SIEMENS

Weighing systems

Electronic weighing system SIWAREX WT231

Manual

05/2015

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Legal information

Warning notice system

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.

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indicates that death or severe personal injury **may** result if proper precautions are not taken.

⚠ CAUTION

indicates that minor personal injury can result if proper precautions are not taken.

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indicates that property damage can result if proper precautions are not taken.

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.

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The product/system described in this documentation may be operated only by **personnel qualified** for the specific task in accordance with the relevant documentation, in particular its warning notices and safety instructions. Qualified personnel are those who, based on their training and experience, are capable of identifying risks and avoiding potential hazards when working with these products/systems.

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Note the following:

⚠ WARNING

Siemens products may only be used for the applications described in the catalog and in the relevant technical documentation. If products and components from other manufacturers are used, these must be recommended or approved by Siemens. Proper transport, storage, installation, assembly, commissioning, operation and maintenance are required to ensure that the products operate safely and without any problems. The permissible ambient conditions must be complied with. The information in the relevant documentation must be observed.

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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.

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Order number: A5E31238908A
℗ 05/2015 Subject to change

Content

Introduction

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1.1 Purpose of the manual

This manual contains all necessary information on the setup, installation, wiring and commissioning of the SIWAREX WT231 standalone electronic weighing system.

1.2 Basic knowledge required

This manual requires basic knowledge of weighing technology.

1.3 Manual - range of validity

This manual is valid for:

Type designation	Order No.	as of version		HMI project
SIWAREX WT231	7MH4965-2AA01	HW 3	FW V2.0.3	V 2.0.3

Note

This manual contains a description of all electronic weighing systems available at the date of publication. We reserve the right to include a Product Information with the latest information on the module.

1.4 Technical support

Technical Support

You can contact Technical Support for weighing technology:

- E-mail (mailto:hotline.siwarex@siemens.com)
- Phone: +49 (721) 595-2811

You can contact Technical Support for all IA and DT products:

- Via the Internet using the **Support Request:**
  Support request (http://www.siemens.com/automation/support-request)
- Phone: +49 (911) 895-7222
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Additional information about our Technical Support is available on the Internet at
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In addition to our documentation, we offer a comprehensive knowledge base online on the Internet at:

Services & Support (http://www.siemens.com/automation/service&support)

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- A Knowledge Manager to find the right documents for you.
- Our bulletin board, where users and specialists share their knowledge worldwide.
- You can find your local contact partner for Industry Automation and Drives Technologies in our partner database.
- Information about field service, repairs, spare parts and lots more under "Services".

Additional Support

Please contact your local Siemens representative and offices if you have any questions about the products described in this manual and do not find the right answers.

Find your contact partner at:

Partner (http://www.automation.siemens.com/partner)

A signpost to the documentation of the various products and systems is available at:

Documentation (http://www.siemens.com/weighing/documentation)

See also

E-mail (mailto:support.automation@siemens.com)

Safety notes 2

2.1 General safety instructions

⚠ WARNING

High voltage

Verify, whether the given mains voltage is in accordance with the specified voltage of the product (to be found on name plate and technical data) as well as with the type approval in effect for you country.

⚠ WARNING

High voltage

The mains cable which has to be installed by end user, may be damaged due to non-qualified handling.

Before commissioning the system, conduct a visual inspection and an inspection of the protective earth conductor. Consider the specific safety standards being valid for your country and/or other applicable regulations. Since the cable is partly located within the product, consider also the product safety standard IEC/EN 61010-1 and the local release respectively.

⚠ WARNING

High voltage

Switch off the machine so that it is in a no-voltage condition before you open the terminal box.

⚠ WARNING

Handling of the device/system by persons other than qualified personnel or ignoring the warning instructions can result in severe injuries or damages. This means only qualified personnel are permitted to handle this device/system.

⚠ WARNING

Commissioning is absolutely prohibited until it has been ensured that the machine in which the component described here is to be installed fulfills the regulations/specifications of Machinery Directive 89/392/EEC.

Note

The device was developed, manufactured, tested and documented in compliance with the relevant safety standards. The device does usually not pose any risks of material damage or personal injury.

Siemens provides automation and drive products with industrial security functions that support the secure operation of plants or machines. They are an important component in a holistic industrial security concept. With this in mind, our products undergo continuous development. We therefore recommend that you keep yourself informed with respect to our product updates. Detailed technical information can be found at: http://support.automation.siemens.com (http://www.siemens.de/automation/csi_en_WW).

To ensure the secure operation of a plant or machine it is also necessary to take suitable preventive action (e.g. cell protection concept) and to integrate the automation and drive components into a state-of-the-art holistic industrial security concept for the entire plant or machine. Products used from other manufacturers should also be taken into account here. You will find further information under: http://www.siemens.com/industrialsecurity (http://www.siemens.com/industrialsecurity).

Description 3

3.1 Product overview

SIWAREX WT231 is a versatile and flexible weighing module that can be operated as a non-automatic weighing instrument.

3.2 Calibration ability

SIWAREX WT231 is currently not in accordance with directive 2009/23/EC. It does not comply with the requirements in accordance with OIML R76.

3.3 Area of application

The electronic weighing system described here is the perfect solution for applications in which signals from weighing or force sensors are to be acquired and processed. The SIWAREX WT231 is a very accurate electronic weighing system.

It is equipped for the following applications:

- Fill-level monitoring of silos and hoppers
- Platform scales

3.4 SIWAREX WT231 product overview

The electronic weighing system described here is a stand-alone weighing electronic; having all functions and interfaces on board, which are necessary to operate an industrial scale.

Figure 3-1 SIWAREX WT231 weighing terminal

The terminal consists of following components:

- Weighing electronic SIWAREX WP231
- Touchpanel SIMATIC KTP400 basic color PN
- Power supply
- Terminal board for up to 4 load cells
- Stainless steel enclosure (1.4301) with
  - M16 cable gland for mains cable
  - 3 M16 + 1 M20 cable gland for load cell connection
  - 4 M16 through-hole with dummy plugs
  - Earthing bolt

3.5 Customer benefits

The electronic weighing system described here is characterized by decisive advantages:

- Stand-alone operation
- Intuitive commissioning via 4” Touch Panel
- Multiple interfaces on board:
    - analog output
    - 4 x digital input
    - 4 x digital output
    - RS485
- Measuring of weight with a resolution of up to 4 million divisions
- High accuracy
- High measuring rate of 100/120 Hz (effective interference frequency suppression)
- Limit monitoring
- Automatic calibration is possible without the need for calibration weights
- Diagnostics functions

3.6 Scope of delivery

The scope of delivery is as follows:

- Weighing terminal SIWAREX WT231
- Pre-mounted wall fastening
- M20 to M16 reduction ring
- M16 cable gland

Application planning

4

4.1 Functions

The primary task of the electronic weighing system is the measurement and registration of the current weight value. The commissioning is carried out by following the touchpanel user interface.

The SIWAREX WT231 is calibrated at the factory. This allows for automatic calibration of the scales without the need for calibration weights and replacement of modules without the need for recalibrating the scales.

Further the SIWAREX WT231 can be connected to any control system or to a PC by using the Modbus RTU protocol.

Mounting 5

5.1 Installation guideline

The weighing electronic SIWAREX WT231 is equipped with 4 lugs on the backside of the product. These can be used for fastening the device at a wall.

Please consider material and condition of the wall, when choosing the mounting equipment. The lugs holes shall be used with M5 screws.

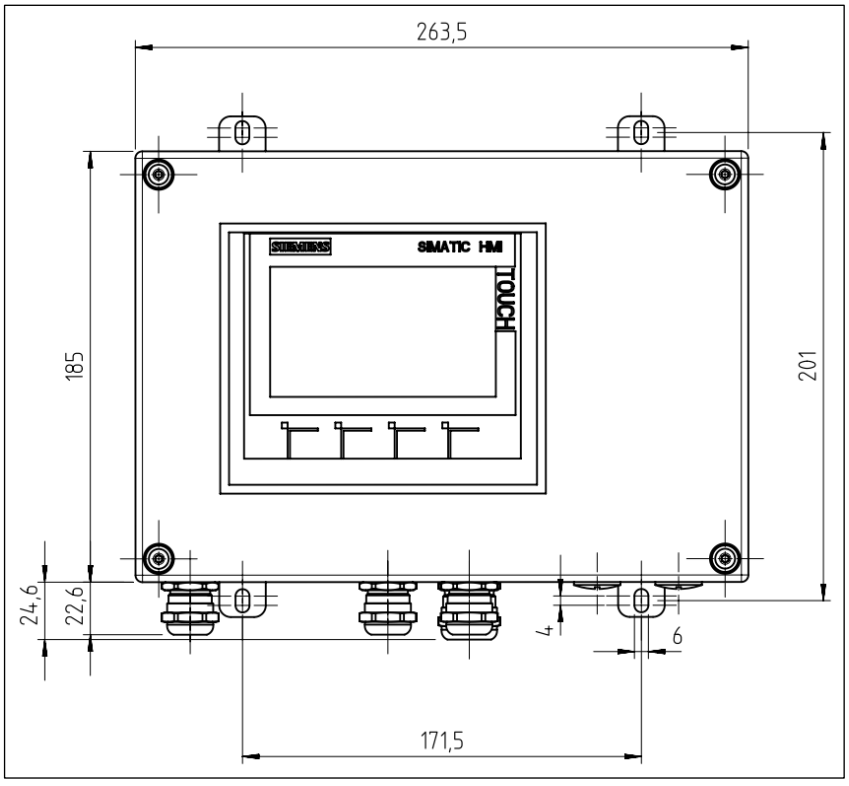


Figure 5-1 SIWAREX WT231 weighing terminal – dimensions and hole pattern

5.2 EMC-compliant setup

5.2.1 Introduction

The electronic weighing system described here was developed for use in industrial environments and complies with high EMC requirements. Nevertheless, you should still carry out EMC planning before installing your devices in order to determine any sources of interference and include them in your considerations.

EMC

EMC (electromagnetic compatibility) describes the capability of electrical equipment to operate without errors in a given electromagnetic environment, without being subject to external influence and without influencing external devices in any way.

5.2.2 Possible effects of interference

Electromagnetic interferences can influence the electronic weighing system described here in various ways:

- Electromagnetic fields having a direct influence on the system
- Interferences transported by communication cables
- Interferences having an effect via process cables
- Interferences entering the system via the power supply and/or protective ground

Interferences can impair the fault-free functioning of the electronic weighing system.

5.2.3 Coupling mechanisms

Depending on the propagation medium (conducted or non-conducted) and the distance between the interference source and the device, interferences can enter the faulty device through four different coupling mechanisms:

- Electrical coupling
- Capacitive coupling
- Inductive coupling
- Radiation coupling

5.2.4 Five basic rules for securing EMC

Observe these five basic rules to secure EMC.

Rule 1: Large area grounding contact

- When installing the devices, make sure that the surfaces of inactive metal parts are properly bonded to chassis ground (see following sections).
- Bond all inactive metal parts to chassis ground, ensuring large area and low-impedance contact (large cross-sections).
- When using screw connections on varnished or anodized metal parts, support contact with special contact washers or remove the protective insulating finish on the points of contact.
- Wherever possible, avoid the use of aluminum parts for ground bonding. Aluminum oxidizes very easily and is therefore less suitable for ground bonding.
- Provide a central connection between chassis ground and the ground/protective conductor system.

Rule 2: Proper cable routing

- Organize your wiring system into cable groups (high-voltage/power supply/signal/measurement/data cables).
- Always route high-voltage and data cables in separate ducts or in separate bundles.
- Install the measurement cables as close as possible to grounded surfaces (e.g. supporting beans, metal rails, steel cabinet walls).

Rule 3: Fixing the cable shielding

- Ensure proper fixation of the cable shielding.
- Always use shielded data cables. Always connect both ends of the data cable shielding to ground on a large area.
- Keep unshielded cable ends as short as possible.
- Always use metal/metalized connector housings only for shielded data cables.

Rule 4: Special EMC measures

- All inductors that are to be controlled should be connected with suppressors.
- For cabinet or enclosure lighting in the immediate range of your controller, use incandescent lamps or interference suppressed fluorescent lamps.

Rule 5: Homogeneous reference potential

- Create a homogeneous reference potential and ground all electrical equipment.

Use sufficiently dimensioned equipotential bonding conductors if potential differences exist or are expected between your system components. Equipotential bonding is absolutely mandatory for applications in hazardous areas.

Connection 6

WARNING
High voltage Switch off the machine so that it is in a no-voltage condition before you open the terminal box.

6.1 Overview

The weighing terminal SIWAREX WT231 comes with a number of connection options. It is equipped with EMC safe cable glands for the major connections (mains and load cells).

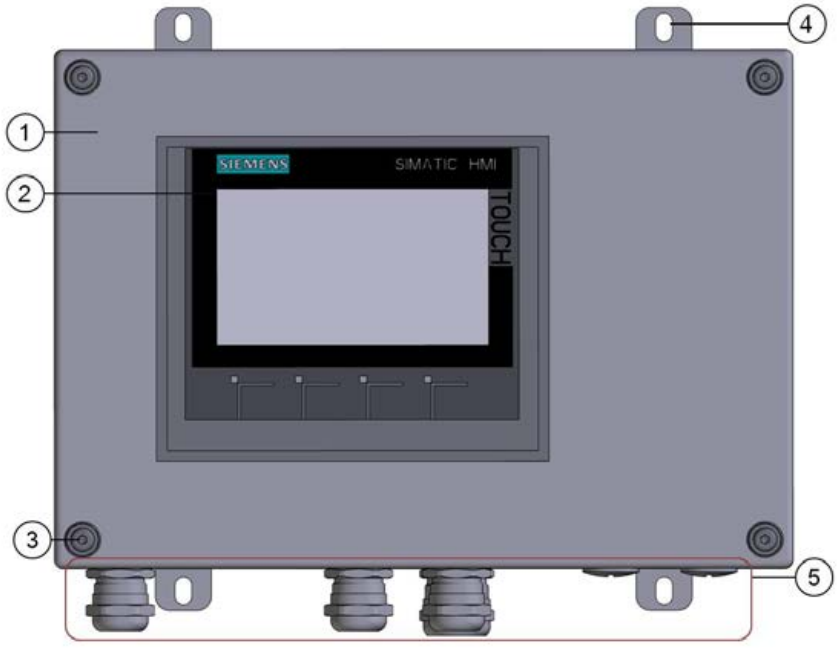


Figure 6-1 SIWAREX WT231 overview

① Stainless steel enclosure
② SIMATIC KTP400 basic color PN color touch display
③ Fastening screws
④ Lugs for wall fastening
⑤ Connection area

Connections at bottom side

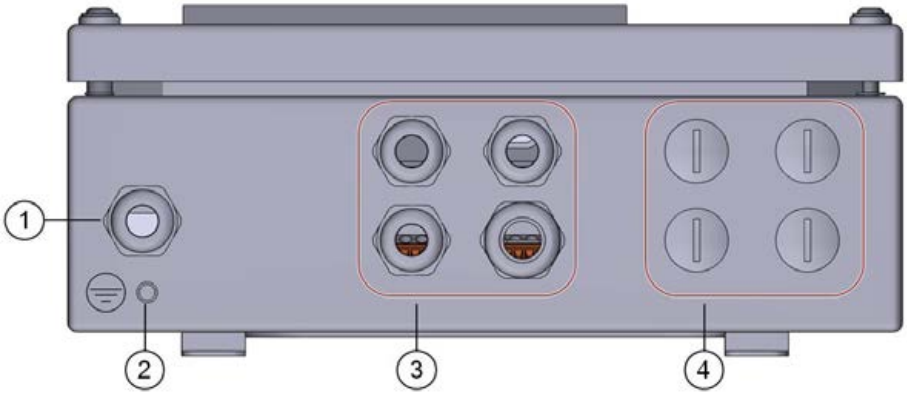


Figure 6-2 SIWAREX WT231 bottom side with connections

① M16 cable gland for mains cable
② Earthing bolt
③ M16 and M20 cable glands for load cells
④ Through holes equipped with dummy plugs for further connections

Connections inside the terminal

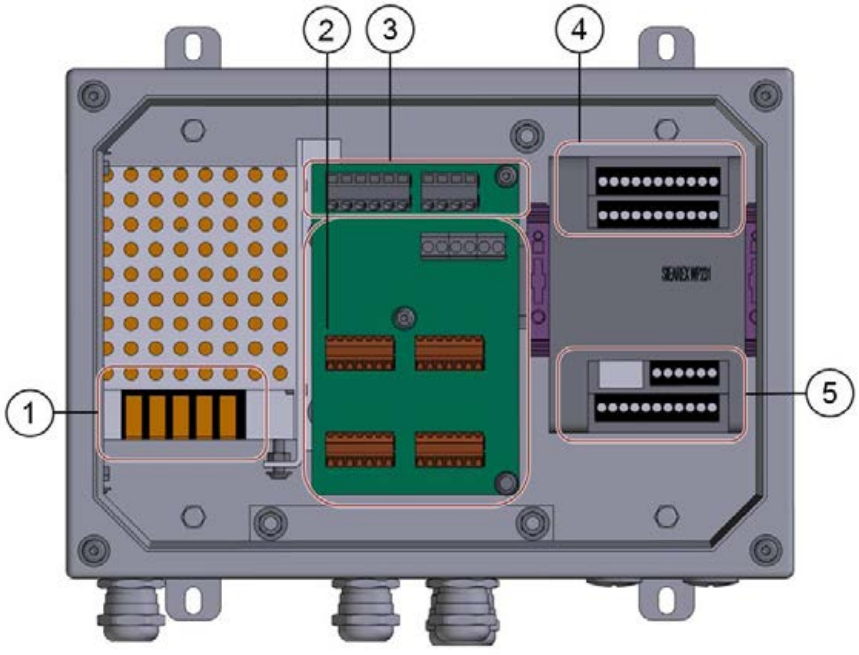


Figure 6-3 SIWAREX WT231 inside

① Mains connection
② Terminal board to connect load cells and analog output
③ Connections to SIWAREX WP231 – premounted to ④
④ Upper terminal block SIWAREX WP231 – premounted to ③
⑤ Lower terminal block SIWAREX WP231 – Digital inputs, digital outputs, RS485

6.2 Connecting to main voltage

WARNING

High voltage
Switch off the machine so that it is in a no-voltage condition before you open the terminal box.

WARNING

Use switch off mechanism

The device must only be operated when using a switch off mechanism. The mechansm shall be located close to the device.

WARNING

High voltage

Varify, whether the given mains voltage is in accordance with the specified voltage of the product (to be found on name plate and technical data) as well as with the type approval in effect for you country.

WARNING

High voltage

The mains cable which has to be installed by end user may be damaged due to non-qualified handling.

Before commissioning the system, conduct a visual inspection and an inspection of the protective earth conductor. Consider the specific safety standards being valid for your countr and/or other applicable regulations. Since the cable is partly located within the product, consider also the product safety standard IEC/EN 61010-1 and the local release respectively.

Note

Clamping range of cable glands

Use cables appropriate to the clamping range of the cable glands.

- Cable gland M16 x 1.5: clamping range 6…10 mm
- Cable gland M20 x 1.5: clamping range 10…14 mm

Note

Minimum wire range

Use connector cable with a minimum wire range of 0.75 mm².

Connect the mains voltage to the premounted power supply unit in the device. Use clamps no. 1, 2 and 3 for connecting the mains voltage.

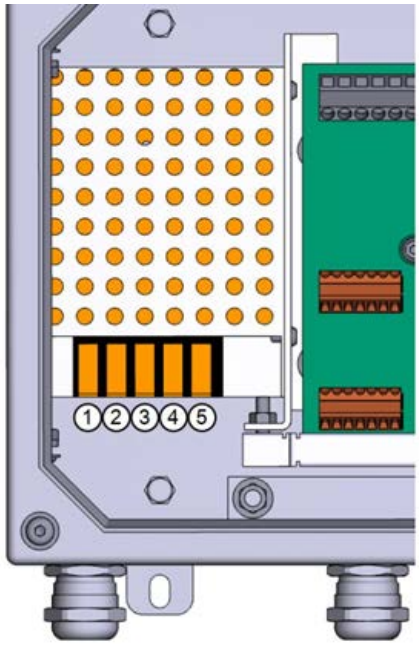


Figure 6-4 SIWAREX WT231 power supply

Marking	Type	Function
1	Input	Clamp for 100 ~ 240 VAC; 50 / 60Hz – L
2	Input	Clamp for neutral wire
3	Input	Clamp for PE
4	Output	24V ground output
5	Output	+24V output

6.3 Connecting the load cells

Overview

Pickups can be connected to the SIWAREX WT231 electronic weighing system which are equipped with strain gauges (DMS full bridge) and meet the following requirements.

- Characteristic value 1 to 4 mV/V
- A supply voltage of 5 V is permitted

The power supply for the load cells is 4.85 V.

The following condition must be satisfied in order to check the maximum possible number of load cells which can be connected to a WT231:

- Scale operation without Ex interface: (input resistance of load cell) / (number of load cells) > 40 Ohm
- Scale operation with Ex interface: (input resistance of load cell) / (number of load cells) > 50 Ohm

Rules

Observe the following rules when connecting analog (strain gauge) load cells:

1. The use of a junction box (SIWAREX JB junction box) is required when more than one load cell is connected (the load cells must be connected in parallel). If the distance of a load cell to the SIWAREX WT231 or the junction box is greater than the available length of the load cell connection cable, use the SIWAREX EB extension box.
2. The cable shield is always applied at the cable gland of the junction box (SIWAREX JB) or the extension box. If there is a risk of equipotential bonding through the cable shield, connect a equipotential equalization conductor parallel to the load cell cable.

3. Twisted wire pairs that are also shielded are required for the specified cables:
   - Sensor cable (+) and (-)
   - Measuring voltage cable (+) and (-)
   - Supply voltage cable (+) and (-)

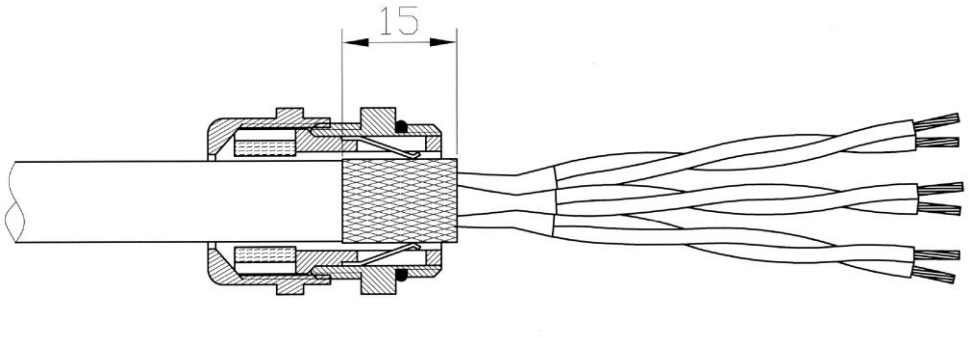


Figure 6-5 Shielding in the screw gland

We recommended that you use the cables listed in chapter → Accessories (Page 165).

Connecting the load cells to the terminal

Connecting load cells to the SIWAREX WT231 is done by using the terminal board within the device. Thereon 4 terminal blocks are mounted, each for connecting one load cell to it.

The terminal blocks are marked LC_A, LC_B, LC_C and LC_D.

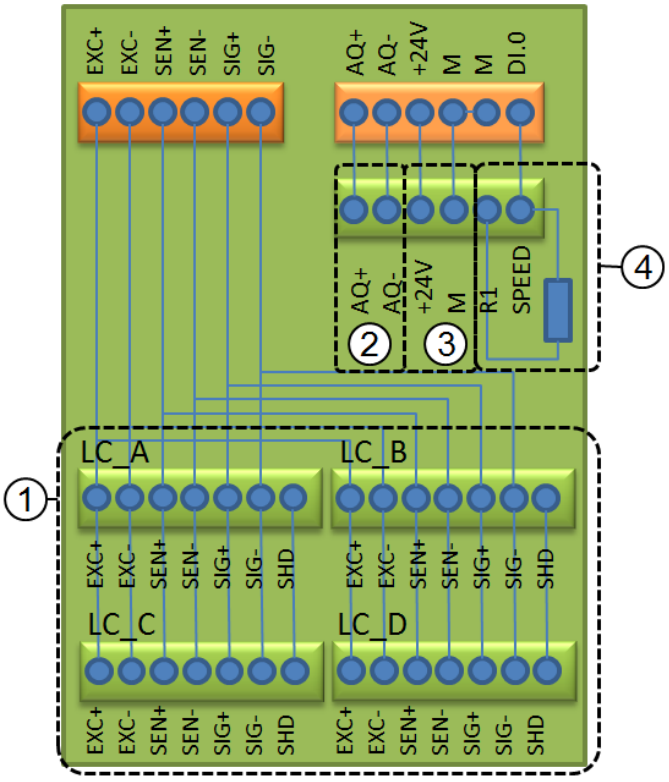


Figure 6-6 Terminal board SIWAREX WT231

① Terminal blocks for load cells
② Terminal block for analog output
③ 24 VDC tap
④ Terminal block for speed sensors (only relevant to SIWAREX WT241)

Selection and order of the chosen load cell terminals is not relevant for function. In case you are using a single load cell or a junction box, you can connect this to LC_A or to LC_B or to LC_C or to LC_D.

Table 6- 1 Load cell connections on the module

Labeling	Function
Sig-	Measurement cable load cell -
Sig+	Measurement cable load cell +
Sen-	Sensor cable load cell -
Sen+	Sensor cable load cell +
Exc-	Supply load cell -
Exc+	Supply load cell +

Connect strain gauge load cells with 6 wires

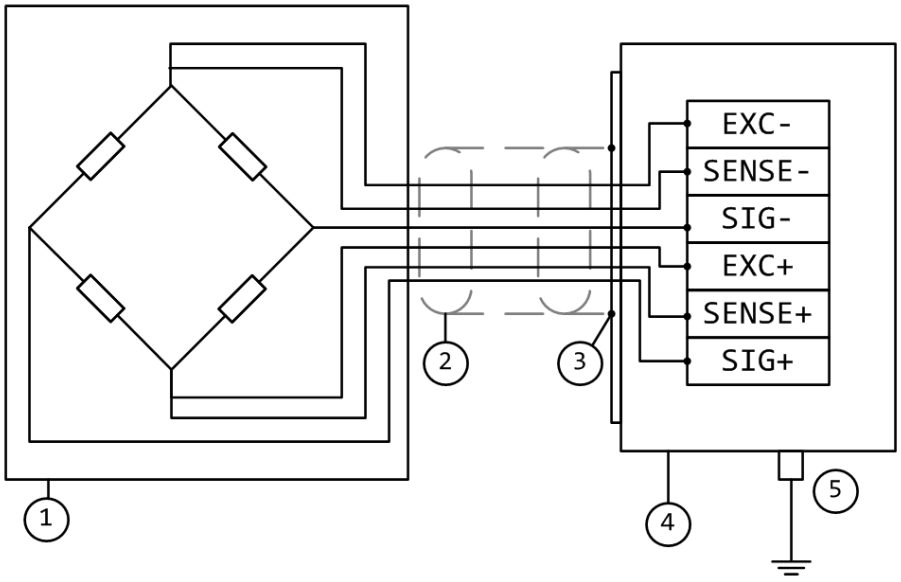


Figure 6-7 Connection of strain gauge load cell(s) with 6-wire system

① Load cell
② Load cell shield
③ Cable glands shield connection
④ SIWAREX WT2X1 weighing terminal
⑤ Earthing bolt

Connect strain gauge load cells with 4 wires

1. Connect the strain gauge load cells according to the wiring diagram to the weighing electronic.

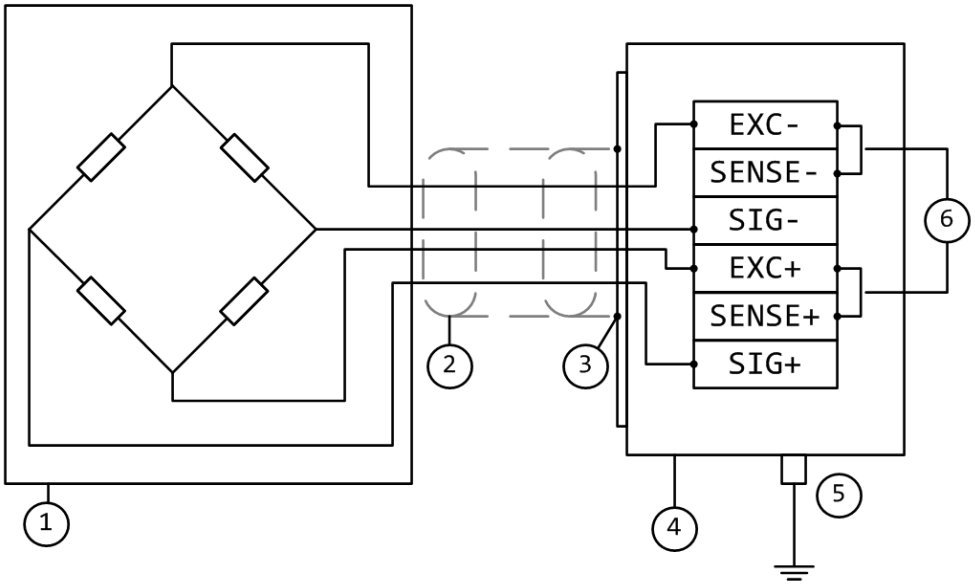


Figure 6-8 Connection of strain gauge load cell(s) with 4-wire system

① Load cell
② Load cell shield
③ Cable glands shield connection
④ SIWAREX WT2X1 weighing terminal
⑤ Earthing bolt
⑥ Bridge wires

2. Add wire bridges between the pins EXC- and SEN- as well between EXC+ and SEN+. The electronic will report a load cell error in case the bridge wires have not been set.

6.4 Connection of digital outputs (4 x DQ)

CAUTION

Unknown assignment of digital outputs

The assignment of the digital outputs is not known at the time of connection. Digital outputs can be active immediately after turning on the power supply. This may damage parts of the system.

Do not create a connection with the digital outputs before you know the assignment of the digital outputs.

The electronic weighing system described here has four digital outputs. They can be found directly at the weighing module SIWAREX WP231 and are not connected through to the terminal board.

They are not permanently assigned to process values in the delivery state. Assignment of these digital outputs to functions as well as definition of the response in the event of a fault is carried out during commissioning via menu 1.5.1 “Digital In & Outputs”

The 24 V power supply for the digital outputs is provided via terminals 3L+ and 3M with electrical isolation.

Table 6- 2 Connection of the digital outputs

Labeling	Function
DQ.0	Digital output 0
DQ.1	Digital output 1
DQ.2	Digital output 2
DQ.3	Digital output 3
DQ.3L+	+24 V DC power supply for digital outputs
DQ.3M	Ground of power supply for digital outputs

6.5 Connection of digital inputs (4 x DI)

⚠ CAUTION

Unknown assignment of digital inputs

If the assignment of the digital inputs is not known at the time of connection, this may damage parts of the system.

Do not create a connection with the digital inputs before you know the assignment.

The electronic weighing system described here has four digital inputs. They can be found directly at the weighing module SIWAREX WP231 and are not connected through to the terminal board.

They are not permanently assigned to process values in the delivery state. Assignment of these digital outputs to functions as well as definition of the response in the event of a fault is carried out during commissioning via menu 1.5.1 Digital In & Outputs”

The external 24 V switching signal is connected electrically isolated to the desired input, the associated ground to terminal 2M.

Table 6- 3 **Connection of the digital inputs**

Labeling	Function
DI.0	Digital input 0
DI.1	Digital input 1
DI.2	Digital input 2
DI.3	Digital input 3
DI.2M	Reference ground potential of the digital inputs

6.6 Connection of the analog output (1 x AQ)

⚠ CAUTION
Unknown assignment of the analog outputs The assignment of the analog output is not known at the time of connection. The analog output can be active immediately after turning on the power supply. This may damage parts of the system. Do not create a connection with the analog output before you know the assignment.

The analog output is not permanently assigned to a process value in the delivery state. The analog output is connected through to the terminal board.

Assignment of the analog output to the process value as well as its response in the event of a fault is carried out during commissioning in Menu 1.5.2 Analogue Output.

Table 6- 4 Connection of analog output

Labeling	Function
AQ+	Analog output +
AQ-	Analog output -

6.7 Connection of RS485 serial interface

The following devices can be connected to the serial interface:

- Siebert display type S102 (connections: see chapter Connection of Siebert display via RS485 (Page 33))
- Communication partner with Modbus protocol RTU

RS485 interface is directly connected at the weighing module SIWAREX WP231. Please use therefore connection are ④ (see 6 Connection, pg. 21).

Table 6- 5 Connection of RS485 serial interface

Labeling	Function
EIA-485 T+	RS485 termination +
EIA-485 T-	RS485 termination -
EIA-485 D+‘	RS485 data line +‘ for looping through of bus signal
EIA-485 D-‘	RS485 data line -‘ for looping through of bus signal
EIA-485 D+	RS485 data line + for feeding in of bus signal
EIA-485 D-	RS485 data line - for feeding in of bus signal

If a SIWAREX WP231 module forms the termination of an RS485 network, insert wire jumpers between the D+‘ and T+ terminals and between the D-‘ and T- terminals for termination of the bus network.

6.8 Connection of Siebert display via RS485

A Siebert display S102 with the order no. S102-W6/14/0R-000/0B-SM can be connected to the RS485 interface of the weighing module. Connect a 24 V DC supply to the Siebert display, and connect the latter to the RS485 interface of the weighing module as shown in the following diagram.

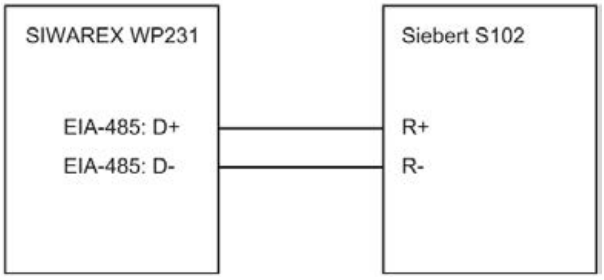


Figure 6-9 Connection of Siebert display S102

The RS485 interface of the SIWAREX WP231 is parameterized in Menu 1.5.6 RS485 Parameter as follows:

- Baud rate: 9 600 bit/s
- Character parity: Even
- Number of data bits: 8
- Number of stop bits: 1

The S102 is set as follows:

Table 6- 6 Settings of Siebert display S102

Menu item	Setting	Meaning	
1 Interface	485	RS485 interface	
9 Station address	01	Address meaning:	
		Address	**Weight value**
		01	Verifiable weight
		02	Total
		03	Net
		04	Tare
t Timeout	2	e.g. timeout after 2 seconds	
C	0.0	No decimal point	
F Segment test	----*	No segment test when switching on	
	8.8.8	Segment test when switching on	

Commissioning

7

7.1 Introduction

Commissioning consists mainly of checking the mechanical scale structure, setting parameters, calibration, and verification of the envisaged functionality.

7.2 Commissioning via Quick Start routine

7.2.1 Start

The SIWAREX WT231 offers a quick start set up.

To carry out the quick start, select the "1.0 Setup" function in the main menu and then "1.2 Quick Start". You will be guided through the individual tasks for setting the most important parameters.

The remaining parameters are factory-set in such a way that they can be used in most cases without any changes.

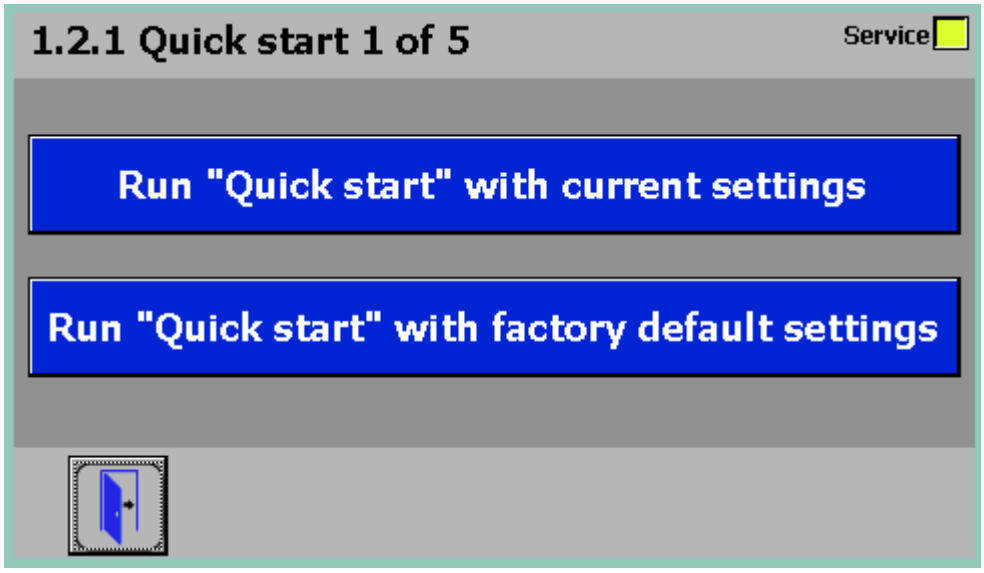


Figure 7-1 Quick start step 1

7.2.2 Standard parameter settings

The quick setup is based on the standard parameter settings. The previously set parameters must therefore be reset prior to the quick setup (except the Ethernet address and Modbus parameters). Service mode must be switched on first. Resetting to the standard parameters can then be carried out.

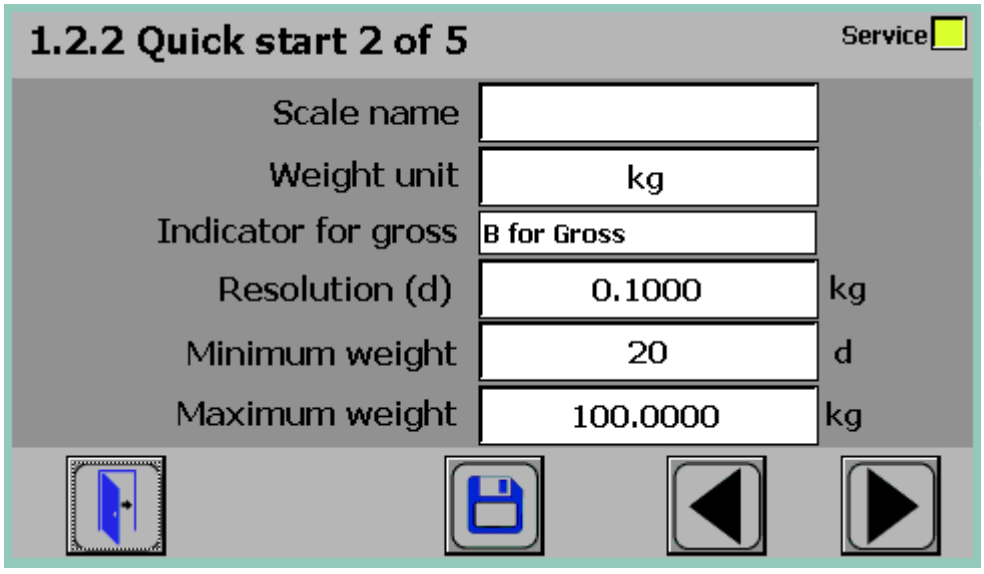


Figure 7-2 Quick start step 2

7.2.3 Selecting the calibration method

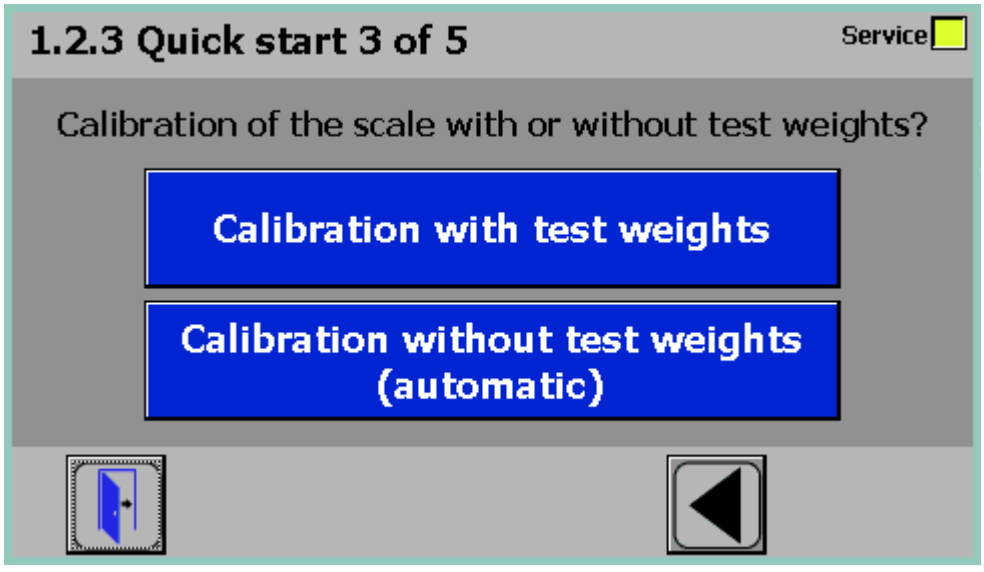


Figure 7-3 Quick start step 3

The module can always be calibrated in two different ways:

- Using test weights: in the case of a calibration with weights, mechanical influences of the scale construction are also partially taken into account.
- Without weights, using the technical specifications of the connected load cell(s): in the case of automatic calibration, the accuracy of the scale is influenced by the mechanical properties to a greater extent than with calibration using reference weights.

With both methods, make sure that the mechanical properties of the scale are flawless prior to calibration.

7.2.4 Defining the calibration weights

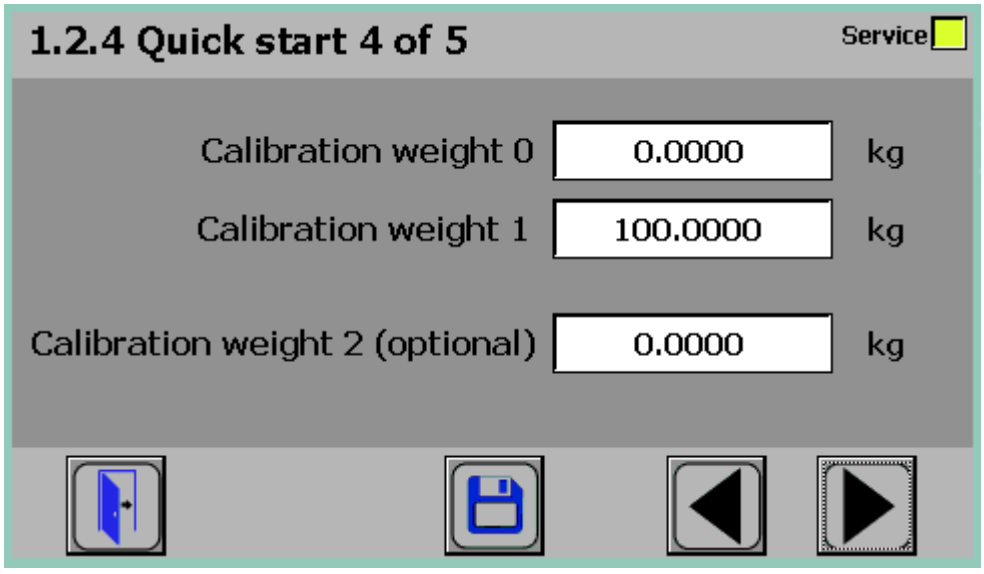


Figure 7-4 Quick start step 4a

In step 4 you enter the calibration weights which are to be positioned on the scale during the calibration. If the scale is not empty and the current contents are known, you can define an "Calibration weight 0" with the current contents of the scale. With an empty scale, this parameter remains as 0 kg. "Calibration weight 1" usually defines the first reference point of the scale characteristic. A further reference point ("Calibration weight 2") can also be set in addition. This is optional, and may not be necessary depending on the mechanical properties of the scale.

Note that the interval between the calibration weights must be at least 2% of the nominal load of the scale. With a 1 000 kg scale, a calibration weight of at least 20 kg must therefore be used.

7.2.5 Setting calibration points

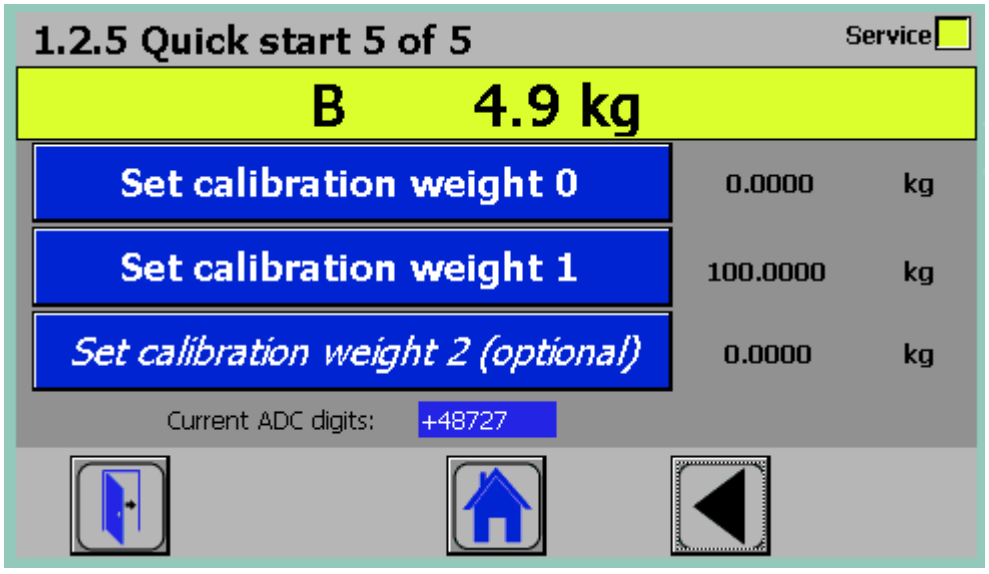


Figure 7-5 Quick start step 5a

Carry out the calibration commands at the end of the quick start:

1. Carry out the "Set calibration weight 0" command. The "Calibration weight 0" defined in step 4 is now visible in the display.
2. Place the "Calibration weight 1" defined in step 4 on the scale construction, and execute the "Set calibration weight 1" command.
3. If an "Calibration weight 2" was selected:
   Place "Calibration weight 2" defined in step 4 on the scale construction, and execute the "Set calibration weight 2" command.
4. Calibration of the scale is now complete. Return to the start screen by clicking on the house icon.

7.2.6 Calibrating the scale automatically

The scale can also be calibrated without weights. To do this, it is necessary to enter data specific to the load cells. In addition, it is essential that the scale is empty.

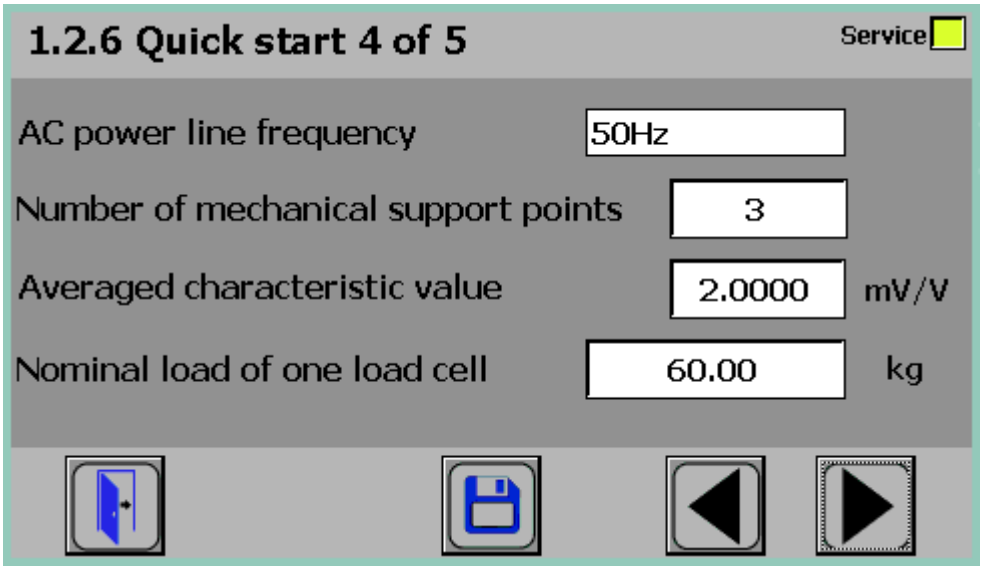


Figure 7-6 Quick start step 4b

The number of points of support corresponds with a silo, for example, to the number of clamps or feet of the silo. A quadratic platform scale with a load cell at each corner has 4 support points. The characteristic values of the individual load cells are required to calculate the average characteristic value of the cells.

The equation for the calculation is as follows:
(characteristic of cell 1 + characteristic of cell 2 + characteristic of cell n) / n

If the exact characteristic values are unknown, it is permissible to also use rounded-off numbers (e.g. 1.0 mV/V, 2.0 mV/V). The nominal load of an individual load cell (not the nominal load of the complete scale!) must subsequently be defined.

7.2.7 Performing the automatic calibration

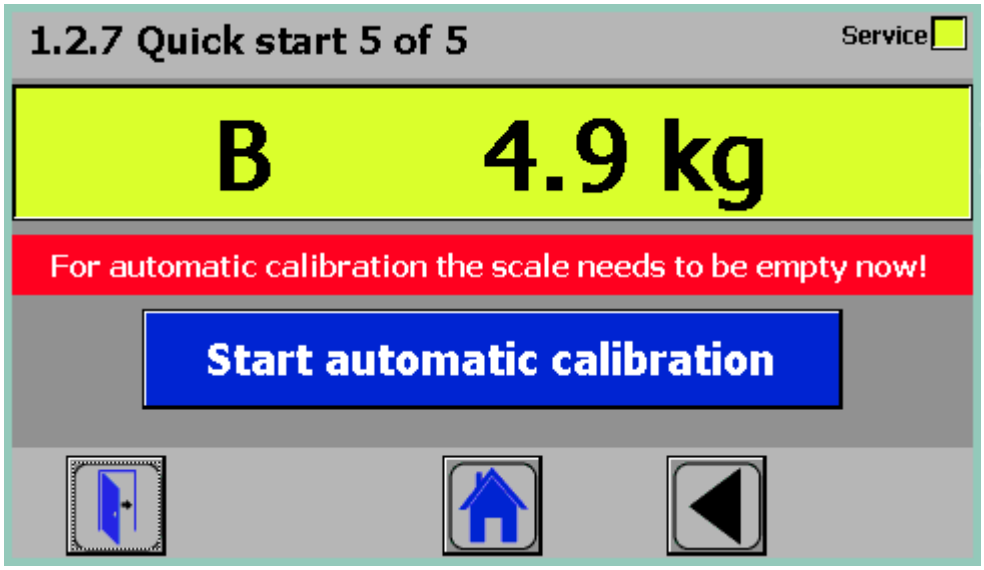


Figure 7-7 Quick start step 5b

Subsequently enter the "Perform automatic calibration" command with the scale empty. The scale is calibrated directly, and clicking on the house icon returns you to the start screen.

7.2.8 Checking the scale following calibration

If the scale is only used for company-internal purposes, a simple check is sufficient.

Perform the following steps:

1. The scale is unloaded and shows "0 kg".
2. Place a known reference weight on the scale.
   Check the displayed value.
3. If a second known reference weight is available, place it on the scale in addition.
   Check whether the scale displays the sum of the reference weights.
4. Remove the test weights from the scale.
   Check that the display is "0 kg" again.

Parameters and functions

8

8.1 SIWAREX WT231 main page

Figure 8-1 SIWAREX WT231 Operating view

Operating the WT231 is done via the touch displays user interface. The starting point for any action as well as for standard operation mode is the main page. It contains following information.

Variable	Description
	Go to main menu
	Go to diagnosis
	Zeroing
	Tare
	Delete current tare
	Go to tare presets
EMPTY	Active if conditions for „EMPTY“ are given Empty range to be set in Menu 1.3.1 Limits
>0<	Active if brutto below ± 0,25e
>< (Standstill)	Active if standstill conditions are given.

	Standstill conditions (range and time) to be set in Menu „1.4.3 Scale settings 3 of 4“
TARA	Set in case tare memory is not zero
PRESET TARA	Set in case tare memory is set through external values
MAX. +9e	Set in case weight exceeded brutto by >9e
GRENZWERT 1	Limit 1 has been set -- Limits are defined in 1.3 Limits.
GRENZWERT 2	Limit 2 has been set -- Limits are defined in 1.3 Limits.
SERVICEMODE	Service mode is active
ERROR	System error occured

8.2 Menu tree

1.0 Setup menu		
	1.1 Recalibration	page 45
	1.2 Quick Start	page 45
	1.3 Limits	page 46
	1.4 Advanced scale parameters	page 48
	1.5 Communication & interfaces	page 52
	1.6 Recovery / reset	page 55
2.0 Diagnostics		
	2.1 Messages	page 56
	2.2 Scale status	page 56
	2.3 Load trend	page 58
	2.4 Module information	page 59
	2.5 Start / stop trace	page 59
	2.6 Increased resolultion	page 59
3.0 Language, Date & Time		page 59
4.0 User management		page 61

8.3 Menu 1.1 Recalibration

Recalibration menu enables the user a quick calibration of the scale. Therefore the calibration weight information out of commissioning will be used. Thus, the same weights need to be put on the scale. Recalibration is possible with up to support points.

8.4 Menu 1.2 Quick Start

Please refer to chapter 7.2 „Commissioning via Quick Start routine“, pg. 36.

8.5 Menu 1.3 Limits

SIWAREX WT231 provides two fully parameterizable limit values as well as an empty monitoring. These can be defined in menu 1.3 by switch-on and switch-off values as well as a trigger delay.

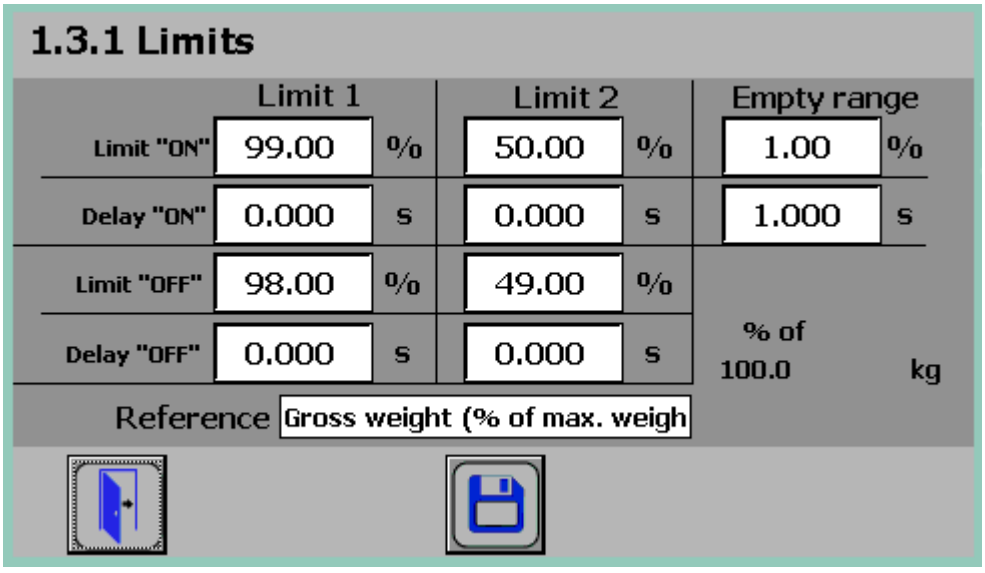
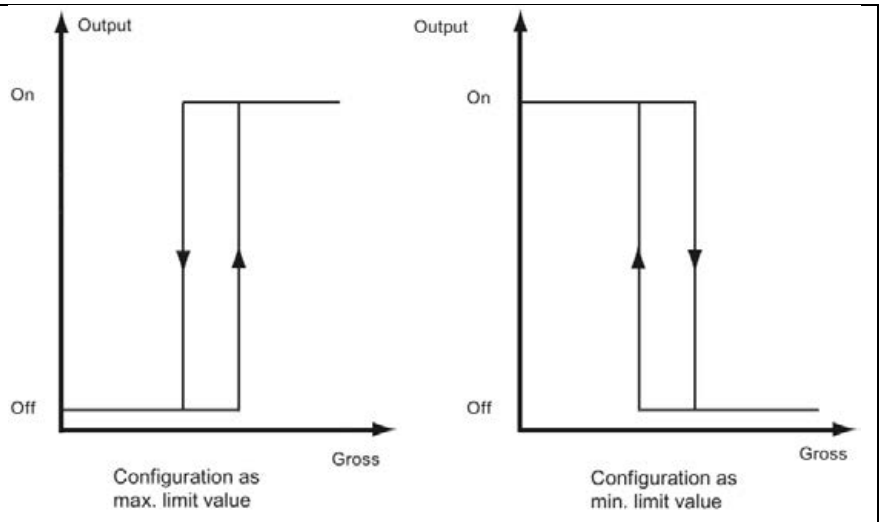


Figure 8-2 Menu 1.3.1 Limits

1.3.1 Limits	
Limit 1 On, Limit 2 On, Limit 1 Off, Limit 2 Off	The switch-on and switch-off points can be specified separately for each limit value as a percentage of the measuring range. This allows both minimum and maximum value violation monitoring with hysteresis. A delay time for switch-on and switch-off can also be specified. Either the current net weight or the current gross weight can be selected as the reference value for limits 1 and 2. Maximum value monitoring is implemented with the following specifications: ● Switch-on value > switch-off value Minimum value monitoring is implemented with the following specification: ● Switch-on value < switch-off value The diagram below illustrates the function of limit values 1 and 2.

	 Figure 8-3 Limit value configuration
Delay time for limit value 1 ON, delay time for limit value 2 ON	If the weight reaches the specified switch value, a delay time (defined in ms) is launched. Once the delay time is over, the limit switch changes status provided the weight still reaches the specified switch value.
Delay time for limit value 1 OFF, delay time for limit value 2 OFF	If the weight reaches the specified switch value, a delay time (defined in ms) is launched. Once the delay time is over, the limit switch changes status provided the weight still reaches the specified switch value.
Limit value "Empty" ON	The value for the empty range is a limit value below which the weighing module registers and returns the status "empty". The values are entered as a percentage of the measuring range. The "Empty" limit always refers to the current gross weight in the scale.
Delay time for limit value "Empty" ON	If the weight reaches the specified switch value for scales status "empty", a delay time (defined in ms) is launched. Once the delay time is over, the switch for "empty" status changes status provided the weight still reaches the specified switch value.

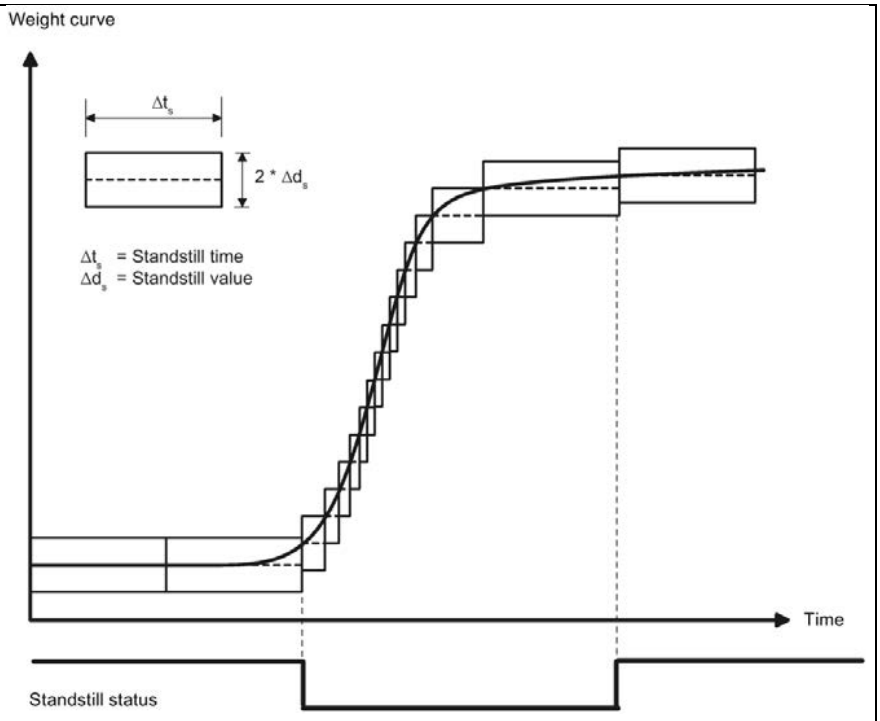
8.6 Menu 1.4 Advanced scale parameters

1.4.1 Advanced scale parameters 1 of 4	
Scale name	You can select any name, but it may not exceed 12 characters. You can enter any designation.
Weight unit	A string with up to four digits can be specified as the unit of weight, e.g.: t, kg, lbs. The defined unit of weight applies to all weight specifications. Entries are not be converted if the unit of weight has changed. Entries must be left-aligned.
Indicator for gross	The gross identifier specifies the letter, B (for brutto) or G (for gross), to be used in the display for gross weights.
Resolution (d)	The scale interval for the weighing range can be defined in accordance with EN 45501 (0.0001 to 50).
Minimum weight	The weight value can only be used above the minimum weighing range for legal trade registration with the specified scale interval. The minimum weighing range in the unit "d" (scale interval) is defined during calibration/official verification. The factory setting is 0 d. 20 d is generally entered for legal trade scales.
Maximum weight	For purposes requiring official calibration, the weight can only be used with the defined scale interval below the maximum weight (+ 9 d, d = scale interval). The maximum weight is defined during commissioning. The maximum weight depends on the number and type of load cells used.

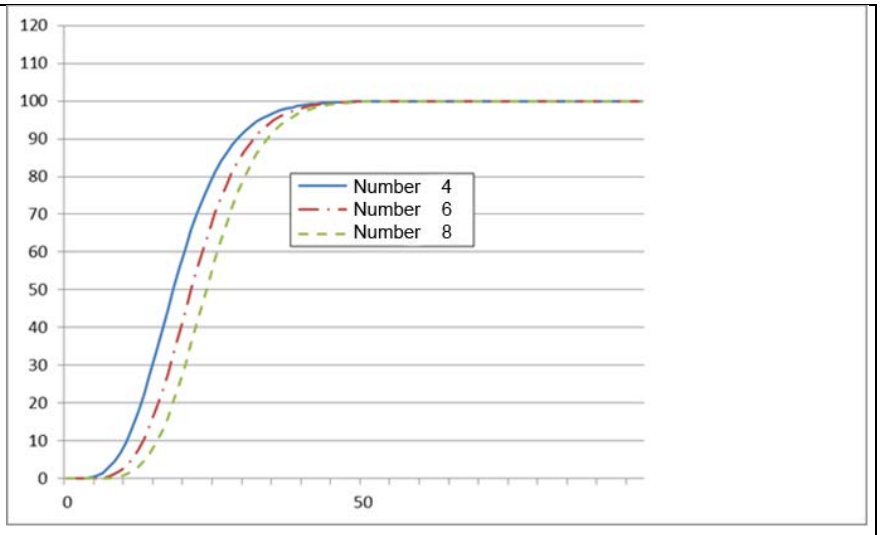
1.4.1 Advanced scale parameters 2 of 4	
Automatic zero tracking	If necessary, the scales can be set semi-automatically to zero by the user by means of the "Zeroing" command. The automatic adjustment sets the scale to zero without a further command in the event of slow zero drifting. Slow drift is assumed if the OIML R76 criteria for this are met.
Initial zero	The scales can automatically be set to zero when the supply voltage is switched on (in legal trade operation, this is at the end of the startup waiting time).
Initial zero if tared	The scales can automatically be set to zero when the supply voltage is switched on. If the initial zero function is enabled, this still does not specify whether initial zero is also to be performed if the tare weight in the tare memory is not equal to zero. If the "Zero by power-on activated for tared scales" parameter is set, the tare weight is also be cleared upon zero by power-on; if the parameter is not set, the scales are not set to zero.
Negative zero range	Zeroing means the scales are automatically set to zero when the supply voltage is switched on.

Positive zero range (initial zero)	If initial zero is enabled, you can limit the effect of this function. The limitation is based not on the actual weight, but rather on the weight which the scales would display had there been no zeroing.
Negative zero range Positive zero range (semi-aut.)	Zeroing defines the current weight of the scales as zero. You can restrict the effect of the zeroing function by defining limits. The limitation is based not on the current gross weight, but rather on the weight which the scales would display had there been no zeroing (time of scale calibration). For legal trade scales, the limitation is 4 % of the weighing range between the negative and positive weight for zeroing.

1.4.1 Advanced scale paramters 3 of 4	
Rounding for process values	This parameter is used to specify the number of decimal places to which the process values are to be rounded. This specification separates the main weight display, which is subject to the legal trade restrictions, and the values used in the control software.
Additive tare	If necessary, the scale can be tared using the Tare" command. The display value is hidden when a subtractive tare is enabled if the gross value exceeds the maximum weighing range by more than 9e. When an additive tare is enabled, the display value is not hidden until the net weight exceeds the maximum weighing range. The maximum subtractive tare is 100 % and the maximum additive tare 250 % of the maximum weighing range. The current tare value is deleted if you switch between additive and subtractive taring.
Weight simulation enabled	For test purposes, weight simulation can be enabled instead of actual weighing. The simulated weight is specified using the DR 16 data record. Weight simulation can, in certain situations, facilitate scale testing and commissioning. The simulated weight is indicated on the main display with the word "TEST".
Maximum tare weight	The weighing module accepts any external tare specification which is less than the maximum tare load (percentage of maximum weighing range). Tare commands are also accepted provided that the current gross weight is less than the configured maximum tare load.
Standstill range	Standstill monitoring checks whether the scales are correctly balanced. Scale standstill is registered if the weight changes by less than a specified fluctuation in d (standstill value) over a specified time (standstill time). Standstill monitoring is used in static scale mode (commands: zeroing, taring). The diagram below illustrates how standstill monitoring works. The current weight can only be registered in legal trade applications if standstill is reached.

	 Figure 8-4 Standstill monitoring
Standstill time	Standstill monitoring checks whether the scales are correctly balanced. Scale standstill is registered if the weight changes by less than a specified fluctuation in d (standstill value) over a specified time (standstill time). Standstill monitoring is used in static scale mode (with the following commands: zeroing, taring). The current weight can only be registered in legal trade applications if standstill is reached.
Max. waiting time for standstill	Standstill waiting time is a maximum waiting time for standstill upon the execution of a command which depends on standstill (taring, zeroing, registering). A technology message is generated if the command cannot be executed during the standstill waiting time because there is no standstill. If the standstill waiting time is equal to zero, a command requiring standstill is rejected immediately if there is no standstill.

1.4.1 Advanced scale parameters 4 of 4	
Frequency low pass filter	There is a critically damped low-pass filter for suppressing faults. The diagram below shows the step response of the filter (f = 2 Hz). The entry "0" means that the filter is switched off. A limit frequency of between 0.01 and 20.0 Hz can be specified.

	 Bild 8-5 Step-forced response of the digital low-pass filter when f = 2 Hz The definition of the limit frequency is extremely important for the suppression of faults. Defining the limit frequency defines the "speed" of the scales' response to changes in the measured value. A value of 5 Hz, for example, results in a relatively rapid response to a change in weight; a value of 0.5 Hz makes the scales "slower".
Order number low pass filter 1	The number of the filter defines the effect of damping. The values 2, 4, 6, 8, and 10 can be set. The higher the selected filter number, the higher the effect.
Samples for average filter	The mean value filter is used to steady the weight against random interference. The weight is the mean value of n (n = max. 250) weights which are recorded by the weighing module every 10 ms, e.g. when n = 10, the mean of 10 weights is calculated. Every 10 ms, the oldest value is discarded and the newest value included in the calculation.
Frequency low pass filter 2	The second low-pass filter can be used for test purposes. Its function is identical to that of the (operating) low-pass filter. An analysis of the signal curve after this low-pass filter can provide additional information on the environment of the scales.
Order number low pass filter 2	

8.7 Menu 1.5 Communication & Interfaces

1.5.1 Digital in- and output settings	
1.5.1.1 Digital in- and output settings 1 of 2	
Input DI.0 … DI.3	A command trigger can be assigned to a digital input. This is done on the basis of the command number: → Command lists (Page 69).
Digital input filter	To ensure that the inputs do not respond too quickly to the signal change, a minimum signal pending time can be specified. The pending signal is not processed further until this time has elapsed. The following values can be set: o 0,2 ms o 0,4 ms o 0,8 ms o 1,6 ms o 3,2 ms o 6,4 ms o 12,8 ms
1.5.1.1 Digital in- and output settings 2 of 2	
Output DQ.0 … DQ.3	A status display can be assigned to a digital input. This is done on the basis of the bit number. → Chapter 9.3 Message list, pg. 65 → Chapter 11.20 DR 30 current process values, pg. 134
Error-Stop-Status	This parameter allows you to define the response of the digital outputs following a fault of the SIWAREX module. o Outputs are switched off o Outputs are not switched off (continue) o The relevant substitute value is activated o Outputs are switched on

1.5.2 Analogue output settings	
Range	This parameter is used to define the output current range. o 0 … 20 mA o 4 … 20 mA
Source	The analog output can be used for a range of purposes. This parameter defines the tag that controls the analog output. o Gross / net weight o Gross weight o Net value o Test / force output

Start value	This parameter defines the specified value at which 0 or 4 mA is output. The value can be greater or less than the end value.
End value	This parameter defines the specified value at which 20 mA is output. The value can be greater or less than the start value.
Error state	This parameter defines the response of the analog output following a fault of the SIWAREX module. o 0 mA o Obtain functionality o Predefined value o Max. (24 mA)

1.5.3 Weight simulation

The SIWAREX module must first be released for simulation mode in menu 1.4.3 “Advanced scale parameters”

Only use weight simulation values which are within the measuring range of the scales. The word "TEST" is displayed on the main display during simulation and a status bit is set. From the start of simulation onward, all parameterized limits, inputs and outputs etc. refer to the simulation weight.

Caution: All process values, limits, inputs and outputs are referring to the simulated weight with the start of the simulations. Therefore they are active during simulation.

Zu simulierendes Gewicht	Only use weight simulation values which are within the measuring range of the scales. The word "TEST" is displayed on the main display during simulation and a status bit is set. From the start of simulation onward, all parameterized limits, inputs and outputs etc. refer to the simulation weight.
Start simulation / Stop simulation	Activate / deactivate the simulation
Dig. Inputs Dig. Outputs Analogue out Limits	The lower part of the simulation view is giving an overview of the interfaces.

1.5.4 Test / force digital outputs

Digital outputs can be manually controlled within this menu. Requirement is, to assign „Test / force output“ in menu 1.5.1.2 „Digital in- and outputs 2 of 2“ to the respective DQ.

1.5.5 Test / force analogue output

The analogue output can be manually controlled within this menu. Requirement is, to assign „Test / force output“ in menu 1.5.2 „Analogue output settings“

1.5.6 RS485 Parameter	
The parameters which define the response of the RS485 interface are specified in this menu. If the interface is not used, the default values can be retained.	
Protokoll	This parameter defines the protocol for communication via the RS485 interface. ○ No device ○ Modbus RTU ○ SIEBERT-Display S102
Baud rate	This parameter defines the baud rate for the RS485 interface. ○ 1 200 Bits/s ○ 2 400 Bits/s ○ 9 600 Bits/s ○ 19 200 Bits/s ○ 38 400 Bits/s ○ 57 600 Bits/s ○ 115 000 Bits/s
Parity	This parameter defines the character parity for the RS485 interface. ○ even ○ odd
Data bits	This parameter defines the number of data bits for the RS485 interface. ○ 7 ○ 8
Stop bits	This parameter defines the number of stop bits for the RS485 interface. ○ 1 ○ 2
Modbus address RTU	This parameter defines the Modbus address (1 to 230) for communication via the RS485 interface with the Modbus protocol.
Decimal point remote display	A fixed decimal place must be specified if a Siebert indicator is used. The following values are permitted: 0 ... 4

1.5.7 Trace settings	
The function trace is record all process values, limits, inputs and outputs. Analyzing trace records is only possible by using the SIWATOOL software → s. chapter 13 “Accessories”, pg.165. Please refer to the SIWAREX WP231 manual for more information.	
Trace rate	The trace function is used for the continuous recording of measured values. The recording rate is defined with the parameter.

	○ Recording every 10 ms ○ Recording every 100 ms ○ Recording every second ○ Recording every 10 s
Memory type	This parameter is used to specify the response of the trace memory. ○ Trace recording runs as circulating memory ○ Trace is stopped when the trace memory is full

1.5.7 Ethernet settings	
This menu is showing the Ethernet parameters of the weighing module SIWAREX WP231 which is used inside the terminal. These values cannot be changed.	
MAC-address	Each SIWAREX module has a unique MAC address. This MAC address cannot be changed by the user.
IP address	IP address of the weighing processor. Per default it is 192.168.0.21

8.8 Menu 1.6 Recovery / reset

1.6.1 Recovery point	
Setting the recovery point in this menu creates an image of all settings of the weighing processor. Reloading is possible anytime and will overwrite the current settings.	
Create recovery point	Creates an image of all settings. Execution will not be acknowledged.
Load recovery point	Loads the latest created image. Execution will not be acknowledged.
Load standard scale parameter	Like "Load factory settings", but interface settings for Ethernet and Modbus RTU are not reset to the factory setting.
Load factory settings	The command resets the SIWAREX to the "ex works" status. During this process: - all parameters and saved data (including protocol memory and logbook) as well as the restore point are loaded with the default values - all message buffers (diagnostics buffer, trace memory, etc.) are reset

8.9 Menu 2.1 Messages

Opens the messages window of the SIWAREX WP231.

8.10 Menu 2.2 Scale status

2.2.1 Scale status 1 of 4 The menu scale status gives an overview about the main status bits.	
1/4d 0	Set if gross is less than ± 0.25e
Max +9e	Set if the weight of the gross weighing range is exceeded by more than 9 display intervals (d)
Tare	Set if the tare memory is not equal to zero
Preset tare	Set if the tare memory is assigned an external specified value
Standstill	Set if standstill condition is met
Waiting for standstill	Set if module is waiting for standstill to execute command
Empty	Set if "Empty" condition is met
Limit 1	Limit value 1 has re-sponded
Limit 2	Limit value 2 has re-sponded
< min. weight	Set if minimum is violated
Error clock	Time incorrect due to empty buffer. Reset the time.
Trace active	Set if trace is running
Error DI	Set in event of synch. error resulting from command at digital input
Calibrated	SIWAREX is calibrated
Service mode	Service mode is enabled
Simulation	Simulation mode is ena-bled
Write protection	Write-protect jumper is enabled
Error ana. out.	Analog output fault – signal line is interrrupted
Start up	Restore point startup or restore has taken place, is deleted again after 5 seconds
Error	Operating error e.g. wrong connected load cell, scale overload, etc.

2.2.2 Scale status 2 of 4 Overview of tare, zero and dead load information.	
Current tare (preset)	The current set tara value out of the preset tares as defined in menu „Tare preset“.
Current tare (semi-automatic)	The current tara value set semi-automatically.
Current zero offset (initial zero)	The scales can automatically be set to zero when the supply voltage is switched on. If the Zero by power-on function is enabled, this still does not specify whether zero by power-on is also to be performed if the tare weight in the tare memory is not equal to zero. If the "Zero by power-on activated for tared scales" parameter is set, the tare weight is also be cleared upon zero by power-on; if the parameter is not set, the scales are not set to zero.
Current zero offset (semi-automatic)	If necessary, the scales can be set semi-automatically to zero by the user by means of the "Zeroing" command. The status ,“current zero offset (semi-automatic) shows the latest load value set to zero.
Current zero offset (zero-tracking)	The automatic adjustment sets the scale to zero without a further command in the event of slow zero drifting. Slow drift is assumed if the OIML R76 criteria for this are met.
Dead load (calculated)	The characteristic curve of the scales is determined during calibration. When there is no load, the main display returns "0". The dead load is the weight of the empty scales, i.e. the weight of the scales themselves.

2.2.3 Scale status 3 of 4 Overview of process values.	
Gross (Filter 1)	Current gross / net values after passing low pass filter 1 and average filter. Gross (F1) and Net (F1) are the basis for the values shown in the operating view.
Net (Filter 1)	
Tare (process)	The current tare weight.
Brutto (F2)	Current gross / net values after passing low pass filter 2 and average filter 2. Gross (F2) and Net (F2) can be used to analyze the signal responding on different filter settings.
Netto (F2)	
G/N weight	The current weight for the main display. The resolution corresponds to the setting in menu 1.4.1 Advanced scale parameters 1 of 4.

G/N weight x 10	The current weight for the main display in higher resolution. The resolution corresponds to the resolution used in menu 2.6 “Increased resolution”
Tare (display)	The current tare weight. Values are rounded as specified in menu 1.4.1 Advanced scale parameters 1 of 4.
Refresh Counter	Measured values are calculated every 10 ms in the SIWAREX module. A counter is incremented by 1 each time. Once the counter reaches the value 65536, it starts again from zero.

2.2.4 Scale status 4 of 4	
ADC digits	Measuring values out of AD-conversion o unfiltered o after low pass filter 1 o after low pass filter 2
Load cell signal	Display of currently measured signal voltage of the load cell(s) in mV.
Status digital inputs	Show the status of the 4 digital inputs. A green flag signals the corresponding DI to be set.
Status digital outputs	Show the status of the 4 digital outputs. A green flag signals the corresponding DQ to be set.
Status AQ	Shows the current value of the analog output.

8.11 Menu 2.3 Load trend

The load trend is a diagram showing the progress of the measured load. The gross value F1 will be used therefor. The diagrams scaling gets automatically adjusted according to the weight.

8.12 Menu 2.4 Module Info

2.4.1 Modul info General information about the SIWAREX WT231	
Order number	Order number of the weighing module used in the terminal.
Serial number	Serial number of the weighing module used in the terminal.
Version	Version of hardware and software.
Version HMI-project	Version of the user interface software.
Support hotline	Call this number to get technical support by telephone: +49 721 595 2811
Support e-mail	Technical support regarding SIWAREX products per e-mail: hotline.siwarex@siemens.com

8.13 Menu 2.5 Trace start / stop

The trace function is used for the continuous recording of measured values, limits, in- and outputs etc. A trace can be started and stopped in menu 2.5. Settings are carried out in menu 1.5.7 “Trace settings”.

Analysis of the recorded traces can only be done by using the software SIWATOOL. Please refer to chapter 13 Accessories, pg. 165. Further information can be found in the manual for SIWAREX WP231.

8.14 Menu 2.6 Increased resolution

Activating the increased resolution will switch back to the operating view. The current weight value will be displayed with the tenfold resolution for 5s.

8.15 Menu 3.0 Language, Date & Time

This menu allows changing settings for

- Language
- Date and
- Time

When changing the language, the user interface needs to restart – therefore three buttons will appear. Please select “Start” to proceed and wait for the system to start up with the selected language. The language will be stored safe against voltage breakdown.

Time and date are buffered by the weighing electronic by using a capacitor. The buffering time is ca. 8 days. In case the time and date settings has been lost e.g. due to a voltage breakdown, the status “Error Clock” in menu 2.2.1 “Scale status 1 of 3” will be set. Time needs to be reset in menu 3.0 or via input by a PLC system.

8.16 Menu 4.0 User management

The SIWAREX WT231 provides password protection. It is activated by default. The password protection can be deactivated (and reactivated again) via a DIP switch at the weighing module SIWAREX WP231 inside the terminal.

In case the password protection is activated, menu 5.0 “User management” will be available. The menus 1.0 “Setup”, 3.0 “Language, Date & Time” and 5.0 “User management” are protected by the password.

The default login values are:

User: ADMIN

Password: WT231

Activate and deactivate the passwort protection by DIP switch

Two DIP switches are located at the bottom side of the weighing module SIWAREX WP231 just next to the Ethernet port (accessible via the air inlet).

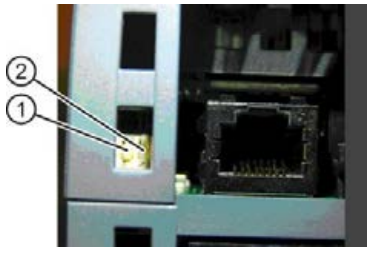


Figure 8-6 DIP switches at SIWAREX WP231weighing module

Position of DIP switch	①password protection	②operation mode
Top	Password protection deactivated	Operating in SIMATIC
Bottom	Password protection activated	Operating stand alone

As default, both switches are located in the lower position, so that the password protection is activated and the weighing module is in stand-alone operation mode.

For deactivating the password protection change the position of the left DIP switch ① to top.

It is important to keep the position of the right switch ② on bottom!

⚠ CAUTION
Take care to keep the login data (username, password) safe. Without password there is not possibility to change settings or recalibrate the scale etc. In case no login data is available anymore, you need to reinstall the user interface with an external software.

User management

In menu „User management“ you can change the default password „WT231“. Additionally new / more users can be generated. New users have to be assigned to the “ADMIN” group.

8.17 Screen saver

To prevent the touchpanel from damage, it will turn on a screen saver automatically after 30 minutes without input. The delay time for switching on the screen saver can be chosen – from 5 minutes to 360 minutes.

Start up the WT231. Before loading the UI, the buttons “Transfer”, “Start” and “Control Panel” are visible for five seconds. Choose “Control Panel” to call up the system settings of the touch panel. Under “Screensaver” the delay time can be adjusted as described above.

In addition you can add acoustic feedback in menu “Sound Settings”.

⚠ CAUTION
Do not change any other settings!

Messages

9

9.1 Message types

The messages in the electronic weighing system described here are divided into three types.

System status messages

System status messages can be generated spontaneously at any time by an unexpected event. They include internal and external hardware problems which can occur spontaneously during weighing.

Data and operating errors

The data and operating errors are always a response to a command due to a plausibility check.

These are data errors if a plausibility error has been detected in a data packet which was sent to the module and receipt of the packet has been rejected by the module.

These are operating errors if the module cannot execute the sent command in its current operating state.

Technology errors

Technology errors occur spontaneously due to the process flow of a weighing.

Status bits, on the other hand, are not messages. The status displays describe the status of the scale during normal operation and can be monitored or evaluated at any time.

9.2 Message paths

You can read out the messages using different paths. You define the path for forwarding and processing of messages during configuration.

The messages are processed for two basic purposes:

- For display on an Operator Panel for the operator
- For linking in the control software to control specific reactions in the process.

The following message paths are possible:

- Output of the message buffer to the SIWATOOL program (takes place automatically)
- Output by means of data records DR 30 and DR 32 in case of communication with a Modbus

9.3 Message list

The message list is an overview of all messages that the SIWAREX module can generate. A message can be quickly identified by the message code (number).

9.3.1 System status message list

Operating errors (code 1000 to 1999) sorted by code no.	Error code	Description and remedy
1000 operating error exists	1000	Group message, at least one operating error exists.
1001 Watchdog	1001	Watchdog, error is displayed for at least 10 seconds. A serious error has occurred in the function of SIWAREX, e.g. program error, severe electromagnetic influence on device, etc. Contact the SIWAREX Support if the error occurs multiple times.
1002 RAM error	1002	RAM error. An error has occurred in the memory; the memory content is no longer correct. The module must be switched off. If the error occurs again, SIWAREX is defective.
1003 Checksum incorrect parameter	1003	Checksum error at parameter. Critical error because the parameters are no longer safe.
1004 Checksum incorrect program	1004	Checksum error program code. Critical error because the program is no longer safe.
1006 logbook error	1006	Error when writing/deleting,or logbook full
1102 ADU error	1102	AD converter error when reading in the measured value. If the error occurs again, make sure that the EMC recommendations are observed (chapter EMC-compliant setup (Page 19)).
1104 Undervoltage	1104	Undervoltage at sensor cables
1105 Overload	1105	Overload of scale (ca. 110%)
1106 Underload	1106	Underload of scale (ca. -10%)
1107 Legal trade display failure	1107	The SecureDisplay legal trade display no longer communicates with the module

9.3.2 Technology error message list

Technology error (code 2000 to 4999)	Error code	Description and remedy
2000 Technology error exists	2000	Group message, at least one technology error exists
2001 Timeout tare/set to zero	2001	Taring of scale or set to zero is not possible because a standstill was not reached during the standstill time. The command was discarded.

Technology error (code 2000 to 4999)	Error code	Description and remedy
2002 Trace overload	2002	The set recording rate for trace function cannot be processed. Set a slower recording rate (chapter "Trace recording cycle (Page 112)")
2003 Set to zero not possible	2003	The switch-on weight is outside the configured value range for set to zero in data record DR 3 defined by the maximum positive and negative weight.

9.3.3 Data and operating errors message list

Data and operating errors (code 5000 to 8999)	Error code	Description and remedy
5000 Data and operating error exists	5000	Group error, a bit is set in the data and operating error bits
5001 Command code or data record unknown	5001	Command code or data record is not known with current application
5002 Command or data change not possible because write protection is active	5002	The command or changing of data is not possible due to write protection. The data record was rejected.
5003 Cannot exit service mode	5003	Cannot exit calibration mode; calibration incomplete
5004 Command or data transmission only available in service mode	5004	Activation of service mode is required to execute command or transmit data
5006 Command or data transmission not possible because of BUSY	5006	Command can currently not be executed because module is BUSY (data record or command transmission already active, …)
5007 Command or data transmission not possible because module is faulty or SIMATIC CPU stop	5007	Command can currently not be executed because of a problem or SIMATIC CPU stop
5102 Command not possible because there is no standstill	5102	Scale command (set to zero, tare, log, …) cannot be executed because standstill is missing.
5103 Command not possible because legal trade display is missing	5103	Command not possible because legal trade display is missing or not visible.
5104 Command not possible because range is exceeded	5104	Command (e.g. set to zero, tare, calibrate command) cannot be executed because the permitted range has been exceeded. The ranges are defined in DR 3.
5105 Load cell parameters not plausible	5105	Load cell parameters in data record DR 10 are not plausible (number, support points, load specifications, etc.).
5107 Characteristic cannot be moved	5107	Characteristic cannot be moved due to possibility of range violation.
5108 ID does not exist	5108	Requested logbook ID not present in memory.
5199 Error in command to DI	5199	Processing of a command triggered at the DIs is not possible. The cause can be determined in data record DR 32.
6002 Logging not possible because weight is too small	6002	Logging is not possible because the limits for the minimum weight or maximum weight were not observed.
7000 Permitted number range violated	7000	The permitted number range, such as for weight values, was violated.
7001 Regulation code not known	7001	Regulation code for application requiring official calibration not known.

Data and operating errors (code 5000 to 8999)	Error code	Description and remedy
7002 Specifications of string lengths not plausible	7002	The string header in a specified string variable is not plausible.
7003 Specification of date / time not plausible	7003	Specifications for date and time are not plausible.
7004 Assignment of DIs/DOs incorrect	7004	An error occurred while assigning the digital inputs or digital outputs.
7006 Reserved	7006	Reserved
7007 The calibration weights or calibration digits are not plausible	7007	Specifications for calibration weights or digits in data record DR 3 are incorrect (minimum distance, reversal of incline).
7008 Set to zero or tare parameter not plausible	7008	The specifications for set to zero (data record DR 3) or tare specifications (data record DR 15) are not plausible.
7009 Standstill range / standstill wait time	7009	Standstill range or standstill wait time are not plausible.
7010 Scale interval / rounding	7010	Scale interval or selection for rounding to decimal places is not plausible.
7011 Filter parameters	7011	Specification of filter parameters is not plausible.
7013 Interface assignment for calibratable HMI not plausible	7013	The assignment of the interface to the calibratable HMI is incorrect.
7014 Specified time not plausible	7014	Specified time value is not plausible or may be signaled in connection with additional errors
7016 Parameter assignment of analog output not plausible	7016	The parameters for the analog output (data record DR 7) are not plausible.
7017 MAC address cannot be changed	7017	
7018 Error in IP mask	7018	The specified IP addresses (DR12) are not plausible.
7019 RS485 parameter error	7019	The specified RS485 interface parameters (DR13) are not plausible.

Command lists

10

10.1 Overview

The commands for the electronic weighing system described here can be transmitted by several interfaces:

- by the Operator Panel via the controller to the SIWAREX module
- by the digital inputs after corresponding assignment in data record DR 7

A data or command error is signaled if a command cannot be executed or if the sent data record is rejected.

Detailed descriptions of the commands can be found in the following command lists:

→ Table 10-1 Commands 1 ... 99: Service commands (Page 70)

→ Table 10-2 Commands 400 ... 449; log commands, statistics, logbook (Page 71)

→ Table 10-3 Commands 450 ... 499: Trace commands (Page 71)

→ Table 10-4 Commands 700 to 899: HMI display switching (Page 72)

→ Table 10-5 Commands 1000 ... : Basic functions for weighing commands (Page 73)

→ Table 10-6 Command groups of the SIWAREX WP231 (Page 74)

See also

Command lists (Page 70)

10.2 Command lists

The commands for the electronic weighing system described here can be transmitted by several interfaces:

- by the Operator Panel via the controller to the SIWAREX module
- by the Operator Panel directly to the SIWAREX module
- by the digital inputs after corresponding assignment in data record DR 7

A data or command error is signaled if a command cannot be executed or if the sent data record is rejected.

Table 10- 1 Commands 1 ... 99: Service commands

Command code	Command	Description	Protect-ed
1	Service mode On	Turn on service mode	
2	Service mode Off	Turn off service mode	
3	Test mode On (simulation)	Turn on test mode. The simulation value from data record 16 is used instead of the measured value for calculation of the pro-cess values.	
4	Test mode Off (simulation)	Switch off test mode.	
11	Load factory setting	The command resets the SIWAREX to the "ex works" status. During this process: - all parameters and saved data (including protocol memory and logbook) as well as the restore point are loaded with the default values - all message buffers (diagnostics buffer, trace memory, etc.) are reset	P
12	Load standard parameters	Like "Load factory settings" (command code 11), but interface settings for Ethernet and Modbus RTU are not reset to the factory setting.	P
31	Load restore point	All parameters saved in the restore point are activated.	P
51	Create restore point	Saves the parameters of the restore point to the memory.	P
60	Calibration point 0 valid	Calibration point 0 valid / save values for calibration point 0.	P
61	Calibration point 1 valid	Calibration point 1 valid / save values for calibration point 1.	P
62	Calibration point 2 valid	Calibration point 2 valid / save values for calibration point 2.	P

Command code	Command	Description	Protected
81	Characteristic shift	Move calibration characteristic. The command defines the current weight of the scale as the new zero point (0 kg) and shifts the complete characteristic without changing the gradient. The command can be used, for example, in order to compensate parts used for mounting calibration weights on the scale at the end of the calibration.	P
82	Perform automatic calibration	Calculation of scale characteristic using the load cell parameters from data record 10. The calculated characteristic is entered directly in data records 3 and 4 and thus immediately enabled following execution of the command. The scale must be empty when the command is executed.	P
83	Perform calibration check	The command calculates the theoretical digital values in•relation to the calibration weights using the load cell parameters from data record 10 and the adjustment weights 0, 1 and 2 from data record 3. These theoretical digits are output in data record 4. The function can be used to carry out a plausibility check for the calibration digits in data record 3 which were determined when calibrated using standard weights.	

Table 10- 2 Commands 400 ... 449; log commands, statistics, logbook

Command code	Command	Description	Protected
401	Generate log	Log current parameters relevant to the calibration	
405	Delete log memory	Delete all logs	P
440		Delete the logbook. Only permitted in non-calibrated state.	
441	Reserve		

Table 10- 3 Commands 450 ... 499: Trace commands

Command code	Command	Description	Protected
451	Trace RAM on	Start permanent tracing	
452	Trace RAM off	Stop permanent tracing	
453	Single trace RAM	Create single trace (current state)	
454	Delete trace RAM	Delete tracing memory.	

Table 10- 4 Commands 700 to 899: HMI display switching

Command code	Command	Description	Protect-ed
701	Increased resolution	Enable increased resolution on the main display and the SecureDisplay (x 10), for duration of 5 s	
705	Display current tare weight	Display current tare weight on main display and SecureDisplay	
710	Activate standard display	Enable standard display gross/net (main display and SecureDisplay)	
714	N process value (no write protection)	Display net process weight on main display, only permitted if OIML is not set as the regulation code (main display and SecureDisplay)	P
715	G process value (no write protection)	Display gross process weight on main display, only permitted if OIML R76 is not set as the regulation code (main display and SecureDisplay)	P
716	G process value after filter 2	Display gross process weight (commissioning) on main display, only permitted if OIML R76 is not set as the regulation code (main display and SecureDisplay)	P
801	Display currently set calibration regulation /country code	Display currently set calibration regulation temporarily on the main display (main display and SecureDisplay), for duration of 5 s	
802	Display weighing range data	Display weighing range data (min., max., digit step) in the legal trade display SecureDisplay (for duration of 10 s)	
860	Hide display	Hides the legal trade display SecureDisplay	
861	Legal trade display for variant 1	Acts on the legal trade display SecureDisplay. Enables version 1 for display size and position according to DisplayCali.xml file	
862	Legal trade display for variant 2	Acts on the legal trade display SecureDisplay. Enables version 1 for display size and position according to DisplayCali.xml file	
863	Legal trade display for variant 3	Acts on the legal trade display SecureDisplay. Enables version 1 for display size and position according to DisplayCali.xml file	
864	Legal trade display for variant 4	Acts on the legal trade display SecureDisplay. Enables version 1 for display size and position according to DisplayCali.xml file	
865	Legal trade display for variant 5	Acts on the legal trade display SecureDisplay. Enables version 1 for display size and position according to DisplayCali.xml file	
870	Display smallest representation of legal trade display	Shows the smallest possible display of the SecureDisplay according to parameter "Min. zoom factor Display%" in DR3	
871	Display current serial number	Display serial number of SIWAREX temporarily on the main display and SecureDisplay, for duration of 5 s	

Command code	Command	Description	Protect-ed
875	Display FW version	Display current firmware version of module on SecureDisplay	
876	Display SecureDisplay soft-ware version		
881	Display first logbook entry	The first logbook entry is displayed on the SecureDisplay.	
882	Display last logbook entry	The last logbook entry is displayed on the SecureDisplay.	
883	Display reading of previous entry	The logbook entry prior to the last read entry is displayed on the SecureDisplay.	
884	Display reading of subsequent entry	The logbook entry after the last read entry is displayed on the SecureDisplay.	
891	Display log entry (DS46)	The log entry requested in DS45 is dis-played on the SecureDisplay, for duration of 10 s.	
Reserve			
Reserve			
Reserve			

Table 10- 5 Commands 1000 ... : Basic functions for weighing commands

Command code	Command	Description	Protect-ed
1001	Set to zero	Zeroing (semi-automatic)	
1011	Tare	Taring (semi-automatic)	
1012	Delete tare	Delete current tare weight	
1013	Tare specification 1 valid	Activate specification tare weight 1	
1014	Tare specification 2 valid	Activate specification tare weight 2	
1015	Tare specification 3 valid	Activate specification tare weight 3	
1016	SIMATIC tare specification	Specified tare weight from SIMATIC I/O interface	

10.3 Command groups of the SIWAREX WP231

The following commands can be triggered in the scale data block DB_SCALE in the area CMD1 to CMD3:

Table 10- 6 Command groups of the SIWAREX WP231

Command group	Description
1 ... 99	Commands are forwarded from the function block via data record DR 2 to the module (scale commands, weighing commands, log commands). The meanings of the commands correspond to the command list (see → Command lists (Page 70)).
2000 + X	Reading of a data record, X corresponds to the data record number. Example: Data record 3 transmitted by SIWAREX module to SIMATIC CPU → 2000 + 3 = command code 2003
4000 + X	Writing of a data record, X corresponds to the data record number. Example: Data record 3 transmitted by SIMATIC CPU to the SIWAREX module → 4000 + 3 = command code 4003
7001	Read all data - Read all data from the SIWAREX to the CPU
7002	Write all data - Write all data from the CPU to the SIWAREX (service mode has to be turned on)

Additional information on transmission of commands from the control program by means of the SIMATIC interface is available in SIWAREX WP231 manual.

Communication 11

11.1 Communication via Modbus

11.1.1 General information

The current process values and parameters can be exchanged via the RS485 interface with Modbus RTU or the Ethernet interface with Modbus TCP/IP. It is possible to use both interfaces for the communication.

Note

The SIWAREX WP231 is designed for use in secure (closed) networks and does not have any protection against unauthorized data traffic.

The following chapters describe the specifications for handling communication. The following functions can be executed:

- Export parameters from the electronic weighing system
- Write parameters
- Export current process values
- Monitor messages

11.1.1.1 Principle of data transmission

This description is valid for communication via Modbus RTU and Modbus TCP/IP.

The standardized MODBUS protocol is used for communication. The master function is always in the connected communication partner, while the SIWAREX module is always the slave.

Data transfer is bidirectional. The master function is always in the connected module which “controls” the communication with corresponding requests to the respective SIWAREX module address. The SIWAREX module is always the slave and responds to the requests of the master, provided that the address matches, with a response frame.

Each Modbus partner has its own address. The SIWAREX module has the default address 1. This address can be changed as a parameter (e.g. in SIWATOOL). This address is without significance if the Ethernet interface is used because the connection is based on the IP address.

If the RS485 interface is used, the following character frame is valid:

Start bit	1
Number of data bits	8

Parity	Even
Stop bit	1

The following baud rates can be set:

- 9 600 bit/s
- 19 200 bit/s (default setting)
- 38 400 bit/s
- 57 600 bit/s
- 115 000 bit/s

Functions which can be used by the master are listed below. The structure and contents of the registers are shown in chapter "Scale parameters and functions (Page 43)".

Service	Function code	Usage
Read Holding Registers	03	Read one or more 16-bit parameter registers
Write Single Register	06	Write a single parameter register
Write Multiple Registers	16	Write multiple registers

If a request of the master is answered by the SIWAREX module (slave), the SIWAREX module sends a response frame with or without errors. In the case of a response without error message, the response frame contains the received function code; in the case of errors, the highest bit of the function code is set. This corresponds to the Modbus standard. Afterwards, the master requests the data record DR 32 to check which process-related data or operator errors exist.

11.1.1.2 Data record concept

The register assignment is an image of the data records. The chapter → Scale parameters and functions (Page 43) describes the data records, variables and functions, including the register addresses. The data records are always checked as complete data packets for plausibility. For this reason, you must follow a specific procedure to change individual parameters.

11.1.1.3 Command mailboxes

Corresponding command codes must be sent in order to execute commands and to read and write data records in the Modbus buffer memories. These are described in more detail in chapter → Command lists (Page 69). The following tables list the Modbus registers used to process these commands:

Table 11- 1 Command mailbox 1: Highest priority

Variable	Note	Type	Modbus registers
CMD1_CODE	Code of command to be executed	USHORT	910
CMD1_TRIGGER	Trigger for starting the command	USHORT	911
CMD1_STATUS	0=job running; 1=job finished (1 cycle)	USHORT	912
CMD1_QUIT	0=no error; <>0=error code	USHORT	913

Table 11- 2 Command mailbox 2: Average priority

Variable	Note	Type	Modbus registers
CMD2_CODE	Code of command to be executed	USHORT	920
CMD2_TRIGGER	Trigger for starting the command	USHORT	921
CMD2_STATUS	0=job running; 1=job finished (1 cycle)	USHORT	922
CMD2_QUIT	0=no error; <>0=error code	USHORT	923

Table 11- 3 Command mailbox 3: Low priority

Variable	Note	Type	Modbus registers
CMD3_CODE	Code of command to be executed	USHORT	930
CMD3_TRIGGER	Trigger for starting the command	USHORT	931
CMD3_STATUS	0=job running; 1=job finished (1 cycle)	USHORT	932
CMD3_QUIT	0=no error; <>0=error code	USHORT	933

11.1.1.4 Reading registers

The method for reading registers depends on whether they belong to the writable data records (DR 3 to DR 29) or can only be read as current values (DR 30 to DR 34).

If you wish to read the registers from the data records DR 3 to DR 29, you must first export these as a complete data record to the internal output buffer.

All Modbus registers of the individual parameters can be found in chapter → Scale parameters and functions (Page 43).

Example

A parameter is to be read from data record 3 (DR 3).

- First, write register CMD3_CODE with 2003 (2000 plus the number of the data record = read data record).
- Then write CMD3_TRIGGER with "1". The DR3 is then updated in the Modbus buffer memory.
- It is now possible to read one or more registers with the corresponding variable(s). The data consistency of the registers read at this time is guaranteed.

You can find all further command numbers in chapter → Command lists (Page 69).

Example

A current measured value is to be read out from DR 30.

⇒ The register can be directly requested because its contents are automatically refreshed in the SIWAREX module at the specified measuring rate of 100 Hz and are always available up-to-date.

11.1.1.5 Writing registers

If you wish to write registers from the data records DR 3 to DR 29, you must first export the corresponding data record to the internal output buffer using an appropriate command. Individual registers can then be written. The complete data record must subsequently be written internally using an appropriate command. A plausibility check of the complete data record is carried out in the process.

Example

A parameter from DR 3 is to be written.

- First, write register CMD3_CODE with 2003 (2000 plus the number of the data record).
- Then write CMD3_TRIGGER with "1". The DR 3 is then updated in the Modbus memory.
- You can now write or change one or more registers with the corresponding variable. If you wish to transfer the written/changed registers to the scale, it is necessary to write the complete data record:
- First, write register CMD3_CODE with 4003 (4000 plus the number of the data record = write data record).
- Then write CMD3_TRIGGER with "1".
- The data record is then transferred to the process memory in the SIWAREX module. All registers of the data record are checked for plausibility in the process.

If the plausibility check fails, the complete data record is not written and a message is output to the user (from the area of data/operator errors).

You can find all further command numbers in chapter → Command lists (Page 69).

In addition, an online document is available for working with SIWAREX WP231 and Modbus → Modbus communication of WP231 (http://support.automation.siemens.com/WW/view/de/77913998).

11.2 Parameters and functions

The weighing module employed here can be used as a non-automatic weighing instrument pursuant to OIML R76.

All parameters are set to default values in the factory. You can restore the configuration to factory settings using the "Load factory settings" command.

You can also create your own restore point. You can reload the saved configuration at a later point in time with the "Load restore point" command.

The default parameters are set such that the scale is immediately ready for operation. The weight value indicates changes in weight on the load cell, but only corresponds to the actual weight following a calibration. You do not need to re-enter all parameters. The advantage of this solution is that you can decide the default values to be retain and the parameters that need to be adapted for your application.

All parameters are divided into data records (DR). The data records are organized in steps (tasks) to be implemented during commissioning or during the process.

The scale functions governed by the parameters are also described in the parameter description below.

First, the parameters of a given data record are displayed in a table. The detailed parameter description for the parameters of this data record then follows.

When it receives new parameters, the SIWAREX module runs a validation check. In the event of a parameter assignment error, the data record is not applied (not saved) by the SIWAREX module and a data/operator error is reported.

11.3 DR 2 command code

DR 2 is a special data record used to transfer commands to the SIWAREX module by SIWATOOL.

11.4 DR 3 calibration parameters

11.4.1 Overview

The calibration parameters need to be checked and if necessary modified for all scales.

The scale is basically defined by calibration parameters and calibration operation. A wire jumper on the P-PR (Parameter Protection) terminals means that the DR 3 data can no longer be changed (write-protected). All changes in data record 3 require service mode to be switched on for the module. If service mode is not active, all parameter inputs are directly rejected with an error.

Procedure

- Check all parameters and modify them as required
- Transfer the DR 3 data record from SIWATOOL to the scales
- Adjust the scales
- Transfer the DR 3 data record from the scales to SIWATOOL

Table 11- 4 Assignment of data record 3

Variable	Note	Type	Length (bytes)	Read/ write pro-tection	De-fault	Min.	Max.	Modbus registers
Data record number	Contains no. of data record	USHORT	2	r	3	-	-	1000
Length	Data record length information	USHORT	2	r	192	-	-	1001
Application	Information on which application the DR belongs to	USHORT	2	r	101	-	-	1002
Version identifier	Information on the current data record version	USHORT	2	r	1	1	65635	1003
Scale name header	Maximum length and actual length of string for scale name	UBYTE[2]	2	rwP	12.12	-	-	1004
Scale name (Page 85)	Scale name specified by user	CHAR[12]	12	rwP	" "	-	-	1005
Unit of weight header	Maximum length and actual length of string for unit of weight (e.g.: g, kg, t, ...)	UBYTE[2]	2	rwP	04.04	-	-	1011

Variable	Note	Type	Length (bytes)	Read/ write protection	Default	Min.	Max.	Modbus registers
Unit of weight (Page 85)	Unit of weight	CHAR[4]	4	rwP	"kg••"	-	-	1012
Gross identifier header	Maximum length and actual length of string for unit of weight	UBYTE[2]	2	rwP	02,02	-	-	1014
Gross identifier (Page 85)	Abbreviation of gross (B or G), only one byte is used!	CHAR[2]	2	rwP	"B"	"B"	"G"	1015
Reserve 1	Reserve	USHORT	2	rw	0	-	-	1016
Code for regulations (Page 85)	0: None 1: OIML R76 (available soon)	USHORT	2	rwP	0	-	-	1017
Minimum weighing range (Page 85)	Minimum number d	USHORT	2	rwP	20	0	65535	1018
Reserve	Reserve	USHORT	2	rw	0	-	-	1019
Maximum weighing range (Page 85)[1)]	Maximum weight	FLOAT	4	rwP	100	> weighing_range_min	maximum number range	1020
Calibration weights 0, 1, 2 and calibration digits 0, 1, 2 (Page 86)	Calibration weight 0[1)] (usually the zero point)	FLOAT	4	rwP	0	1	maximum number range	1022
	Calibration weight 1[1)]	FLOAT	4	rwP	100	1	maximum number range	1024
	Calibration weight 2	FLOAT	4	rwP	0	1	maximum number range	1026
	Calibration digits 0 determined during calibration with calibration weight 0	FLOAT	4	rwP	0	0	1000000	1028
	Calibration digits 1 determined during calibration with calibration weight 1	FLOAT	4	rwP	2000	0	1000000	1030
	Calibration digits 2 determined during calibration with calibration weight 2	FLOAT	4	rwP	0	0	1000000	1032
Scale interval (Page 86) [1)]	Weighing range1 scale interval (1*10**k, 2*10**k, 5*10**k]; k: -3 … 2)	FLOAT	4	rwP	0.1	0.001	50	1034

Variable	Note	Type	Length (bytes)	Read/ write pro-tection	De-fault	Min.	Max.	Modbus registers
Zero by power-on (Page 86)	Zero by power-on 0: Zero by power-on off 1: Zero by power-on on	BIT	0	rw	0	0	1	1036.16
Zero by power-on when tare ≠ 0 (Page 86)	Zero by power-on when tare ≠ 0 0: Zero by power-on disabled when tare ≠ 0 1: Zero by power-on when tare ≠ 0	BIT	0	rw	0	0	1	1036.15
Automatic zero ad-justment (Page 86)	0: Autom. zero adjustment off 1: Autom. zero adjustment on	BIT	0	rw	0	0	1	1036.14
Subtractive / additive tare device (Page 87)	Subtractive / additive tare device 0: Subtractive tare device 1: Additive tare device	BIT	0	rwP	0	0	1	1036.13
Weight simulation (Page 87)	Weight simulation 0: Weight simulation disabled 1: Weight simulation value of DR16 applied Weight simulation is always disabled when write protection is enabled	BIT	0	rwP	0	0	1	1036.12
Bit 5	Bit 5: Reserve	BIT	0	rw	0	0	1	1036.11
Bit 6	Bit 6: Reserve	BIT	0	rw	0	0	1	1036.10
Bit 7	Bit 7: Reserve	BIT	0	rw	0	0	1	1036.9
Bit 8	Bit 8: Reserve	BIT	0	rw	0	0	1	1036.8
Bit 9	Bit 9: Reserve	BIT	0	rw	0	0	1	1036.7
Bit 10	Bit 10: Reserve	BIT	0	rw	0	0	1	1036.6
Bit 11	Bit 11: Reserve	BIT	0	rw	0	0	1	1036.5
Bit 12	Bit 12: Reserve	BIT	0	rw	0	0	1	1036.4
Bit 13	Bit 13: Reserve	BIT	0	rw	0	0	1	1036.3
Bit 14	Bit 14: Reserve	BIT	0	rw	0	0	1	1036.2
Bit 15	Bit 15: Reserve	BIT	2	rw	0	0	1	1036.1
Decimal places for process values (Page 87)	0: No rounding 1: Rounding to 1 decimal place 2: Rounding to 2 decimal places 3: Rounding to 3 decimal places 4: Rounding to 4 decimal places 5: Rounding to 5 decimal places 6: Rounding to 6 decimal places	USHORT	2	rwP	0	0	6	1037
Maximum tare load (Page 88)	Range of the subtractive tare device [in % of max. weighing range] (must not exceed 100% with regulation code "OIML")	FLOAT	4	rwP	0	0	250	1038

Variable	Note	Type	Length (bytes)	Read/write protection	Default	Min.	Max.	Modbus registers
Maximum negative zero setting limit (power-on) (Page 88)	Negative range of the zero by power-on device [in % of maximum weighing range] (positive + negative zero setting limit must not exceed 20% with country code "OIML")	FLOAT	4	rwP	1.0	0	100.0	1040
Maximum positive zero setting limit (power-on) (Page 88)	Positive range of the zero by power-on device [in % of maximum weighing range] (positive + negative zero setting limit must not exceed 20% with country code "OIML")	FLOAT	4	rwP	3.0	0	100.0	1042
Maximum negative zero setting limit (semi-automatically) (Page 88)	Negative range of the semi-automatic zeroing [in % of maximum weighing range] (positive + negative zero setting limit must not exceed 4% with country code "OIML")	FLOAT	4	rwP	10.0	0	100.0	1044
Maximum positive zero setting limit (semi-automatically) (Page 88)	Positive range of the semi-automatic zeroing [in % of maximum weighing range] (positive + negative zero setting limit must not exceed 4% with country code "OIML")	FLOAT	4	rwP	3.0	0	100.0	1046
Standstill range (Page 89)	Standstill range (in d)	FLOAT	4	rwP	0.1	0	maximum number range+	1048
Standstill time (Page 89)	Standstill time 1 in ms	TIME	4	rwP	2000	10	10000	1050
Standstill waiting time (Page 90)	Waiting time until standstill. 0: Any scale commands dependent on standstill are rejected immediately in the absence of standstill. >0: Maximum waiting time until command is executed	TIME	4	rw	2000	0	10000	1052
Low-pass filter limit frequency (Page 90)	Low-pass filter 1 - limit frequency: 0: Filter disabled	FLOAT	4	rwP	0.5	tbd	tbd	1054
Low-pass filter number (Page 90)	Ordinal number of low-pass filter 1: Filter ordinal number 2*(1 … 5)	USHORT	2	rwP	4	2	10	1056
Reserve 2	Reserve	USHORT	2	rw	0	-	-	1057

Variable	Note	Type	Length (bytes)	Read/ write protection	Default	Min.	Max.	Modbus registers
Low-pass filter limit frequency (commissioning) (Page 91)	Low-pass filter 2 - limit frequency: 0: Filter disabled	FLOAT	4	rw	0	tbd	tbd	1058
Low-pass filter number (commissioning) (Page 91)	Ordinal number of low-pass filter 2: Filter ordinal number 2*(1 … 5)	USHORT	2	rw	4	2	10	1060
Mean value filter depth (Page 91)	Filter for digit values, permitted filter depth: 0 … 250	USHORT	2	rwP	10	0	250	1061
Display weighing range data (Page 91)	Display weighing range data 0: No 1: Yes	USHORT	2	rwP	0	0	1	1062
Interface for legal trade display (Page 91)	Selection of interface for SecureDisplay: 0: HMI control at ETHERNET 1: HMI control via S7 interface	USHORT	2	rw	0	0	3	1063
Firmware version SecureDisplayHeader	Maximum length and actual length of string for FW version SecureDisplay	UBYTE[2]	2	rw	12, 12			1064
Firmware version SecureDisplay (Page 91)	FW version of the SecureDisplay used on the HMI	CHAR[12]	12	rw				1065
Reserve	Reserve	UBYTE[2]	2	rw	0	-	-	1071
Reserve	Reserve	CHAR[20]	20	rw	0	-	-	1072
Reserve	Reserve	UBYTE[2]	2	rw	0	-	-	1082
Reserve	Reserve	CHAR[20]	20	rw	0	-	-	1083
Minimum display size [%] (Page 92)	Maximum factor for minimizing the SecureDisplay. Value must not be smaller than the smallest value defined in the DisplayCali file.	USHORT	2	rwP	0	-	-	1093
Reserve 4	Reserve	FLOAT	4	rw	0	-	-	1094

[1] Parameter for calculation of calibration points with theoretical calibration

11.4.2 Scale name

You can select any name, but it may not exceed 12 characters. You can enter any designation.

Note

The scale name cannot be changed after official verification.

11.4.3 Unit of weight

A string with up to four digits can be specified as the unit of weight, e.g.: t, kg, lbs. The defined unit of weight applies to all weight specifications. Entries are not be converted if the unit of weight has changed. Entries must be left-aligned.

11.4.4 Gross identifier

The gross identifier specifies the letter, B (for brutto) or G (for gross), to be used in the display for gross weights.

11.4.5 Code for regulations

Trade scales requiring official calibration are subject to certain restrictions. The restrictions in accordance with the OIML directive are activated by entering "1" for OIML R76. Enter "0" to deactivate the restrictions (function available soon).

11.4.6 Minimum weighing range

The weight value can only be used above the minimum weighing range for legal trade registration with the specified scale interval. The minimum weighing range in the unit "d" (scale interval) is defined during calibration/official verification.

The factory setting is 0 d. 20 d is generally entered for legal trade scales.

11.4.7 Maximum weighing range

For purposes requiring official calibration, the weight can only be used with the defined scale interval below the maximum weight (+ 9 d, d = scale interval). The maximum weight is defined during commissioning.

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

11.4.8 Calibration weights 0, 1, 2 and calibration digits 0, 1, 2

The calibration weights and corresponding calibration digits define the characteristic curve of the scales. A detailed description can be found in section Calibration procedure (Page 93).

11.4.9 Scale interval

The scale interval for the weighing range can be defined in accordance with EN 45501 (0.0001 to 50).

11.4.10 Zero by power-on

The scales can automatically be set to zero when the supply voltage is switched on (in legal trade operation, this is at the end of the startup waiting time). A weight of ±10 % of the maximum measuring range can be set to zero by power-on for legal trade scales.

NOTICE
If the scales are not being used in legal trade operation (no OIML restrictions), fully loaded scales can also be set to zero once this function is enabled. The function can, however, be limited by setting a maximum and minimum weight for zero by power-on. See the section on maximum and minimum weights for zero by power-on.

11.4.11 Zero by power-on when tare ≠ 0

The scales can automatically be set to zero when the supply voltage is switched on. If the Zero by power-on (Page 86) function is enabled, this still does not specify whether zero by power-on is also to be performed if the tare weight in the tare memory is not equal to zero.

If the "Zero by power-on activated for tared scales" parameter is set, the tare weight is also be cleared upon zero by power-on; if the parameter is not set, the scales are not set to zero.

11.4.12 Automatic zero adjustment

If necessary, the scales can be set semi-automatically to zero by the user by means of the "Zeroing" command.

The automatic adjustment sets the scale to zero without a further command in the event of slow zero drifting. Slow drift is assumed if the OIML R76 criteria for this are met.

Note

If the scales are not being used in legal trade operation (no OIML restrictions) and this function is enabled, the scales may eventually read zero after a slow drift even if they are fully loaded. The function can, however, be limited by setting a maximum and minimum weight for zeroing.

11.4.13 Subtractive / additive tare device

If necessary, the scales can be tared using the Tare" command.

The display value is hidden when a subtractive tare is enabled if the gross value exceeds the maximum weighing range by more than 9e.

When an additive tare is enabled, the display value is not hidden until the net weight exceeds the maximum weighing range. The maximum subtractive tare is 100 % and the maximum additive tare 250 % of the maximum weighing range.

The current tare value is deleted if you switch between additive and subtractive taring.

NOTICE
There is no automatic evaluation of whether there is sufficient load cell measuring range capacity for an additive tare.

11.4.14 Weight simulation

For test purposes, weight simulation can be enabled instead of actual weighing. The simulated weight is specified using the DR 16 data record. Weight simulation can, in certain situations, facilitate scale testing and commissioning. The simulated weight is indicated on the main display with the word "TEST".

11.4.15 Decimal places for process values

This parameter is used to specify the number of decimal places to which the process values are to be rounded. This specification separates the main weight display, which is subject to the legal trade restrictions, and the values used in the control software.

11.4.16 Maximum tare load

The weighing module accepts any external tare specification which is less than the maximum tare load (percentage of maximum weighing range). Tare commands are also accepted provided that the current gross weight is less than the configured maximum tare load.

11.4.17 Maximum negative zero setting limit (power-on)

Zeroing means the scales are automatically set to zero when the supply voltage is switched on.

If zero by power-on upon supply voltage ON is enabled, you can limit the effect of this function. The limitation is based not on the actual weight, but rather on the weight which the scales would display had there been no zeroing.

11.4.18 Maximum positive zero setting limit (power-on)

Zeroing means the scales are automatically set to zero when the supply voltage is switched on.

If zero by power-on upon supply voltage ON is enabled, you can limit the effect of this function. The limitation is based not on the actual weight, but rather on the weight which the scales would display had there been no zeroing.

11.4.19 Maximum negative zero setting limit (semi-automatically)

Zeroing defines the current weight of the scales as zero.

You can restrict the effect of the zeroing function by defining limits. The limitation is based not on the current gross weight, but rather on the weight which the scales would display had there been no zeroing (time of scale calibration).

For legal trade scales, the limitation is 4 % of the weighing range between the negative and positive weight for zeroing.

11.4.20 Maximum positive zero setting limit (semi-automatically)

You can restrict the effect of the zeroing function by defining limits. The limitation is based not on the current weight, but rather on the weight which the scales would display had there been no zeroing (time of scale calibration).

For legal trade scales, the limitation is a maximum of 4 % of the weighing range between the negative and positive weight for zeroing.

11.4.21 Standstill range

Standstill monitoring checks whether the scales are correctly balanced. Scale standstill is registered if the weight changes by less than a specified fluctuation in d (standstill value) over a specified time (standstill time). Standstill monitoring is used in static scale mode (commands: zeroing, taring). The diagram below illustrates how standstill monitoring works.

The current weight can only be registered in legal trade applications if standstill is reached.

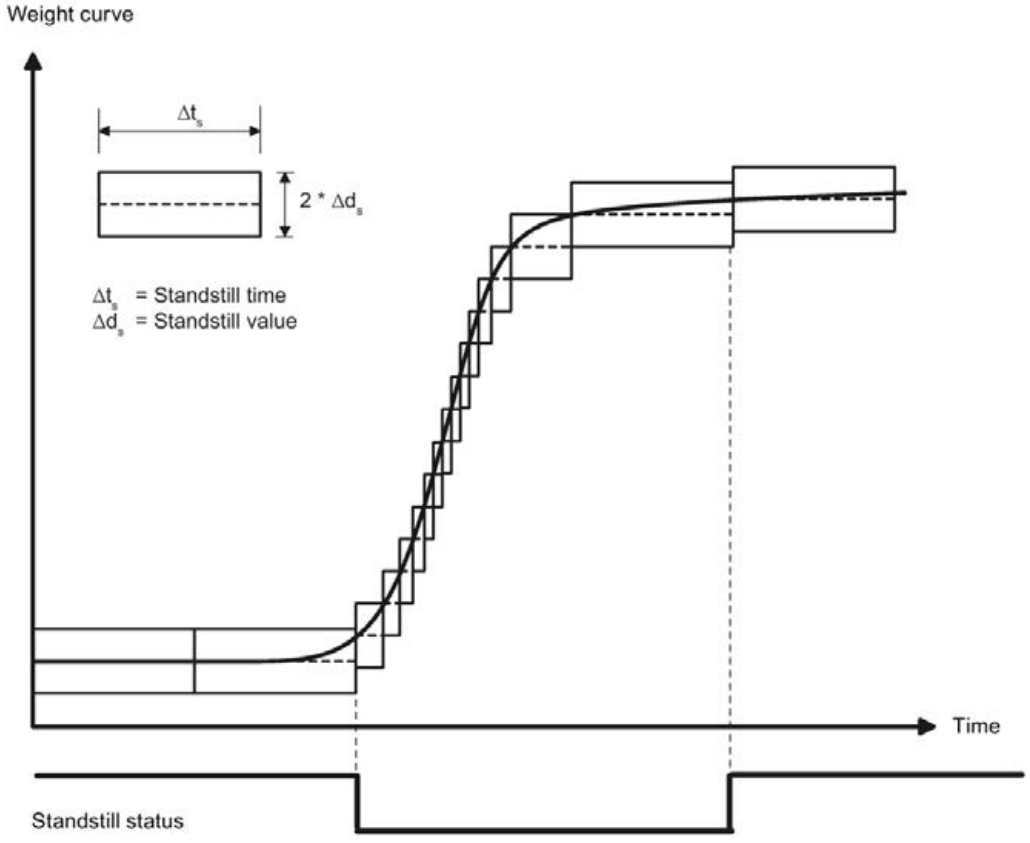


Figure 11-1 Standstill monitoring

11.4.22 Standstill time

Standstill monitoring checks whether the scales are correctly balanced. Scale standstill is registered if the weight changes by less than a specified fluctuation in d (standstill value) over a specified time (standstill time). Standstill monitoring is used in static scale mode (with the following commands: zeroing, taring).

The current weight can only be registered in legal trade applications if standstill is reached.

11.4.23 Standstill waiting time

Standstill waiting time is a maximum waiting time for standstill upon the execution of a command which depends on standstill (taring, zeroing, registering). A technology message is generated if the command cannot be executed during the standstill waiting time because there is no standstill.

If the standstill waiting time is equal to zero, a command requiring standstill is rejected immediately if there is no standstill.

11.4.24 Low-pass filter limit frequency

There is a critically damped low-pass filter for suppressing faults. The diagram below shows the step response of the filter (f = 2 Hz). The entry "0" means that the filter is switched off. A limit frequency of between 0.01 and 20.0 Hz can be specified.

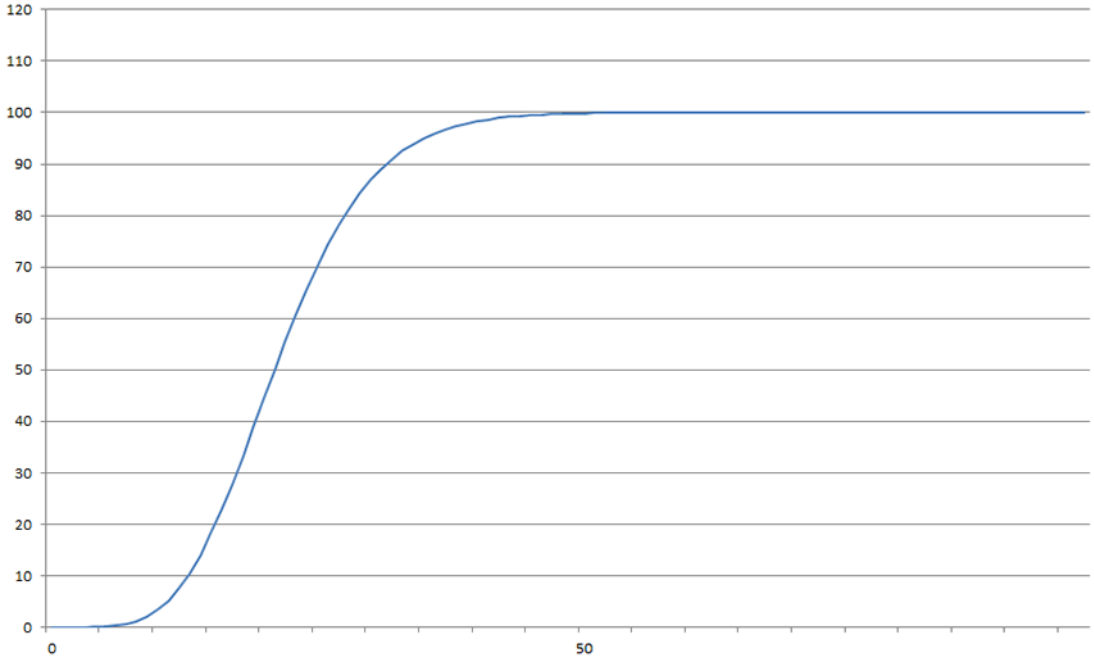


Figure 11-2 Step-forced response of the digital low-pass filter when f = 2 Hz

The definition of the limit frequency is extremely important for the suppression of faults. Defining the limit frequency defines the "speed" of the scales' response to changes in the measured value.

A value of 5 Hz, for example, results in a relatively rapid response to a change in weight; a value of 0.5 Hz makes the scales "slower".

11.4.25 Low-pass filter number

The number of the filter defines the effect of damping. The values 2, 4, 6, 8, and 10 can be set. The higher the selected filter number, the higher the effect.

11.4.26 Low-pass filter limit frequency (commissioning)

The second low-pass filter can be used for test purposes. Its function is identical to that of the (operating) low-pass filter. An analysis of the signal curve after this low-pass filter can provide additional information on the environment of the scales.

11.4.27 Low-pass filter number (commissioning)

The second low-pass filter can be used for test purposes. Its function is identical to that of the (operating) low-pass filter. An analysis of the signal curve after this low-pass filter can provide additional information on the environment of the scales.

11.4.28 Mean value filter depth

The mean value filter is used to steady the weight against random interference. The weight is the mean value of n (n = max. 250) weights which are recorded by the weighing module every 10 ms, e.g. when n = 10, the mean of 10 weights is calculated. Every 10 ms, the oldest value is discarded and the newest value included in the calculation.

11.4.29 Display weighing range data

The weighing range data is relevant to operation with verification capability. The "Display weighing range data" parameter is used to define whether the weighing range data is to be output permanently in the "SecureDisplay" on the HMI. Alternatively, it can be displayed separately using the command "802".

11.4.30 Interface for legal trade display

This parameter is used to define whether the legal trade display "SecureDisplay" is to be made on a panel directly connected over Ethernet or via a SIMATIC CPU which is connected to a panel.

11.4.31 Firmware version SecureDisplay

The version of the SecureDisplay software is entered in the "FW-Version SecureDisplay" Parameter. If the version is not entered correctly, a scale value is not output on the SecureDisplay, and the display indicates "Start Up".

11.4.32 Minimum display size [%]

The minimum display size defines the smallest zoom factor for the legal trade display "SecureDisplay". If the zoom factor for the minimum display size does not correspond to the smallest zoom factor stored in the "DisplayCali.xlm" file in the display unit, the weight value is hidden and the text "Start Up" is displayed.

11.5 Calibration procedure

11.5.1 Calibration with calibration weights

The incoming analog measured value from the load cells is converted into a digital value in an analog-to-digital converter. A weight is calculated using this digital value. This weight is then used by all weighing module functions for messages and for determining the status.

The characteristic curve of the measuring system must be defined before the weight can be calculated from the digital value. In the simplest case, the characteristic curve is defined with points 0 and 1. The first working point (point 0) is defined by the empty scales (no load) at their own weight. The load cells return a voltage measurement to the weighing module as a result of the weight of the scales themselves. Following analog-to-digital conversion of the measured voltage, the zero point is assigned to the digital value (calibration digits for the zero point).

If the scales are loaded with a defined calibration weight (e.g. 50% of the measuring range), the new digital value returned by the analog-to-digital converter is assigned the calibration weight.

The characteristic curve can also be determined with a third point, which must be higher than point 1.

Make sure that the difference between two calibration weights is at least 40 000 digits, as the calibration command may otherwise be rejected.

The calibration procedure involves the following steps:

- Define the calibration weight and other parameters of the DR 3 data record.
- Transfer the DR 3 data record to the scales.
- Trigger "Calibration weight 0 valid" for empty scales.
- Load the scales with the defined calibration weight.
- Trigger "Calibration weight 1 valid".
- Transfer data record DR 3 from the scales to SOWATOOL and save the data on a data medium.

You must follow the correct calibration sequence with increasing calibration weights.

Load cell characteristic value	Digits (approx.) at nominal load
1 mV/V	1 000 000
2 mV/V	2 000 000
4 mV/V	4 000 000

The diagram below illustrates the relationship between calibration digits and the calibration weight.

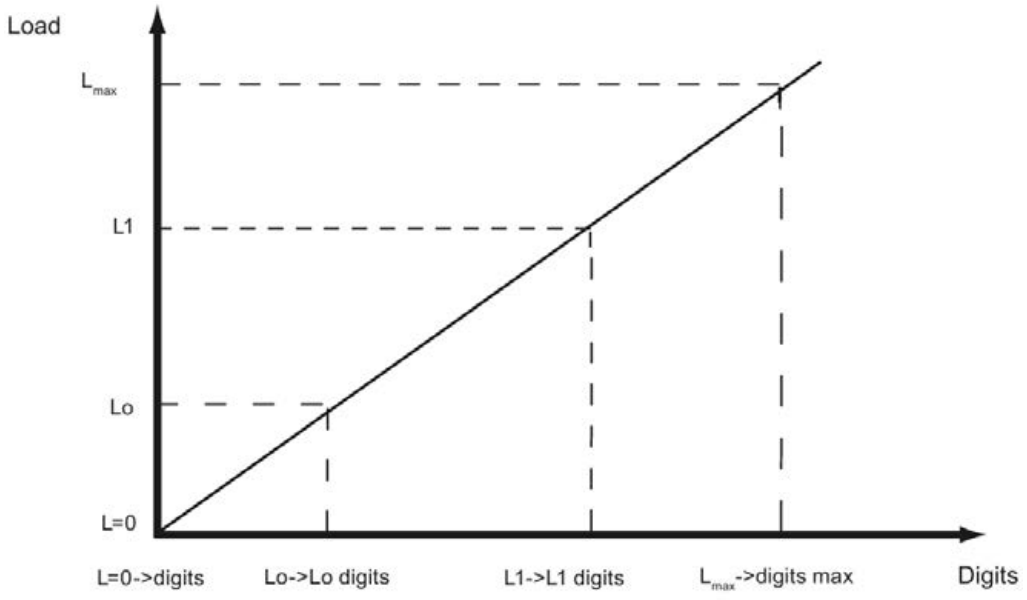


Figure 11-3 Calibration digits and calibration weight

Load	Comment	Load	Digits
L=0	100 kg load cell (2 mV/V) not loaded		Approx. 0
L0	Mechanical installation on load cell (dead load)	25 kg	Approx. 500 000
L1	Calibration weight 1 placed onto scale	e.g. 60 kg	Approx. 1 200 000
L_{max}	Nominal weight of load cell	100 kg	2 000 000
L_{max} +10%	Rated weight + approx. 10 %	Approx. 110 kg	2 200 000

You do not need to perform calibration if the calibration digits and the calibration weights are known to the weighing module described here. They are simply sent to SIWAREX by data record DR 3 and the scales are ready for use immediately.

The SIWATOOL program facilitates rapid calibration.

Following commissioning and calibration, all data records must be read from the weighing module and saved as a scale file.

Identical scales can be put into operation immediately. Connect the PC to the new scales and enable the "Send all data records" function. This transfers the parameters for calibration weights and calibration digits, and the characteristic curve are determined immediately. The same applies when you change a weighing module.

Note

Two working points are usually sufficient for determining the scales' characteristic curve. An additional working point is only required for non-linear systems.

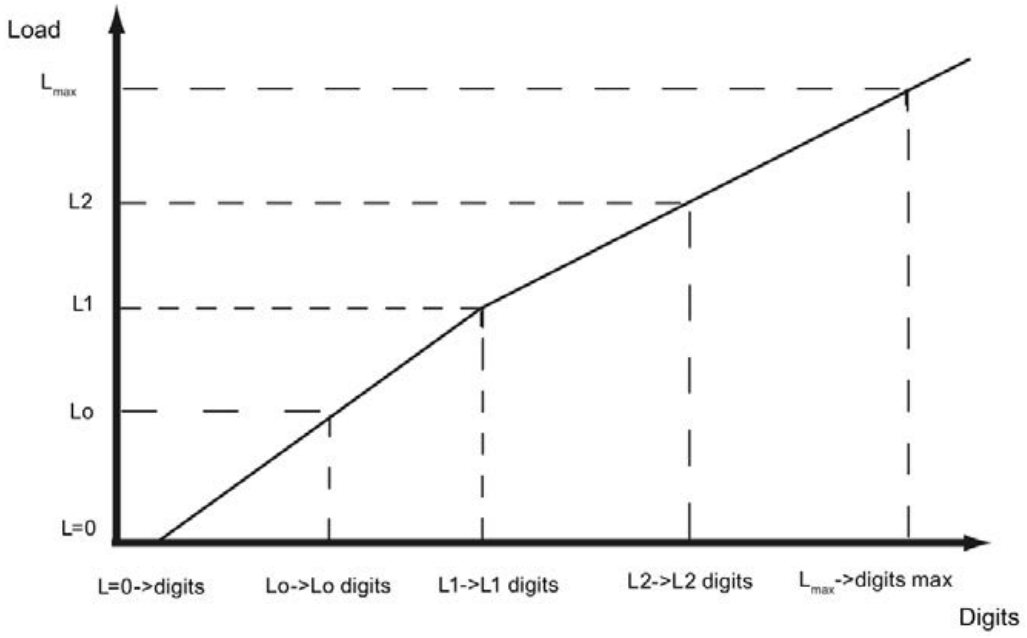


Figure 11-4 Linearizing the scales' characteristic curve

Load	Comment	Load	Digits
L=0	100 kg load cell (2 mV/V) not loaded		Approx. 0
L0	Mechanical installation on load cell (dead load)	e.g. 25 kg	Approx. 500 000
L1	Calibration weight 1 placed onto scale	e.g. 60 kg	Approx. 1 200 000
L2	Calibration weight 2 placed onto scale	e.g. 80 kg	Approx. 1 650 000
L_{max}	Nominal weight of load cell	100 kg	Approx. 2 000 000
L_{max} +10 %	Rated weight + approx. 10 %	Approx. 110 kg	Approx. 2 200 000

11.5.2 Automatic calibration

Scales can be rapidly commissioned with automatic calibration. The accuracy of the scale greatly depends on the entered parameters and the mechanical properties of the scale. The best level of accuracy for the scale can be achieved by calibrating with calibration weights.

During initial commissioning with automatic calibration, the module must be reset using the "Load factory settings" or "Load standard parameters" command.

The load cell parameters must subsequently be defined in data record 10. Command 82 "Perform automatic calibration" then uses this data and the currently applied dead load to calculate the characteristic curve of the scale. The characteristic curve is active immediately.

Note

The characteristic curve data in data record 3 active prior to execution of command 82 is directly overwritten.

Automatic calibration requires the following criteria:

- Correct mechanical installation of the scale
- Scale is empty (only mechanical installation (= dead load) present on the cells)
- Installed load cells are evenly loaded
- There are no shunt circuits

11.6 DR 4 Output of calculated calibration digits

Data record DR 4 outputs the digits calculated from the automatic scale calibration and the calibration check. This data record cannot be sent to the scales.

Table 11- 5 Assignment of data record 4

Variable	Note	Type	Length (bytes)	Rw	Default	Min.	Max.	Modbus Register
Data record number	Contains no. of the data record	USHORT	2	r	4	-	-	1200
Length	Data record length information	USHORT	2	r	28	-	-	1201
Application	Information on which application the DR belongs to	USHORT	2	r	101	-	-	1202
Version identifier	Information on current data record version	USHORT	2	r	1	1	65635	1203
Calibration digits 0, 1, 2 (calculated) (Page 97)	Calibration digits 0 (calculated): calibration digits calculated by 'automatic calibration'	LONG	4	r	200000	0	1600000	1204
	Calibration digits 1 (calculated): calibration digits calculated by 'automatic calibration'	LONG	4	r	0	0	1600000	1206
	Calibration digits 2 (calculated): calibration digits calculated by 'automatic calibration'	LONG	4	r	0	0	1600000	1208
Reserve 1	Reserve	SHORT	2	r	0	-	-	1210
Reserve 2	Reserve	USHORT	2	r	0	-	-	1211
Reserve 3	Reserve	FLOAT	4	r	0	-	-	1212

11.6.1 Calibration digits 0, 1, 2 (calculated)

The calculation is based on the parameters from DR 10 and is executed using command no. 82 or 83.

11.7 DR 5 zeroing memory

Data record DR 5 displays the current values in the tare memory and the zeroing memory.

In legal trade operation, the data record is not write-protected.

Procedure

- Check all parameters
- Transfer the data record to the scales

Table 11- 6 Assignment of data record 5

Variable	Note	Type	Length (bytes)	Read/ write protection	Default	Min.	Max.	Modbus Register
Data record number	Contains no. of data record	USHORT	2	r	5	-	-	1214
Length	Data record length information	USHORT	2	r	40	-	-	1215
Application	Information about which application the DR belongs to	USHORT	2	r	101	-	-	1216
Version identifier	Information about the current data record version	USHORT	2	r	1	1	65635	1217
Effective tare weight - from specification 1, 2 or 3 (Page 99)	Current tare weight (tare setting)	FLOAT	4	rwP	0	0	Depends on specification in DR 3	1218
Effective tare weight (semi-automatic) (Page 99)	Current tare weight (semi-automatic)	FLOAT	4	rwP	0	0	Depends on specification in DR 3	1220
Zero by power-on (value when switching on) (Page 99)	Current zero by power-on weight (affected by switch-on)	FLOAT	4	rwP	0	Depends on specification in DR 3	Depends on specification in DR 3	1222
Zero weight (semi-automatic) (Page 99)	Current zero weight (semi-automatic)	FLOAT	4	rwP	0	Depends on specification in DR 3	Depends on specification in DR 3	1224
Current zero tracking weight (Page 100)	Current zero weight (zero adjustment)	FLOAT	4	rwP	0	Depends on specification in DR 3	Depends on specification in DR 3	1226

Variable	Note	Type	Length (bytes)	Read/ write protection	Default	Min.	Max.	Modbus Register
Dead load (Page 100)	Dead load calculated during automatic calibration	FLOAT	4	r	0	Depends on specification in DR 3	Depends on specification in DR 3	1228
Reserve 1	Reserve	SHORT	2	rw	0	-	-	1230
Reserve 2	Reserve	USHORT	2	rw	0	-	-	1231
Reserve 3	Reserve	FLOAT	4	rw	0	-	-	1232

11.7.1 Effective tare weight - from specification 1, 2 or 3

Up to three tare weights can be specified in the DR 15 data record. You activate a specified tare weight with a command (see commands 1013, 1014, 1015). From this point on, the activated tare weight is factored into the weight calculations. The "Delete tare" command deactivates the active tare weight. This does not delete the specification in data record DR 15.

11.7.2 Effective tare weight (semi-automatic)

The corresponding command (see command 1011) applies the current gross weight as the active tare weight. From this point on, the activated tare weight is factored into the weight calculations. The "Delete tare" command deactivates the active tare weight.

11.7.3 Zero by power-on (value when switching on)

If the automatic zero by power-on is configured, the scale is automatically set to "Zero" when the power supply is switched on provided the gross weight is within the defined zero setting limits. The current gross weight is saved as the zero by power-on weight. The zero by power-on weight must be within the specified range (usually ± 10 %).

11.7.4 Zero weight (semi-automatic)

The zero weight command (see command 1001) entered by the user sets the current gross weight to "Zero" provided it is within the defined zero setting limits. The current gross weight is saved as the zero weight. The zeroing weight must be within the specified range (usually +3 / -1 % of the set zero point).

11.7.5 Current zero tracking weight

The current zero tracking weight is recorded in this parameter if automatic zero tracking is activated.

11.7.6 Dead load

The characteristic curve of the scales is determined during calibration. When there is no load, the main display returns "0". The dead load is the weight of the empty scales, i.e. the weight of the scales themselves.

11.8 DR 6 limit value settings

The switch-on and switch-off values for the limits are configured in data record DR 6.

In legal trade operation, the data record is not write-protected.

Procedure

- Check all parameters and modify them as required
- Transfer the data record to the scales

Table 11- 7 Assignment of data record 6

Variable	Note	Type	Length (bytes)	Rw	Default	Min.	Max.	Modbus Register
Data record number	Contains no. of data record	USHORT	2	r	6	-	-	1234
Length	Data record length information	USHORT	2	r	60	-	-	1235
Application	Information about which application the DR belongs to	USHORT	2	r	101	-	-	1236
Version identifier	Information about the current data record version	USHORT	2	r	1	1	65635	1237
Basis of limits	Gross / net basis of limit values 1 and 2 0: Limit value 1 and limit value 2 are based on the gross value 1: Limit value 1 and limit value 2 are based on the net value	USHORT	2	rw	0	0	1	1238
Reserve 1	Reserve	USHORT	2	rw	0	0	-	1239
Limit value 1 ON, limit value 2 ON, limit value 1 OFF, limit value 2 OFF (Page 103)	Switch-on point for limit value 1 (% of measuring range)	FLOAT	4	rw	0	maxi-mum num-ber range	maxi-mum num-ber range	1240
Delay time for limit value 1 ON, delay time for limit value 2 ON (Page 104)	Time for delayed switch-on of limit value 1 in ms	TIME	4	rw	0	0	maxi-mum num-ber range+	1242

Variable	Note	Type	Length (bytes)	Rw	Default	Min.	Max.	Modbus Register
Limit value 1 ON, limit value 2 ON, limit value 1 OFF, limit value 2 OFF (Page 103)	Switch-off point for limit value 1 (% of measuring range)	FLOAT	4	rw	0	maxi-mum num-ber range	maxi-mum num-ber range	1244
Delay time for limit value 1 OFF, delay time for limit value 2 OFF (Page 104)	Time for delayed switch-off of limit value 1 in ms	TIME	4	rw	0	0	maxi-mum num-ber range+	1246
Limit value 1 ON, limit value 2 ON, limit value 1 OFF, limit value 2 OFF (Page 103)	Switch-on point for limit value 2 (% of measuring range)	FLOAT	4	rw	0	maxi-mum num-ber range	maxi-mum num-ber range	1248
Delay time for limit value 1 ON, delay time for limit value 2 ON (Page 104)	Time for delayed switch-on of limit value 2 in ms	TIME	4	rw	0	0	maxi-mum num-ber range+	1250
Limit value 1 ON, limit value 2 ON, limit value 1 OFF, limit value 2 OFF (Page 103)	Switch-off point for limit value 2 (% of measuring range)	FLOAT	4	rw	0	maxi-mum num-ber range	maxi-mum num-ber range	1252
Delay time for limit value 1 OFF, delay time for limit value 2 OFF (Page 104)	Time for delayed switch-off of limit value 2 in ms	TIME	4	rw	0	0	maxi-mum num-ber range+	1254
Limit value "Empty" ON (Page 104)	Limit value "empty" ON (always based on gross value) (% of measuring range)	FLOAT	4	rw	0	maxi-mum num-ber range	maxi-mum num-ber range	1256
Delay time for limit value "Emp-ty" ON (Page 104)	Time for delayed switch-on of "Empty" in ms	TIME	4	rw	0	0	maxi-mum num-ber range+	1258

Variable	Note	Type	Length (bytes)	Rw	Default	Min.	Max.	Modbus Register
Reserve 2	Reserve	USHORT	2	rw	0	-	-	1260
Reserve 3	Reserve	USHORT	2	rw	0	-	-	1261
Reserve 4	Reserve	FLOAT	4	rw	0	-	-	1262

11.8.1 Limit value 1 ON, limit value 2 ON, limit value 1 OFF, limit value 2 OFF

The switch-on and switch-off points can be specified separately for each limit value as a percentage of the measuring range. This allows both minimum and maximum value violation monitoring with hysteresis. A delay time for switch-on and switch-off can also be specified. Either the current net weight or the current gross weight can be selected as the reference value for limits 1 and 2.

Maximum value monitoring is implemented with the following specifications:

- Switch-on value > switch-off value

Minimum value monitoring is implemented with the following specification:

- Switch-on value < switch-off value

The diagram below illustrates the function of limit values 1 and 2.

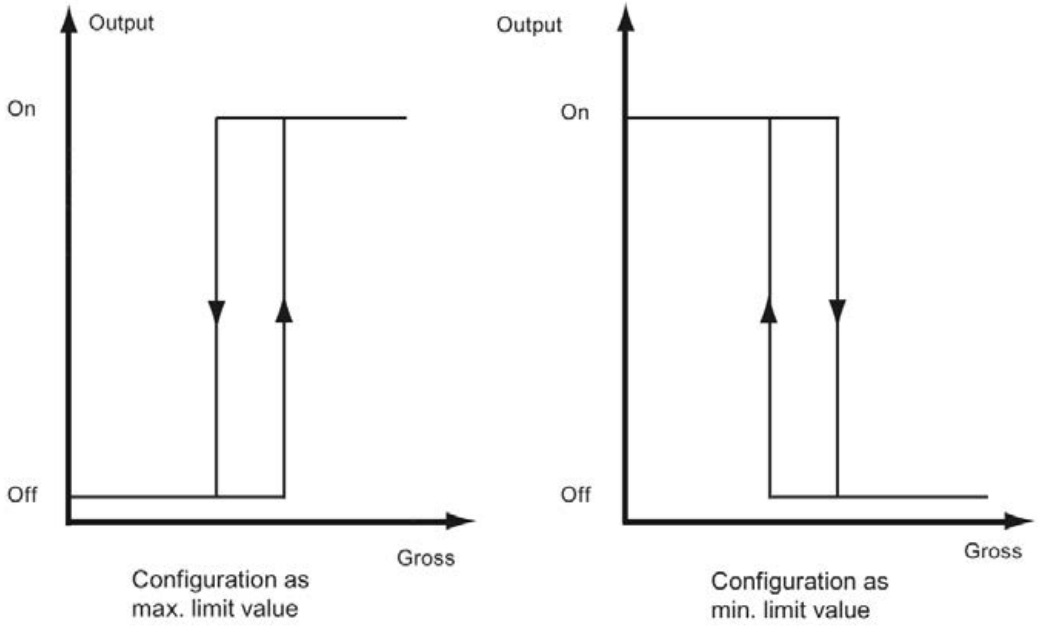


Figure 11-5 Limit value configuration

11.8.2 Delay time for limit value 1 ON, delay time for limit value 2 ON

If the weight reaches the specified switch value, a delay time (defined in ms) is launched. Once the delay time is over, the limit switch changes status provided the weight still reaches the specified switch value.

11.8.3 Delay time for limit value 1 OFF, delay time for limit value 2 OFF

If the weight reaches the specified switch value, a delay time (defined in ms) is launched. Once the delay time is over, the limit switch changes status provided the weight still reaches the specified switch value.

11.8.4 Limit value "Empty" ON

The value for the empty range is a limit value below which the weighing module registers and returns the status "empty". The values are entered as a percentage of the measuring range. The "Empty" limit always refers to the current gross weight in the scale.

11.8.5 Delay time for limit value "Empty" ON

If the weight reaches the specified switch value for scales status "empty", a delay time (defined in ms) is launched. Once the delay time is over, the switch for "empty" status changes status provided the weight still reaches the specified switch value.

11.9 DR 7 interface parameters

Data record DR 7 contains the parameters for defining the properties of the available I/O modules (digital inputs, digital outputs, analog output, serial ports).

If a port is not used, the default values can be retained.

Procedure

- Change the parameters if necessary
- Transfer the data record to the scales

Table 11- 8 Assignment of data record 7

Variable	Note	Type	Length (bytes)	RW	Default	Min.	Max.	Modbus Register
Data record number	Contains no. of data record	USHORT	2	r	7	-	-	1300
Length	Data record length information	USHORT	2	r	60	-	-	1301
Application	Information about which application the DR belongs to	USHORT	2	r	101	-	-	1302
Version identifier	Information about the current data record version	USHORT	2	r	1	1	65635	1303
Assignment for digital input 0, 1, 2, 3 (Page 108)	Assignment for input 0: Code 0: No command assigned 1 … 32767: Command is triggered at a rising edge (0->1 transition)	USHORT	2	rw	0	0	1999	1304
	Assignment for input 1: Code 0: No command assigned 1 … 32767: Command is triggered at a rising edge (0->1 transition)	USHORT	2	rw	0	0	1999	1305
	Assignment for input 2: Code 0: No command assigned 1 … 32767: Command is triggered at a rising edge (0->1 transition)	USHORT	2	rw	0	0	1999	1306
	Assignment for input 3: Code 0: No command assigned 1 … 32767: Command is triggered at a rising edge (0->1 transition)	USHORT	2	rw	0	0	1999	1307

Variable	Note	Type	Length (bytes)	RW	Default	Min.	Max.	Modbus Register
Input filtering (hardware setting) (Page 108)	0: 0.2 ms 1: 0.2 ms 2: 0.4 ms 3: 0.8 ms 4: 1.6 ms 5: 3.2 ms 6: 6.4 ms 7: 12.8 ms	USHORT	2	rw	5	0	7	1308
Assignment for digital output 0, 1, 2, 3 (Page 109)	Assignment for output 0: Code 0 … 0x1F hex: Bit no. of the status flags from byte 0 to 3 (DR 30) Code 0x21 hex: Data record 18 Code 0x22 hex: S7 I/O modules Code 0xFF hex: Output always disabled	USHORT	2	rw	0	0	0xFFFF	1309
	Assignment for output 1: (see output 0)	USHORT	2	rw	0	0	0xFFFF	1310
	Assignment for output 2: (see output 0)	USHORT	2	rw	0	0	0xFFFF	1311
	Assignment for output 3: (see output 0)	USHORT	2	rw	0	0	0xFFFF	1312
Response of digital outputs to faults or SIMATIC STOP (Page 109)	Response of digital outputs following module fault or CPU STOP: 0: Outputs are switched off 1: Outputs are not switched off, continue 2: The relevant substitute value is activated 3: The outputs are switched on	USHORT	2	rw	0	0	0	1313
Substitute value for DQ 0, 1, 2, 3 following fault or SIMATIC STOP (Page 109)	Substitute value for DQ 1 following fault or SIMATIC CPU STOP	BIT	0	rw	0	0	1	1314.16
	Substitute value for DQ 2 following fault or SIMATIC CPU STOP	BIT	0	rw	0	0	1	1314.15
	Substitute value for DQ 3 following fault or SIMATIC CPU STOP	BIT	0	rw	0	0	1	1314.14
	Substitute value for DQ 4 following fault or SIMATIC CPU STOP	BIT	0	rw	0	0	1	1314.13
Bit 4	Reserve	BIT	0	rw	0	0	1	1314.12

Variable	Note	Type	Length (bytes)	RW	Default	Min.	Max.	Modbus Register
Bit 5	Reserve	BIT	0	rw	0	0	1	1314.11
Bit 6	Reserve	BIT	0	rw	0	0	1	1314.10
Bit 7	Reserve	BIT	0	rw	0	0	1	1314.9
Bit 8	Reserve	BIT	0	rw	0	0	1	1314.8
Bit 9	Reserve	BIT	0	rw	0	0	1	1314.7
Bit 10	Reserve	BIT	0	rw	0	0	1	1314.6
Bit 11	Reserve	BIT	0	rw	0	0	1	1314.5
Bit 12	Reserve	BIT	0	rw	0	0	1	1314.4
Bit 13	Reserve	BIT	0	rw	0	0	1	1314.3
Bit 14	Reserve	BIT	0	rw	0	0	1	1314.2
Bit 15	Reserve	BIT	2	rw	0	0	1	1314.1
Analog output range (Page 110)	0: 0 … 20 mA 1: 4 … 20 mA	USHORT	2	rw	0	0	1	1315
Analog output source (Page 110)	Basis of analog value output: 0 = G/N value 1 = Gross 2 = Net 3 = Ext. specification, DR 17 4 = Ext. specification, S7 interface	USHORT	2	rw	2	0	3	1316
Response of analog output to faults or SIMATIC STOP (Page 111)	0: Switch off 1: Continue 2: Output configured output value 3: Output maximum value (24 mA, NAMUR)	USHORT	2	rw	0	0	3	1317
Start value for the analog output (Page 111)	Value at which 0 …4 mA is to be output	FLOAT	4	rw	0	maximum weighing range	maximum weighing range	1318
End value for the analog output (Page 111)	Value at which 20 mA is to be output	FLOAT	4	rw	0	maximum weighing range	maximum weighing range	1320
Output value following fault or SIMATIC STOP (Page 111)	Value to be output when the OutDis signal is enabled (in mA)	FLOAT	4	rw	0	0	24	1322
Trace recording cycle (Page 112)	1: 10 ms 10: 100 ms 100: 1 s 1 000: 10 s	USHORT	2	rw	1	1	1000	1324

Variable	Note	Type	Length (bytes)	RW	Default	Min.	Max.	Modbus Register
Trace storage method, bit 0	0: Trace recording runs as a circular buffer 1: Trace is stopped when the trace memory is full	BIT	0	rw	0	0	1	1325.16
Bit 1	Reserve	BIT	0	rw	0	0	1	1325.15
Bit 2	Reserve	BIT	0	rw	0	0	1	1325.14
Bit 3	Reserve	BIT	0	rw	0	0	1	1325.13
Bit 4	Reserve	BIT	0	rw	0	0	1	1325.12
Bit 5	Reserve	BIT	0	rw	0	0	1	1325.11
Bit 6	Reserve	BIT	0	rw	0	0	1	1325.10
Bit 7	Reserve	BIT	1	rw	0	0	1	1325.9
Bit 8	Reserve	BIT	0	rw	0	0	1	1325.8
Bit 9	Reserve	BIT	0	rw	0	0	1	1325.7
Bit 10	Reserve	BIT	0	rw	0	0	1	1325.6
Bit 11	Reserve	BIT	0	rw	0	0	1	1325.5
Bit 12	Reserve	BIT	0	rw	0	0	1	1325.4
Bit 13	Reserve	BIT	0	rw	0	0	1	1325.3
Bit 14	Reserve	BIT	0	rw	0	0	1	1325.2
Bit 15	Reserve	BIT	1	rw	0	0	1	1325.1
Reserve 1	Reserve	LONG	4	rw	0	0	-	1326
Reserve 2	Reserve	FLOAT	4	rw	0	0	-	1328

11.9.1 Assignment for digital input 0, 1, 2, 3

A command trigger can be assigned to a digital input. This is done on the basis of the command number: → Command lists (Page 69).

Assignment for input 0, 1, 2, 3:

Code	Assignment
0	Not assigned
10 001 ... 12 000	Command code is triggered at a falling edge (1->0 transition)

11.9.2 Input filtering (hardware setting)

To ensure that the inputs do not respond too quickly to the signal change, a minimum signal pending time can be specified. The pending signal is not processed further until this time has elapsed.

The following values can be set:

Value	Signal pending period	Value	Signal pending period
0	0.2 ms	4	1.6 ms
1	0.2 ms	5	3.2 ms
2	0.4 ms	6	6.4 ms
3	0.8 ms	7	12.8 ms

11.9.3 Assignment for digital output 0, 1, 2, 3

A status display can be assigned to a digital input. This is done on the basis of the bit number.

Assignment for output 0, 1, 2, 3:

Code Hex	Status display
0 … 1F	Bit no. of the status flags from byte 0 .. 3 from data record 30
21	Control of output via data record 18
22	Control of output via SIMATIC S7 I/O
Code FF	Output always disabled

11.9.4 Response of digital outputs to faults or SIMATIC STOP

This parameter allows you to define the response of the digital outputs following a fault of the SIWAREX module or SIMATIC STOP.

Value	Response
0	Outputs are switched off
1	Outputs are not switched off (continue)
2	The relevant substitute value is activated
3	Outputs are switched on

11.9.5 Substitute value for DQ 0, 1, 2, 3 following fault or SIMATIC STOP

The outputs are usually reset following a module fault (operating error) or SIMATIC CPU STOP. This response is the default setting.

If an output is to be set following a fault, this response is defined using this parameter. The "Response of digital outputs to fault or SIMATIC STOP" parameter must also be set to "Output substitute value".

The substitute value definition is then valid.

Examples

Table 11- 9 Bit 0 defines digital output 1 (DQ 1)

Value of bit 0	Value of DQ 1 following fault
0	0
1	1

Table 11- 10 Bit 1 defines digital output 2 (DQ 2)

Value of bit 2	Value of DQ 2 following fault
0	0
1	1

NOTICE
Risk to the plant If an output is set following a fault (operating error), this can pose a risk for the plant. Ensure that the parameters are correctly set.

11.9.6 Analog output range

This parameter is used to define the output current range.

Value	Output current
0	0 … 20 mA
1	4 … 20 mA

11.9.7 Analog output source

The analog output can be used for a range of purposes. This parameter defines the tag that controls the analog output.

Value	Basis for the analog output
0	Gross / net value
1	Gross value
2	Net value

Value	Basis for the analog output
3	External specification, DR 17 (Specified in mA)
4	Via SIMATIC S7 I/O modules

11.9.8 Response of analog output to faults or SIMATIC STOP

This parameter defines the response of the analog output following a fault of the SIWAREX module or SIMATIC STOP.

Value	Response
0	Switch off
1	Continue
2	Output configured output value, e.g. 3.5 mA
3	Output maximum value (24 mA, NAMUR)

11.9.9 Start value for the analog output

This parameter defines the specified value at which 0 or 4 mA is output. The value can be greater or less than the end value.

11.9.10 End value for the analog output

This parameter defines the specified value at which 20 mA is output. The value can be greater or less than the start value.

11.9.11 Output value following fault or SIMATIC STOP

The default settings set the analog output to the defined value following a module fault (operating error) or upon SIMATIC CPU STOP.

If the analog output is, for example, to be set to 3.5 mA following a fault, this is defined with this parameter. The current value to be output is entered.

NOTICE
System can be switched to unsafe state If the analog output is to be set to a given value following a fault (operating error), you must ensure that this poses no danger.

11.9.12 Trace recording cycle

The trace function is used for the continuous recording of measured values. The recording rate is defined with the parameter.

Value	Response
1	Recording every 10 ms
10	Recording every 100 ms
100	Recording every second
1 000	Recording every 10 s

11.9.13 Trace storage method

This parameter is used to specify the response of the trace memory.

Value	Response
0	Trace recording runs as circulating memory
1	Trace is stopped when the trace memory is full

11.10 DR 8 date and time

The weighing module has its own hardware clock. The current date and time are specified by or read from data record DR 8. The clock is buffered with a capacitor and can continue operating for up to approximately 70 hours without a supply voltage. If you are using the Modbus protocol, data record DR 48 must be used for the date and time.

Procedure

- Set the date and time
- Transfer the data record to the scales

Table 11- 11 Assignment of data record 8

Variable	Note	Type	Length (bytes)	Rw	Default	Min.	Max.	Modbus registers
Data record number	Contains no. of data record	USHORT	2	r	8	-	-	1330
Length	Data record length information	USHORT	2	r	16	-	-	1331
Application	Information about which application the DR belongs to	USHORT	2	r	101	-	-	1332
Version identifier	Information on current data record version	USHORT	2	r	1	1	65635	1333
Date and time	SIMATIC DTL format	DTL	12	rw	DTL#1970-01-01-00:00:00.0	-	-	1334

11.11 DR 9 module information

No entries can be made in data record DR 9. This data record provides information on the inner workings of the SIWAREX module. This information is used to identify the module at the manufacturer plant (e.g. in the event of repairs). The entries in the data record are of no importance to the user for operation.

Table 11- 12 Assignment of data record 9

Variable	Note	Type	Length (bytes)	Rw	Default	Min.	Max.	Modbus registers
Data record number	Contains no. of data record	USHORT	2	r	9	-	-	1340
Length	Data record length information	USHORT	2	r	68	-	-	1341
Application	Information on which application the DR belongs to	USHORT	2	r	101	-	-	1342
Version identifier	Information on the current data record version	USHORT	2	r	1	1	65635	1343
Order No. - header	Maximum and current string length for the order number	UBYTE[2]	2	r	16,16	-	-	1344
Order No.	Order number of the module 7MH ..	CHAR[16]	16	r	"7MH …"	-	-	1345
Serial number - header	String header	UBYTE[2]	2	r	12,12	-	-	1352
Serial number	Serial number " XXX00001"	CHAR[12]	12	r	" "	-	-	1353
Firmware type - header	String header	UBYTE[2]	2	r	2,2	-	-	1359
Firmware type	Reference V - Release B - Test etc.	CHAR[2]	2	r	'V '	-	-	1360
Firmware version - 1st position	Version 1.	USHORT	2	r	0	-	-	1361
Firmware version - 2nd position	Version 2.	USHORT	2	r	0	-	-	1362
Firmware version - 3rd position	Version 3.	USHORT	2	r	0	-	-	1363
Hardware version number	ES hardware version number (e.g. 03)	USHORT	2	r	1	-	-	1364

Variable	Note	Type	Length (bytes)	Rw	Default	Min.	Max.	Modbus registers
OS version header	String header	UBYTE[2]	2	r	1,1	-	-	1365
OS version (loader) - designation	Reference V - Release B - Test etc.	CHAR[2]	2	r	'V '	-	-	1366
OS version (loader) - designation	e.g. version n	USHORT	2	r	'V '	-	-	1367
DRAM memory	Flash memory	USHORT	2	r	0	-	-	1368
Flash memory	MRAM memory	USHORT	2	r	0	-	-	1369
MRAM memory	Memory type	USHORT	2	r	0	-	-	1370
Reserve 1	0	FLOAT	4	r	0	-	-	1371

11.12 DR 10 load cell parameters

11.12.1 Overview

The parameters of the analog load cells must be checked prior to the automatic calibration and modified if necessary. Only the parameters identified by bold font and asterisk (*) need be entered.

Procedure

- Check the parameters and modify them as required
- Transfer the data record to the scales
- Adjust the scales

Table 11- 13 Assignment of data record 10

Variable	Note	Type	Length (bytes)	Rw	Default	Min.	Max.	Modbus registers
Data record number	Contains no. of data record	USHORT	2	r	10	-	-	1400
Length	Data record length information	USHORT	2	r	44	-	-	1401
Application	Information about which application the DR belongs to	USHORT	2	r	101	-	-	1402
Version identifier	Information on current data record version	USHORT	2	r	1	1	65635	1403
Number of load cells[1)]	Number of analog load cells (internal variable)	USHORT	2	rw	1	1	6	1404
50/60 Hz toggling (Page 117)	50/60 Hz toggling	USHORT	2	rw	0	0	1	1405
Number of support points (Page 117) [1)]	Number of support points	USHORT	2	rw	0	0	8	1406
	Reserve	USHORT	2	rw	0	0	0	1407
Load cell characteristic value (Page 117) [1)]	Characteristic value of the load cell (n) [mV/V], the mean value is used if there is more than one cell.	FLOAT	4	rw	2	>0.1	10	1408
Zero point offset[1)]	Zero point offset in uV/V, the mean value is used if there is more than one cell. (internal variable)	FLOAT	4	rw	0	-1000	1000	1410
Rated load of a load cell (Page 117) [1)]	Rated load of a load cell	FLOAT	4	rw	60	-	-	1412

Variable	Note	Type	Length (bytes)	Rw	Default	Min.	Max.	Modbus registers
Reserve	Reserve	FLOAT	4	rw	0	-	-	1414
Reserve	Reserve	FLOAT	4	rw	0	-	-	1416
Reserve 2	Reserve	SHORT	2	rw	0	-	-	1418
Reserve 3	Reserve	USHORT	2	rw	0	-	-	1419
Reserve 4	Reserve	FLOAT	4	rw	0	-	-	1420

[1] Parameter for calculation of calibration points with theoretical calibration

11.12.2 50/60 Hz toggling

To improve the suppression of faults caused by the supply network, you can specify the network frequency for signal filtering.

11.12.3 Number of support points

If no anchor points are used, the number of support points is equal to the number of load cells.

If anchor points are used in addition to load cells, the number of support points is equal to the total number of load cells and fixed support points.

11.12.4 Load cell characteristic value

The load cell characteristic value is required to correctly interpret the output voltage from the load cell. This specification is also necessary for determining load cell overload. The exact value can be entered if the measurement log for the load cell is available. The mean value can be entered if there is more than one load cell.

Example

Characteristic value = 2.018 mV/V

11.12.5 Rated load of a load cell

The rated load of a load cell is required for checking the maximum weighing range of the scales. The rated load is entered in the specified units of weight.

11.13 DR 12 Ethernet parameters

11.13.1 Overview

Before the SIWAREX module can be integrated into an Ethernet network, the Ethernet parameters need to be configured.

Table 11- 14 Assignment of data record 12

Variable	Note	Type	Length (bytes)	Rw	Default	Min.	Max.	Modbus registers
Data record number	Contains no. of data record	USHORT	2	r	12	-	-	1500
Length	Data record length information	USHORT	2	r	116	-	-	1501
Application	Information about which application the DR belongs to	USHORT	2	r	101	-	-	1502
Version identifier	Information on current data record version	USHORT	2	r	1	1	65635	1503
Device MAC address (Page 119)	Device MAC address 1	USHORT	2	r		0	FF	1504
	Device MAC address 2	USHORT	2	r		0	FF	1505
	Device MAC address 3	USHORT	2	r		0	FF	1506
	Device MAC address 4	USHORT	2	r		0	FF	1507
	Device MAC address 5	USHORT	2	r		0	FF	1508
	Device MAC address 6	USHORT	2	r		0	FF	1509
Port MAC address (Page 119)	Port MAC address 1	USHORT	2	r		0	FF	1510
	Port MAC address 2	USHORT	2	r		0	FF	1511
	Port MAC address 3	USHORT	2	r		0	FF	1512
	Port MAC address 4	USHORT	2	r		0	FF	1513
	Port MAC address 5	USHORT	2	r		0	FF	1514
	Port MAC address 6	USHORT	2	r		0	FF	1515
IP address (Page 119)	IP address x.n.n.n	USHORT	2	r		0	255	
	IP address n.x.n.n	USHORT	2	r		0	255	
	IP address n.n.x.n	USHORT	2	r		0	255	
	IP address n.n.n.x	USHORT	2	r		0	255	
Subnet mask (Page 119)	Subnet mask x.n.n.n	USHORT	2	r		0	255	
	Subnet mask n.x.n.n	USHORT	2	r		0	255	
	Subnet mask n.n.x.n	USHORT	2	r		0	255	
	Subnet mask n.n.n.x	USHORT	2	r		0	255	
Gateway	Gateway x.n.n.n	USHORT	2	r		0	255	
	Gateway n.x.n.n	USHORT	2	r		0	255	

Variable	Note	Type	Length (bytes)	Rw	Default	Min.	Max.	Modbus registers
	Gateway n.n.x.n	USHORT	2	r		0	255	
	Gateway n.n.n.x	USHORT	2	r		0	255	
Device name (Page 120)	Current device name header	UBYTE[2]	2	rw				
	Current device name	CHAR[32]	32	rw				
Reserve 1	Reserve	SHORT	2	r				
Reserve 2	Reserve	FLOAT	4	r				
Reserve 3	Reserve	FLOAT	4	r				

11.13.2 Device MAC address

Each SIWAREX module has a unique MAC address. This MAC address cannot be changed by the user.

11.13.3 Port MAC address

Each SIWAREX module has a unique MAC port address. This MAC address cannot be changed by the user.

11.13.4 IP address

Assign the IP address using the Primary Setup Tool, SIWATOOL, or via the SIMATIC (see chapter "IP address for SIWAREX (Page **Fehler! Textmarke nicht definiert.**)").

11.13.5 Subnet mask

Assign the subnet mask of your network.

11.13.6 Gateway

If a gateway is used between the SIWAREX WP231 and the communication partner, enter the gateway address here.

If a gateway is not present, enter the IP address of the SIWAREX module.

11.13.7 Device name

This parameter can be used to assign a name to the weighing module in the Ethernet network. The length of the name is limited to 32 characters. Empty spaces must be filled by "x".

11.14 DR 13 RS485 parameters

11.14.1 Overview

The parameters which define the response of the RS485 interface are specified in data record DR 13. If the interface is not used, the default values can be retained.

Procedure

- Check the parameters and modify them as required
- Transfer the data record to the scales

Table 11- 15 Assignment of data record 13

Variable	Note	Type	Length (bytes)	Rw	Default	Min.	Max.	Modbus registers
Data record number	Contains no. of data record	USHORT	2	r	13	-	-	1558
Length	Data record length information	USHORT	2	r	24	-	-	1559
Application	Information on which application the data record belongs to	USHORT	2	r	101	-	-	1560
Version identifier	Information on current data record version	USHORT	2	r	1	1	65635	1561
RS485 protocol (Page 122)	0: No protocol 1: MODBUS RTU 2: SIEBERT display	USHORT	2	rw	1	0	2	1562
RS485 baud rate (Page 123)	0: 1 200 bps 1: 2 400 bps 2: 9 600 bps 3: 19 200 bps 4: 38 400 bps 5: 57 600 bps 6:115 000 bps	USHORT	2	rw	3	0	6	1563
RS485 character parity (Page 123)	Character parity 0: Even 1: Odd	BIT	0	rw	0	0	1	1564.16
RS485 number of data bits (Page 123)	Number of data bits per character 0: 7 data bits 1: 8 data bits	BIT	0	rw	0	0	1	1564.15
RS485 number of stop bits (Page 123)	Number of stop bits 0: 1 stop bit 1: 2 stop bits	BIT	0	rw	0	0	1	1564.14

Variable	Note	Type	Length (bytes)	Rw	Default	Min.	Max.	Modbus registers
Bit 3	Reserve	BIT	0	rw	0	0	1	1564.13
Bit 4	Reserve	BIT	0	rw	0	0	1	1564.12
Bit 5	Reserve	BIT	0	rw	0	0	1	1564.11
Bit 6	Reserve	BIT	0	rw	0	0	1	1564.10
Bit 7	Reserve	BIT	0	rw	0	0	1	1564.9
Bit 8	Reserve	BIT	0	rw	0	0	1	1564.8
Bit 9	Reserve	BIT	0	rw	0	0	1	1564.7
Bit 10	Reserve	BIT	0	rw	0	0	1	1564.6
Bit 11	Reserve	BIT	0	rw	0	0	1	1564.5
Bit 12	Reserve	BIT	0	rw	0	0	1	1564.4
Bit 13	Reserve	BIT	0	rw	0	0	1	1564.3
Bit 14	Reserve	BIT	0	rw	0	0	1	1564.2
Bit 15	Reserve	BIT	2	rw	0	0	1	1564.1
RS485 Modbus address (Page 123)	MODBUS address for Vito module	USHORT	2	rw	20	1	255	1565
Decimal place for Siebert indicator (Page 124)	Decimal place for Siebert display	SHORT	2	rw	0	-	-	1566
MODBUS RTU frame delay	Delay time for response with MODBUS RTU in ms (RS485)	USHORT	2	rw	0	-	-	1567
Reserve 3	Reserve	FLOAT	4	rw	0	-	-	1568

11.14.2 RS485 protocol

This parameter defines the protocol for communication via the RS485 interface.

Value	Protocol
0	No communication/protocol
1	Modbus RTU
2	SIEBERT display

11.14.3 RS485 baud rate

This parameter defines the baud rate for the RS485 interface.

Value	Baud rate
0	1 200 bps
1	2 400 bps
2	9 600 bps
3	19 200 bps
4	38 400 bps
5	57 600 bps
6	115 000 bps

11.14.4 RS485 character parity

This parameter defines the character parity for the RS485 interface.

Value	Character parity
0	Even
1	Odd

11.14.5 RS485 number of data bits

This parameter defines the number of data bits for the RS485 interface.

Value	Data bits
0	7
1	8

11.14.6 RS485 number of stop bits

This parameter defines the number of stop bits for the RS485 interface.

Value	Stop bits
0	1
1	2

11.14.7 RS485 Modbus address

This parameter defines the Modbus address (1 to 230) for communication via the RS485 interface with the Modbus protocol.

11.14.8 Decimal place for Siebert indicator

A fixed decimal place must be specified if a Siebert indicator is used. The following values are permitted: 0 ... 4

11.15 DR 14 SIMATIC interface parameters

11.15.1 Overview

The parameters which define the response of the SIMATIC interface are specified in data record DR 14. It is possible to define the process values to be output on the basis of the I/O area.

Procedure

- Check the parameters and modify them as required
- Transfer the data record to the scales

Table 11- 16 Assignment of data record 14

Variable	Note	Type	Length (bytes)	Rw	Default	Min.	Max.	Modbus registers
Data record number	Contains no. of data record	USHORT	2	r	14	-	-	1570
Length	Data record length information	USHORT	2	r	16	-	-	1571
Application	Information about which application the DR belongs to	USHORT	2	r	101	-	-	1572
Version identifier	Information on current data record version	USHORT	2	r	1	1	65635	1573
Selection of process value 1, 2 (Page 126)	Selection of process value 1 (S7 I/O interface): Code for selection of process variable to be updated	USHORT	2	rw	4	0	10	1574

Variable	Note	Type	Length (bytes)	Rw	Default	Min.	Max.	Modbus registers
	Selection of process value 2 (S7 I/O interface): Code for selection of process variable to be updated	USHORT	2	rw	6	0	10	1575
Reserve 1	Reserve	SHORT	2	rw	0	0	-	1576
Reserve 2	Reserve	USHORT	2	rw	0	0	-	1577

11.15.2 Selection of process value 1, 2

The weighing module can communicate with an S7-1200 CPU in two ways: Just via the I/O or by reading out complete data records. The I/O is faster and exhibits a higher performance. Two free-definable channels are available in the S7 I/O (process value 1 and process value 2). Users can decide which scale values (see table) are to be made available cyclically at these two parameters of the PLC.

Table 11- 17 Selection table for process value 1,2

Process value	Decimal code	From DR	Format
No process selected	0	-	-
Gross process	1	30	FLOAT
Net process	2	30	FLOAT
Tare process	3	30	FLOAT
Legal trade G/N weight	4	30	FLOAT
G/N weight_x10	5	30	FLOAT
Legal trade tare weight	6	30	FLOAT
Gross-2-process-value	7	30	FLOAT
Net-2-process-value	8	30	FLOAT
Unfiltered digit value	9	31	LONG
Filtered digit value	10	31	LONG
Filtered digit value 2	11	31	LONG
Refresh counter	12	30	USHORT
Status of analog output, digital outputs, and digital inputs	13	31	WORD, BYTE

Table 11- 18 Structure of status of analog output, digital outputs, and digital inputs

Byte 0 of dw_ProcessValue1/2	Byte 1 of dw_ProcessValue1/2	Byte 2 of dw_ProcessValue1/2	Byte 3 of dw_ProcessValue1/2
Analog output digits HIGH	Analog output digits LOW	Status of digital outputs	Status of digital inputs
WORD		Bit 0 = status DQ 0	Bit 0 = status DI 0
		Bit 1 = status DQ 1	Bit 1 = status DI 1
		Bit 2 = status DQ 2	Bit 2 = status DI 2
		Bit 3 = status DQ 3	Bit 3 = status DI 3

See also

Information about previous versions (Page **Fehler! Textmarke nicht definiert.**)

11.16 DR 15 tare settings

11.16.1 Overview

Data record DR 15 is used for the external specification of up to 3 tare weights.

Procedure

- Enter the tare weight(s)
- Transfer the data record to the scales
- Enable a tare weight with a command

Table 11- 19 Assignment of data record 15

Variable	Note	Type	Length (bytes)	Rw	Default	Min.	Max.	Modbus registers
Data record number	Contains no. of data record	USHORT	2	r	15	-	-	1578
Length	Data record length information	USHORT	2	r	28	-	-	1579
Application	Information about which application the DR belongs to	USHORT	2	r	101	-	-	1580
Version identifier	Information on current data record version	USHORT	2	r	1	1	65635	1581
Specification of tare weight 1, 2, 3 (Page 129)	Tare setting memory 1	FLOAT	4	rw	0	0	Depends on specification in DR 3	1582
	Tare setting memory 2	FLOAT	4	rw	0	0	Depends on specification in DR 3	1584
	Tare setting memory 3	FLOAT	4	rw	0	0	Depends on specification in DR 3	1586
Reserve 1	Reserve	SHORT	2	rw	0	0	-	1588
Reserve 2	Reserve	USHORT	2	rw	0	0	-	1589
Reserve 3	Reserve	FLOAT	4	rw	0	0	-	1590

11.16.2 Specification of tare weight 1, 2, 3

Up to three tare weights can be entered. If a tare weight is to be applied, it must be enabled with the corresponding command. The tare weights may not exceed the maximum values specified in data record DR 3.

11.17 DR 16 simulation value

11.17.1 Overview

Specifying a weight value using data record DR 16 disables the measuring input of the SIWAREX module and "simulates" a weight with the specified value. The SIWAREX module must first be released for simulation mode in DR 3 and then switched to simulation mode with command no. 3.

Procedure

- Release simulation mode in DR 3
- Enter the weight to be simulated
- Transfer the data record to the SIWAREX module
- Start the simulation using command "Weight simulation on (3)"
- Stop the simulation using command "Weight simulation off (4)"

Table 11- 20 Assignment of data record 16

Variable	Note	Type	Length (bytes)	Rw	Default	Min.	Max.	Modbus registers
Data record number	Contains no. of data record	USHORT	2	r	16	-	-	1592
Length	Data record length information	USHORT	2	r	16	-	-	1593
Application	Information about which application the data record belongs to	USHORT	2	r	101	-	-	1594
Version identifier	Information about current data record version	USHORT	2	r	1	1	65635	1595
Weight simulation specification (Page 130)	Weight value specification (only relevant if simulation mode is enabled)	FLOAT	4	rw	0	maximum weighing range	maximum weighing range	1596
Reserve 1	Reserve	SHORT	2	rw	0	0	-	1598
Reserve 2	Reserve	USHORT	2	rw	0	0	-	1599

11.17.2 Weight simulation specification

Only use weight simulation values which are within the measuring range of the scales. The word "TEST" is displayed on the main display during simulation and a status bit is set. From the start of simulation onward, all parameterized limits, inputs and outputs etc. refer to the simulation weight.

11.18 DR 17 analog output control specifications

11.18.1 Overview

If data record DR 17 is configured as the source for the analog output (see Analog output source (Page 110)), specifying a control output sends a corresponding output current at the analog output.

Procedure

- In data record DR 7, check that "Control by DR17" has been configured as the source for the analog output
- Check the analog output configuration (see Analog output source (Page 110))
- Enter a value in data record DR 17
- Transfer the data record to the scales

Table 11- 21 Assignment of data record 17

Variable	Note	Type	Length (bytes)	Rw	Default	Min.	Max.	Modbus registers
Data record number	Contains no. of data record	USHORT	2	r	17	-	-	1600
Length	Data record length information	USHORT	2	r	16	-	-	1601
Application	Information about which application the data record belongs to	USHORT	2	r	101	-	-	1602
Version identifier	Information about current data record version	USHORT	2	r	1	1	65635	1603
Analog output specification (Page 131)	Value which is to be output (only relevant if source is "External specification", see DR 7)	FLOAT	4	rw	0	-	-	1604
Reserve 1	Reserve	SHORT	2	rw	0	0	-	1606
Reserve 2	Reserve	USHORT	2	rw	0	0	-	1607

11.18.2 Analog output specification

The value to be entered must be between the start value (Page 111) and the end value (Page 111) of the analog output.

11.19 DR 18 digital output control specifications

11.19.1 Overview

If a digital output is defined in data record DR 7 for control with data record DR 18 (see Assignment for digital output 0, 1, 2, 3 (Page 109)), you can control this output with data record DR 18. Transfer is always for all four digital outputs. Only outputs which are configured for control by DR 18 (see DR 7 interface parameters (Page 105)) are enabled or disabled in accordance with the content of data record DR 18.

Procedure

- Check or adapt the desired parameter settings of the digital outputs in data record 7
- Define the value for digital output 0, 1, 2, 3
- Transfer the data record to the scales

Table 11- 22 Assignment of data record 18

Variable	Note	Type	Length (bytes)	Rw	Default	Min.	Max.	Modbus registers
Data record number	Contains no. of data record	USHORT	2	r	18	-	-	1608
Length	Data record length information	USHORT	2	r	12	-	-	1609
Application	Information about which application the DR belongs to	USHORT	2	r	101	-	-	1610
Version identifier	Information on current data record version	USHORT	2	r	1	1	65635	1611
Specification for digital output 0, 1, 2, 3 (Page 133)	Specification for digital output 0=1 -> DA0 output enabled (only applies if output is assigned code 21, see DR 7)	BIT	0	rw	0	0	1	1612.16
	Specification for digital output 1=1 -> DA1 output enabled (only applies if output is assigned code 21, see DR 7)	BIT	0	rw	0	0	1	1612.15
	Specification for digital output 2=1 -> DA2 output enabled (only applies if output is assigned code 21, see DR 7)	BIT	0	rw	0	0	1	1612.14

Variable	Note	Type	Length (bytes)	Rw	Default	Min.	Max.	Modbus registers
	Specification for digital output 3=1 -> DA3 output enabled (only applies if output is assigned code 21, see DR 7)	BIT	0	rw	0	0	1	1612.13
Bit 4	Reserve	BIT	0	rw	0	0	1	1612.12
Bit 5	Reserve	BIT	0	rw	0	0	1	1612.11
Bit 6	Reserve	BIT	0	rw	0	0	1	1612.10
Bit 7	Reserve	BIT	0	rw	0	0	1	1612.9
Bit 8	Reserve	BIT	0	rw	0	0	1	1612.8
Bit 9	Reserve	BIT	0	rw	0	0	1	1612.7
Bit 10	Reserve	BIT	0	rw	0	0	1	1612.6
Bit 11	Reserve	BIT	0	rw	0	0	1	1612.5
Bit 12	Reserve	BIT	0	rw	0	0	1	1612.4
Bit 13	Reserve	BIT	0	rw	0	0	1	1612.3
Bit 14	Reserve	BIT	0	rw	0	0	1	1612.2
Bit 15	Reserve	BIT	2	rw	0	0	1	1612.1
Reserve 1	Reserve	USHORT	2	rw	0	-	-	1613

11.19.2 Specification for digital output 0, 1, 2, 3

Digital outputs 0 to 3 can be controlled using data record 18 with this parameter. This function can be used for commissioning purposes, for example.

11.20 DR 30 current process values

11.20.1 Overview

Current states and process values in the scales can be monitored using process values and advanced process values from data record DR 31. Monitoring selected data during commissioning is extremely useful as it helps you to optimize parameters.

Procedure

- Read data record DR 30 cyclically or on a time-triggered basis
- Display/analyze the required tags

It is not always necessary to cyclically read data record DR 30. If the relevant process tags are already selected in data record DR 14 (Page 125), they are immediately transferred via the I/O interface. In this case, these tags and all status bits and messages are accessible without data record communication.

Table 11- 23 Assignment of data record 30

Variable	Note	Type	Length (bytes)	Rw	Default	Min.	Max.	Modbus registers
Data record number	Contains no. of data record	USHORT	2	r	30	-	-	3000
Length	Data record length information	USHORT	2	r	60	-	-	3001
Application	Information about which application the data record belongs to	USHORT	2	r	101	-	-	3002
Version identifier	Information about current data record version	USHORT	2	r	1	1	255	3003
1/4d zero	Set if gross is less than ± 0.25e	BIT	2	r	0	-	-	3004.16
9e max	Set if the weight of the gross weighing range is exceeded by more than 9 display intervals (d)	BIT	0	r	0	-	-	3004.15
Tared	Set if the tare memory is not equal to zero	BIT	0	r	0	-	-	3004.14
Manual tare 1 set (pT)	Set if the tare memory is assigned an external specified value 1	BIT	0	r	0	-	-	3004.13
Reserve		BIT	0	r	0	-	-	3004.12
Waiting for standstill	Set if module is waiting for standstill to execute command	BIT	0	r	0	-	-	3004.11

Variable	Note	Type	Length (bytes)	Rw	Default	Min.	Max.	Modbus registers
Standstill	Set if standstill condition is met	BIT	0	r	0	-	-	3004.10
		BIT	0	r	0	-	-	3004.9
Empty	Set if "Empty" condition is met	BIT	0	r	0	-	-	3004.8
Limit value 1	Limit value 1 has responded	BIT	0	r	0	-	-	3004.7
Limit value 2	Limit value 2 has responded	BIT	0	r	0	-	-	3004.6
Min violated	Set if min. is violated	BIT	0	r	0	-	-	3004.5
Time incorrect	Time incorrect due to empty buffer. Reset the time.	BIT	0	r	0	-	-	3005.11
Trace enabled	Set if trace is running	BIT	0	r	0	-	-	3005.10
Operator error at digit. input	Set in event of synch. error resulting from command at digit. input	BIT	0	r	0	-	-	3005.9
Calibrated	SIWAREX is calibrated	BIT	0	r	0	-	-	3005.8
Service mode	Service mode is enabled	BIT	0	r	0	-	-	3005.7
Simulation mode	Simulation mode is enabled	BIT	0	r	0	-	-	3005.6
Write protection	Write-protect jumper is enabled	BIT	0	r	0	-	-	3005.5
Analog output disrupted	Analog output fault	BIT	0	r	0	-	-	3005.4
Reserve		BIT	0	r	0	-	-	3005.3
Startup	Restore point startup or restore has taken place, is deleted again after 5 seconds	BIT	0	r	0	-	-	3005.2
Fault status	Operating fault	BIT	0	r	0	-	-	3005.1
1000	Group message "Operating error" present	BIT	2	r	0	-	-	3006.16
Reserve		BIT	0	r	0	-	-	3006.15
1104	Undervoltage	BIT	0	r	0	-	-	3006.14
1105	Overload	BIT	0	r	0	-	-	3006.12
1106	Underload	BIT	0	r	0	-	-	3006.11
1002	RAM error	BIT	0	r	0	-	-	3006.10
1102	ADC error	BIT	0	r	0	-	-	3006.9
1005	Reserved	BIT	0	r	0	-	-	3006.8
1003	Checksum error data	BIT	0	r	0	-	-	3006.7
1107	Reserve	BIT	0	r	0	-	-	3006.6

Variable	Note	Type	Length (bytes)	Rw	Default	Min.	Max.	Modbus registers
1004	Checksum error program	BIT	0	r	0	-	-	3006.5
Reserve	-	BIT	0	r	0	-	-	3006.4
1001	Watchdog	BIT	0	r	0	-	-	3006.3
Reserve	-	BIT	0	r	0	-	-	3006.2
Reserve	-	BIT	0	r	0	-	-	3006.1
2000	Group message "Technological error" present	BIT	2	0	0	-	-	3007.16
2001	Taring or zeroing timeout	BIT	0	r	0	-	-	3007.15
2002	Trace overloaded	BIT	0	r	0	-	-	3007.14
2003	Zeroing not possible	BIT	0	r	0	-	-	3007.13
Gross process weight (Page 137)	Gross weight (process value)	FLOAT	4	r	0	-	-	3008
Net process weight (Page 137)	Net weight (process value)	FLOAT	4	r	0	-	-	3010
Tare process weight (Page 137)	Tare weight (process value)	FLOAT	4	r	0	-	-	3012
Gross / net weight (Page 137)	Gross or net weight	FLOAT	4	r	0	-	-	3014
Gross / net weight with increased resolution (x 10) (Page 137)	Legal trade G/N weight with 10x resolution	FLOAT	4	r	0	-	-	3016
Tare weight (Page 137)	Tare	FLOAT	4	r	0	-	-	3018
Gross process weight (commissioning aid) (Page 138)	Gross weight after dig. filter 2 (process value)	FLOAT	4	r	0	-	-	3020
Net process weight (commissioning aid) (Page 138)	Net weight after dig. filter 2 (process value)	FLOAT	4	r	0	-	-	3022
Refresh counter for process values (Page 138)	Refresh counter incremented by 1 if weight values were changed	USHORT	2	r	0	-	-	3024
Reserve 1	Reserve	SHORT	2	r	0	-	-	3025

Variable	Note	Type	Length (bytes)	Rw	Default	Min.	Max.	Modbus registers
Last report ID (Page 138)	Last generated report ID	ULONG	4	r	0	-	-	3026
Reserve 3	Reserve	FLOAT	4	r	0	-	-	3028

11.20.2 Gross process weight

The current gross weight. Values are rounded as specified in data record DR 3 with the "Decimal places for process values" (Page 87) parameter.

11.20.3 Net process weight

The current net weight. Values are rounded as specified in data record DR 3 with the "Decimal places for process values" (Page 87) parameter.

11.20.4 Tare process weight

The current tare weight. Values are rounded as specified in data record DR 3 with the "Decimal places for process values" (Page 87) parameter.

11.20.5 Gross / net weight

The current weight for the main display. The resolution corresponds to the scale interval (Page 86) specified in data record DR 3.

11.20.6 Gross / net weight with increased resolution (x 10)

The current weight for the main display in higher resolution. The resolution corresponds to the scale interval specified in data record DR 3 x 10.

11.20.7 Tare weight

The current tare weight (scale interval from DR 3). The resolution corresponds to the scale interval specified in data record DR 3.

11.20.8 Gross process weight (commissioning aid)

The current gross weight. Values are rounded as specified in data record DR 3 with the "Decimal places for process values" (Page 87) parameter.

11.20.9 Net process weight (commissioning aid)

The current net weight. Values are rounded as specified in data record DR 3 with the "Decimal places for process values" (Page 87) parameter.

11.20.10 Refresh counter for process values

Measured values are calculated every 10 ms in the SIWAREX module. A counter is incremented by 1 each time. Once the counter reaches the value 65536, it starts again from zero. The counter can be used as a time stamp for data record DR 30.

11.20.11 Last report ID

The last generated report ID is displayed.

11.21 DR 31 advanced current process values

11.21.1 Overview

Current states and process values in the scales can be monitored using advanced process values and process values (DR 30). This data is not required for standard operation of the scales.

Monitoring selected data during trial operation is extremely useful as it helps you to optimize parameters.

Procedure

- Read data record DR 31
- Display/analyze the required tags

Table 11- 24 Assignment of data record 31

Variable	Note	Type	Length (bytes)	Rw	Default	Min.	Max.	Modbus registers
Data record number	Contains no. of data record	USHORT	2	r	31	-	-	3300
Length	Data record length information	USHORT	2	r	32	-	-	3301
Application	Information about which application the data record belongs to	USHORT	2	r	101	-	-	3302
Version identifier	Information about current data record version	USHORT	2	r	1	1	65635	3303
Unfiltered digit value (Page 140)	Unfiltered digit value of AD converters / digital load cells	LONG	4	r	0	-	-	3304
Filtered digit value (Page 140)	Filtered digit value of AD converters / digital load cells after dig. filter 1	LONG	4	r	0	-	-	3306
Filtered digit value (commissioning aid) (Page 140)	Filtered digit value of AD converters / digital load cells after dig. filter 2	LONG	4	r	0	-	-	3308
Reserve		SHORT	2	r	0	-100	100	3310
Digits for analog output (Page 141)	Digit value of the analog output currently being output	USHORT	2	r	0	0	65535	3311
Current status of input 0, 1,	Current status of input 0	BIT	0	r	0	0	1	3312.16
	Current status of input 1	BIT	0	r	0	0	1	3312.15
	Current status of input 2	BIT	0	r	0	0	1	3312.14

Variable	Note	Type	Length (bytes)	Rw	Default	Min.	Max.	Modbus registers
2, 3 (Page 141)	Current status of input 3	BIT	0	r	0	0	1	3312.13
Bit 4	Reserve	BIT	0	r	0	0	1	3312.12
Bit 5	Reserve	BIT	0	r	0	0	1	331211
Bit 6	Position of DIP switch 1	BIT	0	r	0	0	1	3312.10
Bit 7	Position of DIP switch 2	BIT	0	r	0	0	1	3312.9
Current status of digital output 0, 1, 2, 3 (Page 141)	Current status of output 0	BIT	0	r	0	0	1	3312.8
	Current status of output 1	BIT	0	r	0	0	1	3312.7
	Current status of output 2	BIT	0	r	0	0	1	3312.6
	Current status of output 3	BIT	0	r	0	0	1	3312.5
Reserve		BIT	0	r	0	0	1	3312.4
Reserve		BIT	0	r	0	0	1	3312.3
Reserve		BIT	0	r	0	0	1	3312.2
Reserve		BIT	2	r	0	0	1	3312.1
Refresh counter for process values (Page 141)	Refresh counter incremented by 1 if weight values were changed	USHORT	2	r	0	-	-	3313
Current load cell signal in mV (Page 141)	Currently measured load cell signal	FLOAT	4	r	0	-	-	3314

11.21.2 Unfiltered digit value

The unfiltered digit value is the internal measured value immediately before filtering.

11.21.3 Filtered digit value

The filtered digit value is the internal measured value immediately after filtering.

11.21.4 Filtered digit value (commissioning aid)

The filtered digit value is the internal measured value immediately after filtering with the commissioning filter.

11.21.5 Digits for analog output

The current digit value for the digital-to-analog converter for the analog output. The resolution of the analog output is 16 bit.

11.21.6 Current status of input 0, 1, 2, 3

This parameter allows you to check the current status of the digital inputs.

11.21.7 Current status of digital output 0, 1, 2, 3

This parameter allows you to check the current status of the digital outputs.

11.21.8 Refresh counter for process values

Measured values are calculated every 10 ms in the SIWAREX module. A counter is incremented by 1 each time. Once the counter reaches the value 65536, it starts again from zero. The counter can be used as a time stamp for data record DR 30.

11.21.9 Current load cell signal in mV

Display of currently measured signal voltage of the load cell(s) in mV.

11.22 DR 32 display of data and operator errors

11.22.1 Overview

Data record DR 32 is used for Modbus communication with a Modbus master. If a function which is used to write to the holding register is completed with an error, the data or operator error reported can be read from data record DR 32. Messages are displayed for at least five seconds and do not need to be acknowledged in the SIWAREX module.

Data record DR 32 does not need to be polled upon positive completion of a function for writing to the SIWAREX register.

Table 11- 25 Assignment of data record 32

Variable	Note	Type	Length (bytes)	Rw	Default	Min.	Max.	Modbus registers
Data record number	Contains no. of data record	USHORT	2	r	32	-	-	3500
Length	Data record length information	USHORT	2	r	28	-	-	3501
Application	Information about which application the data record belongs to	USHORT	2	r	101	-	-	3502
Version identifier	Information about current data record version	USHORT	2	r	1	1	65635	3503
5000	Data or operating error exists	BIT		r	0	0	1	3504.16
5001	Command code or data record unknown	BIT		r	0	0	1	3504.15
5002	Command or data change not possible because write protection is active	BIT		r	0	0	1	3504.14
5003	Leaving calibration mode not possible	BIT		r	0	0	1	3504.13
5004	Command or data transmission only available in service mode	BIT		r	0	0	1	3504.12
5005	Command or data transmission not possible because service mode is active	BIT		r	0	0	1	3504.11
5006	Command or data transmission not possible because BUSY	BIT		r	0	0	1	3504.10
5007	Command or data transmission not possible because module is faulty or ODIS is active	BIT		r	0	0	1	3504.9
Reserve	-	BIT		r	0	0	1	3504.8
Reserve	-	BIT		r	0	0	1	3504.7
5101	Command is not permissible in this operating state	BIT		r	0	0	1	3504.6

Variable	Note	Type	Length (bytes)	Rw	Default	Min.	Max.	Modbus registers
5102	Command not possible because not at standstill	BIT		r	0	0	1	3504.5
5104	Command not possible because range is exceeded	BIT		r	0	0	1	3504.4
5105	Load cell parameter not plausible	BIT		r	0	0	1	3504.3
Reserve		BIT		r	0	0	1	3504.2
5107	Shifting characteristic not possible	BIT		r	0	0	1	3504.1
5199	Error in command to DI	BIT		r	0	0	1	3505.11
6002	Recording not possible because weight iinvalid	BIT		r	0	0	1	3505.5
7000	Permitted number range violated	BIT		r	0	0	1	3506.16
		BIT		r	0	0	1	3506.15
7001	Regulation code unknown	BIT		r	0	0	1	3506.14
7002	Specifications of string lengths not plausible	BIT		r	0	0	1	3506.13
7003	Specification of date / time not plausible	BIT		r	0	0	1	3506.12
7004	Assignment of digital inputs/outputs incorrect	BIT		r	0	0	1	3506.11
7006	Command only possible in test field	BIT		r	0	0	1	3506.10
7007	The calibration weights or calibration digits are not plausible	BIT		r	0	0	1	3506.9
7008	Zeroing/zero setting or tare parameter not plausible	BIT		r	0	0	1	3506.8
7009	Standstill range / standstill wait time not plausible	BIT		r	0	0	1	3506.7
7010	Scale interval / rounding not plausible	BIT		r	0	0	1	3506.6
7011	Filter parameter not plausible	BIT		r	0	0	1	3506.5
7013	Interface assignment for verifiable HMI not plausible	BIT		r	0	0	1	3506.4
Reserve	-	BIT		r	0	0	1	3506.3
Reserve	-	BIT		r	0	0	1	3506.2
7016	Parameter assignment of analog output not plausible	BIT		r	0	0	1	3506.1
7017	MAC address cannot be changed	BIT		r	0	0	1	3607.16
7018	Error in IP mask	BIT		r	0	0	1	3607.15

Variable	Note	Type	Length (bytes)	Rw	Default	Min.	Max.	Modbus registers
7019	RS485 parameter error	BIT		r	0	0	1	3607.14
Reserve	-	USHORT	2	r	0	-	-	3504
Reserve	-	USHORT	2	r	0	-	-	3505
Reserve	-	USHORT	2	r	0	-	-	3506
Reserve	-	USHORT	2	r	0	-	-	3507
Reserve	-	USHORT	2	r	0	-	-	3508
Modbus RTU error code (Page 144)	Synchronous error code for communication at the Modbus RS485 interface	USHORT	2	r	0	-	-	3509
Modbus Ethernet error code (Page 144)	Synchronous error code for communication at the Modbus Ethernet interface	USHORT	2	r	0	-	-	3510
SIWATOOL error code (Page 145)	Synchronous error code for communication at the SIWATOOL interface	USHORT	2	r	0	-	-	3511
Error code following commands at digital input (Page 145)	Synchronous error code caused by command at the DI	USHORT	2	r	0	-	-	3512
Reserve	-	USHORT	2	r	0	-	-	3513

11.22.2 Data and operator errors, bytes 0 to 7

In this area, messages are represented by bits. A set bit means that the corresponding message is activated. The message bit is set following a data or operator error and automatically reset approximately 3 seconds later.
Message bits are analyzed by the operator panel message system.

11.22.3 Modbus RTU error code

The error code is displayed here of the error which was triggered last as a result of a command at the Modbus RTU interface.

11.22.4 Modbus Ethernet error code

The error code is displayed here of the error which was triggered last as a result of a command at the Modbus Ethernet interface.

11.22.5 SIWATOOL error code

The error code is displayed here of the error which was triggered last as a result of a command at the SIWATOOL interface.

11.22.6 Error code following commands at digital input

The error code is displayed here of the error which was triggered last as a result of a command via the digital input.

11.23 DR 34 ASCII main display value

11.23.1 Overview

The ASCII weight corresponds to the value on the main display of the scales and can be used for a supplementary display or operating display as well as the legal trade main display. Reading of the current weight for legal trade use is only possible with the special SecureDisplay software.

Table 11- 26 Assignment of data record 34

Variable	Note	Type	Length (bytes)	Rw	Default	Min.	Max.	Modbus registers
Data record number	Contains no. of data record	USHORT	2	r	34	-	-	4000
Length	Data record length information	USHORT	2	r	26	-	-	4001
Application	Information about which application the DR belongs to	USHORT	2	r	101	-	-	4002
Version identifier	Information about current data record version	USHORT	2	r	1	1	65635	4003
ASCII display string header	Maximum length and actual length of string	UBYTE[2]	2	r	16.2	-	-	4004
Content of main display as ASCII string (Page 146)	For legal trade display of weight with increased resolution, ... (see below)	CHAR[16]	16	r	" "	-	-	4005

11.23.2 Content of main display as ASCII string

The following values can be displayed in non-automatic weighing instruments (NAWI) applications:

Gross process value	From DR 30
Net process value	From DR 30
G/N weight	From DR 0
G/N weight x10	From DR 30
Tare	From DR 30
Gross_2 process value	From DR 30
Firmware version	From DR 9
Current calibration regulation	From DR 9
Serial number of module	From DR 9

Below are some display examples. Commands are used to toggle display values.

The values to be displayed are hidden if, for example, a fault is pending or a value is outside the valid display range.

	Value designation		**Blank**	**Display value**									**Unit of weight (from DR 3)**
Weight (Tare ≠ 0)	NET	•	•	•	•	•	2	2	0	.	5	0	•kg•
Weight (Tare = 0)	B	•	•	•	•	•	•	-	0	.	0	3	•t••
Operator error	•	•	•	•	•	•	1	0	.	0	0	3	HIGH
Weight simulation activated	B	•	•	•	•	•	•	E	r	r	o	r	TEST
Max+9e exceeded	B	•	•	•	•	•	•	-	0	.	0	3	****
Tare display activated (pt)	p	T	•	1	2	5	6	7	8	.	9	0	•kg•
Tare display activated	T	•	•	•	•	•	•	5	0	.	5	0	•kg•

NET = net
B = gross
T = tare
pT = preset tare (tare setting active)
S = sum

11.24 DR 45 protocol request

11.24.1 Overview

Scale logs can be saved in the internal memory of the SIWAREX. If necessary, a log can be read out calibration-proofed using the SIWATOOL V7 program or the SecureDisplay and its contents checked.

Using data records DR 45/DR 46, you can read all logs into the SIMATIC S7 (not calibration-proofed, only as operating information). The users enters the desired protocol ID in DR 45 and subsequently sends DR 45 to the SIWAREX. The protocol is then made available in DR 46 for reading out.

Table 11- 27 Assignment of data record 45

Variable	Note	Type	Length (bytes)	Rw	Default	Min.	Max.	Modbus registers
Data record number	Contains no. of data record	USHORT	2	r	45			6000
Length	Data record length information	USHORT	2	r	28			6001
Application	Information about which application the DR belongs to	USHORT	2	r	101			6002
Version identifier	Information about current data record version	USHORT	2	r	1	1	65635	6003
Reserve	Reserve	UBYTE[2]	2	rw	12,12			6004
Reserve	Reserve	CHAR[12]	12	rw	" "	-	-	6005
Reserve	Reserve	USHORT	2	rw	0			6011
Protocol ID to be read, decimal	ID of requested protocol entry as decimal value	LONG	4	rw	0	1		6012

11.24.2 Protocol ID to be read

The protocol ID of the protocol to be displayed in data record 46 is entered at this point.

The report ID to be read is also used for reading of the report for legal trade use by means of the SecureDisplay.

11.25 DR 46 protocol contents

11.25.1 Overview

Protocol data is provided in data record DR 46.

Table 11- 28 Assignment of data record 46

Variable	Note	Type	Length (bytes)	Rw	Default	Min.	Max.	Modbus registers
Data record number	Contains no. of data record	USHORT	2	r	46			6100
Length	Data record length information	USHORT	2	r	128			6101
Application	Information about which application the DR belongs to	USHORT	2	r	101			6102
Version identifier	Information about current data record version	USHORT	2	r	1	1	65635	6103
Oldest protocol ID	Oldest protocol ID, 0: No entry available	ULONG	4	r	0	1	4,294,967,295	6104
Newest protocol ID	ID of last saved protocol entry, 0: No entry available	ULONG	4	r	0	1	4,294,967,295	6106
Selected protocol ID, numeric	ID of subsequent protocol entry, 0: No entry available)	ULONG	4	r	0	1	4,294,967,295	6108
Reserve	Reserve	UBYTE[2]	2	r	12.12			6110
Reserve	Reserve	CHAR[12]	12	r	" 0"	" 1"	"4294967295"	6111
Reserve	Reserve	UBYTE[2]	2	r	12.12			6117
Reserve	Reserve	CHAR[12]	12	r	" 0"	" 1"	"4294967295"	6118
Reserve	Reserve	UBYTE[2]	2	r	12.12			6124
Reserve	Reserve	CHAR[12]	12	r	" 0"	" 1"	" 4294967295"	6125
String header for report ID currently selected	String header	UBYTE[2]	2	r	28.28			6131
Gross/net identifier	Gross/net identifier	CHAR[2]	2	r	" "			6132*[1)]
Delimiters	Delimiter (semicolon)	CHAR	1	r	";"			
G/N weight	G/N weight	CHAR[8]	8	r	" "			
Delimiters	Delimiter (semicolon)	CHAR	1	r	";"			

Variable	Note	Type	Length (bytes)	Rw	Default	Min.	Max.	Modbus registers
Unit of weight	Unit of weight	CHAR[4]	4	r	" "			
Delimiters	Delimiter (semicolon)	CHAR	1	r	";"			
Tare identifier	Tare identifier No entry: Scale was not tared when logging T: Scale was tared with manual tare when logging pT: Scale was tared with tare specification from DR15 when logging	CHAR[2]	2	r	" "			
Delimiters	Delimiter (semicolon)	CHAR	1	r	";"			
Tare	Currently effective tare	CHAR[8]	8	r	" "			
String header for checksum	String header for checksum	UBYTE[2]	2	r	4.4			
CRC16 checksum	Checksum of selected protocol	CHAR[4]	4	r	"0000"			6146
String header for date	String header for date	UBYTE[2]	2	r	10.10			6147
Date	Date	CHAR[10]	10	r	"2012-03-31"			6150
String header for time	String header for time	UBYTE[2]	2	r	8.8			6155
Time	Time	CHAR[8]	8	r	"23:59:59"			6156
String header for supplementary information	String header for supplementary information	UBYTE[2]	2	r	2.2			6100
Supplementary info	Currently not used	CHAR[4]	4	r	" "			6161
Reserve	Reserve	USHORT	2	r	0			6163

1) The protocol string is read out as a unit over Modbus (Modbus registers 6132 ... 6145)

11.25.2 Oldest protocol ID

The ID of the first saved protocol is displayed here.

11.25.3 Newest protocol ID

The ID of the last saved protocol is displayed here.

11.25.4 Selected protocol ID, numeric

The ID of the protocol requested in data record 45 and shown in data record 46 is displayed here.

11.25.5 Gross / net identifier

The identifier provides information on whether a gross weight or net weight was logged for the selected ID.

11.25.6 G/N weight

The G/N weight of the selected log is displayed here.

11.25.7 Unit of weight

The unit of weight of the selected log is displayed here.

11.25.8 Tare identification

The tare identification of the selected log is displayed here. The identification shows whether the tare has been entered by the user (semi-automatically) or whether it is a specified tare.

11.25.9 Date, time

The date and time of the selected log are displayed here.

11.26 DR 47 logbook

The changes in the SecureDisplay software versions are recorded in the logbook. If the SIWAREX has established communication with the SecureDisplay, SIWAREX checks whether the software version of the SecureDisplay has changed. Changes are recorded in the logbook. In this manner a more recent version of the SecureDisplay can also be used during operation requiring calibration without the calibration being violated.

The logbook entries are present in data record 47. Scrolling in the logbook is possible using commands 881 to 883: → Command lists (Page 69). Reading of the logbook for legal trade use is carried out using the SecureDisplay.

Table 11- 29 Assignment of data record 47

Variable	Note	Type	Length (bytes)	Rw	Default	Min.	Max.	Modbus registers
Data record number	Contains no. of data record	USHORT	2	r	46			6900
Length	Data record length information	USHORT	2	r	128			6901
Application	Information about which application the data record belongs to	USHORT	2	r	101			3902
Version identifier	Information about current data record version	USHORT	2	r	1	1	65635	6903
String header for ID of oldest logbook entry	String header	UBYTE[2]	2	r	8.8			6904
ID of oldest logbook entry	ID of first logbook entry	CHAR[8]	8	r	" 0"	1	99999999	6905
String header for ID of most recent logbook entry	String header	UBYTE[2]	2	r	8.8			6909
ID of most recent logbook entry	ID of last logbook entry	CHAR[8]	8	r	" 0"	1	99999999	6910
String header for selected logbook entry	String header	UBYTE[2]	2	r	8.8			6914
ID of selected logbook entry	ID of selected logbook entry	CHAR[8]	8	r	" 0"	1	99999999	6915
String header for logbook event	String header	UBYTE[2]	2	r	4.4			6919
Logbook event	Currently only logbook for SecureDisplay SW changes, corresponds to entry "HMI"	CHAR[4]	4	r	" "			6920
String header for old SW version	String header	UBYTE[2]	2	r	10.10			6922
Old SW version	Old FW version, e.g. V1.01.03	CHAR[10]	10	r	" "			6923
String header for new SW version	String header	UBYTE[2]	2	r	10.10			6928

Variable	Note	Type	Length (bytes)	Rw	Default	Min.	Max.	Modbus registers
New SW version	New FW version, e.g. V1.01.04	CHAR[10]	10	r	" "			6929
CRC16	Checksum of logbook entry	USHORT	2	r	0			6934
Reserve	Reserve	USHORT	2	r	0			6935

11.27 DR 48 date and time 2 (for Modbus)

The SIWAREX module has its own hardware clock. The current date and the time can be set and read using data record DR 48. The clock is buffered with a capacitor and can continue operating for up to approximately 70 hours without supply voltage. If you are not using the Modbus protocol, data record DR 8 is used for the date and time.

Procedure

- Set the date and time
- Transfer the data record to the SIWAREX module

Table 11- 30 Assignment of data record 48

Variable	Note	Type	Length (bytes)	Rw	Default	Min.	Max.	Modbus registers
Data record number	Contains no. of the data record	USHORT	2	r	48	-	-	6960
Length	Data record length information	USHORT	2	r	24	-	-	6961
Application	Information on which application the data record belongs to	USHORT	2	r	101	-	-	6962
Version identifier	Information on the current data record version	USHORT	2	r	1	1	65635	6963
Year	Year	USHORT	2	rw	2012	2012	2010	6964
Month	Month	USHORT	2	rw	1	1	12	6965
Day	Day in month	USHORT	2	rw	1	1	31	6966
Hour	Hour	USHORT	2	rw	0	0	23	6967
Minute	Minute	USHORT	2	rw	0	0	59	6968
Second	Second	USHORT	2	rw	0	0	59	6969
Millisecond	Millisecond	USHORT	2	rw	0	0	999	6970
Day of the week	Day of the week	USHORT	2	rw	1	1	7	6971

Technical data

12

12.1 Technical specifications

Power supply

Table 12- 1 Technical specifications:power supply

Rated voltage	AC 100…240V
Static low / high limits	AC 88 V / 264 V
Mains frequency nominal	50 … 60 Hz
Mains frequency range	47 … 63 Hz
Input current at 100V / 50 Hz	0,12 A
Input current at 240 V / 50 Hz	0,1 A

Analog load cell interface connection

Table 12- 2 Technical specifications: Analog load cell interface connection

Error limit to DIN1319-1 at 20 °C +10 K		≤ 0.05% v.E.[1)]
Accuracy according to EN45501 / OIML R76	• Class	III (and IV 1000d)
	• Resolution (d=e)	3000d
	• Error percentage pi	0.4
	• Step voltage	0.5 µV/e
Accuracy delivery state[2)]		typ. 0.1% v.E.
Sampling rate		100 Hz
Input signal resolution		± 4 000 000
Measuring range		± 4 mV/V
Common mode voltage range		0 V to 5 V
DMS supply[3)]		4.85 V DC +2/-3 %
Short-circuit and overload protection		Yes
Connection		6-wire
Sensor voltage monitoring		≤ 0.3 V
Min. DMS input resistance	• without Ex-i interface SIWAREX IS	40 Ω
	• with Ex-i interface SIWAREX IS	50 Ω

min. DMS output resistance		4 100 Ω
Temperature coefficient range		≤ ± 5 ppm/K v. E.
Temperature coefficient zero point		≤ ± 0.1 µV/K
Linearity error		≤ 0.002 %
Measured value filtering		Low pass
Electrical isolation		500 V AC
50 Hz / 60 Hz noise suppression CMRR		> 80 dB
Input resistance	• Signal cable	typ. $5*10^6$ Ω
	• Sensor cable	typ. $60*10^6$ Ω

1) Relative accuracy! (Absolute accuracy is only reached by calibration on-site with calibration standard)
2) Accuracy for module replacement or theoretical calibration decisive
3) Value valid at sensor; voltage drops on cables are compensated up to 5 V

Analog output

The set replacement value is output in case of a fault or SIMATIC CPU stop.

Table 12- 3 Technical specifications:

Error limit according to DIN 1319-1 of full-scale value at 20 °C +10 K	0 ... 20 mA: ≤ 0.5 % 4 mA to 20 mA: ≤ 0.3 %
Refresh rate	≤ 100 ms
Resolution	14 bit
Measuring ranges	0 mA to 20 mA 4 mA to 20 mA
Max. output current	24 mA
Error signal (if configured (FW))	22 mA
Max. load	600 Ω
Temperature coefficient range	≤ ± 25 ppm/K v. E.
Temperature coefficient zero point	typ. ± 0.3 µA/K
Linearity error	≤ 0.05 %
Electrical isolation	500 V AC
Cable length	max. 100 m, twisted and shielded

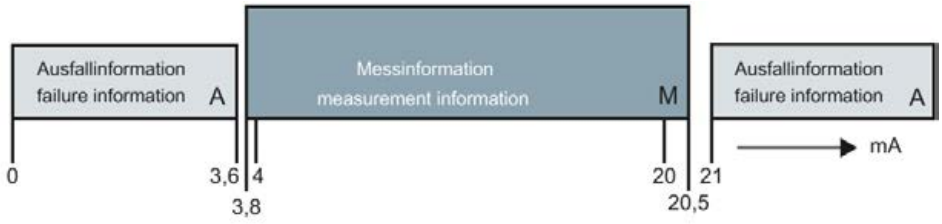


Figure 12-1 Current ranges for signal level to Namur recommendation NE43

Digital outputs (DQ)

The set value is output at the digital output in case of a fault or SIMATIC CPU stop.

A freewheeling diode has to be installed at the consumer with inductive loads at the digital output.

Table 12- 4 Technical specifications: Digital outputs

Quantity	4 (high-side switch)
Supply voltage range	19.2 V DC to 28.8 V DC
Max. output current per output	0.5 A (ohmic load)
Max. total current for all outputs	2.0 A
Refresh rate (FW)	100
Switching delay	typ. 25 µs turn on typ. 150 µs turn off
RDSON	< 0.25 Ω
Short-circuit proof	Yes
Electrical isolation	500 V AC
Cable length (meter)	Max. 500 m shielded, 150 m unshielded

Digital inputs (DI)

Table 12- 5 Technical specifications: Digital inputs

Number of inputs	4
Rated voltage	24 V DC
Supply voltage range	max. 30 V DC
Power consumption at 24 V DC	4 mA
Voltage surge	35 V DC for 0.5 s
Logical signal level 1 (min)	15 V DC at 2.5 mA
Logical signal level 0 (max)	5 V DC at 1.0 mA
Sampling rate (FW)	10 ms
Filtering	0.2, 0.4, 0.8, 1.6, 3.2, 6.4 and 12.8 ms
Electrical isolation	500 V DC

Real-time clock

Table 12- 6 Technical specifications: Real-time clock

Accuracy at 25 °C	± 60 s/month
Buffered period	typ. 10 days at 25 °C min. 6 days at 40 °C

RS485 interface

Table 12- 7 Technical specifications: RS485 interface

Standard	EIA-485
Baud rate	up to 115 kbps*
Data bits	7 or 8

Parity	even | odd | none
Stop bits	1 or 2
Terminating resistors (can be activated)	390 Ω / 220 Ω / 390 Ω
Electrical isolation	500 V AC
Transfer protocol	ASCII for remote display from Siebert and Modbus RTU)
Cable length	≤ 115 kbps max. 1 000 m (fieldbus cable 2-wire, shielded, e.g. 6XV1830-0EH10)

Ethernet

Table 12- 8 Technical specifications: Ethernet

Standard		IEEE 802.3
Transmission rate		10/100 Mbps (determined automatically)
Electrical isolation		1 500 V AC
Transfer protocol		TCP/IP, Modbus TCP (see /1/)
Autonegotiation		Yes
Auto MDI-X		Yes
Cable lengths	• Cat-5e UTP cable (unshielded)	max. 50 m
	• Cat-5e SF/UTP cable (shielded)	max. 100 m

Dimensions and weights

Table 12- 9 Technical specifications:

Dimensions W x H x D	264 x 185 x 97 mm
Weight	4 kg

Mechanical requirements and data

Table 12- 10 Technical specifications: Mechanical requirements and data

Testing	Standards	Test values
Vibrational load during operation	IEC 61131-2 IEC 60068-2-6 Test Fc	5 to 8.4 Hz: 3.5 mm out. 8.4 to 150 Hz: 9.8 m/s^2 (=1G) 0 cycles per axis 1 octave / min.
Shock load during operation	IEC 61131-2 IEC 60068-2-27 Test Ea	150 m/s^2 (approx. 15 g), half sine Duration: 11 ms Quantity: 3 each per axis in negative and positive direction

Testing	Standards	Test values
Vibration load during transport	IEC 60068-2-6 Test Fc	5 to 8.4 Hz: 3.5 mm out. 8.4 Hz ... 500 Hz: 9.8 m/s^2 10 cycles per axis 1 octave / min.
Shock load during transport	IEC 60068-2-27: Test Ea	• 250 m/s^2 (25G), half sine • Duration: 6ms • Quantity: 1 000 each per axis • in negative and positive direction
Free fall	IEC 61131-2 IEC 60068-2-31: Test Ec, procedure 1	• For devices < 10 kg: • In product packaging: 300 mm drop height • In shipping package: 1.0 m drop height • per 5 attempts

12.2 Electrical, EMC and climatic requirements

Electrical protection and safety requirements

Table 12- 11 Requirements: Electrical protection and safety requirements

Met requirement	Standards	Comments
Safety regulations	IEC 61010-1	
Protection class	IEC 61140	
IP degree of protection	IP 65 nach IEC 60529	
Air gaps and creepage distances	IEC 61010-1	Overvoltage category II Pollution degree 2 PCB material IIIa Conductor path distance 0.5 mm
Isolation stability	IEC 61131-2 CSA C22.2, No. 142 UL508 IEC 61010-1	Mains – Enclosure: AC 1500V Mains – SELV circuits: AC 3000V

Electromagnetic compatibility

Table 12- 12 Requirements: Interference emission in industrial area in accordance with EN 61000-6-4

Comments	Standard	Limits
Emission of radio interferences (electromagnetic fields)	Class B residential environment: EN 55011+A1:2010 Cispr 11+A1:2010	• 30 ... 230 MHz, 40 dB (µV/m) QP • 230 ... 1 000 MHz, 47 dB (µV/m) QP
Emission on power supply	Class B: residential environment: EN 55011+A1:2010 Cispr 11+A1:2010	Class A: Industrial environment • 0,15 ... 0,5 MHz, 66 – 56dB(uV) Q* 56 – 46dB(uV) A* • 0,5 ... 30 MHz, 56dB(uV) Q 46dB(uV) A • 0,5 ... 30 MHz, 60 dB(uV) Q 50 dB(uV) A

Table 12- 13 Requirements: Interference immunity in industrial area in accordance with EN 61000-6-2

Comments	Standard	Severity class
Burst pulses on power supply cables	EN 61000-4-4	• 2 kV • Per polarity 1 min.
Electrostatic discharge (ESD)	EN 61000-4-2	• 4 kV direct/indirect • ≥ 10 discharges pos/neg • ≥ 1 s repeat time
Electrostatic air discharge (ESD)	EN 61000-4-2	• 8 kV direkt/indirekt • ≥ 10 Entladungen pos/neg • all sensitive spots
Surge on power supply cables	EN 61000-4-5	• 1 kV, symmetrical • 2 kV, asymmetrical • 1.2/50 µs (8/20) µs pos./neg. • Internal generator resistance: 2 Ω
HF irradiation amplitude modulated	IEC61000-4-3	• 80 to 2 000 MHz: 10 V/m • 2 …2,7 GHz: 3 V/m • Mod.: 80% AM with 1 kHz
HF voltage on data, signal and power supply cables 0.15 to 80 MHz	IEC 61000-4-6	• 10 kHz to 80 MHz: 10 Veff, • Mod.: 80% AM with 1 kHz

Ambient conditions

The use of SIWAREX WP231 is intended under the following conditions in SIMATIC S7-1200. Additionally observe the operating conditions of the S7-1200 system.

Table 12- 14 Operating conditions in accordance with IEC 60721

Mode	IEC60721-3-3 • Class 3M3, 3K3, stationary use, weather-proofed
Storage/transport	IEC 60721-3-2 class 2K4 without precipitation

Table 12- 15 Climatic requirements

Comments		Ambient conditions	Application areas
Operating temperature:	vertical installation	-0 ... +40 °C	
Storage and transport temperature		- 20 ... +60 °C	

Comments		Ambient conditions	Application areas
Relative humidity		5 ... 95 %	No condensation; corresponds to relative humidity (RH) stress level 2 to DIN IEC 61131-2
Contaminant concentration		SO_2: < 0.5 ppm H_2S: < 0.1 ppm;	RH < 60%, no condensation
Atmospheric pressure	Operation	IEC 60068-2-13	1 080 ... 795 hPa (operation) (-1 000 to +2 000 m above sea level)
	Transport and storage	IEC 60068-2-13	1 080 ... 660 hPa (operation) (-1 000 to +3 500 m above sea level)

12.3 Approvals

NOTICE
Safety information for applications in hazardous areas For applications in hazardous areas, observe the safety information in the document "Product Information - Use of SIWAREX modules in a Zone 2 Hazardous Area (http://support.automation.siemens.com/WW/llisapi.dll?aktprim=100&lang=en&referer=%2fWW%2f&func=cslib.cssearch&nodeid0=4000024&viewreg=WW&siteid=csius&extranet=standard&groupid=4000002&objaction=cssearch&content=adsearch%2Fadsearch%2Easpx)".

Note

The currently valid approvals for SIWAREX WP231 are to be found on the module rating plate.

CE	→ CE approval

Accessories

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Ordering data	
Description	**Order No.**
SIWAREX WP231 manual in various languages	Free download from the Internet WP231 manuals (http://support.automation.siemens.com/WW/view/de/64722267/133300)
Ethernet patch cable CAT5 To connect the SIWAREX to a PC (SIWATOOL), SIMATIC CPU, panel, etc.	
Digital remote display The digital remote displays can be connected directly to the SIWAREX WP231 through the RS485 interface. Suitable remote display: S102 Siebert Industrieelektronik GmbH Postfach 1180 D-66565 Eppelborn, Germany Tel.: 06806/980-0 Fax: 06806/980-999 Internet: http://www.siebert-group.com/en (www.siebert.com) Detailed information can be obtained from the manufacturer.	
SIWAREX JB junction box For parallel connection of load cells	7MH4 710-1BA
SIWAREX EB extension box For extending load cell cables	7MH4 710-2AA
Ex interface, type SIWAREX IS With ATEX approval for intrinsically-safe connection of load cells, including manual, suitable for the load cell groups SIWAREX CS, U, M, FTA, and P	
• With short-circuit current < 199 mA DC	7MH4 710-5BA
• With short-circuit current < 137 mA DC	7MH4 710-5CA
Cable (optional)	

Ordering data	
Description	**Order No.**
Cable Li2Y 1 x 2 x 0.75 ST + 2 x (2 x 0.34 ST) - CY • To connect SIWAREX CS, U, M, P, A, WP231 to the junction box (JB), extension box (EB) or Ex interface (Ex-I) or between two JBs, for fixed laying • Occasional bending is possible • 10.8 mm outer diameter • For ambient temperature -20 to +70 °C	7MH4 702-8AG
Cable Li2Y 1 x 2 x 0.75 ST + 2 x (2 x 0.34 ST) - CY, blue sheath • To connect junction box (JB) or extension box (EB) in hazardous area and Ex interface (Ex-I), for fixed laying • Occasional bending is possible, blue PVC insulating sheath, approx. 10.8 mm outer diameter • For ambient temperature -20 to +70 °C	7MH4 702-8AF

ESD guidelines

B

B.1 ESD Guidelines

Definition of ESD

All electronic modules are equipped with large-scale integrated ICs or components. Due to their design, these electronic elements are highly sensitive to overvoltage, and thus to any electrostatic discharge.

The electrostatic sensitive components/modules are commonly referred to as ESD devices. This is also the international abbreviation for such devices.

ESD modules are identified by the following symbol:

NOTICE
ESD devices can be destroyed by voltages well below the threshold of human perception. These static voltages develop when you touch a component or electrical connection of a device without having drained the static charges present on your body. The electrostatic discharge current may lead to latent failure of a module, that is, this damage may not be significant immediately, but in operation may cause malfunction.

Electrostatic charging

Anyone who is not connected to the electrical potential of their surroundings can be electrostatically charged.

The figure below shows the maximum electrostatic voltage which may build up on a person coming into contact with the materials indicated. These values correspond to IEC 801-2 specifications.

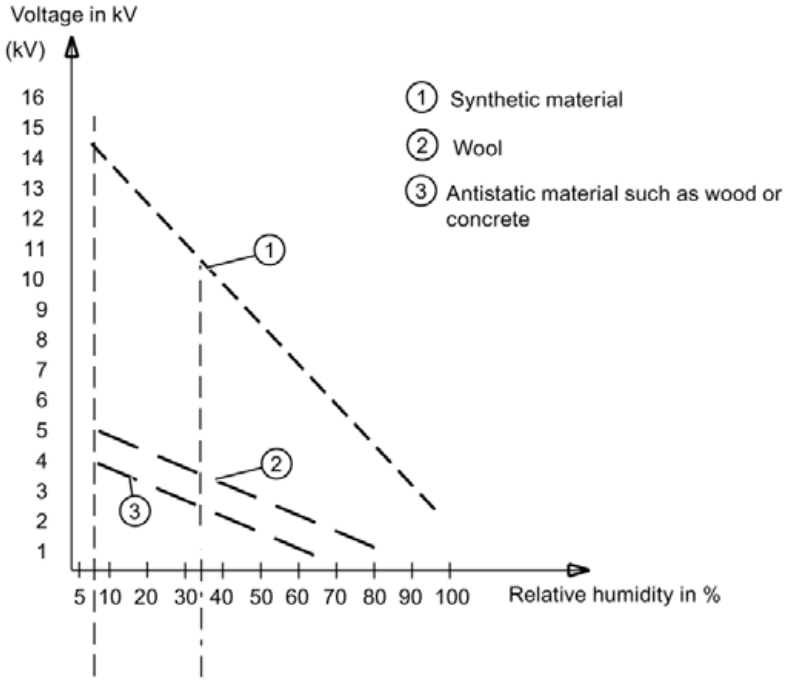

Figure B-1 Electrostatic voltages which an operator can be subjected to

Basic protective measures against electrostatic discharge

- Ensure good equipotential bonding:
  When handling electrostatic sensitive devices, ensure that your body, the workplace and packaging are grounded. This prevents electrostatic charge.
- Avoid direct contact:
  As a general rule, only touch electrostatic sensitive devices when this is unavoidable (e.g. during maintenance work). Handle the modules without touching any chip pins or PCB traces. In this way, the discharged energy can not affect the sensitive devices.

  Discharge your body before you start taking any measurements on a module. Do so by touching grounded metallic parts. Always use grounded measuring instruments.

List of abbreviations

C

ASCII	American Standard Code for Information Interchange
B	Gross weight
CPU	Central processor, in this case SIMATIC CPU
DB	Data block
FB	SIMATIC S7 function block
HMI	Human machine interface (e.g. SIMATIC Operator Panel)
HW	Hardware
NAWI	Non-automatic weighing instrument
NAW	Non-automatic scales
OIML	Organisation Internationale de Metrologie Legale
OP	Operator Panel (SIMATIC)
PC	Personal computer
pT	Preset tare (predefined tare weight with manual taring)
RAM	Random access memory
PLC	Programmable logic controller
STEP 7	Programming device software for SIMATIC S7
T	Tare weight
TM	Technology module
TP	Touch Panel (SIMATIC)
UDT	Universal Data Type (S7)
WRP	Write protection
LC	Load cell(s)
NR	Numerical range