

## 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.   |
|--|---------------|
| <b>SIWAREX U</b><br>For SIMATIC S7 and ET 200M, incl. bus connector, weight 0.3 kg (0.661 lb)  |               |
| Single-channel version <sup>1)</sup> for connecting one scale                                  | 7MH4950-1AA01 |
| Two-channel version <sup>2)</sup> for connecting two scales                                    | 7MH4950-2AA01 |
| <b>SIWATOOL V4 &amp; V7</b><br>Service and commissioning software for SIWAREX weighing modules | 7MH4900-1AK01 |
| <b>SIWAREX U configuration package for PCS 7, version 8.0</b><br>Suitable for 7MH4950-xAA01    | 7MH4950-3AK62 |
| • Function block for CFC   |               |
| • Faceplate  |               |
| • Manual   |               |

## Selection and ordering data (Continued)

|  | Article No.  |
|--|--|
| <b>SIWAREX PCS 7 AddOn Library for PCS 7 V8.x and V9.0</b><br>Supports PROFINET<br>APL faceplates and function blocks for:   | 7MH4900-1AK61  |
| <ul style="list-style-type: none"> <li>• SIWAREX U</li> <li>• SIWAREX FTA</li> <li>• SIWAREX FTC_B (belt scale)</li> <li>• SIWAREX WP321</li> </ul> Classic faceplate and function block for: <ul style="list-style-type: none"> <li>• SIWAREX FTC_L (Loss-in-weight)</li> </ul> |  |
| <b>SIWATOOL connection cable</b><br>From SIWAREX U/CS with serial PC interface, for 9-pin PC interfaces (RS 232), length 3 m (9.84 ft)   | 7MH4607-8CA  |
| <b>Installation material (mandatory)</b>   |  |
| <b>20-pin front connector with screw contacts</b><br>Required for each SIWAREX module  | 6ES7392-1AJ00-0AA0   |
| <b>Shield connection element</b><br>Sufficient for two SIWAREX U modules   | 6ES7390-5AA00-0AA0   |
| <b>Shield connection clamp</b><br>Content: 2 units (suitable for cable with diameter 4 ... 13 mm / 0.16 ... 0.51 inch)<br>Note:<br>One shield connection clamp is required for each of the following:  | 6ES7390-5CA00-0AA0   |
| <ul style="list-style-type: none"> <li>• Scale connection</li> <li>• RS 485 interface</li> <li>• RS 232 interface</li> </ul>   |  |
| <b>S7 DIN rail</b>   |  |
| <ul style="list-style-type: none"> <li>• 160 mm (6.30 inch)</li> <li>• 480 mm (18.90 inch)</li> <li>• 530 mm (20.87 inch)</li> <li>• 830 mm (32.68 inch)</li> <li>• 2 000 mm (78.74 inch)</li> </ul>   | 6ES7390-1AB60-0AA0<br>6ES7390-1AE80-0AA0<br>6ES7390-1AF30-0AA0<br>6ES7390-1AJ30-0AA0<br>6ES7390-1BC00-0AA0 |
| <b>Accessories (optional)</b>  |  |
| <b>Labeling strips</b><br>(10 units, spare part)   | 6ES7392-2XX00-0AA0   |
| <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 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.   |  |

## Selection and ordering data (Continued)

|  | Article No.                    |
|--|--------------------------------|
| <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<br><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><br>7MH4702-8AF |
| <b>Remote displays (optional)</b><br>The digital remote displays can be connected directly to SIWAREX U through a TTY interface.<br>The following remote displays can be used: S102, S302<br><br><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>Internet: <a href="http://www.siebert-group.com/en">http://www.siebert-group.com/en</a><br>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.

## Technical specifications

| SIWAREX U  |  |
|--|--|
| <b>Integration in automation systems</b>   |  |
| <ul style="list-style-type: none"> <li>• S7-300</li> <li>• S7-1500</li> <li>• S7-400 (H)</li> <li>• PCS 7 (H)</li> <li>• Automation systems from other vendors</li> <li>• Stand-alone (without SIMATIC CPU)</li> </ul> | Direct integration<br>Through ET 200M<br>Through ET 200M<br>Through ET 200M<br>Through ET 200M<br>Possible with IM 153-1 |
| <b>Communication interfaces</b>  | <ul style="list-style-type: none"> <li>• SIMATIC S7 (P bus)</li> <li>• RS 232</li> <li>• TTY</li> </ul>                  |
| <b>Connection of remote display (via serial TTY interface)</b>   | Gross, channel 1, 2 or default value 1, 2  |
| <b>Scale adjustment</b>  | Through SIMATIC (P bus) or PC using SIWATOOL U (RS 232)  |
| <b>Measuring properties</b>  |  |
| 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   |

# Weighing Electronics

## SIWAREX for SIMATIC

### Plattform and hopper scales / SIWAREX U weighing electronics

#### Technical specifications (Continued)

|   |   |
|---|---|
| <b>SIWAREX U</b>  |   |
| 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   |
| <b>Weighing functions</b>                                   |   |
| Weight values   | Gross   |
| Limit values  | 2 (min./max.)   |
| Zero-setting function                                       | Per command   |
| Load cells  | Strain gauges in 4-wire or 6-wire system  |
| <b>Load cell powering</b>                                   |   |
| Supply voltage $U_s$ (rated value)                          | 6 V DC <sup>1)</sup>  |
| 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                                 | <ul style="list-style-type: none"> <li>• 500 m<sup>2)</sup></li> <li>• 150/500 m for gas group IIC</li> <li>• 500 m<sup>2)</sup> for gas group IIB (see SIWAREX IS Manual)</li> </ul> |
| Intrinsically-safe load cell powering                       | Optional (Ex interface) with SIWAREX IS   |
| <b>Auxiliary power supply</b>                               |   |
| 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 <sub>US</sub> Haz. Loc.  |
| IP degree of protection to EN 60529; IEC 60529              | IP20  |
| <b>Climatic requirements</b>                                |   |
| $T_{min}$ (IND) ... $T_{max}$ (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)   |

<sup>1)</sup> Load cell supply changed to 6 V DC as compared to 7MH4601-1AA01 and 7MH4601-1BA01.

<sup>2)</sup> Possible up to 1 000 m under certain conditions when using the recommended cable (accessories).