SIEMENS

SIMATIC

ET 200SP
Technology module TM SIWAREX WP351 HF

Operating Instructions

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Legal information

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

⚠ WARNING

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

⚠ CAUTION

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

NOTICE

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

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Introduction 1

1.1 Purpose of this document

These instructions contain the product-specific information you need for connecting, commissioning, parameter assignment/addressing, diagnostics, technical specifications and operation requiring official calibration of the technology module. The following text describes the technology module referred to as the electronic weighing system.

General information on installation and commissioning of ET 200SP is available in the ET 200SP System Manual. Generally applicable information/SIMATIC manual overview (https://support.industry.siemens.com/cs/ww/en/view/109742709)

1.2 Use in hazardous area

WARNING

Use in hazardous area

Risk of explosion.

- Only use equipment that is approved for use in the intended hazardous area and labeled accordingly.
- Do not use devices that have been operated outside the conditions specified for hazardous areas. If you have used the device outside the conditions for hazardous areas, make all Ex markings unrecognizable on the nameplate.

WARNING

Incorrect installation

Risk of explosion in the hazardous area. For use in hazardous areas according to Class I, Division 2 or Class I, Zone 2 or for use in the EU according to ATEX 2014/34/EU, observe the following conditions:

- Install the device in a control cabinet or enclosure.
- The control cabinet or enclosure meets at least the requirements of IP54 according to IEC/EN 60079-7 and pollution degree 2 or better according to IEC/EN 60664-1.

WARNING

If the device is installed in a cabinet, the inner temperature of the cabinet corresponds to the ambient temperature of the device.

⚠ WARNING

Opening the device

DO NOT OPEN WHEN ENERGIZED.

⚠ WARNING

Replacing components

EXPLOSION HAZARD

SUBSTITUTION OF COMPONENTS MAY IMPAIR SUITABILITY FOR CLASS I, DIVISION 2 OR ZONE 2.

⚠ WARNING

Impermissible repair of the device

- Repair must be carried out by Siemens authorized personnel only.

1.3 Security information

Siemens provides products and solutions with industrial security functions that support the secure operation of plants, systems, machines and networks.

In order to protect plants, systems, machines and networks against cyber threats, it is necessary to implement – and continuously maintain – a holistic, state-of-the-art industrial security concept. Siemens' products and solutions constitute one element of such a concept.

Customers are responsible for preventing unauthorized access to their plants, systems, machines and networks. Such systems, machines and components should only be connected to an enterprise network or the internet if and to the extent such a connection is necessary and only when appropriate security measures (e.g. firewalls and/or network segmentation) are in place.

For additional information on industrial security measures that may be implemented, please visit
https://www.siemens.com/industrialsecurity.

Siemens' products and solutions undergo continuous development to make them more secure. Siemens strongly recommends that product updates are applied as soon as they are available and that the latest product versions are used. Use of product versions that are no longer supported, and failure to apply the latest updates may increase customer's exposure to cyber threats.

To stay informed about product updates, subscribe to the Siemens Industrial Security RSS Feed under
https://www.siemens.com/industrialsecurity.

The SIWAREX WP351 electronic weighing system is designed for use in secure, closed networks and does not have any protection against unauthorized data traffic.

1.4 Open Source Software

Open-source software is used in the firmware of the product described. Open Source Software is provided free of charge. We are liable for the product described, including the open-source software contained in it, pursuant to the conditions applicable to the product. Siemens accepts no liability for the use of the open source software over and above the intended program sequence, or for any faults caused by modifications to the software.

For legal reasons, we are obliged to publish the original text of the license conditions and copyright notices. Please read the information on this on the Internet (https://support.industry.siemens.com/cs/ww/en/view/109740777).

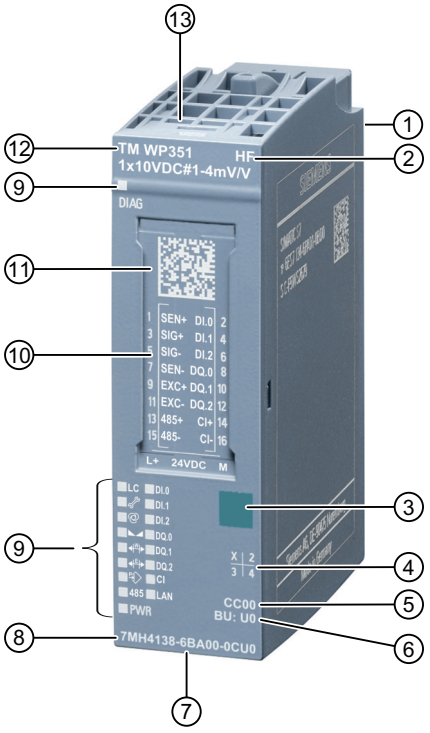
The license terms are stored on the device and available via the web server. For more on this, refer to section Calling the web server (Page 50). To view the license conditions, click the "OSS ReadMe" button.

To resellers: Pass the license conditions on to the buyer to avoid license violations by the reseller and the buyer.

Product overview

2

2.1 View



① Rear: Write protection switch
② Function class
③ Color coding electronic weighing system type
④ Function version
⑤ Color code for selection of the color-coded labels
⑥ BaseUnit type
⑦ Below: Ethernet
⑧ Article number
⑨ LEDs (Page 145)
⑩ Wiring diagram
⑪ 2D matrix code
⑫ Electronic weighing system type and designation
⑬ Button in enclosure for emergency access to the Web server

Figure 2-1 View of the electronic weighing system

See also

ET 200SP Distributed I/O System (http://support.automation.siemens.com/WW/view/en/58649293)

Product information on documentation for the ET 200SP Distributed I/O System (http://support.automation.siemens.com/WW/view/en/73021864)

2.2 Properties

The electronic weighing system has the following properties:

- Technical properties
  - One channel
  - Interfaces:
    Load cell connection with 10 V DC supply voltage; 0.5 µV/e; 3x6000 d
    ±20,000,000 digit resolution at 1 kHz sampling rate
    Digital input signals DI.0, DI.1 and DI.2 24 V DC
    Digital output signals DQ.0, DQ.1 and DQ.2 24 V DC
    Counter input CI; up to 9 kHz; 24 V DC
    Supply voltage L+/M
    Serial interface RS485
    Ethernet interface (RJ45 socket)
- Monitoring of the load cell for impedance, wire break, short-circuit and faulty supply voltage
- Hardware interrupts configurable
- Input filters for suppression of interferences at encoder inputs and digital inputs can be configured
- Calibratable alibi memory for up to 1 000 000 entries.
- Supported load cell types
  - Analog strain gauge load cells with characteristic values of 1 to 4 mV/V
- Supported system functions
  - Firmware update
  - Identification data I&M

2.3 Version dependencies of the functions

The electronic weighing system supports the following functions:

Function	Firmware version of the electronic weighing system	Configurable as of		
		STEP 7 (TIA Portal)	GSD	
			PROFINET IO	PROFIBUS DP
Firmware update	V1.0 or higher	V15	X	—
I&M identification data	V1.0 or higher	V15	X	X
Centralized operation on CPU 151xSP	V1.0 or higher	V15	—	—

Installing 3

3.1 Basic safety notes

WARNING

Open equipment

The devices are "open equipment" according to the standard IEC 61010-2-201 or UL 61010-2-201 / CSA C22.2 No. 61010-2-201. To fulfill requirements for safe operation with regard to mechanical stability, flame retardation, stability, and protection against contact, the following alternative types of installation are specified:

- Installation in a suitable cabinet.
- Installation in a suitable enclosure.
- Installation in a suitably equipped, enclosed control room.

3.1.1 ATEX/IECx special conditions for use

WARNING

Incorrect installation

Risk of explosion in the hazardous area. For use in hazardous areas according to Class I, Division 2 or Class I, Zone 2 or for use in the EU according to ATEX 2014/34/EU, observe the following conditions:

- Install the device in a control cabinet or enclosure.
- The control cabinet or enclosure meets at least the requirements of IP54 according to IEC/EN 60079-7 and pollution degree 2 or better according to IEC/EN 60664-1.

Note

You must not install the device on a wall in hazardous areas.

WARNING

Transient overvoltages

Take measures to ensure that temporary transient overvoltages of more than 119 V do not occur.

3.2 Mounting on the SIMATIC ET 200SP

Mounting on the SIMATIC ET 200SP

Only use the electronic weighing system in conjunction with a SIMATIC ET 200SP distributed I/O system. Install the electronic weighing system in a control cabinet. Observe the information on the protection class and degree of pollution in the section Technical data (Page 149).

When installing the SIMATIC components with the electronic weighing system described herein, follow the setup, assembly and wiring guidelines for the SIMATIC ET 200SP. See system manual (https://support.industry.siemens.com/cs/ww/en/view/109742709) for the SIMATIC ET 200SP.

The electronic weighing system is snapped onto the SIMATIC ET 200SP BaseUnit (BU).

Connect the load cells, the digital input and digital output signals to the BaseUnit of the electronic weighing system. The infeed of the supply voltage at the light-colored BaseUnit of the associated potential group supplies the electronic weighing system and the digital outputs and generates the load cell supply voltage. All information about connecting is available in section Connection to electronic weighing system (Page 24)

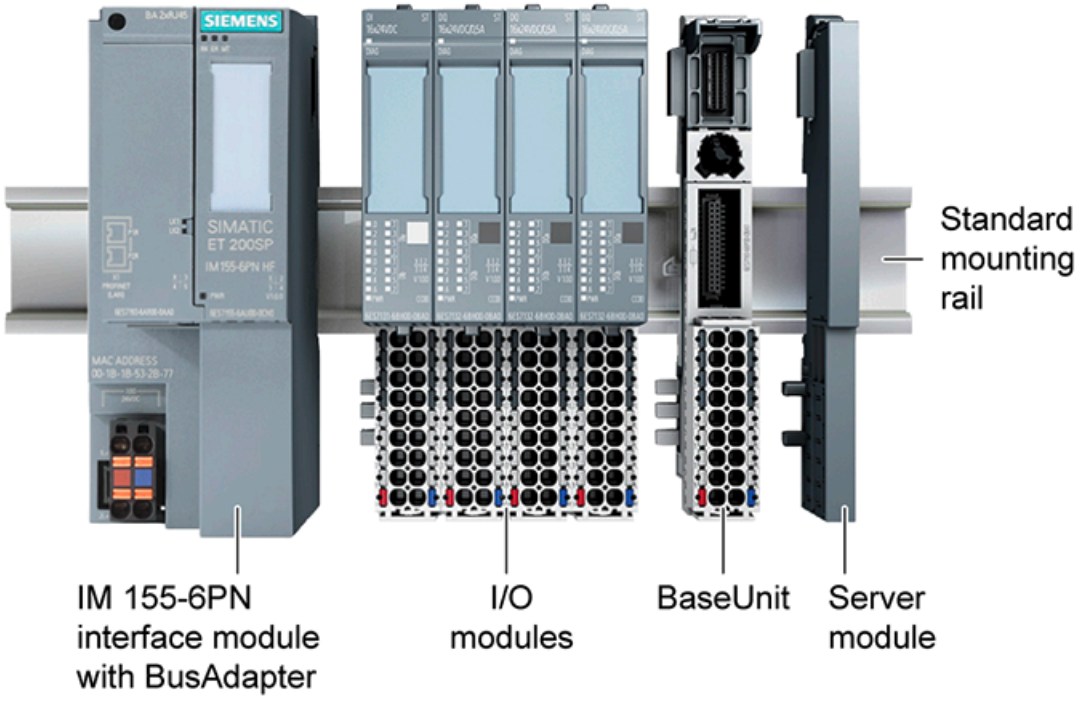


Figure 3-1 Mounting on the SIMATIC ET 200SP

3.3 EMC-compliant installation

3.3.1 Introduction

Overview

The electronic weighing system described here was developed for use in industrial environments and complies with high EMC requirements. Nevertheless, before installing your devices you should prepare an EMC plan and identify and take into consideration possible interference sources.

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.

3.3.2 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.

3.3.3 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

3.3.4 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

4

4.1 Basic safety notes

⚠ WARNING

Safety extra low voltage

The equipment is designed for operation with Safety Extra-Low Voltage (SELV) by a Limited Power Source (LPS). (This does not apply to 100 V...240 V devices.)

This means that only SELV / LPS complying with IEC 60950-1 / EN 60950-1 / VDE 0805-1 must be connected to the power supply terminals. The power supply unit for the equipment power supply must comply with NEC Class 2, as described by the National Electrical Code (r) (ANSI / NFPA 70).

There is an additional requirement if devices are operated with a redundant power supply:

If the equipment is connected to a redundant power supply (two separate power supplies), both must meet these requirements.

⚠ WARNING

Suitable cables at high ambient temperatures

If the temperature of the cable or housing socket exceeds 70 °C or the branching point of conductors exceeds 80 °C, special precautions must be taken.

If the device is operated at ambient temperatures of between 50 °C and 60 °C, only use cables with a maximum permitted operating temperature of at least 80 °C.

4.1.1 ATEX/IECx special conditions for use

⚠ WARNING

WARNING – EXPLOSION HAZARD:

DO NOT CONNECT OR DISCONNECT EQUIPMENT WHEN A FLAMMABLE OR COMBUSTIBLE ATMOSPHERE IS PRESENT.

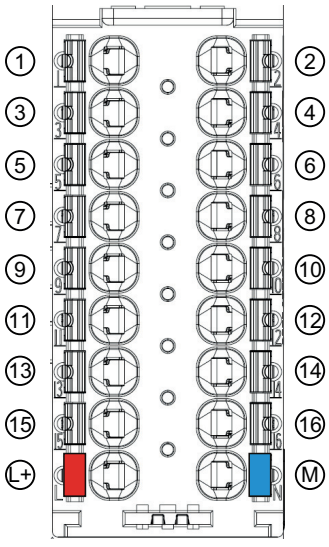
WARNING

Transient overvoltages

Take measures to ensure that temporary transient overvoltages of more than 119 V do not occur.

4.2 Connection to electronic weighing system

Table 4-1 Terminal assignment of the BaseUnit

Designation	Signal name		View	Signal name		Designation
Load cell supply voltage monitoring +	SEN+	1		2	DI.0	Digital input DI.0
Load cell signal +	SIG+	3		4	DI.1	Digital input DI.1
Load cell signal -	SIG-	5		6	DI.2	Digital input DI.2
Load cell supply voltage monitoring -	SEN-	7		8	DQ.0	Digital output DQ.0
Load cell supply voltage +	EXC+	9		10	DQ.1	Digital output DQ.1
Load cell supply voltage -	EXC-	11		12	DQ.2	Digital output DQ.2
RS485 interface +	485+	13		14	CI+	Counter input CI +
RS485 interface -	485-	15		16	CI-	Counter input CI -
24 V DC supply voltage	L+				M	Ground for supply voltage

BaseUnit

The BaseUnit is not included in the scope of delivery of the electronic weighing system and must be ordered separately.

An overview of the BaseUnits that you can use with the electronic weighing system can be found in the Product Information for the documentation of the ET 200SP Distributed I/O System (http://support.automation.siemens.com/WW/view/en/73021864).

Information regarding selection of the suitable BaseUnit can be found in the ET 200SP Distributed I/O System (http://support.automation.siemens.com/WW/view/en/58649293) system manual and in the ET 200SP BaseUnits (http://support.automation.siemens.com/WW/view/en/58532597/133300) manual.

Information on wiring the BaseUnit, creating the cable shield, etc., can be found in the ET 200SP Distributed I/O System System Manual (http://support.automation.siemens.com/WW/view/en/58649293) in the section Connecting.

Supply voltage L+/M

With a dark BaseUnit, the supply voltage of the left BaseUnit is used.

The electronic weighing system monitors whether the supply voltage is connected.

Load cell connection

In case of 6-wire load cells, the supply voltage is measured over the terminals 1 (SEN+) and 7 (SEN-) and used as reference. A voltage drop on the load cell cable does not have an effect on the measurement.

You can connect 4-wire as well as 6-wire load cells. The electronic weighing system is set for operation with 6-wire load cells in the factory.

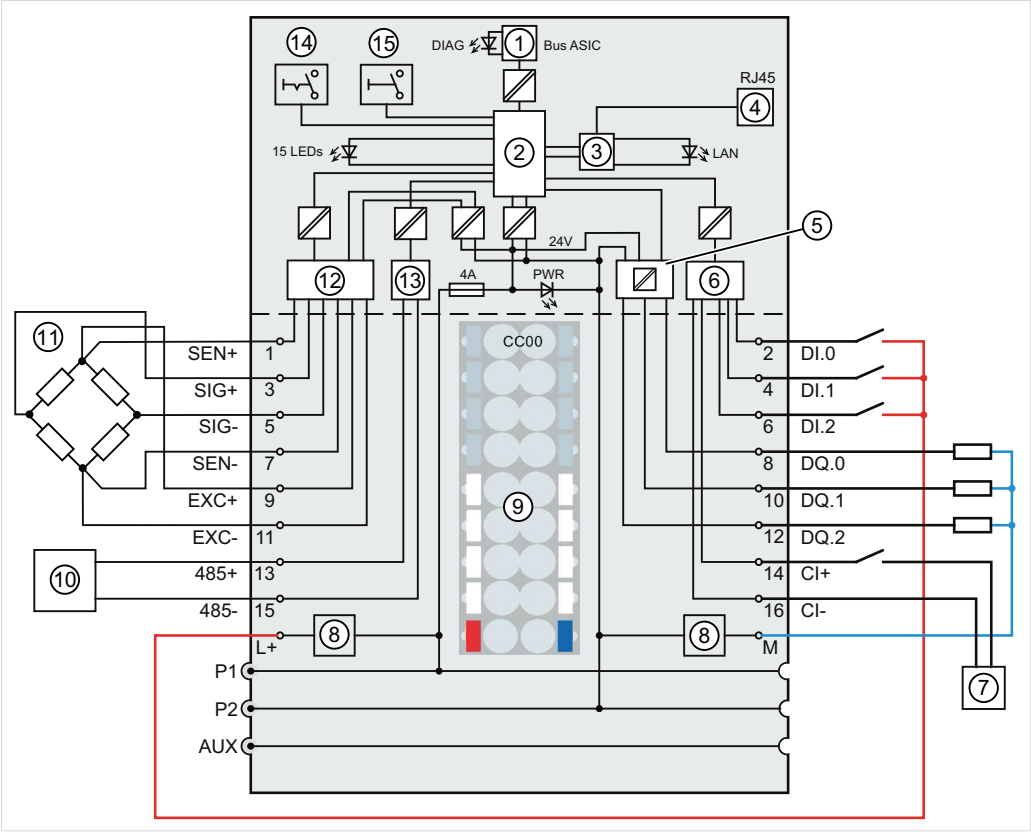
If the power of the electronic weighing system-internal power supply of the load cells is not sufficient, use an external power supply source to supply the load cells.

Note

Compensate for interferences when connecting 4-wire load cells

If you use 4-wire load cells, we recommend that you use a 6-wire cable between the electronic weighing system and the terminal box.

- Set a wire jumper in the terminal box between EXC+/SEN+ and EXC-/SEN-.
  The wire jumper compensates for interferences between the electronic weighing system and the terminal box.



①	Backplane bus interface	⑨	Color identification label CCxx (optional)
②	MCU (microcontroller)	⑩	RS485 device
③	Ethernet sender/receiver (bus coupler)	⑪	Load cell
④	Ethernet	⑫	Filter and A/D converter
⑤	Output electronics	⑬	RS485 sender/receiver (bus coupler)
⑥	Input electronics	⑭	Write protection
⑦	External signal source for counter input CI	⑮	Setup mode
⑧	Filter connection supply voltage (only when light-colored BaseUnit is present)		

Figure 4-1 Principle and pin assignment

Digital inputs DI.0 to DI.2

Assign to the digital inputs scale functions free and individually within the DR 7. No functions are assigned to the inputs at the factory.

The digital inputs are not isolated from each other.

Input delay for digital inputs

In order to suppress noise you can configure an input delay for the digital inputs.

Note

If you select the "None" or "0.0001 " option, you must use shielded cables for connection of the digital inputs.

Digital outputs DQ.0 to DQ.2

Assign to the digital inputs scale status free and individually within the DR 7. No functions are assigned to the outputs at the factory.

The digital outputs are not isolated from each other.

The digital outputs are 24 V sourcing with respect to M and with a nominal load current of 0.5 A. They are protected against overload and short-circuit.

Relays and contactors can be directly connected without an external protective circuit. You can find information about the maximum possible operating frequencies and the inductive loads at the digital outputs in the section Digital outputs DQ (Page 151).

Counter input CI

The counting input CI is used for measuring 24 V signal frequency up to 9 kHz.

Ethernet

The Ethernet port is used to reach the Web server interface or provide access to the electronic weighing system using Modbus TCP/IP.

If you connect a calibratable main display over the Ethernet port, no additional programming is required in the CPU. Connect the electronic weighing system physically to the network of the SIMATIC HMI.

Note

Provide strain relief for the cables that are permanently connected to the Ethernet port.

The strain relief of the cable ensures secure hold of the electronic weighing system in the BaseUnit.

4.3 Connection of analog load cells

Sensors equipped with strain gauges (DMS full bridge) can be connected to the electronic weighing system. These sensors meet the requirements in section Technical data (Page 149).

4.3.1 Connecting SIWAREX JB to the electronic weighing system and load cell

Procedure

1. Open the cover of the SIWAREX JB.
2. Screw in an M16 x 1.5 cable gland for each load cell.
3. Screw in an M20 x 1.5 EMC cable gland for the signal cable to the electronic weighing system.
4. Wire the SIWAREX JB to the load cell and the electronic weighing system in accordance with Wiring diagrams (Page 28).
   To learn how to connect the cable, see section Connecting cables to SIWAREX JB (Page 31).
5. Close any unused opening in the enclosure with a blanking plug.
6. Connect the equipotential bonding conductor to the outside of the enclosure.
   Use shielded cable lugs.
7. Close the cover of the SIWAREX JB according to the tightening torque.

4.3.2 Wiring diagrams

4.3.2.1 Load cells with four-wire system

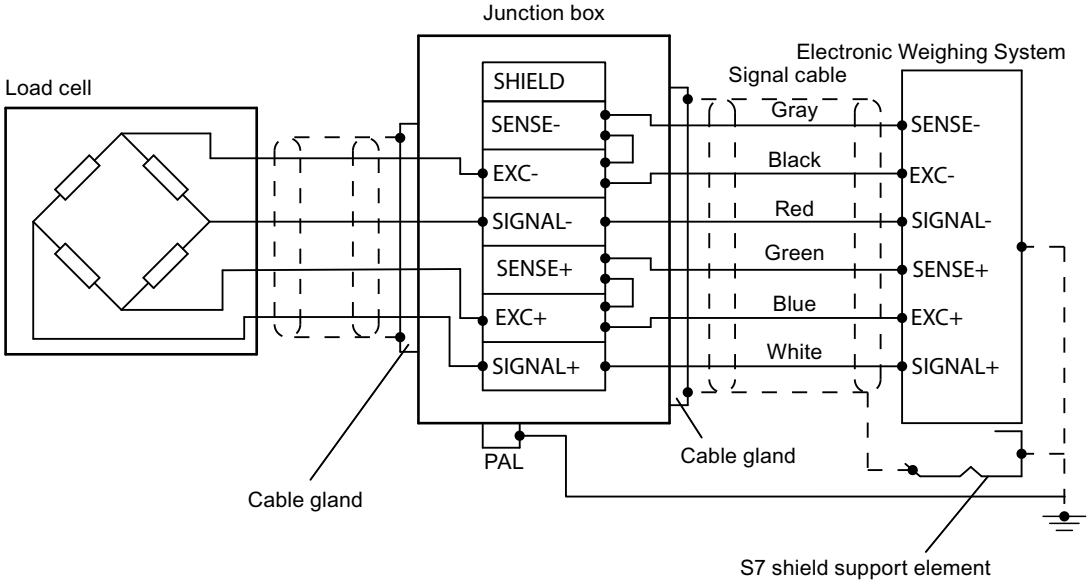


Figure 4-2 Cable shield of the signal cable connected to EMC cable gland

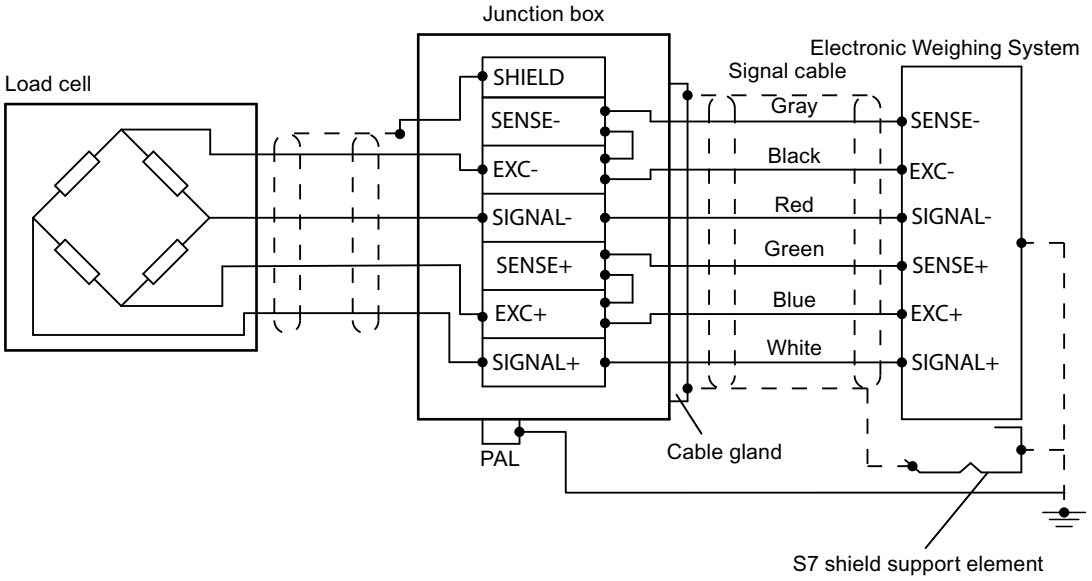


Figure 4-3 Cable shield of the signal cable connected to shield terminal

The following wire jumpers are set by default:

Wire jumper	From terminal	To terminal
1	EXC-	SENSE-
2	EXC+	SENSE+

Note

If the wire jumpers are missing, the electronic weighing system reports a wire break.

4.3.2.2 Load cells with six-wire system

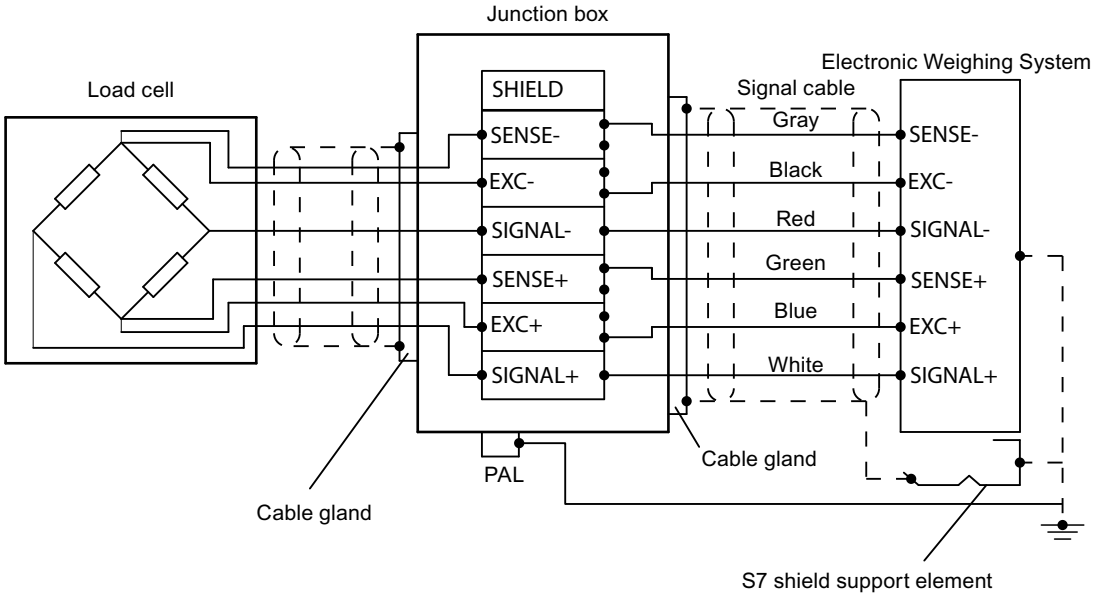


Figure 4-4 Cable shield of load cell cable connected to EMC cable gland

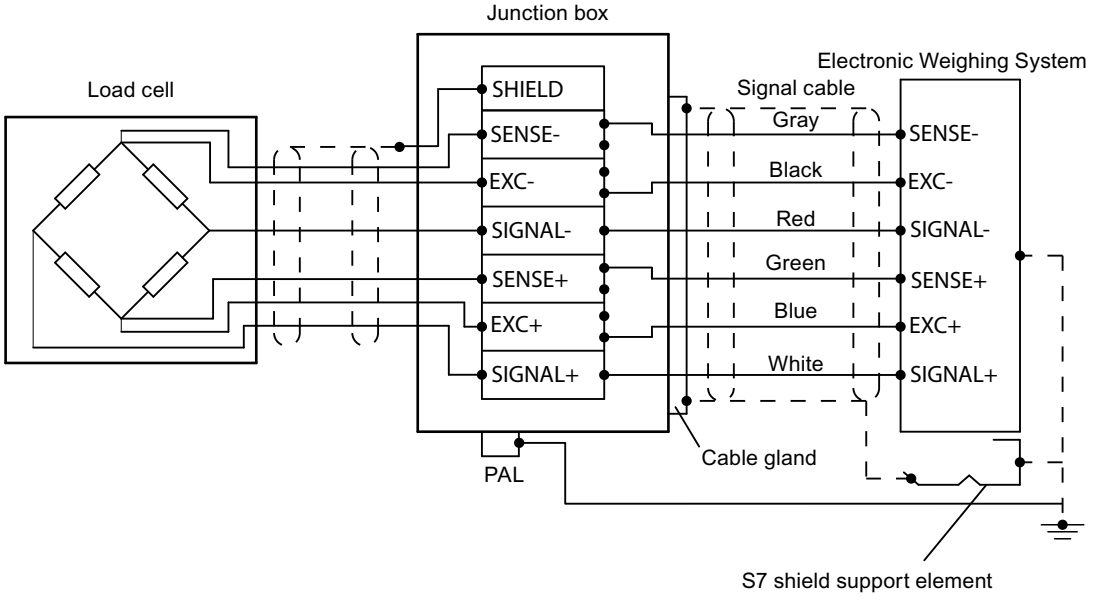


Figure 4-5 Cable shield of load cell cable connected to shield terminal

- Disconnect the following wire jumpers:

Wire jumper	From terminal	To terminal
1	EXC-	SENSE-
2	EXC+	SENSE+

4.3.3 Connecting cables to SIWAREX JB

Requirement

You require a screwdriver with a maximum blade width of 3.5 mm.

Procedure

1. In EMC cable glands, lay the cable shielding over a large area.

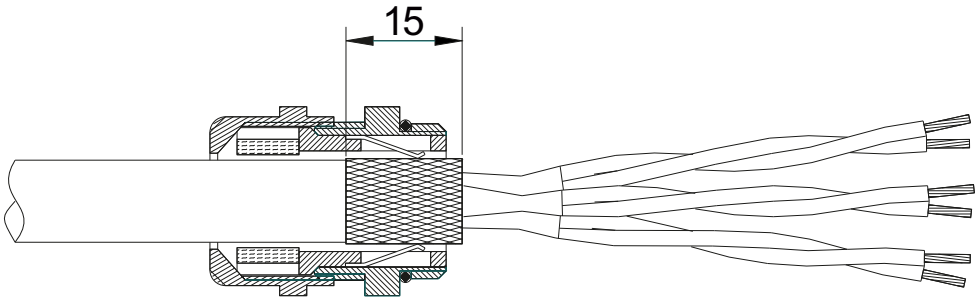


Figure 4-6 Place the cable shield in the EMC cable gland

2. With plastic cable glands, place the corresponding wire of the SIWAREX load cell on the shield terminal.
3. Strip at least 6 mm of insulation from the load cell cable.

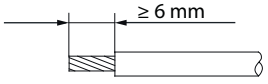


Figure 4-7 Strip cable

4. Insert the stripped load cell cable into the square opening of the screw terminal as far as it will go.
5. Tighten the screws with the specified tightening torque.

Result

The tightened screw firmly holds the stripped wire and establishes the contact.

Commissioning 5

5.1 Calibration with calibration weights

Introduction

As a rule, the characteristic curve can be determined with 2 calibration points. Only determine additional calibration points for non-linear systems.

Requirement

The scale characteristic curve of the scale consisting of calibration weights and adjustment digits of the electronic weighing system is not known.

Procedure

1. Select the "Service mode ON (1)" command.
2. Read DR03.
3. Configure the Justagegewichte [calibrationWeight0 to calibrationWeight4] and other parameters in DR03.
   DR03 Calibration parameters (Page 58)
4. Write DR03.
5. Select the "Service mode OFF (2)" command.
6. Start the "Set calibration point 0 (60)" command with the scale empty.
7. Load the scale with the specified calibration weight.
   The difference between 2 calibration weights must be at least 40 000 adjustment digits, otherwise the calibration command can be rejected. This corresponds to approximately 2% of the nominal load of all load cells (2% of (number of load cells x nominal load of one single load cell)).

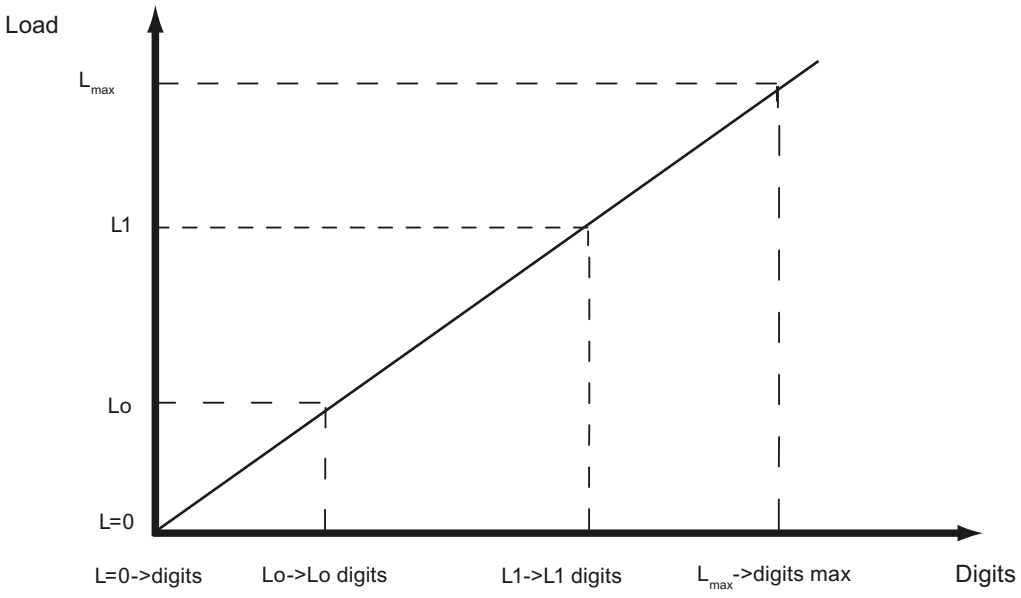
Load cell characteristic value	Adjustment digits (approx.) at nominal load
1 mV/V	20 000 000
2 mV/V	20 000 000
4 mV/V	20 000 000

8. Start the "Set calibration point 1 (61)" command.
9. If you want to define more than 2 calibration points, proceed in the same way with all calibration points.
10. Use increasing calibration weights during calibration.
11. Read DR03.

12. Save the calibration data as a backup.
13. Optional: Start the "Check calibration (83)" command.

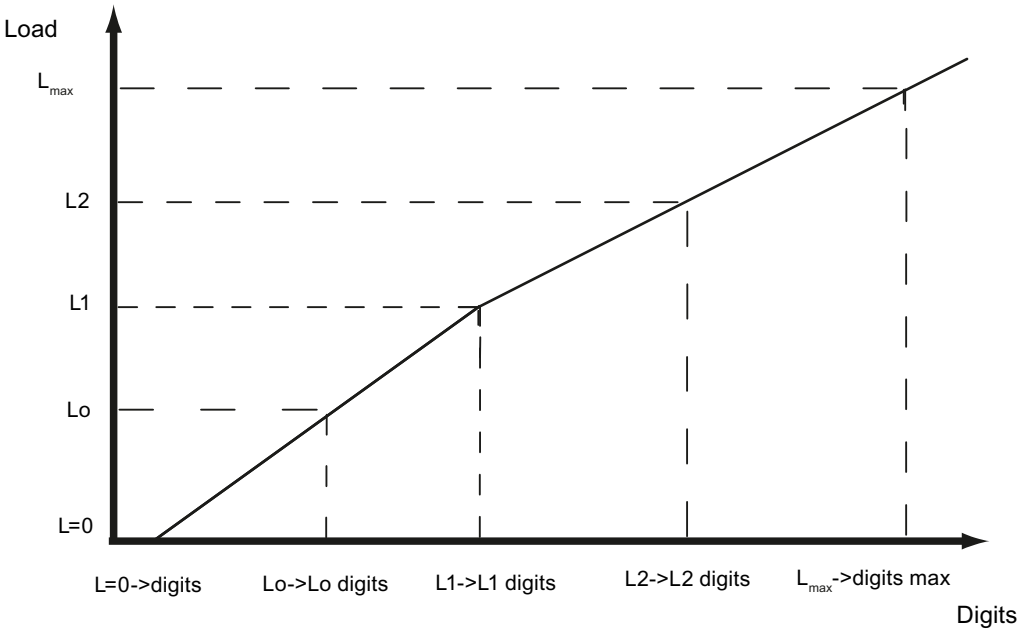
Example

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



Load	Comment	Load	Digits
L=0	100 kg load cell (2 mV/V) not loaded		Approx. 0
L0	Mechanical installation on load cell (dead load)	25 kg	Approx. 5 000 000
L1	Calibration weight 1 placed onto scale	e.g. 60 kg	Approx. 12 000 000
L_{max}	Nominal weight of load cell	100 kg	20 000 000
L_{max}+10%	Nominal weight + approx. 10%	Approx. 110 kg	22 000 000

Figure 5-1 Calibration digits and calibration weight



Load	Comment	Load	Digits
L=0	100 kg load cell (2 mV/V) not loaded		Approx. 0
L0	Mechanical installation on load cell (dead load)	For 25 kg	Approx. 5 000 000
L1	Calibration weight 1 placed on-to scale	For 60 kg	Approx. 12 000 000
L2	Calibration weight 2 placed on-to scale	For 80 kg	Approx. 16 500 000
L_{max}	Nominal weight of load cell	100 kg	Approx. 20 000 000

Figure 5-2 Linearizing the scale characteristic curve

See also

Calibration weights 0, 1, 2, 3, 4 [calibrationWeight] and calibration digits [calibrationDigit] 0, 1, 2, 3, 4 (Page 62)

5.2 Automatic calibration

Introduction

Automatic calibration enables fast commissioning. The accuracy of the scale depends on the entered parameters and the mechanical properties of the scale.

The best level of accuracy for the scale can be achieved by calibrating with Calibration with calibration weights (Page 33).

Requirements

Automatic calibration requires the following criteria:

- Correct mechanical installation of the scale without shunt forces
- Scale is empty (only mechanical installation (= dead load) present on the cells)
- Installed load cells are evenly loaded

Procedure

1. During the first commissioning, reset using the electronic weighing system with the command "Load factory settings (11)" or "Load standard parameter (12)".
2. Select the "Service mode ON (1)" command.
3. Read DR10.
4. Specify the load cell parameters in DR10 (Page 78).
5. Write DR10.
6. Select the "Service mode OFF (2)" command.
7. Start the "Automatic calibration (82)" command.

Result

The characteristic curve of the scale is calculated using the specified load cell parameters from DR10 and the currently applied dead load. The characteristic curve is active immediately.

The characteristic data from DR03 is overwritten with the command "Automatic calibration (82)".

Parameter assignment/addressing 6

6.1 Introduction

The following options are available for parameter assignment and addressing:

- STEP 7 (TIA Portal) user program
  - Commissioning the electronic weighing system with TIA Portal (Page 38)
  - Calling the function block (FB) (Page 41)
  - Executing commands (Page 44)
  - Cyclic data exchange via "cyclicIoData" (Page 46)
  - Reading/writing data records (Page 48)
- Web server
  - Calling the web server (Page 50)
  - Reading/writing data records (Page 51)
  - Parameter assignment
- Modbus TCP/IP commissioning and parameter assignment
  - Communication via Modbus (Page 118)

Parameter table

In addition to the parameter descriptions, the parameter table (https://support.industry.siemens.com/cs/ww/en/ps/7MH4138-6BA00-0CU0/dl) on the Internet provides information on:

- DR number
- Parameter name
- S7 name
- Data type
- Min. value
- Max. value
- Modbus address
- Write protection
- Access
- Status information from DR30

Table 6-1 Example parameter table

DR	Parameter	S7 name	Type	Min. value	Max. value	Modbus address	Write protection	Access
4	Calibration digits 0 (calculated)	calibrationDigits0calculated	DINT	0	-	1200	x	r

6.2 TIA Portal user program

6.2.1 Commissioning the electronic weighing system with TIA Portal

Procedure

1. Download the "Ready to use" TIA Portal example project for the technology module TM SIWAREX WP351 HF (https://support.industry.siemens.com/cs/ww/en/ps/17781/dl) from the Internet.
   The example project must be compatible with your SIMATIC controller.
2. Navigate to the electronic weighing system in the hardware catalog task card: Technology modules > Weighing > SIWAREX > TM SIWAREX WP351 HF.
3. Drag-and-drop the electronic weighing system in the ET 200SP rack.
4. Click on the "General" sub-tab in the "Properties" tab.

5. In the left-hand tree, navigate to TM SIWAREX WP351 HF.

Web server	Activate the access for the Web server.
HTTPS	Function is not supported with FW version 1.0.0.
Logon name / Access right / Password	Create up to five different users. Assign the "Read" or "Read and write" permission individually to each user. **Read** means that the user has read-only access to the Web server and can create and download a backup of the current configuration. The user cannot change data or start commands. **Invalid combination of logon name and password** The following combination is intended exclusively for emergency access to the Web server. Logon name: admin Password: admin For more on this, see section: AUTOHOTSPOT > Procedure in case of loss of user data.

IP address	IP address of the electronic weighing system (default: 192.168.0.21)
Subnet mask	Subnet mask of the electronic weighing system (default: 255.255.255.0)
Set IP address in the project	The IP address of the electronic weighing system is transmitted via the hardware configuration during CPU startup. The IP address is only specified via TIA Portal.
Permit adapting the IP address directly at the device	The IP address of the electronic weighing system is not assigned via the TIA Portal. • Assign the IP address via an external tool (e.g. PST Tool)
Use router	Defines whether or not a router is used.
Router address	IP address of the router
Device name	Network name of the electronic weighing system

6. Enable the desired diagnostic interrupts.
   Monitoring is always active. When an error is detected, a diagnostic interrupt is only triggered when the corresponding diagnostic interrupt is enabled in the device configuration.
7. Enable the desired hardware interrupts.
   With the help of the following event types, parameterize the triggering of a hardware interrupt if they are to be used for controlling dosing. If the dosing signals are to be switched in the cyclic program via the FB, the hardware interrupts can be ignored.
   - Coarse flow (incoming)
   - Coarse flow (outgoing)
   - Fine flow (incoming)
   - Fine flow (outgoing)
   - Emptying (incoming)
   - Emptying (outgoing)
   - Hardware interrupt 4 (event freely definable in DR07)
   - Hardware interrupt 5 (event freely definable in DR07)
   - Hardware interrupt 6 (event freely definable in DR07)
   - Hardware interrupt 7 (event freely definable in DR07)
   - Hardware interrupt 8 (event freely definable in DR07)

   You can select any combination of events for hardware interrupt triggering.
   You can obtain detailed information on the event in the hardware interrupt organization block with the instruction "RALRM" (read additional interrupt info) and in the information system of STEP 7 (TIA Portal).
   The event that triggered the hardware interrupt is logged in the start information of the organization block. The following figure shows the assignment to the bits of double word 8 in local data.

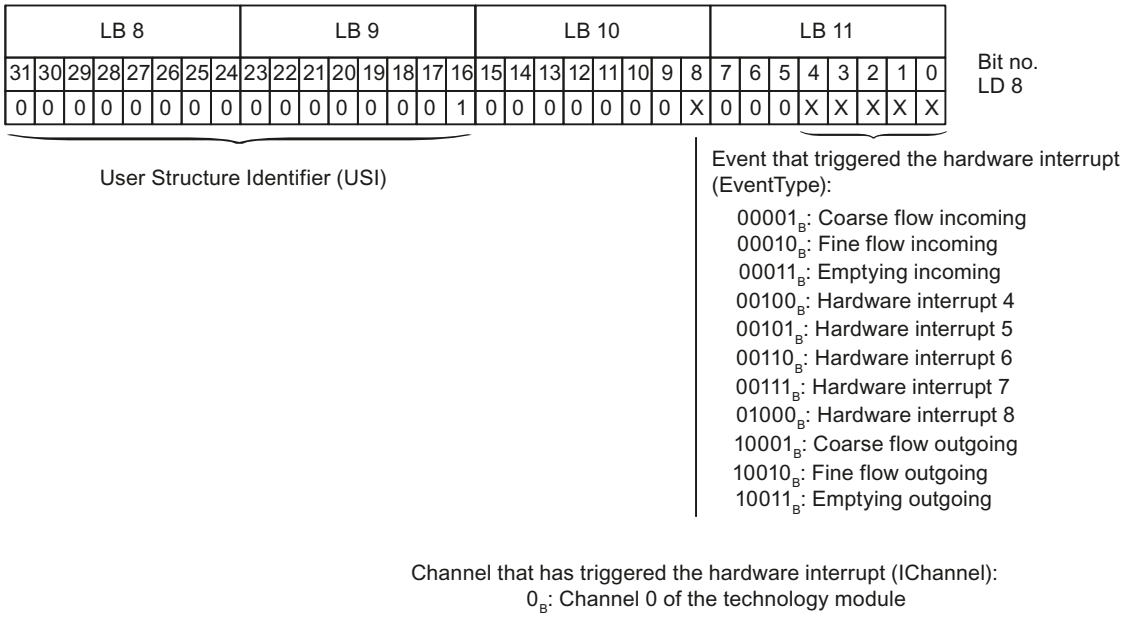


Figure 6-1 Start information of the organization block

See also

Calling the web server (Page 50)

6.2.2 Calling the function block (FB)

Introduction

Call the FB WP351 [FB351] separately once for each electronic weighing system cyclically in the user program. For each call of the FB, adapt the input parameters to the electronic weighing system. Each electronic weighing system has a unique HW ID and its own interface DB. The interface DB contains all weighing parameters. The PLC data types of the interface DB can be found in the TIA Portal example project. Copy the PLC data types from the example project into the target project.

Requirement

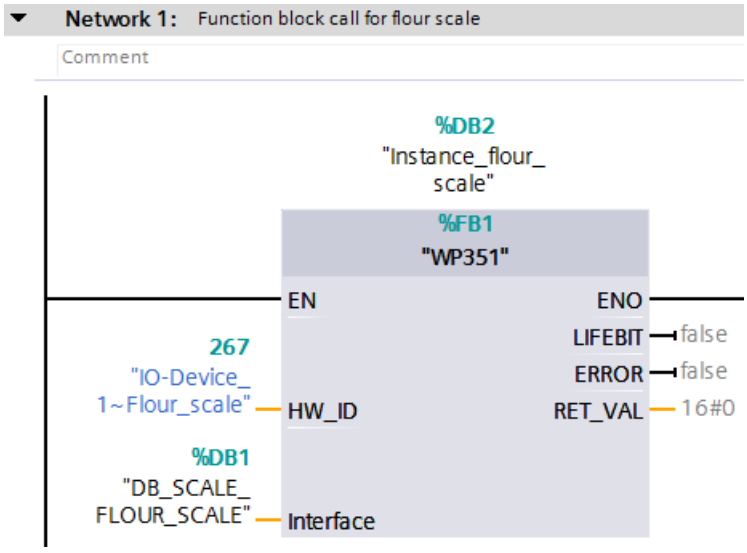
The following FW versions are required in the S7 controllers so that you can work with the FB:

CPU	FW version
S7-1200	≥ V4.2
S7-1500	≥ V2.0

Procedure

1. Copy the FB, the interface DB and the associated UDTs from the example project into the destination project.
2. Call the FB in the user program.
3. Assign the electronic weighing system for the parameter HW ID "HW_ID".

4. Assign the interface DB to the electronic weighing system for the parameter interface "Interface".



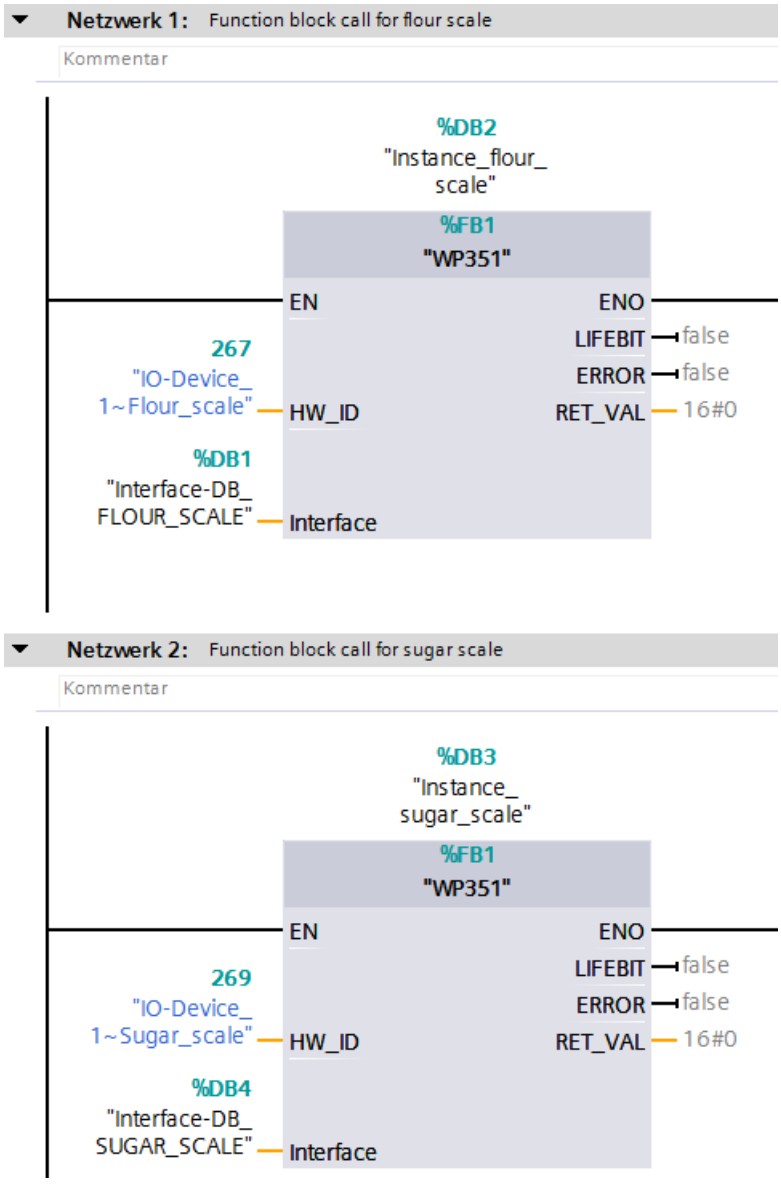
HW_ID	HW ID of the electronic weighing system
Interface	Interface DB of the electronic weighing system
ERROR	"true" = Error
RET_VAL	The meaning of the error codes can be found in the section: Operating errors (Page 130).
LIFEBIT	Optional status bit can be used to monitor communication

Figure 6-2 FB

5. Copy the HMI or the required components from the example project into the destination project.

Example: 2 FBs for 2 electronic weighing systems

The following example shows the setup of 2 FBs in 2 networks for 2 electronic weighing systems.



Network 1 **"Network 1"**	**FB1**	Interface DB of the flour scale "Instance_flour_scale"
		HW_ID of the flour scale "Flour_scale"
		Interface of the flour scale "DB_SCALE_FLOUR_SCALE"
Network 2 **"Network 2"**	**FB2**	Interface DB of the sugar scale "Instance_sugar_scale"
		HW_ID of the sugar scale "Sugar_scale"
		Interface of the sugar scale "DB_SCALE_SUGAR_SCALE"

Figure 6-3 2 FBs for 2 electronic weighing systems

6.2.3 Executing commands

Introduction

Data records (DR) are read or written via specific command codes. There are three command mailboxes within the interface DB for this purpose.

The command mailboxes are managed and processed according to priority. When all three command mailboxes are triggered at the same time by the user program, the FB executes them in the following order:

Command mailbox	Priority	Description
Command1	Highest priority	If you run cyclic commands in the "Command1" command mailbox, this makes it impossible to run commands in the "Command2" or "Command3" command mailbox.
Command2	Medium priority	
Command3	Lowest priority	Cyclic commands from the "Command3" command mailbox are interrupted to run a command in the "Command2" or "Command1" command mailbox.

You can find a list of all commands in section: Commands (Page 111).

Requirement

You have called the FB (Page 41).

Procedure

1. Open the interface DB.
2. In one of the command mailboxes "Command1", "Command2" or "Command3", enter a command code for the parameter "code".

3. Set the associated command trigger [trigger] to "true".
4. Evaluate the associated status bits:
   Command in progress. [inProgress]
   Command finished without error. [finishedOk]
   Command rejected or finished with error. [finishedError] [errorCode (Page 133)] [errorAddInfo (Page 137)] You can find a list of data and operating errors in section Operating errors (Page 130).

Interface-DB_FLOUR_SCALE

	Name	Data type	Start value
4	CommandHandling	"Siwarex_WP35..	
5	Command1	"Siwarex_WP35..	
6	code	Int	0
7	trigger	Bool	FALSE
8	inProgress	Bool	FALSE
9	finishedOk	Bool	FALSE
10	finishedError	Bool	FALSE
11	errorCode	Int	0
12	errorAddInfo	Int	0
13	Command2	"Siwarex_WP35..	
14	code	Int	0
15	trigger	Bool	FALSE
16	inProgress	Bool	FALSE
17	finishedOk	Bool	FALSE
18	finishedError	Bool	FALSE
19	errorCode	Int	0
20	errorAddInfo	Int	0
21	Command3	"Siwarex_WP35..	
22	code	Int	0
23	trigger	Bool	FALSE
24	inProgress	Bool	FALSE
25	finishedOk	Bool	FALSE
26	finishedError	Bool	FALSE
27	errorCode	Int	0
28	errorAddInfo	Int	0

Figure 6-4 Command mailboxes Command1, Command2 and Command3

Example: Configuring calibration weight 1

You want to set the value 12.5 for the parameter Calibration weight 1 [calibrationWeight1].

1. Switch on service mode by entering the command code 1 for the "code" parameter in the "Command1" command mailbox.
2. Set the associated command trigger "trigger" to "true".
   ⇒ The "Wrench LED" on the electronic weighing system flashes orange.
3. Read DR03 by entering the command code 2003 for the "code" parameter in the "Command1" command mailbox.
4. Set the associated command trigger "trigger" to "true".
   ⇒ All current data from DR03 is present in the interface DB.
5. In DR03, enter the value 12.5 for calibration weight 1 [calibrationWeight1].

6. Write DR03 by entering the command code 4003 for the "code" parameter in the "Command1" command mailbox.
7. Set the associated command trigger "trigger" to "true".
8. Evaluate the associated status bits:
   Command finished without error. [finishedOk] is "true".
   ⇒ The new calibration weight is now present in the electronic weighing system and is used.
9. Disable service mode by entering command code 2 for the "code" parameter.
10. Set the associated command trigger "trigger" to "true".

6.2.4 Cyclic data exchange via "cyclicIoData"

The interface DB of the FB makes the "cyclicIoData" structure available. All parameters in this structure are updated cyclically by the electronic weighing system to the SIMATIC controller. All entered parameter values within the "cyclicIoData" structure are used directly – without reading or writing DRs.

The following parameters are available for use within the "cyclicIoData" structure on the factory side:

Interface-DB_FLOUR_SCALE

	Name	Data type	Start value
2	CyclicIoData	"Siwarex_WP35..	
3	input	"Siwarex_WP35..	
4	processValueReal1	Real	0.0
5	processValueReal2	Real	0.0
6	processValueReal3	Real	0.0
7	processValueReal4	Real	0.0
8	processValueDWord1	DWord	16#0000_
9	processValueDWord2	DWord	16#0000_
10	processValueDWord3	DWord	16#0000_
11	processValueDWord4	DWord	16#0000_
12	scaleStatus	"Siwarex_WP35..	
13	output	"Siwarex_WP35..	
14	processValue5	Real	0.0
15	processValue6	Real	0.0
16	processValue7	Real	0.0
17	processValue8	Real	0.0
18	transitions	"Siwarex_WP35..	
19	step0	Bool	false
20	step1	Bool	false
21	step2	Bool	false
22	step3	Bool	false
23	step4	Bool	false
24	step5	Bool	false
25	step6	Bool	false
26	step7	Bool	false
27	digitalOutputControl	"Siwarex_WP35..	
28	DQ0	Bool	false
29	DQ1	Bool	false
30	DQ2	Bool	false

Input

[inProcessValueReal1 to inProcessValueReal4]	I/O process values in Real format according to defined parameters in DR07 (Page 72).
[inProcessValueDWord1 to inProcessValueDWord4]	I/O process values in DWord format according to defined parameters in DR07 (Page 72).
[scaleStatus]	Weighing status of weighing steps according to parameters in DR30 (Page 103).

Output

[ioProcessValue5 to ioProcessValue8]	I/O process value according to defined parameters in DR07 (Page 72).

[transitions]	Interlock weighing steps [step0 to step7] with the following bits. Selection code 0 locks weighing step 0. Selection code 1 locks weighing step 1. Selection code 2 locks weighing step 2. Selection code 3 locks weighing step 3. Selection code 4 locks weighing step 4. Selection code 5 locks weighing step 5. Selection code 6 locks weighing step 6. Selection code 7 locks weighing step 7.
[digitalOutputControl]	Digital output (DQ) that is selected in DR07 (Page 72). Activate the digital output with the following bits: Selection code 0 activates DQ.0. Selection code 1 activates DQ.1. Selection code 2 activates DQ.2.
[errorCode]	Error according to Interrupts/diagnostic messages (Page 129).
[addInfo]	Error according to Interrupts/diagnostic messages (Page 129).

Figure 6-5 "cyclicIoData" structure

6.2.5 Reading/writing data records

Introduction

Every data record (DR) can only be read fully from the electronic weighing system to the SIMATIC controller or written to the electronic weighing system. Transfer of a single parameter within a data record is not possible.

Data in the "cyclicIoData" structure is updated automatically without commands via cyclic communication.

Requirements

You have called the FB (Page 41).

Example: Reading and writing DR07

CAUTION

The number of system functions that can be called at the same time is limited.

Start the commands for reading and writing a data record only when necessary.

1. Switch on service mode by entering the command code 1 for the "code" parameter in the "Command1" command mailbox.
2. Open the interface DB.
3. Read DR07 by entering the command code 2007 for the "code" parameter in the "Command1" command mailbox.
4. Set the associated command trigger [trigger] to "true".
   ⇒ All current data from DR07 is present in the interface DB.
5. Set the scale parameters for DR07 (Page 72).
6. Write DR07 by entering the command code 4007 for the "code" parameter in the "Command1" command mailbox.
7. Set the associated command trigger "trigger" to "true".

6.2.6 Design of hardware configuration

An HSP0281 (Hardware Support Package) is available for download. The following table provides an overview of the possible usage scenarios of the electronic weighing system.

Possible applications	Required components	Configuration software	In the user program
Central operation with a CPU 151xSP	• S7-1500 (SP-CPU) automation system • TM SIWAREX WP351 HF	STEP 7 (TIA Portal as of V15.1): • Basic configuration using the hardware configuration • Web browser for reaching the web server interface	• TM SIWAREX WP351 HF FB for S7-1500/1200 controllers
Distributed operation with an S7-1500 CPU	• Automation System S7-1500 • ET 200SP distributed I/O system • TM SIWAREX WP351 HF		
Distributed operation with an S7-300/400 CPU	• Automation system S7-300/400 • ET 200SP distributed I/O system • TM SIWAREX WP351 HF	STEP 7 (TIA Portal as of V15.1): • Basic configuration using the hardware configuration • Web browser for reaching the web server interface	• TM SIWAREX WP351 HF FB for S7-300/400 controllers
External system	• ET 200SP distributed I/O system • TM SIWAREX WP351 HF	Web browser for reaching the web server interface	• GSD/GSDML file

6.3 Web server

6.3.1 Calling the web server

NOTICE
Low degree of protection against unauthorized access
If you activate the web server, you reduce protection against unauthorized access to functions and data of the electronic weighing system from outside and via the internal network.
• Observe the Security information (Page 12).

Procedure with TIA Portal

1. In the device view, select TM SIWAREX WP351 HF.
2. Click on the "General" sub-tab in the "Properties" tab.
3. Navigate to TM SIWAREX WP351 HF > Parameters.
4. Activate the web server.
5. Create at least one user.
6. Enter the IP address of the electronic weighing system in the Mozilla Firefox or Google Chrome browser. (Default: 192.168.0.21)
7. Log in with the previously defined credentials.

Procedure in case of loss of user data

1. Press the ① pushbutton at the upper left in the enclosure for at least 3 seconds.

⇒ LED ② lights up yellow.

2. Enter the IP address of the electronic weighing system in the Mozilla Firefox or Google Chrome browser within 2 minutes. (Default: 192.168.0.21)
3. Log on as follows:
   Logon name: admin
   Password: admin

See also

Commissioning the electronic weighing system with TIA Portal (Page 38)

6.3.2 Reading/writing data records

Introduction

Every data record (DR) can only be fully read from the electronic weighing system in the web server or written to the electronic weighing system. Transfer of a single parameter within a data record is not possible.

Example: Reading and writing DR06

1. Read DR06 by selecting "Online > Read data record" in the shortcut menu.

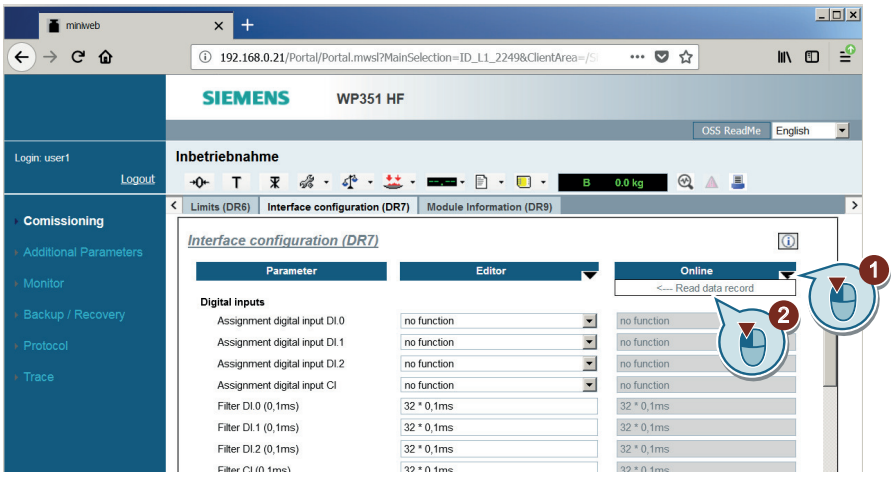


Figure 6-6 Reading DR

2. Set the scale parameters for DR06 (Page 71).
3. Write DR06 by selecting "Editor > Write data record" in the shortcut menu.

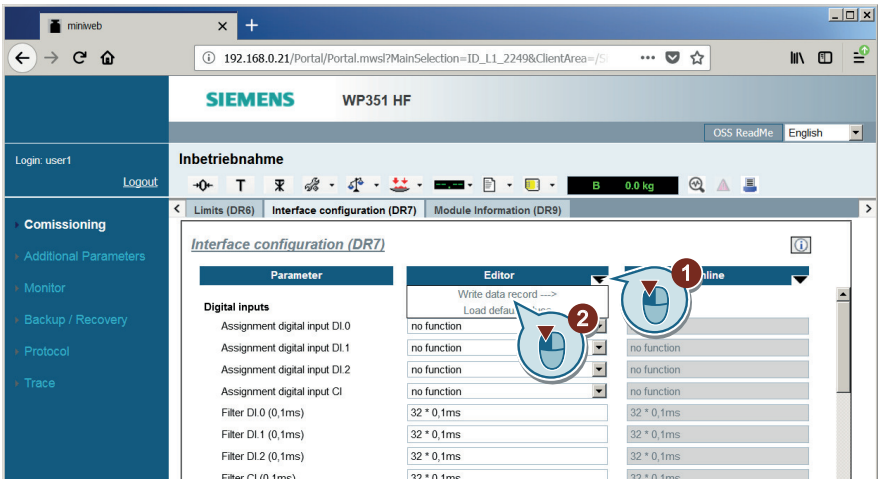


Figure 6-7 Writing DR

6.4 Operating modes

6.4.1 Weighing steps

Dosing is always executed in weighing steps. These weighing steps involve the same task in each weighing operating mode and are presented below. The scale status in the interface DB of the "cyclicIoData" structure indicates the current weighing step of the scale.

Weighing step	Function
0	Scale waits for command
1	Taring/zeroing (based on dosing start settings from DR25)
2	Extra coarse/Coarse/Fine phase (based on settings from DR23)
3	Post-dosing (based on settings from DR22)
4	Checking (based on settings from DR22)
5	Emptying (based on settings from DR25)
6	Checking of actually emptied material Only for DTI Discontinuous totalizing automatic weighing instrument (Page 57) Modus B

6.4.2 NAWI - Non automatic weighing instrument

6.4.2.1 NAWI - Non-automatic weighing instrument - Filling

In this weighing operating mode, intervention by the operator is always required in the case of a legal-for-trade verified scale. The operator initiates logging of the current weight with a command. The operator can initiate the command from the SIMATIC HMI, for example. The material to be weighed is dosed into or placed on the scale.

The material to be weighed is placed on a platform weighing machine, for example, and an entry is made in the log memory of the electronic weighing system by a user command.

In NAWI mode, the electronic weighing system also allows a set point to be set. The set point is automatically dosed by means of the dosing functionality of the electronic weighing system. The user logs the dosed weight with a command. Manual logging is not included in the automatic weighing cycle.

The dosing signals "Coarse flow/Fine flow" can be used to directly control the corresponding dosing elements. After the set point is reached, the electronic weighing system jumps to "stopped" state in weighing step 4. The operator confirms the dosed weight using the "Continue weighing" (1141) command. The operator logs and ends the weighing operation and continues to weighing step 5 for emptying.

In practice, the dosing process may proceed as follows:

1. PLC sends set point (DR20) and material parameter (DR23) to the electronic weighing system
2. PLC sends "Start" command (e.g. 1101) to the electronic weighing system
3. The electronic weighing system performs zeroing or tares (based on DR25)

4. Coarse/fine dosing phase starts
5. If configured and necessary, post-dosing occurs (DR22)
6. The electronic weighing system jumps to the "Stopped" state and waits for the "Next" command (1141) by the operator
7. If the "Next" command is issued, the dosed weight is written in the log memory and the final tolerance check is performed.
8. The electronic weighing system jumps to weighing step 0 and waits for further commands.

6.4.2.2 NAWI - Non-automatic weighing instrument - Emptying

In this weighing operating mode, intervention by the operator is always required in the case of a legal-for-trade verified scale. The operator initiates logging of the current weight with a command. The operator can initiate the command from the SIMATIC HMI, for example.

"Removal" means that the product to be weighed is dosed from the scale (for example, a silo on load cells with discharge valves). In this case, the full scale is tared and the net weight increases with decreasing gross weight.

In NAWI mode, the electronic weighing system also allows a set point to be set, which the dosing functionality of the electronic weighing system then automatically doses.

The dosing signals "Coarse flow/Fine flow" can be used to directly control the corresponding dosing elements. After the set point is reached, the electronic weighing system jumps to "Stopped" state and the operator must confirm the dosed weight using the "Continue weighing" command. As a result of this, the dosed weight is logged and the weighing operation is concluded.

In practice, the dosing process may proceed as follows:

1. Scale is filled with sufficient material.
2. PLC sends set point (DR20) and material parameter (DR23) to the electronic weighing system
3. PLC sends "Start" command (e.g. 1101) to the electronic weighing system
4. The electronic weighing system tares (according to DR25)
5. Coarse/fine dosing phase starts
6. If configured and necessary, post-dosing occurs (DR22)
7. The electronic weighing system jumps to the "Stopped" state and waits for the "Next" command (1141) by the operator
8. If the "Next" command is issued, the dosed weight is written in the log memory and the final tolerance check is performed.
9. Emptying signal is set, if necessary (according to DR25) (weighing step 5)
10. The electronic weighing system jumps to weighing step 0 and waits for further commands.

6.4.3 GFI - Gravimetric filling instrument

In GFI mode, the electronic weighing system also allows a set point to be set, which the dosing functionality of the electronic weighing system then automatically doses.

The dosing signals "Coarse flow/Fine flow" can be used to directly control the corresponding dosing elements (e.g. valves). After the set point is reached, the electronic weighing system automatically logs the dosed weight in the log memory, performs a tolerance check (only in checked cycles), corrects the shut-off points of the dosing signals if necessary (only in checked cycles) and completes the weighing operation autonomously. Optionally, the electronic weighing system can also empty the scale.

In this weighing operating mode, the dosing is controlled by the electronic weighing system in a fully-automatic manner. In contrast to a NAWI scale, logging of the individual dosing operations by an operator command is not required (the electronic weighing system logs every weighing nevertheless). The scale is therefore tested during verification to see if the set point setting is always within the legally prescribed limits.

Typically, GFI scales dose continuously in continuous operation, which the electronic weighing system also supports. In this weighing operating mode, the option also exists to define cycles that are not zeroed/tared and not checked. This increases the throughput of the scale because the operations that require stability do not occur in every weighing cycle.

In practice, the dosing process may proceed as follows:

1. PLC sends set point (DR20) and material parameter (DR23) to the electronic weighing system
2. PLC sends "Start" command (e.g. 1101) to the electronic weighing system
3. The electronic weighing system performs zeroing or tares (based on DR25) (weighing step 1)
4. Coarse/fine dosing phase starts (weighing step 2)
5. If configured and necessary, post-dosing occurs (DR22) (weighing step 3)
6. Dosing result is automatically checked and logged (weighing step 4)
7. Scale is emptied, if necessary (based on setting in DR25) (weighing step 5)
8. The electronic weighing system jumps to weighing step 0 and waits for further commands or jumps directly back to step 1 (continuous operation).

6.4.4 CWI - Catchweighing instrument / CW - Automatic check weigher

6.4.4.1 CWI - Catchweighing instrument/ CW - Automatic check weigher - Filling

In CWI/CW mode, the electronic weighing system also allows a set point to be set, which the dosing functionality of the electronic weighing system then automatically doses.

The dosing signals "Coarse flow/Fine flow" can be used to directly control the corresponding dosing elements (e.g. valves). After the set point is reached, the electronic weighing system automatically logs the dosed weight in the log memory, performs a tolerance check, corrects the shut-off points of the dosing signals if necessary and completes the weighing operation autonomously. Optionally, the electronic weighing system can also empty the scale.

In contrast to the NAWI weighing operating mode, the logging of the dosed single weight is written automatically to the log memory without an operator intervention.

Dosing in continuous operation is possible.

In practice, the dosing process may proceed as follows:

1. PLC sends set point (DR 20) and material parameters (DR 23) to the electronic weighing system
2. PLC sends "Start" command (e.g. 1101) to the electronic weighing system
3. The electronic weighing system performs zero setting or tares (based on DR 25) (weighing step 1)
4. Coarse/fine dosing phase starts (weighing step 2)
5. If configured and necessary, post-dosing occurs (DR 22) (weighing step 3)
6. Dosing result is automatically checked and logged (weighing step 4)
7. Scale is emptied, if necessary (based on DR 25) (weighing step 5)
8. The electronic weighing system jumps to weighing step 0 and waits for further commands or jumps directly back to step 1 (continuous operation).

6.4.4.2 CWI - Catchweighing instrument/ CW - Automatic check weigher - Emptying

In CWI/CW mode, the electronic weighing system also allows a set point to be set, which the dosing functionality of the electronic weighing system then automatically doses.

In CWI/CW mode, the electronic weighing system also allows a set point to be set, which the dosing functionality of the electronic weighing system then automatically doses.

The dosing signals "Coarse flow/Fine flow" can be used to directly control the corresponding dosing elements (e.g. valves). After the set point is reached, the electronic weighing system automatically logs the dosed weight in the log memory and completes the weighing operation autonomously.

In contrast to the NAWI weighing operating mode, the logging of the dosed single weight is written automatically to the log memory without an operator intervention.

"Removal" means that the product to be weighed is dosed from the scale (for example, a silo on load cells with discharge valves). In this case, the full scale is tared and the net weight increases with decreasing gross weight. The "Dosing start" parameter in DR 25 should be set to "Tare" for correct operation.

Dosing in continuous operation is possible.

In practice, the dosing process may proceed as follows:

1. Scale is filled with sufficient material.
2. PLC sends set point (DR 20) and material parameters (DR 23) to the electronic weighing system
3. PLC sends "Start" command (e.g. 1101) to the electronic weighing system
4. The electronic weighing system tares (based on DR 25) (weighing step 1)
5. Coarse/fine dosing phase starts (weighing step 2)

6. If configured and necessary, post-dosing occurs (DR 22) (weighing step 3)
7. Dosing result is automatically checked and logged (weighing step 4)
8. Emptying signal is set, if necessary (based on DR 25) (weighing step 5)
9. The electronic weighing system jumps to weighing step 0 and waits for further commands or jumps directly back to step 1 (continuous operation).

6.4.5 DTI Discontinuous totalizing automatic weighing instrument

In THW weighing operating mode, you can use the electronic weighing system for loading or receiving mode. The difference between loading and receiving operation is the specification of a desired loading quantity (=total set point DR 21). This desired loading quantity is loaded automatically in single fillings (=set point DR 20). For example when loading a ship.

When the loading quantity is set to 0, the electronic weighing system works in receiving operation. Receiving operation means that "n" single fillings are automatically totaled. For example when unloading a ship.

Select mode A or B for the THW weighing operating mode.

Mode A	Mode B
If you are using a poorly flowing material, select mode A. The content of the weighing container may not be fully emptied.	If you are using a free flowing material, select mode B. The content of the weighing container is usually fully emptied.

Weighing step	Function	
	Mode A	Mode B
	PLC sends set point (DR 20), total set point (DR 21) and material parameters (DR 23) to the electronic weighing system.	
0	Waiting for command.	
	PLC sends "Start" command (e.g. 1103 or 1123) to the electronic weighing system.	
1	Taring/Zero setting (based on weighing start options from DR 25)	
2	Coarse/Fine phase (based on settings from DR 23)	
3	Post-dosing (based on settings from DR 22)	
4	Checking (based on settings from DR 22)	Checking (based on settings from DR 22) and totaling
5	Emptying (based on settings from DR 25)	
6	Waiting for stability 1 and totalizing	-
Consequence	• If the total set point has not been reached or the electronic weighing system is in receiving mode, the electronic weighing system automatically jumps to weighing step 1. • When the total set point has been reached, the status bit "Batch completed" is set in DR 30. The total 1 is automatically saved in the alibi memory. The total is reset and the electronic weighing system waits in weighing step 0 for a new command.	

6.4.6 CW - Automatic check weigher

You set the CW weighing operating mode in data record 3. The CW weighing operating mode enables you to implement a static automatic checkweigher with the electronic weighing system. Test objects are checked for a default set point; tolerance bits are set when the value is below or above the set point so that the PLC can sort accordingly.

If you want a legal-for-trade check with the electronic weighing system, it must be performed statically (at stability 2). Static means that the test object is not tested dynamically during throughput. In case of a conveyor belt, a static, legal-for-trade check means that the weighing belt must be briefly stopped to perform the check. For checkweighers that are not legal-for-trade, the check can be made dynamically.
The electronic weighing system offers two options for checking:

1. Start manually triggered check with command 1101 (single weighing).
   The electronic weighing system waits in weighing step 0 for a command from the PLC/user. When the command xyz is sent to the electronic weighing system, the command jumps directly to weighing step 4 and waits for stability 2 (defined in DR 3). As soon as stability 2 has been reached, the current weight is measured and compared to the specified set point (DR 20). According to the tolerance settings in DR 22, corresponding tolerance feedback messages are made available by the electronic weighing system. The result is forwarded to the module-internal statistics (DR 39) and updated.
2. Start automatic continuous operation with command 1103 (continuous operation)
   After the command is triggered, the electronic weighing system waits in weighing step 0 until limit 3 (DR 6) is exceeded. As soon as the actual weight exceeds this threshold, the electronic weighing system automatically jumps to weighing step 4 and waits for stability 2. As soon as stability 2 has been reached, the current weight is measured and compared to the specified set point (DR 20). According to the tolerance settings in DR 22, corresponding tolerance feedback messages are made available by the electronic weighing system. The result is forwarded to the module-internal statistics (DR 39) and updated. Subsequently, limit 3 must be undershot again (discharging the test object) so that the electronic weighing system automatically jumps back to weighing step 0 and waits until the limit is exceeded once again. You can exit continuous operation at any time with command 1123 (Stop continuous mode).

6.5 DR03 Calibration parameters

6.5.1 Overview

Data record DR03 summarizes the basic parameters of non-automatic scales. You can only transfer the parameters during active service mode of the electronic weighing system. You can read the DRs into the interface DB at any time.

DR03 contains the following parameters for the characteristic curve, for example:

- Calibration weight
- Calibration digits
- Stability parameters
- Tare and zeroing / zero setting options

See also

Commands (Page 111)

6.5.2 Scale name [scaleName]

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

Note

The scale name cannot be changed after official verification.

6.5.3 Weight unit [weightUnit]

Sets the weight units.

Selection code	Weight unit	
0	mg	Milligram
1	g	Gram
2 (default)	kg	Kilogram
3	t	Metric ton
4	oz	Ounce
5	lb	Pound
6	T	Short ton
7	TL	Long ton
8	N	Newton
9	No unit	

The weight unit selection has no effect on the internal weight calculation. It involves only ASCII characters. Thus, all parameters with weight must be specified with appropriate conversion when there is a change of weight unit.

6.5.4 Gross indicator [grossIndicator]

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

6.5.5 Restriction code [restrictionCode]

Activates a parameter check in accordance with OIML for operation requiring verification of the scales.

Selection code	
0 (default)	No regulations
1	OIML regulations

6.5.6 Set number of weighing ranges [numberOfWeighingRanges]

For legal trade scales, specify whether the scales are operated as single-, dual- or triple-range scales (3x6000d).

For scales not requiring official calibration, the parameter can be ignored and left to the default value single-range scales.

Selection code	
1 (default)	Single-range scales
2	Dual-range scales
3	Triple-range scales

Minimum weight weighing range 1 [minWeightWeighingRange1]

For scales not requiring official calibration, you can use the default value 0.

The weight value can be used above the minimum weighing range for legal trade registration with the specified scale interval. The parameter is defined during calibration/official verification and specified in the unit of weight.

Maximum weight weighing range 1 [maxWeightWeighingRange1]

For scales not requiring official calibration, you can specify the maximum capacity of the scales.

For scales requiring official calibration, the specification must be greater than the minimum load for weighing range 1 and is dependent on the number and type of connected load cell(s).

Minimum weight weighing range 2 [minWeightWeighingRange2]

For scales not requiring official calibration, you can use the default value 0.

Corresponds to the maximum weight for weighing range 1 for scales requiring official calibration.

The parameter is defined during calibration/official verification and specified in the unit of weight.

With multi-range scales requiring official calibration, 20 times the scale interval of weighing range 2 is usually entered.

Maximum weight weighing range 2 [maxWeightWeighingRange2]

For scales not requiring official calibration, you can use the default value 0.

For scales requiring official calibration, the specification must be greater than the minimum weight for weighing range 2 and is dependent on the number and type of connected load cell(s).

Minimum weight weighing range 3 [minWeightWeighingRange3]

For scales not requiring official calibration, you can use the default value 0.

For multi-interval scales requiring official calibration, the minimum load for weighing range 3 corresponds to the maximum load of weighing range 2. The parameter is defined during calibration/official verification and specified in the unit of weight.

With multi-range scales requiring official calibration, 20 times the scale interval of the weighing range 3 is usually entered.

Maximum weight weighing range 3 [maxWeightWeighingRange3]

For scales not requiring official calibration, you can use the default value 0.

For scales requiring official calibration, the specification must be greater than the minimum weight for weighing range 3 and is dependent on the number and type of connected load cell(s).

6.5.7 Multi range / multi interval scale [multiRangeMultiIntervalScale]

Defines whether the electronic weighing system is to operate as multi-range or multi-interval scales.

For scales not requiring official calibration, the parameter can be ignored.

Selection code	
0	Multi-range scales
1	Multi-interval scales

Multi-range scales

The electronic weighing system can be operated as single-, dual- or triple-range scales. The individual ranges differ in terms of the maximum load and the scale interval.

Example

Triple-range scales with an interval of 6000 steps in each weighing range:

Weighing range 1: 10 – 3000 kg / 0.5 kg

Weighing range 2: 20 – 6000 kg / 1.0 kg

Weighing range 3: 40 – 12000 kg / 2.0 kg

With the multi-range scales, the scales automatically change from the lower weighing range to the next higher weighing range when loaded if the respective maximum weight is exceeded.

A switch to the lower weighing range only takes place when the gross zero point is passed.

In this case, the scales automatically change back to weighing range 1.

When defining a multi-range scale, the maximum weights and scale intervals of the weighing ranges need to be defined in ascending order. The minimum weights generally correspond to 20 times the scale interval of the respective weighing range.

The maximum number of legal-for-trade scale intervals depends on the load cells used (e.g. 6000d with C6 load cells or 3000d with C3 load cells) and may not be exceeded in any of the set ranges in the case of legal-for-trade scales. Only when OIML is set in DR03.

Multi-interval scales

Single-range scales can be set as multi-interval scales with two or three different weighing ranges or scale intervals.

Example

Triple-division scales with:

Weighing range 1: 10 kg – 1500 kg / 0.5 kg

Weighing range 2: 1500 kg – 3000 kg / 1.0 kg

Weighing range 3: 3000 kg – 6000 kg / 2.0 kg

The weighing range and the corresponding scale interval is automatically changed depending on the load applied both during loading and unloading.

After taring, the net weight of the scales is displayed with the scale interval of the smallest weighing range, so that low weights can also be recorded with maximum precision with already loaded scales. The maximum tare value is limited to the maximum load of the smallest weighing range.

When defining a multi-interval scale, the individual ranges must seamlessly connect to one another:

Min2 = Max1; Min3 = Max2

6.5.8 Calibration weights 0, 1, 2, 3, 4 [calibrationWeight] and calibration digits [calibrationDigit] 0, 1, 2, 3, 4

The calibration weights with the associated calibration digits define the scale characteristic.

The calibration weights must be specified in ascending order. Normally, it is enough to calibrate the scale with two calibration points. Setting further calibration points is therefore optional.

Typically, calibration weight 0 = 0, because the calibration point 0 is normally set with the scale empty.

If a scale has been modified and the current content is known, this value can be entered and set as the calibration weight. A larger calibration weight 1 is then specified and set.

The calibration weights must be at least 5% of the nominal load of the scale and must differ from one another by an amount of at least 5% of the nominal load:

- Calibration weight 0 = 0 kg
- Calibration weight 1 = at least 5% of the nominal load of the scale
- Calibration weight 2 = at least 10% of the nominal load of the scale

The calibration digits are determined automatically by the calibration commands and assigned to the respective calibration weights. Therefore, the calibration digits do not have to be specified.

6.5.9 Scale interval for weighing range 1, 2, 3 [scaleIntervalWeighingRange]

Can be defined in accordance with the standard EN 45501 (0.0001 to 50). It defines the smallest indicated weight change and conforms to the accuracy of the overall system for scales requiring official calibration.

6.5.10 Initial zero-setting [initialZeroSetting]

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

Note

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

6.5.11 Initial zero-setting if tared [initialZeroSettingIfTared]

Defines whether initial zeroing in tared state of the scales is to be carried out.

6.5.12 Automatic zero tracking device [automaticZeroTracking]

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

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

Note

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

6.5.13 Tare device [subtractiveAdditiveTare]

Defines whether the scales work with additive or subtractive tare device.

Selection code	
0 (default)	Subtractive tare device
1	Additive tare device

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

With a subtractive tare device, a maximum of up to 100% of the maximum weighing range (see "Maximum tare load") can be tared.

With an additive tare device, a maximum of up to 250% of the maximum weighing range (see "Maximum tare load") can be tared. The load cells must satisfy the relevant requirements that have to be checked and proven in the certificate of compatibility.

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

With scales not requiring official calibration, this parameter is irrelevant and can be left at default.

Note

There is no automatic evaluation of whether there is sufficient load cell measuring range capacity for an additive tare. The plant constructor is responsible for this evaluation.

6.5.14 Enable Weight simulation [weightSimulationEnabled]

The electronic weighing system is tested without connected load cells. The simulated weight value is passed on completely in the electronic weighing system through all signal filters and functions. The response of the electronic weighing system can be traced exactly.

Selection code	
0 (default)	Weight simulation not enabled
1	Enable weight simulation

6.5.15 Automatic zero-setting device [automaticZeroSetting]

If the function is active, the electronic weighing system attempts zeroing if the following conditions are met:

- Stability 1 exists
- Gross weight was stable below zero for at least 5 seconds

The function is restricted by the parameter "Negative limit semi-automatic zero-setting device".

Selection code	
0	Automatic zero-setting off
1	Automatic zero-setting on

6.5.16 Weighing range data in SecureDisplay [weighingRangeDataInSecureDisplay]

In legal trade operation, the software version of the HMI device must be recorded so that it can be checked by an official verification officer.

6.5.17 Automatic zero tracking in dosing cycle [automaticZeroTrackingInCycle]

The parameter defines whether the zero tracking (if activated) is to be active only outside the automatic dosing cycle (only in weighing step 0) or also inside the dosing cycle.

6.5.18 Maximum Tare weight (% of max.) [maxTareWeight]

The parameter is specified as a percentage of the "Maximum weight" parameter. All tare values (semi-automatic, automatic, or preset tare) are checked for this limit and rejected if the limit is exceeded.

6.5.19 Initial zero-setting device limit negative (% of max.) [initialZeroSettingLimitNegative]

Requirement: The Initial zero-setting parameter is enabled.

Max. permissible negative deviation from the calibration zero point. The setting is made in % in reference to the maximum weight of the weighing range 1.

With scales requiring official calibration, the sum of the negative and positive limit value may not exceed 20%.

Example

Maximum weighing range = 100 kg
Maximum negative zeroing limit = 10%
→ Up to -10 kg (10% of 100 kg) can be set to zero by the function on power on.

See also

Initial zero-setting [initialZeroSetting] (Page 63)

6.5.20 Initial zero-setting device limit positive (% of max.) [initialZeroSettingLimitPositive]

Requirement: The Initial zero-setting parameter is enabled.

Max. permissible positive deviation from the calibration zero point if the "Initial zero-setting" function is used. The setting is made in % in reference to the maximum load of the weighing range 1.

With scales requiring official calibration, the sum of the negative and positive limit value may not exceed 20%.

Example

Maximum weighing range= 100 kg
Maximum positive zeroing limit = 10%
→ Up to 10 kg (10% of 100 kg) can be set to zero by the function on power on.

6.5.21 Semi-automatic zero-setting device limit negative (% of max.) [semiAutomaticZeroSettingLimitNegative]

Max. permissible negative deviation from the calibration zero point if the functions "Semi-automatic zero-setting“ (command 21), "Automatic zero-setting device" and "Zero tracking device" are used. The setting is made in % in reference to the maximum load of the weighing range 1.

With scales requiring official calibration, the sum of the negative and positive limit value may not exceed 4%.

Example

Max. weighing range = 100 kg

Maximum negative zeroing limit = 3%
→ Up to 3 kg (3% of 100 kg) can be set to zero by the zero setting functions.

6.5.22 Semi-automatic zero-setting device limit positive (% of max.) [semiAutomaticZeroSettingLimitPositive]

Max. permissible positive deviation from the calibration zero point if the functions "Semi-automatic zero-setting" (command 21), "Automatic zero-setting device" and "Zero tracking device" are used. The setting is made in % in reference to the maximum load of the weighing range 1.

With scales requiring official calibration, the sum of the negative and positive limit value may not exceed 4%.

Example

Maximum weighing range = 100 kg
Maximum negative zeroing limit = 1%
→ Up to 1 kg (1% of 100 kg) can be set to zero by the zero setting functions.

6.5.23 Stability monitoring

The electronic weighing system monitors the weight for stability and reports the stability weight via a status signal (stability 1 and 2). The stability monitoring is defined via the stability weight and a stability time. The electronic weighing system uses the stability status as follows:

- Stability 1: Must exist to start commands such as zeroing or taring.
- Stability 2: Must exist to start automatic log printing, perform tolerance checks or totaling the weight.

Stability 1 applies to dosing steps 0, 1, 5, and 6;

Stability 2 applies to the remaining dosing steps 2 to 4.

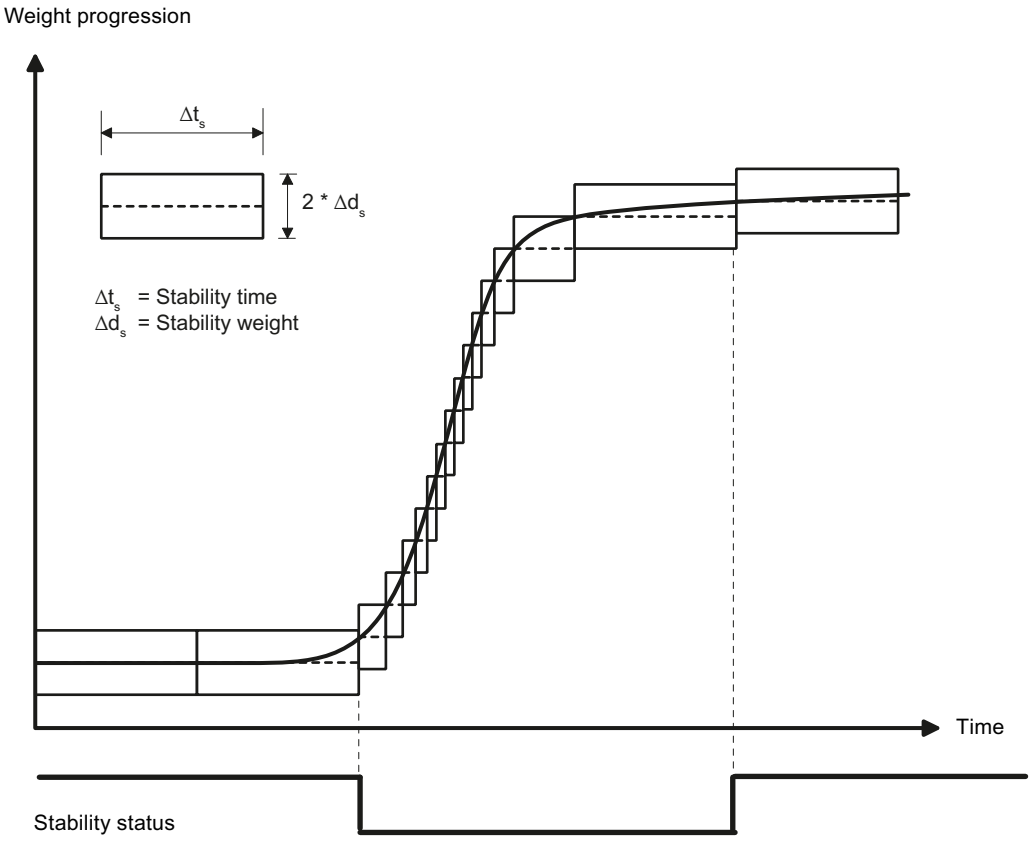


Figure 6-8 Stability monitoring

Stability weight 1 [stabilityWeight1]

The parameter defines the permissible deviation (+/-) by which the weight is allowed to fluctuate within the stability time to detect stability. The input is made in the unit of weight.

Stability time 1 (s) [stabilityTime1]

This parameter defines the time window in which the current weight value may fluctuate within the stability weight (+/-) to report stability.

Maximum waiting time for stability 1 (s) [maximumWaitingTimeStability1]

Defines a maximum waiting time for stability on start of a command which depends on stability. If the command could not be started during the waiting time due to a lack of stability, a technology message is generated by the electronic weighing system. If the parameter is set to 0 , a data/operating error is directly reported in the event of a lack of stability.

Delay time before stability 1 (s) [delayTimeBeforeStability1]

Defines a delay time which expires before a check for stability is performed.

Stability weight 2 [stabilityWeight2]

The parameter defines the permissible deviation (+/-) at which the weight is allowed to fluctuate within the stability time to detect stability. The input is made in the unit of weight.

Stability time 2 (s) [stabilityTime2]

Defines the time window in which the current weight value may fluctuate only within the stability weight (+/-) to report stability.

Maximum waiting time for stability 2 (s) [maximumWaitingTimeStability2]

This parameter defines a maximum waiting time for stability on start of a command which depends on stability. If the command could not be started during the waiting time due to a lack of stability, a technology message is generated by the electronic weighing system. If the parameter is set to 0 , a data/operating error is directly reported in the event of a lack of stability.

Delay time before stability 2 (s) [delayTimeBeforeStability2]

Defines a delay time which expires before a check for stability is performed. In the case of stability 2, this time can be used, for example, to slowly capture material still flowing after closing of the dosing elements.

6.5.24 Digital signal filters

Filter 1 [filter1Period] and 2 period[filter2Period]

Defines in seconds the periods of the filters 1 and 2 to selectively filter out interference frequencies.

If the period is set to 0.1 s, for example, this has a suppression effect on interference frequencies comprising multiples of 10 Hz. If no other interference frequencies are known apart from the local network frequencies, we recommend leaving both periods at the default value (0.1 s).

Characteristic low pass filter [characteristicLowPassFilter]

Defines the characteristic of the low-pass filter. You have the following choices:

Selection code	Characteristics
0	Critically dampened
1	Bessel

Ordinal number low pass filter [ordinalNumberLowPassFilter]

Defines the effect of damping.

Selection code	
2, 4, 6, 8 add 10	The higher the selected filter number, the higher the effect.
0	Filter deactivated

Cut-off frequency low pass filter [cutOffFrequencyLowPassFilter]

Defines the limit frequency in Hz of the low pass filter in the range from 0.05 to 200 Hz.

Period of dosing filter [dosingFilterPeriod]

Defines the period of the dosing filter in seconds. The dosing filter has an additional effect on the weight value during the coarse feed or fine feed. The period should be no longer than the duration of the fine dosing phase.

6.5.25 Operating mode [scaleOperatingMode]

Defines the weighing mode of the scales.

The following weighing modes are available:

Selection code	
0	NAWI - Non-automatic weighing instrument - Filling (Page 53)
1	NAWI - Non-automatic weighing instrument - Emptying (Page 54)
10	GFI - Gravimetric filling instrument (Page 55) - Filling
11	GFI - Gravimetric filling instrument (Page 55) - Emptying
20	CWI - Catchweighing instrument/ CW - Automatic check weigher - Filling (Page 55)
21	CWI - Catchweighing instrument/ CW - Automatic check weigher - Emptying (Page 56)
30	DTI Discontinuous totalizing automatic weighing instrument (Page 57) - Mode A
31	DTI Discontinuous totalizing automatic weighing instrument (Page 57) - Mode B
40	CW - Automatic check weigher (Page 58)

6.5.26 Totalization scale interval dt [TotalizationScaleIntervalDt]

This parameter defines the resolution of the totals 1 in DR30. In DTI mode, this parameter represents the totalization scale interval dt of the legal-for-trade total.

6.5.27 Minimum totalized load [minimumTotalizedLoad]

The parameter defines the minimum totalized load in THW mode.

6.5.28 SecureDisplay interface [legalDisplayInterface]

For legal-for-trade operation, the "SecureDisplay" software is used to display the legal-for-trade weight value. The parameter defines whether "SecureDisplay" communicates directly via the Ethernet port of the electronic weighing system or via the Ethernet port of the SIMATIC controller.

6.5.29 SecureDisplay version [secureDisplayVersion]

For applications requiring official calibration, the "SecureDisplay" software is used to display the calibratable weight value. The parameter defines the version of the "SecureDisplay" software that is running in the HMI device. If the version is not entered correctly, a weight value will not be output in "SecureDisplay", and the display stays in the "Start Up" step.

6.5.30 Smallest zoom factor of SecureDisplay (%) [smallestZoomFactorOfSecureDisplay]

The minimum display size defines the smallest zoom factor for the "SecureDisplay" calibratable display. If the parameter does not match the smallest zoom factor in the .xml file in the HMI device, "SecureDisplay" remains in the "StartUp "step and no weight value is output.

6.6 DR04 Calibration curve check

Calibration digits are calculated based on the parameters from DR10.

The theoretical calibration digits are compared with the measured calibration digits in DR03. The deviations are output in DR04 as percentages.

6.7 DR05 Tare and zero memory

Current preset-tare weight [presetTareWeight]

Current semi-automatic tare weight [semiAutomaticTareWeight]

Current initial zero-setting weight [initialZeroSettingWeight]

- If you have enabled initial zero-setting in DR03, the current weight is displayed after the supply voltage is switched on. Initial zero-setting [initialZeroSetting] (Page 63)

Current semi-automatic zero-setting weight [semiAutomaticZeroSettingWeight]

- If you have enabled the automatic zero-setting device in DR03, the current weight of the zero-setting device is displayed. Automatic zero tracking in dosing cycle [automaticZeroTrackingInCycle] (Page 65)

Current zero tracking weight [zeroTrackingWeight]

Dead load (calculated) [calculatedDeadLoad]

Theoretically calculated load of the scale construction or the empty scale.

See also

Commands (Page 111)

6.8 DR06 Configuration of limits

6.8.1 Reference (limits 1 and 2) [limitReference]

Defines the weight to which the limits 1 and 2 relate and the interpretation of the ON/OFF values.

Selection code	Interpretation of the ON/OFF values for limit 1 and limit 2 [limit1On] [limit2On] [limit1Off] [limit2Off]	Reference weight
0 (default)	% - in relation to maximum weighing range	Gross
1	% - in relation to maximum weighing range	Net
4	Absolute - in relation to maximum weighing range	Gross
5	Absolute - in relation to maximum weighing range	Net

Limit 1 and 2 ON value [limit1On] [limit2On]

Limit 1 and 2 OFF value [limit1Off] [limit2Off]

The ON/OFF values are interpreted depending on the set reference value.

For a percentage-based interpretation of limits, specify values between -200.0 and 200.0.

For an absolute interpretation, specify the ON/OFF values as absolute weight values.

6.8.2 Limit 3 - empty [emptyLimit]

This parameter defines the time starting from which the scale is empty. The unit is expressed either as a percentage of the maximum weight or in the weight unit depending on the "Limit reference" setting

Reference (limit 3 - empty) [emptyLimitReference]

Defines the weight to which limit 3 - empty [emptyLimit] relates and the interpretation of the limit value.

Selection code	Interpretation of Limit 3 - empty [emptyLimit]	Reference weight
2 (default)	% - in relation to maximum weighing range	Gross
3	% - in relation to maximum weighing range	Net
4	Absolute - in relation to maximum weighing range	Gross
5	Absolute - in relation to maximum weighing range	Net

6.8.3 Switch-on delay limit 3 (empty) (s) [delayTimeForEmptyLimit]

Switch-on delay limit 3 (empty) can be deliberately delayed by a delay time. This is helpful, for example, if the weight is undershot at the moment of opening when the scale is being emptied, which would cause Limit 3 to be fallen below already.

6.9 DR07 Interface parameters

6.9.1 Assignment DI.0, DI.1, DI.2, CI [functionDI0 to functionDI2] [functionCI]

Assign a command to each digital input (DI.0, DI.1, DI.2): → Commands (Page 112).

Use counter input CI optionally as a fourth digital input with its own reference potential.

Selection code **[functionDI0]** **[functionDI1]** **[functionDI2]** **[functionCI]**	**Function**
0 (default)	The input operates as highspeed counter.
1 … 32759	Command codes 1 to 32759 according to section Commands (Page 112). Triggered on transition from 0 → 1 at DI.x Example for command code 1121 → selection code = 1121
32760	Transition weighing step 0
32761	Transition weighing step 1
32762	Transition weighing step 2
32763	Transition weighing step 3
32764	Transition weighing step 4
32765	Transition weighing step 5
32766	Transition weighing step 6
32767	Transition weighing step 7
32768	No function assigned
32769 … 65527	Command codes 1 to 32759 (+32768) according to section Commands (Page 112). Triggered on transition from 1 → 0 at DI.x Example for command 1121 → selection code = 1121 + 32768 = 33889
65528	Transition weighing step 0 (inverted)
65529	Transition weighing step 1 (inverted)
65530	Transition weighing step 2 (inverted)
65531	Transition weighing step 3 (inverted)
65532	Transition weighing step 4 (inverted)
65533	Transition weighing step 5 (inverted)
65534	Transition weighing step 6 (inverted)
65535	Transition weighing step 7 (inverted)

6.9.2 Filtering DI.0, DI.1, DI.2 and CI

Specify the following values for filtering the digital inputs and the counter input:

Selection codes **Filter DI.0 [filterDI0]** **Filter DI.1 [filterDI1]** **Filter DI.2 [filterDI2]** **Filter CI [filterCI]**	**Function**
0 (default)	No filtering
1 … 2500 [0.1 ms]	Filtering from 0.1 to 250 ms

6.9.3 Assignment DQ.0, DQ.1, DQ.2

Selection code **[functionDQ0]** **[functionDQ1]** **[functionDQ2]**	**Function**
0 … 79	Corresponding bit of the scale status (see DR30)
80	Controlled via S7 I/O
81	Controlled via data record 18
100 … 179	Corresponding inverted bit of the scale status (see DR30)
255 (default)	Output deactivated
1000 … 1063	Corresponding operating error (see DR32)
1100 … 1163	Corresponding inverted operating error (see DR32)
2000 … 2063	Corresponding technology message (see DR32)
2100 … 2163	Corresponding inverted technology message (see DR32)
3000 … 3063	Corresponding data/operating error (see DR32)
3100 … 3163	Corresponding inverted data/operating error (see DR32)

See also

Commands (Page 111)

6.9.4 Reaction to CPU stop / failure [behaviourOnCPUStopOrFailure]

Selection code	**Function**
0 (default)	Active dosing is stopped
1	Active dosing is continued

6.9.5 Monitoring of digital outputs [monitoringOfDQ]

Selection code	Function
0	Monitoring inactive
1	Monitoring active

6.9.6 Reaction of digital outputs to a CPU stop / failure [behaviourOfDQOnCPUStopOrFailure]

Selection code	Function
0	Set substitute values
1	Retain function

6.9.7 Behavior of digital outputs on error [behaviourOfDQOnError]

Selection code	Function
0 (default)	Set substitute values
1	Retain function

6.9.8 Substitute value for DQ.0 to DQ.3 on error

An output is set in the event of a fault.

Selection code 0 is preset and resets the outputs in the event of a fault (operating error) or on a SIMATIC STOP.

Procedure

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.

1. Set the "DQ behavior on failure" parameter [behaviourOfDQOnError] to "Set substitute values": Selection code 0.
2. Assign substitute values for the event of an error or stop to the digital outputs (DQ.0, DQ.1 and DQ.2).

Selection code [substituteValueDQ0] [substituteValueDQ1] [substituteValueDQ2] [substituteValueDQ3]	Meaning
0 (default)	Switch off output
1	Switch on output

See also

Reaction to CPU stop / failure [behaviourOnCPUStopOrFailure] (Page 73)

6.9.9 Trace rate [traceRate]

Defines the trace rate of scale data in s.

Selection code	Function
0 (default)	Ring memory
1	Stop when memory is full

6.9.10 Subnet mask, IP address, gateway, device name

Default parameter values

Subnet mask [deviceSubNetMask]: 255.255.255.0

IP address [deviceIpAddress]: 192.168.0.21

Gateway [gateway]: 192.168.0.21

Device name [deviceName]: siwarex.wp351

6.9.11 Activate Modbus communication [activateModbusConnection1] [activateModbusConnection2]

Activates the Modbus TCP/IP protocol of the electronic weighing system.

Selection code	Modbus TCP/IP protocol connection 1/2
0 (default)	Deactivated
1	Activated

6.9.12 Modbus TCP Unit Identifier, port, SWAP options

The following options are available for the Modbus TCP/IP interface:

Selection code [modbusUnitIdentifier1]	Function
-1 (default)	Unit Identifier is not evaluated

Modbus TCP port connection [modbusPort]

Defines the port for the Modbus connections.

6.9.13 Byte/Word swap options [byteSwap16Bit] [byteSwap32Bit] [wordSwap32Bit]

Defines the format used for transfer over the Ethernet interface (MODBUS TCP IP).

6.9.14 RS485 protocol

Configures the serial interface RS485.

Selection code	Protocol
0 (default)	Deactivated

6.9.15 I/O process values 1 to 4 [ioProcessValue1 to ioProcessValue4]

You can transfer up to four selectable I/O process values from the electronic weighing system to the CPU cyclically via the I/O. The following I/O process values can be selected:

Table 6-2 Selection table for I/O process values 1, 2, 3 and 4

I/O process value	Selection code
No element is selected	0
Gross process weight 1	1
Net process weight 1	2
Tare process weight	3
Net weight	4
Gross / net weight x10 (legal-for-trade)	5
Gross weight	6
Tare weight (legal-for-trade)	7
Gross process weight 2	8
Net process weight 2	9
Unfiltered digit value	10
Digits filtered by F1	11
Digits filtered by F2	12

I/O process value	Selection code
Last net process weight	13
Last net weight [lastNetWeight]	14
Totalizer 2	15
Youngest protocol ID	16
Current dosing step / Number of dosings in continuous mode	17
Load cell impedance	19
Load cell signal voltage	20
Load cell sense voltage	21
Current fine weight	22
Current trailing weight	23
Current shut-off correction value	24
Remaining amount to be loaded	25
Total set point	26
Weighing cycle progress	27
Tolerance limit TH2 (weight unit)	28
Tolerance limit TH1 (weight unit)	29
Tolerance limit TL1 (weight unit)	30
Tolerance limit TL2 (weight unit)	31
Material flow rate	32
Totalizer 1 (high fraction)	33
Totalizer 1 (low fraction)	34
Current fine signal time	35
Operating error / Technology messages (Word 1)	39
Technology messages (Word 2-+3)	40
Data/operating error (Word 1) / Additional information	41
Data/operating error (Word 2+3)	42
Temperature internal / external	43

6.9.16 I/O process values 5 to 8 [ioProcessValue5 to ioProcessValue8]

You can transfer up to four selectable process values from the CPU to the electronic weighing system cyclically via the I/O. The following process values can be selected:

Selection code [ioProcessValue5 to ioProcessValue8]	Process values
0	Preset tare
1	Simulation weight
2	Weight offset
3	Weight correction factor

6.9.17 Event hardware interrupts 4 to 8 [hardwareInterrupt4 to hardwareInterrupt8]

1. Select the following defined events for up to five additional hardware interrupts [hardwareInterrupt4 to hardwareInterrupt8]:

Selection code [hardwareInterrupt4 to hardwar-eInterrupt8]	
0 ... 79	Scale status bits (see DR30)
100 ... 179	Scale status bits (see DR30) (inverted)
1000 ... 1063	Operating error (see DR32)
1100 ... 1163	Operating error (inverted) (see DR32)
2000 ... 2063	Technology messages (see DR32)
2100 ... 2163	Technology messages (inverted) (see DR32)
3000 ... 3063	Data/operating error (see DR32)
3100 ... 3163	Data/operating error (inverted) (see DR32)

2. Enable the hardware interrupts in the hardware configuration (Page 38).

6.9.18 Source for weight simulation [simulationSource]

Selection code	Process values
0	Simulation value from SIMATIC I/O
1	Simulation value from data record 16

6.10 DR09 Read out module information

Saves the firmware and hardware version of the electronic weighing system.

6.11 DR10 Load cell parameters

6.11.1 Load cell type [loadCellType]

Sets the connected load cell type.

Selection code	
0 (default)	Analog load cells

6.11.2 Connection technology [fourSixWireSensor]

Selection code	
0	4-wire load cell
1	6-wire load cell

6.11.3 Load cell manufacturer [loadCellManufacturer] and load cell order number [loadCellOrderNumber]

- To be able to identify load cells for service operations, enter the load cell manufacturer [loadCellManufacturer] and load cell order number [loadCellOrderNumber].

6.11.4 No. of mechanical support points [numberOfSupportPoints]

The parameter is required for automatic calculation of the scale characteristic curve (command 82).

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

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

Example

A tank is mounted on three load cells → Number of mechanical support points = 3

6.11.5 Averaged load cell characteristic (mV/V) [averagedCharacteristicValue]

The load cell characteristic value is required to correctly interpret the output voltage from the load cell. When Siemens WL series load cells are used, the exact characteristic value can be read from label on the cell. If the exact characteristic value of the utilized cell(s) is not available, a rounded value can also be specified. For scales with multiple load cells, the average of all load cells must be calculated and entered.

Example

Characteristic value according to load cell label = 2.018 mV/V
→ Characteristic value = 2.018 mV/V

If this exact value is not known, 2.0 mV/V could also be entered.

6.11.6 Nominal load of one single load cell [nominalLoadOfSingleLoadCell]

The nominal load is entered in the specified weight units The parameter is required for automatic calculation of the scale characteristic curve (command 82).

6.11.7 Power line frequency [powerLineFrequency]

The parameter defines the line frequency of the power supply grid. A selection between 50 Hz and 60 Hz can be made. By making the correct setting, interferences caused by the power supply grid can be better suppressed.

6.11.8 Using a power line filter [PowerLineFilterActivated]

Activates the line filter with selection code 1

Selection code	
0	Line filter deactivated
1	Line filter activated

6.11.9 External / internal sensor supply [internalExternalAdcSupply]

Activates the external supply of the load cell with selection code 1.

6.11.10 Impedance

Impedance reference (Ohm) [impedanceReference]

The impedance reference can be determined through command 907 after successful commissioning of the electronic weighing system. After this time, the electronic weighing system automatically monitors the current impedance with the reference value. When the maximum permitted deviation is violated, a corresponding bit (impedanceError) is set in the scale status.

Maximum impedance deviation (% of impedance reference) [maximumAllowedImpedanceDeviation]

This parameter defines the maximum permissible deviation of the currently measured impedance as compared to the reference impedance. It is specified as percentage in relation to the impedance reference value.

6.12 DR15 Preset tare

Procedure for Web server and Modbus TCP

1. Read DR15.
2. Enter the preset tare in DR15.

3. Write DR15.
4. Activate the current preset tare value with an "Activate preset tare from DR15 (1013)" command.

TIA Portal procedure

1. Activate service mode: Command code 1.
2. Read DR07: Command code 2007.
3. Define an I/O process value [ioProcessValue5 to ioProcessValue8] as "Preset tare": Selection code 0.
4. Write DR07: Command code 4007.
5. Enter the preset tare for the I/O process value selected in DR07 in the "cyclicIoData > output" structure in the interface DB.
6. Activate the preset tare: Command code 1016.

6.13 DR16 Configuration of weight simulation

6.13.1 Simulate weight

Introduction

The electronic weighing system is tested without connected load cells. The simulated weight value is passed on completely in the electronic weighing system through all signal filters and functions. The response of the electronic weighing system can be traced exactly.

Requirement

Dosing time = 0

Web server procedure

1. Select the "Service mode ON (1)" command.
2. Read DR03.
3. Enable the weight simulation in DR03.
4. Write DR03.
5. Read DR07.
6. Select the simulation weight source in DR07: Simulation weight from DR16.
7. Write DR07.
8. Select the "Service mode OFF (2)" command.

9. Read DR16.
10. in DR16, enter a simulation weight in the measuring range of the scale.
11. Write DR16.
12. Start the simulation using the "Weight simulation ON (3)" command.
    ⇒ The notice "SIMULATION" is shown on the main display and a status bit is set.
    ⇒ From the start of simulation onward, all configured limits and interfaces refer to the simulation weight.
13. Stop the simulation using the "Weight simulation OFF (4)" command.

TIA Portal procedure

1. Activate service mode: Command code 1.
2. Read DR03: Command code 2003.
3. Enable the weight simulation [weightSimulationEnabled] in DR03: Selection code 1.
4. Write DR03: Command code 4003.
5. Read DR07: Command code 2007.
6. Assign the "simulation weight" function to the I/O process value 5, 6, 7 or 8 [ioProcessValue5 to ioProcessValue8]: Selection code 1.
7. Write DR07: Command code 4007.
8. Deactivate service mode: Command code 2.
9. Enter the simulation weight for the I/O process value selected in DR07 in the "cyclicIoData > output" structure in the interface DB.
10. Start simulation mode: Command code 3.
    ⇒ The notice "SIMULATION" is shown on the main display and a status bit is set.
    ⇒ From the start of simulation onward, all configured limits and interfaces refer to the simulation weight.
11. Stop simulation mode: Command code 4.

6.13.2 Simulating dosing

Introduction

When you specify a dosing time, a dosing cycle is simulated completely automatically. When you specify an emptying time, emptying of the scale is simulated completely automatically.

Example of dosing time

A dosing time of 4.5 ms and a set point of 100 kg has the result that the dosing cycle reaches a set point of 100 kg in a linear manner within 4.5 ms.

Example of emptying time

An emptying time of 1 s has the result with enabled simulation (DR03) that emptying at the end of an automatic dosing cycle is simulated within 1 s. Simulation takes place linearly from the dosed weight down to 0 weight units.

Requirement

You have configured a set point (Page 86).

Web server procedure

1. Select the "Service mode ON (1)" command.
2. Read DR03.
3. Enable the weight simulation in DR03.
4. Write DR03.
5. Select the "Service mode OFF (2)" command.
6. Read DR16.
7. Enter a maximum simulation dosing time and simulation emptying time in seconds in DR16.
8. Write DR16.
9. Start the simulation using the "Weight simulation ON (3)" command.
10. Start the dosing with the command "Start single weighing (1101)" or "Start continuous mode (1103)".
11. When you change parameters in simulation mode, start the "Simulation ON (3)" command again.
    ⇒ Parameter changes take effect.
12. Stop the simulation using the "Weight simulation OFF (4)" command.

6.13.3 Material flow, delay time and opening/closing time

Note

Transferring parameter changes

When you change parameters in simulation mode, start the "Simulation ON (3)" command again.

⇒ Parameter changes take effect.

Extra coarse/coarse/fine/empyting material flow

An explicit material flow can be specified for simulation for each phase of a dosing operation. Make sure to specify the correct sign.

Extra coarse/coarse/fine/empyting delay time

Delay time until the respective material flow is activated or deactivated by switch-on/switch-off.

Extra coarse/coarse/fine/empyting opening/closing time

Duration until the respective material flow is fully established or terminated.

6.14 DR18 Digital output and transition control

6.14.1 Controlling digital outputs

Introduction

Digital outputs 0 to 3 can be controlled using DR18 with this parameter. For example, you can control the digital outputs during commissioning.

The set values are not saved in non-volatile memory!

Web server procedure

1. Select the "Service mode ON (1)" command.
2. Read DR07.
3. In DR07, assign a function to each digital output.
   Assignment DQ.0, DQ.1, DQ.2 (Page 73)
4. Write DR07.
5. Select the "Service mode OFF (2)" command.
6. Read DR18.
7. Activate one to three digital outputs in DR18: Control value DQ.0, DQ.1 and DQ.2.
8. Write DR18.

TIA Portal procedure

1. Activate service mode: Command code 1.
2. Read DR07: Command code 2007.
3. In DR07, assign the "Control from SIMATIC" function to each digital output.
   Assignment DQ.0, DQ.1, DQ.2 (Page 73)
4. Write DR07: Command code 4007.

5. Deactivate service mode: Command code 2.
6. Control one to three digital outputs in the "cyclicIoData" structure:
   Selection code 0 activates DQ.0.
   Selection code 1 activates DQ.1.
   Selection code 2 activates DQ.2.

6.14.2 Enabling transitions

Introduction

When you do not want automatic passage from weighing step to weighing step, activate one or more transitions.

The transitions are not saved in non-volatile memory!

Web server procedure

1. Read DR18.
2. In DR18, enable the transition for the desired weighing steps.
3. Write DR18.

TIA Portal procedure

1. In the "cyclicIoData > output > transitions" structure of the interface DB, enable the transition for the desired weighing steps [weighingStep0 to weighingStep7]: Selection code 1.

Result

When one transition is enabled per weighing step, the weighing step is paused until you disable the transition.

Example

You have enabled the transition for weighing step 2. Once dosing starts, weighing step 1 is performed. The electronic weighing system then jumps to weighing step 2 but does not yet execute it. The electronic weighing system outputs the status bit "Step blocked" in DR30. Step 2 is not performed until you reset the "Transition for weighing step 2" status bit.

As an alternative to setting transitions via software, the digital inputs of the electronic weighing system can also be configured with transitions for the individual weighing steps. In this way, a 24 V DC signal can be used to disable or enable individual weighing steps.

See also

TIA Portal user program (Page 38)

6.15 DR20 Configuration of set point [setPoint]

Introduction

The set point in "CW - Automatic check weigher" defines the reference weight of an individual dosing to be checked with the defined weight unit (Page 59).

Procedure

1. Enter the set point [setPoint] in DR20.
   The set point is smaller than the maximum permissible set point (Page 98) from DR25.
2. Write DR20.

6.16 DR21 Configuration of total set point [totalSetPoint]

6.16.1 DR21 Configuration of total set point in DTI

Introduction

The total set point in "DTI - Discontinuous totalizing automatic weighing instruments" specifies the total weight to be loaded with the defined weight unit (Page 59).

Material in feed intake (pre-signal) [materialDisposed]

Specifies the material weight in the feed intake to the scale with the defined weight unit.

Maximum allowed total set point undercut [maxTotalSetPointDeviation]

Defines the maximum permissible underrun of the total weight to be loaded with the defined weight unit.

Requirement

You have selected the weighing operating mode DTI Discontinuous totalizing automatic weighing instrument (Page 57).

Procedure

1. Read DR21.
2. In DR21, define the following parameters with the defined weight unit:
   - **Total set point** [totalSetPoint]
     When you specify a total set point during continuous operation which is smaller than the weighing operations already carried out, continuous operation is stopped following the current weighing operation.
     When you set the total set point to 0, all single loadings are cumulated until you end continuous operation.
   - **Maximum allowed total set point undercut** [maxTotalSetPointDeviation]
   - **Material in feed intake (pre-signal)** [materialDisposed]
3. Write DR21.

6.16.2 DR21 Configuration of total set point GFI

Introduction

The total set point in "GFI - Gravimetric filling instrument" defines the number of containers to be dosed in continuous operation.

Requirement

You have selected the weighing operating mode GFI - Gravimetric filling instrument (Page 55).

Procedure

1. Read DR21.
2. Enter the total set point [totalSetPoint] in DR21.
3. Write DR21.

Example

For example, if you specify a total set point of 20 and have started continuous operation, the electronic weighing system doses 20 containers one after the other. Continuous operation is stopped after the 20th container. The "Loading finished" status bit is set in the scale status. If continuous operation is switched off in the interim or an active dosing is aborted, the counter is restarted.

See also

CWI - Catchweighing instrument / CW - Automatic check weigher (Page 55)

6.17 DR22 Tolerance parameters

6.17.1 Overview

In DR22, you specify the tolerance limits that are to be used in a tolerance check by the electronic weighing system. You can define two tolerance bands around the set point. After the tolerance check, the result of the check is available in the scale status.

The tolerance limits around the set point are as follows:

- TH 2
- TH 1
- SET POINT (DS 20)
- TL 1
- TL 2

Example: TH2 & TL2 is defined with 2 kg. TH1 & TL1 is defined with 1 kg.

When the weight was dosed with an accuracy of +/- 1 kg around the specified set point, dosing is evaluated with "Good". If the final weight differs by more than +/- 2 kg from the specified set point, the tolerance check returns "Bad".

You also define the reaction of the scale to a tolerance error in DR22.

6.17.2 Parameter relation [parameterRelation]

The parameters define how you interpret the specified tolerance limits TH2, TH1, TL1 and TL2. The following options are available:

Selection code	Meaning
0 (default)	The tolerance limits are interpreted as percentages of the set point in DR20.
1	The tolerance limits are interpreted as absolute weight values
2	The tolerance limits are calculated based on OIML R61 "Limits of error on verification Class X1".
3	The tolerance limits are calculated based on OIML R61 "Maximum permissible errors in service Class X1".

In general, the currently valid tolerance limits in DR30 are output in the weight unit. When you select selection codes 2 and 3, the tolerance limits TH2, TH1, TL1 and TL2 entered in DR22 are ignored. The limits are calculated automatically in accordance with the OIML directive.

6.17.3 Tolerance limit TH2 (weight unit) [toleranceLimitTh2]

This parameter defines the limit of the second tolerance band above the set point. The setting conforms to the selected tolerance reference (percentage or absolute) and must be greater than or equal to tolerance limit TH1.

6.17.4 Tolerance limit TH1 (weight unit) [toleranceLimitTh1]

This parameter defines the limit of the first tolerance band above the set point. The setting conforms to the selected tolerance reference (percentage or absolute) and must be less than or equal to tolerance limit TH2.

6.17.5 Tolerance limit TL1 (weight unit) [toleranceLimitTl1]

This parameter defines the limit of the first tolerance band below the set point. The setting conforms to the selected tolerance reference (percentage or absolute) and must be less than or equal to tolerance limit TL2 as a positive value.

6.17.6 Tolerance limit TL2 (weight unit) [toleranceLimitTl2]

This parameter defines the limit of the first tolerance band below the set point. The setting conforms to the selected tolerance reference (percentage or absolute) and must be greater than or equal to tolerance limit TL1 as a positive value.

6.17.7 Behavior in case of TH1 error [behaviorTh1Violated]

The parameter defines the module response following a tolerance error of class "Greater than TO1". The following options are available:

0: Weighing cycle is not stopped and is always completed with "Weighing cycle finished".

1: Weighing cycle is stopped. Check the tolerance again using the "Continue" command (code 1141). The cycle is subsequently always completed with "Dosing completed".

2: Weighing cycle is stopped. Check the tolerance again using the "Continue" command (code 1141). If a tolerance error is still present, the weighing cycle is stopped again. This procedure is repeated until the tolerance error is eliminated (e.g. by manually removing material).

6.17.8 Behavior in case of TL1 error [behaviorTl1Violated]

The parameter defines the module response following a tolerance error of class "Less than TU1". The following options are available:

0: Weighing cycle is not stopped and is always completed with "Dosing completed".

1: Weighing cycle is stopped. Check the tolerance again using the "Continue" command (code 1141). The cycle is subsequently always completed with "Dosing completed".

2: Weighing cycle is stopped. Check the tolerance again using the "Continue" command (code 1141). If a tolerance error is still present, the weighing cycle is stopped again. This procedure is repeated until the tolerance error is eliminated (e.g. by manually adding material).

3: Post-dosing with continuous fine signal. Switch the "Fine signal" on continuously until TU1 is exceeded. The tolerance check is performed again and the weighing cycle is completed with "Dosing completed" as long as a tolerance error is no longer present.

4: Post-dosing with pulsing. "Fine signal" is switched on in pulsing mode until TL1 is exceeded. The tolerance check is performed again and the weighing cycle is completed with "Dosing completed" as long as a tolerance error is no longer present. The pulse/pause ratio in pulsing mode is defined by the pulse duration (DR22) and the sum of "Stability time 2 + deceleration time before stability 2" (DR3). This total corresponds to the pause time.

6.17.9 Pulse duration for pulse post dosing (s) [pulseDuration]

This parameter defines how long the fine signal is switched on when post-dosing in pulsing mode was set as the response to a TL1 violation in the tolerance check (selection code 4). The pause time in pulsing mode corresponds to the total of "Stability time 2 + delay time before stability 2" (DR3).4: Post-dosing with pulsing. "Fine signal" is switched on in pulsing mode until TL1 is exceeded. The tolerance check is performed again and the weighing cycle is completed with "Dosing completed" as long as a tolerance error is no longer present. The pulse/pause ratio in pulsing mode is defined by the pulse duration (DR22) and the sum of "Stability time 2 + deceleration time before stability 2" (DR3). This total corresponds to the pause time.

As of firmware V2.x, the electronic weighing system offers the commands "1135" and "1136". The commands are triggered in the stopped weighing cycle or outside the weighing cycle. For both commands the duration of the pulse time is set for the respective dosing signal.

6.17.10 Number of unchecked weighing cycles [cyclesWithoutCheck]

This parameter defines how many dosing cycles will not be checked for tolerance during continuous operation in GFI mode. The first dosing cycle of the continuous operation is always checked for tolerance, however. The discontinuation of the check(s) starts only after a dosing with "Good" tolerance has been determined. Dosings that are not checked for tolerance are classified as "GOOD" in the statistics (DR 39).

Note

Unchecked dosing cycles

In unchecked cycles, there is no adjustment of the shut-off points by the proportional controller.

Every dosing that is not checked is classified as "Good" in the statistics and the specified set point (DS 20) is used in calculating the statistics.

6.17.11 Capture of weighings into statistics [statisticsData]

Defines, based on the tolerance evaluation, which dosing results are to be included in the statistics calculation.

Selection code	Meaning
0 (default)	All dosings (with tolerance check) are included following "Dosing completed" in the calculated statistics.
1	Dosings (with tolerance check) of "GOOD" class are included following "Dosing completed" in the calculated statistics.
2	Dosings (with tolerance check) of "BAD" class are not included following "Dosing completed" in the calculated statistics.

6.18 DR23 Material parameters

6.18.1 Parameter relation [parameterRelation]

The parameter defines how the specifications for the fine weight and trailing weight are to be interpreted. The following options are available for selection:

Selection code	Meaning
0 (default)	Fine and trailing weights are interpreted as specified percentages of the set point (DS 20).
1	Fine and trailing weights are interpreted as absolute weights in the weight unit.

6.18.2 Fine weight [fineWeight]

Defines how much material is to be dosed only in the fine dosing phase. Depending on the selected unit reference (DR23), the value must be interpreted as a percentage of the set point (DR20) or as an absolute weight value.

Example:

Set point (DR20) = 100 kg

Selection code for parameter relation (DR 23) = 0

Fine value (DR 23) = 20

→ As a result of this setting, 20 kg (20% of 100 kg) is dosed with fine flow only.

6.18.3 Trailing weight fine [trailingWeightFine]

This parameter defines how much material still flows onto the scale after the fine signal is shut off. Depending on the selected unit reference (DR23), the value must be interpreted as a percentage of the set point (DR20) or as an absolute weight value.

Example

Set point (DR20) = 100 kg

Selection code for parameter relation (DR 23) = 0

Fine weight (DR 23) = 5

Trailing weight (DR 23) = 2

→ With this setting, it is assumed during dosing that 2 kg (2% of 100 kg) still flows onto the scale after the fine signal is shut off.

In the example, this means specifically that the coarse and final signal are switched at the start of the dosing. When 93 kg is reached, the coarse signal is shut off; when 98 kg is reached, the fine signal is shut off. The following graphic explains the relationship.

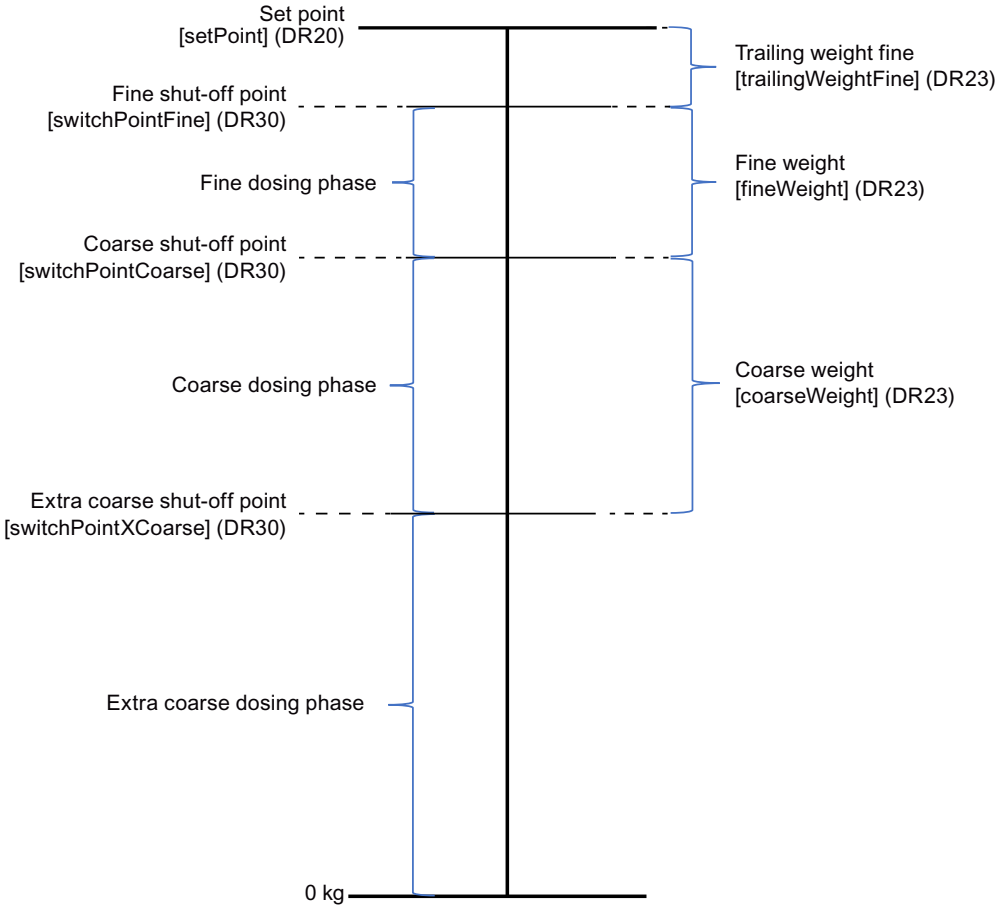


Figure 6-9 Trailing weight

The shut-off points for the fine and coarse signals are corrected or optimized automatically during operation when the controller is activated (DR 24). The fine and trailing weights currently

used by the electronic weighing system can be seen in DR30 (always expressed in DR30 in the weight unit).

6.18.4 Coarse weight [coarseWeight]

Relevant with dosing in three dosing steps (extra coarse, coarse and fine). In the case of classic coarse or fine dosing, the coarse weight remains at 0 (default setting). As soon as a value is specified, the shut-off points are calculated for the three dosing phases. Depending on the selected unit reference, the value must be interpreted as a percentage of the set point (DR20) or as an absolute weight value.

6.18.5 Trailing weight coarse [trailingWeightCoarse]

The parameter defines how much material still flows onto the scale after the coarse signal is shut off. Depending on the selected unit reference (DR23), the value must be interpreted as a percentage of the set point (DR20) or as an absolute weight value.

When dosing in DTI mode only takes place via coarse flow or via coarse flow with activated fine flow, the set weight of the single filling - coarse trailing weight represents the shut-off point of the coarse or fine flow.

In all other weighing operating modes, the parameter can be used as limit for the fine signal time controller. If the controller adjusts a fine weight that is less than the set coarse trailing weight, control is suspended, and the electronic weighing system issues a corresponding technology message.

6.18.6 Trailing weight extra coarse [trailingWeightXCoarse]

Defines how much material still flows onto the scale after the extra coarse signal is shut off. Depending on the selected unit reference (DR23), the value must be interpreted as a percentage of the set point (DR20) or as an absolute weight value.

6.18.7 Blocking time extra coarse (s) [blockingTimeXCoarse]

Defines a timer that begins at the start of three-stage dosing (with extra coarse, coarse and fine phase). While the timer is active, the electronic weighing system does not perform a check to determine whether the extra coarse shut-off point has been reached. At the start of dosing, the "coarse" and "fine" dosing signals are usually set simultaneously. The material may strike the scale hard, producing an overshoot that is higher than the extra coarse shut-off point, which would cause the extra coarse signal to be shut off too early. To prevent this premature shut-off, the "Blocking time extra coarse" can be defined in seconds.

6.18.8 Blocking time coarse signal (s) [blockingTimeCoarse]

This parameter defines a timer that starts when the coarse signal is switched. While the timer is active, the electronic weighing system does not perform a check to determine whether the coarse shut-off point has been reached.

At the start of dosing, the "coarse" and "fine" dosing signals are usually set simultaneously. The material may strike the scale hard, producing an overshoot that is higher than the coarse shut-off point, which would cause the coarse signal to be shut off too early. To prevent this premature shut-off, the "Blocking time coarse signal" can be defined.

6.18.9 Blocking time fine signal (s) [blockingTimeFine]

This parameter defines a timer that starts when the coarse signal is shut off. While the timer is active, the electronic weighing system does not perform a check to determine whether the fine shut-off point has been reached.

When the coarse signal is shut off, this may produce an overshoot that can be higher than the fine shut-off point, which would cause the fine signal to be shut off too early. To prevent this premature shut-off, the "Blocking time fine signal" can be defined.

6.18.10 Blocking time discharging (s) [blockingTimeDischarge]

Defines a timer that starts when the discharge signal is shut off. As long as the timer is active, the electronic weighing system does not perform a check to determine whether the dosing signals have been shut off. When the discharge signal is shut off, this can result in an overshoot that is higher than the coarse or fine shut-off point, for example. To prevent this premature shut-off, the "Blocking time discharging" can be defined in seconds.

6.18.11 External triggered blocking time (s) [externalBlockingTime]

Defines a timer that can be started by the user with command 1151. While the timer is active, the weight value is completely ignored by the electronic weighing system. In this way, significant foreseeable errors can be simply hidden. Using command 1152, the timer can also be stopped early before the specified time has elapsed. The "Blocking time active" status bit in the scale status shows whether a blocking time is currently active or not.

6.18.12 Shut-off correction weight [shutOffCorrectionWeight]

This parameter enables influences that occur during dosing (e.g. overpressure or underpressure) to be taken into account in determining when the set point weight is reached. The setting conforms to the "Parameter relation" setting and can thus be an absolute weight or a percentage of the set point. The shut-off correction weight currently in effect is always output in DR30 Read out process state (Page 103) in the weight unit.

6.18.13 Minimum material flow (weight/s) [minimumMaterialFlowRate]

The material flow is constantly being measured. The sign of the material flow is always positive for the selected weighing application.

Example: You have selected the weighing application "Non-automatic weighing instrument – Removal". In case of weight gain, the material flow gets a negative sign.

As soon as the determined material flow exceeds the limit, this violation is visible in the status display. Only one positive limit can be specified. A default of "0" permanently deactivates the status display.

6.19 DR24 Controller parameters

6.19.1 Parameter relation [parameterRelation]

This parameter defines the unit in which the "Maximum corrective action" and "Controller deadband - upper/lower limit" parameters (DR 24) must be interpreted. The following options are available:

Selection code	Meaning
0 (default)	"Maximum corrective action" and "Controller deadband - upper/lower limit" are interpreted as a percentage of the set point (DS 20).
1	"Maximum corrective action" and "Controller deadband - upper/lower limit" are interpreted in the weight unit.

6.19.2 Type of controller [controllerType]

A proportional controller and a fine time controller are available for optimization of the shut-off points.

Selection code	Meaning
0	No controller
1 (default)	Proportional controller without fine time controller
2	Proportional controller with fine time controller
3	Fine time controller without proportional controller

Note

Stop weighing cycle

If a weighing cycle has been stopped by a Stop command in the meantime, there is no corrective action by the controller for this dosing. The controller becomes active only for completed and checked cycles.

Note

Blocking time error

If blocking time errors occur in two consecutive dosing operations, the shut-off points of the next dosing are reset. The shut-off points are automatically reset to the values currently entered in DR 23. In addition, the module outputs the technology message "TM 2119 – Shut-off points reset due to blocking time error".

6.19.3 Control factor of proportional controller (%) [controlFactorPController]

When proportional controller is activated, its control factor can be defined. The parameter is specified as a percent.

6.19.4 Control factor of fine time controller (%) [controlFactorTController]

The controller changes the coarse shut-off point by changing the fine weight.

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

- F_n Fine weight for current weighing
- F_{n+1} Fine weight of next weighing
- K Control factor for fine time controller
- D_{Fine} Material flow at time fine signal was switched off
- t_{Diff} Control deviation

6.19.5 Max. control access of proportional controller [maximumControllAccessPController]

When proportional controller is activated, the maximum possible correction of the shut-off points by the controller can be defined. Depending on the "Parameter relation" setting (DR 24), the value must be specified and interpreted as a percentage of the set point (DR 20) or as an absolute weight value.

6.19.6 Proportional controller deadband - upper limit [deadBandPControllerPlus]

When proportional controller is activated, a deadband for the controller can be defined. If the achieved final weight of a dosing (with check) is below the upper limit of the deadband, the controller does not correct the shut-off points. If both limits are at zero, the controller corrects after each checked dosing.

6.19.7 Proportional controller deadband - lower limit [deadBandPControllerMinus]

When proportional controller is activated, a deadband for the controller can be defined. If the achieved final weight of a dosing (with check) is above the lower limit of the deadband, the controller does not correct the shut-off points. If both limits are at zero, the controller corrects after each checked dosing.

6.19.8 Controller behavior in case of exceeding max. control access [controllerErrorBehavior]

This parameter defines the controller behavior when the maximum corrective action (DR 24) is exceeded in a cycle. The following options are available:

Selection code	Meaning
0	Control is discontinued for this cycle.
1 (default)	The controller controls with the maximum corrective action (DR 24).

6.19.9 Intervention of fine time controller [interventionTController]

This parameter defines the controller behavior in continuous operation.

Selection code	Meaning
0 (default)	Control only in checked weighing cycles
1	Controller works in any weighing cycle

6.19.10 Set point fine time controller (s) [setPointTController]

If the fine time controller was activated (see type of controller), the desired duration of the fine signal can be set.

The fine time controller optimizes the duration of the fine signal by adjusting the fine weight and thus the coarse flow shut-off point. The shut-off point is adjusted so that the actual duration of the fine signal corresponds to the default value in settled state. The control deviation is determined after fine dosing:

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

t_{Diff} Control deviation (s)
t_{Set} Fine set time (s) (= default)
t_{actual} Fine actual time (s)

The setpoint for the fine time is specified by the user.

6.19.11 Adopt corrected fine-/trailing values to DR23 automatically [adoptCorrectedValues]

At the initial start of a dosing with "Material A", the electronic weighing system calculates the shut-off points for the coarse/fine signal according to settings from DR23 (fine/trailing weight).

If the P-controller is active, the fine/trailing weight of "Material A" internally (DR30 or DR31) is corrected or optimized by the controller during operation if necessary.

If there is now a change to "Material B" that entails different parameters, the corrected fine/ trailing weight of "Material A" would have to be read from DR30 or DR31 and copied to DR23 before the change so that, at the next loading of "Material A", the optimized values would be used directly at the start.

To automate this copying, the "Adopt corrected fine/trailing value to DR 23 automatically" parameter can be set to "YES" or "1".

6.19.12 Max. control access of fine time controller [maximumControllAccessTController]

With activated fine time controller you can define to what maximum extent the fine weight can be adjusted. Depending on the "Parameter relation" setting (DR 24), the value must be specified and interpreted as a percentage of the setpoint (DR 20) or as an absolute weight value.

6.20 DR25 Dosing system parameters

6.20.1 Maximum single set point [maximumSingleSetPoint]

This parameter limits the set point in DR 20 and thus defines the maximum capacity of the scale. The setting must be less than or equal to the maximum weight (DR 3).

6.20.2 Minimum automatic tare weight (% of max.) [minimumAutomaticTareWeight]

This parameter defines a minimum weight that must be tared at the start of dosing. It applies only when a dosing start with taring is set in DR 25.

The parameter can be used to prevent dosing from being started even though, for example, no empty container is on the scale. In this case, the minimum tare weight should correspond to the empty weight of the container to be filled.

6.20.3 Maximum automatic tare weight (% of max.) [maximumAutomaticTareWeight]

This parameter defines a maximum weight that may be tared at the start of dosing; it applies only when a dosing start with taring is set in DR25.

The parameter can be used to prevent overfilling an already prefilled container.

6.20.4 Maximum weighing time (s) [maximumDosingTime]

This parameter represents a timer that is started at the start of an automatic dosing cycle. If the dosing cycle has not yet finished after expiration of the timer, the electronic weighing system outputs a corresponding technology message that has no further effect on the running dosing cycle. The message serves only as information for the operator.

6.20.5 Weighing start options [startOptions]

This parameter defines the first action of an automatic dosing cycle to be executed (weighing step 1). The following options are available:

Selection code	Meaning
0	The dosing starts directly without zero setting or taring
1	The electronic weighing system sets the scale to zero and then starts the dosing process
2 (default)	The electronic weighing system tares the scale and then starts the dosing process
3	The electronic weighing system tares the scale using the preset tare from DR15 and then starts the dosing process
4	The electronic weighing system tares the scale using the preset tare from the SIMATIC I/O and then starts the dosing process
5	The electronic weighing system performs taring using an averaged tare value

6.20.6 Cycle time for automatic zero setting (s) [cycleTimeAutomaticZeroSetting]

This parameter can be used to define a time after which zero setting or taring must have occurred. When "OIML" is set in DR 3, a zero setting/taring occurs at the latest as defined in the regulations. Dependent on the maximum time setting

6.20.7 Number of weighings without automatic taring/zero setting [numberOfCyclesWithoutZeroSetting]

This parameter defines a number of dosing cycles that are not zeroed or tared. It applies only during continuous operation. The first cycle of the continuous operation is always zeroed or tared (if configured for "Dosing start").

6.20.8 Check stop [checkStopAfterStep0 to checkStopAfterStep7]

This parameter enables, in contrast to transitions, the dosing cycle to be stopped after each individual weighing step. By setting bits 0 … 7, corresponding check stops are set for weighing steps 0 … 7. In addition, the "Activate check stop (1122)" command must be issued in order to stop the cycle at the first set check stop point.

Example:

- The check stop bits are set for weighing steps 1 and 2 and DR25 is transmitted to the electronic weighing system.
  The "Activate check stop (1122)" command is issued.
  → The "Check stop follows" bit is set in the AWI Status.
- Dosing is started (single dosing or continuous operation)
  → After weighing step 1 is complete, the electronic weighing system jumps to the "Stopped" state. The "Check stop active" bit is set in the AWI status. The "Check stop follows" bit is reset.
- The "Activate check stop (1122)" command notifies the electronic weighing system to stop again at the next check stop point.
  → The "Check stop follows" bit is set again in the AWI status.
- The "Continue weighing cycle (1141)" command continues the dosing cycle.
  → After weighing step 2 is complete, the electronic weighing system jumps to "Stopped" state. The "Check stop active" bit is set in the AWI status. The "Check stop follows" bit is reset.
- Because no other check stop points were defined, the dosing cycle is performed after "Continue weighing (1141)" to the end.

6.20.9 Automatic discharging [dischargeMode]

This parameter defines whether and in which form the scale is to be emptied by the electronic weighing system at the end of an automatic weighing cycle. The following options are available:

Selection code	Meaning
0 (default)	No emptying. After a tolerance check (if the weighing cycle is checked), the electronic weighing system ends the weighing cycle and jumps to weighing step 0.
1	Empty until limit 3 is fallen below. The electronic weighing system sets the "Discharge" bit (which can be placed directly on one of the digital outputs) until the gross weight falls below limit 3 (defined in DR6) and then resets the bit.
2	Empty according to specified time. The electronic weighing system sets the "Discharge" bit (which can be placed directly on one of the digital outputs) based on the discharge time specified in DR25 and then resets the bit automatically – regardless of whether or not the scale was completely emptied during this time!

Note

In DTI mode, the emptying step is always executed and cannot be deactivated. The selection codes 0 and 1 are both interpreted as "Empty until limit 3 is fallen below" in DTI mode.

6.20.10 Discharge time (s) [dischargeTime]

The parameter defines a fixed time during which the emptying signal is activated in the emptying step. It applies only when selection code 2 (Emptying according to specified time) is selected as the emptying option in DR25.

In DTI mode, the parameter has an additional function. If a residual quantity of the material is located in the weighing container that is less than the emptying limit (DR6) and no additional material flows, loading can be stopped with the "Rest weighing" command. In this configuration the emptying signal for the set emptying time is activated, even if the scale is emptied in normal operation until limit 3 is undershot (empty). The material located in the scale at this time is totaled, emptied and loading is stopped.

6.20.11 Maximum discharge time (s) [dischargeMonitoringTime]

This parameter defines a monitoring time for emptying option 1 in DR 25 (Emptying until limit 3 is fallen below). The time starts together with the emptying signal. If limit 3 has not yet been fallen below after expiration of the time, a corresponding technology message is issued that has no further effect on the weighing cycle or emptying. The message is purely informative.

6.20.12 Discharge overlapping time [dischargeOverlappingTime]

If the scale is emptied over time, the next dosing cycle can already be started with the discharge overlapping time even though the discharge time is still running.

Example

Discharge time = 0.8 s

Discharge overlapping time = 0.3 s

After 0.5 s of the discharge time, the next dosing cycle is started even though emptying will still take place for another 0.3 s.

6.20.13 No. of optimized loadings (OIML R-107) [NumberOfOptimizedLoadings]

The parameter defines whether and how many single fillings are to be made at the end of loading in THW mode definitive with coarse and fine flow. In addition, the individual setpoint is adjusted by optimized single fillings so that the total setpoint is reached as accurately as possible.

Note

The parameter 0 is accepted for compatibility reasons, but it is interpreted as 1 by the function. As a result, at least one filling is optimized each time it is loaded.

6.20.14 Dosing signals

Dosing signals during extra coarse phase [feedOptionsXCoarse]

Defines which signals are switched in the "Extra coarse" dosing phase in three-stage dosing (with extra coarse, coarse and fine phase).

Selection code	Meaning
0 (default)	Extra coarse phase is omitted
1	Only "Extra coarse signal"
3	"Extra coarse signal" + "Coarse signal"
7	"Extra coarse signal" + "Coarse signal" + "Fine signal"

Dosing signals during coarse phase [feedOptionsCoarse]

Defines which signals are switched in the "coarse" dosing phase.

Selection code	Meaning
1 (default)	Only with coarse signal
3	With coarse and fine signal

6.20.15 Delete tare in weighing step 0 [deleteTareStep0]

Selection code	Meaning
0 (default)	Do not delete tare
1	Delete tare memory automatically on transition to weighing step 0

6.21 DR28 Configuration of additional string for protocols

6.21.1 Log with additional string [addAdditionalText]

The freely definable additional string [additionalText] with 42 characters is transmitted from the CPU to the electronic weighing system. When you save the additional string in the protocol, extra information such as batch numbers or similar is saved in the scale protocols.

Selection code [addAdditionalText]	Meaning
0 (default)	Do not save additional string in protocol
1	Save additional string in protocol

6.21.2 Log single loadings (OIML R-107) [logSingleLoadings]

The parameter defines whether single fillings of a load are logged in THW mode in addition to the master totalizer.

If single fillings of a load are logged, the single fillings are permanently labeled with the string "delta n", whereby 'n' stands for the number of the current single filling.

The legal-for-trade accumulated total is labeled "T1" and is stored with the set string 1, 2, 3 or 4 in the alibi memory. Not legal-for-trade loggings of the total T1 (e.g. T1 < Minimum totalized load (DR3)) are labeled "t1" in the protocol memory.

The measured actual weights are logged in CW mode.

6.22 DR29 Configuration of technology messages

Introduction

In DR29, it is possible to suppress the technology messages from the electronic weighing system in a targeted manner as described in section Technology messages (Page 131).

Web server procedure

1. Read DR29.
2. Select "No message" for the desired technology messages.
3. Write DR29.

TIA Portal procedure

1. Read DR29: Command code 2029.
2. Enter "false" for the desired technology messages.
3. Write DR29: Command code 4029.

6.23 DR30 Read out process state

6.23.1 Overview

Internal states and process values of the scale can be monitored using the process values. This data is not required for standard operation of the scale.

The monitoring of selected data during trial operation is extremely useful as it helps you to optimize parameters and locate errors.

DR30 contains all weight values and related status information of the electronic weighing system. All values are read-only. You can find the status information in the parameter table

(https://support.industry.siemens.com/cs/ww/en/ps/7MH4138-6BA00-0CU0/dl) on the Internet. See also section: Introduction (Page 37).

Note

Reading of DR30 to the PLC via command is not mandatory. In DR07 Interface parameters (Page 72), the user can freely select four process variables that are transmitted automatically via the S7-I/O to the CPU and are available there. In addition, the complete scale status is always available cyclically in the I/O (see section TIA Portal user program (Page 38)) and can thus be used directly in the PLC program. At the Modbus end, the parameters and status information from DR30 are always current and the registers can therefore be read immediately.

6.23.2 Digits unfiltered (linearized) [unfilteredDigitsNotLin]

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

6.23.3 Digits filtered by F1 [filteredDigits1]

The filtered digit value is the internal measured value after filtering with filters defined in DR 3.

6.23.4 Digits filtered by F2 [filteredDigits2]

The filtered digit value is the internal measured value after filtering with the average value low pass filter and dosing filter from DR03.

6.23.5 Digits filtered by F3 [filteredDigits3]

The filtered digit value is the internal measured value after filtering with the average value and low pass filter from DR03.

6.23.6 Status DI.0, DI.1, DI.2 and CI.0 [statusDI0] [statusDI1] [statusDI2] [statusCI0]

Current status of digital inputs DI.0 to DI.2 and CI.0.

6.23.7 Status DQ.0, DQ.1 and DQ.2 [statusDQ0 to statusDQ2]

Current status of digital outputs DQ.0 to DQ.3.

6.23.8 Refresh counter [refreshcounter]

The measured values are formed again every millisecond in the electronic weighing system. A counter is incremented by one each time. Once the counter reaches the value 65536, it starts again from zero. The counter can be used as a time stamp for DR30.

6.23.9 Current load cell signal voltage (mV) [loadCellSignalVoltage]

Display of currently measured signal voltage of the load cell(s) between the SIG+ and SIG- terminals in millivolts (mV).

6.23.10 Load cell impedance (Ohm) [loadCellImpedance]

The parameter shows the currently measured impedance of the connected load cells.

6.23.11 Current load cell SEN voltage (V) [loadCellSenseVoltage]

The parameter shows the currently measured SEN voltage of the connected load cells.

6.23.12 Current fine weight [currentFineWeight]

This parameter indicates the calculated fine weight currently used by the electronic weighing system. The value can differ from the specification in DR23 because it may have been adjusted by the proportional controller.

6.23.13 Current trailing weight [currentTrailingWeightFine]

This parameter indicates the calculated trailing weight currently used by the electronic weighing system. The value can differ from the specification in DR23 because it may have been adjusted by the proportional controller.

6.23.14 Tolerance limits (weight unit) [toleranceLimitTh2] [toleranceLimitTh1] [toleranceLimitTl1] [toleranceLimitTl2]

The tolerance limits specified in DR22 are always output in the weight unit because different options are available in DR22 for specifying the tolerance limits (absolute values, relative values or according to OIML R-61).

6.23.15 Gross process weight 1 [grossProcessWeight1], Net process weight 1 [netProcessWeight1], Tare process weight [tareProcessWeight]

These are the gross, net and tare weights in high-resolution process form.

6.23.16 Gross weight [grossWeight], Net weight [netWeight], Tare weight [tareWeight]

These are the gross, net and tare weights after rounding and filtering defined in data record 3.

6.23.17 Gross/net weight x10 [netWeightX10]

This is the gross and net weight after rounding according to settings in DR03 and a resolution raised by a factor of 10.

6.23.18 Gross process weight 2 [grossProcessWeight2], Net process weight 2 [netProcessWeight2]

These are the high-resolution, internal process values of the gross and net weight after filtering according to filters 1 and 2 (DR03).

6.23.19 Last net process weight [lastNetProcessWeight], Last net weight [lastNetWeight]

The parameters show the last dosed net process weight or net weight.

6.23.20 Totalizer 1 [totalizer1] and Totalizer 2 [totalizer2]

Two totalizer memories that you reset separately using a command. Delete totalizer 1: Command code: 651; Delete totalizer 2: Command code: 652. In NAWI and CWI modes, the dosed weight is added to the totalizers after the tolerance check. In weighing operating mode GFI, the actual weight determined by the tolerance check in checked cycles is cumulated. For cycles without tolerance check, the set point set in DR20 is included in the calculated totalizers.

In DTI mode, totalizer 1 represents the legal-for-trade totalizer.

6.23.21 Youngest protocol ID [youngestLogId]

After a successful logging, the "Youngest protocol-ID" parameter is incremented and represents the last protocol ID to be created.

6.23.22 Date & time

The Year, Month, Day, Hour, Minute, Second, Millisecond, and Day of the week parameters represent the current date and time set in the electronic weighing system. The electronic weighing system automatically synchronizes the time with the time of the connected CPU.

6.23.23 Current dosing step [subDosingStep]

This parameter provides information on the dosing step the scale is currently in. A list of the steps is available in section Weighing steps (Page 53).

6.23.24 Number of dosings in continuous mode [dosingsInContinuousMode]

The parameter provides information on how many dosing / single filling operations have been carried out since the last start of continuous operation.

6.23.25 Difference set point / actual value [differenceSetPointActualValue]

The parameter shows the difference between the set point and the actual value of the last check (CW mode).

6.24 DR32 Read out error messages

6.24.1 Overview

In the event of an error, the DR is read out automatically by the WP351 FB so that a connected SIMATIC HMI can generate messages accordingly. With data/operating errors and technology messages, the error bits remain for 3 seconds and do not need to be acknowledged to the electronic weighing system. Operating errors remain permanently until the error is resolved.

The individual error messages are presented and explained in detail in section Operating errors (Page 130). The following table is used only for breaking down the individual messages into their message bits.

6.24.2 Operating errors, technology messages, data/command errors

All available message bits are presented in the table above. For data/command errors, there is also "Additional information" available, which is described in more detail in section Interrupts/ diagnostic messages (Page 129).

6.25 DR34 Weight indicator

DR 34 provides an ASCII string with 16 characters, that can be used as a weight display. The string contains the current gross or net weight after rounding according to DR03, as well as the weight unit. In addition additional parameters and weight values can be (temporarily) displayed or hidden via a command.

For applications requiring official calibration, DR 34 cannot be used as a main display. In this case, the "SecureDisplay" software must be used in order to represent the weight and additional information in a calibratable manner.

The corresponding registers are always currently available at the Modbus end. For operation with a SIMATIC CPU, DR34 must be read or requested by the electronic weighing system via a command.

See also

Commands (Page 111)

6.26 DR38 Advanced diagnostic data

The DR contains the following advanced diagnostic data:

- Time stamps for all available calibration points
- Drag indicator of the gross weight incl. time stamp
- Cycles of operation counter for the dosing signals "extra coarse", "coarse" and "fine"
- Residence time for weighing steps 1 to 7
- Duration of "extra coarse dosing phase", "coarse dosing phase" and "fine dosing phase"

6.27 DR39 Statistical data

DR39 provides a variety of statistical data. You can reset the statistical data at any time with the "Reset statistics (442)" command.

When the electronic weighing system is in CW mode of operation, the statistical data is reset automatically as soon as a new set point is transferred via DR20 to the electronic weighing system. To save the statistical data, read DR39 into the SIMATIC controller/PC system before the set point is changed.

Set the acquisition of statistical data in DR22.

The statistics include the following data:

- Number of weighings of classes TH2, TH1, TL1 and TL2 (relative and absolute)
- Number of weighings of classes GOOD and BAD
- Net weight average value
- Standard deviation
- Performance per hour

- No. of weighings per hour
- Number of weighings

6.28 DR45 Protocol request

The protocol ID of the log to be displayed in data record 46 is entered here.

The protocol ID to be read is also used for the calibratable reading of the log via SecureDisplay. For example, if ID 129 is to be displayed, the value 129 must be entered in DR45 and sent to SIWAREX. The log with ID 129 can then be read from DR 46 and displayed in a calibratable manner in SecureDisplay using command 891.

If the protocol ID to be read in DR 45 is 0, data record DR 46 is automatically written with the last created log. Thus, after a dosing, DR 46 can be read directly into the PLC for further processing without having to request the last log beforehand.

6.29 DR46 Read out protocol content

6.29.1 Overview

Protocol data is provided in DR46.

The protocol memory of the electronic weighing system can hold up to 1,000,000 entries.

Depending on the weighing operating mode, the protocols have different structures. The factory settings are loaded after a change of the weighing operating mode (DR03). Existing, incompatible protocols are deleted.

6.29.2 Oldest protocol ID [oldestLogId]

The ID of the first saved log is displayed here.

6.29.3 Youngest protocol ID [latestLogId]

The ID of the last saved log is displayed here.

6.29.4 Selected protocol ID, numerical [selectedLogId]

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

6.29.5 Protocol string [log]

The protocol string contains the following information depending on the scale type:

Weighing operating mode DTI - Discontinuous totalizing automatic weighing instruments

[Identifier];[Weight value];[Weight unit];[Additional string];[8 spaces]

Example: T1;100;kg;Wheat; ;

Designation	Data type	Length (bytes)
Identifier: T1: Totalizer 1 (legal-for-trade totalizer), t1: Totalizer 1 (non-legal-for-trade totalizer), dt: Single loading	BYTE	2
;	BYTE	1
Weight value	BYTE	11
;	BYTE	1
Weight unit	BYTE	4
;	BYTE	1
Additional string	BYTE	42
;	BYTE	1
8 spaces	BYTE	8
;	BYTE	1

All other weighing operating modes

[Gross/Net identifier];[Weight value];[Weight unit];[Tare identifier];[Tare weight value];
[Additional string];

Example: N;10;kg;T;5;kg;Potatoes

Designation	Data type	Length (bytes)
Gross/Net	BYTE	2
;	BYTE	1
Weight value	BYTE	8
;	BYTE	1
Weight unit	BYTE	4
;	BYTE	1
Tare sign	BYTE	2
;	BYTE	1
Tare weight value	BYTE	8
;	UBYTE	1
Additional string	UBYTE	42
;	UBYTE	1

6.29.6 Checksum, date, time

The checksums, date and time of the selected protocol are displayed here.

6.30 DR47 Read out logbook content

Changes to the used software version of SecureDisplay of the legal-for-trade main display [HMI] and changes to the firmware of the electronic weighing system are recorded in the logbook.

Scrolling in the logbook is possible using commands 881 to 883.

Legal-for-trade reading of the logbook is carried out using the SecureDisplay legal-for-trade main display. Non-legal-for-trade reading is carried out using DR47.

6.31 Commands

6.31.1 Overview

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

- From the SIMATIC HMI via the SIMATIC controller to the electronic weighing system
- From the SIMATIC HMI directly to the electronic weighing system via Modbus
- From the web server directly to the electronic weighing system
- Via the digital inputs after corresponding assignment in data record DR07

If an issued command is not accepted by the electronic weighing system, the cause of the rejection is always substantiated with a corresponding data/operating error.

Detailed descriptions of the commands can be found in the following tables:

→ Table 6-3 Service commands (Page 112)

→ Table 6-4 Protocol commands, statistics, logbook (Page 113)

→ Table 6-5 Trace commands (Page 113)

→ Table 6-6 Totalization commands (Page 114)

→ Table 6-7 Display changeover for DR34 and SecureDisplay (Page 114)

→ Table 6-8 Scale commands (Page 115)

→ Table 6-9 Weighing commands (Page 116)

See also

Commands (Page 112)

6.31.2 Commands

Table 6-3 Service commands

Command code	Command	Description	Write protection
1	Service mode ON	Turn on service mode	
2	Service mode OFF	Turn off service mode	
3	Weight Simulation on	Requirement: You have generally released simulation mode in DR03. Turn on test mode. The simulation value from DR16 is used instead of the measured value for calculation of the process values.	
4	Weight Simulation off	Switch off test mode.	
7	Stop webserver emergency access	When emergency access of the Web server was enabled using the button on the electronic weighing system, you can end emergency access.	
11	Load factory settings	The command resets the electronic weighing system to the "ex works" status. During this process: • All parameters and saved data (including log memory, logbook, IP addresses and Modbus addresses) • All message buffers (diagnostic buffer, trace memory, etc.) are reset • A configured recovery point, if any, is overwritten by the default values.	P
12	Load standard parameters	As "Load factory settings (11)". DR07 is not reset.	P
28	Display weighing operating mode	Shows the set weighing operating mode in the display.	
31	Load recovery parameter	The last recovery point created with command 51 is loaded.	P
51	Create recovery parameter	Backs up all scale parameters as a recovery point that can then be loaded when needed using command 31.	P
60	Set Calibration Point 0	Calibration point 0 valid / save values for calibration point 0. The current load cell signal or the currently measured digits are assigned to calibration weight 0 from DR03 and entered as "Calibration digit 0" in DR03.	P
61	Set Calibration Point 1	Calibration point 1 valid / save values for calibration point 1. The current load cell signal or the currently measured digits are assigned to calibration weight 1 from DR03 and entered as "Calibration digit 1" in DR03.	P
62	Set Calibration Point 2	Calibration point 2 valid / save values for calibration point 2. The current load cell signal or the currently measured digits are assigned to calibration weight 2 from DR03 and entered as "Calibration digit 2" in DR03.	P
63	Set calibration point 3	Set calibration point 3 / save values for calibration point 1.	
64	Set calibration point 4	Set calibration point 4 / save values for calibration point 2.	
81	Shift characteristic curve	Move calibration characteristic. The command defines the current weight of the scale as the new zero point (0 kg) and shifts the complete characteristic without changing the gradient. The command can be used, for example, in order to compensate parts used for mounting calibration weights on the scale at the end of the calibration.	P

Command code	Command	Description	Write protection
82	Automatic calibration	Calculating the scale characteristic curve based on the load cell parameters from DR10. The calculated characteristic curve is entered directly in DR03 and DR04, and thus activated immediately after executing the command. The scale must be empty when the command is executed. The accuracy of a scale that is automatically calibrated depends heavily on the mechanical setup!	P
83	Check calibration	The command calculates the theoretical digital values in relation to the calibration weights using the load cell parameters from DR10 and the calibration weights 1 to 4 from DR03. The output of these theoretical digits is made in DR04. The function can be used to compare the calibration digits in DR03 that were determined during a calibration with calibration weights (commands 61 to 64) with the theoretically expected digits.	
907	Set impedance reference	The currently measured impedance value (DR30) is transferred to DR10 as impedance reference.	
910	Trigger for monitoring of Modbus communication	Starts time-based monitoring of Modbus communication	

Table 6-4 Protocol commands, statistics, logbook

Command code	Command	Description	Write protection
401	Generate protocol	Log current parameters relevant to the calibration	
405	Erase protocols	Delete all logs	P
440	Erase log book	Delete the logbook. Only permitted in non-calibrated state.	P
442	Reset statistical data	Deletes statistical data record DR39	
443	Delete drag indicator	Resets the drag indicator DR38	
444	Reset counter "cycles of operation - xCoarse feed"	Deletes the cycle counter of the extra coarse signal	
445	Reset counter "cycles of operation - coarse feed"	Deletes the cycle counter of the coarse signal	
446	Reset counter "cycles of operation - fine feed"	Deletes the cycle counter of the fine signal	

Table 6-5 Trace commands

Command code	Command	Description	Write protection
451	Trace ON	Start cyclic trace recording	
452	Trace OFF	Stop trace recording	
453	Single trace element	Single recording (current state)	
454	Erase trace memory	Delete trace recording	

Table 6-6 Totalization commands

Command code	Command	Description	Write protection
651	Delete total 1	Deletes total 1 in DR30 (not possible for THW in OIML mode)	
652	Delete total 2	Deletes total 2 in DR30	
653	Log and delete total 1	Logs total 1 in alibi memory and then deletes it (THW mode)	

Table 6-7 Display changeover for DR34 and SecureDisplay

Command code	Command	Description	Write protection
701	High resolution on	Activate high resolution (factor 10) of the weight value on the main display (DR34) and the SecureDisplay for 5 s.	
705	Display Tare Process	Display current tare weight on the main display (DR34) and the SecureDisplay.	
706	Display current gross weight	Display current gross weight in SecureDisplay and DR34	
710	Display standard weight	Display standard gross/net weight display on the main display (DR34) and the SecureDisplay.	
714	Net process weight		
715	Gross process weight		
716	Gross weight after F1		
721	Display single set point	Display currently set point setting from DR20 on the main display (DR34) and the SecureDisplay for 5 seconds.	
722	Display total set point	Display currently total set point setting from DR21 on the main display (DR34) and the SecureDisplay for 5 seconds.	
725	Display deviation set point/actual value	Display current difference between set point and actual value	
726	Display mean value	Display current mean value (from DR39)	
727	Display standard deviation	Display standard deviation (from DR39)	
728	Display number of weighings	Display current number of weighings (from DR39)	
771	Display Totalizer 1	Display Totalizer 1 from DR30	
772	Display Totalizer 2	Display Totalizer 2 from DR30	
801	Display Current Restriction Code	Display restriction code set in DR3 on the main display (DR34) and the SecureDisplay for 5 seconds (command only relevant for scales requiring official calibration).	
802	Display weighing range information	Show weighing range information (min, max, resolution) in SecureDisplay for 10 seconds (command only relevant for scales requiring official calibration).	
860	Hide SecureDisplay	Places SecureDisplay in the background of the HMI (command only relevant for scales requiring official calibration).	

Command code	Command	Description	Write protection
861	SecureDisplay position 1	Shows the SecureDisplay on the HMI in position 1 (see DisplayCali.xml).	
862	SecureDisplay position 2	Shows the SecureDisplay on the HMI in position 2 (see DisplayCali.xml).	
863	SecureDisplay position 3	Shows the SecureDisplay on the HMI in position 3 (see DisplayCali.xml).	
864	SecureDisplay position 4	Shows the SecureDisplay on the HMI in position 4 (see DisplayCali.xml).	
865	SecureDisplay position 5	Shows the SecureDisplay on the HMI in position 5 (see DisplayCali.xml).	
869	Close SecureDisplay	The command completely closes the SecureDisplay application. SecureDisplay must restarted in this case with a script call in the HMI/PC.	
870	Smallest SecureDisplay	Shows the SecureDisplay on the HMI with the smallest zoom factor (see DisplayCali.xml).	
871	Display serial number of the electronic weighing system	Display serial number of the electronic weighing system and in the SecureDisplay for 5 seconds.	
875	Display firmware version of the electronic weighing system	Display firmware version and checksums of the electronic weighing system in the main display (serial number only) and the SecureDisplay for 5 seconds.	
876	Display SecureDisplay Software Version	Display version of SecureDisplay in the main display and the SecureDisplay for 5 seconds.	
881	Show first log book entry	Shows the first log book entry in SecureDisplay (command only relevant for scales requiring official calibration).	
882	Display last log book entry	Shows the last log book entry in SecureDisplay (command only relevant for scales requiring official calibration).	
883	Previous log book entry	Show the previous log book entry in SecureDisplay (command only relevant for scales requiring official calibration).	
884	Next log book entry	Show the next log book entry in SecureDisplay (command only relevant for scales requiring official calibration).	
891	Display protocol	Displays the last requested protocol from DR46 in a legal-for-trade manner in SecureDisplay.	

Table 6-8 Scale commands

Command code	Command	Description	Write protection
1001	Zero	Set to zero (semi-automatic)	
1011	Tare	Taring (semi-automatic)	
1012	Delete Tare	Delete current tare weight	
1013	Activate Preset Tare	Preset tare value from DR15 is applied.	
1016	Active preset tare from SIMATIC controller	The preset tare is taken from the cyclic SIMATIC interface.	

Table 6-9 Weighing commands

Command code	Command	Description	Write protection
1101	Start single weighing	Starts an individual dosing cycle.	
1103	Start continuous mode	Starts n dosing cycles in continuous succession Continuous operation ends automatically if a total set point (DR21) was specified and reached or alternatively using the "Stop continuous mode (1123)" command. If a dosing cycle is still active, it is completed. The "Abort weighing (1124)" command also ends continuous operation but does not terminate an active dosing cycle. The "Continuous mode active" bit in the AWI status (DR30) indicates whether or not the electronic weighing system is operating in continuous mode.	
1121	Stop weighing cycle	Current weighing cycle is stopped and the "Weighing cycle stopped" bit is set in the AWI status (DR30). The "Continue weighing (1141)" command can be used to continue and thus complete the cycle from this status.	
1122	Activate check stop	If check stop points have been defined (see section Check stop [checkStopAfterStep0 to checkStopAfterStep7] (Page 99)), these are activated by "Activate check stop" and the weighing cycle stops at the specified points.	
1123	Stop continuous mode	Continuous operation is stopped. If the command is issued within a weighing cycle, this weighing cycle is first completed, and the electronic weighing system then waits in weighing step 0. The "Continuous mode active" bit in the AWI status (DR30) is reset.	
1124	Abort weighing cycle	The current dosing cycle is directly aborted, and the electronic weighing system jumps immediately to weighing step 0.	
1125	Rest weighing	The command can be issued within the weighing cycle or outside of it (=weighing step 0). Any active coarse or fine signal is directly reset, a tolerance check is performed, a log print is created and – if configured in DR25 –the scale is emptied. The electronic weighing system then waits in weighing step 0. In DTI mode, the command shuts down the dosing signals and starts the emptying process. The material in the scale is still totaled. Loading is then stopped and totalizer 1 is written to the alibi memory. When the weight in the scale at the time of the rest emptying command is less than the emptying limit from DR06, emptying takes place based on time. To do this, specify a corresponding "Discharge time (s)" in DR25.	
1126	Manual emptying ON	The command can be issued only in weighing step 0. The "Emptying signal" bit is then set to TRUE and a linked digital output, if any, is set. The command is used to clean the scale or to open it manually for service.	
1127	Manual emptying OFF	The command can be issued only in weighing step 0. The "Emptying signal" bit is then set to FALSE and a linked digital output, if any, is reset. The command is used to clean the scale or to close it manually after service.	

Command code	Command	Description	Write protection
1128	Rest emptying	The command can only be accepted if an emptying option (emptying based on Limit 3 or time) is configured in DR25. Within a weighing cycle, the command causes the coarse and fine signal to be shut off immediately and the scale jumps directly to the emptying step. A log is not created and a tolerance check is not performed. If the command is issued outside the dosing cycle (in weighing step 0), the emptying signal is set for the specified time – if time-based emptying was configured in DR25. When "Emptying based on limit 3" is configured, the emptying signal is switched until limit 3 is fallen below. In DTI mode, the command shuts down the dosing signals and starts the emptying process. Loading is then stopped. When the weight in the scale at the time of the rest emptying command is less than the emptying limit from DR06, emptying takes place based on time. To do this, specify a corresponding "Emptying time" in DR25.	
1129	Semi-automatic emptying	The scale empties based on the setting from DR25.	
1130	Depleting ON	The command is only relevant for DTI mode. Active "depleting" has the result that a set total set point in DR21 is ignored and loading continues until there is no more material or loading is completed with the "Reset weighing" command.	
1131	Depleting OFF	Switch off active "depleting".	
1135	Jogging "FINE"	The fine signal is switched on for the specified pulse duration (DR22). The command is only accepted in stopped weighing cycle or in weighing step 0.	
1136	Jogging "COARSE"	The coarse signal is switched on for the specified pulse duration (DR22). The command is only accepted in stopped weighing cycle or in weighing step 0.	
1141	Continue weighing	If a dosing cycle is in the "stopped" state or in NAWI mode before a protocol is created, you can continue the dosing cycle using this command.	
1151	External blocking time ON	Enables the external blocking time set in DR23.	
1152	External blocking time OFF	Prematurely ends the external blocking time that is set in DR23 and activated with command 1151.	
1153	Perform tolerance check	Enables check weighing for current weighing cycle The command is only relevant if the weighing cycle is not checked (GFI weighing operating mode).	

See also

Tare device [subtractiveAdditiveTare] (Page 63)

6.31.3 Command groups of the electronic weighing system

You can execute the following commands: See also section: Executing commands (Page 44).

Command code	Description
1 ... 1999	The meanings of the commands correspond to the command list (see → Commands (Page 112)).
2000 + X	Reading/writing data records (Page 48)
4000 + X	Reading/writing data records (Page 48)
7001	Read all data records (7001) Read all data records from the electronic weighing system into the SIMATIC controller.
7002	Write all data records (7002) Write all data records from the SIMATIC controller into the electronic weighing system. **Requirement**: "Service mode On"

Additional information on transmission of commands from the control software by means of the SIMATIC interface is available in section TIA Portal user program (Page 38).

6.32 Communication via Modbus

6.32.1 Introduction

NOTICE
Low degree of protection against unauthorized access If you activate the Modbus interface, you reduce protection against unauthorized access to functions and data of the electronic weighing system from outside and via the internal network. • Observe the Security information (Page 12).

You can exchange the current process values and parameters via Ethernet with Modbus TCP/IP. You can find the Modbus address in the parameter table (https://support.industry.siemens.com/cs/ww/en/ps/7MH4138-6BA00-0CU0/dl) on the Internet. See also section: Introduction (Page 37).

The following chapters describe the specifications for handling communication. You can perform the following functions:

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

6.32.2 Principle of data transmission

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

The standardized Modbus protocol is used for communication. The connected communication partner always has the master function, while the electronic weighing system is always the slave.

Data transfer is bidirectional. The connected electronic weighing system always has the master function. The master function "controls" the communication with corresponding requests to the respective electronic weighing system address (request). The electronic weighing system is always the slave and responds to the requests of the master with a response frame, provided that the address matches.

Service	Selection code	Meaning
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 electronic weighing system (slave), the electronic weighing system sends a response frame with or without errors. In the case of a response without error message, the response frame contains the received selection code; in the case of errors, the highest bit of the selection code is set. This corresponds to the Modbus standard. Afterwards, the master requests DR32 to check which process-related data or command errors exist.

6.32.3 Data record concept

The register assignment is an image of the data records. The chapter → Parameter assignment/ addressing (Page 37) 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.

6.32.4 Command mailboxes

Corresponding command codes must be sent in order to start commands and to read and write data records in the Modbus buffer memories. These are described in more detail in section → Commands (Page 111). The following tables list the Modbus registers used to process these commands:

Table 6-10 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 6-11 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 6-12 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

6.32.5 Reading registers

The method for reading registers depends on whether they belong to the writable data records (DR03 to DR29) or can only be read as current values (DR30 to DR39).

If you wish to read the registers from the data records DR03 to DR29, 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 section → Parameter table (https://support.industry.siemens.com/cs/ww/en/ps/17781/dl).

Example

A parameter is to be read from DR03.

- 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 DR 3 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 other command codes in section → Commands (Page 112).

Example

A current measured value is to be read out from DR30.

⇒ The register can be directly requested because its contents are automatically refreshed in the electronic weighing system at the specified measuring rate of 1000 Hz and are always available up-to-date.

6.32.6 Writing registers

If you wish to write registers from the data records DR03 to DR29, 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 DR03 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 DR03 is then updated in the Modbus memory.
- It is now possible to write or modify one or more registers with the corresponding variable. If you want to transfer the written/changed register to the scale, you need to write the entire 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 electronic weighing system. 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 other command codes in section → Commands (Page 111).

A document for working with the electronic weighing system and Modbus is also available online →Modbus communication of WP231 (https://support.industry.siemens.com/cs/ww/en/view/77913998).

Operation requiring official calibration 7

7.1 Prepare calibration of the scales

Introduction

This section describes the requirements for operation requiring calibration and how to prepare the scale verification.

The official verification officer will check, for example, the scales design and calibration-relevant parameters with the help of the prototype test certificate of the electronic weighing system.

For scales requiring official calibration, the following weighing modes (Page 53) of the electronic weighing system are permitted:

- NAWI - Non automatic weighing instrument - in accordance with OIML R-76
- CWI - Catchweighing instrument in acc. with OIML R-51
- GFI - Gravimetric filling instrument in acc. with OIML R-61
- DTI - Discontinuous totalizing automatic weighing instruments in acc. with OIML R-107
- CW - Automatic check weigher in acc. with OIML R-51

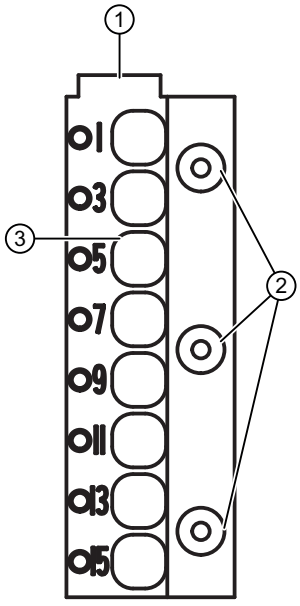
Requirements

- You have coordinated the scales type with the conformity assessment body.
- You have a certificate of conformity which confirms that the load cell in combination with the electronic weighing system meets the customer and legal requirements.
- You have ordered the calibration set (Page 161) and it is available. The calibration set contains the labeling foil for the ID labels, the protective foil and the unlock protection.
- You have printed the ID labels for the scales and the calibratable main display on the labeling foil.
  Templates ID labels (https://support.industry.siemens.com/cs/ww/en/view/109764526)
- You have commissioned the scales.
- You have installed SIMATIC HMI or the computer so that it is visible from the scales.

Procedure

1. Install and parameterize SIWAREX SecureDisplay for SIMATIC HMI.
   Use the SIWAREX SecureDisplay software to convert your SIMATIC HMI or computer into the calibratable main display of the scales.
   SIWAREX SecureDisplay software and description (https://support.industry.siemens.com/cs/ww/de/view/109477602)
2. Integrate the WP351 example project in your SIMATIC HMI project.
   - Or -
   Create your own visualization.
   - When you create your own visualization, take the "legal-for-trade verification" completely from the example project.
   - Document for the user how to reach the parameters and functions on the ready-for-trade main display.
3. Parameterize the scales.
4. Remove the electronic weighing system of the BaseUnit.
5. Push the write protection switch on the rear of the electronic weighing system to ON.
   View (Page 15)
   The electronic weighing system is protected against changes to parameters for operation requiring official calibration. Parameters that are not write protected can still be changed.
6. Place the electronic weighing system on the BaseUnit.
7. Hold the unlock protection in such a way that the recesses for the three fastening screws face upwards.
8. Guide the connecting cables from the top through the cable glands of the unlock protection.

9. Place the unlock protection on the BaseUnit in such a way that the top end of the unlock protection is placed in the housing of the electronic weighing system.



① Top end for inserting in the electronic weighing system
② Recesses for the fastening screws
③ Cable routing

Figure 7-1 Secure the unlock protection

10. Secure the unlock protection with three fastening screws.
    The electronic weighing system can no longer be removed from the BaseUnit.
    The connecting cables of the electronic weighing system, load cells or terminal boxes can no longer be removed.

7.2 Checking parameters relevant to the calibration

Introduction

Verification of the scale according to Modul F of the corresponding directive by the conformity assessment table involves the following procedure.

Procedure

1. Check the following parameters in the legal-for-trade main display in the "legal-for-trade verification" view.
   - The **software ID** of the SIWAREX SecureDisplay (DisplayCali.exe function) corresponds to the requirements in the SIWAREX SecureDisplay test certificate (EC).
   - The **firmware ID** of the SIWAREX WP351 corresponds to the requirements in the EU construction license/type examination certificate.
   - The **smallest zoom factor** meets the minimum requirement of readability and font size according to EN 45501: 2011 draft, section 4.2.1.
   - **Logbook entries** for FW downloads of SIWAREX SecureDisplay or firmware of the electronic weighing system
   - The **serial number** of the electronic weighing system corresponds to the identification labels.
   - The **regulation code** "OIML" is set in the scale parameters.
   - The **write protection symbol** is shown at the bottom right.
2. Check the Identification labels.
3. If you use an additive tare range, check the entire weighing range from the maximum load to the additive maximum tare load.
   - To do this, check up to the maximum load, and repeat this following taring.
   - Repeat this procedure until the upper limit of the range of the additive tare compensation unit has been reached.

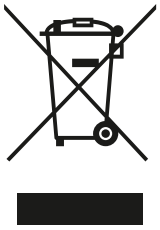
Service and maintenance

8

Note

The device is maintenance-free.

8.1 Disposal



Devices described in this manual should be recycled. They may not be disposed of in the municipal waste disposal services according to the Directive 2012/19/EC on waste electronic and electrical equipment (WEEE).

Devices can be returned to the supplier within the EC, or to a locally approved disposal service for eco-friendly recycling. Observe the specific regulations valid in your country.

Further information about devices containing batteries can be found at: Information on battery/product return (WEEE) (https://support.industry.siemens.com/cs/document/109479891/)

Note

Special disposal required

The device includes components that require special disposal.

- Dispose of the device properly and environmentally through a local waste disposal contractor.

Interrupts/diagnostic messages 9

9.1 Message and error types

Three types are distinguished:

Operating errors

Operating errors can occur spontaneously at any time due to an unforeseen event. They include internal and external hardware problems which can occur spontaneously during weighing, e.g. wire break of the load cell cable.

Data and operating errors

Data and command errors arise always as response to a command or a data record transfer.

A data error occurs when a plausibility error is identified in a data record sent to the module, causing the module to refuse acceptance of the data record.

A command error occurs when the module cannot execute the issued command in its current operating state.

For most data/command errors, the electronic weighing system outputs additional information for the error. This includes further details about the error and is described in detail in the error list in this section.

Technology messages

Technology messages occur spontaneously due to the process flow of a weighing/dosing. Messages provide information to the operator and have no further effect on the dosing operation.

In the event of an error, the error data record DR32 is read automatically from the WP351 FB into the CPU. Data and operating errors as well as technology messages remain set to "true" in DR32 for 3 seconds in each case. Operating errors remain until the error is resolved. It is not necessary to acknowledge the messages to the electronic weighing system.

9.2 Evaluating errors/messages using the Web server

The electronic weighing system has a message buffer that stores the last 100 entries including time stamp in non-volatile memory. If the number of messages in the message buffer exceeds 100, the oldest entry is overwritten. The message buffer can be read out at any time using the Web server (menu item "Read out all data records") and saved together with the scale parameters. This facilitates the detection, analysis and correction of errors in the system. The only way to completely clear the message buffer is with the "Load factory settings (11)" command.

9.3 Evaluating errors/messages using the FB

In the event of an error, the FB of WP351 reads out DR32 automatically. Data/operating errors and technology messages are reported for 3 s. Operating errors remain permanently until the cause is resolved.

9.4 Operating errors

9.4.1 Operating errors

Operating errors	Error code	Description and remedy
1000 operating error exists	1000	Group message, there is at least one operating error.
1001 Watchdog	1001	Watchdog error. A serious error has occurred in the function of the electronic weighing system. Contact SIWAREX Support if the error continues to occur.
1003 Checksum error (parameters)	1003	The checksum of the parameters no longer matches. Remedy: Load factory settings. Contact SIWAREX Support if the error continues to occur.
1004 checksum error (firmware)	1004	The checksum of the electronic weighing system FW no longer matches. Remedy: Load factory settings. Contact SIWAREX Support if the error continues to occur.
1006 Log book full or defective	1006	Error when writing/clearing the logbook. Remedy: Load factory settings. Contact SIWAREX Support if the error continues to occur.
1008 Connection to S7 CPU interrupted	1008	Communication with S7 CPU not possible even though S7 bus controller (PER) power supply is present (=> incompatible SW versions (BTF only on K61 side, for S7 message, see below under S7 diagnostic alarms)
1102 ADC error	1102	AD converter error when reading the measured value. Remedy: Check and follow recommendations for installation meeting EMC requirements (section EMC-compliant installation (Page 19)).
1104 SENSE voltage too low	1104	Undervoltage on the SENSE cables. A voltage between 4.85 V DC and 10 V DC must be present between SEN+ and SEN-. If necessary, check the wiring of the load cells or, in the case of 4-wire load cells, the wire jumpers between EXC+&SEN+ and EXC-&SEN- in the terminal box.
1105 SIG voltage too high (load high)	1105	The maximum SIG input signal of the AD converter has been exceeded by more than 10%. Check the wiring of the load cell(s). If the wiring is correct, check the input and output resistances of the load cells. By checking the resistors, you can find out whether one or more load cells are defective.
1106 SIG voltage too low (load low)	1106	The minimum SIG input signal of the AD converter has been undershot by more than 10%. Check the wiring of the load cell(s). If the wiring is correct, check the input and output resistances of the load cells. By checking the resistors, you can find out whether one or more load cells are defective.

Operating errors	Error code	Description and remedy
1107 SecureDisplay failure	1107	The calibratable main display (SIWAREX SecureDisplay on SIMATIC HMI) no longer communicates with the electronic weighing system • Check the wiring between the SIMATIC HMI and the CPU or the electronic weighing system and the SIMATIC controller. • Check the IP addresses of the network components
1111 DQ short-circuit to ground	1111	Error at digital outputs (short-circuit to ground)

9.4.2 Technology messages

Table 9-1 Technology messages

Technology messages	Error code	Description and remedy
2000 Technological error	2000	Group message, at least one technology message is present
2001 Timeout waiting for stability	2001	Taring, zero setting, post dosing or check weighing was not possible because stability was not reached during the stability waiting time. Check the stability criteria and the stability waiting time in DR03 and adjust the parameters as necessary. Check the scale mechanics for strong fluctuations / disturbances that prevent stability.
2002 Trace error	2002	The set recording cycle for tracing cannot be processed. Set a slower recording rate (Page 75) in DR07.
2003 Initial zero setting (Page 63) not possible	2003	The weight of the initial zero setting is out of range.
2004 Trace memory full	2004	The trace recording has been aborted because the internal trace memory is full.
Reboot after voltage recovery	2005	Diagnostic message for regular restart.
Download error	2006	A FW update was aborted or rejected, e.g. because a FW update is already running or communication with the S7 controller was interrupted.
2007 firmware file invalid	2007	FW update file (*.upd) was rejected because it is invalid. The FW update file is not suitable for the electronic weighing system or is defective, e.g. implausible length, structure, checksum or signature.
2101 Risk of overfilling	2101	Current parameter assignment would lead to overfilling of the scale during dosing. • Check the specified set point in DR20 or the limits for taring / zero setting in DR03 and DR25.
2102 Coarse shut-off point already exceeded	2102	The current weight is already above the coarse shut-off point. Remedy: Adjust set point or empty scale.
2103 No stability	2103	Required stability not present the dosing process.
2104 CPU in Stop	2104	The electronic weighing system is not in stand-alone mode, the SIMATIC CPU is in STOP state and a dosing command has been issued. Remedy: Put the SIMATIC CPU in RUN state or activate the stand-alone mode of the electronic weighing system. **CAUTION:** Ensure the safety of the system before activating stand-alone mode because the electronic weighing system activates dosing elements, if necessary, despite the stopped SIMATIC CPU.

Technology messages	Error code	Description and remedy
2105 Set point too small	2105	The currently specified set point is too small. Remedy: Check the set point setting in DR20.
2106 Error fine weight	2106	Trailing weight (DR23) and single set point (DR20) are incompatible. Check the two entries.
2107 Stop after tolerance error	2107	The weighing cycle was stopped due to a tolerance error according to the parameter assignment in DR22.
2108 Emptying parameter not plausible	2108	The emptying parameter assignment set in DR25 stops the weighing cycle. 1. Adjust the parameter assignment during the stopped cycle. 2. Conclude the weighing cycle with the "Continue weighing (1141)" command.
2109 Inhibition time violation "Coarse"	2109	After expiration of the blocking time coarse signal (DR23), the coarse shut-off point has already been exceeded. Remedy: Decrease the blocking time coarse signal in DR23.
2110 Inhibition time violation "Fine"	2110	After expiration of the blocking time fine signal (DR23), the fine shut-off point has already been exceeded. Remedy: Decrease the blocking time fine signal in DR23.
2111 Maximum weighing time exceeded	2111	The maximum weighing time specified in DR25 was exceeded.
2112 Logging not possible - no standstill	2112	The conditions required for automatic logging (e.g. stability) were not present at the time of the log print. Remedy: Check the stability criteria in DR03 and adapt them as necessary.
2113 Maximum emptying time exceeded	2113	The maximum emptying time configured in DR25 was exceeded during emptying. Remedy: Check the scale mechanics and any soiling. Adjust the maximum emptying time in DR25.
2114 Maximum corrective action of the proportional controller exceeded	2114	The corrective action of the proportional controller was greater than the maximum corrective action configured in DR24.
2115 Log error	2115	Error while reading a log in DR46.
2116 Set point too large	2116	The set point specified in DR20 is greater than the residual quantity on the scale (removal mode). Weighing can still be carried out using the "Continue weighing" and subsequent "Rest weighing" commands!
2117 Maximum corrective action of the fine signal time controller exceeded	2117	The maximum control access of the fine time controller was greater than the maximum corrective action configured in DR24.
2118 Minimum fine weight reached	2118	Fine signal time controller cannot move the coarse flow shut-off point any further because the set coarse trailing weight would otherwise be undershot.
2119 Controller re-initialized	2119	Due to two successive disabling time violations, the controller with the start values from DR23 was re-initialized.
2120 Weight too small for totalizing	2120	The currently loaded / dosed material weighs less than the minimum weight and is not logged automatically. • Log the material with the "Rest weighing (1125)" command. Result: Loading is stopped and total T1 is logged.
2121 Autom. Tare/Zeroing not possible	2121	Weighing was canceled because automatic tare or zeroing was not possible. Check the zeroing limits and tare limits in DR03 and DR25.

Technology messages	Error code	Description and remedy
2122 Inhibition time "extra coarse" error	2122	Inhibition time extra course. After expiration of the inhibition time extra coarse, the extra coarse shut-off point was already exceeded
2123 Extra coarse shut-off point already exceeded	2123	The extra coarse shut-off point is already exceeded before switching on the extra coarse signal
2096 Restore point set	2096	A recovery point was successfully set.
2094 Backup/snapshot set	2094	Backup/snapshot was successfully set.
2095 Backup loaded	2095	Backup (or default values, if no backup) has been successfully loaded.
2097 Restore point loaded	2097	A recovery point was successfully loaded.
2098 Standard parameters loaded	2098	The standard parameters were successfully loaded.
2099 Factory settings loaded	2099	The factory settings were successfully loaded.

9.4.3 Data and command errors

Table 9-2 Data and command errors

Data and command errors	Error code [errorCode]	Add info [errorAddInfo]	Description
5000 Data/command errors	5000	-	Group error, at least one data/operating error present
6050 Unknown command	6050	-	Issued command code is unknown. Check the command code.
6051 Command not possible now	6051	-	The desired command could not be executed because, for example, another process is already active at this time. Additional information contains details.
		9500	Fault present
		9501	No stability
		9502	Waiting for stability
		9507	Dosing active
		9514	CPU is missing or not ready
		9541	Emptying active
		9680	SecureDisplay is missing or not visible
		9681	Display command does not match the current display content of SecureDisplay
6052 Service command error	6052		Commands from the Service commands group could not be executed. Additional information contains details.
		9510	Service mode not active
		9511	Write protection enabled
		9507	Dosing active
		9512	Missing enable
		9522	Calibration not yet complete
6053 Calibration command error	6053		Command from the Calibration commands group could not be executed. Additional information contains details.
		9510	Service mode not active

Data and command errors	Error code [errorCode]	Add info [errorAddInfo]	Description
		9511	Write protection enabled
		9520	Increment between calibration digits too small
		9521	Sequence of calibration points is not correct
		9522	Calibration not yet complete
		9523	Calibration digits out of valid range
		9524	Calibration weight is 0
		9527	Command not permitted in simulation mode
		9519	No test operation
6054 Scale command error	6054		Command from the Scale commands group (Zero, Tare, etc.) could not be executed. Additional information contains details.
		9500	Fault present
		9501	No stability
		9502	Waiting for stability
		9507	Dosing active
		9515	Not permitted in this weighing operating mode
		9530	Current weight is out of defined tare weight range
		9531	Current weight is out of defined zero setting range
6055 Weighing command error	6055		Command from the Weighing commands group (Start single weighing, Start continuous mode, etc.) could not be executed. Additional information contains details.
		9500	Fault present
		9501	No stability
		9502	Waiting for stability
		9508	Dosing is not active
		9509	Time not permitted within dosing
		9513	Service mode is still active
		9515	Not possible in this weighing operating mode
		9539	Total set point already reached
		9540	Current weight is already above fine shut-off point
		9542	Set point too small
		9543	Set point too large
		9544	Tolerance limits implausible
		9545	Relation between fine/trailing weight and set point does not fit
		9546	Dosing would result in overfilling
		9547	Automatic emptying settings (DR25) are not plausible
		9548	No check stop defined
		9549	Scale is already empty
		9555	Jogging time is set to 0 in DR22
6056 Error trace/ protocol/ logging command	6056		Trace, logging or logbook command was rejected. Additional information contains details.

Data and command errors	Error code [errorCode]	Add info [errorAddInfo]	Description
		9500	Fault present
		9501	No stability
		9502	Waiting for stability
		9511	Write protection enabled
		9532	Current weight is out of defined weighing range
		9533	Total too small
		9550	Trace memory full
		9551	Protocol memory full
		9552	Logging task is busy
		9553	Weight did not change since last logging
		9554	Logbook contains no entries
7050 Unknown data record	7050	-	Requested data record is unknown.
7051 Parameter input not possible now	7051		A parameter input is currently not possible. Additional information contains details.
		9507	Dosing active
		9510	Service mode is not active
		9511	Write protection enabled
7052 Parameter is write protected and cannot be changed	7052		A parameter input is currently not possible due to active write protection. Additional information contains details about the parameter involved.
		Parameter ID	Parameter ID of the parameter involved
7053 Error in calibration parameter DR03	7053		Additional information indicates an implausible parameter in DR 3
		Parameter ID	Parameter ID of the affected parameter in DR 3
		9510	Service mode is not active
		9520	Increment between calibration digits too small
		9521	Sequence of calibration points is not correct
		9524	Calibration weight is 0
		9525	Falling characteristic curve not allowed by OIML
		9526	Alternating calibration characteristic curve is not allowed
		9610	Weighing range max - min error
		9611	Resolution not permitted
		9613	OIML and 6000d provision violated
		9614	Zeroing or zero setting limits are not OIML-compliant
7054 Parameter error DR05	7054		Additional information indicates an implausible parameter in DR05
		Parameter ID	Parameter ID of the affected parameter in DR05

Data and command errors	Error code [errorCode]	Add info [errorAddInfo]	Description
		9510	Service mode not active
		9530	Weight is outside the permissible tare weight range
		9531	Weight is outside the permissible zero setting range
7055 Parameter error DR06	7055		Additional information indicates an implausible parameter in DR06
		Parameter ID	Parameter ID of the affected parameter in DR06
7056 Parameter error DR07	7056		Additional information indicates an implausible parameter in DR07
		Parameter ID	Parameter ID of the affected parameter in DR07
		9650	DQ.0 - assignment not possible
		9651	DQ.1 - assignment not possible
		9652	DQ.2 - assignment not possible
		9653	DQ.3 - assignment not possible
7057 Parameter error DR48	7057		Additional information indicates an implausible parameter in DR48
		Parameter ID	Parameter ID of the affected parameter in DR48
7058 Parameter error in DR11	7058		Additional information indicates an implausible parameter in DR11
		Parameter ID	Parameter ID of the affected parameter in DR11
		9510	Service mode not active
7060 Error in extended parameters DR 15 - DR 19	7060		Additional information indicates an implausible parameter in DR 15 - DR 19
		Parameter ID	Parameter ID of the affected parameter in DR 15-19
		9530	, because weight is outside the permissible tare weight range
7061 Error set point DR 20 or DR 21	7061		Additional information indicates an implausible parameter in DR20/DR21
		Parameter ID	Parameter ID of the affected parameter in DR 20/DR 21
7062 Error in dosing system parameters DR 22/DR 23	7062		Additional information indicates an implausible parameter in DR22/DR23
		Parameter ID	Parameter ID of the affected parameter in DR 22/DR 23
		9071	Parameter relation not plausible
		5914	Fine flow, coarse/fine dribbling and set point are incompatible
		9191	Fine flow is less than the coarse dribbling value

Data and command errors	Error code [errorCode]	Add info [errorAddInfo]	Description
		9192	Coarse dribbling is not plausible
		9183	Filter depth material flow is too high
		9182	Minimum material flow is negative
7063 Parameter error DR 24	7063		Additional information indicates an implausible parameter in DR 24
		Parameter ID	Parameter ID of the affected parameter in DR 24
7064 Parameter error DR 25	7064		Additional information indicates an implausible parameter in DR 25
		Parameter ID	Parameter ID of the affected parameter in DR 25
		9507	Dosing active
7067 Parameter error DR 28	7067		Additional information indicates an implausible parameter in DR 28
		Parameter ID	Parameter ID of the affected parameter in DR 28
	7068		Additional information indicates an implausible parameter in DR29
7072 Parameter error DR 45	7072		Additional information indicates an implausible parameter in DR 45
		Parameter ID	Parameter ID of the affected parameter in DR 45
	7075		Additional information indicates an implausible parameter in DR10

9.4.4 Add info [errorAddInfo] for DR03

Additional information is available for most data/command errors. The cause of the error is described in detail with this information. If a data/command error bit is set, the additional information is also filled accordingly. Thus, the error bits and the additional information must be evaluated together in the program to identify the exact cause of the error.

If additional information not listed above appears for a data/operating error bit, it is a parameter ID. This defines the exact parameter that caused the error.

The following table presents the association between the parameter and parameter ID.

Table 9-3 Add info [errorAddInfo] for DR03

Parameter	Add info [errorAddInfo]
Scale name header	301
Scale name	302
Weight unit	303
Restriction code	304
Number of weighing ranges	305
Minimum weight weighing range 1	306
Maximum weight weighing range 1	307

Parameter	Add info [errorAddInfo]
Minimum weight weighing range 2	308
Maximum weight weighing range 2	309
Minimum weight weighing range 3	310
Maximum weight weighing range 3	311
Calibration weight 0	312
Calibration weight 1	313
Calibration weight 2	314
Calibration weight 3	315
Calibration weight 4	316
Calibration digits 0 (measured)	317
Calibration digits 1 (measured)	318
Calibration digits 2 (measured)	319
Calibration digits 3 (measured)	320
Calibration digits 4 (measured)	321
Scale interval weighing range 1	322
Scale interval weighing range 2	323
Scale interval weighing range 3	324
Scale parameters	325
Initial zero-setting	326
Initial zero-setting if tared	327
Automatic zero tracking device	328
Tare device	329
Weight simulation	330
Multi range / multi interval scale	331
Automatic zero-setting device	332
Automatic zero tracking in dosing cycle	334
Weighing range data in SecureDisplay	336
Gross indicator	337
Switch between AGFI / DTI Mode A	339
Maximum tare weight (% of max.)	359
Initial zero-setting device limit negative (% of max.)	362
Initial zero-setting device limit positive (% of max.)	363
Semi-automatic zero-setting device limit negative (% of max.)	364
Semi-automatic zero-setting device limit positive (% of max.)	365
Stability weight 1	366
Stability time 1 (s)	367
Maximum waiting time for stability 1 (s)	368
Delay time before stability 1 (s)	369
Stability weight 2	370
Stability time 2 (s)	371
Maximum waiting time for stability 2 (s)	372
Delay time before stability 2 (s)	373
Filter 1 period (s)	374

Parameter	Add info [errorAddInfo]
Filter 2 period (s)	375
Characteristic low pass filter	376
Ordinal number low pass filter	377
Cut-off frequency low pass filter	378
Operating mode	380
Totalization scale interval dt	381
Minimum totalized load	382
SecureDisplay interface	383
Stringheader FW-Version SecureDisplay	384
Version SecureDisplay	385
Smallest zoom factor of SecureDisplay (%)	386
Period of dosing filter	388

9.4.5 Add info [errorAddInfo] for DR05 and DR06

Table 9-4 Add info [errorAddInfo] for DR05 and DR06

Parameter	Add info [errorAddInfo]
Current preset-tare weight	501
Current semi-automatic tare weight	502
Current initial zero-setting weight	504
Current semi-automatic zero-setting weight	505
Current zero tracking weight	506
Dead load (calculated)	507
Reference (limits 1 and 2)	601
Limit 1 ON value	603
Limit 1 OFF value	605
Limit 2 ON value	607
Limit 2 OFF value	609
Reference (limit 3 - empty)	611
Limit 3 - empty	613
Switch-on delay limit 3 (empty) (s)	614

9.4.6 Add info [errorAddInfo] for DR07

Table 9-5 Add info [errorAddInfo] for DR07

Parameter	Add info [errorAddInfo]
Assignment digital input DI.0	701
Assignment digital input DI.1	702

Parameter	Add info [errorAddInfo]
Assignment digital input DI.2	703
Assignment CI	704
Filter DI.0 (0.1ms)	705
Filter DI.1 (0.1ms)	706
Filter DI.2 (0.1ms)	707
Filter CI (0.1ms)	708
Assignment digital output DQ.0	709
Assignment digital output DQ.1	710
Assignment digital output DQ.2	711
DQ monitoring	712
DQ substitute values	714
DQ.0 substitute value on error / CPU-Stop	715
DQ.1 substitute value on error / CPU-Stop	716
DQ.2 substitute value on error / CPU-Stop	717
Behavior on CPU stop / failure	723
DQ behavior on CPU stop / failure	724
DQ behavior on failure	725
Trace rate (ms)	731
Trace settings	732
Trace memory type	733
IP address x.n.n.n	755
IP address n.x.n.n	756
IP address n.n.x.n	757
IP address n.n.n.x	758
Subnetmask x.n.n.n	759
Subnetmask n.x.n.n	760
Subnetmask n.n.x.n	761
Subnetmask n.n.n.x	762
Gateway x.n.n.n	763
Gateway n.x.n.n	764
Gateway n.n.x.n	765
Gateway n.n.n.x	766
Stringheader Device Name	767
Device name	768
Unit Ident. Modbus connection 1	769
Modbus TCP Port number connection 1	770
Modbus settings connection 1	771
Enable connection	772
Byte swap for text fields	780
Byte swap for 16 bit tags	781
Byte swap for 32 bit tags (1 # 2, 3 # 4)	782
Word swap for 32 bit tags (1, 2 # 3, 4)	783
Unit Ident. Modbus connection 2	788

Parameter	Add info [errorAddInfo]
Modbus TCP Port number connection 2	789
Modbus settings connection 2	790
Enable connection	791
Byte swap for text fields	799
Byte swap for 16 bit tags	800
Byte swap for 32 bit tags (1 # 2, 3 # 4)	801
Word swap for 32 bit tags (1, 2 # 3, 4)	802
I/O process value 1	807
I/O process value 2	808
I/O process value 3	809
I/O process value 4	810
I/O process value 5	811
I/O process value 6	812
I/O process value 7	813
I/O process value 8	814
Event hardware interrupt 4	815
Event hardware interrupt 5	816
Event hardware interrupt 6	817
Event hardware interrupt 7	818
Event hardware interrupt 8	819
RS485 protocol	820
Source for weight simulation	821

9.4.7 Add info [errorAddInfo] for DR10

Table 9-6 Add info [errorAddInfo] for DR10

Parameter	Add info [errorAddInfo]
Load cell type	1001
AD converter settings	342
Power line frequency	343
Power line filter	344
Load cell parameter	1003
Connection technology	1004
External / internal sensor supply	1005
No. of mechanical support points	1020
Averaged load cell characteristic (mV/V)	1021
Nominal load of one single load cell	1022
Impedance reference (Ohm)	1023
Maximum impedance deviation (% of impedance reference)	1024
Stringheader load cell manufacturer	1026
Load cell manufacturer	1027

Parameter	Add info [errorAddInfo]
Stringheader load cell order number	1028
Load cell order number	1029

9.4.8 Add info [errorAddInfo] for DR20 to DR24

Table 9-7 Add info [errorAddInfo] for DR20 to DR24

Parameter	Add info [errorAddInfo]
Set point	2001
Total set point	2101
Maximum allowed total set point undercut	2102
Material in feed intake (pre-signal)	2103
Tolerance relation	2201
Tolerance limit TH2	2203
Tolerance limit TH1	2204
Tolerance limit TL1	2205
Tolerance limit TL2	2206
Behavior in case of TH1 error	2208
Behavior in case of TL1 error	2209
Pulse duration for pulse post dosing (s)	2211
Number of unchecked weighing cycles	2212
Capture of weighings into statistics	2213
Parameter relation	2301
Fine weight	2305
Trailing weight fine	2306
Blocking time coarse signal (s)	2307
Blocking time fine signal (s)	2308
Blocking time discharging (s)	2309
External triggered blocking time (s)	2310
Shut-off correction weight	2311
Trailing weight coarse	2312
Minimum material flow (weight/s)	2313
Coarse weight	2317
Blocking time extra coarse (s)	2318
Trailing weight extra coarse	2320
Parameter relation	2401
Type of controller	2402
Control factor of proportional controller (%)	2403
Control factor of fine time controller (%)	2404
Max. control access of proportional controller	2405
Proportional controller deadband - upper limit	2406
Proportional controller deadband - lower limit	2407

Parameter	Add info [errorAddInfo]
Bitfield: Controller settings	2408
Controller behavior in case of exceeding max. control access	2409
Intervention of fine time controller	2410
Set point fine time controller (s)	2430
Adopt corrected fine-/trailing values to DR23 automatically	2431
Max. control access of fine time controller	2433

9.4.9 Add info [errorAddInfo] for DR25 and DR28

Table 9-8 Add info [errorAddInfo] for DR25 and DR28

Parameter	Add info [errorAddInfo]
Maximum single set point	2501
Minimum automatic tare weight (% of max.)	2502
Maximum automatic tare weight (% of max.)	2503
Maximum weighing time (s)	2504
Reserve (for continuous mode, only relevant for GFI, is now triggered via commands)	2505
Weighing start options	2506
Cycle time for automatic zero setting (s)	2507
Number of weighings without automatic taring/zero setting	2508
Bitfield: Test stops	2509
Check stop after step 0	2510
Check stop after step 1	2511
Check stop after step 2	2512
Check stop after step 3	2513
Check stop after step 4	2514
Check stop after step 5	2515
Check stop after step 6	2516
Check stop after step 7	2517
Delete tare in weighing step 0	2529
Automatic discharging	2544
Discharge time (s)	2545
Discharge overlapping time (s)	2546
Maximum discharge time (s)	2547
No. of optimized loadings (OIML R-107)	2552
Dosing signals during extra coarse phase	2554
Dosing signals during coarse phase	2555
Additional string Stringheader	2801
Additional string	2802
Protocol settings	2803
Log with additional string	2804

9.5 Diagnostic messages

9.5.1 Error codes and corrective measures

Diagnostic results are displayed as plain text in STEP 7 (TIA Portal) via the online and diagnostic message view. Evaluate the error codes by means of the user program.

Error code	Message	Cause/Remedy
9_H	No supply voltage L+	An internal error has occurred. Possible cause: Electronic weighing system faulty. • Check the wiring of the 24 V connection on the Base-Unit. • Check the 24 V supply voltage.
10_H	Short circuit (EXC +/-)	Short-circuit at the load cell supply (EXC +/-). • Check the wiring of the load cells.
124_H	Undervoltage (SEN +/-)	The returned SEN voltage of the load cells is too low (< 5 V DC) • Check the wiring of the load cells. • Check the set load cell type; 4- or 6-conductor load cell type
7_H	Overload (SIG +/-)	The signal voltage of the load cells is ≥ +120% of the permissible range. • Check the wiring of the load cells. • Check the scale mechanics.
8_H	Underload (SIG +/-)	The signal voltage of the load cells is ≥ -+120% of the permissible range. • Check the wiring of the load cells. • Check the scale mechanics.
106_H	DQ short-circuit to ground	Short-circuit to ground at one of the digital outputs. • Check the wiring. • Check the connected actuator.

Reactions to a diagnostic interrupt

The following happens when an event occurs that triggers a diagnostic interrupt:

- The DIAG LED flashes red.
  When you have eliminated all errors, the DIAG LED stops flashing red and turns green.
- The S7-1500 CPU interrupts the processing of the user program. The diagnostic interrupt OB (e.g. OB 82) is called. The event that triggered the interrupt is entered in the start information of the diagnostic interrupt OB.
- The S7-1500 CPU remains in RUN even if no diagnostic interrupt OB is present in the CPU. The technology module continues working unchanged if this is possible despite the error.

You can obtain detailed information on the error event in the error organization block with instruction "RALRM" (Read additional alarm information), in the information system of STEP 7

and in function manual Diagnostics (https://support.industry.siemens.com/cs/ww/en/view/59192926), section "System diagnostics in user program".

If the module is being operated as a distributed module in an ET 200SP system with PROFIBUS DP, you have the option of reading out diagnostic data with the RDREC or RD_REC instruction using data record 0 and 1. You can find the structure of the data records in the manual for the IM 155-6 DP HF interface module available for download on the Internet (https://support.industry.siemens.com/cs/ww/de/view/73098660).

9.5.2 Meaning of the LEDs

The following figure shows the LEDs (status and error displays) of the electronic weighing system.

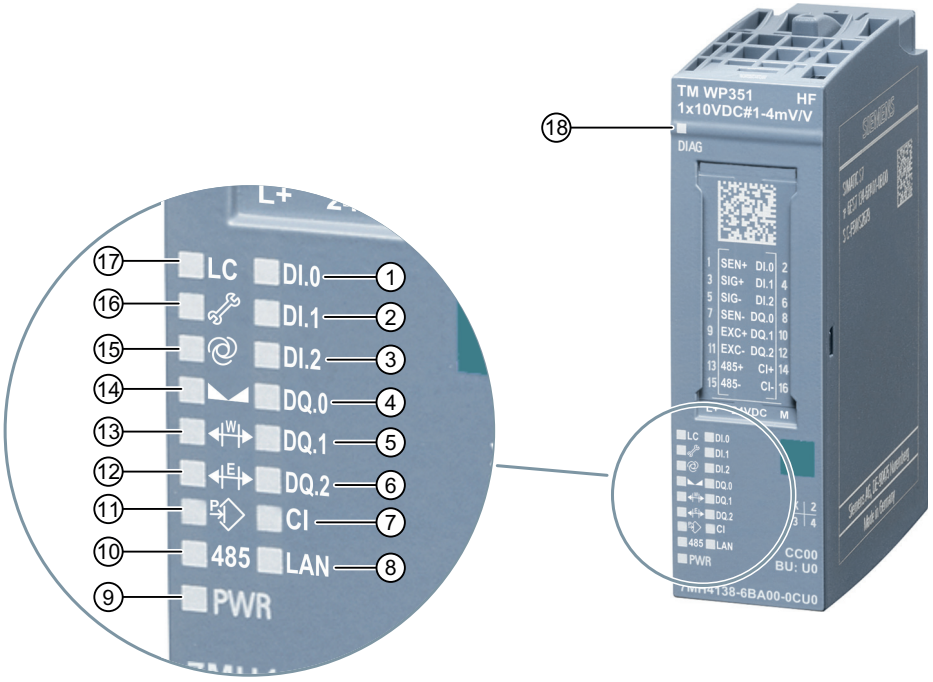


Figure 9-1 LEDs on the electronic weighing system

Table 9-9 Legend

LEDs			Meaning	Solution
①	DI.0	Green/off	Input is not active	-
		Green/on	Input is active	-
②	DI.1	Green/off	Input is not active	-
		Green/on	Input is active	-

LEDs			Meaning	Solution
③	DI.2	Green/off	Input is not active	-
		Green/on	Input is active	-
④	DQ.0	Green/off	Output is not active	-
		Green/on	Output is active	-
		Green/ flashing	Fault at DQ.0, 1 or 2	• Check the wiring of the outputs.
⑤	DQ.1	Green/off	Output is not active	-
		Green/on	Output is active	-
		Green/ flashing	Fault at DQ.0, 1 or 2	• Check the wiring of the outputs.
⑥	DQ.2	Green/off	Output is not active	-
		Green/on	Output is active	-
		Green/ flashing	Fault at DQ.0, 1 or 2	• Check the wiring of the outputs.
⑦	CI	Green/off	Input is not active	-
		Green/on	Input is active	-
⑧	LAN	Green/off	No Ethernet connection	-
		Green/on	Ethernet connection established	-
		Green/ flashing	Ethernet connection is active	-
⑨	PWR	Green/off	No supply voltage L+	• Check the supply voltage. • Check the BaseUnit type and the wiring of the BaseUnit.
		Green/on	Supply voltage L+ present and OK	-
⑩	485	Green/off	Serial communication is not active	-
		Green/on	Serial communication is active	-
⑪		Green/off	Parameter write protection is not active	-
		Green/on	Parameter write protection is active	-
⑫		Yellow/off	Weight outside of the empty range	-
		Yellow/on	Weight within the empty range	-

LEDs			Meaning	Solution
⑬		Yellow/off	Weight within the weighing range	-
		Yellow/on	Weight outside of the weighing range	-
⑭		Green/flashing	Stability 1 is not available	-
		Green/on	Stability 1 is available	-
⑮		Green/off	No automatic weighing cycle is active	-
		Green/on	Automatic weighing cycle is active	-
		Green/flashing	Stopped dosing cycle	-
⑯		Yellow/off	Service mode is not active	-
		Yellow/on	Local Web server access is enabled	-
		Yellow/flashing	Service mode is active	-
⑰	LC Load cell	Green/off	Sensor connection faulty	Check the wiring of the load cells.
		Green/on	Sensor connection OK	-
⑱	DIAG	Green/off	Backplane bus supply of the ET 200SP not OK	Check or switch on the supply voltage on the interface module.
		Green/flashing	Electronic weighing system not parameterized	-
		Green/on	Electronic weighing system parameterized and no diagnostics	-
		Red/flashing	Electronic weighing system parameterized, there is at least one error.	Evaluate the diagnostic alarms and eliminate the error.

Corrective measures for diagnostics alarms can be found in section Error codes and corrective measures (Page 144).

9.6 Hardware interrupts

Introduction

Configure which events during operation are to trigger a hardware interrupt for the electronic weighing system.

What is a hardware interrupt?

In accordance with the parameters assigned, the electronic weighing system triggers a hardware interrupt when certain events or states occur.

When a hardware interrupt occurs, the CPU interrupts execution of the user program and processes the associated hardware interrupt organization block (OB). The event that triggered the interrupt is entered in the start information of the assigned hardware interrupt OB by the CPU.

If different components are dosed into a scale, for example, the hardware interrupts can be used to achieve maximum accuracy. The electronic weighing system signals, for example, the hardware interrupt "Coarse flow (incoming)" directly after dosing has started. The corresponding valve/slider or similar is switched directly in the hardware interrupt OB of the PLC due to a logical operation from the hardware interrupt information and the address of the corresponding output. This procedure achieves a high operating speed and therefore accuracy when dosing multiple components. If only one component is dosed, you should use the digital outputs of the module to achieve the highest possible reaction speed.

Hardware interrupt lost

If the previous event was not yet processed, "Hardware interrupt lost" is triggered.

See also

Commissioning the electronic weighing system with TIA Portal (Page 38)

Technical data

10

10.1 General information

Article number	7MH4138-6BA00-0CU0
General information	
Product type designation	Technology module TM SIWAREX WP351 HF
Firmware version	V1.0
• FW update possible	Yes
usable BaseUnits	BU type U0
Reliability	
Mean Time Between Failure MTBF	60 years @T_A = 40 °C (continuous operation)
Product function	
I&M data	Yes; I&M0 to I&M3
Engineering with	
• STEP 7 TIA Portal can be configured/integrated as of version	Configurable as of V15 using HSP0281
• PROFIBUS as of GSD version/GSD revision	GSD revision 5
• PROFINET as of GSD version/GSD revision	GSDML V2.3
Supply voltage	
Load voltage L+	
• Rated value (DC)	24 V
• Permissible range, low limit, static (DC)	19.2 V
• Permissible range, high limit, static (DC)	28.8 V
• Permissible range, low limit, dynamic (DC)	18.5 V
• Permissible range, high limit, dynamic (DC)	30.2 V
• Polarity reversal protection	Yes
• Non-periodic overvoltages	35 V DC for 500 ms with a recovery time of 50 s
Input current	
Current consumption, max.	max. 140 mA @ 24 V DC + [DQ 3 x 0.5 A]
Power loss	
Typical power loss	1.7 W

Address area	
Assigned address area	
• Inputs	32 bytes
• Outputs	32 bytes
Power supply from SIMATIC S7 backplane bus	
Current consumption ET 200SP backplane bus	max. 27 mA @ 3.5 V (SBK4)

10.2 Analog load cell interface connection

Article number		**7MH4138-6BA00-0CU0**
Analog load cell interface connection		
Error limit according to DIN 1319-1 at 20 °C +/-10 K Relative accuracy (absolute accuracy can only be achieved with local calibration with calibration standards)		≤ 0.002% v.E.
Measuring accuracy in accordance with OIML R76-1:2006/EN45501:2015 (not certified)	Class	III
	Resolution (d=e)	3 x 6000 d
	Error percentage pi	0.4
	Step voltage	0.5 µV/e
Accuracy delivery state Accuracy for module exchange or theoretical calibration decisive		typ. 0.1% v.E.
Sampling rate		1.024 ms
Input signal resolution		±20,000,000
Measuring ranges		0 ... ±1 mV/V 0 ... ±2 mV/V 0 ... ±4 mV/V
Common mode voltage range		+2.8 … 7.7 V
DMS supply (constant voltage)		10 V DC (+ 1% / - 3%) at the EXC terminals
Short-circuit and overload protection		Yes
Connection		6-wire or 4-wire (parameterizable)
Sensor voltage monitoring		typ. ≤ 5.0 V
Min. DMS input resistance per channel	without Ex-i interface SIWAREX IS	56 Ω Low impedance by means of external supply possible
	with Ex-i interface SIWAREX IS	87 Ω @ Type 7MH4710-5BA 180 Ω @ Type 7MH4710-5CA
Max. DMS resistance		4,100 Ω
Temperature coefficient range		≤ ±5 ppm/K
Temperature coefficient zero point		≤ ±0.015 µV/K
Linearity error		≤ 0.001 %
Measured value filtering		Low-pass and average value filter parameterizable (DR3)
Electrical isolation		500 V AC
50 Hz / 60 Hz noise suppression CMRR		> 80 dB
Input resistance	Signal cable	typ. $8*10^6$ Ω
	Sensor cable	typ. $300*10^6$ Ω
Cable length When using SIWAREX cable 7MH4702-8AG		max. 500 m

10.3 Digital inputs DI

The digital inputs are non-isolated with the ground of the electronic weighing system supply voltage 24 V.

Article number	7MH4138-6BA00-0CU0
Digital inputs	
Number of inputs	3
Input voltage	
• Rated value (DC)	24 V
• Permitted voltage at input, max.	30 V DC
• Current consumption @ 24 V DC	1.6 mA
• Voltage surge	35 V DC for 0.5 s
• Logical signal level 1 (min.)	11 V DC, input current typ. ≤.1.45 mA
• Logical signal level 0 (max.)	5 V DC, input current ≤ 0.2 mA
• Signal frequency	0 … 100 Hz
• Sampling rate (firmware)	1 ms
• Filtering can be parameterized (data record 7) • Signal changes that are shorter than the programmed time are not recorded.	0 ... 40 ms in intervals of 5 ms
• Electrical isolation	500 V AC
• Type in accordance with EN 61131-2:2017	Type 3

10.4 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.

Article number	7MH4138-6BA00-0CU0
Digital outputs	
Number of outputs	3 (high-side switch)
Short-circuit protection	Yes
Supply voltage range Supply voltage DQ via electronic weighing system supply	19.2 ... 28.8 V DC
Output switching capacity	
• With resistance load, max.	0.5 A
Total current of the outputs	
• Current per electronic weighing system, max.	1.5 A With a total current ≥ 0.6 A, reduce the ambient temperature by -1 °C per 100 mA.
Refresh rate of the firmware	1 ms

Article number	7MH4138-6BA00-0CU0
Output delay with resistive load	typ. 16 µs turn-on typ. 29 µs turn-off
RDSON	< 0.2 Ω
Electrical isolation	500 V AC
Cable length	
• Shielded, max.	500 m
• Unshielded, max.	150 m

10.5 Counter input CI

The counter input is isolated from L+ / M of the 24 V supply voltage of the electronic weighing system but can also be used as standard DI.

Article number	7MH4138-6BA00-0CU0
Digital inputs	
Number of inputs	1
Input voltage	
• Rated value (DC)	24 V
• Current consumption @ 24 V DC	1.6 mA
• Permitted voltage at input, max.	30 V DC
• Voltage surge	35 V DC for 0.5 s
• Logical signal level 1 (min.)	11 V DC, input current ≤.1.45 mA
• Logical signal level 0 (max.)	5 V DC, input current ≤.0.2 mA
• Signal frequency	0 … 9 kHz
• Sampling rate (firmware)	1 ms (with use as digital input DI)
• Filtering can be parameterized (data record 7) Signal changes that are shorter than the programmed time are not recorded.	0 ... 40 ms in intervals of 5 ms
• Electrical isolation	500 V AC
• Type in accordance with EN 61131-2:2017	Type 3

10.6 RS-485 interface

Article number	7MH4138-6BA00-0CU0
Standard	EIA-485
Transmission protocol	Can be parameterized
Baud rate	Up to 115 Kbps
Data bits	7 or 8
Parity	even | odd | none

Article number	7MH4138-6BA00-0CU0
Stop bits	1 or 2
Terminating resistors (permanently installed)	390 Ω / 220 Ω / 390 Ω
Electrical isolation	500 V AC
Cable length	≤ 115 Kbps max. 1,000 m (fieldbus cable 2-wire, shielded, e.g. 6XV1830-0EH10)

10.7 Ethernet

Article number	7MH4138-6BA00-0CU0
Standard	IEEE 802.3
Transmission speed	10/100 Mbps (determined automatically)
Electrical isolation	1500 V AC
Transmission protocols	TCP/IP, Modbus TCP (TCP port 502), HTTP (TCP port 80)
Autonegotiation	Yes
Auto MDI-X	Yes
Cable length	
• Unshielded, max.	50 m (Cat-5e UTP cable)
• Shielded, max.	100 m (Cat-5e SF/UTP cable)

10.8 Dimensions and weights

Article number	7MH4138-6BA00-0CU0
Dimensions (packaged)	30 x 67 x 75 mm
Dimensions (without packaging)	20 x 57 x 72 mm
Weight (packaged)	0.070 kg

10.9 Mechanical requirements and data

Article number	7MH4138-6BA00-0CU0
Operating conditions in accordance with IEC 60721	
• Operation	IEC60721-3-3 Class 3M3, stationary use, weather-proofed
• Storage/transport	IEC 60721-3-2 Class 2M2 without precipitation
Testing	
Vibrational load during operation	

Article number	7MH4138-6BA00-0CU0
• IEC 61131-2:2017 • IEC 60068-2-6:2007 • Test Fc	5 ... 8.4 Hz: 3.5 mm out. 8.4 to 150 Hz: 9.8 m/s^2 (= 1 G)
Shock load during operation	
• IEC 61131-2:2017 • IEC 60068-2-27:2008 • Test Ea	150 m/s^2 (approx. 15 G), half sine Duration: 11 ms
Vibration load during transport	
• IEC 60068-2-6:2007 • Test Fc	5 ... 8.4 Hz: 3.5 mm Exh. 8.4 ... 500 Hz: 9.8 m/s^2
Shock load during transport	
• IEC 60068-2-27:2008 • Test Ea	250 m/s^2 (approx. 25 G), half-sine Duration: 6 ms
Free fall	
• IEC 61131-2:2017	In product packaging: 300 mm drop height
• IEC 60068-2-31:2008 • Test Ec, procedure 1	In shipping package: 1.0 m drop height

10.10 Electrical, EMC and climatic requirements

Article number	7MH4138-6BA00-0CU0	
Product safety		
Safety regulations	IEC 61010-1:2016 UL 61010-1:2012 IEC 61010-2-201:2013 IEC 61131-2:2017 UL 508:2003 CSA C22.2 No.142	
Protection class	IEC 61140:2016 IEC 61131-2:2017	To maintain the safety characteristics of extra-low voltage circuits, external connections to communications ports, analog circuits, as well as all 24 V DC nominal power supplies and all I/O circuits must be powered by approved sources that fulfill the requirements according to the various standards for SELV, PELV, NEC Class 2, voltage limited or power limited. The ground connection for the DIN rail serves as a functional ground for dissipating interference currents.
IP degree of protection	IEC 60529:2014	IP 20: Protection against contact with standard probe Protection against solid bodies with diameters in excess of 12.5 mm No special protection against water

Article number	**7MH4138-6BA00-0CU0**	
Air gaps and creepage distances	IEC 61131-2:2017 IEC 61010-1:2016 UL 61010-2-201:2018 CSA C22.2, No. 142	Overvoltage category II Pollution degree 2
Isolation stability	IEC 61131-2:2017 CSA C22.2, No. 142 UL 61010-2-201:2018	Ethernet port: 1 500 V AC Other electrical circuits: Test voltage: 500 V AC or 707 V DC
Use in hazardous areas	IEC 60079-0:2017 IEC 60079-15:2016	When using the electronic weighing system in a hazardous area, observe the ATEX/IECx special conditions for use (Page 17).
Electromagnetic compatibility	IEC 61000-6-2:2016 IEC 61000-6-4:2018	All shielded cables must be grounded at both ends to comply with the requirements for electromagnetic compatibility. If the shielded cable is routed out of the hazardous area for explosion-proof equipment, both ends of the cable shield must be connected to the potential equalization. To comply with the requirements for lightning strikes, additional measures are required (see footnote Table 12-14) for installation in Zone A according to IEC 61131-2.
Electromagnetic compatibility		
Interference emission in industrial area in accordance with EN 61000-6-4		
Emission of radio interference (interference field strength)	Class A industrial environment: IEC 61000-6-4: 2018 IEC/CISPR 16-2-3: 2008 EN55016-2-3:2006	30 ... 230 MHz, 40 dBµV/m Q 230 ... 1000 MHz, 47 dBµV/m Q 1 ... 3 GHz / 76 dBµV/m peak, 56 dBµV/m average 3 ... 6 GHz / 80 dBµV/m
Emission on power supply cables	Class A: Industrial environment: IEC 61000-6-4: 2018 IEC/CISPR 16-2-1:2010 EN 55016-2-1: 2009	Class A: Industrial environment 0.15 ... 0.5 MHz, 79 dBµV Q 0.15 ... 0.5 MHz, 66 dBµV M 0.5 ... 30 MHz, 73 dBµV Q 0.5 ... 30 MHz, 60 dBµV M
Emission conducted Ethernet	EN 61000-6-4:2018 IEC/CISPR 22: 2008 EN55022: 2010	0.15 ... 0.5 MHz: 53 ... 43 dBµV Q 40 ... 30 dBµV M 0.5 ... 30 MHz: 43 dBµV Q / 30 dBµV M

Article number	**7MH4138-6BA00-0CU0**	
Interference immunity in industrial area in accordance with EN 61000-6-2		
Burst pulses on power supply cables	EN 61000-4-4:2004 EN 45501:2015 OIML R 76:2006 NAMUR NE21:2011 EN 61326-1:2006 EN 61131-2:2017	±1.0 kV / ±2.0 kV 5/50 ns/5 kHz
Burst pulses on data and signal cables		±2.0 kV 5/50 ns/5 kHz
Electrostatic discharge (ESD)	EN 61000-4-2:2009 EN 45501:2015 OIML R 76:2006 NAMUR NE21:2011 EN 61131-2:2017	2, 4, 6 kV direct/indirect
Electrostatic air discharge (ESD)		2, 4, 6, 8 kV
Surge on power supply cables	IEC 61131-2 :2017 NAMUR NE21 :2011 OIML R76 -2:2006 EN 61000-4-5 :2015 EN 45501:2015	±1.0 kV line to line ±2.0 kV line to earth Power supply lines: ±0.5 kV line to line ±1.0 kV line to earth ±2.0 kV line to earth & line to line[1)]
Surge on data and signal cables shielded		±2.0 kV shield to ground
Surge on data and signal cables unshielded		0.5 kV / 2 kV[2)]
Electromagnetic RF fields	IEC 61131-2 :2017 NAMUR NE21 :2011 OIML R76-2 :2006 EN 61000-4-3:2011 EN 45501:2015	80 MHz ... 6 GHz: 10 V/m
Induced conducted interference	IEC 61131-2 :2017 NAMUR NE21 :2011 OIML R76-2 :2006 EN 61000-4-6 :2015	10 kHz ... 80 MHz: 10 V_{rms}

1) An external fuse must be provided to comply with the requirement (e.g. Lightning conductor BVTAD24, Dehn & Söhne company)

2) An external fuse must be provided to comply with the requirement (e.g. Lightning conductor BSPM4BE24, Dehn & Söhne company)

10.11 Ambient conditions

Article number		7MH4138-6BA00-0CU0
Operating conditions in accordance with IEC 60721		
• Operation		IEC60721-3-3: Class 3K3, stationary use, weather-proofed
• Storage/transport		IEC 60721-3-2 Class 2K4 without precipitation
Ambient conditions		
Ambient temperature in operation		
• Horizontal mounting, min.		-30 °C[1)2)]
• Horizontal mounting, max.		+60 °C[1)2)]
• Vertical mounting, min.		-30 °C[1)2)]
• Vertical mounting, max.		+50 °C[1)2)]
• Legal-for-trade operation, min.		-10 °C
• Legal-for-trade operation, max.		+40 °C
Storage and transport temperature		-40 ... +70 °C
Relative humidity		5 ... 95% No condensation; corresponds to relative humidity (RH) stress level 2 to DIN IEC 61131-2
Contaminant concentration		SO_2: < 0.5 ppm H_2S: < 0.1 ppm;
Air pressure	Operation	IEC 60068-2-13 1,080 ... 533 hPa (-1 000 ... +5,000 m above sea level)[1)]

1) At a height of more than 2000 meters above sea level, reduce the ambient temperature by -1 °C per 100 m. The maximum permissible height is 5000 meters above sea level.

2) With a total current ≥ 0.6 A of the digital outputs DQ, reduce the ambient temperature by -1 °C per 100 mA. The maximum permissible total current is 1.5 A.

10.12 Certificates and approvals

The approvals are available online at Certificates (https://support.industry.siemens.com/cs/ww/en/ps/7MH4138-6BA00-0CU0/cert).

When using the electronic weighing system in a hazardous area, observe the ATEX/IECx special conditions for use (Page 17).

Note

The current approvals for your device can be found on the nameplate.

Symbol	Standard	Marking
		→ CE approval
	Explosion protection in accordance with c-UL-us (USA/Canada)	ANSI / ISA 12.12.01 CSA C22.2 No. 213-M1987 CL. I, Div. 2 GP.A.B.C.D T.. T4 CL. I, Zone 2, GP. IIC, T.. T4 Report no.: E239877
	Explosion protection in accordance with ATEX DEKRA 19ATEX0094 X EN IEC 60079-0 : 2018 EN 60079-7 : 2015 + A1 : 2018	II 3 G Ex ec IIC T.. Gc
	Explosion protection in accordance with IE-CEx DEK 19.0054X IEC 60079-0 : 2017 (Ed.7) IEC 60079-7 : 2015 (Ed.5.1)	Ex ec IIC T.. Gc
		→ EAC certificate, available soon
		→ Tick mark for Australia and New Zealand
		→ KCC approval
		→ The electronic weighing system is RoHS-compliant according to EU Directive 2016/65/EU

Product documentation and support

A

A.1 Product documentation

Product documentation for process instrumentation is available in the following formats:

- Certificates (http://www.siemens.com/processinstrumentation/certificates)
- Downloads (firmware, EDDs, software) (http://www.siemens.com/processinstrumentation/downloads)
- Catalogs and technical data sheets (http://www.siemens.com/processinstrumentation/catalogs)
- Manuals (http://www.siemens.com/processinstrumentation/documentation)
  You have the option to view, open, save or configure the manual.
  - "Display": The manual opens in HTML5 format.
  - "Configure": You can register and configure the specific documentation for your plant here.
  - "Download": The manual is opened or saved in PDF format.
  - "Download as html5, only PC": The manual is opened or saved in HTML5 view on your PC.

You can also find manuals at Industry Online Support (https://support.industry.siemens.com/cs/ww/de/sc/2067) using the mobile app. Download the app to your mobile device and scan the QR code.

See also

Generally applicable information/SIMATIC manual overview (https://support.industry.siemens.com/cs/ww/en/view/109742709)

A.2 Technical support

Technical support

If this documentation does not completely answer your technical questions, you can enter a Support Request (http://www.siemens.com/automation/support-request).

Additional information on our technical support can be found at Technical Support (http://www.siemens.com/automation/csi/service).

Service & support on the Internet

In addition to our technical support, Siemens offers comprehensive online services at Service & Support (http://www.siemens.com/automation/serviceandsupport).

Contact

If you have further questions about the device, contact your local Siemens representative at Personal Contact (http://www.automation.siemens.com/partner).

To find the contact for your product, go to "all products and branches" and select "Products & Services > Industrial automation > Process instrumentation".

Contact address for business unit:
Siemens AG
Digital Industries
Process Automation
Östliche Rheinbrückenstr. 50
76187 Karlsruhe, Germany

SIWAREX support

- Email (mailto:hotline.siwarex@siemens.com)
- Phone: +49 (721) 595-2811 CET 8:00 to 17:00

Ordering data

B

B.1 Accessories

You can order accessories online: Industry Mall (https://mallstage.industry.siemens.com/mall/en/b0/Catalog/Products/10038765?tree=CatalogTree)

The following accessories are not included in the scope of delivery:

- **Mandatory**: BaseUnit of the type U0, article number 6ES7193-6BP00-0xU0
  An overview of the BaseUnits that you can use with the electronic weighing system can be found in the Product Information for the documentation of the ET 200SP Distributed I/O System (http://support.automation.siemens.com/WW/view/en/73021864).
  Information regarding selection of the suitable BaseUnit can be found in the ET 200SP Distributed I/O System (http://support.automation.siemens.com/WW/view/en/58649293) system manual and in the ET 200SP BaseUnits (http://support.automation.siemens.com/WW/view/en/58532597/133300) manual.
- Labeling strips
- Color-coded labels
- Equipment labeling plates
- Shield connection
- Calibration set

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