



SIWAREX[®] FTA

Device Manual

Status 05/2017



Safety Guidelines

This manual contains notices you have to observe in order to ensure your personal safety, as well as to prevent damage to property. The notices referring to your personal safety are highlighted in the manual by a safety alert symbol, notices referring only to property damage have no safety alert symbol. These notices shown below are graded according to the degree of danger.

⚠ DANGER
indicates that death or severe personal injury will result if proper precautions are not taken.
⚠ WARNING
indicates that death or severe personal injury may result if proper precautions are not taken.
⚠ CAUTION
with a safety alert symbol, indicates that minor personal injury can result if proper precautions are not taken.
CAUTION
without a safety alert symbol, indicates that property damage can result if proper precautions are not taken.
NOTICE
indicates that an unintended result or situation can occur if the corresponding information is not taken into account.

If more than one degree of danger is present, the warning notice representing the highest degree of danger will be used. A notice warning of injury to persons with a safety alert symbol may also include a warning relating to property damage.

Qualified Personnel

The device/system may only be set up and used in conjunction with this documentation. Commissioning and operation of a device/system may only be performed by **qualified personnel**. Within the context of the safety notes in this documentation qualified persons are defined as persons who are authorized to commission, ground and label devices, systems and circuits in accordance with established safety practices and standards.

Prescribed Usage

Note the following:

⚠ WARNING
This device may only be used for the applications described in the catalog or the technical description and only in connection with devices or components from other manufacturers which have been approved or recommended by Siemens. Correct, reliable operation of the product requires proper transport, storage, positioning and assembly as well as careful operation and maintenance.

Trademarks

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Disclaimer of Liability

We have reviewed the contents of this publication to ensure consistency with the hardware and software described. Since variance cannot be precluded entirely, we cannot guarantee full consistency. However, the information in this publication is reviewed regularly and any necessary corrections are included in subsequent editions.

Weighing Electronics for Automatic Scale

Revision 05/2017

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1 Preface

1.1 Purpose of This Manual

All of the information required to construct and operation the SIWAREX FTA is found in this manual.

1.2 Fundamental Knowledge Requirements

To understand this manual, a general knowledge of SIMATIC automation technology is required. Weighing technology is also beneficial.

1.3 Scope of this Manual

This manual refers to the SIWAREX FTA module:

Type	Name	Order number	from product status (Version)	
SIWAREX FTA	SIWAREX Flexible Technology Automatic Weighing Instrument*	7MH4900-2AA01	HW V1.0.0	FW V.9.5.2

Table 1-1 Validity of This Manual

*The name corresponds with the naming conventions of the OIML - Organisation Internationale de Metrologie Legale and means "Automatic Weighing Instrument".

Note

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

We reserve the right to deliver production information along with new modules or modules with a newer product status that contains the current information on the module.

For the legal-for-trade display SecureDisplay with TIA-Portal a comprehensive description including additive SIWAREX FTA parameters and commands can be found on the configuration package or in the internet under <http://support.automation.siemens.com/WW/view/en/17831309/133300>

The layout of this manual is based on activities that must be performed in the scope of project planning, commissioning, operation and service / maintenance.

<i>Chapter</i>	Description of Content
<i>1 Preface</i>	Notes on using this manual
<i>2 Scope of Delivery</i>	Description of the SIWAREX FTA scope of delivery
<i>3 Product Overview</i>	Overview of -Structure - Functionality - System integration of SIWAREX FTA
<i>4 Hardware Planning and Assembly</i>	Description - of individual hardware components - of structure and installation - of connections - of operating preparation.
<i>5 Weighing Functions</i>	
<i>6 Commands</i>	Description of commands that can be executed by SIWAREX FTA
<i>7 Messages and Diagnostics</i>	Description of error messages with notes on problem solutions
<i>8 Programming in SIMATIC STEP 7</i>	Description of data exchange with the SIMATIC CPU. This chapter is only meant for users who wish to write their own application software.
<i>9 Project planning in SIMATIC PCS 7</i>	Description for the PCS 7 project planning package
<i>10 Commissioning using a PC – SIWATOOL FTA</i>	Description - Software installation - Software functions
<i>11 Firmware-Update with SIWATOOL FTA</i>	Description - Software installation - Software functions
<i>12 Calibrating Applications</i>	Description of conditions for calibration
<i>13 Accessories</i>	Ordering information for optional components such as: - Digital remote display - Micro Memory Card - Exi-Interface
<i>14 Technical Data</i>	Technical Data
<i>15 Index</i>	
<i>16 Abbreviations</i>	

Table 1-2 Chapter Overview

1.4 Further Support

Do you have more questions about using the SIWAREX FTA? Then please contact your Siemens representative in the office or business location that is responsible for your area or technical support for SIWAREX - Tel.: +49 (0)721 595 2811.

Updated information on SIWAREX Weighing Technology can be found on the respective Internet Site.

<http://www.siemens.com/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 product information belong to the SIWAREX FTA scope of delivery.

For planning your work with the SIWAREX FTA, you will need:

- The SIWAREX FTA project planning package for SIMATIC S7

or

- The SIWAREX FTA project planning package for SIMATIC PCS7

These are not components included in the scope of delivery and must be ordered separately.

The corresponding project planning package is combined of the following components:

- SIWATOOL commissioning program for Windows
- HSP 2036 (Hardware Support Package) for installation of the module in the SIMATIC Manager hardware catalogue (only S7 classic)
- Standard software for operating the SIWAREX FTA in SIMATIC S7 and TIA-Portal
- Manual in several languages
- Description of the SecureDisplay with TIA-Portal
- Quick Guides for fast commissioning
- Set-up for PCS7 Library (Project planning package for PCS7 only)
- SIWAREX FTA Secure OCX – AddOn for WinCC flexible for configuration of the legal for trade display, at the moment only for S7 Classic (Overview of the suitable panels see chap. 8.6)

Application sample software can be very helpful for the first programming steps. This software can be downloaded, free-of-charge over the Internet (www.siemens.com/siwarex).

With software packages:

- SIWAREX Multiscale for batch systems
- SIWAREX Multifill for filling/bagging operations

there is a specially designed STEP 7 software available which enables a very effective system software development.

The required optional accessories are provided in chapter [13 Accessories](#).

3 Product Overview

3.1 General Information

SIWAREX FTA (Flexible Technology, Automatic Weighing Instrument) is a versatile and flexible weighing module which can be utilised wherever a scale should fulfil its tasks automatically. Automatic scale operation is characterised by an weighing procedure performed automatically according to a defined plan.

The function module (FM) SIWAREX FTA is integrated in SIMATIC and uses all features of the modern automation system such as integrated communication, diagnostics system and project planning tools to its advantage. The module can also be used without SIMATIC, as a stand-alone module however.

The scale functionality of the SIWAREX FTA includes the non-automatic scale (Non automatic weighing instrument conforming with OIML R-76), the automatic scale for balancing (Automatic gravimetric filling Instrument conforming with OIML R-61), the automatic scale for catch weighing (Automatic catch weighing instrument conforming with OIML R-51) and the automatic scale for discontinuous totalising (Discontinuous totalising automatic weighing instrument conforming with OIML R-107)

3.2 Benefits

SIWAREX FTA is characterised by a few clear advantages:

- Uniform structure and universal communication through the integration in the SIMATIC S7 and SIMATIC PCS7
- Uniform project planning with SIMATIC
- Direct application in SIMATIC automation system
- Application in the decentralised system concept by connecting to PROFIBUS DP/PROFINET through ET 200M
- Weight measurement or force to resolutions of 16 million parts
- Precision of 3 x 6000d, calibratable (0.5 µV per e)
- Calibratable display with SIMATIC HMI standard operator panels
- Measurement rates of internal 2.5 msec, external 10 msec
- Exact dosage switching signals (< 1 msec)
- Several dosage speeds
- Smooth or step controlled dosage control
- Parameter definable inputs and outputs

- Automatic weighing operation parameter setting for different applications
- Flexible adjustment for various SIMATIC requirements
- Simple parameter definition with the SIWATOOL program through the RS 232 interface
- Theoretical adjustment without any adjustment weights possible
- Module exchanging without readjusting the scale is possible
- Scale status recording
- Intrinsically safe load cell supply for Ex-Zone 1 (optional)
- Application in Ex-Zone 2
- Extensive diagnostic functions
- Stand-alone operation possible

3.3 Range of Application

SIWAREX FTA is the optimal solution wherever weighing technology requires high speed and precision. Because of the high resolution (3 x 6000 d, calibratable), scales can be built to work precisely over broad areas. Calibratable weighing systems, whether a filling system, unloading station, bagging operation, rotopacker, mixer or control stations can be constructed with the SIWAREX FTA. Typical fields of application are e.g.:

- Liquid filling
- Bagging in a packaging system
- Weighing catch levels as well as level decrease weighing and fill weighing
- Catch level testing
- Material loading with totalising

3.4 Structure

SIWAREX FTA is a function module (FM) of the SIMATIC S7-300 and can be read directly on the SIMATIC S7-300- or ET 200M bus board. Installation / cabling efforts for the 80 mm wide module are simplified with the profile rail assembly (snap-in technology).

Connecting load cells, power supply and the serial interface is all done through the 40 pin standard front connector.

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

In certain cases, the module can also be applied without the SIMATIC environment in so-called stand-alone operation. The module then works as a compact module that e.g. is connected to a PC.

3.5 Function

The primary task of the SIWAREX FTA consists of the precise measurement of the current weight values in up to three measurement ranges and the exact control of the weighing procedure. The control of the weighing procedure is completely run from the weighing module as if in separately constructed weighing electronics. The integration in SIMATIC enables the progress of the weighing procedure to be influenced directly from the PLC program however. This enables reasonable task distribution: The extremely fast weighing functions are performed in the SIWAREX module, latching and signal linking is done in the PLC.

There are different automatic weighing procedures for which SIWAREX FTA can be configured optimally by defining the corresponding parameters.

The following operating modes can be defined:

- Non Automatic Weighing Instrument – conforming with OIML R-76
- Automatic Gravimetric Filling Instrument – conforming with OIML R-61 (AWI)
- Automatic catch weighing instrument – conforming with OIML R51 (AWI)
- Automatic Totalising Filling Instrument- totalising – conforming with OIML R 107 (AWI)

During the weighing procedure, SIWAREX FTA monitors and controls a multitude of signals. The optimised system internal data exchange enables a direct evaluation of weighing signals and states in the PLC program.

The weighing procedure influence on the PLC enables a flexible adjustment to suit the changes in the system technology.

SIWAREX FTA 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. Exchanging modules during running operation is also possible when working with “active bus modules”.

The SIWAREX FTA has two serial interfaces. An RS 485 interface is used for connecting digital remote displays. A PC can be connected to the RS 232 interface for setting SIWAREX FTA parameters.

The weighing module SIWAREX FTA can also be used in explosion hazard areas (zones 21 and 22). Load cells are supplied with inherent safety with zone 1 applications using an optional Ex-interface SIWAREX IS.

If the regulation code OIML is set in the adjustment data, there will be a waiting period of 60 seconds after rebooting the SIWAREX FTA before the weight value is displayed. There is no waiting time when using digital load cells.

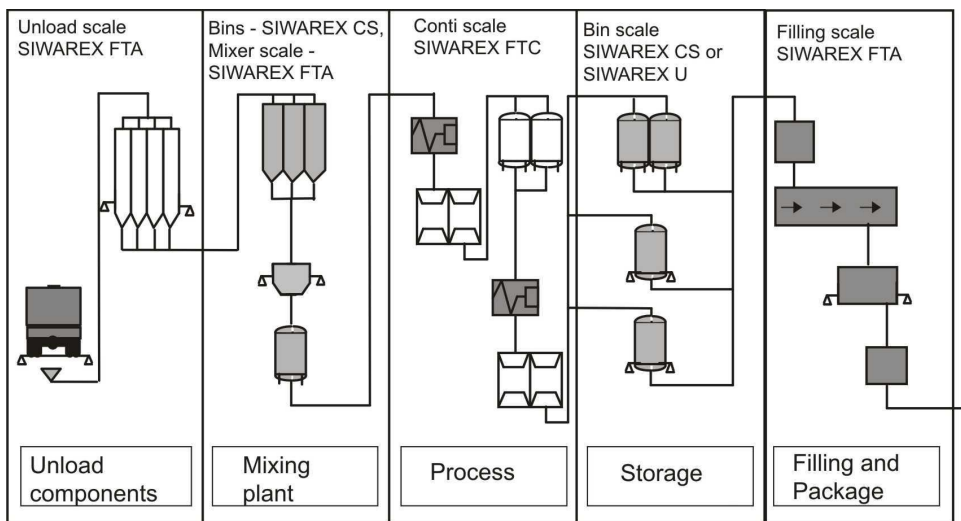


Image 3-1 Areas of application SIWAREX FTA in the production chain

3.6 System Integration in SIMATIC

SIWAREX FTA is completely integrated in the SIMATIC S7 and SIMATIC PCS7. The user is absolutely free to configure his automation solution including the weighing application as desired. The optimal solution can be created for small, medium and large systems by selectively combining the SIMATIC components. The project planning package and the example applications for SIMATIC can help you to quickly and efficiently create customer specific or branch specific solutions. The following image shows a typical assembly for a medium sized system.

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

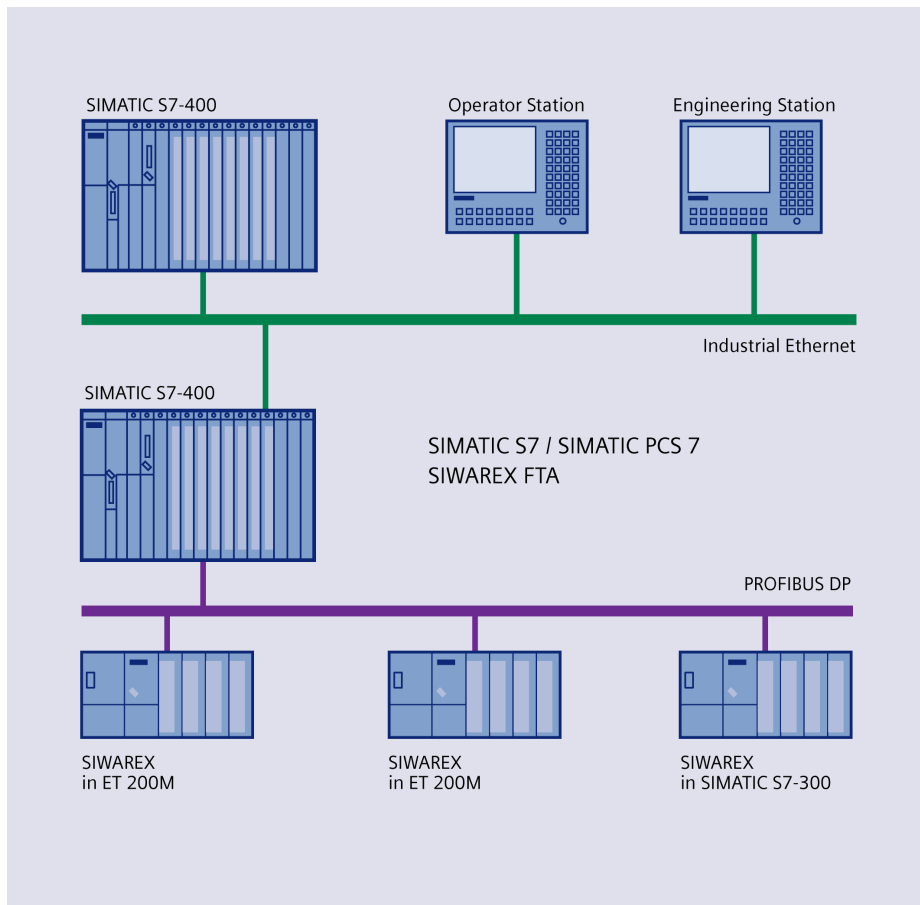


Image 3-2 Configuration SIMATIC S7/PCS7 with SIWAREX FTA

3.7 Commissioning and Service with SIWATOOL FTA

For commissioning, there is a special program SIWATOOL FTA for Windows operating systems.

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

Besides complete access to all parameters, memory or print-outs of the weighing file, the program can create weighing curves as well.

SIWATOOL FTA can also be used for reading the contents of the calibratable records from the calibratable scale memory.

The following image shows the structure of the individual program windows.

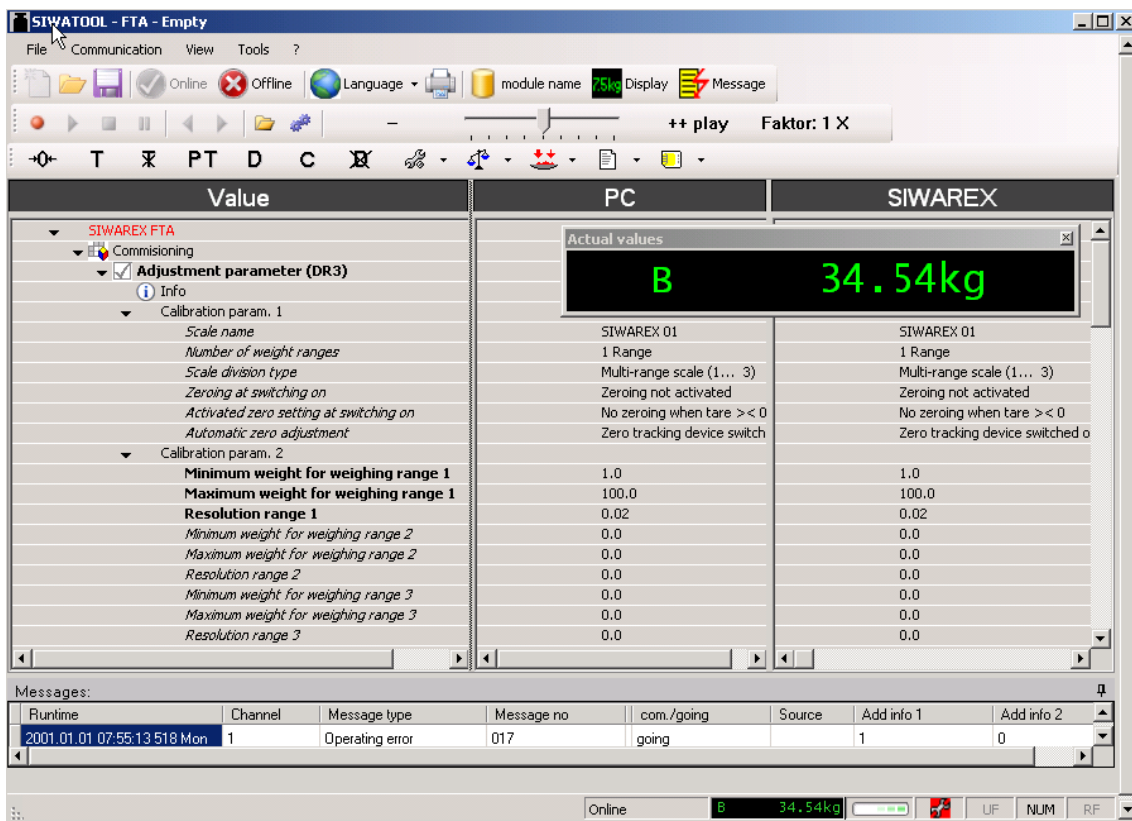


Image 3-3 SIWATOOL FTA Overview

Not only does the SIWATOOL FTA support the user for program entry. Analysing the diagnostics buffer, the contents of which can be saved together with the parameters after reading from the module is also very helpful.

A trace mode exists in the SIWAREX FTA module for optimising weighing progress. The recorded data can be displayed in a curve diagram using the MS Excel.

The following image shows the progress of a weighing procedure displayed with the SIWATOOL FTA.

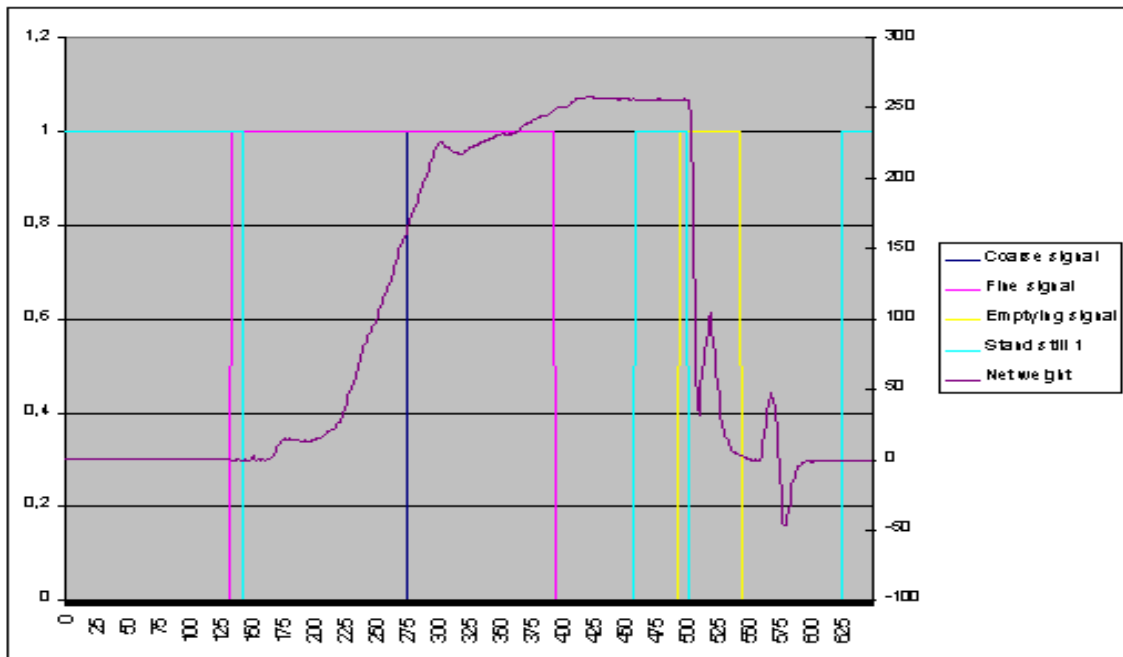


Image 3-4 Weighing procedure progress displayed from the tracing in SIWAREX FTA

3.8 Firmware Download with SIWATOOL FTA

Another feature of the SIWATOOL FTA program helps loading a new firmware version for SIWAREX FTA on-site. It allows you to perform firmware upgrades at any time and from anywhere.

3.9 Reading the stored weighing logs with SIWATOOL FTA

The weighing logs are stored on an MMC (Micro Memory Card) that is inserted into the SIWAREX FTA for the period of time defined in the weights and measures act. If a person disagrees with the results of a certain weighing procedure, the weighing data for that weighing procedure can be reconstructed from the MMC memory.

3.10 Quick Installation with SIWATOOL FTA Wizzard

The Function Wizzard is very helpful in defining parameters for the first time. The user answers several questions provided in dialogs and the program defines the correct parameters for SIWAREX FTA based on these answers.

4 Hardware Planning and Assembly



Warning Notes

For configuration, assembly and commissioning, the definitions from the manual for the SIMATIC S7 300 system are applicable. This chapter provides you with additional information for hardware configuration and assembly, and for preparing the SIWAREX FTA for operation.

The technical safety information is to be strictly adhered to.



Warning

Unqualified intervention in the device/system or not adhering to the warning notices can result in serious injury or damage to equipment. Only qualified personnel are permitted access to the operational components of this device / system.



Warning

The unit has been developed, manufactured, tested and documented according to the corresponding safety standards. The device itself will not cause any danger to equipment or personal health under normal circumstances.



Danger

Installation and start-up operation is not permitted until it is guaranteed that the machine in which these components are to be integrated corresponds with the guidelines 89/392/EWG.

4.1 Planning the Hardware in SIMATIC

SIWAREX FTA is a function module (FM) in the SIMATIC S7 300 automation system. It can be installed in all places that are constructed for function modules.

Utilisation with the SIMATIC S7 300 is possible in central operation, in an expansion device or decentralised in the ET 200M system.

Operation in the SIMATIC S7 400 is only possible decentralised in the ET 200M system. In this case, the active back-plane bus can be used.

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

Total width	Current requirements (5V) from SIMATIC back-plane bus	Application memory requirements in the SIMATIC CPU
n x 80 mm	n x 50 mA	3500 Bytes + n x 1200 Bytes

Table 4-1 Requirements for n SIWAREX FTA

The maximum amount of SIWAREX modules depends on the SIMATIC CPU respectively the ET200M head module, see details in SIMATIC catalogue.

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

4.2 Stand-alone operation

SIWAREX FTA is also ready for operation without SIMATIC. The described hardware configuration and wiring also applies for stand-alone operation. The only difference is that the module is not connected on the SIMATIC backplane bus and the power supply for the module is all handled through the 24V connector on the front.

We recommend the SIMATIC profile rail for fastening the module mechanically.

To run the module in stand-alone operation, use the instruction "12 Switch on stand-alone operation" using the SIWATOOL FTA. The instruction is saved i.e. after switching the power supply off and switching it on again, the module remains in stand-alone operation.

Several particularities must be observed however:

Switching to stand-alone operation can only be done if the module is not connected to a SIMATIC bus.

The module monitors the connections on the SIMATIC bus and if it detects that it is running in SIMATIC, it automatically switches SIWAREX into:

- SIMATIC operation with a default setting regarding the behavior for a CPU-stop, if the SIMATIC CPU is stopped or is already in Run state,
- the operating mode defined in the HW-config if the CPU switches from stop to RUN status.

This means that stand-alone operation is switched off automatically as soon as the module recognizes application in SIMATIC.

Deactivating stand-alone operation can be done with instruction "13 Switch off stand-alone operation".

4.3 EMC-Compatible Structure

SIWAREX FTA is a high-precision measurement device which has to dependably measure the slightest signal. Proper assembly and cabling is an absolute must for interference free operation.

4.3.1 Definition: EMC

EMC (Electromagnetic Compatibility) describes the ability of an electrical device to function in a defined electromagnetic environment without being influenced by its surroundings and without negatively influencing the surroundings.

4.3.2 Introduction

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

4.3.3 Possible Effects of Interference

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

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

Error-free functionality of the SIWAREX FTA can be influenced by interference.

4.3.4 Coupling Mechanisms

Depending on the means of distribution (conductive or non-conductive bound) and the distance between the interference source and the device, interference can be introduced through four different coupling mechanisms into the automation system.

Galvanic coupling

Capacitive coupling

Inductive coupling

Radiation coupling

4.3.5 Five Basic Rules for Guaranteeing EMC

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

Rule 1: Large conductive grounding surface connections

Ensure that while installing the automation devices, a well-made ground connection is made between the inactive metal components (see following section).

Connect all inactive metal components and low-impedance components with ground (broad cross-section).

Use screw connections on painted or anodised metal surfaces either with special contact washers or remove the insulated protective surface in the contact areas.

Do not use aluminium if at all possible for ground connections. Aluminium oxidises easily and is therefore less suitable for grounding connections.

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

Rule 2: Proper and organised wiring

Separate the cabling into groups (high-voltage lines, power supply lines, signal lines, ground wiring, data lines, etc.).

Run the high-voltage lines and ground wiring or data cables in separate channels or bundles.

Run measurement lines as close to grounding surfaces as possible (e.g. support beams, metal rails, cabinet panels).

Rule 3: Fasten cable shielding

Ensure that the cable shielding is connected properly.

Use shielded data wiring only. 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 FTA on the shielding channelling. 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.

Use metallic or metal-plated connector housings for the shielded data lines.

Rule 4: Special EMC measures

All inductivity that is to be controlled should be connected with suppressors.

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

Rule 5: Uniform reference potential

Create a uniform reference potential and ground all electrical operational elements.

Run sufficiently dimensioned potential equalizing cabling if potential differences exist or are to be expected between system components in the system. A potential equalisation is mandatory for Ex applications.

4.4 Assembly on the Profile Rail

When assembling the SIMATIC components and the SIWAREX FTA, the assembly regulations (AR) for the SIMATIC S7 must be fulfilled completely.

SIWAREX FT is assembled in the following steps.

1. Check for whether the SIMATIC bus connector is connected to the left of the SIWAREX FTA in the module group.
2. Connect the SIMATIC bus connector for the following module group in the SIWAREX if necessary.
3. Install the shielding strip under SIWAREX.
4. Hang the SIWAREX FTA in its place.
5. Fasten the SIWAREX FTA with 2 screws in the lower area of the module.
6. Label the SIWAREX FTA corresponding to your identification system.

4.5 Connections and Cabling

4.5.1 Connection areas for SIWAREX FTA

The following connection areas are found 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 (female) D-sub connector for RS 232 to PC or printer connection

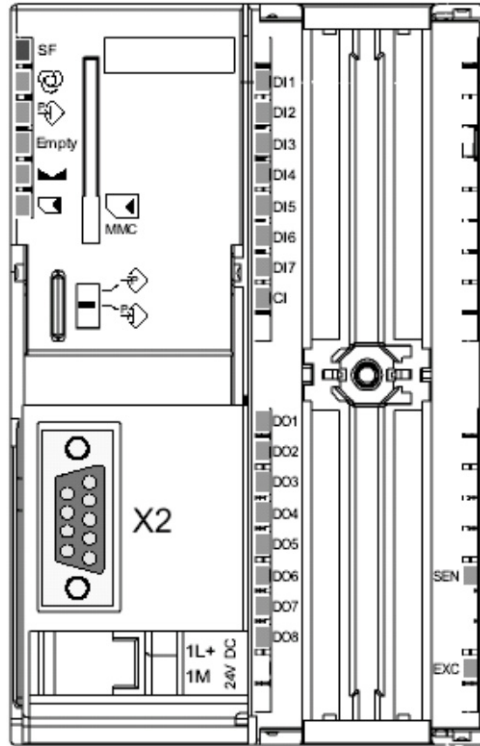


Image 4-1 SIWAREX FTA Front View

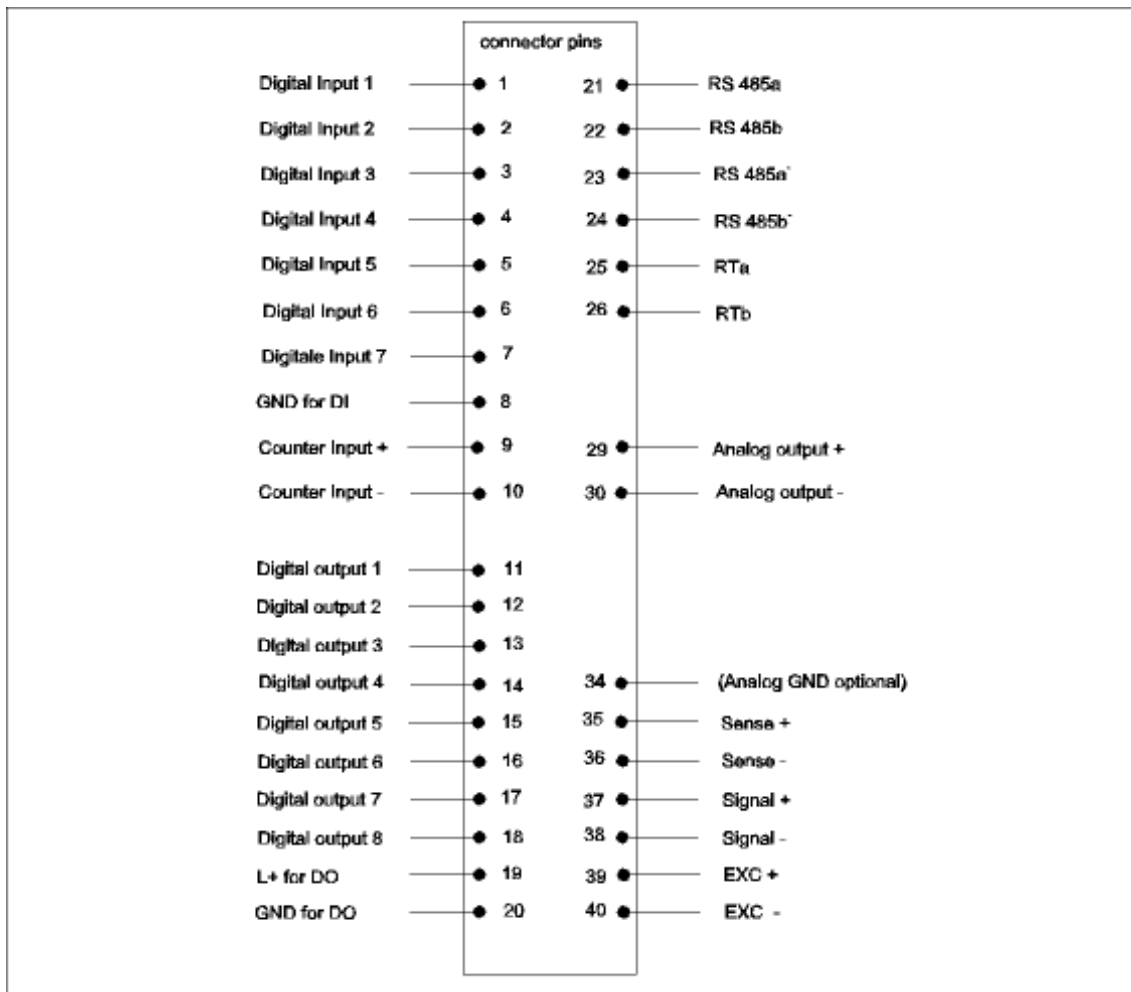


Image 4-2

SIWAREX FTA Pin Assignments

4.5.2 Shield connection

Special attention must be given to the shield strip for shielded lines. The interference resistance of the system can only be guaranteed if the properly constructed.

A cable is shielded to decrease the affects of magnetic, electrical and electromagnetic interference on this line. Interference on cable shielding is routed to ground through shielding rails that are conductively connected with the housing. To ensure that this interference stream does not become a source of interference, a low impedance connection to ground is especially important.

Use only lines with mesh-shielding. Shielding should provide at least 80% coverage.

For fastening the meshed shielding, use only metal cable clamps. The clamps must cover as much shielding as possible and ensure a good contact.

Shield clamps must be ordered separate to the grounding elements. The area covered by the shielding clamp is to be chosen corresponding with the cable diameter.

Approximately 1.5 cm of the cable insulation must be exposed in the area of the cable to be fastened with the shielding clamp. The exposed shielding is then pressed firmly against the grounding element with the shielding clamp.

The following figure shows a proper shielding clamp assembly

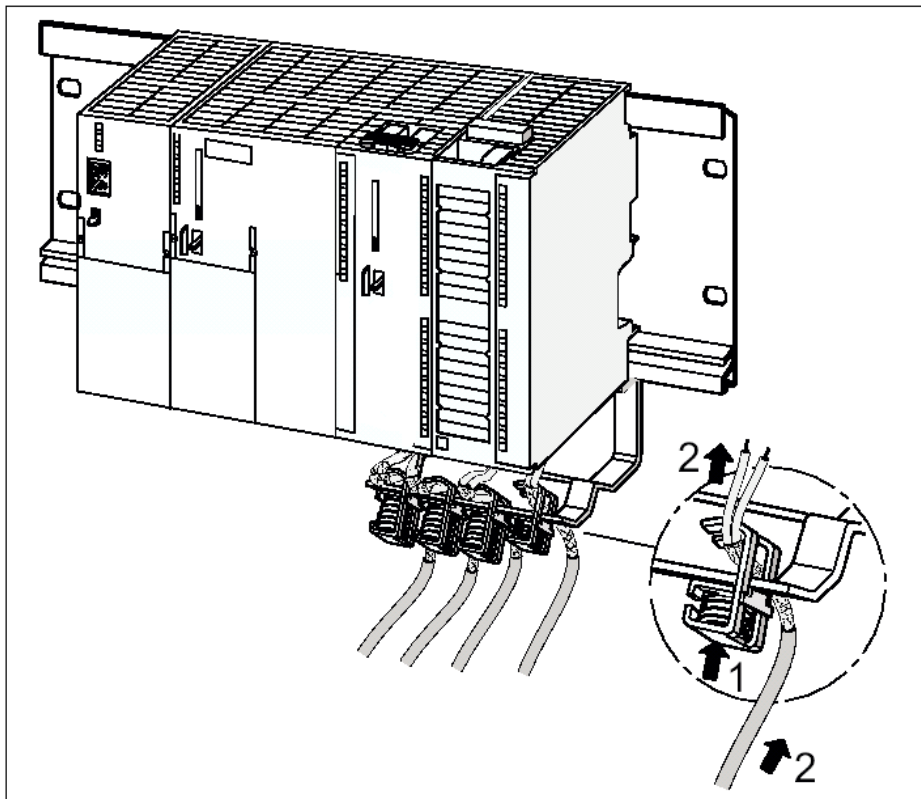


Image 4-3 Shield clamp assembly

The shielding should be pressed against the shielding rail by the shielding clamp.

4.5.3 Connecting the 24 V power supply

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

Note

In central operation in the S7 300 system, the SIMATIC CPU and SIWAREX FTA is to be connected to the same 24 V power supply.

Termination	Signal	Remark
1L+	24 V DC 1L+	Power supply +
1M	24 V DC 1M	Power supply M

Table 4-2 Power supply connection

4.5.4 Connection to front connector

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

Flexible cables with a cross-section of 0.25 to 1.5 mm² can be used. Remove the insulation from the cable for 6 mm and install wire end sleeves.

4.5.5 Load cell connections

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

- 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 chapter [Accessories](#).

Termination Clamp	Signal	Remark
X1.34	AGND	Analog ground (only to be used for servicing or with an external feed)
X1.35	SEN+	Sensor line +
X1.36	SEN-	Sensor line -
X1.37	SIG+	Measurement line +
X1.38	SIG-	Measurement line -
X1.39	EXC+	Load cells-Supply voltage +
X1.40	EXC-	Load cells-Supply voltage -

Table 4-3 Load cell connection

The following rules are to be followed when connecting load cells (WZ).

Using a junction box is required if more than one LC is connected (the LC must be connected parallel to one-another).

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.

In case of the danger of potential equalisation currents on the cable shielding, a potential equalisation 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 equalisation conductor is the preferred method of dealing with EMC (Electromagnetic Compatibility).

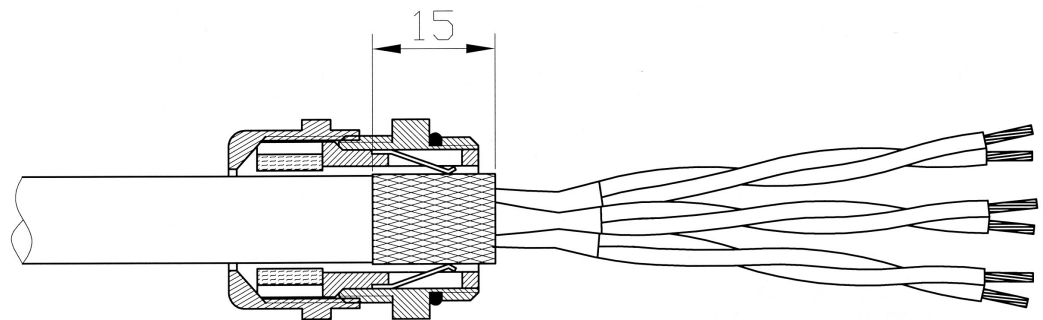


Image 4-4 Shielding in the screw joint

3. Twisted pair cable is required for the indicated wiring:

- Sensor lines (+) and (-)
- Measurement voltage lines (+) and (-)
- Supply voltage lines (+) and (-)

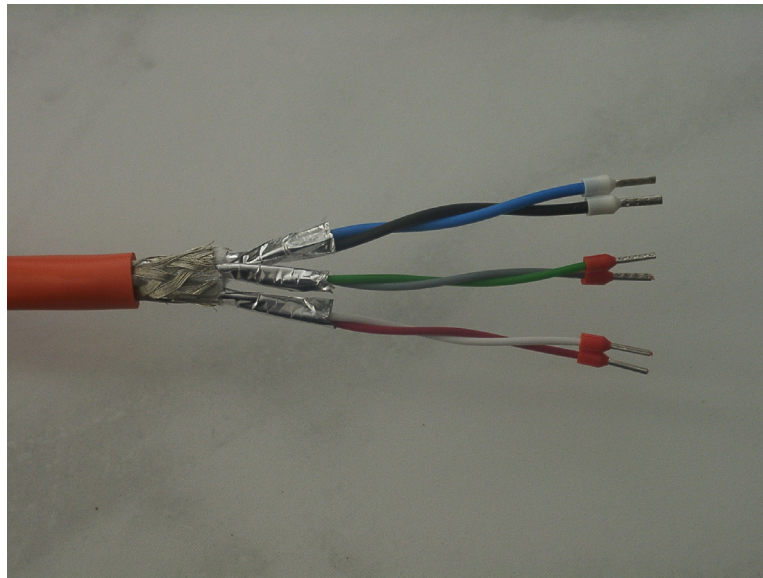


Image 4-5 Pairs of conductors in the shielded cable

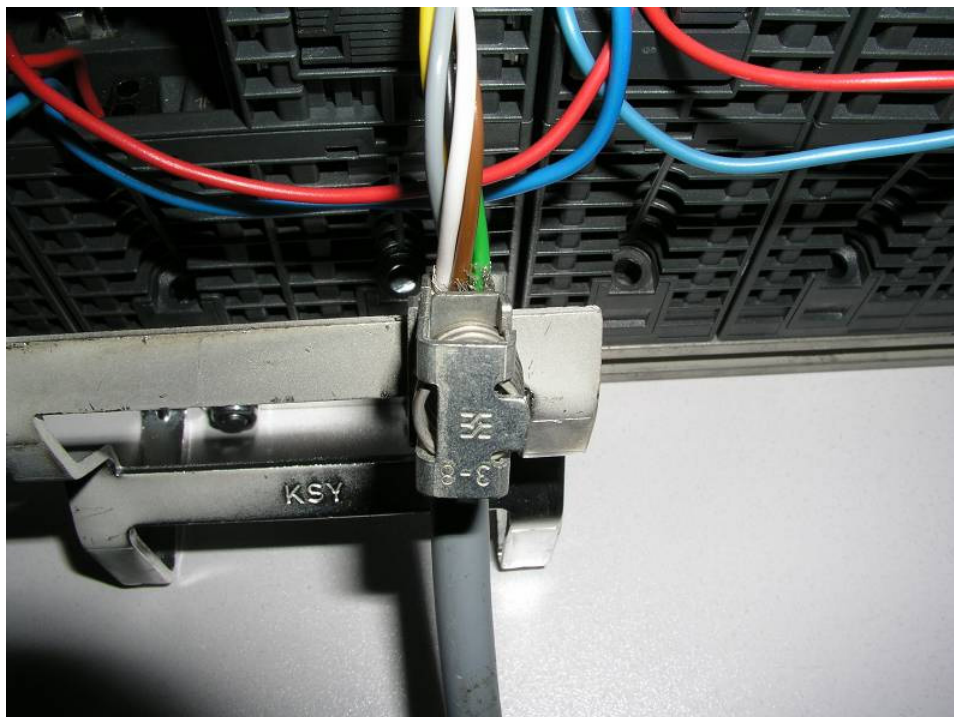


Image 4-6 Example – Mounting of shield clamps on module

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

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

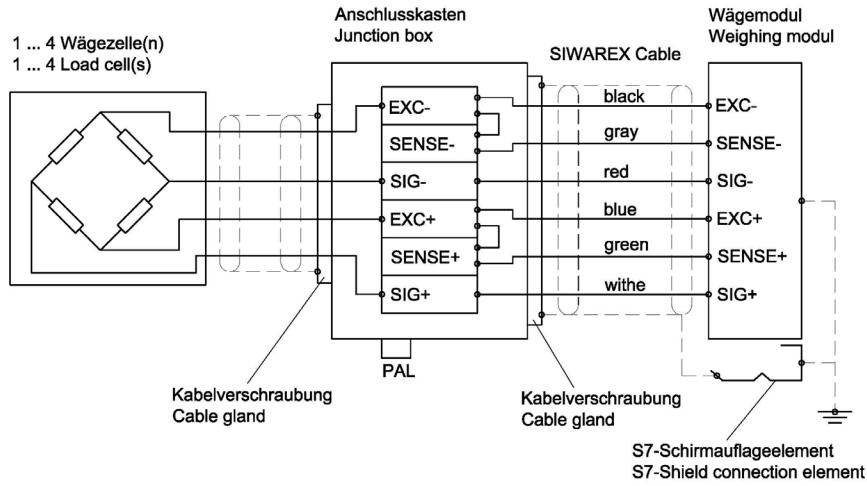


Image 4-7 Load cell connection in 4-wire system

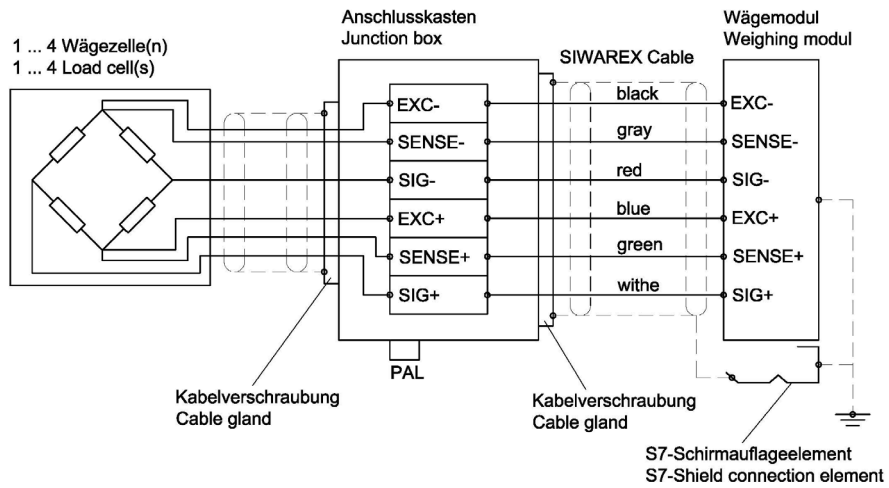


Image 4-8 Load cell connection in 6-wire system

4.5.6 Digital Inputs

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

The functionality of each input can be defined with parameters.

DI status is indicated with LEDs on the front of the SIWAREX FTA.



Warning

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

Termination Clamp	Signal	Remark
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
X1.6	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

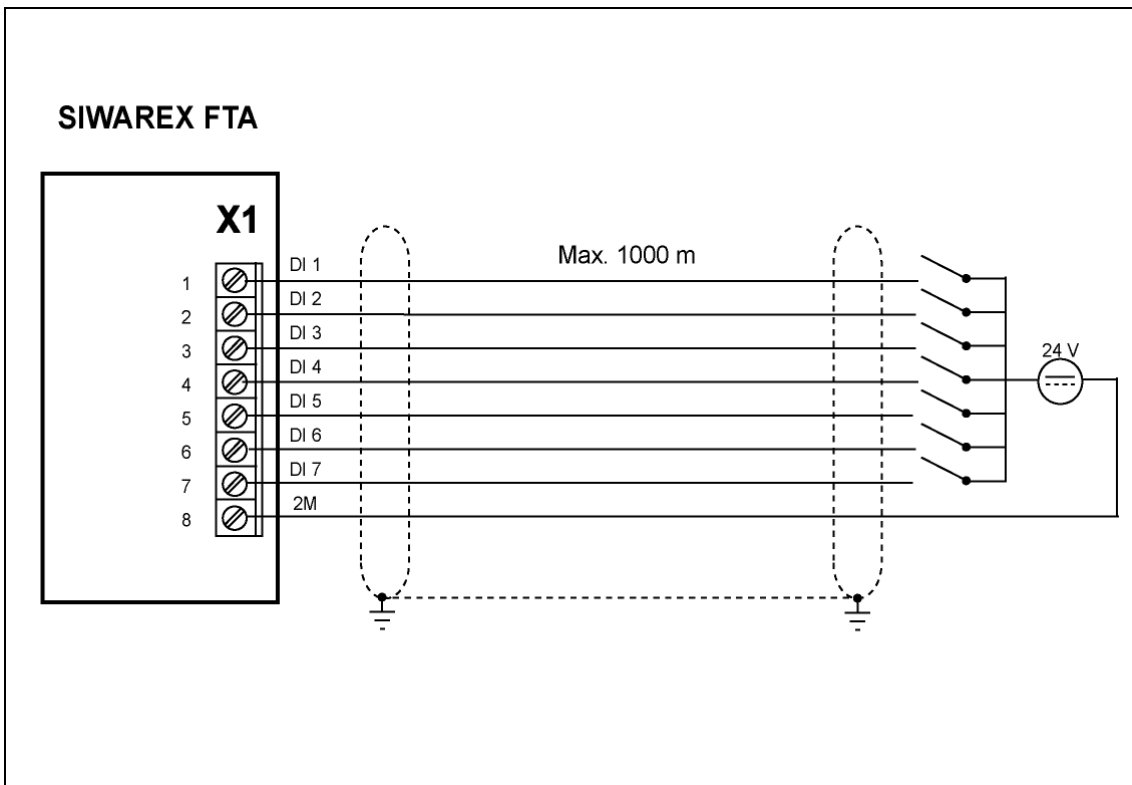


Image 4-9 Digital inputs

4.5.7 Counter Input

The counter input serves as the connection to the pulse encoder which is required during weighing start-up for continuous operation. Twisted pair wiring should be used for the connections.

Termination Clamp	Signal	Remark
X1.9	CI+	Counter input +
X1.10	CI-	Counter input -

Table 4-5 Pulse encoder connection

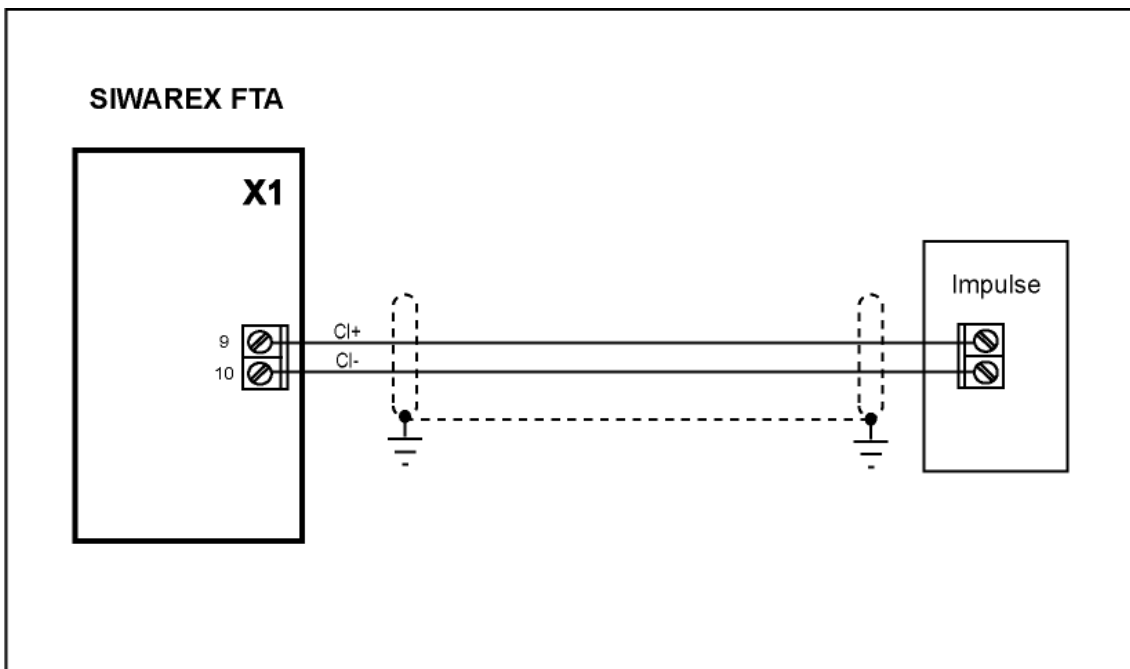


Image 4-10 Counter input

4.5.8 Digital Outputs

The SIWAREX FTA has eight potential 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 potentially isolated from the module group. The outputs share common potential. They have a common ground and a secure 24 V supply. They are short-circuit and overload protected.

DO status is indicated with LEDs on the front of the SIWAREX FTA.

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

Termination Clamp	Signal	Remark
X1.11	DO 1	Parameter definable function
X1.12	DO 2	Parameter definable function
X1.13	DO 3	Parameter definable function
X1.14	DO 4	Parameter definable function

Termination Clamp	Signal	Remark
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

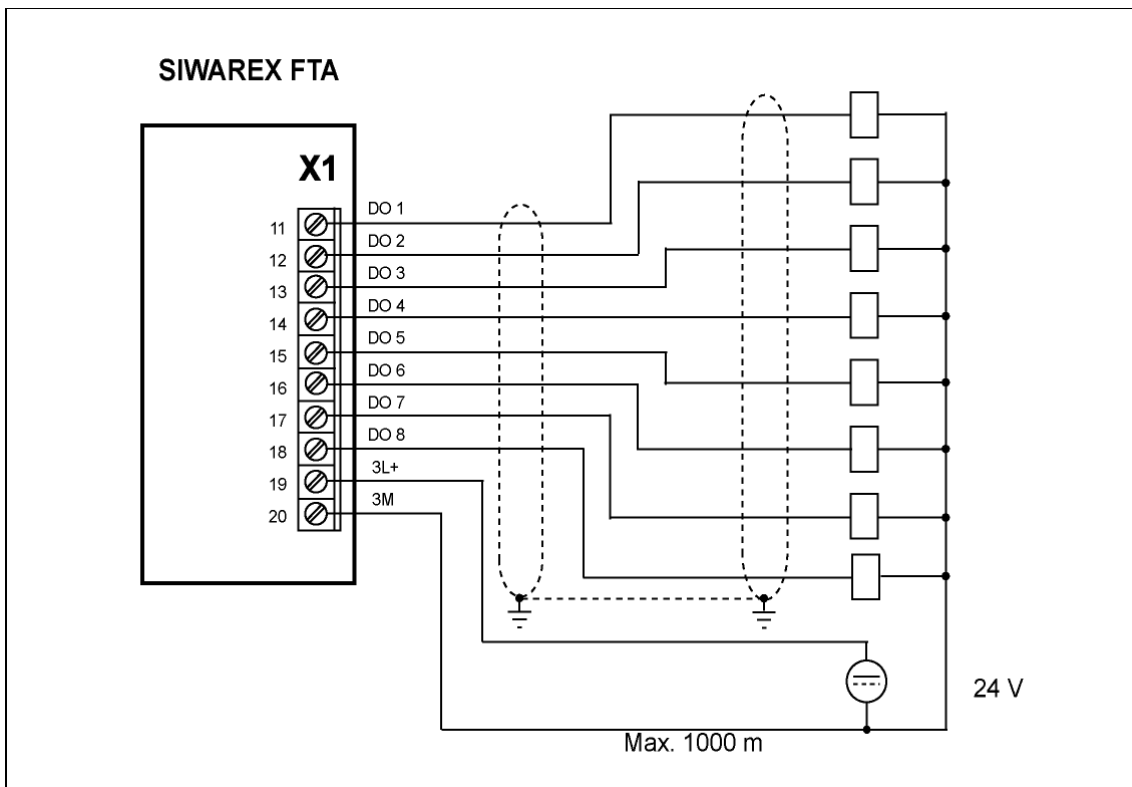


Image 4-11 Digital outputs

4.5.9 Analog Output

Termination Clamp	Signal	Remark
X1.29	IOUT+	Analog output +
X1.30	IOUT-	Analog output -

Table 4-7 Analog output connections

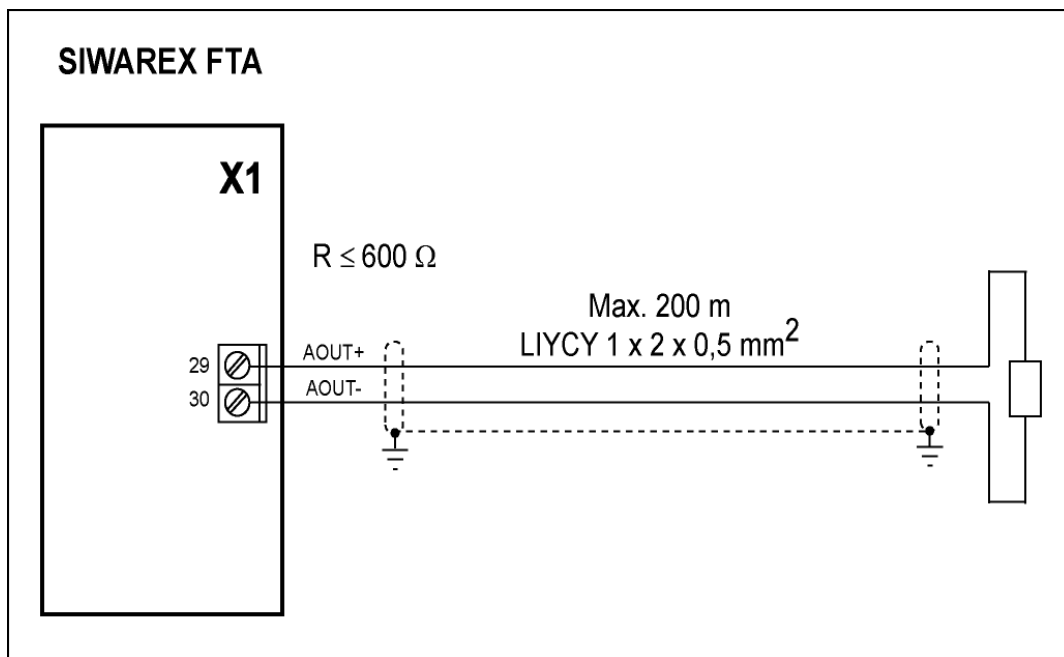


Image 4-12 Analog output

4.5.10 RS 485 interface for a METTLER TOLEDO

A description how to connect METTLER TOLEDO sensors PBK9/PFK9-APW can be found in the internet under

<https://support.industry.siemens.com/cs/ww/en/view/109746396>.

Type WM, WMH sensors from METTLER TOLEDO can be connected to the Siwarex. This enables the realization of high-precision check-weighers and dosing applications for weight values of 0.01g upwards.

The parameters in datasets 3 and 7 must be set as follows:

(DR3) Device selection: Digital load cell Mettler Toledo

(DR7) Baudrate: 38400

(DR7) Character parity: even

(DR7) Data bits: 7

(DR7) Stop bits: 1

Termination Clamp	Signal	Comment
X1.21	485a	Input Ta
X1.22	485b	Input Tb
X1.23	485a	Output Ta
X1.24	485a	Output Tb
X1.25	RTa	Termination resistor RTa
X1.26	RTb	Termination resistor RTb
X1.11	DO 1	Send Start instruction (SIR)
X1.12	DO 2	Send Stop instruction (SI)
X1.19	3L+	24 V for digital outputs
X1.20	3M	Ground for digital outputs

Table 4-8 RS 485 Connections

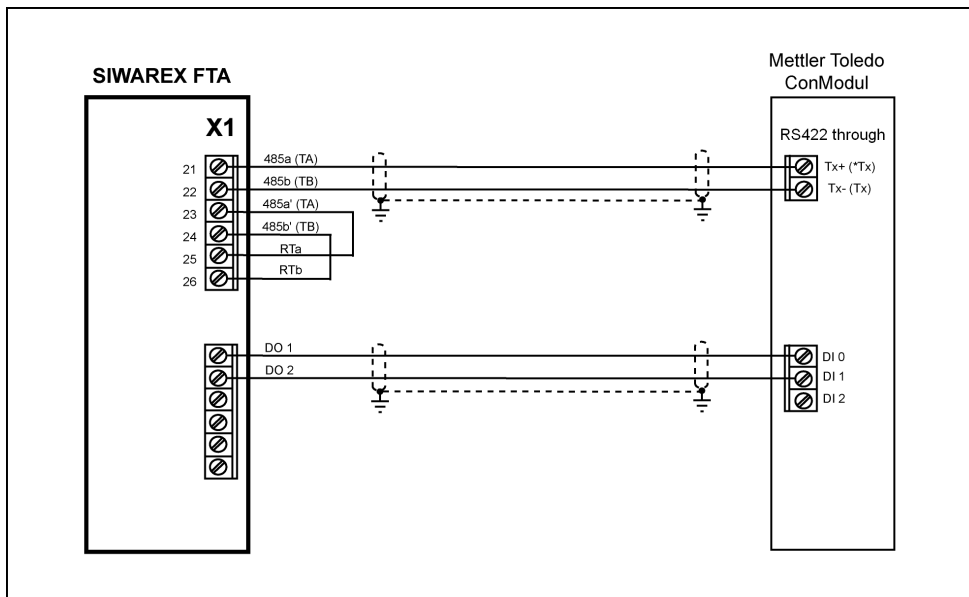


Image 4-13 Connection of load cell METTLER TOLEDO type WM, WMH to RS 485

Connecting METTLER TOLEDO type WM or WMH some additional parameters must be set. [See 5.2.31](#)

4.5.11 RS 485 interface for load cells made by Wipotec/Kaiserslautern

Type EC and IW digital load cells from Wipotec can be connected to the Siwarex. This enables the realization of quick check-weighers.

The following interface parameters must be set in datasets 3 and 7:

- (DR3) load cell type: Wipotec
- (DR7) RS485 baud rate: 38400 Bit/s
- (DR7) RS485 character parity: odd
- (DR7) RS485 data bits: 8
- (DR7) RS485 stop bits: 1

Terminal	Signal name	Remarks
X1.19	24 V	Voltage supply
X1.20	0 V	Voltage supply
X1.21	485a	Input Ta
X1.22	485b	Input Tb

Terminal	Signal name	Remarks
X1.23	485a	Output Ta
X1.24	485a	Output Tb
X1.25	RTa	Termination resistor RTa
X1.26	RTb	Termination resistor RTb

Table 4-9 RS 485 Connections

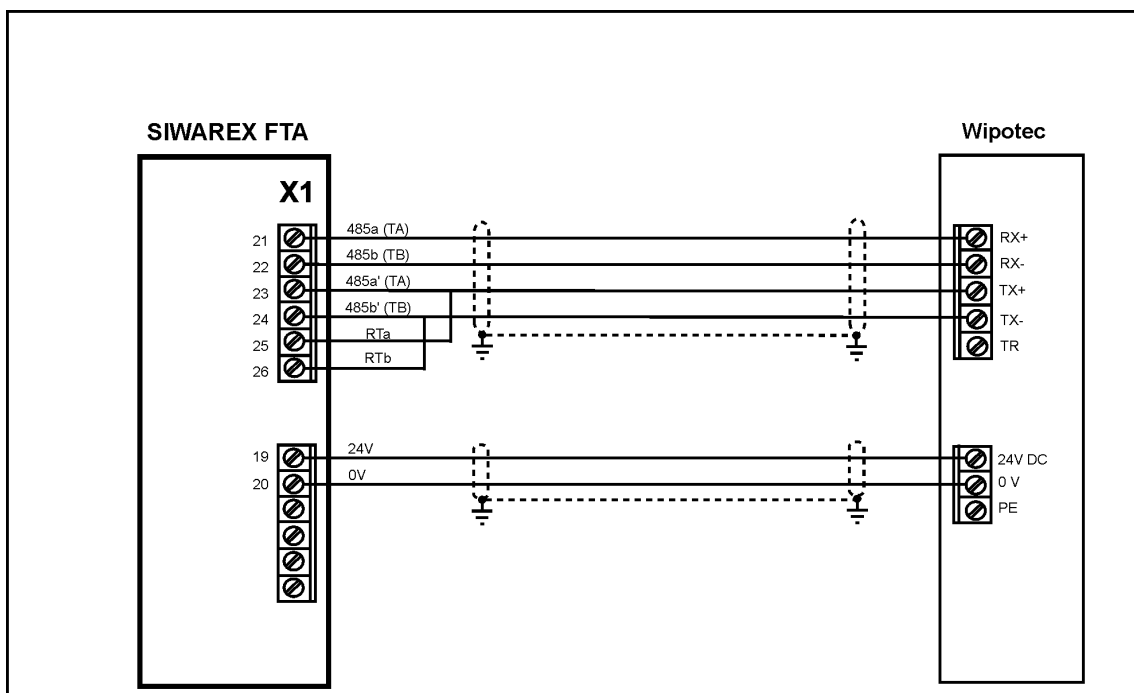


Image 4-14 Wipotec load cell connection

Appropriate settings need to be made when starting up a Wipotec load cell after connection. See 5.2.31.

4.5.12 RS 485 interface for load cells made by PESA, Pfäffikon/Switzerland

Digital load cells can be connected to the Siwarex in accordance with Pesa's string oscillation measurement method.

The following interface parameters must be set in datasets 3 and 7:

(DR3) load cell type: PESA

(DR7) RS485 baud rate: 9600 Bit/s

(DR7) RS485 character parity: even

(DR7) RS485 data bits: 7

(DR7) RS485 stop bits: 1

Note: The load cell must be switched to 2-wire operation.

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	Termination resistor RTa
X1.26	RTb	Termination resistor RTb

Table 4-10 RS 485 Connections

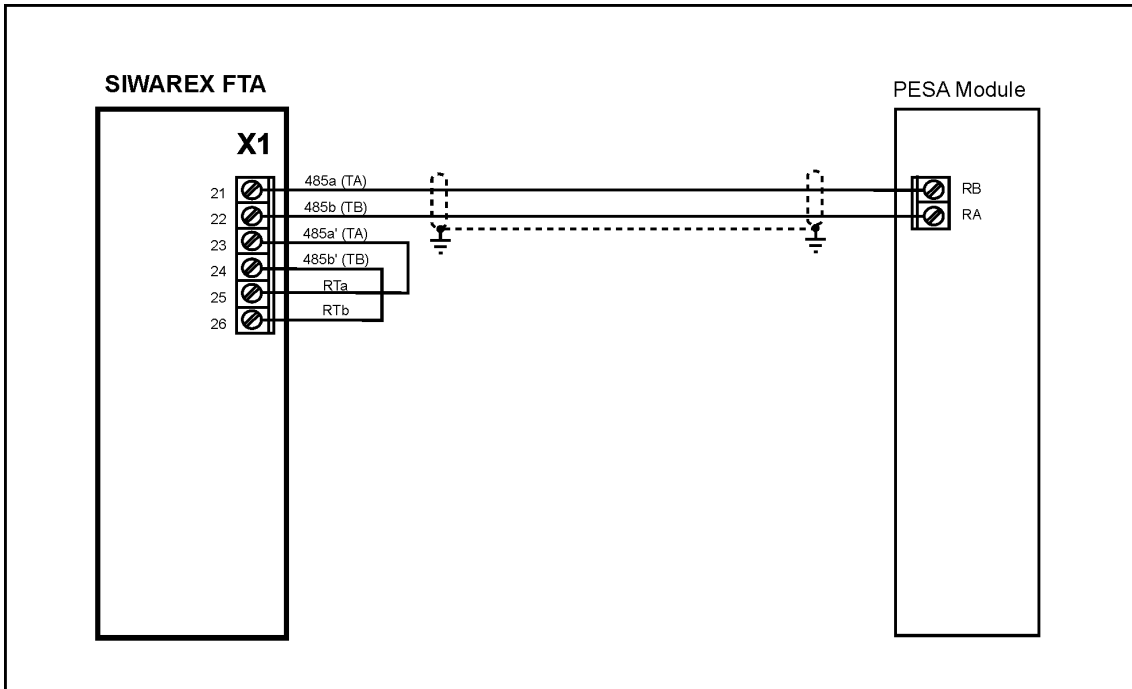


Image 4-15 PESA load cell connection

Appropriate settings need to be made when starting up a PESA load cell after its connection.
[See 5.2.31](#)

4.5.13 Connecting the Remote Display by the Siebert company

One or more Siebert Type S102 displays can be connected to the RS485 interface. 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 FTA for RS 485 are to be defined.

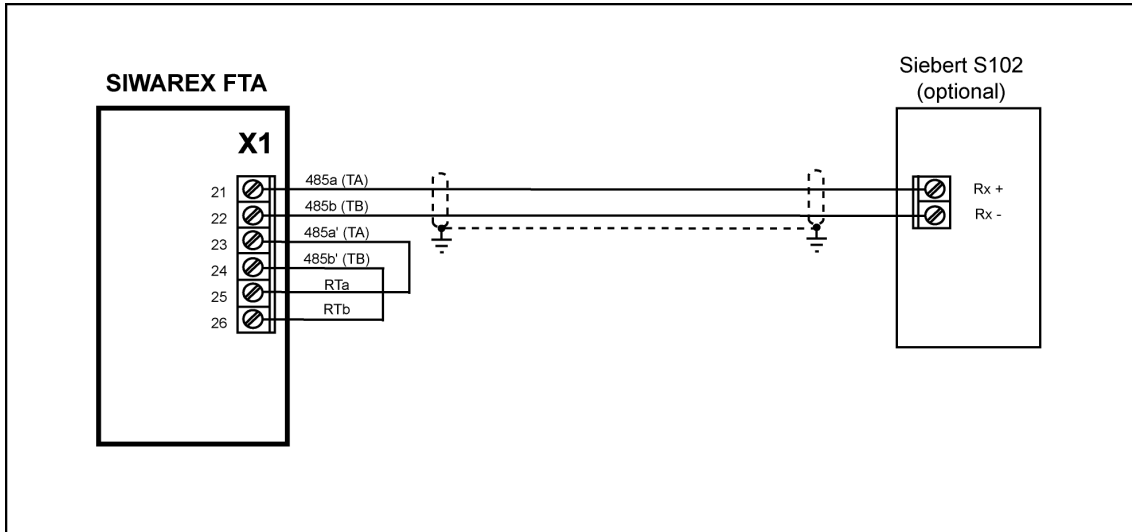


Image 4-16 S102 Display Connection

Connecting an external display is done using the unidirectional Siebert protocol. This protocol is a purely STX / ETX- ASCII protocol. The data is sent to the display cyclically, every 200 ms. The protocol is designed for the S11 and S102 Siebert displays.

Baudrates 1200, 2400, 4800, 9600 and 19200 Bit/sec. can be set. The other interface parameters can also be configured as follows:

- Character parity: even / odd
- Number of data bits: 7 / 8
- Number of stop bits: 1 / 2

The following weight values are available on the display and can be selected via address selection on the display. These display values are sent in rotational sequence (20 ms distance for each value) from the SIWAREX:

Address	Weight value	Comments
01	Verifiable weight value	Main display value
02	Gross	(not verifiable)
03	Net	(not verifiable)
04	Tare	not verifiable and there is no possible differentiation to Preset-Tare pT)
05	setpoint value	(only if it exists; not verifiable and there is no possible differentiation to 'Gross')
06	ext. default value	(not verifiable)

Table 4-11 Address occupation for the S102 display

4.5.14 PC Connection for SIWATOOL FTA

Table		RS 232 Interface
Termination Clamp	Signal	Remark
X2	9 pin D-type	RS 232 Interface

Table 4-12 PC Connection

Cables are provided for connecting the PC (see [Accessories](#))

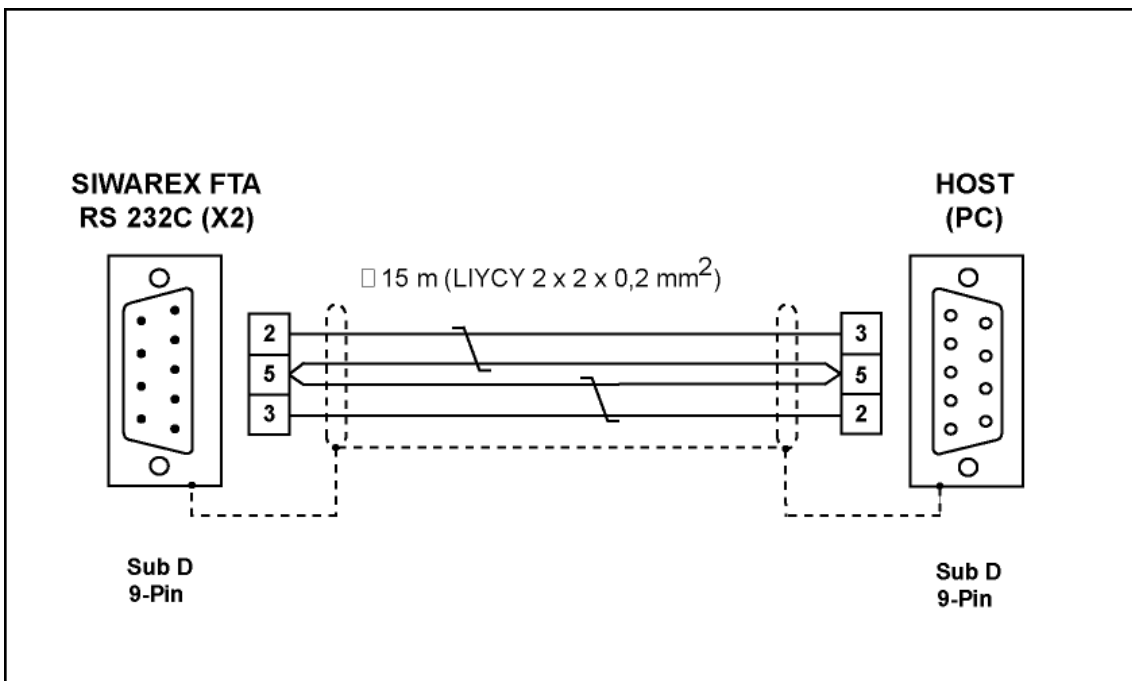


Image 4-17 PC Connection

4.5.15 LED Indicators

Label	LED colour	LED	Description
SF	Red	LED 1 upper left	System Fault Hardware fault
	Green	LED 2	Weighing cycle active (flashing)
	Green	LED 3	Write protect for calibration data activated
	Green	LED 4	Scale in empty range
	Green	LED 5	Scale 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 4-13 Indicators (LED)

4.5.16 Using the Micro Memory Card

A SIMATIC Micro Memory Card can be used for saving the calibratable records or for recording weighing states. Approximately 32 MB of data can be stored on the MMC described in chapter [Accessories](#).



Warning notice

After formatting the MMC with SIWAREX FTA, it can no longer be used in the SIMATIC CPU. Therefore, the MMC should be labelled correspondingly.

4.6 Operational Preparation

Introduction

At this point in the commissioning procedure, after assembling the module group and making all connections, you should perform a partial functionality test for the SIWAREX FTA and the connected components. The individual steps for partial testing 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 group?
- Are the modules situated in the proper positions?
- Are all fastening screws properly tightened?
- Are all connecting cables properly connected and fastened tightly?
- Is the frontal connection made properly?
- Is the shielding properly attached to the shielding conductor for all corresponding cables?
- Is the profile rail connected to the ground conductor?
- Are all tools, materials or components that do not belong to the S7 or SIWAREX FTA removed from the profile rail and the module group?

Connect SIWAREX FTA with 24 V supply

Switch power supply on.

Proper initialisation of the SIWAREX FTA in the SIMATIC can only be guaranteed if:

- the S7 SPU (with decentralised connection with IM 153-1) and the SIWAREX FTA are switched on at the same time
or
- the SIWAREX FTA is switched on first

LED check on the SIWAREX FTA

After attaching the 24V supply voltage and a short initialisation phase (internal testing is indicated by LED running pattern), the SIWAREX FTA goes into operational status. The following LEDs must have the status that is indicated below if the unit is running correctly:

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

4.7 Use in areas with risk of explosion



Danger

DANGER EXPLOSION

Exists when the installation and setup regulations are not adhered to.



For using the SIWAREX FTA in areas with a risk of explosion, the important information in the “SIMATIC Automation Systems - Basics of Explosion protection (Doc.No. A5E00206200)” must be observed!

Below you will find important information on the installation of the SIWAREX FTA in a hazardous area.

SIWAREX FTA may only be used under the conditions, which are specified in the appropriate certificates.

The SIWAREX FTA can be used in Ex zone 2 (acc. to IEC/CENELEC, directive 94/9/EG).

In the following you find some details about the certificates ATEX (Europe) and UL (USA, Canada).

Certificate: ATEX:

Type Examination Certificate Number: ATEX Nr. KEMA 08ATEX0002 X



Please always observe the relevant safety instructions. These can be accessed on the Internet at

<http://support.automation.siemens.com/WW/view/en/29443327>

Certificate: c-UL-us haz. loc.

UL file number. USA: NRAG.E239877

UL file number Canada: NRAG7.E239877

Note to c-UL-us haz.loc:

Warning – Explosion Hazard – Do not disconnect while circuit is live unless area is known to be non-hazardous.

Warning – Explosion Hazard – Substitution of components may impair suitability for Class I, Division 2.

This equipment is suitable for use in Class I, Division 2, Groups A, B, C, D or non-hazardous locations only.

Connection from load cells to SIWAREX FTA:

The SIWAREX FTA can be connected with load cells in zone 1 or zone 2.

For a connection of load cells in zone 2 it is sufficient, that the load cells also have an approval for zone 2 and all associated directives as well as the installation instructions are respected.

For a connection of load cells in zone 1, load cells with the adequate approvals are needed and appropriate provisions according to the guidelines must ensure explosion protected operation. For example SIWAREX R load cells can be connected intrinsically safe via the Ex-Interface SIWAREX IS. The instructions for the Ex-Interface, the load cells and the ATEX as well as the c-UL-CSA directives have to be respected.

Installation and Maintenance:

Required connection and installation work must be performed by qualified personnel.

Repairs can only be carried out at the production location.

5 Weighing Functions

5.1 General Information

The SIWAREX FTA can be used either as a non-automatic weighing instrument or an automatic weighing instrument. The operating mode is determined by the application and is defined during scale commissioning.

The selected operating mode and the defined parameters are very important to the behaviour of the SIWAREX FTA in the process.

The parameters are set with default values from the manufacturer. Using the “Load default values” command, the parameter definitions defined in manufacturing are loaded.

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 behaviour of the scale is changed respectively. The advantage of this solution is that you can define how many default values should be retained and how much that the behaviour of the scale has to be changed for the application.

All parameters are split into data records (DR). The data records are organised according to process steps (tasks) that you have to perform during the commissioning phase or during the process itself.

In the following parameter description, you will find a description of the weighing functions that are influenced by that parameter.

The parameters of a data record are shown in a table to start with. This is then followed by the exact parameter description for the parameters of that data record.

After receiving a new parameter, SIWAREX FTA runs a plausibility check. If there is a parameter error then the data record will not be accepted (stored) by the SIWAREX FTA and a “synchronous” message is generated (see chapter [7 Messages and Diagnostics](#)).

5.2 DR3 Adjustment Parameter (NAWI, AWI)

The adjustment parameter must be tested for every weighing procedure and changed if necessary.

The scale is basically defined using the adjustment parameters and by performing the adjustments. In calibration operation, the data of the DR3 cannot be changed after the calibration is complete.

Procedure:

- Check all parameters and change if necessary.
- Send DR3 to the scale
- Perform scale adjustment
- Receive DR3 from the scale

Name	Type	Address	Default	Range of Values / Explanation	Reference
Adjustment digits for Adjustment zero 0	DINT	DBD000	1.398.101	0 to: 2 ²⁴ Other definitions not permitted.	5.2.1
Adjustment digits for Adjustment weight 1	DINT	DBD004	15.379.113	0 to: 2 ²⁴ Other definitions not permitted.	5.2.1
Adjustment digits for Adjustment weight 2	DINT	DBD008	0	0 to: 2 ²⁴ Other definitions not permitted.	5.2.1
Adjustment digits for Adjustment weight 3	DINT	DBD012	0	0 to: 2 ²⁴ Other definitions not permitted.	5.2.1
Adjustment digits for Adjustment weight 4	DINT	DBD016	0	0 to: 2 ²⁴ Other definitions not permitted.	5.2.1
Adjustment weight 1	REAL	DBD020	50	> 0 Other definitions not permitted.	5.2.1
Adjustment weight 2	REAL	DBD024	0	> 0 Other definitions not permitted.	5.2.1
Adjustment weight 3	REAL	DBD028	0	> 0 Other definitions not permitted.	5.2.1
Adjustment weight 4	REAL	DBD032	0	> 0 Other definitions not permitted.	5.2.1
Characteristic value range	BYTE	DBB036	0	1: Characteristic value to 1mV/V 2: Characteristic value to 2mV/V 4: Characteristic value to 4mV/V Other definitions not permitted.	5.2.2
Filter sequence	BYTE	DBB037	0	Bit 0 : 0: Averaging filter before digital filter 1: Digital filter before averaging filter Bits 1 to 7 not set	5.2.3
Type of low pass filters	BYTE	DBB038	0	0: critically damped 1: Bessel-Filter 2: Butterworth Filter Other definitions not permitted.	5.2.4
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	5.2.5

Name	Type	Address	Default	Range of Values / Explanation	Re-ference
				8: fg = 0,1Hz 9: fg = 0,05Hz Other definitions not permitted.	
Depth of averaging filter	WORD	DBW040	10	0 ... 250 0: Averaging filter deactivated Other definitions not permitted.	5.2.6
Scale name	STRING [10]	DBB042	"SIWAREX XX"		5.2.7
Number of weight ranges	BYTE	DBB054	1	1 Range 2 Ranges 3 Ranges Other definitions not permitted.	5.2.8
Scale type	BYTE	DBB055	0	Bit 0: 0: Multi-range scale 1: Multi-resolution scale	5.2.9
Zero setting activated at start-up			0	Bit 1: 0: Switch-on zero setting device switched off; 1: Switch-on zero setting device switched on	5.2.10
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, when tare ≠ 0	5.2.11
Automatic zero adjustment			0	Bit 3: 0: Zero tracking device switched off; 1: Zero tracking device switched on	5.2.12
Tare selection (subtractive, additive)			0	Bit 4: 0: Use a subtractive tare device 1: Use an additive tare device Bit 5 - 7 not set	5.2.13
Min. weight for Weighing range 1	REAL	DBD056	1		5.2.14
Max. weight for weighing range 1	REAL	DBD060	100		5.2.15
Numeral step for weighing range 1	REAL	DBD064	0,02	Numeral step weighing range 1 ($1 \cdot 10^k$, $2 \cdot 10^k$, $5 \cdot 10^k$) Other definitions not permitted.	5.2.16
Min. weight for Weighing range 2	REAL	DBD068	0		5.2.17
Maximum weight for weighing range 2	REAL	DBD072	0		5.2.18
Numeral step for weighing range 2	REAL	DBD076	0	Numeral step weighing range 2 ($1 \cdot 10^k$, $2 \cdot 10^k$, $5 \cdot 10^k$) Other definitions not permitted.	5.2.19
Min. weight for Weighing range 3	REAL	DBD080	0		5.2.20
Maximum weight for weighing range 3	REAL	DBD084	0		5.2.21
Numeral step for weighing range 3	REAL	DBD088	0	Numeral step weighing range 3 ($1 \cdot 10^k$, $2 \cdot 10^k$, $5 \cdot 10^k$) Other definitions not permitted.	5.2.22
Stand-still time 1	TIME	DBB092	1000sec	msec	5.2.23
Stand-still range 1	REAL	DBD096	0,02	Stand-still range 1 in weight unit	5.2.24

Weighing Functions

Name	Type	Address	Default	Range of Values / Explanation	Reference
Max. waiting time for stand-still 1	TIME	DBB100	2000	If there is no stand-still 1, the respective weighing instruction will be rejected with an operational error with a setting of 0 and otherwise, the waiting time will elapse. If the max. waiting time has elapsed and there is still no stand-still, an error message is sent. For weighing instructions that are activated by an operator, a setting around 2000 ms is reasonable. (During the weighing cycle, this time is not monitored)	5.2.25
Max. negative weight for zero setting when switching on	BYTE	DBB104	10	Negative range for Switch-on zero setting device [in % of weighing range _{max}] (Entry of Pos- + Neg. zero set value must not exceed 20% with country code "OIML")	5.2.26
Max. positive weight for zero setting when switching on	BYTE	DBB105	10	Positive range for Switch-on zero setting device [in % of weighing range _{max}] (Entry of Pos- + Neg. zero set value must not exceed 20% with country code "OIML")	5.2.27
Maximum negative weight for zero setting	BYTE	DBB106	1	Negative range for zero setting device [in % of weighing range _{max}] (Entry of Pos- + Neg. zero set value must not exceed 4% with country code "OIML")	5.2.28
Maximum positive weight for zero setting	BYTE	DBB107	3	Negative range for zero setting device [in % of weighing range _{max}] (Entry of Pos- + Neg. zero set value must not exceed 4% with country code "OIML")	5.2.29
Tare max. weight T-	BYTE	DBB108	100	Subtractive tare device range [in % of WR _{max} with multi-range scale] [in % of WR ₁ with multi-resolution scale] (Value must not exceed 100%) Range of the additive tare device [in % of WB ₁ , only a single range scale is permitted in conjunction with regulation code "OIML"] (Value must not exceed 250%)	5.2.30
Load cell type	BYTE	DBB109	0	0: analog load cell 1: METTLER TOLEDO type WM or WMH 2: WIPOTEC digital load cell 3: PESA digital load cell >3: analog load cell	5.2.31
Timeout digital LC	WORD	DBW110	240	Timeout in ms for receiving the cyclic weight value of the digital load cell	5.2.32
Regulations	STRING [4]	DBB112	"----"	"OIML" : = Regulation Code OIML "----": = No Regulation Code	5.2.33
Unit of measurement	STRING [4]	DBB118	kg		5.2.34
Stand-still range 2	REAL	DBD124	0,02	Stand-still range 2 cm weight unit Effective when starting a weighing procedure	5.2.35
Stand-still time 2	TIME	DBB128	1000	msec	5.2.36
Max. waiting time for stand-still 2	TIME	DBB132	500	Max. waiting time for stand-still when starting a weighing (ms) 0: No waiting time active	5.2.37
Stand-still range 3	REAL	DBD136	0,02	Stand-still range 3 cm weight unit Effective after switching off fine current.	5.2.38
Stand-still time 3	TIME	DBB140	1000	msec	5.2.39
Minimum waiting time at stand-still 3	TIME	DBB144	500	Minimum waiting time at stand-still after switching off fine signal (msec) 0 No waiting time active	5.2.40
Smallest set weight Σ min	REAL	DBD148	100 Wizzard: = WB _{max}	Must only be entered with AWI totalizing operating mode.	5.2.41
Distribution value dt	REAL	DBD152	0,1	dt can correspond with the numerical step in WB _{nmax}	5.2.42

Name	Type	Address	Default	Range of Values / Explanation	Reference
Reserve 3	REAL	DBD156	0	Reserve 3	
Reserve 4	BYTE	DBB160	0	Reserve 4	
Reserve 5	BYTE	DBB162	0	Reserve 5	
		162			

Table 5-1 DR3 Allocation

5.2.1 DR3 - 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 FTA then use this weight value for performing 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 through points 0 and 1. The first operating point (point 0) is always determined by the empty scale alone with its own construction weight. The weight of its own construction, the scale load cells deliver a measurement voltage to the SIWAREX FTA. After the analog-digital conversion of the measurement voltage, the digital value (adjustment digit 0) is assigned the zero point.

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 digital-digital converter is now assigned with 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 (= sum of the nominal loads of all load cells).

The adjustment consists of the following steps:

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

Preset all adjustment digits with 0

Send DR 3 to the scale

Give the instruction "Valid adjustment weight = 0"

Load the scale with the defined calibration weight

Give the instruction "Valid adjustment weight = 1"

Receive the DR 3 from the scale

Store the data to memory (disk)

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

Weighing Functions

Example:

Zero point = 0.0 kg (always) results in 5.800.000 Digits
Adjustment weight 1 = 100 kg results in 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 image clarifies the connection between the adjustment digits and the adjustment weight.

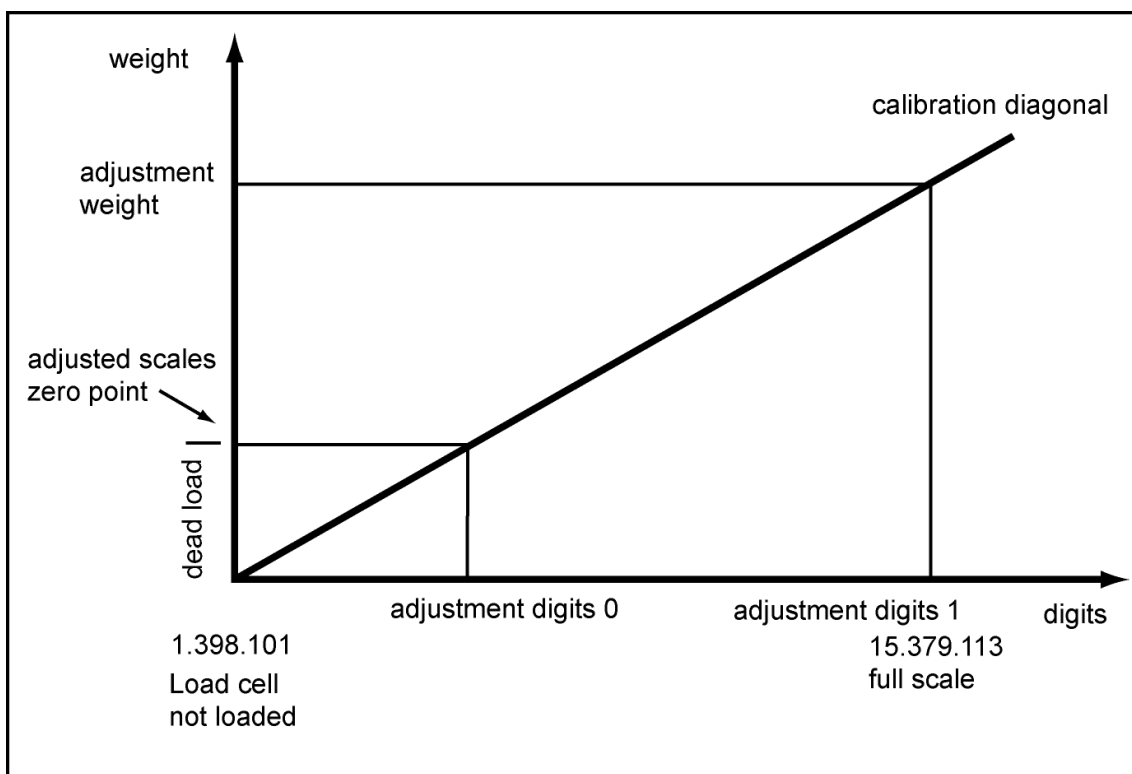


Image 5-1 Adjustment digits and weight value

If the adjustment weights and adjustment digits of a SIWAREX FTA are known then the adjustment procedure does not have to be performed. These are simply sent to the SIWAREX FTA with the DR3 data record and the scale is immediately operational (after an official calibration run on the scale, sending the DR3 is no longer possible).

The SIWATOOL FTA supports you in quickly performing an adjustment.

Possibility 1:

After commissioning and after the adjustment, all data records of the scale are read from SIWAREX FTA and are stored as scale file ScaleX.FTA.

Identical scales can now be put into operation immediately. Connect the PC with the new scale and activate the "Send all data records" function. This also transfers the adjustment weights and the adjustment digits - the characteristic curve is defined immediately. The same applies for exchanging a SIWAREX FTA of course.

Possibility 2:

Use the SIWAREX FTA - function "Theoretical Adjustment" and determine the characteristic curve of the scale from the technical data of the load cells alone. In that case, proper construction of the scale is necessary.

Note

Normally, defining two operation points is sufficient to determine the characteristic curve of the scale. Other operation points must only 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).

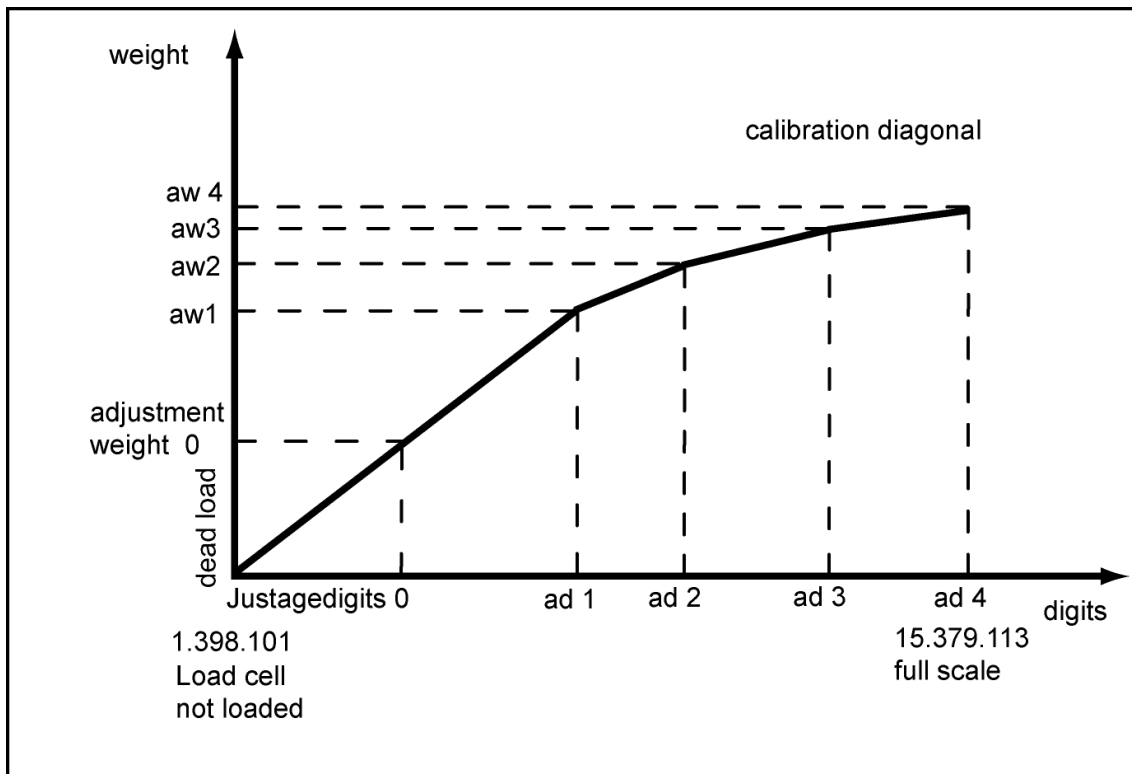


Image 5-2 Linearisation of the Scale's Characteristic Curve

5.2.2 DR3 - 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 FTA 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).

If the characteristic value of the connected load cells is at e.g. 2.85 mV/V then the next higher characteristic value must be set normally, i.e. 4 mV/V.

5.2.3 DR3 – Filter sequence of the signal filter

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

5.2.4 DR3 - Type of low pass filters

3 types of filter are available to choose from, for suppressing interference (critically damped, Bessel filter, Butterworth filter). The selection is performed empirically. The following figures show the step responses of the three filters ($f_g = 2$ Hz).

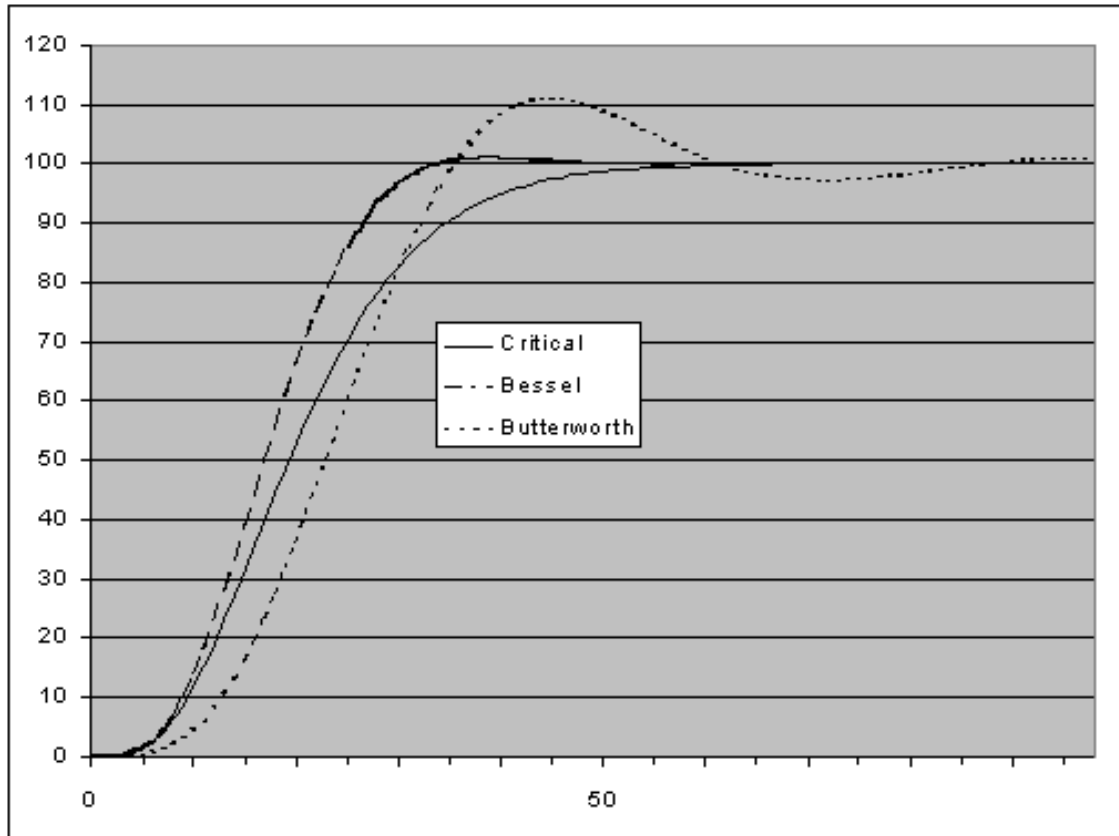


Image 5-3 Digital low pass filter step response

5.2.5 DR3 - Limit frequency

Defining the limit frequency is very important for suppressing interference. The “speed” of the scale’s reaction to the change in measurement value is set by defining the limit frequency.

A value of e.g. 2 Hz leads to a relatively quick scale reaction to a weight change, a value of e.g. 0.5 Hz makes the scale “sluggish”.

5.2.6 DR3 - Type of average value filters

The average value filter is used to calm the weighing value compensating for random interference. The weight value is constructed from the average value of the

n weight value, which is calculated by the SIWAREX FTA with a measurement rate of 10 msec, e.g. at n=10, 10 values are taken to create the average value Every 10 msec, the oldest value is dropped and the newest value is taken into account for the calculation.

5.2.7 DR3 - Scale Name

The name consists of maximum 10 characters and can be selected as you wish.

Note

The scale name can no longer be changed after the official calibration.

5.2.8 DR3 - Number of weight ranges

SIWAREX FTA can be defined as a scale with one, two or three different measurement ranges. Depending on the construction type certification, the numeral step can be defined separately for every range.

5.2.9 DR3 - Scale type

If the number of ranges is greater than one then 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.

5.2.10 DR3 - Activate zero setting on start-up

The scale can be set to zero automatically by switching the supply voltage on (for calibratable scales after waiting period after reboot). On calibratable scales, a weight value of +/- 10% of the max. measurement range can be set to zero on start-up.



Attention

In non-calibratable operation (no OIML restrictions), a full scale can also be set to zero after activating this function. Limiting the effectiveness is possible by entering the max. and min. weight however. See Max. Min. Weight for dss zero setting at start-up.

5.2.11 DR3 - Activated zero setting at start-up, if scale is tared

The scale can be set to zero automatically by switching the supply voltage on. If the above function (5.2.10) is activated, there is still the question of whether zero setting at start-up should be run if the tare is unequal to zero.

If the parameter “Activated zero setting at start-up, if scale is tared” is set then the tare is also deleted with the zero setting, if not then no zero setting is performed on the scale.

5.2.12 DR3 - Automatic zero adjustment

Zero setting the scale can be performed with the “Zero setting” instruction if required.

The automatic zero adjustment sets the scale to zero without an instruction if it slowly drifts away from the zero point. Slow drifting is presumed if the conditions of standard EN45501 have been met.



Attention

In non-calibratable operation (no OIML restrictions), a full scale can also indicate zero after a period of time subject to a slow drift when this function is activated. Using this function you must prevent an overload of the scale.

5.2.13 DR3 - Tare selection (subtractive, additive)

The scale can be tared using the “Tare” function if required.

When the subtractive tare is activated, the display value is hidden if the gross value exceeds the weighing range by more than 9e.

In the case of the additive tare, the display value does not need to be hidden until the net value exceeds the maximum weighing range. For subtractive tare, the maximum tare weight is limited to 100% of the maximum weighing range; for additive tare, it is limited to 250%.

The current tare value is deleted when switching between additive and subtractive tare.

There is no automatic check to ensure the load cell measurement range offers sufficient reserves when additive tare is activated; the user must ensure this is the case.

5.2.14 DR3 - Minimum weight for weighing range 1

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

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

5.2.15 DR3 - Maximum weight for weighing range 1

The weight can be used for calibrating purposes with the numeral step for measurement range 1 only under the maximum weight. The maximum weight is defined with the adjustment.

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

5.2.16 DR3 - Numeral Step for weighing range 1

The numeral step for weighing range 1 can be defined according to standard EN 45501 (0.0001 to 50)

5.2.17 DR3 - Minimum weight for weighing range 2

The weight value can be used for calibratable recording with the numeral step for measurement range 2 only above the minimum weight. The minimum weight is defined by an adjustment or a calibration. The minimum weight depends on the number and type of load cells used.

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

Note

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

5.2.18 DR3 - Maximum weight for weighing range 2

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

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

Note

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

5.2.19 DR3 - Numeral step for weighing range 2

The numeral step for weighing range 2 can be defined according to standard EN 45501 (0.0001 to 50)

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

5.2.20 DR3 - Minimum weight for weighing range 3

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

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

Note

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

5.2.21 DR3 - Maximum weight for weighing range 3

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

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

Note

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

5.2.22 DR3 - Numeral step for weighing range 3

The numeral step for weighing range 1 can be defined according to standard EN 45501 (0.0001 to 50)

Note

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

5.2.23 DR3 - Stand-still time 1

Stand-still monitoring is used for recognising a stable scale balance.

The scale stand-still is defined if the weight value is changed within a defined time (stand-still time) by less than a defined deviation range (Stand-still value). Stand-still 1 is used in static scale operation (Instructions: Zero setting, Taring, Log output).

5.2.24 DR3 - Stand-still range 1

Stand-still monitoring is used for recognising a stable scale balance.

The scale stand-still is defined if the weight value is changed within a defined time (stand-still time) by less than a defined deviation range (Stand-still value). Stand-still 1 is used in static scale operation (Instructions: Zero setting, Taring, Log output).

The functionality of the stand-still monitor clarifies the following image.

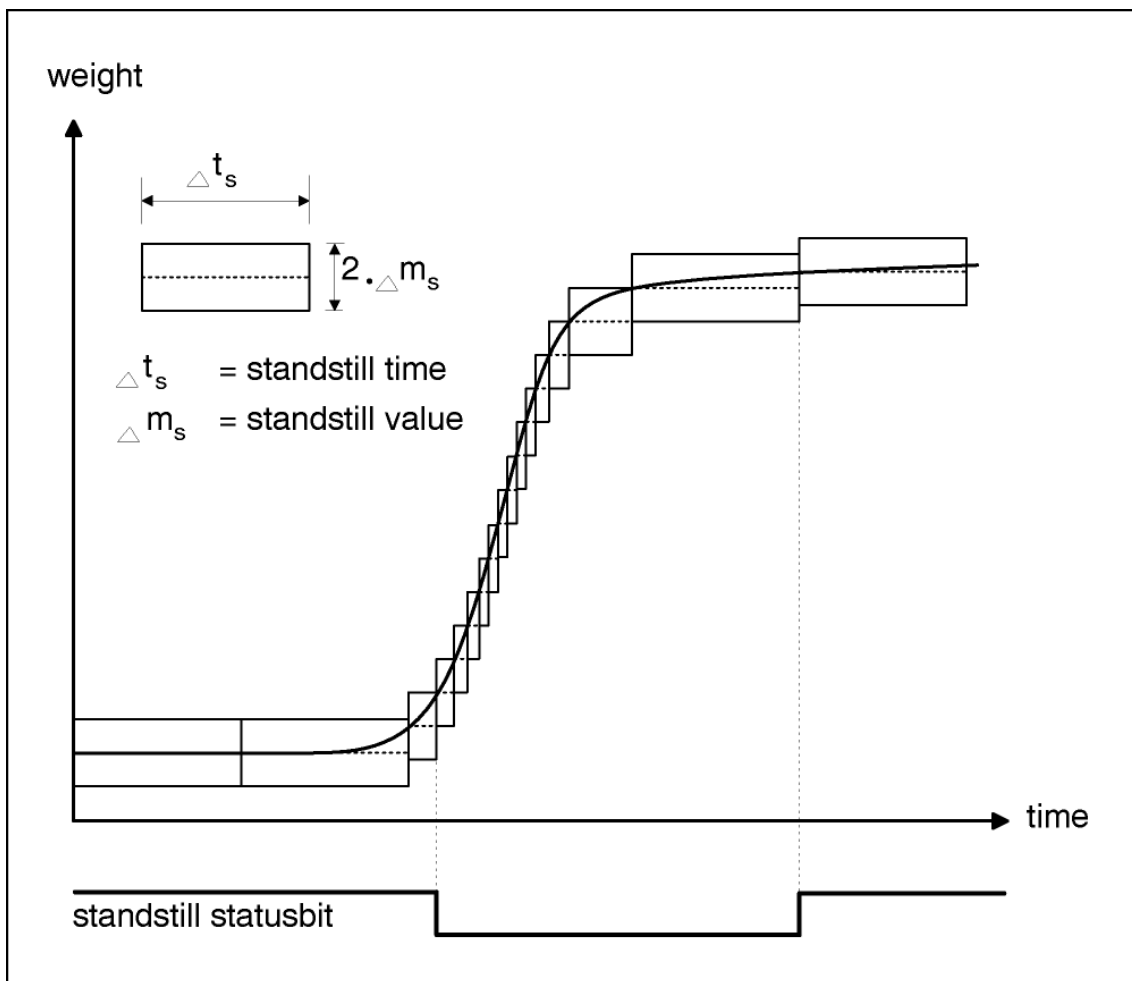


Image 5-4 Stand-still monitoring

5.2.25 DR3 - Waiting time for stand-still 1

To prevent the necessity of having to cancel a weighing instruction (only taring, printing and zero setting in static operation) when the stable weight of the scale is not defined, the waiting time is given for stand-still 1. Only the scale instruction tare, output log or zero setting was not possible after this time has elapsed is the corresponding technology message generated.

5.2.26 DR3 - Maximum negative weight for zero setting at start-up

Zero setting means automatic zero setting on the scale when the power supply is switched on.

If the zero setting when switching on the supply voltage has been activated then the definition will limit the affect of the function. The reference point for the effectiveness of the limitation is not the current weight, it is the weight that was displayed by the scale without a previous zero setting.

5.2.27 DR3 - Maximum positive weight for zero setting at start-up

Zero setting means automatic zero setting on the scale when the power supply is switched on.

If the zero setting when switching on the supply voltage has been activated then the definition will limit the affect of the function. The reference point for the effectiveness of the limitation is not the current weight, it is the weight that was displayed by the scale without a previous zero setting.

5.2.28 DR3 - Maximum negative weight for zero setting

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

For the zero setting, the definition can be used to limit the influence of the function. The reference point for the effectiveness of the limitation is not the current gross weight, it is the weight that was displayed by the scale without a previous zero setting.

On scales in calibratable operation, the restriction between the negative and positive weight for zero setting is 4% of the maximum weighing range.

5.2.29 DR3 - Maximum positive weight for zero setting

For the zero setting, the definition can be used to limit the influence of the function. The reference point for the effectiveness of the limitation is not the current weight, it is the weight that was displayed by the scale without a previous zero setting.

On scales in calibratable operation, the restriction between the negative and positive weight for zero setting is 4% of the maximum weighing range.

5.2.30 DR3 - Tare max. load T-

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

Subtractive tare: With regulation code "OIML", the value is limited to 100% of the maximum weighing range.

Additive tare: in % of WB_1 , only a single range scale is permitted for regulation code "OIML" (value must not exceed 250%)

5.2.31 DR3 - Load cell type

The following load cell types can be connected to the SIWAREX FTA:

- Analog load cells (DMS full bridge)
- Sensors made by METTLER TOLEDO, type WM and WMH
- Sensors made by Wipotec, Kaiserslautern
- Sensors made by Pesa, Pfäffikon/Switzerland

This information defines which interface the signal will come from:

- Via the strain gage connection with analog strain gage load cells
- Via RS 485 for type WM, WMH
- Via RS485 for type Wipotec
- Via RS485 for type PESA

METTLER TOLEDO type WM or WMH

After selecting the sensors METTLER TOLEDO type WM or WMH, settings must be made in dataset DR7 for the RS485 interface (see).

The application-dependent sensor parameters are set using the Mettler configuration software for configuring the WM or WMH sensor.

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

- RS422 interface settings:
 - o PROT_2 (basic protocol)
 - o COM_1_8_0_0 (Interface RS422, 38400 baud, 7 Bits, even parity, 1 stop bit)
- Setting the digital inputs:
 - o DIN1_SIR_0_1 (Input 1 for the SIR command, positive edge, output via RS422)

Wipotec

After selecting the Wipotec load cell, appropriate settings must be made in dataset DR7 for the RS485 interface (see [4.5.10](#)).

The application-dependent sensor parameters are set using the Wipotec configuration software for configuring Wipotec load cells.

Pesa

After selecting the Pesa load cell, appropriate settings must be made in dataset DR7 for the RS485 interface (see [4.5.10](#)).

In dataset 3, the monitoring time for the digital load cell must be set to at least 5000 ms.

The application-dependent sensor parameters are set using the PESA load cell configuration software.

The following sensor settings must be made for communication with SIWAREX FTA:

- Protocol: Low Level Protocol
- Baud rate: 9.600 baud
- Start bits : 1 start bit
- Data bits: 7 data bits
- Parity: even
- Stop bits: 1 stop bit
- Interface: 2 wire connection/half duplex

Note: Sufficient shielding must be provided.

5.2.32 DR3 – Monitoring time for the digital load cells

The receipt of the cyclic weight telegrams from the load cell type types WM, WMH is monitored. If no telegram is received for the defined time period (in ms), SIWAREX FTA indicates an operational fault No. 24 – Digital load cell not ready. A status bit also provides (Status NAWI, Bit 29) 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.

5.2.33 DR3 - Regulations

Scales in calibratable application have certain restrictions. The "OIML" entry (country code) activates these restrictions They are deactivated by entering "----".

When "OIML" is entered, there is a warm-up time of 60s during which no weight value is displayed.

5.2.34 DR3 - Unit of measurement

A 4 character string can be used as the unit of measurement, e.g.: t, kg, lbs.

5.2.35 DR3 - Stand-still range 2

Stand-still monitoring is used for recognising stable scale balance after starting an automatic weighing procedure.

After the start weighing procedure with taring instruction, the SIWAREX FTA waits for stand-still 2. The scale stand-still is defined if the weight value is changed within a defined time (stand-still time) by less than a defined deviation range (Stand-still value).

Note

With scales using calibration, the definition cannot be greater than for stand-still 1.

5.2.36 DR3 - Stand-still time 2

Stand-still monitoring is used for recognising stable scale balance after starting an automatic weighing procedure.

After the start weighing procedure with taring instruction, the SIWAREX FTA waits for stand-still 2. The scale stand-still is defined if the weight value is changed within a defined time (stand-still time) by less than a defined deviation range (Stand-still value).

Note

With scales using calibration, the definition cannot be less than for stand-still 1.

5.2.37 DR3 - Maximum waiting time for stand-still 2

To prevent the necessity of having to cancel a weighing instruction with taring or zero setting as soon as it is given, when the stable weight of the scale is not defined, the waiting time is given for stand-still 1. Only if the weighing instruction could not be executed after this time has elapsed is a corresponding technology error output.

5.2.38 DR3 - Stand-still range 3

Stand-still monitoring is used for recognising stable scale balance after switching off the fine signal.

The scale stand-still is defined if the weight value is changed within a defined time (stand-still time) by less than a defined deviation range (Stand-still value).

Note

With scales using calibration, the definition cannot be greater than for stand-still 1.

5.2.39 DR3 - Stand-still time 3

Stand-still monitoring is used for recognising stable scale balance after switching off the fine signal.

The scale stand-still is defined if the weight value is changed within a defined time (stand-still time) by less than a defined deviation range (Stand-still value).

Note

With scales using calibration, the definition cannot be less than for stand-still 1.

5.2.40 DR3 - Minimum waiting time for stand-still 3

To delay the evaluation of the stand-still after switching off the fine signal, the minimum waiting time is given for stand-still 3. The evaluation of stand-still 3 is only begun after this time has elapsed.

5.2.41 DR3 - Smallest set weight Σ_{\min}

If the scale is supposed to be used as an automatic weighing instrument with weight totalising, the smallest set weight (load) must be defined. The scale will only start a weighing procedure if the set value for the overall quantity is higher than this limit value.

5.2.42 DR3 - Totalising value dt

If the scale is supposed to be used as an automatic weighing instrument with weight totalising, a scaling value must be defined. The total of several weighing procedures is output with this scaling value.

5.3 Theoretical Adjustment – Adjustment Without Adjustment Weights

If performing the adjustment is not possible using adjustment weights, the scale can also be put back into operation without adjustment weights, if 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 FTA during the processing of the adjustment parameters. We call the procedure “theoretical adjustment”.

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

To execute the theoretical adjustment, the rated load for all load cells is defined first, e.g. 3 load cells with 1,000 kg each result in a rated load of 3,000 kg. The adjustment zero offset (unit μV), and the characteristic value (unit mV/V) is then entered for each individual load cell. These values are taken from the respective load cell measurement log. The characteristic value is normally entered with up to 5 decimal places, e.g. 2.01201.

Adjustment zero offset for each load cell is defined as follows:

Adjustment zero offset (μV) = Adjustment zero offset measurement value ($\mu\text{V/V}$) x Weigh module supply voltage (V)

Example:

Load cells - Supply voltage (EXC) = 10 V

Adjustment zero offset = 1.2 $\mu\text{V/V}$ (from Load cells - measurement log)

Entry: Adjustment zero offset = 1.2 $\mu\text{V/V}$ x 10 V = 12 μV

After entering the data for each load cell, the adjustment digits are calculated and the result is displayed by actuating the button “Calculate adjustment digits”. Then, the calculated adjustment digits can be integrated into the data record with adjustment data (DR 3) by actuating button “Accept calculation”. The data record is then sent to the weigh module with the new adjustment data.

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

5.4 DR 4 Basis parameter (NAWI, AWI)

The base parameters determine further features of a scale which are responsible for its basic behaviour. The parameters must be checked and changed if necessary.

During calibration operation it is only possible to switch within a group with the same weighing operating mode.

Procedure:

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

Name	Type	Address	Default	Range of Values / Explanation	Reference
Operating mode / Logs		0			
Type	BYTE	DBB000	3 Wizzard – Direct definition	0 - weighing (additiv) (see 5.4.2) 1 - weighing (subtractiv) (see 5.4.3) 2 - filling (additive) and emptying (see 5.4.4) 3 - filling (additive) without emptying (5.4.5) 4 - filling (subtractive) without emptying (see 5.4.6) 5 - check weight (see 5.4.7) 6 - discontinuous totalizing (see 5.4.8) 7 - filling (additive)/(Big-bag) (see 5.4.9) 8 - filling (subtractiv)/(Big-bag) (see 5.4.10) 9 – filling (subtractive) and emptying (see 5.4.11) Other definitions are not permitted.	5.4.1
Reserve 1	BYTE	DBB001	0	Reserve 1 (default, must not be changed)	
Reserve 2	WORD	DBW002	0	Reserve 2	
Monitoring time for recording	TIME	DBD04	2000	Time within which, a recording task must be ended (msec)	5.5.8
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	5.5.10
Reserve 3	BYTE	DBB009	0	Reserve 3	
Limit values					
Basis weight for limit value 1	BYTE	DBB010	0	Bit 0 : 0 = Basis for limit value 1 is the gross weight 1 = Basis for limit value 1 is the net weight	5.5.11
Basis weight for limit value 2			0	Bit1 : 0 = Basis for limit value 2 is the gross weight 1 = Basis for limit value 2 is the net weight	5.5.12
Basis weight for monitoring the empty range			0	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	5.5.13
Reserve 4	BYTE	DBB011	0	Reserve 4	

Name	Type	Address	Default	Range of Values / Explanation	Reference
Empty range	REAL	DBD012	1 Wizzard: WB _{max} *0,01	For filling procedures this depends on parameters, for emptying procedures relative to gross	5.5.14
Start-up weight limit value 1	REAL	DBD016	1 Wizzard: WB _{max} *0,01		5.5.15
Shut-down weight limit value 1	REAL	DBD020	1,1 Wizzard: WB _{max} *0,01 1		5.5.16
Start-up weight limit value 2	REAL	DBB024	50 Wizzard: WB _{max} *0,5		5.5.17
Shut-down weight limit value 2	REAL	DBB028	49 Wizzard: WB _{max} *0,49		5.5.18
Start-up weight limit value 3	REAL	DBB032	99 Wizzard: WB _{max} *0,99	Limit value 3 corresponds with overfill limit	5.5.19
Shut-down weight limit value 3	REAL	DBB036	98 Wizzard: WB _{max} *0,98		5.5.20
Through-put					
Minimum through-put Limit value 1	REAL	DBB040	0	0: No monitoring > 0 minimum through-put [1/sec]	5.5.21
Minimum through-put Limit value 2	REAL	DBB044	0	0: No monitoring > 0 minimum through-put [1/sec]	5.5.22
Filter depth of average value filter for through-put calculation	BYTE	DBB048	5	[0...255] X 10 msec	5.5.23
Reserve 5	BYTE	DBB049	0	Reserve 5	
		50			

Table 5-2 DR4 Allocation

5.4.1 DR 4 - Scale operating mode (Scale type)

This parameter is used to select the suitable weighing instrument program. One of these weighing operating modes applies depending on the task description.

5.4.2 DR 4 - Type: weighing (additive)

Non-automatic weighing instrument – according to OIML R-76 – only accepts service and adjustment commands and “zero setting” and “taring” weighing instructions. The net weight increases with increasing load on the scale. No dosing functions are supported.

5.4.3 DR 4 - Type: weighing (subtractive)

Non-automatic weighing instrument – according to OIML R-76 – only accepts service and adjustment commands and “zero setting” and “taring” weighing instructions. The net weight increases with decreasing load on the scale. No dosing functions are supported.

5.4.5 DR 4 - Type: filling (additive) without emptying

Automatic catch weighing instrument – conforming with OIML R-51 - Automatic Weighing Instrument (AWI) The scale doses individual amounts in single action. Emptying the scale is not part of the automatic operation cycle. The net weight increases with increasing load on the scale.

The weighing procedure is clarified by the following image

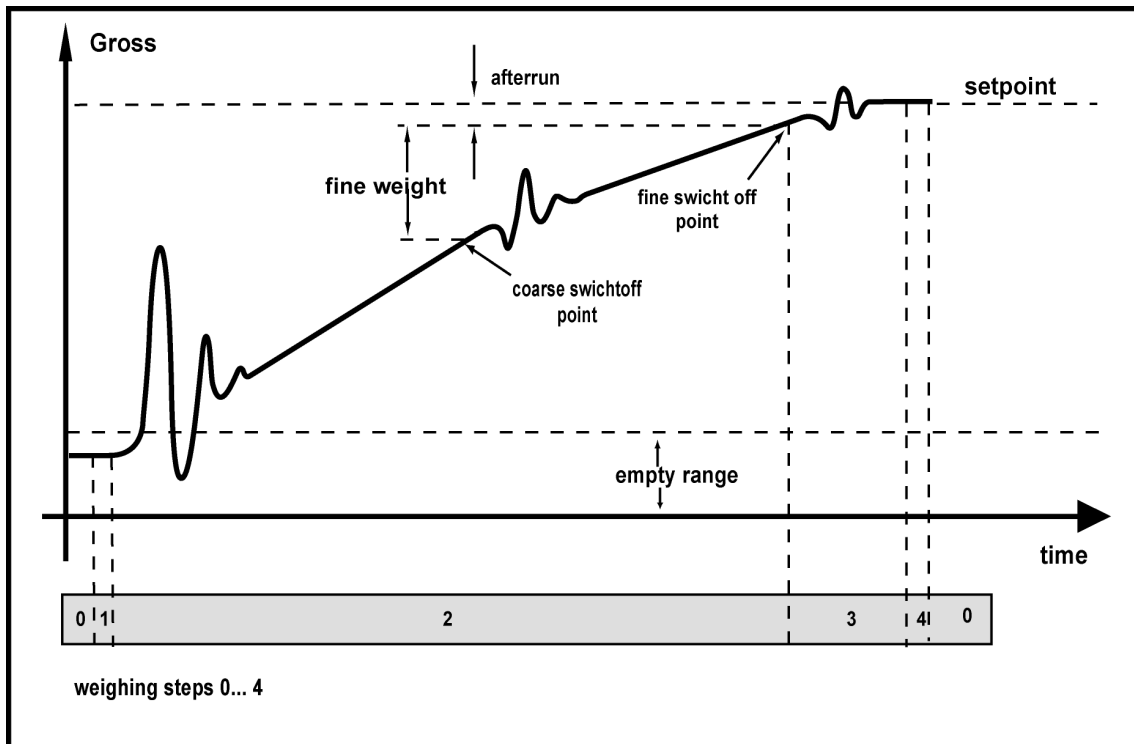


Image 5-6 Weighing steps for catch weighing with filling AWI

5.4.6 DR 4 - Type: filling (subtractive) without emptying

Automatic catch weighing instrument - conforming to OIML R51 - Automatic Weighing Instrument (AWI) of the type automatic catch weighing instrument. The scale doses individual amounts from a weighing container in single operation. Filling the scale is not part of the automatic operation cycle. The net weight increases with decreasing load on the scale.

The weighing procedure is clarified by the following image

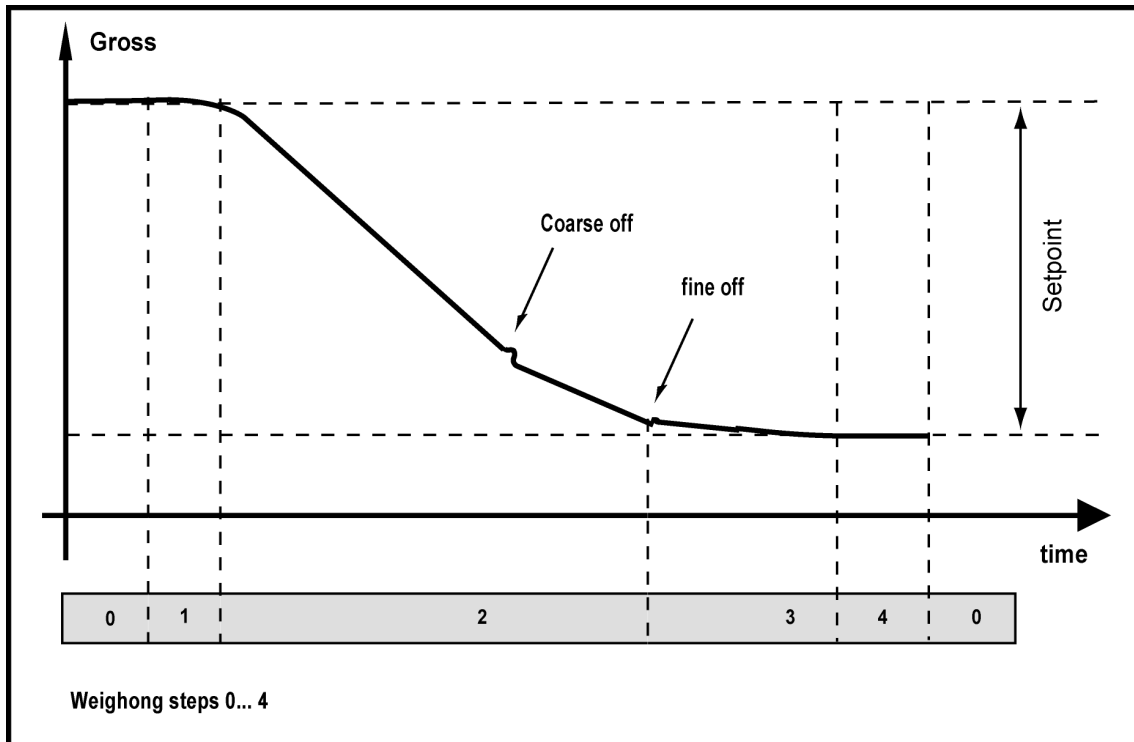


Image 5-7

Weighing steps during automatic catchw./gravim. emptying mode

5.4.7 DR 4 - Type: Check weight

Automatic catch weighing instrument – conforming with OIML R-51 – Automatic Weighing Instrument (AWI). The scale defines and tests the individual amounts in static single action. Putting the weighing part on the scale is done automatically, acquiring the weight is performed in static status.

The test procedure is clarified by the following image.

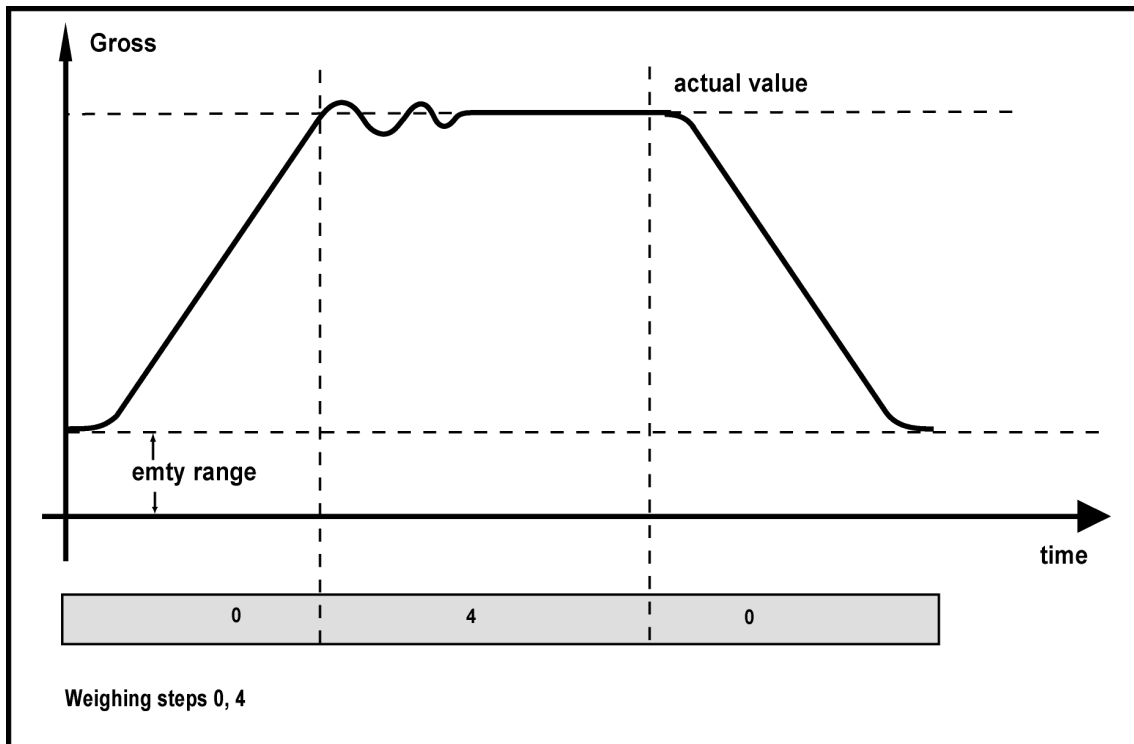


Image 5-8 Weighing steps for a weight recording (check) AWI

5.4.8 DR 4 - Type: Discontinuous totalizing

Automatic Totalising Filling Instrument – conforming with OIML R-107 – Automatic Weighing Instrument (AWI). The scale doses out the entire amount in individual portions. Emptying the scale is part of the automatic operating cycle and is important for determining amounts.

The start of the weighing procedure sets the scale to zero. The scale container is then filled. After filling, the scale waits for stand-still 3, switches to sampling operation and tares. After emptying and achieving stand-still 2, the achieved net weight is totalised.

The weighing procedure is clarified by the following image

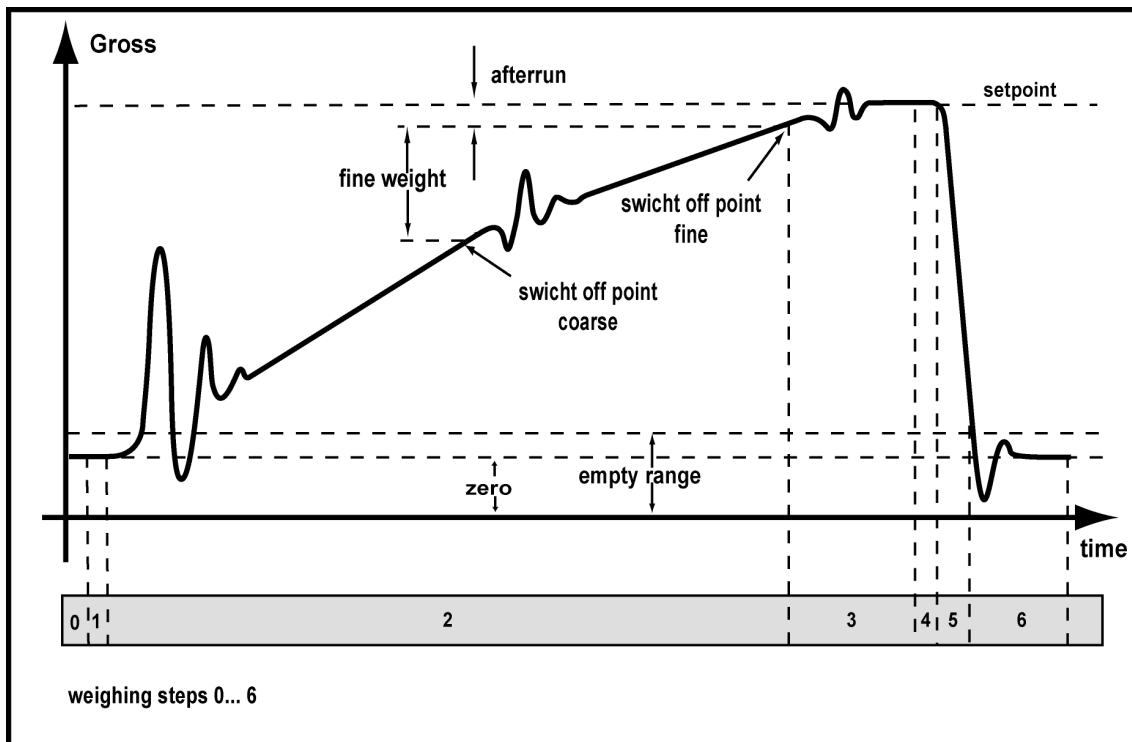


Image 5-9 Weighing steps for AWI Totalising

5.4.9 DR 4 – Type: filling (additive)/(Big-bag)

Automatic Gravimetric Filling Instrument – conforming to OIML R-61 - Automatic Weighing Instrument (AWI) type. As an automatic weighing instrument of type gravimetric filling, the scale doses single quantities in continuous operation until the defined setpoint (fill weight of the big bag) is reached. Emptying the scale is part of the automatic operation cycle.

The start of the weighing procedure sets the scale to zero. The weighing container is then filled. Net weight totalizing occurs when the set weight of the catch weighing

is reached; the weighing container is then emptied. Image 5-5 illustrates the weighing procedure.

5.4.10 DR 4 – Type: filling (subtractive)/(Big-bag)

Automatic Gravimetric Filling Instrument – conforming to OIML R-61 - Automatic Weighing Instrument (AWI) type. As an automatic weighing instrument of type gravimetric filling, the scale doses single quantities from a weighing container in continuous operation until the defined setpoint (fill weight of the big bag) is reached. The net weight increases with decreasing load on the scale. The scale is tared before each dosing. Filling the scale is not part of the automatic operation cycle. Image 5-7 illustrates the weighing procedure.

5.4.11 DR 4 – Type: filling (subtractive) and emptying

Automatic Gravimetric Filling Instrument – conforming to OIML R-61 - Automatic Weighing Instrument (AWI) type. The scale doses individual amounts from a scale container in single or continuous operation according to a repetitive schema. The net weight increases with decreasing load on the scale. The scale is tared before each dosing. Filling the scale is not part of the automatic operation cycle. Image 5-7 illustrates the weighing procedure.

5.5 Weighing Steps – Standard weighing procedure

Every weighing procedure can be split into various steps.

Although weighing procedures are different for different operating modes, the individual steps can be standardised. These standardised steps enable the evaluation of the scale status at any point in time.

The user can pause the processing of a step by blocking it. The block affects the start of the step, i.e. SIWAREX FTA switches from step 2 to step for example, but if step 3 is blocked, it waits at the beginning of step 3 until the block for step 3 is deactivated.

A released block for a step cannot be used on that step again.

Activating the check stop with the “Check stop” instruction has another effect.

If a check-stop is activated before or during the processing of a step then SIWAREX FTA completes the current step and switches to “stopped” status. The “Continue” instruction starts the operation again from the current point.

5.5.1 Processing weighing step 0 - Wait

The scale is waiting in weighing step 0. If step 0 is blocked, no start instruction is accepted. After enabling step 0, the scale waits for the start instruction. When the start instruction is received, a check is performed to determine whether the instruction can be executed or not. If YES, it switches to step 1. If step 1 is blocked, SIWAREX FTA waits for the enable at the beginning of step 1.

5.5.2 Description of Weighing step 1 – Taring/Zero setting

If step 1 is blocked, then no activities in step 1 are performed. After enabling step 1, the scale waits for standstill 2 (only if taring or zero setting is defined). When the standstill is achieved, the taring or the zero setting is performed. If no check stop has been activated, the SIWAREX FTA switches to step 2.

5.5.3 Description of Weighing step 2 – Coarse/Fine

If step 2 is blocked, then no activities in step 2 are performed. After enabling step 2, the coarse and fine weighing procedures are performed. When the fine signal is switched off, a check is performed to determine whether a check stop requirement is active. If no check stop has been activated, the SIWAREX FTA switches to step 3.

5.5.4 Description of weighing step 3 - Post dosing

If step 3 is blocked, then no activities in step 3 are performed. After step 3 is enabled, SIWAREX FTA waits for standstill 3. If standstill 3 exists then the tolerance check is performed and post dosing occurs if necessary. If no check stop has been activated, the SIWAREX FTA switches to step 4.

5.5.5 Description of weighing step 4 - End/Intermediate check

No step 4 activities are performed if step 4 is blocked. After enabling step 4, SIWAREX FTA waits for standstill 3, if it needs to perform a control weighing procedure, to perform the evaluation of the previous weighing procedure. Totalizing occurs during this weighing step in the operating modes gravimetric AWI big bag filling and big bag emptying. If no control weighing procedure is to be performed, a check is performed to determine whether a check stop is activated. SIWAREX FTA will otherwise switch to step=0 or 5 according to the following list depending on the operating mode:

AWI single/continuous operation filling: continue with step 5

AWI catchw. filling, emptying, check: continue with step 0

AWT totalizing with tare re-weighing: continue with step 5, accompanied by simultaneous switchover to discharge weighing and taring.

AWI gravim. big bag filling: continue with step 5

AWI gravim. big bag emptying: continue with step 0

AWI catchw. emptying: continue with step 0

5.5.6 Description of weighing step 5 - Empty

If step 5 is blocked, then no activities in step 5 are performed. After enabling step 5, the empty signal is output. If emptying has finished, a check is performed to determine whether a check stop requirement exists and if not, the switch to step 6 (only with totalising weighing - AWI) or to step 0.

5.5.7 Description of weighing step 6 - End control AWI

If step 6 is blocked, then no activities in step 6 are performed. After step 6 is enabled, a check is performed to determine whether standstill 2 exists. If YES then the weight recording and totalling are performed. A check is then performed to determine whether a check stop requirement exists and if not, the switch to step 0 is made.

5.5.8 Description of Weighing Step 7

Weighing step 7 is currently not utilised (Reserve).

5.5.9 DR 4 - Monitoring time for Logging

If weighing result logging is activated with an instruction or automatically, SIWAREX FTA monitors whether the procedure has been completed within the defined amount of time. If not, an error is generated.

5.5.10 DR 4 - Device for log output

Logs can be output to a connected printer or to the Micro Memory Card (MMC). The contents of the log are defined in data records DR 40 to DR 43.

5.5.11 DR 4 - Basis weight for the limit value 1

The limit values can be defined in reference to the gross weight or the net weight of the scale. This way, a very coarse dosage (net reference) or a refilling of the scale container (gross reference) can be defined for example.

5.5.12 DR 4 - Basis weight for the limit value 2

The limit values can be defined in reference to the gross weight or the net weight of the scale. This way, a very coarse dosage (net reference) or a refilling of the scale container (gross reference) can be defined for example.

5.5.13 DR 4 - Basis weight for monitoring the empty range

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

5.5.14 DR 4 - Empty range

The value for the empty range is a limit value. If the weight value is below this limit value, SIWAREX FTA determines an “empty” status which is output as status information.

5.5.15 DR 4 - Switch-on weight limit value 1

Switch-on and shut-off weights can be defined separately for a limit value. This way, a minimum value monitor and a maximum value monitor can be made with a hysteresis.

Maximum value monitor is created with the following entry:

Switch-on value > shut-off value

Minimum value monitor is created with the following entry:

Switch-on value < shut-off value

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

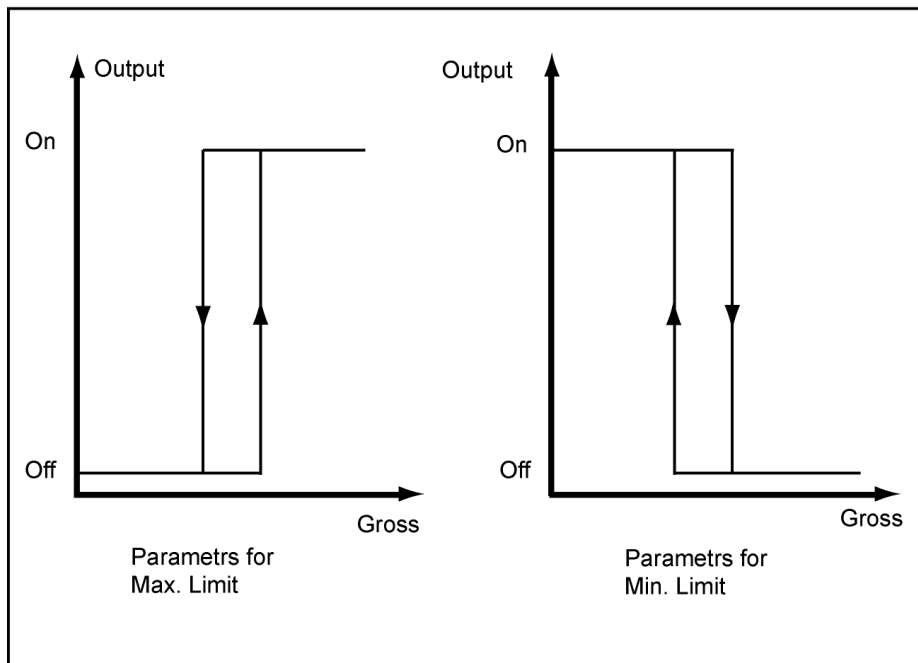


Image 5-10 Defining limit value parameters

5.5.16 DR 4 - Shut-off weight limit value 1

See: Switch-on weight limit value 1

5.5.17 DR 4 - Switch-on weight limit value 2

See: Switch-on weight limit value 1

5.5.18 DR 4 - Shut-off weight limit value 2

See: Switch-on weight limit value 1

5.5.19 DR 4 - Switch-on weight limit value 3

Switch-on and shut-off weights can be defined separately for a limit value. With limit value 3, only the maximum weight monitor can be used. The base weight for limit value 3 is always the gross weight.

5.5.20 DR 4 - Shut-off weight limit value 3

If the value is below the limit value, the status information is reset to "limit value 3".

5.5.21 DR 4 - Minimum through-put limit value 1

The through-put measurement is performed continuously. As soon as the determined through-put value falls below the limit value, it is indicated in the status display.

5.5.22 DR 4 - Minimum through-put limit value 2

The through-put measurement is performed continuously. As soon as the determined through-put value falls below the limit value, it is indicated in the status display.

5.5.23 DR 4 - Filter depth of averaging filter for through-put calculation

A separate average value filter is used for the through-put measurement. The through-put value is generated from the average value of the through-put value which SIWAREX FTA calculates with a measurement rate of 10 msec.

5.6 DR 7 Interfaces (NAWI, AWI)

The parameters that define the behaviour of the SIWAREX FT on the interfaces are defined in DR7. If an interface is not used the default values can be left alone.

- Change parameters if required.
- Send DR 7 to the scale

Name	Type	Address	Default	Range of Values / Explanation	Reference
S7-Interface		0			
Reserve	BYTE	DBB000	0		
Source for the weight simulation	BYTE	DBB001	0	0: Weight simulation inactive 1: Weight simulation value of SIMATIC 2: Weight simulation value of RS232 Other definitions not permitted.	5.6.1
Decade used for rounding the decimal places of the process values (Float weight values)	BYTE	DBB002	3	0: Round to 0 decimal places 1: Round to 1 decimal place 2: Round to 2 decimal places 3: Round to 3 decimal places 4: Round to 4 decimal places 5: Round to 5 decimal places 6: Round to 6 decimal places	5.6.2
Reserve	BYTE	DBB003	0	Reserve	
Force service operation	BYTE	DBB004	0	Bit 0 : 0: Outputs in service operation - Forced operation not possible 1: Outputs in service operation - Forced operation possible Bit 1 - 7 not used	5.6.3
Process value 1 for fast output to the SIMATIC CPU	BYTE	DBB005	1	Various process values are available for selection after listing.	5.6.4
Process value 2 for fast output to the SIMATIC CPU	BYTE	DBB006	2	Various process values are available for selection after listing.	5.6.5
Reserve 2	BYTE	DBB007	0	Reserve 2	
S7-Alarm					
Definition of process alarm 0	WORD	DBB008	0	Value 0 - No process alarm generation Value range 1 – 0FFh Number of the technical error Value range 100h – 13Fh 100h+ 0...1Fh Bit-No. NAWI-status bit - coming 100h+ 20h...3Fh Bit-No. AWI Status flag - coming Value range 200h – 23Fh 200h+ 0...1Fh Bit-No. NAWI status bit - going 200h+ 20h...3Fh Bit-No. AWI status bit - going	5.6.6
Definition of process alarm 1	WORD	DBB010	0	Value 0 - No process alarm generation Value range 1 – 0FFh Number of the technical error Value range 100h – 13Fh 100h+ 0...1Fh Bit-No. NAWI-status bit - coming 100h+ 20h...3Fh Bit-No. AWI Status bit - coming Value range 200h – 23Fh 200h+ 0...1Fh Bit-No. NAWI status bit - going 200h+ 20h...3Fh Bit-No. AWI status bit - going	5.6.6
Definition of process alarm 2	WORD	DBB012	0	Value 0 - No process alarm generation Value range 1 – 0FFh Number of the technical error Value range 100h – 13Fh 100h+ 0...1Fh Bit-No. NAWI-status bit - coming	5.6.6

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Name	Type	Address	Default	Range of Values / Explanation	Reference
				100h+ 20h...3Fh Bit-No. AWI Status bit - coming Value range 200h – 23Fh 200h+ 0...1Fh Bit-No. NAWI status bit - going 200h+ 20h...3Fh Bit-No. AWI status bit - going	
Definition of process alarm 3	WORD	DBB014	0	Value 0 - No process alarm generation Value range 1 – 0FFh Number of the technical error Value range 100h – 13Fh 100h+ 0...1Fh Bit-No. NAWI-status bit - coming 100h+ 20h...3Fh Bit-No. AWI Status bit - coming Value range 200h – 23Fh 200h+ 0...1Fh Bit-No. NAWI status bit - going 200h+ 20h...3Fh Bit-No. AWI status bit - going	5.6.6
Definition of process alarm 4	WORD	DBB016	0	Value 0 - No process alarm generation Value range 1 – 0FFh Number of the technical error Value range 100h – 13Fh 100h+ 0...1Fh Bit-No. NAWI-status bit - coming 100h+ 20h...3Fh Bit-No. AWI Status bit - coming Value range 200h – 23Fh 200h+ 0...1Fh Bit-No. NAWI status bit - going 200h+ 20h...3Fh Bit-No. AWI status bit - going	5.6.6
Definition of process alarm 5	WORD	DBB018	0	Value 0 - No process alarm generation Value range 1 – 0FFh Number of the technical error Value range 100h – 13Fh 100h+ 0...1Fh Bit-No. NAWI-status bit - coming 100h+ 20h...3Fh Bit-No. AWI Status bit - coming Value range 200h – 23Fh 200h+ 0...1Fh Bit-No. NAWI status bit - going 200h+ 20h...3Fh Bit-No. AWI status bit - going	5.6.6
Definition of process alarm 6	WORD	DBB020	0	Value 0 - No process alarm generation Value range 1 – 0FFh Number of the technical error Value range 100h – 13Fh 100h+ 0...1Fh Bit-No. NAWI-status bit - coming 100h+ 20h...3Fh Bit-No. AWI Status bit - coming Value range 200h – 23Fh 200h+ 0...1Fh Bit-No. NAWI status bit - going 200h+ 20h...3Fh Bit-No. AWI status bit - going	5.6.6
Definition of process alarm 7	WORD	DBB022	0	Value 0 - No process alarm generation Value range 1 – 0FFh Number of the technical error Value range 100h – 13Fh 100h+ 0...1Fh Bit-No. NAWI-status bit - coming 100h+ 20h...3Fh Bit-No. AWI Status bit - coming	5.6.6

Name	Type	Address	Default	Range of Values / Explanation	Reference
				Value range 200h – 23Fh 200h+ 0...1Fh Bit-No. NAWI status bit - going 200h+ 20h...3Fh Bit-No. AWI status bit - going	
S7 - FB Life bit monitoring time	TIME	DBB024	0	0 = S7- Life bit monitor switched off 1 to n = Monitor time [msec]	5.6.7
Analog output 0					
Weight for zero point (0 or 4 mA)	REAL	DBB028	0	Value output with the 0 or 4 mA	5.6.8
Reference for end value (20 mA)	REAL	DBB032	0	Value output with the 20 mA.	5.6.9
Replacement value for the analog output at OD	REAL	DBB036	0	Replacement value which is output with the active OD signal if defined.	5.6.10
Source for the analog output	BYTE	DBB040	0	0 = Control signals-SIMATIC 1 = Ext. default value with DR 17 2 = Gross 3 = Net Coarse/fine default values Other definitions not permitted.	5.6.11
Current range for the analog output	BYTE	DBB041	0	Bit 0 : 0: 0 .. 20mA 1: 4 .. 20mA Bit 1 – 7 unused	5.6.12
RS232 0					
RS232-printer baud rate	BYTE	DBB042	3	0 = 1200 Bit/sec. 1 = 2400 Bit/sec. 2 = 4800 Bit/sec. 3 = 9600 Bit/sec. Other definitions not permitted.	5.6.13
RS232-XON/XOFF for printer RS232-RTS/CTS for printer	BYTE	DBB043	1	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 Bit 3 – 7 unused	5.6.14
RS485 0					
Log selection	BYTE	DBB044	0	0: No device 1: SIEBERT Display S11 2: Reserved 3: SIEBERT – Display S102	5.6.15
Decimal place for the remote display	BYTE	DBB045	0	0 to 4 Other definitions not permitted.	5.6.16
RS485-Baudrate	BYTE	DBB046	3	0 = 1200 Bit/sec. 1 = 2400 Bit/sec. 2 = 4800 Bit/sec. 3 = 9600 Bit/sec. 4 = 19200 Bit/s 5 = 38400 Bit/s Other definitions not permitted.	5.6.17

Weighing Functions

Name	Type	Address	Default	Range of Values / Explanation	Reference
RS485-character parity	BYTE	DBB047	0	Bit 0 : 0: Even 1: odd	5.6.18
RS485-Data-Bits			1	Bit 1 : 0: 7 data bits 1: 8 data bits	
RS485-Stop-Bits			0	Bit 2 : 0: 1 Stop Bit 1: 2 Stop Bits	
				Bit 3 - 7 not used	
Digital outputs		0			
Definition of digital output 1	BYTE	DBB048	0FFh	Value range 00h – 3Fh 0...1Fh Bit-No. NAWI status flag 20h...3Fh Bit-No. AWI status flag FDh Start cycl. transfer DigLC FEh Stop cycl.transfer DigLC FFh Output always inactive <i>Range of values 40h – FCh not permitted</i>	5.6.19
Definition of digital output 2	BYTE	DBB049	0FFh	Value range 00h – 3Fh 0...1Fh Bit-No. NAWI status flag 20h...3Fh Bit-No. AWI status flag FDh Start cycl. transfer DigLC FEh Stop cycl. transfer DigLC FFh Output always inactive <i>Range of values 40h – FCh not permitted</i>	5.6.19
Definition of digital output 3	BYTE	DBB050	0FFh	Value range 00h – 3Fh 0...1Fh Bit-No. NAWI status flag 20h...3Fh Bit-No. AWI status flag FDh Start cycl. transfer DigLC FEh Stop cycl. transfer DigLC FFh Output always inactive <i>Range of values 40h – FCh not permitted</i>	5.6.19
Definition of digital output 4	BYTE	DBB051	0FFh	Value range 00h – 3Fh 0...1Fh Bit-No. NAWI status flag 20h...3Fh Bit-No. AWI status flag FDh Start cycl. transfer DigLC FEh Stop cycl.transfer DigLC FFh Output always inactive <i>Range of values 40h – FCh not permitted</i>	5.6.19
Definition of digital output 5	BYTE	DBB052	0FFh	Value range 00h – 3Fh 0...1Fh Bit-No. NAWI status flag 20h...3Fh Bit-No. AWI status flag FDh Start cycl. transfer DigLC FEh Stop cycl. transfer DigLC FFh Output always inactive <i>Range of values 40h – FCh not permitted</i>	5.6.19
Definition of digital output 6	BYTE	DBB053	0FFh	Value range 00h – 3Fh 0...1Fh Bit-No. NAWI status flag 20h...3Fh Bit-No. AWI status flag FDh Start cycl. transfer DigLC FEh Stop cycl. transfer DigLC FFh Output always inactive <i>Range of values 40h – FCh not permitted</i>	5.6.19
Definition of digital output 7	BYTE	DBB054	0FFh	Value range 00h – 3Fh 0...1Fh Bit-No. NAWI status flag 20h...3Fh Bit-No. AWI status flag FDh Start cycl. transfer DigLC FEh Stop cycl. transfer DigLC FFh Output always inactive <i>Range of values 40h – FCh not permitted</i>	5.6.19
Definition of digital output 8	BYTE	DBB055	0FFh	Value range 00h – 3Fh 0...1Fh Bit-No. NAWI status flag 20h...3Fh Bit-No. AWI status flag	5.6.19

Name	Type	Address	Default	Range of Values / Explanation	Reference
				FDh Start cycl. transfer DigLC FEh Stop cycl. transfer DigLC FFh Output always inactive <i>Range of values 40h – FCh not permitted</i>	
Level definition for digital outputs 1....8	BYTE	DBB056	0	Bit 0 : DA1 -> 0 = high active: 1 = low active Bit 7 : DA8 -> 0 = high active: 1 = low active	5.6.20
Replacement values for digital outputs 1 8 upon fault or OD signal	BYTE	DBB057	0	Bit 0 : Replace value digital output 1 Bit 7 : Replace value digital output 8	5.6.21
Activate - Digital output replacement values for operational faults	BYTE	DBB058	0	Bit 0 : 0: Replacement output upon operating error deactivated 1: Replacement output upon operating error activated Bit 1 - 7 not used	5.6.22
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 255 = Step-on condition. (see DR -7 Scale parameter/Step control 5.16.16)	5.6.23
Definition of digital input 2	BYTE	DBB061	0	0 = No command 1- 254 = Command code 255 = Step-on condition. (see DR - Scale parameter/Step control)	5.6.23
Definition of digital input 3	BYTE	DBB062	0	0 = No command 1- 254 = Command code 255 = Step-on condition. (see DR - Scale parameter/Step control)	5.6.23
Definition of digital input 4	BYTE	DBB063	0	0 = No command 1- 254 = Command code 255 = Step-on condition. (see DR - Scale parameter/Step control)	5.6.23
Definition of digital input 5	BYTE	DBB064	0	0 = No command 1- 254 = Command code 255 = Step-on condition. (see DR - Scale parameter/Step control)	5.6.23
Definition of digital input 6	BYTE	DBB065	0	0 = No command 1- 254 = Command code 255 = Step-on condition. (see DR - Scale parameter/Step control)	5.6.23
Definition of digital input 7	BYTE	DBB066	0	0 = No command 1- 254 = Command code 255 = Step-on condition. (see DR - Scale parameter/Step control)	5.6.23
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.	5.6.24
Measurement time for pulse input	TIME	DBB068	1 sec	100 to 10000 ms Other definitions not permitted.	5.6.25
Reserve 4	DWORD	DBB072	0	Reserve 4	
MMC Parameter		0			
Log overflow	BYTE	DBB076	3	Bit 0 : 0: with full memory, the logging procedures are stopped 1: with full memory, the oldest entries are	5.6.26

Name	Type	Address	Default	Range of Values / Explanation	Reference
Trace overflow				overwritten Bit 1 : 0: No overwriting of trace data is possible 1: The oldest trace data is overwritten when the card is full	
Memory for trace				Bit 2 : 0: Trace data is stored in RAM 1: Trace data is stored in the MMC Bit 3 - 7 not used	
Memory segment for trace function	BYTE	DBB077	50	Up to 100% but the total for trace function and log may not exceed 100%	5.6.27
Memory segment for logs	BYTE	DBB078	50	Up to 100% but the total for trace function and log may not exceed 100%	5.6.28
Trace function Recording cycle	BYTE	DBB079	1	1...n x 10 msec	5.6.29

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Table 5-3 DR 7 Allocation

5.6.1 DR 7 - Source for Weight Simulation

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

5.6.2 DR 7 - Decade used for rounding the decimal places of the process values

This parameter can be used to define to how many decimal places that the (weight) process values should be rounded. This entry decouples the display of weight values which trigger the restrictions of the calibration requirements and the values that are used in the control software.

5.6.3 DR 7 - Force in Service Operation

After activating this function, the digital outputs can be forced independent of their parameter definitions. Force control is only possible in service operation and only with the SIMATIC interface.



Warning

Before using this function, you must ensure that the system will not achieve any hazardous state that could be caused by forced control of digital outputs of the SIWAREX FTA.

5.6.4 DR 7 - Process value 1 for fast output to the SIMATIC CPU

The current process values can be read as data packages (data records in the SIMATIC CPU using function block FB41. Transferring a large data record can last for several CPU cycles and puts a load on system performance.

If a process value should be quickly transferred to the SIMATIC CPU immediately after its creation in the SIWAREX FTA then the peripheral interface of the SIWAREX FTA can be used. The data is read by the FB41 cyclically and provided for the user as an output variable. In automatic scale operation, the current net weight (Selection number 2) is normally important.

The selection is made from the following list.

Selection number	Process value
0	NAWI-Status
1	Gross weight (Process value)
2	Net weight (Process value)
3	Tare (process value)
4	Gross-/Net weight (calibratable numeral step)
5	Gross-/Net weight (calibratable numeral step x 10)
6	Tare (calibratable)
7	Pulse counter value
8	Temperature
9	Operating error (32 bit information)
10	Unfiltered ADC value
11	Filtered ADC value (for process value)
20	Through-put / sec
30	AWI status
31	Distribution memory 1
32	Distribution memory 2
33	Total number of weightings
34	Number of control weigh procedures
35	Number of weightings over TO2
36	Number of weightings over TO1
37	Number of weightings opt.
38	Number of weightings less than TU1
39	Number of weightings less than TU2
40	Number of weightings bad
41	Reserve
42	Set value
43	Actual weight average value
44	Standard deviation
45	Last actual weight
46	Weighing procedures per hour
47	Performance per hour
48	Current trailing weight
49	Current fine weight
50	Filtered ADC value (for coarse-, fine signal)
51	Remaining amount
52	Current load set value

Table 5-4 Selection list for process values

5.6.5 DR 7 - Process value 2 for fast output to the SIMATIC CPU

Process value 2 can be defined just the same as process value 1 (see above). In automatic scale operation, the current AWI status (Selection number 30) is normally important.

5.6.6 DR 7 - Definition of the process alarms 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 react immediately to an event this way. Defining a process alarm is explained with the example of process alarm 0. The explanation applies for process alarms 1 to 7 as well.

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

By entering a value unequal to 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 AWI status (see DR 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. AWI Status bit - coming

Value range 512 to 575

Number of the bit from the NAWI- or AWI status (see DR 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. AWI Status bit - going

5.6.7 DR 7 - S7-FB-Life bit Monitoring Time

By monitoring a life bit, the SIWAREX FTA can determine whether the FB is ensuring continuous communication with the SIMATIC CPU. If the FB does not respond then an operating error is output after the defined time-span has elapsed. Monitoring is active in SIMATIC_CPU RUN status.

5.6.8 DR 7 - Weight for zero point (0 or 4 mA)

A weight for the range start can be defined when defining the range parameters for the analog output.

5.6.9 DR 7 - Weight for end value (20 mA)

A weight for the range end can be defined when defining the range parameters for the analog output.

5.6.10 DR 7 - Replacement Value for the Analog Output with OD

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

Normally this corresponds with the SIMATIC CPU status - STOP.

5.6.11 DR 7 - Source for the Analog Output

The source for the analog output can be defined with this parameter. The weight values from the defined source are output as current signals corresponding with 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 DR 17
- 2 - Gross weight
- 3 - Net weight
- 4 - Coarse/fine default values

5.6.12 DR 7 - Current range for the Analog Output

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

5.6.13 DR 7 - RS232 Printer baud rate

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

- 1200 Bit/sec
- 2400 Bit/sec
- 4800 Bit/sec
- 9600 Bit/sec

5.6.14 DR 7 - RS232- Printer transfer control

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

XON/XOFF (for printer protocol only)

0: XON/XOFF transmission control OFF

1: XON/XOFF transmission control ON

RTS/CTS (for printer protocol only)

0: CTS/RTS transmission control OFF

1: CTS/RTS transmission control ON

Parity: even

Data bits: 8

Stop bits: 1

5.6.15 DR 7 – Protocol selection for RS 485

The following protocols can be set for the RS485 interface

- 0 - No protocol
- 1 - Protocol for the S11 display from Siebert
- 2 - Reserved
- 3 - Protocol for the S102 display from Siebert

5.6.16 DR 7 - Decimal Place for Remote Display

If a Siebert display is to be connected to the RS485 interface then the decimal place for displaying the non-calibratable process values can be defined.

5.6.17 DR 7 – RS 485-Baudrate

The following protocols can be set for the RS485 interface:

0 = 1200 Bit/sec

1 = 2400 Bit/sec

2 = 4800 Bit/sec

3 = 9600 Bit/sec

4 = 19200 Bit/sec

5 = 38400 Bit/sec

5.6.18 DR 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

5.6.19 DR 7 - Definition of the Digital Outputs 1, 2, 3, 4, 5, 6, 7, 8

The definition of the digital outputs can be defined 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

32 + 0... 31 Bit-No. AWI status flag

253 Start cycl. value transfer from sensor Mettler Toledo type WM or WMH

254 Stop cycl. value transfer from sensor Mettler Toledo type WM or WMH

255 Output always inactive

Value range 64 to 252 Output always inactive

5.6.20 DR 7 - Level definitions for digital outputs 1 to 8

After assigning the definitions for digital outputs to a status bit, the signal that the output should have when it is active 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.

5.6.21 DR 7 - Replacement value for DO 1 to DO 8 with Interference or Output Disable

Normally, the outputs are reset with a SIMATIC CPU STOP. This behaviour corresponds with 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

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.

5.6.22 DR 7 - Replacement values for digital outputs with operational faults

Normally, the outputs are reset when there is a module group fault (operating error).. This behaviour corresponds with 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.

The 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) then you must ensure that it does not lead to a hazardous situation.

5.6.23 DR 7 - Definition of the Digital Inputs 1, 2, 3, 4, 5, 6, 7

The definition of the digital inputs can be defined with this parameter. This can be done by assigning a command or a step-on condition.

Commands:

If the signal 1 appears at the defined input then the assigned command is executed. To assign a command to an input, its command number (1 to 256) must be entered (see Command list). By entering 0, the input is assigned as unused.

Step-on condition

The step-on condition allows you to influence the weighing procedure through the control program of the SIMATIC (see chapter [8.4.8](#)).

Entering the value 255 defines the input for the step-on conditions. In the second step, you must define which step-on condition that the input is responsible for. This is done by defining scale parameter 2 (see DR 23 – [Step control](#)).

5.6.24 DR 7 - Level definitions for digital inputs 1 to 7

After assigning the definition for digital inputs to a command or a step-on condition, you can define which signal that 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.

5.6.25 DR 7 - Measurement time Pulse input

The measurement time can be defined between 1000 and 10000 Milliseconds for the counter input. Pulses are counted using the defined time intervals and are output as process values.

5.6.26 DR 7 - MMC Log Overflow, MMC Trace Overflow, Target storage for trace function

Bit 0 is used for defining how the logging should be performed in the calibratable MMC memory when the memory is full.

0: with full memory, the logging procedures are stopped

1: with full memory, the oldest entries are overwritten

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

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

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

The trace function is described in [5.6.29](#)

Bit 2 defines which memory is 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 [5.6.29](#)

5.6.27 DR 7 - Memory segment for trace function

The MMC memory can be used for recording the trace data and for recording the calibratable scale 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 calibratable log may not exceed 100%

The trace function is described in [5.6.29](#)

5.6.28 DR 7 - Memory segment for log

The MMC memory can be used for recording the trace data and for recording the calibratable scale logs.

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

Up to 100% is permitted in this definition but the total for trace function and calibratable log may not exceed 100%

The trace function is described in [5.6.29](#)

5.6.29 DR 7 - Trace function recording cycle

Every n-te measurement ($n \times 10$ msec) is recorded. When recording to RAM, $n \geq 1$ is possible and when recording to MMC, $n \geq 5$ is possible.

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.

Name	Type	Length	Range of Values / Explanation
Timestamp1	DATE&TIME	8	
AWI status	ULONG	4	status bit
NAWI-Status	ULONG	4	status bit
Unfiltered raw value	ULONG	4	Unfiltered digit value from ADC
Filtered raw value	LONG	4	Filtered digit value
Net_Process	FLOAT	4	Net weight
Gross_Process	FLOAT	4	Gross weight
Filtered raw value 2	LONG	4	Filtered digit value from filter level 2

Name	Type	Length	Range of Values / Explanation
Net rough/fine shut-off	FLOAT	4	Net weight for rough / fine shut-off
Rough shut-off point	FLOAT	4	Coarse current shut-off point
Fine shut-off point	FLOAT	4	Fine current shut-off point
Reserved	UBYTE[n]	16	Reserved
		64	

Table 5-5 Trace element data

The recorded values can be read with the SIWATOOL FTA and exported to MS Excel or text file.

If the trace function is defined for recording to circulating memory, it can be used for constructing 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 progress of a procedure.

5.7 DR 8 Date / Time (NAWI, AWI)

SIWAREX FTA has its own hardware clock. The actual date and time can be read through DR8. The date and time can be set on the module group using this data record if required.

Procedure:

- Set date and time.
- Send DR 8 to the scale

Name	Type	Address	Default	Range of Values / Explanation	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 5-6 DR 8 Allocation

5.8 DR 9 Info on Module (NAWI, AWI)

No definitions can be made in DR9. The data record uses the information on the inner life of the module.

Name	Type	Address	Default	Range of Values / Explanation	Reference
Info on module					
CRC Checksum	DWORD	DBW000	0	-	
Length of firmware in bytes	DWORD	DBW004	0	-	
Module info	STRING [26]	DBB008	0	Siemens AG Module serial number	

Name	Type	Address	Default	Range of Values / Explanation	Reference
Copyright	STRING [26]	DBB008	0	"Copyright Siemens AG"	
Module name	STRING [10]	DBB036	SIWAREX XX		
Application	STRING [4][8]	DBB048	"AWI" "NAWI" "xxxx" "xxxx" "xxxx" "xxxx" "xxxx" "xxxx"	Application identification	
File name	STRING [20]	DBB082	0		
Version recognition	BYTE [4]	DBB104	0	Byte 0 (ASCII) <u>before delivery approval</u> B = Laboratory status P = Pilot R = Release S = Special status <u>after delivery approval</u> V = Version K = Correction status	
Function status				Byte 1 Function status xx (Main function changes or calibratable changes 0 ... 99)	
Data structure version				Byte 2 Version DR structure yy (indicated changes in the data structure) 0 ... 99	
Correction status				Byte 3 Correction status zz (small changes or error corrections) 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	"AWI" or "NAWI"		
Reserve	WORD	DBW138	0	Reserve	
		140			

Table 5-7 DR 9 Allocation

5.8.1 DR 9 - Info on Module

The information on the SIWAREX FTA module are for identifying the module group at the manufacturer (e.g. for repair). This information has no influence on user operation.

5.9 DR 15 Tare entry (NAWI, AWI)

DR 15 is used for an external tare weight definition.

Procedure:

- Enter tare weight
- Send DR 15 to the scale
- Activate the “Accept tare entry (24)” command

Name	Type	Address	Default	Range of Values / Explanation	Reference
Tare entry					
Tare entry	REAL	DBD000	0	External tare entry (Preset Tare).	5.9.1
		4			

Table 5-8 DR 15 Allocation

5.9.1 DR 15 - Tare Entry

DR 15 is used for an external tare weight definition. After the entry with the DR 15, the tare value is not yet activated. The transfer to the tare memory of the SIWAREX FTA is then made with the “Accept tare entry” command (see command code [24](#))

5.10 DR 16 Weight Simulation Entry (NAWI, AWI)

If the DR 16 has been defined as the source for the weight simulation (see DR 7 [Source for the weight simulation](#)) then the measurement input of the SIWAREX FTA is deactivated by defining a weight value with the DR 16 and the defined value is “simulated” as a weight value.

Procedure:

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

Name	Type	Address	Default	Range of Values / Explanation	Reference
Simulation					
Weight simulation entry	REAL	DBD000	0	Default value for weight simulation (is used instead of the gross weight e.g. for test)	5.10.1
		4			

Table 5-9 DR 16 Allocation

5.10.1 DR 16 - Weight simulation entry

If the DR 16 has been defined as the source for the weight simulation (see DR 7 [Source for the weight simulation](#)) then the measurement input of the SIWAREX FTA is deactivated by defining a weight value with the DR 16 and the defined value is “simulated” as a weight value. This way, system components can be tested although the scale is not yet completely constructed.

5.11 DR 17 Analog Output Control (NAWI, AWI)

If DR17 has been defined as the source for the analog output (see DR 7 [Source for the analog output](#)) then sending a weight value will output a corresponding output stream on the analog output.

Procedure:

- Check for whether DR 17 has been defined as the source for the analog output in DR 7
- Check the parameter definition of the analog output (see DR 7 [Weight for zero point and following parameters](#)).
- Enter value in DR 17
- Send DR 17 to the scale

Name	Type	Address	Default	Range of Values / Explanation	Reference
Analog output					
Ext. Definition for analog output	REAL	DBD000	0	Analog output control with a default value.	5.11.1
		4			

Table 5-10 DR 17 Allocation

5.11.1 DR 17 - Ext. Definition for Analog Output

If the DR 17 has been defined as the source for controlling the analog output (see [DR 7 - Source for the Analog Output](#)) then the analog output is controlled with the defined value with a definition of a weight value on DR 17. This way, the analog output can be set via SIWATOOL.

5.12 DR 18 Control Display (NAWI, AWI)

A value can be defined through DR18 which is to be shown on the remote display. This way, the SIEBERT remote display can be used for displaying values that are calculated in the SIMATIC.

Procedure:

- Enter value in DR 18
- Send DR 18 to the scale

Name	Type	Address	Default	Range of Values / Explanation	Reference
Display					
Ext. Remote display definition	REAL	DBD000	0	Remote display control with a default value.	
		4			

Table 5-11 DR 18 Allocation

5.12.1 External remote display definition

A value can be preset using DR 18 and this value can be displayed on the external display. This way, the external display (Siebert) can be used for displaying any value that is calculated in SIMATIC.

5.13 DR 20 Set Weight (AWI)

The set value for a weighing procedure that can change often in a process is passed onto the scale through DR 20. Normally, the set weight is changed when switching materials.

Procedure:

- Define the set weight
- Send DR 20 to the scale

Name	Type	Address	Default	Range of Values / Explanation	Reference
Set weight					
Set weight	REAL	DBD000	50 Wizzard: $WR_{nmax} * 0.5$	Set weight for the weighing procedure	
		4			

Table 5-12 DR 20 Allocation

5.14 DR 21 Load set value (AWI)

In loading operation, the overall amount of the material to be loaded is defined. The scale performs the individual weighing procedure according to the defined set weight for an individual weighing procedure. In loading operation, the set weight is defined with zero. Procedure:

- Define the set weight
- Send DR 20 to the scale

Name	Type	Address	Default	Range of Values / Explanation	Reference
Load set value					
Load set value	REAL	DBD000	1000 Wizzard: $WB_{nmax} * 10$	Total set weight for filling operation	
		4			

Table 5-13 DR 21 Allocation

5.15 DR 22 Scale Parameter 1 (AWI)

The weighing parameters that change more often in the process are defined in DR 22. Normally, these parameters are changed for switching materials and are then sent to the SIWAREX FTA again.

Procedure:

- Define all parameters according to the material properties
- Send DR 22 to the scale
- If required, check parameters using tests

Name	Type	Address	Default	Range of Values / Explanation	Reference
Scale parameter 1					
Maximum weighing time	Time	DBD000	0	0: deactivated, Definition in msec.	5.15.1
Trailing weight	REAL	DBD004	1 Wizzard WB _{nmax} * 0,01	Trailing amount after switching fine signal off	5.15.2
Fine weight	REAL	DBD008	20 Wizzard: WB _{nmax} *0,2	Amount for dosing during the fine signal	5.15.3
Shut-off correction value	REAL	DBD012	0	+/- value for moving the shut-off point for the fine signal	5.15.4
Timer pre-dosing	TIME	DBD016	0	0: deactivated > 0: Pre-dosing time in msec	5.15.5
TO1	REAL	DBD020	0,2 Wizzard: WB _{nmax} * 0,002	Upper tolerance limit TO1 (entry of the permitted positive deviation from set weight)	5.15.6
TU1	REAL	DBD024	0,2 Wizzard: WB _{nmax} * 0,002	Lower tolerance limit TU1 (entry of the permitted negative deviation from set weight)	5.15.6
TO2	REAL	DBB028	0,5 Wizzard: WB _{nmax} * 0,005	Entry of the upper tolerance limit 2, must be greater than TO1.	5.15.6
TU2	REAL	DBB032	0,5 Wizzard: WB _{nmax} * 0,005	Entry of the lower tolerance limit 2, must be greater than TU1.	5.15.6

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Table 5-14 DR 20 Allocation

5.15.1 DR 22 - Maximum Weighing Time

The weighing time is started with the start of a weighing procedure. After the defined time has elapsed, a test is performed to determine whether the weighing procedure will take longer. If yes then a technology error "Weighing time exceeded" is generated. The weighing procedure is not influenced by the technology error message.

5.15.2 DR 22 - Trailing Weight

The trailing weight should correspond with the amount to add to the amount of the dosage from the coarse- and fine-signal after switching the fine signal off. This means, the fine shut-off point can be calculated as follows:

Fine shut-off point = Set value – trailing weight

The proportional controllers can offset the fine shut-off point by determining the new trailing weight.

5.15.3 DR 22 - Fine Weight

The fine weight entry should correspond with the material amount that was dosed during the fine signal (after switching off the coarse signal until switching off the fine signal). The defined value should be measured so that the material flow can be stabilised by the time that the fine signal is switched off. This means, the coarse shut-off point can be calculated as follows:

coarse shut-off point = Set value – Fine weight – Trailing weight

The proportional controllers can offset the rough shut-off point by determining the new trailing weight.

5.15.4 DR 22 - Shut-off correction value

The shut-off correction value for the fine signal changes the fine shut-off point by the defined entry. The resulting fine shut-off point offset can be used to deliberately achieve an over-dosage or under-dosage. This can be used to compensate for interfering forces such as pressure, vacuum, etc., occurring with the dosage.

5.15.5 DR 22 - Timer pre-dosing

If an output has been defined for the pre-dosing ([see DR 7 - Definition of the Digital Outputs 1, 2, 3, 4, 5, 6, 7, 8](#)) then the time that is started with the weighing procedure start and which controls a coarse pre-dosing that depends on time can be defined with this parameter. This can be used if another dosing step (coarse 1, coarse 2) is required in addition to coarse and fine steps for example.

5.15.6 DR 22 –Tolerance TO1, Tolerance TU1, Tolerance TO2, Tolerance TU2

4 values can be defined for the tolerance evaluation. Based on this value, the results of the automatic operation are tested with reference to the set value. The values are defined so that TO2 > TO1 and TU2 > TU1.

This way, 2 tolerance bands are defined around the set value.

The tolerance evaluation is performed after switching the fine signal off if the scale stabilises and stands still.

The following image shows the progress of the tolerance evaluation over time.

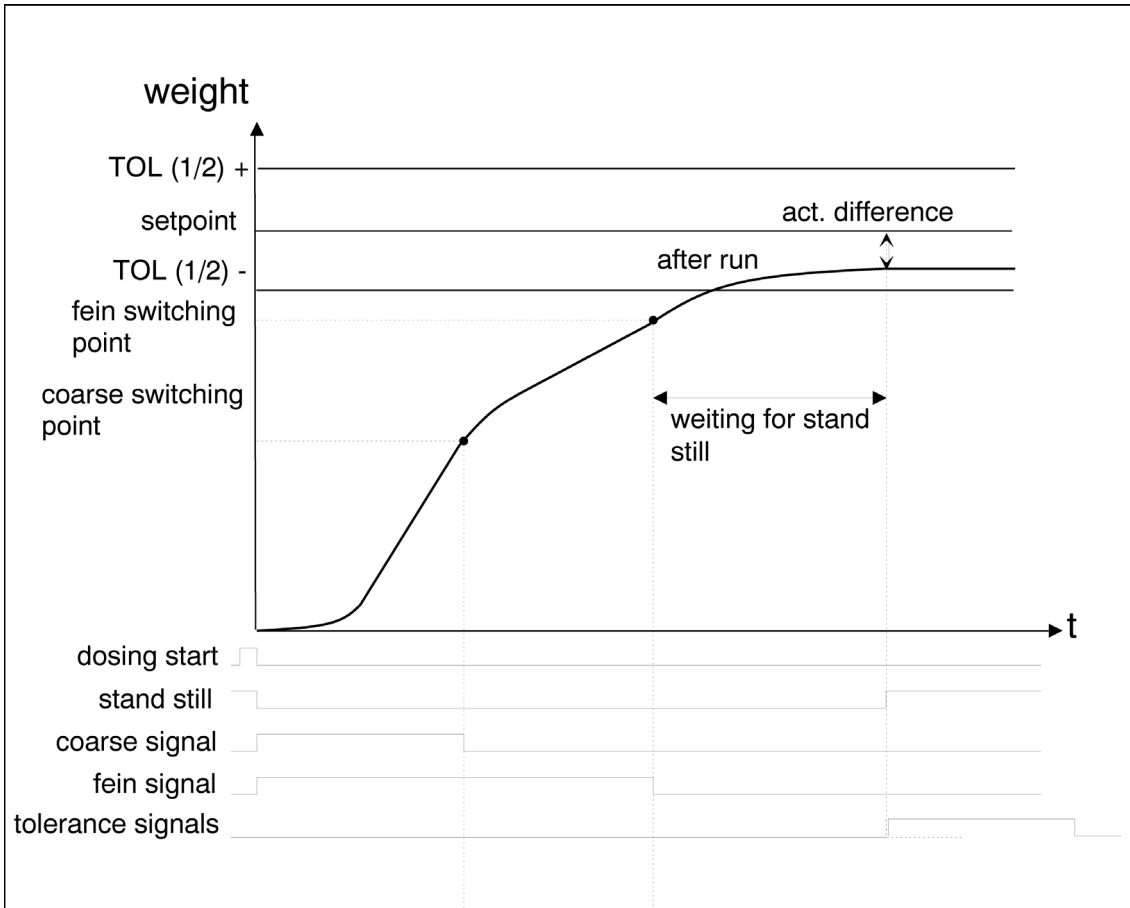


Image 5-11 Tolerance evaluation progress by time with TU1 status

The result of the tolerance evaluation is output based on the defined tolerance values. All information on the weighing result is distributed with 6 status bits.

TO1 – upper tolerance value 1

TO2 – upper tolerance value 2

TU1 – lower tolerance value 1

TU2 – lower tolerance value 2

Good - within tolerance band from TU1 to TO1

Off - outside of tolerance TU2 to TO2 (can be used for sorting the weighing material)

Status output condition	TO2	TO1	Good	TU1	TU2	Off
Net weight from TU1 to TO1	0	0	1	0	0	0
Net weight above TO1 to TO2	0	1	0	0	0	0
Net weight above TO2	1	0	0	0	0	1
Net weight from TU2 to under TU1	0	0	0	1	0	0
Net weight under TU2	0	0	0	0	1	1

Table 5-15 Tolerance information evaluation

5.16 DR 23 Scale parameter 2 (AWI)

Weighing parameters are held in DR23. These are normally typical to the scale and do not depend heavily on the changing material properties within a limited extent. Procedure:

- Adjust all parameters corresponding to their purpose
- Send DR 23 to the scale
- If required, check parameters using tests

Name	Type	Address	Default	Range of Values / Explanation	Reference
Scale parameter 2			0		
Text selection for automatic logging	BYTE	DBB000	1	0: No autom. logging after the weighing procedure 1: autom. logging with text 1 2: autom. logging with text 2 3: autom. logging with text 3 4: autom. logging with text 4 Other definitions not permitted.	5.16.1
Reserve 1	BYTE	DBB001	0	Reserve 1	
Filter depth of average value filter for dosing	WORD	DBB002	0	0 ...250 0: average value filter deactivated Other definitions not permitted.	5.16.9
Max. single set weight	REAL	DBD004	90 Wizzard: WB _{nmax} *	Maximum set weight for a single	5.16.2
Inhibition time coarse	TIME	DBD008	500	0: deactivated After switching the coarse signal on, no weight evaluation is performed for the defined amount of time (msec)!	5.16.3
Inhibition time fine	TIME	DBD012	500	0: deactivated After switching the coarse signal off, no weight evaluation is performed for the defined amount of time (msec)!	5.16.4
Inhibition time Set-Act-comparison	TIME	DBD016	0	After the command for starting the inhibition time, the actual weight is not monitored during the weighing procedure for the defined amount of time.	5.16.5
Default value for analog output with coarse	BYTE	DBB020	60	Analog output value if coarse signal active (in %)	5.16.6
Default value for analog output with fine	BYTE	DBB021	40	Analog output value if fine signal active (in %)	5.16.7

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Name	Type	Address	Default	Range of Values / Explanation	Reference
Dosing filter type	BYTE	DBB022	0	Filter type for dosage control 0: critically damped 1: Bessel-Filter 2: Butterworth Filter Other definitions not permitted.	5.16.8
Dosing filter limit frequency	BYTE	DBB023	2	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 not permitted.	5.16.10
Tare / Zero setting		0			
Tare / Zero setting mode	BYTE	DBB024	0	0: No taring, no zero setting at weighing start 1: Zero setting 2: Tare 3: Taring with average value 4: Taring using external entry tare Other definitions not permitted.	5.16.11
Tare / Zero setting cycle	BYTE	DBB025	0	0: Every weighing is nullified or tared 1: Tipping is not nullified or tared 2...99: 2...99 tippings not nullified or tared Other definitions not permitted.	5.16.12
Reserve 3	WORD	DBB026	0	Reserve 3	
Tare min. weight	REAL	DBB028	0	Taring or ext. tare entries are only executed if gross > tare minimum weight 0: No monitoring of the tare minimum weight	5.16.13
Tare max. weight	REAL	DBB032	0	Taring or ext. Tare entries are only executed if gross < tare maximum weight 0: No monitoring of the tare maximum weight	5.16.14
Cycle time for zero setting	TIME	DBB036	300000 msec	If 0, then no time controlled zero setting Unequal 0: Time between two zero settings <u>Note:</u> Zero setting / taring is performed after 15min at the latest with weighing operating mode AWI and country code "OIML"	5.16.15
Step control / check stop					
Step control through digital input 1	BYTE	DBB040	0	Instead of defined command codes for the digital inputs, step-on conditions can be influenced through the inputs for dosing control (prerequisite in DR interface parameters is identification 0xFF). 0: Weighing waits at step 0 if DI1 is active; 1: Weighing waits at step 1 if DI1 is active 2: Weighing waits at step 2 if DI1 is active ... 7: Weighing waits at step 7 if DI1 is active Other definitions not permitted.	5.16.16
Step control through digital input 2	BYTE	DBB041	0	Instead of defined command codes for the digital inputs, step-on conditions can be influenced through the inputs for weighing control (prerequisite in DR interface parameters is identification 0xFF). 0: Weighing waits at step 0 if DI2 is active; 1: Weighing waits at step 1 if DI2 is active 2: Weighing waits at step 2 if DI2 is active ... 7: Weighing waits at step 7 if DI2 is active Other definitions not permitted.	5.16.16

Name	Type	Address	Default	Range of Values / Explanation	Reference
Step control through digital input 3	BYTE	DBB042	0	<p>Instead of defined command codes for the digital inputs, step-on conditions can be influenced through the inputs for weighing control (prerequisite in DR interface parameters is identification 0xFF).</p> <p>0: Weighing waits at step 0 if DI3 is active; 1: Weighing waits at step 1 if DI3 is active 2: Weighing waits at step 2 if DI3 is active ... 7: Weighing waits at step 7 if DI3 is active Other definitions not permitted.</p>	5.16.16
Step control through digital input 4	BYTE	DBB043	0	<p>Instead of defined command codes for the digital inputs, step-on conditions can be influenced through the inputs for weighing control (prerequisite in DR interface parameters is identification 0xFF).</p> <p>0: Weighing waits at step 0 if DI4 is active; 1: Weighing waits at step 1 if DI4 is active 2: Weighing waits at step 2 if DI4 is active ... 7: Weighing waits at step 7 if DI4 is active Other definitions not permitted.</p>	5.16.16
Step control through digital input 5	BYTE	DBB044	0	<p>Instead of defined command codes for the digital inputs, step-on conditions can be influenced through the inputs for weighing control (prerequisite in DR interface parameters is identification 0xFF).</p> <p>0: Weighing waits at step 0 if DI5 is active; 1: Weighing waits at step 1 if DI5 is active 2: Weighing waits at step 2 if DI5 is active ... 7: Weighing waits at step 7 if DI5 is active Other definitions not permitted.</p>	5.16.16
Step control through digital input 6	BYTE	DBB045	0	<p>Instead of defined command codes for the digital inputs, step-on conditions can be influenced through the inputs for weighing control (prerequisite in DR interface parameters is identification 0xFF).</p> <p>0: Weighing waits at step 0 if DI6 is active; 1: Weighing waits at step 1 if DI6 is active 2: Weighing waits at step 2 if DI6 is active ... 7: Weighing waits at step 7 if DI6 is active Other definitions not permitted.</p>	5.16.16
Step control through digital input 7	BYTE	DBB046	0	<p>Instead of defined command codes for the digital inputs, step-on conditions can be influenced through the inputs for weighing control (prerequisite in DR interface parameters is identification 0xFF).</p> <p>0: Weighing waits at step 0 if DI7 is active; 1: Weighing waits at step 1 if DI7 is active 2: Weighing waits at step 2 if DI7 is active ... 7: Weighing waits at step 7 if DI7 is active Other definitions not permitted.</p>	5.16.16
Reserve 4	BYTE	DBB047	0	Reserve 4	
Monitoring time step control	TIME	DBB048	0	<p>0: No monitoring >0 Time definition for the monitoring If no further stepping to the next weighing step is performed within the defined time then the "Step-on Timeout" technology error is generated.</p>	5.16.17

Weighing Functions

Name	Type	Address	Default	Range of Values / Explanation	Reference
Definition check stop	BYTE	DBB052	0	Bit 0 : No check stop Bit 1 : Weighing goes to check stop after step 1 Bit 2 : Weighing goes to check stop after step 2 ... Bit 7 : Weighing goes to check stop after step 7 Other definitions not permitted.	5.16.18
Reserve 5	BYTE	DBB053	0	Reserve 5	
Post dosing tolerance check					
Automatic dosing	BYTE	DBB054	0	Bit 0 : 0: No automatic post dosing 1: autom. post dosing for Tol-1 deviation	5.16.19
Dosing method				Bit 1 : 0: post dosing with continuous fine signal 1: post dosing pulse mode	5.16.20
Stop if more than TO1				Bit 2 : 0: Weighing procedures not stopped because of tolerance errors 1: Weighing stopped because of tolerance error (weight above TO1)	5.16.21
Stop if more than TO2				Bit 3 : 0: autom. Weighing procedures not stopped because of tolerance errors 1: Weighing stopped because of tolerance error (weight above TO2)	5.16.22
Stop for more than TU1				Bit 4 : 0: Weighing procedures are not stopped because of tolerance errors 1: Weighing procedure is stopped because of tolerance error (weight under TU1)	5.16.23
Stop for more than TU2				Bit 5 : 0: autom. weighing procedures are not stopped because of tolerance errors 1: Weighing procedure is stopped after a filling procedure because of a tolerance error (weight under TU2)	5.16.24
Continue after TOL-Stop				Bit 6 : 0: Cycle cannot be continued when the TOL error persists 1: Cycle can be continued even though the TOL error exists	5.16.25
Control pause	BYTE	DBB055	0	0: All weighing procedures are checked for tolerance deviations 1: A weighing procedure is not checked for tolerance deviations 2...98: 2...98 weighing procedures are not checked for tolerance deviations, 99 no check Other definitions not permitted.	5.16.26
Pulse duration for pulse dosing	TIME	DBD056	1000 msec	Pulse duration of fine signal (in msec)	5.16.27
Controller					
Controller behaviour at scale fault	BYTE	DBB060	0	Bit 0 : 0: Reset controller for technology error (weighing fault) 1: Limit controller to max. Access	5.16.28

Name	Type	Address	Default	Range of Values / Explanation	Reference
				Bits 1 to 7 not used	
Selection for type of controller	BYTE	DBB061	0	0: No control for switching off the rough-/fine-signal 1: Proportional controller without fine signal time controller 2: Proportional controller with fine-signal time controller 3: Fine signal time controller without proportional controller Other definitions not permitted.	5.16.29
Control factor Proportional controller	BYTE	DBB062	30	[0...100 %] Other definitions not permitted.	5.16.30
Reserve 5a	BYTE	1	0	Reserve 5a	
Maximum one-time control access	REAL	DBD064	1	Limitation for maximum one-time control access of proportional controller	5.16.31
Controller optimum Plus	REAL	DBD068	0	0...WR _{max}	
Controller optimum Minus	REAL	DBD072	0	0...WR _{max}	5.16.32
Set value for fine time	TIME	DBD076	3000	Definition of set time for the fine signal-time controller	5.16.33
Control factor fine time controller	BYTE	DBB080	20	0...100 [%] Other definitions not permitted.	5.16.35
Reserve 6	BYTE	DBB081	0	Reserve 6	
Empty					
Reserve 7	WORD	DBB082	0	Reserve 7	
Overlapping time	TIME	DBD084	0	The overlapping time must be less than the emptying time The next scale start can be performed early by the amount of overlapping time, while emptying	5.16.36
Emptying time	TIME	DBD088	0	0: Emptying depending on empty range >0: Empty after defined time	5.16.37
Maximum emptying time	TIME	DBD092	2 sec	0: Monitoring switched off >0: After the emptying time has elapsed and the empty range has not been achieved, a technology error is output	5.16.38
Filling					
Filling with coarse	BYTE	DBB096	0	0: All weighing procedures in the loading operation are controlled with coarse and fine signal 1: The last 5 weighing procedures are run with coarse and fine signals 2: The last 4 weighing procedures are run with coarse and fine signals 4: The last 3 weighing procedures are run with coarse and fine signals 8: The last 2 weighing procedures are run with coarse and fine signals 16: The last 1 weighing procedure is run with coarse and fine signals Other values are not used	5.16.39
Reserve 8	BYTE	DBB097	0	Reserve	

Name	Type	Address	Default	Range of Values / Explanation	Reference
		98			

Table 5-16 DR 23 Allocation

5.16.1 DR 23 - Text Selection for automatic logging

For automatic logging of weighing results, a message text consisting of 4 predefined text blocks can be selected by the user. These text blocks are defined in DR 40 to DR 43. (see [5.25](#)).

5.16.2 DR 23 - Max. single set weight

The set value for an individual weighing procedure is checked with this definition.

5.16.3 DR 23 - Inhibition time - Coarse

After coarse signal activation, the scale can start to oscillate, causing significant deviations in measurement values in the scale's switch-off points. If the evaluation of the weight value is not expedient during these oscillations, the coarse inhibition time can be defined. The coarse inhibition time is activated together with the coarse signal, and weight determination is blocked for the duration of the defined inhibition time, meaning the measurement failure (operating error 17) is eliminated. This prevents the coarse signal from switching off prematurely.

5.16.4 DR 23 - Fine Inhibition time

After switching the coarse signal off, dosing continues with the fine signal. The fine inhibition time can be set if scale oscillation could switch off the fine signal prematurely. The fine inhibition time is activated when the coarse signal is switched off, and weight determination is blocked for the duration of the defined inhibition time, meaning the measurement failure (operating error 17) is eliminated.

5.16.5 DR 23 - Inhibition time Set-Act comparison

After the inhibition time is started with command 111, the current weight is not monitored during the defined period, meaning the measurement failure (operating error 17) is eliminated.

Dosing can be started during the inhibition time. The inhibition time also lasts until after the dosing is complete. If dosing is stopped, the inhibition time is also interrupted.

While the inhibition time is running, it can be restarted with command 111, extending the inhibition time accordingly.

The function is deactivated when the configured inhibition time elapses or with command 112.

This function is useful when using discharge aids.

5.16.6 DR 23 - Default value for analog output with course

If the output of a fixed value has been defined during the coarse-/fine-signal (see DR 7 [Source for the analog output](#)) then the output current during the coarse signal is defined with the parameter (1... 100%).

5.16.7 DR 23 - Default value for analog output with fine

If the output of a fixed value has been defined during the coarse-/fine-signal (see DR 7 [Source for the analog output](#)) then the output current during the fine signal is defined with the parameter (1... 100%).

5.16.8 DR 23 - Filter type for dosing

A separate low-pass filter is used exclusively for the precise control of switching the coarse and fine signal off. Normally, these settings should correspond with the settings for the filter in DR3.

The filter type can be defined with this parameter.

5.16.9 DR 23 - Depth of the mean value filter for dosing

A separate mean value filter is used exclusively for the precise control of switching the coarse and fine signal off.

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 FTA calculates every 10 msec, e.g. if n=10, 10 values are used to calculate the average value. Every 10 msec, the oldest value is removed and the newest is taken into account in the calculation.

5.16.10 DR 23 - Limit Frequency Filter for dosing

A separate low-pass filter is used exclusively for the precise control of switching the coarse and fine signal off. Normally, these settings should correspond with the settings for the filter in DR3.

The limit frequency of the low-pass filter can be defined with this parameter.

5.16.11 DR 23 - Tare-/Zero setting mode

This parameter defines whether the scale starts with:

- neither taring nor zero setting,
- zero setting,
- taring,
- taring with a tare average value (from 10 taring procedures),
- or the external tare definition (see [DR 15 - Tare Entry](#)).

5.16.12 DR 23 - Tare / Zero setting cycle

The entry defined how often the scale must perform a taring or zero setting:

- 0: Every weighing is nullified or tared
- 1: Tipping is not nullified or tared
- 2 to 99: 2 to 99 tippings not nullified or tared

Note

In calibrating applications with the SIWAREX FTA as an automatic weighing instrument for emptying operation, a taring or zero setting is performed automatically after the defined time of 15 minutes has elapsed (see DR 3 [Regulations](#)).

5.16.13 DR 23 - Tare minimum weight

Along with the parameter tare max. weight, a weighing range can be defined within which taring is permitted.

5.16.14 DR 23 - Tare max. weight

Along with the parameter tare min. weight, a weighing range can be defined within which taring is permitted.

5.16.15 DR 23 - Time period for zero setting

With a definition of "0", the time controlled zero setting for the scale is not performed. A definition unequal to "0" means that the scale performs a zero setting automatically after this time has elapsed.

Note

The time controlled zero setting is not performed in the scale cycle.

In calibrating applications with the SIWAREX FTA as an automatic weighing instrument for emptying operation, a taring or zero setting is performed automatically after the defined time of 15 minutes has elapsed (see DR 3 [Regulations](#)).

5.16.16 DR 23 - Step control through digital input 1, 2, 3, 4, 5, 6, 7

Instead of definable command codes for the digital inputs, step-on conditions can be controlled by the inputs for scale control (in DR 7, designation 0xFF is defined with the definition of the digital inputs, see [Definition of digital input 1](#)).

The following applies for digital input DI1:

0: Weighing waits at step 0 if DI1 is active;

1: Weighing waits at step 1 if DI1 is active

2: Weighing waits at step 2 if DI1 is active

...

7: Weighing waits at step 7 if DI1 is active

The digital inputs 2 to 7 are defined similar to this.

5.16.17 DR 23 - Monitor time step control

This definition enables the monitoring of the duration of a process step:

- 0: No monitoring
- >0 Time definition for the monitoring

If no further stepping to the next process step is performed within the defined time then the "Step-on Timeout" technology error is generated.

5.16.18 DR 23 - Definition check stop points

A check stop can be effective at the end of a step. This parameter can be used to define the check stop points. After activating the command "Check stop" (see command [107](#)), SIWAREX FTA stops at the next point of the process. With the "Continue" command (see command [103](#)), the automatic processing can continue.

5.16.19 DR 23 - Automatic post dosing

After switching off the fine signal, the SIWAREX FTA waits for the stand-still. Next is the tolerance check. This parameter is for defining whether dosing should be done automatically if the weight is less than the set value minus the lower tolerance TU1:

0: No automatic post dosing

1: Automatic post dosing when below TU1 deviation

5.16.20 DR 23 - Post dosing type

The type of automatic post dosing is defined with this parameter:

0: post dosing with continuous fine signal

1: post dosing pulse mode

5.16.21 DR 23 - Stop on TO1

This parameter defines whether the automatic processing should stop if the current net weight increases to more than the set value plus TO1.

- 0: Weighing procedures not stopped for tolerance error
- 1: Weighing stopped because of tolerance error (weight above TO1)

5.16.22 DR 23 - Stop on TO2

This parameter defines whether the automatic processing should stop if the current net weight increases to more than the set value plus TO2.

- 0: Weighing procedures not stopped for tolerance error
- 1: Weighing stopped because of tolerance error (weight above TO2)

5.16.23 DR 23 - Stop with TU1

This parameter can be used to define whether the automatic progress should continue if the current net weight has become less than the set value minus TU1.

- 0: Weighing procedures are not stopped because of tolerance errors
- 1: Weighing procedure is stopped because of tolerance error (weight under TU1)

5.16.24 DR 23 - Stop with TU2

This parameter can be used to define whether the automatic progress should be stopped if the current net weight has become less than the set value minus TU2.

- 0: Weighing procedures are not stopped because of tolerance errors
- 1: Weighing procedure is stopped because of tolerance error (weight under TU2)

5.16.25 DR 23 – Continue upon stop because of TOL error

This parameter can be used to define whether the weighing cycle is permitted to continue or not with the “Continue” instruction, even though a tolerance error exists after a stop because of a tolerance error.

- 0: Cycle cannot be continued because of a tolerance error
- 1: Cycle can be continued with the instruction “Continue (103)” when a tolerance error occurs

5.16.26 DR 23 - Control pauses

To increase the material throughput, it may be sensible in certain filling systems to avoid checking every weighing procedure (applies only in AWI Single/Continuous operating mode).

This parameter defines how often that the tolerance check should be done.

- 0: Tolerance deviation checked every weighing procedure.
- 1: A weighing procedure is not checked for tolerance deviations

2 to 98: 2 to 98 weighing procedures are not checked for tolerance deviations

99: No tolerance deviation checking

A weighing procedure with a tolerance check is called control weighing. The following behavior is the result of conjunction with the activated proportional-action controller:

A new control weighing is run if another correction of the controller is required. A correction is required if the set-actual deviation is greater than the Controller optimum plus/minus or than the tolerance definitions range TO1 or TU1.

5.16.27 DR 23 - Pulse duration in pulse dosing

If the automatic post dosing in pulse dosing operation is defined, this parameter can be used to define the fine signal pulse duration. The pause time is then made up of the minimum time value at stand-still 2 and from the waiting for meeting conditions for stand-still 2.

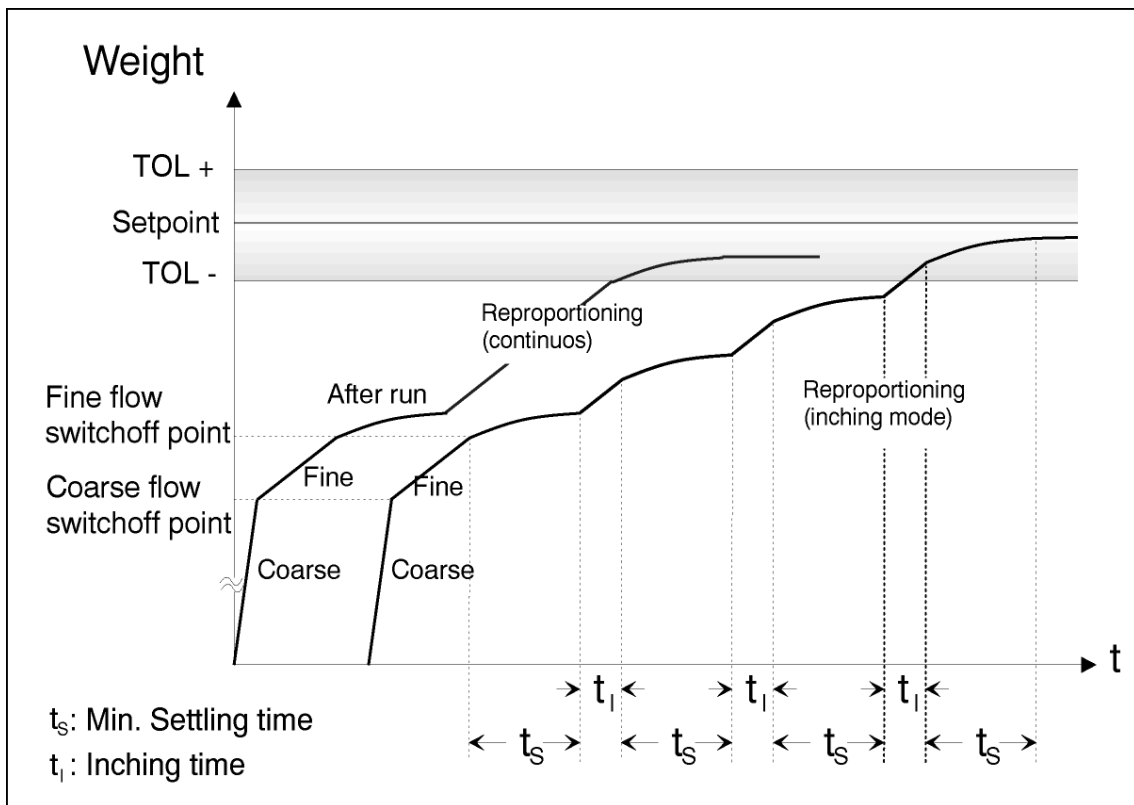


Image 5-12 Automatic post dosing with tolerance TU1

5.16.28 DR 23 - Controller behaviour with dosage fault

If used with parameters Fine weight, Inhibition times, Trailing

If a technology error occurs during the weighing procedure this parameter can define how the proportional controller or the fine-time-controller should act – limiting the control in this case only or reset the parameter to the original value.

5.16.29 DR 23 - Selection for type of controller

Two controllers are integrated in SIWAREX FTA: A proportional controller for correcting the definition for the trailing weight and a fine signal time controller for ensuring the defined duration for the fine signal.

It is also possible to run both controllers at the same time.

5.16.30 DR 23 - Control factor Proportional controller

The proportional controller sets the definition for the trailing weight to adjust it to the actual trailing amounts.

The determined deviation of the weighing net value from the weighing set value is multiplied with the defined control factor (Control factor Proportional controller) and is used for the next filling as a correction set amount.

The trailing weight for the following weighing procedures is calculated according to the following formula:

$$G_{(n+1)} = G_n + (A - S)n \cdot C/100\%$$

$G_{(n+1)}$	Trailing weight for the next weighing procedure
G_n	Trailing weight for the last weighing procedure
S	Set weight
A	Net weight for the last weighing procedure
C	Control factor for proportional controller in %
n	Current weighing procedure
n+1	Following weighing

5.16.31 DR 23 - Maximum one-time correction with the proportional controller

The proportional controller sets the definition for the trailing weight to adjust it to the actual trailing amounts. By defining the maximum correction value, the one-time change can be limited by the controller. This limits runaway values to the maximum correction value.

The trailing weight is modified by the value

$$(S - A)n \cdot C/100\%$$

If the calculation results in a larger value than the maximum correction value, only the maximum correction value is used for the correction of the trailing weight.

Therefore, the formula for calculating the trailing weight is now:

$$G_{(n+1)} = G_n + \text{maximum correction value}$$

5.16.32 DR 23 - Controller Optimum Plus

By defining the Controller Optimum Plus parameter, a weight tolerance is defined above the set weight within which the proportional controller should not control to a finer degree.

A new control weighing is run if another correction of the controller is required. A correction is required if the set-actual deviation is greater than the Controller optimum plus/minus or than the tolerance definitions range TO1 or TU1.

5.16.33 DR 23 - Controller Optimum Minus

By defining the Controller Optimum Plus parameter, a weight tolerance is defined below the set weight within which the proportional controller should not control to a finer degree.

A new control weighing is run if another correction of the controller is required. A correction is required if the set-actual deviation is greater than the Controller optimum plus/minus or than the tolerance definitions range TO1 or TU1.

5.16.34 DR 23 - Set value for fine time

If the fine time controller has been activated (see controller type selection [5.16.29](#)) then the desired duration can be set for the fine signal.

The fine time controller optimises the fine signal duration by setting the fine weight and therefore the rough current shut-off point. The shut-off point is set so that the actual duration of the fine signal in a controlled status corresponds with the defined value. The control deviation is defined after the end of the fine dosing:

$$t_{\text{Diff}} = t_{\text{Set}} - t_{\text{Act}}$$

t_{Diff} = Control difference (s)

t_{Set} = Fine set time (s) (=Default value)

t_{Act} = Fine actual time (s)

The set value for the fine time is defined by the user depending on the material properties.

5.16.35 DR 23 - Control factor fine time controller

The controller sets the rough shut-off point by changing the fine weight.

$$F_{n+1} = F_n + (K * D_{\text{Fine}} * t_{\text{Diff}})$$

F_n = Fine weight for current weighing procedure

F_{n+1} = Fine weight for next weighing procedure

K = Control factor fine time controller

D_{Fine} = Throughput to shut-off time point for the
fine signal

t_{Diff} = Control difference (deviation)

5.16.36 DR 23 - Overlapping time

The overlapping time can be used in combination with emptying over time.

The next start can be advanced by the overlapping time although the emptying procedure is not yet ended.

Note

For emptying over time, you should take measures to ensure that the scale is actually empty after the emptying time has elapsed.

5.16.37 DR 23 - Emptying time

Emptying over time is activated with an entry unequal to 0. The empty signal is activated for the defined time. When this time period has elapsed, the empty signal is reset.

The emptying procedure is ended when the empty range is achieved with a definition of =0.

5.16.38 DR 23 - Maximum empty time

If emptying is not ended after a duration of time and is performed after achieving the empty range instead, a monitoring time can be defined here. The monitoring time is started with the empty signal. If the empty range has not been achieved when this time has elapsed, a technology message is output.

5.16.39 DR 23 - Filling with coarse

For filling "Coarse signal only", the signal "Fine" is switched off together with the "Coarse" signal. At the end of the charge, the fine signal ends the dosing procedure for the defined number of weighing procedures (the last 1 ... 5 weighing procedures).

5.17 DR 26 Internal process value 1 (NAWI)

The current internal states and data of the scale can be read using process values 1 and 2. Their meanings are directly related to the internal processing in the firmware and cannot always be interpreted from an operator's viewpoint.

Observing selected data can be helpful during servicing however, for understanding the behavior of the system.

Sending the data to the SIWAREX FTA is possible (only a good idea for exchanging modules in relation to sending all data to the new module) but is limited in that the data is not changed by the user. SIWAREX FTA therefore checks the check sum after DR 26 receipt and if necessary, rejects the data record.

Name	Type	Length	Default	Range of Values / Meaning
Preset tare	BOOL	1	0	1 if tare memory is occupied with ext. preset value and has been activated.
Reserve 1	UCHAR	1	0	Reserve 1
Reserve 2	UCHAR	1	0	Reserve 2
Diverse internal states	UCHAR	1	0	<i>Bit 0 stand-alone operation</i> 0 = SIMATIC operation activated 1 = Stand-alone operation activated <i>Bit 1 recording from dig. Load cell</i> 0 = Recording stopped 1 = Recording activated <i>Bits 2 to 7 unused</i>
Tara_Prozess	REAL	4	0	Current tare weight process value
Tare average value	REAL	4	0	Current tare-average value (when taring with average value)
Zero set value	REAL	4	0	Zero set value (is set during boot if 'Switch-on zero setting' is activated)
Zero set value	REAL	4	0	Zero set value (is set with zero setting)
Zero value (automatic correction)	REAL	4	0	Zero point correction value, which is influenced by the automatic zero adjustment
Impedance reference value	USHORT	2	0	Impedance reference value
Impedance value	USHORT	2	0	Current impedance value from the last measurement
Slave pointer weight	LONG	4	0	Last largest weight value
operating time	ULONG	4	0	Load counter for the operating minutes since the last default value
Maximum temperature	SHORT	2	0	Load previous maximum inner temperature since last default value [0.1°C] If no temperature value exists: -100.0°C.
Signal level	INT	2	0	Signal level at measurement input
Checksum	USHORT	2	****	

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Table 5-17 DR 26 Allocation

5.18 DR 27 Internal process value 2 (AWI)

Other current internal states and data can be read in the scale using process value 2 (only with SIWATOOL FTA). Their meanings are directly related to the internal processing in the firmware cannot always be interpreted from an operator's viewpoint.

Observing selected data can be helpful during servicing however, for understanding the behavior of the system. DR 27 cannot be sent to the SIWAREX FTA.

5.19 DR 30 Process values 1 (NAWI, AWI)

The current states and data in the scale can be monitored using process values 1 and 2.

Observing the selected data is very helpful in test operation for optimising parameters. In addition, if the SIWAREX FTA is controlled by the SIMATIC CPU then the status can also be observed.

Name	Type	Address	Range of Values / Explanation	Reference
NAWI status bits	DWORD	DBD000	32 status displays for NAWI	
AWI status bits	DWORD	DBD004	32 status displays for AWI	
Gross process value	REAL	DBD008	Current gross weight (Process value)	
Net process value	REAL	DBD012	Current net weight (Process value)	
Tare process value	REAL	DBD016	Current tare weight (Process value)	
G/N weight	REAL	DBD020	Current weight (numeral step from DR3)	
G/N weight_x10	REAL	DBD024	Current weight (numeral step from DR3)	
Tare	REAL	DBD028	Current tare weight (numeral step from DR3)	
Last net weight	REAL	DBD032	Net weight of the last monitored weighing procedure (numeral step from DR3)	
Pulse counter value	DWORD	DBD036	Current pulse counter value	
Distribution memory 1	REAL DOUBLE	DBD040	Current distribution memory 1 value. Format in STEP7 cannot be read (numeral step from DR3)	
Distribution memory 2	REAL	DBD048	Current distribution memory 2 value (numeral step from DR3)	
		52		

Table 5-18 DR 30 Allocation

5.19.1 DR 30 - NAWI-Status bits

Bit No.	Name	Range of Values / Explanation	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 load is exceeded by 9 e	
9	¼d-Zero	Set if the weight does not exceed ¼ d	
10	Waiting for stand-still	Set if the scale waits for a stand-still after the weighing start.	
11	Standstill 1	Stand-still 1 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.	

Bit No.	Name	Range of Values / Explanation	Reference
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	Min. through-put 1 overshoot	Through-put monitor 1 activated	
24	Min. through-put 2 overshoot	Through-put monitor 2 activated	
25	Empty message	Scale in empty range	
26	Calibration data protection	The switch for protecting the calibration data is switched on	
27	Starting up	Set during the warming up phase (duration 1 min, no commands given, in Ascii weight DR 34 the FW-Version is shown)	
28	MMC data ready S7	Preparing the MMC data with the default in DR 46 ended for S7 interface DR 47	
29	Digital LC active	0 = Digital load cell recording not active 1 = Digi load cell recording is running	
30	Stand-alone operation	0 = SIMATIC operation activated 1 = Stand-alone operation activated	
31	Operating error	At least one operating error (fault) exists	

Table 5-19 DR 30 - NAWI status bits

5.19.2 DR 30 - AWI status flags

Bit No.	Name	Range of Values / Explanation	Reference
0	Weighing steps	Current weighing control step 0 to 7	
1			
2			
3			
4			
5			
6			
7			
8	Post dosing active	Post dosing is active	
9	Course signal	The coarse signal is switched on	
10	fine signal	The fine signal is switched on	
11	Timer pre-dosing	The timer for pre-dosing is active	
12	Empty signal	The empty signal is switched on	
13	Weighing stopped	The weighing cycle has been stopped	
14	Weighing stopped because of check stop	The weighing cycle has been stopped because of the check stop command	
15	Check stop follows	The weighing cycle will be stopped by a check stop (is set with the check stop command and reset if the check stop is achieved)	
16	Last weighing procedure aborted	Last weighing procedure aborted with "Residual weighing" or "Reset weighing control".	
17	Weighing blocked	Set if the step-on to the next step in the weighing cycle is blocked because of a missing step enable.	
18	TO2	Net weight above the TO2 limit	
19	TO1	Net weight above TO1	
20	Good	Net weight in tolerance TU1 to TO1	
21	TU1	Net weight under TU1 but over TU2	
22	TU2	Net weight under TU2	
23	TOL bad	Net weight under TU2 or over TO2	
24	Standstill 2	Stand-still 2 exists	
25	Standstill 3	Stand-still 3 exists	
26	Check to follow	A control weighing is run at the end of the cycle	

Bit No.	Name	Range of Values / Explanation	Reference
27	Inhibition time active	Weighing occurs without weight evaluation! Operating error 17 is suppressed	
28	Continuous start active	Continuous start for the cycle sequence is activated! Operating error 17 is suppressed	
29	SecureDisplay visible	SecureDisplay with weight value is visible in foreground	
30	Cycle end	The weighing cycle has ended	
31	Charge end	The emptying operation has ended	

Table 5-20 DR 30 - AWI status flags

5.19.3 DR 30 - Gross process value

The momentary gross weight value

5.19.4 DR 30 - Net process value

The momentary net weight value

5.19.5 DR 30 - Tare process value

The momentary tare weight value

5.19.6 DR 30 - B/N weight

The momentary weight value which will be used for the main display.

5.19.7 DR 30 - B/N weight_x10

The momentary weight value in increased resolution which will be used for the main display.

5.19.8 DR 30 - Tare

The momentary tare weight value (numeral step from DR3).

5.19.9 DR 30 - Net weight

The net weight of the last weighing procedure with tolerance control (numeral step from DR3).

5.19.10 DR 30 - Pulse counter value

The momentary value of the pulse counter (counter input).

5.19.11 DR 30 - Totalising memory 1 (calibratable)

The current value in totalizing memory 1. Since the value can be very large, data type DOUBLE (REAL having 8 bytes) was selected. SIMATIC S7 does not support the data type but the value can be displayed on the PC for example (numeral step from DR3).

5.19.12 DR 30 - Totalising memory 2

The momentary value in totalising memory 2 (numeral step from DR3).

5.20 DR 31 Process values 2 (NAWI, AWI)

The current states and data in the scale can be monitored using process values 1 and 2.

Observing the selected data is very helpful in test operation for optimising parameters. In addition, if the SIWAREX FTA is controlled by the SIMATIC CPU then the status can also be observed.

Name	Type	Address	Range of Values / Explanation	Reference
Process values extended				
Through-put / sec	REAL	DBD000	Actual through-put (amount per second)	
Current trailing weight	REAL	DBD004	Current trailing weight (initialised with default upon receipt of the filling parameter)	
Current fine weight	REAL	DBD008	Current fine weight (initialised with default upon receipt of the filling parameter)	
Unfiltered ADC value	DINT	DBW012	Direct value from the analog/digital converter, unfiltered.	
Filtered ADC value after filter 1	DINT	DBW016	Direct value from the analog/digital converter, after filter 1 (DR3).	
Filtered ADC value after filter 2	DINT	DBW020	Direct value from the analog/digital converter, after filter 2 (DR23).	
Remaining amount to be filled	REAL	DBD024	Current remaining amount in loading operation	
Current set value in load operation	REAL	DBD028	Actual set weight of an individual weighing procedures in filling operation.	
Operating error bit coded	DWORD	DBB032	Current status of the 32 operating errors (faults).	
Date / Time	DATE_AND_TIME	DBD036	Actual date and time in SIWAREX in SIMATIC format.	
Current temperature	INT	DBB044	Current temperature °C	
Digital input states	BYTE	DBB046	Current status of the digital inputs	
Status of digital load cell	BYTE	DBB047	Status of sensor Mettler Toledy type WM or WMH, the following applies: Bit 0: Overload Bit 1: Underload Bit 2: Unknown instruction (not used with Wipotec or PESA) Bit 3: Instruction cannot be executed (not used with Wipotec or PESA) Bit 4: Standstill Bit 5: HW fault Bit 6: - Bit 7: Communication fault	

Name	Type	Address	Range of Values / Explanation	Reference
Reserved	BYTE	DBB047	Reserved	
Impedance reference value	INT	DBB048	Measured impedance value for load cells [0.1Ω]	
Impedance value	INT	DBB050	Current impedance value for load cells [0.1Ω]	
		52		

Table 5-21 DR 31 Allocation

5.20.1 DR 31 - Through-put per second

The momentary through-put value in weight units per second.

5.20.2 DR 31 - Current trailing weight

The trailing weight that is being used.

5.20.3 DR 31 - Current fine weight

The fine weight that SIWAREX FTA is using at the moment.

5.20.4 DR 31 - Unfiltered ADC value

The value of the analog/digital converter at the moment - not filtered.

5.20.5 DR 31 - Filtered ADC value after the signal filter

The value of the analog/digital converter at the moment - after filtering in signal filter (DR3).

5.20.6 DR 31 - Filtered ADC value after the dosing filter

The value of the analog/digital converter at the moment - after filtering in dosing filter (DR).

5.20.7 DR 31 - Current set value in load operation

The momentary value for the set value in load operation.

5.21 DR 32 Statistic data (AWI)

The statistic data provides information on weighing quality. Creating statistic data is restarted with the "Delete statistic data" command and will carry on until the next time that it is deleted.

Residual weighing and the results of dosing in AWI gravimetric filling operating mode during which a dosing fault occurred are not included in the statistics.

Name	Type	Address	Range of Values / Explanation	Reference
Statistic data				
Total number of weighings	DINT	DBD000	Number of weighing procedures (with and without tolerance check)	
Number of control weighs	DINT	DBD004	Number of weighing procedures with tolerance check	
Number of weighing procedures over TO2	DINT	DBD008	Number of weighing procedures with tolerance check over tolerance limit TO2	
No. weigh procedures over TO1	DINT	DBD012	Number of weighing procedures with tolerance check over tolerance limit TO1	
Number of weighing procedures good	DINT	DBD016	Number of weighing procedures with tolerance check within tolerance limits TU1 to TO1.	
No. weigh procedures under TU1	DINT	DBD020	Number of weighing procedures with tolerance check under tolerance limit TU1	
No. weigh procedures under TU2	DINT	DBD024	Number of weighing procedures with tolerance check under tolerance limit TU2	
Number of weighing procedures bad	DINT	DBD028	Number of weighing procedures with tolerance check outside tolerance limits TU2 or TO2	
Reserve 0	DINT	DBD032	Reserve 0	
Reserve 1	DINT	DBD036	Reserve 1	
Set weight	REAL	DBD040	Current set weight (calibratable numeral step, with AWI application and country code "OIML" rounded to the corresponding numeral step)	
Average value of net weight	REAL	DBB044	Average value of the net weights checked for tolerance errors	
Standard deviation of net weights	REAL	DBB048	Standard deviation of the net weights checked for tolerance errors	
Performance per hour	REAL	DBB052	Performance per hour [e.g. g/h, kg/h or t/h] is projected based on the net weight of the last weighing procedure.	
Weighing procedures per hour	INT	DBW056	Weighing procedures per hour projected based on the last weighing procedure (time for one weighing cycle).	

Table 5-22 DR 32 Allocation

5.21.1 DR 32 - Total number of weighing procedures

Number of weighings since the last statistic data deletion. The number of single fills is determined in all operating modes.

5.21.2 DR 32 - Number of control weighs

The number of weighings in which a tolerance check has been performed. In operating modes with totalizing (AWI totalizing and AWI gravimetric big bag), the total loadings are counted.

5.21.3 DR 32 – Classification of tolerance evaluation

The statistics of the results of a tolerance check provides information on the quality of the weighing procedures. Following results are produced:

Number of weigh procedures over tolerance TO2

Number of weigh procedures over tolerance TO1 but not greater than TO2

Number of good weighing procedures (in tolerance band from TU1 to TO1)

Number of weigh procedures under tolerance TO1 but not less than TO2

Number of weigh procedures under tolerance TU2

Number of weigh procedures for sorting (bad), greater than TO2 or less than TU2

Tolerance evaluation is based on the total emptying amount (total 1) for operating modes with totalizing (AWI totalizing and AWI gravimetric big bag).

5.21.4 DR 32 - Set weight

The momentary set weight for automatic operation.

In operating modes with totalizing (AWI totalizing and AWI gravimetric big bag), the set weight corresponds to the emptying amount.

5.21.5 DR 32 - Average net weight value

The current average value of the net weight checked for tolerance errors.

For operating modes with totalizing (AWI totalizing and AWI gravimetric big bag), this is the average value of the emptying amounts.

5.21.6 DR 32 - Standard deviation of net weight from 10

The current standard deviation of the net weight checked for tolerance errors.

For operating modes with totalizing (AWI totalizing and AWI gravimetric big bag), the standard deviation is the actual emptying amounts checked for tolerance errors (total 1).

5.21.7 DR 32 - Performance per hour

Performance per hour [e.g. g/h, kg/h or t/h] is determined based on the net weight of the last weighing procedure and its duration.

This value is irrelevant in the case of operating modes with calibratable total values (AWI totalizing and AWI gravimetric big bag filling).

5.21.8 DR 32 - Weightings per hour

The number of weigh procedures per hour is projected, based on the duration of the last weighing cycle for one hour.

This value is irrelevant in the case of operating modes with calibratable total values (AWI totalizing and AWI gravimetric big bag).

5.22 DR 34 ASCII weight value (NAWI, AWI)

The ASCII weight value corresponds with the value on the main display of the scale.

The data record is displayed in a separate window by activating the function "ActValue" in SIWATOOL FTA.

Name	Type	Address	Default	Range of Values / Explanation	Reference
Current weight in ASCII format	STRING[16]	DBB000	-	Current weight in ASCII format as output on the display	
		18			

Table 5-23 DR 34 Allocation

SIWAREX FTA controls the content of the DR 34 depending on the technical weighing situation.

Display example:

	Net Gross	Weigh range	Space	Weight value									Weight Unit
Weight (Tare memory ≠ 0)	N	1	•	•	•	•	2	2	0	,	5	0	•kg•
Weight	B	2	•	•	•	•	•	•	0	,	0	3	•t••
Weight increase	B	2	•	•	•	•	1	0	,	0	0	3	•kg•
Operating error	•	•	•	•	•	•	E	r	r	•	0	1	••••
Total1	S	•	•	•	•	•	1	0	,	0	0	3	•kg•
Tare	T	•	•	•	•	•	•	•	0	,	0	3	•t••
Weight simulation active	•	•	•	•	•	•	•	t	E	S	t	•	••••
Max+9e exceeded	B	3	-	-	-	-	-	-	-	-	-	-	••••

Table 5-24 Display example for weight display

If the scale is defined as a single range scale only, then a scale is displayed in place of the weighing range.

5.23 DR 35 Coded information for calibratable display (NAWI, AWI)

From the content of the DR 35, the calibratable display is shown on the display of the SIMATIC OP/TP.

Name	Type	Address *1	Default	Range of Values / Explanation	Reference
Coded data fro calibratable weight display	Hex	32		Content is not made public	
		32			

Table 5-25 DR 35 Allocation

5.24 DR39 Version recognition SecureOCX

On a legal for trade display, the contents of DR39 must be identical with the version of the SecureOCX that was used in the WinCC flexible configuration. Defining the version is done during commissioning.

The SecureOCX for ProTool for national certification can be operated with version identifier V 0.0.

Name	Type	Length	Default	Range of Values / Meaning
Version recognition				
Main designation version number	STRING[1]	3	V	"V" for product version
Reserved	BYTE	1	0	
Primary version number	INT	2	2	Serial number 0..15
Secondary version number	INT	2	1	Serial number 0..15
		8		

Table 5-26 DR 39 Allocation

5.25 DR 40 to 43 Log text 1 to 4 (NAWI, AWI)

The logs can be defined in data records DR40 to DR 43. A log text can either be printed automatically or on command or it can be saved in the calibratable MMC memory.

Log text entries 1 to 4 are composed of fixed segments such as title and label and of variable fields.

The variable fields can contain various values from the SIWAREX FTA.

Control characters that will not be printed can be defined in the log for the printer, e.g. for ESC, the following entry is made:

\E1b whereby \E is the lead-in sequence and 1b is the hexadecimal value for ESC.

In addition, 4 designation variables can be defined in addition to the process variables. These designations are 4*16 bytes long and can be specified at any time by the SIMATIC CPU. DR 40 to 43 cannot be defined through the SIMATIC CPU.

Name	Type	Address	Default	Range of Values / Explanation	Reference
Log text 1					
Log text 1	STRING[160]	DBB000	LF,'FF0C',SP,'FF0D', SP,'FF0F',SP,SP,'FF 05',CR,EOT; (Prot.-ID, Date, Time, Weight)	Place holder for field functions "OFFh,Index" (here shown with fxx, Unused characters are initialised with 0 (for possible process values see below)	
		162			

Table 5-27 DR 40 Allocation

Index (for log output 0xFF,nn)	Value	Field length	Field layout (example) (for log field only)
NAWI fields			
12	Gross process value	14	•12345.678•kg•
13	Net process value	14	•12345.678•kg•
14	Tare process value	14	•12345.678•kg•
15	B/N weight calibratable (Format see 5.22)	18	<N1•12345.678•kg•> <B1•-12345.67•kg•>
16	Tare (calibratable)	18	<PT•12345.678•kg•>
17	Pulse counter value	10	1234567890
18	Log ID	16	<No•1234567890•>
19	Date (dd.mm.yy)	8	27.12.02
20	Date (yy-mm-dd)	8	02-12-27
21	Time	8	13:05:00
22	String 1	16	Milk powder•••••
23	String 2	16	Bread crumbs••••
24	String 3	16	Sugar••••••••••
25	String 4	16	Flour••••••••••
26	Through-put / sec	16	•1234567.8•kg•/sec
27	Scale name	10	<Flour_scale1>
AWI fields			
53	Distribution memory 1	18	<S1•12345.678•kg•>
54	Distribution memory 2	16	S2•12345.678•kg•
55	Total number of weightings	6	•12345
56	Number of control weigh procedures	6	•12345
57	Number of weighing procedures over TO2	6	•12345
58	No. weigh procedures over TO1	6	•12345
59	Number of weighing procedures good	6	•12345
60	No. weigh procedures under TU1	6	•12345
61	No. weigh procedures under TU2	6	•12345
62	Number of weighing procedures bad	6	•12345
63	Reserved	6	•12345
64	Set value	18	<Sp•12345.678•kg•>
65	Net weight average value	14	-12345.678•kg•
66	Standard deviation	14	•12345.678•kg•
67	Last net weight	14	•12345.678•kg•
68	Weighing procedures per hour	8	12345•/h
69	Performance per hour	16	•1234567.8•kg•/h
70	Reserved	-	-
71	Current load set value	14	•12345.678•kg

Table 5-28 Process values for log field allocation

5.26 DR 44 Last log (NAWI, AWI)

The log data up to the next logging procedure are stored in DR 44. If required, the contents can be output again.

Name	Type	Address	Default	Range of Values / Explanation	Reference
Last log					
MMC-ID	BYTE[5]	DBB000	0	1 byte manufacturer identification + 4 bytes 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	Identification for saved log text	
Last log data	STRING[160]	DBB012	STRING[160] = 0H	Log text for last logging procedure	
		174			

Table 5-29 DR 44 Allocation

5.26.1 DR 44 - MMC-ID

Identification of the MMC card.

5.26.2 DR 44 - Log ID

Log ID is a single time log number which can be used for identifying the log. The number is incremented with every logging procedure.

5.26.3 DR 44 - Last log data

The last log data that was output can be read until the next logging procedure.

5.27 DR 45 String (NAWI, AWI)

The strings are text that can be inserted in the logs as variables. The contents of the string can be defined using the SIWATOOL FTA or from the control program of the SIMATIC CPU.

Name	Type	Address	Default	Range of Values / Explanation	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 5-30 DR 45 Allocation

5.28 The DR 46 parameter for reading from MMC logs in SIMATIC

Scale logs can be saved on the MMC card. If necessary, a verifiable (legal) log can be read and its contents can be checked using the SIWATOOL FTA program.

Data records DR 46/DR 47 can be used to read any log in SIMATIC (not verifiable). The user enters the desired log ID in DR 46 and then sends DR 46 to the SIWAREX FTA. A short time later, the log is prepared for reading (Status bit "MMC data ready S7"). If the user now requests the DR 47, the log with the desired ID is read in DR 47.

The last log can also be read through DR 47. The value 1 is to be entered in BYTE 4 of DR 46. In this case, the predefined log ID is ignored and the last log will be prepared for DR 47.

Procedures:

- Define ID number and enter in DR 46
- Send DR 46 to the scale
- Wait for status bit "MMC data ready S7"
- Read DR 47
- Display or inspect the contents of the log.

Name	Type	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 DR 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 read through data record DR 47.	
Reserved	BYTE	DBB005	0	Reserve.	
		6			

Table 5-31 Allocation of DR 46

5.29 DR 47 requested log (NAWI, AWI)

The log data is prepared in DR 47.

Name	Type	Address	Default	Range of Values / Meaning	Reference
MMC-ID	BYTE[5]	DBB000	0	1 byte manufacturer's ID + 4 bytes serial number; with log output to RS232 interface always 0	
Reserve 1	BYTE	DBB005	0	Reserve 1	
Reserve 2	WORD	DBB006	0	Reserve 2	

Name	Type	Address	Default	Range of Values / Meaning	Reference
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 5-32 Allocation of DR 47

5.29.1 DR 47 - MMC-ID

Identification of the MMC card.

5.29.2 DR 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.

5.29.3 DR 47 - Last log data

The output log consists of 4 strings.

5.30 DR 120/121 Trace - Data logging

Measurement values and actual states in the weighing process can be stored in RAM memory of the SIWAREX FTA or in the MMC card with the trace function.

When recording to RAM, SIWATOOL FTA reads the trace elements through data record 120, when recording to MMC through data record 121.

The recording can be started with the "Start Recording" command [70](#) and stopped with "End recording" command [71](#).

By defining parameters in data record DR 7 *MMC Parameter* the trace function can be defined. The data record cannot be read through the SIMATIC CPU.

Name	Type	Length	Default	Range of Values / Meaning
Element ID MMC-Trace	DWORD	4	0	Seq. Number of the stored trace element
Length	WORD	2	0	Number of valid data bytes; If 0, then the requested element number does not exist
Trace element	BYTE[n]	64	0	Trace data
Block check character Crc	WORD	2	0	CRC16 (seq.No. + Trace element)
		72		

Table 5-33 Trace data record

Name	Type	Length bytes	Range of Values / Meaning	Reference
Timestamp1	DATE&TIME	8	Time stamp for data logging	
NAWI-Status bits	DWORD	4	Status bits (see 5.19.1)	
AWI status bits	DWORD	4	Status bits (see 5.19.2)	
Unfiltered ADC value	DINT	4	Unfiltered digit value from ADC	
Filtered ADC value	DINT	4	Filtered digit value from ADC	
Net process value	REAL	4	Net weight	
Gross process value	REAL	4	Gross weight	
Filtered ADC value G/F	DINT	4	Filtered digit value from ADC out of filter level 2	
Net for coarse/fine	REAL	4	Net weight for coarse/fine shut-off	
Coarse shut-off point	REAL	4	Process weight value at coarse current shut-off point	
Fine shut-off point	REAL	4	Process weight value at fine current shut-off point	
Temperature	INT	2	Act. Temperature in the module	
Status DE	BYTE	1	Current status of the digital inputs	
Reserve 1	BYTE[n]	13	Reserve 1	
		64		

Table 5-34 Combination of recording elements

The evaluation of the collected data can be completed with the SIWATOOL FTA and MS Excel or similar programs. All of the logged elements that have been recorded are stored in the Excel table or text files and can be read in a graph over time.

The progress of the weighing procedure can be analysed and optimised.

In the event of sporadic events in the system, the recording can be activated as circulating memory 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 FTA) offers a good basis for an analysis or a remote analysis.

An element requires 64 bytes. If the recording is run e.g. once per 50 msec., memory of 1280 bytes per second is required.

In the simplest case, the RAM of the SIWAREX FTA can be used for the logging procedure. The measurement values can be recorded for approx. 10 minutes at the logging speed mentioned above.

5.31 DR 123 Data content MMC

By reading the DR 122, you can define which data are to be stored on the Micro Memory Card with the SIWATOOL FTA. Based on this information, the user can read targeted recordings and logs.

Name	Type	Length	Range of Values / Explanation	Reference
Log ID	DINT	4	Depending on the log output RS232 / MMC, this ID is shown as follows <u>RS232</u> The ID is incremented with every log output ("not with repeat") and is stored and managed in RAM memory. This number is only reset with default values. <u>MMC</u> The ID is incremented with every log output ("not with repeat") and is stored and managed in MMC memory. This number can only be reset by deleting or formatting the card.	
MMC ID	BYTE[5]	5	1 byte manufacturer ID and 4 bytes serial number	
Reserve 1	UBYTE	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 defined trace target; RAM or MMC in 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 5-35 Overview of MMC data

5.32 DR 122 Log data MMC

By reading DR 123, the log data that is stored on the MMC can be determined with SIWATOOL FTA.

Then, a log for a defined log ID can be read with DR 122.

Name	Type	Length	Range of Values / Explanation	Reference
MMC-ID+	BYTE[5]	5	1 byte manufacturer ID + 4 bytes serial number	
Reserve 1	UBYTE	1	Reserve 1	
Length	INT	2	[n] number of valid data bytes in the log text; if 0, then the requested log number does not exist	
Log ID	DINT	4	Identification for saved log text	
Log text	BYTE[n]	174	Log text 1 2 3 4	
Block check character	DWORD	2	CRC16 (MMC-ID + Log ID + Log text[n])	
		188		

Table 5-36 DR 122 MMC log

6 Commands

6.1 Command groups

The SIWAREX commands are divided into groups. The combining of the commands into a group is done according to their functionalities.

Every command has a unique number. A command can be sent via various interfaces (SIMATIC, SIWATOOL FTA, digital input).

Every time that a command is sent to SIWAREX FTA, a check must be made for whether the command has been executed correctly. The data and operating errors (synchronous errors) that are generated provide information on why the command could not be executed.

The group **Service- and adjustment commands** 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 **Scale commands NAWI** contains all commands that affect the handling of a statistic scale. Normally, commands that have anything to do with the operation of the SIWAREX FTA as a **Non-Automatic Weighing Instrument** (e.g. zero setting, taring).

The extensive group of **Scale commands AWI** is used for controlling scale processes. The basic behaviour of the SIWAREX FTA is defined one time by defining parameters. In the defined operating mode, the individual scale procedures are controlled by the commands from this command group.

The group of **Log commands** contains commands that control the log output to a printer or the calibratable storage of the logs to 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 FTA checks for whether the command can be executed. If the check results are negative, the user is informed of the cause by an output of a “synchronous” message (see chapter [7 Messages and Diagnostics](#)).

Note

If the module group is in operating status “Hardware fault” or operating error then only commands (8) Load Default Values, (1) Service On, (2) Service Off and (9) Acknowledge Error, (108) ABORT are accepted. All other commands are rejected with data/operating error 21.

6.2 Command list

Code	Command explanation	Executable in following operating states
	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 weighing cycle
2	Switch off service mode After the adjustment, service operation can be switched off. Only then can the scale accept weighing commands.	Service operation
3	Adjustment zero valid The beginning of the characteristic curve - zero point of the scale - is defined with the momentary dead-load.	Service operation
4	Adjustment weight 1 valid The first adjustment weight is assigned with the momentary weight.	Service operation
5	Adjustment weight 2 valid The second adjustment weight is assigned with the momentary weight.	Service operation
6	Adjustment weight 3 valid The third adjustment weight is assigned with the momentary weight.	Service operation
7	Adjustment weight 4 valid The fourth adjustment weight is assigned with the momentary weight.	Service operation

Code	Command explanation	Executable in following operating states
8	<p>Load factory settings</p> <p>All parameters are set to the status that was assigned originally by the manufacturer.</p>	Service operation
9	<p>Acknowledge error</p> <p>Operating errors and fatal system errors that have led to a reboot are acknowledged. The error status is abandoned if no other operating errors exist.</p>	All
10	<p>Run impedance check</p> <p>The resistance of the load cells is measured and compared with the stored impedance reference value.</p>	No weighing cycle, Service
11	<p>Set impedance reference</p> <p>The resistance of the load cells is determined and stored as a reference value for future impedance checks.</p>	No weighing cycle, Service
12	<p>Switch on stand-alone operation</p> <p>The instruction switches stand-alone operation on. The instruction is saved i.e. after switching the power supply off and switching it on again, the module remains in stand-alone operation. Special features: Stand-alone operation is deactivated automatically as soon as the module is operated in SIMATIC (see also 4.2).</p>	Service, module not on SIMATIC bus
13	<p>Switch off stand-alone operation</p> <p>The instruction switches stand-alone operation off. Special features: Stand-alone operation is deactivated automatically as soon as the module is operated in SIMATIC (see also 4.2).</p>	Service
14	<p>Delete slave pointer</p> <p>The instruction sets the slave pointer (see 5.17) back to 0.</p>	

Code	Command explanation	Executable in following operating states
15	<p>Characteristic curve shift</p> <p>The instruction shifts the entire characteristic curve (adjustment coordinates) so that the current filtered digital value from the ADC is made into a zero point. Only permitted with a calibration switch that is not set. If an impermissible digital value results from the shift then the instruction is rejected.</p>	Service operation
Scale commands		
21	<p>Zeroing</p> <p>The current weight is set to zero. In calibratable operation ("OIML"), only possible with restrictions (-1%, +3%). The tare is deleted at the same time.</p>	No weighing cycle, Service operation
22	<p>Tare</p> <p>The current weight is set to zero and the weight display is designated as "Net" and "Tare" at the same time.</p>	No weighing cycle
23	<p>Delete tare</p> <p>The tare is deleted. The current weight is displayed and designations of "Net" are changed to "Gross", the designation "Tare" or "Preset-Tare" is reset.</p>	No weighing cycle
24	<p>Accept tare entry</p> <p>The defined tare is accepted as tare and at the same time, "Preset tare" is designated together with the weight display.</p>	No weighing cycle
25	<p>Switch on increased resolution</p> <p>Activate output / display of the calibratable weight value with increased resolution for 5 seconds.</p>	All
26	<p>Display tare weight</p> <p>Activate output / display of the tare value for 5 seconds.</p>	All
29	<p>Display firmware</p> <p>Displays the firmware version in the DR34 for 5 seconds</p>	All

Code	Command explanation	Executable in following operating states
	Log commands	
31	Output log text 1 Log output with text layout 1.	No weighing cycle
32	Output log text 2 Log output with text layout 2.	No weighing cycle
33	Output log text 3 Log output with text layout 3.	No weighing cycle
34	Output log text 4 Log output with text layout 4.	No weighing cycle
35	Repeat last logging procedure The last log output is repeated.	Not in service.
	Digital load cell	
40	Send digital load cell On Output instruction to digital load cell for sending the weight value	No weighing cycle
41	Send digital load cell Off Instruction to digital load cell for ending the sending of the weight value	No weighing cycle
	Micro Memory Commands	
70	Start recording/trace The recording (trace function) should start	Not in service.
71	End recording/trace The activated recording (trace function) is ended.	Not in service.
72	Delete logs in MMC The logs stored in the Micro Memory Card are deleted.	Service operation

Code	Command explanation	Executable in following operating states
73	Delete trace in MMC The recorded data (trace function) stored in the Micro Memory Card are deleted.	All
74	Delete trace in RAM The stored data (trace function) in the RAM memory are deleted.	All
75	Format MMC The Micro Memory Card parameters are defined corresponding with the definitions in the module data. All of the stored content in the MMC is deleted.	Service operation
76	Delete all MMC data (log data, measurement data, ...) The data stored in the Micro Memory Card are deleted.	Service operation
77	Trace Single recording The instruction causes a single recording of a trace element. The time intervals between two trace recordings do not require a fixed definition. With a trace to MMC, renewed trace instructions will only lead to a new trace recording after 50 ms. With tracing to RAM, the recording is executed within max. 10 ms.	
	Scale commands	
100	Start weighing with tare zero setting mode Start weighing with previous zero setting or taring corresponding with the setting for tare / zero setting mode.	No weighing cycle, No service
101	Start weighing without tare zero setting mode Start weighing without zero setting or taring. This is only permitted in non-calibratable operation (country code <u>not</u> "OIML").	No weighing cycle, No service
102	Start continuous weighing Continuous start of sequential weighing cycles. (Only possible in operating AWI mode)	No weighing cycle, No service

Code	Command explanation	Executable in following operating states
103	<p>Continue</p> <p>Continue the weighing cycle. Weighing and emptying are continued with this command.</p>	Stopped
104	<p>Continue weighing with pulse dosing</p> <p>Weighing is continued in pulse dosing operation only (Pulse / Pause).</p>	Stopped
105	<p>Stop (halt immediately) in weighing cycle</p> <p>Stops immediately for weighing or emptying, the scale stops and remains in “stopped” status. Possible commands to follow:</p> <p>103 – Continue 104 – Continue weighing with pulse dosing 108 – Abort 110 – Residual weighing</p>	Weighing cycle
106	<p>End continuous operation</p> <p>The current weighing is completed and then the continuous operation is ended.</p>	Stopped, weighing cycle
107	<p>Activate check stop</p> <p>The scale is stopped at the next defined step for the check stop. Continued with:</p> <p>103 – Continue 104 – Continue weighing with pulse dosing 108 – Abort 110 – Residual weighing</p>	Not in service.
108	<p>Abort</p> <p>The stopped weighing cycle is ended with no further activity. No automatic emptying is performed. The previous weight is not taken into account in the totalising calculation.</p>	Stopped
109	<p>Empty on</p> <p>This command activates the emptying signal in halted-state (no weighing cycle active) If the emptying time is 0 then the emptying signal is activated until the weight is in the empty range. Independent from this, the emptying can be ended with command 118.</p>	No weighing cycle

Code	Command explanation	Executable in following operating states
110	<p>Residual weighing</p> <p>If required, a running weighing procedure is stopped and the emptying process is started immediately. The current weight is balanced before emptying. In certain cases, continuous operation is ended.</p>	Stopped, Dosing cycle
111	<p>Activate inhibition time</p> <p>The weight value is not determined for a configured time period. Furthermore, the measurement value error (operating error 17) is suppressed during this period. The defined time can be shortened and thus the inhibition time ended immediately using command 112.</p>	All
112	<p>Deactivate inhibition time</p> <p>The activated inhibition time is stopped prematurely.</p>	All
113	<p>Logging and deleting calibratable totalizing memory 1</p> <p>This command is only executed if total 1 is contained in log text 1.</p>	No weighing cycle
114	<p>Deletes totalizing memory 1</p> <p>Permitted only if country code is not "OIML"</p>	No weighing cycle
115	<p>Deletes totalizing memory 2</p> <p>Totalising memory 2 can be deleted at any time.</p>	No weighing cycle

Code	Command explanation	Executable in following operating states
116	<p>Delete statistic data</p> <p>The statistic data is deleted except for totalising memories</p>	No weighing cycle
117	<p>Output totalizing memory 1</p> <p>The content of the totalizing memory 1 is output instead of the calibratable weight value. In AWI totalizing mode, the totalizing memory 1 will remain as it is; in other operating modes it will switch back to the calibratable weight after 5s. Command no. 125 also switches the calibratable weight back on.</p>	All
118	<p>Empty Off</p> <p>The empty that was started with command 109 is ended immediately.</p>	No weighing cycle
121	<p>Start weighing with/without tare/zero setting</p> <p>Single start with/without performing a tare/inspection. The counter for tare and inspection runs in the background (as in continuous operation) and decides whether taring or an inspection should be performed in certain cases.</p>	No weighing cycle
122	<p>Execute taring/zero setting</p> <p>Taring/zero setting should be executed with the next start. After execution, the taring-cycle counter is reset.</p>	
123	<p>Check follows</p> <p>The inspection should follow. After the execution, the counter is reset but is only restarted after being regulated to the optimal regulation.</p>	
124	<p>Residual emptying</p> <p>Continuous operation is stopped and residue is emptied; the discharged residual amount is not logged.</p>	Weighing cycle
125	<p>Display calibratable weight</p> <p>Displays the content of the calibratable weight value instead of the content of totalizing memory 1.</p>	All

Code	Command explanation	Executable in following operating states
126	<p>Display calibratable log values</p> <p>Displays the calibratable log values Log ID, Gross or Net, Tare, Total 1 and Setpoint in sequence at 4-second intervals, then returns to the original value.</p> <p>(Currently not operable via SIWATOOL)</p>	
127	<p>Residual weighing without emptying</p> <p>Emptying is stopped. The previously emptied quantity is added to the current total 1. Cycle ends without further emptying.</p>	AWI totalizing weighing cycle, empty

Table 6-1 SIWAREX FTA command list

The commands in the table above can be activated over all interfaces.

More commands can be activated on the SIMATIC S7 interface of the FB SIWA_FTA.

Command group	Description
1... 199	Commands are passed on to the module group without reading or writing from or to data records (scale, weighing, logging commands). The meanings of these commands correspond with the settings in table 6-1 <i>Command list of SIWAREX FTA</i>
200 + X	Reading a data record. X is the data record number. <i>Example:</i> Reading data record 3 from FTA to CPU → 200 + 3 = command code 203
400 + X	Writing a data record. X is the data record number. <i>Example:</i> Writing data record 3 from CPU to FTA → 400 + 3 = command code 403
601... 699	Range for combined commands. The function block SIWA_FTA (FB41 [^]) can transfer several data records in sequence.
601	Read DR30 and DR31
602	Read DR34 and DR35
610	Read DR20 and DR22
649	Read all data records from the SIWAREX FTA (DR3, DR4, DR7, DR8, DR9, DR15, DR18, DR20, DR21, DR22, DR23, DR26, DR30, DR31, DR32, DR34, DR35, DR39, DR44, DR45, DR46, DR47, DR123)

Command group	Description
651	Write scale data 1 (DR22) and set weight (DR20) to the SIWAREX FTA and then start the weighing procedures with command 100 (Start weighing with Tare / Zero setting mode)
652	Write scale data 1 (DR22) and emptying quantity (DR21) to SIWAREX FTA and then start the weighing procedure with command 100 (Start weighing with Tare/Zero setting mode)
653	Write scale data 1 (DR22) and set value (DR20) to SIWAREX FTA and then start the weighing procedure with command 102 (Start weighing in continuous operation with Tare/Zero setting mode)
654	Write scale data 1 (DR22) and emptying quantity (DR21) to SIWAREX FTA and then start the weighing procedure with command 102 (Start weighing in continuous operation with Tare / Zero setting mode)
660	Write DR20 and DR22
699	Write data blocks DR3, DR4, DR7, DR8, DR15, DR18, DR20, DR21, DR22, DR23, DR26, DR39, DR45 to SIWAREX FTA.

Table 6-2 Command groups of SIWAREX FTA

More information on command transfers from the control program using the SIMATIC interface can be found in chapter [8 Programming in SIMATIC STEP 7](#)

7 Messages and Diagnostics

7.1 Message types

The SIWAREX FTA messages are divided into different types.

Asynchronous messages can be generated at any time by an unpredictable event. The internal and external hardware faults (operating messages) and the technology messages that can occur spontaneously during a weighing procedure.

Synchronous messages are always the 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 also command 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 display describes the status of the scale in normal operation and can be monitored or evaluated at any time.

7.2 Message paths

The SIWAREX FTA messages are passed on to the user by various paths. During project planning, it is important to choose the right path for routing and processing the messages.

Basically, the messages are processed for two purposes:

- For display on an operating panel
- For connection to control software to control certain reactions in a process.

The following message paths are possible:

- Message buffer output to the SIWATOOL FTA commissioning program
- Output through the SIWA_FTA function block to its message outputs
- Diagnostics alarms in SIMATIC CPU with OB82 evaluation
- Process alarms in the SIMATIC CPU with evaluation in the process alarm OBs.

7.3 Recognising messages using SIWATOOL FTA

A message buffer is integrated in the module and holds up to 99 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 FTA (menu point "Read all data records") and can be saved together with the scale parameters. This helps in recognising, analysing and solving problems in the system.

7.4 Recognising messages using the FB SIWA_FTA

All of the messages of the SIWAREX module can be recognised and processed in the controller using the FB SIWA_FTA. Additional errors in the processing of the FB SIWA_FTA are put out through the FB_ERR output variable (see chapter [8 Programming in SIMATIC STEP 7](#)).

7.5 Recognising messages using the diagnostic alarms in the SIMATIC-CPU

Operating messages (hardware faults) are recognised in the SIMATIC CPU with diagnostic alarms. For more information, see chapter [8 Programming in SIMATIC STEP 7](#).

Recognising messages with process alarms.

Process alarms enable the user to respond flexibly to technology messages or to the corresponding status information. For more information, see chapter [8 Programming in SIMATIC STEP 7](#).

7.6 Message lists Data and command errors

Error No.	Data and command errors - description	Solution
1-1	Unknown command code	
1	Unknown command code	The SIWAREX does not recognise the command code and cannot execute the command Check the command code.
2-3	Action not allowed in service operation	
2	Action not permitted in service operation	Only certain commands or data entries are permitted in service operation. The last command or the last sent data cannot be accepted by the scale in service operation. The following commands are not allowed: Start a weighing procedure (100, 101, 102) Taring (22, 24) Output log (31 to 35) Trace Start/Stop (70, 71) Switch to normal operation.
3	Service operation cannot be deactivated since the assembly is not adjusted	A non-adjusted module group cannot be switched to normal operation. First, adjust the scale and then you can get out of service operation. A theoretical adjustment can be performed with SIWATOOL FTA.
4-4	Action only permitted in service operation	
4	Action only permitted in service operation	Only certain commands or data entries are permitted in normal operation. The last command or the last sent data cannot be accepted by the scale in normal operation. Switch to service operation. The following activities are only possible in service operation: Load factory settings command (8) Switch off service operation (2) Adjustment commands (3, 4, 5, 6, 7) Delete/Format MMC (72 to 75) Send DR3
5-10	Action only permitted in service operation	
5	Calibration parameter transfer with active write protect not permitted	The calibration parameters (DR3) can only be changed with non-active write protection (switch on the front up). First, deactivate the write protection. This also applies for internal data records DR26, DR27. Attention! A pre-calibrated scale will lose its calibration.
6	Adjustment command with active write protect not permitted	The adjustment commands can only be executed with the write protect active (switch on the front in lower position). First, deactivate the write protection. Attention! A pre-calibrated scale will lose its calibration.
7	Download not possible since write protect is active	Downloading the firmware may only be done if the write protection is inactive (switch on front down). First, deactivate the write protection. Attention! A pre-calibrated scale will lose its calibration.

Error No.	Data and command errors - description	Solution
8		Reserved
9		Reserved
10		Reserved
11-19	Action not permitted in weighing cycle	
11	Data record transfer or command transfer to weighing cycle not permitted	<p>The data record or the command is not permitted to be activated during the weighing cycle. Send the data or the command outside of the weighing cycle.</p> <p>The following commands are not permitted in weighing cycle:</p> <ul style="list-style-type: none"> Switch on service operation (1) Impedance measurements (10, 11) Zero setting-, Tare commands (21, 22, 23, 24) Print log (31, 32, 33, 34) Deleting, formatting MMC (72, 73, 74, 75) Start commands (100, 101, 102) Abort (108) Emptying on / off (109, 118) Delete total, statistic (113, 114, 115, 116)
12	Command cannot be executed because the previous command is not finished yet.	<p>A new command cannot interrupt the execution of the current command. Activate the command after the current command has finished executing.</p> <p>This message is generated in the following instances:</p> <ul style="list-style-type: none"> Start command (100, 101, 102) while log output to printer is still running Repeated setting of the data records with default values (8) within one second <p>Execute one of the following commands if the required stand-still has not occurred:</p> <ul style="list-style-type: none"> Continue a weighing procedure (103, 104), Adjustment commands (3, 4, 5, 6, 7), Tare command (22, 23, 24), Print log (31, 32, 33, 34)
13	Command or data transfer not allowed in this operating status	A new command cannot be executed in this operating status.
14	Continue command (104, 104) not possible	The command can no longer be executed since a scale error caused implausible switching points.
15	Set value in cycle not plausible	The set value to be used is greater than the maximum set value in DR23.
16	Instruction is not permitted (digital load cell)	Instruction is not permitted for operation with digital load cell
17	Instruction is not permitted (analog load cell)	Instruction is not permitted with analog load cell
18		Reserved
19		Reserved

Error No.	Data and command errors - description	Solution
20-20	Command not permitted since scale is not adjusted	
20	Command not allowed, scale not adjusted	The activated command is not allowed since the scale is not yet adjusted. Switch to service operation and adjust the scale.
21-21	Command not allowed since the assembly is damaged the OD is active	
21	Command not allowed since the assembly is damaged the OD is active	The activated command is not allowed since the scale has a fault or SIMATIC CPU is in STOP status. Correct the error (red LED on the front must go off).
22-28	Error in the DI/DO interface parameters	
22	DI assignment not allowed	You have assigned the digital inputs incorrectly. Correct your assignments.
23	DO assignment not allowed	You have assigned the digital outputs incorrectly. Correct your assignments. The outputs may only be defined with numbers 0 to 63 and 255.
24	DI assignment for step-on condition not permitted	You have assigned the digital inputs incorrectly for enabling weighing steps. Correct your assignments. In NAWI operating mode, no step-on conditions can be defined.
25	Time range for pulse input not allowed	The definition of the measurement time for the pulse input is incorrect. The permitted range lies between 100 msec and 10000 msec. Correct your definition.
26		Reserved
27		Reserved
28		Reserved
29-34	Error in the interface parameters Analog output	
29	Ext. Analog default value not plausible	Current value entry for the analog output lies outside the defined (DR7) range. Enter a smaller value.
30	Analog output replacement value not plausible.	The replacement value for the analog output lies outside the defined (DR7) range. 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.
32		Reserved
33		Reserved
34		Reserved

Error No.	Data and command errors - description	Solution
35-42	Interface parameter error	
35	Baud rate not permitted for RS232	The baud rate for the RS232 interface is not permitted. Define the baud rate.
36	Process alarm assignment or process value assignment implausible	The assignment of the process alarm or the process values in DR7 for the S7 interface is incorrect. Change your assignment.
37	Baud rate not defined for RS485	The baud rate for the RS485 interface is not defined. Define the baud rate.
38		Reserved
39		Reserved
40		Reserved
41		Reserved
42		Reserved
43-50	Trace not possible	
43	Trace task not possible since MMC full	
44	Trace task cannot be executed, since MMC is defective or non-existent	
45	Trace recording cycle too small	The trace cycle in DR7 is too short. Define parameters for a longer trace cycle (for MMC minimum 5 x 10 msec).
46		Reserved
47		Reserved
48		Reserved
49		Reserved
50		Reserved
51		Reserved
51		Reserved
52		Reserved
53		Reserved
54		Reserved
55		Reserved
56-62	Log text not plausible	
56	Log text too long	The log text with the fill parameters is too long of the end character (EOT) is missing. Change the log text. Ensure that the proper number of characters for the corresponding field are used in place of the respective print field code. The overall length of the text filled with values may not exceed 160 characters (including printer control character but not the terminating EOT).
57	Log text contains fields that are not permitted	Log text contains fields that are not permitted Change the log text.

Error No.	Data and command errors - description	Solution
58	Log text contains angle-brackets	Log text contains angle-brackets. Remove the angle-brackets from the log text.
59		Reserved
60		Reserved
61		Reserved
62-75	Log or MMC command not possible	
62	Logging not possible since the weight lies outside of the weighing range	The logs can only be output within the weighing range in calibratable operation (Code OIML in DR3).
63	Logging output not possible since the SIWATOOL FTA driver is active	The log cannot be output at this time since the SIWATOOL FTA program is active on the interface. Disconnect the PC and connect the printer.
64	Logging output not possible since the printer is not ready	The log cannot be printed since the printer is not ready. Check the printer.
65	Logging output not possible since a print job is still running	The log cannot be printed since another print job is still running. Wait until the current print job is complete.
66	Logging not possible since the MMC is full	Logging is not possible since the MMC is full. Switch MMCs.
67	Logging task cannot be executed, since MMC is defective or non-existent	Logging is not possible since the MMC is defective. Switch MMCs.
68	Log output not possible since there is no data available.	Repeating the last log printout not possible since there was no print-out or the stored data is defective.
69		Reserved
70	Logging output not possible since the log ID is not in the print text	Log output is not possible since the content of the text does not contain the log ID. Define the log ID in the text. This entry is necessary if the calibratable weight is contained in the log text in calibratable operation (Specifications Code OIML in DR 3).
71	Logging output not possible since there was noch change of the measured value	After logging status standstill must have been inactive, otherwise a further logging is rejected.
72		Reserved
73		Reserved
74		Reserved
75		Reserved
76-93	Plausibility error Calibration	

Error No.	Data and command errors - description	Solution
	parameter	
76	Value range Adjustment digits exceeded	The adjustment digits definition 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 proper code. Permitted is ---- 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 entered a zero setting range > 4% of the maximum weighing range or > 20 % in the zero setting range in DR 3 in calibratable operation (Specifications Code OIML in DR 3). The sum of negative and positive values always apply here. Reduce the zero definition range or zero setting range.
79	Number of weight ranges not allowed	The number of the weighing range is incorrect. Enter 1, 2 or 3.
80		Reserved
81	Relationship between weighing ranges implausible	The definitions for the weighing range (Max. and Numerical step) are incorrect. With a multi-segment scale, the min-value of the next higher range must equal the max-value of the next lower range. The max-value must be higher than the min-value. With a multi-range scale, the min-value and max-value in sequential ranges must always be greater and the max-value of a range just always be greater than the min-value. Check parameter definitions.
82	Numeral step not plausible	At least one numeral step in DR 3 is incorrect. The following numeral steps are permitted as numeral steps for the three weighing ranges and the distribution value: 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. In calibratable operation (Specifications Code OIML in DR 3) the numeral step in all three weighing ranges may not be less than one 6000th of the weighing range max-value. In calibratable operation, the total numeral step (Specifications Code OIML in DR 3) may not be less than the numeral step of weighing range 1. The numeral step of a weighing range may not be less than the numeral step in the next lower lying weighing range. Check the parameter.
83	Filter parameter implausible	Filter parameter definitions in DR 3 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 defined in DR 3 is incorrect. Set the parameter to a valid value (1, 2 or 4).
85	Averaging filter length not permitted	The mean value filter in DR 3 has incorrectly defined parameters. Set the parameter for the depth of the mean value filter to maximum 250.
86	Adjustment weight error	The defined adjustment weights are incorrect. The weight values must increase or be 0 if not used.
87		Reserved
88		Reserved

Error No.	Data and command errors - description	Solution
89		Reserved
90		Reserved
91		Reserved
92		Reserved
93		Reserved
94-104	Scale command cannot be executed	
94	Adjustment weight too small	The adjustment weight in DR 3 is too low. Increase the difference to the adjustment weight. The measurement value between sequential adjustment weights is to be at least 5 % of the measurement range of the load cells apart
95	Reserved	Reserved
96	Tare T exceeded	The subtractive Tare has been exceeded. This error is generated in the following cases: With the Tare command, the gross value lies over the defined permitted tare range. An externally defined tare value is negative. An externally defined tare value is greater than the max-value of weighing range 1 on a multi-segment scale. An externally defined tare value is greater than the defined max tare value [%] of the largest weighing range in calibratable operation (specifications Code OIML in DR 3) of a multi-range scale.
97	Totalising memory 1 deletion not permitted	The distribution memory cannot be deleted. The command "Delete distribution memory 1" (114) is not permitted in calibratable operation. Use command (113) - "Delete/Log calibratable distribution memory 1". The command "Delete calibratable distribution memory 1" (113) can only be terminated in calibratable operation (Specifications Code OIML in DR 3) if log text 1 (DR40) contains the distribution memory 1 field. Check the parameters.
98	Totalising memory already deleted	The delete totalizing memory command could not be executed since the memory is already deleted.
99	Totalising memory 1 could not be logged	Logging the distribution memory has failed. Check the output device. Check additional technological faults for indications as to the cause of the fault. A technology fault is generated indicating the cause.
100	Weight outside zero definition range	Zero setting cannot be performed since the current zero point lies outside the defined zero setting range in DR 3 or the current gross value lies above the largest defined weighing range value.
101	Scale command cannot be executed since not at standstill 1	The weighing command (Taring, Zero setting, Logging) cannot be executed because Standstill 1 does not lie within the standstill time defined in DR 3.
102	Adjustment weight missing	Adjustment command cannot be executed because the respective adjustment weight in DR 3 has not been entered.
103	Characteristic curve shift not possible	Adjustment instruction for characteristic curve shift cannot be executed. Possible causes: Shift leads to exceeded range, adjustment not completed, write protect is active).
104		Reserved

Error No.	Data and command errors - description	Solution
105-110	Plausibility error Base parameter	
105	Weighing operating mode not allowed or unknown	Weighing operating mode in DR 4 is not correct. Enter a correct weighing operating mode.
106	Limit values implausible	The default limit values in DR 4 are not plausible. Limit value 3 may only be operated as a max-limit value (On ≥ Off). Correct limit value 3.
107		Reserved
108		Reserved
109		Reserved
110		Reserved
111-135	Plausibility error Weighing parameter	
111	Number tare-zero position cycles not allowed	The number for the tare/zero definition cycle is incorrect (max. 100). Enter a correct value.
112	Value for control weighing pauses incorrect	The default for pauses between the control weighing procedures is incorrect (max. 100). Correct the definition.
113	Empty overlapping time too long	The emptying overlap time in DR 23 is too large. The maximum may only correspond with the emptying time that is defined there.
114	Min./Max.-tare implausible	The limits for tare in DR 23 are not plausible. Tare minimum and maximum weight may not be less. The tare maximum weight must be larger than the minimum weight. Correct the entry.
115	Log text No. assignment for automatic logging is incorrect	The log text number in DR 23 is incorrect. Correct the number (0...4).
116	Operating mode not allowed or unknown	The default for the tare/zero setting mode in DR 23 is incorrect. Correct the default (0..4).
117	Fine time too short	Fine time must be greater than Inhibition time Fine. Correct the default in DR 23.
118	Tolerance range implausible	The default for tolerance ranges TO1, TU1, TO2, TU2 must be corrected. TU2 must be greater than TU1 and TO2 greater than TO1. Check parameter definitions in DR 22.
119		Reserved
120		Reserved
121		Reserved
122		Reserved
123		Reserved
124		Reserved
125		Reserved
126		Reserved
127		Reserved
128		Reserved
129		Reserved
130		Reserved
131		Reserved

Error No.	Data and command errors - description	Solution
132		Reserved
133		Reserved
134		Reserved
135		Reserved
136-165	Plausibility error Weighing parameter	
136	Start not possible because the set value is not permitted	The set value in DR 20 is invalid. It may not be 0 nor may it be greater than the maximum permitted set value for a single fill in DR 23. Correct the parameter.
137		Reserved
138	Start not possible since the fine shut-off point is not plausible.	Start not possible since the default for the trailing weight or the shut-off correction value is not plausible. The following must apply: (Current trailing - shut-off correction value) <= Set value. Check the default in DR 22.
139		Reserved
140		Reserved
141	Start not possible because of possible overfilling	Start not possible since the defined set value does not match the current scale status. The following must apply: Current gross + set value (DR20) – current trailing + shut-off correction value < maximum weighing range
142	Start blocked	Start not possible since a blockage is set in weighing step 0.
143	Start not possible since the loading quantity or the residual quantity is too small	The defined loading quantity is too low or start is not possible because the residual quantity that is still to be loaded is too little. The quantity to be loaded in DR 21 is less than the defined minimum weight definition in DR 3. Correct the value. The quantity to be loaded in DR 21 is lower than the current trailing weight in DR 22. Correct the value. The quantity to be loaded in DR 21 is lower than the minimum weighing range value in DR 3. Correct the values. A dosage in AWI totalizing loading operation cannot be started since the residual quantity is less than the defined minimum weight. E.G. If everything has been loaded already or the loading procedure has been aborted. Give command "Delete calibratable distribution memory" (113) to activate a new loading procedure.
144		Reserved
145	Start not possible since the set value < min. WB1	Start not possible since the set value is less than the minimum weight of weighing range 1 DR 3. Increase the set value.
146	Reserved	Reserved
147	Start not possible since tolerance limit (n) is implausible	The tolerance definitions are not plausible. During the start or while transferring the DR 20 or 22 in the cycle, a set value was set which is less than at least one of the tolerance limits TU2, TU1, TO1, TO2. Check tolerance definitions or the set value.
148	Check stop not possible	Check stop not possible since no check stop has been defined.

Error No.	Data and command errors - description	Solution
149	Start not possible since the distribution memory 1 can overflow	Start not possible since the totalising of actual values in distribution memory 1 overflowed in calibratable operation (Specifications Code OIML in DR 3). Evaluate the distribution memory and then delete them.
150	Command impossible since SIMATIC CPU is in STOP	The command can only be executed in SIMATIC CPU RUN status. This applies for the following commands (Codes): Start a dosing procedure (100, 101, 102) Step-on (103, 104) Residual weighing (110) Emptying on/off (109, 118)
151		Reserved
152		Reserved
153		Reserved
154		Reserved
155		Reserved
156		Reserved
157		Reserved
158		Reserved
159		Reserved
160		Reserved
161		Reserved
162		Reserved
163		Reserved
164		Reserved
165		Reserved
166-175	Number format error in data record	
166	Date Time implausible	Data and time definition not plausible. Correct the definition. The following are allowed: Year: 0..99 Month: 1..12 Day: 1..28/29/30/31 (depending on the month) Hours: 0..23 Minutes: 0..59 Seconds: 0..59 Weekday: 1..7
167	Time definition implausible	The definition for a time definition is not plausible. Check the following conditions: DR3: Standstill times 1, 2 or 3 must be at least 100 msec DR4: Timeout value for the log output monitor must be at least 1000 msec DR23: Inching time must be greater than 0 DR23: The emptying time may not be greater than the maximum emptying time
168	Default percentage value > 100%	The percentage definition is greater than 100%. Decrease one of the following entries.

Error No.	Data and command errors - description	Solution
		DR3: Maximum weight for zero setting and zero setting (pos. / neg.) and tare max. load DR7: Sum of memory segment for trace function and log function DR23: Default value for analog output (Coarse, Fine) DR23: Control factor Fine time controller DR23: Control factor Proportional controller
169	Negative default value not permitted	Negative default value not permitted. Change the entry. The following values may not be negative: DR 3: Adjustment weight 1..4 Numeral steps 1..3, Total numeral step Standstill value 1..3 Transfer-Minimum weight DR 15: Tare default value DR 20: Set value DR 21: Loading quantity DR 22: Tolerance limits TU1, TU2, TO1, TO2 DR 23: Max. Single fill Maximum controller access Controller optimum plus/minus
170	Number range for weighing values exceeded	The number range of a definition is not permitted. The following values must be larger -100 000 000 and less than 100 000 000: DR3: Adjustment weight 1, 2, 3 or 4 Minimum, maximum weight and numeral step of weighing range 1, 2 or 3 Standstill range 1, 2 or 3 Smallest set weight and distribution value (in addition, the lowest set weight must be greater than or equal to the minimum weight for weighing range 1) DR4: Empty range Switch on or shut-off weight of limit value 1, 2 or 3 DR7 - Analog output: Weight for zero value, End value Replacement value DR15: Tare definition DR16: Weight simulation definition DR20: Set value DR22: (All weights in addition < Maximum weighing range + 9 weighing steps) Trailing weight Fine weight Shut-off correction value TO1, TO2, TU1, TU2 DR23: Max. Single set value

Error No.	Data and command errors - description	Solution
		Max. Single controller access Controller Optimum Plus/Minus
171	Checksum error	Checksum error in data record 26 or 27. The data was falsified or the DR versions do not match.
172	Selection code unknown	In the parameters, there is a number for selecting a characteristic which has no meaning. The following values must be retained: DR3: Source for weight simulation 0..2 Decade for the curve 0..6 Source for the analog output 0..4 DR23: Filter type 0..2 Limit frequency Filter 0..9 Tare-/Zero setting mode 0..4 Controller type selection 0..3
173		Reserved
174		Reserved
175		Reserved
176-177	Impedance error	
176	Impedance error	Impedance error is generated if the deviation in impedance is greater than 10 % of the reference value or if an error has occurred in the measurement
178-199	General data and command errors	
178	DS writing not possible	You cannot write to the selected data record if write protection is set.
179-199		Reserved

Table 7-1 List of Data and Operating Errors

7.7 Message list Technology messages

Error No.	Technology message - description	Solution
1-10	MMC error	
1	Card function not executable	MMC defect or non-existent. MMC check required. This error is generated: <ul style="list-style-type: none"> ▪ If a trace entry should be made on the MMC but no formatted MMC is available. ▪ If the MMC is deleted while a log-/trace entry is being made. ▪ If after inserting the MMC, it contains data errors that cannot be restored.
2	Trace recording aborted since the MMC is full	The trace recording was aborted since no further memory is available. If this recording is defined on the MMC, insert a new MMC. Set the method of recording before formatting the MMC so that the oldest data is automatically overwritten by the new data. If record to RAM is set then read the data, if desired, and delete the trace memory. Set the method of recording if you want to automatically overwrite the oldest data.
3	Recording aborted since the parameters have been changed	Trace-recording aborted since the recording device was redefined during the recording procedure.
4	Automatic logging not possible since the MMC is full	Logging to MMC cannot be performed since there is no more memory left on the MMC. Insert a new MMC.
5	MMC error	The defined cycle for the trace recording cannot be processed. There could be problems with the MMC. Insert a new MMC. If the problem still occurs, decrease the recording cycle of the trace function in DR7 or record to the RAM memory (MMC parameter in DR 7).
6	The protocol ID requested in D46 could not be read	Reading the MMC protocol ID requested in DR46 (S7 interface) could not be performed successfully.
7		Reserved
8		Reserved
9		Reserved
10		Reserved
11-20	Log output error	
11	Log error	Logging the used text is not possible because a non-defined code for a variable field has been defined. Check the log texts in DR40, 41, 42 or 43.

Error No.	Technology message - description	Solution
12	Timeout print-out	A print job was not complete within the predefined monitor time for logging in DR4. Check the output device or increase the monitoring time.
13	Error Output device not ready	Logging not possible because the defined output device is not ready. If the printer is defined as the output device, check whether the printer is connected properly and that it is installed and ready for operation. If the output device is selected as the MMC, check for whether a formatted MMC is inserted.
14	Logging not possible since the weight lies outside of the weighing range	Logging is not possible because the weight lies outside of the weighing range for a calibratable application (Code in DR3 OIML).
15		Reserved
16	Logging not possible, Protokoll-ID error	Logging is not possible because no protocol ID was defined in the protocol string (calibratable application, Code in DR3 - OIML).
17	Logging is not possible, printer not ready	Logging is not possible because the printer has not indicated that it is ready. Check the printer.
18	Logging is not possible, MMC is defective	Logging is not possible because the MMC is defective or has been removed. Change the MMC or insert a formatted MMC.
19	Logging is not possible, SIWATOOL program is active	Logging is not possible because the SIWATOOL program is active on the interface. Disconnect the connection to the PC and connect a printer.
20		Reserved
21-40	Weighing function error	
21	Weighing command thrown out for lack of a standstill	Taring/zero setting or logging is not possible because no standstill was achieved within standstill time 1 in DR 3.
22	Zero setting is not possible	The start-up weight lies outside of the defined value range defined in DR 3 for the maximum positive and negative weight for zero setting.
23	Zero setting / taring not possible	Zero positions or zero setting not possible because the gross lies outside the zero setting range or taring not possible because the tare maximum load has been exceeded.
24		Reserved
25		Reserved
26		Reserved
27		Reserved

Error No.	Technology message - description	Solution
28		Reserved
29		Reserved
30		Reserved
31		Reserved
32		Reserved
33		Reserved
34		Reserved
35		Reserved
36		Reserved
37		Reserved
38		Reserved
39		Reserved
40		Reserved
41-100	Error in the weighing cycle	
41	Timeout step switching	Step-on to next weighing step has not occurred within the time defined in DR23.
42	Inhibition time violation coarse	After the coarse inhibition time has elapsed or during the inhibition time set/actual comparison, the fine shut-off point was exceeded.
43	Inhibition time violation fine	After the fine inhibition time has elapsed or during the inhibition time set/actual comparison, the fine shut-off point was exceeded.
44	Weighing time exceeded	Weighing procedure not completed within the weighing time defined in DR22.
45	Empty time exceeded	Emptying was not completed within the weighing time defined in DR23.
46	Weighing procedure stopped, range exceeded for zero setting or with taring	The weighing procedure was stopped because zeroing or zero setting or taring was not possible. Gross outside of zero setting range Tare maximum load exceeded Current gross weight is less than the minimum tare weight defined in DR 23.
47	Control range exceeded	The determined manipulated variable of the Proportional- or fine time controller is greater than the maximum one-time control access defined in DR 23. Depending on the definition of the control behavior for scale faults in DR23, no control is performed in this case or the manipulated variable is limited to the maximum control access value.
48	Weighing stopped because of CPU stop	A dosing operation that is currently running is stopped if the S7 CPU goes into Stopped state.
49	Weighing stopped because of dosing error	A dosing fault leads to implausible shut-off points for coarse and fine feeds.

Error No.	Technology message - description	Solution
50		Reserved
51		Reserved
52	Weighing stopped, shut-off point is not plausible	Dosing stopped since a dosing error led to shut-off points for coarse and fine signals that were not plausible.
53	Weighing was stopped because set value < minimum weight	Dosing stopped because a set value was determined which was less than the minimum weight of the weighing range 1 in DR 3 or is equal to 0 during a totalizing fill.
54	Weighing procedure stopped because weighing range was exceeded	Dosing stopped because the set value does not match the current scale status. The following must apply: Current gross + set value (DR20 or current loading set value with) – current trailing + shut-off correction value < maximum weighing range
55	Weighing stopped because the fine shut-off point is not plausible	Dosing is stopped because the definition for the trailing weight or the shut-off correction value is not plausible. The following must apply: (Current trailing - shut-off correction value) <= set value.
56	Weighing stopped because of overflow in totalizing memory 1	Dosing stopped because totalising the actual values caused an overflow in distribution memory 1 in calibratable operation (Specifications Code OIML in DR 3). Evaluate the distribution memory and delete it.
57	Weighing stopped because the residual set value is too low	Dosing stopped because the quantity to still be loaded is too small. The set value to be loaded is less than the minimum weighing range value in DR 3
58	Weighing stopped because weight is outside measurement range	Dosing is stopped because the current weight lies at least 8 weighing steps above the permitted measurement value range.
59	Weighing stopped because there is a tolerance error	Dosing stopped because there is a tolerance error. This error is only generated if a test has been defined for tolerance band 1 or 2 in DR 23.
60	Weighing stopped because nothing is loaded	Loading stopped because nothing has been emptied for the last fill or less than the minimum weight of weighing range 1 (DR3) was emptied with specification code = OIML (DR3).
61	Weighing stopped because net weight was too high	Dosing stopped because the net weight already lies above the coarse weight.
62	Waiting time for standstill elapsed	Waiting time for standstill 2 elapsed, ongoing dosing is not interrupted.
63		Reserved
64		Reserved
65		Reserved
66		Reserved

Error No.	Technology message - description	Solution
67		Reserved
68		Reserved
69		Reserved
70		Reserved
71		Reserved
72		Reserved
73		Reserved
74		Reserved
75		Reserved
76		Reserved
77		Reserved
78		Reserved
79		Reserved

Table 7-2 List of Technology Messages

7.8 Message list of operating messages

If an error generates an operating message, the red SF LED on the front of the assembly is illuminated. The operating messages are generated coming and going.

(K) - coming, (G) - going

Error No.	Operating messages - description	Solution
1-16	Internal module error Going	
1	(G) Reboot caused by error in RAM read-write testing	The error can mean that the module is defective. This error must be reset with the "Error acknowledge" command. Note: The error is deleted with the acknowledgement but is not set anywhere because there is no longer any activity with a RAM error → <input type="checkbox"/> Watchdog, Error 2
2	(G) Reboot caused by watchdog error (mandatory acknowledgment)	The module must be reset because of a critical error. This error must be reset with the "Error acknowledge" command.
3	(G) Reboot caused by program code error (mandatory acknowledgment)	The error can mean that the module is defective. This error must be reset with the "Error acknowledge" command. Contact the SIWAREX hotline.
4	(G) Lost process alarm	Process alarm on the S7 interface
5	(G) Parameter error (data loss)	Parameter error (Data loss). One or more data records stored in retentive memory are defective. Load the defective data records e.g. using command Set default values or transfer the affected records individually.
6		Reserved
7		Reserved
8		Reserved
9		Reserved
10		Reserved
11		Reserved
12		Reserved
13		Reserved
14		Reserved
15		Reserved
16		Reserved
17-32	External error Going	
17	(G) Limits for load cell signals exceeded or undershot	The measurement is too high. Measure the measurement voltage with a multi-metre and check the load cells. Check the characteristic value set in DR3.

Error No.	Operating messages - description	Solution
18	(G) line-break	The connection to the load cells has been broken. Check the load cell connection.
19	(G) ADC error	The AD converter must be reset because of a fault.
20	(G) Timeout Lifebit	The SIMATIC-CPU has not tracked the lifebit within the defined time. The communication through the FB SIWA is damaged.
21		
22		
23		
24	(G) Digital sensor is not ready	Digital load cell is not sending weight values.
25		
26		
27		
28		
29		
30		
31		
32		
129-144	Internal module error Coming	
129	(C) Reboot caused by error in RAM read-write testing	The error can mean that the module is defective. This error must be reset with the "Error acknowledge" command. Note: The error is deleted with the acknowledgement but is not set anywhere because there is no longer any activity with a RAM error → <input type="checkbox"/> Watchdog_Error 2
130	(C) Reboot caused by watchdog error (mandatory acknowledgment)	The module had to reboot because of a critical error. This error must be reset with the "Error acknowledge" command.
131	(C) Reboot caused by program code error (mandatory acknowledgment)	The error can mean that the module is defective. This error must be reset with the "Error acknowledge" command. Contact the SIWAREX-Hotline.
132	(C) Lost process alarm	Process alarm lost on the S7 interface
133	(C) Parameter error (data loss)	Parameter error (Data loss). One or more data records stored in retentive memory are defective. Load the defective data records e.g. using command Set default values or transfer the affected records individually.
134		
135		
136		
137		

Error No.	Operating messages - description	Solution
138		
139		
140		
141		
142		
143		
144-160	External error Coming	
144		
145	(C) Limits for load cell signals exceeded or undershot	The measurement signal is too high. Measure the measurement voltage with a multi-metre and check the load cells. Check the characteristic value in DR3.
146	(C) line-break	The connection to the load cells has been broken. Check the load cell connection.
147	(C) ADC error	The AD converter must be reset because of a fault.
148	(C) Timeout Lifebit	The SIMATIC-CPU has not tracked the lifebit within the defined time. The communication through the FB SIWA is damaged.
149		
150		
151		
152	(C) Digital sensor is not ready	Digital load cell is not sending weight values.
153		
154		
155		
156		
157		
158		
159		
160		

Table 7-3 List of Operating Messages

8 Programming in SIMATIC STEP 7

8.1 General Information

SIWAREX FTA was developed specifically for operation with the SIMATIC S7.

The hardware set-up is described in detail in chapter 4 Hardware Configuration. SIWAREX FTA is projected as a function module in the SIMATIC Manager. If the SIWAREX FTA is not available in the component catalog for the SIMATIC Manager (SIMATIC S7 classic) it should be installed using the HSP for the SIWAREX FTA (HSP_2036_FOR SIWAREX_FTA_FTC on the configuration package CD).

Attention: if the SIWAREX FTA has already been installed via the Object Manager, it must first be uninstalled before starting the HSP.

The example program – "Getting Started" is part of the configuration package. It contains the S7 blocks necessary for operation of the SIWAREX FTA in SIMATIC.

The example program also shows how application software can be created.

We recommend using the example program and expanding it for different applications.

Another level concerns programs that can be pre-fabricated for certain applications (SIWAREX Multiscale and SIWAREX Multifill). These programs are professional extensions of the example programs concerning functionality, number of weighing procedures and/or materials.

8.2 SIWAREX FTA in the HW Configuration

During project planning for the hardware configuration in the SIMATIC manager, the basic properties of the module are defined:

- The peripheral address of the module
- Diagnostic alarm enable
- Process alarm enable
- Behaviour for CPU stop

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

Other scale specific parameters that are also changed during the control program run-time can be defined in two different ways:

- Using the SIWATOOL FTA parameter definition tool
- By defining the parameters in a scale data block and then transferring them to the SIWAREX FTA. Cyclic communication between the SIWAREX FTA module and the SIMATIC CPU is established through the FB SIWA_FTA function block (FB41).

8.3 SIWAREX FTA in cyclic STEP 7 - Program

SIWAREX FTA communicates with the SIMATIC CPU with the function block FB SIWA_FTA. While programming the call, an instance data block is created for the FB SIWA_FTA. Besides the instance data block, **a scale DB is required for every Scale SIWAREX FTA**, in which the scale parameters are stored. The UDT that comes with it can also be used for creating the scale DB.

The vector DB must also be loaded in the SIMATIC CPU. **A vector DB can be used by more than one SIWAREX FTA.**

The function block FB SIWA_FTA and the data modules are located on the SIWAREX FTA configuration package CD for SIMATIC S7 in directory Getting_Started_FTA as a component of the "Getting started" example program.

The function block FB SIWA_FTA is called one time for each scale in the application program cyclically in a program level (e.g. in OB1) and provided with call parameters.

```

CALL  "SIWA_FTA" , DB10
ADDR      :=256
DB_SCALE  :=12
DB_VECTOR :=11
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_TRANSITIONS
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".w_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
NOP      0

```

Image 8-1 FB SIWA_FTA call parameters.

8.4 Call parameters for FB SIWA_FTA

The call parameters of the FB SIWA_FTA are described in the following section. The call parameters are defined as variables in the scales DB when delivered. It is possible to define the call parameters with other variables of the same type.

While calling the FB SIWA_FTA, the number of the instance DB to be generated must be defined.

8.4.1 ADDR:= 256, Input, INT

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

8.4.2 DB_SCALE:= 12, Input, INT

A scale DB must be defined for every scale, in which the parameter of the SIWAREX FTA and the current actual value are found. The number of the DB can be selected as desired. DB12 has been defined as the scale DB in the project planning package. In addition, the UDT12 is also provided as a template for creating block modules.

8.4.3 DB_VECTOR:= 11, Input, INT

The content of the vector DB may not be modified by the user. It must be loaded one time only per SIMATIC CPU, independent of the number of SIWAREX FTA modules that are used. The number of the DB can be selected as desired.

8.4.4 CMD_IN:= "DB_SCALE".i_CMD_INPUT, Input, INT

The user controls all command using this input variable, whether for transferring a data record or executing a weighing task. The commands are described in chapter 6. The user prepares the command number using this variable and triggers the command using variable CMD_EN:= "DB_SCALE".bo_CMD_ENABLE (see chapter 8.4.23). The FB SIWA_FTA does not delete the command number, it resets the trigger variable CMD_EN:= "DB_SCALE".bo_CMD_ENABLE after the command is finished.

8.4.5 SIM_VAL:= "DB_SCALE".r_SIM_VALUE, Input, REAL

If the simulation has been enabled (see chapter 5.6.1), the value to be simulated can be defined on this input. The value should be found in the weighing range of the weighing instrument.

8.4.6 ANA_OUT:= "DB_SCALE".r_ANALOG_OUT_VALUE, Input, REAL

If control of the analog outputs has been enabled (see chapter 5.6.11), the value to be controlled can be defined on this input. The value should be found in the defined range of the weighing instrument.

8.4.7 DO_FORCE:= "DB_SCALE".b_DIG_OUTPUT_FORCE, Input, BYTE

If forced control of the digital outputs has been enabled (see chapter 5.6.3), the value to be controlled can be defined on this input. Bit 0 corresponds with digital output 0, bit 1 corresponds with digital output 1, etc.

8.4.8 TRANSITION:= "DB_SCALE".b_TRANSITIONS, Input, BYTE

The user can influence the progress of the weighing procedure. The weighing procedure is divided into steps and one step is only executed if the respective bit is not set for the transition (see chapter 5.5). If the value of all bits of the variable is 0 then the weighing procedure is not held in any segment and its progress is strictly the result of the weighing progress. If the value of e.g. bit 2 is set to 1 then step 2 in the weighing procedure is not executed and it waits until the bit is reset.

8.4.9 CMD_INPR:= "DB_SCALE".bo_CMD_IN_PROGRESS, Output, BOOL

This bit informs the user that a command is being processed at the moment.

8.4.10 CMD_INPR:= "DB_SCALE".bo_CMD_FOK, Output, BOOL

This bit informs the user that a command has been executed successfully (Command complete without errors).

8.4.11 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 chapter 7.6. If no error code is defined, the error must be evaluated in `"DB_SCALE".b_FB_ERR_CODE`.

8.4.12 CMD_ERR_C:= "DB_SCALE".b_CMD_ERR_CODE, Output, BYTE

If a command is not executed (completed with error) the error code number is output here. The number that is output is decoded in the table "Data and Operating Errors" in chapter 7.6. The value remains in the output until the next command is triggered. The evaluation is to be performed when the set bit `CMD_ERR:= "DB_SCALE".bo_CMD_ERR` appears. If an error code is defined, the error must be evaluated in `"DB_SCALE".b_FB_ERR_CODE`.

8.4.13 REF_COUNT:= "DB_SCALE".b_INFO_REFRESH_COUNT, Output, BYTE

The current output values which are prepared as output variables of the FB `SIWA_FTA` are read cyclically by the FB through the peripheral range. `SIWAREX_FTA` updates the values internally in a 10 msec rhythm. Every update is assigned a number which can be used in the SIMATIC CPU like a time stamp.

8.4.14 PROC_VAL1:= "DB_SCALE".r_PROCESS_VALUE1, Output, REAL

The selected process value can be output using this variable (See chapter 5.6.4). The gross weight or the net weight of the scale is normally output here.

8.4.15 PROC_VAL2:= "DB_SCALE".w_PROCESS_VALUE2, Output, DWORD

The selected process value is output using this variable (See chapter 5.6.5). The status of the automatic weighing instrument AWI (See chapter 5.19.2) is normally output here.

8.4.16 SC_STATUS:= "DB_SCALE".dw_SCALE_STATUS, Output, DWORD

The status of the non-automatic weighing instrument NAWI (see chapter 5.19.1) is always output through this variable.

8.4.17 ERR_MSG:= "DB_SCALE".bo_ERR_MSG, Output, BOOL

All messages that are prepared by `SIWAREX_FTA` 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 `RR_MSG_TYPE:= "DB_SCALE".b_ERR_MSG_TYPE` and `ERR_MSG_C:= "DB_SCALE".b_ERR_MSG_CODE`. After the message is acknowledged by the user (`ERR_MSG_Q:= "DB_SCALE".bo_ERR_MSG_QUIT`), the bit is reset by the function block.

8.4.18 ERR_MSG_TYPE:= "DB_SCALE".b_ERR_MSG_TYPE, Output, BYTE

The user is shown which message is there with variable:

Bit 0 – Operating message (Fault)

Bit 1 – Technology error

Bit 2 – Data or operating error

8.4.19 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 the 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_FTA is ready to output the next message if one exists.

8.4.20 FB_ERR:= "DB_SCALE".bo_FB_ERR, Output, BOOL

If an error has occurred during the processing of the function block itself, it is indicated through this variable.



Warning

If a processing error occurs for FB SIWA_FTA, we have to assume that the variables that have been output do not correspond with the actual status in the module.

8.4.21 FB_ERR_C:= "DB_SCALE".b_FB_ERR_CODE

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

The following messages can be output:

Bit 0 - DB_SCALE or DB_VECTOR are missing or have incorrect lengths, or SFB52/SFB53 is not available in the CPU

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

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

Bit 3 - Lifebit error, SIWAREX FTA not responding

Bit 4 - Peripheral data could not be read in this cycle

Bit 5 - Activated command was interrupted with a restart

Bit 6 - Reserved

Bit 7 - Reserved



Warning

If a processing error occurs for FB SIWA_FTA, we have to assume that the variables that have been output do not correspond with the actual status in the module.

8.4.22 START_UP:= "DB_SCALE".bo_START_UP_IN_PROGRESS

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

8.4.23 CMD_EN:= "DB_SCALE".bo_CMD_ENABLE

After entering the command number in the CMD_IN:= "DB_SCALE".i_CMD_INPUT variable, the execution of the command is triggered with this bit. To prevent the command from being triggered more than one time, the bit should be created as an edge. The FB SIWA_FTA does not delete the command number, it resets the trigger variable CMD_EN:= "DB_SCALE".bo_CMD_ENABLE after the command is finished.

8.4.24 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_FTA can then output the next message.

8.5 Allocation in the Scale DB

There are variables that are available in the SIMATIC in the scales DB. The allocation corresponds with the data record structure. The variable designation is in English.

8.6 Calibratable weight display for WinCC flexible

For displaying the calibratable weight value, the same device that the operator uses for running the system can be used.

The legal for trade main display for one or more scales can be created in S7 classic with the devices according to the following table:

Operator panel	WinCC flexible Version					
	2005	2007	2008	2008 SP1	2008 SP2	2008 SP3
TP170B color	yes	yes	yes	no	yes	yes
TP170B mono	yes	yes	yes	no	yes	yes
TP170A	no	no	no	no	no	no
OP170B mono	yes	yes	yes	no	yes	yes
TP 177A 6"	no	no	no	no	no	no
TP 177A 6" (Portrait)	no	no	no	no	no	no
TP177B mono	yes	yes	yes	yes	yes	yes

DP						
TP177B color PN/DP	yes	yes	yes	yes	yes	yes
TP177B 4" color PN/DP	no	no	yes	yes	yes	yes
OP177B mono DP	yes	yes	yes	yes	yes	yes
OP 177B color PN/DP	yes	yes	yes	yes	yes	yes
MP177 6" Touch	no	no	yes	yes	yes	yes
TP270 6"	no	yes	yes	no	yes	yes
TP270 10"	yes	yes	yes	no	yes	yes
TP277 6"	yes	yes	yes	yes	yes	yes
OP270 6"	yes	yes	yes	no	no	no
OP270 10"	yes	yes	yes	no	no	no
OP277 6"	no	yes	yes	yes	yes	yes
MP370 12" Key	yes	yes	yes	no	yes	yes
MP370 12" Touch	yes	yes	yes	no	yes	yes
MP370 15" Touch	yes	yes	yes	no	yes	yes
MP270 6" Touch	no	yes	yes	no	yes	yes
MP270 10" Touch	no	yes	yes	no	yes	yes
MP270 10" Key	no	yes	yes	no	yes	yes
MP277 8" Key	no	yes	yes	yes	yes	yes
MP277 8" Touch	no	yes	yes	yes	yes	yes
MP277 10" Key	no	yes	yes	yes	yes	yes
MP277 10" Touch	no	yes	yes	yes	yes	yes
MP 377 12" Key	no	yes	yes	yes	yes	yes
MP 377 12" Touch	no	yes	yes	yes	yes	yes
MP 377 15" Touch	no	yes	yes	yes	yes	yes
MP 377 19" Touch	no	yes	yes	yes	yes	yes

Table 8-1 List of HMI devices for calibratable display



Caution

DS39 can only be written to if the calibration switch is open – you may therefore need to recalibrate an already calibrated weighing instrument.

The SIMATIC HMI device can be connected with the MPI or to PROFIBUS/PROFINET. The calibratable display of the weight value can be connected to any position in the system hierarchy. The connection does not have to be sealed and future planning for operator windows are also not influenced by the calibratable weight display.

8.6.1 Functionality of the calibratable weight display

The value for the calibratable weight display is generated internally by the SIWAREX FTA, it is encoded and then provided in the data record DR 35 for the user.

The DR 35 data record is read by the FB SIWA_FTA and is put in the scale DB just like every other data record in a defined address.

Using the DR 35, the DR39 and variable Variable d_intern_ocx, a common recognition monitoring of the SecureOCX and the SIWAREX firmware is guaranteed.

Dataset DR39 must contain the version number (ID) of the calibratable display. This depends on the used WinCC flexible version.

Win CC flexible	DR39
WinCC flexible 2005	V2.1
WinCC flexible 2007	V2.2
WinCC flexible 2008	V2.3
WinCC flexible 2008 SP1	V2.4
WinCC flexible 2008 SP2	V2.5
WinCC flexible 2008 SP3	V2.6

For the evaluation, an AddOn is used for WinCC flexible – a special function, which is able to decode the contents of the DR 35 and display it in a special output field. This AddOn is called “SecureOCX” and must be installed in addition to WinCC flexible.

If the incoming data is incorrect, ERROR 1 is output.

If data record DR35 is not updated (monitoring time approx. 2 s), instead of the weight value, the text ERROR 2 appears on the screen.

Errors during mutual detection of SIWAREX firmware and “SecureOCX” generate ERROR 3 if Regulations=OIML is set. The current weight value is displayed if Regulations=---- is set.

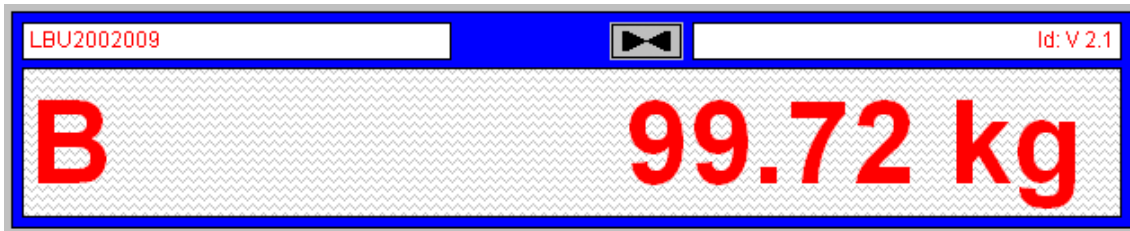


Image 8-2 Calibratable display in TP/OP

8.6.2 Installation and Project Planning for the Calibratable Weight Display

First, the OCX add-on for secure output (SecureOCX) must be integrated into the setup environment of WinCC flexible. There are three different program versions for WinCC flexible 2005 (valid as of version WinCC flexible 2005 SP1 HF6), and WinCC flexible 2007 and WinCC flexible 2008.

The corresponding software is created in the respective configuration package in the directory OCX_FOR_SECURE_DISPLAY_WinCC_....

For the installation of the SecureOCX for WinCC flexible 2008 SP3 follow the instructions of the readme file in the software directory. For all other versions the installation is described in the following chapters.

The corresponding directory contains the OCX directory, which in turn contains all the program components required for installation, and the installation programs Secure OCX Setup_d.bat and Secure OCX Setup_en.bat (for German or English installation of the operating system). The entire directory OCX_FOR_SECURE_DISP_WinCC... is first copied to an installation directory. The installation directory must be located on the same drive as the WinCC flexible software.

If WinCC flexible is not located in the directory <C:\Programs> or <C:\Program Files>, the setup program must be edited using an editor and rewritten to the other directory. The following source code for the Secure OCX Setup.bat shows the sections that may need to be changed marked in bold. This is the code for WinCC flexible 2005.

```

-----
@echo off
color 3f
cls
echo *-----*
echo * Automatic install routine to install the Secure OCX program *
echo * Only works, when SIMATIC winCC Flexible 2005 is installed in directory *
echo * C:\program files\Siemens. *
echo * Otherwise cancel with "Strg"+"C" and adapt the file *
echo * Secure OCX Setup_en.bat (see Device Manual) *
echo *-----*
echo * The following directory structure is installed on your C:\ partition: *

```

```

echo * c:\ocx\secure\winCC Flexible      [OCX Files]                *
echo *-----*
echo * Instruction:                                                    *
echo * Confirm popping up dialogs                                       *
echo *-----*
pause
echo off
echo Install, please wait....
md c:\ocx
cd ocx
echo Copy files to C:\OCX\Secure\winCC Flexible\
xcopy *.* "c:\ocx\secure\winCC Flexible\" /e /h /q /y
echo Copy files into directory SIMATIC winCC Flexible
xcopy "C:\ocx\secure\winCC Flexible\winCC flexible 2005\*.*" "C:\Program
files\Siemens\SIMATIC winCC flexible\winCC flexible 2005" /e /h /q /y
regsvr32 "C:\Program files\Siemens\SIMATIC winCC flexible\winCC flexible
2005\SecureOCX\SecureOCX.dll"
echo *-----*
echo *                               End of installation                *
echo *-----*
pause
cls

```

Before installing the SecureOCX, ensure that no WinCC flexible components are active. This can be done by closing all WinCC flexible programs and deactivating the autostart in the WinCC flexible Start Center. After this, the PC is to be restarted. Then the batch file for the installation can be started. Interactive questions are to be acknowledged with the respective entries. The computer must be rebooted afterwards.

If WinCC flexible is called up then, the toolbar shows the new tool "SecureOCX" (see arrow), which is used for configuration just as with other objects.

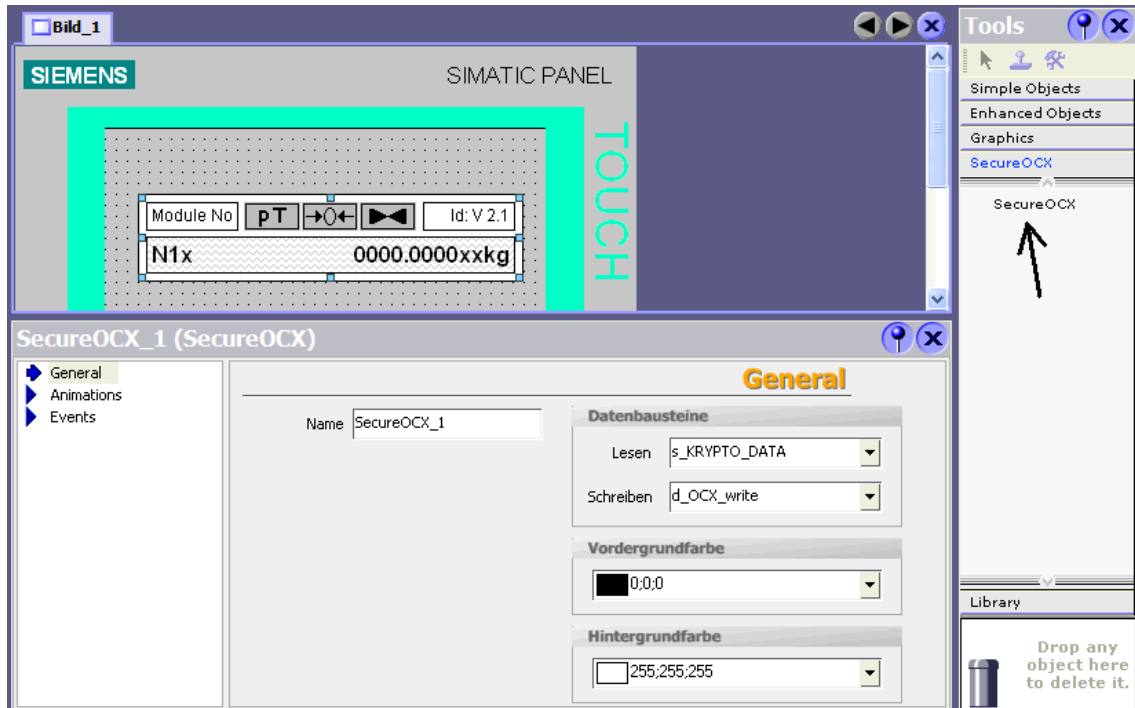


Image 8-3 Function "SecureOCX" in WinCC flexible

During the configuration the variables s_Krypto_Data (corresponds with DR39, data type: Byte, array length: 32) and d_OCX_write (data type: Word, array length: 2) are entered.

The refresh rate lies somewhere around 200 to 300 msec which is comfortable to the eye.

After the configuration, check in the runtime on the configured panel after the configuration that the display is handled as desired.

8.7 Calibratable weight display with TIA-Portal

For a legal-for-trade display with TIA portal there is a separate software SecureDisplay available which runs on Windows CE 5.0 based operator panels.

A comprehensive manual can be found on the configuration package or in the product support under <http://support.automation.siemens.com/WW/view/en/17831309/133300>

This manual contains:

- hardware requirements
- description of the principle of operation

- installation of the software SecureDisplay
- additional parameter and command which are not described in this manual
- integration of the SecureDisplay in TIA Portal
- information for verification

9 Project planning in SIMATIC PCS 7

The integration of SIWAREX FTA is possible as of PCS 7 version 6.1.

For description please refer to the separate manual under
www.siemens.com/siwarex .

10 Commissioning using a PC – SIWATOOL FTA

10.1 General

The scale can be put into operation using the SIWAREX FTA program independent of commissioning the SIMATIC automation system.

The program is included with the delivery of the project planning package.
The program (Catalogue SIWATOOL_FTA) must be installed in the first step.

10.2 Windows and functions of the SIWATOOL FTA

The program window is constructed so as to facilitate navigation through the parameter definition areas of SIWAREX FTA.

The top bar contains the control elements for the SIWATOOL fta program and for operation of the scale. The main window is divided into three panes.

The left-hand pane contains a tree structure of all the SIWAREX FTA parameters. Under each main point are the SIWAREX FTA data records associated with the activities in question, e.g. commissioning or monitoring. Under the data record name there is first an "Info" line and then below it the individual parameters for the data records. When "Info" is selected, an information sheet opens showing which tasks may be processed with the parameters for the data record selected.

The offline values of a parameter are shown to the right in the center column. The right-hand column contains the online value from the weighing electronics when the program is online.

For sending, receiving, and transferring, the corresponding data record is selected and the command list called up by right-clicking. In so doing the entire data record is always processed, not just individual parameters.

10.3 Offline Project Planning

All scale parameters can be edited and stored without the SIWAREX FTA module. This can decrease the start-up time.

The parameters for several scales can be prepared in the office and only have to be transferred to the SIWAREX FTA for commissioning.

Data can also be read from one scale in the operation and used for commissioning other scales.

10.4 Online Operation

To change to online operation, a SIWATOOL cable (see *Accessories*) is to be used to connect the PC with SIWAREX FTA (Connection diagram see 4.5.2). 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 contents of the message buffer from SIWAREX FTA. The current process values can be observed in various windows. For testing purposes, all commands can be sent to the SIWAREX FTA.

Differences between the online/offline data are marked in red by the SIWATOOL - both the data record in question and the individual parameter.

For archiving, all data can be read and stored in a file or can be printed.



Warning

In online operation, all data in the module can be edited. The changes are not automatically fed into the respective scales-data records. You, as the user, must decide whether the data adjustment is necessary and whether it should be performed or not.

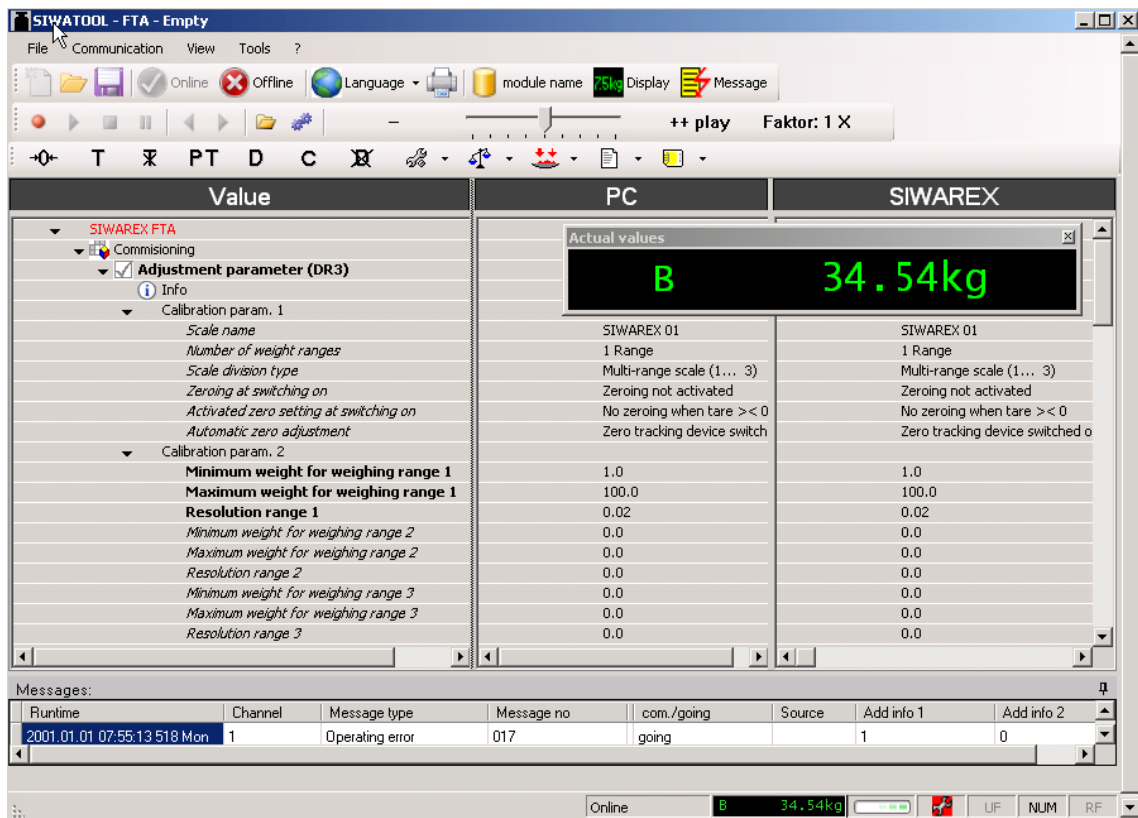


Image 10-1 SIWATOOL FTA Window Distribution

10.5 Recorder

Online parameter curves can be recorded and played back using the recorder function located at the top right-hand edge of SIWATOOL. The data records that are to be recorded can be selected and the save parameters set using the "Configure recorder" button. The playback speed can be set using a slider.

10.6 Assistance

After clicking on a data record in the left-hand program window, the "Info" card can be selected from the right-hand program window. A description on a white area indicates the affect that the data record has on the scale's behaviour.

After selecting a card, a section of the respective data record is displayed as input and output fields. Besides the parameter identification, Tool Tips (text is displayed when the mouse is over the field) help to describe the parameter.

Clicking on the menu point "Help" opens the "SIWAREX FTA" manual. The Acrobat Reader program must be installed in order to read the manual.

10.7 Commissioning - Wizard

Entering the parameter in SIWATOOL FTA can easily be done quicker. By entering the scale type and the weighing range (only suitable for scales with one weighing range), certain parameters are automatically assigned with calculated values by the program Wizard.

The parameters that are changed this way can be seen in the description of data records DR3, DR4, DR20, DR21, DR22, DR23 in column "default".

The weighing range defined in the Wizard is not automatically defined in the adjustment data of the DR3 for safety reasons.

11 Firmware-Update with SIWATOOL FTA

11.1 Advantages of the Firmware-Update

If you want to utilize the firmware update offer on the SIWAREX internet pages (www.siemens.com/weighing-technology / Support), you are able to download the latest firmware cost-free and using the SIWATOOL FTA, you can transfer it to the modules.

The firmware is located in Flash memory. If required, new firmware can be transferred to the modules.

The new firmware can slightly vary from the earlier version - this is the case if the data structures of SIWAREX FTA parameters are not changed. In this case, loading the new firmware does not change the actual data.

If function expansion in the new firmware results in new internal data structures, new data records or changes within existing data records then the SIWAREX FTA assigns the parameters with default values after the download. Therefore, the original parameter status is read using the SIWATOOL FTA ("Communication menu", "Retrieve all data records") and stored in a file.

Loading the firmware onto the SIWAREX FTA module is performed over several steps:

1. Switch the SIMATIC CPU to STOP.
2. Log SIWATOOL FTA in (online)
3. Select Firmware Download, set download mode
4. Select Firmware file
5. Activate download mode with the checkmark
6. Start the transfer

The transfer can take up to several minutes.

After the transfer, SIWAREX FTA is restarted. Communication with SIWATOOL FTA must be reactivated (reset download mode).

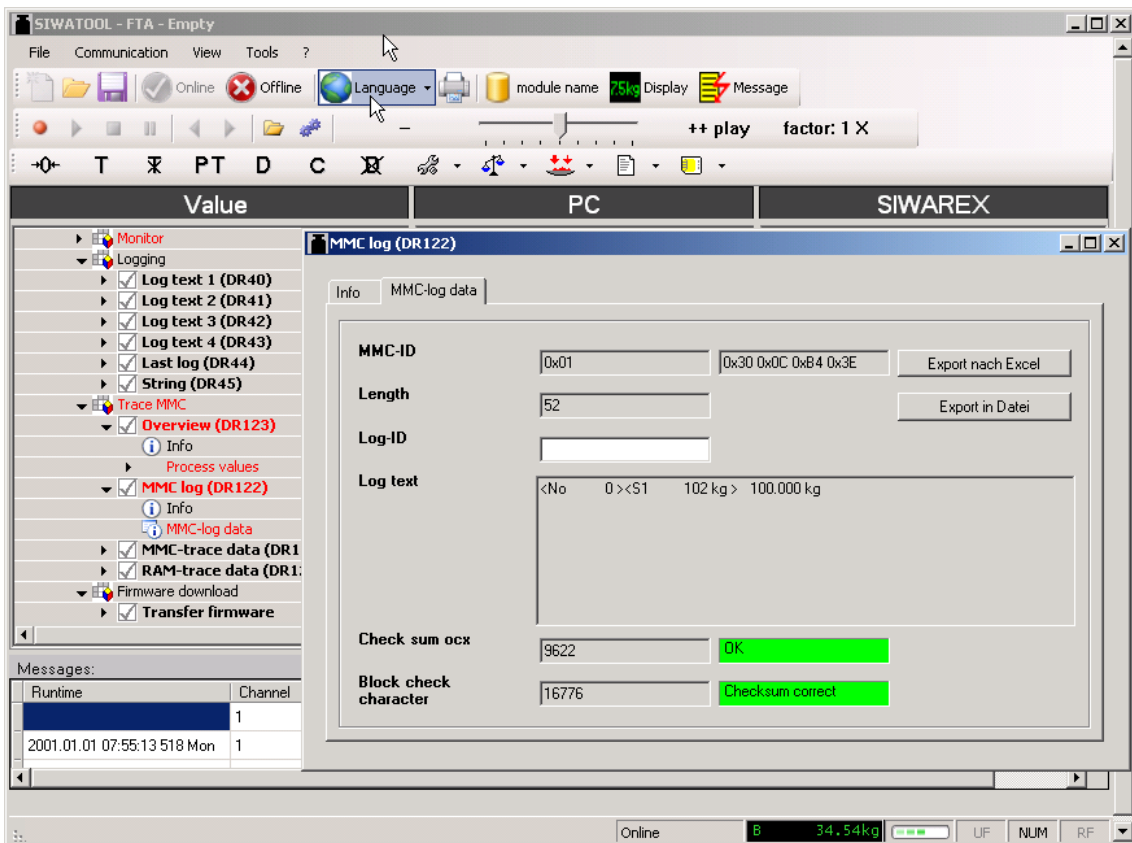


Image 11-1 Downloading Firmware with SIWATOOL FTA



Warning notice

During the firmware download, SIWAREX FTA do not respond to communication requests from the SIMATIC CPU. The CPU indicates the peripheral access error and if no respective organization block (OB) is programmed then the CPU can go to STOP.

Therefore, loading the firmware should only be done when the CPU is in STOP status.

12 Calibrating Applications

12.1 General Note



Attention

Calibratable scales may only be certified by a calibration expert or qualified representative.

Preparations

The following preparations must be made by the scale users before the actual certification by the calibration expert:

Start SIWAREX FTA

- Adjust the scale according to the device manual
- Check all of the points corresponding with (1), (2), (3) and (4).
 - (1) = European Regulations ER (90/384/EWG) on non-automatic weighing instruments
 - (2) = European Standards EN 45 501 for non-automatic weighing instruments
 - (3) = National regulations for automatic weighing instruments
 - (4) = The corresponding OIML recommendations for automatic weighing instruments
 - (5) = Conditions listed in the corresponding certificates.

Calibration sticker

The calibration sticker is found in the calibration set which you can get as an accessory.

Certifying the SIWAREX FTA

The certification of the calibrated scale is done by a calibration expert from a recognised position.

Stamp of approval on SIWAREX FTA

After activating the write protection (WRP switch on the front), the calibration expert attaches the certification stamp and the calibration mark.

12.2 Calibratable main weight display

The calibratable main display for SIWAREX FTA can either be done on a calibratable S 102 display (company Siebert) or when using SIMATIC S7 Classic with certain standard SIMATIC OP/TPs (0). The application conditions and details can be found in the design certification for SIWAREX FTA.

12.3 Reading the calibratable logs with SIWATOOL FTA

The weighing log can be created on a calibratable printer or in the calibratable memory in the optional Micro Memory Card.

The capacity of the MMC should normally be sufficient for recording the scale logs for a period of 3 months. The MMC can be configured with SIWATOOL FTA so that the data will overwrite older data when the memory is full. This creates a circulating buffer that conforms with the documentation of the calibration regulations.

A unique log ID is found in every weighing log that is stored. The log ID is very important because it is also printed out on the non-calibratable delivery note next to the amounts.

If anyone objects to a fixed delivery because of the delivered amount, the log ID is used to help find the log - either in a stack of paper logs or on the Micro Memory Card.

The SIWATOOL FTA is connected with SIWAREX FTA for this reason. After entering the log ID, the data to be checked is read from the MMC, which is still in the SIWAREX FTA and is continuously storing the production scale data, and this data is then displayed.

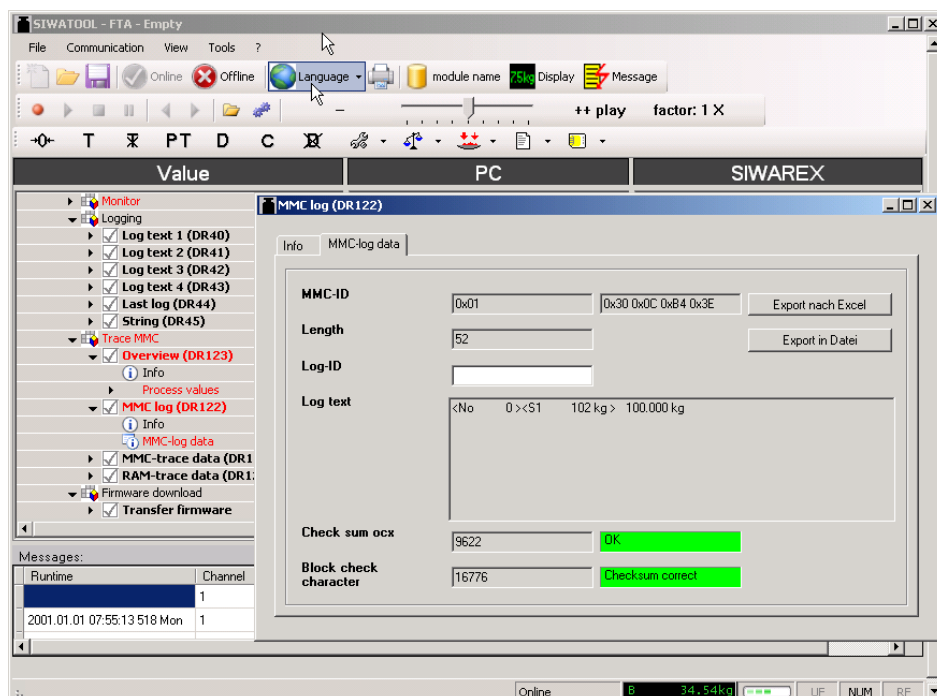


Image 12-1 Read the calibratable memory with SIWATOOL FTA

13 Accessories

There are necessary and optional accessories for the SIWAREX FTA.
The required accessories are indicated in the following table.

Description	Order No.
SIWAREX FTA Calibration weighing electronics for automatic weighing instruments for S7-300 and ET200M. EU Type Certification 3 x 6000d Application areas: Fast dosing, filling / bagging and emptying. Attention: Pay attention to certification conditions for calibrating applications.	7MH4900-2AA01
<ul style="list-style-type: none"> • SIWAREX FTA Manual (The device manual is only available electronically and may be downloaded from www.siwarex.com) 	
SIWAREX FTA Project Planning Package for SIMATIC S7 on CD-ROM <ul style="list-style-type: none"> • SETUP for S7- Integration Step7 and TIA-Portal • Getting Started (S7 classic and TIA-Portal) • PC parameter software SIWATOOL FTA • Manual on CD-ROM • Quick Guides 	7MH4900-2AK02
SIWAREX FTA Project Planning Package for PCS7 V6.0 on CD-ROM <ul style="list-style-type: none"> • SETUP for S7- Integration • Getting started • PC parameter software SIWATOOL FTA • Manual on CD-ROM 	7MH4900-2AK61
SIWAREX Multiscale STEP 7-Software for SIWAREX FTA. Control of one or more scales for an expandable number of components and an optional number of recipes. Applications. Batch systems, mixing in production processes, CD-ROM	7MH4900-2AL01
SIWAREX Multifill STEP 7-Software for SIWAREX FTA. Control for filling and bagging operations for one or more filling stations and an optional number of materials, CD-ROM	7MH4900-2AM01
SIWATOOL connection cable from SIWAREX FTA with a serial PC interface, for 9 pin PC interfaces (RS 232)	
<ul style="list-style-type: none"> • Length 2 m 	7MH4702-8CA
<ul style="list-style-type: none"> • Length 5 m 	7MH4702-8CB
<ul style="list-style-type: none"> • 40-pin front connector with screw contacts (required for every SIWAREX assembly), alternatively with spring-clamps - see next point 	6ES7 392-1AM00-0AA00
<ul style="list-style-type: none"> • 40-pin front connector with spring-clamps (required for every SIWAREX assembly), alternatively 	6ES7 392-1BM00-0AA00

Description	Order No.
with screw contacts - see next point	
<ul style="list-style-type: none"> • Shielding contact rail sufficient for a SIWAREX FTA assembly 	6ES7 390-5AA0-0AA0
<ul style="list-style-type: none"> • Shielding connection clamp Content: 2 pieces (suitable for cable of diameter 4 to 13 mm) Note: One shielding connection clamp is required for each of the following: <ul style="list-style-type: none"> - Scale connection - RS 485 interface - RS 232 interface 	6ES7 390-5CA0-0AA0
<ul style="list-style-type: none"> • S7 profile rail 	
<ul style="list-style-type: none"> - 160 mm 	6ES7 390-1AB60-0AA0
<ul style="list-style-type: none"> - 480 mm 	6ES7 390-1AE80-0AA0
<ul style="list-style-type: none"> - 530 mm 	6ES7 390-1AF30-0AA0
<ul style="list-style-type: none"> - 830 mm 	6ES7 390-1AJ30-0AA0
<ul style="list-style-type: none"> - 2.000 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	
<ul style="list-style-type: none"> • PS 307-1B; 2 A 	6ES7 307-1BA00-0AA0
<ul style="list-style-type: none"> • PS 307-1E; 5 A 	6ES7 307-1EA00-0AA0
<ul style="list-style-type: none"> • PS 307-1K; 10 A 	6ES7 307-1KA00-0AA0
Label strips (10 pieces, replacements)	6ES7 392-2XX00-0AA0
Remote display (optional)	
<p>The digital remote display model Siebert S 102 can be connected directly through an RS 485 interface to the SIWAREX FTA</p> <p>Siebert Industrieelektronik GmbH Box 1180 D-66565 Eppelborn Tel.: 06806/980-0 Fax: 06806/980-999 Internet: http://www.siebert.de</p> <p>For detailed information, please contact the manufacturer.</p>	
Connection and distribution box SIWAREX JB	7MH4710-1BA
for parallel switching for load cells, optional	
Expansion box SIWAREX EB	7MH4710-2AA
for extending load cell cables, optional	
Micro Memory Card (SIMATIC), optional	7MH4900-2AY21
Calibration set – Accessories for a calibration certification (sticker plate, calibration marks, CD with samples and information)	7MH4900-2AY10
Ex-Interface , Type SIWAREX IS with ATEX certification for intrinsically safe connection of load cells, including the manual	
<ul style="list-style-type: none"> • • with short-circuit current < DC 199 mA 	7MH4710-5BA
<ul style="list-style-type: none"> • • with short-circuit current < DC 137 mA 	7MH4710-5CA
Cables (optional)	

Accessories

Description	Order No.
<p><u>Cable Li2Y 1 x 2 x 0.75 ST + 2 x (2 x 0.34 ST) – CY</u> for connecting a SIWAREX FTA with connection and distribution box (JB), expansion box (EB) or Ex-Interface (Ex-I) as well as between two JB's, for stationary cabling, occasional bending is possible, 10.8 mm outer diameter for Environmental temperatures –20 to +70°C</p>	<p>7MH4702-8AG</p>
<p><u>Cable Li2Y 1 x 2 x 0.75 ST + 2 x (2 x 0.34 ST) – CY, blue covered</u> for connecting 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 temperatures –20 to +70°C</p>	<p>7MH4702-8AF</p>
<p>Cable LiYCY 4 x 2 x 0.25 mm² for RS 485</p>	<p>7MH4407-8BD0</p>

14 Technical Data

14.1 24 V power supply

An isolated function low voltage (according to EN60204-1) is to be ensured by the system power supply.

Rated voltage	DC 24 V
Static upper / lower limits	DC 20.4 V/28.8V
Dynamic upper / lower limits	DC 18.5 V/30.2 V
Non-periodic over-voltages	DC 35 V for 500 msec with a recovery time of 50 sec.
Max. current consumption	500 mA
Typical assembly power loss	7.5 W

Table 14-1 Data: 24 V power supply

14.2 Power supply from S7 back-plane bus

Current consumption from S7-300 back-plane bus	Typical 55 mA
--	---------------

Table 14-2 Data: Power supply from S7 back-plane bus

14.3 Load cell connection

EU type certification as non-automatic weighing instrument, class III	3 x 6000 d ($\pi = 0.4$)
Precision with Ex-i-Interface	3 x 6000 d ($\pi = 0.5$)
Error limits conforming with DIN1319-1 from measurement range end value at $20\text{ }^{\circ}\text{C} \pm 10\text{ K}$	Measurement range 1m V/V: = 0,01 % Measurement range 2/4mV/V: = 0,005 %
Refresh rate internal / external	2.5 msec/10 msec
Internal resolution	16 million parts
3 measuring ranges	0 to 1 mV/V 0 to 2 mV/V 0 to 4 mV/V
Max. distance to load cell (calibratable)	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 manual)
Lowest permitted input signal for a calibration value in calibrating operation	= 0.5 $\mu\text{V/e}$
Load cell power Voltage Current	Type DC 10.2 V * = 184 mA

Permitted load cell resistance without Ex-i-Interface	Input resistance > 56 Ω Output resistance < 4010 Ω
Permitted load cell resistance with Ex-i-Interface	Input resistance > 87 Ω Output resistance < 4010 Ω
Monitor for sensing inputs	Typical = 5 V Hysteresis 120 mV
Response time for sense line monitor	= 1 sec
Common mode rejection CMRR @50 Hz	Typical 120 dB
Measuring value filtering for low pass filter	0.05...20 Hz
Measuring value filtering for average value filter	2...250 values
Impedance measurement for load cells	Measuring range 56 Ω...4010 Ω Precision ±5% Repeat accuracy <1 %
Potential separation	500 V

* Values apply to assembly output

Table 14-3 Data: Load cell connection

14.4 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 % *
Refresh rate	10 msec
Load (incl. line resistance)	= 250 Ω, = 30 nF
Line length 0.5 mm ²	200 m
Temperature coefficient	max. ± 75 ppm / K
Resolution	12 Bit (4096 parts) **
Potential separation	500 V

* Definitions apply with current >0.5mA

** Resolution reduced by 20 % with operations 4 to 20 mA

Table 14-4 Data: Analog output

14.5 Digital inputs (DI), Digital outputs (DO)

The defined value is always output on the DO for active BASP-/OD signal (S7 CPU). An inverse diode (recovery diode) is to be used on the consuming component with inductive loads on the DO.		
	DI	DO
Number	7	8
Rated voltage	DC 24 V	
Potential separation	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. total current of all outputs		2 A
Potential isolation		500 V
Voltage drop on assembly		< 0.25 V
Switching delay		= 12 msec
Short-circuit protection		Yes ¹

¹ output current pulsed with short-circuit

Table 14-5 Data: Digital inputs, Digital outputs

14.6 Counter input CI

Number	1
Rated voltage	DC 24 V
Potential separation conforming with 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 separation	500 V

Table 14-6 Data: Counter input CI

14.7 RS 232C interface

Baud rate	1200 to 115200 Baud
Data bits	8
Parity	Even
Stop bits	1
Max. distance	15 m
Signal level	Conforms with EIA-RS232C
Potential separation	500 V

Table 14-7 Data: RS 232C interface

14.8 RS 485 interface

Baud rate	1200 to 19200 Baud
Data bits	7 or 8
Parity	even / odd
Stop bits	1 or 2
Max. distance	1000m at 1200 Baud
Signal level	Conforms with EIA-RS485
Termination resistance	390Ω / 220Ω / 390Ω
Potential separation	500 V

Table 14-8 Data: RS 485 interface

14.9 Dimensions and Weight

Dimensions W x H x D	80 x 125 x130 mm
Weight	600 g

Table 14-9 Data: Dimensions and Weight

14.10 Mechanical requirements and data

Testing	Standards	Test values
Vibration in operation	DIN IEC 60068-2-6 EC 60721-3-3, class 3M3 IEC 61131-2	Testing Fc 10 ... 58 Hz: 0.075 mm amplitude 58 ...150 Hz: 9.8 m/s ² 10 cycles per axis 1 octave / min.
Shock in operation	DIN IEC 60068-2-27 EC 60721-3-3, class 3M3 IEC 61131-2	Test Ea 150 m/s ² , Half sinus Duration: 11 msec Number: 3 per axis each in neg. and pos. directions
Vibration in transportation	DIN IEC 60068-2-6 EC 60721-3-2, class 2M2 IEC 61131-2	Testing Fc 5 ... 9 Hz: 3.5 mm amplitude 9 ...5000 Hz: 9.8 m/s ² 10 cycles per axis 1 octave / min.
Shock in transportation	DIN IEC 60068-2-29 EC 60721-3-2, class 2M2 IEC 61131-2	Test Eb 250 m/s ² , Half sinus Duration: 6 msec Number: 1000 per axis each
Falling	DIN IEC 60000-2-32 IEC 61131-2	Test Ed High: 1 m Number of trails: 5 Shipping package

Table 14-10 Data: Mechanical requirements

14.11 Electrical, EMC and climatic requirements

14.11.1 Electrical protection and safety requirements

Met requirements	Standards	Remarks
Safety guidelines	IEC 61010-1; IEC 61131; UL 508; CSA C22.2 No.142; FM 3611 class I, Div.2;	UL-/CSA-/FM Zone 2 certification upon request
Protection class	IEC 61140	Protection class I, with protective conductor
IP protection	IP 20 nach IEC 60529	<ul style="list-style-type: none"> Protection against contact with standard test fingers Protection against foreign bodies with diameters above 12.5 mm No special protection against
Air and creepage distances	IEC 61131 UL508 CSA C22.2 No.142	Surge category II Pollution degree 2 Circuit board material IIIa Circuit track spacing 0.5 mm
Isolation test	IEC 61131-2: CSA C22.2 No.142	Test voltage 500 V DC
Fire and burn protection	for "Open Type Controller": IEC 61131-2;; UL 508	
Material	SN 36350 (3.93)	

Table 14-11 Data: Electrical protection and safety requirements

14.11.2 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: < 40dB(µV/m) Q 230-1000MHz: < 47dB(µV/m) Q
Emission on power supply lines	IEC 61131-2	EN 55011 Class A, Group 1 EN 55014

Interference immunity (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 (<i>RS232 port</i>) 2 kV (remaining data and signal lines)
Electrostatic discharge (ESD)	IEC 61000-4-2 NAMUR NE 21	6 kV
Electrostatic air discharge (ESD)	IEC 61000-4-2 NAMUR NE 21	8 kV
Surge on power supply lines	IEC 61000-4-5 NAMUR NE 21 IEC 61131-2	± 2 kV unsym.* ± 1 kV sym.*
Surge on data and signal lines :	IEC 61000-4-5 NAMUR NE 21 IEC 61131-2	± 1 kV unsym. (on cable shield)
HF irradiation (electromagnetic fields) 26 MHz to 2000 MHz	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 : 1V/m
HF voltage on data-, signal- and current supply lines 0.15 to 80 MHz	IEC 61000-4-6 IEC 61131-2 NAMUR NE 21	0,15 kHz – 80 MHz 10V (80% AM 1 kHz)

Table 14-12 Data: Electromagnetic Compatibility

* An external protection element should be fitted to meet the requirements (e. g.: Blitzductor VT AD24V, from Dehn&Söhne)

Notice

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).

14.12 Environmental conditions

The SIWAREX FTA is designed to be used in SIMATIC S7-300 or ET200M systems under the following conditions.

Usage conditions in accordance with IEC 60721:

Operation: IEC60721-3-3
Stationary use, weatherproof
Class 3M3, 3K3

Storage/Transport: IEC 60721-3-2
Transport packaged, no condensation
Class 2M2, 2K4

For use in extreme operating conditions (e. B. heavy dust, acidic vapors or gasses, etc.) additional measures are to be taken, e.g. encapsulation





Climatic requirements		
Remarks	Environmental conditions	Application ranges
Operating temperature: Vertical installation in S7-300 Horizontal installation in S7-300 Calibrated operation	-10 to +60 °C -10 to +40 °C -10 to +40 °C	The S7-300 standard module groups may not be operated under 0°C
Storage and transport temperature	-40 to +70 °C	
Relative humidity	5 to 95 %	Without condensation, corresponding with relative humidity (RH) - Exposure level 2 according to DIN IEC 61131-2
Pollutant concentration	SO ₂ : < 0,5 ppm; H ₂ S: < 0.1 ppm;	RH < 60% no condensation
Air pressure	IEC 60068-2-13	Operation: 1080...795 hPa (-1000 to +2000m) Storage: 1080...660 hPa (-1000 to +3500m)

Table 14-13 Data: Climatic requirements

14.13 Licenses

Note:

The licenses that are currently valid for SIWAREX FTA are indicated on the SIWAREX FTA rating plate.

	<p>Directives: 90/384/EWG "Non-automatic weighing instrument" 2004/108/EC "Electromagnetic Compatibility" 94/9/EG "Explosion protection" (ATEX 100a) Note: Further information on the EC directives can be found in the product documentation accompanying every SIWAREX FTA.</p>
	<p>Underwriters Laboratories Inc. nach 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</p>
	<p>Factory Mutual Research (FM) nach 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</p>
	<p>Explosion protection according to EN 60079-15: 2005 (Electrical apparatus for potentially explosive atmospheres; Type of protection "n") Class II 3 G Ex nA II T4 For using the SIWAREX FTA in areas with a risk of explosion, the important information in the "SIMATIC Automation Systems - Basics of Explosion protection (Doc.No. A5E00206200)" must be observed!</p>

14.14 Scale Licenses

SIWAREX FTA has EU type certification as a non-automatic weighing instrument.

For operation of the automatic weighing machine, the previously distributed national certifications become valid as of issue for a transition period of 10 years.

After 30.10.2006, the measuring instrument directives 2004/22/EC apply for automatic weighing machines. The respective certifications are issued for SIWAREX FTA.

The current list of certificates can be viewed on the Internet at www.siwarex.de.

If you require certification which is not included in the list, please contact the SIWAREX hotline at (+49 (0)721 595 2811).

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16 Abbreviations

ADC	Analog-Digital Converter
ASCII	American Standard Code for Information Interchange
AWI	automatic weighing instrument
CPU	Central Processing Unit
DO	Digital output
DR	Data record
DI	Digital input
FC	STEP7 Function call
FB	Function block (S7)
FM	Function module (for S7-300)
G	Gross weight
HMI	Human machine interface (SIMATIC Operator Panel)
HW	Hardware
LC	Load cell(s)
MG	Module group
MID	Measuring instruments directive 2004/22/EC
MMC	Micro-Memory-Card / Multi-Media-Card
MPI	Multi-Point-Interface
NAWI	non automatic weighing instrument
NSW	non automatic weighing instrument
OD	Output Disable (S7)
OIML	Organisation Internationale de Metrologie Legale
OM	Object manager for STEP 7 objects
O&O	Operating & Observing
OP	Operator Panel (SIMATIC)
P-BUS	Peripheral bus (S7)
PC	Personal-Computer
pT	preset Tara (predefined tare-weight for manual taring)
PTB	Physical-Technical-Organization (Certification authorities for calibratable scales)
RAM	random- access-memory
S7-300	Siemens Automation System for mid-range applications
S7-400	Siemens Automation System for the upper application range
SFC	System Function Call (S7)
STEP 7	Programming device software for SIMATIC S7
SWA	Automatic gravimetric filling instrument
SWE	Automatic Catchweighing instrument
SWT	Discontinuous totalising automatic weighing instrument
T	Tare weight
TIA	Totally Integrated Automation
TP	Touch Panel (SIMATIC)
UDT	Universal Data Table (S7)
WRP	Write Protection