SIEMENS

Weighing systems

Electronic weighing system SIWAREX WT241

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.

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⚠ WARNING
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.

Qualified Personnel

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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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.

Siemens AG
Division Process Industries and Drives
Postfach 48 48
90026 NÜRNBERG
GERMANY

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Introduction 1

1.1 Purpose of the manual

This manual contains all necessary information on the setup, installation, wiring and commissioning of the SIWAREX WT241 electronic weighing system.

1.2 Basic knowledge required

This manual requires basic knowledge of weighing technology and of belt scales specifically.

1.3 Manual - range of validity

This manual is valid for:

Type designation	Order No.	as of version		version HMI-project
SIWAREX WT241	7MH4965-4AA01	HW V.1	FW V. 1.0.1	V 1.0.4

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
- Fax: +49 (911) 895-7223

Additional information about our Technical Support is available on the Internet at Technical Support (http://www.siemens.com/automation/csi/service)

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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)

There you will find:

- The latest product information, FAQs, downloads, tips and tricks.
- Our newsletter, providing you with the latest information about your products.
- 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 specifications of the manual for the SIMATIC S7-1200 system apply for configuration, installation and commissioning in the SIMATIC environment. This chapter includes additional information on hardware configuration, installation and preparation for operation of the SIWAREX WT241.

The safety notes must be observed.

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).

3 Description

3.1 Product overview

SIWAREX WT241 is a versatile and flexible weighing module that can be operated as a belt scale.

The electronic weighing system uses all features of a modern automation system, such as integrated communication, operation and monitoring, the diagnostic system and an up to date user interface.

3.2 Area of application

The electronic weighing system described here is the perfect solution where material flows are to be acquired and processed with the assistance of a belt scale. The SIWAREX WT241 is a very accurate electronic weighing system.

3.3 SIWAREX WT241 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 WT241 weighing terminal

The terminal consists of following components:

- Weighing electronic SIWAREX WP241
- Touchpanel SIMATIC KTP400 basic color PN
- Power supply
- Terminal board for belt scale, speed sensor and analog output
- Stainless steel enclosure (1.4301) with
  - M16 cable gland for mains cable
  - 3 M16 + 1 M20 cable gland for load cell connection and speed sensor
  - 4 M16 through-hole with dummy plugs
  - Earthing bolt

3.4 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 1 million parts
- High measuring rate of 100/120 Hz (effective interference frequency suppression)
- Monitoring of a wide range of limits (material flow rate, speed, load)
- Flexible adaptation to varying requirements
- Exact determination of speed – with or without encoder
- Diagnostics functions

3.5 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

Application planning 4

4.1 Functions

The primary task of the electronic weighing system is the calculation of the current flow rate.

The SIWAREX WT241 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 WT241 can be connected to any control system or to a PC by using the Modbus RTU protocol.

Installation 5

5.1 Installation guideline

The weighing electronic SIWAREX WT241 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.

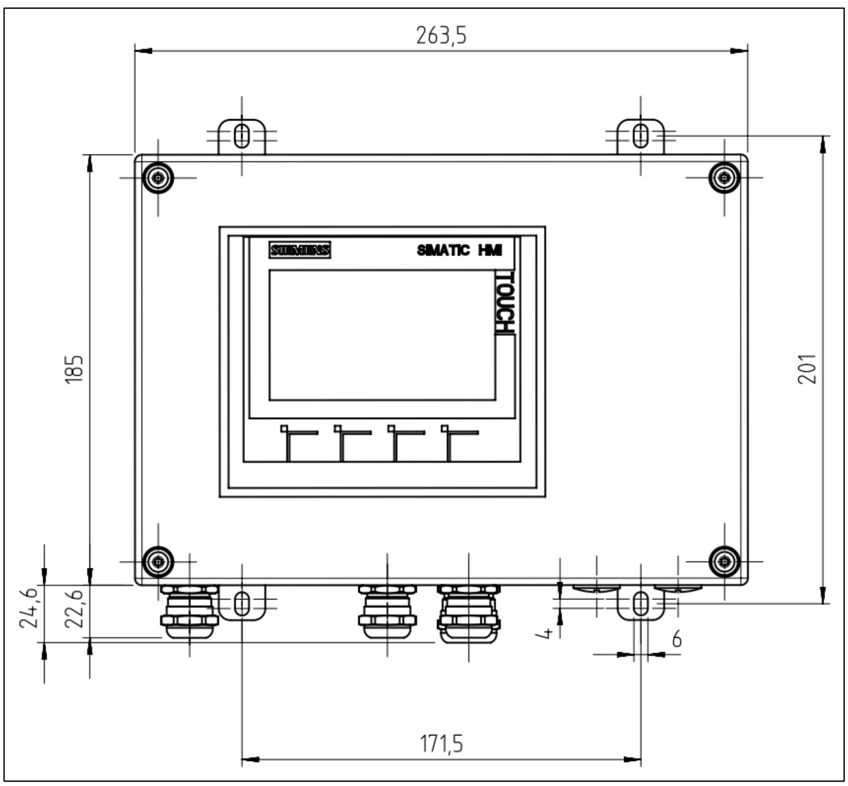


Figure 5-1 SIWAREX WT241 weighing terminal – dimensions and hole pattern

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.

Connecting 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 WT241 comes with a number of connection options. It is equipped with EMC safe cable glands for the major connections (mains and load cells).

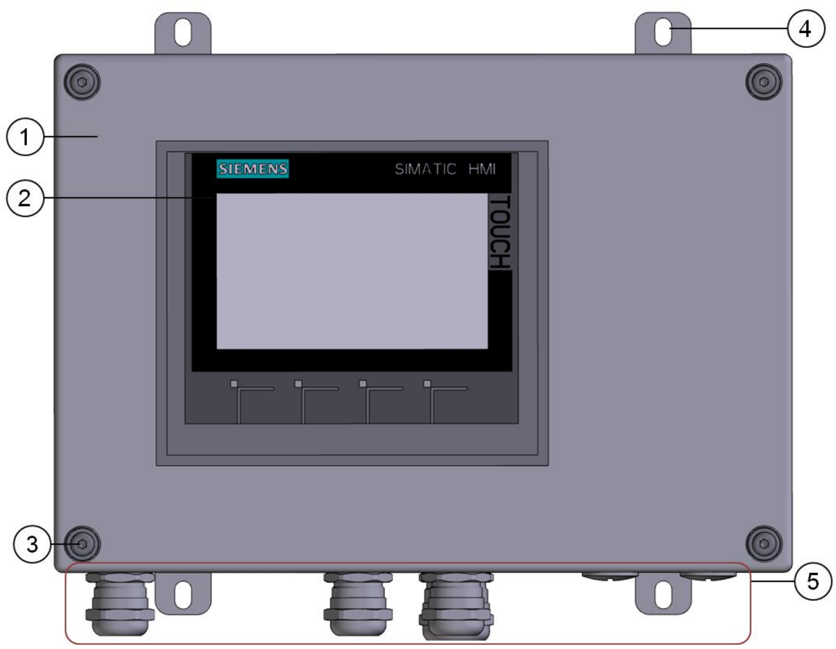


Figure 6-1 SIWAREX WT241 overview

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

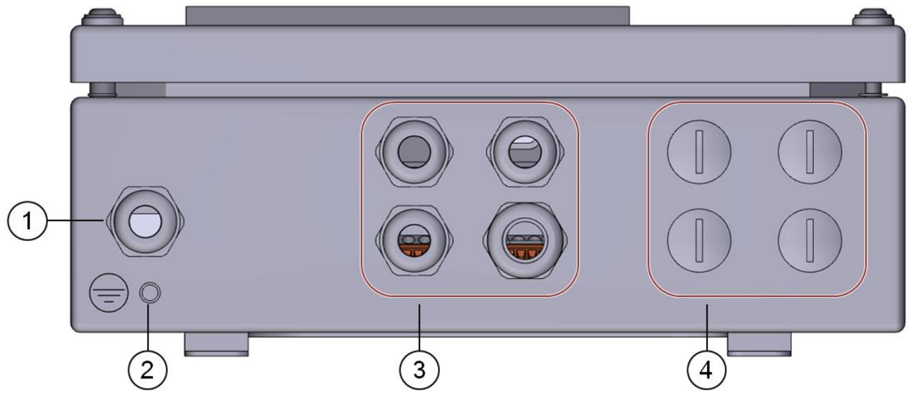


Figure 6-2 SIWAREX WT241 bottom side with connections

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

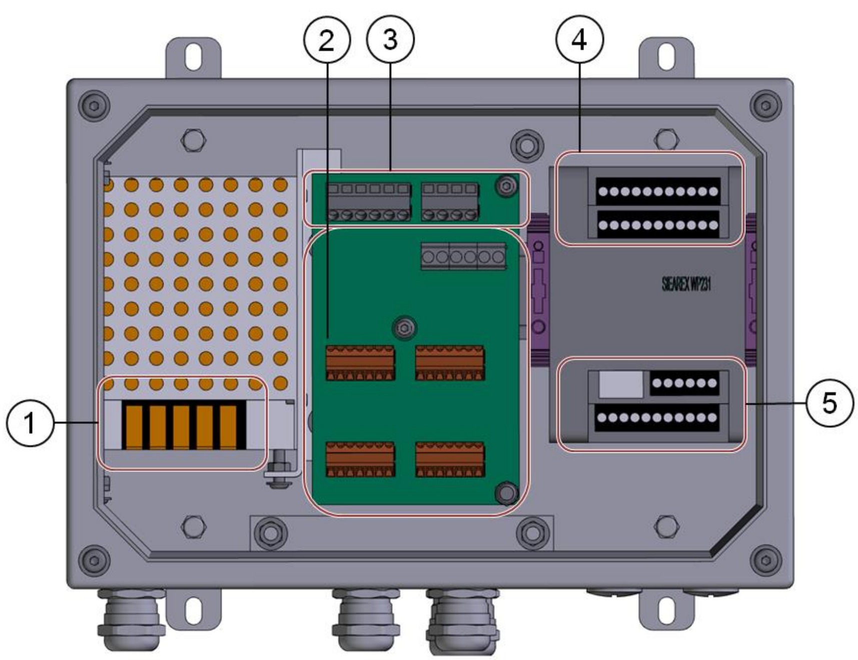


Figure 6-3 SIWAREX WT241 inside

① Mains connection
② Terminal board to connect load cells / belt scale, analog output, speed sensor
③ Connections to SIWAREX WP241 – premounted to ④
④ Upper terminal block SIWAREX WP241 – premounted to ③
⑤ Lower terminal block SIWAREX WP241 – 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 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.

Note

Clamping range of cable glands

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

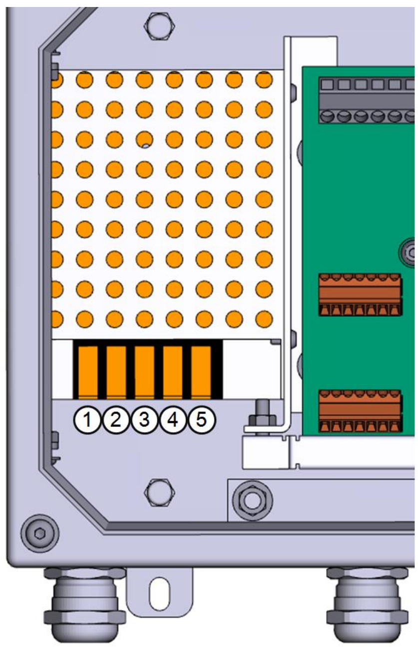
- Cable gland M16 x 1.5: clamping range 6…10 mm
- Cable gland M20 x 1.5: clamping range 10…14 mm

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.



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
5	Output	+24V

Figure 6-4 SIWAREX WT241 power supply

6.3 Connecting the load cells

Overview

Pickups can be connected to the SIWAREX WT241 electronic weighing system which are equipped with strain gauges (full bridge) and meet the following requirements.

- Characteristic value 1 to 4 mV/V
- A supply voltage of 5 V is permitted
- Maximum cable length between WT241 and junction box 1 000 m

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 WT241:

- 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 load cells fitted in the belt scale are connected to the PCB board implemented in the terminal. Use the load cell connection blocks LC_A or LC_B or LC_C or LC_D to connect the load cells. The signals will be paralleled due to the layout of the PCB. Use a well-shielded cable for the connection between belt scale and SIWAREX WT241.
2. The cable shield is always applied at the cable gland of the junction box (SIWAREX JB). If there is a risk of equipotential bonding through the cable shield, connect an equipotential bonding 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 (-)

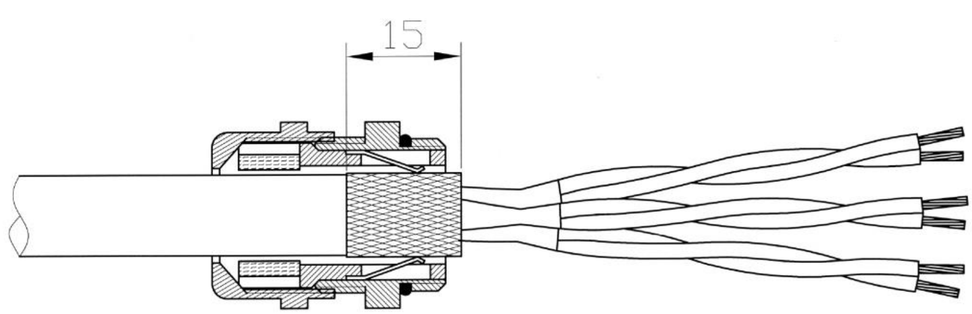


Figure 6-5 Shielding in the screw gland

We recommended that you use the cables listed in chapter → Accessories (Page 181).

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 +

6.3.1 Connection of an MLC / MBS / MUS / MCS / MSI / MMI belt scale to WP241

The following graphic clarifies the interfacing of all Siemens belt scale types to SIWAREX WP241. When using several MSI scales (MMI2 or MMI3) installed in sequence, all additional load cells are connected in parallel in the junction box as shown in the graphic.

All load cells must always be connected in parallel in the junction box. With 4-wire load cells, you must additionally set a jumper between EXC- and SEN- and between EXC+ and SEN+ in the junction box. With 6-wire load cells, the jumpers are omitted and all conductors of the same type are connected in parallel in the junction box and directly through to the SIWAREX.

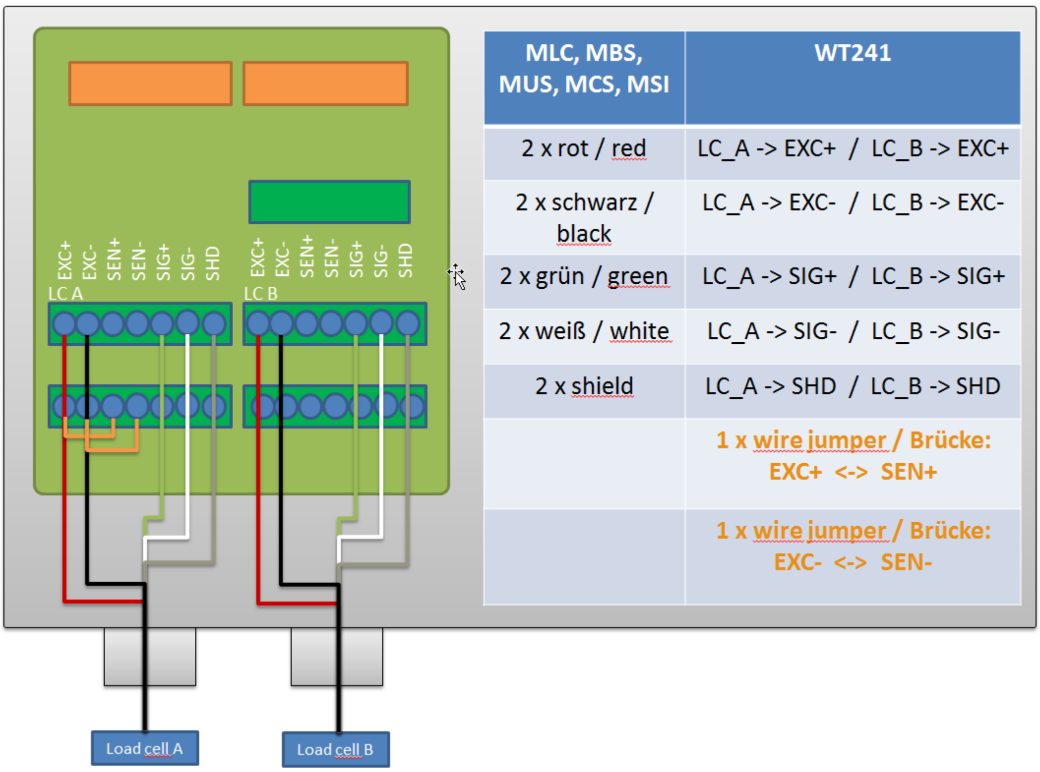
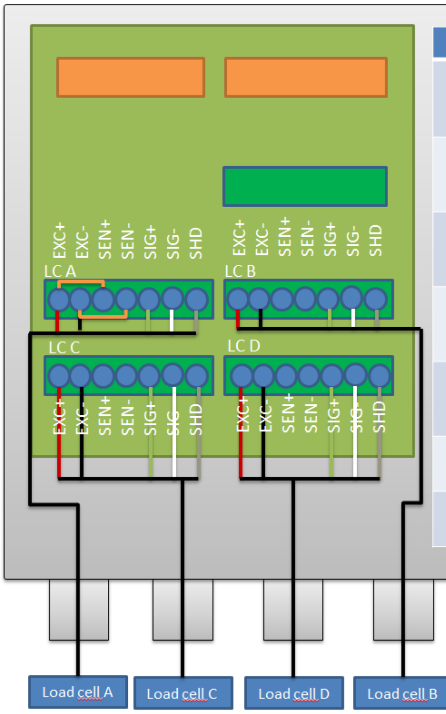


Figure 6-6 Connecting Siemens beltscales MLC, MBS, MUS, MCS, MSU to SIWAREX WT241



MMI-2	WT241
4 x rot / red	1 x LC_A -> EXC+ / 1 x LC_B -> EXC+ 1 x LC_C -> EXC+ / 1 x LC_D -> EXC+
4 x schwarz / black	1 x LC_A -> EXC- / 1 x LC_B -> EXC- 1 x LC_C -> EXC- / 1 x LC_D -> EXC-
4 x grün / green	1 x LC_A -> SIG+ / 1 x LC_B -> SIG+ 1 x LC_C -> SIG+ / 1 x LC_D -> SIG+
4 x weiß / white	1 x LC_A -> SIG- / 1 x LC_B -> SIG- 1 x LC_C -> SIG- / 1 x LC_D -> SIG-
4 x shield	1 x LC_A -> SHD / 1 x LC_B -> SHD 1 x LC_C -> SHD / 1 x LC_D -> SHD
	1 x wire jumper / Brücke: EXC+ <-> SEN+
	1 x wire jumper / Brücke: EXC- <-> SEN-

Figure 6-7 Connecting a Siemens beltscale MMI-2 to SIWAREX WT241

6.3.2 Connection of any scales or load cells

Connecting any other beltscale or load cells to the SIWAREX WT241 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.

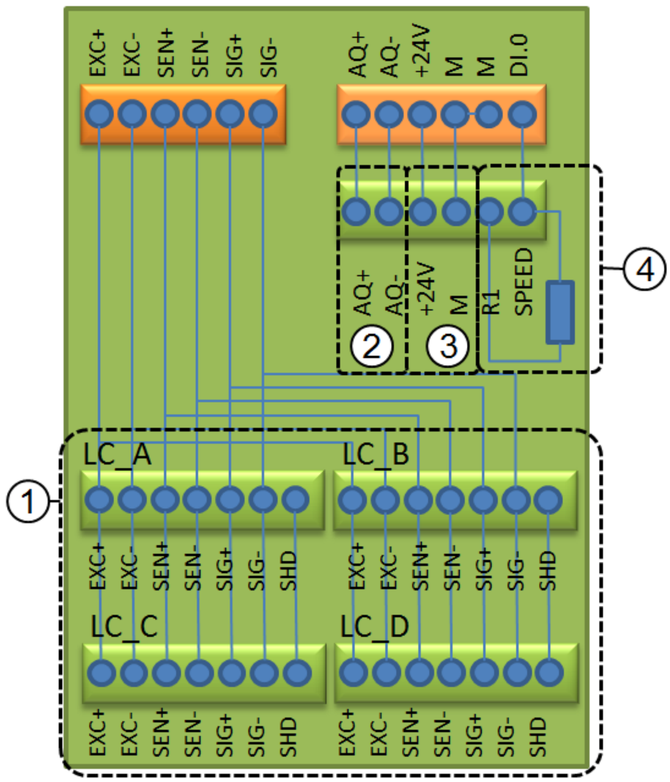


Figure 6-8 Terminal board SIWAREX WT241

① Terminal blocks for load cells / belt scale pickup
② Terminal block for analog output
③ 24 VDC tap
④ Terminal block for speed sensors

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- 2 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

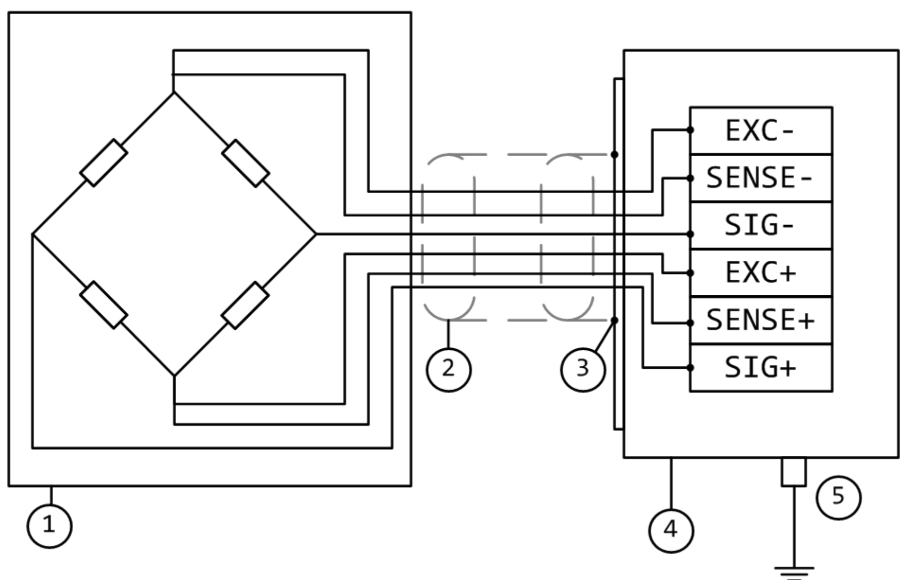


Figure 6-9 Connection of strain gauge load cell(s) with 6-wire system

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.

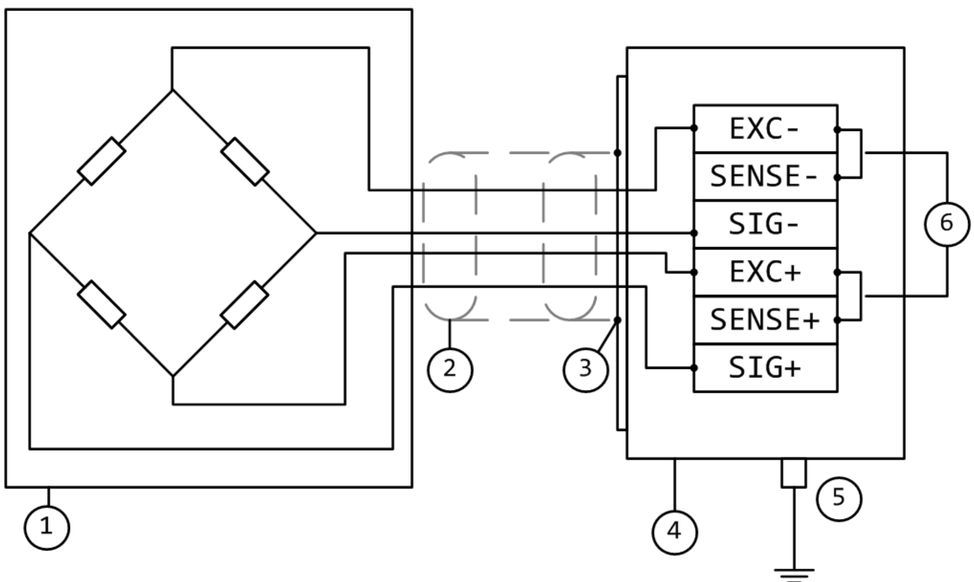


Figure 6-10 Connection of strain gauge load cell(s) with 4-wire system

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 Shield connection

Make sure you observe the correct design of the shield support for the shielded cables. It is the only way to ensure immunity of the system.

A cable is shielded to attenuate the effects of magnetic, electrical and electromagnetic interference on the cable. Interference currents on cable shielding are diverted to ground by conductive isolation rails. To avoid interference as a result of these currents, it is imperative to provide a low-impedance connection to the ground.

Use only cables with protective braided shield (see recommended cables of load cells in chapter Accessories (Page 181)). Shielding density must be at least 80%.

The SIWAREX WT241 is equipped with EMC safe cable glands. Follow the instruction below for proper connected shield.

- Remove insulation
- Uncover shield

- Put cable through coupling nut
- Insert cable into clamp unit
- Impose braid on clamp unit
- Braid shall overlap O-ring by ca. 2mm

- Put clamp unit into the threaded coupling
- Mount gland to the terminal

6.5 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 directly found at the weighing module SIWAREX WP241 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- 3 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

6.6 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 WP241 and are not connected through to the terminal board.

The digital inputs are not permanently assigned to commands in the delivery state. Assignment of the digital inputs to commands is carried out during commissioning by parameter assignment in menu 1.5.1 “Digital in- and outputs”.

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

When using a speed sensor it is essential to connect it to digital input DI.0. In addition, the input must be defined as a speed sensor input in menu 1.5.1.1 “Digital in- and output settings 1 of 2”

Table 6- 4 **Connection of the digital inputs**

Labeling	Function
DI.0	Digital input 0 (input for speed sensor)
DI.1	Digital input 1
DI.2	Digital input 2
DI.3	Digital input 3
DI.2M	Reference ground potential of the digital inputs

6.7 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 (see 6.3.2 “Connection of any scales or load cells”; pg. 32 ; connection area ②)

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- 5 Connection of analog output

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

6.8 Connection of RS485 serial interface

The following devices can be connected to the serial interface:

- Operator Panels or other HMI devices with RS485 and Modbus protocol RTU
- Communication partner with Modbus protocol RTU

RS485 connection is established directly at the weighing module SIWAREX WP241 inside the terminal.

Table 6- 6 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 WP241 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

6.9 Connection of a speed sensor

If a speed sensor is connected to the WT241, this must always be made at digital input DI.0 of the module. This input is factory-configured for operation as a pulse counter. Check this setting in data record 7 during commissioning.

The DI.0 can be found on the PCB board in the connection area ④.

Connection of the various Siemens speed sensors is shown below. A wide range of pulse sensors can be used up to a clock frequency of 5 000 Hz. A level of at least +15 V DC is required for the High signal. The Low signal is reached at a voltage of +5 V DC.
Detailed information on the various sensors can be obtained from the respective manual.

6.9.1 RBSS / WS100 speed sensor on WT241

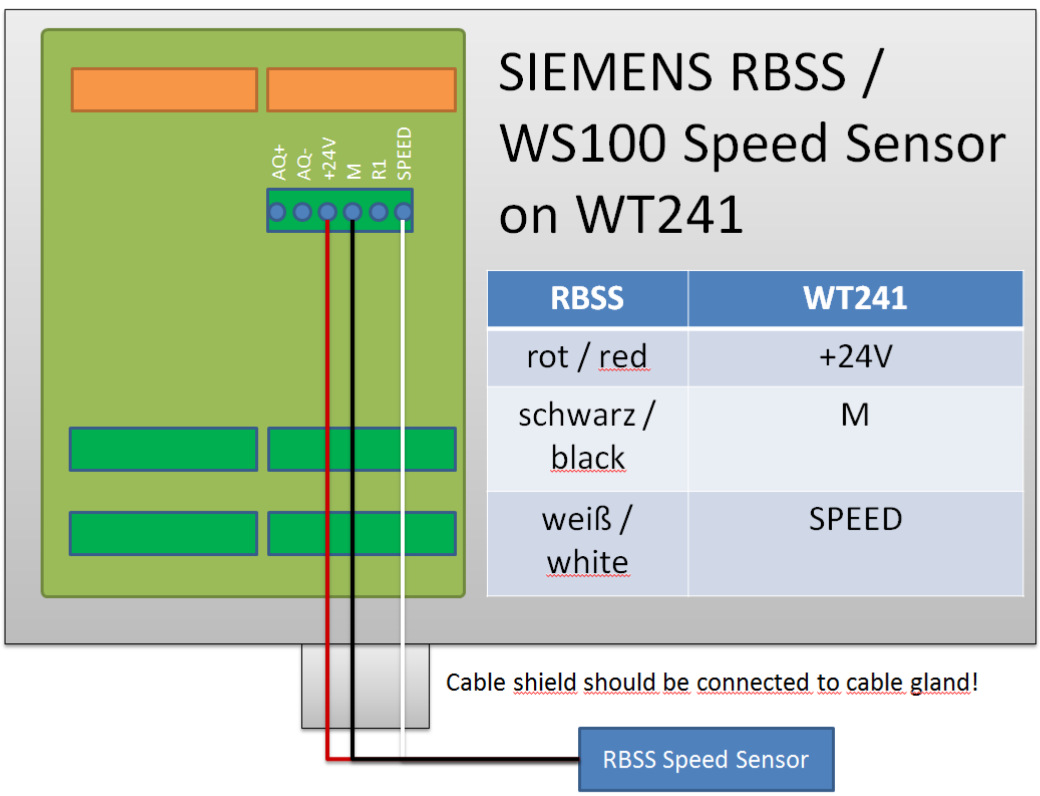


Figure 6-11 RBSS speed sensor on WT241

6.9.2 TASS speed sensor on WT241

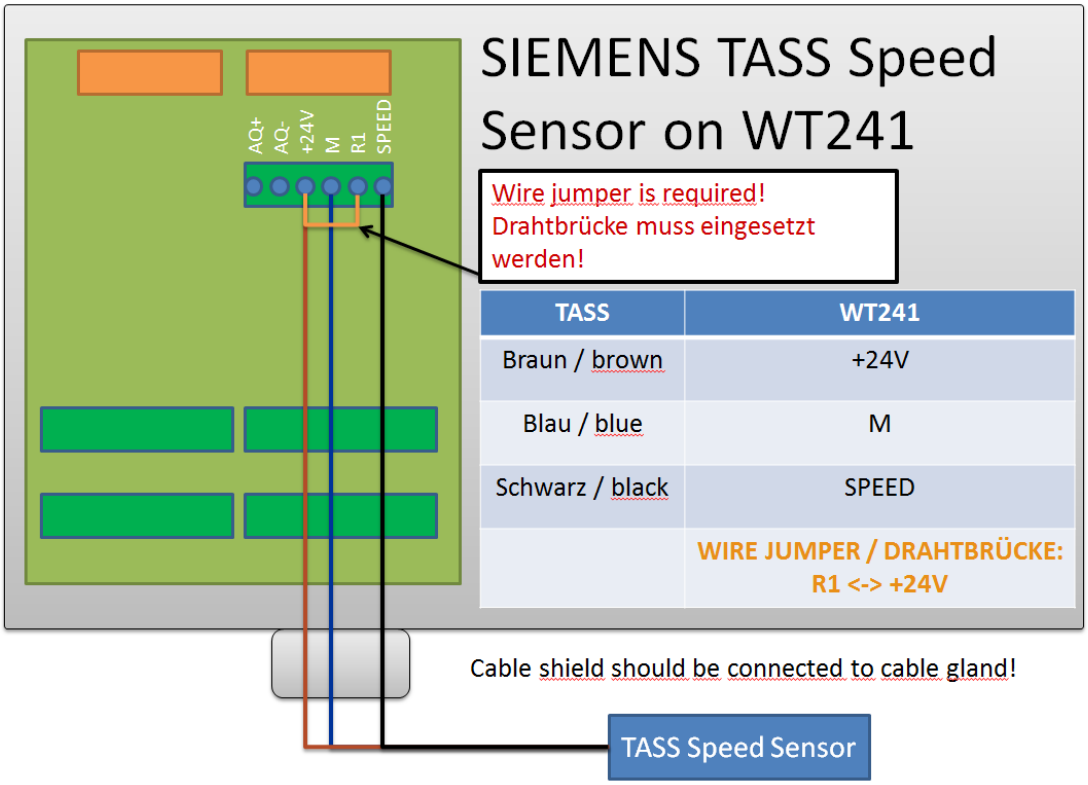


Figure 6-12 TASS speed sensor on WT241

6.9.3 WS300 speed sensor on WT241

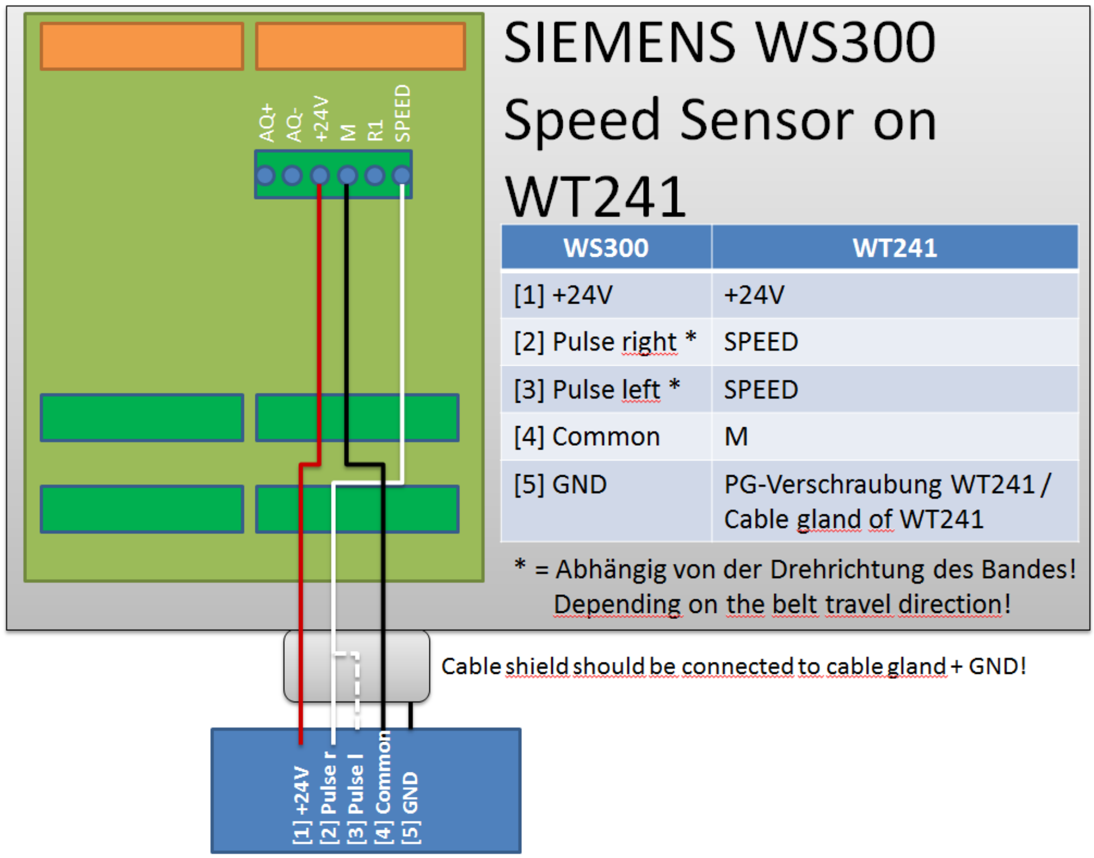


Figure 6-13 WS300 speed sensor on WT241

Commissioning 7

7.1 Introduction

Commissioning consists mainly of checking the mechanical scale structure, setting parameters, calibration, and verification of the envisaged functionality. A lot of helpful information concerning the correct mechanical design of a belt scale can be found in the respective manuals.

These manuals are available online as downloads → Manuals for belt scales (http://support.automation.siemens.com/WW/view/de/18235463/133300).

7.2 Factory-set parameters

The electronic weighing system described here is provided with factory-set parameters. Parameters which can be entered in % or time are preset in such a way that they provide good results for most applications.

7.3 Commissioning via Quick Start routine

The SIWAREX WT241 offers a setup menu to carry out the commissioning of the scale. Select item "1.0 Setup" in the main menu. The system is guiding you through the most important parameters for starting-up the scale. The remaining parameters are factory-set in such a way that they can be used in most cases without any changes.

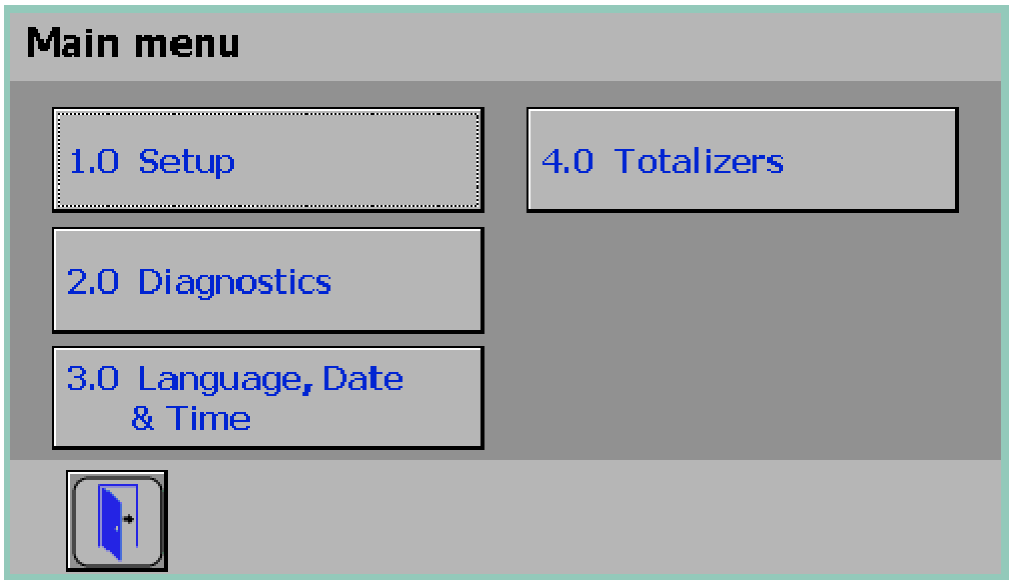


Figure 7-1 Main menu

In the next step, select the item "1.1 Basic parameters" and then press the "Switch on service mode" button in the screen which subsequently appears. The square in the top right corner is then colored yellow (= Service mode ON). You can subsequently use the button with triangle at the bottom right to reach the submenu "1.1.1 Basic parameters 1 of 2".

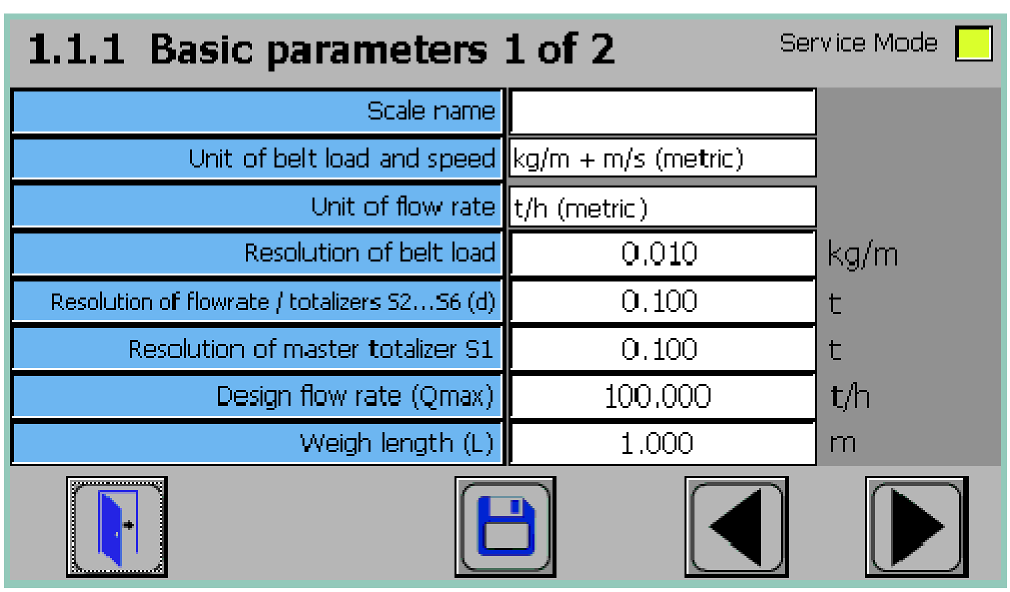


Figure 7-2 Basic parameters 1 of 2

The description for the quick start is based on the factory settings of the parameters. Now make the desired settings in the input form shown above. Note that you must select metric or imperial units for commissioning of the scale. This setting can only be changed again following commissioning by loading the factory settings. A mixture of metric and imperial units for belt load and flow rate is not permissible. Further information on the individual parameters can be found in chapter → Scale parameters and functions of the belt scale (Page 59).

Once the parameters have been appropriately set for your system, confirm them using the save button (diskette symbol) and move on to the next input form using the button with triangle at the bottom right.

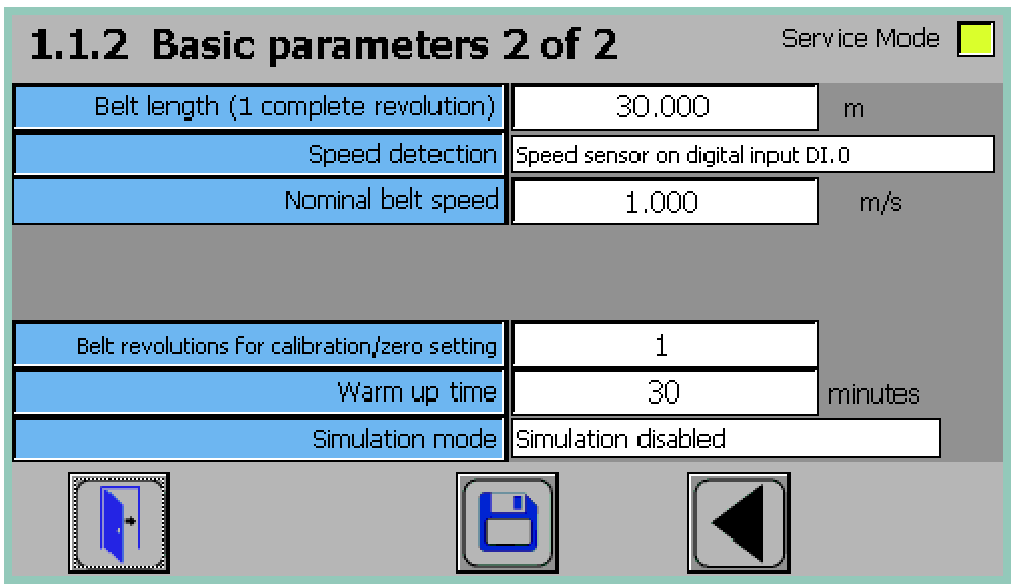


Figure 7-3 Basic parameters 2 of 2

Enter your total belt length. Note that your result will be all the more accurate if you can enter the belt length exactly. Decide in the next step on a speed detection method matching your system. The number of belt revolutions is important for dynamic commands such as zeroing. If the parameter is set to 2, for example, the electronics averages the load cell signal over two complete revolutions and only then carries out the actual calibration/zero setting command. The "Warm-up time" parameter is specified in minutes. An information bit is then available in the scale status which remains TRUE for the defined time. The bit is for information only; it has no effect on other functions. It can be used, for example, to allow the belt to warm up before transportation of material is started. Using simulation mode you can activate the "Load simulation" and "Speed simulation" functions. Without this activation, the scale cannot be switched to the respective simulation mode.

7.3.1.1 Commissioning with speed sensor

When using a speed sensor, use the standard setting "Speed sensor on digital input DI.0" in the speed detection parameter.

Enter the remaining parameters appropriate to your application, and confirm them using the save button. Further information on the individual parameters can be found in chapter →

Scale parameters and functions of the belt scale (Page 59). When using the speed sensor, the "Nominal belt speed" parameter is only used as a reference for the speed limits.

Use the "Door symbol" at the bottom left to return to the Setup menu. In the next step, calibrate your scale using the instructions and parameters under item "1.2 Calibration".

7.3.1.2 Specification of a pulse constant

The pulse constant of the connected speed sensor or pulse encoder is usually noted in the technical data sheet of the respective sensor. If "kg/m" was selected for the belt load, you must specify the pulse constant in "Pulses per meter". If the belt load is displayed in "lbs/ft", you must specify the pulse constant in "Pulses per foot".

If the sensor is mounted on the axis of a guide pulley, use the following equation to calculate the pulse constant:

Pulse constant per meter = (Pulses per revolution) / (π x d)

Pulses per revolution: see sensor data sheet

π = 3.1416

d = diameter of guide pulley in meters

The inputs are completed using the save button (diskette symbol).

Then move on to the "Zero calibration" using → Zero calibration (Page 52).

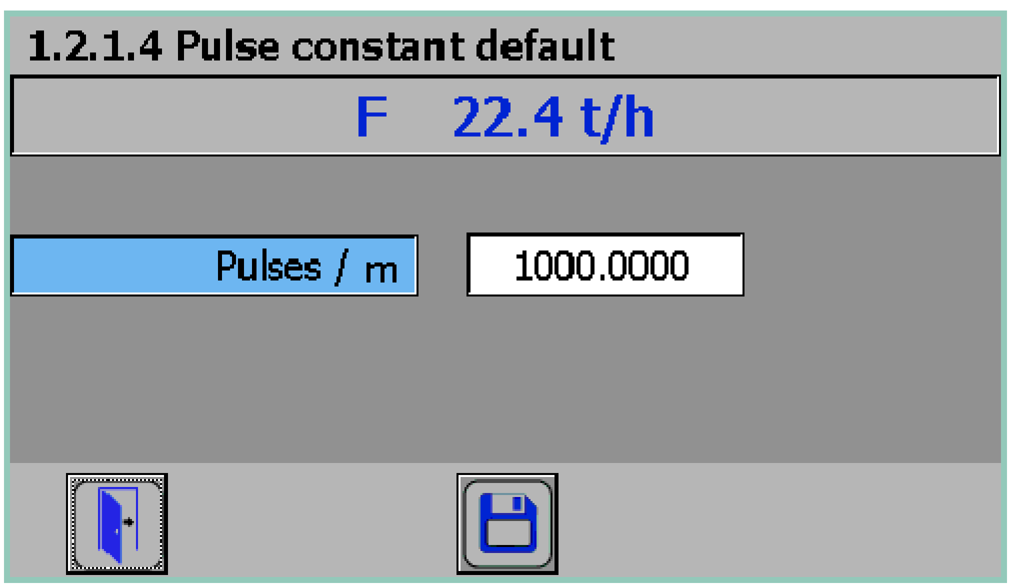


Figure 7-4 Specification of pulse constant

7.3.1.3 Pulse constant calculation

To calculate the pulse constant, use submenu "1.2.1.1 Pulse constant calculation".

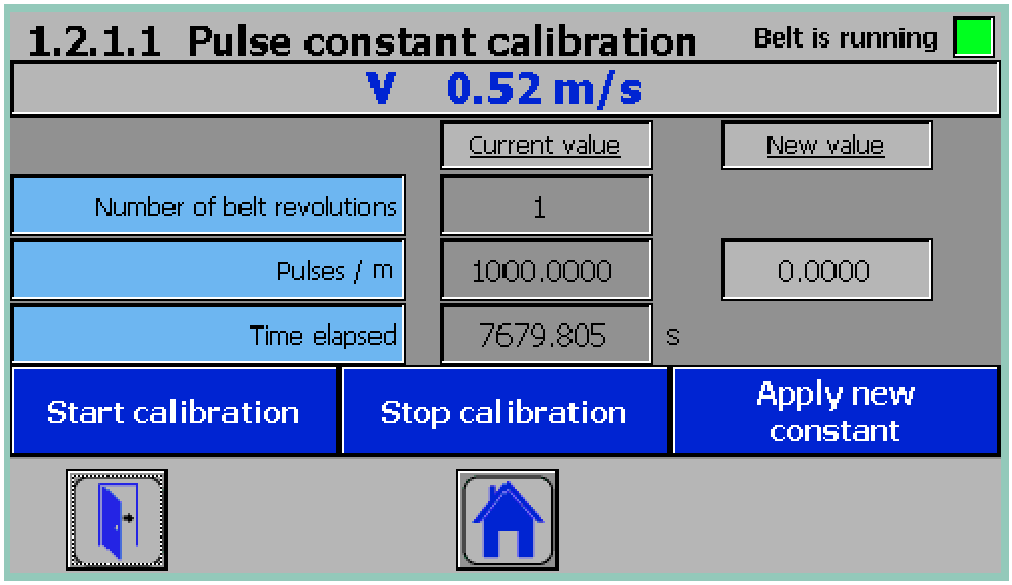


Figure 7-5 Pulse constant calibration

For this procedure you require an optical marking on the belt, e.g. using chalk or adhesive tape.
Start the measurement when the marking has passed a defined point. Stop the measurement as soon as the belt has carried out the defined number of revolutions and the marking has passed the defined point for the last time.
The determined values are displayed in the right-hand column underneath "New value".
Import the values using the "Apply new constant" button. This procedure permits highly exact determination of any unknown pulse constants on the condition that the total belt length is specified exactly.

As an alternative to the belt marking and manual sending of commands, you can connect a belt revolution sensor (e.g. a proximity switch) to digital input DI.1. When assigning the parameters for the digital inputs, you must then assign the "Trigger belt revolution recording" function to DI.1. Pulses are then counted at input DI.1 according to the parameterized number of belt revolutions. The result of the measurement is output when the revolutions have been completed. Import the result using the "Apply new constant" button.

If the values have been applied successfully, the "Pulse / length unit" parameter underneath "New value" becomes zero.

Then move on to the "Zero calibration" using → Zero calibration (Page 52).

7.3.2 Commissioning without speed sensor

You can define a known, constant speed or calculate the current belt speed. In addition, a speed can be defined externally using data record 19.

7.3.2.1 Specification of a known, constant belt speed

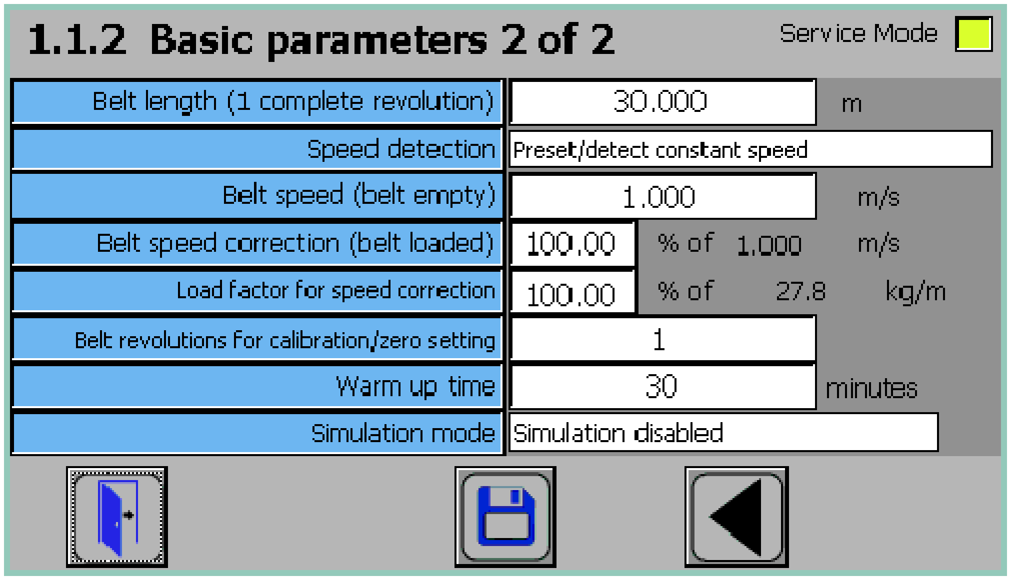


Figure 7-6 Specification of a known, constant belt speed

In menu item 1.1.2 set the "Speed detection" parameter to "Preset/Detect constant speed". Enter the known, constant belt speed in the "Belt speed (belt empty)" parameter. Leave the two parameters "Belt speed correction (belt loaded)" und "Belt load factor for speed correction" at 100%.

Save all settings by clicking the diskette symbol.

Activate the specified speed using one of the three options by means of the external "Set "Belt is running"" command:

- Via a correspondingly parameterized digital input
- Via an external controller
- From the operator panel (menu 1.4.5)

You can reset the speed to zero again using the "Reset "Belt is running"" command.

Then move on to the "Zero calibration" using → Zero calibration (Page 52).

7.3.2.2 Determination of current belt speed (belt empty)

In menu item 1.1.2 set the "Speed detection" parameter to "Preset/Detect constant speed". Subsequently move on to menu item 1.2.1.2 "Speed calibration - No sensor, Belt empty". The belt must have a clearly visible marking, e.g. using chalk or adhesive tape.

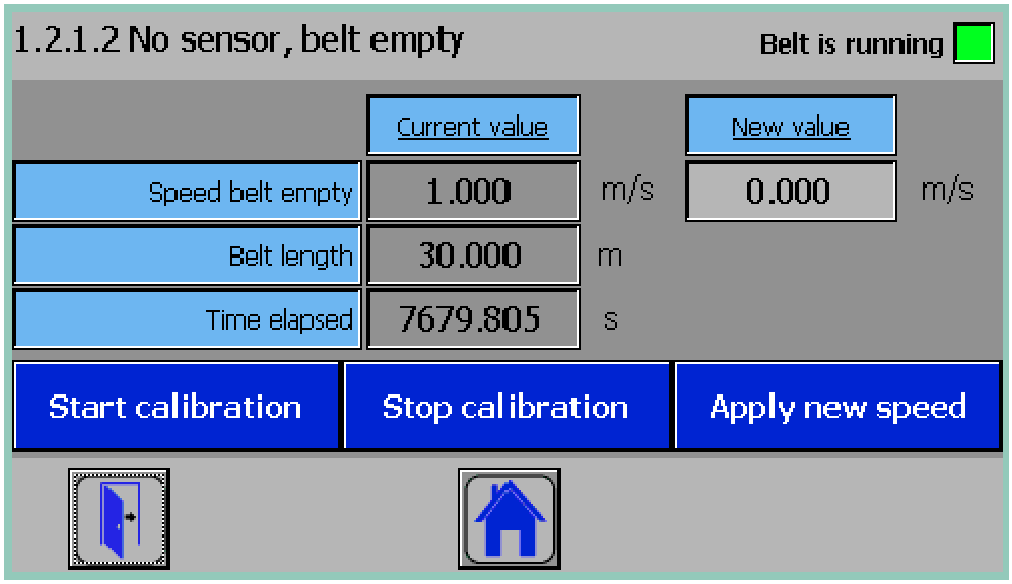


Figure 7-7 Speed calculation with empty belt

Execute the "Start calibration" command when the belt marking passes a defined point. Stop the calibration as soon as the belt has carried out the defined number of revolutions and the marking has passed the defined point for the last time. The belt speed is subsequently displayed in the "New value" column. You can import the belt speed using the "Apply new speed" button.

Activate the specified speed using one of the three options by means of the external "Set "Belt is running"" command:

- Via a correspondingly parameterized digital input
- Via an external controller
- From the operator panel (menu 1.4.5)

You can reset the speed to zero again using the "Reset "Belt is running"" command.

As an alternative to the belt marking and manual sending of commands, you can connect a belt revolution sensor (e.g. a proximity switch) to digital input DI.1. When assigning the parameters for the digital inputs, you must then assign the "Trigger belt revolution recording" function to DI.1. Pulses are then counted at input DI.1 according to the parameterized number of belt revolutions, and an exact trigger point is thus achieved.

Then move on to the "Zero calibration" using → Zero calibration (Page 52).

7.3.2.3 Determination of current belt speed (belt loaded)

In addition to the speed calculation with empty belt, a further calculation can be carried out with the belt loaded. In this case the characteristic of the motor with load is recorded.

A percentage belt load factor and a percentage speed factor are determined. These two values together with the determined nominal speed (→ Determination of current belt speed (belt empty) (Page 49)) then form a characteristic.

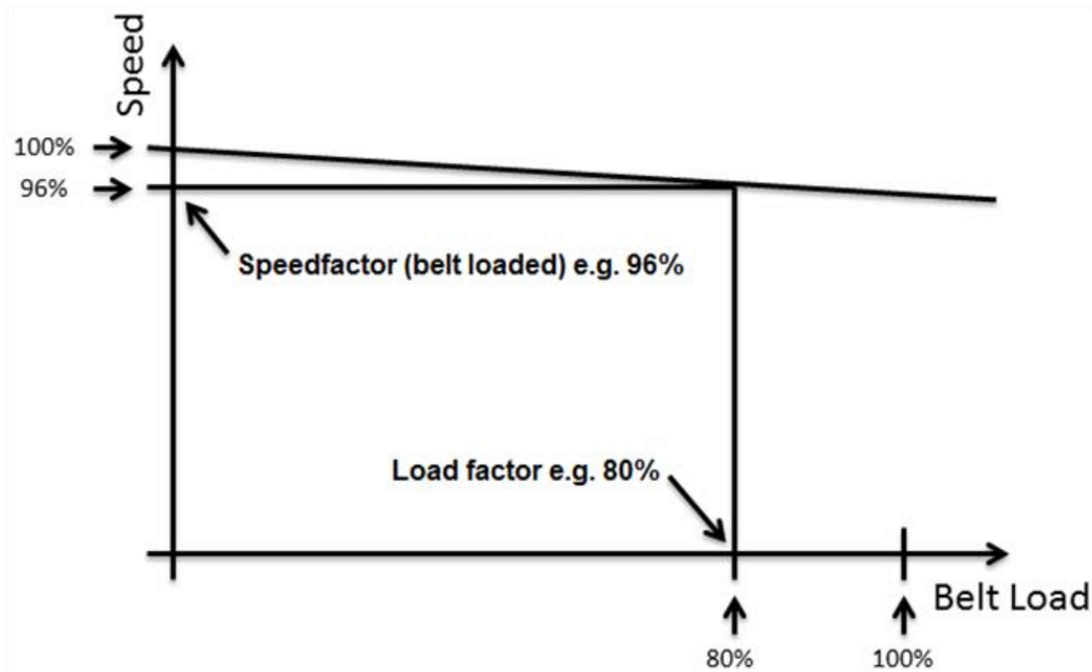


Figure 7-8 Speed characteristic without sensor

Prerequisites for determination of the characteristic are:

- Speed calculation has been carried out with empty belt
- Successful zero calibration
- Successful span calibration

If these conditions have been fulfilled, move on to menu item 1.2.1.3.

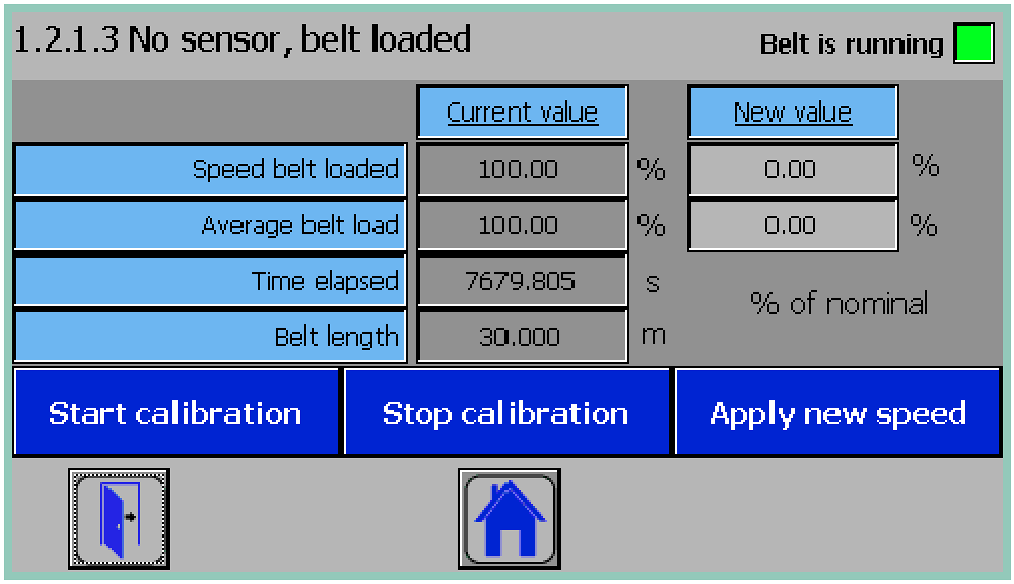


Figure 7-9 Speed calibration (belt loaded)

Activate the procedure when the belt marking is passed by using the "Start calibration" command. Make sure that material is distributed uniformly on the belt at this time. In the optimum case, the belt load should be close to the nominal load during the measurement. Stop the calibration as soon as the belt has carried out the defined number of revolutions and the marking has passed the defined point for the last time.

The average belt load factor is subsequently output as a percentage, and the measured speed in % of the speed with the belt empty. Import the parameters by clicking on "Apply new speed".

As an alternative to the belt marking and manual sending of commands, you can connect a belt revolution sensor (e.g. a proximity switch) to digital input DI.1. When assigning the parameters for the digital inputs, you must then assign the "Trigger belt revolution recording" function to DI.1. Pulses are then counted at input DI.1 according to the parameterized number of belt revolutions, and an exact trigger point is thus achieved.

7.3.2.4 External specification of a speed

If the actual belt speed is available externally (e.g. in a CPU), you can send this to the scale using data record 19 (→ Scale parameters and functions of the belt scale (Page 59)). To do this, set the speed detection to "Speed from CPU (DS19)" in the "Basic parameters 2 of 2" in menu item 1.1.2. The "Nominal belt speed" is then only used as a reference for the speed limits.

As soon as data record 19 is sent with a content not equal to 0 to the electronics (from SIMATIC CPU or with Modbus TCP / RTU), this value is used as the current speed. The "Set "Belt is running"" and "Reset "Belt is running"" commands are not required. In order to stop the belt, write a value of 0 into data record 19 and send this to the electronics.

Following a power loss, a value of 0 is used automatically, and you must again send the current speed externally.

7.3.2.5 Zero calibration

You can determine the zero point following a successful speed calibration. Navigate to menu item 1.2.2.0.

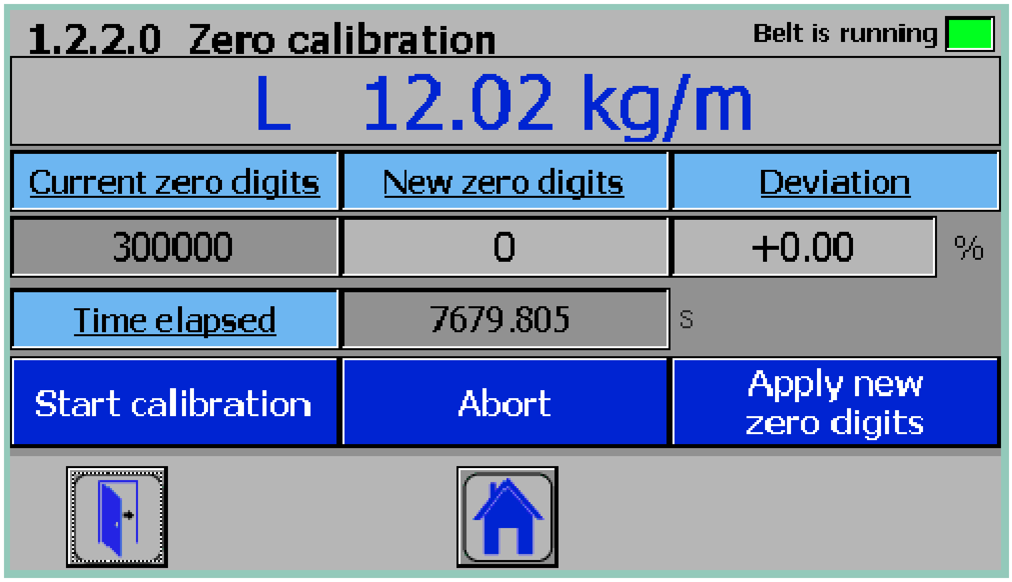


Figure 7-10 Zero calibration

1. Make sure that the belt is running and empty.
2. Start the zero calibration using "Start calibration". A green display field "Zero calibration running" appears. The procedure is stopped automatically following the defined number of belt revolutions, and the new zero digits are displayed.
3. Import these using the "Apply new zero digits" button. Following importing of the new zero point, the actual belt load is displayed as 0.0 kg/m or 0.0 lbs/ft.

Subsequently move on in the calibration menu to item "1.2.3 Span calibration" → Span calibration (Page 52).

7.3.2.6 Span calibration

There are four options for the span calibration:

- Using test weights
- Using a test chain
- Using a material batch
- Automatically using entered load cell data

7.3.2.7 Span calibration by weight

Navigate to menu item 1.2.3.1.

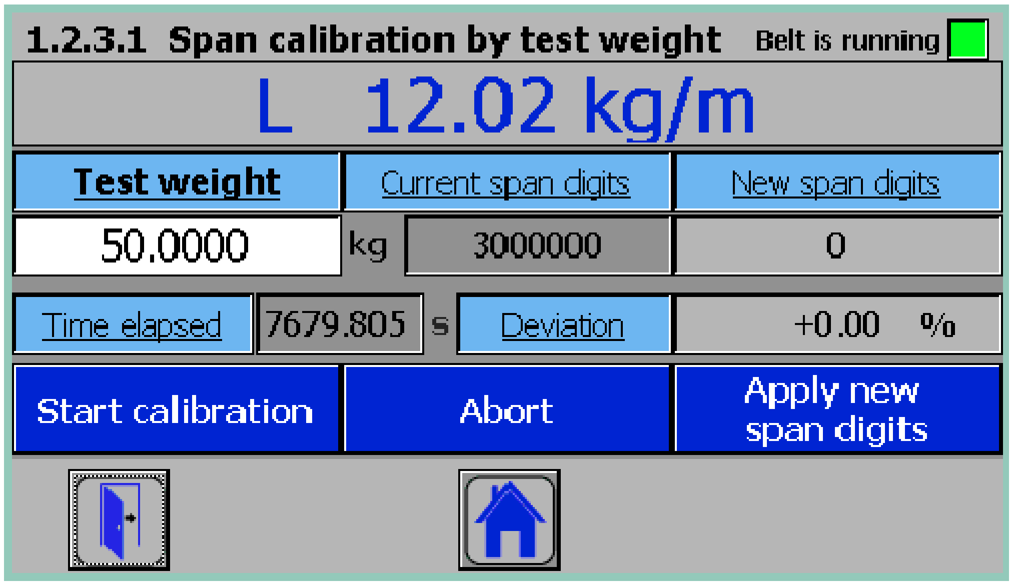


Figure 7-11 Span calibration by weight

1. Enter the mass of the used calibration weight in the field "Calibration weight".
2. Attach this weight with the belt stationary or place it onto the scale.
3. Switch the belt on again and select "Start calibration". The procedure is automatically terminated following the set number of belt revolutions. The new span digits are then displayed in the right-hand column as well as the percentage deviation from the previously used calibration digits (if applicable).
4. Import these values using the "Apply new span digits" button. Commissioning has then been completed.

Additional parameter settings can also be made, for example:

- Setting of limits for belt load, speed, and material flow rate
- Filter settings
- Parameterization of the inputs/outputs of your weighing module

Further information on these and all other parameters can be found in chapter → Scale parameters and functions of the belt scale (Page 59).

You can return to the main screen using the "Home" button (house symbol).

You can improve the results for your system even further following completion of the calibration or also during subsequent operation by means of a flow correction by material test (→ Determination of a correction factor (Page 57)).

7.3.2.8 Span calibration by test chain

In the case of a calibration by test chain, the calibration is not carried out using defined weights but by using a specific belt load which is placed onto the scale in the form of a test chain.

To do this, move on in the calibration menu to item "1.2.3.2 Span calibration by test chain".

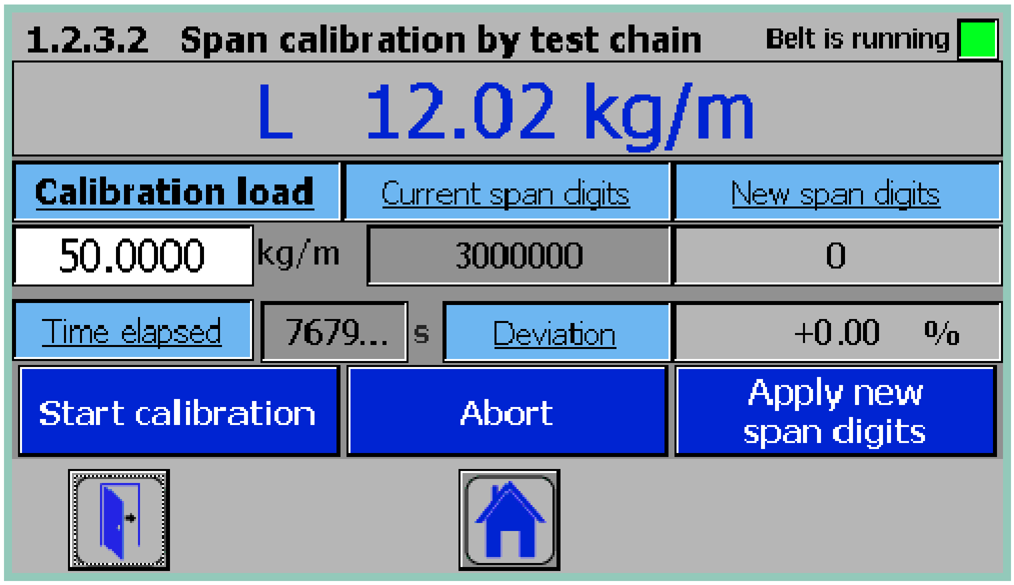


Figure 7-12 Span calibration by test chain

1. Enter the used calibration load in the field "Calibration load".
2. Position the test chain on the belt such that it rests on the complete, effective belt length. Information on positioning of the test chain can be obtained from its enclosed instructions if applicable.
3. Start the calibration procedure using "Start calibration". The procedure is automatically terminated following the set number of belt revolutions. The new span digits are then displayed in the right-hand column as well as the percentage deviation from the previously used calibration digits (if applicable).
4. Import the newly determined digits using the "Apply new span digits" button. The belt load shown at the top of the screen corresponds to the specified calibration load following successful importing of the span digits. Commissioning has then been completed.

Additional parameter settings can also be made, for example:

- Setting of limits for belt load, speed, and material flow rate
- Filter settings
- Parameterization of the inputs/outputs of your weighing module

Further information on these and all other parameters can be found in chapter → Scale parameters and functions of the belt scale (Page 59).

You can return to the main screen using the "Home" button (house symbol).

You can improve the results for your system even further following completion of the calibration or also during subsequent operation by means of a flow correction by material test (→ Determination of a correction factor (Page 57)).

7.3.2.9 Span by material batch

With this type of calibration, a previously or subsequently weighed amount of material is conveyed over the scale. The span is subsequently calculated according to the amount of material.

Prerequisites are a successful calibration of the speed and a zero calibration.

Navigate in the span calibration menu to item "1.2.3.3 Span by material batch".

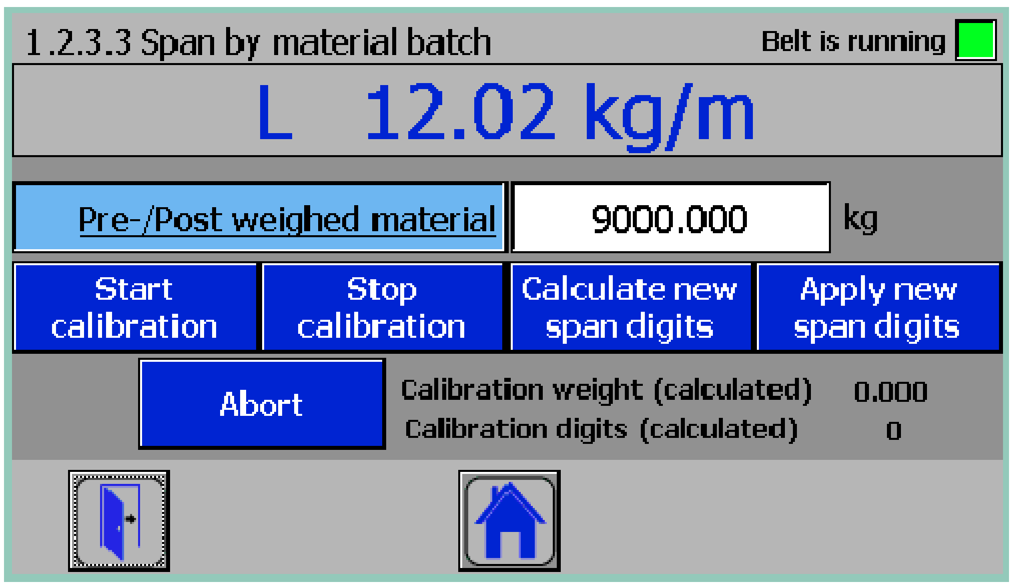


Figure 7-13 Span by material batch

1. If you wish to convey a known amount of material, enter this in the "Conveyed amount of material" field.
   Alternatively you can also enter the amount of material following conveyance.
2. Make sure that the belt is running and empty.
3. Start the calibration procedure using "Start calibration". Allow the material to be conveyed on the belt.
4. When the complete amount of material has passed the scale and the belt is empty again, terminate the procedure using "Stop calibration".
   Enter the amount of material in the "Conveyed amount of material" field if it has not yet been recorded. To do this, weigh the conveyed amount of material on a separate scale.
5. Start the required calculations using the "Calculate new span digits" button. The calculated calibration weight and the calculated span digits are displayed.
6. Import the values using "Apply new span digits". Commissioning has then been completed.

Additional parameter settings can also be made, for example:

- Setting of limits for belt load, speed, and material flow rate
- Filter settings
- Parameterization of the inputs/outputs of your weighing module

Further information on these and all other parameters can be found in chapter → Scale parameters and functions of the belt scale (Page 59).

You can return to the main screen using the "Home" button (house symbol).

You can improve the results for your system even further following completion of the calibration or also during subsequent operation by means of a flow correction by material test (→ Determination of a correction factor (Page 57)).

7.3.2.10 Automatic span calibration

By entering the technical specifications of the used load cells, you can automatically carry out the span calibration without using weights or material.

Navigate in the span calibration menu to item "1.2.3.4 Automatic span by load cell data".

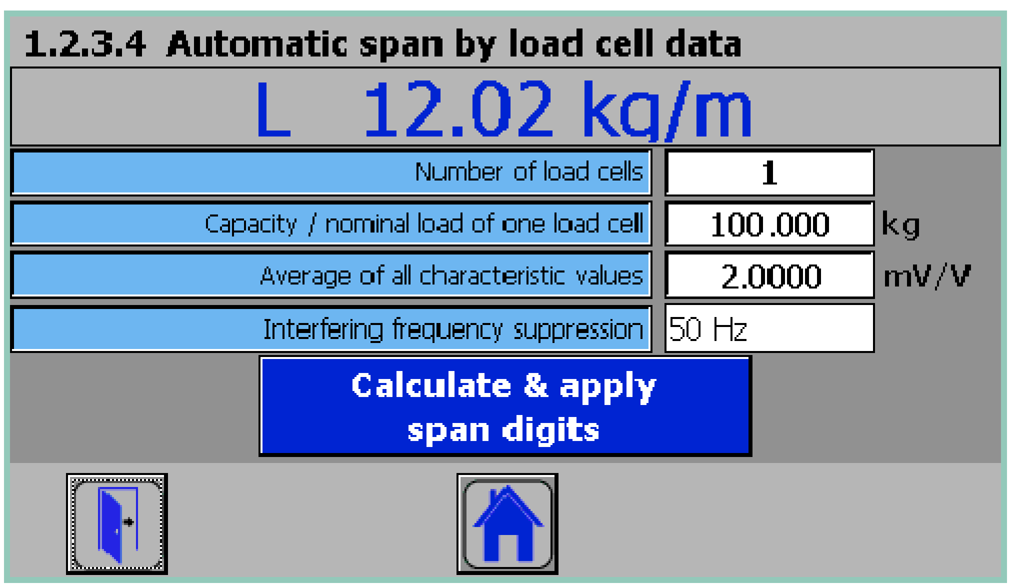


Figure 7-14 Automatic span calibration

A prerequisite for this step is a successful zero calibration.

1. Enter the number of used load cells and the nominal load of one cell.
2. Enter the average of all load cell characteristic values: If the exact characteristic values of the cells are unknown, you can enter coarse values such as 1.0 mV/V, 2.0 mV, 3.0 mV/V or 4.0 mV/V.
3. Select the interfering frequency suppression. The interfering frequency suppression is used to effectively filter out interferences from the power supply network (50 Hz/60 Hz).

4. Calculate and import the span digits using "Calculate & apply span digits". The values are active immediately and need not be imported separately.
5. If the belt of the scale has not been installed exactly horizontally, you must additionally enter the inclination angle of the belt in menu item 1.4.3.
   Commissioning has then been completed.

Additional parameter settings can also be made, for example:

- Setting of limits for belt load, speed, and material flow rate
- Filter settings
- Parameterization of the inputs/outputs of your weighing module

Further information on these and all other parameters can be found in chapter → Scale parameters and functions of the belt scale (Page 59).

You can return to the main screen using the "Home" button (house symbol).

You can improve the results for your system even further following completion of the calibration or also during subsequent operation by means of a flow correction by material test (→ Determination of a correction factor (Page 57)).

7.3.3 Determination of a correction factor

To improve the accuracy, you can specify a correction factor using a material test.

Navigate in the menu to item "1.2.4 Flow correction by material test".

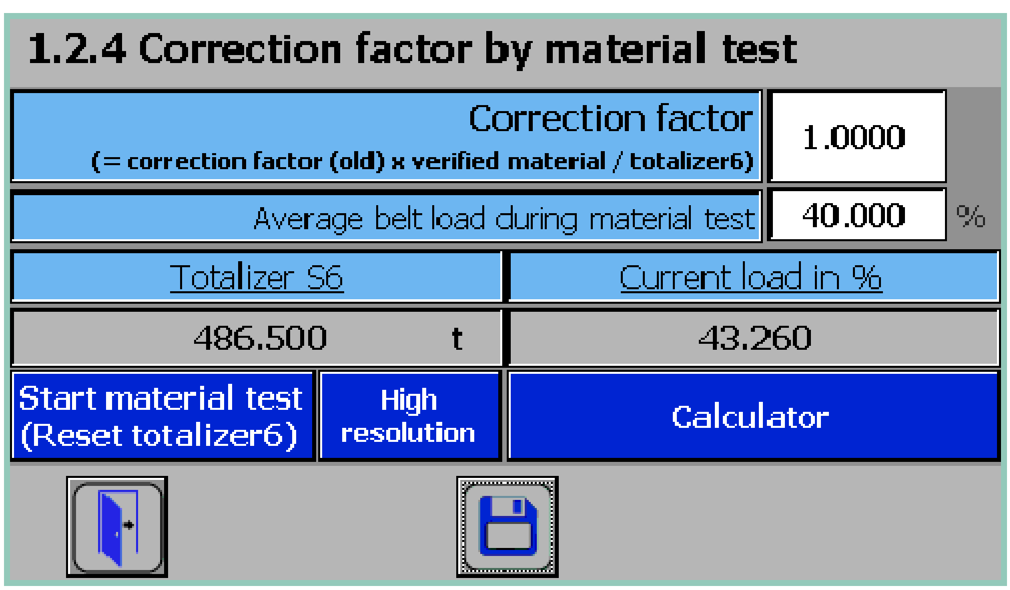


Figure 7-15 Flow correction by material test

1. Make sure that the belt is running and empty.
2. Start the material test using the "Start material test (reset totalizer 6)" button.

3. Load material onto the belt as uniformly as possible so that the belt load remains as constant as possible during the test. During conveyance of the material, observe the "Current load in %" value on the right of the screen.
4. Once the desired amount of material has been conveyed by the belt and the belt is then empty again, the total on the left of the screen remains constant. Determine the correction factor: divide the actually conveyed amount of material (either already known or determined by subsequent weighing on a separate scale) by the value of "Totalizer 6" determined during the test.
   You can also use the integrated calculator for the calculation by selecting the next input form using the "Calculator" button. First enter the two values there in the input fields, and then read the result by clicking on the "Divide symbol".
5. Enter the determined correction factor in the "Correction factor 1" field.
6. Additionally enter the observed value of the "Current load in %" in the input field next to "Belt load factor 1 (% of nominal belt load)".
7. Confirm and save your inputs by subsequently clicking on the diskette symbol. Your scale now uses this correction factor for the complete weighing range.

You can use several correction factors for different belt loads by using the SIWATOOL service and commissioning tool. It is then possible to determine an additional correction factor for a further, higher belt load. A correction characteristic is then produced depending on the belt load.

8 Scale parameters and functions of the belt scale

8.1 SIWAREX WT241 Operating View

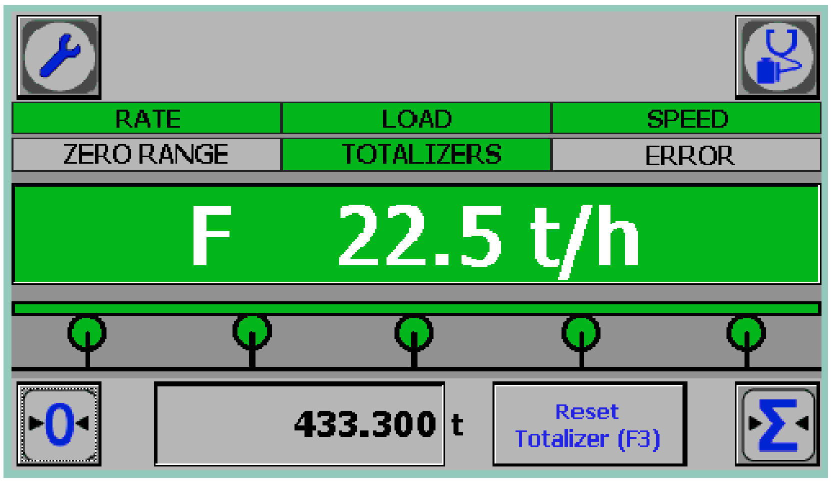
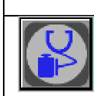
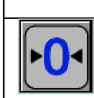
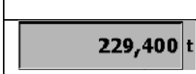
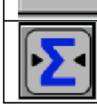


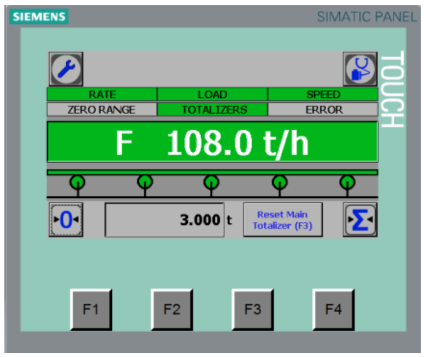
Figure 8-1 Operating View SIWAREX WT241

Variable	Description
	Go to main menu
	Go to menu 2.0 Diagnostics
	Zeroing
	Main totalilzer
	Reset Main totalizer
	Go to menu 4.0 Totalizer

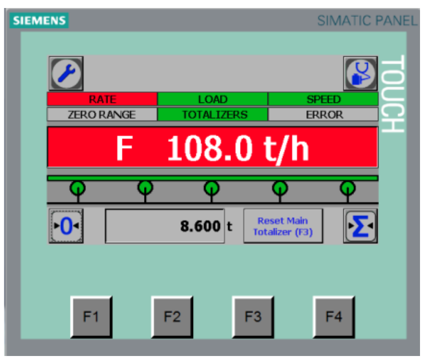
Variable	Description
RATE	Limit flow rate Yellow if current rate below min-imum limit Red if current rate above maxi-mum limit Setting in „1.3.1 Limits 1/2“
LOAD	Limit belt load Yellow if current rate below min-imum limit Red if current rate above maxi-mum limit Setting in „1.3.1 Limits 1/2“
SPEED	Limit belt speed Yellow if current rate below min-imum limit Red if current rate above maxi-mum limit Setting in „1.3.1 Limits 1/2“
ZERO RANGE	Belt load within range of zero offsets Setting in “1.3.2 Limits 2/2”
TOTALIZERS	Totalizers active
ERROR	An error is occured

8.1.1 Dynamic status in operating view

The operating view supports you with dynamic, visualized status information regarding flow rate, belt load and belt speed.

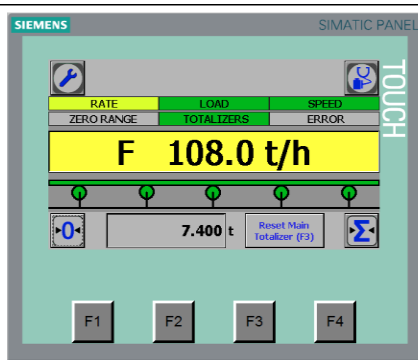


Scale is working within it’s settings



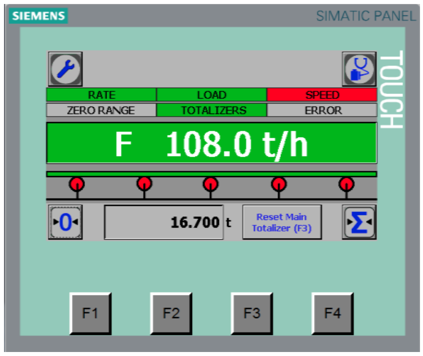
Flow rate is above maximum limit

(see menu “1.3.1 Limits 1 / 2”)



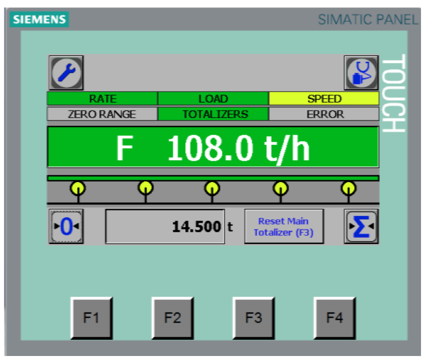
Flow rate is below minimum limit

(see menu “1.3.1 Limits 1 / 2”)



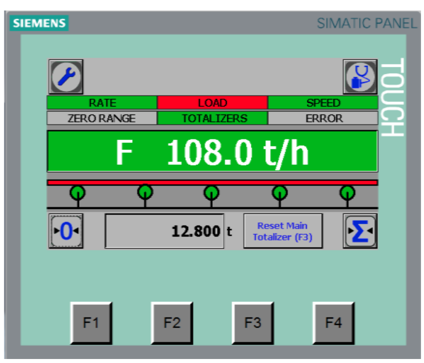
Belt speed is above maximum limit

(see menu “1.3.1 Limits 1 / 2”)



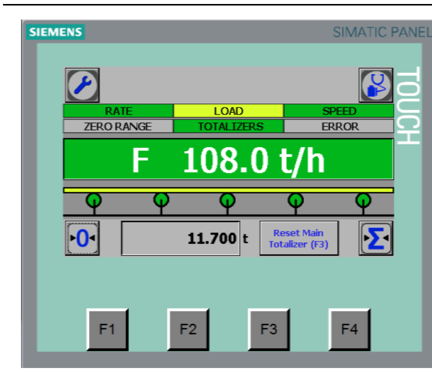
Belt speed is below minimum limit

(see menu “1.3.1 Limits 1 / 2”)



Belt load is above maximum limit

(see menu “1.3.1 Limits 1 / 2”)



Belt load is below minimum limit

(see menu “1.3.1 Limits 1 / 2”)

8.2 Menu tree

8.3 Menu 1.1 Basic parameters

Menu 1.1 “Basic parameters” contains the most important settings for commissioning a scale. Changes to those parameters can only be done when switching to “service mode”. The system is requesting to do in case such changes shall be done.

1.1.1 Basic parameters 1 von 2	
Scale name	You can select any name, but it may not exceed 12 characters. You can enter any designation.
Unit of belt load and speed	When setting parameters for the first time you must select between metric and imperial systems. The following units can be selected for the belt load: 0 – kg/m + m/s (metric) 1 – lbs/foot + foot/s (imperial) 2 – lbs/foot + foot/min (imperial) With the kg/m unit, the material flow rate can be specified in t/h or kg/h. With the lbs/foot unit, the material flow rate can be specified in T/h, TL/h or lbs/h.
Unit of flow rate	Folgende Einheiten für die Förderstärke können gewählt werden: The following units can be selected for the material flow rate: 0 – t/h (metric) 1 – kg/h (metric) 2 – T/h (imperial) 3 – TL/h (imperial) 4 – lbs/h (imperial)
Resolution of belt load	The resolution for the weight measurement and the belt load per length unit can be defined in accordance with the standard EN 45501 (1*10**k, 2*10**k, 5*10**k]; k: -3 … 2) from 0.0001 to 50.
Resolution of flow rate / totalizers S2…S6	The resolution for the material flow rate and totalizers 2 to 6 can be defined in accordance with the standard EN 45501 (1*10**k, 2*10**k, 5*10**k]; k: -3 … 2) from 0.0001 to 50.
Resolution of master totalizer	The resolution for the master totalizer (cannot be deleted) can be defined in accordance with the standard EN 45501 (1*10**k, 2*10**k, 5*10**k]; k: -3 … 2) from 0.0001 to 50.
Design flow rate (Qmax)	The design flow rate is entered during initial commissioning. It can be obtained from the data sheet for the belt scale. It corresponds to the maximum material flow rate (100%) for which the conveyor belt is designed. The % values for the material flow rate limits refer to the rated flow rate.
Weigh length	In the case of a scale with a roller station, the weigh length corresponds to half the distance from the roller station to the adjacent rollers on the left and right which are located upstream and downstream of the roller station. With two or more roller stations, the distance between the roller stations is added to this.

1.1.2 Basic parameter 2 of 2	
Belt length (1 complete revolution)	The length of the conveyor belt is measured during commissioning, and entered. This is usually twice the distance between the axes of the deflection pulleys plus the single circumference of the pulley. The input is made in the length unit from the belt load.
Speed detection	There are three options for determining the current speed: 0 – no speed sensor present. Specification of a constant belt speed or determination of it. 1 – speed sensor at digital input DI.0 2 – external specification of belt speed from PLC via Modbus RTU (see chapter 11 "Communication", pg. 87.
Design / nominal belt speed	The design speed can be determined with the belt empty. To this end, the time for one or more belt revolutions is measured, and the speed determined from this.
Speed correction if belt loaded (Band beladen)	If a speed sensor is not used (speed detection = 0, see above), a speed correction can be determined at a certain belt load factor (preferably the nominal load) in addition to the design speed. A load-dependent characteristic for the speed then results together with the design speed. This characteristic is determined by two working points: Design speed with empty belt and a speed factor correction with a certain belt load factor. The specification is made in % of the design speed.
Load factor for speed correction	The associated belt load factor (in % of nominal load) is specified for determination of the speed correction (see above)
Design speed	The design speed can be determined with the belt empty. To this end, the time for one or more belt revolutions is measured, and the speed determined from this.
Belt revolutions for calibration / zero setting	At least one belt revolution is required for the calibration. You can increase the number of belt revolutions in order to increase the accuracy of the equipment.
Warm up time	Following switching-on of the electronic weighing system, this input indicates in the status area that the time has not yet expired ("Warm-up time running").
Simulation mode	The weighing electronic offers three modes of simulation: 1. Load simulation 2. Speed simulation 3. Load and speed simulation Without enabling one of these modes within the basic parameters, a simulation cannot be started. In case one simulation mode is chosen, the menu "1.5.9 Simulation" will get accessable.

8.4 Menu 1.2 Calibration

Please refer to chapter 7 “Commissioning”, pg. 43.

8.5 Menu 1.3 Limits

1.3.1 Limits 1 / 2	
	Menu 1.3 is containing limit setting for belt speed, flow rate and belt load. To all limits an alarm delay can be added. The limits will switch with undergoing the defined minimum and exceeding the defined maximum for a time >= defined alarm delay. Limits will be visualized in the operating menu (s. chapter “8.1.1 Dynamic status in operating view”, pg 60). Further they can be readout via digital outputs or RS485.
Belt speed	Dropping below the minimum belt speed is displayed in the status area of the scale. The specification is made in % of the nominal belt speed which was specified during commissioning or calculated. Exceeding the maximum belt speed is displayed in the status area of the scale. The specification is made in % of the nominal belt speed which was specified during commissioning or calculated. Violation of the limits for the belt speed is delayed by the specified time. The specification is made in ms.
Flow rate	Dropping below the minimum flow rate is displayed in the status area of the scale. The specification is made in % of the design flow rate. Exceeding the maximum flow rate is displayed in the status area of the scale. The specification is made in % of the design flow rate. Reaching the maximum flow rate is displayed in the status area of the scale only following expiry of the delay. The specification is made in ms.
Belt load	Dropping below the minimum belt load is displayed in the status area of the belt scale. The specification is made in % of the nominal belt load which was determined during commissioning. Exceeding the maximum belt load is displayed in the status area of the belt scale. The specification is made in % of the nominal belt load which was determined during commissioning. Violation of the limits for the belt load is delayed by the specified time. The specification is made in ms.

1.3.2 Limits 2 / 2	
Minimum load for totalizing	Totalizing is not carried out below this value. The specification is made in % of the belt load. If "0" is specified, totalizing is bidirectional.
Maximum positive zero offset Maximum negative zero offset	Zeroing sets the current weight of the scale and the belt load to zero. The specification is made in % of the nominal belt load. The range refers to the original zero point of the last calibration. In the case of sales for legal trade operation, the maximum zero offset is 4%.

8.6 Menu 1.4 Additional parameters

1.4.1 Calculator & stopwatch	
	A calculator and a stopwatch for use when commissioning the scale or maintaining it.
1.4.2 Messaging setting	
	This menu gives the option to blank messages being produced by the weighing electronic. In case displaying a message is not wanted, chose “suppress message” for the applicable message.
2000 Technological message	Group message, at least one technology error exists
2002 Trace overloaded	The set recording rate for trace function cannot be processed. Set a slower recording rate.
2003 Zero setting aborted	The zeroing procedure has been canceled. Possible causes: violation of zeroing limits.
3001 Totalizers disturbed	Fault occurred during totalizing.
2004 Trace aborted	The trace recording has been cancelled. Possible causes: trace memory full and not declared as ring memory.
3002 Calibration aborted	Current calibration procedure has been aborted. Possible causes: non-plausible values have been determined during the command.
1.4.3 Incline angle	
	Input of the angle is provided for belt scales where the inclination of the belt can be changed during operation. Calculation of the current belt load is corrected by entering the current angle. The input is unnecessary if the inclination is always constant: the influence of the constant angle is compensated or automatically taken into consideration during the calibration with weights or test chain.

	If the scale is automatically calibrated using the load cell parameters and if the scale is not installed exactly horizontally, you must subsequently enter the inclination angle of the belt. The input is made in degrees.

1.4.4 Filter settings

A critically damped low-pass filter is provided to suppress interferences. The diagram below shows the step response of the filter (f_g = 2 Hz). The entry "0" means that the filter is switched off. The cut-off frequency can be specified between 0.05 and 50.0 Hz.

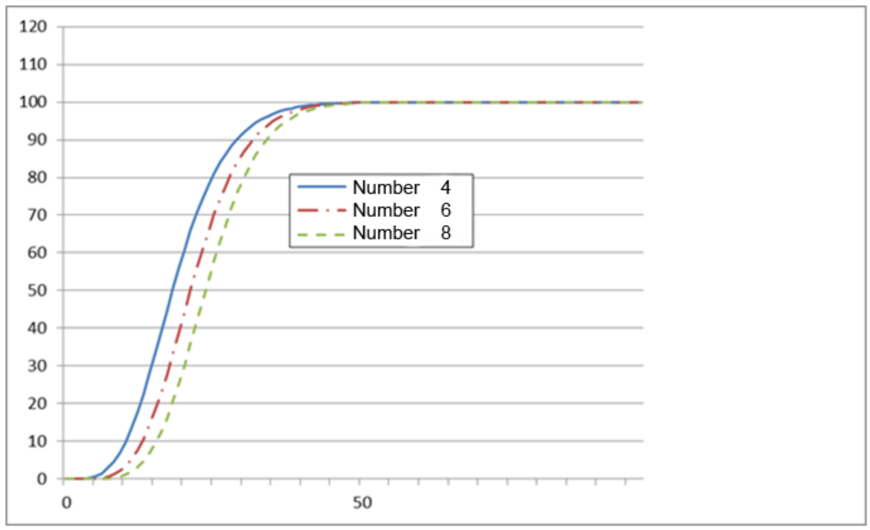


Figure 8-2 Step response of the digital low-pass filter when f_g = 2 Hz

The definition of the cut-off frequency is extremely important for suppressing interferences. Defining the cut-off frequency defines the "speed" of the scale's 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 scale "slower".

The weighing system offers following filters:

- Belt load low pass filter
- Belt speed low pass filter
- Flow rate average filter

Frequency „Belt load“ low pass filter (Hz)	Cutoff frequency of low pass filter for belt load Set “0” to switch off the filter. Cutoff frequency f_g can range between 0.05…50 Hz.
Order number „Belt load“ low pass filter	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 order number, the higher the damping effect of the filter.

Frequency „Belt speed“ low pass filter (Hz)	Cutoff frequency of low pass filter for belt speed Set “0” to switch off the filter. Cutoff frequency f_g can range between 0.05…50 Hz.
Order number „Belt speed“ low pass filter	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 order number, the higher the damping effect of the filter.
Average filter „Flow rate“ (samples)	The mean value filter is used to steady the weight against random interference. The weight is generated from the mean value of n (n = max. 250) weight values calculated by the weighing module every 10 ms. With n = 10, for example, 10 values are used to generate the mean value. The oldest value is discarded every 10 ms, and the newest value included in the calculation.
1.4.5 Belt commands	
	In case of working without speed sensor but using a known belt speed, the command „Belt is running“ must be setted in order to operate the scale. (see 7.3.2.1 „Specification of a known, constant belt speed“, pg. 48)

8.7 Menu 1.5 Communication & interfaces

1.5.1 Digital in- and outputs	
	Parameterize the digital in- and outputs
Input DI.0 … DI.3	Assign commands to digital input 0 to 3. The commands will be triggered with rising edge (0 -> transition). Consider that DI.0 is used for speed sensor input. Refer to chapter 10 “Command lists” page 83 for a list of possible commands.
Filter digital inputs	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: – 0,2 ms – 0,4 ms – 0,8 ms – 1,6 ms – 3,2 ms – 6,4 ms – 12,8 ms
Output DQ.0 … DQ.3	A status display can be assigned to a digital input. This is done on the basis of chosing the status out of the drop down menu.

Error state	This parameter allows you to define the response of the digital in- and outputs following a fault of the SIWAREX module The following values can be set: – All „FALSE" – All outputs are switched off – Obtain functionality – Defined value -- The relevant substitute value is activated – All „TRUE" -- Outputs are switched on

1.5.2 Analogue output

SIWAREX WT241 is providing one analogue output which is parameterized in menu 1.5.2.

Range	This parameter is used to define the output current range. The following values can be set: – 0 … 20 mA – 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. The following values can be set: – Belt speed – Belt load – Flow rate – Test / force output
Start value (0/4mA)	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 (20mA)	This parameter defines the specified value at which 20 mA is output. The value can be greater or less than the start value.
State by error or stop	This parameter defines the response of the analog output following a fault of the SIWAREX module. The following values can be set: – Min. (0mA) – Obtain functionality – Defined value – Max. (24mA)

1.5.3 Remote totalizer pulse signal

By parameterizing the corresponding digital output you can use one of the digital outputs as a pulse sensor/quantity (see 8.7 "Menu 1.5 Communication & interfaces" 68).

In addition you must specify a load per pulse and a pulse duration for the signal. If the material flow rate is displayed e.g. in t/h, you must specify the quantity per pulse in t, or with kg/h in kg. The pulse duration is defined in ms.

Make sure when setting the parameters that you only enter plausible combinations → pulse duration > (amount per pulse / material flow rate).

1.5.4 Test & force digital outputs

Digital outputs can be tested / forced manually in this menu. Requirement is, to assign “Test / force output” in menu 1.5.1.2 “Digital in- and output settings 2 of 2”.

1.5.5 Test & force analogue output

The analogue output can be tested / forces manually in this menu. Requirement is, to assign “Test / force output” in menu 1.5.2 “Analog output settings” as source.

1.5.6 Trace settings

The trace function allows recording virtually all process values, limit values, in- and outputs of the SIWAREX WT241.

Trace rate	The trace function is used for the continuous recording of measured values. The recording rate is defined with the parameter. The following values can be set: – 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. The following values can be set: – Trace recording runs as circulating memory – Trace is stopped when the trace memory is full

1.5.7 RS485 settings

This menu allows the define the RS485 parameters. In case of not using the interface, no change is necessary to the defaults.

Protocol	This parameter defines the protocol for communication via the RS485 interface. The following values can be set: – No communication/protocol – Modbus RTU
Baud rate	This parameter defines the baud rate for the RS485 interface. The following values can be set: – 1 200 bps – 2 400 bps – 9 600 bps – 19 200 bps

	– 38 400 bps – 57 600 bps – 115 000 bps
Parity	This parameter defines the character parity for the RS485 interface. The following values can be set: – Even – Odd
Data bits	This parameter defines the number of data bits for the RS485 interface. The following values can be set: – 7 – 8
Stop bits	This parameter defines the number of stop bits for the RS485 interface. The following values can be set: – 1 – 2
Modbus RTU address	This parameter defines the Modbus address (1 to 230) for communication via the RS485 interface with the Modbus protocol.

1.5.8 Ethernet settings

This menu shows the ethernet parameters of the weighing electronic. These values cannot be changed.

Device-MAC address	MAC address of the weighing module.
IP address	IP address of the weighing module. Default is 192.168.0.21

1.5.9 Simulation

In case the simulation mode is activated (menu 1.1.2 “Basic parameters 2 / 2“) menu 1.5.9 “Simulation” will be accessible. Here simulation can be started and monitored.

Depending on the chosen style of simulation in 1.1.2 “Basic parameters 2 / 2” the menus 1.5.9.1 Load simulation and / or 1.5.9.2 Speed simulation will be shown.

1.5.9.1 Load simulation

Belt load simulati-on value	Enter the belt load value to be simulated.
Start load simula-tion	Start simulation
Stop load simula-	Stop simulation

tion	
1.5.9.2 Speed simulation	
Belt speed simulation value	Enter the belt speed value to be simulated.
Start speed simulation	Start simulation
Stop speed simulation	Stop simulation

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 message log of the weighing electronic.

8.10 Menu 2.2 Scale status

You can directly jump into menu 2.2.1 by pressing the belt scale within the operating view.

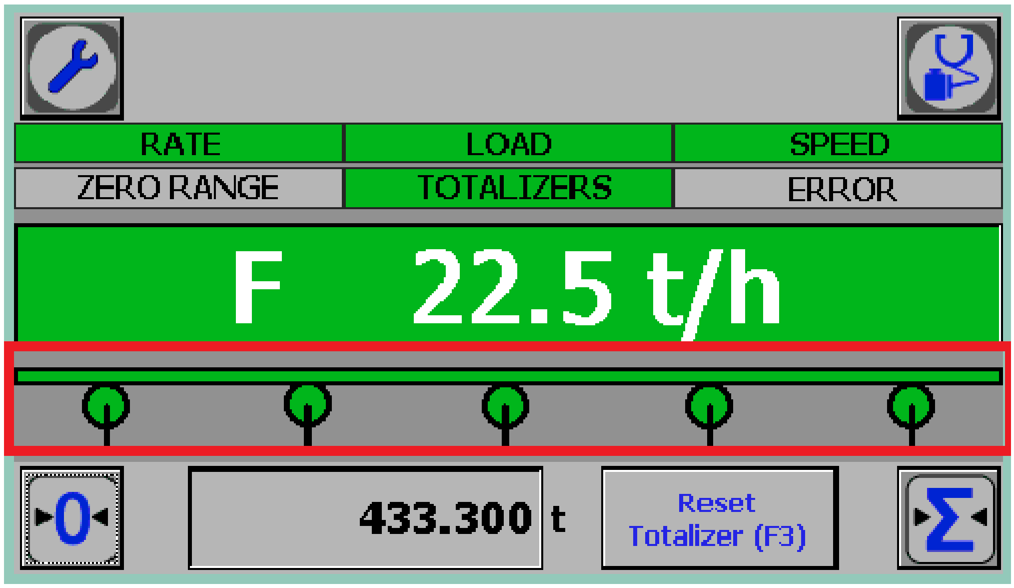


Figure 8-3 SIWAREX WT241 operating view – press the belt scale to jump to menu 2.2.1

2.2.1 Scale status1 of 5 This overview shows the main process values of the beltscale.	
Flow rate	The current material flow rate (belt load x speed).
Belt speed	The current material weight of the loaded belt acting on one unit of the weigh length.
Belt load	The current material weight of the loaded belt acting on one unit of the weigh length.
2.2.2 Scale status 2 of 5 Shows the current status of digital in- and outputs as well as of the analog output.	
Load cell signal	The current input voltage of the load cell(s) in mV.
Status digital inputs	Current status of digital inputs DI.0 to DI.3. A green highlighted flag stands for an activated input.

Status digital outputs	Current status of digital inputs DQ.0 to DQ.3. A green highlighted flag stands for an activated output.
Status analog output	The actual value of the current (in mA) which is output at the analog output.
2.2.3 Scale status 3 of 5 Overview of the status of limits	
Flow rate < min. flow rate	Set in case minimum flow rate is underrun
Flow rate > max. flow rate	Set in case maximum flow rate is exceeded
Speed < min. speed	Set in case minimum speed is underrun
Speed < max. speed	Set in case minimum speed is exceeded
Belt load < Min. belt load	Set in case minimum belt load is underrun
Belt load < max. belt load	Set in case maximum belt load is exceeded
Zero range	Set in case belt load is within zero range
Zero setting active	Set in case automatic zeroing is active
Automatic zero-tracking enabled	Set in case automatic zero-tracking is enabled
Totalizers active	Set in case totalizers are active
Totalized disturbed	Set in case totalizers are disturbed
Totalizers enabled	Set in case totalizers are unblocked
Belt is running	Signalsthe belt is runnings
> Min. belt load for totalizing	Set in case minimum belt load for totalizing is not underrun – this is a condition for totalizing
2.2.4 Scale status 4 of 5 Further process values	
Speed simulation active	Set in case simulation mode speed is active

Load simulation active	Set in case belt load simulation mode is active
Stop watch active	Set in case stop watch has been started and is running e.g by calibration
Clock error	Set in case RTC buffer was cancelled. Will be reset after setting the time.
Trace active	Set in case trace is running
Error on digital input	Set in case an error occured due to a command set through digital input.
Pulse signal for remote totalizer	Set in case a digital output has been defined as pulse signal for external totalizer and is running. Please refer to menu 1.5.3 “Remote totalizer pulse signal”
Scale calibrated	Calibration of load and speed has been performed.
Service mode active	Service mode is activated.
Calibration procedure acti-ve	Set in case calibration has been started.
Write protection active	Write protection is active
Error analog output	Analogue output is disturbed
Warm up time	Warm up time after power on is running
Start up	Weighing electronic is starting up or restoring of recovery point was done. Will be reset after 5 seconds.
System fault	System is disturbed
2.2.4 Scale status 5 of 5 Further process values	
Digits (unfiltered)	The unfiltered digit value (measurement of weight) is the internal measured value immediately before filtering.
Digits (filtered)	The filtered digit value (measurement of weight) is the internal measured value immediately after filtering.
Pulses per belt revolution	Number of sensor pulses per belt revolution.
Pulses / s	Current integer value of impulses per second.
No. of zero calibrations	Number of performed zero calibrations. Will be reset with restor-ing the default values.
No. of span calibrations	Number of performed span calibrations. Will be reset with restor-ing the default values.

Weight	The current material weight of the loaded belt resting on the scale. The output is made in the selected weight unit from the belt load.
Drag indicator (belt load)	Maximum measured belt load
Nominal belt load	The nominal belt load is entered during initial commissioning. It is the basis for generating limits, and is calculated from design flow rate / design speed.
Current zero offset	Current difference compared to original zero (under load)
Current zero offset (%)	Current difference compared to original zero (% of nominal belt load)
No. of zero settings	Number of zero settings, combines manual and automatic zero settings. Will be reset with restoring the default values.

8.11 Menu 2.3 Flow trend

The flow trend is a graphical presentation of the flow rate. The graph will be scaled automatically based on the given values.

8.12 Menu 2.4 Module information

2.4.1 Modul information General information about the SIWAREX WT241	
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 Start & stop trace

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 1.5.6 “Trace settings”.

Analysis of the recorded traces can only be done by using the software SIWATOOL. Please refer to chapter 13 “Accessories”, pg. 176. Further information can be found in the manual for SIWAREX WP241.

8.14 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 “Clock error” in menu 2.2.4 “Scale status 4 of 5” will be set. Time needs to be reset in menu 3.0 or via input by a PLC system.

8.15 Menu 4.0 Totalizers

Overview and control options of all 6 totalizers	
Master totalizer S1	This totalizer contains the total of conveyed material since commissioning of the scale. The master totalizer can only be reset by loading the factory settings.
Main-totalizer S2	The totalizer contains the quantity of material transported since the last memory reset. Main-totalizer S2 can be reset by pressing the “Reset” button on the right.
Totalizer S3 Totalizer S4 Totalizer S5	These totalizers are working like totalizer S2. You can reset these totalizers by pressing the”Reset” button to the right.
Totalizer S6	Totalizer S6 will stay active even with setting the order to stop disable totalizers. Therefore e.g. material tests or a calibration of the scale can be done without booking the “conveyed material” (calibration weights, test chain, etc.).

	You can reset this totalizer by pressing the”Reset” button to the right.
Enable totalizers (F2)	Activate all totalizers. Totalizer S6 will work independently.
Disable totalizers (F3)	Deactivates all totalizers. Totalizer S6 will continue to sum.
Minimum belt load for total-izing	Is green as long as the minimum belt load for totalizing is given or exceeded.

8.16 Menu 5.0 User management

The SIWAREX WT241 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 WP241 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: WT241

Activate and deactivate the passwort protection by DIP switch

Two DIP switches are located at the bottom side of the weighing module SIWAREX WP241 just next to the Ethernet port (accessible via the air inlet).

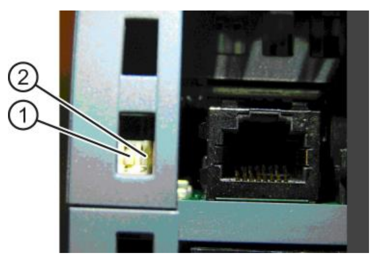


Figure 8-4 DIP switches at SIWAREX WP241weighing module

Position of DIP switch	① password protection	② operation 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 WT241. 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 master

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 20)).
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	2000	Group message, at least one technology error exists
2002 Trace error	2002	The set recording rate for trace function cannot be processed. Set a slower recording rate.
2003 Zeroing aborted	2003	The zeroing procedure has been canceled. Possible causes: violation of zeroing limits.
2004 Trace memory full	2004	The trace recording has been cancelled. Possible causes: trace memory full and not declared as ring memory.

Technology error (code 2000 to 4999)	Error code	Description and remedy
3001 Totalizer error	3001	Fault occurred during totalizing.
3002 Calibration procedure interrupted	3002	Current calibration procedure has been aborted. Possible causes: non-plausible values have been determined during the command.

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
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.).
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.
6003 Command cannot be executed since a dynamic procedure is already active	6003	Desired command cannot be executed since a dynamic command (calibration, zeroing) is already being executed.
6004 Command cannot be executed since a dynamic procedure is not active	6004	Desired command cannot be executed since a dynamic command is not currently being executed.
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.
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.

Data and operating errors (code 5000 to 8999)	Error code	Description and remedy
7004 Assignment of DIs/DQs 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 Zeroing parameters are not plausible	7008	The specifications for zeroing (data record DR 3) 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.
7020 Speed parameter or sensor parameter not plausible	7020	The speed parameter or sensor parameter in DR3 is not plausible.
7021 Units are not plausible	7021	The selected units are not plausible (mixing of metric and imperial parameters).

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 directly to the SIWAREX module
- by the digital inputs after corresponding assignment in data record DR 7
- by a PLC system e.g. via Modbus RTU

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 88)

→ Table 10-2 Commands 450 ... 499: Trace commands (Page 90)

→ Table 10-3 Commands 700 ... 899: HMI display switchover (DR34 – ASCII display) (Page 90)

→ Table 10-4 Commands 1000 ... : Basic functions for weighing commands (Page 91)

→ Table 10-5 Data record commands of SIWAREX WP241 (Page 91)

→ Table 10-6 Totalizing commands of SIWAREX WP241 (Page 91)

See also

Command lists (Page 88)

10.2 Command lists

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

- by the Operator Panel directly to the SIWAREX module
- by a PLC system e.g. via Modbus RTU

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
1	Service mode On	Switch on service mode
2	Service mode Off	Switch off service mode
3	Load simulation ON	Turn on test mode. The simulation value from data record 16 is used instead of the measured value as the belt load value. The simulation must first be released in DR3.
4	Load simulation OFF	Switch off test mode for belt load.
5	Speed simulation ON	Turn on test mode. The simulation value from data record 16 is used instead of the measured value as the belt speed. The simulation must first be released in DR3.
6	Speed simulation OFF	Switch off test mode for speed.
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, all totalizers (including master totalizer), and logbook) as well as the restore point are loaded with the default values - All message buffers (diagnostics buffer, trace memory, etc.) are reset
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.
31	Load restore point	All parameters saved in the restore point are activated.
51	Create restore point	Saves the parameters of the restore point to the memory.
60	Start initial zero calibration	Start initial zero calibration. The zero point of the scale characteristic is determined for the parameterized number of belt revolutions. The result is initially entered in DR4 and can then be imported into DR3 using command 88.
61	Start span calibration with test weight	Start of span calibration with a test weight. The weight value is specified in data record 3. The span of the scale characteristic is determined for the parameterized number of belt revolutions. The result is initially entered in DR4 and can then be imported into DR3 using command 89.
63	Start automatic span calibration	Following a successful zero calibration, command 63 and the load cell data from DR10 can be used to calculate the span. If the belt has not been installed horizontally, the angle must be subsequently entered in DR15. The result is directly imported into DR3 and DR4 and is therefore immediately active.
65	Start span calibration by test chain	Start of span calibration with a test chain. The load value is specified in data record 3. The span of the scale characteristic is determined for the parameterized number of belt revolutions. The result is initially entered in DR4 and can then be imported into DR3 using command 89.

Command code	Command	Description
67	Start span calibration using material batch	Command 67 must be sent before the material defined in data record 3 reaches the measuring point.
68	Stop span calibration using material batch	Command 68 must be sent after the material defined in data record 3 has completely passed the measuring point.
69	Calculate span calibration point after material batch	Command 69 can be used after the commands 67 and 68 to calculate the span calibration point. The result is initially entered in DR4 and can then be imported into DR3 using command 89.
70	Start speed/pulse detection	The command is used in the case of belt scales without speed sensor to start determination of the belt speed, or in the case of belt scales with speed sensor to start calculation of the pulse constants. The basis in each case is an exactly specified belt length in DR3. The command should be sent at the moment when a belt marking passes a defined point.
71	Stop speed/pulse detection	The command is used in the case of belt scales without speed sensor to stop detection of belt speed, or in the case of belt scales with speed sensor to stop calculation of the pulse constants. The command should be sent at the moment when a belt marking passes a defined point. The result is initially entered in DR4 and can then be imported into DR3 using command 85. The defined number of belt revolutions in DR3 must be observed!
72	Start speed measurement "belt loaded"	The command can be used in the case of belt scales without speed sensor in order to start the speed measurement with the belt loaded (preferably with nominal belt load). The command should be sent at the moment when a belt marking passes a defined point.
73	Stop speed measurement "belt loaded"	The command can be used in the case of belt scales without speed sensor in order to stop the speed measurement with the belt loaded (preferably with nominal belt load). The command should be sent at the moment when a belt marking passes a defined point. The result (speed and average belt load in percent) is initially entered in DR4 and can then be imported into DR3 using command 86. The defined number of belt revolutions in DR3 must be observed!
74	Enable belt revolution detection on DI.1	If a proximity switch is used to detect the belt revolutions (digital input DI.1 must be parameterized for this purpose in DR7), detection of the switch signal must first be released using command 74. Totalizing is then stopped, and the module waits for the switch signal at the digital input in order to start the belt revolution detection. The module then expects pulses from the switch at DI.1. For example, 3 pulses are expected if 3 belt revolutions were specified in DR3. Detection of the belt revolution is complete following the third pulse. The result is initially entered in DR4 and can then be imported into DR3 using command 85.
79	Abort running calibration/zeroing/belt detection/speed measurement	All generated dynamic commands are aborted.
81	Multiply a x b	The numbers A and B from DR21 are multiplied together. The result is entered in DR4.
83	Divide a / b	The numbers A and B from DR21 are divided by each other. The result is entered in DR4.
85	Apply (nominal) speed	The nominal speed determined by the commands 70/71 is copied from DR4 to DR3.
86	Apply speed parameters "belt loaded"	The result of the commands 72/73 is copied from DR4 to DR3.

Command code	Command	Description
87	Apply pulse parameter	The pulse parameters determined by the commands 70/71 are copied from DR4 to DR3. The command is only used for belt scales with speed sensor.
88	Apply initial zero calibration digits	The result of commands 60 is copied from DR4 to DR3.
89	Apply span calibration digits	The result of command 61, 63, 65 or 69 is copied from DR4 to DR3.

Table 10- 2 Commands 450 ... 499: Trace commands

Command code	Command	Description
451	Trace ON	Start trace recording
452	Trace OFF	Stop trace recording
453	Single trace element	Create single trace (current state)
454	Reset trace memory	Delete trace recording memory

Table 10- 3 Commands 700 ... 899: HMI display switchover (DR34 – ASCII display)

Command code	Command	Description
701	Increased resolution	Enable increased resolution on the main display and the SecureDisplay (x 10), for duration of 5 s
715	Display weight	Displays the weight currently present on the scale
735	Flow rate in %	Displays the current flow rate in % of the design flow rate from DR3
740	Belt load	Displays the current belt load
745	Belt load in %	Displays the current belt load in % of the nominal belt load from DR31
760	Speed	Displays the current belt speed
765	Speed in %	Displays the current belt speed in % of the design speed from DR3
771	Master totalizer S1	Displays the current master totalizer
772	Main totalizer S2	Displays the current main totalizer
773	Total S3	Displays the current totalizer S3
774	Total S4	Displays the current totalizer S4
775	Total S5	Displays the current totalizer S5
776	Total S6	Shows the current totalizer S6
801	Display calibration regulations	Displays the entered calibration regulations
871	Serial number	Displays the serial number of the module
875	Display SIWAREX FW version	Displays the firmware version of the module

Table 10- 4 Commands 1000 ... : Basic functions for weighing commands

Command code	Command	Description
1001	Start zeroing	Starts the zeroing procedure
1002	Abort zeroing	Aborts the zeroing procedure
1003	Activate automatic zero tracking	Activates the automatic zero tracking
1004	Deactivate automatic zero tracking	Deactivates the automatic zero tracking
1301	Set "Belt is running"	Informs the module that the belt is running and the speed entered in DR3 can be used. Only relevant for systems without speed sensor. A digital input can also be used or parameterized for this. If the speed is sent to the module via DR19, this command is not necessary either!
1302	Reset "Belt is running"	Informs the module that the belt is stationary. The speed is set to 0. Only relevant for systems without speed sensor. A digital input can also be used or parameterized for this. If the speed is sent to the module via DR19, this command is not necessary either!

Table 10- 5 Data record commands of SIWAREX WP241

Command code	Command	Description
2000 + X	Reading of a data record, X corresponds to the data record number.	Starts the zeroing procedure 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.	Aborts the zeroing procedure. 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)

Table 10- 6 Totalizing commands of SIWAREX WP241

Command code	Command	Description
651	Start totalizing	Starts the totalizing. In the basic state, totalizing of the module is always active and must be specifically deactivated by the user (command 652).
652	Stop totalizing	Stops all totalizers except totalizer S6. Can be used for (material) tests which should not be included in the total balance.
670	Reset main totalizer S2	Resets the main totalizer to 0
671	Reset totalizer S3	Resets totalizer 3 to 0
672	Reset totalizer S4	Resets totalizer 4 to 0
673	Reset totalizer S5	Resets totalizer S5 to 0
674	Reset totalizer S6	Resets totalizer S6 to 0
675	Reset totalizers S3...S6	Simultaneously resets totalizers S3 to S6 to 0

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 WP241 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

11.1.2 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 of the belt scale (Page 59)".

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.

11.1.3 Data record concept

The register assignment is an image of the data records. The chapter → Scale parameters and functions of the belt scale (Page 59) 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.

11.1.4 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 87). 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

11.1.5 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 of the belt scale (Page 59).

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 87).

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.

11.1.6 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 87).

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).

This document can also be applied when using a SIWAREX WP241 since the identification mechanisms are identical.

11.2 Parameters and functions

All parameters are set to default values in the factory. In the case of a previously used electronic weighing system, 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 factory-set parameters are provided with typical values so that the scale can be immediately calibrated following input of the rated data. The advantage of this solution is that you can decide which typical values are to be retained and to what extent the response of the scale has to be adapted.

All parameters are divided into data records (DR). The data records are organized in steps (tasks) which constitute a functional unit during commissioning or during the process. Data records can only be read or written as complete packages. Reading or writing of a single parameter within a data record is therefore not possible. It is therefore recommendable to proceed as follows before editing a parameter:

1. Read in the corresponding data record (to SIWATOOL or to the data block of the PLC)
2. Edit the desired parameter
3. Write the data record back into the weighing module

The scale functions influenced by the parameters are also described in the following parameter description.

The parameters of a given data record are initially displayed in an overview table. A description of their effect on the scale then follows.

When it receives new parameters, the SIWAREX module runs a validation check. In the event of a parameter assignment error, the complete 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 only used to transfer commands to the SIWAREX module by the SIWATOOL PC program.

11.4 DR 3 Belt scale parameters

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

The fundamental function of the scale is defined by specifying the parameters and carrying out the calibration. The parameters relevant to calibration can be protected against modifications (write-protected) by means of a wire jumper at the P-PR (Parameter Protection) terminals.

You must activate "Service mode" for the module in order to carry out any changes to the data record:

- In SIWATOOL: in the command group "Service commands"
- From the CPU: using command code 1 (see chapter SIMATIC integration or Modbus integration)

Procedure

- Read in DR 3, check all parameters, and modify them if required
- Transfer the DR 3 data record from SIWATOOL/SIMATIC/Modbus to the scale
- Carry out parameterization or calibration of the belt speed
- Calibrate the scale
- Transfer the DR 3 data record from the scale to SIWATOOL

A special feature distinguishes the WP241 module from other SIWAREX modules.

Every calibration command which results in a change in a parameter, e.g. during calibration of the zero point or with calibration weights, initially leads to output of the result in DR 4. You can check the result and subsequently import it into the DR 3 using an apply command. The parameter becomes effective following importing into the DR3.

Table 11- 4 Assignment of data record 3

Variable	Note	Type	L	Rw	Default	Min.	Max.	Register
Data record number	Contains no. of data record	USHORT	2	r	3	-	-	1000
Length	Data record length information	USHORT	2	r	120	-	-	1001
Application	Information about which application the DR belongs to	USHORT	2	r	104	-	-	1002
Version identifier	Information about current data record version	USHORT	2	r	1	1	65635	1003

Variable	Note	Type	L	Rw	Default	Min.	Max.	Register
Scale name header	Maximum length and actual length of string for scale name	UBYTE[2]	2	rw	12.12	-	-	1004
Scale name (Page 101)	Scale name specified by user	CHAR[12]	12	rw	" "	-	-	1005
Code for regulations (Page 101)	0: No verification 1: OIML R50 2: NTEP Book 44	USHORT	2	rw	0	-	-	1011
Unit for belt load (Page 102)	0=kg/m, 1=lbs/foot	USHORT	2	rw	0	-	-	1012
Unit for flow rate (Page 102)	0=t/h, 1=kg/h, 2=T/h, 3=TL/h, 4=lbs/h	USHORT	2	rw	0	-	-	1013
Resolution of weight and belt load (Page 102)	Resolution (1*10**k, 2*10**k, 5*10**k]; k: -3 … 2)	FLOAT	4	rw	0.01	-	-	1014
Resolution of flow rate (Page 103)	Resolution (1*10**k, 2*10**k, 5*10**k]; k: -3 … 2)	FLOAT	4	rw	0.1			1016
Resolution of master totalizer (Page 103)	Resolution (1*10**k, 2*10**k, 5*10**k]; k: -3 … 2)	FLOAT	4	rw	0.1			1018
Design flow rate (Page 103)	Customer input according to rated data	FLOAT	4	rw	360			1020
Weigh length (Page 103)		FLOAT	4	rw	1			1022
Belt length (Page 104)	Is measured and entered by the user.	FLOAT	4	rw	30			1024
Number of belt revolutions (Page 104)	Number of belt revolutions relevant to measurement, specification applies to calibration and zero setting commands	USHORT	2	rw	1			1026
Speed detection (Page 104)	0: No sensor, speed is specified or determined. 1: One sensor 2: External specification of speed via DR19	USHORT	2	rw	1			1027
Design speed (Page 104)	Maximum speed with empty belt	FLOAT	4	Rw	1			1028
Speed correction if belt loaded (Page 104)	Only relevant if no sensor present. Percentage deviation in speed when belt is loaded (see next parameter)	FLOAT	4	rw	0.98			1030

Variable	Note	Type	L	Rw	Default	Min.	Max.	Register
Belt load factor for speed correction (Page 105)	Belt load in % of nominal load. Only relevant if no sensor is present (specified value or imported from DR4)	FLOAT	4	rw	100			1032
Impulse constant speed sensor (Page 105)	Only relevant if a sensor present	FLOAT	4	rw	1000.0			1034
Reserve		LONG	4	rw	0			1036
Initial zero calibration digits (Page 105)	Calibration digits with empty belt	LONG	4	rw	500000			1038
Calibration weight (Page 106)	Specification in KG or LB (depending on selected unit for belt load)	FLOAT	4	rw	50			1040
Calibration load (Page 106)	Value input, e.g. 35 kg/m for calibration by test chain	FLOAT	4	rw	0			1042
Calibration quantity (Page 106)	Value input in KG or LB (depending on selected unit for belt load)	FLOAT	4	rw	0			1044
Span calibration digits (Page 106)	ADC digits for test weight Value input or imported from DR4	LONG	4	rw	1000000			1046
Simulation mode (Page 106)	Simulation (is enabled or disabled via commands) 0: Simulation not permitted 1: Only weight simulation permitted, weight is imported from DR16 if simulation mode is enabled 2: Only speed simulation permitted, speed is imported from DR16 if simulation mode is enabled 3: Both permitted Weight and speed are imported from DR16 if simulation mode is enabled	USHORT	2	rw	0			1048
Warm-up timer (Page 107)	Status bit in DR30 "Warm-up time running" remains TRUE for the specified time (minutes)	USHORT	2	rw	30			1049
Interface for the legal trade display (Page 107)(available soon)	0: HMI SecureDisplay at ETHERNET 1: HMI SecureDisplay via S7 interface	USHORT	0	rw	0			1050
	HMI SecureDisplay string header version	UBYTE[2]	2					1051

Variable	Note	Type	L	Rw	Default	Min.	Max.	Register
Software version for HMI SecureDisplay with verification capability (Page 107)(available soon)	HMI SecureDisplay version	CHAR[12]	12		V1.05.02			1052
Minimum display size in % of the HMI SecureDisplay with verification capability (Page 107) (available soon)	HMI SecureDisplay with verification capability	USHORT						1058
Reserve		USHORT						

1) Parameter for calculation of calibration points

11.4.1 Scale name

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

Note

If the jumper is closed to protect data with verification capability, the parameter can no longer be changed.

11.4.2 Code for regulations

Trade scales requiring verification are subject to certain restrictions (available soon).

0 – no verification

1 – verification in accordance with OIML R50

2 – verification in accordance with NTEP Book 44

(approvals available soon).

Note

If the jumper is closed to protect data with verification capability, the parameter can no longer be changed.

11.4.3 Unit for belt load

When setting parameters for the first time you must select between metric and imperial systems.

The following units can be selected for the belt load:

0 – kg/m (metric)

1 – lbs/foot (imperial)

With the kg/m unit, the material flow rate can be specified in t/h or kg/h.

With the lbs/foot unit, the material flow rate can be specified in T/h, TL/h or lbs/h.

Note

If the jumper is closed to protect data with verification capability, the parameter can no longer be changed.

11.4.4 Unit for flow rate

The following units can be selected for the material flow rate:

0 – t/h (metric)

1 – kg/h (metric)

2 – T/h (imperial)

3 – TL/h (imperial)

4 – lbs/h (imperial)

Note

If the jumper is closed to protect data with verification capability, the parameter can no longer be changed.

11.4.5 Resolution of weight and belt load

The resolution for the weight measurement and the belt load per length unit can be defined in accordance with the standard EN 45501 (1*10**k, 2*10**k, 5*10**k]; k: -3 … 2) from 0.0001 to 50.

Note

If the jumper is closed to protect data with verification capability, the parameter can no longer be changed.

11.4.6 Resolution of flow rate

The resolution for the material flow rate and totalizers 2 to 6 can be defined in accordance with the standard EN 45501 (1*10**k, 2*10**k, 5*10**k]; k: -3 … 2) from 0.0001 to 50.

Note

If the jumper is closed to protect data with verification capability, the parameter can no longer be changed.

11.4.7 Resolution of master totalizer

The resolution for the master totalizer (cannot be deleted) can be defined in accordance with the standard EN 45501 (1*10**k, 2*10**k, 5*10**k]; k: -3 … 2) from 0.0001 to 50.

Note

If the jumper is closed to protect data with verification capability, the parameter can no longer be changed.

11.4.8 Design flow rate

The design flow rate is entered during initial commissioning. It can be obtained from the data sheet for the belt scale. It corresponds to the maximum material flow rate (100%) for which the conveyor belt is designed.

The % values for the material flow rate limits refer to the rated flow rate.

11.4.9 Weigh length

In the case of a scale with a roller station, the weigh length corresponds to half the distance from the roller station to the adjacent rollers on the left and right which are located upstream and downstream of the roller station.

With two or more roller stations, the distance between the roller stations is added to this.

Note

If the jumper is closed to protect data with verification capability, the parameter can no longer be changed.

11.4.10 Belt length

The length of the conveyor belt is measured during commissioning, and entered. This is usually twice the distance between the axes of the deflection pulleys plus the single circumference of the pulley. The input is made in the length unit from the belt load.

Note

If the jumper is closed to protect data with verification capability, the parameter can no longer be changed.

11.4.11 Number of belt revolutions

At least one belt revolution is required for the calibration. You can increase the number of belt revolutions in order to increase the accuracy of the equipment.

11.4.12 Speed detection

There are three options for determining the current speed:

0 – no speed sensor present. Specification of a constant belt speed or determination of it.

1 – speed sensor at digital input DI.0

2 – external specification of belt speed from CPU (via DR19)

Note

If the jumper is closed to protect data with verification capability, the parameter can no longer be changed.

11.4.13 Design speed

The design speed can be determined with the belt empty. To this end, the time for one or more belt revolutions is measured, and the speed determined from this.

11.4.14 Speed correction if belt loaded

If a speed sensor is not used (speed detection = 0, see Speed detection (Page 104)), a speed correction can be determined at a certain belt load factor (preferably the nominal load) in addition to the design speed. A load-dependent characteristic for the speed then results together with the design speed. This characteristic is determined by two working points: Design speed with empty belt and a speed factor correction with a certain belt load factor.

The specification is made in % of the design speed.

Using commands 72 (Start), 73 (Stop) and 86 (Apply), the point can be determined automatically during commissioning (with loaded belt) or during operation.

11.4.15 Belt load factor for speed correction

The associated belt load factor (in % of nominal load) is specified for determination of the speed correction (→ Speed correction if belt loaded (Page 104)).

You must observe the value in DR30 during the calculation and subsequently enter it.

11.4.16 Impulse constant speed sensor

If known, you can directly enter the pulse constant of the connected sensor. The input is made either in "Pulses per meter" or "Pulses per foot" depending on the selected unit. If the pulse constant is unknown, it can be calculated automatically by the SIWAREX WP241 using an exactly defined total belt length. Commands 70 and 71 are used for this purpose.

You will find more detailed information on using or determining the pulse constants in the section Commissioning with speed sensor (Page 45).

Note

If the jumper is closed to protect data with verification capability, the parameter can no longer be changed.

11.4.17 Initial zero calibration digits

Following calibration of the scale's zero point, the digit value from the A/D converter is stored as the average value for the set number of belt revolutions. When zeroing the scale during subsequent operation, a check is made to establish whether the deviation from this original zero point does not exceed the defined limit.

Note

If the jumper is closed to protect data with verification capability, the parameter can no longer be changed.

11.4.18 Calibration weight

The calibration weight corresponds to the test weight used for the span calibration. With other calibration methods (test chain, amount of material, or automatic), the weight is determined internally by the SIWAREX module in accordance with the reverse calculation.

Note

If the jumper is closed to protect data with verification capability, the parameter can no longer be changed.

11.4.19 Calibration load

If a test chain is used to calibrate the scale, its belt load value can be entered.

11.4.20 Calibration quantity

In order to calibrate the belt scale by means of a material test, a previously or subsequently weighed amount of material can be used. The specification depends on the selected belt loading unit in kg or lb.

You can calibrate the scale using the commands 67 (Start), 68 (Stop), 69 (Calculate span calibration point), and 89 (Apply span calibration digits).

11.4.21 Span calibration digits

Following calibration of the loaded belt scale, the digit value from the A/D converter which corresponds to the calibration weight is stored as the average value for the set number of belt revolutions. The interval from the zero digits must be at least 40 000 digits.

Note

If the jumper is closed to protect data with verification capability, the parameter can no longer be changed.

11.4.22 Simulation mode

The material on the scale and/or the speed of the belt can be simulated for test purposes.

You must enable this functionality using the "Enable simulation" parameter. You specify the simulated input values via DR16. You can enable test mode at any time using the commands "Load simulation ON" (3) or "Speed simulation ON" (5), or disable test mode using the commands "Load simulation OFF" (4) or "Speed simulation OFF" (6).

11.4.23 Warm-up timer

Following switching-on of the electronic weighing system, this input indicates in the status area that the time has not yet expired ("Warm-up time running").

11.4.24 Interface for the legal trade display

This parameter is not yet effective since the function is in preparation.

The parameter defines the interface via which the data is provided for a display with verification capability:

0 - no display with verification capability

1 - HMI SecureDisplay via Ethernet

2 - HMI SecureDisplay via S7 CPU

11.4.25 Software version for HMI SecureDisplay with verification capability

This parameter is not yet effective since the function is in preparation.

The SecDisplay.exe program is used for representation of the display with verification capability. The software version must be entered when commissioning a trade scale requiring verification. The following notation is envisaged: VX.XX.XX, e.g. V1.05.02

11.4.26 Minimum display size in % of the HMI SecureDisplay with verification capability

This parameter is not yet effective since the function is in preparation.

The smallest display size which can still be easily read is defined for representation of the display with verification capability.

11.5 Calibration procedure

11.5.1 General information

Switch service mode on in order to carry out the calibration (service commands in SIWATOOL, or command code "1" from SIMATIC/Modbus).

Certain basic parameters must be entered prior to calibration of the belt scale. These include:

- Regulation code if the scale requires verification
- Unit for the belt load
- Unit for the flow rate
- Design flow rate
- Weigh length
- Total length of conveyor belt
- Speed sensor (pulse sensor) yes/no
- Test weight or chain load if a chain is used for the calibration

Two measurements are important when commissioning the belt scale:

- The speed measurement
- The gravimetric weight measurement (or measurement of the belt load)

All results of the calibration are initially presented by the SIWAREX module in DR4. You can apply the results into the parameter set, or reject them. This guarantees that the individual calibration steps do not change the existing parameter set and become effective immediately.

When calibrating the scale, you can switch off the totalizer using command 652 "Stop totalizing". All totalizers apart from totalizer 6 are then stopped.

Carrying out the calibration

Prior to the calibration, the belt should be in operation for a minimum time (usually 30 minutes) in order to permit it to reach its rated operating conditions.

During initial commissioning, measurement of the speed is calibrated first. Calibration of the speed can be carried out for scales with or without a speed sensor. This is followed by calibration of the weight measurement – the span calibration.

11.5.2 Calibration of the speed

Procedure in three steps

Calibrate the speed using the following steps:

Step 1

Use a tape measure or length measuring device to determine the exact conveyor belt length. You can usually measure the distance between the axes of the deflection pulleys. The length is then twice the distance between the axes plus half the circumference of the deflection pulley and half the circumference of the drive pulley. Exact determination of the belt length is the basis for good accuracy of the belt scale.

Step 2

Make a temporary marking on the conveyor belt, e.g. using chalk or adhesive tape.

This marking is used to measure one belt revolution. The conveyor belt has run for a certain warm-up time and is empty. Once the marking has passed a defined point, start the measurement of the belt revolution using the command "Start speed/pulse detection" (70). Terminate the measurement when the point is passed again (if only one belt revolution is parameterized for the measurement) using the command "Stop speed/pulse detection" (71).

The following parameters are calculated by SIWAREX as a result of the measurement, and output in DR4 as a recommendation for acceptance:

- When using a speed sensor:
  - Design speed
  - Pulses per length unit
  - Pulses per belt revolution
- Without speed sensor:
  - Design speed

Using command 85 you can apply the determined (nominal) speed, using command 87 the determined pulse parameters.

Note

Starting and stopping of the belt measurement can be carried out exactly if an electric switching signal (+24 V) – for example from a proximity switch – is used to signal a belt revolution.

You can parameterize digital input DI.1 of the SIWAREX module as start/stop trigger (DR7 command "Trigger for belt revolution detection on DI" (75)) and use it to measure the belt revolution. The defined number of belt revolutions is recorded following enabling by the command "Enable belt revolution detection on DI (74)".

Step 3 (only for systems without speed sensor)

Following successful zero and span calibrations, you can additionally record and store a speed correction with loaded belt during operation (commands "Start speed measurement "belt loaded"" (72) and "Stop speed measurement "belt loaded"" (73)). A coarse load characteristic of the drive can be recorded in this manner. Import using the command "Apply speed parameters "belt loaded"" (86).

11.5.3 Specification of known speed parameters

Calibration of the speed as described above is always recommended. This guarantees maximum accuracy for the speed calculation and thus maximum accuracy of the complete system.

If it is not possible to calculate the speed or pulse constant, you can also enter the data manually.

- When using a speed sensor at DI.0, you must enter the following parameters manually:
  - DR3 → design speed = maximum speed of belt
  - DR3 → belt revolution pulses = total belt length x pulse constant of sensor
- When operating without a sensor, you must enter the following parameters manually:
  - DR3 → design speed = maximum speed of belt
- With an external speed input via DR19, you must enter the following parameters manually:
  - DR3 → design speed = maximum speed of belt

11.6 Calibration of weight measurement

The incoming analog measured value from the load cells is converted by an analog-to-digital converter into a digital value ("Digits"). A weight is calculated using this digital value. All functions of the electronic weighing system use the weight value to calculate the material flow rate, totalizing, and the status.

The characteristic curve of the measuring system must be defined before the weight can be calculated from the digital value. The characteristic is defined by points 0 and 1. Working point "0" is defined by the dead weight of the empty scale (no load).

The ADC digits are subsequently determined for the scale loaded with a test weight.

11.6.1 Determination of zero point

The load cells return a voltage measurement to the electronic weighing system as a result of the weight of the scale itself, even if the belt is empty. Following analog-to-digital conversion of the signal, the zero point (displayed weight = 0) is assigned to the digital value (calibration digits for the zero point). The measurement is carried out with an empty, running, and warmed-up belt. At least one complete belt revolution is required. The zero point of the scale is determined more accurately if several belt revolutions are used.

The command "Start initial zero calibration" (60) is triggered with the empty belt. The zero point is then determined for the parameterized number of belt revolutions. The status display in DR30 indicates that the calibration is running.

The result is displayed in DR4. You can apply the result using the command "Apply initial zero calibration digits" (88). The zero point is then imported in DR3.

11.6.2 Span calibration by weight

Carrying out the calibration

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

Step 1

The belt is warmed-up and the zero point has been determined.

1. Stop the belt.
2. Enter a test weight appropriate to the measuring range in DR3 (e.g. 50% of the measuring range).
3. Attach this test weight to the scale or place it onto the scale.

Step 2

1. Switched the belt on again. The calibration weight is secured on the scale.
2. Start recording of the weight for the parameterized number of belt revolutions using the command "Start span calibration with test weight" (61). The status display in DR30 indicates that the calibration is running. The result is displayed in DR4.
3. Import the digits into DR3 using the command "Apply span calibration digits" (89). The characteristic curve has thus been determined. The scale can calculate the weight values for the complete load range.

11.6.3 Automatic span calibration with load cell data

Automatic scale calibration

The automatic scale calibration, as an alternative to calibration with test weight, permits very fast commissioning. However, the results are highly dependent on the correct mechanical scale construction and the entered parameters.

The best scale accuracy can be achieved by calibrating with test weights or a test chain. Following a certain period of operation, you can define further correction factors for the material flow rate by means of a material test.

Requirements

The following requirements must be fulfilled in order to achieve successful automatic calibration:

- Proper installation and alignment
- Load cells involved are equally and evenly loaded
- There are no shunt circuits

Step 1

The belt is warmed-up and the zero point has been determined. All relevant data has been entered in DR10 (load cell parameters) and sent to the scale.

Step 2

Start the calculation using the command "Start automatic span calibration" (63). The result is effective immediately and displayed in DR3 and DR4. Importing of the parameters to DR3 is omitted.

Step 3

If the belt scale has not been installed exactly horizontally, enter the inclination angle of the belt in data record DR15 and send this to the scale. The characteristic curve has thus been determined. The scale can calculate the weight values for the complete measuring range.

11.6.4 Span calibration by test chain

Span calibration by test chain

If the scale is loaded with a chain (e.g. 50% of the nominal load), the weight is assigned to the new digital value returned by the analog-to-digital converter.

Step 1

The belt is warmed-up and the zero point has been determined.

1. Stop the belt.
2. Enter a test chain corresponding to the measuring range in DR3 (e.g. 50% of the nominal load).
3. Place the test chain onto the scale.

Step 2

1. Switched the belt on. The test chain is positioned on the scale.
2. Start recording of the weight for the parameterized number of belt revolutions using the command "Start span calibration with test chain" (65). The status display in DR30 indicates that the calibration is running. The result is displayed in DR4.
3. Import the working point into DR3 using the command "Apply span calibration digits" (89). The characteristic curve has thus been determined. The scale can calculate the weight values for the complete load range.

11.6.5 Span calibration with known material flow

Span calibration with known material flow

The material test is usually used to determine the correction factor of a calibrated scale. However, a known quantity of material can also be used to carry out a scale calibration. The calibration is based on transportation of a known quantity of material, and comprises the following steps:

Step 1

The belt is warmed-up and the zero point has been determined.

Step 2

1. A specific quantity of material is now conveyed by the belt.
   Before the material reaches the scale, activate the command "Start span calibration with material batch" (67).
2. The material flow is recorded. The status display indicates that the calibration is running. When the belt is empty, terminate the calibration using the command "Stop span calibration with material batch" (68).
3. Enter the complete quantity of conveyed material before or after the calibration in DR3 in the parameter "Calibration quantity (span calibration with material batch)".

Step 3

1. Calculate the scale characteristic using the command "Calculate span calibration point after material batch" (69). The result is displayed in DR4.
2. Import the working point into DR3 using the command "Apply span calibration digits" (89). The characteristic curve has thus been determined. The scale can calculate the weight values for the complete load range.

11.7 DR 4 Temporary parameters

Data record DR 4 temporarily displays the results of the calibration commands. You can decide if you wish to apply the results and transfer them to the parameter set in DR 3. The new calibration results become effective following importing into the parameter set. The temporary parameters are not saved powerfail-proof.

This data record cannot be sent to the scale.

Table 11- 5 Assignment of data record 4

Variable	Note	Type	L	Rw	Default	Min.	Max.	Register
Data record number	Contains no. of data record	USHORT	2	r	4	-	-	1200
Length	Data record length information	USHORT	2	r	88	-	-	1201
Application	Information about which application the DR belongs to	USHORT	2	r	104	-	-	1202
Version identifier	Information about current data record version	USHORT	2	r	1	1	65635	1203
Vmax. Speed (belt empty)	Determination using the "Start/Stop belt revolution detection" commands with empty belt Command for importing: "Apply (nominal) speed" (85)	FLOAT	4	r	0			1204
Speed correction if belt loaded	Only relevant if a sensor is not present, determination using the "Start/Stop belt revolution detection" commands with empty belt Command for importing: "Apply speed parameters "belt loaded"" (86)	FLOAT	4	r	0			1206
Belt load factor for the speed correction	Only relevant if a sensor is not present, determination using the "Start/Stop belt revolution detection" commands with empty belt Command for importing: "Apply speed parameters "belt loaded"" (86)	FLOAT	4	r	0			1208
Impulse constant speed sensor	Impulses per length unit (length unit from belt load), Determination using the "Start/Stop belt revolution detection" commands with empty belt Command for importing: "Apply pulse parameter" (87)	LONG	4	r	0			1210

Variable	Note	Type	L	Rw	Default	Min.	Max.	Register
Pulses per belt revolution	Pulses for one belt revolution, determination with empty belt using "Start/Stop belt revolution detection" commands Command for importing: "Apply pulse parameter" (87)	LONG	4	r	0			1212
Pulses per second at nominal speed (Vmax)	Determination using the "Start/Stop belt revolution detection" commands with empty belt Command for importing: "Apply pulse parameter" (87)	LONG	4	r	0			1214
Reserve		LONG	4	r	0			1216
Reserve		LONG	4	r	0			1218
Reserve		LONG	4	r	0			1220
Initial zero calibration digits	Measure mean value following calibration command "Start initial zero calibration". Command for importing: "Apply initial zero calibration digits" (88)	LONG	4	r	0			1222
Deviation from old initial zero calibration digits (%)	Is calculated following determination of zero calibration digits	FLOAT	4	r	0			1224
Calibration weight (calculated)	Determine from the automatic calibration or from the weight calibration or from the load calibration or from the amount of material Command for importing: "Apply span calibration digits" (89)	FLOAT	4	r	0			1226
Calibration load (calculated)	Measure mean value	FLOAT	4	r	0			1228
Span calibration digits	Measure mean value following calibration commands	LONG	4	r	0			1230
Deviation from old span calibration digits (%)	Is calculated following determination of span calibration digits	FLOAT	4	r	0			1232
Nominal belt load (calculated)	Design flow rate / design speed	FLOAT	4	r	0			1234
Deviation from old nominal belt load (%)	Is calculated from the nominal power, nominal speed, and weigh length.	FLOAT	4	r	0			1236
Stop watch (Page 117)	Start/Stop via command or with zeroing or calibration commands	LONG	4	r	0			1238

Variable	Note	Type	L	Rw	Default	Min.	Max.	Register
Result calculator (Page 117)	Calculation in accordance with multiply a*b or divide a/b command. a and b are specified in DR21	FLOAT	4	r	0			1240
Reserve		LONG	4	r	0			1242

11.7.1 Stop watch

The clock is reset when the stop watch is started, and the current time is displayed. The current time is also displayed during execution of a calibration command or when zeroing the scale.

The display is in milliseconds.

11.7.2 Result calculator

Data record DR 21 is used to enter digits for multiplication or division of two numbers. The result is displayed here following the calculation (commands 81 and 83).

11.8 DR 5 Correction factors for material flow rate

Data record DR 5 stores the correction factors from the material test. In legal trade operation, the data record is write-protected. The material test is used to determine the correction factor of a calibrated scale. With a material test, the conveyed amount of material is subsequently measured or is already known at the beginning of the test.

You can use e.g. totalizer 6 for this material test. In order to prevent the material conveyed during the test from being included in the balance, stop totalizing using command 652. All totalizers then stop except for totalizer 6. You can subsequently reset totalizer 6 using command 674 and use it for the test.

You can determine two different correction points with two different belt loads. A correction characteristic is then produced depending on the actual belt load. If only one correction point is to be used, set the "Belt load factor 2" parameter to 0 and the "Belt load factor 1" parameter to e.g. 40. With this setting, correction factor 1 applies to the complete working range of the scale. The influence of the belt speed is not taken into consideration for the correction factors.

Set the correction factors to a value of 1 prior to the test. If this is not possible, you must correct (multiply) the existing correction factor with the newly calculated factor.

Table 11- 6 Assignment of data record 5

Variable	Note	Type	L	Rw	Default	Min.	Max.	Register
Data record number	Contains no. of data record	USHORT	2	r	5	-	-	1244
Length	Data record length information	USHORT	2	r	40	-	-	1245
Application	Information about which application the DR belongs to	USHORT	2	r	104	-	-	1246
Version identifier	Information about current data record version	USHORT	2	r	1	1	65635	1247
Belt load factor 1 (Page 119)	Belt load factor for correction point 1 (in % of nominal belt load)	FLOAT	4	rw	40			1248
Correction factors 1 and 2 (Page 119)	Correction factor with belt load factor 1	FLOAT	4	rw	1			1250
Reserve	Reserve	FLOAT	4	rw	0			1252
Reserve	Reserve	FLOAT	4	rw	0			1254
Reserve	Reserve	FLOAT	4	rw	0			1256
Reserve	Reserve	FLOAT	4	rw	0			1258
Belt load factor 2 (Page 119)	Belt load factor for correction point 2 (in % of nominal belt load)	FLOAT	4	rw	0			1260
Correction factors 1 and 2 (Page 119)	Correction factor with belt load factor 2	FLOAT	4	rw	1			1262

11.8.1 Belt load factor 1

The average belt load resulting on the scale from the material test is entered in % of the nominal load.

Observe the percentage belt load during the test in SIWATOOL, on the touch panel or in the SIMATIC, and subsequently enter the value.

11.8.2 Belt load factor 2

The value to be entered must be larger than belt load factor 1.

Observe the belt load during the test in SIWATOOL, on the touch panel or in the SIMATIC, and enter the value.

11.8.3 Correction factors 1 and 2

The correction factors have an effect on the material flow rate display and thus also on the totalizer. They are calculated and entered following the material test. The amount recorded in totalizer 4 is compared with the actual amount. The ratio between the actual amount and the amount in totalizer 4 results in the correction factor.

Correction factor = (amount of material weighed previously or subsequently) / (amount totalized by scale)

11.9 DR 6 Limits

Various limits are parameterized in data record DR 6. The factory-set parameters correspond to the typical settings.

Procedure

- Read the current parameters from the SIWAREX module (receive)
- Check all parameters and modify them as required
- Transfer the data record to the SIWAREX module (send)

Table 11- 7 Assignment of data record 6

Variable	Note	Type	L	Rw	Default	Min.	Max.	Register
Data record number	Contains no. of data record	USHORT	2	r	6	-	-	1264
Length	Data record length information	USHORT	2	r	90	-	-	1265
Application	Information about which application the DR belongs to	USHORT	2	r	104	-	-	1266
Version identifier	Information about current data record version	USHORT	2	r	1	1	65635	1267
Negative and positive zero offset in % (Page 122)	Negative range of zero adjuster referred to the originally calibrated zero point. Specification in % of maximum belt load	FLOAT	4	rw	1	0	100	1268
	Positive range of zero adjuster referred to the originally calibrated zero point. Specification in % of maximum belt load	FLOAT	4	rw	3	0	100	1270
Smallest totalized value (Page 122)	Smallest totalized value which may be recorded with verification capability	FLOAT	4	rw	0	0		1272
Minimum flow rate (Page 122)	Min. flow rate in % of design flow rate (for status display)	FLOAT	4	rw	0	0	200	1274
Maximum flow rate (Page 122)	Max. flow rate in % of design flow rate (for status display)	FLOAT	4	rw	100	0	200	1276
Delay for flow rate limits (Page 122)	Delay for output of status display for flow rate (in ms)	LONG	4	rw	1	0		1278
Minimum belt speed (Page 122)	Min. belt speed for status display 'Minimum belt speed violated' in % of design speed	FLOAT	4	rw	10	0	100	1280
Maximum belt speed (Page 122)	Max. belt speed for status display 'Maximum belt speed violated' in % of design speed	FLOAT	4	rw	100	0	200	1282

Variable	Note	Type	L	Rw	De-fault	Min.	Max.	Register
Delay for belt speed limits (Page 123)	Delay for output of status display for belt speed (in ms)	LONG	4	rw	1	0		1284
Minimum belt load (Page 123)	Min. belt load for status display 'Minimum belt load violated' in % of nominal belt load	FLOAT	4	rw	5	0	100	1286
Maximum belt load (Page 123)	Max. belt load for status display 'Maximum belt load violated' in % of nominal belt load	FLOAT	4	rw	100	0	200	1288
Delay for belt load limits (Page 123)	Delay for output of status display for belt load (in ms)	LONG	4	rw	1	0		1290
Reserve		LONG	4	rw	1	0		1292
Medium load for totalizing (Page 123)	Min. belt load required to start totalizing. Specification in % of nominal belt load	FLOAT						
Reserve			4	rw	0	0		
Frequency low pass filter weight/belt load/belt speed (Page 124)	Low-pass filter - filtering of weight limit frequency 0: filter switched off Range fg: 0.05 … 50 Hz	FLOAT	4	rw	0.5	0	50	1298
Order no low pass filter (Page 124)	Filter number 2*(1…5)	USHORT	2	rw	4	1	5	1300
Reserve 2	Reserve	FLOAT	4	rw	0	0		1301
Frequency low pass filter weight/belt load/belt speed (Page 124)	Low-pass filter - filtering of speed limit frequency 0: filter switched off fg: 0.05 … 50 Hz	FLOAT	4	rw	0	0	50	1302
Order no low pass filter (Page 124)	Filter number 2*(1…5)	SHORT	2	rw	4	1	5	1304
Reserve		FLOAT	4	rw	0	0	0	1305
Reserve		USHORT	2	rw	0	0	0	1307
Depth average filter flow rate (Page 124)	Depth of average filter for weight measurement (n x 10 ms)	USHORT	2	rw	0	0	0	1308

11.9.1 Negative and positive zero offset in %

Zeroing sets the current weight of the scale and the belt load to zero. The specification is made in % of the nominal belt load. The range refers to the original zero point of the last calibration.

In the case of sales for legal trade operation, the maximum zero offset is 4%.

11.9.2 Smallest totalized value

The smallest totalized value is the smallest value which may be recorded with verification capability.

11.9.3 Minimum flow rate

Dropping below the minimum flow rate is displayed in the status area of the scale. The specification is made in % of the design flow rate.

11.9.4 Maximum flow rate

Exceeding the maximum flow rate is displayed in the status area of the scale. The specification is made in % of the design flow rate.

11.9.5 Delay for flow rate limits

Reaching the maximum flow rate is displayed in the status area of the scale only following expiry of the delay. The specification is made in ms.

11.9.6 Minimum belt speed

Dropping below the minimum belt speed is displayed in the status area of the scale. The specification is made in % of the nominal belt speed which was specified during commissioning or calculated.

11.9.7 Maximum belt speed

Exceeding the maximum belt speed is displayed in the status area of the scale. The specification is made in % of the nominal belt speed which was specified during commissioning or calculated.

11.9.8 Delay for belt speed limits

Violation of the limits for the belt speed is delayed by the specified time. The specification is made in ms.

11.9.9 Minimum belt load

Dropping below the minimum belt load is displayed in the status area of the belt scale. The specification is made in % of the nominal belt load which was determined during commissioning.

11.9.10 Maximum belt load

Exceeding the maximum belt load is displayed in the status area of the belt scale. The specification is made in % of the nominal belt load which was determined during commissioning.

11.9.11 Delay for belt load limits

Violation of the limits for the belt load is delayed by the specified time. The specification is made in ms.

11.9.12 Medium load for totalizing

Totalizing is not carried out below this value. The specification is made in % of the belt load. If "0" is specified, totalizing is bidirectional.

11.9.13 Frequency low pass filter weight/belt load/belt speed

A critically damped low-pass filter is provided to suppress interferences. The diagram below shows the step response of the filter (f_g = 2 Hz). The entry "0" means that the filter is switched off. The cut-off frequency can be specified between 0.05 and 50.0 Hz.

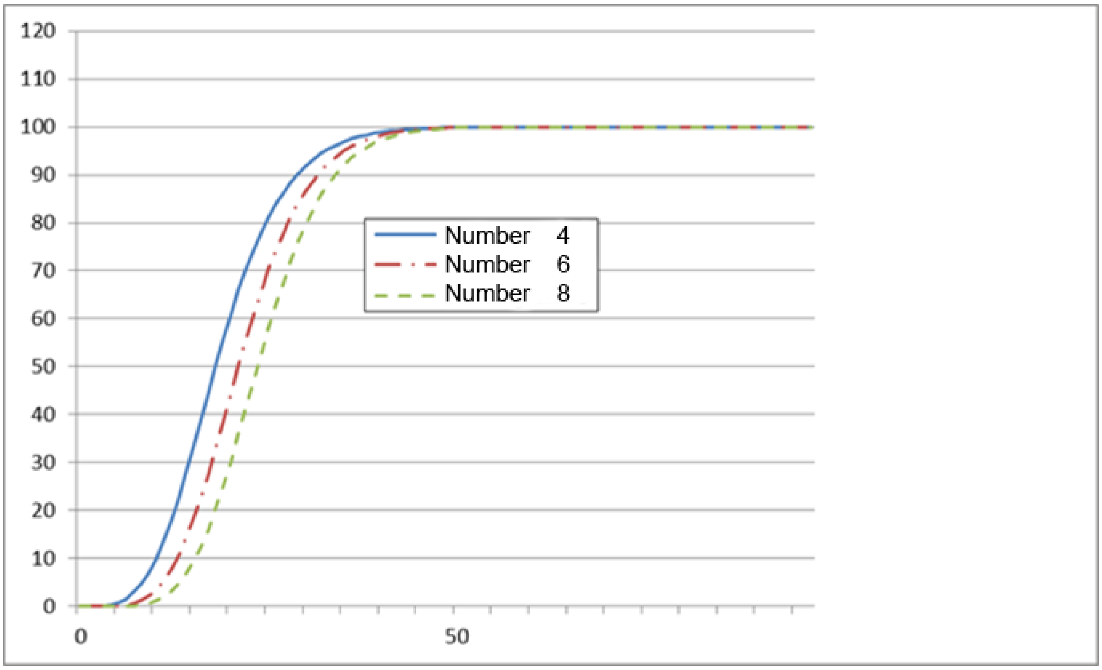


Figure 11-1 Step response of the digital low-pass filter when f_g = 2 Hz

The definition of the cut-off frequency is extremely important for suppressing interferences. Defining the cut-off frequency defines the "speed" of the scale's 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 scale "slower".

11.9.14 Order no low pass filter

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 order number, the higher the damping effect of the filter.

11.9.15 Depth average filter flow rate

The mean value filter is used to steady the weight against random interference. The weight is generated from the mean value of n (n = max. 250) weight values calculated by the weighing module every 10 ms. With n = 10, for example, 10 values are used to generate the mean value. The oldest value is discarded every 10 ms, and the newest value included in the calculation.

11.10 DR 7 Process interfaces

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 value can be retained.

Procedure

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

Table 11- 8 Assignment of data record 7

Variable	Note	Type	L	Rw	Default	Min.	Max.	Register
Data record number	Contains no. of data record	USHORT	2	r	7	-	-	1309
Length	Data record length information	USHORT	2	r	64	-	-	1310
Application	Information about which application the DR belongs to	USHORT	2	r	104	-	-	1311
Version identifier	Information about current data record version	USHORT	2	r	1	1	65635	1312
Assignment digital input DI 0, 1, 2, 3 (Page 128)	Assignment of digital input .0 Code 0: No command assigned 1 … n: command number, is triggered at a rising edge (0->1 transition), 1304 pulse sensor	USHORT	2	rw	0	0	1999	1313
	Assignment of digital input .1 Code 0: No command assigned 1 … n: command number, is triggered at a rising edge (0->1 transition)	USHORT	2	rw	0	0	1999	1314
	Assignment of digital input .2 Code 0: No command assigned 1 … n: command number, is triggered at a rising edge (0->1 transition)	USHORT	2	rw	0	0	1999	1315
	Assignment of digital input .3 Code 0: No command assigned 1 … n: command number, is triggered at a rising edge (0->1 transition)	USHORT	2	rw	0	0	1999	1316
Input filtering (hardware setting) (Page 128)	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	1317
Assignment digital output DQ 0, 1, 2, 3 (Page 128)	Assignment of digital output .0 100…131: Bit no. of the status flags from bytes 0 to 3 (DR 30), but inverted 33: data record 18 34: S7 I/O modules	USHORT	2	rw	0	0	0xFFFF	1318

Variable	Note	Type	L	Rw	Default	Min.	Max.	Register
	Assignment of digital output .1 (see output .0)	USHORT	2	rw	0	0	0xFFFF	1319
	Assignment of digital output .2 (see output .0)	USHORT	2	rw	0	0	0xFFFF	1320
	Assignment of digital output .3 (see output .0)	USHORT	2	rw	0	0	0xFFFF	1321
Response of digital outputs to faults or SIMATIC STOP (Page 129)	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 acti-vated 3: The outputs are switched on	USHORT	2	rw	0	0	0	1322
Substitute value for DQ 0, 1, 2, 3 following fault or SIMATIC STOP (Page 129)	Substitute value for DQ.0 following fault or SIMATIC CPU STOP	BIT	0	rw	0	0	1	1323.16
	Substitute value for DQ.1 following fault or SIMATIC CPU STOP	BIT	0	rw	0	0	1	1323.15
	Substitute value for DQ.2 following fault or SIMATIC CPU STOP	BIT	0	rw	0	0	1	1323.14
	Substitute value for DQ.3 following fault or SIMATIC CPU STOP	BIT	0	rw	0	0	1	1323.13
Bit 4	Reserve	BIT	0	rw	0	0	1	1323.12
Bit 5	Reserve	BIT	0	rw	0	0	1	1323.11
Bit 6	Reserve	BIT	0	rw	0	0	1	1323.10
Bit 7	Reserve	BIT	0	rw	0	0	1	1323.9
Bit 8	Reserve	BIT	0	rw	0	0	1	1323.8
Bit 9	Reserve	BIT	0	rw	0	0	1	1323.7
Bit 10	Reserve	BIT	0	rw	0	0	1	1323.6
Bit 11	Reserve	BIT	0	rw	0	0	1	1323.5
Bit 12	Reserve	BIT	0	rw	0	0	1	1323.4
Bit 13	Reserve	BIT	0	rw	0	0	1	1323.3
Bit 14	Reserve	BIT	0	rw	0	0	1	1323.2
Bit 15	Reserve	BIT	2	rw	0	0	1	1323.1
Analog output range (Page 130)	0: 0 … 20 mA 1: 4 … 20 mA	USHORT	2	rw	0	0	1	1324
Analog output source (Page 130)	Basis of analog value output: 0 = belt speed 1 = belt load 2 = material flow rate 3 = ext. specification DS17 4 = ext. specification S7 interface	USHORT	2	rw	2	0	3	1325

Variable	Note	Type	L	Rw	Default	Min.	Max.	Register
Response of analog output to faults or SIMATIC STOP (Page 130)	0: Switch off 1: retain function 2: Output configured output value 3: Output maximum value (24 mA, NAMUR)	USHORT	2	rw	0	0	3	1326
Start value for the analog output (Page 131)	Value at which 0 …4 mA is to be output	FLOAT	4	rw	0	maxi-mum weigh-ing range	maxi-mum weighing range	1327
End value for the analog output (Page 131)	Value at which 20 mA is to be output	FLOAT	4	rw	0	maxi-mum weigh-ing range	maxi-mum weighing range	1329
Output value fol-lowing fault or SIMATIC STOP (Page 131)	Value to be output when the OutDis signal is enabled (in mA)	FLOAT	4	rw	0	0	24	1331
Trace re-cording cycle (Page 131)	1: 10 ms 10: 100 ms 100: 1 s 1 000: 10 s	USHORT	2	rw	1	1	1000	1333
Trace stor-age method (Page 131)	0: Trace recording runs as a circular buffer 1: Trace is stopped when the trace memory is full	BIT	0	rw	0	0	1	1334.16
Bit 1	Reserve	BIT	0	rw	0	0	1	1334.15
Bit 2	Reserve	BIT	0	rw	0	0	1	1334.14
Bit 3	Reserve	BIT	0	rw	0	0	1	1334.13
Bit 4	Reserve	BIT	0	rw	0	0	1	1334.12
Bit 5	Reserve	BIT	0	rw	0	0	1	1334.11
Bit 6	Reserve	BIT	0	rw	0	0	1	1334.10
Bit 7	Reserve	BIT	1	rw	0	0	1	1334.9
Bit 8	Reserve	BIT	0	rw	0	0	1	1334.8
Bit 9	Reserve	BIT	0	rw	0	0	1	1334.7
Bit 10	Reserve	BIT	0	rw	0	0	1	1334.6
Bit 11	Reserve	BIT	0	rw	0	0	1	1334.5
Bit 12	Reserve	BIT	0	rw	0	0	1	1334.4
Bit 13	Reserve	BIT	0	rw	0	0	1	1334.3
Bit 14	Reserve	BIT	0	rw	0	0	1	1334.2
Bit 15	Reserve	BIT	1	rw	0	0	1	1334.1

Variable	Note	Type	L	Rw	Default	Min.	Max.	Register
Load per pulse (Page 132)	External totalizer - amount per pulse: output of pulses for external totalizer	REAL	4	rw	0	0		1335
	Pulse duration in ms (output of pulses for external totalizers)	LONG	4	rw	0	0		1337
Reserve		LONG	4	rw	0	0		1339

11.10.1 Assignment digital input DI 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 87).

Assignment input DI.0, 1, 2, 3:

Code	Assignment
0	Not assigned
n	Command code is triggered at a rising edge (1->0 transition)
1304 (only DI .0)	The speed sensor is connected (up to approx. 5 kHz)
1303 (only DI .0)	Message to SIWAREX "Belt switched on"
75 (only DI .1)	Belt revolution sensor for calculation of belt for exact triggering of revolution time

11.10.2 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

11.10.3 Assignment digital output DQ 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 output DQ.0, 1, 2, 3:

Code Hex	Status display
Code 255	Output is not active
0 … 31	Bit no. of the status flags from bytes 0 to 3 (DR 30)
100 … 131	Bit no. of the status flags from bytes 0 to 3 (DR 30), but inverted
33	Controlled via data record 18
34	Controlled via S7 I/O modules

11.10.4 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

11.10.5 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 0 (DQ.0)

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

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

Value of bit 1	Value of DQ.1 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.

11.10.6 Analog output range

This parameter is used to define the output current range.

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

11.10.7 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	Belt speed
1	Belt load
2	Material flow rate
3	External specification, DR 17 (Specified in mA)
4	Via SIMATIC S7 interface

11.10.8 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	Retain function
2	Output configured output value, e.g. 3.5 mA
3	Output maximum value (24 mA, NAMUR)

11.10.9 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.

11.10.10 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.

11.10.11 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.

11.10.12 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

11.10.13 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

11.10.14 Load per pulse

By parameterizing the corresponding digital output you can use one of the digital outputs as a pulse sensor/quantity (see Assignment digital output DQ 0, 1, 2, 3 (Page 128)).

In addition you must specify a load per pulse and a pulse duration for the signal. If the material flow rate is displayed e.g. in t/h, you must specify the quantity per pulse in t, or with kg/h in kg. The pulse duration is defined in ms.

Make sure when setting the parameters that you only enter plausible combinations → pulse duration > (amount per pulse / material flow rate)

11.11 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 scale

Table 11- 11 Assignment of data record 8

Variable	Note	Type	L	Rw	Default	Min.	Max.	Register
Data record number	Contains no. of data record	USHORT	2	r	8	-	-	1341
Length	Data record length information	USHORT	2	r	20	-	-	1342
Application	Information about which application the DR belongs to	USHORT	2	r	104	-	-	1343
Version identifier	Information about current data record version	USHORT	2	r	1	1	65635	1344
Date and time	SIMATIC DTL format	DTL	12	rw	DTL#1970-01-01-00:00:00.0	-	-	1345

11.12 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	L	Rw	Default	Min.	Max.	Register
Data record number	Contains no. of data record	USHORT	2	r	9	-	-	1351
Length	Data record length information	USHORT	2	r	68	-	-	1352
Application	Information about which application the DR belongs to	USHORT	2	r	104	-	-	1353
Version identifier	Information about current data record version	USHORT	2	r	1	1	65635	1354
Order No. - header	Maximum and current string length for the order number	UBYTE[2]	2	r	16.16	-	-	1355
Order No.	Order number of the module 7MH ..	CHAR[16]	16	r	"7MH …"	-	-	1356
Serial number - header	String header	UBYTE[2]	2	r	12.12	-	-	1364
Serial number	Serial number " XXX00001"	CHAR[12]	12	r		-	-	1365
Firmware type - header	String header	UBYTE[2]	2	r	2.2	-	-	1371
Firmware type	Character V - Release B - Test etc.	CHAR[2]	2	r	'V '	-	-	1372
Firmware version - 1st position	Version 1.	USHORT	2	r	0	-	-	1373
Firmware version - 2nd position	Version 2.	USHORT	2	r	0	-	-	1374
Firmware version - 3rd position	Version 3.	USHORT	2	r	0	-	-	1375
Hardware version number	ES hardware version number (e.g. 03)	USHORT	2	r	1	-	-	1376
OS version header	String header	UBYTE[2]	2	r	1.1	-	-	1377
OS version (loader) - designation	Character V - Release B - Test etc.	CHAR[2]	2	r	'V '	-	-	1378
OS version (loader) - designation	e.g. version n	USHORT	2	r	'V '	-	-	1379
DRAM memory	Flash memory	USHORT	2	r	0	-	-	1380
Flash memory	MRAM memory	USHORT	2	r	0	-	-	1381
MRAM memory	Memory type	USHORT	2	r	0	-	-	1382
Reserve 1	0	FLOAT	4	r	0	-	-	1383

11.13 DR 10 load cell parameters

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 scale
- Calibrate the scale

Table 11- 13 Assignment of data record 10

Variable	Note	Type	L	Rw	Default	Min.	Max.	Register
Data record number	Contains no. of data record	USHORT	2	r	10	-	-	1400
Length	Data record length information	USHORT	2	r	38	-	-	1401
Application	Information about which application the DR belongs to	USHORT	2	r	104	-	-	1402
Version identifier	Information about current data record version	USHORT	2	r	1	1	65635	1403
Number of load cells (Page 135)[1)]	Number of analog load cells	USHORT	2	rw	1	1	6	1404
50/60 Hz toggling (Page 136)	50/60 Hz toggling	USHORT	2	rw	0	0	1	1405
Reserve 1	Reserve	USHORT	2	rw	0	0	0	1406
Load cell characteristic value (Page 136)[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	1407
Rated load of a load cell (Page 136)[1)]	Rated load of a load cell	FLOAT	4	rw	60	-	-	1409
Reserve	Reserve	FLOAT	4	rw	0	-	-	1411
Reserve	Reserve	FLOAT	4	rw	0	-	-	1413
Reserve 2	Reserve	SHORT	2	rw	0	-	-	1415
Reserve 3	Reserve	USHORT	2	rw	0	-	-	1416
Reserve 4	Reserve	FLOAT	4	rw	0	-	-	1417

1) Parameter for calculation of calibration points with theoretical calibration

11.13.1 Number of load cells

The number of load cells is required for automatic calibration.

11.13.2 50/60 Hz toggling

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

11.13.3 Load cell characteristic value

The characteristic value of the load cell(s) is required to correctly interpret the output voltage from the load cell. The exact value can be entered if the measurement log for the load cell is available. The mean value of all characteristic values is used if there is more than one load cell.

Example

Characteristic value = 2.018 mV/V

11.13.4 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.

11.14 DR 12 Ethernet parameters

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	L	Rw	Default	Min.	Max.	Register
Data record number	Contains no. of data record	USHORT	2	r	12	-	-	1500
Length	Data record length information	USHORT	2	r	110	-	-	1501
Application	Information about which application the DR belongs to	USHORT	2	r	104	-	-	1502
Version identifier	Information about current data record version	USHORT	2	r	1	1	65635	1503
Device MAC address (Page 138)	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 138)	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 138)	IP address x.n.n.n	USHORT	2	r		0	255	1516
	IP address n.x.n.n	USHORT	2	r		0	255	1517
	IP address n.n.x.n	USHORT	2	r		0	255	1518
	IP address n.n.n.x	USHORT	2	r		0	255	1519

Variable	Note	Type	L	Rw	Default	Min.	Max.	Register
Subnet mask (Page 138)	Subnet mask x.n.n.n	USHORT	2	r		0	255	1520
	Subnet mask n.x.n.n	USHORT	2	r		0	255	1521
	Subnet mask n.n.x.n	USHORT	2	r		0	255	1522
	Subnet mask n.n.n.x	USHORT	2	r		0	255	1523
Gateway (Page 139)	Gateway x.n.n.n	USHORT	2	r		0	255	1524
	Gateway n.x.n.n	USHORT	2	r		0	255	1525
	Gateway n.n.x.n	USHORT	2	r		0	255	1526
	Gateway n.n.n.x	USHORT	2	r		0	255	1527
Device name (Page 139)	Current device name header	UBYTE[2]	2	rw				1528
	Current device name	CHAR[32]	32	rw				1529
Reserve 1	Reserve	SHORT	2	r				1545
Reserve 2	Reserve	FLOAT	4	r				1546
Reserve 3	Reserve	FLOAT	4	r				1548

11.14.1 Device MAC address

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

11.14.2 Port MAC address

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

11.14.3 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.**)").

11.14.4 Subnet mask

Assign the subnet mask of your network.

11.14.5 Gateway

If a gateway is used between the SIWAREX WP241 and the communication partner, enter the gateway address here.

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

11.14.6 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".

11.15 DR 13 RS485 parameters

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 scale

Table 11- 15 Assignment of data record 13

Variable	Note	Type	L	Rw	Default	Min.	Max.	Register
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 about which application the data record belongs to	USHORT	2	r	104	-	-	1560
Version identifier	Information about current data record version	USHORT	2	r	1	1	65635	1561
RS485 protocol (Page 141)	0: No protocol 1: MODBUS RTU	USHORT	2	rw	1	0	2	1562
RS485 baud rate (Page 142)	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 142)	Character parity 0: Even 1: Odd	BIT	0	rw	0	0	1	1564.16

Variable	Note	Type	L	Rw	Default	Min.	Max.	Register
RS485 number of data bits (Page 142)	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 142)	Number of stop bits 0: 1 stop bit 1: 2 stop bits	BIT	0	rw	0	0	1	1564.14
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 142)	MODBUS address	USHORT	2	rw	20	1	255	1565
Reserve		SHORT	2	rw	0	-	-	1566
Modbus RTU response delay (Page 143)	Delay time for response with MODBUS RTU in ms (RS485)	USHORT	2	rw	0	-	-	1567
Reserve	Reserve	FLOAT	4	rw	0	-	-	1568

11.15.1 RS485 protocol

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

Value	Protocol
0	No communication/protocol
1	Modbus RTU

11.15.2 RS485 baud rate

This parameter defines the baud rate for the RS485 interface.

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

11.15.3 RS485 character parity

This parameter defines the character parity for the RS485 interface.

Value	Character parity
0	Even
1	Odd

11.15.4 RS485 number of data bits

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

Value	Data bits
0	7
1	8

11.15.5 RS485 number of stop bits

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

Value	Stop bits
0	1
1	2

11.15.6 RS485 Modbus address

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

11.15.7 Modbus RTU response delay

This parameter defines the delay of a response to a data request by the Modbus RTU master (in ms).

11.16 DR 15 belt angle

Data recorder DR 15 is used for an external specification.

Procedure

- Enter the actual inclination angle of the conveyor belt.
- Transfer the data record to the scale.

Table 11- 16 Assignment of data record 15

Variable	Note	Type	L	Rw	Default	Min.	Max.	Register
Data record number	Contains no. of data record	USHORT	2	r	15	-	-	1570
Length	Data record length information	USHORT	2	r	16	-	-	1571
Application	Information about which application the DR belongs to	USHORT	2	r	104	-	-	1572
Version identifier	Information about current data record version	USHORT	2	r	1	1	65635	1573
Current belt angle (Page 144)	Angle of inclination	FLOAT	4	rw	0	0	60	1574
Reserve 1	Reserve	SHORT	2	rw	0	0	-	1576

11.16.1 Current belt angle

Input of the angle is provided for belt scales where the inclination of the belt can be changed during operation. Calculation of the current belt load is corrected by entering the current angle.

The input is unnecessary if the inclination is always constant: the influence of the constant angle is compensated or automatically taken into consideration during the calibration with weights or test chain.

If the scale is automatically calibrated using the load cell parameters and if the scale is not installed exactly horizontally, you must subsequently enter the inclination angle of the belt. The input is made in degrees.

11.17 DR 16 Simulation (belt speed and belt load)

The belt load and belt speed can be simulated using an input via data record DR 16. The SIWAREX module must first be released for simulation mode in DR 3 and then activated with command 3 or 5 or deactivated with command 4 or 6.

Procedure

- Release simulation mode in DR 3
- Send command no. 3 and/or 5 to the SIWAREX module
- Enter the belt load and/or speed to be simulated
- Transfer the data record to the SIWAREX module

Table 11- 17 Assignment of data record 16

Variable	Note	Type	L	Rw	Default	Min.	Max.	Register
Data record number	Contains no. of data record	USHORT	2	r	16	-	-	1578
Length	Data record length information	USHORT	2	r	20	-	-	1579
Application	Information about which application the data record belongs to	USHORT	2	r	104	-	-	1580
Version identifier	Information about current data record version	USHORT	2	r	1	1	65635	1581
Value for belt load simulation (Page 145)		FLOAT	4	rw	0	-	-	1582
Value for belt speed simulation (Page 145)		SHORT	2	rw	0	0	-	1584
Reserve	Reserve	USHORT	2	rw	0	0	-	1586
Reserve		USHORT	2	rw	0	0	-	1587

11.17.1 Value for belt load simulation

Only use values for the belt load which are within the measuring range of the scale. The word "TEST" is displayed on the main display during simulation and a status bit is set.

11.17.2 Value for belt speed simulation

Only use values for simulation of the belt speed which are within the speed range of the belt. The word "TEST" is displayed on the main display during simulation and a status bit is set.

11.18 DR 17 Control analog output

If data record DR 17 is configured as the source for the analog output (see Analog output source (Page 130)), 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 130))
- Enter a value in data record DR 17
- Transfer the data record to the scale

Table 11- 18 Assignment of data record 17

Variable	Note	Type	L	Rw	Default	Min.	Max.	Register
Data record number	Contains no. of data record	USHORT	2	r	17	-	-	1588
Length	Data record length information	USHORT	2	r	16	-	-	1589
Application	Information about which application the data record belongs to	USHORT	2	r	104	-	-	1590
Version identifier	Information about current data record version	USHORT	2	r	1	1	65635	1591
Analog output specification (Page 146)	Value which is to be output (only relevant if source is "External specification", see DR 7)	FLOAT	4	rw	0	-	-	1592
Reserve 1	Reserve	SHORT	2	rw	0	0	-	1594
Reserve 2	Reserve	USHORT	2	rw	0	0	-	1595

11.18.1 Analog output specification

The value to be entered must be between the start value (Page 131) and the end value (Page 131) of the analog output.

11.19 DR 18 Control digital output

If a digital output is defined in data record DR 7 for control with data record DR 18 (see Assignment digital output DQ 0, 1, 2, 3 (Page 128)), 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 Process interfaces (Page 125)) 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 DQ,0, 1, 2, 3
- Transfer the data record to the scale

Table 11- 19 Assignment of data record 18

Variable	Note	Type	L	Rw	Default	Min.	Max.	Register
Data record number	Contains no. of data record	USHORT	2	r	18	-	-	1596
Length	Data record length information	USHORT	2	r	12	-	-	1597
Application	Information about which application the DR belongs to	USHORT	2	r	104	-	-	1598
Version identifier	Information about current data record version	USHORT	2	r	1	1	65635	1599
Definition for digital output DQ.0, 1, 2, 3 (Page 148)	Definition for digital output 0=1 -> DQ0 output enabled (only applies if output is assigned code 21, see DR 7)	BIT	0	rw	0	0	1	1600.16
	Definition for digital output 1=1 -> DQ1 output enabled (only applies if output is assigned code 21, see DR 7)	BIT	0	rw	0	0	1	1600.15
	Definition for digital output 2=1 -> DQ2 output enabled (only applies if output is assigned code 21, see DR 7)	BIT	0	rw	0	0	1	1600.14
	Definition for digital output 3=1 -> DQ3 output enabled (only applies if output is assigned code 21, see DR 7)	BIT	0	rw	0	0	1	1600.13
Bit 4	Reserve	BIT	0	rw	0	0	1	1600.12

Variable	Note	Type	L	Rw	Default	Min.	Max.	Register
Bit 5	Reserve	BIT	0	rw	0	0	1	1600.11
Bit 6	Reserve	BIT	0	rw	0	0	1	1600.10
Bit 7	Reserve	BIT	0	rw	0	0	1	1600.9
Bit 8	Reserve	BIT	0	rw	0	0	1	1600.8
Bit 9	Reserve	BIT	0	rw	0	0	1	1600.7
Bit 10	Reserve	BIT	0	rw	0	0	1	1600.6
Bit 11	Reserve	BIT	0	rw	0	0	1	1600.5
Bit 12	Reserve	BIT	0	rw	0	0	1	1600.4
Bit 13	Reserve	BIT	0	rw	0	0	1	1600.3
Bit 14	Reserve	BIT	0	rw	0	0	1	1600.2
Bit 15	Reserve	BIT	2	rw	0	0	1	1600.1
Reserve 1	Reserve	USHORT	2	rw	0	-	-	1601

11.19.1 Definition for digital output DQ.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 19 External speed

If the SIWAREX module is not to determine the belt speed because the current speed is available externally, e.g. in a controller, it can be passed on to the SIWAREX via DR 19. The current material flow rate can then be calculated.

Procedure

- Enter a value in data record DR 19
- Transfer the data record to the scale

Table 11- 20 Assignment of data record 19

Variable	Note	Type	L	Rw	Default	Min.	Max.	Regis-ter
Data record num-ber	Contains no. of data record	USHORT	2	r	19	-	-	1602
Length	Data record length information	USHORT	2	r	16	-	-	1603
Application	Information about which application the data record belongs to	USHORT	2	r	104	-	-	1604
Version identifier	Information about current data record version	USHORT	2	r	1	1	65635	1605
External speed value	The externally determined speed can be sent to the scale.	FLOAT	4	rw	0	-	-	1606
Reserve 1	Reserve	SHORT	2	rw	0	0	-	1608
Reserve 2	Reserve	USHORT	2	rw	0	0	-	1609

11.21 DR 20 Message configuration

You can suppress technological messages in data record DR 20. If you set the value for an individual message to "0", this message is no longer generated as if it did not exist. We recommend that you do not suppress messages.

NOTICE
Suppressing a message
Suppressing messages could mean that a fault in the belt scale is not recognized.

Procedure

- Define the value for a message to be suppressed to 0
- Transfer the data record to the scale

Table 11- 21 Assignment of data record 20

Variable	Note	Type	L	Rw	Default	Min.	Max.	Register
Data record number	Contains no. of data record	USHORT	2	r	20	-	-	3000
Length	Data record length information	USHORT	2	r	12	-	-	3001
Application	Information about which application the data record belongs to	USHORT	2	r	104	-	-	3002
Version identifier	Information about current data record version	USHORT	2	r	1	1	255	3003
2000 Technology error		BIT	2	rw	1	-	-	3004.16
Reserve		BIT	0	rw	1	-	-	3004.15
2002 Trace error		BIT	0	rw	1	-	-	3004.14
2003 Zeroing aborted		BIT	0	rw	1	-	-	3004.13
3001 Totalizer error		BIT	0	rw	1	-	-	3004.12
2004 Trace memory full		BIT	0	rw	1	-	-	3004.11
3002 Calibration procedure interrupted		BIT	0	rw	1	-	-	3004.10
Reserve		BIT	0	rw	1	-	-	3004.9
Reserve		BIT	0	rw	1	-	-	3004.8
Reserve		BIT	0	rw	1	-	-	3004.7
Reserve		BIT	0	rw	1	-	-	3004.6
Reserve		BIT	0	rw	1	-	-	3004.5
Reserve		BIT		rw	1	-	-	3004.4
Reserve		BIT		rw	1	-	-	3004.3
Reserve		BIT		rw	1	-	-	3004.2
Reserve		BIT		rw	1	-	-	3004.1
Reserve		USHORT		rw		-	-	3005.16

11.22 DR 21 Calculator

The SIWAREX module is equipped with a stop watch (see DR 4 Temporary parameters (Page 115)) and a mini calculator to support important activities during commissioning.

Procedure

- Enter the numbers A and B into data record DR 21
- Transfer the data record to the scale
- Trigger the desired activation function using a command (81 for multiplication A x B, 83 for division A/B)
- The result is displayed in DR 4

Table 11- 22 Assignment of data record 21

Variable	Note	Type	L	Rw	Default	Min.	Max.	Register
Data record number	Contains no. of data record	USHORT	2	r	21	-		
Length	Data record length information	USHORT	2	r	20	-		
Application	Information about which application the data record belongs to	USHORT	2	r	104	-		
Version identifier	Information about current data record version	USHORT	2	r	1	1		
Number a		FLOAT	4	w	0	-		
Number b		FLOAT	4	w	0	-		
Reserve 2	Reserve	USHORT	2	w	0	0		

11.23 DR 30 Process state

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. The most important process variables are already cyclically transferred via the SIMATIC I/O interface.

For Modbus communication with a Modbus master, data record DR 30 (a tag area is read) must be polled for you to receive the current data on the status of the scale.

Table 11- 23 Assignment of data record 30

Variable	Note	Type	L	Rw	Default	Min.	Max.	Register
Data record number	Contains no. of data record	USHORT	2	r	30	-	-	3000
Length	Data record length information	USHORT	2	r	68	-	-	3001
Application	Information about which application the data record belongs to	USHORT	2	r	104	-	-	3002
Version identifier	Information about current data record version	USHORT	2	r	1	1	255	3003
In zero offset range	Set if belt load within offset range	BIT	2	r	0	-	-	3004.16
Zero offset procedure active	Set if automatic zeroing is switched on	BIT	0	r	0	-	-	3004.15
Zero tracking active	Set if automatic zero tracking is switched on	BIT	0	r	0	-	-	3004.14
Min. belt load for totalizing	Set if minimum belt load for totalizing (DR6) is violated. Totalizing not carried out if TRUE.	BIT	0	r	0	-	-	3004.13
Max. material flow rate exceeded	Set if maximum material flow rate is exceeded	BIT	0	r	0	-	-	3004.12
Min. load for totalizing	Set if minimum load is violated	BIT	0	r	0	-	-	3004.11
Min. belt speed violated	Set if minimum belt speed is violated	BIT	0	r	0	-	-	3004.10
Max. belt speed exceeded	Set if maximum belt speed is exceeded	BIT	0	r	0	-	-	3004.9
Min. belt load violated	Set if minimum belt load is violated	BIT	0	r	0	-	-	3004.8
Max. belt load exceeded	Set if maximum belt load is exceeded	BIT	0	r	0	-	-	3004.7
Reserve	Not used	BIT	0	r	0	-	-	3004.6
Reserve	Not used	BIT	0	r	0	-	-	3004.5

Variable	Note	Type	L	Rw	Default	Min.	Max.	Register
Belt is running	Set if belt is running		0	r	0			3004.4
Totalizing active	Set if totalizing is running	BIT	0	r	0			3004.3
Totalizing enabled	Set if totalizing is enabled	BIT	0	r	0			3004.2
Totalizing fault	Set if totalizing is faulty (when changing to service mode)	BIT	0	r	0			3004.1
Pulse output active (see Load per pulse (Page 132))	Signal for quantity per pulse	BIT	0	r	0			3005.16
Reserve	Not used	BIT	0	r	0			3005.15
Simulation mode weight enabled	Simulation mode for weight is enabled	BIT	0	r	0			3005.14
Simulation mode speed enabled	Simulation mode for weight is enabled	BIT	0	r	0			3005.13
Stop watch is running	Set if stop watch has been started by a command (e.g. calibration command)	BIT	0	r	0	-	-	3005.12
Time buffering failed	Set if buffering of the time in RTC has failed. Is deleted following setting of 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 sync. error resulting from command at digital input	BIT	0	r	0	-	-	3005.9
Calibrated	Module is calibrated (calibration of weight measurement and speed)	BIT	0	r	0	-	-	3005.8
Service mode	Service mode active	BIT	0	r	0	-	-	3005.7
Calibration command is running	Set if calibration procedure has been triggered	BIT	0	r	0	-	-	3005.6
Write protection	Write-protect switch is enabled	BIT	0	r	0	-	-	3005.5
Analog output disrupted	Analog output fault	BIT	0	r	0	-	-	3005.4
Warm-up time is running	Warm-up time following power-up is running	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	Fault present	BIT	0	r	0	-	-	3005.1
1000	Group message "Operating error" present	BIT	0	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		BIT	0	r	0	-	-	3006.8

Variable	Note	Type	L	Rw	Default	Min.	Max.	Register
1003	Checksum error data	BIT	0	r	0	-	-	3006.7
Reserve	Reserve	BIT	0	r	0	-	-	3006.6
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
1007		BIT	0	r	0	-	-	3006.2
Reserve		BIT	0	r	0	-	-	3006.1
2000	Group message "Technological error" present	BIT	0	0	0	-	-	3007.16
Reserve	Reserve	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
3001	Fault during totalizing	BIT	0	r	0	-	-	3007.12
2004	Trace memory full	BIT	0	r	0	-	-	3007.11
3002	Calibration aborted	BIT	0	r	0	-	-	3007.10
Current weight (Page 155)		FLOAT	4	r	0	-	-	3008
Current belt load (Page 156)	Current belt load in weight unit per length unit	FLOAT	4	r	0	-	-	3010
Current belt load in % (Page 156)	Current belt load in % of nominal belt load	FLOAT	4	r	0	-	-	3012
Current flow rate (Page 156)	Current material flow rate per hour	FLOAT	4	r	0	-	-	3014
Current flow rate in % (Page 156)	Current material flow rate in % of nominal flow rate	FLOAT	4	r	0	-	-	3016
Current speed (Page 156)	Current speed per second	FLOAT	4	r	0	-	-	3018
Current speed in % (Page 156)	Current speed in % of design speed	FLOAT	4	r	0	-	-	3020
Current master totalizer (S1) (Page 156)	Current master totalizer (total operating time)	DOUBLE	8	r	0	-	-	3022
Current main totalizer (S2) (Page 156)	Current main totalizer	FLOAT	4	r	0	-	-	3026
Reserve		FLOAT	4	r	0	-	-	3028
Refresh counter for process values (Page 157)	Refresh counter incremented by 1 if weight values were changed	USHORT	2	r	0	-	-	3030
Reserve 1	Reserve	SHORT	2	r	0	-	-	3031
Reserve 3	Reserve	FLOAT	4	r	0	-	-	3032

11.23.1 Current weight

The current material weight of the loaded belt resting on the scale. The output is made in the selected weight unit from the belt load.

11.23.2 Current belt load

The current material weight of the loaded belt acting on one unit of the weigh length.

11.23.3 Current belt load in %

Current belt load in % of nominal belt load

11.23.4 Current flow rate

The current material flow rate (belt load x speed).

11.23.5 Current flow rate in %

The current material flow rate (belt load x speed) in % of the nominal flow rate.

11.23.6 Current speed

The current speed used to calculate the material flow rate. The output is made as length per second.

11.23.7 Current speed in %

The current speed used to calculate the material flow rate. The output is made in % of the maximum speed.

11.23.8 Current master totalizer (S1)

The total material flow is summed after the start-up and switching-off of service mode. Resetting the total is only possible using the "Load factory settings" command.

11.23.9 Current main totalizer (S2)

The material flow is saved in a powerfail-proof memory. It can be deleted using the "Log and delete" command.

11.23.10 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.

11.24 DR 31 Process state extended

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	L	Rw	Default	Min.	Max.	Register
Data record number	Contains no. of data record	USHORT	2	r	31	-	-	3300
Length	Data record length information	USHORT	2	r	54	-	-	3301
Application	Information about which application the data record belongs to	USHORT	2	r	104	-	-	3302
Version identifier	Information about current data record version	USHORT	2	r	1	1	65635	3303
Unfiltered digit value (Page 159)	Unfiltered digit value from A/D converter	LONG	4	r	0	-	-	3304
Filtered digit value (Page 160)	Filtered digit value from A/D converter	LONG	4	r	0	-	-	3306
Current load cell signal (mV) (Page 160)	Actual input voltage in mV calculated from the input digits	LONG	4	r	0	-	-	3308
Current analog output (mA) (Page 160)	Actual current to be output in mA at the analog output	USHORT	2	r	0	0	65535	3310
Pulses per belt revolution (Page 160)	Pulses per belt revolution	LONG	4	r	0	0		3312
Reserve		FLOAT	4	r	0	0		3314
Pulses per second at nominal speed (Page 160)	Determined using command "Start belt revolution detection"	FLOAT	4	r	0			3316
Pulses per second (Page 160)		USHORT	2	r	0	0	65535	3318
Reserve	Reserve	USHORT	2	r	0	0	65535	3319
Reserve	Reserve	USHORT	2	r	0	0	65535	3320

Variable	Note	Type	L	Rw	Default	Min.	Max.	Register
Reserve	Reserve	USHORT	2	r	0	0	65535	3321
Current status of input .0	Current status of input .0	BIT	0	r	0	0	1	3322.16
Current status of input .1	Current status of input .0	BIT	0	r	0	0	1	3322.15
Current status of input .2	Current status of input .0	BIT	0	r	0	0	1	3322.14
Current status of input .3	Current status of input .0	BIT	0	r	0	0	1	3322.13
Bit 4	Reserve	BIT	0	r	0	0	1	3322.12
Bit 5	Reserve	BIT	0	r	0	0	1	3322.11
Bit 6	Position of DIP switch 1	BIT	0	r	0	0	1	3322.10
Bit 7	Position of DIP switch 2	BIT	0	r	0	0	1	3322.9
Current status of output .0	Current status of output .0	BIT	0	r	0	0	1	3322.8
Current status of output .1	Current status of output .1	BIT	0	r	0	0	1	3322.7
Current status of output .2	Current status of output .2	BIT	0	r	0	0	1	3322.6
Current status of output .3	Current status of output .3	BIT	0	r	0	0	1	3322.5
Reserve		BIT	0	r	0	0	1	3322.4
Reserve		BIT	0	r	0	0	1	3322.3
Reserve		BIT	0	r	0	0	1	3322.2
Reserve		BIT	2	r	0	0	1	3322.1
Nominal boat load (Page 160)	Is imported from DR 4 if the parameters have been imported from DR 4 into DR 3.	FLOAT	4	r	0	0		3323
Refresh counter for process values (Page 160)	Refresh counter incremented by 1 if weight values were changed	USHORT	2	r	0	-	-	3325
Reserve		USHORT	2	r	0	-	-	3326

11.24.1 Unfiltered digit value

The unfiltered digit value (measurement of weight) is the internal measured value immediately before filtering.

11.24.2 Filtered digit value

The filtered digit value (measurement of weight) is the internal measured value immediately after filtering.

11.24.3 Current load cell signal (mV)

The current input voltage of the load cell(s) in mV.

11.24.4 Current analog output (mA)

The actual value of the current (in mA) which is output at the analog output.

11.24.5 Pulses per belt revolution

Number of sensor pulses per belt revolution.

11.24.6 Pulses per second at nominal speed

This parameter is determined during the belt calculation and indicates how many impulses are output per second by the pulse sensor at the design speed.

11.24.7 Pulses per second

Current integer value of impulses per second.

11.24.8 Nominal boat load

The nominal belt load is entered during initial commissioning. It is the basis for generating limits (DR 6), and is calculated from design flow rate / design speed.

11.24.9 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 31.

11.25 DR 32 display of data and operator errors

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 three 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	L	Rw	Default	Min.	Max.	Register
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	104	-	-	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
5008	Command not possible since memory is full (concerns the trace function)	BIT		r	0	0	1	3504.7
5101	Command is not permissible in this operating state	BIT		r	0	0	1	3504.6
Reserve	-	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
Reserve	-	BIT		r	0	0	1	3505.5

Variable	Note	Type	L	Rw	Default	Min.	Max.	Register
6003	Command cannot be executed since a similar command is already active	BIT		r	0	0	1	3505.4
6004	Command not possible because no dynamic procedure is active.	BIT		r	0	0	1	3505.3
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 parameter not plausible	BIT		r	0	0	1	3506.8
Reserve	-	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
Reserve	-	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
7019	RS485 parameter error	BIT		r	0	0	1	3607.14
7020	Speed parameter or sensor parameter not plausible	BIT		r	0	-	-	3507.13
7021	Selection of unit not plausible	BIT		r	0	-	-	3507.12
Reserve	-	USHORT	2	r	0	-	-	3508
Modbus RTU error code (Page 163)	Synchronous error code for communication at the Modbus RS485 interface	USHORT	2	r	0	-	-	3509
Modbus Ethernet error code (Page 163)	Synchronous error code for communication at the Modbus Ethernet interface	USHORT	2	r	0	-	-	3510
SIWATOOL error code (Page 163)	Synchronous error code for communication at the SIWATOOL interface	USHORT	2	r	0	-	-	3511
Error code following commands at digital input (Page 163)	Synchronous error code caused by command at the DIs	USHORT	2	r	0	-	-	3512
Reserve	-	USHORT	2	r	0	-	-	3513

11.25.1 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.

11.25.2 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.

11.25.3 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.

11.25.4 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.

11.25.5 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.

11.26 DR 33 Totalizers

Data record DR 33 contains the actual values of the totalizers.

Totalizing becomes active when the minimum belt load for the totalizer (parameter in DR6) has been exceeded. Command 652 can be used to stop all totalizers except S6. Command 651 starts totalizing again.

Table 11- 26 Assignment of data record 33

Variable	Note	Type	L	Rw	Default	Min.	Max.	Regis-ter
Data record num-ber	Contains no. of data record	USHORT	2	r	33	-		3514
Length	Data record length information	USHORT	2	r	44	-		3515
Application	Information about which application the data record belongs to	USHORT	2	r	104	-		3516
Version identifier	Information about current data record version	USHORT	2	r	1			3517
Current master totalizer (S1) (Page 164)	Master totalizer (S1) since commissioning of the scale	DOUBLE	8	r	0			3518
Current main total-izer (S2) (Page 164)	Current main totalizer (S2)	FLOAT	4	r	0			3522
Reserve	-	FLOAT	4	r	0			3524
Totalizer 3 (S3), totalizer 4 (S4), totalizer 5 (S5) (Page 165)	Totalizer S3	FLOAT	4	r	0			3526
	Totalizer S4	FLOAT	4	r	0			3528
	Totalizer S5	FLOAT	4	r	0			3530
Totalizer 6 (S6) (Page 165)	Totalizer S6	FLOAT	4	r	0			3532
Reserve	-	FLOAT	4	r	0			3534

11.26.1 Current master totalizer (S1)

This totalizer contains the total of conveyed material since commissioning of the scale. The master totalizer can only be reset by loading the factory settings.

11.26.2 Current main totalizer (S2)

The totalizer contains the quantity of material transported since the last memory reset. The operating total must be logged in the case of trade scales requiring verification (available soon). You can reset the total using command 670.

11.26.3 Totalizer 3 (S3), totalizer 4 (S4), totalizer 5 (S5)

The totalizers respond like the main totalizer S2. In the case of trade scales requiring verification, these totals can be reset without logging.

You can reset the totals individually to 0 using the following commands:

- S3 using command 671
- S4 using command 672
- S5 using command 673

11.26.4 Totalizer 6 (S6)

A special property of totalizer 6 is that it remains active even following the command "Stop totalizing (652)", and therefore indicates the total amount. You can therefore carry out material tests or calibrate the scale, for example, without recording the "transported material" (calibration weight, test chain) into the balance.

You can reset the total S6 using command 674.

11.27 DR 34 ASCII main display value

The ASCII display value corresponds to the value on the scale's main display. The content can be controlled using display commands.

Table 11- 27 Assignment of data record 34

Variable	Note	Type	L	Rw	Default	Min.	Max.	Register
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	104	-	-	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 166)	For display of the material flow rate, belt load, speed, totals	CHAR[16]	16	r	" "	-	-	4005

11.27.1 Content of main display as ASCII string

Commands are used to toggle the display.

The following values can be displayed in belt scale applications:

Value	Command
Material flow rate	710
Weight	715
Flow rate in %	735
Belt load	740
Belt load in %	745
Speed	760
Speed in %	765
Accumulated total	771
Main total	772
Totalizer S3	773
Totalizer S4	774
Totalizer S5	775
Totalizer S6	776
Official calibration	801

Value	Command
Serial number	871
Firmware version	875

11.28 DR 38 Process state extended

The data record contains scale-specific parameters.

Procedure

- Read data record DR 38
- Display/analyze the required tags

Table 11- 28 Assignment of data record 38

Variable	Note	Type	L	Rw	Default	Min.	Max.	Register
Data record number	Contains no. of data record	USHORT	2	r	38	-	-	4500
Length	Data record length information	USHORT	2	r	64	-	-	4501
Application	Information about which application the data record belongs to	USHORT	2	r	104	-	-	4502
Version identifier	Information about current data record version	USHORT	2	r	1	1	65635	4503
Counter zeroing	Number of implemented zeroing procedures, recording of manual and automatic zeroing procedures (is reset when loading the factory settings)	ULONG	4	r	0			4504
Counter initial zero calibration	Number of implemented initial zero calibration procedures (is reset when loading the factory settings)	ULONG	4	r	0			4506
Counter span calibration	Number of implemented span calibration procedures (is reset when loading the factory settings)	ULONG	4	r	0			4508
Drag indicator (belt load)	Maximum belt load that has occurred	FLOAT	4	r	0			4510
Reserve		LONG	4	r	0			4512
Current initial zero offset (belt load)	Current deviation from original zero (when loaded)	FLOAT	4	r	0			4514
Current initial zero offset (in % of nominal load)	Current deviation from original zero (in % of nominal load)	FLOAT	4	r	0			4516
Reserve		FLOAT	4	r	0			4518
Reserve		LONG	4	r	0			4520
Reserve		LONG	4	r	0			4522
Reserve		LONG	4	r	0			4524
Reserve	3xLONG	LONG	12		0			4526

11.29 DR 48 Date and time 2

The SIWAREX module has its own hardware clock. You can set and read the current date and time using data record DR 48. The clock is buffered with a capacitor and continues to operate for up to approximately 70 hours without a 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- 29 Assignment of data record 48

Variable	Note	Type	L	Rw	Default	Min.	Max.	Register
Data record number	Contains no. of data record	USHORT	2	r	48	-	-	6960
Length	Data record length information	USHORT	2	r	24	-	-	6961
Application	Information about which application the data record belongs to	USHORT	2	r	104	-	-	6962
Version identifier	Information about 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 specifications 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 OIML R76	• Class	III and IV
	• Resolution (d=e)	3000d
	• Error percent-age 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
Maximum cable length between junction box and WP241		1 000 m (3 280 ft)
Common mode voltage range		0 V to 5 V
DMS supply[3)]		4.85 V DC ±2 %
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. $5*10^6$ 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

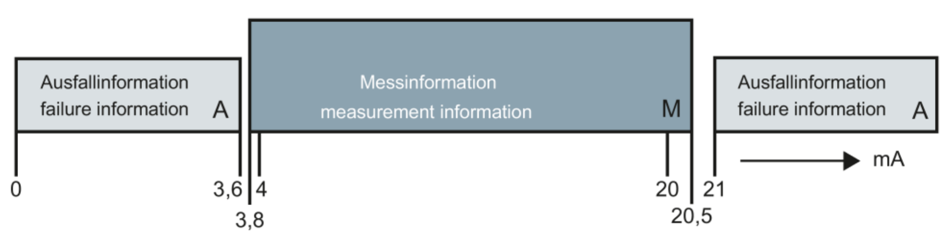


Figure 12-1 Current ranges for signal level to Namur recommendation NE43

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/s² (=1G) 0 cycles per axis 1 octave / min.
Shock load during operation	IEC 61131-2 IEC 60068-2-27 Test Ea	150 m/s² (approx. 15 g), half sine Duration: 11 ms Quantity: 3 each per axis in negative and positive direction
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/s² 10 cycles per axis 1 octave / min.
Shock load during transport	IEC 60068-2-27: Test Ea	• 250 m/s² (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

Table 12- 14 Operating conditions in accordance with IEC 60721

Mode	IEC60721-3-3 • Class 3M3, 3K3, stationary use, weatherproofed
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	
Relative humidity		5 ... 95 %	No condensation; corresponds to relative humidity (RH) stress level 2 to DIN IEC 61131-2

Comments		Ambient conditions	Application areas
Contaminant concentration		SO_2: < 0.5 ppm H_2S: < 0.1 ppm;	RH < 60%, no condensa-tion
Atmospheric pressure	Operation	IEC 60068-2-13	1 080 ... 795 hPa (opera-tion) (-1 000 to +2 000 m above sea level)
	Transport and storage	IEC 60068-2-13	1 080 ... 660 hPa (opera-tion) (-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 WP241 are to be found on the module rating plate.

	→ CE approval

13 Accessories

Ordering data	
Description	**Order No.**
SIWAREX WP241 manual in various languages	Free download from the Internet WP241 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.	
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, P, WP231, WP321, and WP241	
• With short-circuit current < 199 mA DC	7MH4 710-5BA
• With short-circuit current < 137 mA DC	7MH4 710-5CA
Cable (optional)	
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, WP321, and WP241 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

Ordering data	
Description	**Order No.**
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.

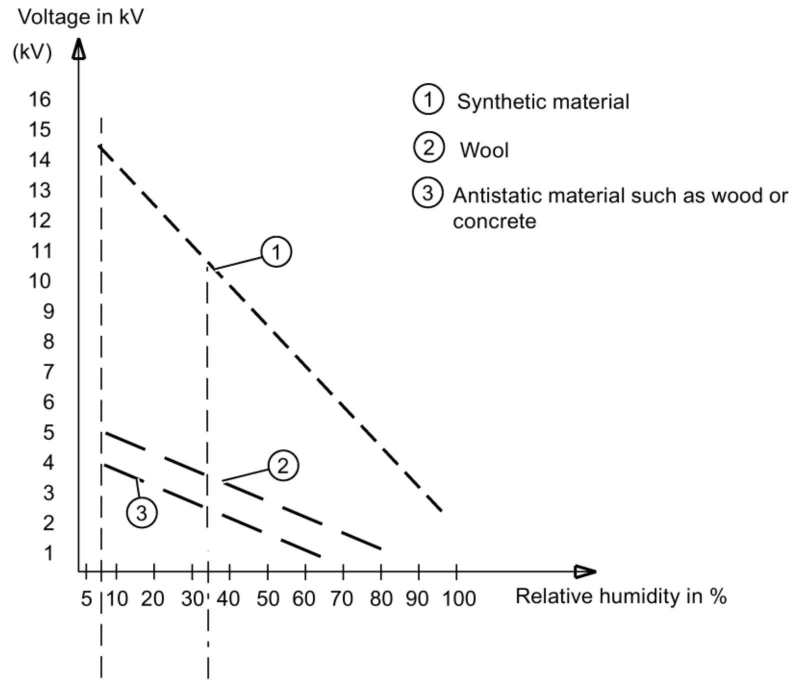


Figure B-1 Electrostatic voltages which an operator can be subjected to

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

C.1 List of abbreviations

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