Overview

SIWAREX WP251 electronic weighing module

SIWAREX WP251 is a flexible weighing module for dosing and filling processes. The compact module can be installed seamlessly in the SIMATIC S7-1200 automation system. It can also be used without a SIMATIC CPU in stand-alone mode.

Benefits

SIWAREX WP251 offers the following key advantages:

- Uniform design technology and consistent communication in SIMATIC S7-1200
- Uniform configuration with TIA Portal
- Legal-for-trade according to OIML R-76, R-51 and R-61
- Legal-for-trade according to OIML R-107 (available soon)
- Internal alibi memory for up to 550 000 entries
- Operation without SIMATIC CPU also possible
- Ethernet port ex works (Modbus TCP/IP / SIWATOOL)
- RS 485 interface ex works (Modbus RTU / remote display)
- Four digital inputs and outputs, one analog output ex works
- Measurement of weight and force with a high resolution of up to $\pm$ 4 million parts and an accuracy of 0.05%
- Simple calibration and setup of the scale using SIWATOOL V7 via the Ethernet interface
- Recovery-point for the simple restoration of all parameters
- Automatic calibration without the need for calibration weights
- Supports replacement of module without recalibration of scales
- Direct use in hazardous area zone 2

Application

SIWAREX WP251 is the optimum solution wherever fast and precise dosing and filling are required. The typical applications of SIWAREX WP251 are:

- Automatic catchweighing instruments (ACI) - legal-for-trade in accordance with OIML R-51
- Gravimetric filling instruments (GFI) - legal-for-trade in accordance with OIML R-61
- Non-automatic weighing instrument (NAWI) - legal-for-trade in accordance with OIML R-76
- Discontinuous Totalizing Automatic Weighing Instrument (SWT) Legal-for-trade according to OIML R-107 (in preparation)

Design

SIWAREX WP251 is a compact technology module in the SIMATIC S7-1200, and communicates directly via the system bus with the SIMATIC S7-1200 controller.

The compact weighing module with a width of 70 mm (2.76 inches) is installed using a mounting rail. This is extremely user-friendly.

The connections for the power supply, the load cells, the RS 485 port, the digital inputs/outputs, and the analog output are located on removable screw connector blocks. An RJ45 port is available for the Ethernet connection (SIWATOOL and Modbus TCP/IP).

Function

SIWAREX WP251 controls dosing and filling processes completely autonomously. The dosing valves (coarse/fine flow) can be controlled directly via the four digital outputs of the module. This achieves maximum accuracy since the weighing process is controlled completely independently of the CPU and its cycle time.

The CPU can be used to manage recipes and material parameters. These parameters and the desired setpoint are then transferred to SIWAREX WP251 by function block, and the dosing process is started. SIWAREX WP251 automatically optimizes the shut-off points, generates statistics, and logs every dosing task in the internal protocol memory that is also accessible from the CPU and can be read out by the CPU.

Diverse options are available for commissioning. The SIWAREX WP251 function block enables full access to all parameters of the SIWAREX WP251. The downloadable example application "ready-for-use" provides full data access to the weighing module, calibration options and operation of the scale - without any additional programming effort. Further, the PC service software SIWATOOL V7 that communicates via Ethernet with the SIWAREX module can be used for commissioning. Access using W-LAN is thus also possible by means of a WIFI access point. Consequently, remote access via the Internet is also no problem. For servicing purposes, centralized access to all scales from a single location is possible – worldwide. In addition, there is full access to all parameters and commands, both via the RS485 port (Modbus RTU) and via the Ethernet interface (Modbus TCP/IP), meaning that full commissioning and operation can also take place via these channels.

Weighing Electronics
SIWAREX weighing electronics for SIMATIC
Dosing/Filling/Bagging scale

SIWAREX WP251

Weighing functions

SIWAREX WP251 provides the weighing modes Non-automatic weighing instrument, Automatic catchweighing instrument and Automatic gravimetric filling instrument.

In the operating modes Non-automatic weighing instrument and Automatic catchweighing instrument, there is a choice between filling mode and emptying mode. The entire filling or dosing process is fully controlled from SIWAREX WP251. It is only necessary to transfer a setpoint and a start command to the module. The coarse flow, fine flow and empty signals can be switched directly via the digital outputs of the module.

The weight, as well as all scale and dosing status bits, is available cyclically in the program code in the PLC for further evaluation. If stand-alone mode of the module is activated, there is an additional guarantee that dosing and operation of the scales can continue even in the event of a CPU stop.

Software

SIWATOOL V7 is a special program for commissioning and servicing and runs with Windows operating systems.
The program enables the user to perform scale calibration without requiring automation engineering skills. During servicing, the technician can use a PC to analyze and test the procedures in the scale. Reading the diagnostics buffer from SIWAREX WP251 is extremely helpful when analyzing events.

The following are just some of the tasks that can be carried out using SIWATOOL V7:

• Parameter assignment and calibration of the scale

• Testing of scale properties

• Recording and analysis of weighing sequence
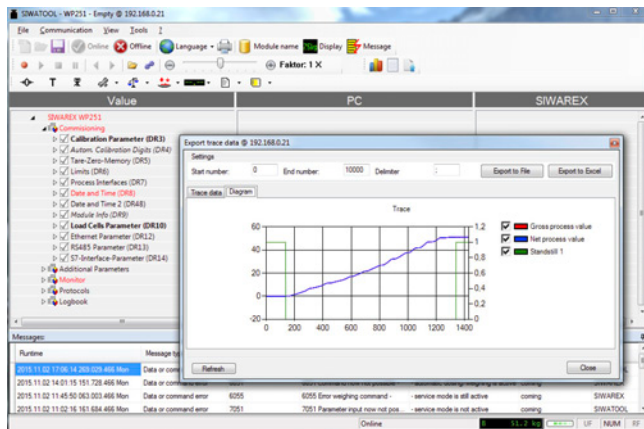
Software SIWATOOL V7, layout of the program window

It is also extremely helpful to analyze the diagnostics buffer which can be saved together with the parameters from the module in a backup file.
Trace mode is provided to optimize the weighing sequences in the SIWAREX WP251 weighing module. The recorded weight values and associated states can be displayed as trends using SIWATOOL V7 and MS Excel.

Upgrading firmware

An additional program function can be used to download a new firmware version onto the SIWAREX WP251 on site. This means that firmware upgrades can be carried out on site as required anywhere in the world.

Integration

Integration into the automation environment

SIWAREX WP251 is part of the SIMATIC S7-1200 basic controller range, and is integrated seamlessly into the TIA Portal. The free function block enables full access to all parameters, actual values, setpoints, weight values and status information (e.g. limits, coarse flow signal, fine flow signal, empty signal) conveniently and without programming effort. Customized operator interfaces can thus be created in conjunction with SIMATIC HMI touch panels. Management of several languages can also be easily implemented and organized.

The example project "Ready-for-use SIWAREX WP251" is available free of charge to help you to get started quickly and simply. This TIA portal project contains both the function block and a fully fledged visualization system for commissioning, operating and monitoring the SIWAREX WP251. The visualization can be freely edited and adapted, or transferred completely into an existing HMI project.
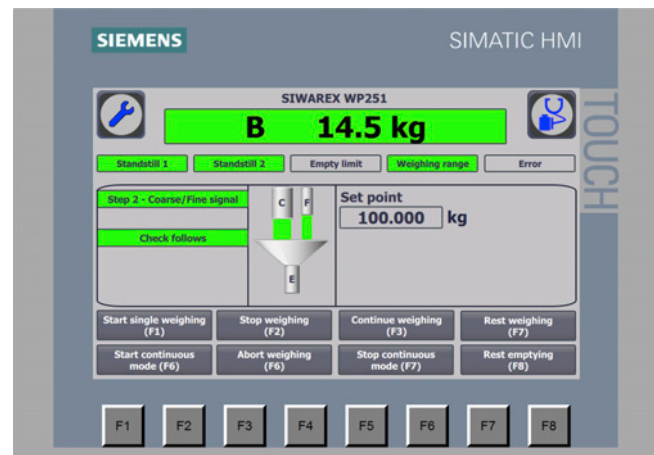
Stand-alone mode

Alternatively, SIWAREX WP251 can also be used without a SIMATIC CPU. In this case, the module is connected with a supply voltage of 24 V DC only. In this case, a PC (e.g. using an OPC server) or a Modbus-enabled operator panel can be used for operator input. Both Modbus interfaces of SIWAREX WP251 (TCP/IP and RTU) enable access to all parameters, actual values, setpoints, weight values and status information. A customized and plant-specific operator interface can thus be created on the PC or the Modbus-enabled operator panel. Integration into third-party systems is also no problem via the Modbus interfaces.

Technical specifications

SIWAREX WP251	
Weighing modes	• Non-automatic weighing instrument (NAWI) (filling + removal) (legal-for-trade according to OIML R-76) • Automatic catchweighing instruments (ACI) (filling + removal) (legal-for-trade according to OIML R-51) • Gravimetric filling instruments (GFI) (legal-for-trade according to OIML R-61) • Discontinuous Totalizing Automatic Weighing Instrument (SWT) (legal-for-trade according to OIML R-107 - in preparation
Integration in automation systems	
S7-1200	SIMATIC S7-1200 system bus
Operator panel and/or automation systems from other vendors	Via Ethernet (Modbus TCP/IP) or RS 485 (Modbus RTU)
Ports	• 1 x SIMATIC S7-1200 system bus • 1 x Ethernet (SIWATOOL and Modbus TCP/IP) • 1 x RS 485 (Modbus RTU or remote display) • 1 x analog output (0/4 ... 20 mA) • 4 x digital inputs (24 V DC, floating) • 4 x digital outputs (24 V DC, floating, short-circuit proof)
Functions	• 3 limits • Tare • Tare specification • Zeroing • Zero adjustment • Statistics • Automatic correction of the shut-off points • Internal protocol memory for 550 000 entries • Trace function for signal analysis • Internal restore point • Stand-alone mode or SIMATIC S7-1200 integrated
Parameter assignment	• Full access using function block in SIMATIC S7-1200 • Full access using Modbus TCP/IP • Full access using Modbus RTU
Remote display	
Connection	via RS 485
Setting the scales	PC software SIWATOOL (Ethernet), S7-1200 function block and touch panel or directly connected operator panel (Modbus)
Measuring accuracy	
Error limit according to DIN 1319-1 of full-scale value at 20 °C ± 10 K (68 °F ± 10 K)	0.05 %
Internal resolution	Up to ± 4 million parts
Number of measurements/second	100 or 120 (selectable)
Filter	• Low-pass filter 0.1 ... 50 Hz • Average value filter

SIWAREX WP251	
Load cells	Full-bridge strain gauges in 4-wire or 6-wire system
Load cell powering	
Supply voltage (regulated via feedback)	4.85 V DC
Permissible load resistance	
• R_{Lmin}	> 40 Ω
• R_{Lmax}	< 4 100 Ω
With SIWAREX IS Ex interface	
• R_{Lmin}	> 50 Ω
• R_{Lmax}	< 4 100 Ω
Load cell characteristic	1 ... 4 mV/V
Permissible range of the measurement signal (with 4 mV/V sensors)	-21.3 ... +21.3 mV
Max. distance of load cells	500 m (229.66 ft)
Connection to load cells in Ex zone 1	Optionally via SIWAREX IS Ex interface
Certificates	• ATEX Zone 2 • UL • KCC • EAC • RCM
Calibration approvals	• EU type-examination certificate 2014/31/EU (NAWI) according to OIML R76 • EU type-examination certificate 2014/32/EU (MID) according to OIML R61 and OIML R51 • EU type-examination certificate 2014/32/EU (MID) according to OIML R107 (available soon)
Auxiliary power supply	
Rated voltage	24 V DC
Max. power consumption	200 mA
Max. power consumption SIMATIC Bus	3 mA
IP degree of protection according to DIN EN 60529; IEC 60529	IP20
Climatic requirements	
$T_{min\,(IND)}$ to $T_{max\,(IND)}$ (operating temperature)	
• Vertical installation	-10 ... +40 °C (14 ... 104 °F)
• Horizontal installation	-10 ... +55 °C (14 ... 131 °F)
EMC requirements	according to EN 45501
Dimensions	70 x 75 x 100 mm (2.76 x 2.95 x 3.94 in)

2

Weighing Electronics
SIWAREX weighing electronics for SIMATIC
Dosing/Filling/Bagging scale

SIWAREX WP251

2

■ **Selection and ordering data**   Article No.   Article No.

SIWAREX WP251 weighing module	7MH4960-6AA01

Single-channel, legal-for-trade, for automatic dosing and batching scales (GFI, ACI, NAWI) with analog load cells / full-bridge strain gauges (1 - 4 mV/V), 1 x LC, 4 x DQ, 4 x DI, 1 x AQ, 1 x RS 485, Ethernet port.

SIWAREX WP251 equipment manual

Available in a range of languages

Free download on the Internet at:

http://www.siemens.com/weighing/documentation

SIWAREX WP251 "Ready for Use"

Free download on the Internet at:

http://www.siemens.com/weighing/documentation

SIWATOOL V4 & V7	7MH4900-1AK01

Service and commissioning software for SIWAREX weighing modules

Calibration set for SIWAREX WP2xx	7MH4960-0AY10

Valid for SIWAREX WP231 K and SIWAREX WP251.

For verification of up to 3 scales, comprising:
- 3 x inscription foil for labeling
- 1 x protective film
- 3 x calibration protection plate
- Guidelines for verification, certificates and approvals, adaptable label, SIWAREX WP

Ethernet cable patch cord 2 m (7 ft)	6XV1850-2GH20

For connecting SIWAREX WP251 to a PC (SIWATOOL), SIMATIC CPU, panel, etc.

Remote display (optional)

The digital remote displays can be connected directly to the SIWAREX WP251 via the RS 485 interface.

Suitable remote display: S102

Siebert Industrieelektronik GmbH

Postfach 1180

D-66565 Eppelborn, Germany

Tel.: +49 6806/980-0

Fax: +49 6806/980-999

Internet:
http://www.siebert-group.com/en

Detailed information is available from the manufacturer.

Accessories

SIWAREX JB junction box, aluminum housing	7MH4710-1BA

For connecting up to 4 load cells in parallel, and for connecting multiple junction boxes.

SIWAREX JB junction box, stainless steel housing	7MH4710-1EA

For connecting up to 4 load cells in parallel.

SIWAREX JB junction box, stainless steel housing (ATEX)	7MH4710-1EA01

For parallel connection of up to 4 load cells (for zone allocation, see manual or type-examination certificate).

Ex interface SIWAREX IS

For intrinsically-safe connection of load cells. With ATEX approval (not UL/FM). Suitable for SIWAREX electronic weighing system. Compatibility of load cells must be checked.
- Short-circuit current < 199 mA DC   7MH4710-5BA
- Short-circuit current < 137 mA DC   7MH4710-5CA

Cable (optional)

Cable Li2Y 1 x 2 x 0.75 ST + 2 x (2 x 0.34 ST) – CY

For connecting SIWAREX electronic weighing systems to junction box (JB), extension box (EB) and Ex interface or between two JBs.

For permanent installation. Occasional bending is possible.

External diameter: approx. 10.8 mm (0.43 in)

Permissible ambient temperature -40 ... +80 °C (-40 ... +176 °F).

Sold by the meter.
- Sheath color: orange   7MH4702-8AG
- For potentially explosive atmospheres. Sheath color: blue.   7MH4702-8AF

Ground terminal for connecting the load cell cable shield to the grounded DIN rail	6ES5728-8MA11

▪ Selection and ordering data   Article No.

	Article No.
Commissioning	
Commissioning charge for one static scale with SIWAREX module	**9LA1110-8SN50-0AA0**
(Travel and setup charge must be ordered separately)	
Scope:	
• Recording of data	
• Checking of mechanical installation of the scale	
• Checking of electrical wiring and function	
• Static adjustment of the scale	
Requirements:	
• Mechanical design functional	
• Modules electrically wired and tested	
• Adjustment weights available	
• Free access to scale	
Flat charge for travel and setup in Germany	**9LA1110-8RA10-0AA0**