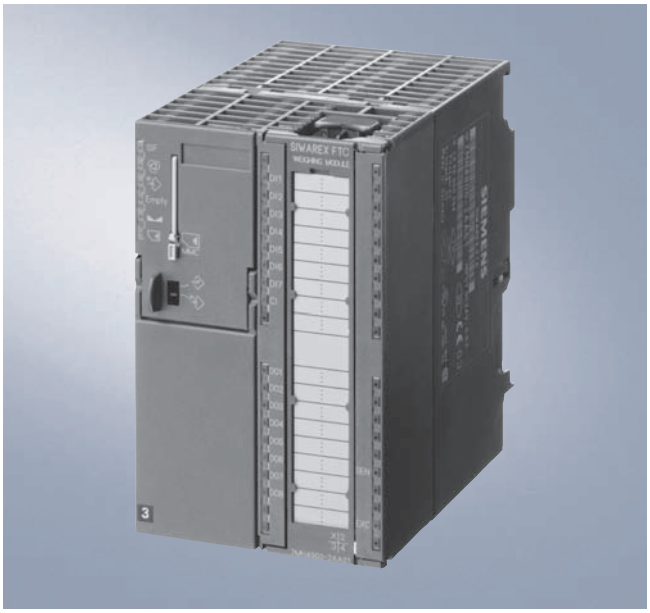
SIWAREX FTC

Overview



SIWAREX FTC weighing module

The SIWAREX FTC (Flexible Technology for Continuous Weighing) is a versatile and flexible weighing module for conveyor scales. It can also be used to record weights and measure force. The SIWAREX FTC function module is integrated in SIMATIC S7/PCS7, and uses the features of this modern automation system, such as integral communication, diagnostics and configuration tools.

Note: Start of delivery 12/2004.

Benefits

- Uniform design, and totally integrated communication through integration 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 via ET 200M
- Measurement of weight or force with high resolution of 16 million intervals
- High accuracy 3 x 6000 d, legal-for-trade OIML R-76
- Display with SIMATIC standard operator panels
- Parameterizable inputs and outputs
- Parameterizable for highly versatile situations
- Flexible adaptation to different requirements with SIMATIC
- Simple adjustment of scale using the SIWATOOL FTC program
- Replacement of module without renewed adjustment of scale
- Recording of weighing sequence
- 8 totalization memories with different digit intervals
- Use possible in Ex applications

Application

The SIWAREX FTC weighing module is the optimum solution wherever high demands are placed on the conveyor scale. As a result of its exceptional measuring properties, weights can be measured at high accuracy in up to three ranges. With force measurements, the value can be recorded bidirectionally.

Typical applications of the conveyor scale are, for example:

- Recording of belt occupation
- Recording of flowrate
- Recording of conveyed quantity
- Loading of material

The flowrate of the material can be regulated using the control functions integrated in SIMATIC.

Design

The SIWAREX FTC is a function module of the SIMATIC S7-300 and can be snapped directly onto the SIMATIC S7-300 or ET 200M backplane bus. The installation/cabling requirements of the 80-mm wide weighing module are extremely low as a result of the DIN rail assembly and snap-on technique.

A standard 40-pin front plug is used to connect the load cells, the RS 485 serial interface, the analog output and the digital inputs/outputs, a 9-pin Sub-D plug to connect the PC (RS 232), and a separate 2-pin plug to connect the power supply.

Operation of the SIWAREX FTC in SIMATIC means that complete integration of the conveyor scale into the automation system is guaranteed.

Function

The main tasks of the SIWAREX FTC are highly exact measurement of the actual weight in up to three measuring ranges, and exact calculation of the belt load and the conveyed quantity. In the "Force measurement" mode, the force is recorded bidirectionally.

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

Weighing functions

The following operating modes can be set:

- Weight measurement and force measurement
- Conveyor scale

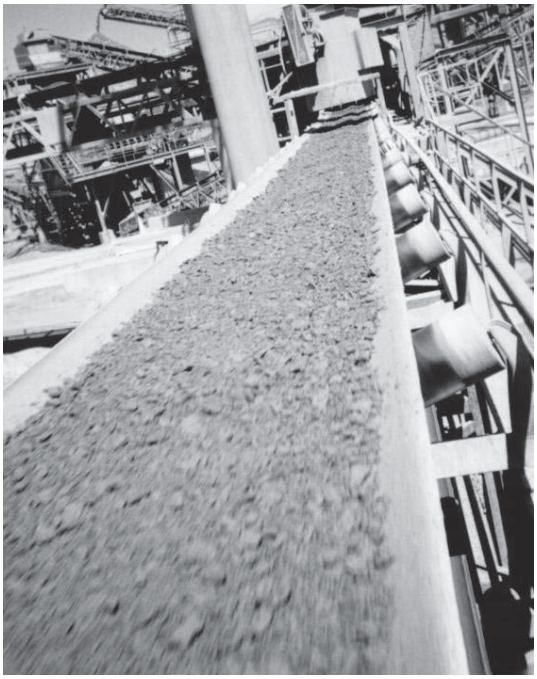
SIWAREX FTC can measure the input signals at high resolution both bidirectionally (+/- 100%) and unidirectionally.

In the "Conveyor scale" mode, calculations are carried out which are typical for this mode:

- Speed of the belt
- Belt load
- Flowrate
- Conveyed quantity (in 8 totalization memories)

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.

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



Example application of the SIWAREX FTC

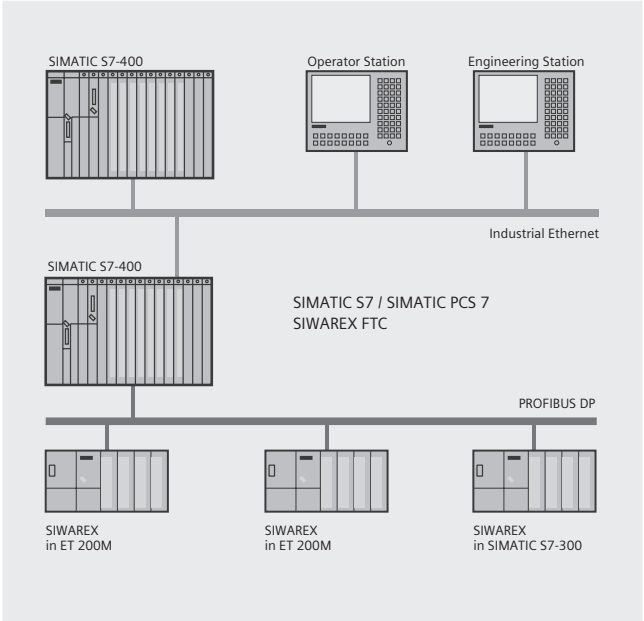
Integration in SIMATIC

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

Appropriate combination of SIMATIC components means that optimum solutions can be found for small, medium-size and large plants. The scales are operated and monitored using SIMATIC standard operator panels. These operator panels (also touch panels such as the TP170B) can of course also be simultaneously used for operation 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 Fig. shows a typical configuration of a medium-size plant.

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 FTC

Software

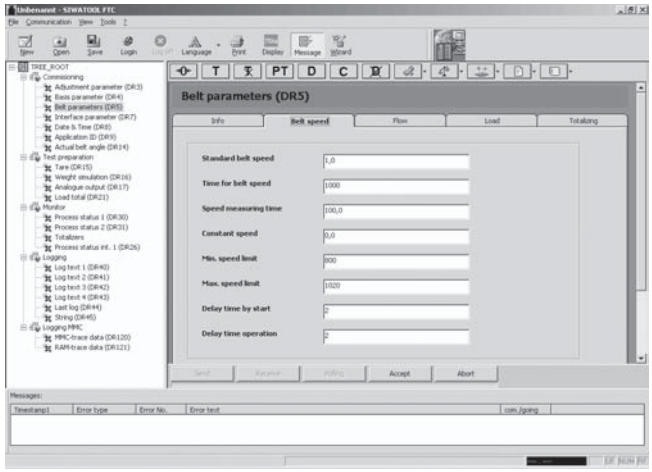
Adjustment of the scale using SIWATOOL FTC

SIWATOOL FTC is a special program for adjustment of the scale, and executes with Windows operating systems.

The program permits adjustment of the scale without knowledge of the automation system. When servicing, the technician can analyze and test the procedures in the scale using the PC. Reading out the diagnostics buffer from the SIWAREX FTC is extremely helpful when analyzing events.

The following work, inter alia, can be carried out using SIWATOOL FTC:

- Parameterization and adjustment of the scale
- Testing of scale properties
- Saving and printing scale data
- Recording and analysis of weighing sequence



SIWATOOL FTC adjustment 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.

SIWAREX FTC

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 of 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 and worldwide as required.

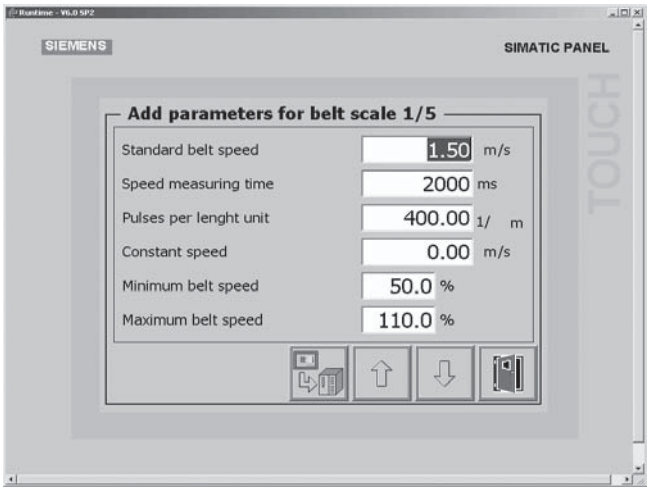
Reading out of weighing reports

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

SIWAREX FTC – simple configuring

Integration in SIMATIC can result in freely-programmable, modular weighing systems for conveyor scales which can be modified according to operational requirements.

To facilitate incorporation of the module into the STEP 7 program and as a basis for application programming, the ready-to-use SIWAREX FTC software "Getting started" is available free-of-charge in addition to the configuration package. A SIWAREX FTC conveyor scale can then be simply implemented in SIMATIC and a touch panel (TP/OP 170/270/370) as the operator panel.



Scale faceplate in the SIWAREX FTC software "Getting started"

Technical specifications

SIWAREX FTC	
Use in automation systems	
• S7-300	Directly or via ET 200M
• S7-400 (H)	Via ET 200M
• PCS 7 (H)	Via ET 200M
Communications interfaces	SIMATIC S7, RS 232, RS 485
Module parameterization	Using SIMATIC S7
	Using SIWATOOL FTC software (RS 232)
Measuring properties	
• EC type approval as non-automatic weighing machine, trade class III	3 x 6000 d ≥ 0.5 µV/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 machine, force measurement	
• Conveyor scale	
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}	≤ 4010 Ω
Max. distance of load cells	
When using the recommended cable:	
• Standard	1000 m (500 m legal-for-trade)
• In hazardous area [1])	
- For gases of group IIC	300 m
- For gases of group IIB	1000 m
Connection to load cells in Ex zone 1	Optionally via SIWAREX IS Ex interface
Ex approvals zone 2 and safety	ATEX 100a, FM, UL, cUL$_{US}$ Haz. Loc. (all available soon)
Power supply	
• Rated voltage	24 V DC
• Max. current consumption	500 mA
• Current consumption from 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 to 20 mA
- Updating rate	100 Hz
Approvals	
For NAWI mode	EC type approval, OIML-R76
Degree of protection to DIN EN 60529; IEC 60529	IP20
Climatic requirements	
($T_{min\ (IND)}$ ... $T_{max\ (IND)}$) (operating temperature)	
• Vertical installation	-10 ... 60 °C
• Horizontal installation	-10 ... 40 °C
EMC requirements	EN 61326, EN 45501, NAMUR NE21, Part 1
Dimensions in mm	80 x 125 x 130
Weight	600 g

1) For details, refer to SIWAREX IS data sheet

Selection and Ordering Data

	Order No.
SIWAREX FTC [1]	**7MH4900-3AA01**
Weighing electronics for conveyor scales for S7-300 and ET 200M.	
Applications: Force measurement, conveyor scales	
SIWAREX FTC Manual [1]	
German, English, Italian, Spanish, French	
Free download from the Internet at:	
www.siemens.com/weighing-technolgy	
SIWAREX FTC "Getting started"	
Example software for easy acquaintance with scale programming in STEP 7.	
Free download from the Internet at:	
www.siemens.com/weighing-technology	
SIWAREX FTC configuration package for SIMATIC S7 on CD-ROM [1]	**7MH4900-3AK01**
• SETUP for S7 link with Step 7 V5.2	
• S7 function block	
• SIWATOOL FTC commissioning software	
• Manual	
SIWAREX FTC configuration package for PCS 7 V6.0 on CD-ROM [1]	**7MH4900-3AK61**
• SETUP for S7 link	
• Function block for CFC	
• Faceplate	
• SIWATOOL FTC commissioning software	
• Manual	
SIWATOOL cable from SIWAREX FTC with serial PC interface, for 9-pin PC interfaces (RS 232)	
• 2 m long	**7MH4702-8CA**
• 5 m long	**7MH4702-8CB**
40-pin front plug with screw contacts	**6ES7392-1AM00-0AA0**
(required for each SIWAREX module), alternatively with spring-loaded contacts	
40-pin front plug with spring-loaded contacts	**6ES7392-1BM01-0AA0**
(required for each SIWAREX module), alternatively with screw contacts	
Shield contact element	**6ES7390-5AA00-0AA0**
Sufficient for one SIWAREX FTC module	

	Order No.
Shield connection terminal	**6ES7390-5CA00-0AA0**
Contents: 2 units (suitable for cable with diameter 4 ... 13 mm)	
Note: one shield connection terminal is required each for:	
• Scale connection	
• RS 485 interface	
• RS 232 interface	
S7 DIN rail	
• 160 mm	**6ES7390-1AB60-0AA0**
• 480 mm	**6ES7390-1AE80-0AA0**
• 530 mm	**6ES7390-1AF30-0AA0**
• 830 mm	**6ES7390-1AJ30-0AA0**
• 2000 mm	**6ES7390-1BC00-0AA0**
PS 307 load power supply (only required if DC 24 V is not available)	
120/230 V AC; 24 V DC	
• PS 307-1B; 2 A	**6ES7307-1BA00-0AA0**
• PS 307-1E; 5 A	**6ES7307-1EA00-0AA0**
• PS 307-1K; 10 A	**6ES7307-1KA00-0AA0**
MMC memory for data recording up to 16 MB	**6ES7953-8LF11-0AA0**
Remote display (option)	
The Siebert S11, S102, S302 remote digital display can be directly connected to the SIWAREX FTC via an RS 485 interface. (not suitable for mode "Conveyor scale")	
Siebert Industrieelektronik GmbH *P.O. Box 1180* *D-66565 Eppelborn* *Tel.: +49 6806/980-0* *Fax: +49 6806/980-999* *Internet: http://www.siebert.de*	
Detailed information available from manufacturer.	
SIWAREX JB junction box, aluminium housing	**7MH4710-1BA**
for connecting up to 4 load cells in parallel, and for connecting several junction boxes	
SIWAREX JB junction box, stainless steel housing	**7MH4710-1EA**
for connecting up to 4 load cells in parallel	
Ex interface, type SIWAREX Pi	**7MH4710-5AA**
With UL and FM approvals, but **without ATEX approval** for intrinsically-safe connection of load cells, suitable for the SIWAREX U, M, FTA, FTC, CS and P weighing modules. Use in the EC is not possible.	
Manual for Ex interface type SIWAREX Pi	**C71000-T5974-C29**

1) Start of delivery 12/2004.
A) Liable to exportregulations AL: N, ECCN: EAR99H.

SIWAREX FTC

	Order No.
SIWAREX IS Ex interface With ATEX approval, but **without UL and FM approvals** for intrinsically-safe connection of load cells, including Manual, suitable for the SIWAREX U, M, FTA, FTC, CS and P weighing modules. Use in the EC is possible.	
• With short-circuit current < 199 mA DC	**7MH4710-5BA**
• With short-circuit current < 137 mA DC	**7MH4710-5CA**
Cable (optional)	
Cable Li2Y 1 x 2 x 0.75 ST + 2 x (2 x 0.34 ST) - CY, orange sheath to connect SIWAREX U, M, P, FTA, FTC and CS to the junction box (JB), extension box (EB) or Ex interface (Ex-I) or between two JBs, for fixed laying, occasional bending is possible, 10.8 mm outer diameter, for ambient temperature –40 to +80°C	**7MH4702-8AG**
Cable Li2Y 1 x 2 x 0.75 ST + 2 x (2 x 0.34 ST) - CY, blue sheath to connect the junction box (JB) or extension box (EB) in a potentially explosive atmosphere to the Ex interface (Ex-I), for fixed laying, occasional bending is possible, blue PVC insulating sheath, approx. 10.8 mm outer diameter, for ambient temperature –40 to +80°C	**7MH4702-8AF**
Cable LiYCY 4 x 2 x 0.25 mm² A) for TTY (connect 2 pairs of conductors in parallel), for connection of a remote indicator	**7MH4407-8BD0**

A) Liable to exportregulations AL: N, ECCN: EAR99H.