## 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.

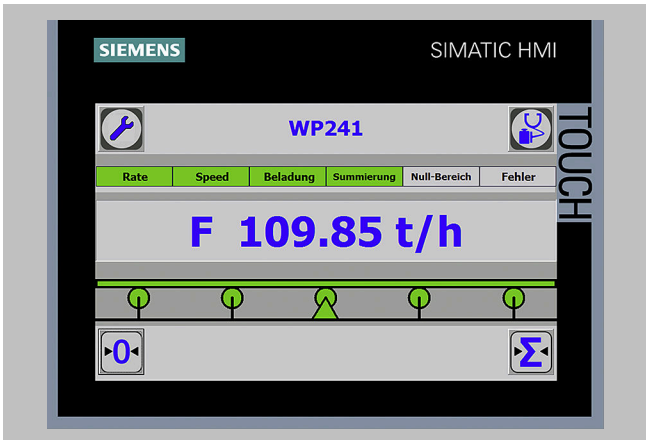
### *Monitoring the scale signals and states*

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.

### *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.

## Function (Continued)



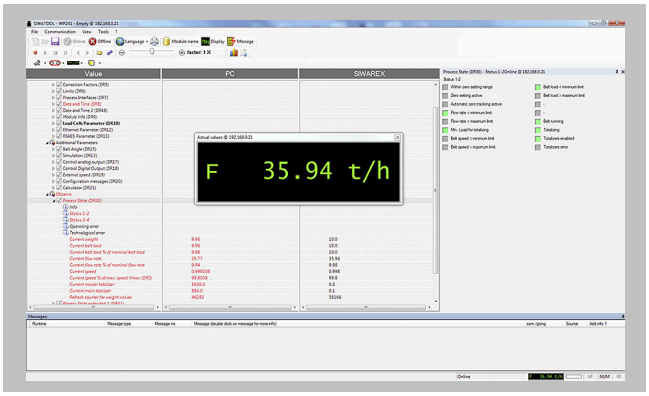

SIWAREX WP241 "Ready-for-use"

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




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.

## Function (Continued)

### *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**<br>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**<br>Available in a range of languages<br>Free download on the Internet at: http://www.siemens.com/weighing/documentation | |
| **SIWAREX WP241 "Ready-for-use"**<br>Complete software package for belt scale (for S7-1200 and a directly connected operator panel)<br>Free download on the Internet at: http://www.siemens.com/weighing/documentation | |
| **SIWATOOL V4 & V7**<br>Service and commissioning software for SIWAREX weighing modules | 7MH4900-1AK01 |
| **Ethernet cable patch cord 2 m (7 ft)**<br>For connecting SIWAREX WP241 to a PC (SIWATOOL), SIMATIC CPU, panel, etc. | 6XV1850-2GH20 |
| **Accessories** | |
| **SIWAREX EB extension box**<br>For extending sensor cables | 7MH4710-2AA |
| **SIWAREX JB junction box, aluminum housing**<br>For connecting up to 4 load cells in parallel, and for connecting multiple junction boxes | 7MH5001-0AA20 |
| **SIWAREX JB junction box, stainless steel housing**<br>For connecting up to 4 load cells in parallel | 7MH5001-0AA00 |
| **SIWAREX JB junction box, stainless steel housing (ATEX)**<br>For parallel connection of up to 4 load cells (for zone allocation, see manual or type-examination certificate) | 7MH5001-0AA01 |
| **SIWAREX IS Ex interface**<br>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 × 2 × 0.75 ST + 2 × (2 × 0.34 ST) – CY**<br>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.<br>External diameter: approx. 10.8 mm (0.43 inch)<br>Permissible ambient temperature -40 ... +80 °C (-40 ... +176 °F)<br>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** |

## 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<br>• RS 485 (Modbus RTU)<br>• Ethernet (SIWATOOL V7, Modbus TCP/IP)<br>• Analog output 0/4 - 20 mA<br>• 4 × digital outputs, 24 V DC, floating, short-circuit proof<br>• 4 × digital inputs 24 V DC, floating |
| **Commissioning options** | • Using SIWATOOL V7<br>• Using function block in SIMATIC S7-1200 CPU / Touch Panel<br>• Using Modbus TCP/IP<br>• 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<br>• Belt load<br>• Material flow rate<br>• Accumulated total<br>• Main total<br>• Free totals 1 ... 4<br>• Belt speed |
| Limits (min/max) | • Belt load<br>• Material flow rate<br>• Belt speed |

## Technical specifications (Continued)

| SIWAREX WP241 | |
|---|---|
| **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<br>• UL<br>• EAC<br>• KCC<br>• RCM |
| **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**<br>$T_{min\ (IND)}$ ... $T_{max(IND)}$ (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) |