

## 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  $\pm 4$  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 used for the weight calculation. The signal can also be digitally filtered if required.

##### 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.

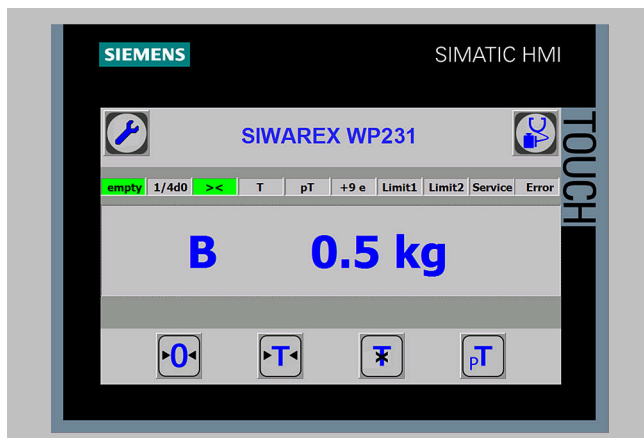
A PC for configuring the SIWAREX WP231 can be connected to the Ethernet interface.

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.

## Function (Continued)



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.

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.

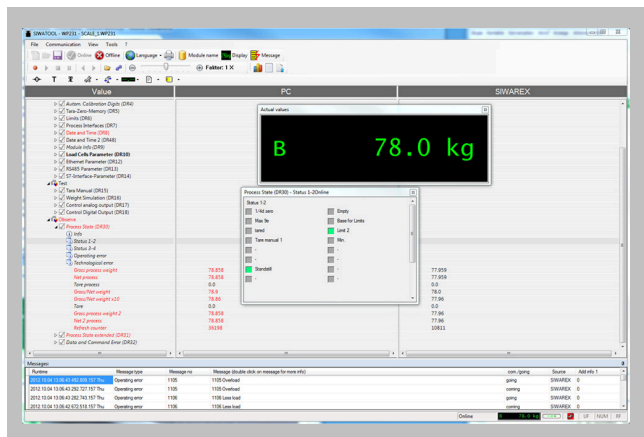
## Software

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

## Function (Continued)

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.

## Selection and ordering data

|  | Article No.   |
|--|---------------|
| <b>SIWAREX WP231 weighing electronics</b><br>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 |
| <b>SIWAREX S7-1200 Equipment Manual</b><br>Available in a range of languages<br>Free download on the Internet at: <a href="http://www.siemens.com/weighing/documentation">http://www.siemens.com/weighing/documentation</a>  |               |
| <b>SIWAREX WP231 "Ready-for-use"</b><br>Complete software package for non-automatic weighing instrument (for S7-1200 and a directly connected operator panel)<br>Free download on the Internet at: <a href="http://www.siemens.com/weighing/documentation">http://www.siemens.com/weighing/documentation</a> |               |
| <b>SIWAREX WP231 "Ready-for-use - legal-for-trade"</b><br>Software package for non-automatic weighing instruments for S7-1200 requiring official calibration<br>Free download on the Internet at: <a href="http://www.siemens.com/weighing/documentation">http://www.siemens.com/weighing/documentation</a>  |               |
| <b>Software SecureDisplay</b><br>Software for a legal trade display on Windows CE-based Panel. SIMATIC Basic and Key Panels are excluded<br>Free download on the Internet at: <a href="http://www.siemens.com/weighing/documentation">http://www.siemens.com/weighing/documentation</a>                      |               |
| <b>SIWATOOL V4 &amp; V7</b><br>Service and commissioning software for SIWAREX weighing modules   | 7MH4900-1AK01 |
| <b>Calibration set for SIWAREX WP2xx</b><br>Valid for SIWAREX WP231 and SIWAREX WP251.<br>For verification of up to 3 scales, comprising:<br>• 3 x inscription foils for ID label<br>• 1 x protective film<br>• 3 x calibration protection plates  | 7MH4960-0AY10 |

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##### Selection and ordering data (Continued)

|   | Article No.                |
|---|----------------------------|
| <ul style="list-style-type: none"> <li>Guidelines for verification, certificates and approvals, editable label, SIWAREX WP</li> </ul>   |                            |
| <b>Ethernet cable patch cord 2 m (7 ft)</b><br>For connecting SIWAREX WP231 to a PC (SIWATOOL), SIMATIC CPU, panel, etc.  | 6XV1850-2GH20              |
| <b>Accessories</b>  |                            |
| <b>SIWAREX EB extension box</b><br>For extending sensor cables  | 7MH4710-2AA                |
| <b>SIWAREX JB junction box, aluminum housing</b><br>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><br>For connecting up to 4 load cells in parallel  | 7MH5001-0AA00              |
| <b>SIWAREX JB junction box, stainless steel housing (ATEX)</b><br>For parallel connection of up to 4 load cells (for zone allocation, see manual or type-examination certificate)   | 7MH5001-0AA01              |
| <b>SIWAREX DB digital terminal box</b><br>For enhanced diagnostic and monitoring options in conjunction with SIWAREX WP electronics   | 7MH5001-0AD20              |
| <b>SIWAREX IS Ex interface</b><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. <ul style="list-style-type: none"> <li>Short-circuit current &lt; 199 mA DC</li> <li>Short-circuit current &lt; 137 mA DC</li> </ul>   | 7MH4710-5BA<br>7MH4710-5CA |
| <b>Cable (optional)</b>   |                            |
| <b>Cable Li2Y 1 × 2 × 0.75 ST + 2 × (2 × 0.34 ST) – CY</b><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. <ul style="list-style-type: none"> <li>Sheath color: orange</li> <li>Sheath color (for hazardous atmospheres): blue</li> </ul> | 7MH4702-8AG<br>7MH4702-8AF |
| <b>Ground terminal for connecting the load cell cable shield to the grounded DIN rail</b>   | 6ES5728-8MA11              |
| <b>Remote display (optional)</b><br>The digital remote displays can be connected directly to the SIWAREX WP231 via the RS 485 interface.<br>Suitable remote display: S102   |                            |

##### Selection and ordering data (Continued)

|   | Article No. |
|---|-------------|
| <b>Siebert Industrieelektronik GmbH</b><br>PO Box 1180<br>D-66565 Eppelborn<br>Tel.: +49 6806/980-0<br>Fax: +49 6806/980-999<br><br><a href="http://www.siebert-group.com/en">http://www.siebert-group.com/en</a><br>Detailed information is available from the manufacturer. |             |

##### Technical specifications

| SIWAREX WP231   |  |
|---|--|
| <b>Integration in automation systems</b><br>S7-1200<br>Operator panel and/or automation systems from other vendors  | SIMATIC S7-1200 system bus<br>Via Ethernet (Modbus TCP/IP) or RS 485 (Modbus RTU)  |
| <b>Communication interfaces</b>   | <ul style="list-style-type: none"> <li>SIMATIC S7-1200 backplane bus</li> <li>RS 485 (Modbus RTU, Siebert remote display)</li> <li>Ethernet (SIWATOOL V7, Modbus TCP/IP)</li> <li>Analog output 0/4 ... 20 mA</li> <li>4 × digital outputs 24 V DC, floating, short-circuit proof</li> <li>4 × digital inputs 24 V DC, floating</li> </ul> |
| <b>Commissioning options</b>  | <ul style="list-style-type: none"> <li>Using SIWATOOL V7</li> <li>Using function block in SIMATIC S7-1200 CPU / Touch Panel</li> <li>Using Modbus TCP/IP</li> <li>Using Modbus RTU</li> </ul>  |
| <b>Measuring accuracy</b><br>EC type approval as non-automatic weighing instrument, trade class III<br>Error limit according to DIN 1319-1 of full-scale value at 20 °C ± 10 K (68 °F ± 10 K)<br>Internal resolution<br>Measuring frequency | 3000 d ± 0.5 µV/e<br>0.05%<br>Up to ± 4 million parts<br>100 / 120 Hz  |
| <b>Digital filter</b>   | Variable adjustable low-pass and average filter  |
| <b>Typical applications</b>   | <ul style="list-style-type: none"> <li>Non-automatic weighing instruments</li> <li>Force measurements</li> <li>Fill-level monitoring</li> <li>Belt tension monitors</li> </ul>   |
| <b>Weighing functions</b><br>Weight values<br>Limit values<br>Zeroing<br>Tare<br>Tare specification   | <ul style="list-style-type: none"> <li>Gross</li> <li>Net</li> <li>Tare</li> <li>2 × min/max</li> <li>Empty</li> <li>Per command</li> <li>Per command</li> <li>Per command</li> </ul>  |
| <b>Load cells</b>   | Full-bridge strain gauges in 4-wire or 6-wire system   |
| <b>Load cell powering</b><br>Supply voltage (regulated via feedback)<br>Permissible load resistance<br>• R <sub>Lmin</sub><br>• R <sub>Lmax</sub><br>With SIWAREX IS Ex interface<br>• R <sub>Lmin</sub>                                    | 4.85 V DC<br>> 40 Ω<br>< 4 100 Ω<br>> 50 Ω   |

## Technical specifications (Continued)

| SIWAREX WP231   |   |
|---|---|
| • $R_{Lmax}$  | < 4 100 $\Omega$  |
| 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)  |
| Approvals/certificates  | <ul style="list-style-type: none"> <li>• ATEX Zone 2</li> <li>• UL</li> <li>• EAC</li> <li>• KCC</li> <li>• RCM</li> <li>• OIML R76</li> <li>• Type approval 2009/23/EC (NAWI)</li> </ul> |
| Calibration approval  | EC type approval OIML R76   |
| 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   |   |
| $T_{min(IND)}$ ... $T_{max(IND)}$ (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)  |