

## 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, check weigher, bagging and filling scale.

All operating 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 and processing time
- Installation of legal-for-trade multi-interval/multi-range scales with up to  $3 \times 6\,000$  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 check weighers, requiring official calibration/not requiring official calibration
- Automatic dynamic check weighers, 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.

## Weighing Electronics

SIWAREX weighing electronics for SIMATIC  
Dosing/filling/bagging and checking scales

### SIWAREX WP351

#### 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% v.E.
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

SIWAREX WP351	
Accuracy delivery state	Typ. 0.1% v.E.
The accuracy is relevant for module exchange or theoretical adjustment	
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
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
• With SIWAREX IS Ex-i interface	Lower impedance by means of external supply possible 87 Ω @ type 7MH4710-5BA 180 Ω @ type 7MH4710-5CA
Max. DMS resistance	4 100 Ω
Temperature coefficient range	≤ ±5 ppm/K
Temperature coefficient zero point	≤ ±0.015 μV/K
Linearity error	≤ 0.0025%
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 <sup>6</sup> Ω
• Sense line	Typ. 300*10 <sup>6</sup> 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 meters 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.

Selection and ordering data	Article No.	Article No.
<b>TM SIWAREX WP351 weighing module</b> SIMATIC ET 200SP, TM SIWAREX WP351 HF, legal-for-trade weighing module for automatic dosing and filling scales, check weighers and totalizing weighing instruments	7MH4138-6BA00-0CU0	
<b>SIWAREX WP351 Equipment Manual</b> Available in a range of languages Free download on the Internet at: <a href="http://www.siemens.com/weighing/documentation">http://www.siemens.com/weighing/documentation</a>		
<b>SIWAREX WP351 "Getting Started" sample project</b> Sample software shows beginners how to program the scales in TIA Portal V15.1 Free download on the Internet at: <a href="http://www.siemens.com/weighing/documentation">http://www.siemens.com/weighing/documentation</a>		
<b>SIWAREX WP351 legal-for-trade verification set</b> For verification of up to 3 scales consisting of 3 x labeling film for descriptive plate, 1 x protection film, 3 x unlocking device, 6 x screw. Attention: For legal trade applications please follow the local laws applying in the country of verification.		
<b>ET 200SP BaseUnit type U0</b> <ul style="list-style-type: none"> <li>For constructing a new potential group (white)</li> <li>For continuing an existing potential group (gray)</li> </ul>	6ES7193-6BP00-0DU0 6ES7193-6BP00-0BU0 6ES7193-6SC00-1AM0	
<b>SIWAREX JB junction box, aluminum housing</b> For connecting up to 4 load cells in parallel, and for connecting multiple junction boxes.	7MH5001-0AA20	
<b>SIWAREX JB junction box, stainless steel housing</b> For connecting up to 4 load cells in parallel.	7MH5001-0AA00	
<b>SIWAREX JB junction box, stainless steel housing (ATEX)</b> For parallel connection of up to 4 load cells (for zone allocation, see manual or type-examination certificate).	7MH5001-0AA01	
<b>SIWAREX IS Ex interface</b> 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. <ul style="list-style-type: none"> <li>With short-circuit current &lt; 199 mA DC</li> <li>With short-circuit current &lt; 137 mA DC</li> </ul>	7MH4710-5BA 7MH4710-5CA	
		<b>Cable (optional)</b> <b>Cable Li2Y 1 x 2 x 0.75 ST + 2 x (2 x 0.34 ST) – CY</b> For connecting SIWAREX electronic weighing systems to junction box (JB), extension box (EB) and Ex interface or between two EBs. 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. <ul style="list-style-type: none"> <li>Sheath color: orange</li> <li>For hazardous atmospheres. Sheath color: blue.</li> </ul>
		<b>Commissioning</b> <b>Commissioning charge for one static scale with SIWAREX module</b> (Flat charge for travel and setup must be ordered separately)
		7MH4702-8AG 7MH4702-8AF 9LA1110-8SN50-0AA0
		Scope: <ul style="list-style-type: none"> <li>Recording of data</li> <li>Checking of mechanical installation of the scale</li> <li>Checking of electrical wiring and function</li> <li>Static adjustment of the scale</li> </ul> Requirements: <ul style="list-style-type: none"> <li>Mechanical design functional</li> <li>Modules electrically wired and tested</li> <li>Calibration weights available</li> <li>Free access to scale</li> </ul>
		<b>Flat charge for travel and setup in Germany</b> 9LA1110-8RA10-0AA0