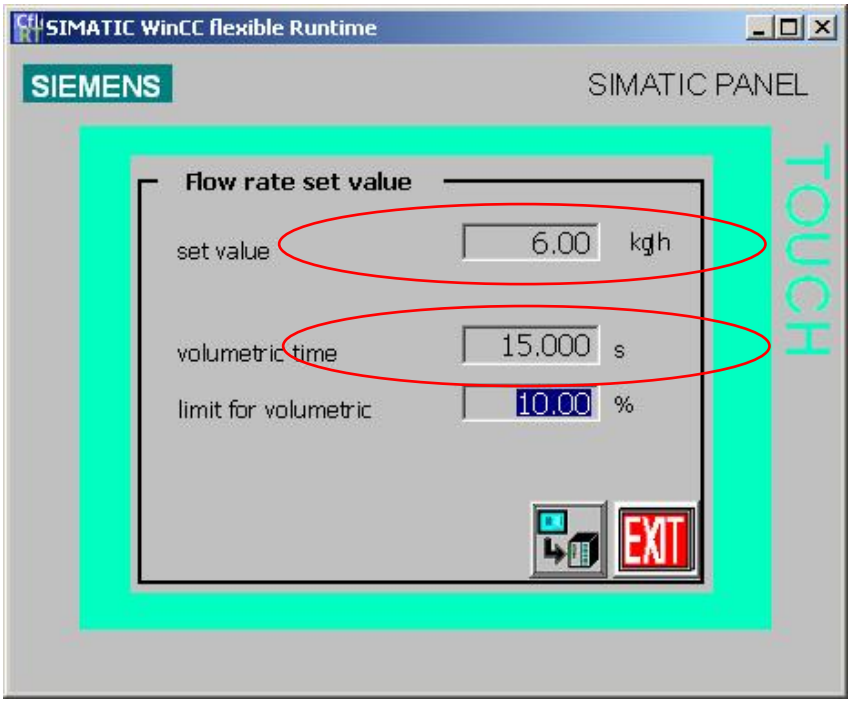


Figure 7-27 Flow rate setpoint

The flow rate setpoint can be specified in this screen. Specification is either as a % of the nominal flow rate or as an absolute value. The method not used must be entered as a "0" in each case. The specification "Time volumetric" is deemed to be a volumetric time after a change to the setpoint.

Minor changes to the setpoint below the threshold value (entries in % of the nominal flow rate) are performed in gravimetric operation.

Optimization via material characteristic curve

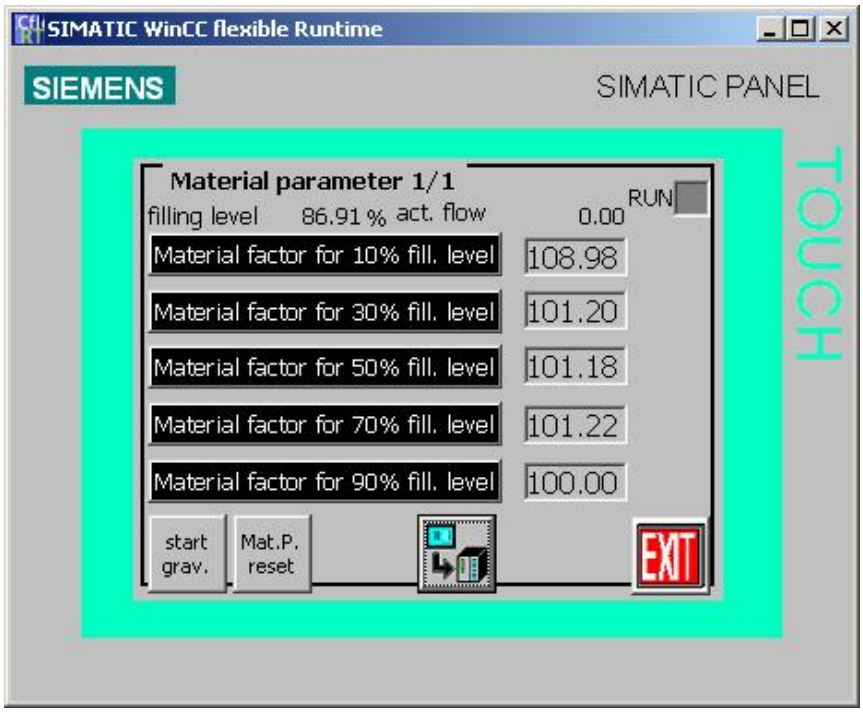


Figure 7-28 Filling degree compensation

Determination of the material characteristic curve is used to compensate for the influence of the filling degree on the dosage characteristic curve. In volumetric operation, whether during refilling or as a result of an interruption, the setpoint can be reached more readily if the material characteristic curve has been determined. Determination of the characteristic curve should be performed under normal operating conditions, starting with a full container, with a stable flow rate, and without temporary interruptions. For each filling degree, a command can be activated to calculate the correction factor (click on the "Material factor for ..% filling" field once the corresponding filling degree +/- 1% is displayed). The characteristic curve should be determined with the average setpoint. The individual points on the characteristic curve can be corrected again so that the characteristic curve corresponds to the current material characteristics.

If the controller results are not yet optimal after automatic specification of the parameters, individual parameters can be specified manually.

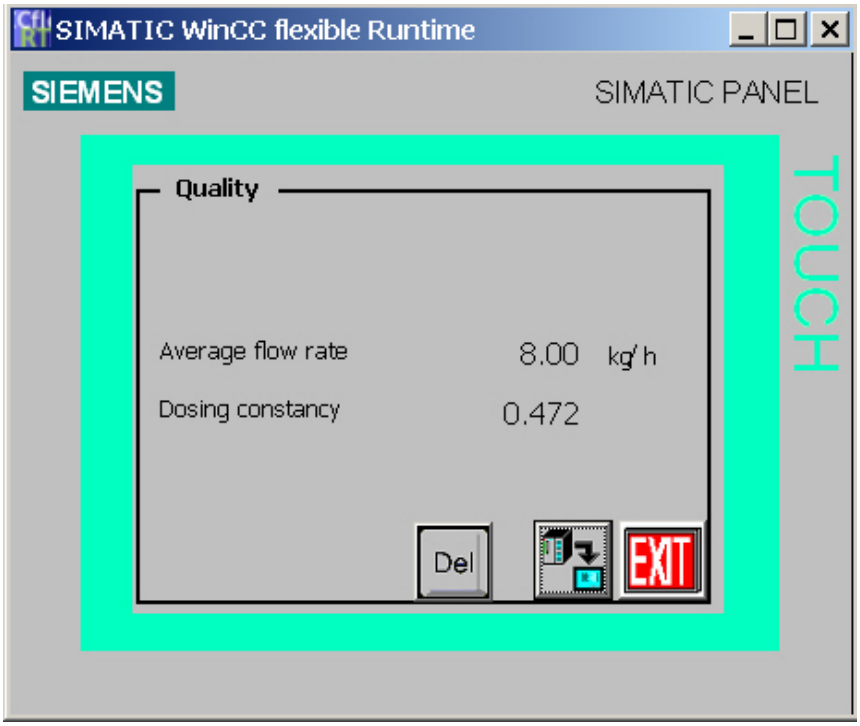


Figure 7-29 Quality data

The screen can be called up again for optimization and trials at a later stage to measure the results of different settings. The values are displayed once the periods entered have expired (specification is performed in the screen Dosage parameters I page 1/4)

It is extremely helpful to use the SIWATOOL program to activate the "Trace" graph recording function. The search for improved settings can be speeded up significantly by considering the controller processes and the signal quality. However, the manual should be used in this case to understand the complex interactions of the individual parameters.

8 Optimizing the settings

8.1 Trace function - dosage curve display

The program SIWATOOL FTC_L and the "Trace" recording function available in SIWAREX FTC can be used to record the current scale and dosage states. The smallest time interval is 10 ms, although we recommend a setting of 100 ms or 200 ms (for more information, see *11.33* and *11.8.28*).

After the recordings have been read and transferred to MS Excel for tabular calculation, the dosage procedures can be analyzed.

The figures shown here are typical of certain faulty settings in an individual parameter. First, two recordings of the dosage procedure are performed after execution of the Autosetup function. Second, the individual parameters are set and the dosage procedure recorded.

The search for optimized settings should be performed in the following sequence:

1. Specify device characteristic curve
2. Perform Autosetup
3. Change individual parameters F1, F2, Kp, Ti in the required direction, and record and evaluate the dosage procedure.

The stability criterion (stability time, stability value, see) should be changed with caution. Narrowing the stability window leads to stability monitoring being activated too frequently. Extending the stability window leads to "non-recognition" of flow rate faults.

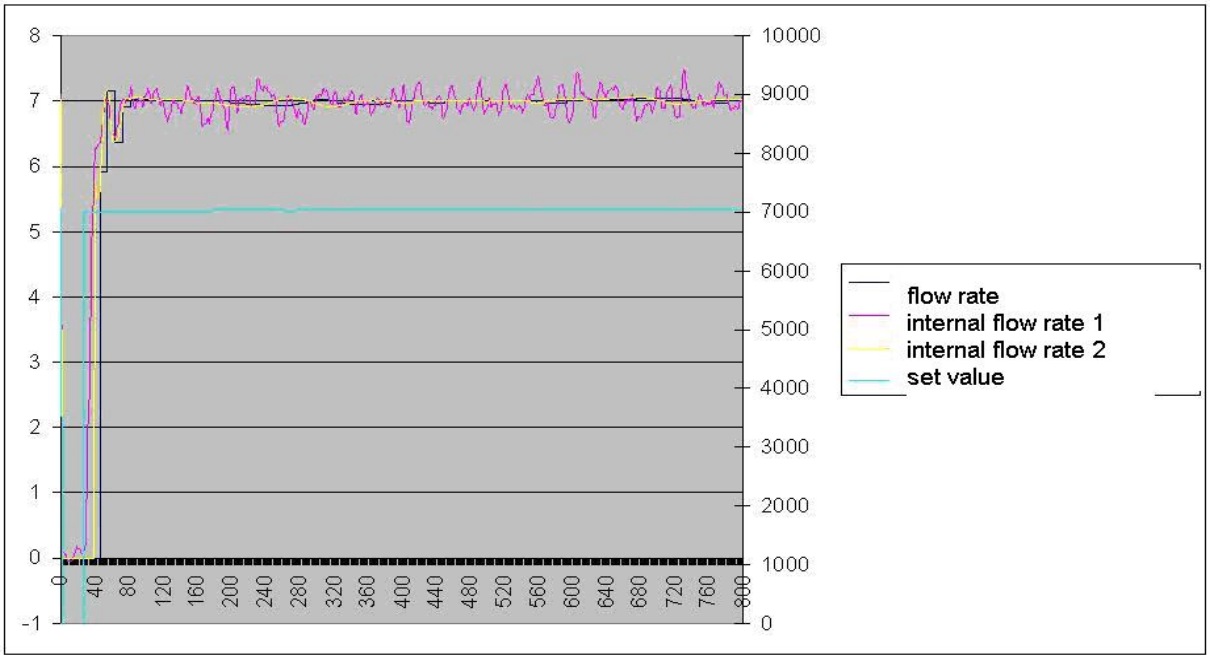


Figure 8-1 Positive results after Autosetup; F2 could be one level stronger

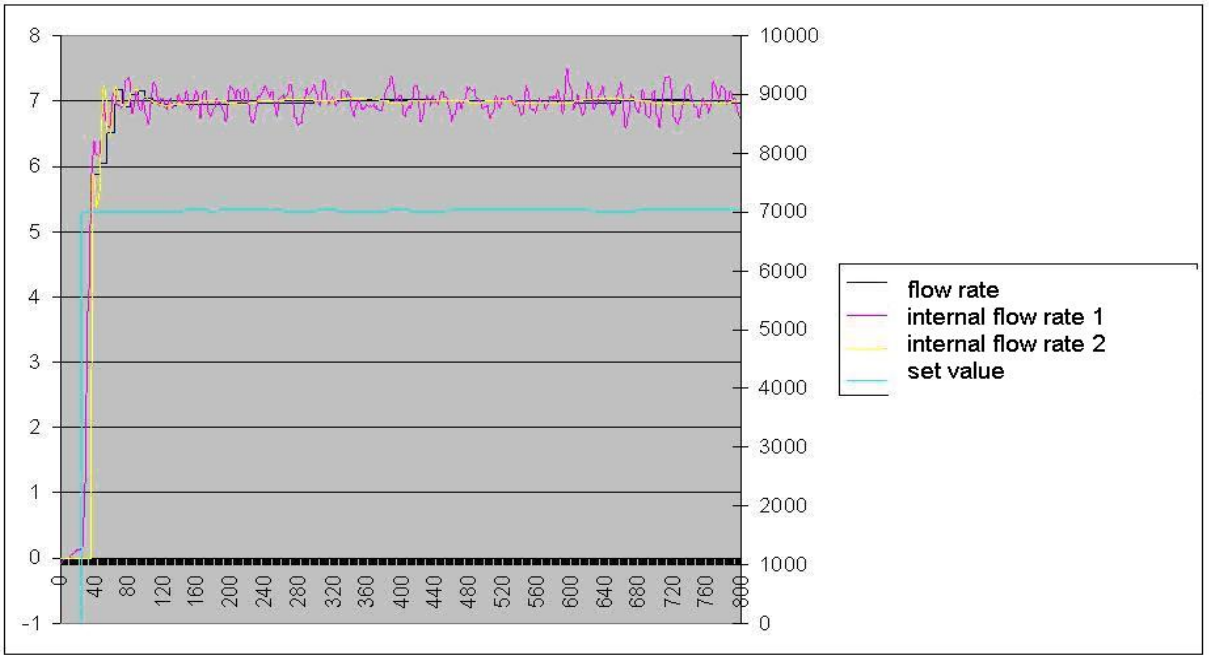


Figure 8-2 Positive results after Autosetup

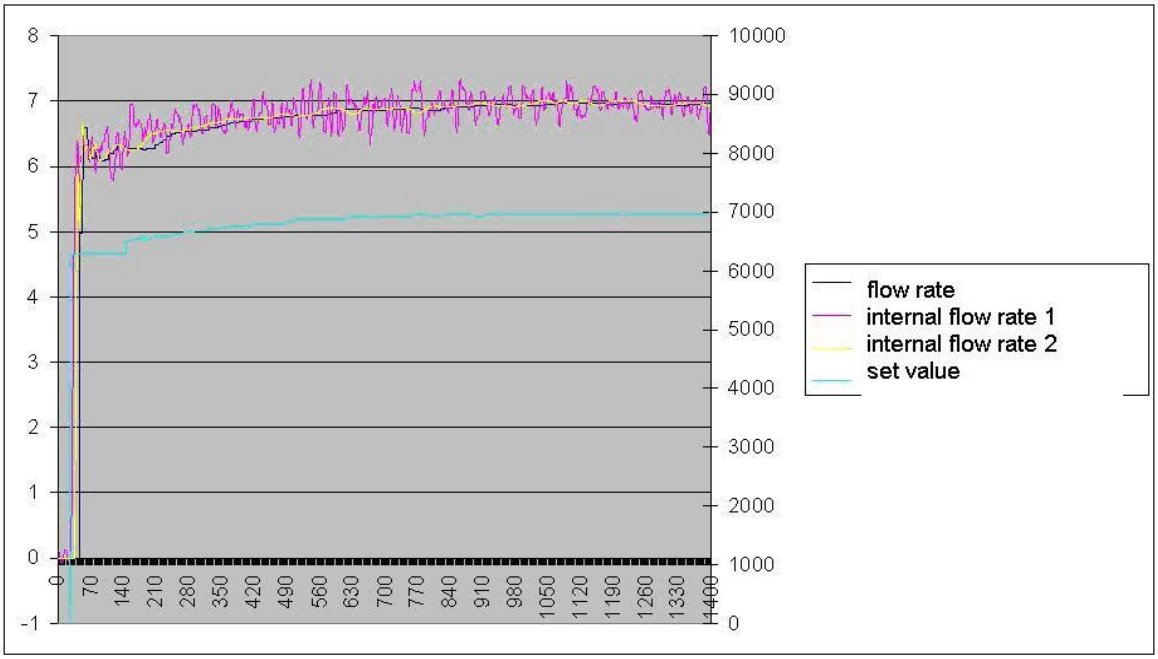


Figure 8-3 Device characteristic curve not correct

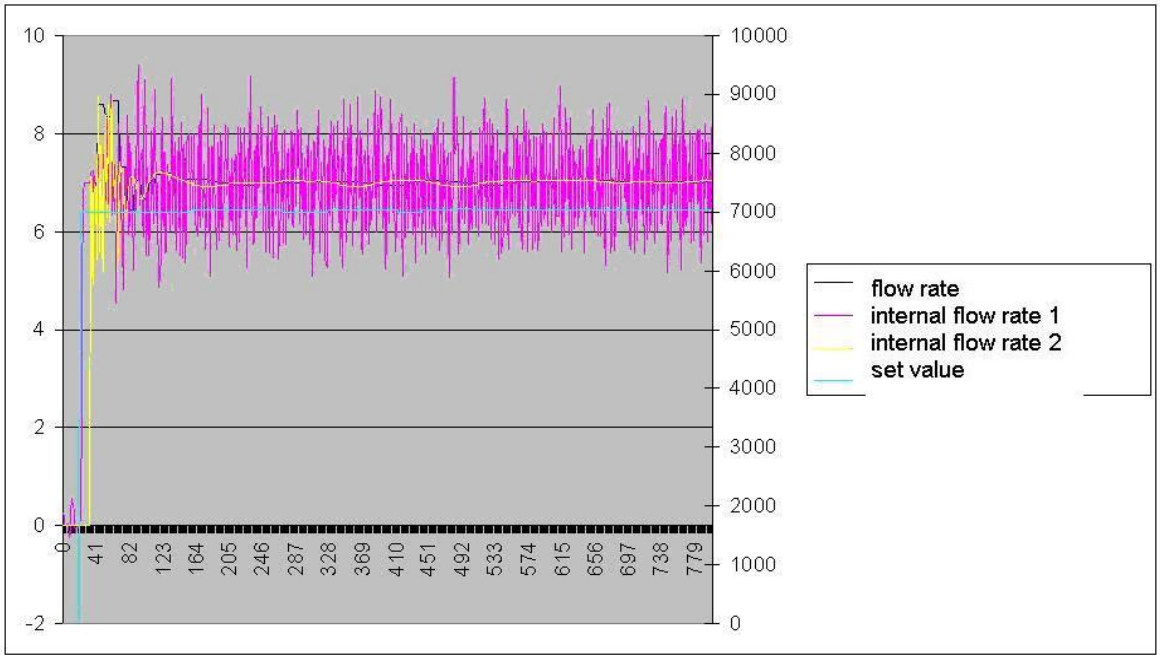


Figure 8-4 Internal filter F1 limit frequency too high

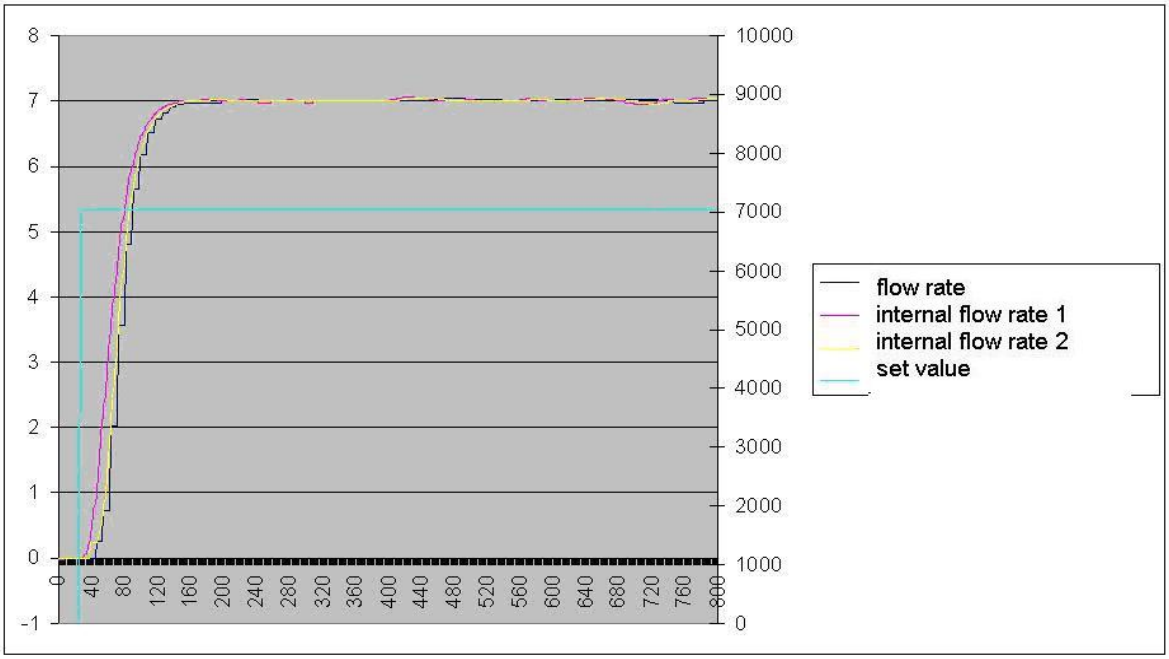


Figure 8-5 Internal filter F1 limit frequency too low

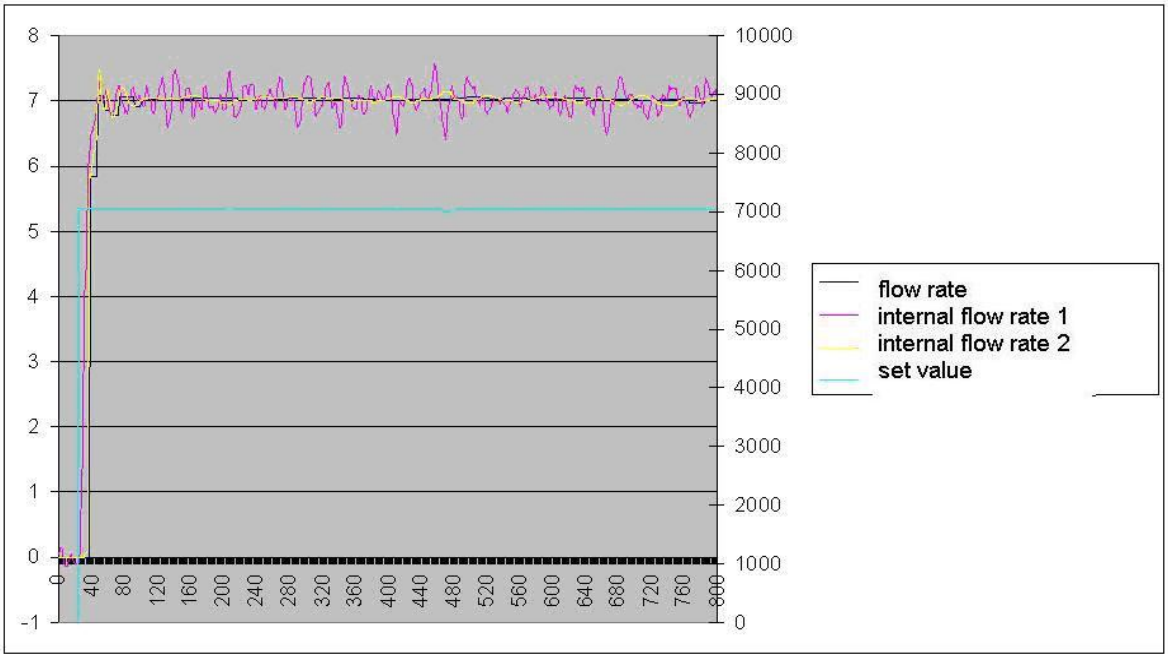


Figure 8-6 Internal filter F2 limit frequency too high

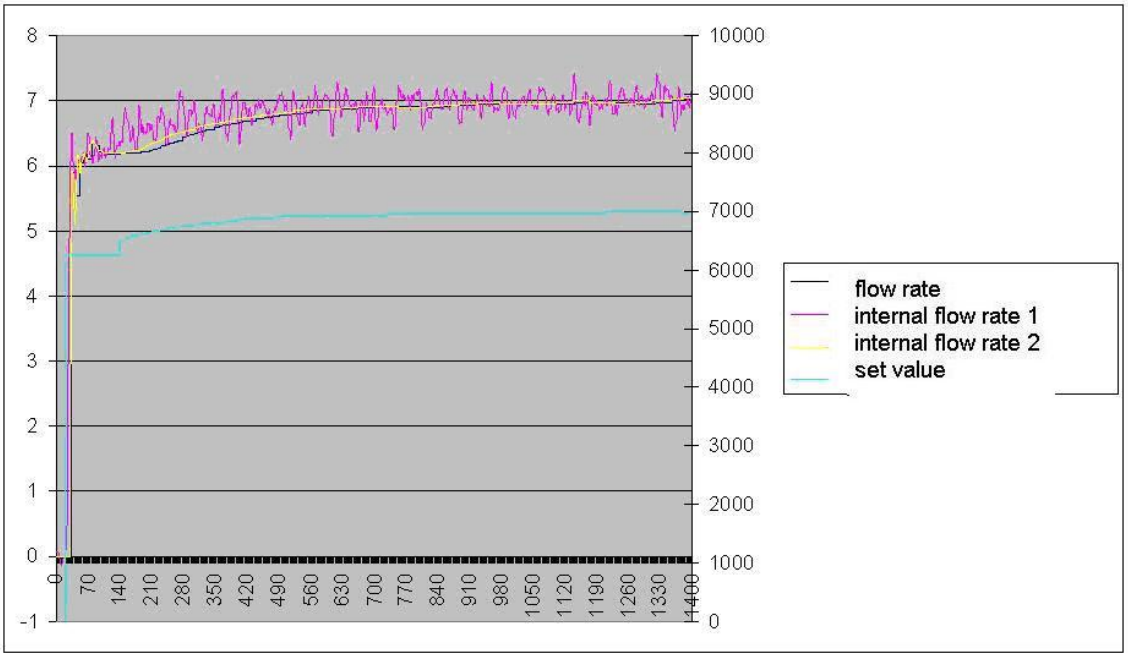


Figure 8-7 Internal filter F2 limit frequency too low

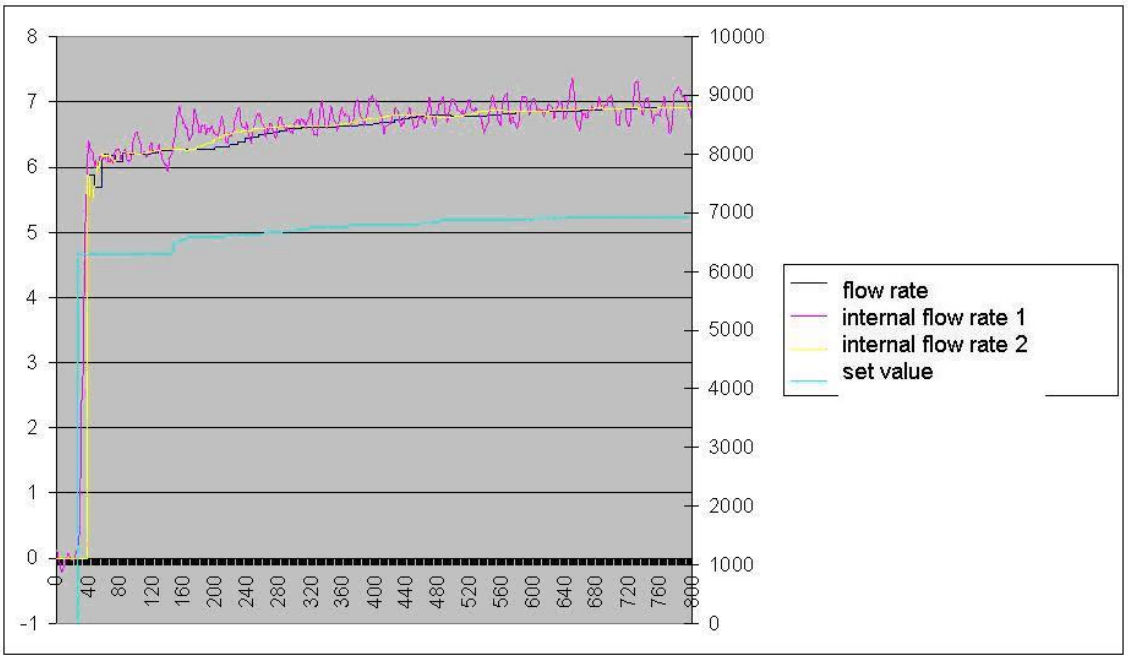


Figure 8-8 PID parameter Kp too small

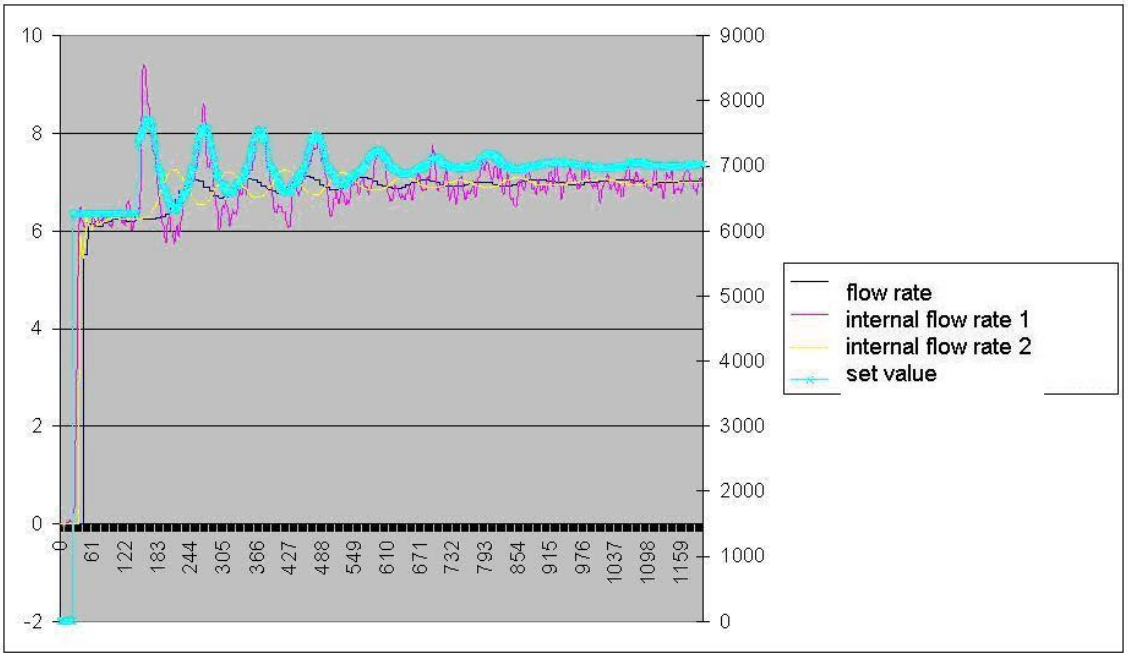


Figure 8-9 PID parameter Kp too large and limit frequency F2 too high

9 Commissioning with a PC - SIWATOOL FTC_L

9.1 General

The scale can be put into operation using the SIWATOOL FTC_L program, regardless of the commissioning of the SIMATIC automation system.
This program is included in the configuration package supplied.
The program (catalog SIWATOOL_FTC) must be installed in the first instance. Less than 30 MB of memory is required on the hard drive.

9.2 Windows and functions in SIWATOOL FTC_L

The program windows are constructed so that navigating through the parameter definition areas of the SIWAREX FTC is made easier. On the left side the overview of the parameters is arranged as a tree structure. The parameter grouping corresponds to the various activities which can occur during configuration, commissioning, tests and when serving.

A data record in SIWAREX FTC belongs to every branch of the tree structure. Several parameters are combined in one data record. The parameters of a data record can be edited in the window on the right.
An information sheet provides the user with details on which tasks can be processed with the parameters of the selected data record. When sending, receiving and transferring, the entire data record is always handled, not just an index card.

9.3 Offline configuration

All scale parameters can be processed and stored without the SIWAREX FTC. The parameters for more than one scale can be prepared in the office and only have to be transferred to the SIWAREX FTC when starting the operation on-site. Data from one scale that is currently in operation can be read and used in the commissioning of another scale. In this way, the commissioning time can be reduced.

9.4 Online operation

To switch to online operation, the PC must be connected to the SIWAREX FTC with the SIWATOOL cable (see *Accessories*). The COM interface can be set up in the communication menu. All parameters can be changed in

online operation. A message window shows the current content of the message buffer in SIWAREX FTC. For testing purposes, all commands can be sent to the SIWAREX FTC. All data can be read out and stored as a file or printed for archiving purposes.

Warning

All data can be edited in the module during online operation. The changes are not automatically transferred to the SIWAREX FTC. As a user, you must decide whether data reconciliation is necessary, and perform it if required.

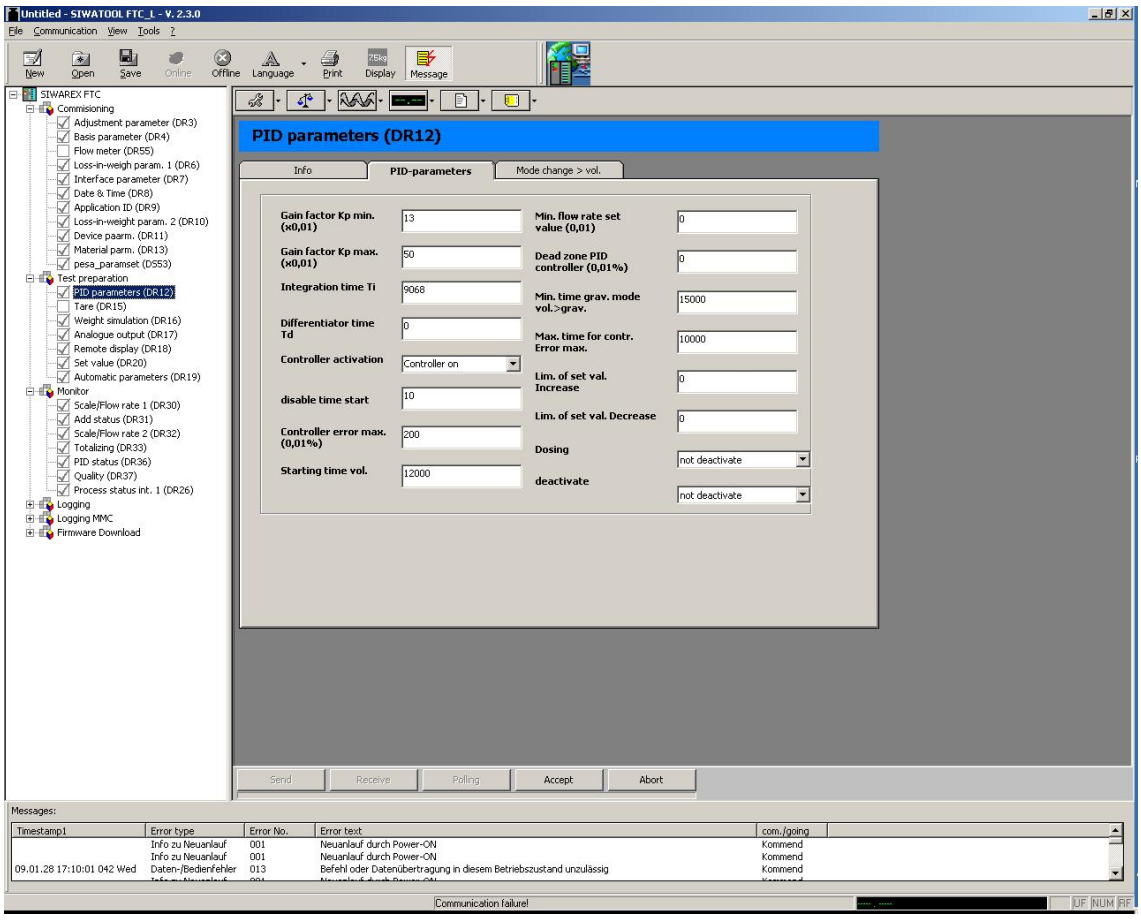


Figure 9-1 SIWATOOL FTC_L window distribution

9.5 Help

After selecting a data record in the left-hand program window, the information can be selected in the right-hand program window.

A description of the effect of the data record on the behavior of the scale is shown in a blank area.

After selection, a section of the corresponding data record is displayed in the form of input and output fields. In addition to the parameter designation, the Tool Tips (text is displayed if the mouse pointer is positioned over a field) can also be helpful as an aid to remembering the meanings of certain parameters.

After clicking on the menu item "Help," the "SIWAREX FTC" manual is called up. Acrobat Reader must be installed so that you can read the manual.

10 Firmware update with SIWATOOL FTC_L

10.1 Advantages of a firmware update

If you want to utilize the firmware update offer on the SIWAREX Internet site (www.siemens.de/siwarex/Support) you can download the latest firmware versions free of charge and then transfer them to the module with the SIWATOOL FTC_L PC program.

The firmware resides on internal flash memory. If necessary, new firmware can be transferred to the module.

The new firmware can vary slightly from earlier versions with small changes; this is the case if the data structures of the SIWAREX FTC parameters are not changed. In this case, installing the new firmware will not change the current data.

If the new firmware creates new internal data structures, new data records or changes to existing data records because of function enhancements, the SIWAREX FTC will define those parameters with default values after the new firmware has been downloaded. For this reason, the original status of those parameters should be read using the SIWATOOL FTC_L (menu: "Communication," "Receive all data records") and then saved to a file.

Loading the firmware onto the SIWAREX FTC module is completed in several steps:

1. Switch SIMATIC CPU to STOP.
2. Register SIWATOOL FTC_L (online)
3. Select Firmware download
4. Select Firmware file
5. Activate download mode with the checkmark
6. Start the transfer

This transfer can take several minutes.

When the transfer is complete, SIWAREX FTC restarts. Communication with SIWATOOL FTC_L must be activated again.

7. Deactivate download mode using the checkmark

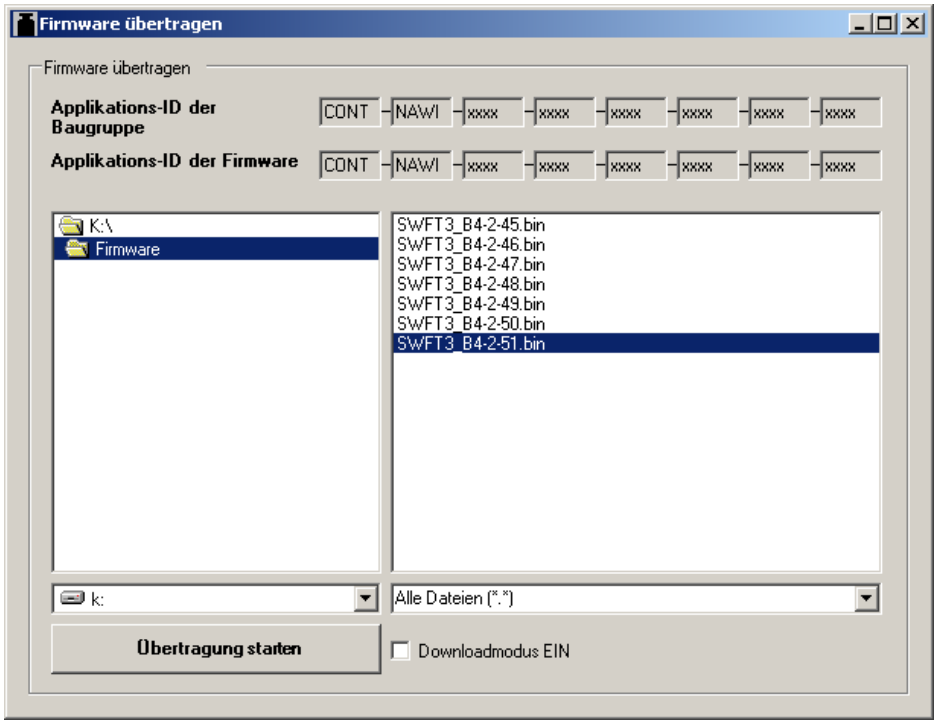


Figure 10-1 Downloading firmware with SIWATOOL FTC_L

Warning notice

SIWAREX FTC will not respond to the communication requests from the SIMATIC CPU while transferring the firmware. The CPU indicates a peripheral access error and, unless a corresponding OB (Organization Block) is programmed, the CPU can go to STOP status.

In this case, loading the new firmware should only be done with the CPU in STOP status.

11 Parameter insert space description

11.1 General information

The SIWAREX FTC can be used as a non-automatic scale, for force measurement, a conveyor scale, a loss-in-weight scale, or as a bulk flow measurement device. The operating mode is set a single time when commissioning the scale in the adjustment data area (data record 3). The selected operating mode and the defined parameters are crucial in terms of the behavior of the SIWAREX FTC during the process.
The parameters are set with default values from the manufacturer. Using the command "Load default values," the parameters can be returned to their factory settings.
The default operating mode is "Conveyor scale." If you want to run the scale in another operating mode (e.g. loss-in-weight scale), you must set the operating mode during initial commissioning (e.g. to "Loss-in-weight scale").
The default parameters are defined so that the scale is immediately ready for each operating mode. Not all parameters must be re-entered for each operating mode. By changing a parameter, the behavior of the scale is changed accordingly. The advantage of this solution is that you yourself can determine to what extent the default values are to be kept and the degree to which the behavior of the scale should be adapted to the application.
All parameters are split into data records (DS). The data records are organized according to process steps (tasks) that you have to perform during the commissioning phase or during the process itself.
An overview of data records is provided in the following table.

DS no.	Content/Structure	Remarks	Cross-reference
3	Adjustment parameters	All operating modes	*11.2*
4	Basis parameters	All operating modes	*11.4*
5	Conveyor scale	Conveyor scale (separate manual)	*11.5*
55	Bulk flow measurement device	Bulk flow measurement device	*11.6*
6	Differential scale 1	Loss-in-weight scale	*11.7*
7	Interface parameters	All operating modes	*11.8*
8	Date/Time	All operating modes	*11.9*
9	Application ID	All operating modes	*11.10*
10	Differential scale 2	Loss-in-weight scale	*11.11*
11	Device characteristic curve	Loss-in-weight scale	*11.12*

DS no.	Content/Structure	Remarks	Cross-reference
12	PID controller parameter	Loss-in-weight scale	11.13
13	Material characteristic curve	Loss-in-weight scale	11.14
14	Current tilt angle	Conveyor scale only (separate manual)	
15	Tare input	NAWI, force, conveyor scale	11.15
16	Weight simulation value	All operating modes	11.16
17	Ext. analog default value	All operating modes	11.17
18	Ext. display default value	All operating modes	11.18
19	Automatic characteristic curve	Loss-in-weight scale	11.18
20	Target_flow_value	Loss-in-weight scale	11.20
21	Parameter for batch operation	Conveyor scale (separate manual)	
26	Internal state	For service only	
30	Process state 1	NAWI, force measurement, conveyor scale	11.21
31	Process state 2	All operating modes	11.22
32	Differential scale process values	Loss-in-weight scale, bulk flow measurement device	11.23
33	Totals	Conveyor scale, loss-in-weight scale, bulk flow measurement device	11.24
34	ASCII weight value	All operating modes	11.25
35			
36	PID controller process values	Loss-in-weight scale	11.26
37	Quality	Loss-in-weight scale	11.27
40	Log text 1	All operating modes	11.28
41	Log text 2	All operating modes	11.28
42	Log text 3	All operating modes	11.28
43	Log text 4	All operating modes	11.28
44	Last log data	All operating modes	11.29
45	String	All operating modes	11.30
46	Log ID for requirements through S7 interface	All operating modes	11.31
47	Log output to S7 interface	All operating modes	11.32
53	Digital load cell	Loss-in-weight scale	
120	MMC trace data	All operating modes	11.33
121	RAM trace data	All operating modes	11.33
122	MMC log data	All operating modes	11.35
123	MMC/RAM trace/log process values	All operating modes	11.34

Table 11-1 Data record overview

In the following parameter description, the weighing functions affected by the parameters are described at the same time.

First, the parameters of a data record are shown in a table.
This is followed by an accurate description of the parameters for this data record. After new parameters have been received, SIWAREX FTC performs a plausibility test corresponding to the defined operating mode. If a parameter error exists, the data record will not be accepted (stored) by the SIWAREX FTC and a "synchronous" message is generated (see chapter *13 Messages and diagnostics*).

11.2 DS 3 adjustment parameters

The adjustment parameters must be checked for each scale and changed as necessary, and, most importantly, the operating mode must be defined during commissioning.

As a rule, the scale is defined by the adjustment parameters and adjustment execution. Adjusting the scale can be done using adjustment weights (see *11.2.1*) or theoretically (see *11.3*). During verifiable operation as a non-automatic scale, DS 3 data cannot be changed after calibration.

Procedure:

- Check all parameters and change if necessary
- Switch on service operation (command)
- Send DS 3 to the scale
- Perform scale adjustment
- Receive DS 3 from the scale
- Switch off service operation

Name	Model	Address	Default	Range of values/Meaning	Reference
(6) Adjustment					
Adjustment digits for adjustment zero 0	DINT	DBD000	1398101	0 to 2^{24} Other definitions are not permitted.	*11.2.1*
Adjustment digits for adjustment weight 1	DINT	DBD004	15379113	0 to 2^{24} Other definitions are not permitted.	*11.2.1*
Adjustment digits for adjustment weight 2	DINT	DBD008	0	0 to 2^{24} Other definitions are not permitted.	*11.2.1*
Adjustment digits for adjustment weight 3	DINT	DBD012	0	0 to 2^{24} Other definitions are not permitted.	*11.2.1*
Adjustment digits for adjustment weight 4	DINT	DBD016	0	0 to 2^{24} Other definitions are not permitted.	*11.2.1*
Adjustment weight 1 (Flow rate with bulk flow measurement device)	REAL	DBD020	50	> 0 Other definitions are not permitted.	*11.2.1*
Adjustment weight 2 (Flow rate with bulk flow measurement device)	REAL	DBD024	0	≥ 0 Other definitions are not permitted.	*11.2.1*
Adjustment weight 3 (Flow rate with bulk flow measurement device)	REAL	DBD028	0	≥ 0 Other definitions are not permitted.	*11.2.1*
Adjustment weight 4 (Flow rate with bulk flow	REAL	DBD032	0	≥ 0 Other definitions are not permitted.	*11.2.1*

Name	Model	Address	Default	Range of values/Meaning	Reference
measurement device)					
Characteristic value range	BYTE	DBB036	2	1: Characteristic value to 1 mV/V 2: Characteristic value to 2 mV/V 4: Characteristic value to 4 mV/V 101: Characteristic value +/- 1 mV/V (force measurement, bi-directional) 102: Characteristic value +/- 2 mV/V (force measurement, bi-directional) 104: Characteristic value +/- 4 mV/V (force measurement, bi-directional) Other definitions are not permitted.	11.2.2
(5) Filter					
Filter sequence	BYTE	DBB037	0	Bit 0: 0: Mean value filter before digital filter 1: Digital filter before mean value filter Bits 1 to 7 not set	11.2.3
Type of low-pass filters	BYTE	DBB038	0	0: Critically damped 1: Bessel filter 2: Butterworth filter Other definitions are not permitted.	11.2.4
Limit frequency	BYTE	DBB039	4	0: No filter 1: fg = 20Hz 2: fg = 10Hz 3: fg = 5Hz 4: fg = 2Hz 5: fg = 1Hz 6: fg = 0.5Hz 7: fg = 0.2Hz 8: fg = 0.1Hz 9: fg = 0.05Hz Other definitions are not permitted.	11.2.5
Depth of average value filter	INT	DBW040	10	[0 - 250] x 10 ms 0: Mean value filter deactivated Other definitions are not permitted.	11.2.6
(1) Adjustment parameter I		0			
Scale name	STRING [10]	DBB042	"SIWAREX XX"		11.2.7
Number of weight ranges	BYTE	DBB056	1	1 range 2 ranges 3 ranges Other definitions are not permitted.	11.2.8
Scale type	BYTE	DBB057	0	Bit 0: 0: Multi-range scale 1: Multi-resolution scale	11.2.9
Activate zero setting upon start-up			0	Bit 1: 0: Switch-on zero setting device switched off 1: Switch-on zero setting device switched on	11.2.10
Activated zero setting at start-up if scale is tared			0	Bit 2: 0: Switch-on zero setting, not when tare ≠ 0 1: Switch-on zero setting performed with tare ≠ 0	11.2.11
Automatic zero adjustment			0	Bit 3: 0: Zero tracking device switched off 1: Zero tracking device switched on Bits 4-7 not set	11.2.12
(2) Calibration parameter II					
Minimum weight for Weighing range 1	REAL	DBD058	1		11.2.13

Name	Model	Address	Default	Range of values/Meaning	Reference
Maximum weight for weighing range 1	REAL	DBD062	100		11.2.14
Numeral step for weighing range 1	REAL	DBD066	0.02	Number step weighing range 1 ($1*10^k$, $2*10^k$, $5*10^k$, $k \in N_0$) Other definitions are not permitted.	11.2.15
Minimum weight for weighing range 2	REAL	DBD070	0		11.2.16
Maximum weight for weighing range 2	REAL	DBD074	0		11.2.17
Numeral step for weighing range 2	REAL	DBD078	0	Number step WB2 ($1*10^k$, $2*10^k$, $5*10^k$, $k \in N_0$) Other definitions are not permitted.	11.2.18
Minimum weight for weighing range 3	REAL	DBD082	0		11.2.19
Maximum weight for weighing range 3	REAL	DBD086	0		11.2.20
Numeral step for weighing range 3	REAL	DBD090	0	Numeral step WB3 ($1*10^k$, $2*10^k$, $5*10^k$, $k \in N_0$) Other definitions are not permitted.	11.2.21
(3) Calibration parameter III					
Standstill time	TIME	DBD094	1000	ms	11.2.22
Standstill range	REAL	DBD098	0.02	standstill range in weight unit	11.2.23
Wait time for standstill	TIME	DBD102	2000	If there is no standstill, the weighing command is immediately rejected with an operating error at setting 0; otherwise the wait time is waited through. If no standstill has occurred after the wait time has elapsed, an error message is generated and the command is aborted. For weighing commands (zero setting, taring in operation as non-automatic scale) that are activated by an operator, a setting in the 2000 ms range is a good idea.	11.2.24
Maximum negative weight for zero setting when switching on	BYTE	DBB106	10	Neg. range of the switch-on zero setting device [in % of WB_{max}] (amount from pos. + neg. zero setting value must not exceed 20% for country code "OIML") Deactivated for loss-in-weight scale.	11.2.25
Maximum positive weight for zero setting when switching on	BYTE	DBB107	10	Pos. range for switch-on zero setting device [in % of WB_{max}] (amount from pos. + neg. zero setting value must not exceed 20% for country code "OIML") Deactivated for loss-in-weight scale.	11.2.26
Maximum negative weight for zero setting	BYTE	DBB108	1	Neg. range of zero setting device [in % of WB_{max}] (amount from pos. + neg. zero setting value must not exceed 4% for country code "OIML")	11.2.27
Maximum positive weight for zero setting	BYTE	DBB109	3	Neg. range of zero setting device [in % of WB_{max}] (amount from pos. + neg. zero setting value must not exceed 4% for country code "OIML")	11.2.28
Maximum tare load T-	BYTE	DBB110	100	Subtractive tare device range [in % of WB_{max} with multi-range scale] [in % of WB_1 with multi-resolution scale] (amount must not exceed 100% with country code "OIML")	11.2.29
Operating mode	BYTE	DBB111	0	Operating mode: 0 NAWI-filling procedure 1 NAWI-emptying procedure 2 Force measurement 3 Conveyor scale 4 Loss-in-weight scale 5 Bulk flow measurement device	11.2.30
Reserve_3_110	BYTE	DBB112	0	Reserve	
Load cell type	BYTE	DBB113	0	0: Analog strain gauge load cell 1: METTLER TOLEDO type WM or WMH	11.2.37

Name	Model	Address	Default	Range of values/Meaning	Reference
				2: Reserve - do not use 3: Load cell with vibrating wire (PESA) 4 - 255 analog strain gauge load cell	
Timeout digital LC	WORD	DBW114	240	Timeout in ms for receiving the cyclical weight value of the digital load cell	11.2.38
Regulations	STRING [4]	DBB116	"----"	"OIML": = regulation code OIML "----": = no regulation code	11.2.39
Weight unit	STRING [4]	DBB122	kg	Weight unit	11.2.40
Weight unit large	STRING [4]	DBB128	t	Large weight unit	11.2.41
Length unit	STRING [2]	DBD134	m	Length unit (conveyor scale only)	11.2.42
U factor	REAL	DBD138	1000	Conversion factor weight unit > large weight unit	11.2.43
Determination time 3	TIME	DBD140	10000	Adjustment or zero setting time for dynamic zero setting, taring or adjusting 0 to max. 900,000 ms (conveyor scale only)	11.2.44
		144			

Table 11-2 DS 3 allocation

11.2.1 DS 3 - Adjustment digits 0, 1, 2, 3, 4 for the zero point and adjustment weights 1, 2, 3, 4

The analog measurement value coming from the load cells is converted into a digital value with an analog-digital converter. A weight value is then calculated from this digital value. All functions of the SIWAREX FTC then use this weight value for executing their tasks.

To calculate the weight value from the digital value, the characteristic curve of the measurement system must be determined. In the simplest case, the characteristic curve is defined by points 0 and 1. The first operating point (point 0) is always determined by the empty scale alone with its own construction weight. Through the weight of its own construction, the scale load cells supply a measurement voltage to the SIWAREX FTC. After the analog-digital conversion of the measurement voltage, the digital value (adjustment digit 0) is assigned the zero point (zero weight).

For determining the average value of the adjustment point for the conveyor scale (zero point, adjustment weight) over a predefined period of time, the determination time must be defined. This time entry is not applicable for other operating modes.

If the scale is loaded with a known calibration weight (e.g. with 50% of the measurement range), then the second operation point can be determined. The new digital value from the analog-digital converter is now assigned the calibration weight.

The characteristic curve can be further adjusted using a maximum of three other points that must lie above point 1.

Ensure that the difference between two adjustment weights is at least 5% of the measurement range.

The adjustment consists of the following steps:

Define adjustment weights and other parameters of the DS 3 data record.

Send DS 3 to the scale

With an empty scale, issue the command "Adjustment weight 0 valid"

Load the scale with the defined calibration weight

Issue the command "Adjustment weight 1 valid"

Receive DS 3 from the scale

Save the data on data media

The adjustment sequence for the increasing adjustment weights must be retained.

Example:

Zero point = 0.0 kg (always)	produces 5,800,000 digits
Adjustment weight 1 = 100 kg	produces 10,100,000 digits

This defines the characteristic curve (0 is entered as the weight value for further adjustment weights) and the scale can now perform the calculations for the weight values over the entire measurement range.

Note:

Since the maximum value for adjustment digits is 15,379,113 and the value for completely empty load cells (without the weight of the construction itself) is 1,398,101, the plausibility of the characteristic curve can be roughly estimated to determine load deviations for example.

The illustration shows the relationship between the adjustment digits and the adjustment weight of the scale.

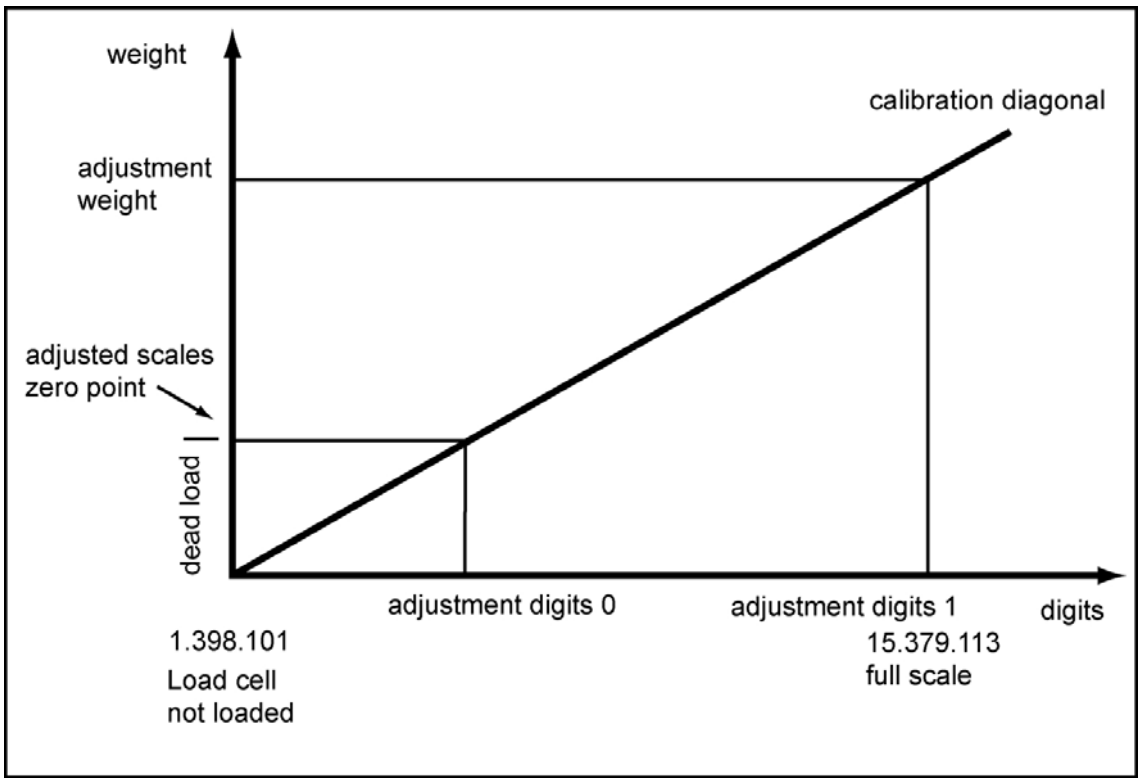


Figure 11-1 Adjustment digits and weight value

If the adjustment weights and adjustment digits of a SIWAREX FTC are known, then the adjustment procedure does not need to be performed. They are simply sent to the SIWAREX FTC in the DS 3 data record and the scale is immediately operational (after official calibration of the scale, it is no longer possible to send DS 3).

The SIWATOOL FTC program helps you to perform an adjustment quickly.

Option 1:

After commissioning and adjustment, all data records for the scale are read from SIWAREX FTC and are stored as a scale file WaageX.FTL.

Identical scales can now be put into operation immediately. Connect the PC to the new scale and activate the "Send all data sets" function. The adjustment weights and adjustment digits are also transferred in the process - the characteristic curve is immediately determined. Of course, the same applies when exchanging a SIWAREX FTC.

Option 2:

Use the SIWATOOL FTC "Theoretical adjustment" function and determine the characteristic curve of the scale from the technical data of the load cells alone. This assumes proper construction of the scale (see *11.3*).

Note

Normally, defining two operating points is sufficient to determine the characteristic curve for the scale. Other operation points only have to be defined on non-linear systems: new digital values (adjustment digits 2, 3, 4) are assigned with other calibration weights (e.g. 70%, 80%, 100% of the measurement range).

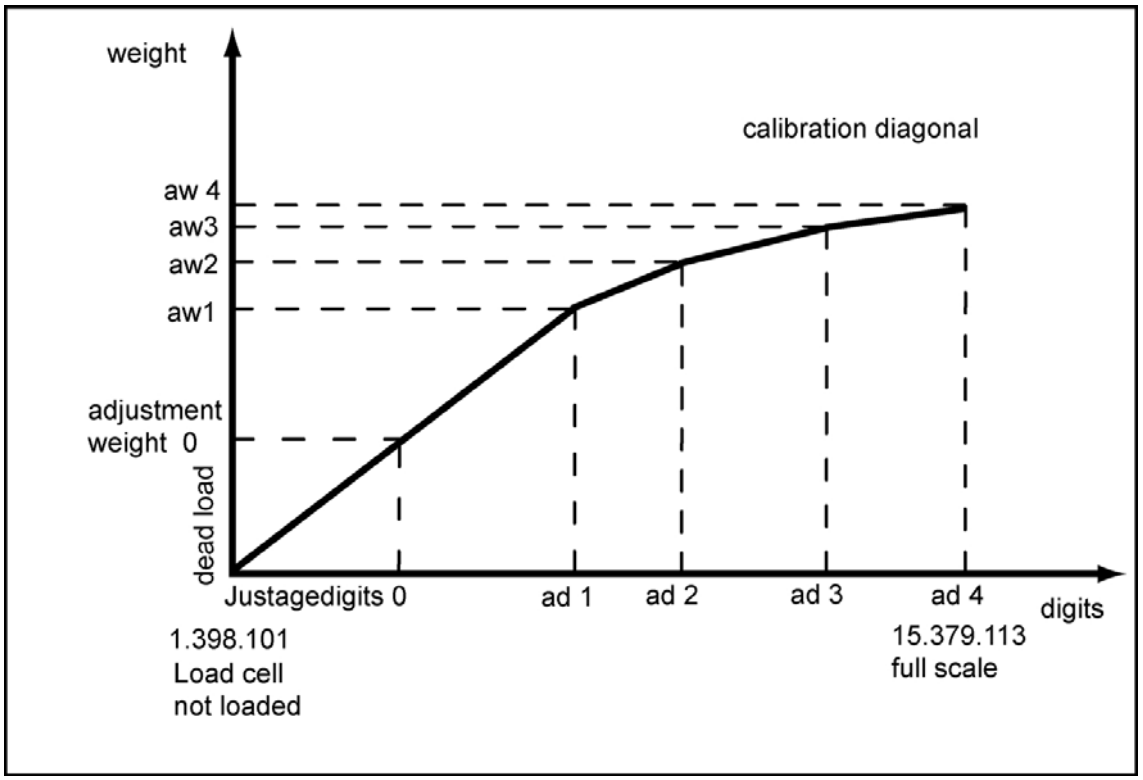


Figure 11-2 Linearization of the scale characteristic curve

11.2.2 DS 3 - Characteristic value range

Depending on the characteristic value of the connected load cells, the value 1 mV/V, 2 mV/V or 4 mV/V must be selected. Since the SIWAREX FTC supplies the load cells with approximately 10 V, the measuring input is redefined according to the expected measurement voltage (max. 10 mV, max. 20 mV or max. 40 mV). For example, if the characteristic value of the connected load cells is 2.85 mV/V, then the next higher characteristic value must normally be set, i.e. 4 mV/V.

For bi-directional force measurement, the characteristic value range should be defined as +/-.

11.2.3 DS 3 - Filter sequence for signal filter

Changing the filter sequence can be an advantage in some cases. Normally, the signal is first filtered by the mean value filter.

11.2.4 DS 3 - Type of low-pass filter

For suppression of interference to the weight display, 3 types of filter have been provided for selection (critically damped, Bessel filter, Butterworth filter). The selection is performed empirically. The following images show the step responses of the three filters (fg = 2 Hz).

For suppression of interference in average values, separate filters are activated in the parameters for the respective operating mode.

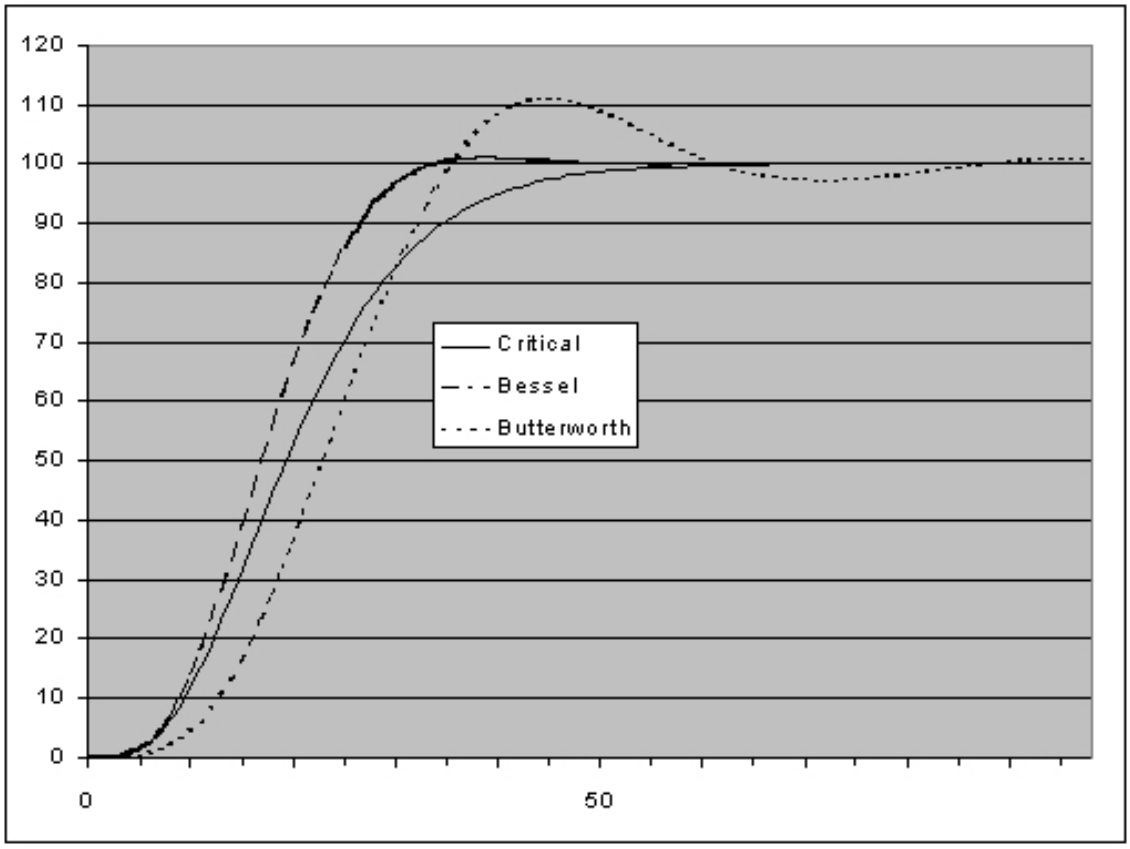


Figure 11-3 Step responses of the digital low-pass filters

11.2.5 DS 3 - Limit frequency

The specification of the limit frequency has decisive significance for the suppression of interference during weight recording. The "speed" of the scale's reaction to the change in the measured value is determined by specifying the limit frequency.

A value of e.g. 2 Hz produces a relatively quick reaction to a weight change, while a value of 0.5 Hz makes the scale somewhat "sluggish." This filter is used for setting up stability monitoring of the flow rate (only for loss-in-weight scale).

11.2.6 DS 3 - Depth of mean value filter

The mean value filter is used to calm the weight value when there is incidental interference. The weight value is based on the average of the n weight values that the SIWAREX FTC calculates every 10 ms, e.g. if n=10, 10 values are used for calculating the average value. Every 10 ms, the oldest value drops out of the calculation and the most recent is taken into account in the calculation. For the loss-in-weight scale, the filter should preferably have a value of N=0.

11.2.7 DS 3 - Scale name

The name consists of a maximum of 10 characters and can be freely selected.

11.2.8 DS 3 - Number of weight ranges

SIWAREX FTC can be defined as a scale with one, two or three different measurement ranges. Normally, only one measuring range is used in the force measurement and continuous weighing (conveyor scale, bulk flow measurement device) operating modes.

11.2.9 DS 3 - Scale type

If the number of ranges is greater than one, the scale type can be defined as a multi-range scale or a multi-resolution scale.

Information on the function of a multi-range or multi-resolution scale can be found in EN 45 501.

Note

If only one range is defined, then this entry is meaningless.

11.2.10 DS 3 - Activating zero setting at start-up

The scale can be set to zero automatically by switching the supply voltage on. On verifiable scales, a weight value of +/- 10% of the max. measurement range can be set to zero at start-up.



Attention

In non-verifiable mode (no OIML restrictions), a full scale can also be set to zero after activating this function. The effectiveness can, however, be limited by entering the max. and min. weight. See max./min. weight for zero setting at switch-on. In operating modes "Conveyor scale" and "Loss-in-weight scale," this function cannot be activated.

11.2.11 DS 3 - Activated zero setting at start-up, if scale tared

The scale can be set to zero automatically by switching the supply voltage on. If the above function is activated, the question remains as to whether zero setting at start-up should be run if the tare weight is not equal to zero.

If it is to be run, then the tare weight is also deleted during the process, but if it is not to be run, then no zero setting is performed on the scale.

11.2.12 DS 3 - Automatic zero adjustment

Zero setting the scale can be performed with the "Zero setting" command if required. The automatic zero adjustment sets the scale to zero without instruction if it only deviates slightly from the zero point. Slow drifting is presumed if the conditions of standard EN45501 have been met. This function is executed as a dynamic zero setting function in "Conveyor scale" operating mode.

This function has no effect in "Loss-in-weight scale"operating mode.



Attention

After activating this function during non-verifiable operation (no OIML restrictions), the scale may gradually drift back to zero even if it is full. When using this function, suitable measures must be taken to prevent the scale being overloaded.

11.2.13 DS 3 - Minimum weight for weighing range 1

The current weight value can only be used for verifiable recording (with the numeral step for measurement range 1) above the minimum weight. The minimum weight is defined by an adjustment or calibration. The minimum weight depends on the number and type of load cells used.

The value can be set to 0 on non-calibrating scales.

11.2.14 DS 3 - Maximum weight for weighing range 1

The current weight can only be used for calibrating purposes (with the numeral step for measurement range 1) under the maximum weight. The maximum weight is defined during adjustment. The maximum weight depends on the number and type of load cells used and the required weight range.

11.2.15 DS 3 - Numeral step for weighing range 1

The numeral step for weighing range 1 can be defined in accordance with standard EN 45501 (0.0001 to 50).

11.2.16 DS 3 - Minimum weight for weighing range 2

The current weight value can only be used for verifiable recording (with the numeral step for measurement range 2) above the minimum weight. The minimum weight is defined by an adjustment or calibration. The minimum weight depends on the number and type of load cells used. The value can be set to 0 on non-calibrating scales.

Note

If only one weighing range is defined (e.g. for conveyor scales or loss-in-weight scales), then this definition is meaningless.

11.2.17 DS 3 - Maximum weight for weighing range 2

The current weight can only be used for calibrating purposes (with the numeral step for measurement range 2) under the maximum weight. The maximum weight is defined during adjustment.

The maximum weight depends on the number and type of load cells used.

Note

If only one weighing range is defined then this entry is meaningless.

11.2.18 DS 3 - Numeral step for weighing range 2

The numeral step for weighing range 2 can be defined in accordance with standard EN 45501 (0.0001 to 50).

If only one weighing range is defined then this entry is meaningless.

11.2.19 DS 3 - Minimum weight for weighing range 3

The current weight value can only be used for verifiable recording (with the numeral step for measurement range 3) above the minimum weight. The minimum weight is defined by an adjustment or calibration. The minimum weight depends on the number and type of load cells used.

The value can be set to 0 on non-calibrating scales.

Note

If only one or two weighing ranges are defined then this entry is meaningless.

11.2.20 DS 3 - Maximum weight for weighing range 3

The current weight can only be used for calibrating purposes (with the numeral step for measurement range 3) under the maximum weight. The maximum weight is defined during adjustment.

The maximum weight depends on the number and type of load cells used.

Note

If only one or two weighing ranges are defined then this entry is meaningless.

11.2.21 DS 3 - Numeral step for weighing range 3

The numeral step for weighing range 1 can be defined in accordance with standard EN 45501 (0.0001 to 50).

Note

If only one or two weighing ranges are defined then this entry is meaningless.

11.2.22 DS 3 - Standstill time

Standstill monitoring is used to identify when the scale is at a stable equilibrium.

Scale standstill is determined if the weight value changes by less than a defined deviation range (standstill value) within a defined time (standstill time). Standstill is used in static operation of the scale (commands: Zero setting, Taring, Output log).

11.2.23 DS 3 - Standstill range

Standstill monitoring is used to identify when the scale is at a stable equilibrium.

Scale standstill is determined if the weight value changes by less than a defined deviation range (standstill value) within a defined time (standstill time). Standstill is used in static operation of the scale (commands: Zero setting, Taring, Output log).

The figure below illustrates the functionality of the standstill monitoring feature.

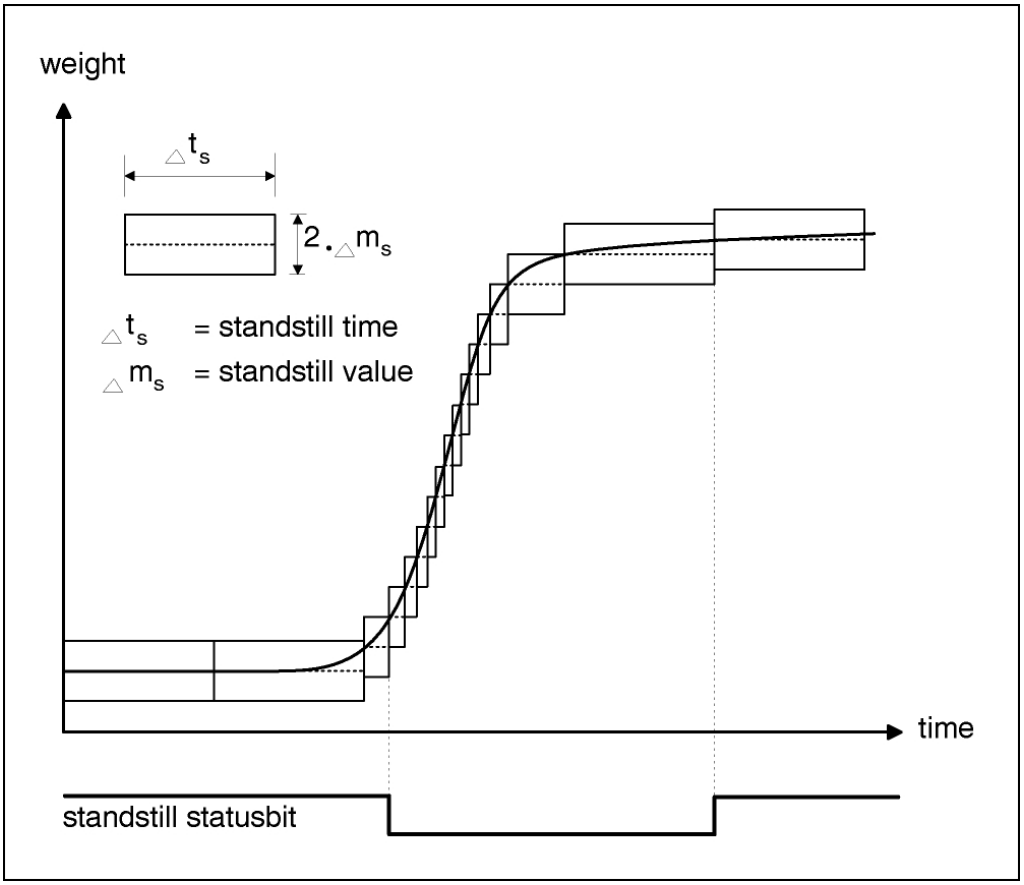


Figure 11-4 Standstill monitoring

11.2.24 DS 3 - Wait time for standstill

To prevent having to immediately cancel a weighing command (only taring, printing and zero setting in static operation) in the absence of a stable weight of the scale, the wait time is given for standstill. If the scale command Tare, Output log or Zero setting cannot be executed after this time has elapsed, then a corresponding technology message is generated.

11.2.25 DS 3 - Maximum negative weight for zero setting at start-up

Zero setting means that an automatic zero setting is performed for the scale when the supply voltage is switched on.

If zero setting upon switching on the supply voltage has been activated, then the definition will limit the effect of the function. The reference point for the effectiveness of the limitation is not the current weight; rather it is the weight that would be displayed by the scale without a previous zero setting. This function is not effective in the "Conveyor scale" and "Loss-in-weight scale" operating modes.

11.2.26 DS 3 - Maximum positive weight for zero setting at start-up

Zero setting means that an automatic zero setting is performed for the scale when the supply voltage is switched on.

If zero setting upon switching on the supply voltage has been activated, then the definition will limit the effect of the function. The reference point for the effectiveness of the limitation is not the current weight; rather it is the weight that would be displayed by the scale without a previous zero setting. This function is not effective in the "Conveyor scale" and "Loss-in-weight scale" operating modes.

11.2.27 DS 3 - Maximum negative weight for zero setting

The current gross weight of the scale is defined as zero for zero setting.

For zero setting, the specification can be used to limit the effect of the function. The reference point for the affect of the limitation is not the current gross weight. It is the weight that the scale would show without a previous zero setting.

For scales in calibrating mode, the limitation between the negative and positive weights for zero setting is 4% of the maximum weighing range.

11.2.28 DS 3 - Maximum positive weight for zero setting

For zero setting, the specification can be used to limit the effect of the function. The reference point for the effectiveness of the limitation is not the current weight; rather it is the weight that would be displayed by the scale without a previous zero setting.

For scales in calibrating mode, the limitation between the negative and positive weights for zero setting is 4% of the maximum weighing range.

11.2.29 DS 3 - Max tare load T-

SIWAREX FTC accepts every weight value which is less than the % of the maximum weighing range with multi-range scales or weighing range 1 with a multi-resolution scale.

With calibrating scales, the value is limited to 100% of the maximum weighing range.

11.2.30 DS 3 - Operating mode

This parameter can be used to select the suitable weighing program.
One of these weighing operating modes applies, depending on the task set.

The operating mode is defined during initial commissioning of the module by sending the adjustment data record DS 3 with the newly defined operating mode.

Data records or individual parameters that have no significance in a certain operating mode are also accepted by the SIWAREX FTC.

The following operating modes can be defined:

- 0 - Non-automatic weighing machine (OIML R 76) for filling procedure
- 1 - Non-automatic weighing machine (OIML R 76) for emptying procedure
- 2 - Force measurement (bi-directional)
- 3 - Conveyor scale (default value, description in separate manual)
- 4 - Loss-in-weight scale
- 5 - Bulk flow measurement device

11.2.31 DS 3 - Weighing operating mode: NAWI filling procedure

Non-automatic weighing machine (NAWI) - according to OIML R-76 - only accepts the service and adjustment instructions and weighing instructions "Zero setting" and "Taring." The net weight increases as the load on the scale increases.

11.2.32 DS 3 - Weighing operating mode: NAWI emptying procedure

Non-automatic weighing machine (NAWI) - according to OIML R-76 - only accepts the service and adjustment instructions and weighing instructions "Zero setting" and "Taring." The net weight increases as the load on the scale decreases.

11.2.33 DS 3 - Operating mode: Force measurement

This operating mode is not verifiable. The scope of functionality is similar to that of the operating mode "Non-automatic weighing machine filling procedure." The difference lies in the ability to use the measuring range in both positive and negative directions.

11.2.34 DS 3 - Weighing operating mode: Conveyor scale

In the "Conveyor scale" operating mode, the parameters from the DS 5 are also evaluated. The scope of functionality is designed for operation of a conveyor scale. The conveyor scale is described in a separate manual.

11.2.35 DS 3 - Weighing operating mode: Loss-in-weight scale

In the "Loss-in-weight scale" operating mode, the adjustment parameters from data records DS 6, DS 10, DS 11, DS 12, DS 13 and DS 19 are also evaluated. The scope of functionality is designed for operation of a loss-in-weight scale.

11.2.36 DS 3 - Weighing operating mode: Bulk flow measurement device

In the "Bulk flow measurement device" operating mode, the adjustment parameters from the DS 55 are also evaluated. The scope of functionality is designed for operation of a bulk flow measurement device.

11.2.37 DS 3 - Load cell type

Both analog load cells (DMS full bridge) and sensors from METTLER TOLEDO - types WM or WMH - and load cells with a vibrating wire can be connected to the SIWAREX FTC. This information defines which interface the signal will come from:

- Via the DMS connection with analog DMS load cells
- Via RS 485 with type WM or WMH
- Via RS 485 for a load cell with a vibrating wire

After selecting the sensors METTLER TOLEDO type WM or WMH, appropriate settings must be made in data record DS 7 for the RS485 interface (see *4.4.10*).

The adjustment digits and adjustment weight must be defined in data record 3:

- Adjustment digits for zero point = 8388608
- Adjustment digits 1 = 13388608
- Adjustment digits 2, 3, 4 = 0
- Adjustment weight 1 = 5000000/digital value per weight unit e.g. if 10000d/kg was sent from the sensor 5000000/10000=500
- Adjustment digits 2, 3, 4 = 0

The application-dependent sensor parameters are set using the tools for defining parameters for the WM or WMH sensors.

The following settings must be made on the sensor (using commands) for communication with SIWAREX FTC:

- RS422 interface settings:
  - PROT_2_(frame protocol)

- COM_1_8_0_0 (interface RS422, 38400 baud, 7 bits, even parity, 1 stop bit)

- Setting the digital inputs:
  - DIN1_SIR_0_1 (input 1 for the SIR command, positive edge, output via RS422)
  - DIN1_SI_0_1 (input 1 for the SIR command, positive edge, output via RS422)

After selecting sensors with a vibrating wire, appropriate settings must be made in data record DS 7 for the RS485 interface.

- RS485 baud rate: 9600

- 1 start bit

- RS485 character parity: even

- RS485 data bits: 7

- RS485 stop bit: 1

The adjustment digits and adjustment weight must be defined in data record 3:

- Adjustment digits for zero point = 8388608
- Adjustment digits 1 = 8388608 + nominal weight of the load cell
- Adjustment digits 2, 3, 4 = 0
- Adjustment weight 1 = nominal weight of the load cell
- Adjustment digits 2, 3, 4 = 0

After selecting sensors with a vibrating wire, appropriate settings must be made in data record DS 53 for the load cell, and must be transferred to the load cell.

Load cell with one wire: A125 W003 F03 F10 F20 F30

Load cell with two wires: A125 W003 F03 F10 F20 F30 F40

11.2.38 DS 3 - Monitoring time for digital load cell

Receipt of cyclical weight telegrams from the digital load cell is monitored. If no telegram is received for the defined time period (in ms), the SIWAREX FTC indicates operational fault no. 24 - Digital load cell not ready. A status bit (status NAWI, bit 29) also provides the information on whether the digital load cell is ready. If the status bit is not set, the weight values are not evaluated because no plausible weight values have been received.

11.2.39 DS 3 - Regulations

Calibrating scales are subject to certain restrictions. The "OIML" entry activates these restrictions. For a loss-in-weight scale or bulk flow measurement device, "----" should be entered.

11.2.40 DS 3 - Weight unit

A 4-character string can be defined as the weight unit, e.g.: g, kg, lbs

11.2.41 DS 3 - Large weight unit

A 4-character string can be defined as the large weight unit e.g.: t.

The relationship between the weight unit and the large weight unit is determined by a factor (e.g. 1000). The large weight unit is advantageous when defining quantities that refer to lengthy periods of time, e.g. conveyor quantity per hour.

11.2.42 DS 3 - Length unit (conveyor scale only)

The length unit is used for defining the conveyor length. Calculating the conveyor load refers to this definition.

The parameter is only relevant in the "Conveyor scale" operating mode.

11.2.43 DS 3 - Conversion factor

The conversion factor indicates the relationship between the weight unit and the large weight unit. The factor can be defined as required.

Example:

Weight unit: kg

Large weight unit: t

Conversion factor 1000.0

11.2.44 DS 3 - Determination time (conveyor scale only)

With a static scale (determination time = 0), the operation points are determined immediately after activating the instruction during adjustment. Zero setting is also executed immediately when a stable weight exists.

A determination time can also be defined for these instructions for the conveyor scale. The scale determines the operation point during the defined determination time as an average value of all measurements, and the average value is output after the determination time has elapsed.

The determination time applies for the following instructions: zero point valid, adjustment weight 1 - 4 valid, zero settings, taring.

Example:

If the determination time is set to 10,000 ms, a new weight is determined e.g. every 10 ms with the "Zero setting" instruction. After 10 seconds have elapsed, the average value of all measurements will be defined as the new zero point.

11.3 Theoretical adjustment - Adjustment without adjustment weights

If it is not possible to perform the adjustment using adjustment weights, then the scale can also be put back into operation without adjustment weights, assuming the mechanical structure of the scale is correct and the measuring logs are available for the individual load cells. Execution is handled with the help of SIWATOOL FTC_L (not in "Force measurement" operating mode) during processing of the adjustment parameters. We call this procedure "Theoretical adjustment."

First, the characteristic value range (1 mV/V, 2 mV/V or 4 mV/V) must be defined in the "Adjustment" tab of the data record for the adjustment data. Then switch to the "Theoretical adjustment" tab.

To perform the theoretical adjustment, first the rated load of all load cells is specified, e.g. 3 load cells with 1000 kg each produce a rated load of 3000 kg. The zero point offset (unit µV) and the characteristic value (unit mV/V) are then entered for each individual load cell. These values are taken from the respective load cell measurement log. The characteristic value is generally entered with up to 5 decimal places, e.g. 2.01201.

Zero point offset for each load cell is defined as follows:

Zero point offset (µV) = zero point offset measurement value (µV/V) x weigh module supply voltage (V)

Example:

Load cell supply voltage (EXC) = 10 V

Zero point offset = 1.2 µV/V (from load cell measurement log)

Entry: Zero point offset = 1.2 µV/V x 10 V = 12 µV

After the data has been entered for each load cell, the adjustment digits are calculated by pressing the "Calculate adjustment digits" button and the result is displayed. The calculated adjustment digits can then be integrated into the data record with adjustment data (DS 3) by actuating the "Accept calculation" button. The data record with the new adjustment data is then sent to the weighing module.

Depending on the mechanics of the device, a completely empty scale may indicate a value that deviates slightly from the zero value. In this case, the instruction "Characteristic curve shift" can be executed.

11.4 DS 4 basis parameters

The basis parameters define other features of a scale that are responsible for basic behavior. The parameters must be checked and sometimes have to be changed. DS 4 is not subject to write protection in verifiable mode.

Procedure:

- Check all parameters and change if necessary
- Send the DS 4 to the scale

Name	Model	Address	Default	Range of values/Meaning	Reference
Reserve_4_0	BYTE	DBB000	0	Reserve	
Reserve_4_1	BYTE	DBB001	0	Reserve	
Reserve_4_2	WORD	DBW002	0	Reserve	
Monitoring time for logging	TIME	DBD004	2000	Time within which a logging task must be ended (ms)	*11.4.1*
Device for log output	BYTE	DBB008	1	Bit 0: 0 = Log output to RS232 interface 1 = Log output to MMC Bits 1 to 7 not used	*11.4.2*
Reserve_4_9	BYTE	DBB009	0	Reserve	
Basis weight for limit value 1 Basis weight for limit value 2 Basis weight for the empty range	BYTE	DBB010	0 0	Bit 0: 0 = Basis for limit value 1 is the gross weight 1 = Basis for limit value 1 is the net weight Bit1: 0 = Basis for limit value 2 is the gross weight 1 = Basis for limit value 2 is the net weight Bit 3: 0 = Basis for empty range is the gross weight 1 = Basis for empty range is the net weight Bits 4 to 7 not used	*11.4.3* *11.4.4* *11.4.5*
Reserve_4_11	BYTE	DBB011	0	Reserve	
Empty range	REAL	DBD012	1	For filling procedures, this depends on parameters, for emptying procedures it is relative to gross. For the loss-in-weight scale: limit value for ending the emptying run.	*11.4.6*
Switch-on weight Limit value 1	REAL	DBD016	1	Switch-on weight Limit value 1	*11.4.7*
Cut-off weight Limit value 1	REAL	DBD020	1.1	Cut-off weight Limit value 1	*11.4.8*
Switch-on weight Limit value 2	REAL	DBD024	50	Switch-on weight Limit value 2	*11.4.9*
Cut-off weight Limit value 2	REAL	DBD028	49	Cut-off weight Limit value 2	*11.4.10*
Switch-on weight Limit value 3	REAL	DBD032	99	Limit value 3 corresponds to overfill limit	*11.4.11*
Cut-off weight Limit value 3	REAL	DBD036	98	Cut-off weight limit value 3	*11.4.12*
		40			

Table 11-3 Allocation of DS 4

11.4.1 DS 4 - Monitoring time for logging

If logging of the weighing results is generated by an instruction or automatically, SIWAREX FTC monitors whether the procedure has been completed within the predefined time. If not, a technology error is generated.

11.4.2 DS 4 - Device for log output

Logs can be output to a connected printer or to the Micro Memory Card (MMC). The content of the logs is defined in data records DS 40 to DS 43.

11.4.3 DS 4 - Basis weight for limit value 1

The limit values can be defined in relation to the gross weight or net weight of the scale.

11.4.4 DS 4 - Basis weight for limit value 2

The limit values can be defined in relation to the gross weight or net weight of the scale.

11.4.5 DS 4 - Basis weight for monitoring the empty range

The limit value for monitoring the empty range can be defined in relation to the gross weight or net weight of the scale.

11.4.6 DS 4 - Empty range

The value for the empty range is a limit below which SIWAREX FTC interprets the status as "empty" and outputs the status information accordingly.

In the "Loss-in-weight scale" operating mode, emptying in automatic mode is terminated if the value drops below the limit.

11.4.7 DS 4 - Switch-on weight limit value 1

Switch-on and cut-off weights can be defined separately for a limit value. In this way, both minimum and maximum value monitoring can be realized by hysteresis. Maximum value monitoring is realized with the following specification:

Activation value > deactivation value

Minimum value monitoring is realized with the following specification:

Activation value < deactivation value

The following image shows the functionality of limit values 1, 2, 3

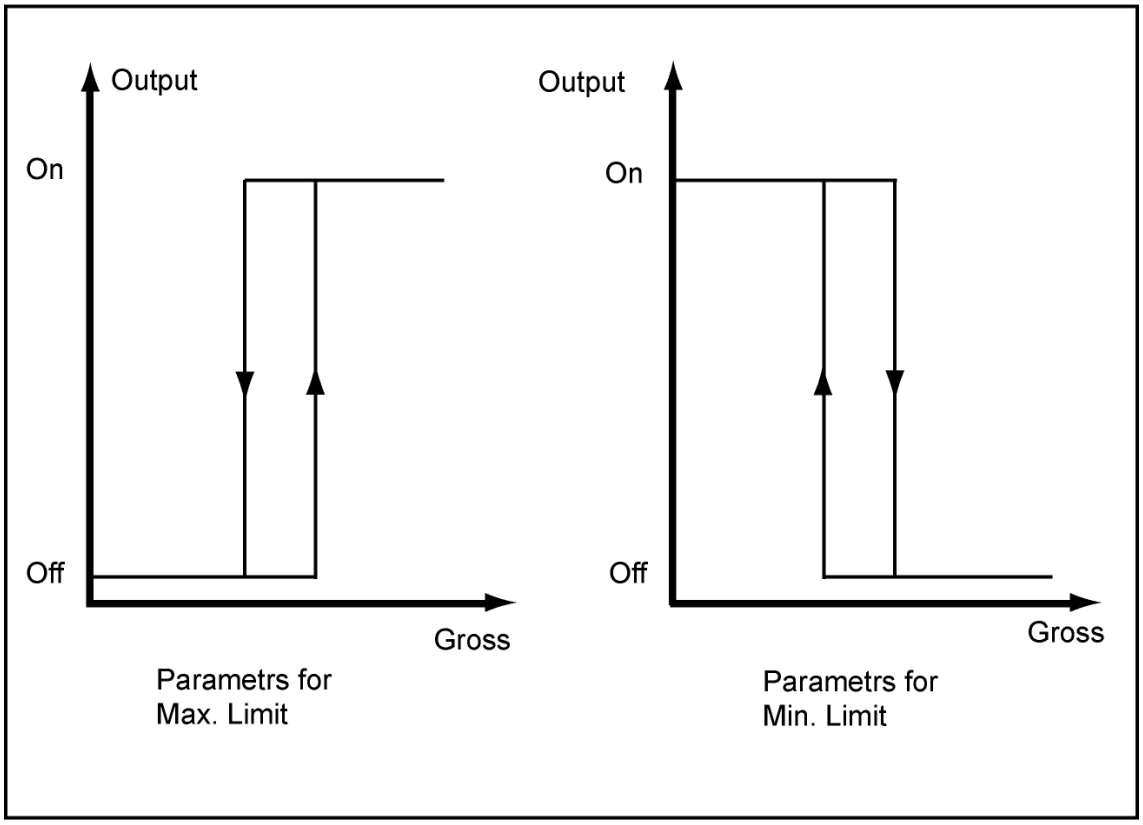


Figure 11-5 Defining limit value parameters

11.4.8 DS 4 - Cut-off weight limit value 1

See: Switch-on weight limit value 1

11.4.9 DS 4 - Switch-on weight limit value 2

See: Switch-on weight limit value 1

11.4.10 DS 4 - Cut-off weight limit value 2

See: Switch-on weight limit value 1

11.4.11 DS 4 - Switch-on weight limit value 3

The switch-on and cut-off weights can be defined separately for the limit value. With limit value 3, only maximum weight monitoring can be realized. The basis weight for limit value 3 is always the gross weight.

11.4.12 DS 4 - Cut-off weight limit value 3

When the limit value is undercut, the status information "Limit value 3" is reset.

11.5 DS 5 Conveyor scale parameters (description in separate manual)

11.6 DS 55 Bulk flow measurement device parameters

The parameters in this data record are only relevant in "Bulk flow measurement device" operating mode. The parameters must be checked and changed if necessary.

Procedure:

- Check all parameters and change if necessary
- Send the DS 55 to the scale

Name	Model	Address	Default	Range of values/Meaning	Reference
Reserve_55_0	REAL	DBD000	0	Reserve	
Reserve _55_4	TIME	DBD004	0	Reserve	
Reserve_55_8	REAL	DBD008	0	Reserve	
Reserve_55_12	REAL	DBD012	0	Reserve	
Reserve_55_16	INT	DBW016	0	Reserve	
Reserve_55_18	INT	DBW018	0	Reserve	
Reserve_55_20	TIME	DBD020	0	Reserve	
Reserve_55_24	TIME	DBD024	0	Reserve	
Reserve_55_28	INT	DBD028	0	Reserve	
Reserve_55_30	INT	DBD030	0	Reserve	
Nominal flow rate	REAL	DBD032	50	Nominal flow in WU/h (weight unit per hour)	*11.6.1*
Reserve_55_30	REAL	DBD036	0	Reserve	*11.6.2*
Flow rate correction factor	REAL	DBD040	1	Correction factor for calculating flow rate Value range 0.5-2	
Minimum flow rate	INT	DBW044	200	Limit value for minimum flow rate in % of nominal flow rate. With 0 - no monitoring.	*11.6.3*
Maximum flow rate	INT	DBW046	1250	Limit value for maximum flow rate in % of nominal flow rate. With 0 - no monitoring	*11.6.4*
Reserve_55_48	REAL	DBW048	0	Reserve	
Max. flow rate for zero setting	INT	DBW052	10	Maximum flow rate with zero setting in % of nominal flow rate.	*11.6.5*
Minimum flow rate for totalizing	INT	DBW054	0	Minimum flow rate in % of nominal flow rate for performing totalizing	*11.6.6*
Delay time for monitoring flow rate at start	TIME	DBD056	1 sec	Delay time after switching on the feed until monitoring of flow rate is actuated.	*11.6.7*
Delay time for monitoring flow rate in operation	TIME	DBD060	1 sec	Delay time in continuous operation until monitoring flow rate is actuated.	*11.6.8*
Totalizing numeral step in WU	REAL	DBD064	0.1	Numeral step ("totalizing value") for distribution memory locations (group 1) 1-4 in weight unit WU	*11.6.9*
Totalizing numeral step in LWU	REAL	DBD068	0.1	Numeral step ("totalizing value") for distribution memory locations (group 2) 5-8 in large weight unit LWU	*11.6.10*
Quantity per pulse 1	REAL	DBD072	0	Specifies after what quantity increase for group 1 a pulse should be output (when external	*11.6.11*

Name	Model	Address	Default	Range of values/Meaning	Reference
				totalizing counter is connected)	
Pulse duration 1 for digital output	TIME	DBD076	0	Pulse duration 1 for outputting the conveyed quantities to a digital output (when external totalizing counter 1 is connected) (50-1000ms)	*11.6.12*
Minimum pause duration 1 for digital output	TIME	DBD080	0	Minimum pause duration 1 for output of the conveyed quantities to digital output (when an external totalizing counter is connected) 50-1000ms	*11.6.13*
Quantity per pulse 2	REAL	DBD084	0	Specifies after what quantity increase a pulse should be output (when external totalizing counter 2 is connected)	*11.6.14*
Pulse duration 2 for digital output	TIME	DBD088	0	Pulse duration group 2 for output of the conveyed quantities to a digital output (when an external totalizing counter is connected) 50-1000 ms	*11.6.15*
Minimum pause duration 2 for digital output	TIME	DBD092	0	Minimum pause duration group 2 for output of the conveyed quantities to a digital output (when a totalizing counter is connected) 50-1000 ms	*11.6.16*
Overload/underload inhibition time	TIME	DBD096	0	Time delay for the error messages that are caused by overloading or underloading the measuring range	*11.6.17*
Reserve_5_100	INT	DBW100	0	Reserve	
		102			

Table 11-4 Allocation of DS 55

11.6.1 DS 55 - Nominal flow rate

Nominal flow rate in WU (weight units)/h is defined by the user.

It corresponds to the flow rate (100%) for which the bulk flow measurement device is designed.

11.6.2 DS 55 - Flow rate correction factor

A material test can be performed to compare the quantity of material actually conveyed with the total calculated by SIWAREX FTC.
The correction factor can be used to influence the material quantity calculation for slight deviations. The following formula applies for the correction factor:

Output flow rate = measured flow rate x correction factor

11.6.3 DS 55 - Minimum flow rate

Minimum flow rate is a limit value in 0.1% of the nominal flow rate. Entry of the number 800, for example, corresponds to 80.0%. After this value has been undercut, SIWAREX FTC sets a status bit.

11.6.4 DS 55 - Maximum flow rate

Maximum flow rate is a limit value in 0.1% of the nominal flow rate. Entry of the number 1020, for example, corresponds to 102.0%. After this value has been exceeded, SIWAREX FTC sets a status bit.

11.6.5 DS 55 - Maximum flow rate for zero setting

Maximum flow rate for zero setting is a limit value in 0.1% of the nominal flow rate. Entry of the number 20, for example, corresponds to 2.0%. After this value has been undercut, SIWAREX FTC will not execute or cancel the zero setting instruction.

11.6.6 DS 55 - Minimum flow rate for totalizing

Minimum flow rate is a limit value in 0.1% of the nominal flow rate for executing the totalizing. Entry of the number 8, for example, corresponds to 0.8%. After exceeding this value, totalizing is possible.

11.6.7 DS 55 - Time for monitoring the flow rate after the start

After switching on the feed, under-cutting the minimum flow rate is only indicated after this time has elapsed.

11.6.8 DS 55 - Delay time for activating monitoring of the flow rate in continuous operation

After under-cutting the minimum flow rate, the respective message or status bit is only output after this time has elapsed.

11.6.9 DS 55 - Numeral step for totals 1-4

Distribution memory locations 1-4 are run with the weight unit indicated in data record 3. The user can use the numeral step to define the smallest step for creating totals;

e.g. weight unit 1 kg, numeral step for creating the total is 5 kg.

11.6.10 DS 55 - Numeral step for totals 4-5

Distribution memory locations 4-8 are run with the large weight unit indicated in data record 3. The user can use the numeral step to define the smallest step for creating totals;

e.g. weight unit 1 kg, numeral step for totalizing is 1 t.

11.6.11 DS 55 - Material quantity per pulse 1

The material quantity per pulse 1 specifies after what quantity increase in distribution memory locations 1-4 1 a pulse should be output through the parameterized digital output.

11.6.12 DS 55 - Pulse duration 1 for digital output

For the external quantity counter, the pulse duration (ms) can be defined so that the device can detect the pulse with certainty. The pulse duration must not be selected so long that compliance with the minimum pause duration would make the next pulse late.

11.6.13 DS 55 - Minimum pause duration 1 for digital output

For the external quantity counter, the pulse duration (ms) can be defined so that the device can detect the pulse with certainty. The pulse duration must not be selected so long that compliance with the minimum pause duration would make the next pulse late.

11.6.14 DS 55 - Material quantity per pulse 2

The material quantity per pulse 2 specifies after what quantity increase in distribution memory locations 1-4 2 a pulse should be output through the parameterized digital output.

11.6.15 DS 55 - Pulse duration 2 for digital output

For the external quantity counter, the pulse duration (ms) can be defined so that the device can detect the pulse with certainty. The pulse duration must not be selected so long that compliance with the minimum pause duration would make the next pulse late.

11.6.16 DS 55 - Minimum pause duration 2 for digital output

For the external quantity counter, the pulse duration (ms) can be defined so that the device can detect the pulse with certainty. The pulse duration must not be selected so long that compliance with the minimum pause duration would make the next pulse late.

11.6.17 DS 55 - Overload and underload inhibition time

When undercutting or exceeding the measurement range, a fault is indicated. The fault message is suppressed for the specified inhibition time. If the status remains longer than the specified time, the fault message is displayed.

11.7 DS 6 Loss-in-weight scale I

The following parameters are the main determinants of the measuring behavior of the loss-in-weight scale. Other parameters in DS 10 set up filtering of the flow rate value and describe monitoring limit values.

Procedure:

- Check all parameters and change if necessary
- Send DS 6 to the scale

Name	Model	Address	Default	Range of values/Meaning	Reference
Time unit for flow rate definition	STRING [2]	DBB000	"h"	Time unit for defining the flow rate. Permitted entries "s" or "h"	*11.7.1*
Nominal filling weight	REAL	DBD004	10	Nominal filling weight of the weighing container.	*11.7.2*
Nominal flow rate in WU/s or WU/h	REAL	DBD008	10	Nominal flow rate in weight units/s or /h as specified for the time unit. The nominal flow rate can be determined automatically by means of start-up mechanism 1, 2, 3.	*11.7.3*
Update time for flow rate	TIME	DBD012	1000	Update time for display of flow rate (must be ≥ 100 ms).	*11.7.4*
Flow rate correction	REAL	DBD016	1	Correction factor for calculating flow rate	*11.7.5*

Name	Model	Address	Default	Range of values/Meaning	Reference
factor				Value range 0.5 - 2.	
Flow rate min	INT	DBW020	2000	Limit value for minimum flow rate in 0.01% of nominal flow rate	*11.7.6*
Flow rate max	INT	DBW022	12,500	Limit value for maximum flow rate in 0.01% of nominal flow rate	*11.7.7*
Time for flow rate stability	TIME	DBD024	3000	Specification of a time window for monitoring flow rate stability.	*11.7.8*
Start filling 0.01	INT	DBW028	3000	Min. limit value to start/activate refilling in 0.01% of nominal filling weight.	*11.7.9*
End filling 0.01%	INT	DBW030	9000	Max. limit value for switching refilling off in 0.01% of nominal filling weight.	*11.7.10*
Settling time after filling	TIME	DBD032	5000	Delay time after switching filling off until switching to gravimetric operation.	*11.7.11*
Filling time	TIME	DBD036	0	If the filling time is not equal to 0, filling is performed for the defined time.	*11.7.12*
Monitoring time for filling	TIME	DBD040	0	After the max. filling time has elapsed, a check is performed to detect whether filling is ended. If necessary, a status bit and a technology fault NNN are output (no malfunction stop). Monitoring is effective while filling according to weight values. 0: Monitoring switched off	*11.7.13*
Inhibition time	TIME	DBD044	0	Inhibition time for suppression of the fault message when the measurement range is exceeded. No message is issued during the inhibition time.	*11.7.14*
Numeral step display	REAL	DBD048	0	Numeral step for flow rate display	
Measuring period for quality	TIME	DBD052	0	Time for a measurement interval (0 or >=100 ms)	*11.7.15*
Number of measuring periods	INT	DBW056	0	Number of measuring periods for calculating the statistical values.	*11.7.16*
Refill parameter	BYTE	DBB058	0	Bit 0: After expiry of filling monitoring time 0: Do not end filling 1: End filling Bit 1: After expiry of filling monitoring time 0: Do not end dosing 1: End dosing Bit 2: Output value during filling 0: According to material characteristic curve 1: Retain current output value Bit 3: During filling 0: Display setpoint 1: Freeze current value Bits 3-7 not used	*11.7.17*
Filter level for flow rate display	BYTE	DBB058	0	0 - no filter, 1 - weak filtering, 9 - strong filtering.	*11.7.18*
Totalizing numeral step in WU	REAL	DBD060	0.1	Numeral step ("totalizing value") for distribution memory locations (group 1) 1-4 in weight unit WU	*11.7.19*
Totalizing numeral step in LWU	REAL	DBD064	0.1	Numeral step ("totalizing value") for distribution memory locations (group 2) 5-8 in large weight unit LWU	*11.7.20*
Stability weight	REAL	DBD068	0.005	Stability weight for flow rate monitoring	*11.7.21*
		72			

Table 11-5 Allocation of DS 6

11.7.1 DS 6 - Time unit for flow rate

The definitions for flow rate can be made in units "s" (per second) or "h" (per hour). This definition is effective for all flow rate entries.

11.7.2 DS 6 - Nominal fill quantity

The nominal filling weight amounts to the quantity of material that should be in the container after refilling is complete.

11.7.3 DS 6 - Nominal flow rate

Nominal flow rate in WU (weight units)/s or WU (weight units)/h is defined by the user. This corresponds to the flow rate (100.00%) for which the loss-in-weight scale is designed. The nominal flow rate for the current material and dosing organ can be calculated automatically by means of the start-up mechanisms 1, 2, 3 (see commands 161, 162 and 163). The value determined can be viewed after reading out the DS 6.

11.7.4 DS 6 - Update time for display

The current flow rate is output with the defined update time.

11.7.5 DS 6 - Correction factor for flow rate

A material test can be performed to compare the quantity of material actually conveyed with the total calculated by SIWAREX FTC. Where there are slight deviations, the correction factor can be used to influence the calculation of the total quantity.

The following formula applies for the correction factor:

Output flow rate = measured flow rate x correction factor

11.7.6 DS 6 - Minimum flow rate

Minimum flow rate is a limit value in 0.01% of nominal flow rate. Entry of the number 800, for example, corresponds to 8.00%. If this value is exceeded, the SIWAREX FTC sets the status bit "> min. flow rate."

11.7.7 DS 6 - Maximum flow rate

Maximum flow rate is a limit value in 0.01% of nominal flow rate. Entry of the number 10020, for example, corresponds to 100.20%. If this value is exceeded, the SIWAREX FTC sets the status bit "> max. flow rate."

11.7.8 DS 6 - Time definition for flow rate stability

Flow rate is monitored by means of a stability window. The weighing process (filtered using the filters from DS 3) is checked for maximum deviation during the time specified for flow rate stability. If the maximum deviation occurs in the weighing process, the status bit "flow rate stable" is reset and the time is restarted.

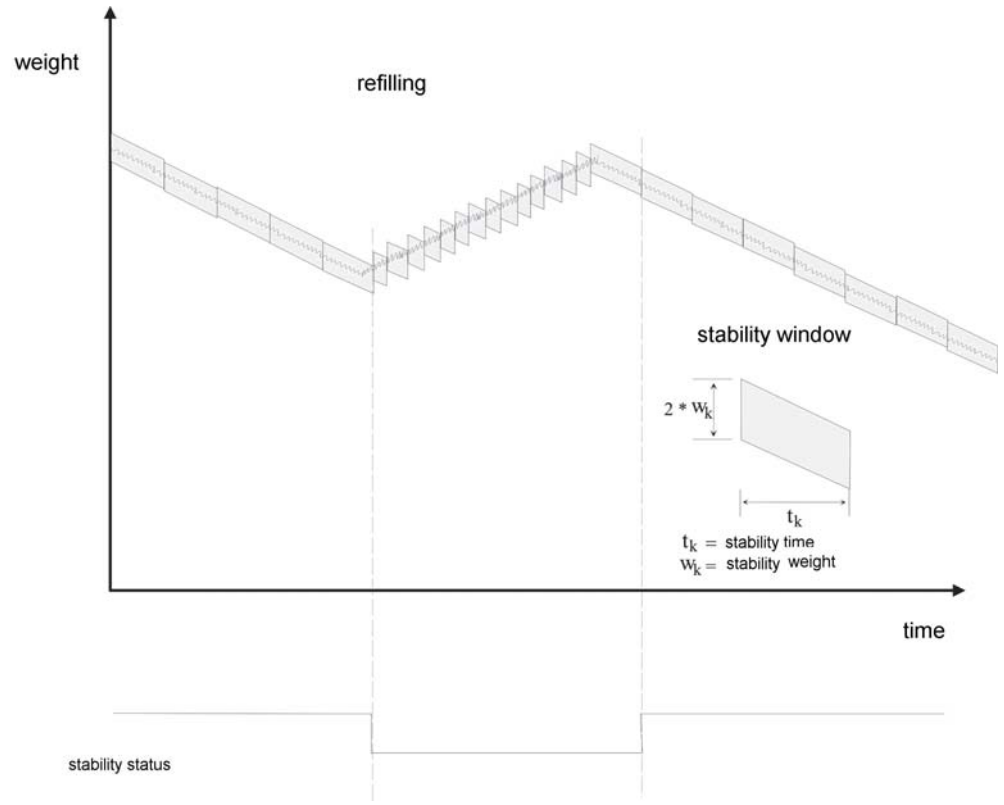


Figure 11-6 Function of stability monitoring for flow rate (refilling)

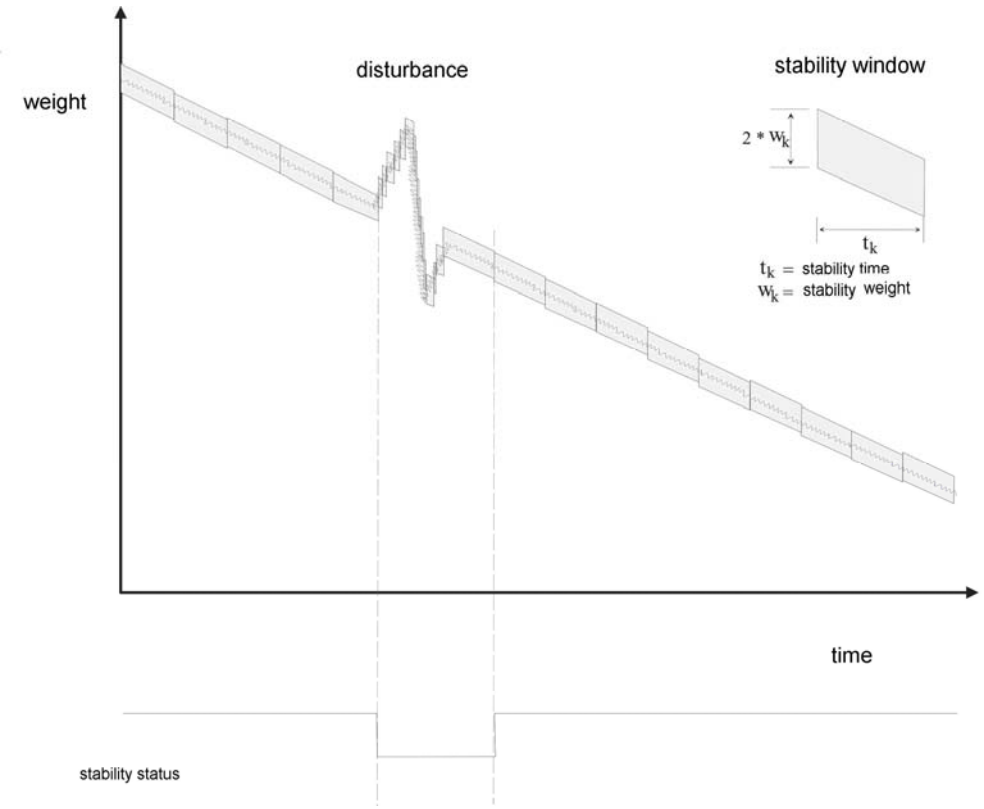


Figure 11-7 Function of stability monitoring for flow rate (fault)

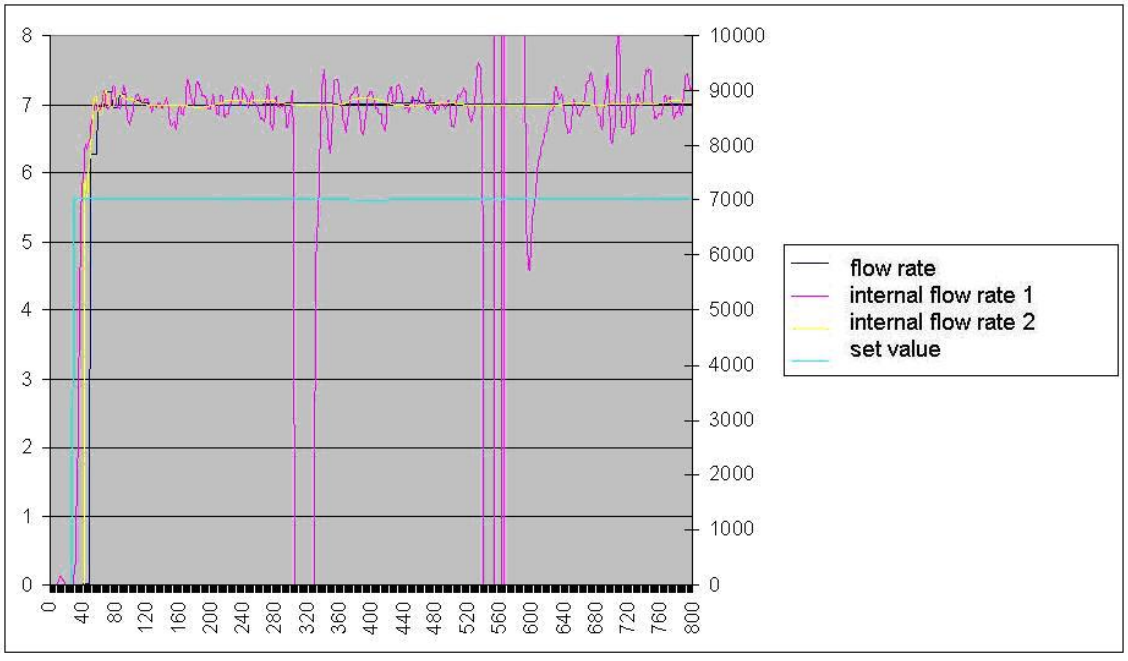


Figure 11-8 Effect of stability monitoring in the event of a fault

11.7.9 DS 6 - Start refilling

If the limit value is undercut (in 0.01% of the nominal fill quantity), the refilling process is started in automatic operation. During refilling, the scale continues to work in volumetric mode.

11.7.10 DS 6 - End refilling

If the limit value is exceeded (in 0.01% of the nominal fill quantity), the refilling process is ended in automatic operation. When the settling time has elapsed, the scale switches to gravimetric operation.

11.7.11 DS 6 - Settling time refilling

After switching the refilling off, the settling time is started. After this time has elapsed, the switch from volumetric mode to gravimetric mode is made.

11.7.12 DS 6 - Refill time

Refilling can also be controlled by time. If the defined time = 0, refilling is performed after the defined weight limit values for refilling. If the definition is > 0 (ms), refilling is performed for the defined time. The refilling time must not be longer than the filling monitoring time minus settling time.

11.7.13 DS 6 - Filling monitoring time

Refilling can be monitored for a defined time. If the defined time = 0, then there is no monitoring. If the definition is > 0 (ms), the time is started when filling begins. If the filling (including settling time) has not ended when the defined time has elapsed, a technology message is generated. Filling is continued or stopped, depending on the filling parameters. Dosing is continued or stopped, depending on the filling parameters.

11.7.14 DS 6 - Inhibition time

The inhibition time (ms) is used to suppress the message caused by the measuring range being exceeded. The message is suppressed for the duration of the inhibition time. During the inhibition time, volumetric mode is switched to automatically.

11.7.15 DS 6 - Measurement time for dosing consistency

To evaluate the dosing consistency, a measurement interval must be selected. See also *11.27.*

11.7.16 DS 6 - Number of measurements for dosing consistency

The dosing consistency determined for the defined time is calculated as an average value of the n measuring periods for the calculation and output of dosing consistency.

11.7.17 DS 6 - Filling parameters

The user can use the filling parameters to activate certain functions in conjunction with the filling of the container.

Bit 0: After expiry of the monitoring time for filling

0: Do not end filling

1: End filling

Bit 1: After expiry of the monitoring time for filling

0: Do not end dosing

1: End dosing

Bit 2: Output value during filling

0: According to material characteristic curve

1: Retain current output value

Bit 3: During filling

0: Display setpoint

1: Freeze current flow rate

Bits 4-7 not used

11.7.18 DS 6 - Filter level for flow rate display

The internal flow rate value is filtered with the F2 filter for PID control. In addition, it can be useful to filter the flow rate value for the display as well in order to improve the read-out.

Level 0.0 (0) indicates no additional filtering

Level 1.0 (1) indicates weak additional filtering

.....

Level 0.05 (9) indicates strong additional filtering

11.7.19 DS 6 - Numeral step for totals 1-4

Distribution memory locations 1-4 are run with the weight unit indicated in data record 3. The user can use the numeral step to define the smallest step for creating totals;

e.g. weight unit 1 kg, numeral step for creating the total is 5 kg.

11.7.20 DS 6 - Numeral step for totals 4 - 5

Distribution memory locations 4-8 are run with the large weight unit indicated in data record 3. The user can use the numeral step to define the smallest step for creating totals;

e.g. weight unit 1 kg, numeral step for totalizing is 1 t.

11.7.21 DS 6 - Stability weight for flow rate

Flow rate is monitored by means of a stability window (see also *11.7.8*). The weighing process is checked for maximum deviation during the time specified for flow rate stability. If the maximum deviation occurs in the weighing process, the status bit "flow rate stable" is reset and the time is restarted.

11.8 DS 7 Interfaces

The parameters that define the behavior of the SIWAREX FTC on the interfaces are defined in DS 7. If an interface is not used the default values can be left alone.

- Change parameter if required.
- Send the DS 7 to the scale

Name	Model	Address	Default SIWATOOL FTC_L	Range of values/Meaning	Reference
S7 interface		0			
Reserve	BYTE	DBB000	0		
Source for weight simulation	BYTE	DBB001	0	0: Weight simulation inactive 1: Weight simulation value from SIMATIC 2: Weight simulation value from RS232 Other definitions are not permitted.	*11.8.1*
Decade used for rounding the decimal places of the process values (REAL weight values)	BYTE	DBB002	3	0: rounding to 0 decimal places 1: rounding to 1 decimal place 2: rounding to 2 decimal places 3: rounding to 3 decimal places 4: rounding to 4 decimal places 5: rounding to 5 decimal places 6: rounding to 6 decimal places	*11.8.2*
Reserve	BYTE	DBB003	0	Reserve	
Force in service operation	BYTE	DBB004	0	Bit 0: 0: Outputs in service operation Forced control not possible 1: Outputs in service operation Forced control possible Bits 1 - 7 not used	*11.8.3*
Process value 1 for fast output to the SIMATIC CPU	BYTE	DBB005	41	Various process values are available for selection after listing.	*11.8.4*
Process value 2 for fast output to the SIMATIC CPU	BYTE	DBB006	30	Various process values are available for selection after listing.	*11.8.5*
Reserve 2	BYTE	DBB007	0	Reserve 2	
S7 alarms					

Name	Model	Address	Default SIWATOOL FTC_L	Range of values/Meaning	Reference
Definition of process alarm 0	WORD	DBW008	0	Value 0 - No process alarm generation Value range 1 - 0FFh Number of the technology error Value range 100h - 13Fh 100h+ 0...1Fh bit no. NAWI status bit coming 100h+ 20h...3Fh bit no. Conti status flag coming Value range 200h - 23Fh 200h+ 0...1Fh bit no. NAWI status bit going 200h+ 20h...3Fh bit no. Conti status bit going	*11.8.6*
Definition of process alarm 1	WORD	DBW010	0	Value 0 - No process alarm generation Value range 1 - 0FFh Number of the technology error Value range 100h - 13Fh 100h+ 0...1Fh bit no. NAWI status bit coming 100h+ 20h...3Fh bit no. Conti status bit coming Value range 200h - 23Fh 200h+ 0...1Fh bit no. NAWI status bit going 200h+ 20h...3Fh bit no. Conti status bit going	*11.8.6*
Definition of process alarm 2	WORD	DBW012	0	Value 0 - No process alarm generation Value range 1 - 0FFh Number of the technology error Value range 100h - 13Fh 100h+ 0...1Fh bit no. NAWI status bit coming 100h+ 20h...3Fh bit no. Conti status bit coming Value range 200h - 23Fh 200h+ 0...1Fh bit no. NAWI status bit going 200h+ 20h...3Fh bit no. Conti status bit going	*11.8.6*
Definition of process alarm 3	WORD	DBW014	0	Value 0 - No process alarm generation Value range 1 - 0FFh Number of the technology error Value range 100h - 13Fh 100h+ 0...1Fh bit no. NAWI status bit coming 100h+ 20h...3Fh bit no. Conti status bit coming Value range 200h - 23Fh 200h+ 0...1Fh bit no. NAWI status bit going 200h+ 20h...3Fh bit no. Conti status bit going	*11.8.6*
Definition of process alarm 4	WORD	DBW016	0	Value 0 - No process alarm generation Value range 1 - 0FFh Number of the technology error Value range 100h - 13Fh 100h+ 0...1Fh bit no. NAWI status bit coming 100h+ 20h...3Fh bit no. Conti status bit coming Value range 200h - 23Fh 200h+ 0...1Fh bit no. NAWI status bit going 200h+ 20h...3Fh bit no. Conti status bit going	*11.8.6*

Name	Model	Address	Default SIWATOOL FTC_L	Range of values/Meaning	Reference
Definition of process alarm 5	WORD	DBW018	0	Value 0 - No process alarm generation Value range 1 - 0FFh Number of the technology error Value range 100h - 13Fh 100h+ 0...1Fh bit no. NAWI status bit coming 100h+ 20h...3Fh bit no. Conti status bit coming Value range 200h - 23Fh 200h+ 0...1Fh bit no. NAWI status bit going 200h+ 20h...3Fh bit no. Conti status bit going	*11.8.6*
Definition of process alarm 6	WORD	DBW020	0	Value 0 - No process alarm generation Value range 1 - 0FFh Number of the technology error Value range 100h - 13Fh 100h+ 0...1Fh bit no. NAWI status bit coming 100h+ 20h...3Fh bit no. Conti status bit coming Value range 200h - 23Fh 200h+ 0...1Fh bit no. NAWI status bit going 200h+ 20h...3Fh bit no. Conti status bit going	*11.8.6*
Definition of process alarm 7	WORD	DBW022	0	Value 0 - No process alarm generation Value range 1 - 0FFh Number of the technology error Value range 100h - 13Fh 100h+ 0...1Fh bit no. NAWI status bit coming 100h+ 20h...3Fh bit no. Conti status bit coming Value range 200h - 23Fh 200h+ 0...1Fh bit no. NAWI status bit going 200h+ 20h...3Fh bit no. Conti status bit going	*11.8.6*
S7 FB Life bit monitoring time	TIME	DBD024	0	0 = S7 Life bit monitoring switched off 1 to n = Monitoring time [ms]	*11.8.7*
Analog output		0			
Process value for zero point (0 or 4 mA)	REAL	DBD028	0	Value at which 0 or 4 mA is output	*11.8.8*
Process value for end value (20 mA)	REAL	DBD032	20	Value at which 20 mA is output	*11.8.9*
Replacement value for analog output at OD	REAL	DBD036	0	Replacement value which is output with an active OD signal if the parameters are defined respectively	*11.8.10*
Source for analog output	BYTE	DBB040	7	0 = Control signals SIMATIC 1 = Ext. default value through DS 17 2 = Gross 3 = Net 4 = Conveyor speed 5 = Flow rate 1 6 = Conveyor load Other definitions not permitted 7 = Output value PID controller	*11.8.11*
Current range for analog output	BYTE	DBB041	0	Bit 0: 0: 0 .. 20mA 1: 4 .. 20mA Bits 1-7 unused	*11.8.12*

Name	Model	Address	Default SIWATOOL FTC_L	Range of values/Meaning	Reference
RS232		0			
RS232 printer baud rate	BYTE	DBB042	3	0 = 1200 bits/sec 1 = 2400 bits/sec 2 = 4800 bits/sec 3 = 9600 bits/sec Other definitions are not permitted.	*11.8.13*
RS232- XON/XOFF for printer RS232- RTS/CTS for printer	BYTE	DBB043	1 0 0	Bit 0: 0: XON/XOFF transmission control OFF 1: XON/XOFF transmission control ON Bit 1: 0: CTS/RTS transmission control OFF 1: CTS/RTS transmission control ON Bit 2: reserved, must always be 0 Bits 3-7 unused	*11.8.14*
RS485		0			
Protocol selection	BYTE	DBB044	0	0: No protocol 1: SIEBERT protocol S11 2: ASCII protocol 3: SIEBERT protocol S102 (6-position)	*11.8.15*
Decimal place for the remote display	BYTE	DBB045	0	0 to 4 Other definitions are not permitted.	*11.8.16*
RS485 baud rate	BYTE	DBB046	3	0 = 1200 bits/sec 1 = 2400 bits/sec 2 = 4800 bits/sec 3 = 9600 bits/sec 4 = 19200 bits/sec Other definitions are not permitted.	*11.8.17*
RS485 character parity RS485 data bits RS485 stop bits	BYTE	DBB047	0 1 0	Bit 0: 0: even 1: odd Bit 1: 0: 7 data bits 1: 8 data bits Bit 2: 0: 1 stop bit 1: 2 stop bits Bits 3-7 not used	*11.8.18*
Digital outputs		0			
Definition of digital output 1	BYTE	DBB048	0FFh	0...1Fh bit no. basis/NAWI status flag 20h...3Fh bit no. SWX status flag or Conti Status at SIWAREX FTC FDh Start MW transmission digital LC FEh Stop MW transmission digital LC FFh Output always inactive *Range of values 40h - FCh not permitted*	*11.8.19*
Definition of digital output 2	BYTE	DBB049	0FFh	0...1Fh bit no. basis/NAWI status flag 20h...3Fh bit no. SWX status flag or Conti Status at SIWAREX FTC FDh Start MW transmission digital LC FEh Stop MW transmission digital LC FFh Output always inactive *Range of values 40h - FCh not permitted*	*11.8.19*

Name	Model	Address	Default SIWATOOL FTC_L	Range of values/Meaning	Reference
Definition of digital output 3	BYTE	DBB050	0FFh	0...1Fh bit no. basis/NAWI status flag 20h...3Fh bit no. SWX status flag or Conti Status at SIWAREX FTC FDh Start MW transmission digital LC FEh Stop MW transmission digital LC FFh Output always inactive *Range of values 40h - FCh not permitted*	*11.8.19*
Definition of digital output 4	BYTE	DBB051	0FFh	0...1Fh bit no. basis/NAWI status flag 20h...3Fh bit no. SWX status flag or Conti Status at SIWAREX FTC FDh Start MW transmission digital LC FEh Stop MW transmission digital LC FFh Output always inactive *Range of values 40h - FCh not permitted*	*11.8.19*
Definition of digital output 5	BYTE	DBB052	0FFh	0...1Fh bit no. basis/NAWI status flag 20h...3Fh bit no. SWX status flag or Conti Status at SIWAREX FTC FDh Start MW transmission digital LC FEh Stop MW transmission digital LC FFh Output always inactive *Range of values 40h - FCh not permitted*	*11.8.19*
Definition of digital output 6	BYTE	DBB053	0FFh	0...1Fh bit no. basis/NAWI status flag 20h...3Fh bit no. SWX status flag or Conti Status at SIWAREX FTC FDh Start MW transmission digital LC FEh Stop MW transmission digital LC FFh Output always inactive *Range of values 40h - FCh not permitted*	*11.8.19*
Definition of digital output 7	BYTE	DBB054	0FFh	0...1Fh bit no. basis/NAWI status flag 20h...3Fh bit no. SWX status flag or Conti Status at SIWAREX FTC FDh Start MW transmission digital LC FEh Stop MW transmission digital LC FFh Output always inactive *Range of values 40h - FCh not permitted*	*11.8.19*
Definition of digital output 8	BYTE	DBB055	0FFh	0...1Fh bit no. basis/NAWI status flag 20h...3Fh bit no. SWX status flag or Conti Status at SIWAREX FTC FDh Start MW transmission digital LC FEh Stop MW transmission digital LC FFh Output always inactive *Range of values 40h - FCh not permitted*	*11.8.19*
Level definition for digital outputs 1 - 8	BYTE	DBB056	0	Bit 0: DO1 -> 0 = high active: 1 = low active .... Bit 7: DO8 -> 0 = high active: 1 = low active	*11.8.20*
Replacement values for digital outputs 1 - 8 upon fault or OD signal	BYTE	DBB057	0	Bit 0: Replacement value digital output 1 .... Bit 7: Replacement value digital output 8	*11.8.21*
Replacement values for digital outputs upon operating error	BYTE	DBB058	0	Bit 0: 0: Replacement value output upon operating error deactivated 1: Replacement value output upon operating error activated Bits 1 - 7 not used	*11.8.22*
Reserve 3	BYTE	DBB059	0	Reserve 3	
Digital inputs		0			
Definition of digital input 1	BYTE	DBB060	0	0 = No command 1- 254 = Command code	*11.8.23*
Definition of digital input 2	BYTE	DBB061	0	0 = No command 1- 254 = Command code	*11.8.23*

Name	Model	Address	Default SIWATOOL FTC_L	Range of values/Meaning	Reference
Definition of digital input 3	BYTE	DBB062	0	0 = No command 1- 254 = Command code	*11.8.23*
Definition of digital input 4	BYTE	DBB063	0	0 = No command 1- 254 = Command code	*11.8.23*
Definition of digital input 5	BYTE	DBB064	0	0 = No command 1- 254 = Command code	*11.8.23*
Definition of digital input 6	BYTE	DBB065	0	0 = No command 1- 254 = Command code	*11.8.23*
Definition of digital input 7	BYTE	DBB066	0	0 = No command 1- 254 = Command code	*11.8.23*
Level definition for digital inputs 1-7	BYTE	DBB067	0	Bit 0: Digital input 1 -> 0 = high active: 1 = low active .... Bit 6: Digital input 7 -> 0 = high active: 1 = low active Bit 7: Not used	*11.8.24*
Reserve	TIME	DBD068	0	Reserve	
Reserve 4	DWORD	DBB072	0	Reserve 4	
MMC parameter		0			
Log overflow	BYTE	DBB076	1	Bit 0: 0: With full memory, the logging procedure is stopped 1: With full memory, the oldest entries are overwritten	*11.8.25*
Trace overflow			1	Bit 1: 0: No overwriting of trace data is possible 1: The oldest trace data is overwritten with full card	
Memory for trace			0	Bit 2: 0: Trace data is stored in RAM 1: Trace data is stored in the MMC Bits 3-7 not used	
Memory segment for trace function	BYTE	DBB077	50	Up to 100%, but the total for trace function and logs must not exceed 100%.	*11.8.26*
Memory segment for logs	BYTE	DBB078	50	Up to 100%, but the total for trace function and logs must not exceed 100%.	*11.8.27*
Trace function Recording cycle	BYTE	DBB079	1	1 - n x 10 ms	*11.8.28*
		80			

Table 11-6 Allocation of DS 7

11.8.1 DS 7 - Source for weight simulation

Instead of actual weight determination, weight simulation can be activated for test purposes. The simulated weight value can be defined through the SIMATIC interface or the RS232 interface (SIWATOOL FTC). Weight simulation makes commissioning of the scale much easier in certain situations.

11.8.2 DS 7 - Decade for rounding decimal places of process values

This parameter can be used to specify to how many decimal places the (weight) process values should be rounded. This entry decouples the display of weight values that are subject to calibration restrictions from the values that are used in the control software.

11.8.3 DS 7 - Force in service operation

After activating this function, the digital outputs can be compulsorily controlled - regardless of the parameterization of their function. Compulsory control is only possible in service operation - and only with the SIMATIC interface.



Warning notice

Before using this function, you must ensure that the system will not reach any hazardous statuses caused by compulsory control of the digital outputs of the SIWAREX FTC.

11.8.4 DS 7 - Process value 1 for fast output to SIMATIC CPU

The current process values can be read out as data packages (data records) to the SIMATIC CPU using function block FB43. Transferring a large data record can last for several SIMATIC CPU cycles and puts a load on system performance.

If a process value is to be transferred very quickly to the SIMATIC CPU immediately after it is generated in the SIWAREX FTC, then the peripheral interface of the SIWAREX FTC exists for the purpose. The data is read by the FB43 cyclically and provided for the user as an output variable.
The current conveyor load (selection code 45) is normally of some importance in the conveyor scale operating mode. Selection is made from the list, see: *Table 11-29Process values for allocating log fields.*

11.8.5 DS 7 - Process value 2 for fast output to the SIMATIC CPU

Process value 2 can be defined in exactly the same way as process value 1 (see above). The current Conti status (selection code 30) is normally of interest in the loss-in-weight scale operating mode.

11.8.6 DS 7 - Definition of process alarm 0, 1, 2, 3, 4, 5, 6, 7

The process alarms can be defined with this parameter. The module can generate process alarms in the SIMATIC CPU. The control program can therefore react immediately to an event. Defining a process alarm is explained with the example of process alarm 0. The explanation also applies to process alarms 1 to 7.

If parameter value 0 is defined for process alarm 0 then no process alarms are generated.

By entering a value other than zero, a process alarm is allocated according to the following procedures:

Value range 1 to 255

Number of the technology message. If the defined technology error occurs then process alarm 0 is generated.

Value range 256 to 319

Number of the bit from the NAWI or Conti status (see DS 30). If the defined status occurs then process alarm 0 is generated.

256+ 0...31 bit no. NAWI status bit coming

288+ 0...31 bit no. Conti status bit coming

Value range 512 to 575

Number of the bit from the NAWI or Conti status (see DS 30). If the defined status goes then process alarm 0 is generated.

512+ 0...31 bit no. NAWI status bit going

544+ 0...31 bit no. Conti status bit going

11.8.7 DS 7 - S7 FB Life bit monitoring time

The SIWAREX FTC can determine whether the FB is maintaining communication with the SIMATIC CPU by monitoring the life bit. If the FB does not respond, an operating error is output after the defined time has elapsed. Monitoring is active in RUN status of the SIMATIC CPU.

11.8.8 DS 7 - Input value for zero point (0 or 4 mA)

When defining the parameters for the range for the analog output, a process value (output value of the PID controller = 0.00) can be defined for the range start.

11.8.9 DS 7 - Input value for the end value (20 mA)

When defining the parameters for the range for the analog output, a process value (output value of the PID controller = 100.00) can be defined for the range end.

11.8.10 DS 7 - Replacement value for analog output with OD

A process value can be defined for the analog output, for which a corresponding signal is output if the OD (Output Disable) signal exists.

Normally this corresponds to the SIMATIC CPU status STOP.

11.8.11 DS 7 - Source for analog output

The source for the analog output can be defined with this parameter. The weight values from the parameterized source are output as current signals corresponding to the parameter definitions for start and end ranges.

The following sources are available:

0 - Control value from the SIMATIC (FB)

1 - Default value from the DS 17

2 - Gross weight

3 - Net weight

4 - Conveyor speed

5 - Flow rate 1

6 - Conveyor load

7 - Output value from PID controller

11.8.12 DS 7 - Current range for analog output

The analog output can be operated with a current range 0...20 mA or 4...20 mA.

11.8.13 DS 7 - RS232 Printer baud rate

If a printer is connected to the RS232 interface, the following baud rates can be defined.

1200 bits/sec

2400 bits/sec

4800 bits/sec

9600 bits/sec

11.8.14 DS 7 - RS232 transmission control for printer

The transfer control parameters for the RS232 interfaces can be defined as follows:

XON/XOFF (for print protocol only)

0: XON/XOFF transmission control OFF

1: XON/XOFF transmission control ON

RTS/CTS (for print protocol only)

0: CTS/RTS transmission control OFF

1: CTS/RTS transmission control ON

11.8.15 DS 7 - Protocol selection for RS485

The following protocols can be set for the RS 485 interface:
- 0: No protocol
  1: SIEBERT protocol S11
  2: ASCII protocol
  3: SIEBERT protocol S102 (6-position)

11.8.16 DS 7 - Decimal place for remote display

If a display from the Siebert company is connected to the RS 485 interface, the decimal place for the display of non-verifiable process values can be defined.

11.8.17 DS 7 - RS 485 baud rate

The following protocols can be set for the RS 485 interface:

0 = 1200 bits/sec

1 = 2400 bits/sec

2 = 4800 bits/sec

3 = 9600 bits/sec

4 = 19200 bits/sec

11.8.18 DS 7 - RS485 character frame

Parity:

0: even

1: odd

Number of data bits

0: 7 data bits

1: 8 data bits

Number of stop bits:

0: 1 stop bit

1: 2 stop bits

11.8.19 DS 7 - Definition of digital outputs 1, 2, 3, 4, 5, 6, 7, 8

The meaning of the digital outputs can be determined with this parameter. Assigning a bit from the pool of status bits for the scale causes the output to be active (active can be signal level 0 or 1 - see below) if the bit is set.

When assigning a number between 0 and 63, the digital output is assigned to a status bit of the scale, and when assigning a number > 63 the output remains inactive.

0...31	bit no. NAWI status flag
31 + 0...31	bit no. Conti status flag
253	Start MW transmission digital LC
254	Stop MW transmission digital LC
255	Output always inactive

Other values not allowed

11.8.20 DS 7 - Level definition for digital outputs 1 to 8

After assigning the importance of the digital outputs to a status bit, the signal that the output should have when it is activated can be determined,

e.g. digital output 1 (DO1) is determined with bit 0:

if bit 0 is 0 then DO1 is high active and if bit 0 is 1 then DO1 is low active,

if bit 1 is 0 then DO2 is high active and if bit 1 is 1 then DO2 is low active

etc.

11.8.21 DS 7 - Replacement values for DO 1 to 8 upon fault or Output Disable

Normally, the outputs are reset with a SIMATIC CPU STOP. This behavior corresponds to the default setting.

If it makes sense to set an output with a SIMATIC CPU STOP, you can define it with this parameter,

e.g. digital output 1 (DO1) is determined with bit 0:

if bit 0 is 0 then DO1 is also 0 with OD signal,

if bit 0 is 1 then DO1 is 1 with OD signal,

the digital output 1 (DO2) is determined with bit 1:

if bit 1 is 0 then DO2 is also 0 with OD signal,

if bit 1 is 1 then DO2 is 1 with OD signal

etc.



Warning notice

If an output is to be set with the SIMATIC CPU STOP then you must ensure that it does not lead to a hazardous situation.

11.8.22 DS 7 - Replacement values for digital outputs upon operating error

Normally, the outputs are reset when there is a module fault (operating error). This behavior corresponds to the default setting.

If it makes sense to set an output with a fault, you can define it with this parameter,

e.g. digital output 1 (DO1) is determined with bit 0:

if bit 0 is 0 then DO1 is also 0 with fault,

if bit 0 is 1 then DO1 is 1 with fault.

Digital output 1 (DO2) is determined with bit 1:

if bit 1 is 0 then DO2 is also 0 with fault,

if bit 1 is 1 then DO2 is 1 with fault

etc.

Warning

If an output is to be set with the fault (operating error), you must ensure that it does not lead to a hazardous situation.

11.8.23 DS 7 - Definition of digital inputs 1, 2, 3, 4, 5, 6, 7

The meaning of the digital inputs can be defined with this parameter. This can happen by allocating an instruction.

Commands:

If the signal 1 appears at the defined input then the assigned command is executed. To allocate an instruction to an input, its instruction number (1 to 255) must be entered (see Command list). By entering 0, no meaning is assigned to the input.

11.8.24 DS 7 - Level definition for digital inputs 1 to 7

After assigning the meaning of digital inputs to a command or a step-on condition, you can define which signal should be interpreted as active on the input.

e.g. digital input 1 (DI1) is determined with bit 0:

if bit 0 is 0 then DI1 is high active and if bit 0 is 1 then DI1 is low active,

if bit 1 is 0 then DI2 is high active and if bit 1 is 1 then DI2 is low active

etc.

11.8.25 DS 7 - MMC log overflow, MMC trace overflow, target memory for trace function

Bit 0 is used to define how the logging should be performed in the verifiable MMC memory when the memory is full:

0: with full memory, the logging procedure is stopped

1: with full memory, the oldest entries are overwritten.

Bit 1 is used to define how the logging of trace data should continue if memory is full.

0: No overwriting of trace data is possible with full MMC memory

1: The oldest trace data is overwritten when MMC memory is full

The trace function is described in *11.8.28*

Bit 2 defines which memory is to be used for recording the trace data.

0: Trace data is stored in RAM

1: Trace data is stored in the MMC

The trace function is described in *11.8.28*

11.8.26 DS 7 - Memory segment for trace function

The MMC memory can be used for recording the trace data and for recording the verifiable weighing logs.

The percentage of MMC memory that is available for the trace function is defined with this parameter.

Up to 100% is permitted in this definition but the total for trace function and verifiable logs must not exceed 100%.

The trace function is described in *11.8.28*

11.8.27 DS 7 - Memory segment for logs

The MMC memory can be used for recording the trace data and for recording the verifiable weighing logs.

The percentage of MMC memory that is to be available for the verifiable logs is defined with this parameter.

Up to 100% is permitted in this definition but the total for trace function and verifiable logs must not exceed 100%.

The trace function is described in *11.8.28*

11.8.28 DS 7 - Trace function recording cycle

Every n-th measurement (n x 10 ms) is recorded. When recording to RAM, n can be ≥ 1, and when recording to MMC n can be ≥ 5.

The recording can be started with the "Start Recording" 70 command and stopped with "End recording" 71 command.

A recording element has a length of 64 bytes and contains several measurement values and status bits (*see Table 11-34 Composition of a recording element*).

The values that are recorded can be read with the help of SIWATOOL FTC and then exported to MS Excel.

If the trace function is defined as recording to circulating storage, then it can be used to construct a status recorder. The command for starting the recording can come from the SIMATIC control program and the command for stopping can also come from the control program, e.g. if you want to record and save the history of an event.

11.9 DS 8 Date/time

SIWAREX FTC has its own hardware clock. The current date and time can be read through DS 8. The date and time can be set on the module using this data record if required.

Procedure:

- Setting the date and time.
- Send the DS 8 to the scale

Name	Model	Address	Default	Range of values/Meaning	Reference
Date/Time					
Date/Time	DATE_AND_TIME, DT	DBD000	01.01.01 00:00:00 000 Mo	Date&Time in SIMATIC format	
		4			

Table 11-7 Allocation of DS 8

11.10 DS 9 info on module

No entries can be made in DS 9. The data record uses the information on the inner life of the module.

Name	Model	Address	Default	Range of values/Meaning	Reference
Info about the module					
CRC checksum	DWORD	DBW000	0	-	
Length of firmware in bytes	DWORD	DBW004	0	-	
Product info	STRING [26]	DBB008	0	Siemens AG serial number of the module	
Module name	STRING [10]	DBB036	SIWAREX XX		
Application	STRING [4][8]	DBB048	"CONT"	Application identification	
			"NAWI"		
			"xxxx"		
			"xxxx"		
			"xxxx"		
			"xxxx"		
			"xxxx"		
			"xxxx"		
File name	STRING [20]	DBB082	0		

Name	Model	Address	Default	Range of values/Meaning	Reference
Version recognition	BYTE [4]	DBB104	0	Byte 0 (ASCII) Before delivery approval B = Laboratory status P = Pilot R = Release S = Special status After delivery approval V = Customer version K = Correction status	
Function status				Byte 1 function status xx (important function changes or technology changes for calibration 0...99)	
Data structure version				Byte 2 version DS structure yy (indicates changes to the data record structure) 0...99	
Correction status				Byte 3 correction status zz (minor changes or error clean-up) 0...99	
Creation date	STRING [10]	DBB108	0		
Creation time	STRING [8]	DBB120	0		
Boot loader version	WORD	DBW130	0		
Scale type	STRING [4]	DBB132	"CONT" or "NAWI"		
Reserve	WORD	DBW138	0	Reserve	
		140			

Table 11-8 Allocation of DS 9

11.10.1 DS 9 - Info on module

The information on the SIWAREX FTC module is used for the purpose of identifying the module in the manufacturer's plant (e.g. for repairs). This information has no influence on user operation.

11.11 DS 10 Loss-in-weight scale II

In DS 10, the parameters are defined for filtering and monitoring the flow rate value.

- Change the parameter if necessary.
- Send DS 10 to the scale

Name	Model	Address	Default	Range of values/Meaning	Reference
Limit frequency for internal filter F1	BYTE	DBB000	6	Limit frequency for internal flow rate filter F1 0: No filter 1: fg = 20Hz 2: fg = 10Hz 3: fg = 5Hz 4: fg = 2Hz 5: fg = 1Hz 6: fg = 0.5Hz 7: fg = 0.2Hz 8: fg = 0.1Hz	*11.11.1*

Name	Model	Address	Default	Range of values/Meaning	Reference
				9: fg = 0.05Hz	
Filter type of internal filter F1	BYTE	DBB001	0	0: Critically damped 1: Bessel filter 2: Butterworth filter Other definitions are not permitted.	*11.11.2*
Limit frequency for internal filter F2	BYTE	DBW002	19	0: No filter 1: fg = 20Hz 2: fg = 10Hz 3: fg = 5Hz 4: fg = 2Hz 5: fg = 1Hz 6: fg = 0.9 Hz 7: fg = 0.8 Hz 8: fg = 0.7 Hz 9: fg = 0.6 Hz 10: fg = 0.5 Hz 11: fg = 0.4 Hz 12: fg = 0.3 Hz 13: fg = 0.2 Hz 14: fg = 0.1 Hz 15: fg = 0.09 Hz 16: fg = 0.08 Hz 17: fg = 0.07 Hz 18: fg = 0.06 Hz 19: fg = 0.05 Hz 20: fg = 0.04 Hz 21: fg = 0.03 Hz 22: fg = 0.02 Hz 23: fg = 0.01 Hz	*11.11.3*
Filter type of internal filter F2	BYTE	DBB003	0	0: Critically damped 1: Bessel filter 2: Butterworth filter Other definitions are not permitted.	*11.11.4*
Reserve	INT	DBW004	0	Reserve	
Reserve	INT	DBW006	0	Reserve	
Flow rate min. in 0.01% in relation to setpoint	INT	DBW008	9500	0: No monitoring > 0 minimum flow rate in % of setpoint If the value is undercut, a status message is output (Conti status flags). Also effective in non-controlled operation, the setpoint from DS 20 creates a criterion.	*11.11.5*
Flow rate max. in 0.01% in relation to setpoint	INT	DBW010	10,500	0: No monitoring > 100: Maximum flow rate in 0.01% of the setpoint If the value is exceeded, a status message is output (Conti status flags). Also effective in non-controlled operation, the setpoint from DS 20 creates a criterion.	*11.11.6*
Limit value for max. flow rate change	INT	DBW012	0	Limit value for monitoring the maximum change in flow rate in 0.01% of the nominal flow rate per second 0: Monitoring switched off	*11.11.7*
Switch-off	BYTE	DBB014	0	Bit 0: Switch off dosing after toleration time for fault 0: Do not switch off 1: Switch off dosing Bit 1: Switch off dosing after expiry of volumetric minimum time 0: Do not switch off 1: Switch off dosing Bits 3 - 7 not used	*11.11.8*
Reserve	BYTE	DBB014	0	Reserve	

Name	Model	Address	Default	Range of values/Meaning	Reference
Min. vol. time	TIME	DBD016	5000	Minimum time for volumetric operation after automatic switch to volumetric operation because of flow rate faults 0: No minimum time >100: Minimum time (ms)	*11.11.9*
Toleration time for fault	TIME	DBD020	7500	Maximum time for suppression of faults in flow rate	*11.11.10*

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Table 11-9 Allocation of DS 10

11.11.1 DS 10 - Internal flow rate filter F1 limit frequency

Specification of the limit frequency has a decisive meaning for the suppression of interference. The "speed" of the flow rate calculation reaction to the change in the measured value is determined by specifying the limit frequency.

A value of 2 Hz, for example, produces a relatively quick reaction of the scale to a weight change, while a value of 0.5 Hz makes the scale "sluggish."

11.11.2 DS 10 - Type of internal flow rate filter F1

For suppression of interference to the weight display, three types of filter have been provided for selection (critically damped, Bessel filter, Butterworth filter). The selection is performed empirically. In the loss-in-weight scale application, the critically damped filter is used by preference.

11.11.3 DS 10 - Internal flow rate filter F2 - limit frequency

Specification of the limit frequency has a decisive meaning for the suppression of interference. The control difference is formed after filtering with this filter. In general, the limit frequency of the internal filter F2 should lie one decade lower than the limit frequency of internal filter F1, e.g. if F1= 0.5 Hz then F2 should be set to 0.05.

11.11.4 DS 10 - Type of internal flow rate filter F2

For suppression of interference to the weight display, three types of filter have been provided for selection (critically damped, Bessel filter, Butterworth filter). The selection is performed empirically. In the loss-in-weight scale application, the critically damped filter is used by preference.

11.11.5 DS 10 - Flow rate min.

The definition determines the lower tolerance band for the flow rate value in relation to the setpoint. Undercutting the value can be used (see DS 12 - PID parameters) for switching to volumetric operation. The definition is done in 0.01%.

11.11.6 DS 10 - Flow rate max.

The definition determines the upper tolerance band for the flow rate value in relation to the setpoint. Exceeding the value can be used (see also DS12 - PID parameters) for switching to volumetric operation. The definition is done in 0.01%.

11.11.7 DS 10 - Max. flow rate change

The definition determines a limit value for the maximum change to flow rate. The definition is done in 0.01% of the nominal flow rate per second. Exceeding the value can be used (see also DS 12 - PID parameters) for switching to volumetric operation.

11.11.8 DS 10 - Fault-based switch-off

Numerous functions that work for a limited period of time are available for bypassing short-term faults. These parameters can be used to specify whether the dosing should be continued after expiry of the prescribed time for a specific bypass strategy. The following settings are possible

Bit 0: Switch off dosing after toleration time for fault

0: Do not switch off dosing

1: Switch off dosing

Bit 1: Switch off dosing after expiry of volumetric minimum time

0: Do not switch off dosing

1: Switch off dosing

Bits 3-7 not used

11.11.9 DS 10 - Min. time volumetric

The definition of the minimum time for volumetric operation after automatic switching to volumetric operation because of flow rate faults. If the fault no longer exists before this time has elapsed, volumetric operation is retained for this minimum time. The definition is made in ms.

11.11.10 DS 10 - Toleration time for fault

If a fault has been determined in the weighing process (loss of stability) or in the flow rate value (breach of min/max limit value), the output value is frozen and waits the length of the toleration time to ascertain whether the fault is resolved of its own accord. If the fault persists, it switches to volumetric operation.

11.12 DS 11 Device characteristic curve for loss-in-weight scale

The characteristic curve of the dosing device is stored in DS 11. The characteristic curve describes the dependency of the flow rate on the output signal. Ideally, it is assumed that the current fill status is constant in the dosing container (e.g. fill quantity at approx. 100%). The characteristic curve should be recorded once during commissioning.

Determination of the characteristic curve occurs automatically, or manually in some cases. The output values for which the flow rate is to be determined are defined first. The operating points are started and stored using the command Start Auto 1, 2 or 3. If necessary, the characteristic curve can be determined for different materials and stored in the controller. When materials are changed, the respective DS 11 is transferred to the scale. Up to four values can be entered as an output value.

An initial value of 0 corresponds to the output signal 0% (of the setting range)

A final value of 100.00 corresponds to the output signal 100.00% of the setting range

The output value can also be output via Profibus (SIMATIC) to a connected drive.

Name	Model	Address	Default	Range of values/Meaning	Reference
Minimum output value	REAL	DBD000	0	Minimum output value for operation of the dosing device. Definitions greater than 0 and less than the defined limit value are raised to the minimum output value.	*11.12.1*
Raise limit	REAL	DBD004	0	Raise limit for the output value in % per second.	*11.12.2*
Drop limit	REAL	DBD008	0	Drop limit for the output value in % per second.	*11.12.3*
Operating point 1 Output value	REAL	DBD012	50.00	Output value	*11.12.4*
Operating point 1 Flow rate	REAL	DBD016	5	Achieved flow rate	*11.12.5*
Operating point 2 Output value	REAL	DBD020	0	Output value	*11.12.6*
Operating point 2 Flow rate	REAL	DBD024	0	Achieved flow rate	*11.12.7*
Operating point 3 Output value	REAL	DBD028	0	Output value	*11.12.8*
Operating point 3 Flow rate	REAL	DBD032	0	Achieved flow rate	*11.12.9*
Operating point 4 Output value	REAL	DBD036	0	Output value	*11.12.10*
Operating point 4 Flow rate	REAL	DBD040	0	Achieved flow rate	*11.12.11*

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Table 11-10 Allocation of DS 11

11.12.1 DS 11 - Minimum output value

The minimum output value is defined with this parameter (standardized value). If a lower value than the minimum value (but greater than 0) results from the calculation of the output value, then the minimum value is output.

11.12.2 DS 11 - Raise limit for output value

Too great an increase in the output signal is prevented with this parameter. The change speed is entered in % of the nominal flow rate per second.

11.12.3 DS 11 - Drop limit for output value

Too great a decrease in the output signal is prevented with this parameter. The change speed is entered in % of the nominal flow rate per second.

11.12.4 DS 11 - Operating point output value 1

In volumetric operation, the corresponding flow rate is measured and retained for this output value.

11.12.5 DS 11 - Operating point flow rate 1

The flow rate value stored for the output value.

11.12.6 DS 11 - Operating point output value 2

In volumetric operation, the corresponding flow rate is measured and retained for this output value.

11.12.7 DS 11 - Operating point flow rate 2

The flow rate value stored for the output value.

11.12.8 DS 11 - Operating point output value 3

In volumetric operation, the corresponding flow rate is measured and retained for this output value.

11.12.9 DS 11 - Operating point flow rate 3

The flow rate value stored for the output value.

11.12.10 DS 11 - Operating point output value 4

In volumetric operation, the corresponding flow rate is measured and retained for this output value.

11.12.11 DS 11 - Operating point flow rate 4

The flow rate value stored for the output value.

11.13 DS 12 PID controller parameters for loss-in-weight scale

The controller parameters for the PID controller are compiled in DS 12. Setting the controller parameters is decisive for the quality of dosing. The integration time Ti and the amplification factor Kp min. and Kp max. (Kp min. can also be the same as Kp max.) must be defined in the first step. The trace function integrated into SIWAREX FTC can be used to verify the controller results. In this case, the most important actual values are recorded in the defined time interval and can be read subsequently. In the second step, the control parameters can be adjusted depending on the dosing results achieved.

Procedure:

- Setting controller parameters
- Send DS 12 to the SIWAREX FTC
- Evaluating dosing results
- Testing other controller settings.

Name	Model	Address	Default	Range of values/Meaning	Reference
Proportional coefficient Kp min.	INT	DBW000	30	Proportional coefficient Kp (controller amplification) with two decimal places, e.g. a value of 30 corresponds to 0.3 (effective with control deviation = 0)	*11.13.1*
Proportional coefficient Kp max.	INT	DBW002	110	Proportional coefficient Kp (controller amplification) with two decimal places, e.g. a value of 110 corresponds to 1.1 (effective with max. control deviation)	*11.13.2*
Integration time Ti	TIME	DBD004	20,000	Integration time; determines the behavior of the integrator.	*11.13.3*
Differentiation time Tv	TIME	DBD008	0	Differentiation time, determines the behavior of the differentiator (if 0, the D part is switched off). In the loss-in-weight scale, the D part of the controller is always 0.	*11.13.4*
Controller activation	BYTE	DBB012	1	0 = controller off, 1 = activate control Other values not permitted	*11.13.5*
Start-up phase	BYTE	DBB013	10	Percentage of the start-up phase as part of the total start-up time (up to max. 50%). Flow rate calculation is suppressed during this time.	*11.13.6*
Max. control difference	INT	DBW014	400	Control difference with which the maximum proportional coefficient will be effective	*11.13.7*
Start-up time	TIME	DBD016	12,000	The start-up time in volumetric operation until switching to controlled operation.	*11.13.8*
Minimum setpoint	INT	DBW020	0	Minimum setpoint in 0.01% of the nominal flow rate. Setpoints under the limit value are not accepted.	*11.13.9*
Dead zone PID controller	INT	DBW022	0	Symmetrical dead zone in control difference for the controller in 0.01% of the nominal flow rate. No readjusting control is done within the dead zone.	*11.13.10*
Min. time gravimetric	TIME	DBD024	5000	Minimum time for gravimetric operation ("toleration time") is started after switching to gravimetric operation. As long as this time is running, no switch to volumetric operation is made because of the flow rate monitoring.	*11.13.11*
Max. time control difference	TIME	DBD028	0	Maximum time for violating the limit value for the max. control difference. 0=Monitoring switched off. Upon activation: Status bit and technology message.	*11.13.12*
Setpoint Raise limit	INT	DBW032	0	Setpoint raise limit Definition in 0.01% of nominal flow rate per second 0: Limitation switched off	*11.13.13*
Setpoint Drop limit	INT	DBW034	0	Setpoint drop limit Definition in 0.01% of nominal flow rate per second 0: Limitation switched off	*11.13.14*
Volumetric upon flow rate fault	BYTE	DBB036	Bit 2 =1 Bit 3 =1	*Switch to volumetric operation upon* *Bit 0:* Undercut flow rate min. (DS6) *Bit 1:* Exceeded flow rate max. (DS6) *Bit 2:* Undercut flow rate min. (set) *Bit 3:* Exceeded flow rate max. (set) *Bit 4:* Exceeded max. flow rate change speed *Bits 5-7 unused* Switchback to gravimetric operation depends on the cause of the fault disappearing.	*11.13.15*

Name	Model	Address	Default	Range of values/Meaning	Reference
				If several faults occur, volumetric operation continues as long as a fault exists.	
Hitch-free switching	BYTE	DBB37	0	Hitch-free switching to volumetric operation: *When switching to volumetric operation* *Bit 0*: 0 = Switch gravim -> volum. should be done smoothly 1 = Switching according to characteristic curve when undercutting the flow rate min. (DS 6) *Bit 1:* 0 = Switch gravim -> volum. should be done smoothly 1 = Switching according to characteristic curve when exceeding the flow rate max. (DS 6) *Bit 2:* 0 = Switch gravim -> volum. should be done smoothly 1 = Switching according to characteristic curve when undercutting the flow rate min. (set) *Bit 3:* 0 = Switch gravim -> volum. should be done smoothly 1 = Switching according to characteristic curve when exceeding the flow rate max. (set) *Bit 4:* 0 = Switch gravim -> volum. should be done smoothly 1 = Switching according to characteristic curve when exceeding the max. change speed of the flow rate *Bit 5:* Switch-off of dosing after max. time for max. control deviation 0 = Do not switch off dosing 1 = Switch off dosing *Bit 6:* Activation of material characteristic curve 0 = Material characteristic curve is activated 1 = Material characteristic curve is switched off *Bit 7 unused* Switch-back to gravimetric operation depends on the cause of the fault disappearing. If several faults occur, volumetric operation continues as long as a fault exists.	*11.13.16*
Reserve	INT	DBW038	0	Reserve	
Monitoring time for volumetric operation	TIME	DBD040	15,000	Monitoring time for the duration of volumetric operation. If no switch has been made back to gravimetric operation within this time, a status bit and a technology message are output. Monitoring also works when switching to volumetric operation following a command. Monitoring does not work during refilling.	*11.13.17*
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Table 11-11 Allocation of DS 12

11.13.1 DS 12 - Proportional coefficient Kp min.

The proportional coefficient can be reset during operation depending on the control difference. With a control difference of 0, the defined Kp min. is effective and increases in a straight line to Kp max. when the max. control deviation is reached. The definition Kp min. = Kp max. is permitted.

11.13.2 DS 12 - Proportional coefficient Kp max.

The proportional coefficient can be reset during operation depending on the control difference. With a control difference of 0, the defined Kp min. is effective and increases in a straight line to Kp max. when the max. control deviation is reached.

11.13.3 DS 12 - Integration time Ti

Integration time - determines the behavior of the integrator (if 0, the I part is switched off). The definition is made in ms.

11.13.4 DS 12 - Differentiation time Td

Differentiation time - determines the behavior of the differentiator (if 0, the D part is switched off). In the loss-in-weight scale, the D part of the controller is always 0.

11.13.5 DS 12 - Controller activation

The PID controller can be switched off. In this case, the SIWAREX FTC functions as a differential scale with active flow rate measurement.

11.13.6 DS 12 - Start-up phase

Percentage of the start-up phase as part of the total start-up time (up to max. 50%). Flow rate calculation is suppressed during this time.

11.13.7 DS 12 - Control difference max.

The max. control difference is a limit value of 0.01% of the nominal flow rate at which the maximum proportional coefficient Kp max. becomes effective. If the limit value is violated, the monitoring time "Time control difference max." is also started. If the control difference remains greater than the limit value after this monitoring time has elapsed, a technology message and the respective status information are output.

11.13.8 DS 12 - Start-up time

The start-up time (ms) determines the duration of volumetric mode in automatic operation until switching to gravimetric mode.

11.13.9 DS 12 - Minimum setpoint

Minimum setpoint in 0.01% of the nominal flow rate. To prevent an incorrect setpoint definition, setpoints under the limit value are not accepted.

11.13.10 DS 12 - Dead zone for PID controller

Symmetrical dead zone in control difference for the controller in 0.01% of the nominal flow rate. No readjusting control occurs within the dead zone, i.e. the output value is not readjusted.

11.13.11 DS 12 - Minimum time for switching from volumetric to gravimetric

Minimum time (ms) for gravimetric operation; is started after switching from volumetric to gravimetric mode. As long as the time is running, no switch is made to volumetric mode because of flow rate monitoring.

11.13.12 DS 12 - Max. time for max. control deviation

Maximum time for exceeding the limit value for the max. control difference. After this time has elapsed, a status information and a technology message are created.

With definition = 0, the monitoring is switched off.

11.13.13 DS 12 - Raise limit for setpoint

When making the setpoint definition, a check is performed to ensure that the setpoint is not raised too high. If the increase in the setpoint is too great, a ramp function is activated which limits the increase to the defined value. Definition is made in 0.01% of the nominal flow rate per second.

With definition = 0, the monitoring is switched off.

11.13.14 DS 12 - Drop limit for setpoint

When making the setpoint definition, a check is performed to ensure that the setpoint is not decreased too much. If the decrease in the setpoint is too great, a ramp function is activated which limits the decrease to the defined value. Definition is made in 0.01% of the nominal flow rate per second.

With definition = 0, the monitoring is switched off.

11.13.15 DS 12 - Switching to volumetric operation upon flow rate fault

Switching to volumetric operation can be parameterized for activation of various limit values:

Undercutting flow rate min. (DS 6, in relation to nominal flow rate)

Exceeding flow rate max. (DS 6, in relation to nominal flow rate)

Undercutting flow rate min. (DS 10, in relation to setpoint)

Exceeding flow rate max. (DS 10, in relation to setpoint)

Exceeding max. flow rate change speed (DS 10, in relation to flow rate/sec)

Switching to volumetric mode can be done according to the material characteristic curve or hitch-free. Hitch-free means that the current output value will not be influenced by the controller.

Switch-back to gravimetric operation is performed when errors no longer exist. If several faults occur, the volumetric operation continues as long as a fault still exists.

11.13.16 DS 12 - Hitch-free switching upon flow rate fault

If switching to volumetric operation is parameterized for a certain flow rate fault, it is also possible to define whether the switch to volumetric operation is performed according to a material characteristic curve (a minor change to the output value is possible for switching) or hitch-free. Hitch-free switching means fixing the current output value, corrected by the influence on the material characteristic curve where necessary.

When switching to volumetric operation:

Bit 0:

0 = Switch gravim -> volum. should be done smoothly

1 = Switching according to characteristic curve

when undercutting the flow rate min. (DS 6)

Bit 1:

0 = Switch gravim -> volum. should be done smoothly

1 = Switching according to characteristic curve

when exceeding the flow rate max. (DS 6)

Bit 2:

0 = Switch gravim -> volum. should be done smoothly

1 = Switching according to characteristic curve

when undercutting the flow rate min. (set)

Bit 3:

0 = Switch gravim -> volum. should be done smoothly

1 = Switching according to characteristic curve

when exceeding the flow rate max. (set)

Bit 4:

0 = Switch gravim -> volum. should be done smoothly

1 = Switching according to characteristic curve

when exceeding the max. change speed of the flow rate

Bit 5: Switch-off dosing after max. time for max. control deviation

0 = Do not switch off dosing

1 = Switch off dosing

Bit 6: Activation of material characteristic curve

0 = Material characteristic curve is activated

1 = Material characteristic curve is switched off

Switch-back to gravimetric operation depends on the cause of the fault disappearing.

If several faults occur, volumetric operation continues as long as a fault exists.

11.13.17 DS 12 - Monitoring time for volumetric operation

If no switch has been made back to gravimetric operation within this time, a status bit and a technology message are output. Monitoring does not work during refilling.

Monitoring also works when switching to volumetric operation following a command. With definition = 0, the monitoring is switched off.

11.14 DS 13 Material characteristic curve

The characteristic curve of the dosing device was stored in DS 11. The characteristic curve describes the dependency of the flow rate on the output signal. Ideally, it is assumed that the current weight is constant in the dosing container (e.g. fill quantity approx. 100%).

The second characteristic curve - the material characteristic curve - in DS 13 describes the influence of the current fill quantity on the output value.

Determining the characteristic curve can be done in volumetric or gravimetric mode. A command can be activated at the respective fill height to calculate the correction factor. The characteristic curve should be determined with the typical setpoint. The individual points on the characteristic curve can be corrected again so that the characteristic curve corresponds to the current material characteristics. Determination of the operating point should always take place in a stable dosing operation where no faults are present.

If necessary, the characteristic curve can be determined for different materials and stored in the controller. When switching materials, DS 11 and DS 13 are sent to the scale.

Name	Model	Address	Default	Range of values/Meaning	Reference
Reserve	REAL	DBD000	0	Reserve	
Factor 10% Fill quantity	INT	DBW004	10,000	Fill quantity factor at 10% fill quantity. Definition in 0.0001.	*11.14.1*
Factor 30% Fill quantity	INT	DBW006	10,000	Fill quantity factor at 30% fill quantity. Definition in 0.0001.	*11.14.1*
Factor 50% Fill quantity	INT	DBW008	10,000	Fill quantity factor at 50% fill quantity. Definition in 0.0001.	*11.14.1*
Factor 70% Fill quantity	INT	DBW010	10,000	Fill quantity factor at 70% fill quantity. Definition in 0.01.	*11.14.1*
Factor 90% Fill quantity	INT	DBW012	10,000	Fill quantity factor at 90% fill quantity. Definition in 0.0001.	*11.14.1*
Reserve	INT	DBW014	0	Reserve	
		16			

Table 11-12 Allocation of DS 13

11.14.1 DS 13 - Factor for 10% (30%, 50%, 70%, 90%) fill quantity

The factor is determined by activating the appropriate command (176...180). By reading DS 13 from the SIWAREX FTC, the current factors can be viewed. The determination is permitted within the range of +/- 10%, otherwise the command is rejected. The definition is made in 0.0001, e.g. 10232 means a factor of 1.0232.

11.15 DS 15 Tare entry

DS 15 is used for external specification of the tare weight. In loss-in-weight scale operation mode no provision is made for entering an external tare weight.

Procedure:

- Enter tare weight
- Send DS 15 to the scale
- Activate the command "Accept tare entry (24)"

Name	Model	Address	Default	Range of values/Meaning	Reference
Tare entry					
Tare entry	REAL	DBD000	0	External tare entry (preset tare).	*11.15.1*
		4			

Table 11-13 Allocation of DS 15

11.15.1 DS 15 - Tare entry

DS 15 is used for external specification of the tare weight. Once specified with DS 15, the tare value is not yet activated. The transfer to tare memory of the SIWAREX FTC is then performed with the instruction "Accept tare entry" (see command code *24*).

11.16 DS 16 Weight simulation entry

If the DS 16 was parameterized as the source for the weight simulation (see DS 7 *Source for weight simulation*), defining a weight value through DS 16 will deactivate the measurement input of the SIWAREX FTC and the defined value is "simulated" as the weight value.

Procedure:

- Check in DS 7 whether DS 16 has been parameterized as the source for the weight simulation
- Enter a value to be simulated
- Send DS 16 to the scale

Name	Model	Address	Default	Range of values/Meaning	Reference
Simulation					
Weight simulation entry	REAL	DBD000 4	0	Default value for weight simulation (is used instead of the gross weight, e.g. for testing)	*11.16.1*

Table 11-14 Allocation of DS 16

11.16.1 DS 16 - Weight simulation entry

If the DS 16 was parameterized as the source for the weight simulation (see DS 7 *Source for weight simulation*), defining a weight value through DS 16 will deactivate the measurement input of the SIWAREX FTC and the defined value is "simulated" as the weight value. In this way, system components (including filter settings) can be tested even though the scale is not set up yet.

11.17 DS 17 Analog output control

If DS 17 has been defined as the source for the analog output (see DS 7 *Source for analog output*), defining a process value via the analog output module will determine a corresponding output.

Procedure:

- Check in DS 7 whether DS 17 was parameterized as the source for the analog output module.
- Check the parameter definitions of the analog output (see DS 7 *Process value for zero point* and the following parameters).
- Enter a value in DS 17
- Send DS 17 to the scale

Name	Model	Address	Default	Range of values/Meaning	Reference
Analog output					
Ext. definition for analog output	REAL	DBD000 4	0	Analog output control with a default value.	*11.17.1*

Table 11-15 Allocation of DS 17

11.17.1 DS 17 - Ext. definition for analog output

If DS 17 has been parameterized as the source for controlling the analog output (see DS 7 *DS 7 - Source for analog output*), then the analog output is controlled with the defined value with a definition of a weight value on DS 17. In this way, the analog output can be set continuously from the SIMATIC control program.

11.18 DS 18 Control display for non-automatic weighing machine

A value can be preset using DS 18 and this value can be displayed on the remote display. In this way, the remote display (Siebert) can be used

for displaying any value that is calculated in SIMATIC. The display can only be used in "Non-automatic weighing machine" operating mode.

Procedure:

- Enter a value in DS 18
- Send DS 18 to the scale

Name	Model	Address	Default	Range of values/Meaning	Reference
Display					
Ext. definition for remote display	REAL	DBD000	0	Remote display control (Siebert S102) with a default value	
		4			

Table 11-16 Allocation of DS 18

11.19 DS 19 Autostart parameters

Defining Autostart parameters allows the commands for Autostart to be executed - up to 4 operating points can be defined to determine the device characteristic curve. The parameters are also used for automatic determination of the filter and controller parameters. Procedure:

- Specify parameters
- Send DS 19 to the scale

Name	Model	Address	Default	Range of values/Meaning	Reference
Direct output value	INT	DBW000	0	The output value can be defined directly for test purposes. This is effective for all start commands. The value must be set to 0 before switching to normal operation.	*11.19.1*
Output value operating point 1	INT	DBW002	2000	Definition of the output value for determining flow rate in operating point 1 (in 0.01%).	*11.19.2*
Factor for automatic characteristic curve	BYTE	DBB004	2	Definition of the time intervals for automatic correction of the device characteristic curve (if activated). The factor is a multiplicator of the start-up time, e.g. factor 2 indicates that automatic correction of the device characteristic curve occurs every 2 x start-up time.	*11.19.3*
Additional parameters for automatic characteristic curve	BYTE	DBB005	0	*Bit 0:* Automatic determination of the characteristic curve in operation activated 0 = Not active 1 = Active *Bits 1-7 not used*	*11.19.4*
Reserve	INT	DBW006	0		
Determination time		DBD008	20,000	The time is used for determining an operating point.	*11.19.5*
Reserve	REAL	DBD012	0	Reserve	
Reserve	TIME	DBD016	0	Reserve	
Reserve	BYTE	DBB020	0	Reserve	
Reserve	BYTE	DBB021	0	Reserve	
Output value operating point 2	INT	DBW022	6000	Definition of the output value for determining flow rate in operating point 2 (in 0.01%).	*11.19.2*
Output value operating point 3	INT	DBW024	0	Definition of the output value for determining flow rate in operating point 3 (in 0.01%).	*11.19.2*
Output value operating point 4	INT	DBW026	0	Definition of the output value for determining flow rate in operating point 4 (in 0.01%).	*11.19.2*

Name	Model	Address	Default	Range of values/Meaning	Reference
Reserve		DBD028		Reserve	
		32			

Table 11-17 Allocation of DS 19

11.19.1 DS 19 - Direct output value

The output value can be defined directly for test purposes. This is effective for all start commands. The value must be set to 0 before switching to normal operation.

11.19.2 DS 19 - Output value operating point 1 (2, 3, 4)

Definition of the output value for determining flow rate in operating point 1 (in 0.01%). The definitions for the operating points that follow must each be at least 10% (1000) higher.

11.19.3 DS 19 - Factor for automatic characteristic curve

Definition of the time intervals for automatic correction of the device characteristic curve (if activated). The factor is a multiplicator of the start-up time, e.g. factor 2 indicates that automatic correction of the device characteristic curve occurs every 2 x start-up time.

11.19.4 DS 19 - Additional parameters for automatic characteristic curve

Automatic determination of the device characteristic curve during operation (in the background) can be activated or deactivated.

Bit 0: Automatic determination of the characteristic curve in operation activated

0 = Not active

1 = Active

11.19.5 DS 19 - Time for determining the device characteristic curve

The time is used for determining an operating point.

11.20 DS 20 Flow rate setpoint

The definition of a setpoint has an effect in both manual and automatic operation. A new setpoint can be defined during operation. In addition, the length of time that volumetric mode should run with a setpoint change can also be defined.

Procedure:

- Defining set weight, possibly correcting vol. time
- Send DS 20 to the scale

Name	Model	Address	Default	Range of values/Meaning	Reference
Setpoint	REAL	DBD000	5	Setpoint in WU/s or WU/h. The current setpoint definition must be greater than the min. setpoint and	*11.20.1*

Name	Model	Address	Default	Range of values/Meaning	Reference
				must not be greater than 1.5 times the nominal feed rate.	
Setpoint in 0.01%	INT	DBW004	0	Setpoint in % of the nominal flow rate. The current setpoint definition must be greater than the min. setpoint and must not be greater than 1.5 times the nominal feed rate.	*11.20.2*
Setpoint threshold	INT	DBW006	500	Definition of the threshold in 0.01% for the setpoint change (reference to current setpoint) for switching to volumetric operation.	*11.20.3*
Time for volumetric	TIME	DBD008	12,000	The duration of the volumetric start-up can also be determined with the setpoint definition.	*11.20.4*

Table 11-18 Allocation of DS 20

11.20.1 DS 20 - Flow rate setpoint (absolute)

Setpoint in WU/s or WU/h. The current setpoint definition must be greater than the min. setpoint and must not be greater than 1.5 times the nominal feed rate. The definition is only accepted if the second setpoint definition is pre-defined in % with 0.

11.20.2 DS 20 - Flow rate setpoint in %

Setpoint in 0.01% of the nominal flow rate. The current setpoint definition must be greater than the min. setpoint and must not be greater than 1.5 times the nominal feed rate. The definition is only accepted if the second definition of the setpoint in WU/s or WU/h% is pre-defined with 0.

11.20.3 DS 20 - Setpoint threshold

Definition of the threshold in 0.01% for the setpoint change (reference to current setpoint) for switching to volumetric operation.

11.20.4 DS 20 - Time volumetric upon setpoint change

If the switch to volumetric operation takes place on acceptance of the new setpoint, the duration of volumetric operation can be defined. The definition is made in ms.

11.21 DS 30 Process state 1 (only for operating modes NAWI, force measurement, conveyor scale), not for loss-in-weight scale

The process values and the expanded process values can be used to monitor the current statuses and data in the non-automatic weighing machine. Observing the selected data is very helpful in test mode for optimizing parameters. The status can also be monitored if the SIWAREX FTC is controlled by the SIMATIC CPU.

Name	Model	Address	Range of values/Meaning	Reference
NAWI status flags	DINT	DBD000	Status bits (see below)	*11.21.1*
Conti status flags	DINT	DBD004	Status bits (see below)	*11.21.2*
Gross process value	REAL	DBD008	Gross weight	*11.21.3*

Name	Model	Address	Range of values/Meaning	Reference
Net process value	REAL	DBD012	Net weight	11.21.4
Tare process value	REAL	DBD016	Tare weight	11.21.5
G/N weight	REAL	DBD020	Verifiable G/N weight value for display and logging purposes (basis for DS ASCII weight value)	11.21.6
G/N weight_x10	REAL	DBD024	Verifiable G/N weight value with 10-fold resolution (basis for DS ASCII weight value)	11.21.7
Tare weight	REAL	DBD028	Verifiable tare weight value for display and logging purposes	
Conveyor speed	REAL	DBD032	Current speed [LU/s]	
Conveyor speed in %	INT	DBW036	Conveyor speed in % related to the nominal speed	
Conveyor load in %	INT	DBW038	Conveyor load in relation with the nominal conveyor load	
Nominal conveyor load	REAL	DBD040	Nominal conveyor load [WU/LU] calculated from nominal flow rate and nominal speed	
Conveyor load	REAL	DBD044	Current conveyor load [WU/LU]	
Flow rate 1	REAL	DBD048	Flow rate 1 [WU/s]	11.21.8
Flow rate 2	REAL	DBD052	Flow rate 2 [WU/h]	11.21.9
Flow rate 3	REAL	DBD056	Flow rate 3 [LWU/h]	11.21.10
Flow rate in %	INT	DBW060	In relation to nominal flow rate	11.21.11
Operating hours counter	INT	DBW062	(is not reset, begins after overflow at 0)	11.21.12
Pulse counter value	DINT	DBD064	Pulse counter value in relation to the set measuring time	
		68		

Table 11-19 Allocation of DS 30

11.21.1 DS 30 - NAWI status bits

The status flags are described together with DS 32.

11.21.2 DS 30 - Conti status flags

The status flags are described together with DS 32.

11.21.3 DS 30 - Gross process value

The current gross weight value. Dimension: Weight unit [WU].

11.21.4 DS 30 - Net process value

The current net weight value. Dimension: Weight unit [WU].

11.21.5 DS 30 - Tare process value

The current tare weight value. Dimension: Weight unit [WU].

11.21.6 DS 30 - G/N weight

The current weight value which will be used for the main display. Dimension: Weight unit [WU].

11.21.7 DS 30 - G/N weight_x10

The current weight value in increased resolution which will be used for the main display. Dimension: Weight unit [WU].

11.21.8 DS 30 - Flow rate 1 (conveyor scale only)

The current flow rate 1 is output in the dimension weight unit/sec [WU/s].

11.21.9 DS 30 - Flow rate 2 (conveyor scale only)

The current flow rate 2 is output in the dimension weight unit/h [WU/h].

11.21.10 DS 30 - Flow rate 3 (conveyor scale only)

The current flow rate 3 is output in the dimension large weight unit/h [LWU/h].

11.21.11 DS 30 - Flow rate in % of the nominal flow rate

The current flow rate is output in 0.1% of the nominal flow rate.

11.21.12 DS 30 - Operating hours counter

The operating hours counter records the number of hours that the SIWAREX FTC is supplied with 24 V voltage.

11.22 DS 31 Process state 2 (all operating modes)

The user or the service technician can retrieve information on the current status of the scale in the expanded process values.

Name	Model	Address	Range of values/Meaning	Reference
Unfiltered digital value	DINT	DBD000	Unfiltered digital value from ADU	*11.22.1*
Filtered digital value	DINT	DBD004	Filtered digital value from filter level 1 for NAWI fct.	*11.22.2*
Reserve33_1	DINT	DBD008	Reserve	
Operating errors	DWORD	DBD012	Error word Operating error (for test dept., bit no. = error code -1)	*11.22.3*
curr. Date/Time	DATE_AND_TIME	DBD016	curr. Date/Time	*11.22.4*
Current temperature	INT	DBW024	Current inner temperature of the module [0.1°C]. If no temperature value is available: -100.0°C.	*11.22.5*
DE status	BYTE	DBB026	Current status of the digital inputs (without pulse input)	*11.22.6*
Reserve_31_27	BYTE	DBB027	Reserve 1	
Impedance reference value	INT	DBW028	Impedance reference value [0.1Ω]	*11.22.7*
Impedance actual value	INT	DBW030	Impedance actual value [0.1Ω]	*11.22.8*
		32		

Table 11-20 Allocation of DS 31

11.22.1 DS 31 - Unfiltered digital value

The current number of digits from the AD converter is output without being filtered.

11.22.2 DS 31 - Unfiltered digital value

The current number of digits from the AD converter is output after the filtering.

11.22.3 DS 31 - Operating errors

The current existing operating errors (faults) are output as a double word.

11.22.4 DS 31 - Date/time

The current date and time from the internal clock of the SIWAREX FTC.

11.22.5 DS 31 - Max. temperature

The maximum occurring module temperature (drag pointer).

11.22.6 DS 31 - Status of digital inputs

The current signal level on the digital inputs 1...6. The status of the input for the pulse counter is not indicated.

11.22.7 DS 31 - Impedance reference value

The total resistance of the load cell(s) which is measured upon commissioning. Measurement is initiated with an instruction.

11.22.8 DS 31 - Impedance actual value

Current measured total resistance of the load cell(s). Measurement is initiated with an instruction.

11.23 DS 32 Process state loss-in-weight scale

The user or the service technician can retrieve information on the current status of the scale in the expanded process values.

Name	Model	Address	Range of values/Meaning	Reference
NAWI status flags	DINT	DBD000	Status bits (see DS 30)	*11.23.1*
Conti status flags	DINT	DBD004	Status bits (see DS 30)	*11.23.2*
Gross process value	REAL	DBD008	Gross weight	*11.23.3*
Net process value	REAL	DBD012	Net weight	*11.23.4*
Tare process value	REAL	DBD016	Tare weight	*11.23.5*
Flow rate 1	REAL	DBD020	Internal flow rate 1 in WU/s or in WU/h, as currently measured; also values that arise due to faults.	*11.23.6*
Flow rate 2	REAL	DBD024	Flow rate 2 in WU/s or in WU/h, as currently measured. If switching to volumetric operation because of faults, the last valid value before the fault is frozen.	*11.23.7*
Flow rate	REAL	DBD028	Flow rate in WU/s or in WU/h, as currently measured. If switching to volumetric operation because of faults, the last valid value before the fault is frozen. In addition, the value is set immediately at zero when dosing is switched off.	*11.23.8*
Flow rate in %	INT	DBW032	Current flow rate in 0.01% in relation to nominal	*11.23.9*

Name	Model	Address	Range of values/Meaning	Reference
			flow rate.	
Operating hours counter	INT	DBW034	(is not reset, begins at 0 after overflow).	11.23.10
Reserve	REAL	DBD036	Reserve	
		40		

Table 11-21 Allocation of DS 32

11.23.1 DS 30 - NAWI status bits

Bit no.	Name	Range of values/Meaning	Reference
0	WR1	Weight within weighing range 1	
1	WR2	Weight within weighing range 2	
2	WR3	Weight within weighing range 3	
3	Limit 1	Limit value 1 activated	
4	Limit 2	Limit value 2 activated	
5	Limit 3	Limit value 3 activated	
6	Tared (NET)	Set if the scale is tared	
7	Preset tare	Set if the scale was tared with tare input	
8	Max+9e	Set if maximum capacity is exceeded by 9 e	
9	¼d zero	Set if the weight does not exceed ¼ d	
10	Waiting for standstill	Set if the scale waits for a stand-still after start of weighing.	
11	Standstill	Standstill exists	
12	Scale adjusted	Set if the scale is adjusted (calibrated)	
13	Error on DI	Set if a command could not be executed on a digital input	
14	Simulation active	Set if the weight simulation has been activated	
15	Service operation active	Set if service operation has been activated	
16	Printing log	The log is being printed.	
17	RS232 print not possible	The log cannot be printed.	
18	MMC inserted	The MMC is in position	
19	MMC ready	The MMC is formatted and ready for recording	
20	MMC trace ready	The MMC is ready for the trace function	
21	MMC log ready	The MMC is ready for logging	
22	Trace active	The trace function is activated	
23	Stability	Stability of flow rate exists	
24	Reserve	Reserve	
25	Empty message	Scale is in empty range	
26	Calibration data protection	The switch for protecting the calibration data is switched on	
27	Reserve	Reserve	
28	Reserve	Reserve	
29	Reserve	Reserve	
30	Standalone operation activated	1, if standalone operation has been activated	
31	Operating errors	At least one operating error (fault) exists	

Table 11-22 DS 30 - NAWI status bits

11.23.2 DS 30 - Conti status flags

Bit no.	Name	Range of values/Meaning	Reference
0	Conveyor control status	0: Conveyor control off 1: Conveyor control on	
1	Totalizing status	1: Recording and totalizing of the dosing quantity is active 0: Dosing quantity will not be recorded	
2	Min. conveyor loading exceeded	Conveyor loading min has been exceeded (is returned with a delay in some cases)	
3	Conveyor loading max.	Conveyor loading max. has been exceeded (is indicated with	

Bit no.	Name	Range of values/Meaning	Reference
	exceeded	a delay in some cases)	
4	Min. conveyor speed exceeded	Min. conveyor speed exceeded (returned with a delay in some cases)	
5	Max. conveyor speed exceeded	Max. conveyor speed exceeded (is indicated with a delay in some cases)	
6	Min. pulse undercut	1 = Pulse encoder generates fewer than 2 pulses/second 0 = Pulse encoder generates a minimum of 2 pulses/second	
7	Min. conveyor load exceeded for totalizing	1= Min. conveyor load exceeded for totalizing; the totalizing can be performed	
8	Scale in dynamic zero setting range	=1, if the scale is in the dynamic zero setting range	
9	Dynamic adjustment or zero setting procedure is running	=1, if dynamic adjustment or zero setting procedure is running	
10	Dyn. zero setting aborted	1: If dynamic zero setting could not be completed or was ended early because of leaving the zero setting range	
11	Volumetric operation	Volumetric operation in automatic mode.	
12	Filling	Filling activated.	
13	> max. flow rate +/-	Change speed of flow rate too great	
14	> min. flow rate	Minimum flow rate exceeded (in relation to nominal flow rate or setpoint)	
15	> max. flow rate	Maximum flow rate exceeded (in relation to the nominal flow rate or setpoint)	
16	Pulse 1 external	Pulses for external summator 1	
17	Pulse 2 external	Pulses for external summator 2	
18	Gravimetric operation	Gravimetric operation in automatic mode.	
19	Emptying activated	The command for emptying was activated. Scale will not refill, the container will empty until the limit value "Empty range" from DS 4.	
20	Max. control difference	Maximum control difference exists.	
21	Start-up mechanisms active	Start-up mechanism active	
22	Max. filling time	The maximum filling time has been reached.	
23	Max. time max. control difference	The maximum control difference is at the max. defined monitoring time.	
24	Max. vol. time	Volumetric mode is active longer than the defined max. monitoring time.	
25	Automatic characteristic curve active	Automatic determining of the characteristic curve in operation active	
26	Status change	Status change running. The information is set with the following events: - Start-up in volumetric operation - Setpoint change in volumetric operation - Switch to grav. operation. For the time of the monitoring delay (DS 12) - parameterized switch to volumetr. operation upon flow rate fault	
27	Fade-out active	Fade-out of the fault during inhibition time or toleration time	
28	Dosing active	Switch on material discharge organ	
29	Loading active	Loading (conveyor scale) is activated.	
30	Loading complete	Loading (conveyor scale) is complete.	
31	Material characteristic curve active	Use of the material characteristic curve was activated	

Table 11-23 DS 30 - Conti status flags

11.23.3 DS 32 - Gross process value

The current gross weight value. Dimension: Weight unit [WU].

11.23.4 DS 32 - Net process value

The current net weight value. Dimension: Weight unit [WU].

11.23.5 DS 32 - Tare process value

The current tare weight value. Dimension: Weight unit [WU].

11.23.6 DS 32 - Internal flow rate 1

The current flow rate, which is continually measured. Values that are a result of a flow rate fault are also output. The value is filtered using the internal filter F1.

11.23.7 DS 32 - Internal flow rate 2

Current flow rate used for formation of the control difference. The value is filtered using the internal filter F2.

11.23.8 DS 32 - Flow rate

Current flow rate displayed. The value is filtered using internal filters F2 and F3. The value is used for totalizing.

11.23.9 DS 32 - Flow rate in % of nominal flow rate

Current flow rate (derived from flow rate) output in 0.01% of nominal throughput.

11.23.10 DS 32 - Operating hours counter

The operating hours counter records the number of hours that the SIWAREX FTC is supplied with 24 V voltage.

11.24 DS 33 Distribution memory

Totalizing is performed at the same time for every distribution memory location. The user can delete a certain location at any time, thereby defining the totalizing period.

Name	Model	Address	Range of values/Meaning	Reference
Distribution memory 1	REAL	DBD000	For saving the total quantity related to WU and rounded to the numeral step	*11.24.1*
Distribution memory 2	REAL	DBD004	For saving the total quantity and rounded to the numeral step WU;	*11.24.2*
Distribution memory 3	REAL	DBD008	For saving the total quantity rounded to the numeral step WU	*11.24.3*
Distribution memory 4	REAL	DBD012	For saving the total quantity and rounded to the numeral step WU;	*11.24.4*
Distribution memory 5	REAL	DBD016	For saving the total quantity and rounded to the numeral step LWU	*11.24.5*
Distribution memory 6	REAL	DBD020	For saving the total quantity and rounded to the numeral step LWU;	*11.24.6*
Distribution memory 7	REAL	DBD024	For saving the total quantity and rounded to the numeral step LWU	*11.24.7*
Distribution memory 8	REAL	DBD028	For saving the total quantity and rounded to the numeral step LWU;	*11.22.8*
		32		

Table 11-24 Allocation of DS 33

11.24.1 DS 33 - Distribution memory 1

Contents of distribution memory. Dimension in weight units [WU]. Can be reset with the instruction "Delete distribution memory 1" or "Log and delete distribution memory 1."

11.24.2 DS 33 - Distribution memory 2

Contents of distribution memory. Dimension in weight units [WU]. Can be reset with the instruction "Delete distribution memory 2" or "Log and delete distribution memory 2."

11.24.3 DS 33 - Distribution memory 3

Contents of distribution memory. Dimension in weight units [WU]. Can be reset with the instruction "Delete distribution memory 3" or "Log and delete distribution memory 3."

11.24.4 DS 33 - Distribution memory 4

Contents of distribution memory. Dimension in weight units [WU]. Can be reset with the instruction "Delete distribution memory 4" or "Log and delete distribution memory 4."

11.24.5 DS 33 - Distribution memory 5

Contents of distribution memory. Dimension in large weight unit [LWU]. Can be reset with instruction "Delete distribution memory 5" or "Log and delete distribution memory 5."

11.24.6 DS 33 - Distribution memory 6

Contents of distribution memory. Dimension in large weight unit [LWU]. Can be reset with instruction "Delete distribution memory 6" or "Log and delete distribution memory 6."

11.24.7 DS 33 - Distribution memory 7

Contents of distribution memory. Dimension in large weight unit [LWU]. Can be reset with instruction "Delete distribution memory 7" or "Log and delete distribution memory 7."

11.24.8 DS 33 - Distribution memory 8

Contents of distribution memory. Dimension in large weight unit [LWU]. Can be reset with instruction "Delete distribution memory 8" or "Log and delete distribution memory 8."

11.25 DS 34 ASCII display value

The ASCII weight value corresponds to the value on the main display of the scale.

The data record is displayed in a separate window in SIWATOOL FTC by activating the "Actual value" function.

Name	Model	Address	Default	Range of values/Meaning	eference
Current weight in ASCII format	STRING [16]	DBB000	-	Current weight in ASCII format as output on the display	
		18			

Table 11-25 Allocation of DS 34

SIWAREX FTC controls the content of DS 34 via instructions 25, 26, 128...142, 181… 192.

11.26 DS 36 Process status of PID controller

The current statuses and data of the controller can be observed using the process values of the PID controller and the process values for loss-in-weight scales. Observing the selected data is very helpful in test mode for optimizing parameters. The status can also be monitored if the SIWAREX FTC is controlled by the SIMATIC CPU.

Name	Model	Address	Range of values/Meaning	Reference
Current setpoint	REAL	DBD000	The currently defined setpoint in WU/s or in WU/h.	*11.26.1*
Effective setpoint	REAL	DBD004	The currently defined and active setpoint in WU/s or in WU/h, limited if necessary by the defined ramp function (setpoint limitation).	*11.26.2*
Current internal flow rate 1	REAL	DBD008	Current internal flow rate value in WU/s or WU/h.	*11.26.3*
Current control difference	REAL	DBD012	Current control difference affecting the control input.	*11.26.4*
Current output current	REAL	DBD016	Current current value to be output in mA if analog output was parameterized.	*11.26.5*
Current setpoint in 0.01%	INT	DBW020	Current defined setpoint in 0.01% of the nominal flow rate.	*11.26.6*
Effective setpoint in 0.01%	INT	DBW022	Current defined and active setpoint in 0.01% of the nominal flow rate, limited if necessary by the defined ramp function (setpoint limitation).	*11.26.7*
Current flow rate 1 in 0.01%	INT	DBW024	Current flow rate value in 0.01% of the nominal flow rate.	*11.26.8*
Current control difference in 0.01%	INT	DBW026	Current control difference affecting the control input in 0.01% of the nominal flow rate.	*11.26.9*
Current output value from the controller in 0.01%	INT	DBW028	Current output value directly according to the controller in 0.01%.	*11.26.10*
Current output value according to the material characteristic curve in 0.01%.	INT	DBW030	Current output value according to the controller in 0.01%, corrected by the material characteristic curve.	*11.26.11*
Current difference between volumetr. and gravimetr. Output value in % x 100	INT	DBW032	Current difference between the output value according to the material characteristic curve in gravimetric operation and the theoretical output value according to the material characteristic curve in volumetric operation in relation to the setpoint.	*11.26.12*
Current filling status in % of the nominal fill quantity	INT	DBW034	Current fill quantity in 0.01% of the nominal fill quantity.	*11.26.13*
Standardized output value	REAL	DBD036	Standardized output value for controlling dosing devices through a bus connection. Output of 10,000 corresponds to 100.00% of the setting range.	*11.26.14*

Name	Model	Address	Range of values/Meaning	Reference
		40		

Table 11-26 Allocation of DS 36

11.26.1 DS 36 - Flow rate setpoint

The currently defined setpoint in WU/s or in WU/h. By reading the setpoint in DS 36, the setpoint definition, which is made through DS 20, can be checked.

11.26.2 DS 36 - Effective flow rate setpoint

The currently defined and active setpoint in WU/s or in WU/h, limited if necessary by the defined ramp function (setpoint limitation). The setpoint raise limit can be parameterized in DS 6. The effective setpoint is used for creating the control difference.

11.26.3 DS 36 - Internal flow rate 1

Current internal flow rate value in WU/s or WU/h. This value corresponds to the current measurement; the determined value is still output with a flow rate fault. The value is filtered using the internal filter F1.

11.26.4 DS 36 - Control difference

Current control difference affecting the control input. The output is done in WU/s or in WU/h.

11.26.5 DS 36 - Output current

Present current value to be output in mA, if the analog output was parameterized. This is the calculated value that is passed on to the digital/analog converter. Whether the current actually flows is not monitored.

11.26.6 Flow rate setpoint in 0.01%

Current defined setpoint in 0.01% of the nominal flow rate. By reading the setpoint in DS 36, the setpoint definition, which is made through DS 20, can be checked.

11.26.7 DS 36 - Effective flow rate setpoint in 0.01%

Current defined and active setpoint in 0.01% of the nominal flow rate, limited if necessary by the defined ramp function (setpoint limitation). The setpoint raise limit can be parameterized in DS 6. The effective setpoint is used for creating the control difference.

11.26.8 DS 36 - Flow rate in 0.01%

Current flow rate value in 0.01% of the nominal flow rate. To create the flow rate value, flow rate 3 is used (treated).

11.26.9 DS 36 - Control difference in 0.01%

Current control difference affecting the control input in 0.01% of the nominal flow rate.

The value provides current information on the percentage deviation from the setpoint.

11.26.10 DS 36 - Output value directly according to controller in 0.01%

Current output value directly according to the controller in 0.01%.
The output value which has not yet been corrected with the material characteristic curve.

11.26.11 DS 36 - Output value according to material characteristic curve in 0.01%

Current setpoint according to the controller in 0.01% corrected by the material characteristic curve. This value is subsequently output to the dosing device.

11.26.12 DS 36 - Output value difference grav./vol. in 0.01%

Current difference between the output value according to the material characteristic curve in gravimetric operation (controller active) and the theoretical output value according to the material characteristic curve in volumetric operation in 0.01% in relation to the setpoint. This value provides information indicating the difference by which the output value would change directly in the event of a switch (e.g. fault-related) if the switch is not parameterized as hitch-free.

By reading this value, the necessity for updating the material characteristic curve can be estimated.

11.26.13 DS 36 - Fill quantity in 0.01%

Current fill quantity in 0.01% of the nominal fill quantity. This display is helpful in creating the material characteristic curve.

11.26.14 DS 36 - Standardized output value

Standardized output value for controlling dosing devices through a bus connection. Output of 10,000 corresponds to 100.00% of the setting range.

The amount of current that is output through the analog output is a theoretical value when controlling the dosing device via the bus.

11.27 DS 37 Dosing consistency

Corresponding to the definition of parameters in DS 6, the current quality data can be checked in DS 37.

Name	Model	Address	Range of values/Meaning	Reference
Average weight change	REAL	DBD000	Average value of the weight reduction in the time interval of the measurement time.	*11.27.1*
Average flow rate	REAL	DBD004	Average value of the flow rate measured in the defined number of measuring periods.	*11.27.1*

Name	Model	Address	Range of values/Meaning	Reference
Dosing consistency	REAL	DBD008	Definition concerning dosing quality.	*11.27.1*
Reserve	REAL	DBD012		
Reserve	INT	DBW016		
Reserve	INT	DBW018		
		20		

Table 11-27 Allocation of DS 37

11.27.1 DS 37- Details of dosing consistency

Average value of the weight reduction in the time interval of the update time for display, measured in the defined number of measuring periods.

Average value of the flow rate values, measured in the defined number of measurement periods.

The dosing consistency is an indicator of the dosing quality. The value is calculated as a quotient of the standard deviation in relation to the average value of the flow rate.

AW = 1/n * Total(dG);

AF = AW/T ; [WU/s]

AF =3600 * AW/T ; [WU/h]

$$DC = \frac{100}{AW} \sqrt{\frac{1}{n-1} * \sum_{1}^{n} (dWi - AW)^2}$$

n: Number of measurement periods

T: Measurement period

AF: With mean flow rate

AW: Mean weight change

AW: Mean weight change [WU]

dW: Weight change in one measurement interval. The measurement interval is defined in DS 6.

11.28 DS 40 to 43 Log text 1 to 4

The logs can be defined in data records DS 40 to DS 43. A log text can either be printed automatically or on command, or it can be saved in the verifiable MMC memory.

Log text entries 1 to 4 are composed of fixed segments such as title and label and variable fields.

The variable fields can contain various values from the SIWAREX FTC.

In addition, four string variables can be defined in addition to the process variables. These strings are 4*16 bytes long and can be specified at any time by the SIMATIC CPU. DS 40 to 43 cannot be defined through the SIMATIC CPU.

Name	Model	Address	Default	Range of values/Meaning	Reference
Log text 1					
Log text 1	STRING[160]	DBB000	LF, 'FF0C', SP, 'FF0D', SP,'FF0F', SP, SP, 'FF05', CR, EOT;(prot. ID, date, time, weight)	Place holder for field functions "0FFh,Index" (indicated here with ƒxx). Unused characters are initialized with 0 (for process values, see below)	
		162			

Table 11-28 Allocation of DS 40

10BPARAMETER INSERT SPACE DESCRIPTION

Index (with log output 0xFF,nn)	**Value**	**S7**	**Log field**	**Field length** [bytes] (for log field only)	**Field layout (example)** (for log field only)
NAWI fields (nn)					
0	NAWI status flags	j	n	-	-
1	Grossweight_Process	j	j	14	•12345.678•kg•
2	Netweight_Process	j	j	14	•12345.678•kg•
3	Tareweight_Process	j	j	14	•12345.678•kg•
4	G/N weight verifiable	j	j	18	<N1•12345.678•kg•> <B1•-12345.67•kg•>
5	G/N weight_x10	j	n	-	-
6	Tare weight (verifiable)	j	j	18	<PT•12345.678•kg•>
7	Pulse counter value	j	j	10	1234567890
8	Temperature	j	n	5	21.5
9	Operating errors	j	n	-	-
10	Unfiltered raw value	j	n	-	-
11	Filtered raw value 1	j	n	-	-
12	Log ID	n	j	16	<No•1234567890•>
13	Date (dd.mm.yy)	n	j	8	27.12.02
14	Date (yy-mm-dd)	n	j	8	02-12-27
15	Time	n	j	8	13:05:00
16	String 1	n	j	16	Milk powder •••••
17	String 2	n	j	16	Breadcrumbs••••
18	String 3	n	j	16	Sugar•••••••••
19	String 4	n	j	16	Wheat flour••••••
20					
21	Description	n	j	10	<Loss-in-weight scale1>
22					
23					
24					
25					
26					
27					
28					
29					
Conti fields (nn)					
30	Conti status flags	j	n	-	
31	Distribution memory 1	j	j	16	S1•12345678.9•kg
32	Distribution memory 2	j	j	16	S2•12345.6789•kg
33	Distribution memory 3	j	j	16	S3•12345.6789•kg
34	Distribution memory 4	j	j	16	S4•12345.6789•kg
35	Distribution memory 5	j	j	16	S5•12345.6789•kg
36	Distribution memory 6	j	j	16	S6•12345.6789•kg
37	Distribution memory 7	j	j	16	S7•12345.6789•kg
38	Distribution memory 8	j	j	16	S8•12345.6789•kg
39	Flow rate 1	j	j	16	F1•1234567.8kg/s
40	Flow rate 2	j	j	16	F2•1234567.8kg/h
41	Flow rate	j	j	16	F3•1234567.8•t/h
42	Conveyor speed	j	j	16	BS•1234567.8•m/s
43	Conveyor load	j	j	16	BB 1234567.8kg/m
44	Flow rate in %	j	j	16	FS•123•%••••••••
45	Conveyor load in %	j	j	16	BB•123•%••••••••
46	Conveyor speed in %	j	j	16	BS•123•%••••••••
47	Current setpoint	j	j	18	SP•1234567.8kg/s
48	Effective setpoint	j	j	18	SW•1234567.8kg/s
49	Current control difference	j	j	18	DI•1234567.8kg/s
50	Curr. control difference in %	j	j	10	D•123.00•%
51	Curr. difference vol/grav in %	j	j	10	K•123.00•%

52	Fill level in %	j	j	10	W•123.00•%
53	Output value according to controller in %	j	j	18	C•123.00•%
54	Output value according to mat. char. curve in %	j	j	10	M•123.00•%
55	Standardized output value in %	j	j	10	Y•123.00•%
56	Average weight change	n	j	10	AW•12345678.90•kg•
57	Average flow rate	n	j	10	AF•1234567.89•kg/s
58	Dosing consistency	n	j	10	DC•1234567.89•••••
59					
60					

Table 11-29 Process values for allocating log fields

11.29 DS 44 Last log

The log data is stored up until the next logging procedure in DS 44. If necessary, the contents can be output again.

Name	Model	Address	Default	Range of values/Meaning	Reference
Last log					
MMC-ID	BYTE[5]	DBB000	0	1-byte manufacturer ID + 4-byte serial number; with log output to RS232 interface always 0	*11.29.1*
Reserve 1	BYTE	DBB005	0	Reserve 1	
Reserve 2	WORD	DBB006	0	Reserve 2	
Log ID	DINT	DBD008	0	ID for stored log text	*11.29.2*
Last log data	STRING[160]	DBB012	STRING[160] = 0H	Log text for last logging procedure	*11.29.3*
		174			

Table 11-30 Allocation of DS 44

11.29.1 DS 44 - MMC ID

Identification of the MMC card.

11.29.2 DS 44 - Log ID

The log ID is a unique log number that can be used to identify the log. The number is incremented with every logging procedure.

11.29.3 DS 44 - Last log data

The last output of the log data can be read out until the next logging procedure.

11.30 DS 45 String

The strings are texts that can be inserted as variables in the logs.
The contents of the string can be defined through SIWATOOL FTC or from the control program of the SIMATIC CPU.

Name	Model	Address	Default	Range of values/Meaning	Reference
String					
String 1	STRING[16]	DBB000	"String 1"	16 String 1	
String 2	STRING[16]	DBB018	"String 2"	16 String 2	
String 3	STRING[16]	DBB036	"String 3"	16 String 3	
String 4	STRING[16]	DBB054	"String 4"	16 String 4	
		72			

Table 11-31 Allocation of DS 45

11.31 DS 46 Parameters for reading MMC logs in SIMATIC

Weighing logs can be saved on the MMC card. If necessary, a verifiable log can be read and its contents checked using the SIWATOOL FTC program.

Data records DS 46/DS 47 can be used to read any log in SIMATIC S7 (not verifiable and only to be used as operational display). The user enters the desired log ID in DS 46 and then sends DS 46 to the SIWAREX FTC. A short time later, the log is prepared for reading (status bit "MMC data ready S7"). If the user now requests the DS 47 with the log, the log with the desired ID is read in DS 47.

The last log can also be read through DS 47. 1 must be entered in BYTE 4 of DS 46. In this case, the predefined log ID is ignored.

Procedure:

- Define ID number and enter in DS 46
- Send DS 46 to the scale
- Wait for status bit "MMC data ready S7"
- Read DS 47
- Display or check contents of log

Name	Model	Address	Default	Range of values/Meaning	Reference
Index					
ID number for reading	DINT	DBD000	0	The definition ensures that the log with the ID number is read when reading the DS 47. If the request of the last data record (byte 0) is activated, the ID number is ignored.	
Request for the last data record	BYTE	DBB004	0	With the definition = 1, the last log is output through data record DS 47.	
Reserve	BYTE	DBB005	0	Reserve.	
		6			

Table 11-32 Allocation of DS 46

11.32 DS 47 Requested log

The log data is prepared in DS 47.

Name	Model	Address	Default	Range of values/Meaning	eference
MMC-ID	BYTE[5]	DBB000	0	1-byte manufacturer ID + 4-byte serial number; with log output to RS232 interface always 0	
Reserve 1	BYTE	DBB005	0	Reserve 1	
Reserve 2	WORD	DBB006	0	Reserve 2	
Log ID	DINT	DBD008	0	ID for stored log text	
Log data 1	STRING[40]	DBB012	STRING[40] = 0H	Log text part 1	
Log data 2	STRING[40]	DBB054	STRING[40] = 0H	Log text part 2	
Log data 3	STRING[40]	DBB096	STRING[40] = 0H	Log text part 3	
Log data 4	STRING[40]	DBB0138	STRING[40] = 0H	Log text part 4	
		180			

Table 11-33 Allocation of DS 47

11.32.1 DS 47 - MMC ID

Identification of the MMC card.

11.32.2 DS 47 - Log ID

The log ID is a unique log number that can be used to identify the log. The number is incremented with every logging procedure.

11.32.3 DS 47 - Log data

The log data consists of four strings.

11.33 DS 120/121 Trace data logging

The trace function is used for recording measurement values and current statuses of the scale in RAM memory of the SIWAREX FTC or in the MMC card.

When recording in RAM, SIWATOOL FTC reads the trace elements with data record 120 and when logging in MMC it is done through data record 121.

The recording is started with the instruction "Start recording" *70* and can be ended with the instruction "End current recording" *71*.

The trace function can be defined by defining parameters in data record DS 7 *MMC parameter*. The data record cannot be read through SIMATIC CPU.

Name	Model	Length Bytes	Range of values/Meaning	Referenc e
Time stamp	DATE&TIME	8		
Conti status flag	DINT	4	Status bits	
NAWI status flags	DINT	4	Status bits	
Unfiltered raw value	DINT	4	Unfiltered digital value from ADC	
Filtered raw value	DINT	4	Filtered digital value	
Net_Process	REAL	4	Net weight	
Flow rate	REAL	4	Current flow rate	

Name	Model	Length Bytes	Range of values/Meaning	Reference
Pulse counter value	DINT	4	Pulse counter value with reference to the measurement time	
Flow rate 1	REAL	4	Internal flow rate 1 [weight/time unit]	
Flow rate 2	REAL	4	Internal flow rate 2 [weight/time unit]	
Digital input states	BYTE	1	Status of the DI	
Reserve	BYTE	1	Reserve	
Current output value from controller in % *100	INT	2	Current output value from controller in % *100	
Setpoint	REAL	4	Setpoint	
Effective setpoint	REAL	4	Effective setpoint	
Output value according to material characteristic curve	REAL	4	Output value according to material characteristic curve	
Output value according to device characteristic curve	INT	2	Output value according to device characteristic curve	
Reserve	INT	2	Reserve	
		64		

Table 11-34 Composition of a recording element

Evaluation of the collected data can be handled using SIWATOOL FTC and MS Excel. All of the recording elements that have been read are stored in the Excel table and can be represented as time diagrams.

The weighing procedure can be analyzed and optimized by the evaluation.

In the event of sporadic events in the system, the recording can be activated as circulating storage and can be ended with a condition in the SIMATIC control program at any time. The subsequent evaluation can help to explain a sporadic event in the system. A simultaneous evaluation of the message buffer in which the last 100 events are stored (evaluation with SIWATOOL FTC) offers a good basis for an analysis or remote analysis.

An element requires 46 bytes. If the recording is run e.g. once per 50 ms, it means memory requirements of 920 bytes per second.

In the simplest case, the RAM memory (approx. 2 MB) of the SIWAREX FTC can be used for the recording.

11.34 DS 123 Data contents MMC

By reading the DS 122, SIWATOOL FTC can be used to determine which data is stored on the Micro Memory Card. Based on this information, the user can read targeted records and logs.

Name	Model	Length	Range of values/Meaning	Reference
Log ID	DINT	4	*Depending on the parameter bit log output RS232/MMC, this ID is shown as follows:* RS232 The ID is incremented with every log output (not with "repeat") and is stored and managed in non-volatile memory. This number is only reset with default values. MMC The ID is incremented with every log output (not with "repeat") and is stored and managed in MMC non-volatile memory. This number can only be reset by deleting or formatting the card.	
MMC ID	BYTE[5]	5	1-byte manufacturer ID and 4-byte serial number	
Reserve 1	BYTE	1	Reserve 1	
Reserve 2	INT	2	Reserve 2	
MMC memory capacity	DINT	4	MMC - total memory capacity in bytes	
Available MMC capacity for log data	DINT	4	Capacity of the MMC for log data [bytes]	
Available capacity for trace data	DINT	4	Display depending on the defined trace target RAM or MMC in the interface parameters [bytes]	
Oldest MMC log ID	DINT	4	Oldest element	
Youngest MMC log ID	DINT	4	Youngest element	
Oldest MMC trace ID	DINT	4	Oldest element	
Youngest MMC trace ID	DINT	4	Youngest element	
Oldest RAM trace ID	DINT	4	Oldest element	
Youngest RAM trace ID	DINT	4	Youngest element	
		48		

Table 11-35 Overview of MMC data

11.35 DS 122 Log data MMC

By reading the DS 122, SIWATOOL FTC can be used to determine which log data is stored on the MMC.

A log can then be read for a defined log ID.

Name	Model	Length	Range of values/Meaning	Reference
MMC-ID	BYTE[5]	5	1-byte manufacturer ID + 4-byte serial number	
Reserve 1	BYTE	1	Reserve 1	
Length	INT	2	[n] Number of valid data bytes in the log text; if 0, the requested log number does not exist	
Log ID	DINT	4	ID for stored log text	
Log text	BYTE[n]	174	Log text 1|2|3|4	
Block check character	INT	2	CRC16 (MMC ID + log ID + log text[n])	
		188		

Table 11-36 MMC log

12 Description of commands

12.1 Command groups

The SIWAREX commands are divided into groups. The composition of the commands in a group is based on their functional relationship.

Every command has a unique number. A command can be sent via various interfaces (SIMATIC, SIWATOOL FTC, digital input).

Every time that a command is sent to SIWAREX FTC, it must be checked whether the command has been executed correctly. The data and operating errors (synchronous errors) that are generated provide information on why a command could not be executed.

The **Service and adjustment commands** group is used during the commissioning of the scale. As long as the scale is not adjusted, it can only be used in service operation. Switching to service operation is indicated in the status bits.

The group of **weighing commands NAWI (non-automatic weighing machine)** contains all instructions that concern the handling of a static scale. Normally, these are commands that are related to operation of the SIWAREX FTC as a non-automatic weighing machine (e.g. zero setting, taring).

The group of **display commands** contains all commands that are used for switching the content of the main display.

The extensive group of **weighing commands for the loss-in-weight scale** is used for controlling the loss-in-weight scale. The basic behavior of the SIWAREX FTC is defined once by defining parameters.

The group of **log commands** contains commands that control the output of logs to the printer or the verifiable storage of the logs on the MMC.

Use of the Micro Memory Card MMC is controlled with commands from the command group **Micro Memory Commands**.

After receiving a command, SIWAREX FTC checks whether the command can be executed. If it cannot, the user is informed of the cause by output of a "synchronous" message (see chapter *13 Messages and diagnostics*).

Note

If the module is in "Hardware fault" or operating fault operating status, then only the instructions (8) LOAD DEFAULT VALUES, (1) SERVICE ON, (2) SERVICE_OFF and (9) ACK_ERROR, (150, 156) DOSING (FILLING) STOP are accepted; all other instructions are rejected with a data/operating error

12.2 Command list

Code	Command meaning	Remarks
	Service and adjustment commands	
1	**Switch on Service mode** The SIWAREX must be switched to service operation to perform the adjustment. A non-adjusted scale cannot get out of service operation.	No totalizing
2	**Switch off service operation** After the adjustment, service operation can be switched off. Only then can the scale accept weighing commands.	Service operation
3	**Adjustment command zero point valid** The start of the characteristic curve - zero point of the scale - is defined with the current dead load.	Service operation
4	**Adjustment command Adjustment weight 1 valid** The first adjustment weight is assigned to the current weight.	Service operation
5	**Adjustment command Adjustment weight 2 valid** The second adjustment weight is assigned to the current weight.	Service operation
6	**Adjustment command Adjustment weight 3 valid** The third adjustment weight is assigned to the current weight.	Service operation
7	**Adjustment command Adjustment weight 4 valid**	Service operation

Code	Command meaning	Remarks
	The fourth adjustment weight is assigned to the current weight.	
8	**Predefine all data records with default values** All parameters are set to the status that was assigned originally by the manufacturer.	Service operation
9	**Acknowledge error** Operating errors and fatal system errors that have led to a reboot are acknowledged. The operating status "damaged" is aborted if no other operating errors exist.	Always
10	**Run impedance check** The resistance of the load cells is measured and compared with the stored impedance reference value.	Not in totalizing
11	**Determine impedance reference value** The resistance of the load cells is determined and stored as a reference value for future impedance checks.	Not in totalizing
12	**Activate stand-alone operation** The SIWAREX is switched to stand-alone operation.	Service operation
13	**Deactivate stand-alone operation** The SIWAREX is switched to operation in SIMATIC.	Service operation
14	**Delete drag pointer** The instruction resets the slave pointer DS 26 to 0.	

Code	Command meaning	Remarks
15	**Characteristic curve shift** The instruction shifts the entire characteristic curve (adjustment points) so that the current filtered digital value from the ADC becomes a new zero point. Only permitted with a calibration switch that is not set. If the shift results in an impermissible digital value, then the instruction is rejected.	Service operation
	Weighing commands	
21	**Scale zero setting** The current weight is set to zero. In verifiable operation ("OIML"), only possible with restrictions (-1%, +3%). The tare is deleted at the same time.	
22	**Tare** The current weight is set to zero and the weight display is designated as "net" and "tare" at the same time.	
23	**Delete tare** The tare is deleted. The current weight is displayed, and the designation of "net" is changed to "gross" and "tare" or "preset tare" is reset.	
24	**Accept defined tare** The defined tare is accepted as tare, and at the same time "preset tare" is designated together with the weight display.	
25	**Switch on increased resolution** Activate output/display of the verifiable weight value with increased resolution for 5 seconds.	
26	**Display tare weight** Activate output/display of the tare value for 5 seconds.	
27	**End dynamic zero setting/adjustment** Dynamic zero setting is ended and the new zero value is accepted.	

Code	Command meaning	Remarks
28	**Abort dynamic zero setting/adjustment** Dynamic zero setting is aborted and the new zero value is not accepted.	
	Log commands	
31	**Output log text 1** Log output with text layout 1	
32	**Output log text 2** Log output with text layout 2	
33	**Output log text 3** Log output with text layout 3	
34	**Output log text 4** Log output with text layout 4	
35	**Repeat last logging procedure** The last log output is repeated.	
40	**Digital load cell send on** Output instruction to digital load cell for sending the weight values	
41	**Digital load cell send off** Instruction to digital load cell for ending the sending of the weight values	
42	**Send parameters to digital load cell (DS 53)**	
	Micro Memory Commands	
70	**Start recording** The recording (trace function) should start.	
71	**End running recording** The activated recording (trace function) is terminated.	

Code	Command meaning	Remarks
72	**Delete logs in MMC** The logs stored in the Micro Memory Card are deleted.	Service operation
73	**Delete log in MMC (trace)** The recorded data (trace function) stored in the Micro Memory Card is deleted.	
74	**Delete log in RAM (trace)** The stored data (trace function) in the RAM memory is deleted.	
75	**Format MMC** The Micro Memory Card parameters are defined corresponding to the definitions in the module data. All of the content stored on the MMC is deleted.	Service operation
76	**Delete all MMC data (log data, measurement data etc.)** The data stored on the Micro Memory Card is deleted.	Service operation
80	Totalizing sum 1 on	
81	Totalizing sum 1 off	
82	Totalizing sum 2 on	
83	Totalizing sum 2 off	
84	Totalizing sum 3 on	
85	Totalizing sum 3 off	
86	Totalizing sum 4 on	
87	Totalizing sum 4 off	
88	Totalizing sum 5 on	

Code	Command meaning	Remarks
89	Totalizing sum 5 off	
90	Totalizing sum 6 on	
91	Totalizing sum 6 off	
92	Totalizing sum 7 on	
93	Totalizing sum 7 off	
94	Totalizing sum 8 on	
95	Totalizing sum 8 off	
	Weighing commands	
100	**Switch conveyor on** Used for switching the conveyor belt on (The conveyor control bit is set in CONTI status)	
101	**Switch conveyor off** Used for switching the transport conveyor off (The conveyor control bit is deleted in CONTI status) and, if necessary, the running totalizing procedure is stopped, the discharge organ is switched off at the same time.	
102	**Switch on totalizing** This is used for starting the totalization using the flow rate in the 8 distribution memory locations (is only used if the conveyor control is switched on)	
103	**Switch off totalizing/Switch off loading** This is used for stopping the totalizing, the flow rate continues to be measured and there is no integration into the distribution memory locations. Load operation is ended.	
104	**Switch on dosing (conveyor scale)** Activate discharge organ (is only used if the conveyor control is switched on)	

Code	Command meaning	Remarks
105	**Switch off dosing (conveyor scale)** Deactivate discharge organ	
106	**Switch conveyor on, switch totalizing on** The conveyor scale sends a signal for dosing (the conveyor control bit is set in the CONTI status). Totalizing is activated. The loading quantity (DS 21) must be larger than the lag. The content of distribution memory 1 must be less than the loading quantity lag. The distribution memory locations are not deleted at the start.	
107	**Switch the conveyor on, switch totalizing on, switch dosing on** Material loading is started according to the total quantity definition, totalizing is switched on and conveyor control is switched on. The content of distribution memory 1 must be less than the loading quantity lag. If necessary, delete the contents of distribution memory 1 in advance. The loading quantity (DS 21) must be larger than the lag.	
110	**Delete all distribution memory locations** Deletes all 8 distribution memory locations.	
111	**Log and delete distribution memory 1** Deletes verifiable distribution memory 1 *This automatically includes a logging procedure. In this case, text 1 (DS 40) is used. The deletion is only performed if total 1 is contained in the log text.*	
112	**Delete distribution memory 1** Deletes distribution memory 1.	
113	**Log and delete distribution memory 2** Deletes distribution memory 2. *This automatically includes a logging procedure. Text 1 (DS 40) is used here.*	

Code	Command meaning	Remarks
	Deletion is only executed if total 2 is contained in the log text.	
114	**Delete distribution memory 2** Deletes distribution memory 2.	
115	**Log and delete distribution memory 3** Deletes distribution memory 3. *This automatically includes a logging procedure. Text 1 (DS 40) is used here.* *Deletion is only executed if total 3 is contained in the log text.*	
116	**Delete distribution memory 3** Deletes distribution memory 3.	
117	**Log and delete distribution memory 4** Deletes verifiable distribution memory 4 *This automatically includes a logging procedure. Text 1 (DS 40) is used here.* *Deletion is only executed if total 1 is contained in the log text.*	
118	**Delete distribution memory 4** Deletes distribution memory 4.	

Code	Command meaning	Remarks
119	**Log and delete distribution memory 5** Deletes verifiable distribution memory 5. *This automatically includes a logging procedure. Text 1 (DS 40) is used here. Deletion is only executed if total 1 is contained in the log text.*	
120	**Delete distribution memory 5** Deletes distribution memory 5.	
121	**Log and delete distribution memory 6** Deletes verifiable distribution memory 6 *This automatically includes a logging procedure. Text 1 (DS 40) is used here. Deletion is only executed if total 1 is contained in the log text.*	
122	**Delete distribution memory 6** Deletes distribution memory 6.	
123	**Log and delete distribution memory 7** Deletes verifiable distribution memory 1 *This automatically includes a logging procedure. Text 1 (DS 40) is used here. Deletion is only executed if total 1 is contained in the log text.*	
124	**Delete distribution memory 7** Deletes distribution memory 1.	
125	**Log and delete distribution memory 7** Deletes verifiable distribution memory 7 *This automatically includes a logging procedure. Text 1 (DS 40) is used here. Deletion is only executed if total 1 is contained in the log text.*	
126	**Delete distribution memory 8** Deletes distribution memory 8.	
127		
128	**Display distribution memory 1** Display total weight value in D S34 (total 1 from DS 33).	

Code	Command meaning	Remarks
129	**Display distribution memory 2** Display total weight value in DS 34 (total 2 from DS 33).	
130	**Display distribution memory 3** Display total weight value in DS 34 (total 3 from DS 33).	
131	**Display distribution memory 4** Display total weight value in DS 34 (total 4 from DS 33).	
132	**Display distribution memory 5** Display total weight value in DS 34 (total 5 from DS 33).	
133	**Display distribution memory 6** Display total weight value in DS 34 (total 6 from DS 33).	
134	**Display distribution memory 7** Display total weight value in DS 34 (total 7 from DS 33).	
135	**Display distribution memory 8** Display total weight value in DS 34 (total 8 from DS 33).	
136	**Display flow rate 1 in DS 34** Display flow rate 1 in DS 34 (from DS 32).	
137	**Display flow rate 2 in DS 34** Display flow rate 2 in DS 34 (from DS 32).	
138	**Display flow rate 3 in DS 34** Display flow rate 3 in DS 34 (from DS 32).	
139	**Show conveyor loading in DS 34** Display of the conveyor loading in DS 34 (from DS 31).	
140	**Show verifiable weight G/N in DS 34** Return to weight display.	
142	**Display flow rate 1 (%) in DS 34** Display the flow rate (in % of nominal flow rate) in DS 34 (from DS 32).	

Code	Command meaning	Remarks
143	**Display conveyor loading (%) in DS 34** Display of the conveyor loading (% of the nominal conveyor load) in DS 34 (from DS 31).	
144	**Display conveyor speed (%) in DS 34** Display of the conveyor speed (% of the nominal speed of the conveyor) in DS 34 (from DS 31).	
145		
146		
147		
148		
149		
150	**Dosing (man./vol.) on** Dosing is volumetric according to material characteristic curve.	
151	**Dosing off** Switch off dosing in automatic and manual operation.	
152	**Totalizing on** This is used for starting the totalization using the flow rate in the 8 distribution memory locations (only used if dosing is switched on).	
153	**Totalizing off** This is used for stopping the totalizing; flow rate continues to be measured and there is no integration into the distribution memory.	
154	**Filling on** Filling is switched on immediately. In manual operation, there is no effect on other functions. This switches automatically to volumetric operation in automatic mode.	

Code	Command meaning	Remarks
155	**Filling off** Filling is switched off immediately.	
156	**Dosing & filling off** The command switches both functions off simultaneously in automatic operation and manual operation.	
157	**Dosing (auto/vol.) on** The command starts volumetric operation in automatic mode. The switch to gravimetric operation is not automatic in this case; a command must be used instead.	
158	**Dosing (auto/grav.) on** This command switches automatic operation on. If parameterized, the volumetric mode is switched on first, then the switch to gravimetric operation is done automatically.	
159	**Dosing (auto/vol. hitch-free)** The command switches to automatic operation from gravimetric operation, whereby the output value is retained. The output value is then corrected according to the fill quantity.	
160	**Reserve**	
161	**Emptying (auto) on** The command activates emptying. If the fill quantity reaches the limit value for refilling (DS 6), no refilling is started but the dosing is continued in gravimetric operation until the empty range is reached (DS 4).	
162	**Emptying (manual) on** The command activates emptying. If the fill quantity reaches the limit value for refilling (DS 6), no refilling is started but the dosing is continued in volumetric operation until the empty range is reached (DS 4).	
163	**Emptying off** The command deactivates emptying in automatic operation as well as in manual operation.	

Code	Command meaning	Remarks
164	**Start automatic parameterization** After the start, the operating points of the device characteristic curve are started up individually and retained for the parameterized determination time in each case. Internally, the F1, F2 filters, the control parameters kp and Ti, and stability weight and stability time are then determined.	
165	**Start start-up mechanism 1** The device operating points are determined.	
166	**Start start-up mechanism 2** The device operating points are determined, followed by a switch to volumetric operation based on the setpoint defined (DS 20).	
167	**Start start-up mechanism 3** The device operating points are determined, followed by a switch to volumetric operation based on the setpoint defined (DS 20) and a switch to gravimetric operation after expiry of the start-up time.	
168		
170	**Reserve**	
171	**Device operating point 1 valid** This command indicates operating point 1 as being valid on the device characteristic curve. The output value and associated flow rate value are retained (in DS 11).	
172	**Device operating point 2 valid** This command indicates operating point 2 as being valid on the device characteristic curve. The output value and associated flow rate value are retained (in DS 11).	
173	**Device operating point 3 valid** This command indicates operating point 3 as being valid on the device characteristic curve. The output value and associated flow rate value are retained (in DS 11).	

Code	Command meaning	Remarks
174	**Device operating point 4 valid** This command indicates operating point 4 as being valid on the device characteristic curve. The output value and associated flow rate value are retained (in DS 11).	
175	**Delete quality data** The contents of DS 37 are deleted with this command.	
176	**Factor 10% valid** This command determines the fill quantity factor for the material characteristic curve and stores it in DS 13.	
177	**Factor 30% valid** This command determines the fill quantity factor for the material characteristic curve and stores it in DS 13.	
178	**Factor 50% valid** This command determines the fill quantity factor for the material characteristic curve and stores it in DS 13.	
179	**Factor 70% valid** This command determines the fill quantity factor for the material characteristic curve and stores it in DS 13.	
180	**Factor 90% valid** This command determines the fill quantity factor for the material characteristic curve and stores it in DS 13.	
181	**Display current setpoint** This command switches on the display of the setpoint in DS 34 (from DS 36).	
182	**Display effective setpoint** This command switches on the display of the effective setpoint in DS 34 (from DS 36).	
183	**Curr. Display control difference** This command switches on the display of the effective setpoint in DS 34 (from DS 36).	

Code	Command meaning	Remarks
184	**Curr. Display control difference in %** The command switches on the display of the control difference in 0.01% of the setpoint in DS 34 (from DS 36).	
185	**Display the current output value difference between volumetric and gravimetric operation** This command switches on the display of the output value difference between the current output value and the output value according to the material characteristic curve in 0.01% of the setpoint in DS 34 (from DS 36).	
186	**Display fill level in %** The command switches on the display of the fill level in 0.01% of the nominal fill level in DS 34 (from DS 36).	
187	**Display output value according to controller in %** The command switches on the display of the output value according to the PID controller in 0.01% of the nominal flow rate in DS 34 (from DS 36).	
188	**Display output value according to material characteristic curve in %** The command switches on the display of the output value according to the material characteristic curve in 0.01% of the nominal flow rate in DS 34 (from DS 36).	
189	**Display standardized output value in %** The command switches on the display of the standardized output value in 0.01% steps in DS 34 (from DS 36).	
190	**Display average weight change** The command switches on the display of the average weight change in DS 34 (from DS 37).	
191	**Display average flow rate** The command switches on the display of the average flow rate in DS 34 (from DS 37).	

Code	Command meaning	Remarks
192	**Display dosing consistency** The command switches on the display of the dosing consistency in DS 34 (from DS 37).	
193		
194		
195		

Table 12-1 SIWAREX FTC command list

The commands in the above table can be activated via all interfaces.
More commands can be activated on the SIMATIC S 7 interface of the FB SIWA_FTC.

Command group	Description
1...199	Commands are passed on to the module without reading or writing data records (scale, weighing, logging commands). The meanings of these commands correspond to the settings in table XX.
203...245...399	Read a data record 3...47. The numbers 248...399 are reserved for expansion.
403...445...599	Write a data record 3...47. The numbers 448...599 are reserved for expansion.
601...699 601 649 699	Range of combined commands. The block SIWA_FTC (FB44) can transfer several data records in sequence. Read DS 31, DS 32, DS 34 Read all data records (loss-in-weight scale) into the SIWAREX FTC (DS 3, DS 4, DS 6, DS 7, DS 8, DS 9, DS 10, DS 11, DS 12, DS 13, DS 15, DS 20, DS 26, DS 31, DS 32, DS 33, DS 34, DS 35, DS 36, DS 37, DS 44, DS 45, DS 47, DS 123) Write the data records (loss-in-weight scale) DS 3, DS 4, DS 6, DS 7, DS 8, DS 10, DS 11, DS 12, DS 13, DS 15, DS 20, DS 26 into the SIWAREX FTC

Table 12-2 SIWAREX FTC command groups

More information on command transfers from the control program via the SIMATIC interface can be found in chapter *6.12*

13 Messages and diagnostics

13.1 Message types

The SIWAREX FTC messages are divided into different types.

The **asynchronous** messages can be generated spontaneously at any time due to an unforeseen event. The internal and external hardware faults (operating messages) and the technology messages that can occur spontaneously during a weighing procedure.

The **synchronous** messages are always a response to user activity.

There are data errors if a plausibility error is determined in a data package that the user wants to send to the module and the module does not accept that data package. These are operating errors if the module in the current operating status cannot execute the given command.

The status displays are not messages in this respect. The status displays describe the status of the scale in normal operation and can be monitored or evaluated at any time.

13.2 Message paths

The SIWAREX FTC messages are passed on to the user by various paths. During configuration, it is important to choose the right path for routing and processing the messages.

Essentially, the messages are processed for two purposes:

- For display on a control unit
- For links in the control software to control certain reactions in the process.

The following message paths are possible:

- Message buffer output to the SIWATOOL FTC_L commissioning program
- Output through the SIWA_FTC function block to its message outputs
- Diagnostic alarms in SIMATIC CPU with OB82 evaluation
- Process alarms in the SIMATIC CPU with evaluation in the process alarm OBs.

13.3 Detection of messages using SIWATOOL FTC_L

A message buffer is integrated into the module and holds up to 100 entries. If the number of messages in the message buffer reaches 99 then a new message will immediately delete the oldest message. The message buffer can be read at any time with SIWATOOL FTC_L (menu point "Read all data records") and can be saved together with the scale parameters. This helps in recognizing, analyzing and solving problems in the system.

13.4 Detection of messages using FB SIWA_FTC

All of the messages of the SIWAREX module can be recognized and processed in the controller using the FB SIWA_FTC. Errors in the processing of the FB SWIA_FTC are additionally reported via the FB_ERR output variable (see chapter *6.12*.)

13.5 Detection of messages using the diagnostic alarms in the SIMATIC CPU

Operating messages (hardware faults) can be detected in the SIMATIC CPU using diagnostic alarms.

13.6 Detection of messages using process alarms

Process alarms enable the user to respond flexibly to technology messages or to the selected status information.

13.7 Message list data and operating errors

Error no.	Data and operator errors - Meaning	Explanation
1	Unknown command code	The SIWAREX does not recognize the command code or the data record in the parameterized mode or is unable to process the command or data record in the current operating state.
2	Action not permitted in service operation	Only certain commands or data entries are permitted in service operation. The last command or the data last sent cannot be accepted by the scale in service operation. The following commands are not permitted: - Start totalization - Taring (22, 24) - Output logs (31 to 35) - Start/stop trace (70, 71) First switch to normal operation.
3	Service operation cannot be deactivated as the module is not adjusted	A non-adjusted module cannot be switched to normal operating mode. First, adjust the scale and then you can leave service operation. A theoretical adjustment can be performed with the SIWATOOL FTC_L.
4	Action only permitted in service operation	Only certain commands or data entries are permitted in normal operation. The last command or the data last sent cannot be accepted by the scale in normal operation. First switch to service operation. The following activities can only be performed in service operation: - Load factory settings command (8) - Switch service operation off (2) - Adjustment commands (3, 4, 5, 6, 7) - Delete/format MMC (72 to 75) - Send DS 3
5	Calibration parameter transfer with active write protection not permitted	The calibration parameters (DS 3) may only be changed if write protection is not active (switch on the front moved to down position). First deactivate write protection. This also applies to the internal data record DS 26. Attention! A pre-calibrated scale will lose its calibration.
6	Adjustment command with active write protection not permitted	The adjustment commands can only be executed when write protection is inactive (switch on the front moved to down position). First deactivate write protection. Attention! A pre-calibrated scale will lose its calibration.
7	Download not possible as write protection is active	Downloading the firmware may only be done if write protection is inactive (switch on front moved to down position). First deactivate write protection. Attention! A pre-calibrated scale will lose its calibration.

Error no.	Data and operator errors - Meaning	Explanation
11	Transmission of the data record or command is not permitted in continuous operation	The data record or the command is not permitted to be activated during the totalizing.
12	Command cannot be executed because the previous command is not finished yet.	A new command cannot interrupt execution of the current command. Activate the command after the current command has finished executing.
13	Command or data transfer not allowed in this operating state	A new command cannot be executed in this operating state.
16		Reserve
21	Command not allowed as the module is damaged or OD is active	The activated command is not permitted as the scale has a fault or SIMATIC CPU is in STOP status. First correct the cause of the error (red LED on the front must go off).
22	DI assignment not permitted	You have assigned the digital inputs incorrectly. Correct the assignment.
23	DO assignment not permitted	You have assigned the digital outputs incorrectly. Correct the assignment. The outputs may only be parameterized with numbers 0 to 63 and 255.
25	Time range for pulse input not permitted	The measurement time entry for the pulse input is incorrect. The permitted range lies between 100 ms and 10,000 ms. Correct the entry.
29	Ext. analog default value implausible	The current value entry for the analog output lies outside the defined (DS 7) range. Enter a smaller value.
30	Analog output replacement value implausible.	The replacement value for the analog output lies outside the defined (DS 7) range. Is too large for the analog output. Enter a smaller value.
31	Analog zero value to analog end value implausible	The default analog zero value or analog end value is incorrect. Change at least one of the values.
35	Baud rate for RS232 not permitted	The baud rate is not permitted for the RS232 interface. Define the baud rate.
36	Process alarm assignment or process value assignment implausible	The allocation of the process alarms or process values in DS 7 is incorrect for the S 7 interface. Change the assignment.
37	Baud rate not defined for RS485	The baud rate for the RS485 interface is not defined. Define the baud rate.
43	Trace task not possible as MMC is	

Error no.	Data and operator errors - Meaning	Explanation
	full	
44	Trace task cannot be executed as MMC is defective or non-existent	
45	Trace recording cycle too small	The recording cycle in DS 7 is too small. Define a longer recording cycle (at least 5 x 10 ms for MMC).
56	Log text too long	The log text with filled in parameters is too long or the end character (EOT) is missing. Change the log text. Ensure that the respective number of characters for the field is set in place of the corresponding print field code. The overall length of the text filled with values must not exceed 160 characters (incl. printer control characters but without the final EOT).
57	Log text contains fields that are not permitted	Log text contains fields that are not permitted. Change the log text.
58	Log text contains angle brackets	Log text contains angle brackets. Remove the angle brackets from the log text.
62	Logging not possible as the weight lies outside the weighing range	Logs can only be output within the weighing range in verifiable operation (code OIML in DS 3).
63	Logging output not possible as the SIWATOOL FTA driver is active	The log cannot be output because the SIWATOOL FTC_L is active at the interface. Disconnect the PC and connect a printer.
64	Logging output not possible as the printer is not ready	The log cannot be printed as the printer is not ready. Check the printer.
65	Logging output not possible as a print job is still running	The log cannot be printed as another print job is still running. Wait until the current print job is complete.
66	Logging not possible as the MMC is full	Logging is not possible as the MMC is full. Switch MMCs.
67	Logging task cannot be executed, as MMC is defective or non-existent	Logging is not possible as the MMC is defective. Switch MMCs.
68	Log output not possible as no data is available.	Repeating the last log printout is not possible as there has been no previous printout or the saved data is defective.
70	Logging output not possible as the log ID is not in the print text	Log output is not possible as the text does not contain the log ID. Define the log ID in the text. This entry is necessary if the verifiable weight is contained in the log text in verifiable operation (technical regulation code OIML in DS 3).

Error no.	Data and operator errors - Meaning	Explanation
76	Value range adjustment digits exceeded	The definition for the adjustment digits in DS 3 is too large. Enter a smaller value. The highest permitted value is 16,777,215.
77	Regulation code not permitted	The regulation code is incorrect. Enter the correct code. The permitted entries are ---- or OIML.
78	Zero setting range > 4% or zero setting range exceeded	The zero definition range or zero setting range is too large. This is the case if you have defined a zero setting range of > 4% of the maximum weighing range, or > 20% of the zero setting range in DS 3 in verifiable operation (technical regulation code OIML in DS 3). The sum of the negative and positive values apply in this instance. Reduce the zero definition range or zero setting range.
79	Number of weighing ranges not allowed	The number of weighing ranges is incorrect. Enter 1, 2 or 3.
81	Relationship between weighing ranges implausible	The definition for weighing ranges is incorrect in DS 3 (max. and min. values). On a multi-resolution scale, the min. value of the next higher range must be equal to the max. value of the range below it. The max. value must be greater than the min. value. On a multi-range scale, the min. and max. values must be increasing sequential ranges and the max. value of a range must always be greater than the min. value. Check parameters.
82	Numeral step not plausible	At least one numeral step is incorrect in DS 3. The following numeral steps are permitted as numeral steps for the three weighing ranges and the distribution value total: 50, 20, 10, 5, 2, 1, .., 0.5, 0.2, 0.1, 0.05, 0.02, 0.01, 0.005, 0.002, 0.001, 0.0005, 0.0002, 0.0001. The numeral step in all three weighing ranges must not be less than one 6000th of the weighing range maximum value in verifiable operation (technical regulation code OIML in DS 3). The total numeral step must not be less than the numeral step of weighing range 1 in verifiable operation (regulation code OIML set in DS 3). The numeral step of a weighing range must not be less than the numeral step of the weighing range below it. Check parameters.
83	Filter parameter implausible	The filter parameter definition in DS 3 or DS 10 is not plausible. Check the codes for the filter type (0..2) and the limit frequency (0..9).
84	Characteristic value not plausible	The characteristic value in DS 3 is incorrect. Set the parameter to a valid value (1, 2 or 4).
85	Mean filter length not	The mean value filter is defined incorrectly in DS 3. Set

Error no.	Data and operator errors - Meaning	Explanation
	permitted	the parameter for the depth of the average value filter to a maximum of 250.
86	Adjustment weights error	The defined adjustment weights are incorrect. The weight values must be in ascending order, or 0 if not used.
87	Conversion factor error	The conversion factor from weight unit to large weight unit is implausible.
88	Adjustment zero setting time too large	The adjustment time and zero setting time are too great (0…900 s).
89		Reserve
94	Adjustment weight too low	The adjustment weight is too low in DS 3. Increase the adjustment weight interval. The measurement values between two sequential adjustment weights must be separated by a space of at least 2% of the measurement range.
96	Tare T- invalid	The subtractive tare has been exceeded. This error is generated in the following cases: ▪ The gross value lies above the defined permitted tare range for the taring command. ▪ An externally defined tare value is negative. ▪ An externally defined tare value is larger than the maximum value of weighing range 1 on a multi-resolution scale. ▪ An externally defined tare value is larger than the maximum tare value [%] of the largest weighing range defined in DS 3 when operating a multi-range scale in verifiable mode (technical regulation code OIML in DS 3).
97		
98	Totalizing memory already deleted	The delete distribution memory command could not be executed as the distribution memory is already zero
99	Distribution memory could not be logged	An error has occurred while logging the totalizing memory. Check the output device. Check the additional technology errors for indications concerning the cause of the error. A technology fault is defined with the cause.
100	Weight outside zero definition range	Zero definition cannot be executed as the current zero point lies outside the zero definition range defined in DS 3 or the current gross value lies above the largest parameterized weighing range value. For a loss-in-weight scale, the limit value is defined in DS 5.
101	Scale command cannot be executed as not at standstill	The weighing command (Taring, Zero definition, Logging) cannot be executed as the standstill is not within the defined standstill time in DS 3.
102	Adjustment weight missing	Adjustment command cannot be executed because the respective adjustment weight is not entered in DS 3.
105	Weighing operating	Incorrect weighing operating mode in DS 3. Enter a

Error no.	Data and operator errors - Meaning	Explanation
	mode not permitted or unknown	correct weighing operating mode.
106	Limit values implausible	The defined limit values in DS 4 are not plausible. Limit value 3 may only be operated as a max. limit value (On ≥ Off). Correct limit value 3.
111	Parameter for external distribution memory implausible	At maximum flow rate, the pulses for the external summator can no longer be output.
112	Nominal speed implausible.	Nominal speed implausible (must be greater than 0).
113	Pulse constant implausible.	Pulse constant implausible (must be greater than 0).
114		
115	Allocation of log text no. for autom. logging not permitted	The log text number in DS 21 is incorrect. Correct the number (0..4).
116	Conveyor length implausible	Effective conveyor length implausible (must be greater than 0).
119	Tilt angle implausible	Tilt angle of conveyor implausible (must be greater than 0).
120		
121		
122	Current value definition is not plausible	Current value definition (output value) in the device characteristic curve DS 11 is not plausible.
123	Operating point in the characteristic curve is not plausible	The definition of the operating point in the device characteristic curve or in the material characteristic curve is not plausible.
124	Reserve	Reserve
125	Flow rate setpoint not plausible.	The setpoint in DS 20 is not plausible.
143	Load amount too low (conveyor scale)	The defined load amount is too low. For conveyor scale only.
150	Command impossible as SIMATIC CPU is in STOP	Command impossible as SIMATIC CPU is in STOP
166	Date time implausible	The date or time definition is not plausible. Correct the definition. The following are permitted: ▪ Year: 0..99 ▪ Month: 1..12 ▪ Day: 1..28/29/30/31 (depending on the month) ▪ Hour: 0..23

Error no.	Data and operator errors - Meaning	Explanation
		▪ Minute: 0..59 ▪ Second: 0..59 Weekday: 1..7
167	Time definition implausible	The definition for a time entry is not plausible. Check the following conditions: ▪ DS 6: Measuring time for flow rate not in permitted range ▪ DS 6: Filling time does not match maximum filling time ▪ DS6: Inhibition time does not match settling time DS 12: Control cycle time, integration time, or differentiation time not plausible
168	Percentage default value incorrect	The percentage default value is not plausible.
169	Negative default value not permitted	Negative default value not permitted Change the definition.
170	Number range for weighing values exceeded	The numeral range for a definition is invalid. Permitted values are -100,000,000 and less than 100,000,000.
171	Checksum error	Checksum error in data record 26. The data was falsified or the DS versions do not match.
172	Selection code unknown	The parameters contain a number for selecting a property that has no meaning. The following values must be observed: DS 3: ▪ Source for weight simulation 0..2 ▪ Decade for rounding 0..6 ▪ Source for analog output 0..4 DS 6: Time unit selection incorrect DS 12 Controller activation or switching flag not plausible
176	Impedance error	Impedance error is output if the impedance deviation is greater than 10% from the reference value, or if an error has occurred during measurement.
178	DS writing not possible	The selected data record cannot be defined if write protection is set.

Table 13-1 List of data and operating errors

13.8 Message list technology messages

Error No.	Technology message - Meaning	Explanation
1-10	**MMC error**	
1	Card function not executable	MMC defective or non-existent. MMC check required. This error is generated: ▪ If a trace entry should be made in the MMC, but no formatted MMC is inserted ▪ If the MMC is deleted during a logging/trace entry ▪ If the MMC contains data errors that cannot be restored after insertion
2	Trace recording aborted as the MMC is full	Trace recording has been aborted because there is no more memory available. If recording to the MMC has been parameterized, use a new MMC. Set the recording method to circulating storage before formatting an MCC so that the oldest data is automatically overwritten continuously. If recording to RAM is defined, read the data, if desired, and delete the trace memory. Set the recording method to circulating storage if you want to overwrite the oldest data automatically.
3	Recording aborted as the parameters have been changed	Trace recording has been aborted because the recording device parameters have been changed during the recording process.
4	Logging not possible as the MMC is full	Logging to the MMC cannot be performed because the memory on the MMC is exhausted. Use a new MMC.
5	Trace overloaded	The defined cycle for the trace recording cannot be processed. There may be problems with the MMC. Use a new MMC. If the problem still occurs, decrease the recording cycle of the trace function in DS 7 or record to the RAM memory (MMC parameter in DS 7).

Error No.	Technology message - Meaning	Explanation
11-20	**Log output error**	
11	Error in log	Logging the used text is not possible because a non-defined code has been defined for a variable field. Check the log texts in DS 40, 41, 42 or 43.
12	Timeout printout	A print job was not completed within the monitoring time defined for logging in DS 4. Check the output device or increase the monitoring time.
13	Error output device not ready	Logging is not possible because the defined output device was not ready. If the printer is defined as the output device, check that the printer is connected properly and that it is ready. If the MMC is selected as the MMC, check whether a formatted MMC is being used.
14	Logging not possible as the weight lies outside the weighing range	Logging not possible as the weight lies outside the weighing range in verifiable application (code in DS 3 OIML)
15		Reserve
16	Logging is not possible as there is no log ID in the print text	Logging is not possible as no log ID is defined in the log string (verifiable application, code in DS 3 - OIML).
17	Logging is not possible because the printer is not ready	Logging is not possible because the printer has not indicated that it is ready. Check the printer.
18	Logging is not possible because the MMC is defective or is not available	Logging is not possible because the MMC is defective or it has been removed. Change or insert the MMC.
19	Logging is not possible because the SIWATOOL driver is active	Logging is not possible because the SIWATOOL program is active at the interface. Disconnect the connection to the PC and connect a printer.
20		Reserve
21-40	**Error in weighing function**	
21	Scale command aborted, not at standstill	Taring/zero definition or logging not possible because no standstill has been achieved within the standstill waiting time 1 defined in DS 3.
22	Zero setting not possible	The switch-on weight lies outside the value range defined in DS 3 for zero setting with the maximum positive and negative weights.

Error No.	Technology message - Meaning	Explanation
23	Zero setting/taring not possible	Zero definition or zero setting not possible because the gross is outside the zero definition range or taring is not possible because the tare maximum load has been exceeded.
41-100	**Error in continuous operation**	
50	Weighing procedure aborted because of CPU stop	A running process has been aborted because the S7 CPU went into stop status.
70	Time for maximum control difference elapsed	The max. control difference was longer than the maximum permitted time.
71	Procedure stopped because value not in permitted measuring range	Refilling was stopped because the measuring range was exceeded
72	Maximum refilling time was exceeded	Maximum time for refilling procedure was exceeded. (Refilling is not switched off)
73	Reserve	Reserve
74	Max. vol. time exceeded	Monitoring time for switching back from volumetr. operation to gravimetr. operation has elapsed
75	Toleration time elapsed	After the time has expired, the scale is switched to volumetric operation or dosing stops (if parameter is defined).
76	Start-up mechanism canceled	Start-up mechanism interrupted. Device characteristic curve not determined.
101	Reparameterization of digital load cell failed	Error occurred during transmission of parameters to digital load cell (DS 53). The load cell issued a negative acknowledgement.

Table 13-2 List of technology messages

13.9 Message list of operating messages

If an error generates an operating message, the red SF LED on the front of the module is illuminated. The operating messages are generated coming and going.

Error No.	Operating messages - Meaning	Solution
	Internal module error going	
1	Reboot due to error in RAM read-write testing	The error can mean that the module is defective. This fault must be reset with the "Acknowledge error" command. *Note: An error is deleted by acknowledging but is never set as there is no more activity when a RAM fault occurs → Watchdog, Error 2*
2	Reboot caused by watchdog error (mandatory acknowledgment)	The module had to be reset because of a critical error. This fault must be reset with the "Acknowledge error" command.
3	Reboot caused by program error (mandatory acknowledgment)	The error can mean that the module is defective. This fault must be reset with the "Acknowledge error" command. Contact the SIWAREX hotline.
4	Process alarm lost	Process alarm at the S7 interface lost
5	Parameter error (data loss)	Parameter error (data loss). One or more data segments in non-volatile memory are defective. Load the defective data records e.g. with the Set default values command or transfer the affected records individually.
	External error going	
17	Limit for load cell signal exceeded or undershot	The measurement signal is too high. Measure the measurement voltage with a multimeter and check the load cells. Check the set characteristic value in DS 3.
18	Wire break	The connection to the load cells has been broken. Check the load cell connection.
19	ADC error	The AD converter must be reset because of a fault.

Error No.	Operating messages - Meaning	Solution
20	Life bit timeout	The SIMATIC CPU has not tracked the life bit within the defined time. Communication via the FB SIWA is faulty.
23	Conveyor speed too low	The pulse input no longer delivers pulses (fewer than 2 pulses)
24	Fault on RS485	Communication fault at the RS485 interface.

Table 13-3 List of operating messages - going

Error No.	Operating messages - Meaning	Solution
	Internal module error going	
129	Reboot due to error in RAM read-write testing	The error can mean that the module is defective. This fault must be reset with the "Acknowledge error" command. *Note: An error is deleted by acknowledging but is never set as there is no more activity when a RAM fault occurs → Watchdog, Error 2*
130	Reboot caused by watchdog error (mandatory acknowledgment)	The module had to be reset because of a critical error. This fault must be reset with the "Acknowledge error" command.
131	Reboot caused by program error (mandatory acknowledgment)	The error can mean that the module is defective. This fault must be reset with the "Acknowledge error" command. Contact the SIWAREX hotline.
132	Process alarm lost	Process alarm at the S7 interface lost
133	Parameter error (data loss)	Parameter error (data loss). One or more data segments in non-volatile memory are defective. Load the defective data records e.g. with the Set default values command or transfer the affected records individually.
	External error going	
145	Limit for load cell signal exceeded or undershot	The measurement signal is too high. Measure the measurement voltage with a multimeter and check the load cells. Check the set characteristic value in DS 3.
146	Wire break	The connection to the load cells has been broken. Check the load cell

Error No.	Operating messages - Meaning	Solution
		connection.
147	ADC error	The AD converter must be reset because of a fault.
148	Life bit timeout	The SIMATIC CPU has not tracked the life bit within the defined time. Communication via the FB SIWA is faulty.
151	Conveyor speed too low	The pulse input no longer delivers pulses (fewer than 2 pulses)
152	Fault on RS485	Communication fault at the RS485 interface.

Table 13-4 List of operating messages - coming

14 Accessories

There are necessary and optional accessories for the SIWAREX FTC.

The essential accessories are indicated in the following table.

Description	Order no.
SIWAREX FTC Weighing electronics for continuous weighing for S7-300 and ET200M. EU construction type certification 3 x 6000d as non-automatic weighing machine Application areas: non-automatic weighing machine, force measurement, conveyor scale, loss-in-weight scale and bulk flow measurement device.	**7MH4900-3AA01**
• **SIWAREX FTC device manual** (The device manual is only available electronically and is available on the Internet at www.siemens.de/siwarex)	
SIWAREX FTC configuration package for SIMATIC S7 for non-automatic weighing machine, force measurement, loss-in-weight scale and bulk flow measurement device on CD-ROM • SETUP for S7 integration from Step7 V5.2 • S7 function block, Getting Started • PC parameter software SIWATOOL FTC_L • Manual on CD-ROM	**7MH4900-3AK02**
SIWAREX FTC_B configuration package for PCS7 V7.0 (conveyor scale only) on CD-ROM • SETUP for S7 integration • Function block for the CFC plan • Face plate for WINCC • PC parameter software SIWATOOL FTC_B • Manual on CD-ROM	**7MH4900-3AK63**
SIWAREX FTC_L configuration package for PCS7 V7.0 (loss-in-weight scale only) • SETUP for S7 integration • Function block for the CFC plan • Face plate for WINCC • PC parameter software SIWATOOL FTC_L • Manual on CD-ROM	**7MH4900-3AK64**
SIWATOOL-connection cable from SIWAREX FTC with a serial PC interface, for 9-pin PC interfaces (RS 232)	
• **Length 2 m**	**7MH4702-8CA**
• **Length 5 m**	**7MH4702-8CB**
• **40-pin front connector**, with screw contacts (required for every SIWAREX module), alternatively with spring clamps - see next point	**6ES7 392-1AM00-0AA00**
• **40-pin front connector**, with spring clamps (required for every SIWAREX module), alternatively with screw contacts - see next point	**6ES7 392-1BM00-0AA00**

13BACCESSORIES

Description	Order no.
• **Shielding contact rail** sufficient for one SIWAREX FTC module	**6ES7 390-5AA00-0AA0**
• **Shield terminal clamp** Contents: 2 pieces (suitable for cable of diameter 4 to 13 mm) Note: One shield terminal clamp is required for each of the following: - Scale connection - RS 485 interface - RS 232 interface	**6ES7 390-5CA00-0AA0**
• S7 profile rail	
- **160 mm**	**6ES7 390-1AB60-0AA0**
- **480 mm**	**6ES7 390-1AE80-0AA0**
- **530 mm**	**6ES7 390-1AF30-0AA0**
- **830 mm**	**6ES7 390-1AJ30-0AA0**
- **2000 mm**	**6ES7 390-1BC00-0AA0**
Power supply PS 307 (only required if no DC 24 V is available) AC 120/230 V; DC 24 V	
• **PS 307-1B; 2 A**	**6ES7 307-1BA00-0AA0**
• **PS 307-1E; 5 A**	**6ES7 307-1EA00-0AA0**
• **PS 307-1K; 10 A**	**6ES7 307-1KA00-0AA0**
Label strips (10 pieces, replacements)	**6ES7 392-2X00-0AA0**
Remote display (optional)	
The digital remote display model Siebert S102 can be connected directly to the SIWAREX FTC via an RS485 interface Siebert Industrieelektronik GmbH Postfach 1180 66565 Eppelborn, Germany Tel. +49 (0) 6806/980-0 Fax: +49 (0) 6806/980-999 Internet: http://www.siebert.de For more detailed information, contact the manufacturer.	
SIWAREX JB connection and distribution box for parallel switching of load cells, optional	**7MH4710-1BA**
SIWAREX EB expansion box for extending load cell cables, optional	**7MH4710-2AA**
Micro Memory Card (SIMATIC), optional	7MH4900-2AY20
Calibration set for non-automatic weighing machine - Accessories for a calibration certification (sticker plate, calibration marks, CD with samples and information)	**7MH4900-2AY10**
Ex interface, SIWAREX IS model with ATEX certification for intrinsically safe connection of load cells - including manual	
• • with short-circuit current < DC 199 mA	**7MH4710-5BA**
• • with short-circuit current < DC 137 mA	**7MH4710-5CA**
Cable (optional)	
Cable Li2Y 1 x 2 x 0.75 ST + 2 x (2 x 0.34 ST) - CY for connecting a SIWAREX FTC with connection and distribution box (JB), expansion box (EB) or Ex interface (Ex-I) as well as between two JBs, for stationary cabling, occasional bending is possible, 10.8 mm outer diameter for Environmental temperature -20 to +70°C	**7MH4702-8AG**

Description	Order no.
Cable Li2Y 1 x 2 x 0.75 ST + 2 x (2 x 0.34 ST) - CY, blue cover Connecting of connection and distribution box (JB) or expansion box (EB) in explosion hazard areas and Ex interface (Ex-I), for stationary cabling, occasional bending is possible, blue PVC insulating cover, approx. 10.8 mm outer diameter for environmental temperature –20 to +70°C	**7MH4702-8AF**
Cable LiYCY 4 x 2 x 0.25 mm² for RS 485	**7MH4407-8BD0**

15 Technical data

15.1 24 V Power supply

An isolated functional extra-low voltage (in accordance with EN60204-1) must be ensured by the system power supply.

Rated voltage	DC 24 V
Upper/lower limits static	DC 20.4 V/28.8 V
Upper/lower limits dynamic	DC 18.5 V/30.2 V
Non-periodic excess voltage	DC 35 V for 500 ms with a recovery time of 50 s.
Max. current consumption	500 mA
Power loss of module typical	7.5 W

Table 15-1 Data: 24 V power supply

15.2 Power supply from S7 backplane bus

Current consumption from S7-300 backplane bus	Typical 55 mA

Table 15-2 Data: Power supply from S7 backplane bus

15.3 Load cell activation

EU type certification as non-automatic weighing machine, class III	3 x 6000 d (pi = 0.4)
Precision with Ex-i interface	3 x 6000 d (pi = 0.5)
Error limit in accordance with DIN1319-1 from measurement range end value at 20 °C ±10 K	Measuring range 1 mV/V: ≤ 0.01 % Measuring range 2/4 mV/V: ≤ 0.005 %
Refresh rate internal/external	2.5 ms/10 ms
Resolution internal	16 million parts
3 measurement ranges	0 to 1 mV/V 0 to 2 mV/V 0 to 4 mV/V
Max. distance to load cell (verifiable)	1000 m (500 m)
Max. distance from load cell to Ex-i-Interface in Ex range	150/500 m for gas group IIC 1000 m for gas group IIB (see SIWAREX IS device manual)
Lowest permitted input signal for a calibration value in verifiable operation	≥ 0.5 µV/e

Load cell power Voltage Current	Typical DC 10.2 V * ≤ 184 mA
Permitted load cell resistance without Ex-i interface	> 56 Ω < 4010 Ω
Permitted load cell resistance with Ex-i interface	> 87 Ω < 4010 Ω
Monitor for sensor inputs	Typical ≥ 5 V Hysteresis 120 mV
Response time sense line monitoring	≤ 1 s
Common mode suppression CMRR @50 Hz	Typical 120 dB
Measuring value filtering for low-pass filter	0.05...20 Hz
Measured value filtering for mean value filter	2...250 values
Impedance measurement for load cells	Measuring range 56 Ω...4010 Ω Precision ±5% Repeat accuracy <1 %
Potential isolation	500 V

* Values apply to module output

Table 15-3 Data: Load cell connection

15.4 Analog output

The defined replacement value is output for active BASP/ OD signal (S7 CPU).	
Range 1	0 to 20 mA
Range 2	4 to 20 mA
Max. total error at 25 °C	< 0.5 % *
Update rate	10 ms
Load (incl. line resistance)	≤ 520 Ω, ≤ 30 nF
Cable length 0.5 mm^2	200 m
Temperature coefficient	max. ± 75 ppm/K
Resolution	12-bit (4096 parts) **
Potential isolation	500 V

* Definitions apply with current >0.5mA

** Resolution reduced by 20% with operating mode 4 to 20 mA

Table 15-4 Data: Analog output

15.5 Digital inputs (DI), digital outputs (DO)

The parameterized value is always output on the DO for active BASP/OD signal (S7 CPU). A recovery diode is to be used on the consuming component with inductive loads on the DO.		
	DI	**DO**
Amount	7	8
Rated voltage	DC 24 V	
Potential isolation	500 V	
Voltage range for H signal	DC 15 V to 30 V	
Voltage range for L signal	DC -3 V to 5 V	

Input current (15 to 30 V)	2 to 15 mA	
Switching frequency	max. 50 Hz	max. 50 Hz
Rated current		0.5 A
Max. output current		0.6 A
Max. cumulative current of all outputs		2 A
Potential isolation		500 V
Voltage drop on module		< 0.25 V
Switching delay		≤ 12 ms
Resistance to short-circuits		Yes[1]

[1] Output current pulsed upon short-circuit

Table 15-5 Data: Digital inputs, digital outputs

15.6 Counter input CI (for conveyor scale)

Number	1
Rated voltage	DC 24 V
Potential isolation conforming to IEC 1131, UL 508, CSA C22.2 NO. 142	500 V
Voltage range for H signal	DC 9 V to 30 V
Voltage range for L signal	DC -3 V to 5 V
Input current (15 to 30 V)	2 to 15 mA
Switching frequency	max. 10 kHz
Potential isolation	500 V

Table 15-6 Data: Counter input CI

15.7 RS 232C interface

Baud rate	1200 to 115200 baud
Data bits	8
Parity	Even
Stop bits	1
Max. distance	15 m
Signal level	in accordance with EIA-RS232C
Potential isolation	500 V

Table 15-7 Data: RS 232C interface

15.8 RS 485 interface

Baud rate	1200 to 19,200 baud
Data bits	7 or 8
Parity	Even/odd
Stop bits	1 or 2
Max. distance	1000 m at 1200 baud
Signal level	Conforms to EIA-RS485
Termination resistance	390ΩR220Ω / 390Ω
Potential isolation	500 V

Table 15-8 Data: RS 485 interface

15.9 Dimensions and weight

Dimensions W x H x D	80 x 125 x 130 mm
Weight	600 g

Table 15-9 Data: Dimensions and weight

15.10 Mechanical requirements and data

Test	Standards	Test values
Vibration in operation	IEC 60068-2-6 IEC 60721-3-3, class 3M3 IEC 61131-2	Test Fc 10...58 Hz: 0.075 mm movement 58...150 Hz: 9.8 m/s^2 10 cycles per axis 1 octave/min.
Shock in operation	IEC 60068-2-27 IEC 60721-3-3, class 3M3 IEC 61131-2	Test Ea 150 m/s^2, half sine Duration: 11 ms Number: 3 per axis in neg. and pos. direction
Vibration during transport	IEC 60068-2-6 IEC 60721-3-2, class 2M2 IEC 61131-2	Test Fc 5...9 Hz: 3.5 mm movement 9...500 Hz: 9.8 m/s^2 10 cycles per axis 1 octave/min.
Shock during transport	IEC 60068-2-29 IEC 60721-3-2, class 2M2 IEC 61131-2	Test Eb 250 m/s^2, half sine Duration: 6 ms Number: 1000 per axis
Free fall	IEC 68000-2-32 IEC 61131-2	Test Ed Height of fall 1 m Number of attempts: 5 Packed ready for dispatch

Table 15-10 Data: Mechanical requirements

15.11 Electrical, EMC and climatic requirements

15.11.1 Electrical protection and safety requirements

Requirement fulfilled	Standards	Comments
Safety regulations	EN60204; DIN VDE 0113; IEC 1131; UL 508; CSA C22.2 No.142; FM class I, Div.2; UL/CSA	UL/CSA/FM zone 2 certification upon request
Protection class	VDE 0106 part 1 IEC 536	Protection class I, with protective conductor
IP protection type	DIN 60529	in S7 frame: IP20

Requirement fulfilled	Standards	Comments
	IEC 529	SIWAREX FTC only: IP10
Air gaps and creepage distances	IEC 1131 UL508 CSA C22.2 No.142	Excess voltage category II Degree of contamination 2 Circuit board material IIIa Circuit track spacing 0.5 mm
Isolation test	IEC 1131-2: 1992 CSA C22.2 No.142	Rated voltage 24 V Test voltage 500 V DC
Fire resistance	for "open type controller": IEC 1131-2: 1992; UL 508	
Material	SN 36350 (3.93)	

Table 15-11 Data: Electrical protection and safety requirements

15.11.2 Electromagnetic compatibility

Interference emission **(industrial use)**: EN 61000-6-4		
Comments	Standard	Limit values
Emission of radio interference (electromagnetic fields)	IEC 61131-2	EN 55011 Class A, Group 1 30-230 MHz: < 40 dB(µV/m) Q 230-1000 MHz: < 47dB(µV/m) Q
Emission on power supply lines	IEC 61131-2	EN 55011 Class A, Group 1 EN 55014

Interference resistance **(industrial use)**: EN 61000-6-2		
Comments	Standard	Degree of severity
Burst pulses on power supply lines	IEC 61000-4-4 IEC 61131-2 NAMUR NE 21	2 kV
Burst pulses on data and signal lines:	IEC 61000-4-4 IEC 61131-2 NAMUR NE 21	1 kV *(RS232 interface)* 2 kV (remaining data and signal lines)
Electrostatic contact discharge (ESD)	IEC 61000-4-2 NAMUR NE 21	6 kV
Electrostatic air discharge (ESD)	IEC 61000-4-2 NAMUR NE 21	8 kV
Voltage spikes/Surge on power supply lines	IEC 61000-4-5 NAMUR NE 21 IEC 61131-2	± 2 kV unsym.* ± 1 kV sym.*
Voltage spikes/Surge on data and signal lines	IEC 61000-4-5 NAMUR NE 21 IEC 61131-2	± 1 kV unsym. (on cable shield)

Interference resistance **(industrial use)**: EN 61000-6-2		
Comments	Standard	Degree of severity
HF irradiation (electromagnetic fields)	IEC 61000-4-3 IEC 61131-2 NAMUR NE 21	26 MHz to 1000 MHz and 1.4 GHz to 2.0 GHz: 10 V/m 900 MHz and 1.89 GHz: 10 V/m 2.0 GHz - 2.7 GHz: 1 V/m
HF current feed Data, signal and power supply lines	IEC 61000-4-6 IEC 61131-2 NAMUR NE 21	0.15 kHz - 80 MHz 10 V (80% AM 1 kHz)

Table 15-12 Data: Electromagnetic compatibility

* To meet the requirements, an ext. protection element should be fitted (e.g. Blitzductor BVT AD24 from Dehn & Söhne).

Attention
This is a class A device. In residential areas, this device can cause radio interference. In such areas, users must take suitable measures (e.g. use in 8MC cabinets).

15.12 Environmental requirements

The SIWAREX FTC is suitable for weather-protected, stationary application in SIMATIC S7-300 systems. Conditions for application conforming to IEC 1131-2.

For use in extreme operating conditions (e.g. heavy dust, corrosive vapors or gases etc.), additional measures are to be taken such as encapsulation.

Climatic requirements		
Comments	Environmental conditions	Areas of use
Operating temperature: Vertical installation in S7-300 Horizontal installation in S7-300 Verifiable operation	 -10 to +60 °C -10 to +40 °C -10 to +40 °C	The S7-300 standard modules must not be operated below 0°C
Storage and transport temperature	- 40 to +70°C	
Relative air humidity	5 to 95 %	Without condensation, corresponds to relative humidity (RH) exposure

Climatic requirements		
Comments	Environmental conditions	Areas of use
		level 2 in accordance with DIN IEC 1131-2
Pollutant concentration	$SO_{2:}$ < 0.5 ppm; H_2S: < 0.1 ppm;	RH < 60% no condensation

Table 15-13 Data: Climatic requirements

15.13 Licenses

Note:
The licenses that are currently valid for SIWAREX FTC are indicated on the SIWAREX FTC rating plate.

CE	Directives: 2004/108/EC "Electromagnetic compatibility" 94/9/EC "Explosion protection" (ATEX 100a) **Note**: Further information on the EC directives can be found in the product documentation accompanying every SIWAREX FTC.
c UL us HAZ. LOC.	Underwriters Laboratories Inc. in accordance with UL 508 (Industrial Control Equipment) CSA C22.2 No. 142 (Process Control Equipment) UL 1604 (Hazardous Location) CSA-213 (Hazardous Location) APPROVED for use in Class I, Division 2, Group A, B, C, D T4; Class I, Zone 2, Group IIC T4
FM APPROVED	Factory Mutual Research (FM) in accordance with Approval Standard Class Number 3611, 3600, 3810 APPROVED for use in Class I, Division 2, Group A, B, C, D T4; Class I, Zone 2, Group IIC T4
Ex	Explosion protection in accordance with EN 60079-15: 2005 (Electrical apparatus for potentially explosive atmospheres; Type of protection "n") Class II 3 G EEx nA II T4 When using the SIWAREX FTC in the ex area the important information in the manual "SIMATIC Automation Systems - Explosion Protection Principles (doc. no. A5E00206200)" must be observed.

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17 Abbreviations

ADC	Analog digital converter
ASCII	American Standard Code for Information Interchange
G	Gross weight
O&O	Operating & observing
CPU	Central processing unit
DO	Digital output
DB	Data block
DI	Digital input
FC	STEP7 function call
FB	Function block (S7)
FM	Function module (for S7-300)
HMI	Human machine interface (SIMATIC operator panel)
HW	Hardware
MMC	Micro Memory Card/Multimedia Card
MPI	Multi-point interface
NAWI	Non-automatic weighing machine
NSW	Non-automatic weighing machine
OD	Output disable (S7)
OIML	Organization Internationale de Metrologie Legale
OM	Object Manager for STEP 7 objects
OP	Operator panel (SIMATIC)
P-BUS	Peripherals bus (S7)
PC	Personal computer
RAM	Random Access Memory
S7-300	Siemens automation system for the medium performance range
S7-400	Siemens automation system for the upper performance range
SFC	System function call (S7)
STEP 7	Configuration device software for SIMATIC S7
T	Tare weight
TIA	Totally Integrated Automation
TP	Touch panel (SIMATIC)
UDT	Universal data table (S7)
LC	Load cell(s)