

SIMATIC

ET 200SP Technology Module TM SIWAREX WP341 HF

Operating Instructions

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7MH4138-6CA00-0CU0

Legal information

Warning notice system

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

DANGER

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

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.

Proper use of Siemens products

Note the following:

WARNING

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

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Disclaimer of Liability

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

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Introduction

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/cert>.

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.

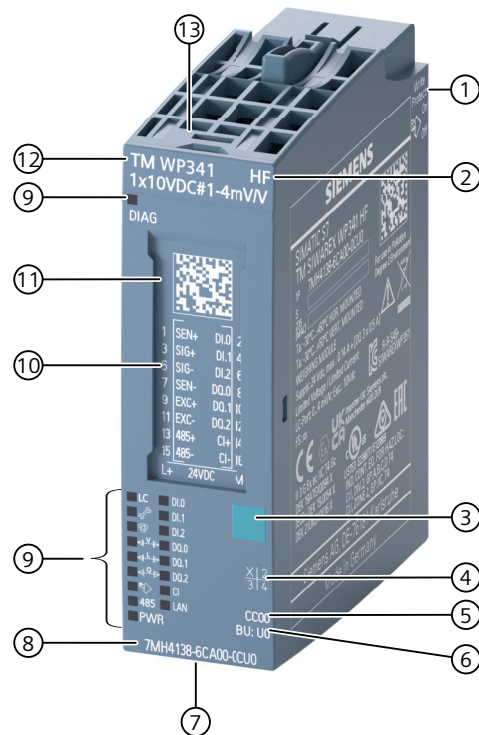
For legal reasons, we are obliged to publish the original text of the license conditions and copyright notices. Please read the information on this on the Internet (<https://support.industry.siemens.com/cs/ww/en/view/109740777>).

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 54). 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

2.1 View



- | | |
|--|--|
| ① Rear: Write protection switch | ⑧ Article number |
| ② Function class | ⑨ LEDs (Page 108) |
| ③ Color coding electronic weighing system type | ⑩ Wiring diagram |
| ④ Function version | ⑪ 2D matrix code |
| ⑤ Color code for selection of the color-coded labels | ⑫ Electronic weighing system type and designation |
| ⑥ BaseUnit type | ⑬ Button in enclosure for emergency access to the Web server |
| ⑦ Below: Ethernet | |

Figure 2-1 View of the electronic weighing system

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
 - ±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 filter for suppression of interferences at encoder inputs and parameterizable digital inputs
- Internal protocol 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	V16	X	—
I&M identification data	V1.0 or higher	V16	X	X
Centralized operation on CPU 151xSP	V1.0 or higher	V16	—	—

Installing

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 111).

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 Connecting (Page 21)

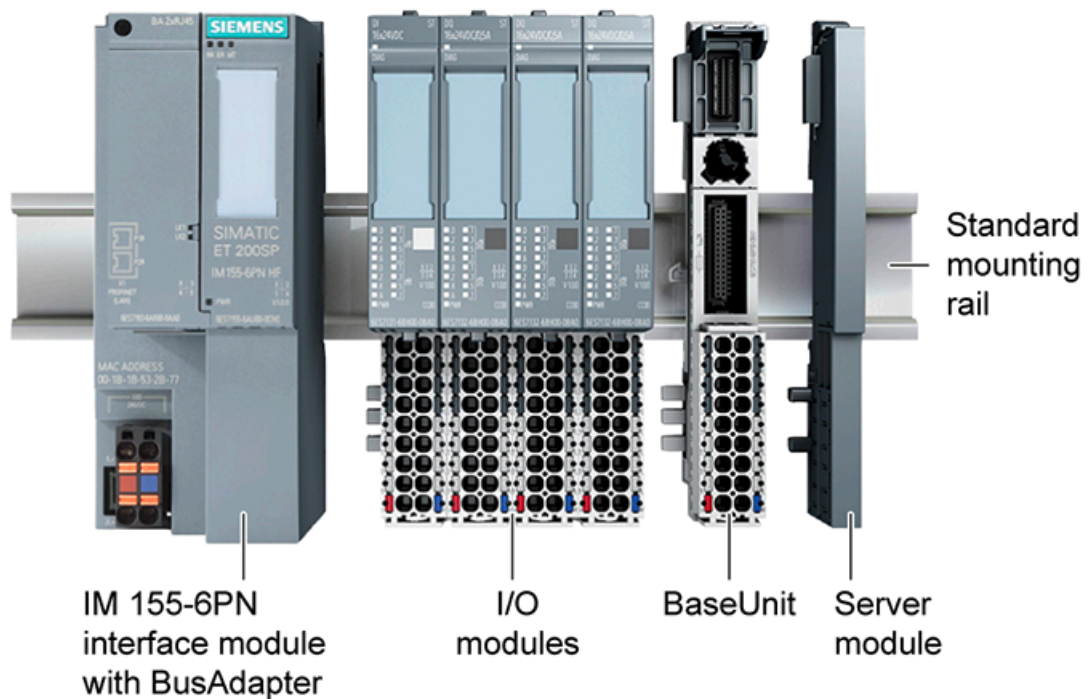


Figure 3-1 Mounting on the SIMATIC ET 200SP

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).
- Make screw connections on painted or anodized metal parts either with special contact washers or remove the insulating protective layers at the contact points.
- 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 beams, 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.
- To connect the signal cables, use the corresponding SIMATIC ET 200SP shield supports with order number 6ES7193-6SC00-1AM0.

Rule 4: Special EMC measures

- All inductors that are to be controlled should be connected with suppressors.
- For cabinet lighting in the immediate range of your controller, use 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

4.1 Basic safety notes

WARNING

Safety extra low voltage

The equipment is designed for operation with a directly connectable safety extra low voltage (SELV) from a limited power source (LPS). (This does not apply to 100 V...240 V devices).

The power supply therefore needs to meet at least one of the following conditions:

- Only safety extra low voltage (SELV) with limited power source (LPS) complying with IEC 60950-1 / EN 60950-1 / VDE 0805-1 or IEC 62368-1 / EN 62368-1 / VDE 62368-1 may be connected to the power supply terminals.
- The power supply unit for the device must meet NEC Class 2 according to 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.

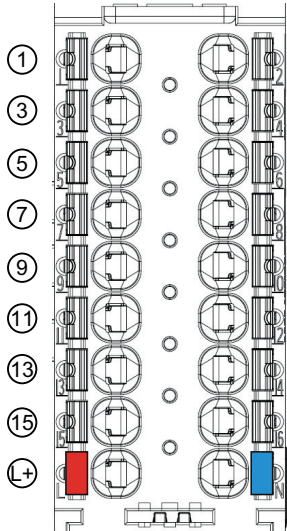
! WARNING

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/73021864>) 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 System Manual ET 200SP Distributed I/O System (<http://support.automation.siemens.com/WW/view/en/58649293>) in 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 4-wire load cells in the factory.

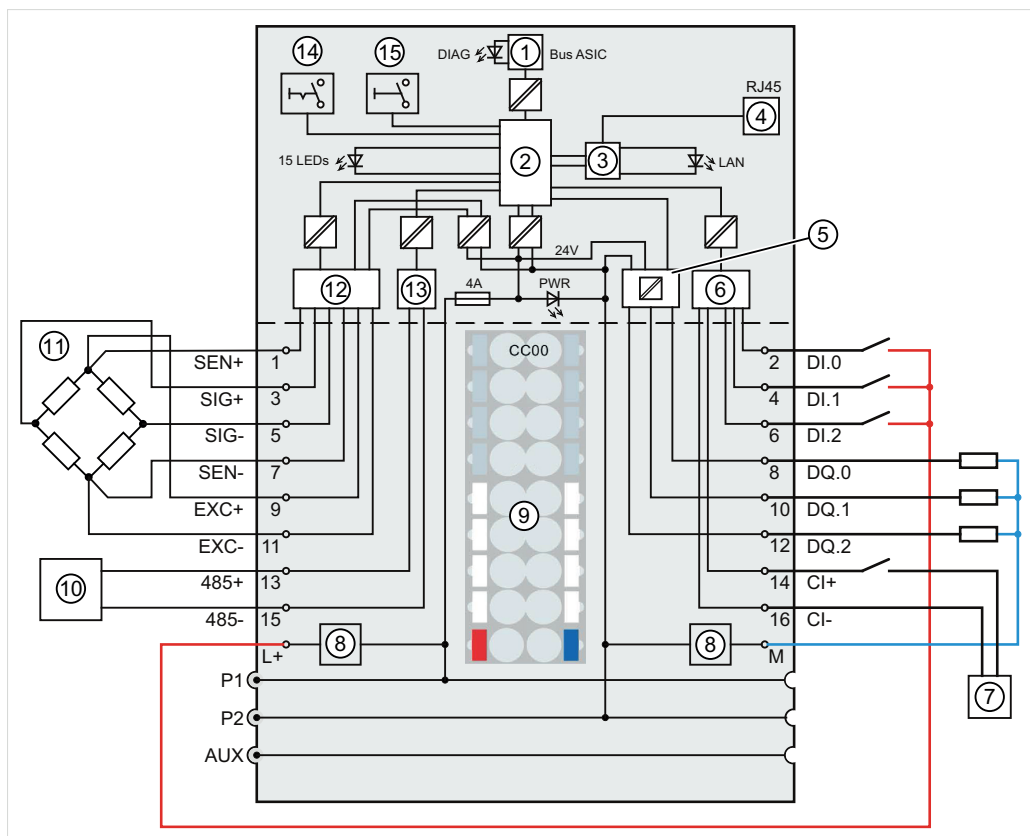
If the power of the electronic weighing system-internal power supply of the load cells is not sufficient, use an external power supply source to supply the load cells.

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 interface for the operation of SIWAREX DB |
| ⑥ Input electronics | ⑭ Write protection |
| ⑦ Counter input for speed signal | 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 scale functions freely and individually to the digital inputs within DR 7. No functions are assigned to the inputs at the factory. Optionally, you can configure the inputs as standard inputs for the user program so that there is no direct reference to the belt scale.

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 scale status freely and individually to the digital inputs within the DS 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 Technical data (Page 111).

Counter input CI

The counter input CI is used for measuring 24 V signal frequencies up to 9 kHz. Connect a speed sensor to the CI input.

In case of constant belt speed, a binary 24 V can be used as status signal "belt on" (=24 V) or "belt off" (0 V). The behavior of the CI input adapts according to the parameterization in DR3.

Ethernet

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

Note

To ensure a secure hold of the periphery module, there should be no permanent connection with an Ethernet cable.

4.3 Connection of analog load cells

Sensors equipped with expansion measuring strips (EMS) can be connected to the electronic weighing system. These sensors meet the requirements in section Technical data (Page 111).

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 26).
To learn how to connect the cable, see section Connecting cables to SIWAREX JB (Page 29).
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

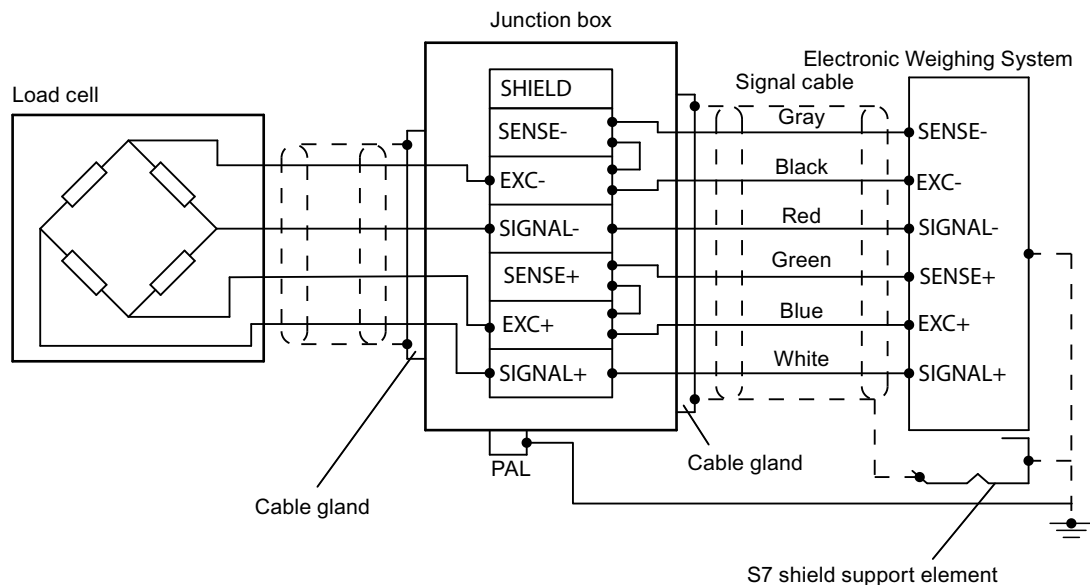


Figure 4-2 Cable shield of the signal cable connected to EMC cable gland

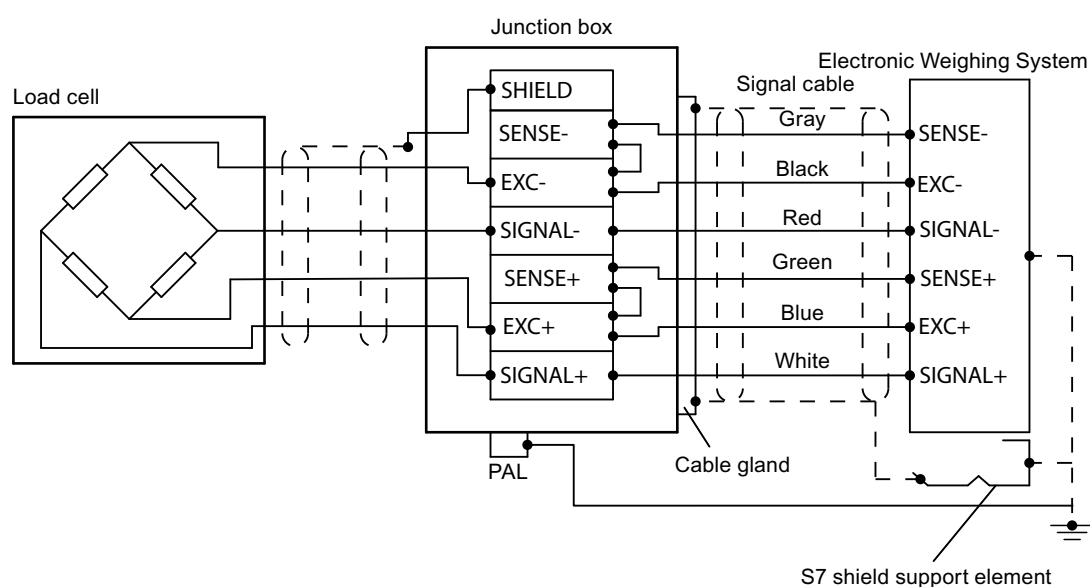


Figure 4-3 Cable shield of the signal cable connected to shield terminal

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

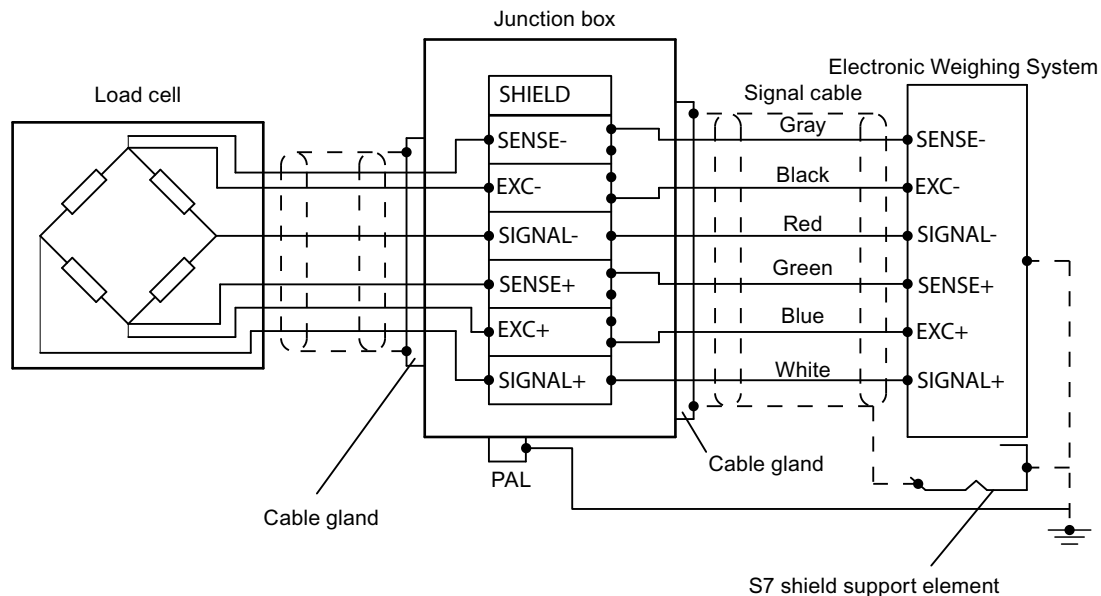


Figure 4-4 Cable shield of load cell cable connected to EMC cable gland

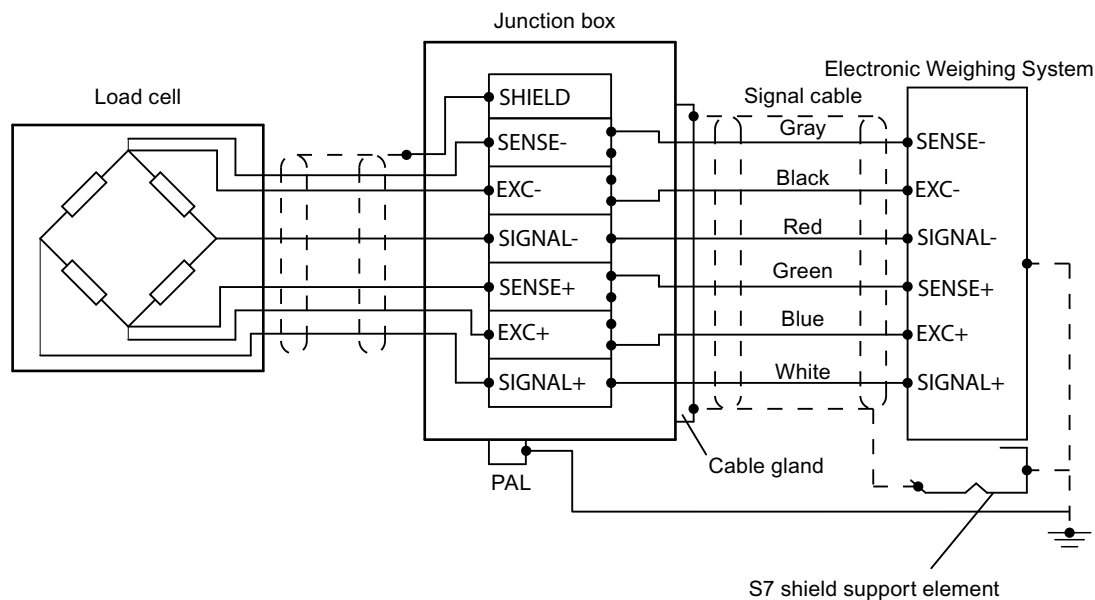


Figure 4-5 Cable shield of load cell cable connected to shield terminal

- 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.

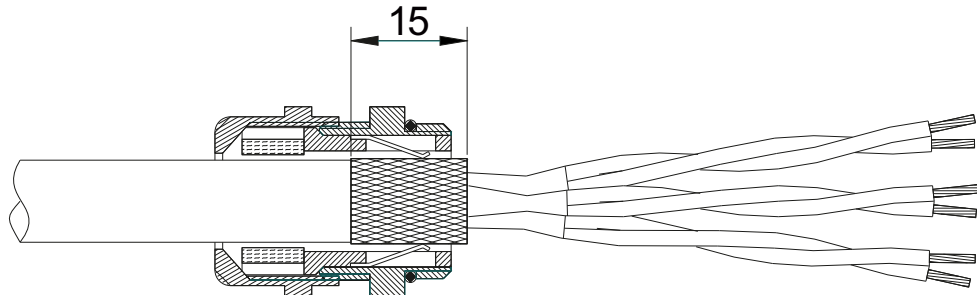


Figure 4-6 Place the cable shield in the EMC cable gland

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.

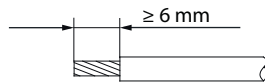


Figure 4-7 Strip cable

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 (Page 111).

Result

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

4.4 Connection of the SIWAREX DB

The digital junction box SIWAREX DB allows connection of up to 4 analog load cells. SIWAREX DB has 4 separate AD converters and thus digitizes each load cell separately.

In addition to the actual measured value, the following **extended diagnostics data** are available for each individual load cell:

- Current signal voltage in millivolts
- Wire-break monitoring

4.4 Connection of the SIWAREX DB

- Current input resistance in ohms
- Current "excitation current" in mA etc.

In the event of a defective load cell, the electronic weighing system reports the affected load cell. Service as well as commissioning are significantly facilitated and accelerated.

SIWAREX DB also enables digital adjustment of different load cell characteristics (corner load compensation).

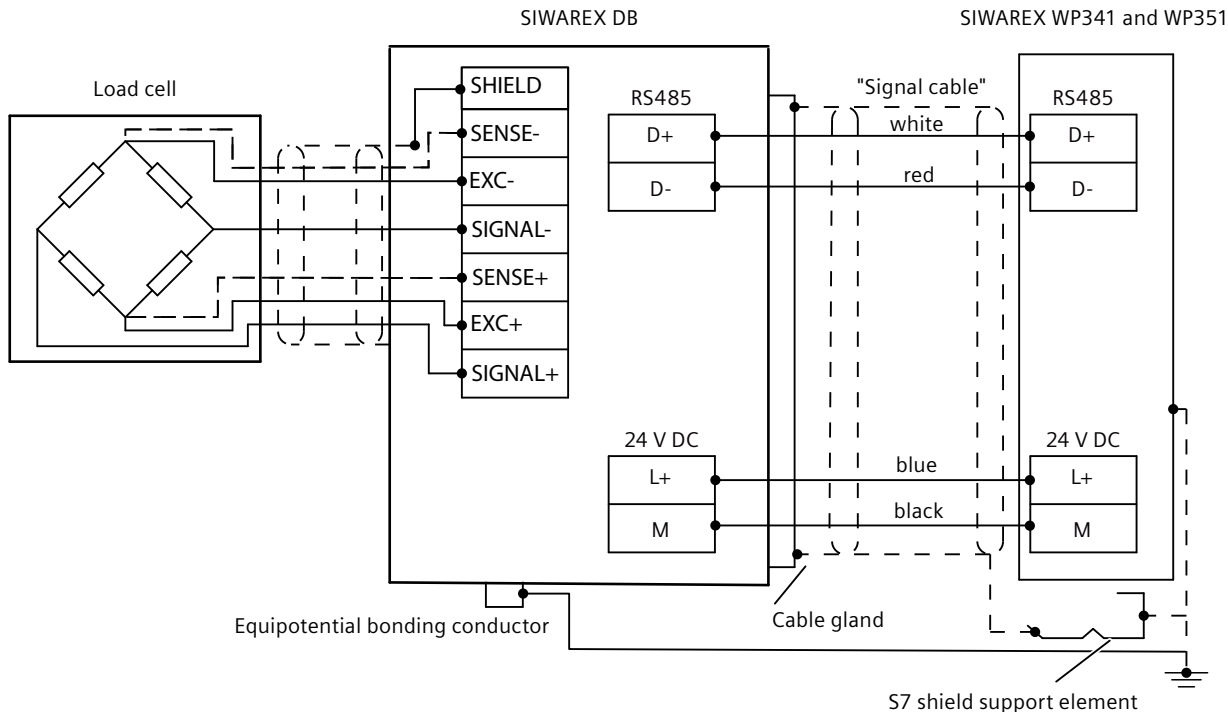
4.4.1 Connecting the SIWAREX DB to WP341 and WP351

Procedure

1. Open the cover of the SIWAREX DB.
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 SIWAREX WP electronic weighing system.
4. Attach the cables from SIWAREX DB to the load cell and the SIWAREX WP electronic weighing system.

Connect the cable (Page 31)

The maximum distance between SIWAREX DB and the WP electronic weighing system is 1000 m when using the recommended cable 7MH4702-8AG.



5. Close any unused opening in the enclosure with a blanking plug.

6. Connect the equipotential bonding conductor (functional grounding) to the enclosure exterior.
Use shielded cable lugs.
7. Close the cover of the SIWAREX DB according to the tightening torque 1.5 to 2 Nm.

4.4.2 Connect the cable

Condition

You require a screwdriver with a maximum blade width of 2.5 mm.

You can use the SIWAREX cable for supply voltage and RS-485 communications. Accessories (Page 119)

Procedure

1. Place the cable shield in the EMC cable gland over a large area.

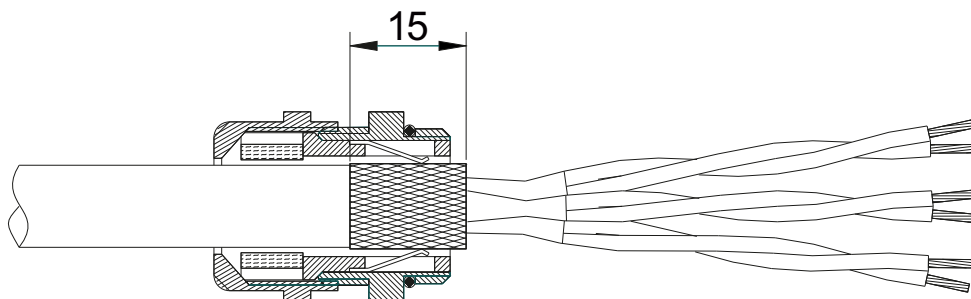


Figure 4-8 Place the cable shield in the EMC cable gland.

2. For plastic cable glands, connect the corresponding wire of the SIWAREX load cell to the shield terminal.
3. Strip the cable ends at least 6 mm.
4. Push the screwdriver into the rectangular opening of the terminals.
5. Insert the stripped cable into the round opening as far as it will go.
6. Remove the screwdriver from the rectangular opening.

Commissioning

5.1 Performing calibration

Introduction

Calibrate the scale via the web server or SIMATIC HMI.

Requirements

- In order for the conveyor to reach its rated operating conditions, the conveyor has been in operation for at least 30 minutes.
- You have integrated the Example project "Ready-to-use" (Page 42) into your CPU and the SIMATIC HMI or, alternatively, established a connection to the web server (Page 54).
- You know how to operate the web server.

Procedure

1. Select the "Service mode ON (1)" command.
2. Read DR03.
3. Set the following basic parameters in DR03 (Page 56):
 - Unit for the belt load
 - Unit for the flow rate
 - Design flow rate
 - Weigh length
 - Total length of conveyor belt
 - Speed sensor (pulse sensor) yes/no
 - Speed sensor pulses (pulses per length unit)
 - Test weight or chain load if a test chain is used for the calibration
4. When commissioning for the first time, initially calibrate the speed.
Calibration can be carried out for scales with or without a speed sensor.
Calibration of the speed (Page 34)
5. Calibrate the weight measurement.
Calibration of weight measurement (Page 36)
6. Read DR03.
7. Select the "Service mode OFF (2)" command.

Result

All results of the individual calibration commands are initially displayed in DR36.

You can first check the results for plausibility in DR36 and then apply them to the parameter set or reject them. This ensures that the individual calibration steps do not take effect immediately and change the existing parameter set.

When calibrating the scale, you can switch off the totalizer using command "Stop totalizing" (652). All totalizers apart from totalizer 6 are then stopped. Calibration thus has no influence on material quantities that have already been totalized.

See also

TIA Portal user program (Page 42)

Web server (Page 54)

5.2 Calibration of the speed

5.2.1 Calibration of the speed

When using a speed sensor with a known pulse constant (pulses per length unit), go to chapter Specification of known speed parameters (Page 35).

When using a speed sensor with unknown pulse constant or for belt scale systems without speed sensor, you can calibrate the speed as per the following 3 steps.

Procedure in 3 steps

Calibrate the speed using the following steps:

Step 1

Use a tape measure or length measuring device to determine the exact conveyor belt length and enter these into DR03. You can usually measure the distance between the axes of the deflection pulleys. The length is then twice the distance between the axes plus half the circumference of the deflection pulley and half the circumference of the drive pulley. Exact determination of the belt length is the basis for good accuracy of the belt scale.

Step 2

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

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

several belt revolutions are required for the calibration commands, you have to parameterize this accordingly in data record DR 3 and let the marking pass a corresponding number of times before you stop the measurement.

The following parameters are calculated by SIWAREX as a result of the measurement, and output in DR36 Temporary data (Page 77) as a recommendation for acceptance:

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

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

Note

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

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

Step 3 (only for systems without speed sensor)

Following successful zero and span calibrations, you can optionally record and store a speed correction with loaded belt (commands "Start speed measurement belt loaded" (72) and "Stop speed measurement belt loaded" (73)). A coarse load characteristic of the drive can be recorded in this manner. It is then put into effect with the command "Accept speed parameters belt loaded" (86). Thus, the electronic weighing system corrects the belt speed as a function of the belt load even without a speed sensor, resulting in increased measuring accuracy.

5.2.2 Specification of known speed parameters

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

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

- When using a speed sensor, you must enter the following parameters manually:
 - DR3 → design speed = maximum speed of belt
 - DR3 → pulses per meter or per foot.
- When operating without a sensor, you must enter the following parameters manually:
 - DR3 → design speed = maximum speed of belt
- With an external speed value via the process representation, you must enter the following parameters manually:
 - DR3 → design speed = maximum speed of belt

5.3 Calibration of weight measurement

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

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

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

5.3.1 Determination of zero point

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

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

The result is displayed in DR36 Temporary data (Page 77). You can apply the result using the command "Accept zero calibration digits" (88). The zero point is then imported in DR3.

5.3.2 Span calibration by weight

Carrying out the calibration

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

Step 1

The belt is warmed-up and the zero point (Page 36) has been determined.

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

Step 2

1. Switch the belt on again. The calibration weight is secured on the scale.
2. Start recording of the weight for the parameterized number of belt revolutions using the command "Start span calibration with test weight" (61). The status display "Calibration / zero setting procedure" in DR30 indicates that the calibration is running. The result is displayed in DR36 Temporary data (Page 77).
3. Apply the digits to DR3 using the command "Accept span calibration digits" (89). The characteristic curve has thus been determined. The scale can calculate the weight values for the complete load range.

5.3.3 Automatic span calibration with load cell data

Automatic scale calibration

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

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

Requirements

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

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

Step 1

The belt is warmed-up and the zero point (Page 36) has been determined. All relevant data has been entered in DR10 (load cell parameters) and sent to the scale.

Step 2

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

Step 3

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

5.3.4 Span calibration by test chain

Span calibration by test chain

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

Step 1

The belt is warmed-up and the zero point (Page 36) has been determined.

1. Stop the belt.
2. Enter the load simulating your test chain in DR3.
3. Place the test chain onto the scale.

Step 2

1. Switch the belt on. The test chain is positioned on the scale.
2. Start recording of the weight for the parameterized number of belt revolutions using the command "Start span calibration with test chain" (65). The status display in DR30 indicates that the calibration is running. The result is displayed in DR36 Temporary data (Page 77).
3. Import the working point into DR3 using the command "Apply span calibration digits" (89). The characteristic curve has thus been determined. The scale can calculate the weight values for the complete load range.

5.3.5 Span calibration with known material flow

Span calibration with known material flow

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

Step 1

The belt is warmed-up and the zero point (Page 36) has been determined.

Step 2

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

Step 3

1. Calculate the scale characteristic using the command "Calculate span calibration (material batch)" (69). The result is displayed in DR36 Temporary data (Page 77).
2. Import the working point into DR3 using the command "Apply span calibration digits" (89).
The characteristic curve has thus been determined. The scale can calculate the weight values for the complete load range.

Parameter assignment/addressing

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 42)
 - Call function block FB WP341 [FB341]. (Page 45)
 - Executing commands (Page 48)
 - Cyclic data exchange via "cyclicData" (Page 50)
 - Reading/writing data records (Page 52)
- Web server
 - Calling the web server (Page 54)
 - Reading/writing data records (Page 55)
 - Parameter assignment (Page 41)
- Modbus TCP/IP commissioning and parameter assignment
 - Communication via Modbus (Page 88)

Parameter table

In addition to the parameter descriptions, the parameter table (<https://support.industry.siemens.com/cs/ww/en/ps/17252/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

6.2 TIA Portal user program

Table 6-1 Example parameter table

DR	Parameter	S7 name	Type	Min. value	Max. value	Modbus ad- dress	Write pro- tection	Access
4	Calibration dig- its 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 WP341 HF (<https://support.industry.siemens.com/cs/ww/en/ps/25196/dl>) from the internet.
The example project must be compatible with your SIMATIC controller.
2. Adjust the example project to match your configuration.
- or -
Copy the required components from the example project into your destination project.
3. Click on the "General" sub-tab in the "Properties" tab.

4. In the left-hand tree, navigate to TM SIWAREX WP341 HF.

Web server	If desired, activate 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: Calling the web server (Page 54) > 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

6.2 TIA Portal user program

5. 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.
6. Enable the desired hardware interrupts.
With the help of the following event types, parameterize the triggering of a hardware interrupt.
 - Hardware interrupt 1 (event freely definable in DR07)
 - Hardware interrupt 2 (event freely definable in DR07)
 - Hardware interrupt 3 (event freely definable in DR07)
 - 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.

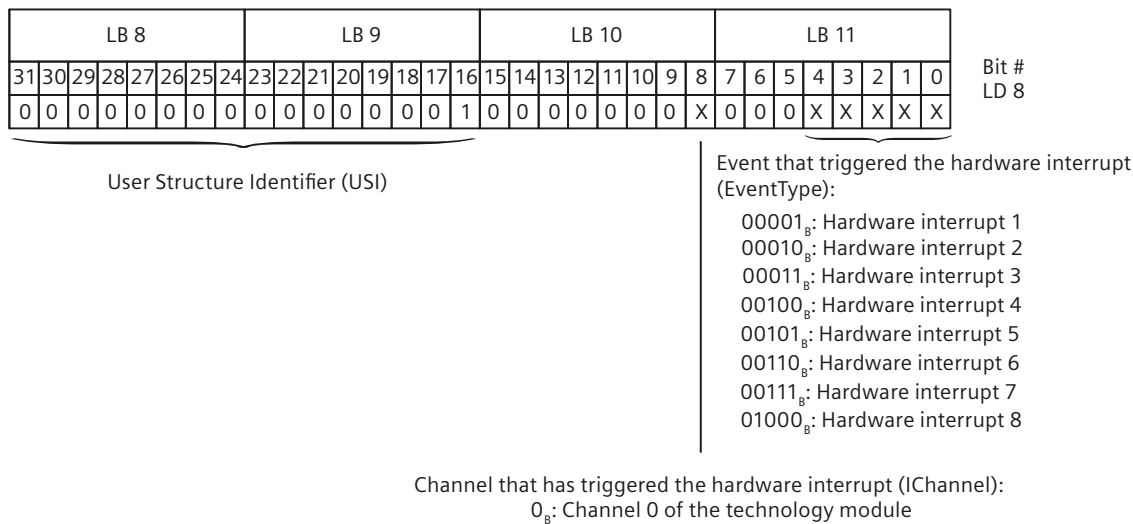


Figure 6-1 Start information of the organization block

6.2.2 Call function block FB WP341 [FB341].

Introduction

For each electronic weighing system, call the FB cyclically once 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

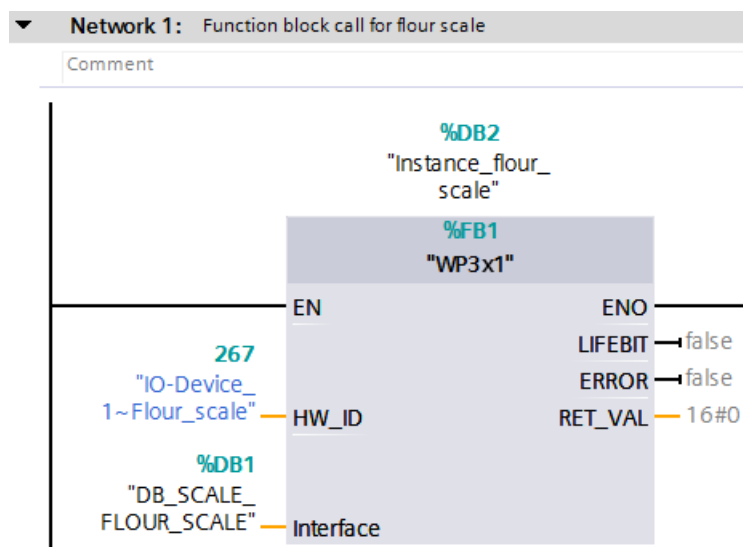
The following FW versions are required in the S7 controllers so that you can work with the FB:

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".

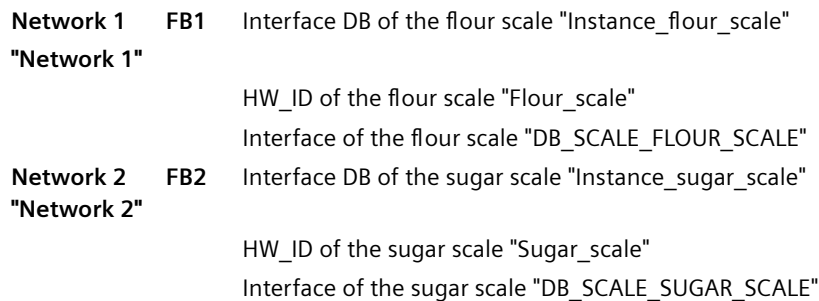


HW_ID	HW ID of the electronic weighing system
Interface	Interface DB of the electronic weighing system
ERROR	"true" = Error
RET_VAL	The meaning of the error codes can be found in the section: Operating errors (Page 96).
LIFEBIT	Optional status bit can be used to monitor communication

Figure 6-2 FB

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

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



Technology Module TM SIWAREX WP341 HF
Operating Instructions, 08/2022, A5E52180517-AA

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 81).

Requirement

You have called the FB (Page 45).

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 96)]
 [errorAddInfo (Page 99)] You can find a list of data and operating errors in section Data and command errors (Page 99).

Interface-DB_FLOUR_SCALE			
	Name	Data type	Start value
4	CommandHandling	"Siwarex_WP3..	
5	Command1	"Siwarex_WP3..	
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_WP3..	
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_WP3..	
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: Parameterize the calibration weight

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

1. Switch on service mode by entering the command code 1 (= Service mode ON) 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 [calibrationWeight].

6.2 TIA Portal user program

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 (= Service mode OFF) for the "code" parameter.
10. Set the associated command trigger "trigger" to "true".

6.2.4 Cyclic data exchange via "cyclicloData"

The interface DB of the FB makes the "cyclicloData" 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 "cyclicloData" structure are used directly – without reading or writing the data records.

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

Interface-DB_FLOUR_SCALE				
	Name	Data type	Start value	
2	▼ CyclicIoData	"Siwarex_WP3 5..		
3	▼ input	"Siwarex_WP3 5..		
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_0	
9	processValueDWord2	DWord	16#0000_0	
10	processValueDWord3	DWord	16#0000_0	
11	processValueDWord4	DWord	16#0000_0	
12	scaleStatus	"Siwarex_WP3 5..		
13	▼ output	"Siwarex_WP3 5..		
14	processValue5	Real	0.0	
15	processValue6	Real	0.0	
16	processValue7	Real	0.0	
17	processValue8	Real	0.0	
18	▼ transitions	"Siwarex_WP3 5..		
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_WP3 5..		
28	DQ0	Bool	false	
29	DQ1	Bool	false	
30	DQ2	Bool	false	

Input

[inProcessValueReal1 to inProcessValueReal4]

Cyclic I/O process values (reading) in real format according to defined parameters in DR07 (Page 64).
Standard in DR7:

Process Value 1: Flow rate

Process Value 2: Belt load

Process Value 3: Belt speed

Process Value 4: Totalizer 2

[inProcessValueDWord1 to inProcessValueDWord4]

Cyclic I/O process values in DWord format according to defined parameters in DR07 (Page 64).

[scaleStatus]

Weighing status of weighing steps according to parameters in DR30 (Page 74).

Output

[ioProcessValue5 to ioProcessValue8]	Cyclic I/O process values (writing) according to defined parameters in DR07 (Page 64). Default in DR7: Process Value 5: not assigned Process Value 6: not assigned Process Value 7: not assigned Process Value 8: not assigned
[digitalOutputControl]	If a digital output DQ is configured for control from the CPU (DR07), the DQ may be controlled here via the according bit.
[errorCode]	Error according to Interrupts/diagnostic messages (Page 95).
[addInfo]	Error according to Interrupts/diagnostic messages (Page 95).

Figure 6-5 "cyclicloData" 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 "cyclicloData" structure is updated automatically without commands via cyclic communication.

Requirements

You have called the FB (Page 45).

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 64).
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 HSP2107 (Hardware Support Package) is available for download for this purpose. 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 V16): - 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 V16): - 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

6.2.7 Automatic time synchronization

All logs and error messages, as well as numerous diagnostics data, are time-stamped by the electronic weighing system.

The function block of the electronic weighing system automatically synchronizes the time from the electronic weighing system with the CPU time. It is therefore not required to separately set the time in the electronic weighing system.

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.
Follow the Security information (Page 10).

Introduction

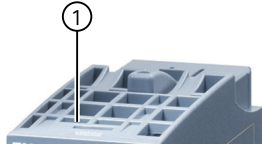
Using the web server of the electronic weighing system, you can start up the electronic weighing system in a completely autonomous way and without additional software tools. You do not need any specific SIMATIC knowledge. After commissioning the electronic weighing system, connect the automation system.

Procedure with TIA Portal

1. In the device view, select TM SIWAREX WP3x1 HF.
2. Click on the "General" sub-tab in the "Properties" tab.
3. Navigate to TM SIWAREX WP3x1 HF > Parameters.
4. Activate the web server.
5. Create at least one user.
Do not create **any** user with the name "admin".
6. Compile the hardware configuration.
7. Transfer the hardware configuration to your system.
8. Enter the IP address of the electronic weighing system in the Mozilla Firefox or Google Chrome browser. (Default: 192.168.0.21)
9. 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.



⇒ The LED  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

6.3.2 Reading/writing data records

Introduction

Only the entire data record (DR) can be 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.

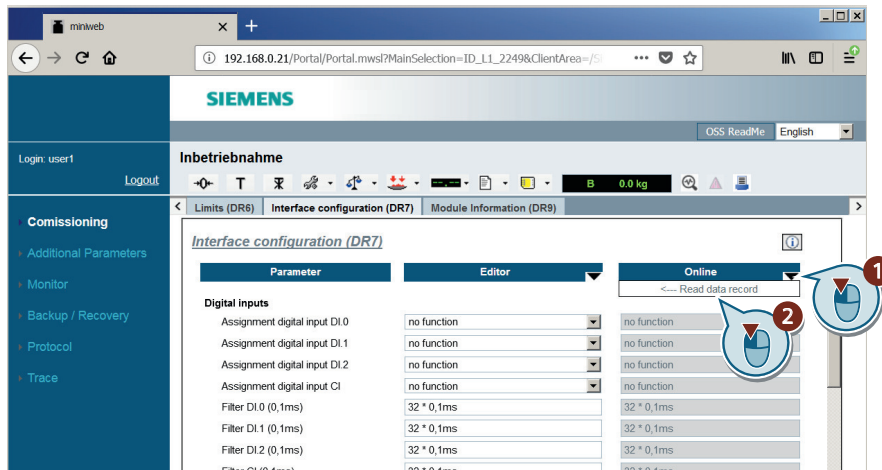


Figure 6-6 Reading DR

2. Set the parameters for DR06 (Page 62) in the column "Editor".
3. Write DR06 by selecting "Editor > Write data record" in the shortcut menu.

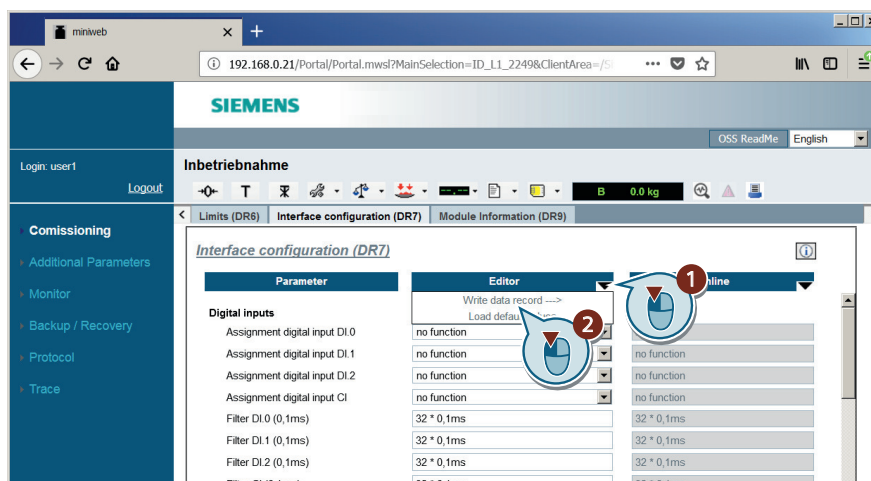


Figure 6-7 Writing DR

6.4 DR03 Calibration parameters**6.4.1 Scale name [scaleName]**

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

6.4.2 Measurement unit for load and speed [unitBeltLoad]

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

The following units can be selected for the belt load:

0 – kg/m + m/s (metric)

1 – lbs/foot + ft/s (imperial)

2 – lbs/foot + ft/min (imperial)

When 0 is selected, the material flow rate can be specified in t/h or kg/h.

When 1 or 2 is selected, the material flow rate can be specified in T/h, TL/h or lbs/h.

6.4.3 Unit for the flow rate [unitFlowRate]

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

0 – t/h (metric)

1 – kg/h (metric)

2 – T/h (imperial)

3 – TL/h (imperial)

4 – lbs/h (imperial)

6.4.4 Scale intervals of weight, belt load and totalizers

The scale intervals define the resolution at which the corresponding process variables are output by the electronic weighing system. Example: With a scale interval of 0.1 for totalizers T1 and T2, the totalizer values T1 and T2 are output with one decimal place.

- Scale interval of weight and belt load [scaleIntervalWeightAndLoad]
- Totalization and flow rate interval (totalizers T1..T2) [totalizationIntervalD]
- Totalization interval (totalizers T3..T6) [totalizationIntervalSubTotalizer]

6.4.5 Design flow rate [designFlowRate]

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

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

6.4.6 Weigh length [weighLength]

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

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

6.4.7 Belt length (1 complete revolution) [beltLength]

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

6.4.8 Number of belt revolutions for calibration [beltRevolutionsForCalibration]

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

6.4.9 Speed input [speedInput]

There are three options for determining the current speed:

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

1 – speed sensor at digital input at CI

2 – external specification of belt speed from CPU

6.4.10 Speed input [speedInput]

There are three options for determining the current speed:

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

1 – speed sensor at digital input DI.0

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

6.4.11 Design speed [designSpeed]

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

6.4.12 Speed factor under load [speedFactorUnderLoad]

If a speed sensor is not used (speed detection = 0, see Speed input [speedInput] (Page 58)), a speed correction can be determined at a certain belt load factor (preferably the nominal load) in addition to the design speed. A load-dependent characteristic for the speed then results together with the design speed. This characteristic is determined by two working points: Design speed with empty belt and a speed factor correction with a certain belt load factor.

The specification is made in % of the design speed.

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

6.4.13 Load at 'Speed factor under load' [loadAtSpeedFactor]

The associated belt load factor (in % of nominal load) is specified for determination of the speed correction (→ Speed factor under load [speedFactorUnderLoad] (Page 59)).

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

6.4.14 Speed sensor pulses [speedSensorPulses]

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

6.4.15 Zero calibration digits [zeroCalibrationDigits]

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

6.4.16 Span calibration digits [spanCalibrationDigits]

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

6.4.17 Calibration weight (test weight) [calibrationTestWeight]

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

6.4.18 Calibration load (test chain) [calibrationLoad]

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

6.4.19 Calibration quantity (material test) [calibrationQuantity]

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

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

6.4.20 Enable simulation

To enable a full system test without a scale and/or speed sensor, the electronic weighing system supplies all process variables as simulation values. Enable or disable simulation options via the mentioned parameters. The further procedure for simulating the process variables can be found in the description of DR16.

Load simulation [loadSimulationEnabled]

Speed simulation [speedSimulationEnabled]

Flow rate simulation [flowSimulationEnabled]

Incline angle simulation [angleSimulationEnabled]

6.4.21 Operating mode [operatingMode]

Defines the operating mode of the scale.

The following operating modes are available:

Selection code	
50	Belt Scale
51	Solids flowmeters

6.4.22 Belt load signal filter [loadSignalFilter] and speed [speedSignalFilter]

Strength of the filter for the weight and speed value.

Use the filter to attenuate or smooth unstable load cell and/or speed signals. The following 6 filter levels are available:

0: Off

1: Very weak

- 2: Weak
- 3: Medium
- 4: Strong
- 5: Very strong

6.4.23 Speed signal filter [speedSignalFilter]

Analog weight filter

6.5 DR04 Correction factor [correctionFactor]

Introduction

To further increase system accuracy, you can determine a characteristic curve consisting of 3 pairs of values. Assuming that the scale mechanics has different effects at different belt loads, a material test can be run at 25%, 50% and 75% of the load, for example. The 3 resulting correction factors can be stored in a characteristic curve with the associated percentage belt loads in DR05. Thus, the correction factor is automatically adjusted by the electronic weighing system depending on the current belt load.

The correction factor is calculated as follows:

Correction factor = reference quantity / quantity of material totalized by WP341.

This correction factor is calculated internally as follows:

Flow rate = belt load x belt speed x correction factor

Procedure

1. Reset the material test parameters with the "Reset material test (100)" command.
2. If known, specify the material test reference in DR14.
3. Start the material test with the command "Start material test (101)".
4. Convey material over the scale.
5. Stop the material test with the command "Stop material test (102)".
6. If the reference quantity is unknown, determine the weight with a reference scale and enter the reference quantity in DR14.
⇒ The correction factor is displayed in DR36.
7. Apply the correction factor according to DR04 with the command "Accept correction factor (104)".
8. Alternatively to step 7, you can use the "Put new correction factor into average (103)" command to convert the determined correction factor into an average value calculation. The electronic weighing system calculates an averaged correction factor from any number of material tests and finally copies the correction factor to DR04.

6.7 DR06 Parameterize limits

9. Repeat steps 2 to 8 (without step 7) as often as required.
10. Apply the averaged correction factor with the command "Accept correction factor (104)".

6.6 DR05 Correction curve

To further increase system accuracy, you can determine a characteristic curve consisting of 3 pairs of values.

Assuming that the scale mechanics has different effects at different belt loads, a material test can be run at 25%, 50% and 75% of the load, for example. The 3 resulting correction factors can be stored in a characteristic curve with the associated percentage belt loads in DR05. Thus, the correction factor is automatically adjusted by the WP341 depending on the current belt load.

- Correction factor curve enabled [curveEnabled]
- Belt load 1 [beltLoad1]
- Correction factor 1 [correctionFactor1]
- Belt load 2 [beltLoad2]
- Correction factor 2 [correctionFactor2]
- Belt load 3 [beltLoad3]
- Correction factor 3 [correctionFactor3]

6.7 DR06 Parameterize limits

6.7.1 Maximum negative zero setting range [zeroSettingLimitNegative] and maximum positive zero setting range [zeroSettingLimitPositive]

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

6.7.2 Minimum flow rate [minimumFlowRate]

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

6.7.3 Maximum flow rate [maximumFlowRate]

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

6.7.4 Delay time flow rate limits [delayTimeFlowRateLimits]

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

6.7.5 Minimum belt speed [minimumBeltSpeed]

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

6.7.6 Maximum belt speed [maximumBeltSpeed]

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

6.7.7 Delay time belt speed limits [delayTimeBeltSpeedLimits]

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

6.7.8 Minimum belt load [minimumBeltLoad]

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

6.7.9 Maximum belt load [maximumBeltLoad]

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

6.7.10 Delay time belt load limits [delayBeltLoadLimits]

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

6.7.11 Minimum belt load for totalizing [minimumBeltLoadForTotalizing]

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

6.8 DR07 Interface parameters

6.8.1 Digital inputs DI.0 to DI.2 [functionDI0 bis functionDI2]

Assign a command to each digital input (DI.0, DI.1, DI.2): → Commands (Page 81).

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

Selection code [functionDI0] [functionDI1] [functionDI2]	Function
1 ... 32759	Command codes 1 to 32759 according to section Commands (Page 81). Triggered on transition from 0 → 1 at DI.x Example for command code 1121 → selection code = 1121

6.8.2 Filtering DI.0 to DI.2

Specify the following values for filtering the digital inputs:

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

6.8.3 Digital output DQ.0 to DQ.2

Selection code [functionDQ0] [functionDQ1] [functionDQ2]	Function
0 ... 79	Corresponding bit of the scale status (see DR30)
80	Controlled via S7 process representation (ioData)
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)

6.8.4 Signal logic DQ.0 to DQ.2 [signalLogicDQ0 bis signalLogicDQ2]

The parameter defines whether the output of the assigned status bit should be normal or inverted.

6.8.5 Signal logic DI.0 to DI.3 [signalLogicDI0 bis signalLogicDI2]

The parameter defines whether the function at the respective input is to be executed on a rising or a falling edge.

6.8.6 DQ monitoring [monitoringOfDQ]

The digital outputs of the electronic weighing system can be monitored for short circuits. An operating error is reported in case of short-circuit. Reporting of the error can be suppressed by the parameter.

Selection code	Function
0	Monitoring inactive
1	Monitoring active

6.8.7 Substitute value for DQ.0 to DQ.2 on error [substituteValueDQ0 to substituteValueDQ2]

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]	Meaning
0 (default)	Switch off output
1	Switch on output

6.8.8 Reaction to CPU stop / failure [behaviourOnCPUStopOrFailure]

Selection code	Function
0 (default)	Active output signals are switched off
1	Active output signals remain active

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

Selection code	Function
0	Set substitute values
1	Retain function

6.8.10 Behavior of digital outputs on error [behaviourOfDQOnError]

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

6.8.11 Trace rate [traceRate]

The parameter defines in which grid the internal trace should record. The minimum recording time is 1 ms. The shorter the cycle is set, the lower the recording capacity of the trace function.

6.8.12 Trace memory mode [traceMemoryMode]

Defines the trace rate of scale data in s.

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

6.8.13 Load per pulse [loadPerPulsRemoteTotalizer] [pulsDurationRemoteTotalizer] [pauseDurationRemoteTotalizer]

By parameterizing a corresponding digital output you can use one of the digital outputs as pulse sensor/quantity (see Digital output DQ.0 to DQ.2 (Page 64)).

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

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

6.8.14 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.wp341

6.8.15 Unit Ident. Modbus connection 1 [modbusUnitIdentifier1]

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.

6.8.16 Modbus TCP enable connection 1 [modbusPort1]

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

6.8.17 Byte/Word swap options [byteSwapTextFields] [byteSwap16Bit] [byteSwap32Bit] [wordSwap32Bit]

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

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

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

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

Cyclic I/O process value	Selection code
No element is selected	0
Current weight	1
Current belt load	2
Current relative belt load	3
Current flow rate	4
Current relative flow rate	5
Current speed	6
Current relative speed	7
Current General Totalizer T1 (high share)	8
Current General Totalizer T1 (low share)	9
Current General Totalizer T1 (low resolution)	10
Current Main totalizer T2	11
Totalizer T3	12
Totalizer T4	13
Totalizer T5	14
Totalizer T6	15
Current CI frequency	16
Digits unfiltered	17
Digits unfiltered (linearised)	18
Digits filtered 1	19
Load cell impedance (Ohm)	20
Current load cell signal voltage (mV)	21

Cyclic I/O process value	Selection code
Current load cell SEN voltage (V)	22
Newest log ID	23
Drag indicator belt load	24
Current zero offset belt load	25
Current relative zero offset belt load	26
Stopwatch	27
Progress dynamic command	28

6.8.19 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	Not assigned
1	Parameter/simulation value belt speed
2	Parameter belt incline angle
3	Parameter correction factor
4	Parameter/simulation value "flow rate"
5	Parameter/simulation value "belt load"

6.8.20 Hardware interrupt 1 to 8 [hardwareInterrupt1 to hardwareInterrupt8]

1. Select additional hardware interrupts for the following defined events:

Selection code [hardwareInterrupt1 to hardwareInterrupt8]	
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 42).

6.8.21 Source for simulation values [simulationSource]

Selection code	Process values
0	Simulation value from SIMATIC peripheral process representation
1	Data record DR16

6.8.22 Signal logic hardware interrupt 1 to 8 [alarmLogic1 to alarmLogic8]

It can be defined whether the respective hardware interrupts are to be triggered on rising or falling signal edge.

6.9 DR09 Read out module information

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

6.10 DR10 Load cell parameters**6.10.1 Load cell input [loadCellType]**

Sets the connected load cell type.

Selection code	
0 (default)	Analog load cells
6	SIWAREX DB (medium speed)
7	SIWAREX DB (high speed)

6.10.2 Mains frequency [mainsFrequency]

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.

6.10.3 Mains frequency filter [mainsFrequencyFilterActivated]

Activates the line filter with selection code 1

Selection code	
0	Line filter deactivated
1	Line filter activated

6.10.4 4-wire / 6-wire sensor [fourSixWireSensor]

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

6.10.5 External / internal sensor supply [internalExternalAdcSupply]

Activates the external supply of the load cell with selection code 1. This may be necessary if the total impedance of all connected load cells is below the minimum permissible impedance.

6.10.6 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

An idler is supported on a belt scale with two load cells → No. of mechanical support points = 2.

6.10.7 Averaged load cell characteristic value (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 the 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 cell characteristic values 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.

6.10.8 Capacity of one single load cell [capacityOfOneSingleLoadCell]

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

6.10.9 Impedance reference (Ohm) [impedanceReference]

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.

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

This parameter defines the maximum permissible deviation of the currently measured load cell impedance as compared to the impedance reference. If the limit is exceeded, the electronic weighing system sets a corresponding bit in the scale status.

6.10.11 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 DR14 Material test reference [referenceWeightForMaterialTest]

This parameter specifies the pre-weighed or post-weighed quantity of material determined during the material test on a reference scale. The input is necessary for the internal calculation of a correction factor.

6.12 DR15 Configuration of technology messages

Introduction

In DR15, it is possible to suppress the technology messages from the electronic weighing system in a targeted manner as described in section Technology messages (Page 98).

Web server procedure

1. Read DR15.
2. Select "No message" for the desired technology messages.
3. Write DR15.

TIA Portal procedure

1. Read DR15: Command code 2015.
2. Enter "false" for the desired technology messages.
3. Write DR15: Command code 4015.

6.13 DR16 Simulation

6.13.1 Simulating process values

Introduction

The basic process values of a belt scale can be simulated using an input via data record DR 16. These would be belt load, belt speed or flow rate. In addition, a ramp up and ramp down time can be defined for the speed value. All functions of the electronic weighing system behave as with the scale and speed sensor connected, which is why a complete function test is possible without any problems.

Procedure

- Enable simulation mode in DR 3
- Send command no. 3 (simulation ON) to the electronic weighing system
- Enter the belt load, speed or flow rate to be simulated in DR16
- Transfer the data record DR16 to the electronic weighing system
- Optionally, the simulation values can also be specified directly via process representation. For this purpose, process values 5 to 8 must be configured accordingly in DR7 and the source of the simulation values must be changed to SIMATIC.

6.14 DR17 Incline angle [inclineAngle]

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

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

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

6.15 DR18 External speed value [externalSpeed]

The electronic weighing system should not determine the belt speed because the current speed is available externally in a controller, for example.

For the current belt speed to be calculated, transmit the belt speed to the electronic weighing system via the "External speed" data record.

However, it is generally recommended to specify an external speed directly via the process representation. For this purpose, a process value (process values 5 to 8) must be configured accordingly in DR7. With this variant of the specification, the permanent writing of data record 16 is not required (acyclic data record transfer).

6.16 DR28 Add user tag to log [userTag] [addLogTag]

The freely definable user tag [userTag] with 42 characters is transmitted from the CPU to the electronic weighing system. This user tag can be used for information such as batch number, material designation, license plate or similar. By setting that the user tag is to be stored in the log, it will be stored with the log impressions in the alibi memory.

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

6.17 DR30 Scale status

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 41).

Note

Reading of DR30 to the PLC via command is not mandatory. In DR07 Interface parameters (Page 64), 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 42)) 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.

6.18 DR31 Scale status extended

6.18.1 Drag indicator "belt load" (unfiltered) [dragIndicatorBeltLoad]

This data record provides extended process data.

- Zero setting value [zeroSettingValue]
- Zero setting value (% of Design belt load) [zeroSettingValuePerCentOfDesignLoad]
- Counter "zero settings" [counterZeroSettings]
- Counter "zero calibrations" [counterZeroCalibrations]
- Counter "span calibrations" [counterSpanCalibrations]
- Time stamp last "zero setting" [timeStampLastZeroSetting]
- Time stamp last "zero calibration" [timeStampLastZeroCalibration]
- Time stamp last "span calibration" [timeStampLastSpanCalibration]
- Time stamp "Change of correction factor DR4" [timeStampChangeInDR4]
- Time stamp "Accept new correction factor into DR4" [timeStampAcceptNewCorrectionFactor]
- Time stamp "Change of correction curve DR5" [timeStampChangeInDR5]
- Time stamp "Accept as point 1 to 3 in DR5" [timeStampNewPoint1InDR5 bis timeStampNewPoint3InDR5]

The values can only be reset via "Load factory settings".

6.19 DR32 Read out error messages

In the event of an error, the DR is read out automatically by the WP341 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 Commands (Page 81). The following table is used only for breaking down the individual messages into their message bits.

6.20 DR33 Totalizers

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

Totalizing becomes active when the minimum belt load for the totalizer (parameter in DR6) has been exceeded. Command 652 can be used to stop all totalizers except T6. Command 651 starts totalizing again.

6.20.1 General Totalizer T1 [generalTotalizerT1]

This totalizer contains the total of conveyed material since commissioning of the scale. The master totalizer can only be reset by loading the factory settings. The Long-Real format is used as the data type.

6.20.2 Totalizer T2 [totalizerT2]

The totalizer contains the quantity of material transported since the last memory reset. You can reset the total using command 670 or use command 653 to first store it in the internal alibi memory and then reset it.

6.20.3 Totalizer T3 [totalizerT3], Totalizer T4 [totalizerT4], Totalizer T5 [totalizerT5]

The totalizers respond like the main totalizer T2.

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

- T3 using command 671 (or command 654 (log and reset))
- T4 using command 672 (or command 655 (log and reset))
- T5 using command 673 (or command 656 (log and reset))

6.20.4 Totalizer T6 [totalizerT6]

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

You can reset the totalizer T6 using command 674 (or command 656 (log and reset)).

6.21 DR34 Current display

The ASCII display value corresponds to the value on the scale's main display. The content can be controlled using display commands. If the data record is to be used in an HMI visualization, for example, the data record must be read cyclically via command.

6.21.1 Content of main display as ASCII string

Commands are used to toggle the display.

The following values can be displayed in belt scale applications:

Value	Command
Flow rate	710
Weight	715
Flow rate in %	735
Flow rate without correction	736
Belt load	740
Belt load in %	745
Speed	760
Speed in %	765
General Totalizer T1	771
Main totalizer T2	772
Totalizer T3	773
Totalizer T4	774
Totalizer T5	775
Totalizer T6	776
Official calibration	801
Serial number	871
Firmware version	875

6.22 DR36 Temporary data

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

6.22.1 Stop watch

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

The display is in milliseconds.

6.22.2 Progress dynamic command (%)

Display of how far a currently active, dynamic command (e.g. calibration command or zeroing) has progressed. The display is in percent. 100 % = command is completed. The display is reset to zero by starting a new command.

6.23 DR45 Protocol request

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

If the protocol ID to be read in DR45 is 0, data record DR46 is automatically written with the last created log. Thus, after a logging, DR46 can be read directly into the PLC for further processing without having to request the last log beforehand.

6.24 DR46 Read out protocol content

6.24.1 Overview

Protocol data is provided in DR46.

The protocol memory of the electronic weighing system can hold up to 1,000,976 entries.

6.24.2 Oldest protocol ID [oldestLogId]

The ID of the first saved log is displayed here.

6.24.3 Youngest protocol ID [latestLogId]

The ID of the last saved log is displayed here.

6.24.4 Selected protocol ID, numerical [selectedLogId]

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

6.24.5 Protocol string [log]

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

Designation	Data type	Length (bytes)
Totalizer ID, for example "T2"	BYTE	2
Totalizer weight value	BYTE	11
Totalizer weight unit	BYTE	4
User tag from DR28 (if enabled)	BYTE	42

Example of a log: T2;548,7;t;quartz sand

6.24.6 Checksum, date, time

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

6.25 DR47 Read out logbook content

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.

6.26 DR 70 SIWAREX DB parameter

The parameters which define the response in combination with SIWAREX DB are specified in data record DR 70.

If SIWAREX DB is not used, the default settings can be accepted.

Load cell input

- Enter the location designation of the respective sensor for each load cell input.
In the event of a fault, you can identify the affected sensor.

Channels

- Activate and deactivate the individual channels of SIWAREX DB.
For correct operation, disable unused channels.
- By factory setting, all 4 channels of SIWAREX DB are activated.

Corner load factors

- The corner load factors of the individual channels are stored in DR 70.
The corner load factors are relevant if you have performed a corner load compensation during commissioning. The procedure for corner load compensation is described in chapter Commands (Page 82) of command codes 151 to 160.

6.27 DR 80 / DR 81 / DR 82 SIWAREX DB process status and device information

The following diagnostic bits are available for each load cell input.

- QI-flag (0 = no error on the channel; 1 = channel disturbed)
- Underload of the load cell signal
- Overload of the load cell signal
- SEN error
- Impedance error (< 330 ohms or > 4100 ohms)
- EXC short circuit
- Error power supply

In addition, the following measured values are continuously recorded for each channel and made available in the data records:

- Filtered ADC raw value
- Percentage utilization of the connected sensor
- Signal voltage in mV

The current firmware and hardware version of the SIWAREX DB can also be read out.

6.28 DR156 Security Audit Log Entry

The Security Audit Log records all logins in the web server of the electronic weighing system. In addition to the user, commands executed in the web server and data record transfers are also logged. These events may be read retrospectively in the web server or in the connected CPU via data record DR156. Command codes 922 and 923 allow to scroll forward and backward in the audit log, respectively.

The audit log can only be reset by loading the factory settings.

The following is the breakdown of the information that is transmitted to the CPU in DR156:

Event ID [eventID]

Consecutive ID that is incremented with each new event.

Date and time [dateAndTime]

Event [event]

- | | |
|---|----------------------------|
| 0 | Successful login |
| 1 | Unsuccessful login attempt |
| 2 | Logout by user |
| 3 | Logout by system timeout |
| 4 | Write command/data record |

User number [userNumber]

0	admin - with access via local button
5	Web server user 1 from TIA Portal hardware configuration
6	Web server user 2 from TIA Portal hardware configuration
7	Web server user 3 from TIA Portal hardware configuration
8	Web server user 4 from TIA Portal hardware configuration
9	Web server user 5 from TIA Portal hardware configuration

Username [userName]**Eventinfo [eventInformation]**

1	Only read rights
2	Read/write rights
3	Action completed successfully
4	Action successfully rejected

Command [command]

Command code to be executed

6.29 Commands

6.29.1 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 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 82)

→ Table 6-4 Log commands (Page 85)

→ Table 6-5 Display commands (Page 86)

→ Table 6-6 Scale commands (Page 87)

→ Table 6-7 Other commands (Page 87)

See also

Commands (Page 82)

6.29.2 Commands

Table 6-3 Service commands

Com- mand code	Command	Description	Write pro- tection
1	Service mode ON	Turn on service mode	
2	Service mode OFF	Turn off service mode	
3	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	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 point	The last recovery point created with command 51 is loaded.	P
51	Create recovery point	Backs up all scale parameters as a recovery point that can then be loaded when needed using command 31.	P
60	Start zero calibration	Start the zero calibration. Requirements: WP341 correctly detects the belt speed (=speed sensor is correctly wired, pulse constant has been correctly specified or calibrated. Alternatively, at constant belt speed, a constant 24V provides the information that the belt is running or the software command code 1301 has been sent). There are no calibration weights on the belt scale & the conveyor belt runs empty. Initially, the result of the calibration is displayed temporarily in DR36 and is not yet active. After checking for plausibility, the result can be transferred to DR3 by means of command 88 and thus activated.	

Com- mand code	Command	Description	Write pro- tection
61	Start span calibration (test weight)	Determine the span calibration point using the calibration weight. Requirements: Zero calibration has already been performed. The calibration weight / test weight specified in DR3 is applied to the belt scale & the conveyor belt runs empty. Initially, the result of the calibration is displayed temporarily in DR36 and is not yet active. After checking for plausibility, the result can be transferred to DR3 by means of command 89 and thus activated.	
63	Start span calibration (automatic calibration)	Automatic calibration without weights. Requirement: Zero calibration has already been performed. The load cell data are correctly specified in DR10. If the conveyor belt is not horizontal, the angle of the conveyor belt must be entered in DR17 after command 63. Initially, the result of the calibration is displayed temporarily in DR36 and is not yet active. After checking for plausibility, the result can be transferred to DR3 by means of command 89 and thus activated.	
65	Start span calibration (test chain)	Determine the span calibration point using a test chain. Requirements: Zero calibration has already been performed. The calibration load specified in DR3 is applied on the running conveyor belt in the form of a test chain.	
67	Start span calibration (material batch)	Start the span calibration by material batch. Requirements: Zero calibration has already been performed. Before the material to be conveyed reaches the weighing range of the scale, the command must be sent.	
68	Stop span calibration (material batch)	Stop the span calibration using a known quantity of material. When the complete material has been conveyed over the scale and the belt runs empty again, the command must be sent.	
69	Calculate span calibration (material batch)	Calculate the span calibration point by material batch. Requirement: The quantity of material conveyed over the scale between the execution of command 67 and 68 is correctly specified in DR3. Initially, the result of the calibration is displayed temporarily in DR36 and is not yet active. After checking for plausibility, the result can be transferred to DR3 by means of command 89 and thus activated.	
70	Start speed/pulse detection	Measure the pulse constant of the speed sensor or the nominal speed. Requirement: the conveyor length must be correctly specified in DR3.	
71	Stop speed/pulse detection	Command to stop the determination of the pulse constant/speed. Note how many belt revolutions have been specified for the calibration commands in DR3. The corresponding number of revolutions must be completed before the command is sent. Initially, the result of the calibration is displayed temporarily in DR36 and is not yet active. After checking for plausibility, the result can be transferred to DR3 by means of command 85 and 87 and thus activated.	
72	Start speed measurement 'belt loaded'	Speed measurement with loaded belt. This command is only relevant for systems without speed sensor. Optionally, a speed measurement with a loaded belt can be calibrated, which then represents the characteristic curve of the actuator (loaded conveyor belt runs slower than empty belt). Requirement: the conveyor belt is running loaded.	
73	Stop speed measurement 'belt loaded'	Stops the speed measurement with loaded belt. After checking for plausibility, the result can be transferred to DR3 by means of command 86 and thus activated.	

6.29 Commands

Command code	Command	Description	Write protection
74	Enable belt revolution detection on DI	Enable belt revolution trigger signal on a digital input. A 24V binary sensor capable of sensing belt revolution can be wired to an appropriately configured digital input. This means that the calibration commands are issued with high precision without knowledge of the length of the conveyor belt and without the belt speed having to be calibrated first.	
79	Abort calibration/zeroing/belt detection/speed measurement	Running calibration is aborted	
85	Accept (nominal) speed	Apply the speed parameters according to DR3.	
86	Accept speed parameters 'belt loaded'	Apply speed parameters (belt loaded) according to DR3.	
87	Accept pulse parameter	Apply the measured pulse constant according to DR3.	
88	Accept zero calibration digits	Apply the zero calibration digits according to DR3.	
89	Accept span calibration digits	Apply the span calibration digits according to DR3.	
93	Start stop watch		
94	Stop stop watch		
100	Reset material test	Reset material test data in DR36	
101	Start material test	Start a new material test. Requirements: The scale is correctly calibrated. Before the material to be conveyed reaches the scale, the command must be sent.	
102	Stop material test	When all the material of the material test has been conveyed and the belt runs empty over the scale, the command must be sent. Afterwards, the quantity of material totalized by WP341 is temporarily available in DR36. The result of the reference scale must now be entered in DR14 (if the quantity is already known before the test, you can also enter this before starting the test). The determined correction factor is thereby temporarily output in DR36. It can then be transferred directly to DR4 via command 104 or to an average value calculation (command 103).	
103	Put new correction factor into average	Copies the correction factor currently calculated in DR36 into an average value, so that another material test can be run afterwards (commands 101 and 102), the result of which can then also be included in the average value calculation. This procedure can be repeated as often as required and finally completed with command 104.	
104	Accept correction factor	Transfers the correction factor to DR4 and calculates it with a factor that may already exist there.	
105	Accept correction factor as correction curve point 1	Transfer the averaged correction factor to DR5 as characteristic point 1	
106	Accept correction factor as correction curve point 2	Transfer the averaged correction factor to DR5 as characteristic point 2	
107	Accept correction factor as correction curve point 3	Transfer the averaged correction factor to DR5 as characteristic point 3	

Command code	Command	Description	Write protection
151	Corner load compensation load cell input 1	Calculate the corner load factor load cell input 1 Before executing the command, place a weight (at least 10% of the rated load of the scale) over the load cell connected to channel 1 of SIWAREX DB. Then execute command 151. If you do not use the digital junction box SIWAREX DB, commands 151 - 160 are not relevant.	
152	Corner load compensation load cell input 2	Calculate the corner load factor load cell input 2 Before executing the command, place the weight already used for channel 1 over the load cell connected to channel 2 of SIWAREX DB. Then execute command 152.	
153	Corner load compensation load cell input 3	Calculate the corner load factor load cell input 3 Before executing the command, place the weight already used for channel 1 and 2 over the load cell connected to channel 3 of SIWAREX DB. Then execute command 153. If you have only two load cells connected to SIWAREX DB, proceed with command 160.	
154	Corner load compensation load cell input 4	Calculate the corner load factor load cell input 4 Before executing the command, place the weight already used for channel 1, 2 and 3 over the load cell connected to channel 4 of SIWAREX DB. Then execute command 154. Complete the corner load compensation with command 160.	
160	Corner load compensation complete	Calculate corner load factors and transfer to DR70	

Table 6-4 Log commands

Command code	Command	Description	Write protection
401	Log general totalizer T1	Creates a log entry with general totalizer	
405	Delete log memory	Deletes the complete log memory	
443	Reset drag indicator (belt load)	Resets the drag indicator	
444	Reset zero setting counter	Resets the cycle counter of the extra coarse signal	
445	Reset zero calibration counter	Resets the cycle counter of the coarse signal	
446	Reset span calibration counter	Resets the cycle counter of the fine signal	
451	Trace ON	Start trace recording	
452	Trace OFF	Stop trace recording	
453	Single trace element	Record only one trace element	
454	Reset trace memory	Reset trace recording	
651	Enable totalizers	Activate the totalizers	
652	Disable totalizers	Switch off the totalizers	
653	Log and reset totalizer T2		
654	Log and reset totalizer T3		
655	Log and reset totalizer T4		

6.29 Commands

Command code	Command	Description	Write protection
656	Log and reset totalizer T5		
657	Log and reset totalizer T6		
658	Log and reset totalizers T2 ... T6		
670	Reset totalizer T2		
671	Reset totalizer T3		
672	Reset totalizer T4		
673	Reset totalizer T5		
674	Reset totalizer T6		
675	Reset totalizer T3 ... T6		
676	Reset totalizers T2 ... T6		

Table 6-5 Display commands

Command code	Command	Description	Write protection
704	Totalizer T6 (high resolution)	Increase resolution of totalizer 6 in DR33 by a factor of 100, but max. 4 decimal places.	
710	Display flow rate in DR34		
715	Display weight in DR34		
731	Display flow rate in DR34		
735	Display flow rate (% of design flow rate) in DR34		
736	Display flow rate (without correction) in DR34		
740	Display belt load in DR34		
745	Display belt load (% of design load) in DR34		
760	Display speed in DR34		
765	Display speed (% of design speed) in DR34		
771	Display general totalizer T1 in DR34		
772	Display totalizer T2 in DR34		
773	Display totalizer T3 in DR34		
774	Display totalizer T4 in DR34		
775	Display totalizer T5 in DR34		
776	Display totalizer T6 in DR34		

Table 6-6 Scale commands

Command code	Command	Description	Write protection
1001	Zero setting	Set to zero (semi-automatic)	
1002	Abort zero setting		
1003	Enable automatic zero tracking	With active zero tracking, the electronic weighing system attempts to zero as soon as it is within the defined zero setting range. If the zero setting range is exceeded during the zero setting process, the process is aborted	
1004	Disable automatic zero tracking		

Table 6-7 Other commands

Command code	Command	Description	Write protection
907	Set impedance reference	The currently measured impedance value (DR30) is transferred to DR 3.	
910	Trigger for monitoring of Modbus communication	Starts time-based monitoring of Modbus communication	
922	Show previous security audit log entry	Display in DR156	
923	Show next security audit log entry	Display in DR156	
1301	Set 'Conveyor ON'	Command to start the scale (=calculation of flow rate based on a constant belt speed), if there is no speed sensor. Alternatively, a 24V signal at the CI input can be used to start/stop the scale.	
1302	Reset 'Conveyor ON'	Command to stop the scale if there is no speed sensor. Alternatively, a 24V signal at the CI input can be used to start/stop the scale.	

6.29.3 Command groups of the electronic weighing system

You can execute the following commands: See also section: Executing commands (Page 48).

Command code	Description
1 ... 1999	The meanings of the commands correspond to the command list (see → Commands (Page 82)).
2000 + X	Reading/writing data records (Page 52)
4000 + X	Reading/writing data records (Page 52)
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 42).

6.30 Communication via Modbus

6.30.1 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 10).

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 41).

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

6.30.2 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.

6.30.3 Data record concept

The register assignment is an image of the data records. The chapter → Parameter assignment/addressing (Page 41) 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.

6.30.4 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 81). The following tables list the Modbus registers used to process these commands:

Table 6-8 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 6-9 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 6-10 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

6.30.5 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/17252/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 82).

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.

6.30.6 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 81).

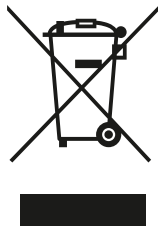
A document for working with the electronic weighing system and Modbus is also available online → Modbus communication of WP231 (<https://support.industry.siemens.com/cs/ww/en/view/77913998>).

Service and maintenance

Note

The device is maintenance-free.

7.1 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.
-

7.1 Disposal

Interrupts/diagnostic messages

8.1 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 command 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 electronic weighing system, causing the electronic weighing system to refuse acceptance of the data record.

A command error occurs when the electronic weighing system 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 operation. Messages provide information to the operator and have no further effect on the dosing operation.

8.2 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. The message buffer is opened in the web server via the following icon:



8.3 Evaluating errors/messages using the FB

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

8.4 Operating errors

Operating errors	Error code	Description and remedy
Operation error existent	1000	Group message, there is at least one operating error.
Watch dog	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.
Checksum error (Parameter)	1003	The checksum of the parameters no longer matches. Remedy: Load factory settings. Contact SIWAREX Support if the error continues to occur.
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.
Logbook full / defective	1006	Error when writing/clearing the logbook. Remedy: Load factory settings. Contact SIWAREX Support if the error continues to occur.
No communication to the digital load cell or SIWAREX DB	1110	Communication to digital load cell or digital junction box SIWAREX DB is interrupted. Check the following: • SIWAREX DB <-> SIWAREX WP wiring • Terminators and address of SIWAREX DB (see operating instructions of SIWAREX DB) • Communication speed in DR10
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 17)).
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.
SIG voltage too high (overload)	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.
SIG voltage too low (underload)	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
SecureDisplay not connected / visible	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
DQ short circuit to ground	1111	Error at digital outputs (short-circuit to ground)
Underload load cell input 1	1201	SIWAREX DB –The minimum input signal of load cell input 1 has been under-run. Check the wiring and the load cell.
Underload load cell input 2	1211	SIWAREX DB –The minimum input signal of load cell input 2 has been under-run. Check the wiring and the load cell.
Underload load cell input 3	1221	SIWAREX DB –The minimum input signal of load cell input 3 has been under-run. Check the wiring and the load cell.
Underload load cell input 4	1231	SIWAREX DB –The minimum input signal of load cell input 4 has been under-run. Check the wiring and the load cell.
Overload load cell input 1	1202	SIWAREX DB –The maximum input signal of load cell input 1 has been overrun. Check the wiring and the load cell.
Overload load cell input 2	1212	SIWAREX DB –The maximum input signal of load cell input 2 has been overrun. Check the wiring and the load cell.
Overload load cell input 3	1222	SIWAREX DB –The maximum input signal of load cell input 3 has been overrun. Check the wiring and the load cell.
Overload load cell input 4	1232	SIWAREX DB –The maximum input signal of load cell input 4 has been overrun. Check the wiring and the load cell.
Error SENSE voltage load cell input 1	1203	SIWAREX DB –The minimum permissible sense voltage of load cell input 1 has been underrun. Check the wiring and the load cell.
Error SENSE voltage load cell input 2	1213	SIWAREX DB –The minimum permissible sense voltage of load cell input 2 has been underrun. Check the wiring and the load cell.
Error SENSE voltage load cell input 3	1223	SIWAREX DB –The minimum permissible sense voltage of load cell input 3 has been underrun. Check the wiring and the load cell.
Error SENSE voltage load cell input 4	1233	SIWAREX DB –The minimum permissible sense voltage of load cell input 4 has been underrun. Check the wiring and the load cell.
Impedance error load cell input 1	1204	SIWAREX DB – The impedance at load cell input 1 is out of permitted range (< 330 ohms or > 4100 ohms)
Impedance error load cell input 2	1214	SIWAREX DB – The impedance at load cell input 2 is out of permitted range (< 330 ohms or > 4100 ohms)
Impedance error load cell input 3	1224	SIWAREX DB – The impedance at load cell input 3 is out of permitted range (< 330 ohms or > 4100 ohms)
Impedance error load cell input 4	1234	SIWAREX DB – The impedance at load cell input 4 is out of permitted range (< 330 ohms or > 4100 ohms)
EXC short circuit load cell input 1	1205	SIWAREX DB – Short circuit on load cell supply (excitation) at load cell input 1. Check the wiring and the load cell.
EXC short circuit load cell input 2	1215	SIWAREX DB – Short circuit on load cell supply (excitation) at load cell input 2. Check the wiring and the load cell.
EXC short circuit load cell input 3	1225	SIWAREX DB – Short circuit on load cell supply (excitation) at load cell input 3. Check the wiring and the load cell.
EXC short circuit load cell input 4	1235	SIWAREX DB – Short circuit on load cell supply (excitation) at load cell input 4. Check the wiring and the load cell.
Error power supply load cell input 1	1206	SIWAREX DB – Error on the power supply of load cell input 1

8.4 Operating errors

Operating errors	Error code	Description and remedy
Error power supply load cell input 2	1216	SIWAREX DB – Error on the power supply of load cell input 2
Error power supply load cell input 3	1226	SIWAREX DB – Error on the power supply of load cell input 3
Error power supply load cell input 4	1236	SIWAREX DB – Error on the power supply of load cell input 4
Check sum error SIWAREX DB	1250	SIWAREX DB – Check sum error. If restarting the SIWAREX DB does not solve the problem, please contact the SIWAREX hotline.
Watchdog error SIWAREX DB	1251	SIWAREX DB – Check sum error. If restarting the SIWAREX DB does not solve the problem, please contact the SIWAREX hotline.
ADC error SIWAREX DB	1252	SIWAREX DB – AD converter error. If restarting the SIWAREX DB does not solve the problem, please contact the SIWAREX hotline.
FW update error SIWAREX DB	1254	SIWAREX DB – Firmware update failed

8.4.1 Technology messages

Table 8-1 Technology messages

Technology messages	Error code	Description and remedy
Technology error existent	2000	Group message, at least one technology message is present
Totalizing error	3001	Error during totalizing
Trace overloaded	2002	Trace recorder cannot record in the cycle time requested in DR7.
Zero setting procedure aborted	2003	Zero setting procedure was aborted because the specified zero setting limits were exceeded.
Trace memory full	2004	Internal trace memory is full and not configured as ring memory (DR7)
Reboot after power reset	2005	Restart of electronic weighing system after power failure
Download error	2006	Firmware download was aborted because the connection to the S7 CPU is disturbed or because a download process is already active.
Calibration aborted	3002	Zero or span calibration aborted because the values determined were out of the permitted range.
Backup created	2094	Backup file successfully created in the web interface.
Backup loaded	2095	Backup file successfully loaded in the web interface.
Firmware file invalid	2007	Loaded firmware file is invalid.
Modbus communication timeout	2104	The communication to a Modbus partner is disturbed.
Recovery point created	2096	Module internal recovery point set successfully.
Recovery point loaded	2097	Module internal recovery point loaded successfully.
Standard parameters loaded	2098	Standard parameters (all data records except DR7) were loaded successfully.
Factory settings loaded	2099	Factory settings were loaded successfully.
Logging not possible	2112	Logging not possible because the necessary conditions are not met (e.g. totalizers are active)
Log error	2115	Error while reading a log from the log memory.
Log memory full	2124	Module internal log memory is full.
Please recalibrate the scale	2126	Please perform a zero and span calibration again, since a new corner load compensation has been performed in the meantime.

8.4.2 Data and command errors

Data and command errors	Error code [errorCode]	Description
Data or command error	5000	A data or command error exists.
Command not known	6050	The executed command number is not known.
Command not possible now	6051	The corresponding additional info can be found in the table "Additional info".
Error service command	6052	The corresponding additional info can be found in the table "Additional info".
Error calibration command	6053	The corresponding additional info can be found in the table "Additional info".
Error scale command	6054	The corresponding additional info can be found in the table "Additional info".
Error trace/ protocol/ logging/ security audit command	6056	The corresponding additional info can be found in the table "Additional info".
Data record not known	7050	
Parameter input not possible	7051	The corresponding additional info can be found in the table "Additional info".
Parameter input not possible - write protection is set	7052	
Parameter error "Calibration Pa- rameter" DR03	7053	The corresponding additional info can be found in the table "Additional info".
Parameter error "Correction fac- tor" DR04	7054	The corresponding additional info can be found in the table "Additional info".
Parameter error "Correction Curve" DR05	7055	The corresponding additional info can be found in the table "Additional info".
Parameter error "Limits" DR06	7056	The corresponding additional info can be found in the table "Additional info".
Parameter error "process inter- faces" DR07	7057	The corresponding additional info can be found in the table "Additional info".
Parameter error "Limits" DR06	7056	The corresponding additional info can be found in the table "Additional info".
Parameter error "process inter- faces" DR07	7057	The corresponding additional info can be found in the table "Additional info".
Parameter error "Load Cell Pa- rameters" DR10	7059	The corresponding additional info can be found in the table "Additional info".
Parameter error "Scale type" DR11	7060	The corresponding additional info can be found in the table "Additional info".
Parameter error "RS485" DR13	7061	The corresponding additional info can be found in the table "Additional info".
Parameter error "Correction fac- tor reference" DR14	7062	The corresponding additional info can be found in the table "Additional info".
Parameter error "Configuration of technology messages" DR15	7063	The corresponding additional info can be found in the table "Additional info".
Parameter error "Simulation" DR16	7064	The corresponding additional info can be found in the table "Additional info".

8.4 Operating errors

Data and command errors	Error code [errorCode]	Description
Parameter error "Additional strings" DR28	7066	The corresponding additional info can be found in the table "Additional info".
Error during log request DR45	7067	The corresponding additional info can be found in the table "Additional info".
Parameter error "SIWAREX DB" DR70	7069	The corresponding additional info can be found in the table "Additional info".
Parameter error "Incline Angle" DR17	7070	The corresponding additional info can be found in the table "Additional info".
Parameter error "External speed value" DR18	7071	The corresponding additional info can be found in the table "Additional info".

8.4.3 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 8-2 Add info [errorAddInfo] for DR03

Parameter	Add info [errorAddInfo]
Scale name	302
Metrological mode	303
Measurement units for load and speed	304
Measurement unit for flow rate	305
Scale interval of weight and belt load	306
Totalization and flow rate interval (totalizers T1..T2)	307
Totalization interval (totalizers T3..T6)	308
Design flow rate	309
Weigh length	310
Belt length (1 complete revolution)	311
Number of belt revolutions for calibration	312
Speed input	313
Design speed	314
Speed factor under load	315
Load at 'Speed factor under load'	316
Speed sensor pulses	317
Zero calibration digits	318
Span calibration digits	319
Calibration weight (test weight)	320

Parameter	Add info [errorAddInfo]
Calibration load (test chain)	321
Calibration quantity (material test)	322
Simulation	323
Load simulation	324
Speed simulation	325
Flow rate simulation	326
Incline angle simulation	327
Operating mode	340
SecureDisplay interface	341
Stringheader FW-Version SecureDisplay	342
Version SecureDisplay	343
Smallest zoom factor of SecureDisplay (%)	344
Belt load signal filter	350
Speed signal filter	351
Warm-up time	345

8.4.4 Add info [errorAddInfo] for DR04, DR05 and DR06

Table 8-3 Add info [errorAddInfo] for DR04, DR05 and DR06

Parameter	Add info [errorAddInfo]
Correction factor	401
Correction Curve (DR5)	500
Correction curve parameter	501
Correction factor curve enabled	502
Belt load 1	519
Correction factor 1	520
Belt load 2	521
Correction factor 2	522
Belt load 3	523
Correction factor 3	524
Maximum negative zero setting range	601
Maximum positive zero setting range	602
Minimum totalized load	603
Minimum flow rate	604
Maximum flow rate	605
Delay time flow rate limits	606
Minimum belt speed	607
Maximum belt speed	608
Delay time belt speed limits	609
Minimum belt load	610
Maximum belt load	611

8.4 Operating errors

Parameter	Add info [errorAddInfo]
Delay time belt load limits	612
Minimum belt load for totalizing	614

8.4.5 Add info [errorAddInfo] for DR07

Table 8-4 Add info [errorAddInfo] for DR07

Parameter	Add info [errorAddInfo]
Substitute value on error / CPU-Stop DQ.0	715
Substitute value on error / CPU-Stop DQ.1	716
Substitute value on error / CPU-Stop DQ.2	717
Behavior on CPU stop / failure	723
DQ behavior on CPU stop / failure	724
DQ behavior on failure	725
Trace rate	731
Trace settings	732
Trace memory mode	733
Load per pulse (remote totalizer)	749
Pulse duration (remote totalizer)	750
Pause duration (remote totalizer)	751
IP address x.n.n.n	758
IP address n.x.n.n	759
IP address n.n.x.n	760
IP address n.n.n.x	761
Subnetmask x.n.n.n	762
Subnetmask n.x.n.n	763
Subnetmask n.n.x.n	764
Subnetmask n.n.n.x	765
Gateway x.n.n.n	766
Gateway n.x.n.n	767
Gateway n.n.x.n	768
Gateway n.n.n.x	769
Device name	771
Unit Ident. Modbus connection 1	772
Modbus TCP Port number connection 1	773
Modbus connection #1	774
Enable connection	775
Byte swap for text fields	783
Byte swap for 16 bit tags	784
Byte swap for 32 bit tags (1 # 2, 3 # 4)	785
Word swap for 32 bit tags (1, 2 # 3, 4)	786
Unit Ident. Modbus connection 2	791

Parameter	Add info [errorAddInfo]
Modbus TCP Port number connection 2	792
Modbus connection #2	793
Enable connection	794
Byte swap for text fields	802
Byte swap for 16 bit tags	803
Byte swap for 32 bit tags (1 # 2, 3 # 4)	804
Word swap for 32 bit tags (1, 2 # 3, 4)	805
Cyclic I/O process value 1	810
Cyclic I/O process value 2	811
Cyclic I/O process value 3	812
Cyclic I/O process value 4	813
Cyclic I/O process value 5	814
Cyclic I/O process value 6	815
Cyclic I/O process value 7	816
Cyclic I/O process value 8	817
Hardware interrupt 1	818
Hardware interrupt 2	819
Hardware interrupt 3	820
Hardware interrupt 4	821
Hardware interrupt 5	822
Hardware interrupt 6	823
Hardware interrupt 7	824
Hardware interrupt 8	825
Source for simulation values	827
Signal logic alarm 1	849
Signal logic alarm 2	850
Signal logic alarm 3	851
Signal logic alarm 4	852
Signal logic alarm 5	853
Signal logic alarm 6	854
Signal logic alarm 7	855
Signal logic alarm 8	856

8.4.6 Add info [errorAddInfo] for DR10, DR11, DR14, DR16, DR17, DR18 and DR28

Table 8-5 Add info [errorAddInfo] for DR10, DR11, DR14, DR16, DR17, DR18 and DR28

Parameter	Add info [errorAddInfo]
Load cell input	1001
AD converter settings	1002
Mains frequency	1003
Mains frequency filter	1004

8.4 Operating errors

Parameter	Add info [errorAddInfo]
Load cell parameter	1019
4-wire / 6-wire sensor	1020
External / internal sensor excitation	1021
No. of mechanical support points	1036
Averaged load cell characteristic value (mV/V)	1038
Capacity of one single load cell	1039
Impedance reference (Ohm)	1040
Maximum impedance deviation (% of impedance reference)	1041
Load cell manufacturer	1044
Load cell order number	1046
Scale type	1101
Reference weight of material test	1401
Belt load	1619
Speed	1620
Flow rate	1621
Incline angle	1622
Ramp up time speed	1623
Ramp down time speed	1624
Simulation configuration	1601
Incline angle	1701
External speed value	1801
User tag	2802
Add user tag to log	2804
Log memory mode	2806

8.4.7 Add info [errorAddInfo] for DR30

Table 8-6 Add info [errorAddInfo] for DR30

Parameter	Add info [errorAddInfo]
Log-ID	4501
Year	4801
Month	4802
Day	4803
Hour	4804
Minute	4805
Second	4806
Millisecond	4807
Day of the week	4808
Location designation sensor 1	7006
Location designation sensor 2	7008
Location designation sensor 3	7010

Parameter	Add info [errorAddInfo]
Location designation sensor 4	7012
Load cell input 1	7014
Load cell input 2	7015
Load cell input 3	7016
Load cell input 4	7017

8.4.8 Add info [errorAddInfo] starting DR70

Table 8-7 Add info [errorAddInfo] starting DR70

Parameter	Add info [errorAddInfo]
Corner load factor load cell input 1	7051
Corner load factor load cell input 2	7052
Corner load factor load cell input 3	7053
Corner load factor load cell input 4	7054
Belt is running	9501
Belt is not running	9502
Action not possible because an already active action is still in progress	9507
CPU failed or not ready (STOP)	9514
Command not possible because of current parameter setting	9682
Command not executable because totalizing is active	9683
Command not executable because no corner load compensation was performed at load cell input 1	9684
Command not executable because no corner load compensation was performed at load cell input 2	9685
Command not executable because no corner load compensation was performed at load cell input 3	9686
Command not executable because no corner load compensation was performed at load cell input 4	9687
Command not executable because the corner load compensation cannot be calculated. If necessary, use heavier weight for corner load compensation.	9688
Service mode is not active	9510
Write protection is enabled	9511
Enable is missing	9512
Calibration not finished completely	9522
Distance between calibration digits is too small. Please use a heavier calibration weight	9520
Sequence of calibration points is not correct	9521
Calibration digits out of valid range	9523
Calibration weight must not be zero	9524
Command in simulation mode not possible	9527
New parameters are not plausible	9534

8.5 Diagnostic messages

Parameter	Add info [errorAddInfo]
Process cannot be completed, because it was not started.	9508
Service mode is still active	9513
In this scale operation mode not possible	9515
Module disturbed	9500
Trace memory full	9550
Log memory full	9551
Logging task is busy	9552
Logbook / security audit logging contains no or no more entries	9554
Number of belt revolutions is too small	9535
Totalizers error had occurred	9536

8.5 Diagnostic messages

8.5.1 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 BaseUnit. - 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 $\geq +120\%$ of the permissible range. - Check the wiring of the load cells. - Check the scale mechanics.

Error code	Message	Cause/Remedy
8 _H	Underload (SIG +/-)	The signal voltage of the load cells is $\geq -+120\%$ 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>).

8.5.2 Meaning of the LEDs

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

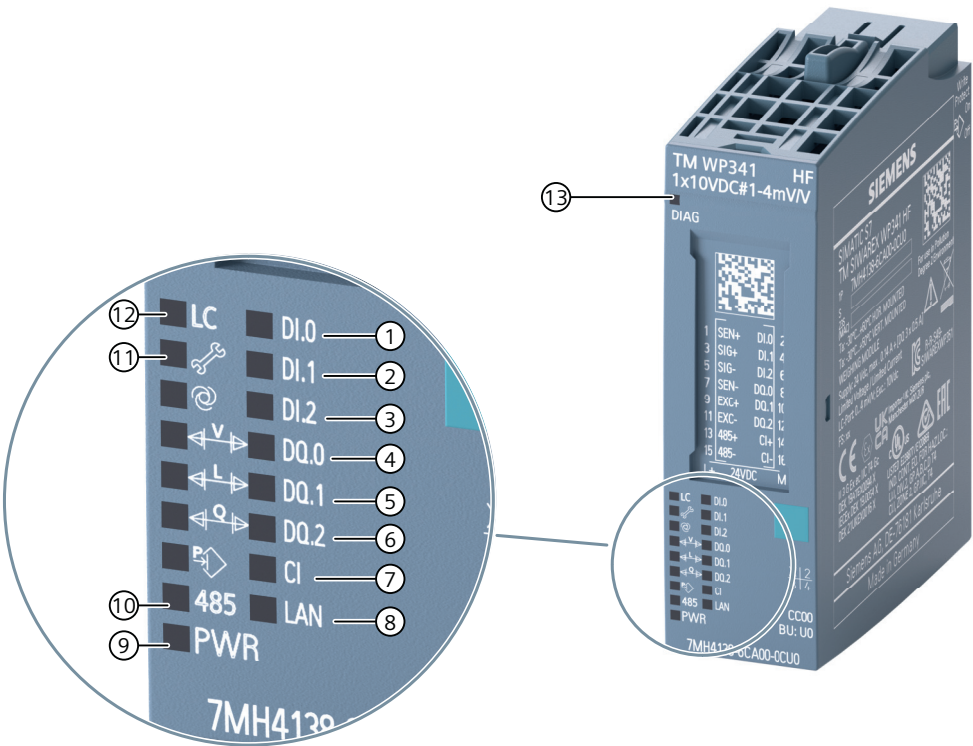


Figure 8-1 LEDs on the electronic weighing system

Table 8-8 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	-
③	DI.2	green/ off	Input is not active	-
		green/ on	Input is active	-

LEDs			Meaning	Solution
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		yellow/ off	Service mode is not active	-
		yellow/ on	Local Web server access is enabled	-
		yellow/ flashing	Service mode is active	-
⑫	LC Load cell	green/ off	Sensor connection faulty	Check the wiring of the load cells.
		green/ on	Sensor connection OK	-

8.6 Hardware interrupts

LEDs			Meaning	Solution
⑬	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 Diagnostic messages (Page 106).

8.6 Hardware interrupts

Introduction

Configure in DR07 which events during operation are to trigger a hardware interrupt. In addition, the corresponding hardware interrupt must be enabled in the hardware configuration by the electronic weighing system in TIA Portal.

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.

Hardware interrupt lost

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

Technical data

Article number	7MH4138-6CA00-0CU0
General information	
Product type designation	TM SIWAREX WP341 HF
HW functional status	1
Firmware version	V1.0
• FW update possible	Yes
usable BaseUnits	BU type U0
Color code for module-specific color identification plate	CC00
Product function	
• I&M data	Yes; I&M0 to I&M3
• Isochronous mode	No
• Adjustment of measuring range	Yes; $\pm 0 \dots 4 \text{ mV/V}$
Engineering with	
• STEP 7 TIA Portal configurable/integrated from version	V16
• STEP 7 configurable/integrated from version	- / -
• PROFIBUS from GSD version/GSD revision	GSD as of Revision 5
• PROFINET from GSD version/GSD revision	GSDML V2.34
Supply voltage	
Load voltage L+	
• Rated value (DC)	24 V
• permissible range, lower limit (DC)	19.2 V
• permissible range, upper limit (DC)	28.8 V
• Short-circuit protection	Yes
• Reverse polarity protection	Yes
Input current	
Current consumption, max.	140 mA; Without DQ
Power	
Power available from the backplane bus	94.5 mW
Power loss	
Power loss, typ.	1.7 W
Address area	
Address space per module	
• Inputs	32 byte
• Outputs	32 byte
Hardware configuration	
Automatic encoding	Yes
• Mechanical coding element	Yes

Article number	7MH4138-6CA00-0CU0
• Type of mechanical coding element	type B
Digital inputs	
Number of digital inputs	3
Digital inputs, parameterizable	Yes
Input characteristic curve in accordance with IEC 61131, type 3	Yes
Input voltage	
• Type of input voltage	24 V DC
• Rated value (DC)	24 V
• for signal "0"	< 5 V DC
• for signal "1"	+11 to +30V
• permissible voltage at input, min.	-30 V
• permissible voltage at input, max.	30 V
Input current	
• for signal "1", typ.	1.6 mA
Input delay (for rated value of input voltage) for technological functions	
– parameterizable	Yes
Cable length	
• shielded, max.	500 m
• unshielded, max.	150 m
Digital outputs	
Number of digital outputs	3
Current-sourcing	Yes
Digital outputs, parameterizable	Yes
Short-circuit protection	Yes
Digital output functions, parameterizable	
• Freely usable digital output	Yes
Switching capacity of the outputs	
• with resistive load, max.	0.5 A
Output voltage	
• Type of output voltage	DC
Output delay with resistive load	
• "0" to "1", typ.	20 µs
• "1" to "0", typ.	30 µs
Parallel switching of two outputs	
• for uprating	No
Switching frequency	
• with resistive load, max.	500 Hz
Total current of the outputs	
• Current per channel, max.	0.5 A; the total current of all outputs ≥ 0.6 A, the ambient temperature is reduced by -1 °C per 100 mA

Article number	7MH4138-6CA00-0CU0
Current per module, max.	1.5 A; Observe derating
Cable length	
- shielded, max. - unshielded, max.	500 m 150 m
Encoder	
Connection of signal encoders	
- For strain gauges (full bridges) with 4-conductor connection - For strain gauges (full bridges) with 6-conductor connection - Resistance of full bridge, min. - Resistance of full bridge, max.	Yes Yes 56 Ω; when using SIWAREX IS 87 ohm for 7MH4710-5BA; 180 ohm when using 7MH4710-5CA 4 100 Ω
Errors/accuracies	
Linearity error (relative to input range), (+/-)	0.001 %
Error limit according to DIN 1319-1	0.002 %; of full-scale value
Accuracy class	III
Temperature coefficient, zero point	≤ ±0.015 μV/K
Temperature coefficient, span	≤ ±5 ppm/K
1. Interface	
Interface types	
RS 485	Yes; Terminated internally with 390 Ω / 220 Ω / 390 Ω
2. Interface	
Interface types	
- RJ 45 (Ethernet) - Number of ports	Yes; 10/100 Mbit/s 1
Protocols	
- IP protocol - Web server	Yes; IPv4 Yes
Interface types	
RJ 45 (Ethernet)	
- Autonegotiation - Autocrossing	Yes Yes
RS 485	
- Transmission rate, max. - Cable length, max.	115.2 kbit/s 1 000 m; ≤ 115 kbps, shielded cable
Protocols	
Web server	
- HTTP - HTTPS	Yes Yes
Interrupts/diagnostics/status information	
Diagnostics function	Yes; Diagnostic alarm

Article number	7MH4138-6CA00-0CU0
Substitute values connectable	No
Alarms	
• Diagnostic alarm	Yes; Parameterizable
• Hardware interrupt	Yes; Parameterizable
Diagnoses	
• Monitoring the supply voltage	Yes
• Wire-break	Yes
• Short-circuit	Yes
• Group error	Yes; green/red DIAG LED
Diagnostics indication LED	
• ERROR LED	Yes; green/red DIAG LED
• Monitoring of the supply voltage (PWR-LED)	Yes; green PWR LED
Integrated Functions	
Counter	Yes
• Number of counters	1
• Counting frequency, max.	8 kHz
Load cell	
• permissible input signal per verification interval, min.	0.4 μ V/e
• Sampling rate	1 024 Hz
• Resolution of input signal	$\pm 20\,000\,000$ parts at 0 ... 4 mV/V
• Common mode voltage, min.	2.8 V
• Common mode voltage, max.	7.7 V
• input resistance of signal line, typ.	8 M Ω
• input resistance of sense line, typ.	300 M Ω
• Cable length, max.	500 m; when using the SIWAREX 7MH4702-8AG cable
Measuring functions	
Measuring range	
– -1 mV/V to +1 mV/V	Yes
– -2 mV/V to +2 mV/V	Yes
– -4 mV/V to +4 mV/V	Yes
Isolation	
Isolation tested with	707 V DC (type test)
Ambient conditions	
Ambient temperature during operation	
• horizontal installation, min.	-30 °C
• horizontal installation, max.	60 °C
• vertical installation, min.	-30 °C
• vertical installation, max.	50 °C
Altitude during operation relating to sea level	
• Installation altitude above sea level, max.	5 000 m; more than 2 000 m above sea level, the ambient temperature is reduced by -1 °C per 100 m

Article number	7MH4138-6CA00-0CU0
Ambient air temperature-barometric pressure-altitude	1 080 ... 533 hPa (-1 000 ... 5 000 m above sea level)
Decentralized operation	
to SIMATIC S7-300	Yes
to SIMATIC S7-400	Yes
to SIMATIC S7-1200	Yes
to SIMATIC S7-1500	Yes
to standard PROFIBUS master	Yes
to standard PROFINET controller	Yes
Dimensions	
Width	20 mm
Height	57 mm
Depth	72 mm
Weights	
Weight, approx.	50 g

9.1 Certificates and approvals

- All certificates are available online at Certificates (<https://support.industry.siemens.com/cs/ww/en/ps/cert>).
- The current approvals for your device can be found on the nameplate.
- When using the electronic weighing system, follow the requirements specified in the safety notes for hazardous areas.

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

9.1 Certificates and approvals

Symbol	Standard	Marking
	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 UK-CA DEKRA 21UKEX0016X	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.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>).

For help creating a support request, view this video here (www.siemens.com/opensr).

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) 667-1200 CET 8:00 to 17:00

Ordering data

B.1 Accessories

You can order accessories online: Industry Mall (<https://mallstage.industry.siemens.com/mall/en/b0/Catalog/Products/10364709?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

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