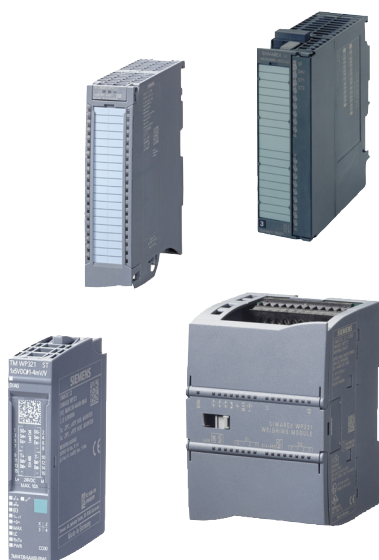
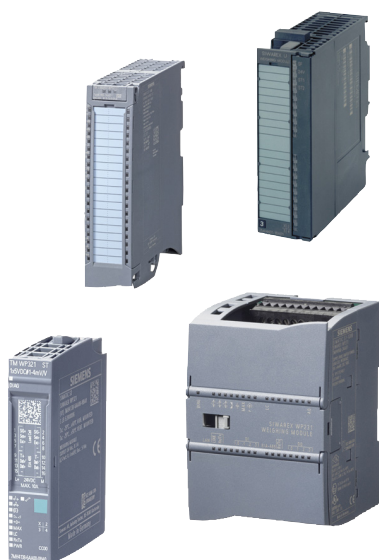


Weighing Electronics



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Overview

Automation with integral weighing and batching technology

In addition to the accuracy when weighing and proportioning, incorporation of weighing technology into modern automation systems serves to increase the sustained success of a company.

Requirements on scales in industrial processes

The weighing and proportioning system is of significant importance in many industrial processes, where many different weighing tasks have to be handled. Both programmable controllers (PLC) and process control systems (PCS) are used to automate production processes.

There are many different types of scales that work together with automation systems, depending on requirements.

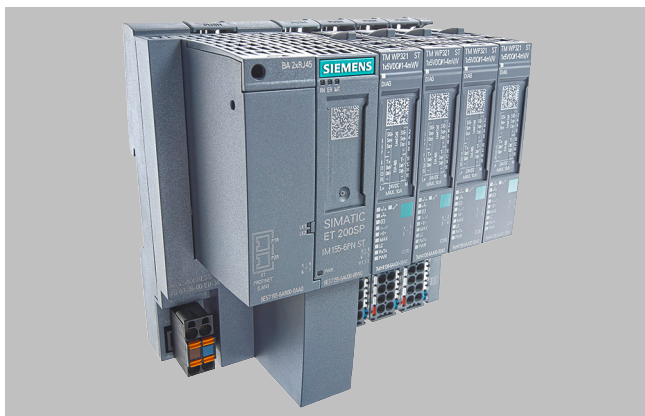
Production automation places the following demands on weighing technology:

- Flexibility with respect to typical scale functions
- Simple expansion of the weighing system
- Adaptability to the automation task, and
- Integrated communications concept

Scales that are able to satisfy these demands can be classified as part of the automation system. In this sense, the scale is an intelligent automation object comprising:

- Sensor technology
- Closed-loop control
- Actuator technology

The scale carries out its tasks according to the definitions of the control system.



SIWAREX WP321 electronic weighing system in the SIMATIC ET 200SP system

Distribution of weighing functions within automation system

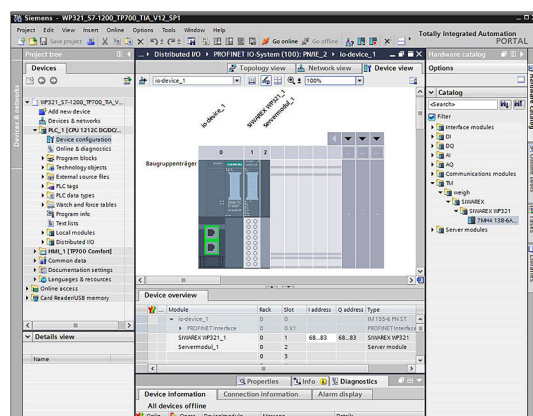
The distribution of weighing functions within automation systems has been subject to constant change in recent years. The reasons for this can be found in the search for an efficient solution for weighing tasks in the automation environment. The performance of hardware components is no longer the only reason for deciding to use a specific solution architecture. The demands placed on a modern weighing solution include the following scale-related requirements:

Overview (continued)

- High operational reliability
- Simple operation
- Very good reproducibility
- High accuracy

as well as the requirements associated with the following automation properties:

- Integration (hardware/software)
- Flexibility
- Standardization



Hardware configuration in the TIA Portal with the SIWAREX WP321 electronic weighing system

Application-compatible implementation leads to the following three aspects:

- The demands relating to accuracy and reproducibility require the use of special, high-quality function units for signal recording, signal conditioning, A/D conversion and preprocessing, as well as open-loop and closed-loop control functions. The task means that the weighing signals must be resolved in up to 16 million digitization steps. During proportioning and filling, material flows must be controlled over binary scale signals with a time resolution of up to less than one millisecond.
- A whole range of other application-specific functions are also required to perform the overall task. It is therefore essential to take into account the complete value chain in the production process. These might include the automatic filling of supply hoppers or the unloading of the final product - so that a system is required that supports simple implementation of the necessary functions.
- It is also necessary to ensure full integration of the weighing systems into the total automation technology wherever possible. This covers not only communication, but also requires functional integration and the engineering of all automation functions using standard tools.

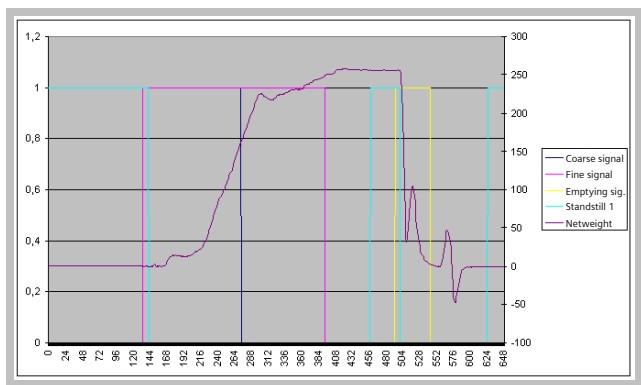
These aspects result in the following solution, which easily satisfies all requirements:

Weighing Electronics

Introduction

Overview (continued)

- Function or technology modules for weighing systems that contain the required hardware and firmware as standard, in order to satisfy the high accuracy requirements and time-critical tasks. These modules feature all the characteristics of the standard automation system and are therefore completely compatible.
- Use of standard automation systems for the implementation of application-specific tasks. This not only enables the use of the standards already generally applied for engineering, visualization, archiving etc., but also supports full integration into the total automation technology without the need for any further adaptation. Sector-specific and application-specific solutions can be implemented particularly flexibly in this case. Special weighing and process methods or recipes can be protected from access by third-parties by means of software protection (know-how protected).
- This concept sees the weighing system as an automation object integrated in the total automation solution. The aforementioned total compatibility means that the standard automation functions and the weighing functions combine to form an homogeneous entity for the user. The demands for uniformity, ease of use and flexibility on the basis of existing standards are fulfilled.
- This solution means that the component architecture can be central or distributed. In a distributed configuration, i.e. when components are integrated into the scale, the weighing system is easily transformed into an autonomous "field device", connected to the automation technology through the open PROFIBUS or PROFINET.



Curve display of dosing, recorded over the electronic weighing system using SIWAREX FTA

SIWAREX weighing systems in automation

Totally Integrated Automation plays an essential role in SIWAREX weighing systems.

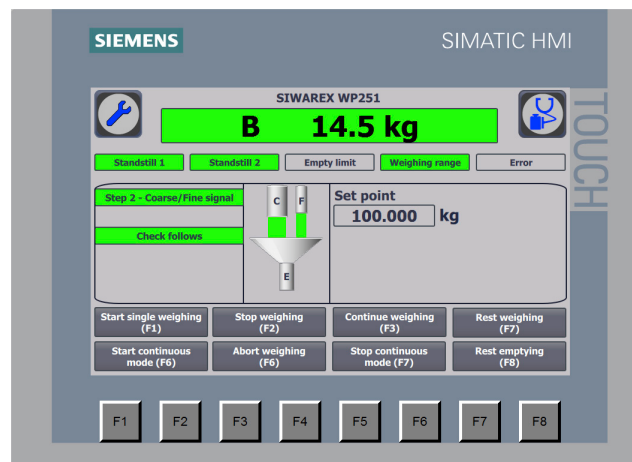
A key feature is the total integration of SIWAREX into the SIMATIC world.

This means:

- Implementation of central automation concepts by direct integration in SIMATIC S7
- Implementation of distributed automation concepts by means of connection to SIMATIC ET 200
- Integration in the SIMATIC PCS 7 process control system
- Operator control and monitoring through SIMATIC HMI
- Uniform configuring and programming through SIMATIC software

Overview (continued)

Dosing control



Visualization of dosing with SIMATIC HMI

SIWAREX - electronic weighing system - uniform SIMATIC system basis

By investing in SIWAREX weighing modules, you are investing in the uniform SIMATIC system basis on which the automation components of the entire production process can build – from incoming goods (upstream area) to the production process (mainstream area) down to the filling machine at the end of the production chain (downstream area) – a system basis which encompasses all hierarchical levels from the human-machine interface to the PROFIBUS DP fieldbus or PROFINET. Why use specialized technology for each weighing or proportioning problem when a uniform basis is available for all individual problem solutions? With SIWAREX, Siemens has created this uniform basis.

Integrated automation solutions with weighing technology

SIWAREX weighing modules are ideally suited to integrated automation solutions using weighing technology. SIWAREX can be used for every SIMATIC solution regardless of whether it is integrated into the SIMATIC S7 automation system in the form of a module or used as a distributed I/O with the SIMATIC S7.

The highlight: SIWAREX modules are integrated into the automation system with the same engineering tools as all other automation components. This is an excellent solution which reduces engineering costs and training expenses!

The ET 200 I/O device is designed as a modular system. The weighing electronics are selected from the module catalog and placed in the rack of the modular I/O station. The software addresses the weighing electronics as if they were modules plugged into the central controller of an automation system.

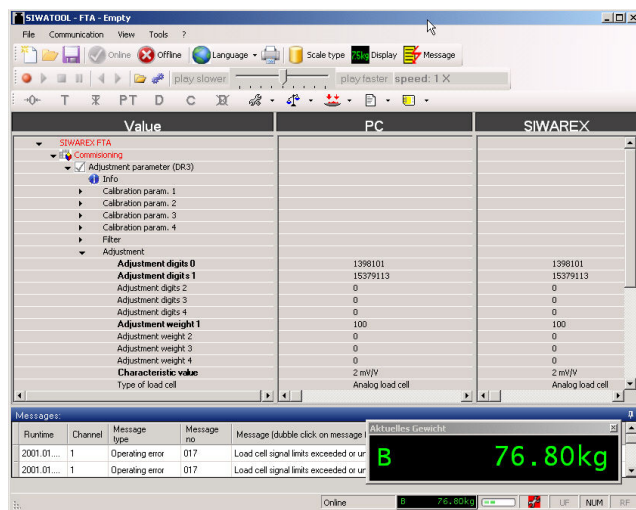
By using standard hardware (SIMATIC components) and standard software (STEP 7/TIA Portal), freely programmable, modular weighing systems are available which can be inexpensively adapted to specific plant requirements, e.g. by means of:

- Additional SIMATIC digital outputs for controlling a mixer, heater, agitator, etc.
- Additional functions implemented in STEP 7 for determining and controlling the material flow or for correcting the setpoint based on material moisture.

The advantages of direct integration at a glance:

Overview (continued)

- Low-cost system integration because no additional coupling modules are required
- Low configuration costs due to the integrated system design
- System-compatible module behavior (diagnostics interrupts, hardware interrupts, command output disables, etc.)
- Tailor-made, low-cost weighing systems due to expansion with standard SIMATIC components
- High plant availability
- Easy installation thanks to snap-on technique
- Low space requirements due to compact design



Scales can also be adjusted without an automation system.

High plant availability – to ensure that production does not come to a halt

Apart from the advantage that configuration know-how is only required for a single system, there are also enormous advantages in terms of plant availability.

In the SIMATIC S7, for example, faults (measuring range exceeded, proportioning fault, sensor fault, etc.) are reported to the automation system via diagnostic interrupts without the need to input a single line of programming code.

Error messages from the weighing electronics are automatically transferred to the automation system. The diagnostic information enables easy location of the module from which the message originated.

Additional diagnostic options are available when the load cells are connected via SIWAREX DB. The single channel monitoring that is thus possible identifies wire breaks, impedances and the current utilization of each and every load cell in a targeted manner.

Using a programmer or the plant visualization, operating personnel are then able to localize the error, display its cause and, if necessary, replace the defective module.

A replaced module is automatically detected by the automation system. Thanks to the transparent data management, the scales parameters saved in the automation system can then be transferred to the new weighing electronics. The scales are immediately available again for weighing tasks – no need to readjust with control weights (except applications requiring official calibration).

Overview (continued)

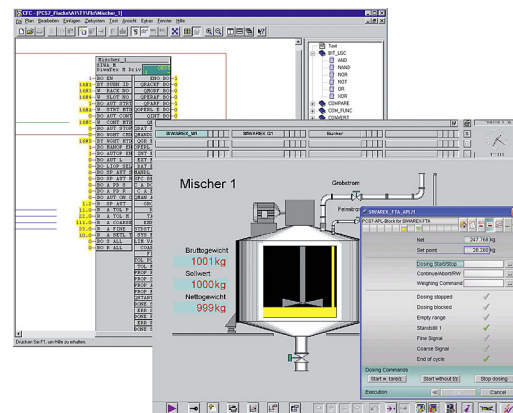
Since SIWAREX weighing systems are comprised solely of standard components (e.g. SIWAREX weighing modules, SIMATIC digital input/outputs, etc.), spare parts inventories are very easy to handle.

Standard programming in the SIMATIC PCS 7 process control system as in the SIMATIC S7 automation system

While the weighing modules used with the SIMATIC S7 automation system should preferably be integrated into the system with the typical PLC programming languages STL (Statement List), LAD (Ladder Diagram), FBD (Function Block Diagram) or SCL, the configuration in the SIMATIC PCS 7 process control system is implemented by means of graphic interconnection in the CFC (Continuous Function Chart). Configuration is used instead of programming.

The scales are displayed in the ES (engineering system) as "technology blocks" in the CFC. At the OS (operator station), however, faceplates are used to display the scales in the WinCC visualization system.

The faceplates can be used to monitor the weight values and operate the scales.



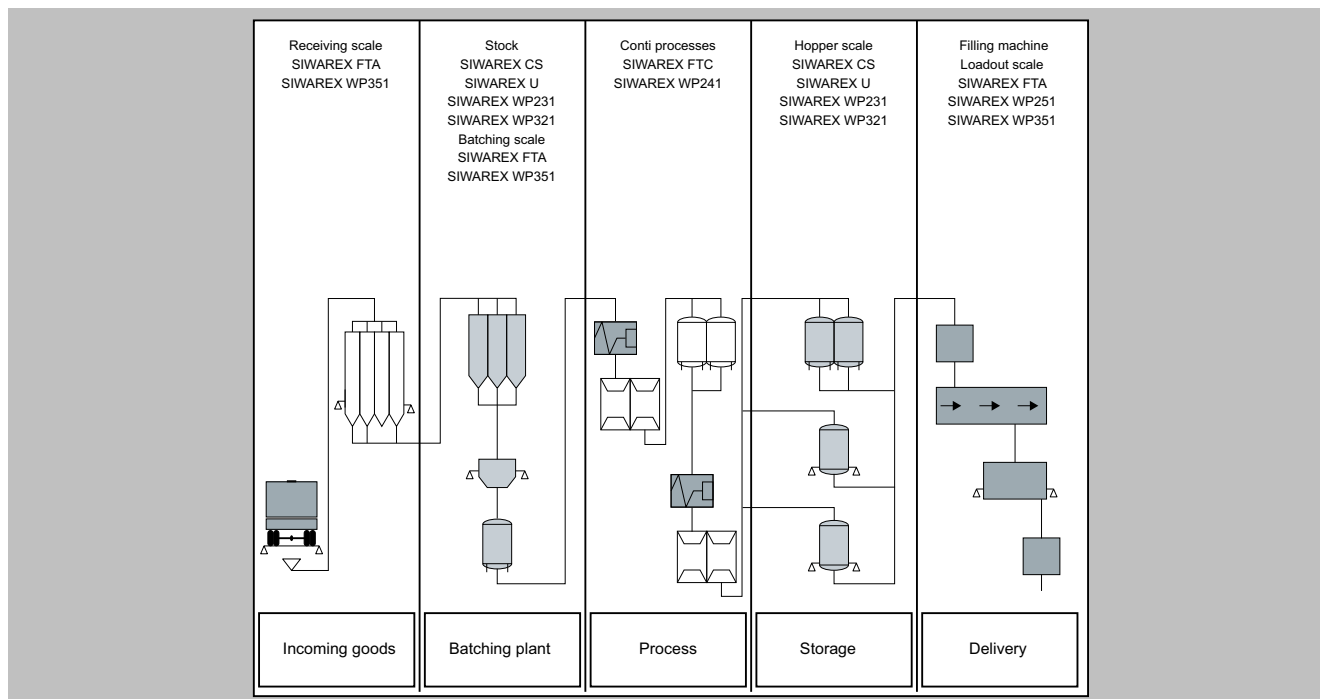
Scales displayed in the ES engineering system (on the left) and on the OS operator station (on the right)

Weighing Electronics

Introduction

Application

Applications of SIWAREX weighing technology in the production process



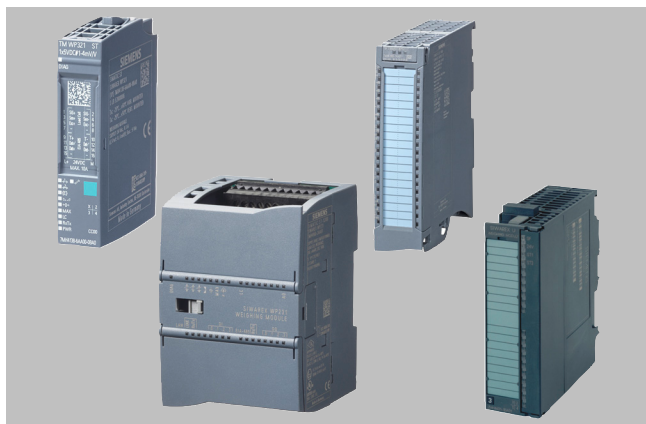
SIWAREX application table

Application	Selection	For PLC
Static weight measurements e.g. platform scales, hopper scales, vehicle scales, silos	SIWAREX WP321	ET 200SP
	SIWAREX WP231 (OIML R-76)	S7-1200
	SIWAREX WP521 ST	S7-1500 and ET 200MP
	SIWAREX WP522 ST	S7-1500 and ET 200MP
	SIWAREX U	S7-300 and ET 200M
	SIWAREX FTA (OIML R-76)	S7-300 and ET 200M
Force measurement e.g. rolling mills, monitoring of loads and belt tensions, overload protection, torque measurements	SIWAREX WP351 (OIML R-76)*	ET 200SP
	AI 2xGS 4/6-wire HS	ET 200SP
	SIWAREX WP231	S7-1200
	SIWAREX WP522 ST	S7-1500 and ET 200MP
Dosing e.g. batching plants, batch processes, proportioning recipes, single-scale and multi-scale systems	SIWAREX WP522 ST	S7-1500 and ET 200MP
	SIWAREX FTC	S7-300 and ET 200M
	SIWAREX WP251 (OIML R-51)	S7-1200
	SIWAREX FTA (OIML R-51)	S7-300 and ET 200M
Dosing (continuous) e.g. batching plants, in continuous operation	SIWAREX WP351 (OIML R-51)*	ET 200SP
	SIWAREX FTC (loss-in-weight scale operation mode)	S7-300 and ET 200M

Application	Selection	For PLC
Filling, bagging e.g. filling machines, weighing and sack filling machines, big bag	SIWAREX WP251 (OIML R-51/R-61)	S7-1200
	SIWAREX FTA (OIML R-51/R-61)	S7-300 and ET 200M
	SIWAREX WP351 (OIML R-51/R-61)*	ET 200SP
Loading e.g. loading scales for receiving and load operations	SIWAREX FTA (OIML R-107)	S7-300 and ET 200M
	SIWAREX WP251 (OIML R-107)	S7-1200
	SIWAREX WP351 (OIML R-107)*	ET 200SP
Checking scales (static) e.g. automatic weight control in static mode, e.g. following filling	SIWAREX FTA (OIML R-51)	S7-300 and ET 200M
	SIWAREX WP351 (OIML R-51)*	ET 200SP
Flow measurement e.g. solid flow meter (baffle plate)	SIWAREX FTC (solid flow meter operation mode)	S7-300 and ET 200M
Belt scales e.g. measurement of belt load, conveyed quantity, loading according to setpoint	SIWAREX WP241	S7-1200
	SIWAREX FTC (belt scale operation mode)	S7-300 and ET 200M

* certificates available soon

Overview



Platform and hopper scales

Weighing silos, vessels or platforms is a standard task in industry. The comprehensive SIWAREX electronics properties and functions can fulfil all requirements.

Platform scales

In the various branches of industry the use of platform scales is bound to very different requirements, in particular with regard to the load classes.

While platform scales are also used for small loads, road vehicle and track scales are especially suited for heavy loads.

Hopper scales

In almost every industry, liquids, powders, bulk goods or gases are produced and stored in funnels or vessels. To ensure their availability, the exact fill levels of these vessels must be known.

Weighing Electronics

SIWAREX for SIMATIC

Plattform and hopper scales / TM SIWAREX WP521 ST and WP522 ST weighing electronics

Overview



Weighing electronics TM SIWAREX WP521 ST (left) and TM SIWAREX WP522 ST (right)

The TM SIWAREX WP521 ST and WP522 ST (ST = Standard) are versatile weighing modules for the SIMATIC S7-1500 Advanced Controller family. With these electronic weighing systems, simple weighing applications, such as platform or hopper scales, can be seamlessly integrated into the S7-1500 automation environment.

Benefits

SIWAREX WP521 ST and WP522 ST offer the following key advantages:

- Uniform design technology and consistent communication in SIMATIC S7-1500
- Uniform configuration with TIA Portal
- Single (WP521 ST) and dual-channel (WP522 ST) variants are available
- Operation possible without or with failed SIMATIC CPU
- Optional direct connection of an operator panel via Ethernet port (Modbus TCP/IP)
- Optional direct connection of a remote display via RS 485 interface
- Modbus TCP/IP interface
- Modbus RTU interface
- Three digital inputs and four digital outputs
- Measurement of weight or force with a high resolution of up to ± 4 million parts and a measurement rate of 100/120 Hz
- Simple commissioning by means of HMI/CPU or PC software SIWATOOL V7 via the Ethernet interface
- Recovery point for simple restoration of all parameters
- Automatic calibration is possible without the need for calibration weights
- Module can be replaced without renewed adjustment of scale
- Automatic impedance monitoring of the connected load cells
- Direct use in hazardous area zone 2
- Up to eight 350 ohm load cells can be connected per channel
- High EMC resistance

Application

SIWAREX WP521 ST and WP522 ST are the optimum solution for the integration of non-automatic scales, such as platform or hopper scales, into the SIMATIC S7-1500 automation environment. The two modules have the basic weighing functions: zeroing, taring and tare specification. Three limit values can also be freely defined and, if required, also output via the digital outputs. All further available status information can also be flexibly linked to the outputs. The digital inputs can be used for the direct wiring of pushbuttons, for example. All weighing functions (e.g. zeroing) can be freely and flexibly assigned to each input.

Design

SIWAREX WP521 ST and WP522 ST are technology modules of the SIMATIC S7-1500 Advanced Controller family and therefore communicate directly with the SIMATIC S7-1500 controller via the system bus. Additional expensive communication cards are therefore not required when using SIWAREX weighing technology.

The compact, 35 mm wide weighing modules can be mounted directly on the SIMATIC DIN rail. Assembly is therefore extremely easy and consistent with the remaining automation.

The modules are delivered ex works with a shielding set, comprising a shield clamp, shielding bracket and 24 V DC supply element with screw-type terminals. This set is assembled with an appropriate front connector (must be ordered separately, see accessories and ordering data) and therefore guarantees optimum hardware design and EMC immunity.

The power supply, load cells, RS 485 interface and the digital inputs/outputs are also connected via the removable front connector. An RJ45 port is available on the bottom of the module for the Ethernet connection (SIWATOOL and Modbus TCP/IP).

Function

SIWAREX WP521 ST and WP522 ST provide simple weighing applications such as platform or hopper scales (ST = Standard). The basic functions zeroing, taring and tare specification can easily be issued by the CPU/HMI via the ready-made function block or alternatively via a 24 V signal at one of the three digital inputs.

The ready-made function block provides full access to all parameters. Commissioning, maintenance and operation of the scales can be performed fully from the CPU or HMI – without additional programming work. The free "Ready-for-use" software (can be downloaded in the Siemens Online Support) also contains fully fledged HMI configuration, which can be transferred to your own project as you wish and freely edited. Customer- and plat-specific weighing applications can therefore be realized in an instant. In addition, languages can be added easily and quickly with the help of the corresponding functions of the TIA Portal.

As an alternative to the CPU/HMI, the module can also be put into operation and maintained conveniently and without a knowledge of SIMATIC via the PC software SIWATOOL V7. This simplifies work considerably for the service staff as no interventions in the controller are required.

The automatic impedance monitoring of the module also increases plant safety and availability. The total impedance of the connected cells is determined as the reference value during commissioning. You can also freely define from which percentage deviation from the reference value a corresponding status bit is to be set. In the event of an error (e.g. severing of a load cell cable), this bit can generate corresponding alarms in the controller and initiate measures. The impedance is continuously monitored every 100 ms.

Up to eight 350-ohm load cells switched in parallel can be connected per scale (per channel).

The modules can be integrated into the plant network via the Ethernet interface of the modules, so that during servicing, remote access is easily possible worldwide by means of SIWATOOL. Please refer to the information at <http://www.siemens.com/industrialsecurity>

A firmware update of the modules can be performed via the TIA Portal (MMC card or by file selection) or SIWATOOL V7.



Software SIWATOOL V7

The software SIWATOOL V7 for Windows operating systems is optionally available for commissioning and servicing. The software is free of charge and part of the configuration package (see accessories).

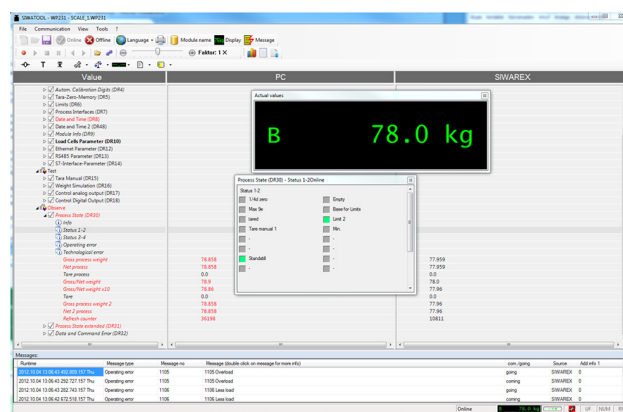
The program enables the scales to be parameterized and commissioned without the need for prior knowledge of the automation system. During servicing, the technician can use a PC to analyze and test the procedures in the scale. Reading the power fail-safe diagnostics buffer is also a useful feature for troubleshooting. A trace can also be started and read. This trace records all the weight values

Function (continued)

and status information in 10 ms intervals. The data can be read out using SIWATOOL V7 and exported to spreadsheet programs, thus enabling highly granular investigation and optimization.

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 (trace)
- Firmware update
- Creation/loading of external backup files



SIWATOOL V7, layout of the program windows

Weighing Electronics

SIWAREX for SIMATIC

Plattform and hopper scales / TM SIWAREX WP521 ST and WP522 ST weighing electronics

Selection and ordering data

	Article No.
Weighing electronics TM SIWAREX WP521 ST Single-channel, for platform scales or hopper scales with analog load cells (1 - 4 mV/V), 1 x LC, 4 x DQ, 3 x DI, 1 x RS 485, Ethernet port, including shielding set.	7MH4980-1AA01
Weighing electronics TM SIWAREX WP522 ST Two-channel, for two separate platform scales or hopper scales with analog load cells (1 - 4 mV/V), per channel 1 x LC, 4 x DQ, 3 x DI, 1 x RS 485, Ethernet port, including shielding set.	7MH4980-2AA01
SIMATIC S7-1500, front connector with screw-type terminals 40-pin, for 35 mm wide modules, including 4 jumper links and cable ties	6ES7592-1AM00-0XB0
SIMATIC S7-1500, front connector with push-in technology 40-pin, for 35 mm wide modules, including 4 jumper links and cable ties	6ES7592-1BM00-0XB0
SIWATOOL V4 & V7 Service and commissioning software for SIWAREX weighing modules	7MH4900-1AK01
Ethernet cable patch cord 2 m (7 ft) For connecting SIWAREX WP52x ST to a PC (SIWATOOL V7 or Modbus TCP/IP)	6XV1850-2GH20
Accessories	
SIWAREX EB extension box For extending sensor cables	7MH4710-2AA
SIWAREX JB junction box, aluminum housing For connecting up to 4 load cells in parallel, and for connecting multiple junction boxes	7MH5001-0AA20
SIWAREX JB junction box, stainless steel housing For connecting up to 4 load cells in parallel	7MH5001-0AA00
SIWAREX JB junction box, stainless steel housing (ATEX) For parallel connection of up to 4 load cells (for zone allocation, see manual or type-examination certificate)	7MH5001-0AA01
SIWAREX IS Ex interface For intrinsically safe connection of load cells. With ATEX approval (not UL/FM). Suitable for SIWAREX electronic weighing systems. Compatibility of load cells must be checked separately.	
• Short-circuit current < 199 mA DC	7MH4710-5BA
• Short-circuit current < 137 mA DC	7MH4710-5CA
Cable (optional)	

Selection and ordering data (continued)

	Article No.
Cable Li2Y 1 x 2 x 0.75 ST + 2 x (2 x 0.34 ST) – CY For connecting SIWAREX electronic to junction box (JB), extension box (EB), digital junction box (DB), Ex interface (IS) or between two extension boxes. For permanent installation. Occasional bending is possible. External diameter: approx. 10.8 mm (0.43 inch) Permissible ambient temperature -40 ... +80 °C (-40 ... +176 °F) Sold by the meter.	
• Sheath color: orange	7MH4702-8AG
• Sheath color (for hazardous atmospheres): blue	7MH4702-8AF
Remote display (optional) The digital remote displays can be connected directly to the SIWAREX WP231 via the RS 485 interface. Suitable remote display: S102 Siebert Industrie-elektronik GmbH PO Box 1180 D-66565 Eppelborn Tel.: +49 6806/980-0 Fax: +49 6806/980-999 http://www.siebert-group.com/en Detailed information is available from the manufacturer.	

Technical specifications

SIWAREX WP521 ST / WP522 ST	
Weighing modes	Non-automatic scales, e.g. platform and hopper scales
Ports	1 × SIMATIC S7-1500 system bus 1 × Ethernet (SIWATOOL, Modbus TCP/IP) 1 × RS 485 per channel (Modbus RTU or remote display) 3 × digital inputs per channel (24 V DC) 4 × digital outputs (24 V DC short-circuit proof) per channel
Functions	3 limits - Zeroing - Tare - Tare specification - Zero adjustment - Trace function for signal analysis - Internal restore point - SIMATIC S7-1500 integrated and/or stand-alone operation
Parameter assignment	- Using function block in SIMATIC S7-1500 and HMI - Using SIWATOOL V7 - Using Modbus TCP/IP - Using Modbus RTU
Remote display (see accessories)	
Connection	Via RS 485
Display	Additional display for weight value
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 0.05 ... 50 Hz - Average value filter
Weighing functions	
Weight values	- Gross - Net - Tare
Limit values	2 × min/max 1 × empty
Zeroing	Per command
Tare	Per command
Tare specification	Per command
Compatible sensors	Analog load cells / full-bridge strain gauges (1-4 mV/V) 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	800 m (2 624 ft)
Connection to load cells in Ex zone 1	Optionally via SIWAREX IS Ex interface

Technical specifications (continued)

SIWAREX WP521 ST / WP522 ST	
Certificates	- ATEX Zone 2 - UL - KCC - EAC - RCM - FM - IECEX
Auxiliary power supply	
Rated voltage	24 V DC
Max. power consumption WP521 ST / WP522 ST	120 mA / 200 mA
Max. power consumption SIMATIC Bus	35 mA @ 15 V
IP degree of protection to EN 60529; IEC 60529	IP20
Climatic requirements $T_{min} (IND) \dots T_{max} (IND)$ (operating temperature)	
• Horizontal installation	-10 ... +60 °C (14 ... 140 °F)
• Vertical installation	-10 ... +40 °C (14 ... 104 °F)
EMC requirements	According to IEC 61000-6-2:2004; IEC 61000-6-4:2007+A1:2011
Dimensions (W × H × D)	35 × 147 × 129 mm (1.38 × 5.79 × 5.08 inch)

Weighing Electronics

SIWAREX for SIMATIC

Plattform and hopper scales / SIWAREX WP231 weighing electronics

Overview



SIWAREX WP231 is a versatile, legal for trade weighing module for all simple weighing and force measuring tasks. The compact module is easy to install in the SIMATIC S7-1200 automation system. It can also be operated without a SIMATIC CPU.

Benefits

SIWAREX WP231 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
- Operation without SIMATIC CPU possible
- Direct connection of an operator panel via Ethernet
- Direct connection of a remote display via RS 485 interface
- Modbus TCP/IP interface
- Modbus RTU interface
- Four digital inputs and outputs, one analog output
- Measurement of weight or force with a high resolution of up to ± 4 million parts and an accuracy of 0.05%
- Simple adjustment of scale using the SIWATOOL V7 program via the Ethernet interface
- Recovery point for simple restoration of all parameters
- Automatic calibration is possible without the need for calibration weights
- Supports replacement of module without recalibration of scales
- Use in hazardous area zone 2
- Connection of digital force compensation load cells from WIPOTEC and Mettler-Toledo (type WM and PBK)

Application

SIWAREX WP231 is the optimum solution wherever load cells are used for measuring tasks. The following are typical SIWAREX WP231 applications:

- Non-automatic weighing instruments, also legal for trade
- Fill level monitoring of silos and bunkers
- Measuring of crane and cable loads
- Load measuring for industrial lifts and rolling mills
- Scales in zone 2 hazardous areas
- Force measuring, hopper scales, platform scales and crane scales

Design

SIWAREX WP231 is a compact technology module in the SIMATIC S7-1200 and can be connected directly via the system bus with S7-1200 components. The rail mounting of the 70 mm (2.76 inch) wide weighing module means that it is extremely easy to mount/wire.

The power supply, load cells, the RS 485, digital input/outputs and the analog output are connected via the screw connector of the weighing module. An RJ45 plug is used for the Ethernet connection.

Function

The primary task of SIWAREX WP231 is the measurement and conversion of sensor voltage into a weight value. Up to three interpolation points are used for the weight calculation. The signal can also be digitally filtered if required.

Weighing functions

There are commands available for zeroing and taring. Up to three different tare default values can be activated for this. SIWAREX WP231 is factory-calibrated. This means the scale can be automatically adjusted without adjustment weights, and modules can be replaced without the need to readjust the scale.

Monitoring and control of the scale signals and states

In addition to weight determination, the SIWAREX WP231 monitors two freely programmable limits (optionally min/max) as well as the empty range. It signals violations of the limits. Consistent and uniform communication between all system components enables fast, reliable and cost-effective integration and diagnostics in process plants.

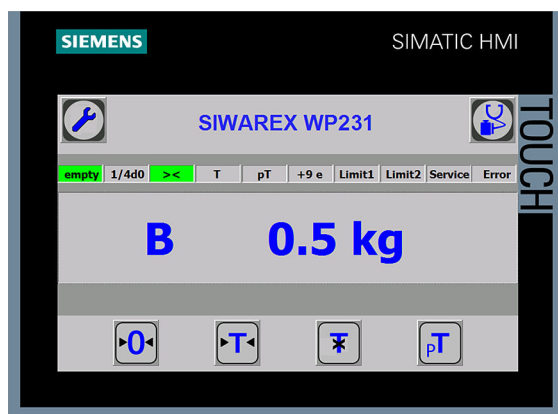
Integration in the plant environment

SIWAREX WP231 is directly integrated into the SIMATIC S7-1200 via the SIMATIC bus. All scale parameters can be read and edited by the CPU. Therefore a complete commissioning of the scales by the CPU or by a connected HMI device is possible. A wide variety of connection options are provided via the RS 485 and Ethernet interface. Via Modbus TCP/IP or Modbus RTU, control panels can be connected and it is also possible to communicate with various automation systems. A remote display can also be connected to the RS 485. A PC for configuring the SIWAREX WP231 can be connected to the Ethernet interface.

Weight value, status, tare, commands and messages are transmitted via the SIMATIC I/O area. The parameters of the data records can be set via SIWATOOL or with an operator panel connected directly to the weighing electronics.

SIWAREX WP231 can be integrated into the plant software with the aid of a ready-made function block. In contrast to serially linked weighing electronics, SIWAREX WP231 does not need costly additional modules to link it to SIMATIC.

Used in conjunction with SIWAREX WP231, it is possible to configure freely programmable, modular weighing systems in SIMATIC, which can be adapted to company-specific requirements as needed.



In addition to the configuration package, a fully-featured SIWAREX WP231 "Ready-for-use" software is also available free-of-charge. It shows beginners how to integrate the module in a TIA Portal program and offers a basis for application programming. This allows you to connect the scale application very easily to an operator panel either connected to the SIMATIC CPU or connected directly to the SIWAREX WP231.

Function (continued)

A "Ready-for-use" example program is available in the TIA Portal for applications requiring official calibration. This is designed so that it can be used directly with the legal trade SecureDisplay software. Required is a Windows CE-based operating panel (for example, SIMATIC Comfort Touch series).

SIMATIC Basic and Key Panels cannot be used for applications requiring official calibration.

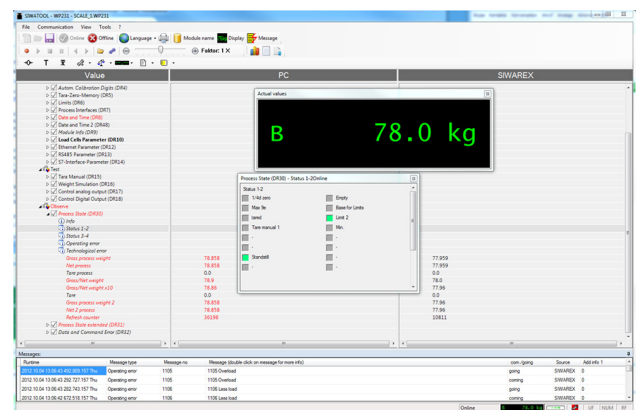
Software

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 the SIWAREX WP231 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



SIWATOOL V7 calibration software, layout of the individual program windows

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 WP231 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 WP231 on site. This means that firmware upgrades can be carried out on site as required anywhere in the world.

Weighing Electronics

SIWAREX for SIMATIC

Plattform and hopper scales / SIWAREX WP231 weighing electronics

Selection and ordering data

	Article No.
SIWAREX WP231 weighing electronics Single-channel, legal-for-trade, for NAWI non-automatic weighing instruments (e.g. platform scales or hopper scales) with analog load cells (1–4 mV/V), 1 x LC, 4 x DQ, 4 x DI, 1 x AQ, 1 RS 485, Ethernet port	7MH4960-2AA01
SIWAREX S7-1200 Equipment Manual Available in a range of languages Free download on the Internet at: http://www.siemens.com/weighing/documentation	
SIWAREX WP231 "Ready-for-use" Complete software package for non-automatic weighing instrument (for S7-1200 and a directly connected operator panel) Free download on the Internet at: http://www.siemens.com/weighing/documentation	
SIWAREX WP231 "Ready-for-use - legal-for-trade" Software package for non-automatic weighing instruments for S7-1200 requiring official calibration Free download on the Internet at: http://www.siemens.com/weighing/documentation	
Software SecureDisplay Software for a legal trade display on Windows CE-based Panel. SIMATIC Basic and Key Panels are excluded Free download on the Internet at: http://www.siemens.com/weighing/documentation	
SIWATOOL V4 & V7 Service and commissioning software for SIWAREX weighing modules	7MH4900-1AK01
Calibration set for SIWAREX WP2xx Valid for SIWAREX WP231 and SIWAREX WP251. For verification of up to 3 scales, comprising: • 3 x inscription foils for ID label • 1 x protective film • 3 x calibration protection plates • Guidelines for verification, certificates and approvals, editable label, SIWAREX WP	7MH4960-0AY10
Ethernet cable patch cord 2 m (7 ft) For connecting SIWAREX WP231 to a PC (SIWATOOL), SIMATIC CPU, panel, etc.	6XV1850-2GH20
Accessories	
SIWAREX EB extension box For extending sensor cables	7MH4710-2AA
SIWAREX JB junction box, aluminum housing For connecting up to 4 load cells in parallel, and for connecting multiple junction boxes	7MH5001-0AA20

Selection and ordering data (continued)

	Article No.
SIWAREX JB junction box, stainless steel housing For connecting up to 4 load cells in parallel	7MH5001-0AA00
SIWAREX JB junction box, stainless steel housing (ATEX) For parallel connection of up to 4 load cells (for zone allocation, see manual or type-examination certificate)	7MH5001-0AA01
SIWAREX DB digital terminal box For enhanced diagnostic and monitoring options in conjunction with SIWAREX WP electronics	7MH5001-0AD20
SIWAREX IS Ex interface For intrinsically safe connection of load cells. With ATEX approval (not UL/FM). Suitable for SIWAREX electronic weighing systems. Compatibility of load cells must be checked separately. • Short-circuit current < 199 mA DC • Short-circuit current < 137 mA DC	7MH4710-5BA 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 to junction box (JB), extension box (EB), digital junction box (DB), Ex interface (IS) or between two extension boxes. For permanent installation. Occasional bending is possible. External diameter: approx. 10.8 mm (0.43 inch) Permissible ambient temperature -40 ... +80 °C (-40 ... +176 °F) Sold by the meter. • Sheath color: orange • Sheath color (for hazardous atmospheres): blue	7MH4702-8AG 7MH4702-8AF
Ground terminal for connecting the load cell cable shield to the grounded DIN rail	6ES5728-8MA11
Remote display (optional) The digital remote displays can be connected directly to the SIWAREX WP231 via the RS 485 interface. Suitable remote display: S102 Siebert Industrie Elektronik GmbH PO Box 1180 D-66565 Eppelborn Tel.: +49 6806/980-0 Fax: +49 6806/980-999 http://www.siebert-group.com/en Detailed information is available from the manufacturer.	

Technical specifications

SIWAREX WP231	
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)
Communication interfaces	• SIMATIC S7-1200 backplane bus • RS 485 (Modbus RTU, Siebert remote display) • Ethernet (SIWATOOL V7, Modbus TCP/IP) • Analog output 0/4 ... 20 mA • 4 × digital outputs 24 V DC, floating, short-circuit proof • 4 × digital inputs 24 V DC, floating
Commissioning options	• Using SIWATOOL V7 • Using function block in SIMATIC S7-1200 CPU / Touch Panel • Using Modbus TCP/IP • Using Modbus RTU
Measuring accuracy EC type approval as non-automatic weighing instrument, trade class III Error limit according to DIN 1319-1 of full-scale value at 20 °C ± 10 K (68 °F ± 10 K) Internal resolution Measuring frequency	3000 d ≥ 0.5 µV/e 0.05% Up to ± 4 million parts 100 / 120 Hz
Digital filter	Variable adjustable low-pass and average filter
Typical applications	• Non-automatic weighing instruments • Force measurements • Fill-level monitoring • Belt tension monitors
Weighing functions Weight values Limit values Zeroing Tare Tare specification	• Gross • Net • Tare • 2 × min/max • Empty Per command Per command Per command
Load cells	Full-bridge strain gauges in 4-wire or 6-wire system
Load cell powering Supply voltage (regulated via feedback) Permissible load resistance • R_{Lmin} • R_{Lmax} With SIWAREX IS Ex interface • R_{Lmin} • R_{Lmax}	4.85 V DC > 40 Ω < 4 100 Ω > 50 Ω < 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 (compatibility of the load cells must be checked)

Technical specifications (continued)

SIWAREX WP231	
Approvals/certificates	• ATEX Zone 2 • UL • EAC • KCC • RCM • OIML R76 • Type approval 2009/23/EC (NAWI)
Calibration approval	EC type approval OIML R76
Auxiliary power supply Rated voltage Max. power consumption Max. power consumption SIMATIC Bus	24 V DC 200 mA 3 mA
IP degree of protection to EN 60529; IEC 60529	IP20
Climatic requirements $T_{min(IND)} ... T_{max(IND)}$ (operating temperature) • Vertical installation • Horizontal installation	 -10 ... +40 °C (14 ... 104 °F) -10 ... +55 °C (14 ... 131 °F)
EMC requirements	According to EN 45501
Dimensions	70 × 75 × 100 mm (2.76 × 2.95 × 3.94 inch)

Weighing Electronics

SIWAREX for SIMATIC

Plattform and hopper scales / TM SIWAREX WP321 ST weighing electronics

Overview



SIWAREX WP321 is a versatile and flexible weigh beam for the seamless integration of a static scale into the SIMATIC automation environment.

The weighing electronics are integrated within the SIMATIC ET 200SP system series and use all the features of a modern automation system, such as integrated communication, operator control and monitoring, diagnostics units and the project planning tools in the TIA portal, SIMATIC Step 7, WinCC flexible and PCS 7.

In conjunction with the digital SIWAREX DB junction box, up to four connected load cells can be diagnosed separately. This enables the weigh beam module to detect the failure of individual load cells and, in the event of an error, to provide relevant load cell data such as order number and location designation directly in the CPU or at the HMI. This increases the operational reliability of the scale, reduces downtimes, makes commissioning easier and simplifies servicing.

All messages and process values of the individual load cell channels are of course available in the SIMATIC controller.

Benefits

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

- Uniform design technology and consistent communication in SIMATIC ET 200SP
- Compact design with only 15 mm module width
- Parameterization of the scales via the control panel, CPU or PC
- Flexible configuration options in SIMATIC TIA Portal, SIMATIC STEP 7 and PCS 7
- Measuring of weights and forces with a resolution of up to +/- 2 million parts
- 100/120/600 Hz measurement rate
- Internal scale monitoring of freely definable limit values
- Easy commissioning using the SIWATOOL software
- Automatic calibration is possible without the need for calibration weights
- Modules can be replaced without recalibrating the scale
- Direct use in ATEX Zone 2 possible
- Wide range of status and diagnostic information
- "Ready-for-use" sample program

Application

SIWAREX WP321 is the optimum solution wherever analog load cells are used for measuring tasks.

The SIWAREX WP321 is suitable for the following applications:

- Non-automatic weighing instrument (NAWI), e.g. platform and hopper scales
- Fill-level monitoring of silos and bins
- Measuring of crane and cable loads
- Force measurements
- Monitoring of belt tensions
- Setup of scales in hazardous areas

Design

SIWAREX WP321 is a technology module (TM) of the SIMATIC ET 200SP series and is thus linked to the controller in a distributed manner by means of an ET 200SP interface module (PROFIBUS/PROFINET).

The following BaseUnits (Type A0) can be used for integration:

For opening a new potential group:

BU15P-16+A10+2D (6ES7193-6BP20-0DA0)

BU15P-16+A0+2D (6ES7193-6BP00-0DA0)

For continuing the potential group:

BU15P-16+A10+2B (6ES7193-6BP20-0BA0)

BU15P-16+A0+2B (6ES7193-6BP00-0BA0)

The load cells or force sensors are connected to the terminals of the BaseUnits. This means that modules can be replaced quickly, easily and without any wiring work.

Function

The primary task of the weighing electronics is to determine the current weight and force values on the basis of signals supplied by the connected sensors. Thanks to the seamless integration into the SIMATIC environment, values can be processed directly and in any available programming language of the CPU. If the freely selectable and internally monitored values are exceeded or undershot, this is reported directly to the controller. A variety of status and diagnostic information can also be read out and evaluated in the CPU without difficulty.

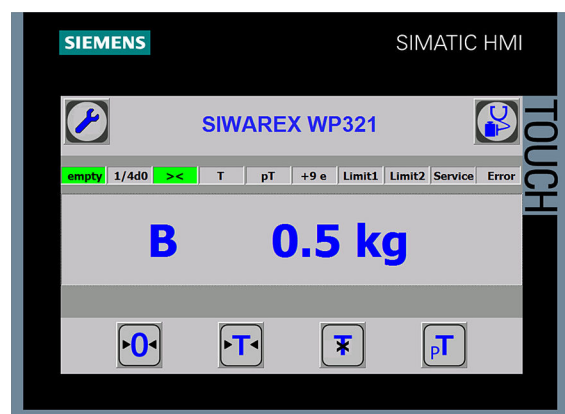
The SIWAREX WP321 is calibrated in the factory. This not only permits automatic calibration of the scales (without the need for calibration weights), but also the replacement of modules without the need for recalibration.

Via the integral RS 485 interface, a PC can be connected for setting the parameters of the weighing electronics using the "SIWATOOL" software. A USB-RS 485 interface converter is required for this purpose.

Thanks to its seamless integration into the SIMATIC environment, the use of SIWAREX weighing electronics does not require any complicated or expensive communication drivers for the scales.

Programmable weighing applications tailored to any situation can be created and then adapted or extended at any time in combination with the functionalities of the TIA Portal and of the SIMATIC Manager and WinCC flexible.

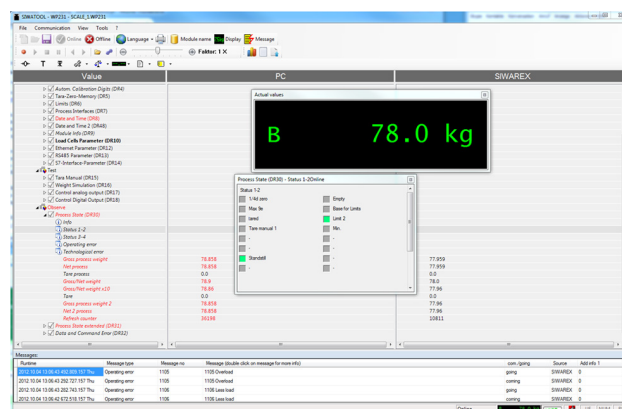
Likewise, WP321 enables scales to be set up in hazardous areas. Depending on the zone and the load cells used, the use of the SIWAREX IS Ex interface may also be necessary.



SIWAREX WP321 Ready-for-use

For an easy introduction to the integration of the module into the TIA Portal and SIMATIC Manager, a "Ready-for-use" sample project is available free of charge. This project demonstrates the integration of the module into the hardware configuration and contains the function block for communication between the CPU and SIWAREX. It also contains a ready-made data block that contains all the parameters for the scales. The "Ready for Use" project is rounded off with a touch panel configuration feature, which not only permits complete commissioning of the scales from the panel, but also includes an "operator view" that can be used to show the normal operation of the scales.

Function (continued)



SIWAREX WP321 SIWATOOL

SIWATOOL is a service software tool which enables you to calibrate the module quickly and efficiently on site, set or reset parameters, or perform diagnostics in the event of a fault. Furthermore, complete backup files can be created for the scales, which can be uploaded to a new module with a few mouse clicks, so that the module continues to operate exactly as it did before the backup, without the need for any recalibration. It is even possible to upload configuration files that were created offline, or to read out the error buffer. No special SIMATIC knowledge is required to use SIWATOOL. It is connected via the RS 485 port of the module which requires the use of a USB-RS 485 interface converter. Please refer to the SIWAREX WP321 Equipment Manual for further recommendations.

Weighing Electronics

SIWAREX for SIMATIC

Plattform and hopper scales / TM SIWAREX WP321 ST weighing electronics

Selection and ordering data

	Article No.
TM SIWAREX WP321 weighing electronics Single-channel, for platform scales or hopper scales with analog load cells (1 ... 4 mV/V), 1 × LC, 1 × RS 485	7MH4138-6AA00-0BA0
SIWAREX WP321 Equipment Manual Available in a range of languages Free download on the Internet at: http://www.siemens.com/weighing/documentation	
SIWAREX WP321 "Ready-for-use" TIA Portal and SIMATIC Manager sample configuration Free download on the Internet at: http://www.siemens.com/weighing/documentation	
SIWATOOL V4 & V7 Service and commissioning software for SIWAREX weighing modules	7MH4900-1AK01
SIWAREX PCS 7 AddOn Library for PCS7 V8.x and V9.0 Supports PROFINET APL faceplates and function blocks for: • SIWAREX U • SIWAREX FTA • SIWAREX FTC_B (belt scale) • SIWAREX WP321 Classic faceplate and function block for: • SIWAREX FTC_L (Loss-in-weight)	7MH4900-1AK61
Accessories (mandatory requirement)	
BaseUnit (Type A0 – one BaseUnit required for each WP321) For opening a new potential group • BU15P-16+A0+2D • BU15P-16+A10+2D For continuing the potential group • BU15P-16+A0+2B • BU15P-16+A10+2B	6ES7193-6BP00-0DA0 6ES7193-6BP20-0DA0 6ES7193-6BP00-0BA0 6ES7193-6BP20-0BA0
Shield connection for BaseUnit (5 units / for 5 scales) For laying load cell cable	6ES7193-6SC20-1AM0
Accessories (optional)	
SIWAREX EB extension box For extending sensor cables	7MH4710-2AA
SIWAREX JB junction box, aluminum enclosure For connecting up to 4 load cells in parallel, and for connecting multiple junction boxes	7MH5001-0AA20
SIWAREX JB junction box, stainless steel enclosure For connecting up to 4 load cells in parallel	7MH5001-0AA00
SIWAREX JB junction box, stainless steel enclosure (ATEX) For parallel connection of up to 4 load cells (for zone allocation, see manual or type-examination certificate)	7MH5001-0AA01

Selection and ordering data (continued)

	Article No.
SIWAREX DB digital junction box For enhanced diagnostic and monitoring options in conjunction with SIWAREX WP electronics Enclosure made of: • Aluminum • Stainless steel	7MH5001-0AD20 7MH5001-0AD01
SIWAREX IS Ex interface For intrinsically-safe connection of load cells. With ATEX approval (not UL/FM). Suitable for SIWAREX electronic weighing systems. Compatibility of load cells must be checked separately. Approved for use in the EU • Short-circuit current < 199 mA DC • Short-circuit current < 137 mA DC	7MH4710-5BA 7MH4710-5CA
Cable (optional)	
Cable Li2Y 1 × 2 × 0.75 ST + 2 × (2 × 0.34 ST) – CY For connecting SIWAREX electronic to junction box (JB), extension box (EB), digital junction box (DB), Ex interface (IS) or between two extension boxes. For permanent installation. Occasional bending is possible. External diameter: approx. 10.8 mm (0.43 inch) Permissible ambient temperature -40 ... +80 °C (-40 ... +176 °F) Sold by the meter. • Sheath color: orange • Sheath color (for hazardous atmospheres): blue	7MH4702-8AG 7MH4702-8AF
RS 485/USB interface converter Commercially available interface converter with FTDI chip, e.g. USB-Nano from CTI https://www.ctishop.com/en/rs485-converter/usb-nano-485	
Remote display The Siebert S102 and S302 remote digital displays can be directly connected to the SIWAREX WP321 via an RS 485 interface. Siebert Industrie Elektronik GmbH PO Box 1180D-65565 Eppelborn, Germany Tel: +49 6806/980-9 Fax: +49 6806/980-999 http://www.siebert-group.com/en Detailed information is available from the manufacturer.	

Technical specifications

SIWAREX WP321	
Integration in automation systems SIMATIC S7-300, S7-400, S7-1200 and S7-1500 Other manufacturers (with restrictions)	Via SIMATIC ET 200SP interface module (PROFIBUS or PROFINET) Via SIMATIC ET 200SP interface module (PROFIBUS or PROFINET)
Communication interfaces	• SIMATIC ET 200SP backplane bus • RS 485 (SIWATOOL, Siebert remote display)
Commissioning options	• Using SIWATOOL V7 • Using function block in SIMATIC CPU / Touch Panel
Measuring accuracy According to DIN 1319-1 of full-scale value at 20 °C ± 10 K (68 °F ± 10 K) Internal resolution Measuring frequency	0.05% ± 2 million parts 100 / 120 / 600 Hz
Digital filter	Variable adjustable low-pass and average filter
Typical applications	• Non-automatic weighing instruments • Force measurements • Fill-level monitoring • Belt tension monitors
Weighing functions Weight values Limit values Zeroing Tare External tare specification Calibration commands	• Gross • Net • Tare • 2 × min/max • Empty Via command by controller or HMI Via command by controller or HMI Via command by controller or HMI Via command by controller or HMI
Load cells	Full-bridge strain gauges in 4-wire or 6-wire system
Load cell powering Supply voltage (value applies at sensor, cable-related voltage drops of up to 5 V are controlled) Permissible load resistance • R_{Lmin} • R_{Lmax} With SIWAREX IS Ex interface • R_{Lmin} • R_{Lmax}	4.85 V DC ±2% > 40 Ω < 4 100 Ω > 50 Ω < 4 100 Ω
Load cell characteristic	1 ... 4 mV/V
Permissible range of measuring signal (at greatest set characteristic value)	-21.3 ... +21.3 mV
Max. distance of load cells	1000 m (459.32 ft)
Connection to load cells in Ex zone 1	Optionally via SIWAREX IS Ex interface (compatibility of the load cells must be checked)
Approvals/certificates	• ATEX Zone 2 • UL • FM • EAC • KCC • IECEx • RCM

Technical specifications (continued)

SIWAREX WP321	
Auxiliary power supply Rated voltage Max. power consumption Max. power consumption SIMATIC Bus	24 V DC Typ. 0.1 A @ 24 V DC (0.2 A max.) 30 mA
IP degree of protection to EN 60529; IEC 60529	IP20
Climatic requirements $T_{min(IND)} \dots T_{max(IND)}$ (operating temperature) • Vertical installation in SIMATIC S7 ¹⁾ • Horizontal installation in SIMATIC S7 ¹⁾	 -25 ... +50 °C (-13 ... 122 °F) -25 ... +60 °C (-13 ... 140 °F)
EMC requirements	According to IEC 61000-6-2, IEC 61000-6-4, OIML R76-1
Dimensions (width)	15 mm (0.6 inch)

¹⁾ The S7 standard modules may not be operated at temperatures below 0 °C (32 °F). For operating conditions below 0 °C (32 °F), SIMATIC modules from the SIPLUS series must be used.

Weighing Electronics

SIWAREX for SIMATIC

Plattform and hopper scales / SIWAREX U weighing electronics

Overview



SIWAREX U is a versatile weighing module for all simple weighing and force measuring tasks. The compact module can be integrated into SIMATIC automation systems without any problems. Complete data access is then possible via the SIMATIC.

Benefits

SIWAREX U offers the following key advantages:

- Uniform design technology and consistent communication in SIMATIC
- Implementation in a distributed system concept thanks to connection to PROFIBUS DP/PROFINET via ET 200M
- Measurement of weight or force with a high resolution of 65 000 parts and 0.05% accuracy
- Space saving through use of two-channel version for two scales
- Direct connection of a remote display to the TTY interface
- Simple adjustment of scale using the SIWATOOL U program
- Supports theoretical adjustment without adjustment weights
- Supports replacement of module without recalibration of scales
- Can be used in Ex applications

Application

SIWAREX U is the optimum solution wherever strain gage sensors, such as load cells, force sensors or torque measuring shafts, are used for measuring tasks. The typical applications of SIWAREX U are:

- Fill level monitoring of silos and bunkers
- Monitoring of loads on cranes and cables
- Measuring the loading on conveyor belts
- Overload protection of industrial elevators or rolling mills
- Balances in hazardous areas (using an Ex interface)
- Monitoring of belt tension

Design

SIWAREX U is a compact SIMATIC S7-300 function module (FM) and can be directly snapped onto the SIMATIC S7-300 or ET 200M backplane bus. The snap-on system for DIN rails greatly simplifies the installation/cabling work.

The load cells, power supply and serial interfaces are connected via the 20-pin standard front connector.

Operation of SIWAREX U in SIMATIC ensures that the weighing system is completely integrated into the automation system.

Function

SIWAREX U is available with either one or two measuring channels. One measuring channel is required for each set of scales.

The primary task of SIWAREX U is the measurement of sensor voltage and the conversion of this measurement into a weight value. The signal can also be digitally filtered if required.

As well as determining weights, the SIWAREX U monitors two freely programmable limits (min./max. as required).

The SIWAREX U comes factory-calibrated. This means that theoretical adjustment of the scale is possible without adjustment weights, and that modules can be replaced without the need to readjust the scale. When using "active bus modules", replacement is also possible during operation.

Consistent and uniform communication between all system components enables fast, reliable and cost-effective integration and diagnosis in industrial processes.

The SIWAREX U has two serial interfaces. The TTY interface serves to connect up to four digital remote displays. In addition to the two weight values of weighing channels 1 and 2, another two values can be set via SIMATIC and indicated on the remote displays.

A PC for adjusting the scale can be connected through the RS 232 interface.

SIWAREX U can not only be integrated in the plant software using the classic PLC programming languages; STL (Statement List), LD (Ladder Diagram) SFC (Sequential Function Chart) or SCL (Structured Control Language), it can also be integrated by means of graphical configuration with CFCs (Continuous Function Chart), where faceplates are provided in PCS 7 for visualization of the scales.

In contrast to serially linked weighing electronics, SIWAREX U does not need costly additional modules to link it to SIMATIC.

Integration in SIMATIC produces freely-programmable, modular weighing systems which can be modified according to operational requirements.

Using the SIWATOOL U software, the SIWAREX weighing modules can be set up with the convenience of Windows independently of the automation system. Input masks allow all parameters for the weighing modules to be specified, saved and printed for plant documentation.

The diverse diagnostic options provided by SIWATOOL U ensure fast fault locating in online mode.

The SIWAREX U weighing module can be used for hazardous areas (zone 2). The load cells can be provided with an intrinsically-safe power supply through an optional Ex interface.

Selection and ordering data

	Article No.
SIWAREX U For SIMATIC S7 and ET 200M, incl. bus connector, weight 0.3 kg (0.661 lb)	
Single-channel version ¹⁾ for connecting one scale	7MH4950-1AA01
Two-channel version ²⁾ for connecting two scales	7MH4950-2AA01
SIWATOOL V4 & V7 Service and commissioning software for SIWAREX weighing modules	7MH4900-1AK01
SIWAREX U configuration package for PCS 7, version 8.0 Suitable for 7MH4950-xAA01	7MH4950-3AK62
- Function block for CFC - Faceplate - Manual	
SIWAREX PCS 7 AddOn Library for PCS 7 V8.x and V9.0 Supports PROFINET APL faceplates and function blocks for:	7MH4900-1AK61
- SIWAREX U - SIWAREX FTA - SIWAREX FTC_B (belt scale) - SIWAREX WP321	
Classic faceplate and function block for:	
SIWAREX FTC_L (Loss-in-weight)	
SIWATOOL connection cable From SIWAREX U/CS with serial PC interface, for 9-pin PC interfaces (RS 232), length 3 m (9.84 ft)	7MH4607-8CA
Installation material (mandatory)	
20-pin front connector with screw contacts Required for each SIWAREX module	6ES7392-1AJ00-0AA0
Shield connection element Sufficient for two SIWAREX U modules	6ES7390-5AA00-0AA0
Shield connection clamp Content: 2 units (suitable for cable with diameter 4 ... 13 mm / 0.16 ... 0.51 inch) Note: One shield connection clamp is required for each of the following:	6ES7390-5CA00-0AA0
- Scale connection - RS 485 interface - RS 232 interface	
S7 DIN rail	
160 mm (6.30 inch) 480 mm (18.90 inch) 530 mm (20.87 inch) 830 mm (32.68 inch) 2 000 mm (78.74 inch)	6ES7390-1AB60-0AA0 6ES7390-1AE80-0AA0 6ES7390-1AF30-0AA0 6ES7390-1AJ30-0AA0 6ES7390-1BC00-0AA0
Accessories (optional)	
Labeling strips (10 units, spare part)	6ES7392-2XX00-0AA0
SIWAREX EB extension box For extending sensor cables	7MH4710-2AA

Selection and ordering data (continued)

	Article No.
SIWAREX JB junction box, aluminum housing For connecting up to 4 load cells in parallel, and for connecting multiple junction boxes	7MH5001-0AA20
SIWAREX JB junction box, stainless steel housing For connecting up to 4 load cells in parallel	7MH5001-0AA00
SIWAREX JB junction box, stainless steel housing (ATEX) For parallel connection of up to 4 load cells (for zone allocation, see manual or type-examination certificate)	7MH5001-0AA01
SIWAREX IS Ex interface For intrinsically safe connection of load cells. With ATEX approval (not UL/FM). Suitable for SIWAREX electronic weighing systems. Compatibility of load cells must be checked separately.	
With short-circuit current < 199 mA DC	7MH4710-5BA
With short-circuit current < 137 mA DC	7MH4710-5CA
Cable (optional)	
Cable Li2Y 1 × 2 × 0.75 ST + 2 × (2 × 0.34 ST) – CY For connecting SIWAREX electronic to junction box (JB), extension box (EB), digital junction box (DB), Ex interface (IS) or between two extension boxes. For permanent installation. Occasional bending is possible. External diameter: approx. 10.8 mm (0.43 inch) Permissible ambient temperature -40 ... +80 °C (-40 ... +176 °F) Sold by the meter.	
Sheath color: orange	7MH4702-8AG
Sheath color (for hazardous atmospheres): blue	7MH4702-8AF
Remote displays (optional) The digital remote displays can be connected directly to SIWAREX U through a TTY interface. The following remote displays can be used: S102, S302 Siebert Industrieelektronik GmbH PO Box 1180 D-66565 Eppelborn Tel.: +49 6806/980-0 Fax: +49 6806/980-999 Internet: http://www.siebert-group.com/en Detailed information is available from the manufacturer.	

¹⁾ Compatible with 7MH4601-1AA01; supply of load cells changed to 6 V DC.²⁾ Compatible with 7MH4601-1BA01; supply of load cells changed to 6 V DC.

Weighing Electronics

SIWAREX for SIMATIC

Plattform and hopper scales / SIWAREX U weighing electronics

Technical specifications

SIWAREX U	
Integration in automation systems	
• S7-300	Direct integration
• S7-1500	Through ET 200M
• S7-400 (H)	Through ET 200M
• PCS 7 (H)	Through ET 200M
• Automation systems from other vendors	Through ET 200M
• Stand-alone (without SIMATIC CPU)	Possible with IM 153-1
Communication interfaces	• SIMATIC S7 (P bus) • RS 232 • TTY
Connection of remote display (via serial TTY interface)	Gross, channel 1, 2 or default value 1, 2
Scale adjustment	Through SIMATIC (P bus) or PC using SIWATOOL U (RS 232)
Measuring properties	
Error limit according to DIN 1319-1 of full-scale value at 20 °C ± 10 K (68 °F ± 10 K)	0.05%
Internal resolution ADC	65 535
Data format weight values	2 bytes (fixed-point)
Number of measurements/second	50
Digital filter	0.05 ... 5 Hz (in 7 steps), mean value filter
Weighing functions	
Weight values	Gross
Limit values	2 (min./max.)
Zero-setting function	Per command
Load cells	Strain gauges in 4-wire or 6-wire system
Load cell powering	
Supply voltage U_s (rated value)	6 V DC ¹⁾
Max. supply current	≤ 150 mA per channel
Permissible load resistance	
• R_{Lmin}	> 40 Ω per channel
• R_{Lmax}	< 4 010 Ω
With Ex(i) interface	
• R_{Lmin}	> 87 Ω per channel
• R_{Lmax}	< 4 010 Ω
Permissible load cell characteristic	Up to 4 mV/V
Max. distance of load cells	• 500 m²⁾ • 150/500 m for gas group IIC • 500 m²⁾ for gas group IIB (see SIWAREX IS Manual)
Intrinsically-safe load cell powering	Optional (Ex interface) with SIWAREX IS
Auxiliary power supply	
Rated voltage	24 V DC
Max. power consumption	150 mA (single-channel) / 240 mA (dual-channel)
Current consumption on backplane bus	≤ 100 mA
Certification	ATEX 95, FM, cUL _{US} Haz. Loc.
IP degree of protection to EN 60529; IEC 60529	IP20
Climatic requirements $T_{min} (IND) \dots T_{max} (IND)$ (operating temperature)	
• Horizontal installation	0 ... +60 °C (32 ... 140 °F)
• Vertical installation	0 ... +40 °C (32 ... 104 °F)
EMC requirements	According to NAMUR NE21, Part 1; EN 61326
Dimensions	40 × 125 × 130 mm (1.58 × 4.92 × 5.12 inch)

Technical specifications (continued)

- 1) Load cell supply changed to 6 V DC as compared to 7MH4601-1AA01 and 7MH4601-1BA01.
- 2) Possible up to 1 000 m under certain conditions when using the recommended cable (accessories).

Overview

Typical requirements in many industries are high-precision mixing and dosing, and packing and filling at high speed. The corresponding SIWAREX electronics offer comprehensive properties and functions that fulfill all requirements - including for legal-for-trade operation.

The dosing process used in production operations depends on a variety of factors: Depending on the type and quantity of materials weighed, different dosing systems and weighing processes are required. It must be possible to fill liquid or solid goods quickly and precisely.

Weighing Electronics

SIWAREX for SIMATIC

Dosing, filling, bagging and checking scales / TM SIWAREX WP351 HF weighing electronics

Overview



The SIWAREX WP351 is a compact, precise weighing module in the SIMATIC ET 200SP format.

With a width of just 20 mm it is one of the slimmest weighing modules on the market, yet its firmware includes the functionalities of an automatic totalizing weighing instrument and checking, bagging and filling scale.

All operation modes are part of the firmware and certified according to OIML R-51, R-61, R-76 and R-107. This means the WP351 can be used in both scales requiring official calibration and those that do not, where demands are high regarding speed and accuracy.

Benefits

- Low space requirements with only 20 mm module width
- Seamless integration into SIMATIC ET 200SP
- 1 000 Hz sampling rate und processing time
- Installation of legal-for-trade multi-interval/multi-range scales with up to 3 × 6 000 d
- Operation with SIMATIC S7-300, S7-400, S7-1200 and S7-1500 controllers
- Operation in Ethernet IP or Modbus TCP-based systems using ET 200SP multi-field bus IM
- Three digital inputs and outputs each ex works
- High degree of scalability in connection with all available SIMATIC standard components
- Open SIWAREX concept – all settings and parameters accessible, no encapsulated black box in the field
- Unrestricted access to all scale parameters and functions from the SIMATIC S7 Controller / HMI
- Internal, legal-for-trade protocol memory for up to 1 000 000 entries
- Commissioning and maintenance from HMI or module-internal web server
- Legal-for-trade main display integrated in the SIMATIC HMI

Application

SIWAREX WP351 offers a compact and extremely versatile solution for automatic and non automatic scale applications with high requirements for accuracy and performance.

Typical areas of application include:

- Silo, hopper and platform scales, requiring official calibration/not requiring official calibration
- Totalizing automatic weighing instruments, requiring official calibration/not requiring official calibration
- Filling scales, requiring official calibration/not requiring official calibration
- Static checking scales, requiring official calibration/not requiring official calibration
- Automatic dynamic checking scales, not requiring official calibration
- Recipe-controlled batch/mixing scales

Design

The SIWAREX WP351 is a technology module of the SIMATIC ET 200SP distributed I/O system.

Installation is on a type U0 BaseUnit. The load cells, serial RS 485 interface and digital inputs/outputs are wired directly on the BaseUnit with user-friendly push-in terminals. This makes it quick and easy to replace modules without any wiring effort.

The web server is addressed via an Ethernet interface in the module. Should more interfaces and I/O be required, they can be added with the ET 200SP system components.

Function

The weighing module controls automatic proportioning, checking and loading processes completely autonomously. The intelligence required is contained in the module firmware, thus representing a standard. Dosing signals can be controlled directly via the three digital outputs – typically coarse flow/fine flow and emptying. Internal control algorithms and signal filters continually optimize and adjust the weighing process.

The controller only transfers the desired setpoint, as well as other material-specific parameters, to the module via the WP351 function block. A start command initiates the dosing process, which is executed by the weighing module independently of the cycle time of the main controller with maximum accuracy. Finally the WP351 carries out a tolerance check and signals the result to the controller. In addition, the result is included in the statistics calculated in the background, which can be called up at any time from the controller. Depending on the operating mode, a log is generated in the internal protocol memory, either automatically or initiated by the user. If the scales are calibrated, the log conforms to the requirements of the Weights and Measures Act.

The open and standardized SIWAREX concept means that the plant operator can service the scales themselves if necessary.

Selection and ordering data

	Article No.
TM SIWAREX WP351 HF weighing electronics SIMATIC ET 200SP, TM SIWAREX WP351 HF, legal-for-trade weighing module for automatic dosing, filling and checking scales and totalizing weighing instruments	7MH4138-6BA00-0CU0
SIWAREX WP351 Equipment Manual Available in a range of languages Free download on the Internet at: http://www.siemens.com/weighing/documentation	
SIWAREX WP351 "Getting Started" sample project Sample software shows beginners how to program the scales in TIA Portal V15.1 Free download on the Internet at: http://www.siemens.com/weighing/documentation	
Calibration set SIWAREX WP351 For verification of up to 3 scales, comprising: • 3 × inscription foil for ID label • 1 × protective film • 3 × unlocking protection • 6 × screw For applications requiring official calibration, follow the calibration regulations of the country of destination.	7MH4138-6BA00-0AY0
ET 200SP BaseUnit type U0 • For constructing a new potential group (white)	6ES7193-6BP00-0DU0
• For continuing an existing potential group (gray)	6ES7193-6BP00-0BU0
Shield connection for BaseUnit (5 units/for 5 scales) For laying load cell cable	6ES7193-6SC20-1AM0
SIWAREX EB extension box For extending sensor cables.	7MH4710-2AA
SIWAREX JB junction box, aluminum enclosure For connecting up to 4 load cells in parallel, and for connecting multiple terminal boxes.	7MH5001-0AA20
SIWAREX JB junction box, stainless steel enclosure For connecting up to 4 load cells in parallel.	7MH5001-0AA00
SIWAREX JB junction box, stainless steel enclosure (ATEX) For parallel connection of up to 4 load cells (for zone allocation, see manual or prototype test certificate).	7MH5001-0AA01
SIWAREX IS Ex interface For intrinsically safe connection of load cells. With ATEX approval (not UL/FM). Suitable for SIWAREX electronic weighing systems. Compatibility of load cells must be checked separately. • With short-circuit current < 199 mA DC	7MH4710-5BA

Selection and ordering data (continued)

	Article No.
• With short-circuit current < 137 mA DC	7MH4710-5CA
Cable (optional)	
Cable Li2Y 1 × 2 × 0.75 ST + 2 × (2 × 0.34 ST) – CY For connecting SIWAREX electronic to junction box (JB), extension box (EB), digital junction box (DB), Ex interface (IS) or between two extension boxes. For permanent installation. Occasional bending is possible. External diameter: approx. 10.8 mm (0.43 inch) Permissible ambient temperature -40 ... +80 °C (-40 ... +176 °F) Sold by the meter.	
• Sheath color: orange	7MH4702-8AG
• Sheath color (for hazardous atmospheres): blue	7MH4702-8AF

Weighing Electronics

SIWAREX for SIMATIC

Dosing, filling, bagging and checking scales / TM SIWAREX WP351 HF weighing electronics

Technical specifications

SIWAREX WP351	
Firmware version	V1.0
• FW update possible	Yes
Usable BaseUnits	BU type U0
Reliability	
Mean time between failures (MTBF)	62 years @ TA = 40 °C
Product function	
I&M data	Yes, I&M0 to I&M3
Engineering with	
• STEP 7 TIA Portal can be configured/integrated	Configurable as of V15 using HSP0281
• PROFIBUS as of GSD version/GSD revision	GSD V04.02.41
• PROFINET as of GSD version/GSD revision	GSDML V2.34
Supply voltage	
Load voltage L+	
• Rated value (DC)	24 V
• Permissible range, low limit, static (DC)	19.2 V
• Permissible range, high limit, static (DC)	28.8 V
• Permissible range, low limit, dynamic (DC)	18.5 V
• Permissible range, high limit, dynamic (DC)	30.2 V
• Reverse polarity protection	Yes
• Non-periodic overvoltages	35 V DC for 500 ms with a recovery time of 50 s
Input current	
Current consumption, max.	Max. 140 mA @ 24 V DC + [DQ 3 × 0.5 A]
Power loss	
Typical power loss	1.7 W
Address range	
Assigned address range	
• Inputs	32 bytes
• Outputs	32 bytes
Power supply from SIMATIC S7 backplane bus	
Current consumption from ET 200SP backplane bus	Max. 27 mA @ 3.5 V (SBK4)
Analog load cell interface connection	
Error limit according to DIN 1319-1 at 20 °C (-4 °F) +/-10 K	≤ 0.002% of end value
Relative accuracy (absolute accuracy can only be achieved with local calibration using calibration standards)	
Measuring accuracy in accordance with OIML R76-1:2006/EN 45501:2015	
• Class	III
• Resolution (d=e)	3 × 6000 d
• Error percentage pi	0.4
• Step voltage	0.4 µV/e
Accuracy delivery state The accuracy is relevant for module exchange or theoretical adjustment	Typ. 0.1% of end value
Sampling rate	1.024 ms
Input signal resolution	± 20 000 000
Measuring ranges	0 ... ±1 mV/V 0 ... ±2 mV/V 0 ... ±4 mV/V
Common mode voltage range	+2.8 ... 7.7 V

Technical specifications (continued)

SIWAREX WP351	
Strain gauge supply (constant voltage)	10 V DC (+1 % / -3 %) at the EXC terminals
Short-circuit and overload protection	Yes
Connection	6-wire or 4-wire (parameterizable)
Sensor voltage monitoring	Typ. ≤ 5.0 V
Min. strain gauge input resistance per channel	
• Without SIWAREX IS Ex-i interface	56 Ω Lower impedance by means of external supply possible
• With SIWAREX IS Ex-i interface	87 Ω @ type 7MH4710-5BA 180 Ω @ type 7MH4710-5CA
Max. strain gauge resistance	4 100 Ω
Temperature coefficient range	≤ ±5 ppm/K
Temperature coefficient zero point	≤ ±0.015 µV/K
Linearity error	≤ 0.001%
Measured value filtering	Low-pass and average value filter configurable (DR3)
Galvanic isolation	500 V AC
50 Hz / 60 Hz noise suppression CMRR	> 80 dB
Input resistance	
• Signal line	Typ. 8*10 ⁶ Ω
• Sense line	Typ. 300*10 ⁶ Ω
Cable length	
• When using SIWAREX cable 7MH4702-8AG	Max. 500 m
Ambient conditions	
Ambient temperature in operation	
• Horizontal mounting position *	Min. -30 °C Max. +60 °C
• Vertical mounting position *	Min. -30 °C Max. +50 °C
Storage and transport temperature	
-40 ... +70 °C (-40 ... +158 °F)	

* At a height of more than 2 000 m above sea level, a derating of the ambient temperature of -1 °C / 100 m has to be adhered to. The maximum permissible height is 5 000 meters above sea level. At over 0.6 A total current of the digital outputs DQ, a derating of the ambient temperature of -1 °C per 100 mA has to be adhered to. The max. permissible total current is 1.5 A.

Overview



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 R76, R51, R61 and R107
- Internal alibi memory for up to 550 000 entries
- Operation without SIMATIC CPU 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 ± 4 million parts and an accuracy of 0.05%
- Simple adjustment of scale using the SIWATOOL V7 program via the Ethernet interface
- Recovery point for simple restoration of all parameters
- Automatic calibration is possible 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 following are typical SIWAREX WP251 applications:

- Catchweighing instruments (CWI) - legal-for-trade in accordance with OIML R51
- Gravimetric filling instruments (GFI) - legal-for-trade in accordance with OIML R61
- Non automatic weighing instrument (NAWI) - legal-for-trade in accordance with OIML R76
- Discontinuous totalizing automatic weighing instrument (DTI) - legal-for-trade in accordance with OIML R107

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 has a width of 70 mm (2.76 inch) and is installed using a DIN rail. This is extremely user-friendly.

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

Weighing Electronics

SIWAREX for SIMATIC

Dosing, filling, bagging and checking scales / SIWAREX WP251 weighing electronics

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 WLAN 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, via both the RS 485 interface (Modbus RTU) and the Ethernet interface (Modbus TCP/IP), meaning that full commissioning and operation can also take place via these channels.

Weighing functions

SIWAREX WP251 provides the weighing modes NAWI (non-automatic weighing instrument), ACI (automatic catchweighing instrument) and AGFI (automatic gravimetric filling instrument).

In the operating modes NAWI and ACI, there is a choice between filling mode and emptying mode. The entire filling or dosing process is controlled fully 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.

Data regarding the weight, as well as all scale and dosing status bits, are 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

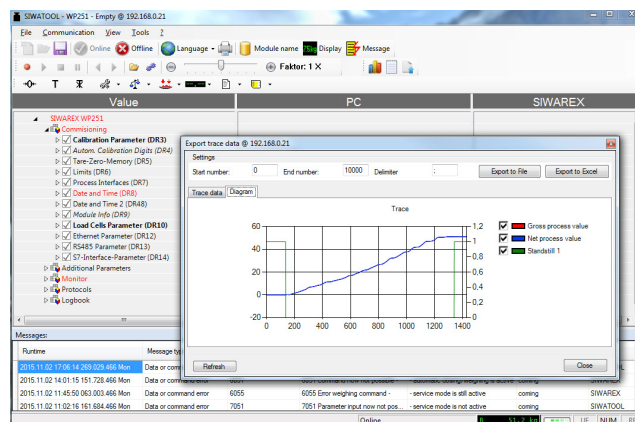
SIWATOOL V7 is a special program for commissioning and servicing and runs with Windows operating systems.

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

Function (continued)



Software SIWATOOL V7, layout of the program windows

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

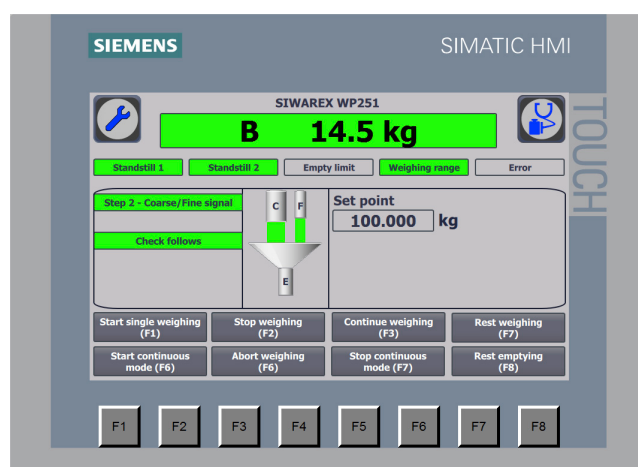
An additional program function can be used to download a new firmware version onto the SIWAREX WP251 on site. This means that firmware upgrades can be carried out on site as required anywhere in the world.

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, set-points, 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 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 (using an OPC server, for example) 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.

Selection and ordering data

	Article No.
SIWAREX WP251 weighing electronics Single-channel, legal-for-trade, for automatic dosing and filling scales (AGFI, ACI, NAWI) with analog load cells / full-bridge strain gauges (1 - 4 mV/V), 1 × LC, 4 × DQ, 4 × DI, 1 × AQ, 1 × RS 485, Ethernet port	7MH4960-6AA01
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 Service and commissioning software for SIWAREX weighing modules	7MH4900-1AK01
Calibration set for SIWAREX WP2xx Valid for SIWAREX WP231 and SIWAREX WP251. For verification of up to 3 scales, comprising: • 3 × inscription foils for ID label • 1 × protective film • 3 × calibration protection plates • Guidelines for verification, certificates and approvals, editable label, SIWAREX WP	7MH4960-0AY10
Ethernet cable patch cord 2 m (7 ft) For connecting SIWAREX WP251 to a PC (SIWATOOL), SIMATIC CPU, panel, etc.	6XV1850-2GH20
Accessories	
SIWAREX EB extension box For extending sensor cables	7MH4710-2AA
SIWAREX JB junction box, aluminum housing For connecting up to 4 load cells in parallel, and for connecting multiple junction boxes	7MH5001-0AA20
SIWAREX JB junction box, stainless steel housing For connecting up to 4 load cells in parallel	7MH5001-0AA00
SIWAREX JB junction box, stainless steel housing (ATEX) For parallel connection of up to 4 load cells (for zone allocation, see manual or type-examination certificate)	7MH5001-0AA01
SIWAREX IS Ex interface For intrinsically safe connection of load cells. With ATEX approval (not UL/FM). Suitable for SIWAREX electronic weighing systems. Compatibility of load cells must be checked separately • Short-circuit current < 199 mA DC • Short-circuit current < 137 mA DC	7MH4710-5BA 7MH4710-5CA
Cable (optional)	

Weighing Electronics

SIWAREX for SIMATIC

Dosing, filling, bagging and checking scales / SIWAREX WP251 weighing electronics

Selection and ordering data (continued)

Article No.	
Cable Li2Y 1 × 2 × 0.75 ST + 2 × (2 × 0.34 ST) – CY For connecting SIWAREX electronic to junction box (JB), extension box (EB), digital junction box (DB), Ex interface (IS) or between two extension boxes. For permanent installation. Occasional bending is possible. External diameter: approx. 10.8 mm (0.43 inch) Permissible ambient temperature -40 ... +80 °C (-40 ... +176 °F) Sold by the meter.	
• Sheath color: orange	7MH4702-8AG
• Sheath color (for hazardous atmospheres): blue	7MH4702-8AF
Ground terminal for connecting the load cell cable shield to the grounded DIN rail	6ES5728-8MA11
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 PO Box 1180 D-66565 Eppelborn Tel.: +49 6806/980-0 Fax: +49 6806/980-999 Internet: http://www.siebert-group.com/en Detailed information is available from the manufacturer.	

Technical specifications

SIWAREX WP251	
Weighing modes	• Non automatic weighing instrument (NAWI) (filling + removal) (legal-for-trade in accordance with OIML R76) • Catchweighing instrument (CWI) (filling + removal) (legal-for-trade in accordance with OIML R51) • Gravimetric filling instrument (GFI) (legal-for-trade in accordance with OIML R61) • Discontinuous totalizing automatic weighing instrument (DTI) - (legal-for-trade in accordance with OIML R107)
Integration in automation systems S7-1200 Operator panel and/or automation systems from other vendors	SIMATIC S7-1200 system bus Via Ethernet (Modbus TCP/IP) or RS 485 (Modbus RTU)
Ports	• 1 × SIMATIC S7-1200 system bus • 1 × Ethernet (SIWATOOL and Modbus TCP/IP) • 1 × RS 485 (Modbus RTU or remote display) • 1 × analog output (0/4 - 20 mA) • 4 × digital inputs (24 V DC, floating) • 4 × 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
Scale adjustment	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) Internal resolution	0.05% Up to ± 4 million parts
Number of measurements/second	100 or 120 (selectable)
Filter	• Low-pass filter 0.1 ... 50 Hz • Average value filter
Load cells	Strain gauges in 4-wire or 6-wire system
Load cell powering Supply voltage (regulated via feedback) Permissible load resistance	4.85 V DC > 40 Ω < 4 100 Ω
With SIWAREX IS Ex interface	

Technical specifications (continued)

SIWAREX WP251	
• 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 certificates 2014/32/EU (MID) according to OIML R107
Auxiliary power supply	
Rated voltage	24 V DC
Max. power consumption	200 mA
Max. power consumption SIMATIC Bus	3 mA
IP degree of protection to EN 60529; IEC 60529	IP20
Climatic requirements	
$T_{min(IND)} \dots T_{max(IND)}$ (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 × 75 × 100 mm (2.76 × 2.95 × 3.94 inch)

Weighing Electronics

SIWAREX for SIMATIC

Dosing, filling, bagging and checking scales / SIWAREX FTA weighing electronics

Overview



SIWAREX FTA (Flexible Technology, Automatic Weighing Instrument) is a versatile and flexible weighing module for industrial use. It can be used in both non-automatic and automatic weighing operation, for example the production of mixtures, and for filling, loading, monitoring and bag filling.

It has the corresponding scale approvals and is also suitable for weighing systems requiring official calibration.

The SIWAREX FTA function module is integrated in SIMATIC S7/PCS 7 and uses the features of this modern automation system, such as integrated communication, diagnostics and configuration tools.

Benefits

SIWAREX FTA is characterized by the following features:

- Uniform design and totally integrated communication in SIMATIC S7 and SIMATIC PCS 7
- Uniform configuration with SIMATIC
- Direct use in the SIMATIC automation system
- Use in distributed plant concept through connection to PROFIBUS DP/PROFINET using ET 200M
- Measurement of weight or force with high resolution of 16 million intervals
- High accuracy $3 \times 6\,000d$, legal-for-trade according to OIML R-76, R-51, R-61 and R-107
- For use with analog strain gauge load cells
- Alternative option of connecting individual load cells from the manufacturers METTLER TOLEDO, Wipotec and PESA
- Legal-for-trade display with Windows-based Panels, e.g. SIMATIC Comfort Panels
- Stepless or stepped dosing control
- Exact switching of dosing signals ($< 1\text{ ms}$)
- Parameterizable inputs and outputs
- Parameterizable for highly versatile applications
- Flexible adaptation to different requirements with SIMATIC
- Simple adjustment of scale using the SIWATOOL FTA program
- Theoretical adjustment without calibration weights
- Replacement of module without renewed adjustment of scale
- Recording of weighing sequence
- Alibi memory with calibration capability
- Can be used in Ex applications

Application

The SIWAREX FTA weighing module is the optimum solution wherever high demands are placed on accuracy and speed.

Thanks to its outstanding measuring properties, weights can be measured with extreme accuracy in up to three ranges.

SIWAREX FTA can be used to design legal-for-trade dosing systems, such as filling plants, loading stations, bagging stations, rotopackers, mixers or test stations.

Typical fields of application include:

- Filling of liquids
- Bagging of solid matter (also big bag)
- Proportioning as deduction weighing or fill weighing
- Checking of individual quantities
- Loading or receiving of materials
- Static checking scale
- Check weigher (in combination with Wipotec load cells)

Design

SIWAREX FTA is a function module of SIMATIC S7-300 which can be directly snapped onto the SIMATIC S7-300 or ET 200M backplane bus. The rail mounting of the 80 mm wide weighing module means that it is extremely easy to mount/wire.

The load cells, the RS 485 serial interface, the analog output and the digital inputs and outputs are connected by means of the 40-pin standard front connector, the PC (RS 232) by means of a 9-pin SUB-D connector and the power supply by means of a separate 2-pin connector.

Operation of SIWAREX FTA in SIMATIC enables the weighing system to be completely integrated into the automation system.

Function

The main tasks of the SIWAREX FTA are the high-precision measurement of the current weight in up to three measuring ranges, and exact control of the weighing procedures.

The weighing module controls the weighing procedures fully automatically. However, integration in SIMATIC means that it is also possible to directly influence the weighing procedures using a PLC program. This means that the tasks can be sensibly divided: The very fast weighing functions are implemented in the SIWAREX FTA, the interlocking and logic functions in the SIMATIC CPU.

Weighing functions

The SIWAREX FTA is easy to parameterize for the various automatic weighing functions.

The following legal-for-trade weighing functions can be parameterized:

- **NAWI (Non-Automatic Weighing Instrument)** according to OIML R76
- **AGFI (Automatic Gravimetric Filling Instrument)** according to OIML R61
- **ACI (Automatic Catchweighing Instrument)** according to OIML R51
- **DTAWI (Discontinuous Totalizing Automatic Weighing Instrument (Totalizing Hopper Weigher))** according to OIML R107

Monitoring and control of the load cell signals and statuses

During the weighing procedure, the SIWAREX FTA weighing module monitors and controls the load cell signals and statuses. The optimized exchange of data within SIMATIC permits direct evaluation of the load cell signals and statuses in the PLC program.

The SIWAREX FTA can easily be adapted to changes in the system technology thanks to the PLC's influence on the weighing process.

The SIWAREX FTA is already factory-calibrated. This means that the theoretical adjustment of the scale is possible without calibration weights, and that modules can be replaced without readjustment of the scale. When using "active bus modules", replacement is also possible during operation.

Integration in SIMATIC

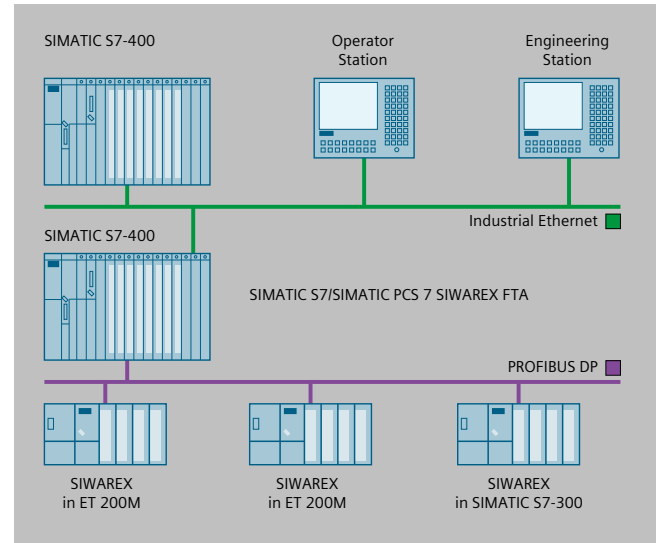
SIWAREX FTA is completely integrated into the SIMATIC S7 and SIMATIC PCS 7. Users can freely configure their automation solution – including the weighing application.

The right combination of SIMATIC components can produce optimum solutions for small, medium-size and large plants. The scales are operated and monitored using SIMATIC standard operator panels. Needless to say, these operator panels can also be simultaneously used for the operator control and monitoring of the plant.

Customized or sector-specific solutions can be developed extremely quickly using the configuration package and example applications for SIMATIC. The following Figure shows a typical configuration of a medium-size plant.

Function (continued)

The ready-to-use function blocks for the automation system and the faceplates for the operator station are used for the configuration in SIMATIC PCS 7.



SIMATIC S7/PCS 7 configuration with SIWAREX FTA

Software

SIWATOOL FTA commissioning software

SIWATOOL FTA is a special program for commissioning and servicing and runs with Windows operating systems.

The program enables the scales to be set without the need for prior knowledge of the automation system. During servicing, the technician can use a PC to analyze and test the procedures in the scale. Reading out the diagnostics buffer from the SIWAREX FTA is extremely helpful when analyzing events.

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

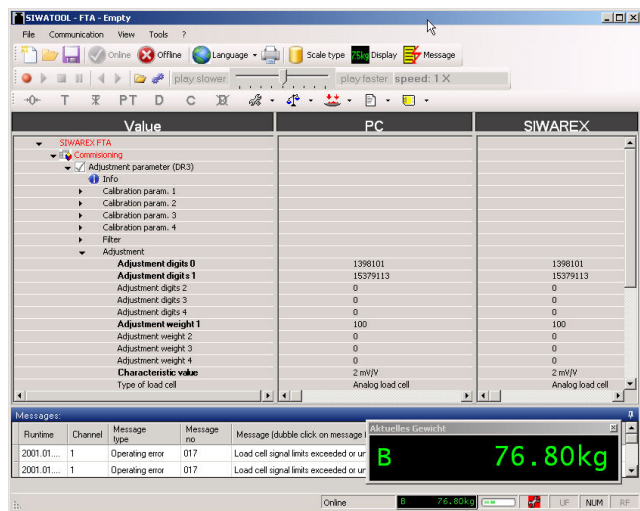
- Parameter assignment and calibration of the scale
- Testing of scale properties
- Saving and printing scale data
- Recording and analysis of weighing sequence

Weighing Electronics

SIWAREX for SIMATIC

Dosing, filling, bagging and checking scales / SIWAREX FTA weighing electronics

Function (continued)



Settings in SIWAREX FTA software

It is extremely helpful to analyze the diagnostics buffer, which can be saved together with the parameters from the module in a backup file.

The SIWAREX FTA weighing module includes a trace mode for optimization of weighing sequences. The recorded weight values and associated statuses can be displayed as traces using SIWATOOL FTA and MS Excel.

Upgrading firmware

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

Reading out of weighing reports

The weighing reports are saved on an MMC (Micro Memory Card) inserted in the SIWAREX FTA for the duration specified by the Weights and Measures Act. If complaints are received concerning a particular weighing procedure, the associated data can be read out of the MMC using SIWATOOL.

SIWAREX FTA – simple configuration

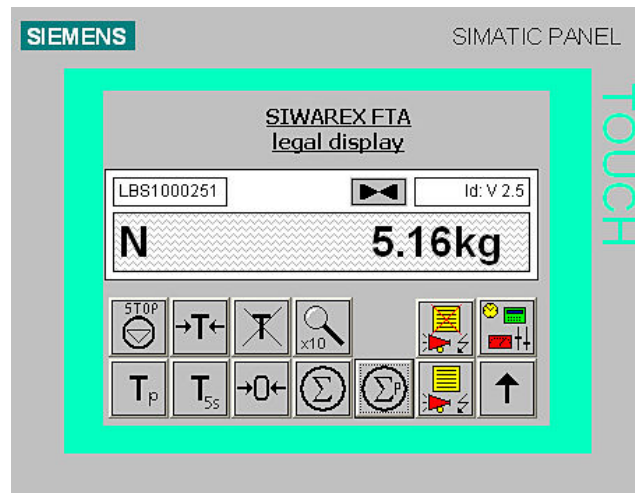
Integration in SIMATIC results in freely-programmable, modular weighing systems which can be modified according to operational requirements.

The ready-to-use SIWAREX FTA software "Getting Started" is also available free-of-charge. It shows beginners how to integrate the module into a STEP 7 program and offers a basis for application programming. This allows you to connect the scale very easily to an operator panel connected directly to the SIMATIC CPU.

Configuring the legal trade display on the panel

The software SecureOCX is available in systems running WinCC flexible. It provides a function for configuration of the legal trade display directly in WinCC flexible. In the TIA Portal, the SecureDisplay software is used. This is installed directly on a Windows CE-based panel (for example, SIMATIC Comfort Touch series). There is a separate "Getting Started" for using this software in the TIA Portal. This solution requires a SIMATIC CPU with an Ethernet port. SIMATIC Basic and Key Panels cannot be used.

Function (continued)



Scale faceplate in the SIWAREX FTA "Getting Started" software

In addition, the STEP 7 program SIWAREX FTA Multiscale provides a professional basis for the implementation of batching or filling plants.

Selection and ordering data

	Article No.
SIWAREX FTA Legal-for-trade electronic weighing systems for automatic scales for S7-300 and ET 200M. EC type approval 3 × 6000 d Applications: Dosing, filling, bagging, loading. Note: Observe approval conditions for applications requiring official calibration. We recommend using our calibration set and contacting our SIWAREX hotline.	7MH4900-2AA01
SIPLUS FTA SIPLUS FTA -10 ... +60 °C with conformal coating based on 7MH4900-2AA01 Legal-for-trade electronic weighing system for automatic scales for S7-300 and ET 200M. EU type approval 3 × 6000 d Applications: Dosing, filling, bagging, loading. Note: Observe approval conditions for applications requiring official calibration. We recommend using our calibration set and contacting our SIWAREX hotline.	6AG1900-2AA01-4AA0
SIWAREX FTA Equipment Manual Available in a range of languages Free download on the Internet at: http://www.siemens.com/weighing/documentation	
SIWAREX FTA "Getting Started" Sample software shows beginners how to program the scales in STEP 7. Free download on the Internet at: http://www.siemens.com/weighing/documentation	
SIWATOOL V4 & V7 Service and commissioning software for SIWAREX weighing modules	7MH4900-1AK01
Configuration package SIWAREX FTA for SIMATIC PCS 7, Version 8.0 on CD-ROM - HSP hardware support package for integrating SIWAREX FTA/FTC in STEP 7 - Function block for CFC - Faceplate - Manual	7MH4900-2AK63
SIWAREX PCS 7 AddOn Library for PCS 7 V8.x and V9.0 Supports PROFINET APL faceplates and function blocks for: - SIWAREX U - SIWAREX FTA - SIWAREX FTC_B (belt scale) - SIWAREX WP321 Classic faceplate and function block for: - SIWAREX FTC_L (Loss-in-weight)	7MH4900-1AK61

Selection and ordering data (continued)

	Article No.
Calibration set for SIWAREX FTA For verification of up to 5 scales comprising: 3 × inscription foils for ID label 1 × protective film - Guidelines for verification, verification certificates and approvals, editable label, SIWAREX FTA Equipment Manual on CD-ROM	7MH4900-2AY10
SIWATOOL connection cable From SIWAREX FTA with serial PC interface, for 9-pin PC interfaces (RS 232) 2 m long (6.56 ft) 5 m long (16.40 ft)	7MH4702-8CA 7MH4702-8CB
Front connector, 40-pin Required for each SIWAREX module - With screw contacts - With spring-loaded terminals	6ES7392-1AM00-0AA0 6ES7392-1BM01-0AA0
Shield connection element Sufficient for one SIWAREX FTA module	6ES7390-5AA00-0AA0
Shield connection clamp Content: 2 units (suitable for cable with diameter 4 ... 13 mm / 0.16 ... 0.51 inch) Note: One shield connection clamp is required for each of the following: - Scale connection - RS 485 interface - RS 232 interface	6ES7390-5CA00-0AA0
S7 DIN rail 160 mm (6.30 inch) 480 mm (18.90 inch) 530 mm (20.87 inch) 830 mm (32.68 inch) 2 000 mm (78.74 inch)	6ES7390-1AB60-0AA0 6ES7390-1AE80-0AA0 6ES7390-1AF30-0AA0 6ES7390-1AJ30-0AA0 6ES7390-1BC00-0AA0
MMC memory For data logging up to 32 MB, only for legal-for-trade applications R76, R51 and R107	7MH4900-2AY21
Accessories	
SIWAREX EB extension box For extending sensor cables.	7MH4710-2AA
SIWAREX JB junction box, aluminum housing For connecting up to 4 load cells in parallel, and for connecting several junction boxes	7MH5001-0AA20
SIWAREX JB junction box, stainless steel housing For connecting up to 4 load cells in parallel.	7MH5001-0AA00
SIWAREX JB junction box, stainless steel housing (ATEX) For parallel connection of up to 4 load cells (for zone allocation, see manual or type-examination certificate).	7MH5001-0AA01

Weighing Electronics

SIWAREX for SIMATIC

Dosing, filling, bagging and checking scales / SIWAREX FTA weighing electronics

Selection and ordering data (continued)

	Article No.
Ex interface SIWAREX IS For intrinsically safe connection of load cells. With ATEX approval (not UL/FM). Suitable for SIWAREX electronic weighing systems. Compatibility of load cells must be checked separately.	
With short-circuit current < 199 mA DC	7MH4710-5BA
With short-circuit current < 137 mA DC	7MH4710-5CA
Cable (optional)	
Cable Li2Y 1 × 2 × 0.75 ST + 2 × (2 × 0.34 ST) – CY For connecting SIWAREX electronic to junction box (JB), extension box (EB), digital junction box (DB), Ex interface (IS) or between two extension boxes. For permanent installation. Occasional bending is possible. External diameter: approx. 10.8 mm (0.43 inch) Permissible ambient temperature -40 ... +80 °C (-40 ... +176 °F) Sold by the meter.	
Sheath color: orange	7MH4702-8AG
Sheath color (for hazardous atmospheres): blue	7MH4702-8AF
Remote displays (optional) The Siebert S102 and S302 remote digital displays can be directly connected to the SIWAREX FTA via an RS 485 interface. Siebert Industrie Elektronik GmbH PO Box 1180 D-66565 Eppelborn Tel.: +49 6806/980-0 Fax: +49 6806/980-999 Internet: http://www.siebert-group.com/en Detailed information is available from the manufacturer.	

Technical specifications

SIWAREX FTA	
Use in automation systems	
S7-300	Directly or via ET 200M
S7-1500	Through ET 200M
S7-400 (H)	Through ET 200M
PCS 7 (H)	Through ET 200M
Communication interfaces	
S7	Through backplane bus
RS 232	For SIWATOOL or printer connection
RS 485	For remote display or digital load cell
Module parameterization	Using SIMATIC S7 Using SIWATOOL FTA software (RS 232)
Measuring properties	
EC type approval as non automatic weighing instrument, trade class III	3 × 6 000 d ≥ 0.5 µV/e
Internal resolution	16 million parts
Internal/external updating rate	400/100 Hz
Several parameterizable digital filters	Critically damped, Bessel, Butterworth (0.05 ... 20 Hz), mean-value filter
Weighing functions	
Non automatic weighing instrument	OIML R76
Automatic weighing machine	OIML R51, R61, R107
Load cells	Strain gauges in 4-wire or 6-wire system
3 characteristic value ranges	1, 2 or 4 mV/V
Load cell powering	
Supply voltage U_s (rated value)	10.3 V DC
Max. supply current	184 mA
Permissible load cell resistance	
• R_{Lmin}	> 56 Ω
	> 87 Ω with Ex interface
• R_{Lmax}	≤ 4 010 Ω
Max. distance of load cells	
When using the recommended cable:	
Standard	1 000 m (3 280 ft)
In hazardous area ¹⁾	
• For gases of group IIC	300 m (984 ft)
• For gases of group IIB	1000 m (3 280 ft)
Connection to load cells in Ex zone 1	Optionally via SIWAREX IS Ex interface
Ex approvals zone 2 and safety	ATEX 95, FM, cUL _{US} Haz. Loc.
Auxiliary power supply	
Rated voltage	24 V DC
Max. power consumption	500 mA
Current consumption on backplane bus	Typ. 55 mA
Inputs/outputs	
Digital inputs	7 DI electrically isolated
Digital outputs	8 DO electrically isolated
Counter input	Up to 10 kHz
Analog output	
• Current range	0/4 ... 20 mA
• Updating rate	100 Hz
Approvals	EC type approval (CE, OIML R76) EU type-examination certificate according to MID (OIML R51, R61, R107)
Degree of protection according to EN 60529; IEC 60529	IP20
Climatic requirements T_{min} (IND) ... T_{max} (IND) (operating temperature)	
• Horizontal installation	-10 ... 60 °C (14 ... 140 °F)
• Vertical installation	-10 ... 40 °C (14 ... 104 °F)

Technical specifications (continued)

SIWAREX FTA	
EMC requirements	EN 61326, EN 45501, NAMUR NE21, Part 1
Dimensions	80 × 125 × 130 mm (3.15 × 4.92 × 5.12 inch)
Weight	600 g (0.44 lb)

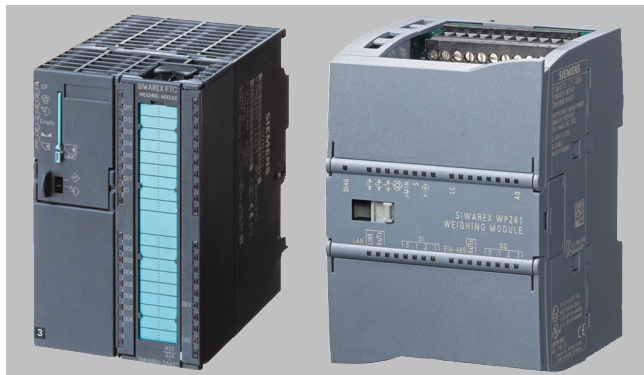
¹⁾ For further details, see Ex interface, type SIWAREX IS.

Weighing Electronics

SIWAREX for SIMATIC

Belt scales / Introduction

Overview



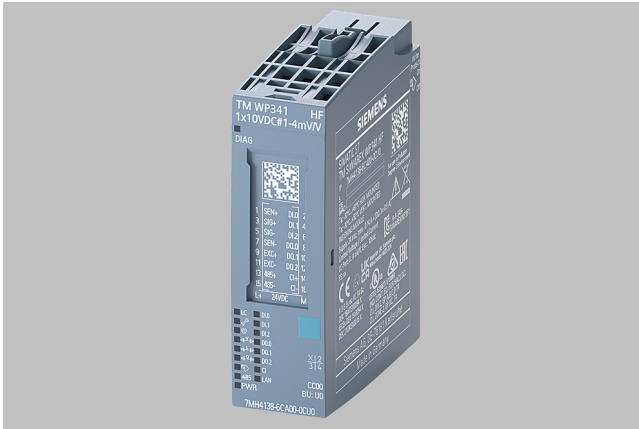
Belt scales

The gravel, cement, coal, recycling and mining industries require exact weight measurement of the material to be conveyed using belt scales. The comprehensive SIWAREX electronics properties and functions can fulfil all requirements.

The Milltronics belt scales from Siemens combine simple installation and low maintenance costs (no moving parts) with higher reproducibility. This results in high productivity. With minimum hysteresis and maximum linearity, lateral forces have no influence on measuring accuracy. All load cells are equipped with overload protection.

The installation of belt scales in danger zones is also available as option. Various versions are available for high accuracy, small loads and heavy loads.

Overview



The SIWAREX WP341 is a compact, precise weighing electronics in the SIMATIC ET 200SP format.

With a width of just 20 mm it is one of the slimmest weighing electronics on the market, yet its firmware includes the functionalities of a continuous belt weighing electronics. Optionally the WP341 can be used for operation of solids flowmeters.

The load cells and the speed sensor are directly connected to the ET 200SP Base Unit (type U0) and therefore the complete system is directly integrated into the automation system.

Benefits

- Low space requirements with only 20 mm module width
- Seamless integration into SIMATIC ET 200SP
- 1 000 Hz sampling rate und processing time
- Dedicated firmware for continuous belt weighing applications
- Operation with SIMATIC S7-300, S7-400, S7-1200 and S7-1500 controllers
- Operation in Ethernet IP or Modbus TCP-based systems using ET 200SP multi-field bus IM
- Three digital inputs and outputs each ex works
- High degree of scalability in connection with all available SIMATIC standard components
- Open SIWAREX concept – all settings and parameters accessible, no encapsulated black box in the field
- Unrestricted access to all scale parameters and functions from the SIMATIC S7 Controller / HMI
- Internal, protocol memory for up to 1 000 000 entries
- Commissioning and maintenance from HMI or weighing electronics-internal web server
- Advanced diagnostic features in combination with SIWAREX DB

Application

SIWAREX WP341 offers a compact and extremely versatile solution for continuous belt weighing applications with high requirements for accuracy and performance.

Typical areas of application include:

- Belt weighers in recycling, mining, aggregate, cement, chemical and food industries
- Easy and completely integrated realization of weigh feeding applications
- Operation with solids flowmeters

Design

The SIWAREX WP341 is a technology module of the SIMATIC ET 200SP distributed I/O system.

Installation is on a type U0 BaseUnit. The load cells, serial RS 485 interface and digital inputs/outputs are wired directly on the BaseUnit with user-friendly push-in terminals. This makes is quick and easy to replace weighing electronics without any wiring effort.

The web server is addressed via an Ethernet interface in the weighing electronics. Should more interfaces and I/O be required, they can be added with the ET 200SP system components.

Function

The load cells of the belt scale as well as the speed sensor are directly wired to the BaseUnit. The weighing electronics internally calculates the current flow rate based on the current weight and speed signal. Six individual totalizers are available and can be easily read out of the weighing electronics into the connected CPU. The totalizers are resettable by software command or alternatively by a 24 V signal connected to one of the on board digital inputs. Different methods of commissioning are supported: by test weight, by test chain, by material batch or based on load cell data.

A correction factor calculated by a material test can be applied. Additionally a correction factor curve based on different belt load levels can be defined. Digital signal filters for speed and load offer the possibility to optimize the results of the weighing process. A logging function for all calibration actions with time stamp provide a transparent and secure operation of the scale. In combination with the digital junction box SIWAREX DB up to four connected load cells can be individually monitored and diagnosed down from the single sensor up into the MES level.

The free of charge function block and HMI visualization give full access to all available data and parameters of the WP341 from the controller / HMI. Therefore the belt weighing application can be easily integrated into existing HMI visualizations and allow an intuitive operation and service of the scale.

Weighing Electronics

SIWAREX for SIMATIC

Belt scales / TM SIWAREX WP341 HF weighing electronics

Selection and ordering data

	Article No.
TM SIWAREX WP341 weighing electronics SIMATIC ET 200SP, TM SIWAREX WP341 HF, weighing electronics for continuous belt weighing applications	7MH4138-6CA00-0CU0
SIWAREX WP341 Equipment Manual Available in a range of languages Free download on the Internet at: http://www.siemens.com/weighing/documentation	
SIWAREX WP341 "Getting Started" sample project Sample software shows beginners how to program the scales in TIA Portal V16 Free download on the Internet at: http://www.siemens.com/weighing/downloads	
ET 200SP BaseUnit type U0 • For opening a new potential group (white) • For continuing an existing potential group (gray)	6ES7193-6BP00-0DU0 6ES7193-6BP00-0BU0
Shield connection for BaseUnit (5 units/for 5 scales) For laying load cell cable	6ES7193-6SC20-1AM0
Accessories	
SIWAREX EB extension box For extending sensor cables	7MH4710-2AA
SIWAREX JB junction box, aluminum enclosure For connecting up to 4 load cells in parallel, and for connecting multiple terminal boxes.	7MH5001-0AA20
SIWAREX JB junction box, stainless steel enclosure For connecting up to 4 load cells in parallel.	7MH5001-0AA00
SIWAREX JB junction box, stainless steel enclosure (ATEX) For parallel connection of up to 4 load cells (for zone allocation, see manual or prototype test certificate).	7MH5001-0AA01
SIWAREX DB digital junction box For enhanced diagnostic and monitoring options in conjunction with SIWAREX WP electronics. Enclosure made of: • Aluminum • Stainless steel incl. ATEX and IECEx approval II 3 G Ex ec IIC T4 Gc and II 3 D Ex tc IIIC T120 °C Dc	7MH5001-0AD20 7MH5001-0AD01
SIWAREX IS Ex interface For intrinsically safe connection of load cells. With ATEX approval (not UL/FM). Suitable for SIWAREX weighing electronics. Compatibility of load cells must be checked separately. • With short-circuit current < 199 mA DC	7MH4710-5BA

Selection and ordering data (continued)

	Article No.
• With short-circuit current < 137 mA DC	7MH4710-5CA
Cable (optional)	
Cable Li2Y 1 × 2 × 0.75 ST + 2 × (2 × 0.34 ST) – CY For connecting SIWAREX electronic to junction box (JB), extension box (EB), digital junction box (DB), Ex interface (IS) or between two extension boxes. For permanent installation. Occasional bending is possible. External diameter: approx. 10.8 mm (0.43 inch) Permissible ambient temperature -40 ... +80 °C (-40 ... +176 °F) Sold by the meter. • Sheath color: orange • Sheath color (for hazardous atmospheres): blue	7MH4702-8AG 7MH4702-8AF

Technical specifications

Article number	7MH4138-6CA00-0CU0
General information	
Product type designation	TM SIWAREX WP341 HF
• Product function	
• I&M data	Yes; I&M0 to I&M3
• Isochronous mode	No
• Adjustment of measuring range	Yes; $\pm 0 \dots 4$ 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	
Rated value (DC)	24 V
• Load voltage L+	
• Rated value (DC)	24 V
• Short-circuit protection	Yes
• Reverse polarity protection	Yes
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
Digital outputs	
Number of digital outputs	3
Digital outputs, parameterizable	Yes
Short-circuit protection	Yes
• Digital output functions, parameterizable	
• Freely usable digital output	Yes

Technical specifications (continued)

Article number	7MH4138-6CA00-0CU0
• 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 μ s
• "1" to "0", typ.	30 μ s
• 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 $\geq$ 0.6 A, the ambient temperature is reduced by -1 °C per 100 mA
• Current per module, max.	1.5 A; Observe derating
Encoder	
• Connection of signal encoders	
• For strain gauges (full bridges) with 4-conductor connection	Yes
• For strain gauges (full bridges) with 6-conductor connection	Yes
• Resistance of full bridge, min.	56 Ω ; when using SIWAREX IS 87 ohm for 7MH4710-5BA; 180 ohm when using 7MH4710-5CA
• Resistance of full bridge, max.	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	$\leq \pm 0.015$ μ V/K
Temperature coefficient, span	$\leq \pm 5$ 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)	Yes; 10/100 Mbit/s
• Number of ports	1
• Protocols	
• IP protocol	Yes; IPv4
• Web server	Yes
Interface types	

Weighing Electronics

SIWAREX for SIMATIC

Belt scales / TM SIWAREX WP341 HF weighing electronics

Technical specifications (continued)

Article number	7MH4138-6CA00-0CU0
• RJ 45 (Ethernet)	
• Autonegotiation	Yes
• Autocrossing	Yes
• RS 485	
• Transmission rate, max.	115.2 kbit/s
• Cable length, max.	1 000 m; ≤ 115 kbps, shielded cable
Protocols	
• Web server	
• HTTP	Yes
• HTTPS	Yes
Interrupts/diagnostics/status information	
Diagnostics function	Yes; Diagnostic alarm
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 µV/e
• Sampling rate	1 024 Hz
• Resolution of input signal	±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 MΩ
• input resistance of sense line, typ.	300 MΩ
• Cable length, max.	500 m; when using the SIWAREX 7MH4702-8AG cable
• Measuring functions	

Technical specifications (continued)

Article number	7MH4138-6CA00-0CU0
• 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
Standards, approvals, certificates	
Suitable for safety functions	No
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
• 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

Overview



SIWAREX WP241 is a flexible weighing module for belt scales. The compact module is easy to install in the SIMATIC S7-1200 automation system. It can also be operated as a stand-alone module, i.e. without a SIMATIC CPU.

Benefits

SIWAREX WP241 offers the following key advantages:

- Uniform design technology and consistent communication in SIMATIC S7-1200
- Uniform configuration with TIA Portal
- Operation without SIMATIC CPU possible
- Direct connection of an operator panel via Ethernet
- Four digital inputs and outputs, one analog output
- Measurement of weight with a high resolution of ± 4 million parts
- Simple adjustment of belt scales using the SIWATOOL V7 program via the Ethernet interface - even without knowledge of SIMATIC
- Replacement of module possible without renewed calibration of the scale
- Use in hazardous area zone 2
- Different calibration methods: With test weights, test chain, automatically or via material batch.
- Specification of belt inclination angle
- 6 totalization memories
- Simulation of speed and belt load for test purposes
- Comprehensive diagnostics functions

Application

SIWAREX WP241 is the optimal solution wherever belt scales are used that demand high accuracy, high user-friendliness, and flexible system integration. The typical applications of the SIWAREX WP241 are determining the current material flow rate, belt load, and belt speed. Furthermore, 6 totalizers are available for evaluating the amount of material conveyed.

Design

SIWAREX WP241 is a compact technology module in the SIMATIC S7-1200, and it allows direct connection to S7-1200 components via a sliding connector. The rail mounting of the 70 mm (2.76 inch) wide weighing module means that it is extremely easy to mount/wire.

The power supply, load cells, RS 485 interface, digital input/outputs and the analog output are connected via the screw plug of the weighing module. An RJ45 plug is used for the Ethernet connection.

Function

The primary task of the SIWAREX WP241 is to measure the speed of the belt, to measure and convert the sensor voltage to a weight value, and to precisely calculate the amount of material conveyed or material flow rate.

The volume of material conveyed can be recorded in 6 totalization memories: The accumulated totalization memory determines the conveyed material over the entire operating time of the scale (can only be reset by loading the factory settings). The overall total and the four remaining totalization memories are available for use as required. For example, for recording the daily or weekly totals.

Four different options are available for rapid commissioning:

• Automatic calibration

The calibration is calculated automatically using the load cell parameters entered. Only the zero point has to be calculated at the actual plant.

• Calibration with calibration weights or test weights

Test weights are secured to the weighing equipment and the conveyor belt is started. The calibration values are determined while the belt is running. The zero point must also be calculated.

• Calibration with test chain

Instead of test weights, a chain of a known weight can be placed on the measuring points of the belt. The calibration values are calculated as for calibration with test weights.

• Calibration via material batch

This method can be used if a volume of material is available, but neither test weights nor a chain are available. The material can either be preweighed or weighed afterwards. It is conveyed over the belt scale. Then the weighing module calculates the calibration characteristic automatically.

If "Automatic set to zero" is active, the electronic weighing system automatically executes a "set to zero" procedure when the belt reaches the "set to zero" area.

Extensive diagnostics functions are available. Diagnostic messages are output to the different interfaces. In simulation mode, both the speed and the belt load can be specified by the user. This makes it possible to test many functions in advance without operating belt scales. Both the digital inputs/outputs and the analog output can also be simulated for test purposes. The "Trace" function is extremely helpful for optimizing the plant or when troubleshooting. It records the weighing history stored in the internal module memory (e.g. material flow rate, belt load, speed) and exports it to Excel in a graphical format.

Monitoring the scale signals and states

The SIWAREX WP241 monitors the belt load, the material flow rate, and the belt speed, and it signals if the limits are exceeded. The respective limits can be parameterized as required.

Consistent and uniform communication between all system components enables fast, reliable and cost-effective integration and diagnosis in industrial processes.

Weighing Electronics

SIWAREX for SIMATIC

Belt scales / SIWAREX WP241 weighing electronics

Function (continued)

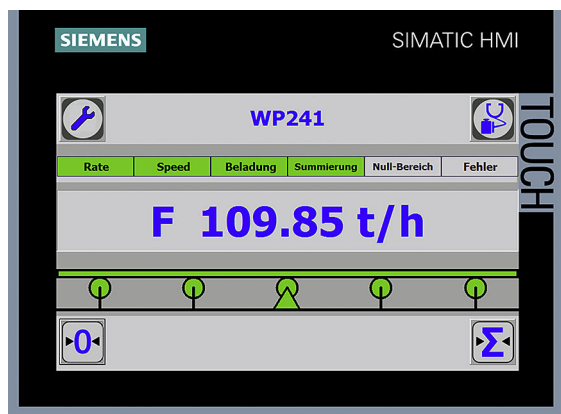
Integration in the plant environment

SIWAREX WP241 can be directly integrated into the SIMATIC S7-1200 via the SIMATIC bus. Standalone operation without SIMATIC is also possible.

A wide variety of connection options are provided via the RS 485 and Ethernet interface. Via Modbus TCP/IP or Modbus RTU, control panels can be connected and it is also possible to communicate with various automation systems. A PC for programming the SIWAREX WP241 via SIWATOOL can be connected to the Ethernet interface.

SIWAREX WP241 can be integrated into the system software using all standard PLC programming languages from the TIA Portal. In contrast to serially linked weighing electronics, SIWAREX WP241 does not need costly additional modules to link it to SIMATIC.

Used in conjunction with SIWAREX WP241, it is possible to configure freely programmable, modular weighing systems in SIMATIC, which can be adapted to company-specific requirements as needed.



SIWAREX WP241 "Ready-for-use"

In addition to the configuration package, fully-featured SIWAREX WP241 "Ready-for-use" software is also available free-of-charge. It shows beginners how to integrate the module in a STEP 7 program and offers a basis for application programming. This allows you to connect the scale to an operator panel either connected to the SIMATIC CPU or connected directly to the SIWAREX WP241.

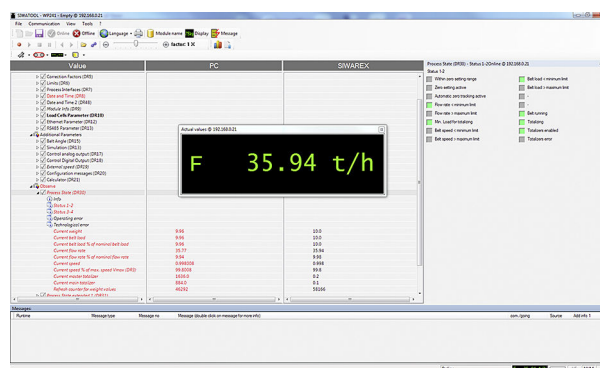
Software

There is also the option of using a Windows PC for commissioning and servicing. The program SIWATOOL enables the belt scales to be set without prior knowledge of the automation system, as required. During servicing, the technician can use a PC to quickly and simply analyze and test the procedures in the scale.

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

- Parameterization and calibration of the scale
- Testing/Simulation of scale properties
- Recording, analysis and export of scale traces ("Trace")
- Creation of backup files for rapidly replacing modules without calibration

Function (continued)



SIWAREX WP241 SIWATOOL

It is also extremely helpful to analyze the diagnostics buffer which can be saved together with the parameters following reading out from the module.

The SIWAREX WP241 weighing module includes a trace mode for optimization of weighing sequences. 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 WP241 on site. This means that firmware upgrades can be carried out on site as required anywhere in the world.

Selection and ordering data

	Article No.
SIWAREX WP241 weighing electronics Single-channel, for belt scales with analog load cells / full-bridge strain gauges (1 - 4 mV/V), 1 × LC, 4 × DQ, 4 × DI, 1 × AQ, 1 × RS 485, Ethernet port	7MH4960-4AA01
SIWAREX S7-1200 Equipment Manual Available in a range of languages Free download on the Internet at: http://www.siemens.com/weighing/documentation	
SIWAREX WP241 "Ready-for-use" Complete software package for belt scale (for S7-1200 and a directly connected operator panel) Free download on the Internet at: http://www.siemens.com/weighing/documentation	
SIWATOOL V4 & V7 Service and commissioning software for SIWAREX weighing modules	7MH4900-1AK01
Ethernet cable patch cord 2 m (7 ft) For connecting SIWAREX WP241 to a PC (SIWATOOL), SIMATIC CPU, panel, etc.	6XV1850-2GH20
Accessories	
SIWAREX EB extension box For extending sensor cables	7MH4710-2AA
SIWAREX JB junction box, aluminum housing For connecting up to 4 load cells in parallel, and for connecting multiple junction boxes	7MH5001-0AA20
SIWAREX JB junction box, stainless steel housing For connecting up to 4 load cells in parallel	7MH5001-0AA00
SIWAREX JB junction box, stainless steel housing (ATEX) For parallel connection of up to 4 load cells (for zone allocation, see manual or type-examination certificate)	7MH5001-0AA01
SIWAREX IS Ex interface For intrinsically safe connection of load cells. With ATEX approval (not UL/FM). Suitable for SIWAREX electronic weighing systems. Compatibility of load cells must be checked separately. • Short-circuit current < 199 mA DC • Short-circuit current < 137 mA DC	7MH4710-5BA 7MH4710-5CA
Cable (optional)	

Selection and ordering data (continued)

	Article No.
Cable Li2Y 1 × 2 × 0.75 ST + 2 × (2 × 0.34 ST) – CY For connecting SIWAREX electronic to junction box (JB), extension box (EB), digital junction box (DB), Ex interface (IS) or between two extension boxes. For permanent installation. Occasional bending is possible. External diameter: approx. 10.8 mm (0.43 inch) Permissible ambient temperature -40 ... +80 °C (-40 ... +176 °F) Sold by the meter. • Sheath color: orange • Sheath color (for hazardous atmospheres): blue	7MH4702-8AG 7MH4702-8AF
Ground terminal for connecting the load cell cable shield to the grounded DIN rail	6ES5728-8MA11

Weighing Electronics

SIWAREX for SIMATIC

Belt scales / SIWAREX WP241 weighing electronics

Technical specifications

SIWAREX WP241	
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)
Communication interfaces	• SIMATIC S7-1200 backplane bus • RS 485 (Modbus RTU) • Ethernet (SIWATOOL V7, Modbus TCP/IP) • Analog output 0/4 - 20 mA • 4 × digital outputs, 24 V DC, floating, short-circuit proof • 4 × digital inputs 24 V DC, floating
Commissioning options	• Using SIWATOOL V7 • Using function block in SIMATIC S7-1200 CPU / Touch Panel • Using Modbus TCP/IP • Using Modbus RTU
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
Measuring frequency	100 / 120 Hz
Digital filter	Separate, variable adjustable low-pass and average filter for loading and speed
Filter for conveyor load	Low-pass filter (limit frequency 0.05 ... 50 Hz)
Filter for belt speed	Low-pass filter (limit frequency 0.05 ... 50 Hz)
Weighing functions Readout data	• Weight • Belt load • Material flow rate • Accumulated total • Main total • Free totals 1 ... 4 • Belt speed
Limits (min/max)	• Belt load • Material flow rate • Belt speed
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 measurement signal range	-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 (compatibility of the load cells must be checked)
Approvals/certificates	• ATEX Zone 2 • UL • EAC • KCC • RCM

Technical specifications (continued)

SIWAREX WP241	
Auxiliary power supply	
Rated voltage	24 V DC
Max. power consumption	200 mA
Max. power consumption SIMATIC Bus	3 mA
IP degree of protection to EN 60529; IEC 60529	IP20
Climatic requirements $T_{min}(IND) \dots T_{max}(IND)$ (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 × 75 × 100 mm (2.76 × 2.95 × 3.94 inch)

Overview



The SIWAREX FTC (Flexible Technology for Continuous Weighing) is a versatile and flexible weighing module for belt scales, loss-in-weight feeders and solids flowmeters. It can also be used to record weights and measure force. The SIWAREX FTC function module is integrated in SIMATIC S7/PCS 7 and uses the features of this modern automation system, such as integrated communication, diagnostics and configuration tools.

Benefits

SIWAREX FTC is characterized by the following features:

- Uniform design and totally integrated communication in SIMATIC S7 and SIMATIC PCS 7
- Uniform configuration with SIMATIC
- Direct use in the SIMATIC automation system
- Use in distributed plant concept through connection to PROFIBUS DP/PROFINET using ET 200M
- Measurement of weight or force with high resolution of 16 million intervals
- High accuracy $3 \times 6\,000$ d
- For use with analog strain gauge load cells
- Alternative option of connecting individual load cells from the manufacturers METTLER TOLEDO, WIPOTEC and PESA
- Display with SIMATIC standard operator panels
- Parameterizable inputs and outputs
- Parameterizable for highly versatile applications
- Flexible adaptation to different requirements with SIMATIC
- Simple adjustment of scale using the SIWATOOL FTC program
- Theoretical adjustment without calibration weights
- Replacement of module without renewed adjustment of scale
- Recording of weighing sequence
- 8 totalization memories with different digit intervals
- Can be used in Ex applications

Application

The SIWAREX FTC weighing module is the optimum solution wherever high demands are placed on continuous weighing procedures. Thanks to its outstanding measuring properties, weights can be measured with extreme accuracy in up to three ranges. In the case of force measurements, the value can be measured bidirectionally.

Typical applications for SIWAREX FTC include:

- Flowrate/flow measurement
- Belt volume measurement
- Material loading, summation
- Flowrate/flow control
- Belt load measurement
- Belt scale / weighfeeder
- Loss-in-weight scale
- Force measurement

Design

SIWAREX FTC is a function module of SIMATIC S7-300 which can be directly snapped onto the SIMATIC S7-300 or ET 200M backplane bus. The rail mounting of the 80 mm wide weighing module means that it is extremely easy to mount/wire.

The load cells, the RS 485 serial interface, the analog output and the digital inputs and outputs are connected by means of the 40-pin standard front connector, the PC (RS 232) by means of a 9-pin SUB-D connector and the power supply by means of a separate 2-pin connector.

Operation of SIWAREX FTC in SIMATIC enables the belt scale to be completely integrated into the automation system.

Weighing Electronics

SIWAREX for SIMATIC

Belt scales / SIWAREX FTC weighing electronics

Function

The main tasks of SIWAREX FTC are the high-precision measurement of the current weight, and the exact calculation of the conveyed quantity or flow. In "Force measurement" operation mode, SIWAREX FTC measures the force in both directions.

The conveyed quantity can be recorded in 8 totalization memories. Through integration in SIMATIC it is also possible to directly control scale operation by means of a PLC program. This means that the tasks can be sensibly divided: The weighing functions are implemented in the SIWAREX FTC and the interlocking and logic functions for the plant control in the SIMATIC CPU.

Weighing functions

The following operating modes can be set:

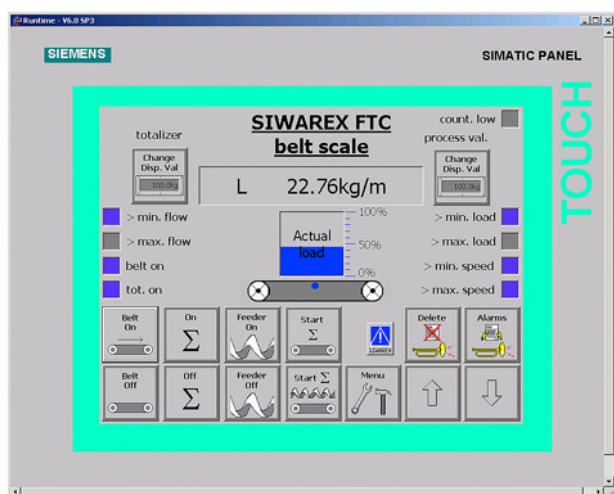
Weight measurement and force measurement

In this operating mode, the weight value or the force is determined, processed in the PLC and then displayed.

For this purpose, the configuration package can be selected.

Belt scale / weighfeeder

The functions of a belt scale are implemented in this operating mode. Calculations are performed for the typical process values; belt load, flowrate and belt speed. Commands can be used to control the belt and display the required values. A weighfeeder can be implemented by activating the SIMATIC PID controller.



Scale faceplate of a belt scale

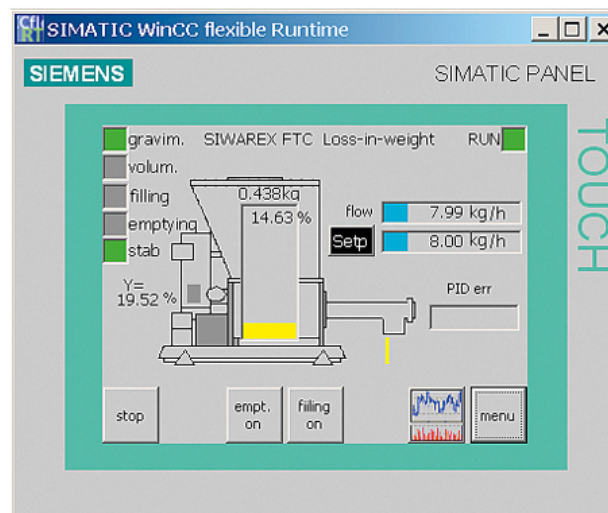
Loss-in-weight scale

The typical functions of a loss-in-weight scale are implemented in this operating mode. The actual weight of the vessel is measured and the flowrate is regulated according to the preset setpoint.

Application-specific parameters, such as proportioning parameters, and device and material characteristics, can be set directly in SIWAREX FTC. Various commands are available that have been fine-tuned to the requirements of the loss-in-weight scales, such as proportioning (manual, automatic, gravimetric, volumetric), filling and emptying.

The high measurement resolution, real-time signal processing, detection and filtering of signals in the electronic weighing system enable extremely high proportioning accuracy.

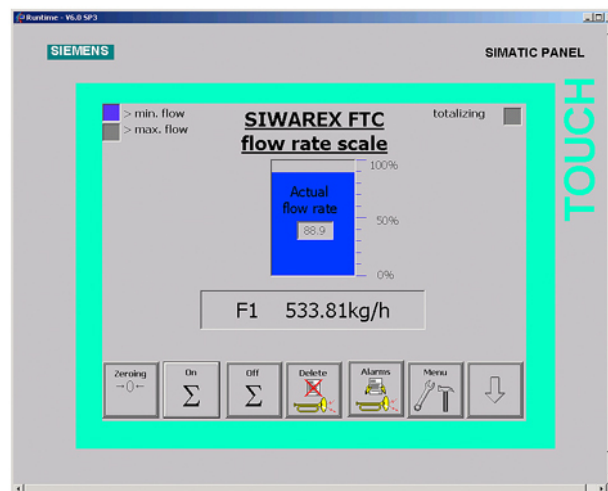
Function (continued)



Scale faceplate of a loss-in-weight scale

Solids flowmeter

The typical functions of a solids flowmeter are implemented in this operating mode. The calculations for the typical process values; flow and conveyed quantity, are performed in the SIWAREX module. Application-specific parameters for setting the scales and commands for their operation are also available.



View of a solids flowmeter

Monitoring and control of the load cell signals and statuses

The SIWAREX FTC weighing module monitors the statuses during the weighing process, and informs the operator of any irregularities. The optimized exchange of data within SIMATIC permits direct evaluation of the load cell signals in the PLC program.

Influencing of the weighing sequences by the PLC means that the SIWAREX FTC can be easily adapted to any modifications in system technology.

Function (continued)

A module can be replaced without recalibrating the scales. When using "active bus modules", replacement is also possible during operation.



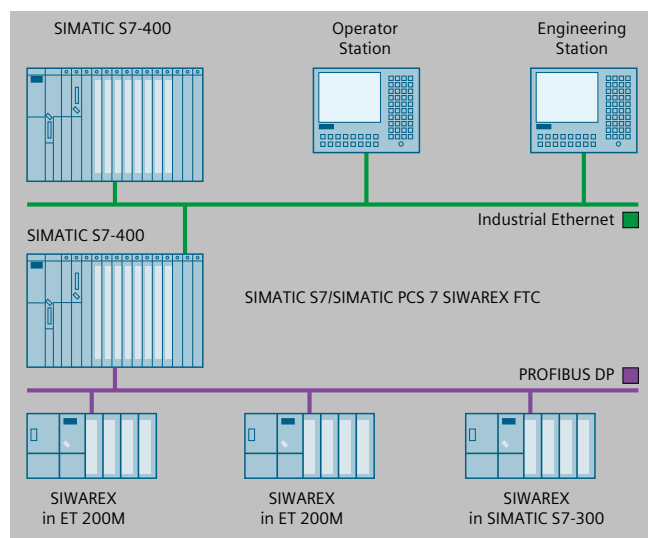
Applications of SIWAREX FTC

Integration in SIMATIC

SIWAREX FTC is completely integrated into the SIMATIC S7 and SIMATIC PCS 7. Users can freely configure their automation solution – including the weighing application.

The right combination of SIMATIC components can produce optimum solutions for small, medium-size and large plants. The scales are operated and monitored using SIMATIC standard operator panels. Needless to say, these operator panels can also be simultaneously used for the operator control and monitoring of the plant.

Custom design or sector-specific solutions can be developed extremely quickly using the configuration package and example applications for SIMATIC.



SIMATIC S7/PCS 7 configuration with SIWAREX FTC (medium-sized plants)

Software**Adjustment of the scale using SIWATOOL FTC**

SIWATOOL FTC is a special program for adjusting and servicing the scale and runs with Windows operating systems.

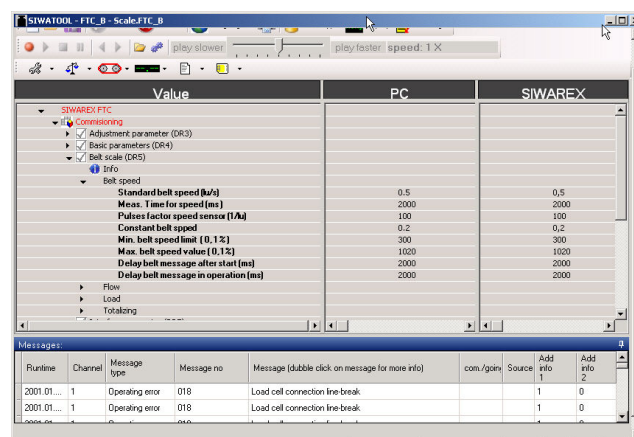
The program enables the scales to be commissioned without the need for prior knowledge of the automation system. During servi-

Function (continued)

cing, the technician can use a PC to analyze and test the procedures in the scale. Reading out the diagnostics buffer from the SIWAREX FTC is extremely helpful when analyzing events.

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

- Parameter assignment and calibration of the scale
- Testing of scale properties
- Saving and printing scale data
- Recording and analysis of weighing sequence



Settings in SIWAREX FTC software

It is also extremely helpful to analyze the diagnostics buffer which can be saved together with the parameters following reading out from the module.

The SIWAREX FTC weighing module includes a trace mode for checking of weighing sequences. The recorded weight values and associated statuses can be displayed as traces using SIWATOOL FTC and MS Excel.

Upgrading firmware

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

Reading out of weighing reports

The totalization memories can be saved on a MMC (Micro Memory Card) inserted into the SIWAREX FTC.

SIWAREX FTC – simple configuring

Integration in SIMATIC means that freely-programmable, modular weighing systems for belt scales, solids flowmeters and loss-in-weight scales can be created and modified to meet individual operational requirements.

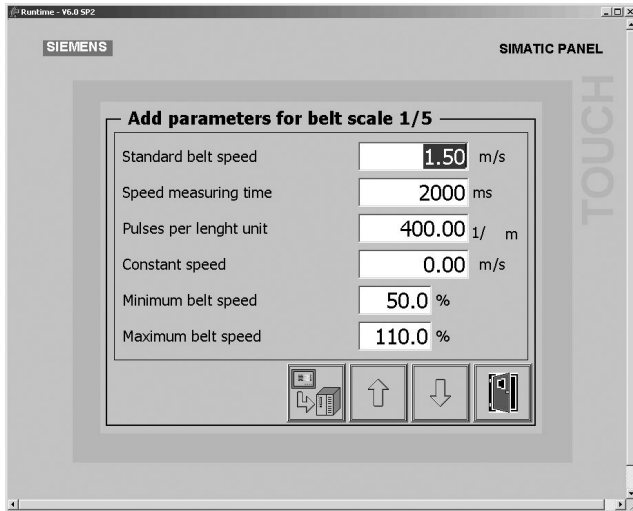
A free version of the ready-to-use SIWAREX FTC "Getting Started" software is also available for the belt scale, solids flowmeter and loss-in-weight scale operation modes. It shows beginners how to integrate the module into the STEP 7 program and provides a basis for application programming. This allows you to implement the belt scale very easily with an operator panel connected directly to the SIMATIC CPU.

Weighing Electronics

SIWAREX for SIMATIC

Belt scales / SIWAREX FTC weighing electronics

Function (continued)



Scale faceplate in the SIWAREX FTC "Getting Started" software

Selection and ordering data

	Article No.
SIWAREX FTC Electronic weighing system for S7-300 and ET 200M. Applications: Belt scales, force measurement, loss-in-weight scales and solids flowmeters	7MH4900-3AA01
SIWAREX FTC_B Equipment Manual for belt scales Available in a range of languages Free download on the Internet at: http://www.siemens.com/weighing/documentation	
SIWAREX FTC_L Equipment Manual for solids flowmeters and loss-in-weight scales Available in a range of languages Free download on the Internet at: http://www.siemens.com/weighing/documentation	
SIWAREX FTC "Getting Started" for belt scales Sample software shows beginners how to program the scales in STEP 7 for belt scale mode Free download on the Internet at: http://www.siemens.com/weighing/documentation	
SIWAREX FTC "Getting Started" for solids flowmeters Sample software shows beginners how to program the scales in STEP 7 for solids flowmeter mode Free download on the Internet at: http://www.siemens.com/weighing/documentation	
SIWAREX FTC "Getting Started" for loss-in-weight scales Sample software shows beginners how to program the scales in STEP 7 for loss-in-weight scale mode Free download on the Internet at: http://www.siemens.com/weighing/documentation	
SIWATOOL V4 & V7 Service and commissioning software for SIWAREX weighing modules	7MH4900-1AK01
SIWAREX PCS 7 AddOn Library for PCS7 V8.x and V9.0 • Supports PROFINET APL faceplates and function blocks for: • SIWAREX U • SIWAREX FTA • SIWAREX FTC_B (belt scale) • SIWAREX WP321 Classic faceplate and function block for: • SIWAREX FTC_L (Loss-in-weight)	7MH4900-1AK61
SIWATOOL connection cable from SIWAREX FTC with serial PC interface, for 9-pin PC interfaces (RS 232) • 2 m long (6.56 ft) • 5 m long (16.40 ft)	7MH4702-8CA 7MH4702-8CB

Selection and ordering data (continued)

	Article No.
40-pin front connector with screw contacts Required for each SIWAREX module	
• With screw contacts	6ES7392-1AM00-0AA0
• With spring-loaded terminals	6ES7392-1BM01-0AA0
Shield connection element Sufficient for one SIWAREX FTC module	6ES7390-5AA00-0AA0
Shield connection clamp Content: 2 units (suitable for cable with diameter 4 ... 13 mm / 0.16 ... 0.51 inch) Note: One shield connection clamp is required for each of the following:	6ES7390-5CA00-0AA0
• Scale connection	
• RS 485 interface	
• RS 232 interface	
S7 DIN rail	
• 160 mm (6.30 inch)	6ES7390-1AB60-0AA0
• 480 mm (18.90 inch)	6ES7390-1AE80-0AA0
• 530 mm (20.87 inch)	6ES7390-1AF30-0AA0
• 830 mm (32.68 inch)	6ES7390-1AJ30-0AA0
• 2 000 mm (78.74 inch)	6ES7390-1BC00-0AA0
MMC memory For data logging up to 32 MB, only for legal-for-trade applications R76, R51 and R107	7MH4900-2AY21
Accessories	
SIWAREX EB extension box For extending sensor cables.	7MH4710-2AA
SIWAREX JB junction box, aluminum housing For connecting up to 4 load cells in parallel, and for connecting multiple junction boxes.	7MH5001-0AA20
SIWAREX JB junction box, stainless steel housing For connecting up to 4 load cells in parallel.	7MH5001-0AA00
SIWAREX JB junction box, stainless steel housing (ATEX) For parallel connection of up to 4 load cells (for zone allocation, see manual or type-examination certificate).	7MH5001-0AA01
Ex interface SIWAREX IS For intrinsically safe connection of load cells. With ATEX approval (not UL/FM). Suitable for SIWAREX electronic weighing systems. Compatibility of load cells must be checked separately.	
• With short-circuit current < 199 mA DC	7MH4710-5BA
• With short-circuit current < 137 mA DC	7MH4710-5CA
Cable (optional)	

Selection and ordering data (continued)

	Article No.
Cable Li2Y 1 × 2 × 0.75 ST + 2 × (2 × 0.34 ST) – CY For connecting SIWAREX electronic to junction box (JB), extension box (EB), digital junction box (DB), Ex interface (IS) or between two extension boxes. For permanent installation. Occasional bending is possible. External diameter: approx. 10.8 mm (0.43 inch) Permissible ambient temperature -40 ... +80 °C (-40 ... +176 °F) Sold by the meter.	
• Sheath color: orange	7MH4702-8AG
• For hazardous atmospheres. Sheath color: blue	7MH4702-8AF
Remote display (optional) The Siebert S102 and S302 remote digital displays can be directly connected to the SIWAREX FTC via an RS 485 interface. (not suitable for belt scale mode) Siebert Industrieelektronik GmbH PO Box 1180 D-66565 Eppelborn Tel.: +49 6806/980-0 Fax: +49 6806/980-999 Internet: http://www.siebert-group.com/en Detailed information is available from the manufacturer.	

Weighing Electronics

SIWAREX for SIMATIC

Belt scales / SIWAREX FTC weighing electronics

Technical specifications

SIWAREX FTC	
Use in automation systems	
S7-300	Directly or via ET 200M
S7-1500	Through ET 200M
S7-400 (H)	Through ET 200M
PCS 7 (H)	Through ET 200M
Communication interfaces	
S7	Through backplane bus
RS 232	For SIWATOOL or printer connection
RS 485	For remote display or digital load cell
Module parameterization	
	Using SIMATIC S7
	Using SIWATOOL FTC software (RS 232)
Measuring properties	
Accuracy according to EN 45501	$3 \times 6\,000\,d \geq 0.5\,\mu\text{V/e}$
Internal resolution	+/- 8 million parts
Internal/external updating rate	400/100 Hz
Several parameterizable digital filters	Critically dampened, Bessel, Butterworth (0.05 ... 20 Hz), mean-value filter
Weighing functions	• Non automatic weighing instrument, force measurement • Belt scale • Loss-in-weight scale • Solids flowmeters
Load cells	Strain gauges in 4-wire or 6-wire system
3 characteristic value ranges	1, 2 or 4 mV/V
Load cell powering	
Supply voltage U_s (rated value)	10.3 V DC
Max. supply current	184 mA
Permissible load cell resistance	
• R_{Lmin}	$> 56\,\Omega$
	$> 87\,\Omega$ with Ex interface
• R_{Lmax}	$\leq 4\,010\,\Omega$
Max. distance of load cells	
When using the recommended cable:	
Standard	1 000 m (3 280 ft)
In hazardous area ¹⁾	
• For gases of group IIC	300 m (984 ft)
• For gases of group IIB	1 000 m (3 280 ft)
Connection to load cells in Ex zone 1	Optionally via SIWAREX IS Ex interface
Ex approvals zone 2 and safety	ATEX 95, FM, cUL _{US} Haz. Loc.
Auxiliary power supply	
Rated voltage	24 V DC
Max. power consumption	500 mA
Current consumption on backplane bus	Typ. 55 mA
Inputs/outputs	
Digital inputs	7, electrically isolated
Digital outputs	8, electrically isolated
Counter input	Up to 10 kHz
Analog output	
• Current range	0/4 ... 20 mA
• Updating rate	100 Hz
Degree of protection according to EN 60529; IEC 60529	IP20
Climatic requirements	
T_{min} (IND) ... T_{max} (IND) (operating temperature)	
• Horizontal installation	-10 ... 60 °C (14 ... 140 °F)
• Vertical installation	-10 ... 40 °C (14 ... 104 °F)

Technical specifications (continued)

SIWAREX FTC	
EMC requirements	EN 61326, EN 45501, NAMUR NE21, Part 1
Dimensions	80 × 125 × 130 mm (3.15 × 4.92 × 5.12 inch)
Weight	600 g (0.44 lb)

¹⁾ For further details, see Ex interface, type SIWAREX IS.

Overview



SIWAREX FTC weighing electronics

The very demanding task of differential dosing can be mastered without difficulty using SIWAREX FTC. The electronic weighing system provides extensive functionalities and can be commissioned in only 15 minutes using the auto setup function. The module automatically determines the most important parameters, such as dosing power, measurement time, stability and PID parameters and saves them. The parameters are continuously optimized during operation. The standard operator control and monitoring components from Siemens provide options for operating and calibrating the scales, as well as for error diagnostics.

Both single components and applications for multi-component dosing can be implemented in relation to one another.

Benefits

- High metering accuracy
- High reproducibility
- Real-time signal processing
- Openness and user freedom enable individual optimization by the company's own personnel or specialists

Weighing Electronics

SIWAREX for SIMATIC

Loss-in-weight scales / SIWAREX FTC weighing electronics

Overview



The SIWAREX FTC (Flexible Technology for Continuous Weighing) is a versatile and flexible weighing module for belt scales, loss-in-weight feeders and solids flowmeters. It can also be used to record weights and measure force. The SIWAREX FTC function module is integrated in SIMATIC S7/PCS 7 and uses the features of this modern automation system, such as integrated communication, diagnostics and configuration tools.

Benefits

SIWAREX FTC is characterized by the following features:

- Uniform design and totally integrated communication in SIMATIC S7 and SIMATIC PCS 7
- Uniform configuration with SIMATIC
- Direct use in the SIMATIC automation system
- Use in distributed plant concept through connection to PROFIBUS DP/PROFINET using ET 200M
- Measurement of weight or force with high resolution of 16 million intervals
- High accuracy $3 \times 6\,000$ d
- For use with analog strain gauge load cells
- Alternative option of connecting individual load cells from the manufacturers METTLER TOLEDO, WIPOTEC and PESA
- Display with SIMATIC standard operator panels
- Parameterizable inputs and outputs
- Parameterizable for highly versatile applications
- Flexible adaptation to different requirements with SIMATIC
- Simple adjustment of scale using the SIWATOOL FTC program
- Theoretical adjustment without calibration weights
- Replacement of module without renewed adjustment of scale
- Recording of weighing sequence
- 8 totalization memories with different digit intervals
- Can be used in Ex applications

Application

The SIWAREX FTC weighing module is the optimum solution wherever high demands are placed on continuous weighing procedures. Thanks to its outstanding measuring properties, weights can be measured with extreme accuracy in up to three ranges. In the case of force measurements, the value can be measured bidirectionally.

Typical applications for SIWAREX FTC include:

- Flowrate/flow measurement
- Belt volume measurement
- Material loading, summation
- Flowrate/flow control
- Belt load measurement
- Belt scale / weighfeeder
- Loss-in-weight scale
- Force measurement

Design

SIWAREX FTC is a function module of SIMATIC S7-300 which can be directly snapped onto the SIMATIC S7-300 or ET 200M backplane bus. The rail mounting of the 80 mm wide weighing module means that it is extremely easy to mount/wire.

The load cells, the RS 485 serial interface, the analog output and the digital inputs and outputs are connected by means of the 40-pin standard front connector, the PC (RS 232) by means of a 9-pin SUB-D connector and the power supply by means of a separate 2-pin connector.

Operation of SIWAREX FTC in SIMATIC enables the belt scale to be completely integrated into the automation system.

Function

The main tasks of SIWAREX FTC are the high-precision measurement of the current weight, and the exact calculation of the conveyed quantity or flow. In "Force measurement" operation mode, SIWAREX FTC measures the force in both directions.

The conveyed quantity can be recorded in 8 totalization memories. Through integration in SIMATIC it is also possible to directly control scale operation by means of a PLC program. This means that the tasks can be sensibly divided: The weighing functions are implemented in the SIWAREX FTC and the interlocking and logic functions for the plant control in the SIMATIC CPU.

Weighing functions

The following operating modes can be set:

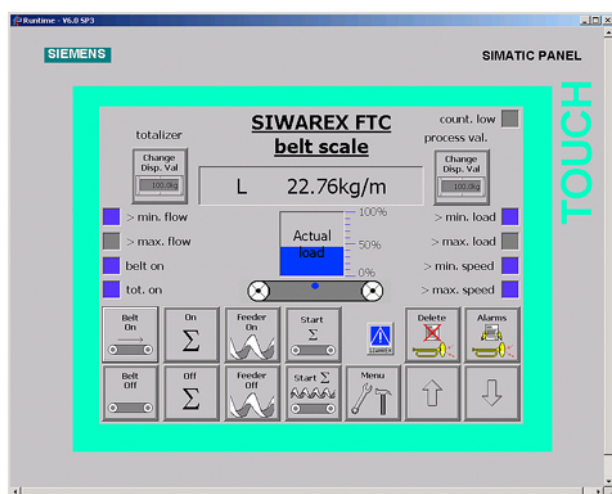
Weight measurement and force measurement

In this operating mode, the weight value or the force is determined, processed in the PLC and then displayed.

For this purpose, the configuration package can be selected.

Belt scale / weighfeeder

The functions of a belt scale are implemented in this operating mode. Calculations are performed for the typical process values; belt load, flowrate and belt speed. Commands can be used to control the belt and display the required values. A weighfeeder can be implemented by activating the SIMATIC PID controller.



Scale faceplate of a belt scale

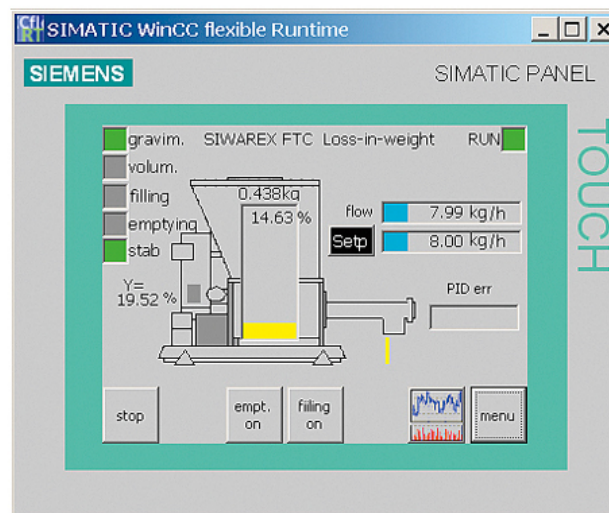
Loss-in-weight scale

The typical functions of a loss-in-weight scale are implemented in this operating mode. The actual weight of the vessel is measured and the flowrate is regulated according to the preset setpoint.

Application-specific parameters, such as proportioning parameters, and device and material characteristics, can be set directly in SIWAREX FTC. Various commands are available that have been fine-tuned to the requirements of the loss-in-weight scales, such as proportioning (manual, automatic, gravimetric, volumetric), filling and emptying.

The high measurement resolution, real-time signal processing, detection and filtering of signals in the electronic weighing system enable extremely high proportioning accuracy.

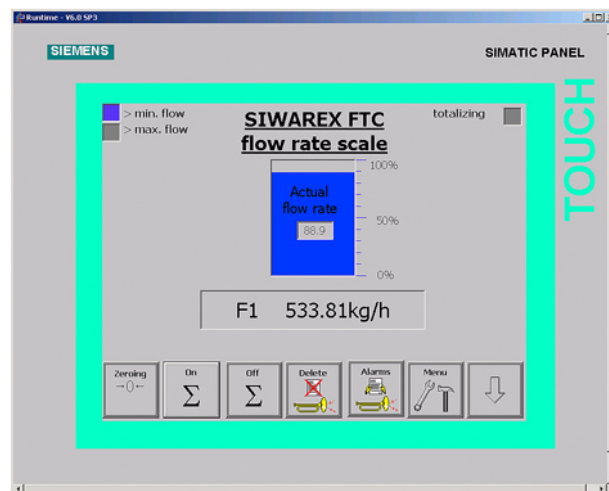
Function (continued)



Scale faceplate of a loss-in-weight scale

Solids flowmeter

The typical functions of a solids flowmeter are implemented in this operating mode. The calculations for the typical process values; flow and conveyed quantity, are performed in the SIWAREX module. Application-specific parameters for setting the scales and commands for their operation are also available.



View of a solids flowmeter

Monitoring and control of the load cell signals and statuses

The SIWAREX FTC weighing module monitors the statuses during the weighing process, and informs the operator of any irregularities. The optimized exchange of data within SIMATIC permits direct evaluation of the load cell signals in the PLC program.

Influencing of the weighing sequences by the PLC means that the SIWAREX FTC can be easily adapted to any modifications in system technology.

Weighing Electronics

SIWAREX for SIMATIC

Loss-in-weight scales / SIWAREX FTC weighing electronics

Function (continued)

A module can be replaced without recalibrating the scales. When using "active bus modules", replacement is also possible during operation.



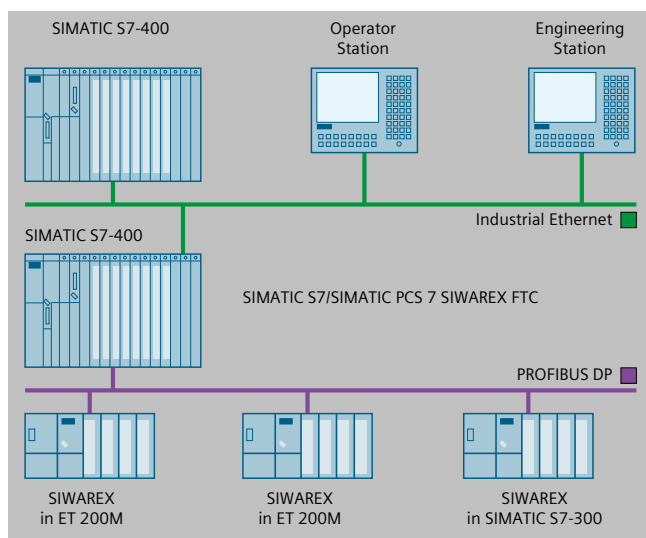
Applications of SIWAREX FTC

Integration in SIMATIC

SIWAREX FTC is completely integrated into the SIMATIC S7 and SIMATIC PCS 7. Users can freely configure their automation solution – including the weighing application.

The right combination of SIMATIC components can produce optimum solutions for small, medium-size and large plants. The scales are operated and monitored using SIMATIC standard operator panels. Needless to say, these operator panels can also be simultaneously used for the operator control and monitoring of the plant.

Custom design or sector-specific solutions can be developed extremely quickly using the configuration package and example applications for SIMATIC.



SIMATIC S7/PCS 7 configuration with SIWAREX FTC (medium-sized plants)

Software

Adjustment of the scale using SIWATOOL FTC

SIWATOOL FTC is a special program for adjusting and servicing the scale and runs with Windows operating systems.

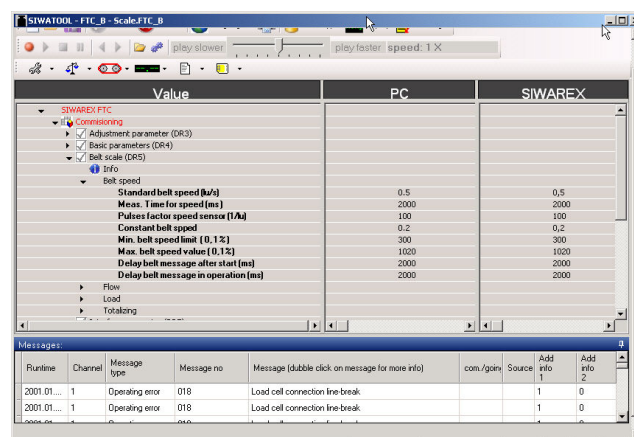
The program enables the scales to be commissioned without the need for prior knowledge of the automation system. During servi-

Function (continued)

cing, the technician can use a PC to analyze and test the procedures in the scale. Reading out the diagnostics buffer from the SIWAREX FTC is extremely helpful when analyzing events.

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

- Parameter assignment and calibration of the scale
- Testing of scale properties
- Saving and printing scale data
- Recording and analysis of weighing sequence



Settings in SIWAREX FTC software

It is also extremely helpful to analyze the diagnostics buffer which can be saved together with the parameters following reading out from the module.

The SIWAREX FTC weighing module includes a trace mode for checking of weighing sequences. The recorded weight values and associated statuses can be displayed as traces using SIWATOOL FTC and MS Excel.

Upgrading firmware

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

Reading out of weighing reports

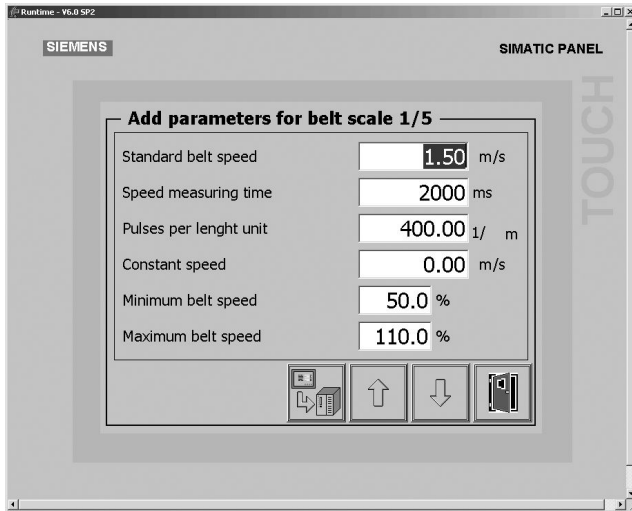
The totalization memories can be saved on a MMC (Micro Memory Card) inserted into the SIWAREX FTC.

SIWAREX FTC – simple configuring

Integration in SIMATIC means that freely-programmable, modular weighing systems for belt scales, solids flowmeters and loss-in-weight scales can be created and modified to meet individual operational requirements.

A free version of the ready-to-use SIWAREX FTC "Getting Started" software is also available for the belt scale, solids flowmeter and loss-in-weight scale operation modes. It shows beginners how to integrate the module into the STEP 7 program and provides a basis for application programming. This allows you to implement the belt scale very easily with an operator panel connected directly to the SIMATIC CPU.

Function (continued)



Scale faceplate in the SIWAREX FTC "Getting Started" software

Selection and ordering data

	Article No.
SIWAREX FTC Electronic weighing system for S7-300 and ET 200M. Applications: Belt scales, force measurement, loss-in-weight scales and solids flowmeters	7MH4900-3AA01
SIWAREX FTC_B Equipment Manual for belt scales Available in a range of languages Free download on the Internet at: http://www.siemens.com/weighing/documentation	
SIWAREX FTC_L Equipment Manual for solids flowmeters and loss-in-weight scales Available in a range of languages Free download on the Internet at: http://www.siemens.com/weighing/documentation	
SIWAREX FTC "Getting Started" for belt scales Sample software shows beginners how to program the scales in STEP 7 for belt scale mode Free download on the Internet at: http://www.siemens.com/weighing/documentation	
SIWAREX FTC "Getting Started" for solids flowmeters Sample software shows beginners how to program the scales in STEP 7 for solids flowmeter mode Free download on the Internet at: http://www.siemens.com/weighing/documentation	
SIWAREX FTC "Getting Started" for loss-in-weight scales Sample software shows beginners how to program the scales in STEP 7 for loss-in-weight scale mode Free download on the Internet at: http://www.siemens.com/weighing/documentation	
SIWATOOL V4 & V7 Service and commissioning software for SIWAREX weighing modules	7MH4900-1AK01
SIWAREX PCS 7 AddOn Library for PCS7 V8.x and V9.0 • Supports PROFINET APL faceplates and function blocks for: • SIWAREX U • SIWAREX FTA • SIWAREX FTC_B (belt scale) • SIWAREX WP321 Classic faceplate and function block for: • SIWAREX FTC_L (Loss-in-weight)	7MH4900-1AK61
SIWATOOL connection cable from SIWAREX FTC with serial PC interface, for 9-pin PC interfaces (RS 232) • 2 m long (6.56 ft) • 5 m long (16.40 ft)	7MH4702-8CA 7MH4702-8CB

Weighing Electronics

SIWAREX for SIMATIC

Loss-in-weight scales / SIWAREX FTC weighing electronics

Selection and ordering data (continued)

	Article No.
40-pin front connector with screw contacts Required for each SIWAREX module	
• With screw contacts	6ES7392-1AM00-0AA0
• With spring-loaded terminals	6ES7392-1BM01-0AA0
Shield connection element Sufficient for one SIWAREX FTC module	6ES7390-5AA00-0AA0
Shield connection clamp Content: 2 units (suitable for cable with diameter 4 ... 13 mm / 0.16 ... 0.51 inch) Note: One shield connection clamp is required for each of the following:	6ES7390-5CA00-0AA0
• Scale connection	
• RS 485 interface	
• RS 232 interface	
S7 DIN rail	
• 160 mm (6.30 inch)	6ES7390-1AB60-0AA0
• 480 mm (18.90 inch)	6ES7390-1AE80-0AA0
• 530 mm (20.87 inch)	6ES7390-1AF30-0AA0
• 830 mm (32.68 inch)	6ES7390-1AJ30-0AA0
• 2 000 mm (78.74 inch)	6ES7390-1BC00-0AA0
MMC memory For data logging up to 32 MB, only for legal-for-trade applications R76, R51 and R107	7MH4900-2AY21
Accessories	
SIWAREX EB extension box For extending sensor cables.	7MH4710-2AA
SIWAREX JB junction box, aluminum housing For connecting up to 4 load cells in parallel, and for connecting multiple junction boxes.	7MH5001-0AA20
SIWAREX JB junction box, stainless steel housing For connecting up to 4 load cells in parallel.	7MH5001-0AA00
SIWAREX JB junction box, stainless steel housing (ATEX) For parallel connection of up to 4 load cells (for zone allocation, see manual or type-examination certificate).	7MH5001-0AA01
Ex interface SIWAREX IS For intrinsically safe connection of load cells. With ATEX approval (not UL/FM). Suitable for SIWAREX electronic weighing systems. Compatibility of load cells must be checked separately.	
• With short-circuit current < 199 mA DC	7MH4710-5BA
• With short-circuit current < 137 mA DC	7MH4710-5CA
Cable (optional)	

Selection and ordering data (continued)

	Article No.
Cable Li2Y 1 × 2 × 0.75 ST + 2 × (2 × 0.34 ST) – CY For connecting SIWAREX electronic to junction box (JB), extension box (EB), digital junction box (DB), Ex interface (IS) or between two extension boxes. For permanent installation. Occasional bending is possible. External diameter: approx. 10.8 mm (0.43 inch) Permissible ambient temperature -40 ... +80 °C (-40 ... +176 °F) Sold by the meter.	
• Sheath color: orange	7MH4702-8AG
• For hazardous atmospheres. Sheath color: blue	7MH4702-8AF
Remote display (optional) The Siebert S102 and S302 remote digital displays can be directly connected to the SIWAREX FTC via an RS 485 interface. (not suitable for belt scale mode) Siebert Industrielektronik GmbH PO Box 1180 D-66565 Eppelborn Tel.: +49 6806/980-0 Fax: +49 6806/980-999 Internet: http://www.siebert-group.com/en Detailed information is available from the manufacturer.	

Technical specifications

SIWAREX FTC	
Use in automation systems	
S7-300	Directly or via ET 200M
S7-1500	Through ET 200M
S7-400 (H)	Through ET 200M
PCS 7 (H)	Through ET 200M
Communication interfaces	
S7	Through backplane bus
RS 232	For SIWATOOL or printer connection
RS 485	For remote display or digital load cell
Module parameterization	
	Using SIMATIC S7
	Using SIWATOOL FTC software (RS 232)
Measuring properties	
Accuracy according to EN 45501	$3 \times 6\,000\,d \geq 0.5\,\mu\text{V/e}$
Internal resolution	+/- 8 million parts
Internal/external updating rate	400/100 Hz
Several parameterizable digital filters	Critically dampened, Bessel, Butterworth (0.05 ... 20 Hz), mean-value filter
Weighing functions	- Non automatic weighing instrument, force measurement - Belt scale - Loss-in-weight scale - Solids flowmeters
Load cells	Strain gauges in 4-wire or 6-wire system
3 characteristic value ranges	1, 2 or 4 mV/V
Load cell powering	
Supply voltage U_s (rated value)	10.3 V DC
Max. supply current	184 mA
Permissible load cell resistance	
• R_{Lmin}	$> 56\,\Omega$
	$> 87\,\Omega$ with Ex interface
• R_{Lmax}	$\leq 4\,010\,\Omega$
Max. distance of load cells	
When using the recommended cable:	
Standard	1 000 m (3 280 ft)
In hazardous area ¹⁾	
• For gases of group IIC	300 m (984 ft)
• For gases of group IIB	1 000 m (3 280 ft)
Connection to load cells in Ex zone 1	Optionally via SIWAREX IS Ex interface
Ex approvals zone 2 and safety	ATEX 95, FM, cUL _{US} Haz. Loc.
Auxiliary power supply	
Rated voltage	24 V DC
Max. power consumption	500 mA
Current consumption on backplane bus	Typ. 55 mA
Inputs/outputs	
Digital inputs	7, electrically isolated
Digital outputs	8, electrically isolated
Counter input	Up to 10 kHz
Analog output	
• Current range	0/4 ... 20 mA
• Updating rate	100 Hz
Degree of protection according to EN 60529; IEC 60529	IP20
Climatic requirements	
$T_{min}\text{ (IND)} \dots T_{max}\text{ (IND)}$ (operating temperature)	
• Horizontal installation	-10 ... 60 °C (14 ... 140 °F)
• Vertical installation	-10 ... 40 °C (14 ... 104 °F)

Technical specifications (continued)

SIWAREX FTC	
EMC requirements	EN 61326, EN 45501, NAMUR NE21, Part 1
Dimensions	80 × 125 × 130 mm (3.15 × 4.92 × 5.12 inch)
Weight	600 g (0.44 lb)

¹⁾ For further details, see Ex interface, type SIWAREX IS.

Weighing Electronics

SIWAREX for SIMATIC

Force and torque measurements / Introduction

Overview



AI 2xSG 4-I6-wire HS, ET 200SP analog input module for force and torque sensors

Automation with integral force measuring technology

In addition to accuracy when measuring force, incorporating force measuring technology in modern automation systems is also a significant feature.

Due to the direct connection of the force sensor to the SIMATIC-integrated evaluation electronics, there is no need for costly, difficult-to-integrate external interface converters. In addition, the measuring accuracy of SIMATIC-based solutions is increased enormously, because only one A/D conversion takes place before the measured value is available in the automation system. These properties facilitate the integration of a final product test and other tests into the SIMATIC environment.

Overview



ET 200SP analog input module for force and torque sensors

Technical specifications

SIMATIC ET 200SP, analog input module, AI 2xSG 4-, 6-wire high speed	
General information	
Product type designation	AI 2xSG 4-/6-wire HS
Product function	
• I&M data	Yes, I&M0 to I&M3
• Measuring range scalable	Yes
• Measured values scalable	No
• Measuring range adaptation	Yes; $\pm 0.5 \dots 320 \text{ mV/V}$
Engineering with	
• STEP 7 TIA Portal can be configured/integrated as of version	V14 SP1
• STEP 7 can be configured/integrated as of version	V5.6
• PROFIBUS as of GSD version/GSD revision	V03.01.105
• PROFINET as of GSD version/GSD revision	GSDML V2.33
Operating mode	
• Oversampling	Yes; 2 channels per module
• MSI	No
CiR – Configuration in RUN	
Parameter reassignment possible in RUN	Yes
Calibration possible in RUN	No
Supply voltage	
Rated value (DC)	24 V
Reverse polarity protection	Yes
Analog inputs	
No. of analog inputs	2; differential inputs
Cycle time (all channels), min.	100 μs
Analog input with oversampling	Yes
• Values per cycle, max.	14
• Resolution, min.	100 μs
Input ranges	
• Strain gauge (full bridge)	Yes
Cable length	
• Shielded, max.	500 m
Generation of analog input values	
Measuring principle	Sigma delta
Integration and conversion time/resolution per channel	
• Resolution with overrange (bits including sign), max.	28 bits; 16 bits with oversampling
• Configurable integration time	Yes
• Interference voltage suppression for interference frequency f1 in Hz	60 / 50 Hz / no
• Conversion time (per channel)	100 μs
Measured value smoothing	
• IIR low-pass filter frequency	0.01 ... 600 Hz
• IIR low-pass filter ordinal number	1 ... 4
• Notch filter frequency	0.1 ... 1 000 Hz
• Notch filter quality	5.00 ... 250.00
• Average value filter	0.1 ... 655.3 ms

Selection and ordering data

	Article No.
SIMATIC ET 200SP analog input module, AI 2xSG 4-, 6-wire high speed Suitable for BU type A0 color code CC00, channel diagnostics, 28/16-bit, +/- 0.05% for full-bridge strain gauges	7MH4134-6LB00-0DA0
Accessories	
SIMATIC ET 200SP, BaseUnit BU15-P16+A0+2B, BU type A0, push-in terminals, without AUX terminals, bridged to the left, W x H: 15 x 117 mm (1.57 x 7.09 in)	6ES7193-6BP00-0BA0
SIMATIC ET 200SP, BaseUnit BU15-P16+A0+2D, BU type A0, push-in terminals, without AUX terminals, new load group, W x H: 15 x 117 mm (1.57 x 7.09 in)	6ES7193-6BP00-0DA0
SIMATIC ET 200SP, BaseUnit BU15-P16+A10+2B, BU type A0, push-in terminals, with 10 AUX terminals, bridged to the left, W x H: 15 x 141 mm (1.57 x 7.09 in)	6ES7193-6BP20-0BA0
SIMATIC ET 200SP, BaseUnit BU15-P16+A10+2D, BU type A0, push-in terminals, with 10 AUX terminals, new load group, W x H: 15 x 141 mm (1.57 x 7.09 in)	6ES7193-6BP20-0DA0
SIMATIC ET 200SP, 5 shield connection clamps and 5 shield supports, for direct connection	6ES7193-6SC00-1AM0

Weighing Electronics

SIWAREX for SIMATIC

Force and torque measurements / AI 2xSG 4/6-wire HS

Technical specifications (continued)

SIMATIC ET 200SP, analog input module, AI 2xSG 4-, 6-wire high speed	
Encoders	
Connection of sensors	
• For strain gauge (full bridge) with 4-wire connection	Yes
• For strain gauge (full bridge) with 6-wire connection	Yes
• Resistance of full bridge min.	80 W
• Resistance of full bridge max.	5 000 W
Errors/accuracies	
Temperature coefficient zero point	$\leq \pm 0.25 \text{ mV/K}$
Temperature coefficient, span 4-wire connection (in relation to end value)	$\leq \pm 5 \text{ ppm/K}$
Temperature coefficient, span 6-wire connection (in relation to end value)	$\leq \pm 10 \text{ ppm/K}$
Basic error limit (operational limit at 25 °C)	
• Voltage, related to input range, (+/-)	0.05%; see manual for details
Isochronous mode	
Isochronous mode (application synchronized up to terminal)	Yes
Filter and processing (TWE), min.	87 μs
Bus cycle time (TDP), min.	125 μs
Interrupts/diagnostics/status information	
Diagnostic function	Yes
Interrupts	
• Diagnostic interrupt	Yes
• Limit alarms	Yes, two high and two low limits
Diagnostic messages	
• Monitoring of supply voltage	Yes
• Wire break	Yes
• Short circuit	Yes
• Group error	Yes
• Overflow/underflow	Yes
Diagnostics LED	
• Monitoring of supply voltage (PWR LED)	Yes; green PWR LED
• Channel status display	Yes; green LED
• For channel diagnostics	Yes; red LED
• For module diagnostics	Yes; green/red DIAG LED
Galvanic isolation	
Galvanic isolation of channels	
• Between the channels and backplane bus	Yes
Insulation	
Insulation tested with	707 V DC (type test)
Standards, approvals, certificates	
Suitable for safety functions	No
Ambient conditions	
Ambient temperature in operation	
• Horizontal mounting, min.	-25 °C
• Horizontal mounting, max.	60 °C
• Vertical mounting, min.	-25 °C
• Vertical mounting, max.	50 °C

Technical specifications (continued)

SIMATIC ET 200SP, analog input module, AI 2xSG 4-, 6-wire high speed	
Operating height in relation to sea level	
• With reference to ambient temperature, air pressure and altitude	$T_{\min} \dots T_{\max}$ at 1 140 hPa ... 795 hPa (-1 000 m ... +2 000 m) $T_{\min} \dots (T_{\max} - 1 \text{ K/100 m})$ at 795 hPa ... 701 hPa (+2 000 m ... +3 000 m)
Dimensions	
Width	15 mm
Height	73 mm
Depth	58 mm
Weight	
Weight, approx.	45 g

Overview



SIWAREX IS, Ex interface

Additional parts are required aside from the weighing modules in order to construct scales. Special interface modules are used for scales in hazardous areas.

The recommended cable and connection lengths are listed together with the weighing modules.

Weighing Electronics

SIWAREX for SIMATIC

Ex-Interfaces / SIWAREX IS Ex interface

Overview



SIWAREX IS New Generation

The Ex interface SIWAREX IS can be used for SIWAREX weighing modules. It comprises six safety barriers and has been granted the approvals stated in the technical data. The Ex interface must be installed outside the potentially explosive area. It is installed inside the control cabinet, preferably under the electronic weighing system, and fixed using a 35 mm mounting rail.

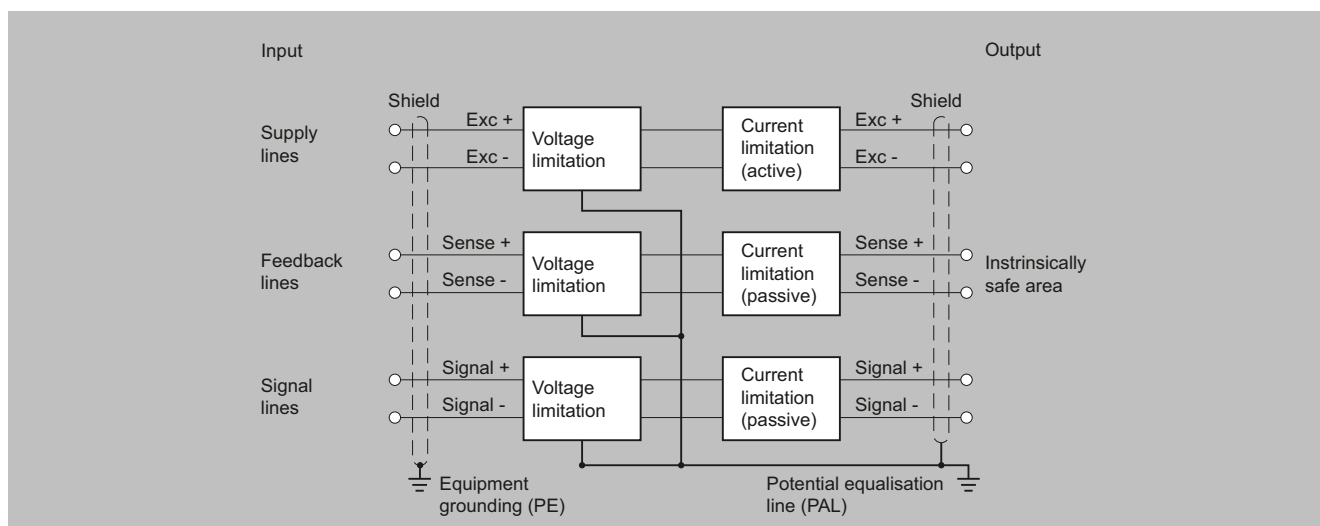
The SIWAREX IS only interferes with the load cell signal to a very small extent and is therefore approved for scales requiring official calibration.

The connection is made at the front using two clamp-type plugs. A separate screw terminal is available for connection of the equipotential bonding conductor (EBC).

Function

Operating principle

The safety barriers limit current and voltage in the supply, sensor and measured signal cables of load cells that are installed in hazardous areas.



Function diagram

Selection and ordering data

	Article No.
Ex interface SIWAREX IS For intrinsically-safe connection of load cells. Suitable for SIWAREX electronic weighing systems. The compatibility of the load cells must be checked.	
With short-circuit current < 199 mA DC	7MH4710-5BA
With short-circuit current < 137 mA DC	7MH4710-5CA
Cable (optional)	
Cable Li2Y 1 × 2 × 0.75 ST + 2 × (2 × 0.34 ST) – CY For connecting SIWAREX electronic to junction box (JB), extension box (EB), digital junction box (DB), Ex interface (IS) or between two extension boxes. For permanent installation. Occasional bending is possible. External diameter: approx. 10.8 mm (0.43 inch) Permissible ambient temperature -40 ... +80 °C (-40 ... +176 °F) Sold by the meter.	
Sheath color: orange	7MH4702-8AG
Sheath color (for hazardous atmospheres): blue	7MH4702-8AF

Technical specifications

Ex interface, type SIWAREX IS	Standard	Low-current version
Non-intrinsically-safe circuits		
Load cell powering		
Rated voltage U_{n1}	10 V DC	10 V DC
Permissible error voltage	250 V AC	250 V AC
Internal resistance of load cells depending on input voltage	$\geq 8.7 \Omega/V$	$\geq 18 \Omega/V$
Total	< 4 010 Ω	< 4 010 Ω
Sensor line		
Rated voltage U_{n2}	10 V DC	10 V DC
Permissible error voltage	250 V AC	250 V AC
Measuring signal line		
Rated voltage U_{n3}	10 ... 40 mV DC	10 ... 40 mV DC
Permissible error voltage	250 V AC	250 V AC
Intrinsically safe circuits		
Load cell powering		
No-load voltage U_{01}	≤ 13.1 V DC	≤ 13.1 V DC
Voltage against equipotential bonding cond.	≤ 6.6 V DC	≤ 6.6 V DC
Short-circuit current I_{K1}	≤ 120 mA	≤ 58 mA
Sensor line		
No-load voltage U_{02}	≤ 14.4 V DC	≤ 14.4 V DC
Voltage against equipotential bonding cond.	≤ 7.2 V DC	≤ 7.2 V DC
Short-circuit current I_{K2}	≤ 25 mA	≤ 25 mA
Measuring signal line		
No-load voltage U_{03}	≤ 12.8 V DC	≤ 12.8 V DC
Voltage against equipotential bonding cond.	≤ 6.4 V DC	≤ 6.4 V DC
Short-circuit current I_{K3}	≤ 54 mA	≤ 54 mA
Total connection load (when circuits are connected together)		
No-load voltage U_0	≤ 14.4 V DC	≤ 14.4 V DC
Short-circuit current I_K	≤ 199 mA	≤ 137 mA
Power P_0	≤ 1.835 W	≤ 1.025 W
For gas group II C		
Max. permissible external capacitance C_{a3}	500 nF	450 nF
Max. permissible external inductance L_a	0.15 mH	0.5 mH
For gas group II B		
Max. permissible external capacitance C_{a3}	2 000 nF	2 000 nF
Max. permissible external inductance L_a	1 mH	2 mH
General data		
Weight, approx.	500 g	500 g
Permissible ambient temperature		
During operation	-10 ... +60 °C (14 ... 140 °F) (for vertical mounting)	-10 ... +60 °C (14 ... 140 °F) (for vertical mounting)
During operation for legal-for-trade weighing machines	-10 ... +40 °C (14 ... 104 °F) (for vertical mounting)	-10 ... +40 °C (14 ... 104 °F) (for vertical mounting)
During transportation and storage	-40 ... +85 °C (-40 ... +185 °F)	-40 ... +85 °C (-40 ... +185 °F)
Permissible relative humidity	$\leq 95\%$	$\leq 95\%$
Degree of protection	IP20	IP20

Weighing Electronics

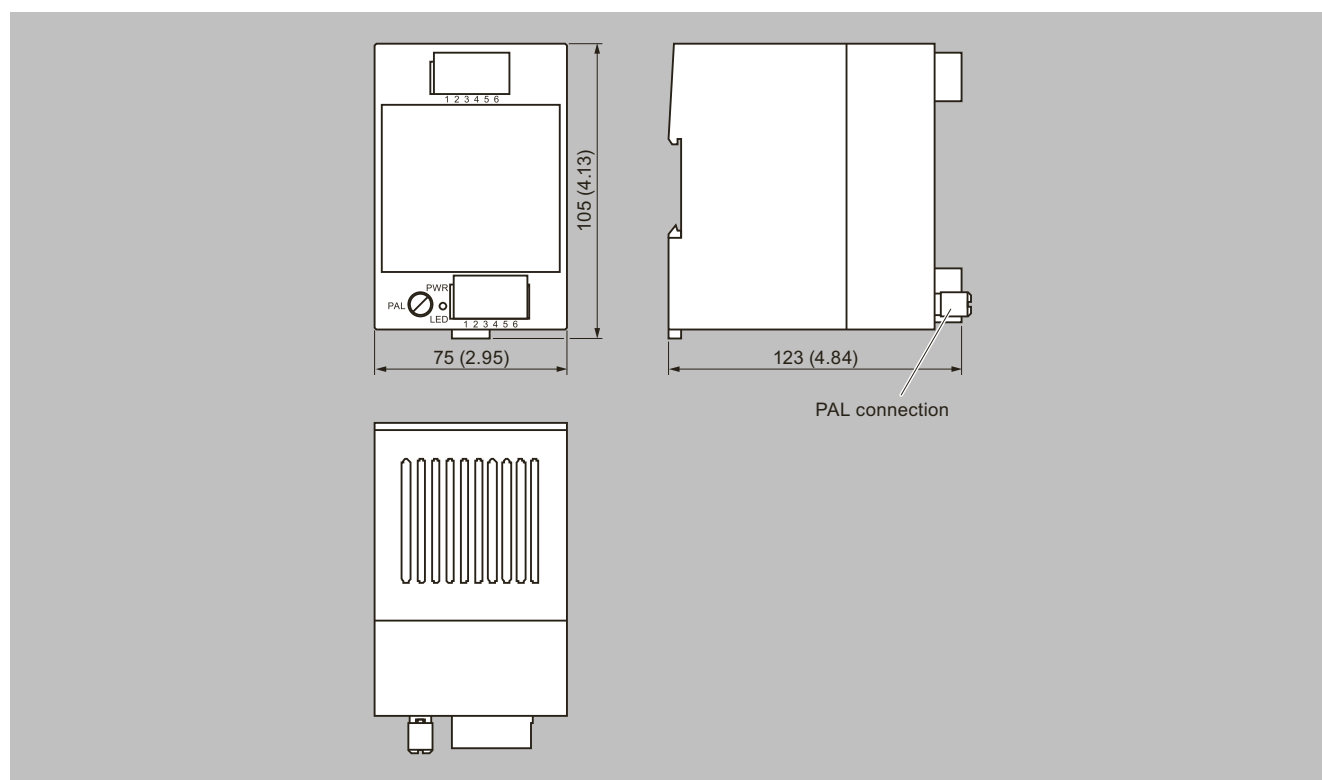
SIWAREX for SIMATIC

Ex-Interfaces / SIWAREX IS Ex interface

Technical specifications (continued)

Ex interface, type SIWAREX IS	Standard	Low-current version
Approvals		
EC type test certificates No.	TÜV 01 ATEX 1722 X	TÜV 01 ATEX 1722 X
Type of explosion protection	Intrinsic safety "i" II (2) G [Ex ibGb] IIC or II (2) D [Ex ib Db] IIIC	Intrinsic safety "i" II (2) G [Ex ibGb] IIC or II (2) D [Ex ib Db] IIIC
IEC certification	IECEX TUN 06.0002 X [Ex ib Gb] IIC or [Ex ib Db] IIIC	IECEX TUN 06.0002 X [Ex ib Gb] IIC or [Ex ib Db] IIIC
Calibration approval (German Testing Laboratory test certificate) according to	EN 45501, OIML R76-1, 90/384/EEC	EN 45501, OIML R76-1, 90/384/EEC

Dimensional drawings



SIWAREX IS Ex interface, dimensions in mm (inch)

Overview



Stand-alone platform and hopper scales

Weighing silos, vessels or platforms is a standard task in industry. The comprehensive SIWAREX electronics properties and functions can fulfil all requirements.

Platform scales

In the various branches of industry the use of platform scales is bound to very different requirements, in particular with regard to the load classes.

While platform scales can also be used for small loads, road vehicle and track scales are especially suitable for heavy loads.

Hopper scales

In almost every industry, liquids, powders, bulk goods or gases are produced and stored in vessels. To ensure their availability, the exact fill levels of these vessels must be known.

Weighing Electronics

Stand-alone

Platform and hopper scales / SIWAREX WP231 weighing electronics

Overview



SIWAREX WP231 is a versatile, legal for trade weighing module for all simple weighing and force measuring tasks. The compact module is easy to install in the SIMATIC S7-1200 automation system. It can also be operated without a SIMATIC CPU.

Benefits

SIWAREX WP231 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
- Operation without SIMATIC CPU possible
- Direct connection of an operator panel via Ethernet
- Direct connection of a remote display via RS 485 interface
- Modbus TCP/IP interface
- Modbus RTU interface
- Four digital inputs and outputs, one analog output
- Measurement of weight or force with a high resolution of up to ± 4 million parts and an accuracy of 0.05%
- Simple adjustment of scale using the SIWATOOL V7 program via the Ethernet interface
- Recovery point for simple restoration of all parameters
- Automatic calibration is possible without the need for calibration weights
- Supports replacement of module without recalibration of scales
- Use in hazardous area zone 2
- Connection of digital force compensation load cells from WIPOTEC and Mettler-Toledo (type WM and PBK)

Application

SIWAREX WP231 is the optimum solution wherever load cells are used for measuring tasks. The following are typical SIWAREX WP231 applications:

- Non-automatic weighing instruments, also legal for trade
- Fill level monitoring of silos and bunkers
- Measuring of crane and cable loads
- Load measuring for industrial lifts and rolling mills
- Scales in zone 2 hazardous areas
- Force measuring, hopper scales, platform scales and crane scales

Design

SIWAREX WP231 is a compact technology module in the SIMATIC S7-1200 and can be connected directly via the system bus with S7-1200 components. The rail mounting of the 70 mm (2.76 inch) wide weighing module means that it is extremely easy to mount/wire.

The power supply, load cells, the RS 485, digital input/outputs and the analog output are connected via the screw connector of the weighing module. An RJ45 plug is used for the Ethernet connection.

Function

The primary task of SIWAREX WP231 is the measurement and conversion of sensor voltage into a weight value. Up to three interpolation points are used for the weight calculation. The signal can also be digitally filtered if required.

Weighing functions

There are commands available for zeroing and taring. Up to three different tare default values can be activated for this. SIWAREX WP231 is factory-calibrated. This means the scale can be automatically adjusted without adjustment weights, and modules can be replaced without the need to readjust the scale.

Monitoring and control of the scale signals and states

In addition to weight determination, the SIWAREX WP231 monitors two freely programmable limits (optionally min/max) as well as the empty range. It signals violations of the limits. Consistent and uniform communication between all system components enables fast, reliable and cost-effective integration and diagnostics in process plants.

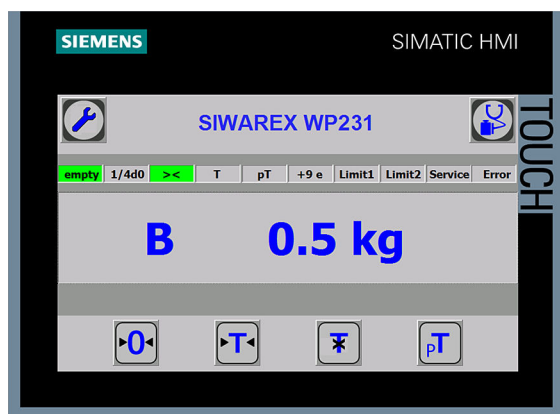
Integration in the plant environment

SIWAREX WP231 is directly integrated into the SIMATIC S7-1200 via the SIMATIC bus. All scale parameters can be read and edited by the CPU. Therefore a complete commissioning of the scales by the CPU or by a connected HMI device is possible. A wide variety of connection options are provided via the RS 485 and Ethernet interface. Via Modbus TCP/IP or Modbus RTU, control panels can be connected and it is also possible to communicate with various automation systems. A remote display can also be connected to the RS 485. A PC for configuring the SIWAREX WP231 can be connected to the Ethernet interface.

Weight value, status, tare, commands and messages are transmitted via the SIMATIC I/O area. The parameters of the data records can be set via SIWATOOL or with an operator panel connected directly to the weighing electronics.

SIWAREX WP231 can be integrated into the plant software with the aid of a ready-made function block. In contrast to serially linked weighing electronics, SIWAREX WP231 does not need costly additional modules to link it to SIMATIC.

Used in conjunction with SIWAREX WP231, it is possible to configure freely programmable, modular weighing systems in SIMATIC, which can be adapted to company-specific requirements as needed.



In addition to the configuration package, a fully-featured SIWAREX WP231 "Ready-for-use" software is also available free-of-charge. It shows beginners how to integrate the module in a TIA Portal program and offers a basis for application programming. This allows you to connect the scale application very easily to an operator panel either connected to the SIMATIC CPU or connected directly to the SIWAREX WP231.

Function (continued)

A "Ready-for-use" example program is available in the TIA Portal for applications requiring official calibration. This is designed so that it can be used directly with the legal trade SecureDisplay software. Required is a Windows CE-based operating panel (for example, SIMATIC Comfort Touch series).

SIMATIC Basic and Key Panels cannot be used for applications requiring official calibration.

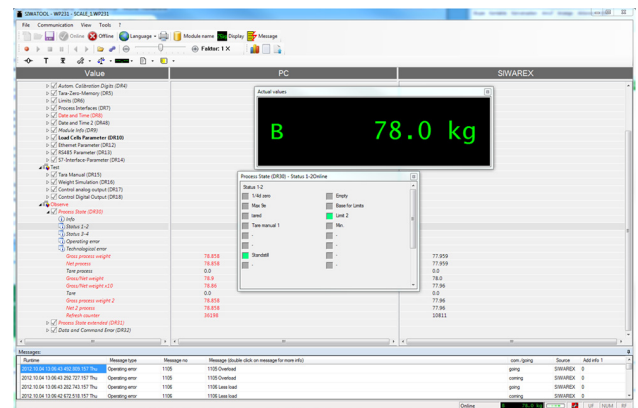
Software

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 the SIWAREX WP231 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



SIWATOOL V7 calibration software, layout of the individual program windows

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 WP231 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 WP231 on site. This means that firmware upgrades can be carried out on site as required anywhere in the world.

Weighing Electronics

Stand-alone

Platform and hopper scales / SIWAREX WP231 weighing electronics

Selection and ordering data

	Article No.
SIWAREX WP231 weighing electronics Single-channel, legal-for-trade, for NAWI non-automatic weighing instruments (e.g. platform scales or hopper scales) with analog load cells (1–4 mV/V), 1 x LC, 4 x DQ, 4 x DI, 1 x AQ, 1 RS 485, Ethernet port	7MH4960-2AA01
SIWAREX S7-1200 Equipment Manual Available in a range of languages Free download on the Internet at: http://www.siemens.com/weighing/documentation	
SIWAREX WP231 "Ready-for-use" Complete software package for non-automatic weighing instrument (for S7-1200 and a directly connected operator panel) Free download on the Internet at: http://www.siemens.com/weighing/documentation	
SIWAREX WP231 "Ready-for-use - legal-for-trade" Software package for non-automatic weighing instruments for S7-1200 requiring official calibration Free download on the Internet at: http://www.siemens.com/weighing/documentation	
Software SecureDisplay Software for a legal trade display on Windows CE-based Panel. SIMATIC Basic and Key Panels are excluded Free download on the Internet at: http://www.siemens.com/weighing/documentation	
SIWATOOL V4 & V7 Service and commissioning software for SIWAREX weighing modules	7MH4900-1AK01
Calibration set for SIWAREX WP2xx Valid for SIWAREX WP231 and SIWAREX WP251. For verification of up to 3 scales, comprising: • 3 x inscription foils for ID label • 1 x protective film • 3 x calibration protection plates • Guidelines for verification, certificates and approvals, editable label, SIWAREX WP	7MH4960-0AY10
Ethernet cable patch cord 2 m (7 ft) For connecting SIWAREX WP231 to a PC (SIWATOOL), SIMATIC CPU, panel, etc.	6XV1850-2GH20
Accessories	
SIWAREX EB extension box For extending sensor cables	7MH4710-2AA
SIWAREX JB junction box, aluminum housing For connecting up to 4 load cells in parallel, and for connecting multiple junction boxes	7MH5001-0AA20

Selection and ordering data (continued)

	Article No.
SIWAREX JB junction box, stainless steel housing For connecting up to 4 load cells in parallel	7MH5001-0AA00
SIWAREX JB junction box, stainless steel housing (ATEX) For parallel connection of up to 4 load cells (for zone allocation, see manual or type-examination certificate)	7MH5001-0AA01
SIWAREX DB digital terminal box For enhanced diagnostic and monitoring options in conjunction with SIWAREX WP electronics	7MH5001-0AD20
SIWAREX IS Ex interface For intrinsically safe connection of load cells. With ATEX approval (not UL/FM). Suitable for SIWAREX electronic weighing systems. Compatibility of load cells must be checked separately. • Short-circuit current < 199 mA DC • Short-circuit current < 137 mA DC	7MH4710-5BA 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 to junction box (JB), extension box (EB), digital junction box (DB), Ex interface (IS) or between two extension boxes. For permanent installation. Occasional bending is possible. External diameter: approx. 10.8 mm (0.43 inch) Permissible ambient temperature -40 ... +80 °C (-40 ... +176 °F) Sold by the meter. • Sheath color: orange • Sheath color (for hazardous atmospheres): blue	7MH4702-8AG 7MH4702-8AF
Ground terminal for connecting the load cell cable shield to the grounded DIN rail	6ES5728-8MA11
Remote display (optional) The digital remote displays can be connected directly to the SIWAREX WP231 via the RS 485 interface. Suitable remote display: S102 Siebert Industrie Elektronik GmbH PO Box 1180 D-66565 Eppelborn Tel.: +49 6806/980-0 Fax: +49 6806/980-999 http://www.siebert-group.com/en Detailed information is available from the manufacturer.	

Technical specifications

SIWAREX WP231	
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)
Communication interfaces	• SIMATIC S7-1200 backplane bus • RS 485 (Modbus RTU, Siebert remote display) • Ethernet (SIWATOOL V7, Modbus TCP/IP) • Analog output 0/4 ... 20 mA • 4 × digital outputs 24 V DC, floating, short-circuit proof • 4 × digital inputs 24 V DC, floating
Commissioning options	• Using SIWATOOL V7 • Using function block in SIMATIC S7-1200 CPU / Touch Panel • Using Modbus TCP/IP • Using Modbus RTU
Measuring accuracy EC type approval as non-automatic weighing instrument, trade class III Error limit according to DIN 1319-1 of full-scale value at 20 °C ± 10 K (68 °F ± 10 K) Internal resolution Measuring frequency	3000 d ≥ 0.5 µV/e 0.05% Up to ± 4 million parts 100 / 120 Hz
Digital filter	Variable adjustable low-pass and average filter
Typical applications	• Non-automatic weighing instruments • Force measurements • Fill-level monitoring • Belt tension monitors
Weighing functions Weight values Limit values Zeroing Tare Tare specification	• Gross • Net • Tare • 2 × min/max • Empty Per command Per command Per command
Load cells	Full-bridge strain gauges in 4-wire or 6-wire system
Load cell powering Supply voltage (regulated via feedback) Permissible load resistance • R_{Lmin} • R_{Lmax} With SIWAREX IS Ex interface • R_{Lmin} • R_{Lmax}	4.85 V DC > 40 Ω < 4 100 Ω > 50 Ω < 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 (compatibility of the load cells must be checked)

Technical specifications (continued)

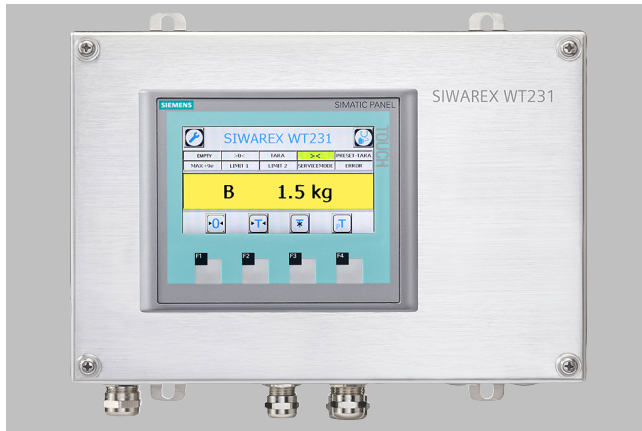
SIWAREX WP231	
Approvals/certificates	• ATEX Zone 2 • UL • EAC • KCC • RCM • OIML R76 • Type approval 2009/23/EC (NAWI)
Calibration approval	EC type approval OIML R76
Auxiliary power supply Rated voltage Max. power consumption Max. power consumption SIMATIC Bus	24 V DC 200 mA 3 mA
IP degree of protection to EN 60529; IEC 60529	IP20
Climatic requirements $T_{min(IND)} ... T_{max(IND)}$ (operating temperature) • Vertical installation • Horizontal installation	-10 ... +40 °C (14 ... 104 °F) -10 ... +55 °C (14 ... 131 °F)
EMC requirements	According to EN 45501
Dimensions	70 × 75 × 100 mm (2.76 × 2.95 × 3.94 inch)

Weighing Electronics

Stand-alone

Platform and hopper scales / SIWAREX WT231 weighing terminal

Overview



SIWAREX WT231 weighing terminal

The SIWAREX WT231 is a weighing terminal for industrial use. Siemens standard components are installed in a stainless steel enclosure with numerous connection options. This ensures the tried and tested SIWAREX quality for stand-alone solutions and is also ideal for hopper scales and platform scales.

Benefits

SIWAREX WT231 offers the following key advantages:

- Complete solution – no configuration in SIMATIC required
- Fast and easy commissioning due to intuitive operating concept
- Stainless steel enclosure permits applications in many diverse environments
- Integrated terminals for up to 4 load cells (1 ... 4 mV/V)
- Flexible connection to different systems through diverse choice of interfaces:
 - Four digital inputs (24 V DC)
 - Four digital outputs (24 V DC)
 - One analog output (0/4 ... 20 mA)
 - RS 485 interface and Modbus RTU
- High resolution of load cell signal of up to ± 4 million parts
- Comprehensive diagnostics functions
- All diagnostic and error messages, as well as all scale parameters, in plain text
- Recovery point for simple restoration of all parameters
- Automatic calibration is possible without the need for calibration weights
- Simulation mode
- Three freely programmable limit values

Application

SIWAREX WT231 is the optimum solution wherever strain gauge sensors, such as load cells, force sensors or torque measuring shafts, are used for measuring tasks. The following are typical SIWAREX WT231 applications:

- Non-automatic weighing instruments
- Fill-level monitoring of silos and bins
- Measuring of crane and cable loads
- Load measuring for industrial elevators and rolling mills
- Force measuring, hopper scales, platform scales and crane scales

Design

SIWAREX WT231 is a stand-alone weighing terminal based on the tried and tested Siemens SIWAREX WP231 products and the Siemens SIMATIC KTP 400 touch display. Along with a connection board and a wide-range power supply, these components are preinstalled in a compact, stainless steel enclosure.

The enclosure can be wall mounted and has 9 cable entries, of which 5 are equipped with cable glands at the factory. A variety of interfaces support the integration into the plant environment.

The SIWAREX WT231 is preconfigured with the SIWAREX "Ready-for-use" software. This means that no further commissioning is required in SIMATIC.

Function

The primary task of SIWAREX WT231 is the measurement and conversion of sensor voltage into a weight value. Up to three interpolation points are used for the weight calculation. The signal can also be digitally filtered if required.

Weighing functions

There are commands available for zeroing and taring. Up to three different tare default values can be activated. The SIWAREX WT231 is calibrated at the factory. This means the scale can be automatically adjusted without adjustment weights, and modules can be replaced without the need to readjust the scale.

Monitoring and control of the scale signals and states

In addition to weight determination, the SIWAREX WT231 monitors two freely programmable limits (optionally min/max) as well as the empty range. A violation of the limit values is signaled.

1.3.1 Limits

	Limit 1		Limit 2		Empty range	
Limit "ON"	99.00	%	50.00	%	1.00	%
Delay "ON"	0.000	s	0.000	s	1.000	s
Limit "OFF"	98.00	%	49.00	%	% of 100.0 kg	
Delay "OFF"	0.000	s	0.000	s		
Reference	Gross weight (% of max. weigh)					

SIWAREX WT231 operating view "Limit values"

Software

The touch panel is preconfigured with the SIWAREX "Ready-for-use" software. This gives the user interface a clear structure and makes it intuitive to operate: English, German, French and Chinese versions are available. The structured menu-based operation facilitates the operation of the scale and supports the user through guided commissioning.

A variety of diagnostics options is also offered: Using the trace function, weighing histories can be recorded and exported. A further option also makes it possible to simulate the behavior of the scale.

The service tool "SIWATOOL V7", which is included in the optional configuration package, is required for reading out this trace data. In addition, using SIWATOOL a scale backup can be created and reimported whenever required. This means that in the event of a fault, the WT231 can be replaced within seconds, without the need for recalibration.

Selection and ordering data

	Article No.
SIWAREX WT231 Weighing terminal for industrial scales	7MH4965-2AA01
SIWAREX WT231 Equipment Manual In various languages. Free download on the Internet at: http://www.siemens.com/weighing/documentation	
Accessories	
SIWATOOL V4 & V7 Service and commissioning software for SIWAREX weighing modules	7MH4900-1AK01
Ethernet cable patch cord 2 m (7 ft) For connecting SIWAREX WT231 to a PC (SIWATOOL), SIMATIC CPU, panel, etc.	6XV1850-2GH20
Protective film 4" widescreen For KTP400 Basic 1 st Generation, KTP400 Basic 2 nd Generation and KTP400 Comfort	6AV2124-6DJ00-0AX0
Spare parts	
Connection board SIWAREX WT2x1 For connecting load cells and speed sensor in SIWAREX WT2x1 as spare part	A5E46650277
Cable (optional)	
Cable Li2Y 1 × 2 × 0.75 ST + 2 × (2 × 0.34 ST) – CY For connecting SIWAREX electronic to junction box (JB), extension box (EB), digital junction box (DB), Ex interface (IS) or between two extension boxes. For permanent installation. Occasional bending is possible. External diameter: approx. 10.8 mm (0.43 inch) Permissible ambient temperature -40 ... +80 °C (-40 ... +176 °F) Sold by the meter.	
• Sheath color: orange	7MH4702-8AG
• Sheath color (for hazardous atmospheres): blue	7MH4702-8AF

Integration

Integration in the plant environment

Using the onboard RS 485 interface and the Modbus RTU protocol, the SIWAREX WT231 can be connected to a wide range of different automation systems or to a PC.

Four digital inputs, four digital outputs and one analog output are also available. Direct, straightforward further processing of alarms or status messages is thus made possible.

Weighing Electronics

Stand-alone

Platform and hopper scales / SIWAREX WT231 weighing terminal

Technical specifications

SIWAREX WT231	
Enclosure	Stainless steel enclosure (1.4301) with the interfaces: • 1 × wall bushing for power supply • 4 × wall bushing for load cell connection with EMC screw connection • 4 × wall bushing with blanking plugs • Ground connection bolt
Connection board	Internal connection board • Connection of up to 4 load cells • Device version of analog output • 24 V direct voltage design
Integration in automation systems	
Any automation systems	Via RS 485 (Modbus RTU)
Communication interfaces	• RS 485 (Modbus RTU) • 4 digital outputs (24 V DC) • 4 digital inputs (24 V DC) • 1 analog output (0/4 ... 20 mA)
Commissioning options for the scale	Directly via the color touch panel and the preinstalled "Ready-for-use" operating software
Calibration approval	No
Internal resolution	Up to ± 4 million parts
Number of measurements/second (internal)	100 Hz
Filter	• Low-pass filter 0.1 ... 50 Hz • Average value filter
Weighing functions	
Weight values	• Gross • Net • Tare
Limit values	• Min/max • Empty
Zero-setting function	Per command
Tare function	Per command
Tare specification	Per command
Load cells	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 measuring signal (at greatest set characteristic value)	-21.3 ... +21.3 mV
Max. distance of load cells	500 m (229.66 ft)
Auxiliary power supply	
Rated voltage	100 ... 240 V AC
Line frequency	50 ... 60 Hz
Max. power consumption	0.12 A
IP degree of protection to EN 60529; IEC 60529	IP65

Technical specifications (continued)

SIWAREX WT231	
Climatic requirements	
$T_{min (IND)}$... $T_{max (IND)}$ (operating temperature)	
• Vertical installation	0 ... +40 °C (32 ... 104 °F)
EMC requirements according to	EN 45501
Dimensions	264 × 185 × 97 mm (10.39 × 7.28 × 3.82 inch)
Weight	4 kg (8.82 lb)

Overview



Stand-alone belt scales

The gravel, cement, coal, recycling and mining industries require exact weight measurement of the material to be conveyed using belt scales. The comprehensive SIWAREX electronics properties and functions can fulfil all requirements.

The Milltronics belt scales from Siemens combine simple installation and low maintenance costs (no moving parts) with higher reproducibility. This results in high productivity. With minimum hysteresis and maximum linearity, lateral forces have no influence on measuring accuracy. All load cells are equipped with overload protection.

The installation of belt scales in danger zones is also available as option. Various versions are available for high accuracy, small loads and heavy loads.

Weighing Electronics

Stand-alone

Belt scales / SIWAREX WP241 weighing electronics

Overview



SIWAREX WP241 is a flexible weighing module for belt scales. The compact module is easy to install in the SIMATIC S7-1200 automation system. It can also be operated as a stand-alone module, i.e. without a SIMATIC CPU.

Benefits

SIWAREX WP241 offers the following key advantages:

- Uniform design technology and consistent communication in SIMATIC S7-1200
- Uniform configuration with TIA Portal
- Operation without SIMATIC CPU possible
- Direct connection of an operator panel via Ethernet
- Four digital inputs and outputs, one analog output
- Measurement of weight with a high resolution of ± 4 million parts
- Simple adjustment of belt scales using the SIWATOOL V7 program via the Ethernet interface - even without knowledge of SIMATIC
- Replacement of module possible without renewed calibration of the scale
- Use in hazardous area zone 2
- Different calibration methods: With test weights, test chain, automatically or via material batch.
- Specification of belt inclination angle
- 6 totalization memories
- Simulation of speed and belt load for test purposes
- Comprehensive diagnostics functions

Application

SIWAREX WP241 is the optimal solution wherever belt scales are used that demand high accuracy, high user-friendliness, and flexible system integration. The typical applications of the SIWAREX WP241 are determining the current material flow rate, belt load, and belt speed. Furthermore, 6 totalizers are available for evaluating the amount of material conveyed.

Design

SIWAREX WP241 is a compact technology module in the SIMATIC S7-1200, and it allows direct connection to S7-1200 components via a sliding connector. The rail mounting of the 70 mm (2.76 inch) wide weighing module means that it is extremely easy to mount/wire.

The power supply, load cells, RS 485 interface, digital input/outputs and the analog output are connected via the screw plug of the weighing module. An RJ45 plug is used for the Ethernet connection.

Function

The primary task of the SIWAREX WP241 is to measure the speed of the belt, to measure and convert the sensor voltage to a weight value, and to precisely calculate the amount of material conveyed or material flow rate.

The volume of material conveyed can be recorded in 6 totalization memories: The accumulated totalization memory determines the conveyed material over the entire operating time of the scale (can only be reset by loading the factory settings). The overall total and the four remaining totalization memories are available for use as required. For example, for recording the daily or weekly totals.

Four different options are available for rapid commissioning:

- **Automatic calibration**
The calibration is calculated automatically using the load cell parameters entered. Only the zero point has to be calculated at the actual plant.
- **Calibration with calibration weights or test weights**
Test weights are secured to the weighing equipment and the conveyor belt is started. The calibration values are determined while the belt is running. The zero point must also be calculated.
- **Calibration with test chain**
Instead of test weights, a chain of a known weight can be placed on the measuring points of the belt. The calibration values are calculated as for calibration with test weights.
- **Calibration via material batch**
This method can be used if a volume of material is available, but neither test weights nor a chain are available. The material can either be preweighed or weighed afterwards. It is conveyed over the belt scale. Then the weighing module calculates the calibration characteristic automatically.

If "Automatic set to zero" is active, the electronic weighing system automatically executes a "set to zero" procedure when the belt reaches the "set to zero" area.

Extensive diagnostics functions are available. Diagnostic messages are output to the different interfaces. In simulation mode, both the speed and the belt load can be specified by the user. This makes it possible to test many functions in advance without operating belt scales. Both the digital inputs/outputs and the analog output can also be simulated for test purposes. The "Trace" function is extremely helpful for optimizing the plant or when troubleshooting. It records the weighing history stored in the internal module memory (e.g. material flow rate, belt load, speed) and exports it to Excel in a graphical format.

Monitoring the scale signals and states

The SIWAREX WP241 monitors the belt load, the material flow rate, and the belt speed, and it signals if the limits are exceeded. The respective limits can be parameterized as required.

Consistent and uniform communication between all system components enables fast, reliable and cost-effective integration and diagnosis in industrial processes.

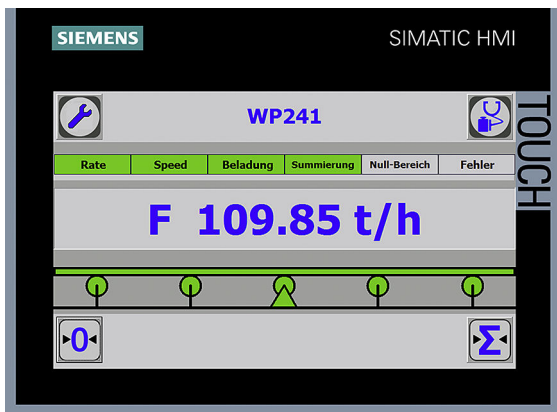
Function (continued)**Integration in the plant environment**

SIWAREX WP241 can be directly integrated into the SIMATIC S7-1200 via the SIMATIC bus. Standalone operation without SIMATIC is also possible.

A wide variety of connection options are provided via the RS 485 and Ethernet interface. Via Modbus TCP/IP or Modbus RTU, control panels can be connected and it is also possible to communicate with various automation systems. A PC for programming the SIWAREX WP241 via SIWATOOL can be connected to the Ethernet interface.

SIWAREX WP241 can be integrated into the system software using all standard PLC programming languages from the TIA Portal. In contrast to serially linked weighing electronics, SIWAREX WP241 does not need costly additional modules to link it to SIMATIC.

Used in conjunction with SIWAREX WP241, it is possible to configure freely programmable, modular weighing systems in SIMATIC, which can be adapted to company-specific requirements as needed.



SIWAREX WP241 "Ready-for-use"

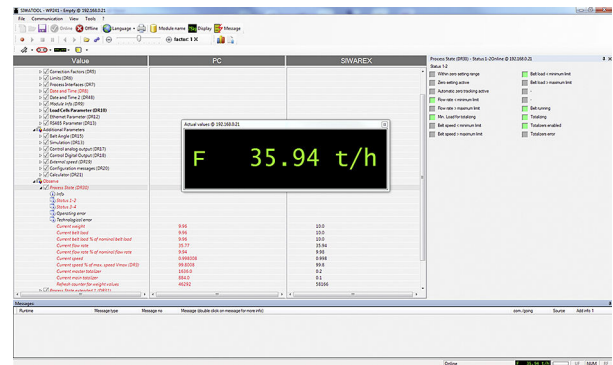
In addition to the configuration package, fully-featured SIWAREX WP241 "Ready-for-use" software is also available free-of-charge. It shows beginners how to integrate the module in a STEP 7 program and offers a basis for application programming. This allows you to connect the scale to an operator panel either connected to the SIMATIC CPU or connected directly to the SIWAREX WP241.

Software

There is also the option of using a Windows PC for commissioning and servicing. The program SIWATOOL enables the belt scales to be set without prior knowledge of the automation system, as required. During servicing, the technician can use a PC to quickly and simply analyze and test the procedures in the scale.

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

- Parameterization and calibration of the scale
- Testing/Simulation of scale properties
- Recording, analysis and export of scale traces ("Trace")
- Creation of backup files for rapidly replacing modules without calibration

Function (continued)

SIWAREX WP241 SIWATOOL

It is also extremely helpful to analyze the diagnostics buffer which can be saved together with the parameters following reading out from the module.

The SIWAREX WP241 weighing module includes a trace mode for optimization of weighing sequences. 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 WP241 on site. This means that firmware upgrades can be carried out on site as required anywhere in the world.

Weighing Electronics

Stand-alone

Belt scales / SIWAREX WP241 weighing electronics

Selection and ordering data

	Article No.
SIWAREX WP241 weighing electronics Single-channel, for belt scales with analog load cells / full-bridge strain gauges (1 - 4 mV/V), 1 × LC, 4 × DQ, 4 × DI, 1 × AQ, 1 × RS 485, Ethernet port	7MH4960-4AA01
SIWAREX S7-1200 Equipment Manual Available in a range of languages Free download on the Internet at: http://www.siemens.com/weighing/documentation	
SIWAREX WP241 "Ready-for-use" Complete software package for belt scale (for S7-1200 and a directly connected operator panel) Free download on the Internet at: http://www.siemens.com/weighing/documentation	
SIWATOOL V4 & V7 Service and commissioning software for SIWAREX weighing modules	7MH4900-1AK01
Ethernet cable patch cord 2 m (7 ft) For connecting SIWAREX WP241 to a PC (SIWATOOL), SIMATIC CPU, panel, etc.	6XV1850-2GH20
Accessories	
SIWAREX EB extension box For extending sensor cables	7MH4710-2AA
SIWAREX JB junction box, aluminum housing For connecting up to 4 load cells in parallel, and for connecting multiple junction boxes	7MH5001-0AA20
SIWAREX JB junction box, stainless steel housing For connecting up to 4 load cells in parallel	7MH5001-0AA00
SIWAREX JB junction box, stainless steel housing (ATEX) For parallel connection of up to 4 load cells (for zone allocation, see manual or type-examination certificate)	7MH5001-0AA01
SIWAREX IS Ex interface For intrinsically safe connection of load cells. With ATEX approval (not UL/FM). Suitable for SIWAREX electronic weighing systems. Compatibility of load cells must be checked separately. • Short-circuit current < 199 mA DC • Short-circuit current < 137 mA DC	7MH4710-5BA 7MH4710-5CA
Cable (optional)	

Selection and ordering data (continued)

	Article No.
Cable Li2Y 1 × 2 × 0.75 ST + 2 × (2 × 0.34 ST) – CY For connecting SIWAREX electronic to junction box (JB), extension box (EB), digital junction box (DB), Ex interface (IS) or between two extension boxes. For permanent installation. Occasional bending is possible. External diameter: approx. 10.8 mm (0.43 inch) Permissible ambient temperature -40 ... +80 °C (-40 ... +176 °F) Sold by the meter. • Sheath color: orange • Sheath color (for hazardous atmospheres): blue	7MH4702-8AG 7MH4702-8AF
Ground terminal for connecting the load cell cable shield to the grounded DIN rail	6ES5728-8MA11

Technical specifications

SIWAREX WP241	
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)
Communication interfaces	• SIMATIC S7-1200 backplane bus • RS 485 (Modbus RTU) • Ethernet (SIWATOOL V7, Modbus TCP/IP) • Analog output 0/4 - 20 mA • 4 × digital outputs, 24 V DC, floating, short-circuit proof • 4 × digital inputs 24 V DC, floating
Commissioning options	• Using SIWATOOL V7 • Using function block in SIMATIC S7-1200 CPU / Touch Panel • Using Modbus TCP/IP • Using Modbus RTU
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
Measuring frequency	100 / 120 Hz
Digital filter	Separate, variable adjustable low-pass and average filter for loading and speed
Filter for conveyor load	Low-pass filter (limit frequency 0.05 ... 50 Hz)
Filter for belt speed	Low-pass filter (limit frequency 0.05 ... 50 Hz)
Weighing functions Readout data	• Weight • Belt load • Material flow rate • Accumulated total • Main total • Free totals 1 ... 4 • Belt speed
Limits (min/max)	• Belt load • Material flow rate • Belt speed
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 measurement signal range	-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 (compatibility of the load cells must be checked)
Approvals/certificates	• ATEX Zone 2 • UL • EAC • KCC • RCM

Technical specifications (continued)

SIWAREX WP241	
Auxiliary power supply	
Rated voltage	24 V DC
Max. power consumption	200 mA
Max. power consumption SIMATIC Bus	3 mA
IP degree of protection to EN 60529; IEC 60529	IP20
Climatic requirements $T_{min}(IND) \dots T_{max}(IND)$ (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 × 75 × 100 mm (2.76 × 2.95 × 3.94 inch)

Weighing Electronics

Stand-alone

Belt scales / SIWAREX WT241 weighing terminal

Overview



The SIWAREX WT241 is a weighing terminal for belt scales. Siemens standard components are installed in a stainless steel enclosure with numerous connection options. This ensures the tried and tested SIWAREX quality as standalone solution and is ideal for belt scales.

Benefits

SIWAREX WT241 offers the following key advantages:

- Complete solution – no configuration in SIMATIC required
- Fast and easy commissioning due to intuitive operating concept
- Stainless steel enclosure permits applications in many diverse environments
- Integrated terminals for up to 4 load cells (1 ... 4 mV/V)
- Flexible connection to different systems through diverse interfaces
 - Four digital inputs (24 V DC)
 - Four digital outputs (24 V DC)
 - One analog output (0/4 ... 20 mA)
 - RS 485 interface and Modbus RTU
- High resolution of load cell signal of up to ± 4 million parts
- Comprehensive diagnostics functions
- All diagnostic and error messages, as well as all scale parameters, in plain text
- Recovery point for simple restoration of all parameters
- Multiple calibration methods: using test weights, test chain, automatically or via material batch
- Specification of belt inclination angle
- 6 separately resettable totalization memories
- Simulation of speed and belt load for test purposes
- Parameterizable pulse signal (24 V DC) for external totalizer
- Correction of material flow rate by means of correction factor

Application

SIWAREX WT241 is the optimal solution wherever belt scales are used that demand high accuracy, high user-friendliness, and comprehensive adjustment options.

The typical applications of the SIWAREX WT241 are determining the current material flow rate, belt load, and belt speed. Furthermore, 6 totalizers are available for evaluating the amount of material conveyed.

Design

SIWAREX WT241 is a stand-alone weighing terminal based on the tried and tested Siemens SIWAREX WP241 products and the Siemens SIMATIC KTP 400 touch display. Supplemented with a connection board and a wide-range power supply, these components are preinstalled in a compact stainless steel enclosure. The enclosure can be wall mounted and has nine cable entries, of which five are equipped with cable glands at the factory. A variety of interfaces support the integration into the plant environment.

The integrated connection board permits the direct connection of the belt scales and of the speed sensor.

The SIWAREX WT241 is preconfigured with the SIWAREX "Ready for Use" software. This means that no further commissioning is required in SIMATIC.

Function

The main tasks of the SIWAREX WT241 are:

- To measure the belt speed
- To measure and convert the sensor voltage into a weight value
- To calculate material quantities and flow rates.

The volume of material conveyed is recorded in 6 totalization memories.

Four different options are available for rapid commissioning:

- Automatic calibration

The calibration is calculated automatically using the load cell parameters entered. Only the zero point has to be calculated at the actual plant.

- Calibration with calibration weights or test weights

Test weights are secured to the weighing equipment and the conveyor belt is started. The calibration values are determined while the belt is running. The zero point must also be calculated.

- Calibration with test chain

Instead of test weights, a chain of a known weight can be placed on the measuring points of the belt. The calibration values are calculated as for calibration with test weights.

- Calibration via material batch

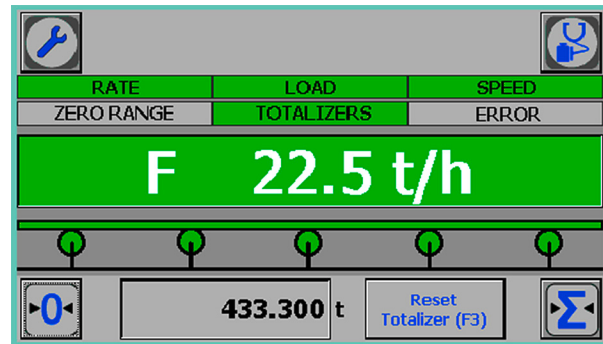
This method can be used if a volume of material is available, but neither test weights nor a chain are available. The material can either be preweighed or weighed afterwards. It is conveyed over the belt scale. Then the weighing module calculates the calibration characteristic automatically.

If "Automatic set to zero" is active, the electronic weighing system automatically executes a "set to zero" procedure when the belt reaches the "set to zero" area.

Extensive diagnostics functions are available. Diagnostic messages are output to the different interfaces. In simulation mode, both the speed and the belt load can be specified by the user. This makes it possible to test many functions in advance without operating belt scales. Both the digital inputs/outputs and the analog output can also be simulated for test purposes. The "Trace" function is extremely helpful for optimizing the plant or when troubleshooting. It records the weighing history stored in the internal module memory (e.g. material flow rate, belt load, speed) and exports it to Excel in a graphical format.

The service tool "SIWATOOL V7", which is included in the optional configuration package, is required for reading out this trace data. In addition, using SIWATOOL a scale backup can be created and reimported whenever required. This means that in the event of a fault, the WT241 can be replaced within seconds, without the need for recalibration.

Function (continued)



SIWAREX WT241 weighing terminal operating view

Monitoring the scale signals and states

Using the onboard RS 485 interface and the Modbus RTU protocol, the SIWAREX WT241 can be connected to a wide range of different automation systems or to a PC.

Furthermore, 4 digital inputs, 4 digital outputs, and an analog output are available. Direct, straightforward further processing of alarms or status messages is thus made possible.

Software

The touch panel is preconfigured with the SIWAREX "Ready-for-use" software. This gives the user interface a clear structure and makes it intuitive to operate: English, German, French and Chinese versions are available. The structured menu-based operation facilitates the operation of the scale and supports the user through guided commissioning.

Furthermore, a variety of diagnostics options are offered. Using the trace function, weighing histories can be recorded and exported, for example. It is also possible to simulate the behavior of the scale.

Weighing Electronics

Stand-alone

Belt scales / SIWAREX WT241 weighing terminal

Selection and ordering data

Selection and ordering data	Article No.
SIWAREX WT241 Weighing terminal for belt scales	7MH4965-4AA01
SIWAREX WT241 Equipment Manual In various languages. Free download on the Internet at: http://www.siemens.com/weighing/documentation	
Accessories	
SIWATOOL V4 & V7 Service and commissioning software for SIWAREX weighing modules	7MH4900-1AK01
Ethernet cable patch cord 2 m (7 ft) For connecting SIWAREX WT241 to a PC (SIWATOOL), SIMATIC CPU, panel, etc.	6XV1850-2GH20
Protective film 4" widescreen For KTP400 Basic 1 st Generation, KTP400 Basic 2 nd Generation and KTP400 Comfort	6AV2124-6DJ00-0AX0
Spare parts	
Connection board SIWAREX WT2x1 For connecting load cells and speed sensor in SIWAREX WT2x1 as spare part	A5E46650277
Cable (optional)	
Cable Li2Y 1 × 2 × 0.75 ST + 2 × (2 × 0.34 ST) – CY For connecting SIWAREX electronic to junction box (JB), extension box (EB), digital junction box (DB), Ex interface (IS) or between two extension boxes. For permanent installation. Occasional bending is possible. External diameter: approx. 10.8 mm (0.43 inch) Permissible ambient temperature -40 ... +80 °C (-40 ... +176 °F) Sold by the meter.	
• Sheath color: orange	7MH4702-8AG
• Sheath color (for hazardous atmospheres): blue	7MH4702-8AF

Technical specifications

SIWAREX WT241	
Enclosure	Stainless steel enclosure (1.4301) with the interfaces: 1 × wall bushing for power supply 4 × wall bushing for load cell connection with EMC screw connection 4 × wall bushing with blanking plugs - Ground connection bolt
Connection board	Internal connection board - Connection of up to 4 load cells - Device version of analog output - Connection of speed sensor 24 V direct voltage design
Integration in automation systems	
Any automation systems	Via RS 485 (Modbus RTU)
Communication interfaces	- RS 485 (Modbus RTU) 4 digital outputs (24 V DC) 3 digital inputs (24 V DC) 1 speed sensor input (24 V DC, up to 5 kHz) 1 analog output (0/4 ... 20 mA)
Commissioning options for the scale	Directly via the color touch panel and the preinstalled "Ready-for-use" operating software
Calibration approval	No
Internal resolution	Up to ± 4 million parts
Number of measurements/second (internal)	100 Hz
Updating time for material flow rate	100 ms
Filter	
Filter for material flow rate	Low-pass filter 0.1 ... 50 Hz
Filter for weight values	Low-pass filter 0.1 ... 50 Hz
Filter for belt speed	Low-pass filter 0.1 ... 50 Hz
Weighing functions	
Readout data	- Weight - Belt load - Material flow rate - Accumulated total - Main total - Free totals 1 ... 4 - Belt speed
Limits (min./max.)	- Belt load - Material flow rate - Belt speed
Zero-setting function	On command or automatic set to zero
Load cells	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 measuring signal (at greatest set characteristic value)	-21.3 ... +21.3 mV
Max. distance of load cells	500 m (229.66 ft)

Technical specifications (continued)

SIWAREX WT241	
Auxiliary power supply	
Rated voltage	100 ... 240 V AC
Line frequency	50 ... 60 Hz
Max. power consumption	0.12 A
IP degree of protection to EN 60529; IEC 60529	IP65
Climatic requirements	
$T_{\min}(\text{IND}) \dots T_{\max}(\text{IND})$ (operating temperature)	
• Vertical installation	0 ... +40 °C (32 ... 104 °F)
EMC requirements according to	EN 45501
Dimensions	264 × 185 × 97 mm (10.39 × 7.28 × 3.82 inch)
Weight	4 kg (8.82 lb)

Weighing Electronics

Stand-alone

Belt scales / Milltronics BW500 and BW500/L

Overview



Milltronics BW500 is a full feature integrator for use with both belt scales and weighfeeders. Milltronics BW500/L is an integrator for use in basic belt scale or weighbelt applications.

Benefits

- Automatic zero and electronic span calibration
- Alarms for rate, load, speed, or diagnostic error
- On-board Modbus and optional: PROFIBUS DP, Modbus TCP/IP, PROFINET, EtherNet/IP, and DeviceNet
- Comprehensive weighfeeder control functions
- PID control and on-line calibration with optional analog I/O card
- Differential speed detection with second speed sensor
- Moisture meter input with optional analog I/O card for calculation of dry weight
- Inclinator input with optional analog I/O card to compensate for conveyor slope
- Suitable for belt scale custody approval
- Measurement Canada, OIML, MID, PAC Russia, and NTEP approved

Application

Milltronics BW500 and BW500/L operate with a belt scale and a speed sensor. Belt load and speed signals are processed for accurate flow rate and totaled weight of bulk solids.

BW500 can take on lower level control functions traditionally handled by other devices, and it supports popular industrial communication buses. Its proven load cell balance function eliminates matching of load cells.

The PID function may be used for rate control on shearing weighfeeders - where belt loading is constant - but can also control prefeeding devices. Operating in tandem with two or more weighfeeders, the BW500 may be used for ratio blending and controlling additives. Batching, load out, and alarm functions are also provided by the BW500.

Integrator selection guide

	BW500 (advanced feature set)	BW500/L (basic feature set)
PID control	With optional I/O card	N/A
Differential speed detection	Standard	N/A
Online calibration	Standard	N/A
Trade approval (OIML, MID, Measurement Canada, GOST, NTEP)	Optional	N/A
SmartLinx communications (DeviceNet, PROFINET, Modbus, TCP/IP, EtherNet/IP, and PROFIBUS DP)	Optional	Optional
Modbus	Standard	Standard
Ratio blending and batching	Standard	N/A
Moisture and incline compensation	• With optional I/O card, or • Parameter set	Parameter set
Multi Span	Standard	N/A
RD500 connectivity	Standard	Standard
Relay output	5	2
Time/date stamped printing	Standard	N/A
mA output	3 ¹⁾	1
mA input	2 ¹⁾	0

¹⁾ mA input/output for BW500 is based on I/O card

Selection and ordering data

Milltronics BW500 and BW500/L Integrator Full-feature, powerful integrator designed for use with both belt scales and weighfeeders.						Article No. 7MH7152- ● ● ● ● ● - ● ● ●					
Click on the Article No. for the online configuration in the PIA Life Cycle Portal.											
Input voltage											
AC voltage						2					
DC voltage						3					
Auxiliary input/output board											
None						A					
Board with 2 analog inputs and 2 analog outputs ¹⁾						B					
Feature software											
BW500, 1 ... 6 load cell input (advanced feature set)						A					
BW500/L, 1 ... 2 load cell input ²⁾ (basic feature set)						B					
Auxiliary memory											
None								0			
Data communications ³⁾											
SmartLinX ready								0			
SmartLinX PROFIBUS DP module								2			
SmartLinX DeviceNet module								3			
SmartLinX PROFINET module								4			
SmartLinX EtherNet/IP module								5			
SmartLinX Modbus TCP/IP module								6			
Enclosures											
Standard enclosure, no entry holes										1	
Standard enclosure, 4 entries, for M20 glands										2	
Trade approval stickers											
No trade approval sticker										A	
Not legal for Canadian and EU trade sticker										B	
Legal for Canadian trade ⁴⁾ ⁵⁾ ⁶⁾										C	
Legal for U.S. trade (NTEP) ⁴⁾ ⁵⁾ ⁶⁾										D	
Legal for World trade (OIML), European trade (MID) ⁴⁾ ⁵⁾ ⁶⁾										E	
Legal for Russian Trade (PAC) ⁴⁾ ⁶⁾										F	
Approvals											
Ordinary Locations/General Purpose (Non-Ex), CE, UKCA, cCSA _{US} , FM, RCM, EAC, KC											
A											

Selection and Ordering data	Order code
Further designs	
Please add "-Z" to article no. and specify order code(s).	
Stainless steel tag (69 x 50 mm), Measuring-point number/identification (max 27 characters), specify in plain text.	Y15
Manufacturer's test certificate: According to EN 10204-2.2	C11
OIML/MID approval additional nameplate (submit application data with order)	Y77
NTEP approval additional nameplate (submit application data with order)	Y78
LVDT conditioner card mounted and connected for use with LVDT belt scales	G21
Stainless steel, sun/weather shield 357 x 305 x 203 mm (14 x 12 x 8 inch) (finished unit is field mounted with enclosure)	S50
Stainless steel enclosure, 304 (1.4301), [406 x 305 x 152 mm (16 x 12 x 6 inch), Nema/Type 4X, IP66; (finished unit is mounted inside enclosure)]	
• With window	A11
• Without window	A12
Painted mild steel, [406 x 305 x 152 mm (16 x 12 x 6 inch), Nema/Type 4, IP66; (finished unit is mounted inside enclosure)]	

Selection and Ordering data	Order code
• With window	A13
• Without window	A14
Painted mild steel, anti-vibration enclosure with viewing window [406 x 305 x 203 mm (16 x 12 x 8 inch), Nema/Type 4, IP66; (finished unit is mounted inside enclosure)]	A15
Painted mild steel, heated enclosure with viewing window for use down to -50 °C (-58 °F); finished unit is mounted inside enclosure 483 x 584 x 203 mm (19 x 23 x 8 inch)	A35
Instruction manuals	Article No.
All literature is available to download for free, in a range of languages, at http://www.siemens.com/weighing/documentation	
Optional equipment	
Auxiliary I/O card spare	7MH7723-1BJ
LVDT Conditioners in Nema 4 enclosure (to interface LVDT Flowmeter/Belt scale without internal pre-amplifier)	7MH7723-1AJ
Supply voltage regulators, 120 V AC, 60 Hz	7MH7726-1AN
Cables to connect BW500, BW500/L, and SF500 keypad to -motherboard	7MH7723-1CB
SITRANS RD100 Remote displays, see SITRANS RD100 catalog page: https://support.industry.siemens.com/cs/document/109765059	7MLS741-.....

Weighing Electronics

Stand-alone

Belt scales / Milltronics BW500 and BW500/L

Selection and ordering data (continued)

Selection and Ordering data	Order code
SITRANS RD200 Remote displays, see SITRANS RD200 catalog page: https://support.industry.siemens.com/cs/document/109765328	7ML5742-.....-....
SITRANS RD300 Remote displays, see SITRANS RD300 catalog page: https://support.industry.siemens.com/cs/document/109765138	7ML5744-.....-..
Large LED display, 150 mm (6 inch) high characters	A5E31871009
Spare parts	
Display card	7MH7723-1AF
BW500 motherboard, AC	A5E34320772
BW500/L motherboard, AC	A5E34320773
BW500 motherboard, DC	A5E34320774
BW500/L motherboard, DC	A5E34320775
Fuse, 2 A, 250 V, BW500, BW500/L, and SF500, spare	7MH7723-1DG
Lid with overlay and keypad for BW500	7MH7723-1AK
Lid with overlay and keypad for trade approved BW500	7MH7723-1HN

Selection and Ordering data	Order code
Lid with overlay and keypad for BW500/L	A5E34699647
Keypads spare for BW500, BW500/L, and SF500	7MH7723-1CD
LVDT card spare, internal to BW500	A5E34699664
Modbus TCP/IP, EtherNet/IP module	7ML1830-1PN
PROFINET IO module	7ML1830-1PM
PROFIBUS DP module	7ML1830-1HR
DeviceNet module	7ML1830-1HT

- ¹⁾ Required for PID control and online calibration, available with feature software option A only.
- ²⁾ Available with auxiliary I/O option A, and trade approval stickers A, B only.
- ³⁾ Required for industrial communications. SmartLinX PROFINET module is certified per standard V2.2.4.
- ⁴⁾ Requires use with applicable certified MSI or MMI.
- ⁵⁾ Complete specification data sheet found on the MSI/MMI catalog page and submit with order: <https://support.industry.siemens.com/cs/document/109764828>
- ⁶⁾ Available with feature software option A only.

Technical specifications

Milltronics BW500 and BW500/L	
Mode of operation	
Measuring principle	Belt scale integrator
Typical application	- Compatible with Milltronics belt scales or equivalent 1, 2, 4¹⁾, or 6¹⁾ load cell scales - Compatible with LVDT equipped scales, with use of optional interface board (remotely mounted)
Inputs	
Load cell	0 ... 45 mV DC per load cell
Speed sensor	
• Pulse train	0 ... 5 V low, 5 ... 15 V high 1 ... 3 000 Hz, or - Open collector switch, or - Relay dry contact
Auto zero	Dry contact from external device
mA	See optional mA I/O board ¹⁾
Auxiliary	5 discrete inputs for external contacts, each programmable for either: display scrolling, totalizer 1 reset, zero, span, multi-span, print, batch reset, PID function or online calibration, 2nd speed sensor
Outputs (load and speed)	
mA	Programmable 0/4 ... 20 mA, for rate, optically isolated, 0.1 % of 20 mA resolution, 750 Ω load max. (see optional mA I/O board)
Load cell	10 V DC compensated excitation for strain gauge type, 6 cells max, 150 mA max.
Speed sensor(s)	12 V DC, 150 mA max. excitation
Remote totalizer 1	- Contact closure 10 ... 300 ms duration - Solid state relay contact 30 V DC, 100 mA max. - Max. contact on-resistance = 36 ohms - Max. off-state leakage = 1 uA
Remote totalizer 2	- Contact closure 10 ... 300 ms duration - Solid state relay contact rated 240 V AC/DC, 100 mA max. - Max. contact on-resistance = 36 ohms - Max. off-state leakage = 1 uA
Relay output	5 alarm/control relays, 1 SPST Form A relay contact per relay, rated 5 A at 250 V AC, non-inductive or 30 V DC
Measuring accuracy	
Resolution	0.02 % of full scale
Accuracy	0.1 % of full scale
Rated operating conditions	
Ambient conditions	
Location	Indoor/outdoor
Ambient temperature	-20 ... +50 °C (-5 ... +122 °F)
Relative humidity/ingress protection	Suitable for outdoor/Type 4X/NEMA 4X/IP65
Installation category	II
Pollution degree	4
Design	
Material (enclosure)	Polycarbonate
Dimensions	209 W x 285 H x 92 D mm (8.2 W x 11.2 H x 3.6 D inch)
Weight	2.6 kg (5.7 lb)

Technical specifications (continued)

Milltronics BW500 and BW500/L	
Power supply	
Standard	AC version 100 ... 240 V AC, ± 10 %, 50/60 Hz, 55 VA max. - Fuse FU3 = 2AG, 2 AMP, 250 V Slo Blo DC version 10 ... 30 V DC, 26 W max. - Fuse FU2 = 3.75 A resettable (not user replaceable)
Controls and displays	
Displays	Illuminated 5 x 7 dot matrix liquid crystal display with 2 lines of 40 characters each
Programming	Via local keypad
Memory	Program and parameters stored in non-volatile Flash memory
Communications	- Two RS 232 ports - One RS 485 port - SmartLinx compatible
mA I/O board	
Inputs	2 programmable 0/4 ... 20 mA for PID control and on-line calibration, optically isolated, 0.1 % of 20 mA resolution, 200 Ω input impedance
Outputs	2 programmable 0/4 ... 20 mA for PID control, rate, load, and speed output, optically isolated, 0.1 % of 20 mA resolution, 750 Ω load max
Output supply	Isolated 24 V DC at 50 mA, short circuit protected
Approvals	
BW500	CE, UKCA, cCSA _{US} , FM, Measurement Canada, NTEP, MID, OIML, PAC Russia, RCM, EAC, SABS, STAMEQ, KC
BW500/L	CE, UKCA, cCSA _{US} , FM, RCM, EAC, KC
Options	- Speed sensor: MD-36/36A, MD-256, SITRANS WS300, TASS, or RBSS, or compatible - SmartLinx Modules: protocol specific modules for interface with popular industrial communications systems. Refer to product documentation. - LVDT interface card: for interface with LVDT based scales

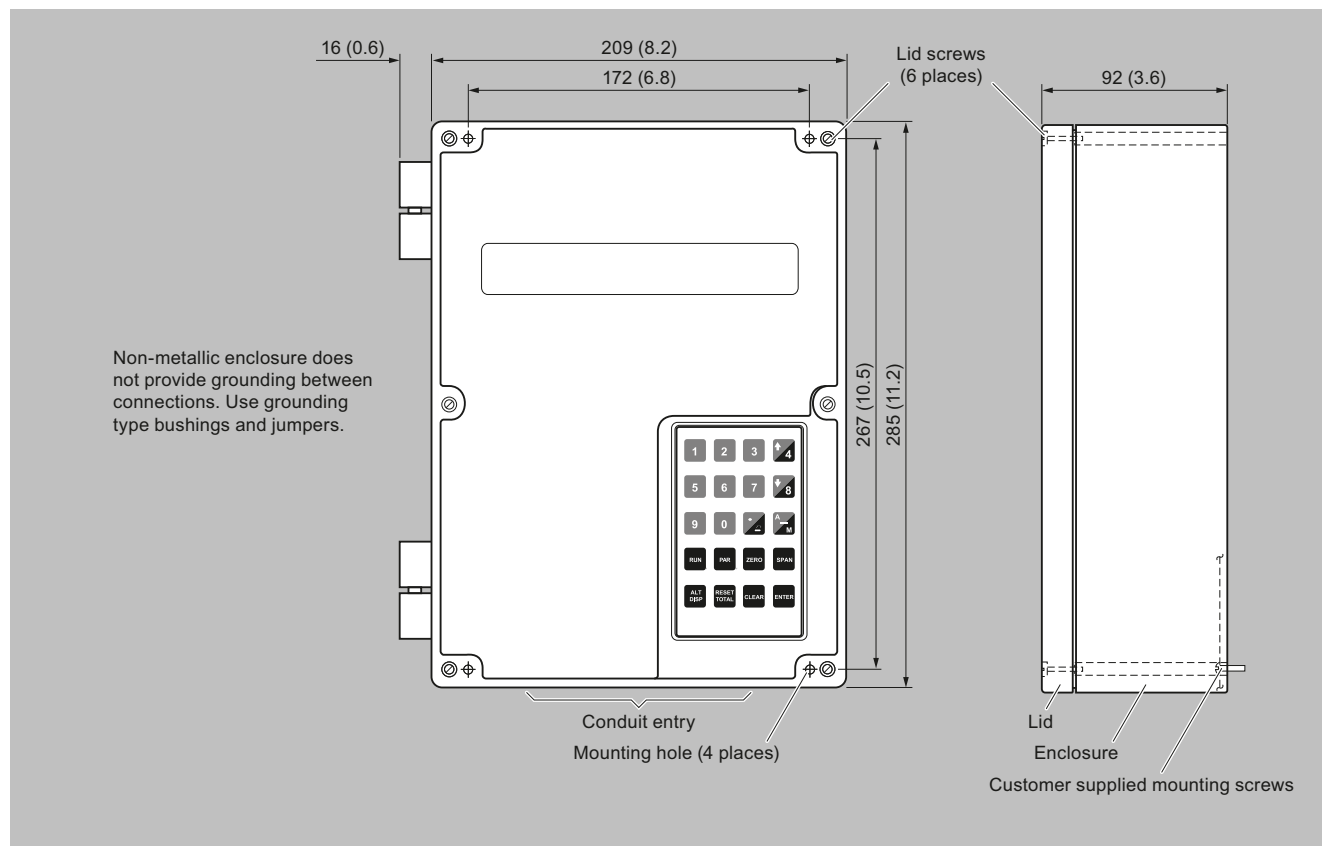
1) BW500 only

Weighing Electronics

Stand-alone

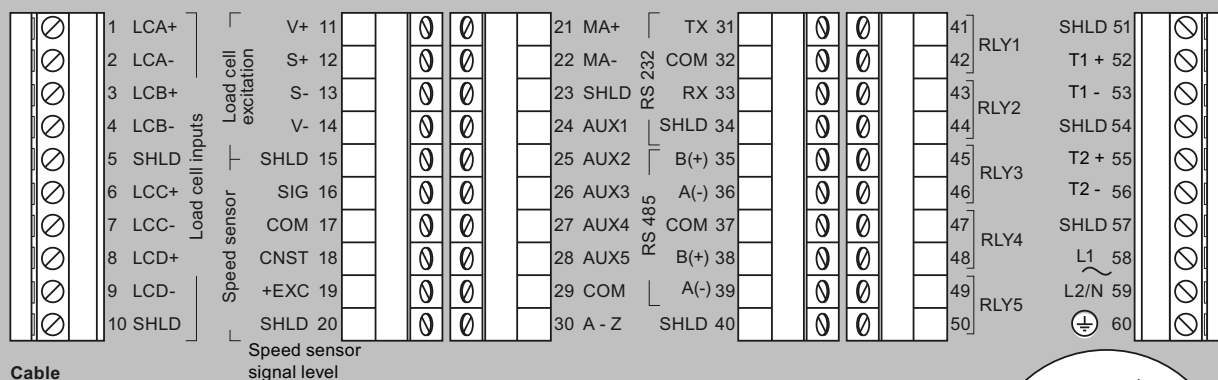
Belt scales / Milltronics BW500 and BW500/L

Dimensional drawings



Milltronics BW500 and BW500/L, dimensions in mm (inch)

Circuit diagrams

**Cable**

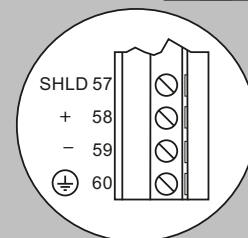
• One load cell:

- Non-sensing: Belden 8404, 4 wire shielded, 20 AWG (0.5 mm²) or equivalent, 150 m (500 ft) max.
- Sensing: Belden 9260, 6 wire shielded, 20 AWG (0.5 mm²) or equivalent, 300 m (1 000 ft) max.

• Two/four/six¹⁾ load cells:

- Non-sensing: Belden 9260, 6 wire shielded, 20 AWG (0.5 mm²) or equivalent, 150 m (500 ft) max.
- Sensing: Belden 8418, 8 wire shielded, 20 AWG (0.5 mm²) or equivalent, 300 m (1 000 ft) max.
- Speed sensor: Belden 8770, 3 wire shielded, 18 AWG (0.75 mm²) or equivalent, 300 m (1 000 ft)
- Auto zero: Belden 8760, 1 pair, twisted/shielded, 18 AWG (0.75 mm²) or equivalent, 300 m (1 000 ft) max.
- Remote total: Belden 8760, 1 pair, twisted/shielded, 18 AWG (0.75 mm²) or equivalent, 300 m (1 000 ft) max.

¹⁾ For four/six load cell scale, run two separate cables of two load cell configuration



DC version

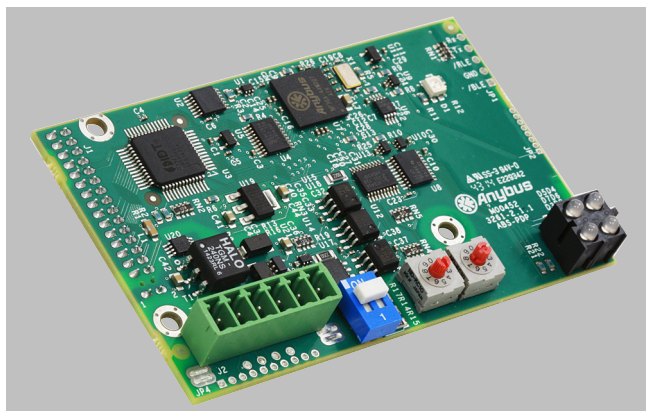
Milltronics BW500 and BW500/L connections

Weighing Electronics

Stand-alone

Belt scales / SmartLinx module

Overview



SmartLinx modules provide direct digital connection to popular industrial communications buses with true plug-and-play compatibility with products manufactured by Siemens.

Benefits

- Fast, easy installation
- Direct connection: no additional installation required
- Scalable application layer allows for optimized network bandwidth and memory requirements (for PROFIBUS DP-V0 and DeviceNet only)
- Modules available for PROFIBUS DP-V0, PROFIBUS DP-V1, PROFINET, DeviceNet, Modbus TCP/IP, and EtherNet/IP

Application

With the addition of a SmartLinx module, Siemens instruments can be connected to a variety of industrial communications networks.

They're fast and easy to install, and can be added at any time. The module simply plugs into the socket on any SmartLinx enabled product. They require no secondary private buses or gateways and no separate wiring. There are no extra boxes to connect to your network so there's a minimum load on engineering and maintenance staff.

SmartLinx provides all data from the instrument, including measurement and status, and allows changes to operation parameters to be done over the bus or telemetry link. The user can select which data in the application layer to transfer over the bus. This selection saves bandwidth and memory and optimizes data throughput and speeds up the network, enabling you to connect more instruments to your network.

Selecting a communications module: PROFIBUS DP-V0 versus PROFIBUS DP-V1

The PROFIBUS DP-V1 card was added to MultiRanger 200 HMI and HydroRanger 200 HMI to provide acyclic communication and SIMATIC PDM support over PROFIBUS and PROFINET. For backward compatibility, the PROFIBUS DP-V0 card can also be used with MultiRanger 200 HMI and HydroRanger 200 HMI.

MultiRanger 100/200, HydroRanger 200, BW500/L, and SF500 are compatible only with the PROFIBUS DP-V0 module.

Selection and ordering data

Selection and Ordering data	Article No.
SmartLinx modules provide direct digital connection to popular industrial communications buses with true plug-and-play compatibility with products manufactured by Siemens.	
SmartLinx PROFIBUS DP-V0 module	7ML1830-1HR
SmartLinx PROFIBUS DP-V1 module	A5E35778741
SmartLinx DeviceNet module	7ML1830-1HT
SmartLinx PROFINET IO module ¹⁾	7ML1830-1PM
SmartLinx Modbus TCP/IP, EtherNet/IP module	7ML1830-1PN
Operating Instructions	
All literature is available to download for free, in a range of languages, at http://www.siemens.com/processinstrumentation/documentation	

¹⁾ SmartLinx PROFINET module is certified per standard V2.2.4.

Technical specifications

Module type	PROFIBUS DP-V0
Interface	RS 485 (PROFIBUS standard)
Transmission rate	All valid PROFIBUS DP rates from 9 600 Kbps ... 12 Mbps
Slave address	0 ... 99
Connection	Slave
SmartLinux module compatibility	• MultiRanger 200 HMI • MultiRanger 100/200 • HydroRanger 200 HMI • HydroRanger 200 • Milltronics BW500, BW500/L • Milltronics SF500

Module type	PROFIBUS DP-V1
Interface	RS 485 (PROFIBUS standard)
Transmission rate	All valid PROFIBUS DP rates from 9 600 Kbps ... 12 Mbps
Slave address	0 ... 99
Connection	Slave
SmartLinux module compatibility	• MultiRanger 200 HMI • HydroRanger 200 HMI

Module type	PROFINET IO module
Interface	RJ 45 female
Transmission rate	10/100 Mbits/s
Address	IP address through dip switches or via DCP or DHCP
Connection	Slave/server
SmartLinux module compatibility	• MultiRanger 200 HMI • HydroRanger 200 HMI • Milltronics BW500, BW500/L • Milltronics SF500

Module type	Modbus TCP/IP, EtherNet/IP
Interface	RJ 45 female
Transmission rate	10/100 Mbits/s
Address	IP address through dip switches or via DCP or DHCP
Connection	Slave/server
SmartLinux module compatibility	• MultiRanger 200 HMI • HydroRanger 200 HMI • Milltronics BW500, BW500/L • Milltronics SF500

Module type	DeviceNet
Interface	DeviceNet physical layer
Transmission rate	125, 250, 500
MAC address	0 ... 63
Connection	Slave (group 2)
SmartLinux module compatibility	• MultiRanger 200 HMI • MultiRanger 100/200 • HydroRanger 200 HMI • HydroRanger 200 • Milltronics BW500, BW500/L • Milltronics SF500

Weighing Electronics

Stand-alone

Dosing, filling, bagging and checking scales / Introduction

Overview



SIWAREX WP251 weighing electronics

Typical requirements in many industries are high-precision mixing and dosing, and packing and filling at high speed. The comprehensive SIWAREX electronics properties and functions can fulfil all requirements.

The dosing process used in production operations depends on a variety of factors: Depending on the type and quantity of materials weighed, different dosing systems and weighing processes are required. It must be possible to fill liquid or solid goods, such as cement, quickly and precisely.

Overview



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 R76, R51, R61 and R107
- Internal alibi memory for up to 550 000 entries
- Operation without SIMATIC CPU 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 ± 4 million parts and an accuracy of 0.05%
- Simple adjustment of scale using the SIWATOOL V7 program via the Ethernet interface
- Recovery point for simple restoration of all parameters
- Automatic calibration is possible 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 following are typical SIWAREX WP251 applications:

- Catchweighing instruments (CWI) - legal-for-trade in accordance with OIML R51
- Gravimetric filling instruments (GFI) - legal-for-trade in accordance with OIML R61
- Non automatic weighing instrument (NAWI) - legal-for-trade in accordance with OIML R76
- Discontinuous totalizing automatic weighing instrument (DTI) - legal-for-trade in accordance with OIML R107

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 has a width of 70 mm (2.76 inch) and is installed using a DIN rail. This is extremely user-friendly.

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

Weighing Electronics

Stand-alone

Dosing, filling, bagging and checking scales / SIWAREX WP251 weighing electronics

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 WLAN 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, via both the RS 485 interface (Modbus RTU) and the Ethernet interface (Modbus TCP/IP), meaning that full commissioning and operation can also take place via these channels.

Weighing functions

SIWAREX WP251 provides the weighing modes NAWI (non-automatic weighing instrument), ACI (automatic catchweighing instrument) and AGFI (automatic gravimetric filling instrument).

In the operating modes NAWI and ACI, there is a choice between filling mode and emptying mode. The entire filling or dosing process is controlled fully 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.

Data regarding the weight, as well as all scale and dosing status bits, are 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

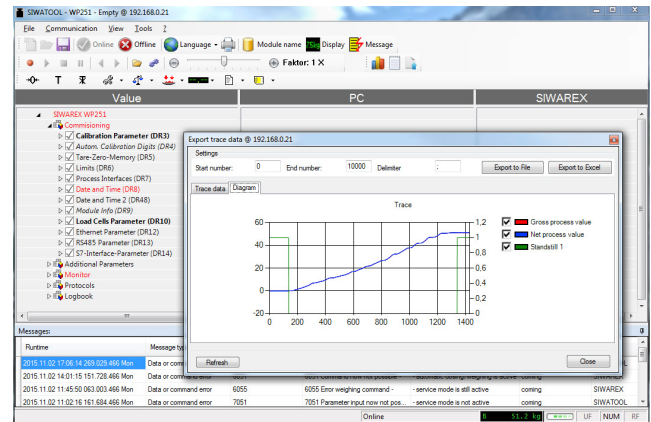
SIWATOOL V7 is a special program for commissioning and servicing and runs with Windows operating systems.

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

Function (continued)



Software SIWATOOL V7, layout of the program windows

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

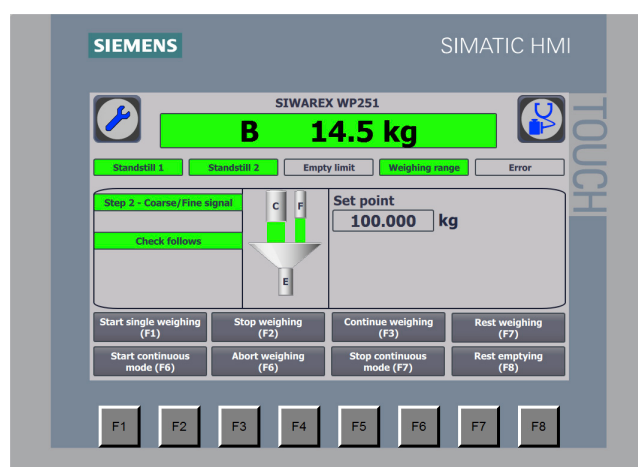
An additional program function can be used to download a new firmware version onto the SIWAREX WP251 on site. This means that firmware upgrades can be carried out on site as required anywhere in the world.

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, set-points, 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 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 (using an OPC server, for example) 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.

Selection and ordering data

	Article No.
SIWAREX WP251 weighing electronics Single-channel, legal-for-trade, for automatic dosing and filling scales (AGFI, ACI, NAWI) with analog load cells / full-bridge strain gauges (1 - 4 mV/V), 1 × LC, 4 × DQ, 4 × DI, 1 × AQ, 1 × RS 485, Ethernet port	7MH4960-6AA01
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 Service and commissioning software for SIWAREX weighing modules	7MH4900-1AK01
Calibration set for SIWAREX WP2xx Valid for SIWAREX WP231 and SIWAREX WP251. For verification of up to 3 scales, comprising: • 3 × inscription foils for ID label • 1 × protective film • 3 × calibration protection plates • Guidelines for verification, certificates and approvals, editable label, SIWAREX WP	7MH4960-0AY10
Ethernet cable patch cord 2 m (7 ft) For connecting SIWAREX WP251 to a PC (SIWATOOL), SIMATIC CPU, panel, etc.	6XV1850-2GH20
Accessories	
SIWAREX EB extension box For extending sensor cables	7MH4710-2AA
SIWAREX JB junction box, aluminum housing For connecting up to 4 load cells in parallel, and for connecting multiple junction boxes	7MH5001-0AA20
SIWAREX JB junction box, stainless steel housing For connecting up to 4 load cells in parallel	7MH5001-0AA00
SIWAREX JB junction box, stainless steel housing (ATEX) For parallel connection of up to 4 load cells (for zone allocation, see manual or type-examination certificate)	7MH5001-0AA01
SIWAREX IS Ex interface For intrinsically safe connection of load cells. With ATEX approval (not UL/FM). Suitable for SIWAREX electronic weighing systems. Compatibility of load cells must be checked separately • Short-circuit current < 199 mA DC • Short-circuit current < 137 mA DC	7MH4710-5BA 7MH4710-5CA
Cable (optional)	

Weighing Electronics

Stand-alone

Dosing, filling, bagging and checking scales / SIWAREX WP251 weighing electronics

Selection and ordering data (continued)

Article No.	
Cable Li2Y 1 × 2 × 0.75 ST + 2 × (2 × 0.34 ST) – CY For connecting SIWAREX electronic to junction box (JB), extension box (EB), digital junction box (DB), Ex interface (IS) or between two extension boxes. For permanent installation. Occasional bending is possible. External diameter: approx. 10.8 mm (0.43 inch) Permissible ambient temperature -40 ... +80 °C (-40 ... +176 °F) Sold by the meter.	
• Sheath color: orange	7MH4702-8AG
• Sheath color (for hazardous atmospheres): blue	7MH4702-8AF
Ground terminal for connecting the load cell cable shield to the grounded DIN rail	6ES5728-8MA11
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 PO Box 1180 D-66565 Eppelborn Tel.: +49 6806/980-0 Fax: +49 6806/980-999 Internet: http://www.siebert-group.com/en Detailed information is available from the manufacturer.	

Technical specifications

SIWAREX WP251	
Weighing modes	• Non automatic weighing instrument (NAWI) (filling + removal) (legal-for-trade in accordance with OIML R76) • Catchweighing instrument (CWI) (filling + removal) (legal-for-trade in accordance with OIML R51) • Gravimetric filling instrument (GFI) (legal-for-trade in accordance with OIML R61) • Discontinuous totalizing automatic weighing instrument (DTI) - (legal-for-trade in accordance with OIML R107)
Integration in automation systems S7-1200 Operator panel and/or automation systems from other vendors	SIMATIC S7-1200 system bus Via Ethernet (Modbus TCP/IP) or RS 485 (Modbus RTU)
Ports	• 1 × SIMATIC S7-1200 system bus • 1 × Ethernet (SIWATOOL and Modbus TCP/IP) • 1 × RS 485 (Modbus RTU or remote display) • 1 × analog output (0/4 - 20 mA) • 4 × digital inputs (24 V DC, floating) • 4 × 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
Scale adjustment	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) Internal resolution	0.05% Up to ± 4 million parts
Number of measurements/second	100 or 120 (selectable)
Filter	• Low-pass filter 0.1 ... 50 Hz • Average value filter
Load cells	Strain gauges in 4-wire or 6-wire system
Load cell powering Supply voltage (regulated via feedback) Permissible load resistance	4.85 V DC > 40 Ω < 4 100 Ω
• R _{Lmin}	
• R _{Lmax}	
With SIWAREX IS Ex interface	

Technical specifications (continued)

SIWAREX WP251	
• 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 certificates 2014/32/EU (MID) according to OIML R107
Auxiliary power supply	
Rated voltage	24 V DC
Max. power consumption	200 mA
Max. power consumption SIMATIC Bus	3 mA
IP degree of protection to EN 60529; IEC 60529	IP20
Climatic requirements	
$T_{min(IND)} \dots T_{max(IND)}$ (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 × 75 × 100 mm (2.76 × 2.95 × 3.94 inch)

Weighing Electronics

Stand-alone

Solids flowmeters / Milltronics SF500

Overview



Milltronics SF500 is a full feature integrator for use with solids flowmeters.

Benefits

- Automatic zero and electronic span calibration
- Alarms for rate or diagnostic error
- On-board Modbus and optional: PROFIBUS DP, PROFINET, Modbus TCP/IP, EtherNet/IP, and DeviceNet
- On-line calibration and dual PID control with optional analog I/O card
- Multi-point linearizer for high turn down accuracy
- Up to 8 multi-spans for application of more than one flow condition and/or material
- Moisture meter input with optional analog I/O card for calculation of dry weight

Application

Milltronics SF500 operates with any solids flowmeter with up to two strain gauge load cells or LVDT sensor. The SF500 processes sensor signals for accurate flow rate and totalized weight of bulk solids. It can take on lower level control functions traditionally handled by other devices, and it supports popular industrial communication buses. Its proven load cell balance function eliminates matching of load cells.

The PID function may be used for rate control of pre-feeding devices and/or control of additives with two internal PID controllers. Operating in tandem with two or more solids flowmeters or weighfeeders, the SF500 may be used for ratio blending and controlling additives. Batching, load out, and alarm functions are also provided by the SF500.

Selection and ordering data

Milltronics SF500 Integrator Full feature, powerful integrator designed for use with solids flowmeters.	Article No. 7MH7156- ● ● ● ● ● - ● ● ●									
Click on the Article No. for the online configuration in the PIA Life Cycle Portal.										
Input voltage										
AC voltage			2							
DC voltage			3							
Auxiliary input/output boards ¹⁾										
None				A						
Board with 2 analog inputs and 2 analog outputs				B						
Feature software										
Standard				A						
Auxiliary memory										
None					0					
Data communications ²⁾										
SmartLinx Ready						0				
SmartLinx PROFIBUS DP module						2				
SmartLinx DeviceNet module						3				
SmartLinx PROFINET module						4				
SmartLinx EtherNet/IP module						5				
SmartLinx Modbus TCP/IP module						6				
Enclosures										
Standard enclosure, no entry holes								1		
Standard enclosure, 4 entries, for M20 glands								2		
Trade approval stickers										
No trade approval sticker									A	
Not legal for Canadian and EU trade sticker									B	
Approvals										
Ordinary Locations/General Purpose (Non-Ex), CE, UKCA, cCSAus, FM, RCM, EAC, KC										A

¹⁾ Required for PID control and online calibration.

²⁾ Required for industrial communications. SmartLinX PROFINET module is certified per standard V2.2.4.

Further designs	Order Code
Please add "-Z" to article no. and specify order code(s).	
Stainless steel tag (69 x 50 mm), Measuring-point number/identification (max 27 characters), specify in plain text.	Y15
Stainless steel, sun/weather shield 357 x 305 x 203 mm (14 x 12 x 8 inch) (finished unit is field mounted with enclosure)	S50
Manufacturer's test certificate: According to EN 10204-2.2	C11
LVDT conditioner card mounted and connected for use with LVDT flowmeters	G21
Stainless steel enclosure, 304 (1.4301), [406 x 305 x 152 mm (16 x 12 x 6 inch), Type 4X, IP66; (finished unit is mounted inside enclosure)]	
• With window	A11
• Without window	A12
Painted mild steel, [406 x 305 x 152 mm (16 x 12 x 6 inch), Type 4, IP66; (finished unit is mounted inside enclosure)]	
• With window	A13
• Without window	A14
Painted mild steel, anti-vibration enclosure with -viewing window [406 x 305 x 203 mm (16 x 12 x 8 inch), Nema/Type 4, IP66; (finished unit is mounted inside enclosure)]	A15

Further designs	Order Code
Painted mild steel, heated enclosure with viewing window for use down to -50 °C (-58 °F) (finished unit is mounted inside enclosure) 483 x 584 x 203 mm (19 x 23 x 8 inch)	A35
Instruction manuals	
All literature is available to download for free, in a range of languages, at http://www.siemens.com/weighing/documentation	

Optional equipment	Article No.
Auxiliary I/O card spare	7MH7723-1BJ
LVDT Conditioners in NEMA 4 enclosure (to interface LVDT Flowmeter/Belt scale without internal pre-amplifier)	7MH7723-1AJ
Cables to connect BW500/SF500 keypad to motherboard	7MH7723-1CB
SITRANS RD100 Remote displays, see SITRANS RD100 catalog page: https://support.industry.siemens.com/cs/document/109765059	7ML5741-.....
SITRANS RD200 Remote displays, see SITRANS RD200 catalog page: https://support.industry.siemens.com/cs/document/109765328	7ML5740-.....
SITRANS RD300 Remote displays, see SITRANS RD300 catalog page: https://support.industry.siemens.com/cs/document/109765138	7ML5744-.....
Spare parts	
Display card	7MH7723-1AF
Lid with overlay and keypad	7MH7723-1AG

Weighing Electronics

Stand-alone

Solids flowmeters / Milltronics SF500

Selection and ordering data (continued)

Optional equipment	Article No.
SF500 motherboard, AC	A5E34320776
SF500 motherboard, DC	A5E34320778
Fuse, 2 A, 250 V, BW500, BW500/L, and SF500, spare	7MH7723-1DG

Optional equipment	Article No.
Keypad spare for BW500, BW500/L, and SF500	7MH7723-1CD
LVDT card spare kit, internal to SF500	A5E34699664
PROFINET IO module	7ML1830-1PM
Modbus TCP/IP, EtherNet/IP module	7ML1830-1PN
PROFIBUS DP module	7ML1830-1HR
DeviceNet module	7ML1830-1HT

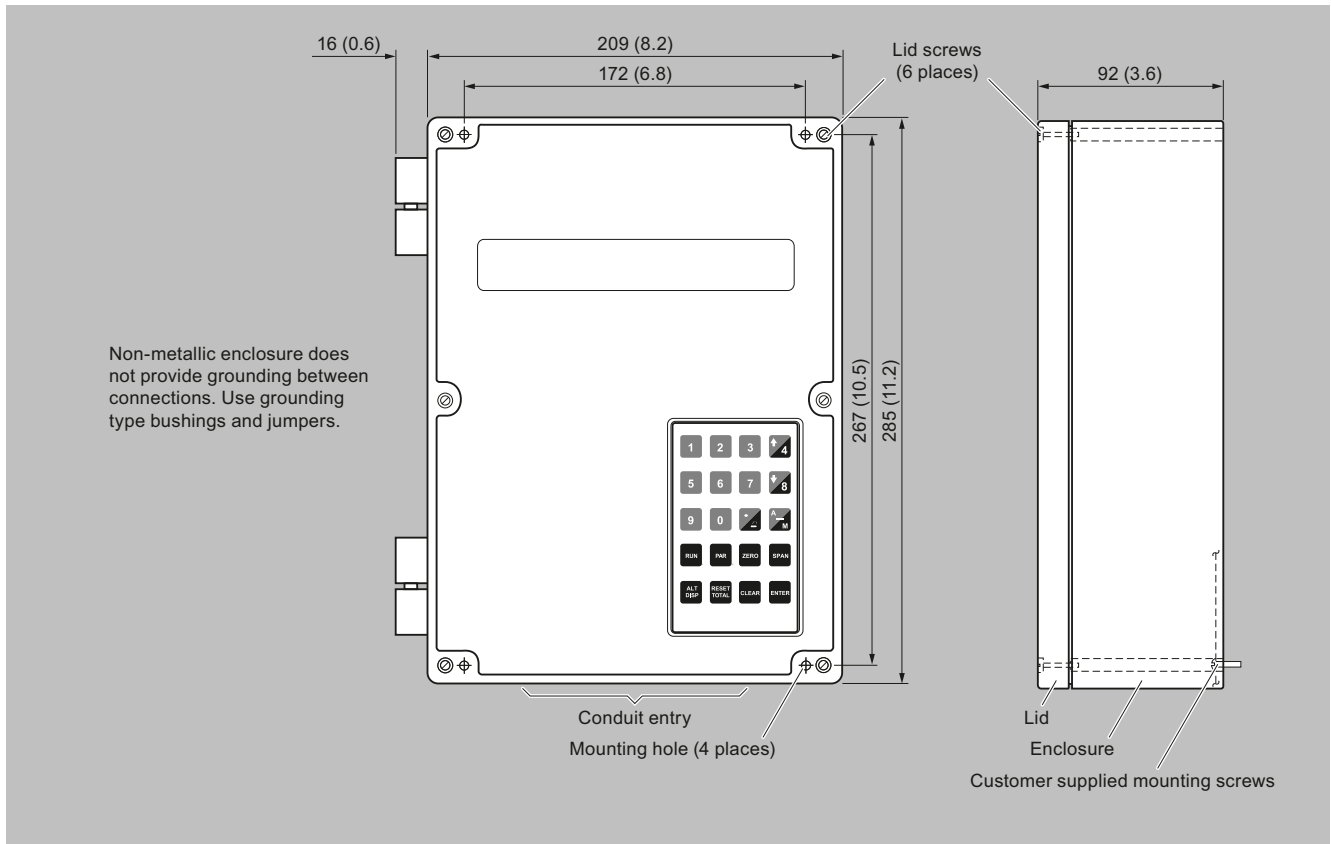
Technical specifications

Milltronics SF500	
Mode of operation	
Measuring principle	Flowmeter integrator
Typical application	- Compatible with SITRANS solids flowmeters or equivalent 1 or 2 load cell models - Compatible with LVDT equipped solids flowmeters, with use of optional interface board (remotely mounted)
Input	
Load cell/LVDT	0 ... 45 mV DC per load cell or LVDT interface card
Auto zero	Dry contact from external device
mA	See optional mA I/O board
Auxiliary	5 discrete inputs for external contacts, each programmable for either: display scrolling, totalizer 1 reset, zero, span, multi-span, print, batch reset, PID function, or on-line calibration
Output	
mA	Programmable 0/4 ... 20 mA, for rate, optically isolated, 0.1 % of 20 mA resolution, 750 Ω load max. (see optional mA I/O board)
Load cell/LVDT conditioner card	10 V DC compensated excitation for strain gauge type, 2 cells max., 150 mA max.
Remote totalizer 1	- Contact closure 10 ... 300 ms duration - Solid state relay contact 30 V DC, 100 mA max. - Max. contact on-resistance = 36 ohms - Max. off-state leakage = 1 uA
Remote totalizer 2	- Contact closure 10 ... 300 ms duration - Solid state relay contact rated 240 V AC/DC, 100 mA max. - Max. contact on-resistance = 36 ohms - Max. off-state leakage = 1 uA
Relay output	5 alarm/control relays, 1 SPST Form A relay contact per relay, rated 5 A at 250 V AC, non-inductive or 30 V DC
Measuring accuracy	
Resolution	0.02 % of full scale
Accuracy	0.1 % of full scale
Rated operating conditions	
Ambient conditions	
Location	Indoor/outdoor
Ambient temperature	-20 ... +50 °C (-5 ... +122 °F)
Relative humidity/ingress protection	Suitable for outdoor/Type 4X/NEMA 4X/IP65
Installation category	II
Pollution degree	4
Design	
Material (enclosure)	Polycarbonate
Dimensions	209 W x 285 H x 92 D mm (8.2 W x 11.2 H x 3.6 D inch)

Technical specifications (continued)

Milltronics SF500	
Weight	2.6 kg (5.7 lb)
Power supply	
Standard	AC version 100 ... 240 V AC ± 10 %, 50/60 Hz, 55 VA max. - Fuse FU3 = 2AG, 2 AMP, 250 V Slo Blo DC version 10 ... 30 V DC, 26 W max. - Fuse FU2 = 3.75 A resettable (not user replaceable)
Controls and displays	
Display	Illuminated 5 x 7 dot matrix liquid crystal display with 2 lines of 40 characters each
Programming	Via local keypad
Memory	Program and parameters stored in non-volatile Flash memory
Communications	Two RS 232 ports One RS 485 port SmartLinux compatible
Approvals	CE, UKCA, cCSAus, FM, RCM, EAC, KC
Options	- SmartLinux modules: protocol specific modules for interface with popular industrial communications systems. Refer to associated product documentation. - LVDT interface card: for interface with LVDT based solids flowmeters - mA I/O board - Inputs: 2 programmable 0/4 ... 20 mA for PID control or online calibration, optically isolated, 0.1 % ... 20 mA resolution, 200 Ω input impedance - Outputs: 2 programmable 0/4 ... 20 mA for PID control or rate output, optically isolated, 0.1 % of 20 mA resolution, 750 Ω load max - Output supply: isolated 24 V DC at 50 mA, short circuit protected

Dimensional drawings



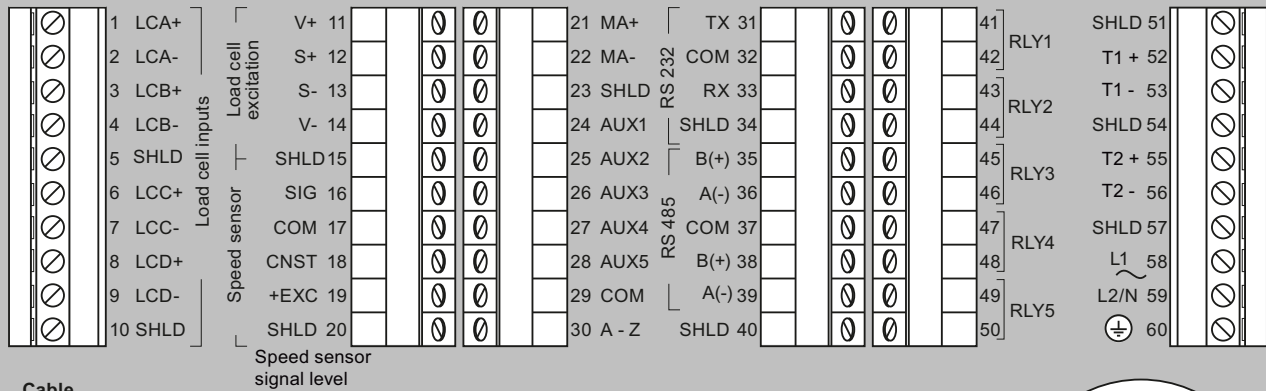
Milltronics SF500, dimensions in mm (inch)

Weighing Electronics

Stand-alone

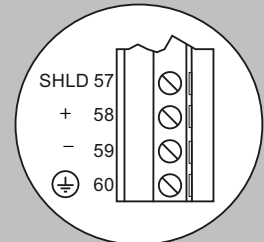
Solids flowmeters / Milltronics SF500

Circuit diagrams



Cable

- One load cell:
 - Non-sensing: Belden 8404, 4 wire shielded, 20 AWG (0.5 mm²) or equivalent, 150 m (500 ft) max.
 - Sensing: Belden 9260, 6 wire shielded, 20 AWG (0.5 mm²) or equivalent, 300 m (1 000 ft) max.
- Two load cells:
 - Non-sensing: Belden 9260, 6 wire shielded, 20 AWG (0.5 mm²) or equivalent, 150 m (500 ft) max.
 - Sensing: Belden 8418, 8 wire shielded, 20 AWG (0.5 mm²) or equivalent, 300 m (1 000 ft) max.
- Auto zero: Belden 8760, 1 pair, twisted/shielded, 18 AWG (0.75 mm²) or equivalent, 300 m (1 000 ft) max.
- Remote total: Belden 8760, 1 pair, twisted/shielded, 18 AWG (0.75 mm²) or equivalent, 300 m (1 000 ft) max.



DC version

Milltronics SF500 connections

Overview



The SITRANS RD100 is a 2-wire loop powered, NEMA 4X enclosed remote digital display for process instrumentation.

Benefits

- Easy setup
- Approved for hazardous locations
- NEMA 4X, IP67 impact-resistant enclosure
- Simple two-step calibration
- Two modes of input allow for easy servicing, with no interruption of loop required

Application

The RD100 is designed for maximum versatility, allowing seamless installation both indoors and outdoors, in a wide range of environments. Whether in heat or cold, the RD100 performs reliably in non-hazardous areas. Operating efficiently from -40 to +85 °C (-40 to +185 °F), it adds only 1 V to the loop.

Calibration consists of a quick two-step process involving the adjustment of only two non-interacting potentiometers.

- Key Applications: remotely displays process variables in level, flow, pressure, temperature, and weighing applications, in a 4 to 20 mA loop.

Selection and ordering data

SITRANS RD100 Display Remote digital display for process instruments. 2-wire, loop powered, NEMA 4X enclosure.		Article No. 7ML5741- ● ● A 0 0 - 0						
Click on the Article No. for the online configuration in the PIA Life Cycle Portal.								
Conduit hole location (½ inch)								
None			1					
Bottom			2					
Rear			3					
Top			4					
Approvals								
CE				B				

Selection and Ordering data	Article No.
Operating Instructions	
All literature is available to download for free, in a range of languages, at http://www.siemens.com/processinstrumentation/documentation	
Accessories	
Panel mount kit	7ML1930-1BN
2 inch (5.08 cm) pipe mounting kit (stainless steel, Type 304, EN 1.4301)	7ML1930-1BQ

Weighing Electronics

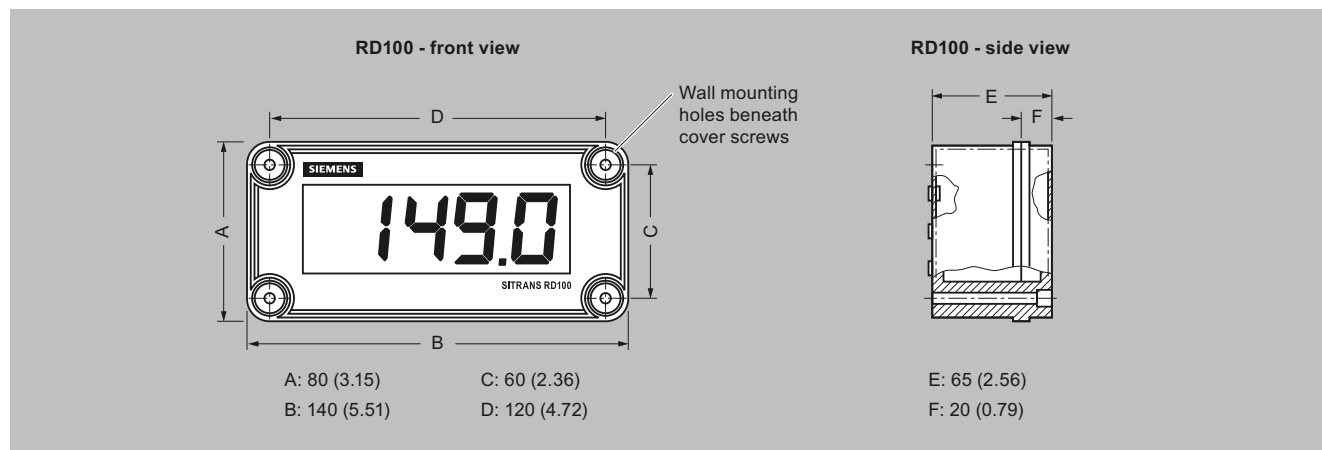
Supplementary components

Displays / SITRANS RD100

Technical specifications

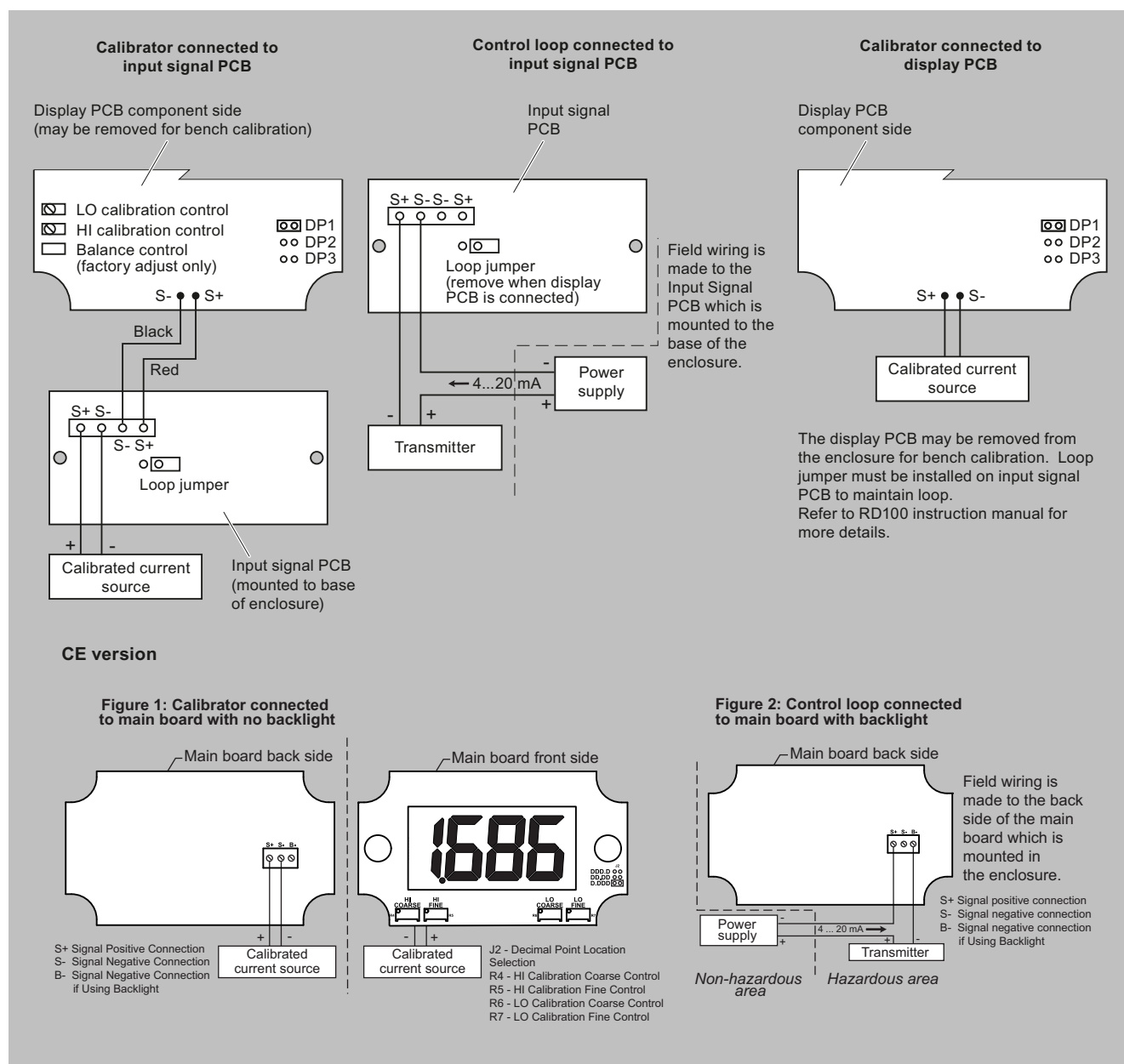
SITRANS RD100	
Mode of operation	
Measuring principle	Analog to digital conversion
Measuring range	4 ... 20 mA
Measuring points	1 instrument only
Accuracy	± 0.1 % of span ± 1 count
Rated operating conditions	
Ambient conditions	
• Operating temperature range	-40 ... +85 °C (-40 ... +185 °F)
• Storage temperature	-40 ... +85 °C (-40 ... +185 °F)
Design	
Weight	340 g (12 oz)
Material (enclosure)	Impact-resistant glass filled polycarbonate body and clear polycarbonate cover
Degree of protection	NEMA 4X, IP67
Power supply	
External loop power supply	30 V DC max.
Display	
1.0 inch (2.54 cm) high LCD - Numeric range from -1 000 ... +1 999	
Certificates and approvals	
Non-hazardous	CE
Options	
Mounting	
2 inch (5.08 cm) pipe mounting kit (zinc plated or stainless steel) - Panel mounting kit	

Dimensional drawings



SITRANS RD100, dimensions in mm (inch)

Circuit diagrams



SITRANS RD100 connections

Weighing Electronics

Supplementary components

Displays / SITRANS RD150

Overview



The SITRANS RD150 is a remote display for 4 to 20 mA and HART devices.

Benefits

- Ease of use through 4 button menu driven display
- Backlit display
- HART communications
- Flexible mounting options
- Plastic, stainless steel or aluminum housings up to IP68

Application

The versatile SITRANS RD150 can be installed remotely from your instrument, providing 4/20 mA or multiple HART variable readings in a safe and convenient location.

Easy to use, 4 button, menu driven, display for monitoring of HART instruments via HART communication or 4/20 mA.

- Key Applications: remotely displays process variables in level, flow, pressure, temperature, and weighing applications, in a 4 to 20 mA HART loop.

Selection and ordering data

SITRANS RD150 display Remote digital display, HART or 4 to 20 mA loop display, metal and plastic field mount enclosures.										Article No. 7ML574- 2-
Click on the Article No. for the online configuration in the PIA Life Cycle Portal.										
Approvals										
Ordinary Locations/General Purpose (Non-Ex), CE, UKCA										0 A
ATEX II 1G, Ex ia IIC T6...T1 Ga ⁴⁾ UKEX II 1G, Ex ia IIC T6...T1 Ga ⁴⁾										0 C
ATEX II 2G Ex db IIC T6 Gb ⁹⁾¹⁰⁾ UKEX II 2G Ex db IIC T6 Gb ⁹⁾¹⁰⁾										0 F
IECEX Ex ia IIC T6...T1 Ga, Gb ⁴⁾										0 J
IECEX Ex db IIC T6 Gb ⁹⁾¹⁰⁾										0 M
cCSA _{US} (IS) Class I, Div. 1, Groups A, B, C, D ¹²⁾										0 N
cCSA _{US} (XP) Class I, Div. 1, Groups A, B, C, D ⁹⁾¹¹⁾										0 R
Electronics										
Two-wire 4 ... 20 mA/HART										A
Two-wire 4 ... 20 mA without HART										B
Housing										
Plastic ¹⁾⁴⁾⁶⁾										0
Aluminum ²⁾⁴⁾⁷⁾										1
Stainless steel (precision casting) ²⁾⁴⁾⁷⁾										2
For panel mounting (72 x 72 mm) ³⁾⁵⁾⁸⁾										3
Housing protection										
IP66/IP67 NEMA 4X										0
IP66/IP68 NEMA 6P (0.2 bar)										1
IP40 NEMA 2										2
IP40 Type 1										3
Cable entry										
M20 x 1.5/Cable gland PA black (ø5 ... 9 mm), standard										0
M20 x 1.5/Cable gland brass nickel plated (ø6 ... 12 mm)										1
M20 x 1.5/Blind plug										2
M20 x 1.5/Threaded fitting brass nickel-plated; for shielded cable (ø9 ... 13 mm)										3
½" NPT/Blind plug										4
½" NPT/Cable gland PA black (ø5 ... 9 mm)										5
½" NPT/Threaded fitting brass nickel plated (ø6 ... 12 mm)										6
½" NPT/Threaded fitting brass nickel plated; for shielded cable (ø9 ... 13 mm)										7
Without										8
Display										
Without										A
Mounted										B
Mounting										
For wall mounting with aluminum or stainless steel housing										A
For carrier rail and wall mounting with plastic housing										B
For carrier rail with aluminum or stainless steel housing										C
For tube mounting (29 ... 60 mm) incl. mounting material										D
For panel mounting										E
Certificates										
None										0
3.1 Certificate/Instrument with test data										1
Quality and Test plan										2

Selection and ordering data	Order code
Further designs	
Please add "-Z" to Article No. and specify Order code(s).	
Identification Label (measurement loop) stainless steel: max. 40 characters add in plain text. To add more than one line use a comma", " for Line break.	Y17
Identification Label (measurement loop) foil: max. 40 characters add in plain text. To add more than one line, use a coma", " for line break.	Y18

Selection and ordering data	Article No.
Operating Instructions	
All literature is available to download for free, in a range of languages, at http://www.siemens.com/processinstrumentation/documentation	
Accessories	
USB communicator	A5E35192015
SITRANS LG/SITRANS RD150 sensor display module	A5E34143449

Weighing Electronics

Supplementary components

Displays / SITRANS RD150

Selection and ordering data (continued)

- 1) Available only with Housing protection option 0.
- 2) Available only with Housing protection option 1.
- 3) Available only with Housing protection option 2.
- 4) Available only with Cable entry options 0, 2, 4, and 5.
- 5) Available only without Cable entry option 8.
- 6) Available only with Carrier rail and Tube mount Mounting options.
- 7) Available only with Wall mount, Carrier rail with aluminum or stainless steel housing, and Tube mount Mounting options.

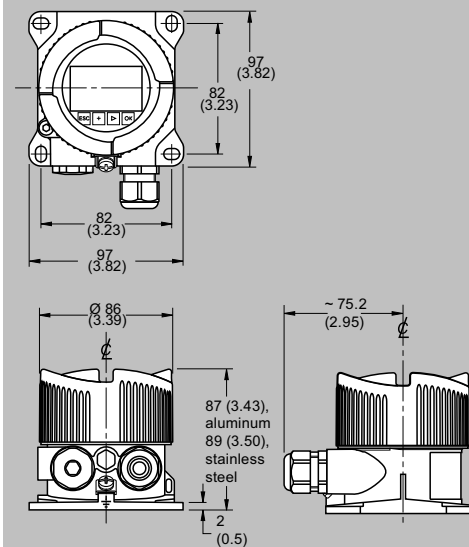
- 8) Available only with Panel mounting option.
- 9) Available only with Housing options 1 and 2.
- 10) Available only with Cable entry options 2, 3, 4, and 7.
- 11) Available only with Cable entry options 2, 3, 4, 6, and 7.
- 12) Not available with Cable entry option 1.

Technical specifications

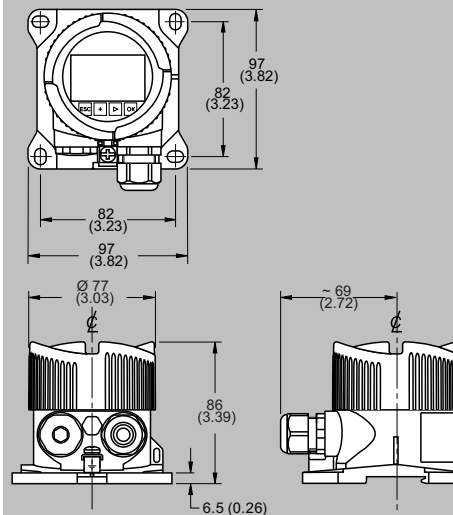
SITRANS RD150	
Mode of operation	
Measuring principle	Analog to digital conversion
Measuring range	3.5 ... 22.5 mA
Measuring points	HART multi-drop support
Accuracy	± 0.1 % of 20 mA
Rated operating conditions	
Without display and adjustment module	-40 ... +80 °C (-40 ... +176 °F)
With display and adjustment module	-20 ... +70 °C (-4 ... +158 °F)
Storage temperature	-40 ... +80 °C (-40 ... +176 °F)
Design	
Weight	
• Plastic housing	0.35 kg (0.772 lb)
• Aluminum housing	0.7 kg (1.543 lb)
• Stainless steel housing	2.0 kg (4.409 lb)
Material (enclosure)	
• Plastic housing	Plastic PBT (Polyester)
• Aluminum housing	Aluminum die-casting AlSi10Mg, powder-coated (basis: Polyester)
• Stainless steel housing	316L precision casting, blasted
Degree of protection	
• Plastic housing	IEC 60529 IP66/IP 67, NEMA Type 4X
• Housing for panel mounting (mounted)	IEC 60529 IP40, NEMA Type 1
• Aluminum/stainless steel housing	IEC 60529 IP66/IP68 (0.2 bar), NEMA Type 6P
Power supply	
External loop power supply	35 V DC max.
Display	
Number of digits	5
Digit size	7 x 13 mm (0.28 x 0.51 inch)
Certificates and approvals	See the online PIA configuration tool for details.
Options	
Mounting	• Panel Mounting • Carrier rail mounting • Pipe mounting

Dimensional drawings

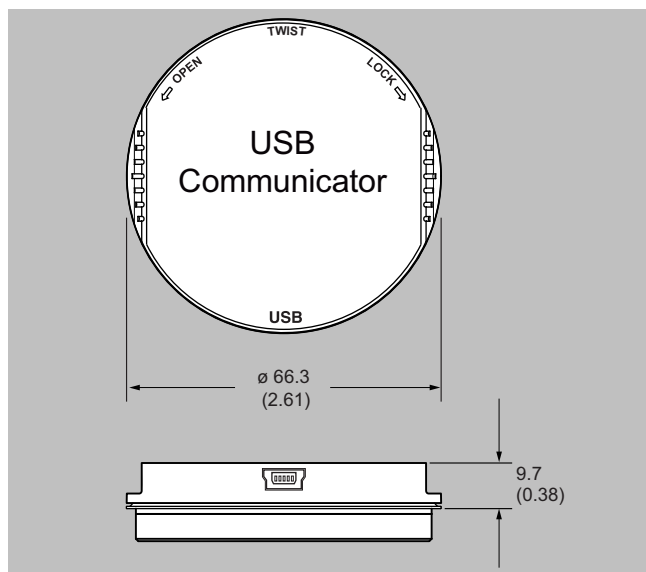
SITRANS RD150, aluminum/stainless steel housing



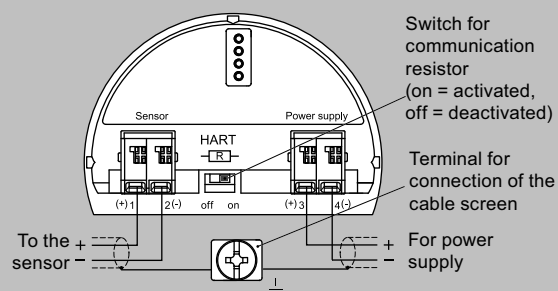
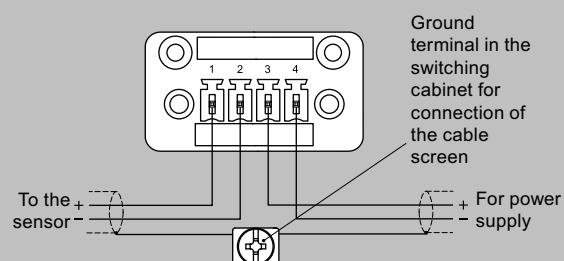
SITRANS RD150, plastic housing



SITRANS RD150, dimensions in mm (inch)

Dimensional drawings (continued)


USB Communicator, dimensions in mm (inch)

Circuit diagrams
Standard housing with 2 wire device

Panel mount


SITRANS RD150 connections

Weighing Electronics

Supplementary components

Displays / SITRANS RD200

Overview



The SITRANS RD200 is a universal input, panel mount remote digital display for process instrumentation.

Benefits

- Easy setup and programming via front panel buttons or remotely using RD software
- Display readable in sunlight
- Universal input: accepts current, voltage, thermocouple, and RTD signals
- Single or dual 24 V DC transmitter power supply
- Serial communication using built in protocol or Modbus RTU
- Two optional relays for alarm indication or process control applications
- Linear or square root function supported
- Meter Copy feature to reduce setup time, cost, and errors
- RD software supports remote configuration, monitoring, and logging for up to 100 displays
- Other features include: 4 to 20 mA analog output option, pump alternation control, and optional NEMA 4 and 4X field enclosures
- 2X option for 30.5 mm (1.2 inch) high, red LED display

Application

The RD200 is a universal remote display for level, flow, pressure, temperature, weighing, and other process instruments.

Data can be remotely collected, logged and presented from as many as 100 displays on your local computer using the free downloadable RD Software.

The display accepts a single input of current, voltage, thermocouple, and RTD. This makes the RD200 an ideal fit for use with most field instruments.

The RD200 can be set up as a standard panel mount, or combined with optional enclosures to allow it to house up to 6 displays.

- Key Applications: tank farms, pump alternation control, local or remote display of level, temperature, flow, pressure and weighing instrument values, PC monitoring, and data logging with RD Software.

Selection and ordering data

SITRANS RD200 Display Remote digital display for process instruments. With 4 to 20 mA, 0 to 10 V, RTD, and TC inputs and pump control. Panel mount with field mount enclosure options.			Article No. 7ML574- ● ● ● ● ● - ● A 0-						
Click on the Article No. for the online configuration in the PIA Life Cycle Portal.									
Input voltage									
85 ... 265 V AC, 50/60 Hz; 90 ... 265 V DC, 20 W max.				1					
12 ... 36 V DC; 12 ... 24 V AC, 6 W max.				2					
Transmitter supply									
None					A				
Single 24 V DC transmitter supply ¹⁾					B				
Dual 24 V DC transmitter supply ¹⁾²⁾					C				
Output									
None						A			
2 relays						B			
4 ... 20 mA output						C			
Communication									
Modbus RTU							0		
Approvals									
Ordinary Locations/General Purpose (Non-Ex), CE, UKCA, UL, cUL								1	
Display Size									
Standard									0
2X option for 30,5 mm (1.2 inch) high, red LED									1

¹⁾ Available with input voltage option 1 only.

²⁾ Available with output option C only.

Selection and Ordering data	Article No
Operating Instructions	
All literature is available to download for free, in a range of languages, at http://www.siemens.com/processinstrumentation/documentation	
Accessories	
SITRANS RD200 copy cable 2.1 m (7 ft)	7ML1930-1BR
SITRANS RD200 RS 232 serial adapter (copy cable included)	7ML1930-1BS
SITRANS RD200 RS 422/485 serial adapter (copy cable included)	7ML1930-1BT
RS 232 to RS 422/485 isolated converter	7ML1930-1BU
USB to RS 422/485 isolated converter	7ML1930-1BX
RD200 USB serial adapter	7ML1930-6AH
USB to RS 232 converter	7ML1930-6AK
Low cost polycarbonate plastic enclosure for 1 display	7ML1930-1CF
2 inch (5.08 cm) pipe mounting kit (stainless steel, Type 304, EN 1.4301) only available with 7ML1930-1CF	7ML1930-1BQ
<u>Thermoplastic enclosure</u>	
For use with 1 display	7ML1930-1CG

Selection and Ordering data	Article No
For use with 2 displays	7ML1930-1CH
For use with 3 displays	7ML1930-1CJ
For use with 4 displays	7ML1930-1CK
For use with 5 displays	7ML1930-1CL
For use with 6 displays	7ML1930-1CM
<u>Stainless steel enclosure (Type 304, EN 1.4301)</u>	
For use with 1 display	7ML1930-1CN
For use with 2 displays	7ML1930-1CP
For use with 3 displays	7ML1930-1CQ
For use with 4 displays	7ML1930-1CR
For use with 5 displays	7ML1930-1CS
For use with 6 displays	7ML1930-1CT
<u>Steel enclosure</u>	
For use with 1 display	7ML1930-1CU
For use with 2 displays	7ML1930-1CV
For use with 3 displays	7ML1930-1CW
For use with 4 displays	7ML1930-1CX
For use with 5 displays	7ML1930-1CY
For use with 6 displays	7ML1930-1DA

Weighing Electronics

Supplementary components

Displays / SITRANS RD200

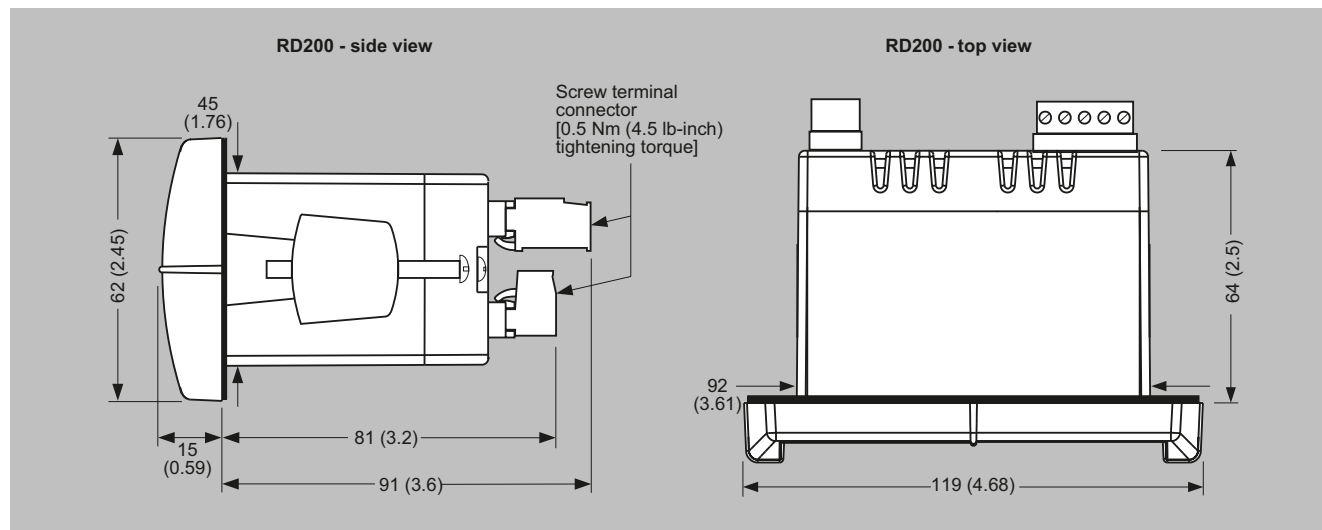
Technical specifications

SITRANS RD200	
Mode of operation	
Measuring principle	Analog to digital conversion
Measuring points	1 instrument - Remote monitoring of 100 instruments with PC and RD software
Input	
Measuring range	
• Current	• 4 ... 20 mA, 0 ... 20 mA
• Voltage	• 0 V DC ... 10 V DC, 1 ... 5 V, 0 ... 5 V
• Thermocouple temperature	- Type J: -50 ... +750 °C (-58 ... +1 382 °F) - Type K: -50 ... +1 260 °C (-58 ... +2 300 °F) - Type E: -50 ... +870 °C (-58 ... +1 578 °F) - Type T: -180 ... +371 °C (-292 ... +700 °F) - Type T, 0.1° resolution: -180.0 ... +371 °C (-199.9 ... +700 °F)
• RTD temperature	• 100 Ω RTD: -200 ... +750 °C (-328 ... +1 382 °F)
Output signal	
Output	4 ... 20 mA (optional) - Modbus RTU
Relays	2 SPDT Form C relays, rated 3 A at 30 V DC or 3 A at 250 V AC, non-inductive, auto-initializing (optional)
Communications	- RS 232 with PDC or Modbus RTU - RS 422/485 with PDC or Modbus RTU
Accuracy	
4 ... 20 mA optional output	± 0.1 % FS ± 0.004 mA
Process input	± 0.05 % of span ± 1 count, square root: 10 ... 100 % FS
Thermocouple temperature input	- Type J: ± 1 °C (± 2 °F) - Type K: ± 1 °C (± 2 °F) - Type E: ± 1 °C (± 2 °F) - Type T: ± 1 °C (± 2 °F) - Type T, 0.1° resolution: ± 1 °C (± 1.8 °F)
RTD temperature input	• 100 Ω RTD: ± 1 °C (± 1 °F)
Rated operating conditions	
Ambient conditions	
• Storage temperature range	-40 ... +85 °C (-40 ... +185 °F)
• Operating temperature range	-40 ... +65 °C (-40 ... +149 °F)
Design	
Weight	269 g (9.5 oz) (including options)
Material (enclosure)	1/8 DIN, high impact plastic, UL94V-0, color: gray - Optional plastic, steel and stainless steel (Type 304, EN 1.4301) NEMA 4 enclosures
Degree of protection	Type 4X, NEMA 4X, IP65 (front cover); panel gasket provided
Electrical connection	
mA output signal	2-core copper conductor, twisted, shielded, 0.82 ... 3.30 mm ² (18 ... 12 AWG), Belden 8 760 or equivalent is acceptable
Electrical connection and relay connection	Copper conductor according to local requirements, rated 3 A at 250 V AC
Power supply	
Input voltage option 1	85 ... 265 V AC, 50/60 Hz; 90 ... 265 V DC, 20 W max.
Input voltage option 2	12 ... 36 V DC; 12 ... 24 V AC, 6 W max.

Technical specifications (continued)

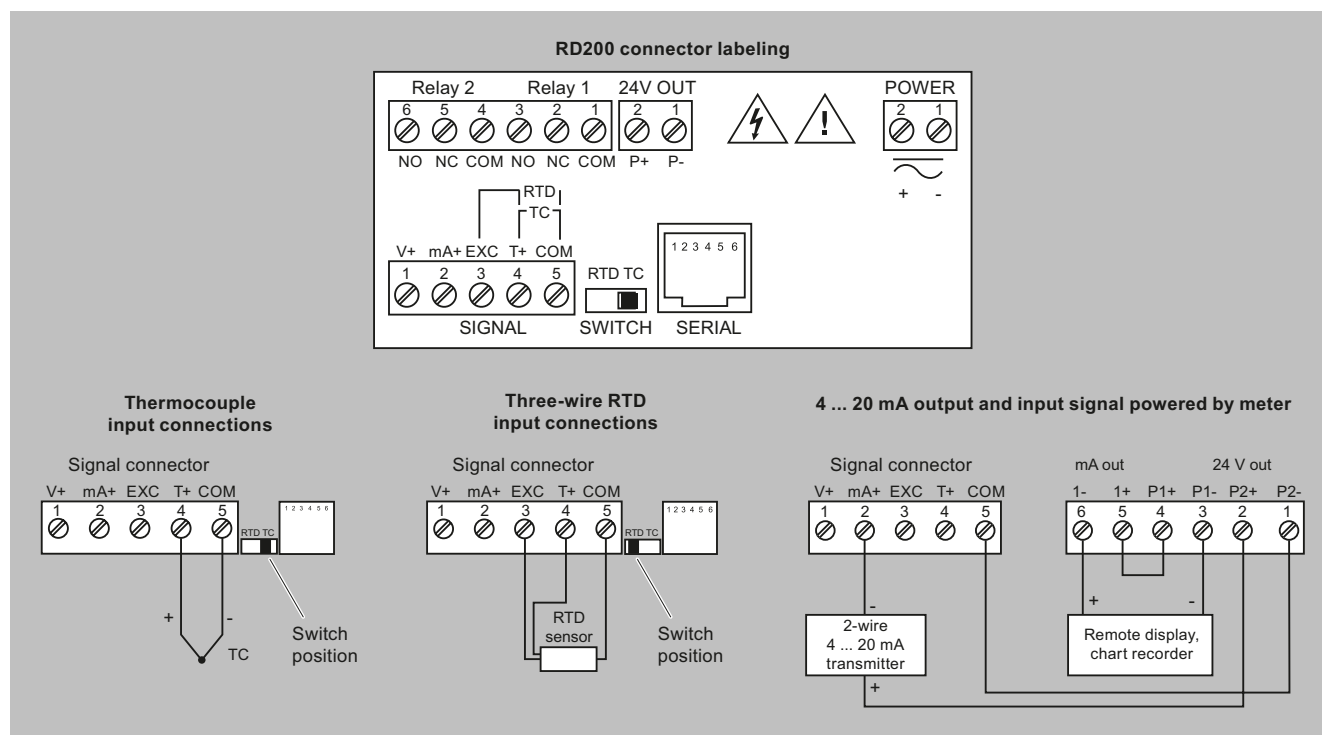
SITRANS RD200	
Transmitter power supply	One or two isolated transmitter power supplies (optional)
• Single power supply	One 24 V DC ± 10 % at 200 mA max.
• Dual power supplies	Two 24 V DC ± 10 % at 200 mA and 40 mA max.
External loop power supply	35 V DC max.
Output loop resistance	24 V DC, 10 ... 700 Ω max. 35 V DC (external), 100 ... 1 200 Ω max.
Displays and controls	
Display	14 mm (0.56 inch) high LED 2X option for 30.5 mm (1.2 inch) high, red LED - Numeric range from -1 999 ... +9 999 - Four digits, automatic lead zero blanking - Eight intensity levels
Memory	- Non-volatile - Stores settings for minimum of 10 years if power is lost
Programming	- Primary: front panel - Secondary: meter copy or PC with SITRANS RD software
Certificates and approvals	CE, UKCA, UL, cUL
Options	
Enclosures	Plastic, steel, and stainless steel (Type 304, EN 1.4301) NEMA 4 and 4X enclosures
Mounting	2 inch (5.08 cm) pipe mounting kit (zinc plated seal) 2 inch (5.08 cm) pipe mounting kit (stainless steel, Type 304, EN 1.4301)

Dimensional drawings



SITRANS RD200, dimensions in mm (inch)

Circuit diagrams



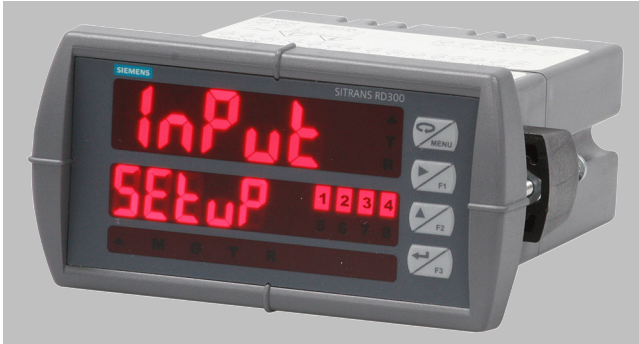
SITRANS RD200 connections

Weighing Electronics

Supplementary components

Displays / SITRANS RD300

Overview



The SITRANS RD300 is a panel mount remote digital display for process instrumentation and acts as a multi-purpose, easy to use, rate/totalizer ideal for flow rate, total, and control applications.

Benefits

- Easy setup and programming via front panel buttons or using free RD software available via USB drive
- Display readable in sunlight
- Input: accepts current and voltage
- Single or dual 24 V DC transmitter power supply
- Serial communication using built in protocol or Modbus RTU
- Supports up to 8 relays and 8 digital I/O for process control and alarming
- 32-Point linearization, square root or exponential linearization
- Multi-pump alternation control
- Supports total, grand total or non-resettable grand total
- 9-digit totalizer with total overflow feature
- Large dual-line, 6-digit display
- Configure, monitor, and datalog from a PC
- Dual-input option with math functions: addition, difference, average, multiplication, division, minimum, maximum, weighted average, ratio, concentration

Application

The RD300 is a remote display for level, flow, pressure, weighing, and other process instruments. This display also acts as a multi-purpose, easy to use rate/totalizer ideal for flow rate, total, and control applications.

Data can be remotely collected, logged and presented on your local computer using the free RD software available via USB drive.

The display accepts a single or dual input of current and voltage. This makes the RD300 an ideal fit for use with most field instruments.

The RD300 can be set up as a standard panel mount, or combined with optional enclosures to allow it to house up to 6 displays.

- Key Applications: tank farms, pump alternation control, local or remote display of level, flow, pressure and weighing instrument values, PC monitoring and data logging with RD Software.

Selection and ordering data

SITRANS RD300 Display		Article No.							
Remote digital panel mount process display with current or voltage inputs. Two input, multi-line display, totalizer and pump control.		7ML5744-	•	•	•	•	•	-	0 A
Click on the Article No. for the online configuration in the PIA Life Cycle Portal.									
Input voltage									
85 ... 265 V AC, 50/60 Hz; 90 ... 265 V DC, 20 W max.			1						
12 ... 36 V DC; 12 ... 24 V AC, 6 W max.			2						
Output									
None				A					
2 Relays				B					
4 Relays				C					
4 ... 20 mA output				D					
2 Relays and 4 ... 20 mA output				E					
4 Relays and 4 ... 20 mA output				F					
Type									
Single input process and flow rate/totalizer Mtr				A					
Dual input process Mtr				B					
Display									
Standard						0			
SunBright						1			
Approvals									
UL, cUL, and CE							0		

Selection and Ordering data	Article No.
Operating Instructions	
All literature is available to download for free, in a range of languages, at http://www.siemens.com/processinstrumentation/documentation	
Accessories	
DIN-Rail Mounting Kit	7ML1930-6AB
4 Relays Expansion Module	7ML1930-6AC
4 Digital I/O Module	7ML1930-6AD
Dual output 4 ... 20 mA expansion module for dual input meter	7ML1930-6AP
RD300 RS 232 Serial Adapter	7ML1930-6AF

Selection and Ordering data	Article No.
RD300 RS 422/485 Serial Adapter	7ML1930-6AG
RD300 USB Serial Adapter	7ML1930-6AJ
USB to RS 232 Converter	7ML1930-6AK
RS 232 to RS 422/485 isolated converter	7ML1930-1BU
USB to RS 422/485 isolated converter	7ML1930-1BX
Snubber	7ML1930-6AL
<u>Plastic enclosure</u>	
For 1 meter	7ML1930-6AM
For 2 meters	7ML1930-6AN
For 4 meters	7ML1930-1CK
For 5 meters	7ML1930-1CL
For 6 meters	7ML1930-1CM

Weighing Electronics

Supplementary components

Displays / SITRANS RD300

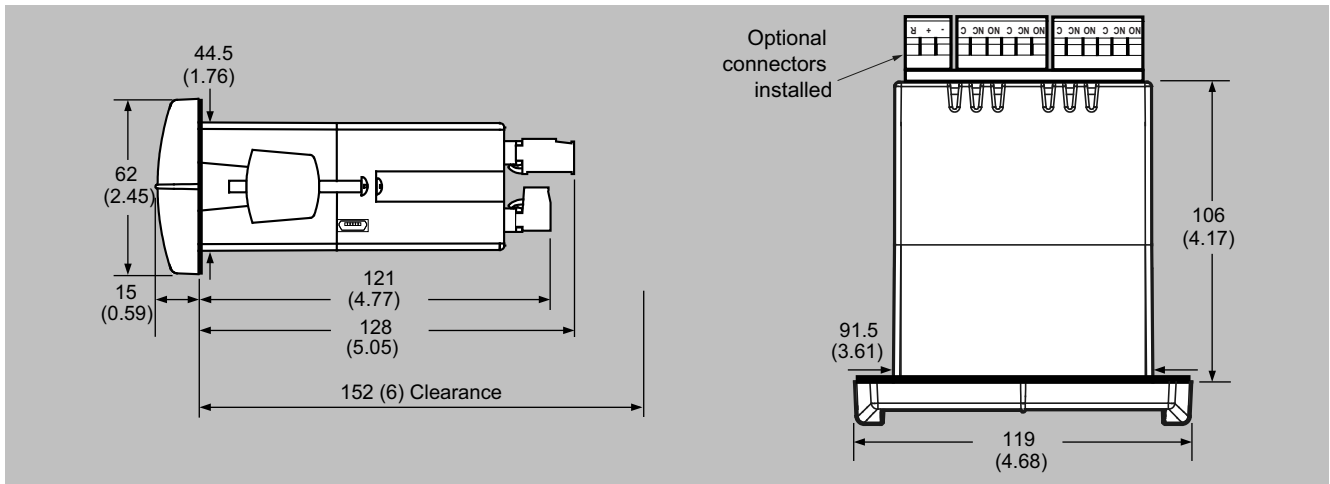
Technical specifications

SITRANS RD300	
Mode of operation	
Measuring principle	Analog to digital conversion
Measuring points	1 or 2 instruments
Input	
Measuring range	
• Current	4 ... 20 mA, 0 ... 20 mA
• Voltage	0 V DC ... +10 V DC, 1 ... 5 V, 0 ... 5 V
Output signal	
Output	• 4 ... 20 mA (optional) • Modbus RTU
Relays	2 or 4 SPDT (Form C) internal and/or 4 SPST (Form A) external; rated 3 A at 30 V DC and 125/250 V AC resistive load; 1/14 HP (50 W) at 125/250 V AC for inductive loads (optional)
Communications	• RS 232 with Modbus RTU • RS 422/485 with Modbus RTU • USB configuration and monitoring port
Accuracy	
4 ... 20 mA optional output	$\pm 0.1\%$ FS ± 0.004 mA
Process input	$\pm 0.05\%$ of span ± 1 count, square root: 10 ... 100 % FS
Rated operating conditions	
Ambient conditions	
• Storage temperature range	-40 ... +85 °C (-40 ... +185 °F)
• Operating temperature range	-40 ... +65 °C (-40 ... +149 °F)
Design	
Weight	269 g (9.5 oz) (including options)
Material (enclosure)	• 1/8 DIN, high impact plastic, UL94V-0, color: gray • Optional plastic, steel and stainless steel (Type 304, EN 1.4301) NEMA 4 enclosures
Degree of protection	Type 4X, NEMA 4X, IP65 (front cover); panel gasket provided
Electrical connection	
mA output signal	2-core copper conductor, twisted, shielded, 0.82 ... 3.30 mm ² (18 ... 12 AWG), Belden 8 760 or equivalent is acceptable
Electrical connection and relay connection	Copper conductor according to local requirements, rated 3 A at 250 V AC
Power supply	
Input voltage option	85 ... 265 V AC, 50/60 Hz; 90 ... 265 V DC, 20 W max. or jumper selectable 12/24 V DC $\pm 10\%$, 15 W max.
Transmitter power supply	Terminals P+ & P-: 24 V DC $\pm 10\%$, 12/24 V DC powered models selectable for 24, 10, or 5 V DC supply (internal jumper J4), 85 ... 265 V AC models rated at 200 mA max, 12/24 V DC powered models rated at 100 mA max., at 50 mA max. for 5 or 10 V DC supply.
External loop power supply	35 V DC max.
Output loop resistance	• 24 V DC, 10 ... 700 Ω max. • 35 V DC (external), 100 ... 1 200 Ω max.
Displays and controls	
Main display	0.6 inch (15 mm) high, red LEDs
Second display	0.46 inch (12 mm) high, red LEDs, 6-digits: each (-99 999 ... 999 999)

Technical specifications (continued)

SITRANS RD300	
Memory	• Non-volatile • Stores settings for minimum of 10 years if power is lost
Programming	• Primary: front panel • Secondary: Meter Copy or PC with SITRANS RD Software
Certificates and approvals	CE, UL, cUL
Options	
Enclosures	Plastic, steel and stainless steel (Type 304, EN 1.4301) NEMA 4 and 4X enclosures

Dimensional drawings



SITRANS RD300, dimensions in mm (inch)

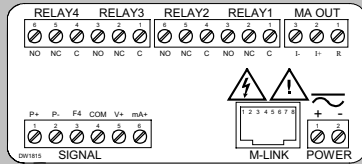
Weighing Electronics

Supplementary components

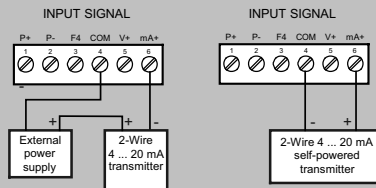
Displays / SITRANS RD300

Circuit diagrams

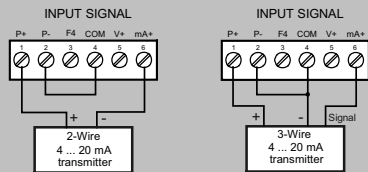
Connector labeling for fully loaded single input meter



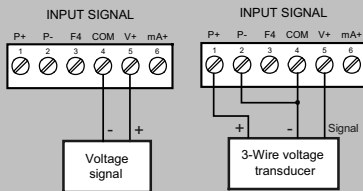
Transmitter powered by external supply or self-powered



Transmitter powered by internal supply



Voltage Input Connections



SITRANS RD300 connections

Overview



Configuration software for easy integration

For fast, simple integration of our weighing modules, we offer configuration packages for the SIMATIC S7 automation system and the SIMATIC PCS 7 process control system.

As well as the operating tools, both PCS 7 faceplates and function blocks make the commissioning and control of the SIWAREX weighing electronics as easy and convenient as conceivably possible.

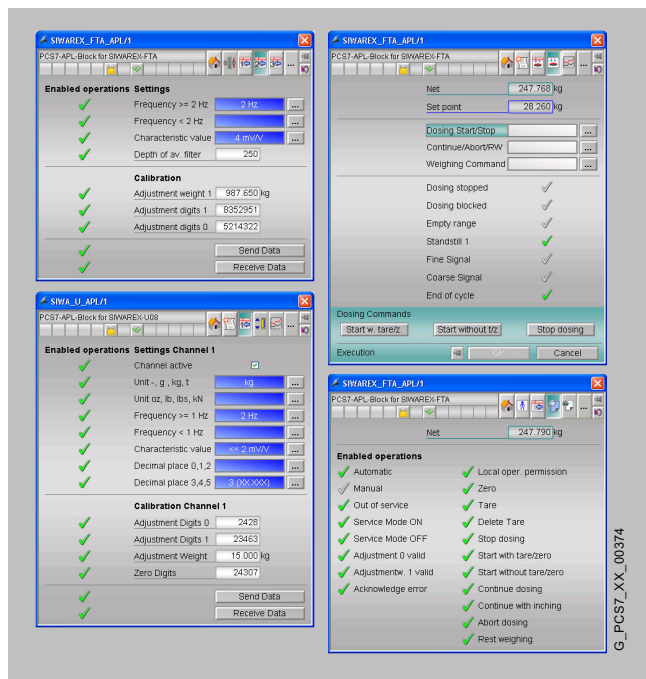
Tools and add-ons for Siemens weighing components

Our configuration packages enable straightforward data exchange between the SIMATIC S7 or SIMATIC PCS 7 automation system and our weighing modules. Integrated signaling behavior and maintenance functions such as the reading or writing of all weighing parameters enable high plant availability and correspondingly low downtimes.

Weighing Electronics Software

SIMATIC PCS 7 Add-ons

Overview



Level, proportioning, belt, and loss-in-weight scales in process engineering applications can be quickly and efficiently configured using pre-configured weighing blocks. The uniform design of the SIWAREX weighing controllers matching that of SIMATIC ET 200M or ET 200SP also enables easy and consistent wiring in the control cabinet.

For the SIMATIC PCS 7 process control system, Siemens offers the **SIWAREX PCS 7 AddOn Library** with function blocks for the SIWAREX U, SIWAREX FTA, SIWAREX FTC and SIWAREX WP321 weighing controllers. These weighing blocks are suitable for both standard and fault-tolerant automation systems. In high-availability automation systems, the singularly installed SIWAREX U/FTA/FTC/WP321 can be accessed via both subsystems.

The weighing blocks supplied with the faceplate not only allow the rational integration of the SIWAREX U/FTA/FTC/WP321 weighing controllers into the engineering system, they also enable user-friendly operation and commissioning of the scales via the SIMATIC PCS 7 operator stations. Integrated signaling behavior and maintenance functions such as the reading or writing of all scale parameters ensure short standstill times and help to increase the availability.

The pixel-graphics engineering with the CFC editor is very clear and easy to use. The use of prepared blocks also eliminates possible sources of errors and reduces the configuration costs.

The SIWAREX PCS 7 AddOn Library also supports communication via PROFINET.

Note:

The function blocks and faceplates for the weighing controllers can be used together with SIMATIC PCS 7 V8.x and V9.0.

For SIMATIC PCS 7 V8.x, configuration packages are still available in the style of the PCS 7 Standard Library for SIWAREX U and SIWAREX FTA.

Design

Product overview SIWAREX configuration packages for SIMATIC PCS 7 and the associated weighing controller

Configuration packages, variants	Associated hardware (SIWAREX weighing controller)	Article number	
SIWAREX U (platform weighing machine/level measurement) - SIWAREX PCS 7 AddOn Library for SIMATIC PCS 7 V8.x and V9.0, PCS 7 Advanced Process Library (APL) design - Configuration package SIWAREX U for SIMATIC PCS 7 V8.x, PCS 7 Standard Library design	SIWAREX U (1-channel), in design of ET 200M SIWAREX U (2-channel), in design of ET 200M	7MH4950-1AA01 7MH4950-2AA01	
SIWAREX FTA (automatic dosing and filling scales) - SIWAREX PCS 7 AddOn Library for SIMATIC PCS 7 V8.x and V9.0, PCS 7 Advanced Process Library (APL) design - SIWAREX FTA configuration package for SIMATIC PCS 7 V8.x, PCS 7 Standard Library design	SIWAREX FTA, in design of ET 200M	7MH4900-2AA01	
SIWAREX FTC_B (conveyor scales) SIWAREX PCS 7 AddOn Library for SIMATIC PCS 7 V8.x and V9.0, PCS 7 Advanced Process Library (APL) design	SIWAREX FTC, with ET 200M design	7MH4900-3AA01	
SIWAREX FTC_L (differential proportioning weigher) SIWAREX PCS 7 AddOn Library for SIMATIC PCS 7 V8.x and V9.0, PCS 7 Advanced Process Library (APL) design			
SIWAREX WP321 (platform weighing machine/level measurement) SIWAREX PCS 7 AddOn Library for SIMATIC PCS 7 V8.x and V9.0, PCS 7 Advanced Process Library (APL) design	SIWAREX WP321, in design of ET 200SP	7MH4138-6AA00-0BA0	

Weighing Electronics

Software

SIMATIC PCS 7 Add-ons

Selection and ordering data

SIWAREX PCS 7 AddOn Library	
SIWAREX PCS 7 AddOn Library for SIMATIC PCS 7 V8.x and V9.0 Consisting of function blocks, faceplates and manual, 2 languages (English, German), engineering license for SIWAREX weighing modules, single license for 1 installation	7MH4900-1AK61
• APL faceplates and function blocks for - SIWAREX U - SIWAREX FTA - SIWAREX FTC_B (conveyor scales) - SIWAREX WP321 • Classic faceplate and function block for - SIWAREX FTC_L (loss in weight) Engineering and runtime software, software class A Type of delivery: Software and electronic documentation on CD, engineering license (Certificate of License)	
SIWAREX PCS 7 AddOn Library for SIMATIC PCS 7 V8.1 (or higher), V9.0 and V9.1 consisting of function blocks. Single license for 1 installation	7MH4900-1AK62
• APL faceplates and function blocks for - SIWAREX U - SIWAREX FTA - SIWAREX FTC - SIWAREX WP321 - SIWAREX WP341 - SIWAREX WP351 Engineering and runtime software, software class A Type of delivery: software. Email address is essential for delivery	
Associated hardware	
SIWAREX U weighing controller • SIWAREX U (1-channel)¹⁾ • SIWAREX U (2-channel)¹⁾	7MH4950-1AA01 7MH4950-2AA01
SIWAREX FTA weighing controller SIWAREX FTA ¹⁾	7MH4900-2AA01
SIWAREX FTC weighing controller SIWAREX FTC ¹⁾	7MH4900-3AA01
SIWAREX WP321 weighing controller SIWAREX WP321 ¹⁾	7MH4138-6AA00-0BA0

¹⁾ For further accessories (ground terminal, etc.), refer to the corresponding Equipment Manual.

More information

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 You can find additional information on the Internet at:
<http://www.siemens.com/weighing-technology>

Overview

SIWATOOL is a service software tool which enables you to calibrate the module quickly and efficiently on site, set or reset parameters, and perform diagnostics in the event of a fault. Furthermore, complete backup files can be created for the scales before module replacement. These can be uploaded to the new module with a few mouse clicks, so that it operates exactly the same as at the point of backup of the old module without the need for any recalibration. It is even possible to upload configuration files that were created off-line and to read out the error buffer. No special SIMATIC knowledge is required to use SIWATOOL.

Benefits

- No special SIMATIC knowledge is required
- Fast adjustment and definition of parameters

Selection and ordering data

	Article No.
SIWATOOL V4 & V7 Service and commissioning software for SIWAREX weighing modules	7MH4900-1AK01
Ethernet cable patch cord 2 m (7 ft) For connection of SIWAREX WP2xx and 5xx to a PC	6XV1850-2GH20
SIWATOOL connection cable For connecting SIWAREX U/CS to a PC (RS 232), length 3 m (9.84 ft)	7MH4607-8CA
SIWATOOL connection cable For connection of SIWAREX FTx to a PC (RS 232)	
• Length: 2 m (6.56 ft)	7MH4702-8CA
• Length: 5 m (16.40 ft)	7MH4702-8CB