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Weighing Electronics





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Introduction

Overview

Integrators process sensor signals into operating data for continuous in-line weighing. They can take over basic control functions traditionally handled by other devices, like PID and batch control.

Mode of operation

Milltronics integrators from Siemens incorporate patented electronic load cell balancing to perform basic and sophisticated level and flow control functions. Integrators process the speed or load signal from the sensor and perform functions to convert the data into rate or totalization. The integrator displays primary speed and load values, as well as derived values of rate and total on the LCD, or outputs the information as analog mA output, alarm relay, or remote totalizer.

The Milltronics BW100 offers basic control functions for use with belt scales. It can be retrofitted for use with previously installed belt scale systems with a maximum of two load cells.

The Milltronics BW500/L offers standard control functions for use with belt scales. It offers multiple language selections and industrial communication options. It can be used with a maximum of two load cell style belt scales.

The Milltronics BW500 are versatile integrators for use with a wide range of belt scales. It is NTEP and Measurement Canada certified as legal-for-trade when used with an MMI-2 belt scale and WS series speed sensor.

The Milltronics BW500 and SF500 offer online calibration so the process does not need to be shut down to calibrate the integrator. Both models also offer linearization, PID and batch control, multi-span and auto zero.

Definitions

<u>PID – Proportional, Integral, Derivative</u> – The PID control function combines proportion, integral reset, and derivative rate to consistently control systems.

A proportioning band creates an area around a setpoint where the controller is controlling the process. If the band is too narrow, the reading will center around the setpoint. If the band is too wide, the control values will take a long time to settle and will be slow to respond adequately to upset conditions. An integral reset corrects for any difference between the desired setpoint and variables altered during the process. A derivative rate prevents the control from shifting too dramatically on process upsets or startups.

Batch Control – A predetermined quantity of material is accumulated, and the integrator will alarm, notifying that the batch process is completed.

Linearization – Locations where the ideal belt scale or flowmeter location has been compromised or where there is a high variety in belt tension or flow cause the belt scale or flowmeter to report non-linearily. The integrator linearization function smooths out the result to provide an accurate report of the process.

<u>Multi-span</u> – The integrator can be calibrated for up to 8 different feed conditions that would produce varying load or rate characteristics. A span correction is added to the measurement to realize maximum accuracy.

Differential Speed Detection – Dual point belt speed sensing is used for monitoring speed at two different points in the system. The two speed sensors are typically applied on belt conveyors to give an alarm if excessive slip between the head pulley and tail pulley is detected (BW500 only).

Incline Compensation – By receiving a mA signal proportional to conveyor slope, the conveyor loading can be re-calculated to compensate for changes in angle (BW500 only).

<u>Moisture Compensation</u> – By receiving a mA signal proportional to moisture content, the conveyor load or rate can be re-calculated to read dry weight (BW500 or SF500 only).

Technical specifications

Criteria	Milltronics BW100	Milltronics BW500 and BW500/L	Milltronics SF500
Applications and compatibility	Milltronics MLC, MBS, MUS, MCS, MSI, and WD600 belt scales Retrofit with other installed belt scale systems with a maximum of two load cells	SITRANS WW100, WW200, WW300; Milltronics MLC, MBS, MUS, MCS, MSI, MMI and WD600 belt scales; or equivalent 1,2, 4, or 6 load cell scales	SITRANS WF Series flowmeters Other 1 or 2 load cell flowmeters LVDT equipped solids flowmeters, with use of optional interface board
		Retrofit of most other belt scale or weighfeeder systems	
Display output	Rate, totalized weight, belt loading, belt speed	Rate, totalized weight, belt loading, belt speed, PID ¹⁾ , batching ¹⁾	Rate, totalized weight, PID, batching
Analog output	Optically isolated 4 20 mA scalable	Optically isolated 4 20 mA scalable	Optically isolated 4 20 mA scalable
	Selectable for rate, load, or speed	Option: two additional analog inputs and two outputs program- mable for PID control ¹⁾	Option: two additional analog inputs and two outputs program- mable for PID control
Remote totalizer	Two adjustable pulsed outputs	Two adjustable pulsed outputs	Two adjustable pulsed outputs
Alarm relay	One programmable SPDT Form C contact rated 5 A at 250 V AC non- inductive	Five programmable SPST Form A contacts rated 5 A at 250 V AC non-inductive, reversible ²⁾	Five programmable SPST Form A contacts rated 5 A at 250 V AC non-inductive, reversible
Power requirements	100/115/200/230 V AC ± 15 % 50/60 Hz, 15 VA Optional 12 V DC and 24 V DC	100/115/200/230 V AC ± 15 % 50/60 Hz, 31 VA	100/115/200/230 V AC ± 15 % 50/60 Hz, 31 VA
Approvals	CSA _{US/C} , FM, CE, C-TICK	CSA _{US/C} , FM, CE, Measurement Canada, NTEP, MID, OIML ¹⁾ , C-TICK, SABS, GOST	CSA _{US/C} , FM, CE, C-TICK

1) Available with BW500 only

2/2

2) BW500/L: Two programmable SPST Form A contacts

Overview



Milltronics BW100 is an economical integrator for use with belt scales.

Benefits

- Multi-field backlit LCD
- Two remote totalizer contacts
- Auto zero function
- Load linearization
- Isolated mA output
- Programmable relay

Application

Milltronics BW100 integrator works with single or dual strain gauge load cell-based belt scales. With a speed sensor, it measures flow rate and totalized weight of bulk solids. It electronically balances the weigh bridge load cells to provide exceptional accuracy. The system is unaffected by uneven lateral loading so there is no need for load cell matching or mechanical balancing.

The large backlit display features a bar graph comparing current rate to full scale, reducing the possibility of human error.

The unit has a four-button control pad with tactile feedback keys used to set all parameters, or you can use Dolphin Plus software for programming and downloading through a PC or laptop.

Technical specifications Controls and displays Milltronics BW100 Displays 38 x 100 mm (1.5 x 4 inch) Mode of operation multi-field liquid crystal display Measuring principle Belt scale integrator Via local keypad with silicone Programming Typical applications Integrator for use with boot and/or Dolphin interface Milltronics MBS, MLC, WD600, MUS, MCS, and MSI belt scales Program stored in non-volatile FLASH memory, upgradeable Memory Inputs via Dolphin interface Load cell 0 ... 30 mV per load cell, dual · Parameters stored in load cell applications non-volatile EEPROM 0 ... 45 mV per load cell, single Dolphin compatible Setup load cell applications Cable/separation Speed sensor Single load cell • 0 ... 5 V low, 0 ... 15 V high, Pulse train Non-sensing Belden 8404, 4-wire shielded, 1 ... 2000 Hz, or 20 AWG (0.5 mm²) or equivalent, · Open collector switch, or 150 m (500 ft) max. · Relay dry contact Belden 9260, 6-wire shielded, Sensing Auto zero Dry contact from external device 20 AWG (0.5 mm²) or equivalent, 300 m (1000 ft) max. Output Dual load cell Analog Optically isolated 0/4 ... 20 mA. Non-sensing Belden 9260, 6-wire shielded, 750 Ω max loading 20 AWG (0.5 mm) or equivalent, Resolution: 0.1 % of 20 mA 150 m (500 ft) max. 10 V DC compensated for strain Load cell Sensing Belden 8418, 8-wire shielded, gauge, 2 cells max 20 AWG (0.5 mm²) or equivalent, 300 m (1000 ft) max. Speed sensor 12 V DC, 50 mA max excitation Remote totalizer 1 Contact closure 32 ... 288 ms Belden 8770, 3-wire shielded, Speed sensor 18 AWG (0.75 mm²) or equivalent, duration 300 m (1000 ft) Open collector switch rated 30 V DC, 100 mA max. Belden 8760, 1 pair, Auto zero twisted/shielded, Remote totalizer 2 Contact closure 32 ... 288 ms 18 AWG (0.75 mm²) or equivalent, duration 300 m (1000 ft) max Open collector switch rated Belden 8760, 1 pair, 240 V AC/DC, 100 mA max. Analog output twisted/shielded, Relay output Programmable function 1 SPDT 18 AWG (0.75 mm²) or equivalent Form C relay contact rated 5 A at Belden 9552, 2 pair, 250 V AC, non-inductive Bi-polar current (comm.port) twisted/ shielded, Measuring accuracy 18 AWG (0.75 mm²), or equivalent, 3000 m (10,000 ft) max. loop Resolution 0.02 % of full scale Belden 8760, 1 pair, twisted/shielded, Remote total [t1 (DC)] 0.25 % of full scale mA range Accuracy below 50 µA 18 AWG (0.75 mm²) or equivalent, 0.1 % of full scale mA range between 50 μA and 20 mA 300 m (1000 ft) max. Approvals CE, CSA_{US/C}, FM, C-TICK, GOST Rated operating conditions Options Speed sensor: Ambient conditions SITRANS WS100, WS300, MD-36, MD-256, TASS, RBSS, Location Indoor/outdoor or equivalent Ambient temperature -20 ... +50 °C (-5 ... +122 °F) Dolphin Plus: Windows-based software interface and infrared Relative humidity/ingress protection Suitable for outdoor/Type 4X/NEMA 4X/IP65 ComVerter link • Incline Compensator, for signal Installation category Ш compensation on variable incli-4 Pollution degree ne conveyors Design LVDT interface card: for interface with LVDT based scales Material (enclosure) Polypropylene alloy Sealed electronics compartment Integral junction box with terminal • 0.2 ... 4 mm² solid, or block for: • 0.2 ... 2.5 mm² stranded (12 ... 24 AWG) Power supply Standard 100/115/200/230 V AC ± 15%, 50/60 Hz, 15 VA Optional • 11 ... 15 V DC, 15 W

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• 19 ... 30 V DC, 15 W

Milltronics BW100

Selection and Ordering data	Order No.
Milltronics BW100	C) 7MH7150-
An economical integrator for use with belt scales. Standard features include; dual totalizer, analog rate output, alarm relay, linearizer and bi-polar current communications.	A -
Input voltage AC voltage 12 V DC 24 V DC	1 2 3
Feature software Standard	A
Data communications Bi-polar current	- 1
Enclosures Standard enclosure, no entry holes Standard with 4 drilled entry holes for M20 glands	1 3
Trade approval stickers No trade approval sticker Not legal for Canadian and EU trade sticker	0
Approvals CSA _{USIC} , CE (EN 61326), FM, C-TICK	
<i>Further designs</i> Please add '-Z ' to Order No. and specify Order code(s).	Order Code
Stainless Steel tag (69 mm x 50mm) Measuring-point number / identification (max 16 characters), specify in plain text.	Y15
Painted mild steel, anti-vibration enclosure with viewing window 406 x 305 x 203 mm (16 x 12 x 8 inch), Nema/Type 4, IP66 (finished unit is mounted inside enclosure)	A15
Painted mild steel, heated enclosure with viewing window for use down to -50°C (-58 °F) (finished unit is mounted inside enclosure) 483 X 584 X 203 mm (19 x 23 x 8 inch)	A35
Acceptance test certificate: Manufacturer's test certificate M to DIN 55350, Part 18 and ISO 9000 Stainless Steel, sun/weather shield 357 x 305 x 203 mm (14 x12 x 8 inch) (finished unit	C11 S50

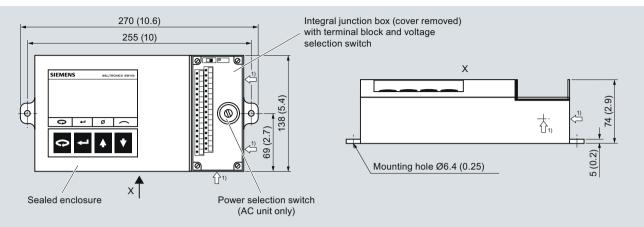
	_	
		Order No.
Milltronics BW100	C)	7MH7150-
An economical integrator for use with belt scales. Standard features include; dual totalizer, analog rate output, alarm relay, linearizer and bi-polar current communications.		A -
Instruction manuals		
• English	C)	7ML1998-5DJ02
• German	C)	7ML1998-5DJ31
• French	C)	7ML1998-5DJ11
• Spanish Note: The instruction manual should be ordered as a separate item on the order.	C)	7ML1998-5DJ21
Additional instruction manuals		
LVDT Conditioner Card Manuals, English	C)	7ML1998-5EF01
LVDT Conditioner Card Manuals, German	C)	7ML1998-5EF31
This device is shipped with the Siemens Milltronics manual CD containing the complete instruction manual library.	;	
Optional equipment		
LVDT Conditioners in Nema 4 enclosure (to inter- face LVDT belt scale without internal pre-amplifier)	C)	7MH7723-1AJ
SITRANS RD100 Remote displays - see RD100 on page 2/16		
SITRANS RD200 Remote displays - see RD200 on page 2/18		
SITRANS RD500 web, datalogging, alarming, ethernet, and modem support for instrumentation - see RD500 on page 2/22	K)	7ML5750-1AA00-0
C) Subject to export regulations AL: N, ECCN: EAR99).	
K) Subject to export regulations AL: N, ECCN: 5A991	Х.	

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Weighing Electronics Stand-alone Integrators

Milltronics BW100

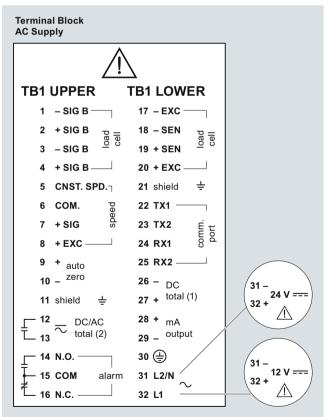
Dimensional drawings



¹⁾ Conduit entry area. Recommended drilling the enclosure with a hole saw and using suitable cable glands to maintain ingress rating.

Milltronics BW100 dimensions in mm (inch)

Schematics



Interconnection

All field wiring must have insulation for at least 250 V. DC terminals shall be supplied from an SELV source in accordance with IEC 1010-1 Annex H.

For DC versions TB#31 is used for negative (-) and TB#32 is used for positive (+) connection.

Non-metallic enclosure does not provide grounding between connections.

Use grounding type bushings and jumpers.

Application

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Weighing Electronics Stand-alone Integrators

Milltronics BW500 and BW500/L operate with a belt scale and a speed sensor. Belt load and speed signals are processed for ac-

BW500 can take on lower level control functions traditionally

handled by other devices, and it supports popular industrial communication buses. Its patented load cell balance function

The PID function may be used for rate control on shearing weighfeeders - where belt loading is constant - but can also control pre-feeding devices. Operating in tandem with two or more weighfeeders, the BW500 may be used for ratio blending and controlling additives. Batching, load out, and alarm functions are

Dolphin Plus software may be used for programming the unit on

curate flow rate and totalized weight of bulk solids.

eliminates matching of load cells.

also provided by the BW500.

Milltronics BW500 and BW500/L

Overview



Milltronics BW500 is a full feature integrator for use with both belt scales and weighfeeders.

Milltronics BW500/L is an integrator for use in basic belt scale or weighbelt applications.

Benefits

- Automatic zero and electronic span calibration
- · Alarms for rate, load, speed, or diagnostic error
- On-board Modbus, optional PROFIBUS DP, Allen-Bradley RIO and DeviceNet
- Comprehensive weighfeeder control functions
- PID control and on-line calibration with optional analog I/O card
- · Differential speed detection with second speed sensor
- Moisture meter input with optional analog I/O card for calculation of dry weight
- Inclinometer input with optional analog I/O card to compensate for conveyor slope
- · Suitable for belt scale custody approval
- Measurement Canada,OIML, MID, GOST, and NTEP approved

Integrator selection guide

	BW500 (advanced feature set)	BW500/L (basic feature set)
PID control	With optional I/O card	N/A
Differential speed detection	Standard	N/A
Online calibration	Standard	N/A
Trade approval (OIML, MID, Measurement Canada, GOST, NTEP)	Optional	N/A
Smartlinx communications (AB RIO, DeviceNET, Profibus DP)	Optional	Optional
Modbus	Standard	Standard
Ratio Blending and Batching	Standard	N/A
Moisture and incline compensation	 With optional I/O card, or Parameter set 	Parameter set
Multi Span	Standard	N/A
RD500 connectivity	Standard	Standard
Relay output	5	2
mA output	3 ¹⁾	1
mA input	2 ¹⁾	0

¹⁾ mA input/output for BW500 is based on I/O card

Milltronics BW500 and BW500/L

Milltronics BW500 and BW500L		Power
Mode of operation		Standa
Measuring principle	Belt scale integrator	
Typical application	• Compatible with Milltronics belt scales or equivalent 1, 2, 4 ¹⁾ , or 6 ¹⁾ load cell scales	Contro
	 Compatible with LVDT equipped scales, with use of optional inter- face board (remotely mounted) 	Displa
Inputs		Progra
Load cell	0 45 mV DC per load cell	N 4
Speed sensor		Memo
Pulse train	• 0 5 V low, 5 15 V high 1 3000 Hz, or	
	 Open collector switch, or 	Comm
	 Relay dry contact 	
Auto zero	Dry contact from external device	A 1//
mA	See optional mA I/O board ¹⁾	mA I/C
Auxiliary	5 discrete inputs for external contacts, each programmable for either: display scrolling, totalizer 1 reset, zero, span, multispan, print, batch reset, PID function or online calibration, 2nd speed sensor	Inputs Outpu
Outputs (load and speed)		
mA	Programmable 0/4 20 mA, for rate, optically isolated, 0.1 % of 20 mA resolution, 750 Ω load max. (see optional mA I/O board)	Outpu
Load cell	10 V DC compensated excitation for strain gauge type, 4 cells max, 150 mA max.	Appro BW50
Speed sensor(s)	12 V DC, 150 mA max. excitation	
Remote totalizer 1	Contact closure 10 300 ms duration, open collector switch rated 30 V DC, 100 mA max.	BW50 Optio
Remote totalizer 2	Contact closure 10 300 ms duration, open collector switch rated 240 V AC/DC, 100 mA max.	
Relay output	5 alarm/control relays, 1 SPST Form A relay contact per relay, rated 5 A at 250 V AC, non-inductive or 30 V DC	
Measuring accuracy		
Resolution	0.02 % of full scale	
Accuracy	0.1% of full scale	
Rated operating conditions		
 Ambient conditions 		¹⁾ BW
Location	Indoor/outdoor	
 Ambient temperature 	-20 +50 °C (-5 +122 °F)	
Relative humidity/ingress protec- tion	Suitable for outdoor/Type 4X/NEMA 4X/IP65	
 Installation category 	II	
Pollution degree	4	
Design		
Material (enclosure)	Polycarbonate	
Dimensions (W x H x D)	209 x 285 x 92 mm (8.2 x 11.2 x 3.6 inch)	
Weight	2.6 kg (5.7 lb)	

Power supply	
Standard	100/115/200/230 V AC ± 15 %, 50/60 Hz, 31 VA fuse, FU1: 2AG, Slo Blo, 2 A, 250 V or equivalent
Controls and displays	
Displays	Illuminated 5x7 dot matrix liquid crystal display with 2 lines of 40 characters each
Programming	Via local keypad and/or Dolphin Plus interface
Memory	Program and parameters stored in non-volatile Flash memory, upgradeable via Dolphin Plus interface
Communications	Two RS 232 ports
	One RS 485 port
	 SmartLinx compatible
mA I/O board	
Inputs	2 programmable 0/4 20 mA for PID control and on-line calibration, optically isolated, 0.1 % of 20 mA resolution, 200 Ω input impedance
Outputs	2 programmable 0/4 20 mA for PID control, rate, load and speed output, optically isolated, 0.1 % of 20 mA resolution, 750 Ω load max.
Output supply	Isolated 24 V DC at 50 mA, short circuit protected
Approvals	
BW500	CE, CSA _{US/C} , FM, Measurement Canada, NTEP, MID, OIML, C-TICK, , GOST, SABS
BW500/L	CE, CSA _{US/C} , FM, C-TICK, GOST
Options	Speed sensor: MD-36/36A, MD-256, SITRANS WS100, WS300, TASS, or RBSS, or compatible
	Dolphin Plus: Windows based software interface. Refer to associated product documentation.
	 SmartLinx Modules: protocol specific modules for interface with popular industrial com- munications systems. Refer to product documentation. LVDT interface card: for inter- face with LVDT based scales
1) BWEOD only	
¹⁾ BW500 only	

Milltronics BW500 and BW500/L

Order No.

_										
	Selection and Ordering data					Order No.				
	Milltronics BW500 and BW500/L C)					7MH7152-				
	A full-feature, powerful integrator designed for use with both belt scales and weighfeeders				ľ					
	Input voltage AC voltage	1								
	Auxiliary Input/Output board									
	None Board with 2 analog inputs and 2 analog outputs ¹⁾		A B							
	Feature software BW500, 1 6 load cell input (advanced feature set) BW500/L, 1 2 load cell input ²⁾ (basic feature set)		AB							
	Auxiliary memory None			0						
	Data communications ³⁾ SmartLinx ready Smartlinx Allen-Bradley RIO module Smartlinx PROFIBUS DP module Smartlinx DeviceNet module				0 1 2 3					
	Enclosures Standard enclosure, no entry holes Standard enclosure, 4 entries, for M20 glands					1 2				
	Trade approval stickers No trade approval sticker Not legal for Canadian and EU trade sticker Legal for Canadian trade ^{4) 5) 6)} Legal for U.S. trade (NTEP) ^{4) 5) 6)} Legal for World trade (OIML), European trade (MID) ^{4) 5) 6)}						3 ;)			
	Approvals CE, CSAus/c, FM, C-TICK						A			
	Further designs Please add "-Z" to Order No. and specify Order	0	rde	er (Co	de				
	code(s). Stainless Steel tag (69 x 50 mm), Measuring-point number/identification (max 16 characters), specify in plain text.	Y	15							
	Acceptance test certificate: Manufacturer's test certificate M to DIN 55350, Part 18 and ISO 9000	C	11							
	Stainless Steel, sun/weather shield 357 x 305 x 203 mm (14 x12 x 8 inch) (finished unit is field mounted with enclosure)	S	50							
	Stainless steel enclosure, 304 (1.4301), [406 x 305 x 152 mm (16 x12 x 6 inch), Nema/Type 4X, IP66 (finished unit is mounted inside enclosure)]									
	With windowWithout window	A [.]								
	Painted mild steel, [406 x $305 \times 152 \text{ mm}$ (16 x 12×6 inch), Nema/Type 4, IP65; finished unit is mounted inside enclosure]									
	 With window Without window Painted mild steel, anti-vibration enclosure with viewing window 406 x 305 x 203 mm (16 x 12 x 8 inch), Nema/Type 4, 	А [.] А [.]	14							
	(16 x 12 x 8 inch), Nema Type 4, IP66; finished unit is mounted inside enclosure Painted mild steel, heated enclosure with viewing window for use down to -50°C (-58 °F); finished unit is mounted inside enclosure 483 X 584 X 203 mm (19 x 23 x 8 inch)	A	35							
	1) Required for PID control and online calibration, available	ole	wit	h I	=ea	atur	е			

 Required for PID control and online calibration, available with Feature Software option A only

²⁾ Available with Auxiliary I/O option A, and Trade approval stickers A, B only

3) Required for industrial communications

4) Requires use with applicable certified MSI or MMI

⁵⁾ Complete specification data sheet on page 4/3 and submit with order

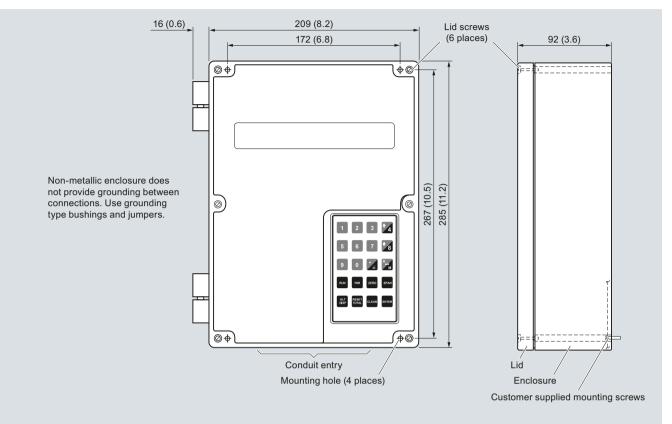
⁶⁾ Available with Feature Software option A only

Milltronics BW500 and BW500/L C) 7MH7152-A full-feature, powerful integrator designed for use with both belt scales and weighfeeders BW500 and BW500/L, German C) 7ML1998-5DK35 BW500, French C) 7ML1998-5DK12 BW500, Spanish C) 7ML1998-5DK23 Note: The instruction manual should be ordered as a separate item on the order. Additional instruction manuals LVDT Conditioner Card Instruction Manuals, C) 7ML1998-5EF01 English LVDT Conditioner Card Instruction Manuals, C) 7ML1998-5EF31 German Smartlinx Allen-Bradley Remote I/O, English C) 7ML1998-1AP03 Smartlinx PROFIBUS DP, English C) 7ML1998-1AQ03 Smartlinx PROFIBUS DP, German C) 7ML1998-1AQ33 Smartlinx PROFIBUS DP. French C) 7ML1998-1AQ12 Smartlinx DeviceNet, English C) 7ML1998-1BH02 Note: The appropriate Smartlinx instruction manual should be ordered as a separate line on the order This device is shipped with the Siemens Milltronics manual CD containing the complete instruction manual library. **Optional equipment** Auxilliary I/O cards spare C) 7MH7723-1BJ LVDT Conditioners in Nema 4 enclosure (to C) 7MH7723-1AJ interface LVDT belt scale without internal pre-amplifier) Supply voltage regulators, 120 V AC, 60 Hz C) 7MH7726-1AN SITRANS RD100 Remote displays see RD100 on page 2/16 SITRANS RD200 Remote displays see RD200 on page 2/18 SITRANS RD500 web, datalogging, alarming, K) 7ML5750-1AA00-0 ethernet, and modem support for instrumentation see page 2/22 Spare parts Display cards 7MH7723-1AF C) 7MH7723-1AH Motherboards Batteries, 3V, lithium C) 7MH7723-1ES Fuses, 2 A, 250 V, BW500, BW500/L, and SF500, C) 7MH7723-1DG spare Lid with overlay and keypad for BW500 and C) 7MH7723-1AK BW500/L 7MH7723-1HN Lid with overlay and keypad for trade approved BW500 Cables to connect BW500, BW500/L, and SF500 7MH7723-1CB keypad to motherboard Keypads spare for BW500, BW500/L, and SF500 7MH7723-1CD C) Subject to export regulations AL: N, ECCN: EAR99.

K) Subject to export regulations AL: N, ECCN: 5A991X.

Milltronics BW500 and BW500/L

Dimensional drawings



Milltronics BW500 and BW500/L dimensions in mm (inch)

Schematics

	- -						
	1 LCA+	V+ 11	000	21 MA+ T	X 31	0 41 -	51
$ \oslash $	2 LCA-	ဋ္ဌ S+ 12	00	22 MA- 🎇 COM	и 32		$\mathbb{R}^{\mathrm{RLY3}}$ 52
	2 LCA- ====================================	S- 13	00	23 SHLD 👷 R	× 33		53 O
	4 LCB- st	© V- 14	00	24 AUX1 SHLI	⊃ 34 🛛 🔘	0 44 - ⁰	
	5 SHLD	SHLD 15	00	25 AUX2 T1	+ 35	Ø 45 +	RLY5 55
		SIG. 16	00	26 AUX3 T1	- 36	Ø 46 SHLD	
	Load Load	COM 17	00	27 AUX4 SHLI	D 37	0 47 _{RLY1}	SHLD 57
	8 LCD+ 👳	CNST 18	00	28 AUX5 T2	+ 38		58 🛇
	8 LCD+ paed 9 LCD- S	+EX 19	00	29 COM T2	2- 39	Ø 49 RLY2	L2/N 59
		SHLD 20	00	30 A - Z SHLI	⊃ 40 0		L1 60

Cable

• One load cell:

- Non-sensing: Belden 8404, 4 wire shielded, 20 AWG (0.5 mm²) or equivalent, 150 m (500 ft) max.
- Sensing: Belden 9260, 6 wire shielded, 20 AWG (0.5 mm²) or equivalent, 300 m (1000 ft) max.
- Two/four/six1) load cells:
- Non-sensing: Belden 9260, 6 wire shielded, 20 AWG (0.5 mm²) or equivalent, 150 m (500 ft) max.
 Sensing: Belden 8418, 8 wire shielded, 20 AWG (0.5 mm²) or equivalent, 300 m (1000 ft) max.
- Speed sensor: Belden 8770, 3 wire shielded, 18 AWG (0.75 mm²) or equivalent, 300 m (1000 ft)
- Auto zero: Belden 8760, 1 pair, twisted/shielded, 18 AWG (0.75 mm²) or equivalent, 300 m (1000 ft) max.
- Remote total: Belden 8760, 1 pair, twisted/shielded, 18 AWG (0.75 mm²) or equivalent, 300 m (1000 ft) max.

¹⁾ For four/six load cell scale, run two separate cables of two load cell configuration

Milltronics BW500 and BW500/L connections

Milltronics SF500

Overview



Milltronics SF500 is a full feature integrator for use with solids flowmeters.

Benefits

- Automatic zero and electronic span calibration
- · Alarms for rate or diagnostic error
- On-board Modbus, optional PROFIBUS DP, Allen-Bradley RIO and DeviceNet
- On-line calibration and dual PID control with optional analog I/O card
- Multi-point linearizer for high turn down accuracy
- Up to 8 multi-spans for application of more than one flow condition and/or material
- Moisture meter input with optional analog I/O card for calculation of dry weight

Application

Milltronics SF500 operates with any solids flowmeter with up to two strain gauge load cells or LVDT sensor. The SF500 processes sensor signals for accurate flow rate and totalized weight of bulk solids. It can take on lower level control functions traditionally handled by other devices, and it supports popular industrial communication buses. Its patented load cell balance function eliminates matching of load cells.

The PID function may be used for rate control of pre-feeding devices and/or control of additives with two internal PID controllers. Operating in tandem with two or more solids flowmeters or weighfeeders, the SF500 may be used for ratio blending and controlling additives. Batching, load out, and alarm functions are also provided by the SF500.

Dolphin Plus software may be used for programming the unit with a PC.

Milltronics SF500

Milltronics SF500		Controls and displays	
Mode of operation		Display	Illuminated 5x7 dot matrix liquic
Measuring principle	Flowmeter integrator		crystal display with 2 lines of 40 characters each
Typical application	 Compatible with SITRANS solids flowmeters or equivalent 1 or 2 load cell models 	Programming	Via local keypad and/or Dolphin Plus interface
	 Compatible with LVDT equipped solids flowmeters, with use of optional interface board (remo- tely mounted) 	Memory	 Program stored in non-volatile FLASH ROM, upgradeable via Dolphin Plus interface Parameters stored in battery
Input			backed RAM,
Load cell/LVDT	0 45 mV DC per load cell or LVDT interface card		3 V NEDA 5003LC or equivaler 10 year life
Auto zero	Dry contact from external device	Communications	Two RS 232 ports
mA	See optional mA I/O board		One RS 485 port SmartLinx compatible
		Approvala	•
Auxiliary	5 discrete inputs for external contacts, each programmable	Approvals	CE, CSA _{US/C} , FM, C-TICK
	for either: display scrolling, totali- zer 1 reset, zero, span, multispan, print, batch reset, PID function, or on-line calibration	Options	 Dolphin Plus: Windows based software interface. Refer to associated product documentation.
Output			 SmartLinx modules: protocol specific modules for interface
mA	Programmable 0/4 20 mA, for rate, optically isolated, 0.1 % of 20 mA resolution, 750 Ω load max. (see optional mA I/O board)		with popular industrial com- munications systems. Refer to associated product do cumentation.
Load cell/LVDT conditioner card	10 V DC compensated excitation for strain gauge type, 2 cells max, 150 mA max.		LVDT interface card: for inter- face with LVDT based solids flowmeters
Remote totalizer 1	Contact closure 10 300 ms duration, open collector switch rated 30 V DC, 100 mA max.		 mA I/O board inputs: 2 programmable 0/4 20 mA for PID control or online calibration,
Remote totalizer 2	Contact closure 10 300 ms duration, open collector switch rated 240 V AC/DC, 100 mA max.		optically isolated, 0.1 % 20 mA resolution, 200 Ω input impedance
Relay output	5 alarm/control relays, 1 SPST Form A relay contact per relay, rated 5 A at 250 V AC, non-inductive or 30 V DC		 outputs: 2 programmable 0/4 20 mA for PID control or rate output, optically isolated, 0.1 % of 20 mA resolution 750 Ω load max
Measuring accuracy			 output supply: isolated 24 V DC at 50 mA,
Resolution	0.02 % of full scale		short circuit protected
Accuracy	0.1 % of full scale		
Rated operating conditions			
 Ambient conditions 			
Location	Indoor/outdoor		
 Ambient temperature 	-20 +50 °C (-5 +122 °F)		
Relative humidity/ingress protec- tion	Suitable for outdoor/Type 4X/NEMA 4X/IP65		
 Installation category 	II		
Pollution degree	4		
Design			
Material (enclosure)	Polycarbonate		
Dimensions (W x H x D)	209 x 285 x 92 mm (8.2 x 11.2 x 3.6 inch)		
Weight	2.6 kg (5.7 lb)		
Power supply			
Standard	100/115/200/230 V AC ± 15 %, 50/60 Hz, 31 VA Fuse, FU1: 2AG, Slo Blo, 2 A, 250 V or equivalent		

Milltronics SF500

Order No.

Selection and Ordering data				Nc).	
Milltronics SF500 C)			171	56	ò-	
A full feature, powerful integrator designed for use with solids flowmeters	1		1	•		
Input voltage AC voltage	1					
Auxiliary input/output boards ¹⁾						
None		Α				
Board with 2 analog inputs and 2 analog outputs	_	В				
Feature software Standard			A			
Auxiliary memory	-	1				
None			0			
Data communications ²⁾	-					
SmartLinx Ready				0		
Smartlinx A-B RIO module				1		
Smartlinx PROFIBUS DP module				2		
Smartlinx DeviceNet module	_			3		
Enclosures						
Standard enclosure, no entry holes Standard enclosure, 4 entries, for M20 glands					1	
Trade approval stickers	-				2	
No trade approval sticker						A
Not legal for Canadian and EU trade sticker						в
Approvals						
CE, CSAus/c, FM, C-TICK						A
Further designs	С)rd	er (Со	de	
Please add "-Z" to Order No. and specify Order code(s).						
Stainless Steel tag (69 mm x 50 mm),	Y	15				
Measuring-point number/identification						
(max 16 characters), specify in plain text. Stainless Steel, sun/weather shield	G	50				
$357 \times 305 \times 203 \text{ mm} (14 \times 12 \times 8 \text{ inch}) (finished unit)$	3	50				
is field mounted with enclosure)						
Acceptance test certificate: Manufacturer's test certificate M to DIN 55350, Part 18 and ISO 9000	C	11				
Stainless steel enclosure, 304 (1.4301),						
[406 x 305 x 152 mm (16 x 12 x 6 inch), Type 4X, IP66 (finished unit is mounted inside enclosure)]						
With window	A	11				
Without window	A	12				
Painted mild steel, [406 x 305 x 152 mm						
(16 x 12 x 6 inch), Type 4, IP65 (finished unit is						
mounted inside enclosure)] With window		.13				
Without window		.14				
Painted mild steel, anti-vibration enclosure with vie-		.15				
wing window 406 x 305 x 203 mm	1					
(16 x 12 x 8 inch), Nema/Type 4, IP66 (finished unit is mounted inside enclosure)						
Painted mild steel, heated enclosure with viewing	A	35				
window for use down to -50°C (-58 °F) (finished unit						
is mounted inside enclosure) 483 X 584 X 203 mm (19 x 23 x 8 inch)						
· /						

1) Required for PID control and online calibration.

²⁾ Required for industrial communications.

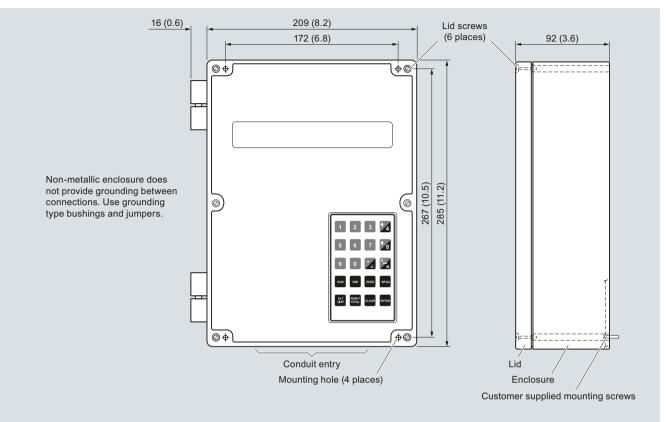
Instruction manuals SF500, English SF500, French SF500, German Note: The instruction manual should be ordered as a separate item on the order.	C)	7ML1998-5CN02 7ML1998-5CN11 7ML1998-5CN31
Additional instruction manuals Smartlinx Allen-Bradley Remote I/O, English Smartlinx PROFIBUS DP, English Smartlinx PROFIBUS DP, German Smartlinx PROFIBUS DP, French Smartlinx DeviceNet, English Note: The appropriate Smartlinx instruction manual should be ordered as a separate line on the order.	C) C) C)	7ML1998-1AP03 7ML1998-1AQ03 7ML1998-1AQ33 7ML1998-1AQ12 7ML1998-1BH02
LVDT Conditioner Card Manuals, English LVDT Conditioner Card Manuals, German This device is shipped with the Siemens Milltronics manual CD containing the complete instruction manual library.	C)	7ML1998-5EF01 7ML1998-5EF31
Optional equipment Milltronics analog I/O cards LVDT Conditioners in NEMA 4 enclosure (to interface LVDT belt scale without internal pre- amplifier) SITRANS RD100 Remote displays - see RD100 on page 2/16 SITRANS RD200 Remote displays see RD200 on page 2/18		7MH7723-1BJ 7MH7723-1AJ
SITRANS RD500 web, datalogging, alarming, ethernet, and modem support for instrumentation - see on page 2/22	K)	7ML5750-1AA00-0
Spare parts Displays Lids with overlay and keypad Motherboards Batteries, 3V, lithium Fuses, 2A, 250V, BW500/SF500, spare LVDT conditioners in NEMA 4 enclosure Auxiliary I/O cards spare Cables to connect BW500/SF500 keypad to motherboard Keypads spare for BW500/SF500	C) C) C) C)	7MH7723-1AF 7MH7723-1AG 7MH7723-1AH 7MH7723-1ES 7MH7723-1DG 7MH7723-1AJ 7MH7723-1AJ 7MH7723-1CB 7MH7723-1CB
C) Subject to expert regulations AL N ECCN: EARO		

C) Subject to export regulations AL: N, ECCN: EAR99.

K) Subject to export regulations AL: N, ECCN: 5A991X.

Milltronics SF500

Dimensional drawings



Milltronics SF500 dimensions in mm (inch)

Schematics

n , , , , , , , , , , , , , , , , , , ,			
1 LCA+ V+ 11	0 0 10 21 MA+	TX 31 0 0	41 - 51 O
2 LCA- ㅎ 5 5 S+ 12	0 0 22 MA-	З СОМ 32 0 0	$42 + \frac{1}{52} 52 $
2 LCA- = 5 5 S+ 12 3 LCB+ be 5 5- 13 4 LCB- 2 X 0 X 0 X 14	0 0 23 SHLD	2 RX 33 0 0	
4 LCB- 밝 그 윤 V- 14	0 0 24 AUX1	SHLD 34 0 0	44 - 🗠 KL14 54
5 SHLD 🚊 - SHLD 15	0 0 25 AUX2	T1+ 35	45 +
6 LCC+ 🖁 눉 SIG. 16	0 0 26 AUX3	T1- 36 0 0	
7 LCC- of the COM 17	0 0 27 AUX4	SHLD 37 0 0	
8 LCD+ g CNST 18 9 LCD- G +EX 19	0 0 28 AUX5	T2+ 38 0 0	
9 LCD- 👸 +EX 19	0 0 29 COM	T2- 39 0 0	49 RLY2 2/N 59
10 SHLD SHLD 20	0 0 30 A - Z	SHLD 40 0 0	

Cable

One load cell input for single load cell or LVDT application:

- Non-sensing: Belden 8404, 4 wire shielded, 20 AWG (0.5 mm²) or equivalent, 150 m (500 ft) max.

- Sensing: Belden 9260, 6 wire shielded, 20 AWG (0.5 mm²) or equivalent, 300 m (1000 ft) max.

Two load cells:

- Non-sensing: Belden 9260, 6 wire shielded, 20 AWG (0.5 mm²) or equivalent, 150 m (500 ft) max.

- Sensing: Belden 8418, 8 wire shielded, 20 AWG (0.5 mm²) or equivalent, 300 m (1000 ft) max.

• Auto zero: Belden 8760, 1 pair, twisted/shielded, 18 AWG (0.75 mm²) or equivalent, 300 m (1000 ft) max.

• Remote total: Belden 8760, 1 pair, twisted/shielded, 18 AWG (0.75 mm²) or equivalent, 300 m (1000 ft) max.

Milltronics SF500 connections

Dolphin Plus Software

Overview



Dolphin Plus is instrument configuration software that allows you to quickly and easily configure, monitor, tune and diagnose several Siemens weighing devices remotely. Remote access is available using your desktop PC or connected directly in the field using a laptop.

Benefits

- · Real-time monitoring and adjustment of parameters
- · On-screen visualization of process values
- Copying of data for programming several devices
- · Fast setup and commissioning of device
- Generation of configuration reports in seconds

Note:

The Dolphin Plus software is only available in English.

Compatibility

Dolphin Plus works with a wide range of Siemens products, including:

- Milltronics BW500 and BW500/L
- Milltronics SF500

Connection to a Siemens instrument may be a direct RS 232 serial connection or via an RS 485 converter or Siemens infrared ComVerter, depending on the instrument being configured.

Meets VDE 2187 user interface requirements.

Application

Dolphin Plus is easy to install and use. Just load the software from the CD. In minutes, you're ready to set up or modify complete parameter configurations for one or more devices.

Following configuration, you can alter parameters, upload and download parameter sets to and from a disk, and use parameter sets saved from other instruments.

Selection and Ordering data			Order No.		
Dolphin Plus	V) 7	М	L18	841-	
Instrument configuration software to quickly and easily configure, monitor, tune and diagnose most Siemens Milltronics devices remotely, from your desktop PC or connected directly in the field using a laptop.		A	A ()	
Dolphin Plus Software includes a software CD, and a nine pin adapter with a 2.1 m (82.7 inch) cable for connection to a PC serial port.					
RS 485 to RS 232 converters					
No	0				
Yes	_ 1				
ComVerter					
No				0	
Yes				1	
Instruction manuals					
Connection manual, English: Included on Dolphin Plus CD and available at www.siemens.com/processautomation					
Spare parts Converters, RS 485 to RS 232 (D-Sub) Kits containing one 9-pin D-Sub to RJ11 adapter and one 2.1 m (82.7") telephone cable with two male jacks	· ·			830-1HA 830-1MC	
,	C) 7	'M	L1	830-1MM	

C) Subject to export regulations AL: N, ECCN: EAR99

N) Subject to export regulations AL: N, ECCN: 5D992.

SITRANS RD100

Overview



The SITRANS RD100 is a 2-wire loop powered, NEMA 4X enclosed remote digital display for process instrumentation.

Benefits

- · Easy setup
- · Approved for hazardous locations
- NEMA 4X, IP67 impact-resistant enclosure
- Simple two-step calibration
- Two modes of input allow for easy servicing, with no interruption of loop required

Application

The RD100 is very versatile. It can be installed indoors or outdoors, in hot or cold environments, and in safe or hazardous areas.

It has been approved by FM and CSA as Intrinsically Safe and non-incendive, and operates from -40 to +85 °C (-40 to +185 °F), adding only 1 V to the loop.

The RD100 has a large 1 inch (2.54 cm) high display making it easy to read.

Calibration consists of a quick two-step process involving the adjustment of only two non-interacting potentiometers.

Key Applications: Remotely displays process variables in level, flow, pressure, temperature and weighing applications, in a 4 to 20 mA loop.

Technical specifications	
SITRANS RD100	
Mode of operation	
Measuring principle	Analog to digital conversion
Measuring range	4 20 mA
Measuring points	1 instrument only
Accuracy	\pm 0.1 % of span \pm 1 count
Rated operating conditions	
Ambient conditions	
 Operating temperature range 	-40 +85 °C (-40 +185 °F)
Design	
Weight	340 g (12 oz)
Material (enclosure)	Impact-resistant glass filled poly- carbonate body and clear poly- carbonate cover
Degree of protection	NEMA 4X, IP67

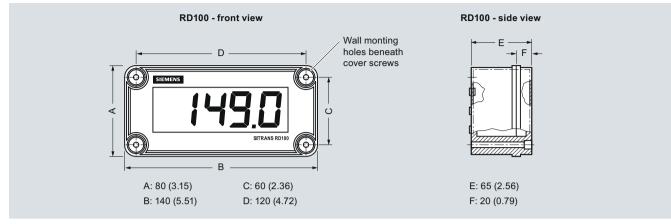
Power supply				
External loop power supply	30 V DC max.			
Display	• 1.0 inch (25.4 mm) high LCD			
	• Numeric range from -1000 +1999			
Certificates and approvals				
Hazardous				
Intrinsically Safe	 CSA/FM Class I, II, III, Div. 1, Groups A, B, C, D, E, F, G T4 			
	 CSA/FM Class I, Zone 0, Group IIC 			
Non-incendive	• CSA/FM Class I, Div. 2, Groups A, B, C, D			
	CSA/FM Class II and III, Div. 2, Groups F and G			
Options				
Mounting	 2 inch (50.8 mm) pipe mounting kit (zinc plated or stainless steel) 			
	 Panel mounting kit 			

Selection and Ordering data	Or	de	r N	0.	
SITRANS RD100 C) 7N	IL5	74	1-	
A 2-wire loop powered, NEMA 4X enclosed remote digital display for process instrumentation.	-	AA	0 0	- 0	
Conduit hole location (1/2 inch)					
None	1				
Bottom	2				
Rear Top	3 4				
	-	_			
Instruction manuals			~~		
	'				JU01 JU11
	'				JU31
Note: The instruction manual should be ordered as a separate line item.) <i>1</i> IV		330	5-50	1031
This device is shipped with the Siemens Milltronics manual CD containing ATEX Quick Starts and instruction manuals.					
Accessories					
Panel mount kits C) 7N	IL1	93)-1E	ЗN
=) 7 Ⅳ	IL1	93)-1E	BP
(zinc plated seal)			~~		
2 inch (5.08 cm) pipe mounting kit C (stainless steel, Type 304, EN 1.4301))7N	111	93(J-1E	30

C) Subject to export regulations AL: N, ECCN: EAR99.

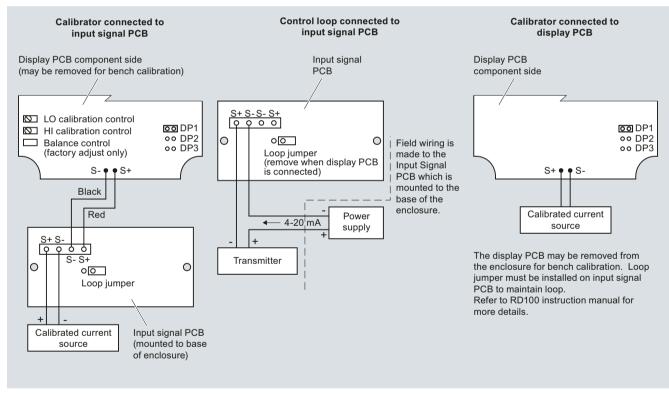
SITRANS RD100

Dimensional drawings



SITRANS RD100 dimensions in mm (inch)

Schematics



SITRANS RD100 connections

Overview



The SITRANS RD200 is a universal input, panel mount remote digital display for process instrumentation.

Benefits

- Easy setup and programming via front panel buttons or remotely using RD software
- Display readable in sunlight
- Universal input: accepts current, voltage, thermocouple and RTD signals
- Single or dual 24 V DC transmitter power supply
- · Serial communication using built in protocol or Modbus RTU
- Two optional relays for alarm indication or process control applications
- Linear or square root function supported
- Meter Copy feature to reduce setup time, cost or errors
- RD software supporting remote configuration, monitoring and logging for up to 100 displays

Application

The RD200 is a universal remote display for level, flow, pressure, temperature, weighing, and other process instruments.

Data can be remotely collected, logged and presented from as many as 100 displays on your local computer using the free downloadable RD Software.

The display accepts a single input of current, voltage, thermocouple, and RTD. This makes the RD200 an ideal fit for use with most field instruments.

The RD200 can be set up as a standard panel mount, or combined with optional enclosures to allow it to house up to 6 displays.

Key Applications: Tank farms, pump alternation control, local or remote display of level, temperature, flow, pressure and weighing instrument values, PC monitoring and data logging with RD Software.

SITRANS RD200

Milltronics RD200		Electrical connection	
Mode of operation		 mA output signal 	2-core copper conductor, twisted
Measuring principle	Analog to digital conversion	nin ealpar eignai	shielded, 0.82 3.30 mm ² (18 12 AWG), Belden 8760 or equivalent is acceptable
 Measuring points 	 1 instrument Remote monitoring of 100 instruments with PC and RD software 	Electrical connection and relay connection	Copper conductor according to local requirements, rated 3 A at 250 V AC
Input		Power supply	
Measuring range		Input voltage option 1	85 265 V AC, 50/60 Hz;
• Current	4 20 mA, 0 20 mA		90 265 V DC, 20 W max.
Voltage	0 10 V DC, 1 5 V, 0 5 V	Input voltage option 2	12 36 V DC; 12 24 V AC, 6 W max.
Thermocouple temperature	• Type J: -50 … +750 °C (-58 … +1382 °F)	Transmitter power supply	One or two isolated transmitter power supplies (optional)
	• Type K: -50 +1260 °C (-58 +2300 °F)	- Single power supply	One 24 V DC ± 10 % at 200 mA max.
	• Type E: -50 +870 °C (-58 +1578 °F)	- Dual power supplies	Two 24 V DC \pm 10 % at 200 mA and 40 mA max.
	 Type T: -180 +371 °C (-292 +700 °F) 	External loop power supply	35 V DC max.
	(-292 +700 T) • Type T, 0.1 resolution: -180.0 +371 °C (-199.9 +700 °F)	Output loop resistance	 24 V DC, 10 700 Ω max. 35 V DC (external), 100 1200 Ω max.
 RTD temperature 	• 100 Ω RTD: -200 +750 °C	Displays and controls	
	(-328 +1382 °F)	• Display	• 14 mm (0.56 inch) high LED
Output signal			Numeric range from
Output	PDC output		-1999 +9999Four digits, automatic lead zero
	4 20 mA (optional)Modbus		 Four algris, automatic read zero blanking Eight intensity levels
• Relays	2 SPDT Form C relays, rated 3 A	Memory	Non-volatile
	at 30 V DC or 3 A at 250 V AC, non-inductive, auto-initializing (optional)	,	 Stores settings for minimum of 10 years if power is lost
Communications	 RS 232 with PDC or Modbus RTU 	Programming	 Primary: front panel Secondary: meter copy or PC
	• RS 422/485 with PDC or		with SITRANS RD software
A	Modbus RTU	Certificates and approvals	CE, UL, _C UL
		Options	
4 20 mA optional outputProcess input	± 0.1 % FS ± 0.004 mA ± 0.05 % of span ± 1 count,	Enclosures	Plastic, steel and stainless steel (Type 304, EN 1.4301) NEMA 4 and 4X enclosures
Thermocouple temperature input	square root: 10 100 % FS • Type J: ± 1 °C (± 2 °F)	Communications	Modbus RTU
	 Type K: ± 1 °C (± 2 °F) Type E: ± 1 °C (± 2 °F) Type T: ± 1 °C (± 2 °F) Type T, 0.1° Resolution: ± 1 °C (± 1.8 °F) 		
 RTD temperature input 	• 100 Ω RTD: ± 1 °C (± 1 °F)		
Rated operating conditions			
Ambient conditions			
Storage temperature range	-40 +85 °C (-40 +185 °F)		
Operating temperature range	0 65 °C (32 149 °F)		
Design			
Weight Material (enclosure)	 269 g (9.5 oz) (including options) 1/8 DIN, high impact plastic, 		
	 UL94V-0, color: gray Optional plastic, steel and stainless steel (Type 304, EN 1.4301) 		
	NEMA 4 enclosures		
Degree of protection	Type 4X, NEMA 4X, IP65 (front		

SITRANS RD200

Selection and Ordering data	Order No.
SITRANS RD200 C	7ML5740-
A universal input, panel mount remote digital display for process instrumentation.	- 0 A
Input voltage 85 265 V AC, 50/60 Hz; 90 265 V DC, 20 W max. 12 36 V DC; 12 24 V AC, 6 W max.	1 2
Transmitter supply None Single 24 V DC transmitter supply ¹⁾ Dual 24 V DC transmitter supply ¹⁾²⁾	A B C
Output None 2 relays 4 20 mA output	A B C
Communication Modbus disabled Modbus enabled	0
Approvals CE, UL, _C UL	1
Instruction manuals	
English C	7ML1998-5JS01
German C	7ML1998-5JS31
Note: The instruction manual should be ordered as a separate line item.	
This device is shipped with the Siemens Milltronics manual CD containing ATEX Quick Starts and instruction manuals.	
Other Instruction manuals	
SITRANS RD Enclosures, English C	7ML1998-5JX01
SITRANS RD Enclosures, German C	7ML1998-5JX31
SITRANS RD Serial Adapters, English C	7ML1998-5JV01
SITRANS RD Serial Adapters, German C	7ML1998-5JV31
SITRANS RD Software, English C	7ML1998-5JW01
SITRANS RD Software, German C	7ML1998-5JW31

		Order No.
SITRANS RD200	C)	7ML5740-
A universal input, panel mount remote digital display for process instrumentation.		- 0 A
Accessories		
SITRANS RD200 copy cables 2.1 m (7 ft)	C)	7ML1930-1BR
SITRANS RD200 RS 232 serial adapters (copy cable included)	C)	7ML1930-1BS
SITRANS RD200 RS 422/485 serial adapters (copy cable included)	C)	7ML1930-1BT
RS 232 to RS 422/485 isolated converters	C)	7ML1930-1BU
RS 232 to RS 422/485 non-isolated converters	C)	7ML1930-1BV
SITRANS RD200 RS 232 and RS 485 isolated multi-input adapter boards	C)	7ML1930-1BW
USB to RS 422/485 isolated converters	C)	7ML1930-1BX
USB to RS 422/485 non-isolated converters	C)	7ML1930-1BY
USB to RS 232 converters	C)	7ML1930-1DC
RD Software CD for 1 100 displays	C)	7ML1930-1CC
Modbus option enabled		7ML1930-1CD
Low cost polycarbonate plastic enclosures for 1 display	C)	7ML1930-1CF
Thermoplastic enclosures		
For use with 1 display	C)	7ML1930-1CG
For use with 2 displays	C)	7ML1930-1CH
For use with 3 displays	C)	7ML1930-1CJ
For use with 4 displays	C)	7ML1930-1CK
For use with 5 displays	C)	7ML1930-1CL
For use with 6 displays	C)	7ML1930-1CM
Stainless steel enclosures (Type 304, EN 1.4301)		
For use with 1 display	C)	7ML1930-1CN
For use with 2 displays	C)	7ML1930-1CP
For use with 3 displays	C)	7ML1930-1CQ
For use with 4 displays	C)	7ML1930-1CR
For use with 5 displays	C)	7ML1930-1CS
For use with 6 displays	C)	7ML1930-1CT
Steel enclosures		
For use with 1 display	C)	7ML1930-1CU
For use with 2 displays	C)	7ML1930-1CV
For use with 3 displays	C)	7ML1930-1CW
For use with 4 displays	ĺ.	7ML1930-1CX
For use with 5 displays	C)	7ML1930-1CY
For use with 6 displays	C)	7ML1930-1DA
¹⁾ Available with input voltage option 1 only		

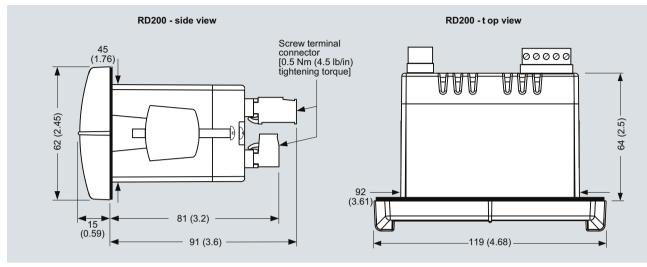
¹⁾ Available with input voltage option 1 only

 $^{2)}\,$ Available with output option C only

C) Subject to export regulations AL: N, ECCN: EAR99.

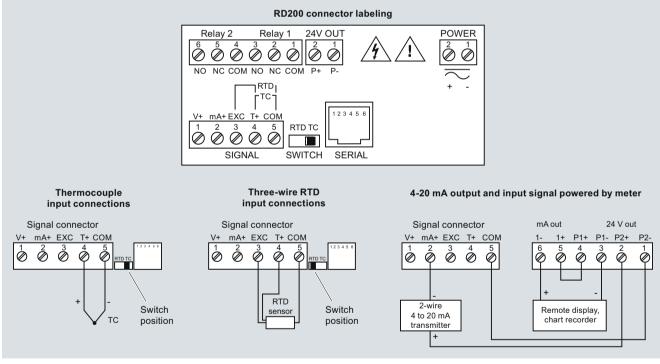
SITRANS RD200

Dimensional drawings



SITRANS RD200 dimensions in mm (inch)

Schematics



SITRANS RD200 connections

SITRANS RD500

Overview



The SITRANS RD500 is a remote data manager providing remote monitoring through integrated web access, alarm event handling, and data capture for instrumentation and other devices.

Benefits

- RD500 supports report and alarm events via email, SMS, and FTP transfer
- Web provides worldwide access to instrument data and RD500 configuration and setup
- Simple configuration using a standard web browser, no programming or additional software required.
- Offers scalability with optional I/O modules for current (4 ... 20 mA), voltage (0 ... 10 V), thermocouple (TC), resistance temperature detector (RTD), and digital input, output and counter
- 10 base-TI 100 Base-TX ethernet and support for GSM, GPRS, and PSTN provide flexible remote communications options
- Supports up to 128 devices with the flexible I/O modules and supports addressing for up to 247 Modbus serial devices via RS 232 and RS 485 serial ports
- Integrated FTP server and client supports FTP data synchronization to central servers
- Compact flash slot supports up to 2 Gbyte of expandable memory for data capture and storage, 1 Gbyte industrial compact flash card included
- Log files formats are CSV (comma separated values) for data files and HTML for report files
- Supports modbus TCP via ethernet and GPRS for easy integration into control systems

Application

The RD500 is an easy-to-use remote data monitoring solution, using a web-based application and hardware modules. The unique modular approach allows a variety of process signals to be monitored, while the serial ports allow data to be collected from any Modbus RTU device.

The RD500 comprises a master communications module, and up to 16 slave modules. Various module types are available, allowing up to a maximum of 128 conventional inputs and outputs. The RD500's serial ports can support addressing for up to 247 Modbus RTU slave devices including field instruments.

The RD500's built-in web server, FTP, and email client allows the process to be monitored remotely. Alarm notifications are communicated through email and SMS text messages to one or more recipients to ensure that appropriate actions are taken by personnel.

The RD500 supports modems, providing flexibility for applications in which GSM/GPRS cellular or landline connectivity is desired.

The RD500 is configured via a web-based interface - a standard browser is all the software you need to configure your system.

• Key Applications: Remote monitoring, inventory management, web enabled instrumentation or other devices.

SITRANS RD500

Milltronics RD500	
Mode of operation	
 Measuring principle 	Remote data manager
 Measuring points 	 Up to 128 standard input/out- puts
	 Addressing for up to 247 Modbus serial devices
Input	See table on page 2/24
Output	See table on page 2/24
Accuracy	See table on page 2/24
Rated operating conditions	
Storage temperature range	-30 +70 °C (-22 +158 °F)
Operating temperature	0 50 °C (32 122 °F)
Operating and storage humidity	80 % max relative humidity, noncondensing, from 0 50 °C (32 122 °F)
Design	
Material (enclosure)	High impact plastic and stainless steel
Installation category	1
Pollution degree	2
Weight	456.4 g (15.1 oz)
Mounting	Snaps onto standard DIN style top hat (T) profile mounting rails according to EN50022 – 35 x 7.5 and – 35 x 15
Power	24 V DC ± 10 %
	400 mA min. (1 module)
	3.5 Amps max. (16 modules)
	Must use Class 2 or SELV-rated power supply
Display	
Status LEDs	STS - status LED indicates con- dition of master
	 TX/RX - transmit/receive LEDs show serial activity
	 Ethernet - link and activity LEDs CF - CompactFlash LED indicates card status and read/write activity

Memory				
On-board user memory	4 Mbytes of non-volatile Flash memory			
On-board SDRAM	2 Mbytes			
Memory card	CompactFlash Type II slot for Type I and Type II cards; 1 Gbyte (optional 2 Gbyte)			
Certificates and approvals				
• Safety	 UL listed to U.S. and Canadian safety standards for use in Class I, II and III, Division 1 and 2 hazardous locations CE, C-TICK 			
Communication				
USB/PG port	Adheres to USB specifications 1.1. Device only using Type B connection.			
Serial ports	Format and baud rates for each port are individually software pro- grammable up to 115, 200 baud			
RS 232/PG port	RS 232 port via RJ12			
Comms ports	RS 422/485 port via RJ45 and RS 232 port via RJ12			
Ethernet port	10 BASE-T/100 BASE-TX; RJ45 jack is wired as a NIC (Network Interface Card)			

SITRANS RD500

Technical specifications (continued)

SITRANS RD500 Module Specifications

	8 inputs, 6 solid state outputs	8 inputs, 6 relay outputs	8 channel, 4 20 mA	8 channel ± 10 V	6 channel, RTD	8 channel thermo- couple module
Order number	7ML1930-1ES	7ML1930-1ER	7ML1930-1EP	7ML1930-1EQ	7ML1930-1ET	7ML1930-1EU
Application	8 inputs, 6 outputs used to monitor contact or sensor inputs	8 inputs, 6 outputs used to monitor contact or sensor inputs	16 bit analog input module provides high density signal measurement for data monitoring applications and accepts 0/4 20 mA pro- cess signals	16 bit analog input module provides high density signal measurement for data monitoring applications and accepts ± 10 V process signals	16 bit analog input module provides high-density sig- nal measurement for data acquisition applications and accepts various RTD inputs	16 bit thermo- couple input module provides high density signal measurement for data acquisition applications and accepts wide range of thermo- couple types
Accuracy	Not applicable	Not applicable	± 0.1 % of span	± 0.1 % of span	$\begin{array}{c} \pm (0.2 \ \% \ of \ span, \\ 1 \ ^\circ C) \ 0 \ \dots \ 50 \ ^\circ C \\ (32 \ \dots \ 122 \ ^\circ F); \\ \pm (0.1 \ \% \ of \ span, \\ 1 \ ^\circ C) \ 18 \ \dots \ 28 \ ^\circ C \\ (64 \ \dots \ 82 \ ^\circ F); \\ includes \ NIST \ conformity, \ A/D \ conversion \ errors, \\ temperature \ coefficient \ and \ linearization \ conformity \\ at \ 23 \ ^\circ C \ after \\ 20 \ minutes \ warmup \end{array}$	± (0.3 % of span, 1 °C); includes NIST conformity, cold junction effect, A/D conver- sion errors, tempe- rature coefficient and linearization conformity at 23 °C after 20 minute warm-up
Mounting	Snaps onto standar	d DIN style top hat (T) profile mounting rail	s according to EN500)22 – 35 x 7.5 and -35	5 x 15
Inputs	Dip switch selecta- ble for sink or source	Dip switch selecta- ble for sink or source max. voltage: 30 V DC, reverse polarity protected off voltage: < 1.2 V on voltage: < 3.8 V input frequency: • filter switch on: 50 Hz • filter switch off: 300 Hz	8 single-ended ranges: 0 20 mA or 4 20 mA resolution: full 16-bit sample time: 50 400 ms depending on number of enab- led inputs	8 single-ended ranges: 0 10 V DC or ± 10 V DC resolution: full 16-bit sample time: 50 400 ms depending on number of enab- led inputs	6 single-ended resolution: full 16-bit sample time: 67 400 ms depending on number of enab- led inputs	8 single-ended resolution: full 16-bit sample time: 50 400 ms depending on number of enab- led inputs
Outputs	Solid state output, switched DC, contact rating 1 A DC max.	Form A, NO pairs share common ter- minals: 1&2, 3&4, 5&6 current rating by pair: 3 Amps at 30 V DC/125 V AC resis- tive 1/10 HP at125 V AC	Not applicable	Not applicable	Not applicable	Not applicable

SITRANS RD500

Selection and Ordering data		Order No.
SITRANS RD500	K)	7ML5750-
The SITRANS RD500 is a remote data manager pro- viding integrated web access, alarm event handling and data capture for instrumentation.		A 0 0 - 0
Communications Connection		
Ethernet ¹⁾		1
Digital Communications to Instruments RS 485 Modbus RTU		A
Input configuration modules		
Note: one RD500 supports 16 input modules		
RD500 8 channel 0/4 20 mA input module		7ML1930-1EP
RD500 8 channel ± 10 V input module		7ML1930-1EQ
RD500 8 digital inputs, 6 relay outputs module		7ML1930-1ER
RD500 8 digital inputs, 6 solid state outputs module ¹⁾	C)	7ML1930-1ES
RD500 6 channel input, RTD module	()	7ML1930-1ET
RD500 8 channel thermocouple module		7ML1930-1EU
	0)	
Operating Instructions		7ML1998-5MA01
Application manual, English Application manual, German		7ML1998-5MA01
Note: Additional Operating Instructions should be	R)	/ IVIL 1990-SIVIAS I
ordered as a separate line item.		
This device is shipped with the Siemens Milltronics manual CD containing Quick Starts and Operating Instructions.		
Other Operating Instructions		
RD500 Remote Data Manager manual, English: web access, alarm event handling, and data capture	K)	7ML1998-5MK01
RD500 Remote Data Manager manual, German: web access, alarm event handling, and data cap- ture	K)	7ML1998-5MK31
RD500 8 channel 0/4 20 mA input module manual, English	C)	7ML1998-5MB01
RD500 8 channel 0/4 20 mA input module manual, German	C)	7ML1998-5MB31
RD500 8 channel ± 10 V input module manual, English	C)	7ML1998-5MC01
RD500 8 channel ± 10 V input module manual, German	C)	7ML1998-5MC31
RD500 8 inputs, 6 relay outputs module manual, English	C)	7ML1998-5MD01
RD500,8 inputs, 6 relay outputs module manual, German		7ML1998-5MD31
RD500 8 inputs, 6 solid state outputs module manual, English		7ML1998-5ME01
RD500 8 inputs, 6 solid state outputs module manual, German		7ML1998-5ME31
RD500 6 channel input, RTD module manual, English		7ML1998-5MF01
RD500 6 channel input, RTD module manual, German RD500 8 channel thermocouple module manual,	,	7ML1998-5MF31
RD500 8 channel thermocouple module manual, English RD500, 8 channel thermocouple module manual,		7ML1998-5MJ01 7ML1998-5MJ31
German	0)	7 MIL 1990-01003 I

		Order No.
SITRANS RD500	K)	7ML5750-
The SITRANS RD500 is a remote data manager pro- viding integrated web access, alarm event handling and data capture for instrumentation.		A 0 0 - 0
Accesories		
Multitech GPRS modem, external	C)	7ML1930-1EX
Industrial CompactFlash card, 2 Gbyte	L)	7ML1930-1FB
Industrial CompactFlash card, 1 Gbyte	L)	7ML1930-1FC
RJ11 serial to terminal block RS 232	C)	7ML1930-1FD
RJ45 serial to terminal block RS 485	C)	7ML1930-1FE
GPRS Modem antenna	C)	7ML1930-1FF
RD500 Spare Module base	C)	7ML1930-1FG
RD500 Spare End terminator	C)	7ML1930-1FH
5' Ethernet Cat 5e Red X/O cable for configuration		7ML1930-1FM
USB cable type A to B	C)	7ML1930-1FN

¹⁾ Configuration limited to 16 modules.

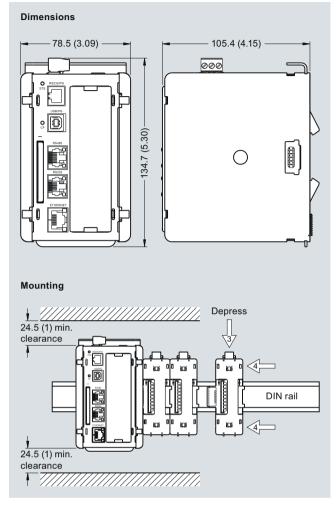
C) Subject to export regulations AL: N, ECCN: EAR99.

K) Subject to export regulations AL: N, ECCN: 5A991X.

L) Subject to export regulations AL: N, ECCN: 3A991X.

SITRANS RD500

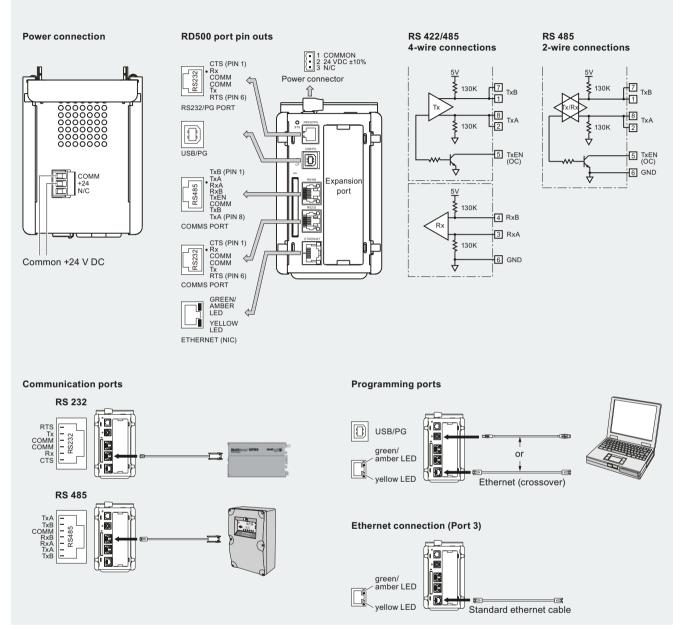
Dimensional drawings



SITRANS RD500 dimensions in mm (inch)

SITRANS RD500

Schematics

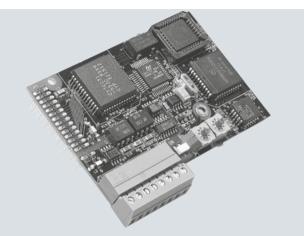


SITRANS RD500 connections

2

SmartLinx

Overview



SmartLinx modules provide direct digital connection to popular industrial communications buses with true plug-and-play compatibility with products manufactured by Siemens.

Benefits

- · Fast, easy installation
- · Direct connection: no additional installation required
- Scaleable application layer allows for optimized network bandwidth and memory requirements
- Modules available for PROFIBUS DP, Allen-Bradley Remote I/O and DeviceNet

Application

Many Siemens Milltronics products include Modbus communications. For additional communication modules, SmartLinx cards are the answer.

They are fast and easy to install, and can be added at any time. The module simply plugs into the socket on any SmartLinx-enabled product. They require no secondary private buses or gateways and no separate wiring. There are no extra boxes to connect to your network so there's a minimum load on engineering and maintenance staff.

SmartLinx provides all data from the instrument, including measurement and status, and allows changes to operation parameters to be done over the bus. The user can select which data in the application layer to transfer over the bus. This selection saves bandwidth and memory and optimizes data throughput and speeds up the network, enabling you to connect more instruments to your network.

Technical specifications

Smart Linx	
Module type	Allen-Bradley Remote I/O
Interface	RIO
Transmission rate	57.6, 115.2 or 230.4 kbps
Rack address	1 73, 1/4 full rack
Connection	RIO slave
SmartLinx module compatibility	Milltronics BW500Milltronics SF500

Module type	PROFIBUS DP
Interface	RS 485 (PROFIBUS standard)
Transmission rate	All valid PROFIBUS DP rates from 9600 kbps to 12 Mbps
Rack address	0 99
Connection	Slave
SmartLinx module compatibility	Milltronics BW500 Milltronics SF500

Module type	DeviceNet
Interface	DeviceNet physical layer
Transmission rate	125, 250, 500 kbps
Rack address	0 63
Connection	Slave (group 2)
SmartLinx module compatibility	Milltronics BW500
	 Milltronics SF500

Selection and Ordering data		Order No.
SmartLinx modules Allen-Bradley Remote I/O modules PROFIBUS DP modules DeviceNet modules	C)	7ML1830-1HS 7ML1830-1HR 7ML1830-1HT
Instruction manuals Allen-Bradley Remote I/O communications module, English PROFIBUS communications module	C)	7ML1998-1AP03
English	C)	7ML1998-1AQ03
French	C)	7ML1998-1AQ12
German	C)	7ML1998-1AQ32
DeviceNet, English	C)	7ML1998-1BH02
Spare SmartLinx software		
Allen-Bradley data diskettes	C)	7ML1830-1CK
PROFIBUS DP data diskettes	C)	7ML1830-1CL
DeviceNet data diskettes	C)	7ML1830-1CM

C) Subject to export regulations AL: N, ECCN: EAR99.

Overview

Automation with integral weighing and proportioning technology

In addition to the accuracy when weighing and proportioning, incorporation of weighing technology into modern automation systems serves to increase the sustained success of a company.

Requirements on scales in industrial processes

The weighing and proportioning system is of significant importance in many industrial processes, where many different weighing tasks have to be handled. Both programmable controllers (PLC) and process control systems (PCS) are used to automate production processes.

There are many different types of scales that work together with automation systems, depending on requirements.

Production automation places the following demands on weighing technology:

- Flexibility for typical scale functions
- Simple expansion of weighing system
- · Adaptability to the automation task, and
- Integrated communication concept

Scales that are able to satisfy these demands can be classified as part of the automation system. In this sense, the scale is an intelligent automation object comprising:

- Sensor technology
- Control
- Actuator technology

and carries out its tasks according to the definitions of the control system.



SIWAREX FTA weighing electronics in the S7-300 system

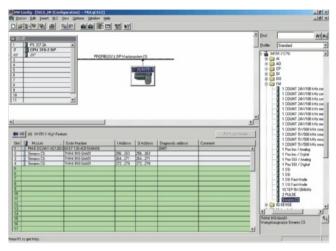
Distribution of weighing functions within automation system

The distribution of weighing functions within automation systems has been subject to constant change in recent years. The reasons for this can be found in the search for an efficient solution for weighing tasks in the automation environment. The performance of hardware components is no longer the only reason for deciding to use a specific solution architecture. A modern weighing solution needs to cover the following scale-related requirements:

- High reliability
- Simple operation
- · Excellent reproducibility, and
- High accuracy

as well as the requirements associated with the following automation properties:

- Consistency (hardware/software)
- Flexibility
- Standardization



SIMATIC hardware configuration with SIWAREX CS weighing electronics

Application-compatible implementation leads to the following three aspects:

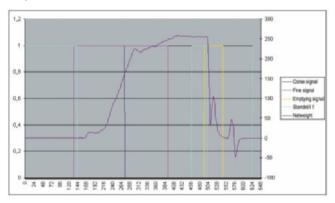
- The demands for accuracy and reproducibility require the use of special, high-quality function units for signal recording, signal adaptation, A/D conversion and preprocessing, as well as open-loop and closed-loop control functions. The task means that the weighing signals must be resolved in up to 16 million digitization steps. During proportioning and filling, material flows must be controlled over binary scale signals with a time resolution of up to less than one millisecond.
- A range of other application-specific functions are also required to perform the overall task. It is therefore essential to take into account the complete value chain in the production process. These might include the automatic filling of supply hoppers or the unloading of the final product - so that a system is required that supports simple implementation of the necessary functions.
- It is also necessary to ensure full integration of the weighing systems into the total automation technology wherever possible. This covers not only communication, but also requires functional integration and the engineering of all automation functions using standard tools.

These aspects result in the following solution, which easily satisfies all requirements:

- Function modules for weighing systems that contain the required hardware and firmware as standard, in order to satisfy the high accuracy requirements and time-critical tasks. These function modules contain all the features of the standard automation system and are therefore completely compatible.
- Use of standard automation systems for the implementation of application-specific tasks. This not only enables the use of the standards already generally applied for engineering, visualization, archiving etc., but also supports full integration into the total automation technology without the need for any further adaptation. Sector-specific and application-specific solutions can be implemented particularly flexibly in this case. Special weighing and process methods or recipes can be protected from access by third-parties by means of software protection (know-how protected).

Introduction

- This concept sees the weighing system as an automation object integrated in the total automation solution. The aforementioned total compatibility means that the standard automation functions and the weighing functions combine to form a homogenous entity for the user and meet the demands for uniformity, ease of use and flexibility on the basis of existing standards.
- This solution means that the component architecture can be central or distributed. The advantage of a central architecture is the time-optimized interaction between control CPU and weighing processor. In the case of distributed architecture, i.e. when the components are integrated in the scale, the weighing system is easily transformed into an autonomous "field device" connected to the automation technology through the open PROFIBUS or PROFINET.



Curve display of proportioning, recorded over the weighing electronics using SIWAREX FTA

SIWAREX weighing systems in automation

"Totally Integrated Automation" is an integral part of the SIWAREX weighing systems.

A key feature is the total integration of SIWAREX into the SIMATIC world.

This means:

- Implementation of central automation concepts through direct integration in SIMATIC S7
- Implementation of distributed automation concepts by direct integration in SIMATIC NET
- Integration in the SIMATIC PCS 7 process control system
- · Operator control and monitoring through SIMATIC HMI
- Consistent configuration and programming using SIMATIC software

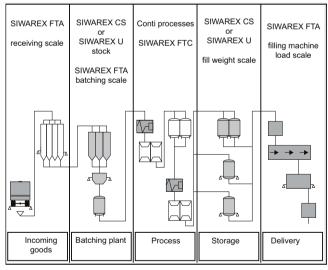
Material parameters

Component ID 1						
Name Flour	Maximum weighing time	0				
Device number 1	In flight value	1.00				
Name Scale 1	Fine weight	1.00				
Command by start 651	Fine switch off correction	0.00				
Command by continue 103	Timer for predosing	0				
Bin no.	Tolerance limit TO1	1.00				
	Tolerance limit TU1	1.00				
Route on 📃	Tolerance limit TO2	1.50				
Fine optimization 📃	Tolerance limit TU2	1.50				
	Component coloritory					
Component selection:	y compo + compo	back				

Sample material parameters in SIMATIC HMI

SIWAREX - weighing electronics - uniform SIMATIC system basis

By investing in SIWAREX weighing modules, you are investing in the uniform SIMATIC system basis on which the automation components of the entire production process can build – from incoming goods (upstream area) to the production process (mainstream area) down to the filling machine at the end of the production chain (downstream area) – a system basis that encompasses all hierarchic levels, from the HMI through to the PROFIBUS DP or PROFINET fieldbus. Why use specialized technology for each weighing or proportioning problem when a uniform basis is available for all individual problem solutions? With SIWAREX, Siemens has created this uniform basis.



Applications of SIWAREX weighing technology in the production process

Introduction

Overview (continued)

Integrated automation solutions with weighing technology

SIWAREX weighing modules are ideally suited to integrated automation solutions using weighing technology. SIWAREX can be used for every SIMATIC solution regardless of whether it is integrated into the SIMATIC S7 automation system in the form of a module or used as a distributed I/O with the SIMATIC S7 or C7.

The highlight: SIWAREX modules are integrated into the automation system with the same engineering tools as all other automation components. This is an excellent solution which reduces engineering costs and training expenses!

The ET 200 I/O station is designed as a modular system. The weighing electronics are selected from the module catalog and placed in the rack of the modular I/O station. The software addresses the weighing electronics as if they were modules plugged into the central controller of an automation system.

With the use of standard hardware (SIMATIC components) and standard software (STEP 7), freely programmable, modular weighing systems are available which can be inexpensively adapted to specific plant requirements, e.g. by means of:

- Additional SIMATIC digital outputs for controlling a mixer, heater, agitator, etc.
- Additional functions implemented in STEP 7 for determining and controlling the material flow or for correcting the setpoint based on material moisture.

The advantages of direct integration at a glance:

- Low-cost system integration because no additional coupling modules are required
- · Low configuration costs due to the uniform system concept
- System-compatible module behavior (diagnostic interrupts, process interrupts, command output disables, etc.)
- Tailor-made low-cost weighing systems through expansion with standard SIMATIC components
- High plant availability
- · Easy installation due to snap-on technique
- · Low space requirements due to compact design

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Scales can also be adjusted without an automation system

High plant availability – to ensure that production does not come to a halt

Apart from the advantage that configuration know-how is only required for a single system, there are also enormous advantages in terms of plant availability.

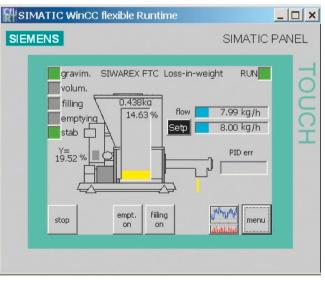
In the SIMATIC S7, for example, faults (measuring range exceeded, proportioning fault, sensor fault, etc.) are reported to the automation system via diagnostic interrupts without the need to input a single line of programming code.

Error messages from the weighing electronics are automatically transferred to the automation system. The diagnostic information enables easy location of the module from which the message originated.

Using a programmer or the plant visualization, operating personnel are then able to localize the fault, display its cause and, if necessary, replace the defective module.

When the correct bus modules are used, the SIWAREX U, SIWAREX CS, SIWAREX FTA, SIWAREX FTC and SIWAREX CF weighing electronics can even be replaced under power. A replaced module is automatically detected by the automation system. Thanks to the transparent data management, the scales parameters saved in the automation system can then be transferred to the new weighing electronics. The scales are immediately available again for weighing tasks – no need to readjust with control weights (except for applications that require legalfor-trade certification).

Because SIWAREX weighing systems are made solely of standard components (e.g. SIWAREX weighing modules, SIMATIC digital input/outputs, etc.), spare parts inventories are very easy to handle.



Scale faceplate of a loss-in-weight scale

2

Introduction

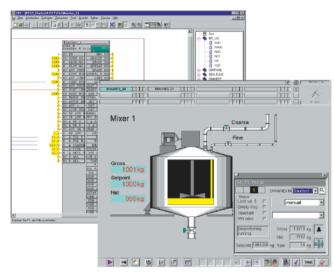
Overview (continued)

Standard programming in the SIMATIC PCS 7 process control system as in the SIMATIC S7 automation system

While the weighing modules used with the SIMATIC S7 automation system are usually integrated into the system with the typical PLC programming languages; STL (Statement List), LAD (Ladder diagram) or FBD (Function Block Diagram), configuration in the SIMATIC PCS 7 process control system is usually implemented by means of graphic interconnection in the CFC (Continuous Function Chart). Configuration is used instead of programming.

The scales are displayed in the ES (engineering system) as "technology blocks" in the CFC. At the OS (operator station), however, faceplates are used to display the scales in the WinCC visualization system.

The faceplates can be used to monitor the weight values and operate the scales.



Scales displayed in the ES engineering system (on the left) and on the OS operator station (on the right)

SIWAREX application table

Application	Examples	Selection
Static weight measurements, high accuracy	Platform scales, container weighers, vehicle scales	SIWAREX FTA ¹⁾ , max. resolution 16 million parts
Static weight measurements, medium accuracy	Container weighers, silos	SIWAREX U for S7 300 and ET 200M SIWAREX CS for ET 200S For ET 200S SIWAREX MS for S7 200
Force and torque measurements	Rolling mills, monitoring of loads and belt ten- sions, overload protection, torque measure- ments	SIWAREX FTC (bidirectional) SIWAREX CF for ET 200S (bidirectional) SIWAREX MS for S7 200 (bidirectional)
Proportioning	Batching plants, batch processes, propor- tioning recipes, single-scale and multi-scale systems	SIWAREX FTA ¹⁾ (OIML R-51)
Proportioning	Batching plants, in continuous operation, pro- portioning recipes, single-scale and multi- scale systems	SIWAREX FTC (operating mode - loss-in-weight scale)
Filling, fast filling	Filling machines, weighing and sack filling machines, big bag	SIWAREX FTA ¹⁾ (OIML R-61) SIWAREX MULTISCALE (software for batch- ing plants and mixers) SIWAREX MULTIFILL (software for filling/bag- ging in multi-head plants)
Fast loading	Loading scales for receiving and load opera- tions	SIWAREX FTA ¹⁾ (OIML R-107)
Static quantity control	Automatic weight control in static mode, e.g. following filling	SIWAREX FTA ¹⁾ (OIML R-51)
Flow meter	Bulk flow meter (baffle plate)	SIWAREX FTC (flow meter mode)
Conveyor scale, weighfeeder	Measurement of belt load, conveyed quantity, loading according to setpoint	SIWAREX FTC (conveyor scale operating mode) and PID control

1) Suitable for applications that require legal-for-trade certification

Introduction

Overview (continued)

SIEMENS

Questionnaire SIWAREX	<				
Customer information					
Contact:			E-mail:		
Company:					
Address:			Date :		
City:					
Zip/Postal Code:	Phone: ()	Fax: ()	
Electronics					
Application type					
Non Automatic Weighing Ins	trument	Truck/Wagon	scale static	[Checkweigher
Platform Scale		Automatic fillin	ig/Big Bag s	cale	Solid flow meter
Vessel/Silo/level measureme	ent	Dosing scale		[Weighfeeder
Truck scale		Belt scale		[Loss in weight dosing scale
Force measurement					
Type of material:					
Requested features					
Basic weighing functions		Error control a	nd logging	[Fast weight value processing
Recording of weighing seque	ence	Preventive diag	gnostics	[Legal-for-trade
With Ex approval	Zone type/n	umber:			
SIMATIC integration					
SIMATIC S7-200 directly	SIN	ATIC PCS7 Versio	on:		Other
SIMATIC S7-300 directly	WI	NCC flex Version:		Nam	e:
SIMATIC S7-300/400 with b	us Type: _				
SIWAREX Mechanic					
Load cells					
Total maximum weight:		Dead load	:		Required precision:
		support points:			
Vibration (Motor, Mixer, etc.)	G	uide elements requ	uired?	Lift up protection	on Diagnostics
High overload protection	🗌 Hi	gh measuring rate		Ex Protection	Stainless steel required ?
Special application requirements	i				
Pictures available	Draw	ng available		Retrofit of a	an old installation
This questionnaire is only a gui	ueiine. ⊢or specia	configurations refer to yo	ur Siemens con	tact person.	

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SIWAREX U

Overview



SIWAREX U weighing electronics

SIWAREX U is a versatile weighing module for all simple weighing and force measuring tasks. The compact module is easy to install in all SIMATIC automation systems. Complete data access is then possible via SIMATIC.

Benefits

SIWAREX U offers the following key advantages:

- Uniform design technology and consistent communication in SIMATIC
- Use in distributed plant concept through connection to PROFIBUS DP/PROFINET using ET 200M
- Measurement of weight or force with a high resolution of 65 000 parts and an accuracy of 0.05 %
- 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 renewed adjustment of scale
- 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 following are typical SIWAREX U applications:

- · Fill level monitoring of silos and bunkers
- Monitoring of crane and cable loads
- Measuring of conveyor belt loads
- Overload protection for industrial lifts and rolling mills
- Weighing in potentially explosive areas (through use of an Ex interface)
- Monitoring of belt tension

Design

SIWAREX FTC is a compact SIMATIC S7-300 function module (FM) and can be snapped directly onto the SIMATIC S7-300 or ET 200M backplane bus. The snap-on rail mounting means that it is extremely easy to mount/wire.

The load cells, power supply and the serial interface are connected via a standard 20-pin front plug.

The operation of the SIWAREX U in SIMATIC ensures the total integration of the weighing technology in 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 MS 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 be integrated not only 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), but also 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.

The SIWATOOL U software uses the familiar Windows interface and can be used to set SIWAREX weighing modules, independent 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 potentially explosive areas (zone 2). The load cells can be provided with an intrinsically-safe power supply through an optional Ex interface.

SIWAREX U

SIWAREX U	
Integration in automation sys-	
tems:	
S7-300	Direct integration
S7-400 (H)	Via ET 200M
PCS 7 (H)	Via ET 200M
C7	Via IM or ET 200M
Automation systems from other vendors	Via ET 200M
Stand-alone (without SIMATIC CPU)	Possible with IM 153-1
Communication interfaces	 SIMATIC S7 (P bus)
	• RS 232 • TTY
Connection of remote displays (through TTY serial interface)	Gross, channel 1, 2 or default value 1, 2
Adjustment of scale settings	Via SIMATIC (P bus) or PC w SIWATOOL U (RS 232)
Measuring properties	
Error limit to DIN 1319-1 of full-scale value at 20 °C \pm 10 K	0.05 %
Internal resolution ADC Data format of weight values	65 535 2 byte (fixed-point)
Number of measurements/s	50
Digital filter	0.05 5 Hz (in 7 steps), me value filter
Weighing functions	
Weight values	Gross
Limit values	2 (min./max.)
Zero setting function	Per command
Load cells	Strain gages in 4-wire or 6-wire system
Load cell powering	
Supply voltage $U_{\rm s}$ (rated value)	6 V DC ¹⁾
Maximum 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	500 m ²⁾ 150/500 m for gas group IIC 500 m ²⁾ for gas group IIB (se SIWAREX IS Manual)
Intrinsically-safe load cell powering	Optional (Ex interface) with SIWAREX IS
Auxiliary power	
Rated voltage	24 V DC
Maximum current consumption	150 mA (single-channel)/
Current consumption from back- plane bus	240 mA (two-channel) ≤ 100 mA

Cartification	
Certification	ATEX 95, FM, cUL _{US} Haz. Loc.
IP degree of protection to DIN EN 60529; IEC 60529	IP20
Climatic requirements	
$T_{min (IND)}$ to $T_{max (IND)}$) (operating temperature)	
 Vertical installation 	0 60 °C (32 140 °F)
 Horizontal installation 	0 40 °C (32 104 °F)
EMC requirements according to	NAMUR NE21, Part 1
	EN 61326
Dimensions	40 x 125 x 130 mm (1.58 x 4.92 x 5.12 inch)

¹⁾ Supply of load cells compared to 7MH4601-1AA01 or ... 1BA01 changed to 6 V DC

²⁾ Up to 1 000 m (3280 ft) possible under certain conditions, provided the recommended cable is used (see Accessories).

SIWAREX U

For SIMARIC S7 and ET 200M, incl. bus connection weight 0.3 kg Simple-channel version ¹¹ for corp. mediag row scalas mediag and scalas Simple-channel version ¹¹ for corp. mediag row scalas TMH4950-2AA01 Two-charnel version ¹² for corp. mediag row scalas TMH4950-2AA01 Simple-channel TMH4950-2AA01 Two-charnel version ¹² for corp. mediag row scalas TMH4950-2AA01 Simple-channel Simple-channel Simple-channel Simple-channel Simple-channel Simple-channel Simple-channel Simple-channel				
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Single-channel version ¹ 0 ro con- tending one scale 7 SWAREX U manual 7 Available in a range of languages Free download on the internet at: http://www.semens.com/weigh- ingochrinology 7 SWAREX U configuration pack- ege for SIMATC S 7 SWAREX U manual 7 SWAREX U configuration pack- ege for SIMATC S 7 SWAREX U configuration pack- ege for TRATING S	incl. bus connector, weight 0.3 kg		cable with diameter 4 13 mm	
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age for integrating SIWAREX U PS 307-1K: 10 A 6ES7392-2XX00-0AA0 SIWAREX U configuration pack- age for PCS 7, version 6.x 7MH4683-3BA64 PS 307-1K: 10 A 6ES7392-2XX00-0AA0 SUBLABLE for 7PCS 7, version 6.x 7MH4683-3BA64 PS 307-1K: 10 A 6ES7392-2XX00-0AA0 SUBLABLE for 7PLS 7, version 7.0 7MH4950-3AA01 Amount 5, spare part) Remote displays (aption) The digital remote displays can be connected directly to S SIWAREX U configuration pack- age for PCS7 S7, Version 7.0 SIWAREX U configuration pack- age for PCS7 S7, Version 7.0 TMH4950-3AK61 SWAREX U configuration pack- age for PCS7 S7, Version 7.0 7MH4950-3AK61 The following remote displays can be used: S102, S302 The following remote displays			PS 307-1E; 5 A	6ES7307-1EA00-0AA0
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age for PCS 7, version 6.2. Remote displays (option) Suitable for 7MH4601-1*A01 and Available in German and English on CD-ROM, module for the CFC and faceplate TMH4950-3AK61 SWAREX U configuration pack- and faceplate TMH4950-3AK61 SWAREX U through a TTV inter- face. The digital remote displays can be connected directly to SIWAREX U through a TTV inter- face. SWAREX U configuration pack- and V7.1 or higher TMH4950-3AK61 Suitable for 7MH4950-1AA01 and MH4950-2AA01 TMH4950-3AK61 Package for integrating SIWAREX U in STEP 7 Findelowing remote displays can be used: SIWATOOL U commissioning software SIWATOOL U commissioning software TMH4607-8CA SIWAREX U/CS with serial C interface. for 9-pin PC inter- faces (RS 223), all ong (9.84 ft) TMH4607-8CA SIWAREX U/CS with serial C interface. for 9-pin PC inter- faces (RS 223), all ong (9.84 ft) SiWAREX J/CS with serial C interface. for 9-pin PC inter- face (RS 223), all ong (9.84 ft) TMH4607-8CA SiWAREX U/CS with serial C interface. for 9-pin PC inter- face (RS 223), all ong (9.84 ft) SiWAREX JB junction box, stainless steel housing for connecting up to 4 load cells in parallel, and for connecting several junction boxes TMH4710-1EA Sild contact element Sufficient for two SIWAREX U nedules GES7390-5AA00-0AA0 With UL and FL approval for intrinsically-safe connection of load cells, suitable for the SIWAREX U, CS, MS, FTA and FTC weighing mod- ules. <td></td> <td></td> <td></td> <td>6ES7392-2XX00-0AA0</td>				6ES7392-2XX00-0AA0
Suitable for 7/MH4801-11*A01 and Available in German and English on CD-ROM. TMH4950-3AK61 SIWAREX U configuration pack- and faceplate TMH4950-3AK61 SIWAREX U configuration pack- and faceplate TMH4950-3AK61 SIWAREX U through a TTY inter- face. The digital remote displays can be connected directly to SIWAREX U through a TTY inter- face. SUBJECT ST, Version 7.0 and V7.1 or higher TMH4950-3AK61 Suitable for 7MH4950-1AA01 and 7MH4950-2AA01 TMH4950-3AK61 Package for integrating SIWAREX U in STEP 7 Siebert Industrieektronik GmbH Package for integrating SIWAREX U in STEP 7 Encition block for CFC Faceplate SiWAREX U in STEP 7 SIWAREX U/CS with serial PC interface, for 9-pin PC inter- faces (RS 232), 3 m long (9.84 tf) TMH4607-8CA SIWAREX U/CS with serial PC interface, for 9-pin PC inter- faces (RS 232), 3 m long (9.84 tf) TMH4607-8CA SIWAREX U/CS with serial PC interface, for 9-pin PC inter- faces (RS 232), 3 m long (9.84 tf) SiWAREX JB junction box, stainless steel housing for connecting up to 4 load cells in parallel, and for connecting several junction box, stainless steel housing for connecting up to 4 load cells in parallel TMH4710-1EA Sild to enach SIWAREX Mod- ule GES7392-1AJ00-0AA0 With UL and FI approval for intrinsically-safe connection of load cells, suitable for the SIWAREX U, CS, MS, FTA and FTC weighing mod- ules. TMH4710-5AA		7MH4683-3BA64		
Available in German and Engish on CD-ROM, module for the CFC and faceplate TMH4950-3AK61 be connected directly to' SIWAREX U through a TTY inter- face. SiWAREX U configuration pack- age for PCS7 S7, Version 7.0 and V7.1 or higher TMH4950-3AK61 the following remote displays can be used: SiWAREX U configuration pack- age for PCS7 S7, Version 7.0 and V7.1 or higher TMH4950-3AK61 the following remote displays can be used: Suitable for 7MH4950-1AA01 and 7MH4950-2AA01 TMH4950-3AK61 the following remote displays can be used: O CD-ROM - Faceplate Silebert Industrieelektronik GmbH TMH4950-3AK61 • Faceplate SiWAREX U in STEP 7 Encotion block for CFC Encotion block for CFC • Faceplate SiWAREX U commissioning software TMH4607-8CA SiWAREX JB junction box, stainless steel housing for connecting up to 4 load cells in parallel, and for connecting several junction boxes TMH4710-1EA SiWAREX U/CS with serial PC Interface, for 9-pin PC inter- faces (RS 232), 3 m long (9.84 ft) 6ES7392-1AJ00-0AA0 SiWAREX JB junction box, stainless steel housing for connecting up to 4 load cells in parallel TMH4710-1EA SiMcle contact element Sufficient for two SIWAREX U ueles 6ES7390-5AA00-0AA0 Ex interface, type SIWAREX Pi Vith UL and FTX approval for intrinsically-safe connection of load cells, suitable for the SIWAREX U, CS, MS, FTA and FTC weighing mod- ules.				
And Inclose of NUT Finites of Stression 7.0 and V7.1 or higher Silizable for XDH14950-1AA01 and YMH4950-2AA01 Silebert Industrieelektronik on CD-ROM Be used: HSP Hardware Support Finites of integrating Package for integrating Silebert Industrieelektronik SilWAREX U in STEP 7 Function block for CFC Facceplate Finites of integrating SilWATOL L cable From SilWAREX U/CS with serial from SilWAREX U/CS with serial 7MH4607-8CA SIWAREX U JS 232), 3 m long (9.84 ft) Finites of the stressing Installation material (mandatory) 6ES7392-1AJ00-0AA0 Stille of for each SIWAREX U modules 6ES7392-5AA00-0AA0 Sile of or each SIWAREX U modules 6ES7392-5AA00-0AA0	Available in German and English on CD-ROM, module for the CFC		be connected directly to SIWAREX U through a TTY inter-	
Suitable for 7MH4950-1AA01 and 7MH4950-2AA01 Sibbert Industrieelektronik GmbH on CD-ROM	age for PCS7 S7, Version 7.0	7MH4950-3AK61	be used:	
on CD-ROM P.O. Box 1180 HSP Hardware Support Package for integrating StWAREX U in STEP 7 Function block for CFC Faceplate Faceplate StWATOOL U commissioning software TMH4607-8CA Manual TMH4710-1BA StWATOL cable TMH4607-8CA From SIWAREX U/CS with serial PC interface, for 9-pin PC	Suitable for 7MH4950-1AA01 and		Siebert Industrieelektronik	
HSP Hardware Support Package for integrating SIWAREX U in STEP 7 Function block for CFC Faceplate SIWATOOL U commissioning software Manual SIWATOOL cable from SIWAREX U/CS with serial PC interface, for 9-pin PC inter- faces (RS 232), 3 m long (9.84 ft) Installation material (mandatory) 20-pin front plug with screw contacts (required for each SIWAREX mod- ule) Shift contact element Sufficient for two SIWAREX U modules 6ES7390-5AA00-0AA0 6ES7390-5AA00-0AA0 7MH4710-5AA With UL and FM approvals, but without ATEX approval for intrinsically-safe connection of load cells, suitable for the SIWAREX U, CS, MS, FTA and FTC weighing mod- ules. Not approved for use in the EU.			P.O. Box 1180	
 Package for integrating SIWAREX U in STEP 7 Function block for CFC Faceplate SIWATOOL U commissioning software Manual SIWATOOL cable from SIWAREX U/CS with serial PC interface, for 9-pin PC inter- faces (RS 232), 3 m long (9.84 ft) Package for and software Package for integrating the screw contacts (required for each SIWAREX U Bidlic contact element Sufficient for two SIWAREX U modules Sitificient for two SIWAREX U Sitificient for two SIWAREX U Sufficient for two SIWAREX U Sufficient for two SIWAREX U Manual Face and the screw contacts (required for each SIWAREX U modules Sitificient for two SIWAREX U Manual Sitificient for two SIWA	HSP Hardware Support			
• Function block for CFC • Faceplate • SIWATOOL U commissioning software • Manual • Manual SIWATOOL cable rom SIWAREX U/CS with serial PC interface, for 9-pin PC interfaces (RS 232), 3 m long (9.84 ft) Installation material (mandatory) 20-pin front plug with screw contacts (required for each SIWAREX module) 6ES7390-5AA00-0AA0 Shield contact element SUMAREX U modules 6FS7390-5AA00-0AA0 Shield contact element south for two SIWAREX U modules 6FS7390-5AA00-0AA0			Fax: +49 6806/980-999	
Faceplate SIWATOOL U commissioning software Manual SIWATOOL cable from SIWAREX U/CS with serial PC interface, for 9-pin PC interface, for 9-pin PC interfaces (RS 232), 3 m long (9.84 ft) Installation material (mandatory) 20-pin front plug with screw contacts (required for each SIWAREX module) 6ES7392-1AJ00-0AA0 Shield contact element Sufficient for two SIWAREX U modules 6ES7390-5AA00-0AA0 With UL and FM approvals, but without ATEX approval for intrinsically-safe connection of load cells, suitable for the SIWAREX U, CS, MS, FTA and FTC weighing modules. Not approved for use in the EU.				
aluminium housing • Manual • Manual • Manual SIWATOOL cable irrom SIWAREX U/CS with serial PC interface, for 9-pin PC inter- faces (RS 232), 3 m long (9.84 ft) Installation material (mandatory) 20-pin front plug with screw contacts (required for each SIWAREX mod- ule) Shield contact element Sufficient for two SIWAREX U modules 6ES7390-5AA00-0AA0 Finite of the SIWAREX U, CS, MS, FTA and FTC weighing mod- ules. Not approved for use in the EU.				
SIWATCOL cable 7MH4607-8CA from SIWAREX U/CS with serial 7MH4607-8CA PC interface, for 9-pin PC inter- faces (RS 232), 3 m long (9.84 ft) 7MH4710-1EA Installation material (mandatory) 6ES7392-1AJ00-0AA0 20-pin front plug with screw contacts (required for each SIWAREX mod- ule) 6ES7392-1AJ00-0AA0 Shield contact element Sufficient for two SIWAREX U modules 6ES7390-5AA00-0AA0				7MH4710-1BA
SIWATOOL cable 7MH4607-8CA from SIWAREX U/CS with serial 7MH4607-8CA PC interface, for 9-pin	• Manual			
from SIWAREX U/CS with serial PC interface, for 9-pin PC inter- faces (RS 232), 3 m long (9.84 ft) 7MH4710-1EA Installation material (mandatory) for connecting up to 4 load cells in parallel for connecting up to 4 load cells in parallel 20-pin front plug with screw contacts (required for each SIWAREX mod- ule) 6ES7392-1AJ00-0AA0 Ex interface, type SIWAREX Pi 7MH4710-5AA Shield contact element Sufficient for two SIWAREX U modules 6ES7390-5AA00-0AA0 With UL and FM approvals, but without ATEX approval for intrinsically-safe connection of load cells, suitable for the SIWAREX U, CS, MS, FTA and FTC weighing mod- ules. Not approved for use in the EU.	SIWATOOL cable	7MH4607-8CA		
Taces (HS 232), 3 m long (9.84 ft) installation material (mandatory) 20-pin front plug with screw contacts (required for each SIWAREX module) 6ES7392-1AJ00-0AA0 Shield contact element Sufficient for two SIWAREX U modules 6ES7390-5AA00-0AA0 Shield contact element Sufficient for two SIWAREX U 6ES7390-5AA00-0AA0	PC interface, for 9-pin PC inter-		SIWAREX JB junction box,	7MH4710-1EA
Installation material (mandatory) in parallel 20-pin front plug with screw contacts (required for each SIWAREX module) 6ES7392-1AJ00-0AA0 Shield contact element Sufficient for two SIWAREX U modules 6ES7390-5AA00-0AA0 Sufficient for two SIWAREX U 6ES7390-5AA00-0AA0	. ,		-	
contacts (required for each SIWAREX mod- ule) With UL and FM approvals, but without ATEX approval for intrinsically-safe connection of load cells, suitable for the SIWAREX U, CS, MS, FTA and FTC weighing mod- ules. Not approved for use in the EU.	1 11		in parallel	
(required for each SIWAREX module) With UL and FM approvals, but without ATEX approval for intrinsically-safe connection of load cells, suitable for the SIWAREX U, CS, MS, FTA and FTC weighing modules. Shield contact element Sufficient for two SIWAREX U Modules With UL and FM approvals, but without ATEX approval for intrinsically-safe connection of load cells, suitable for the SIWAREX U, CS, MS, FTA and FTC weighing modules. Not approved for use in the EU.		6ES7392-1AJ00-0AA0	Ex interface, type SIWAREX Pi	7MH4710-5AA
Shield contact element 6ES7390-5AA00-0AA0 load cells, suitable for the SIWAREX U, CS, MS, FTA and FTC weighing modules. Not approved for use in the EU. Not approved for use in the EU.	(required for each SIWAREX mod-		without ATEX approval	
	Sufficient for two SIWAREX U	6ES7390-5AA00-0AA0	load cells, suitable for the SIWAREX U, CS, MS, FTA and FTC weighing mod-	
			Not approved for use in the EU.	
Manual for Ex interface C71000-T5974-C29 SIWAREX Pi				C71000-T5974-C29

D) Subject to export regulations AL: N, ECCN: EAR99H.

SIWAREX U

Selection and Ordering data (c	Order No.
Ex interface, type SIWAREX IS With ATEX approval, but without UL and FM approvals, for intrin- sically-safe connection of load cells, including manual suitable for the SIWAREX U, CS, MS, FTA, FTC and CF weighing modules. Approved for use in the EU.	
With short-circuit current < 199 mA DC	7MH4710-5BA
With short-circuit current < 137 mA DC	7MH4710-5CA
Cable (optional)	
2 x (2 x 0.34 ST) – CY, orange sheath to connect SIWAREX U, CS, MS, FTA, FTC and CF to the junction box (JB), extension box (EB) or Ex interface (Ex-I) or between two JBs, for fixed laying, occasional bending permitted, 10.8 mm (0.43 inch) outer diameter, for ambient temperature -40 to +80 °C (-40 +176 °F)	
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 poten- tially explosive area to the Ex interface (Ex-1), for fixed laying, occasional bending permitted, blue PVC insulating sheath, approx. 10.8 mm (0.43 inch) outer diameter, for ambient temperature -40 +80 °C (-40 +176 °F)	7MH4702-8AF
Cable LiYCY 4 x 2 x 0.25 mm²) D) for TTY (connect 2 pairs of conductors in parallel), for connec-	7MH4407-8BD0

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.

D) Subject to export regulations AL: N, ECCN: EAR99H.

SIWAREX CS

Overview



SIWAREX CS weighing electronics

SIWAREX CS is a versatile weighing module for all simple weighing and force measuring tasks. The compact module is easy to install in all SIMATIC automation systems. Data can be accessed directly in the SIMATIC.

Benefits

SIWAREX CS offers the following key advantages:

- Uniform design technology and consistent communication in SIMATIC
- Uniform configuration with SIMATIC
- Use in distributed plant concept through connection to PROFIBUS DP or PROFINET via ET 200S
- Measurement of weight or force with a high resolution of 65 000 parts and an accuracy of 0.05 %
- Direct connection of a remote display to the TTY interface
- Simple adjustment of scale using the SIWATOOL CS program via the RS 232 interface
- Supports theoretical adjustment without adjustment weights
- Supports replacement of module without renewed adjustment of scale
- For use in Ex zone 2, intrinsically-safe load cell powering for zone 1 using Ex interface.

Application

SIWAREX CS is the optimum solution wherever strain gage sensors, such as load cells, force sensors or torque measuring shafts, are used for measuring tasks. The following are typical SIWAREX CS applications:

- Non-automatic weighing machines
- · Fill level monitoring of silos and bunkers
- · Measuring of crane and cable loads
- Load measuring for industrial lifts and rolling mills
- Weighing in potentially explosive areas (zone 2 directly, or zone 1 using Ex interface SIWAREX IS)
- Monitoring of belt tension
- Force measuring, container weighers, platform scales and crane scales

Design

SIWAREX CS is a compact function module (FM) in the SIMATIC ET 200S and can be plugged directly onto a terminal module. The power supply is connected via a power module and an internal power supply rail.

The load cells and the serial interface are connected via the terminal module connections. The use of the terminal module enables replacement of the module without the need to undo connection cables.

Function

The primary task of SIWAREX CS is the measurement of sensor voltage and the conversion of this measurement into a weight value. Up to 3 interpolation points are used for the weight calculation. The signal can also be digitally filtered if required.

As well as determining weights, the SIWAREX CS monitors two freely programmable limits (min./max. as required) and notifies SIMATIC if these values are exceeded.

The SIWAREX CS 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.

Consistent and uniform communication between all system components enables fast, reliable and cost-effective integration and diagnosis in industrial processes.

All master modules support the readout of process data from SIWAREX CS via peripherals. In the case of PROFIBUS master modules that support the protocol DP V1 and PROFINET master modules, it is also possible to use data record communication to read out data and input settings.

Group diagnostics and process alarms are possible with all PROFIBUS master modules with DP V1 and PROFINET modules. Master modules with DP V0 support group diagnosis, but not process alarms.

The SIWAREX CS has two serial interfaces. The TTY interface serves to connect digital remote displays. The remote displays can show the weight value with status information.

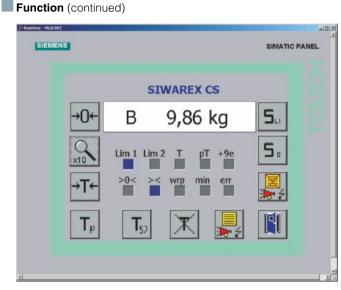
A PC can be connected via the RS 232 interface to parameterize the SIWAREX CS.

SIWAREX CS can 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).

In contrast to serially linked weighing electronics, SIWAREX CS does not need costly additional modules to link it to SIMATIC.

Used in conjunction with SIWAREX CS, it is possible to configure freely programmable, modular weighing systems in SIMATIC.

SIWAREX CS



Scale faceplate in the SIWAREX CS software "Getting started"

In addition to the configuration package, the ready-to-use SIWAREX CS software "Getting started" is also available free-ofcharge and shows beginners how to integrate the module in a STEP 7 program and offers a basis for application programming. A SIWAREX CS scale is then easy to implement in SIMATIC, for use together with a SIMATIC panel as operator panel.

Using the SIWATOOL CS software, the SIWAREX weighing modules offer Windows convenience and are quick to get up and running. Screen forms allow all user-definable parameters of the weighing modules to be specified, saved and printed for plant documentation.

The diverse diagnostic options provided by SIWATOOL CS ensure fast fault locating in online mode.

The SIWAREX CS weighing module can be used in potentially explosive areas (zone 2). It can also be used in zone 1 by implementing an optional Ex interface, whereby SIWAREX CS must be installed in a safe area.

Technical specifications

SIWAREX CS	
Integration in automation systems	
S7-400, S7-300, C7	via ET 200S
IM151-7 CPU	Through backplane bus
Automation systems from other manufacturers (possible with limitations)	via ET 200S
Communication interfaces	SIMATIC S7 (ET 200S backplane bus), RS 232, TTY
Connection of remote displays (through TTY serial interface)	Display for weight value
Adjustment of scale settings	using SIMATIC S7/C7 IM151-7 CPU or SIWATOOL CS PC param- eterization software (RS 232)
Measuring accuracy	
Error limit to DIN 1319-1 of full-scale value at 20 $^\circ\text{C}$ \pm 10 K	0.05 %
Internal resolution Data format of weight values	65 535 2 byte (fixed-point)

Number of measurements/s	50	
Digital filter	0.05 5 Hz (in 7 steps), mean- value filter	
Weighing functions		
Weight values	Gross, net	
Limit values	2 (min./max.)	
Zero setting function	Per command	
Tare function	Per command	
Tare specification	Per command	
Load cells	Strain gages in 4-wire or 6-wire system	
Load cell powering		
Supply voltage $U_{\rm S}$ (rated value)	6 V DC typ.	
Max. supply current	≤ 68 mA	
Permissible load resistance		
• R _{Lmin}	> 87 Ω	
• R _{Lmax}	< 4 010 Ω	
With SIWAREX IS Ex interface:		
• R _{Lmin}	> 87 Ω	
• R _{Lmax}	< 4 010 Ω	
Load cell characteristic	1 4 mV/V	
Permissible range of measuring signal (at greatest set character- istic value)	-2.4 +26.4 mV	
Max. distance of load cells	1 000 m (3 280 ft)	
Intrinsically-safe load cell powering	Optional (SIWAREX IS Ex inter- face)	
External load cell powering	≤ 24 V	
Connection to load cells in Ex zone 1	Optionally via SIWAREX IS Ex interface	
Ex approvals zone 2 and safety	ATEX 95, FM, cUL _{US} Haz. Loc.	
Auxiliary power		
Rated voltage	24 V DC	
Max. current consumption	150 mA	
IP degree of protection acc. to DIN EN 60529; IEC 60529	IP20	
Climatic requirements		
T _{min (IND)} T _{max (IND)} (operating temperature)		
 Vertical installation 	-10 +60 °C (14 140 °F)	
 Horizontal installation 	-10 +40 °C (14 104 °F)	
EMC requirements according to	EN 61326, EN 45501 NAMUR NE21, Part 1	
Dimensions	80 x 125 x 130 mm (3.15 x 4.92 x 5.12 inch)	

SIWAREX CS

Selection and Ordering data		Accessories	
		Accessories	
Weighing electronics for scales in SIMATIC ET 200S	7MH4910-0AA01	SIWAREX JB junction box, alu- minium housing	7MH4710-1BA
SIWAREX CS Manual		for connecting up to 4 load cells in parallel, and for connecting several junction boxes	
Available in a range of languages Free download on the Internet at: http://www.siemens.com/ weighingtechnology		SIWAREX JB junction boxs stainless steel housing for connecting up to 4 load cells	7MH4710-1EA
SIWAREX CS "Getting started"		in parallel	
Sample software shows begin- ners how to program the scales in STEP 7.		Ex interface, type SIWAREX Pi With UL and FM approvals, but	7MH4710-5AA
Free download on the Internet at: http://www.siemens.com/ weighingtechnology		without ATEX approval for intrinsically safe connection of load cells	
Configuration package SIWAREX CS on CD-ROM for SIMATIC S7, version V5.4 or	7MH4910-0AK01	 Suitable for weighing modules SIWAREX U, CS, MS, FTA and FTC. Not approved for use in the EU. 	
higher Software for SIWATOOL CS 		Manual for Ex interface SIWAREX Pi	C71000-T5974-C29
scale adjustment (available in a range of languages)		Ex interface, type SIWAREX IS	
 Manuals available on CD (in a range of languages) 		With ATEX approval, but without UL and FM approvals for intrinsically safe connection of	
 SIWAREX CS "Getting started" 		load cells, incl. manual	
SIWATOOL connection cable D) from SIWAREX U/CS with serial PC interface, for 9-pin PC inter- faces (RS 232), 3 m long (9.84 ft)	7MH4607-8CA	Suitable for weighing modules SIWAREX U, CS, MS, FTA, FTC and CF. Approved for use in the EU.	
Installation material (mandatory)		With short-circuit current	7MH4710-5BA
Terminal module	6ES7193-4CG20-0AA0	< 199 mA DC	
TM-E 30 mm (1.18 inch) wide (required for each SIWAREX	or compatible	With short-circuit current < 137 mA DC	7MH4710-5CA
module)		Cable (optional)	
Shield contact element Contents 5 items, sufficient for	6ES7193-4GA00-0AA0	Cables Li2Y 1 x 2 x 0.75 ST + 2 x (2 x 0.34 ST) – CY, orange sheath	7MH4702-8AG
5 cables	CE07102 40000 04 40	to connect SIWAREX U, CS, MS,	
Shield connection terminal Contents: 5 items, sufficient for 5 cables	6ES7193-4GB00-0AA0	FTA, FTC and CF to the junction box (JB), extension box (EB) or Ex interface (Ex-I) or between two	
Note: one shield connection ter- minal is required each for the		JBs, for fixed laying, occasional bending permitted, 10.8 mm (0.43 inch) outer diameter, for	
scales connection and		ambient temperature -40 to +80 °C (104 +176 °F)	
TTY interface or		Cable Li2Y 1 x 2 x 0.75 ST +	7MH4702-8AF
RS 232 interface		2 x (2 x 0.34 ST) - CY, blue sheath	
N busbar, galvanized	8WA2842	to connect the junction box (JB)	
3 x 10 mm (0.12 x 0.39 inch), 1.0 m (3.28 ft) long		or extension box (EB) in a poten- tially explosive atmosphere to the	
Feeder terminal for N busbar	8WA2868	 Ex interface (Ex-I), for fixed lay- ing, occasional bending permit- ing becasional bending permit- 	
Remote displays (option)		ted, blue PVC insulating sheath, approx. 10.8 mm (0.43 inch)	
The digital remote displays can be connected directly to the SIWAREX CS through the TTY		outer diameter, for ambient tem- perature -40 +80 °C (104 +176 °F)	
interface.		Cable LiYCY 4 x 2 x 0.25 mm ² D)	7MH4407-8BD0
The following remote display can be used: S102		for TTY (connect 2 pairs of con-	
Siebert Industrieelektronik GmbH		ductors in parallel), for connec- tion of a remote display	
P.O. Box 1180 D-66565 Eppelborn Tel.: +49 6806/980-0 Fax: +49 6806/980-999 Internet: http://www.siebert.de		D) Subject to export regulations AL: I	N, ECCN: EAR99H.
Detailed information available from manufacturer.			

Design

SIWAREX MS is a compact module in SIMATIC S7-200 and can be directly mounted on a 35 mm rail to EN 50022, but is also suitable for direct wall mounting. The power supply, load cells and the optional remote display are all connected using screw-type terminals. The serial RS 232 interface is connected over a 9-pin Sub-D connector.

Function

The primary task of SIWAREX MS is the measurement of sensor voltage and the conversion of this measurement into a weight value. Up to 3 interpolation points are used for the weight calculation. The signal can also be digitally filtered if required.

As well as determining weights, the SIWAREX MS monitors two freely programmable limits (min./max. as required) and quickly notifies the SIMATIC CPU using status bits if these values are exceeded.

The SIWAREX MS 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.

Consistent and uniform communication between all system components enables fast, reliable and cost-effective integration and diagnosis in industrial processes.

The SIWAREX MS has two serial interfaces. The TTY interface serves to connect digital remote displays. The remote displays show the weight value with status information.

A PC for parameterizing the SIWAREX MS can be connected via the RS 232 interface. Alternatively, this interface can also be used for serial connection (SIWAREX protocol) to a host computer (e.g. PC).

SIWAREX MS is integrated in the plant software via STEP 7-Micro/WIN 32. In contrast to serially linked weighing electronics, SIWAREX MS does not need costly additional modules to link it to SIMATIC.

Used in conjunction with SIWAREX MS, it is possible to configure freely programmable, modular weighing systems comprising one or more scales in SIMATIC S7-200.

SIEMENS SIMATIC PANEL

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Scale faceplate in the SIWAREX MS software "Getting started"

Lim1 Lim2

>0<

Overview



SIWAREX MS is a versatile weighing module for all simple weighing and force measuring tasks. The compact module is easy to install in SIMATIC S7-200 automation systems The data for the actual weight can be accessed directly in the SIMATIC CPU without the need for any additional interfaces.

Benefits

SIWAREX MS offers the following key advantages:

- Uniform design technology and consistent communication in SIMATIC S7-200
- Uniform configuration with STEP 7 Micro/WIN
- Measurement of weight or force with a high resolution of 65 000 parts and an accuracy of 0.05 %
- Simple configuration with the ready to use software "Getting started"
- Simple adjustment of the scale using the SIWATOOL MS PC program via the RS 232 interface
- Supports theoretical adjustment without adjustment weights
- Supports replacement of module without renewed adjustment of scale
- For use in Ex zone 2, intrinsically safe load cell powering for zone 1 via Ex interface
- Supports direct connection of a remote display to TTY interface

Application

SIWAREX MS is the optimum solution wherever strain gage sensors, such as load cells, force sensors or torque measuring shafts, are used for measuring tasks. The following are typical SIWAREX MS applications:

- Non-automatic weighing machines
- Simple discontinuous weighing processes
- · Fill level monitoring of silos and bunkers
- Measuring of crane and cable loads
- · Load measuring for industrial lifts and rolling mills
- Scales for potentially explosive areas (zone 2 or zone 1 using Ex interface SIWAREX IS or Pi)
- Monitoring of belt tension
- Force measuring, container weighers, platform scales and crane scales

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SIWAREX MS

Function (continued)

In addition to the configuration package, the ready-to-use SIWAREX MS software "Getting started" is available free-ofcharge and shows beginners how to integrate the module in a STEP 7 program and offers a basis for application programming. A complete SIWAREX MS scale is then easy to implement in SIMATIC, for use together with a SIMATIC panel as operator panel.

It is also used in the Micro Automation Set 6.

The software for scale adjustment, SIWATOOL MS, can be used to set the SIWAREX weighing modules using the familiar Windows interface without the need for SIMATIC expertise. Screen forms allow all user-definable parameters of the weighing modules to be specified, saved and printed for plant documentation. The diverse diagnostic options provided by SIWATOOL MS ensure fast fault locating in online mode.

The SIWAREX MS weighing module can also be used in potentially explosive areas (zone 2), and in zone 1 if an optional Ex interface is used, although SIWAREX MS itself must be installed in a safe area. The following certification conditions must be observed.

Technical specifications

SIWAREX MS	
Integration in S7-200 automation systems	 CPU222 (6ES7212-1*B23-0XB0) CPU224 (6ES7214-1*D23-0XB0) CPU224XP (6ES7214-2*D23-0XB0) CPU226 (6ES7216-2*D23-0XB0)
Communication interfaces	SIMATIC S7 bus, RS 232, TTY
Connection of remote displays (through TTY interface)	Weight value (gross, net)
Adjustment of scale settings	via the PC parameterization soft- ware SIWATOOL MS (RS 232)
Measuring properties	
• Error limit acc. to DIN 1319-1 of full-scale value at 20 °C ± 10 K (68 °F ± 10 K)	0.05 %
 Internal resolution Data format of weight values 	65 535 2 byte (fixed-point)
Number of measurements/s	50 or 30
Digital filter	0.05 5 Hz (in 7 steps), mean-value filter
Weighing functions	
 Weight values 	Gross, net
Limit values	2 (min./max.)
 Zero setting function 	Per command
Tare function	Per command
 Tare specification 	Per command

Load cells	Strain gages in 4-wire or 6-wire system
Load cell powering	
• Supply voltage $U_{\rm s}$ (rated value)	Typ. 6 V DC
Max. supply current	≤ 150 mA
Permissible load resistance	
- R _{Lmin}	> 40 Ω
- R _{Lmax}	< 4 010 Ω
With SIWAREX IS Ex interface or SIWAREX Pi	
- R _{Lmin}	> 87 Ω
- R _{Lmax}	< 4 010 Ω
Load cell characteristic	1 mV/V 4 mV/V
Permissible range of measuring signal (at greatest set character- istic value)	-2,4 +26.4 mV
Max. distance of load cells	500 m (1 640 ft)
Intrinsically-safe load cell powering	
Connection to load cells in Ex zone 1	Optionally via SIWAREX IS Ex interface or SIWAREX Pi:
Ex approvals and safety	CE, ATEX 95, FM, cUL _{US} Haz. Loc.
Auxiliary power	
 Rated voltage 	24 V DC
- Max. current consumption	130 mA
 Rated voltage (of CPU) Max. current consumption 	5 V DC
· · ·	140 mA
IP degree of protection acc. to DIN EN 60529; IEC 60529	IP20
Climatic requirements	
T _{min (IND)} T _{max (IND)}) (operating temperature)	
 Vertical installation 	0 +55 °C (32 +131 °F)
 Horizontal installation 	0 +40 °C (32 +104 °F)
EMC requirements according to	EN 61326, EN 45501 NAMUR NE21, Part 1
Dimensions	71.2 x 80 x 62 mm (2.80 x 3.15 x 2.44 inch)

SIWAREX MS

2

Selection and Ordering data		-		Order No.
SIWAREX MS	D) 7MH49	930-0AA01	Ex interface, type SIWAREX Pi	7MH4710-5AA
Weighing electronics for scales in SIMATIC S7-200 for applica- tions without obligation of verifi-			With UL and FM approvals, but without ATEX approval	
cation			For intrinsically safe connection of load cells	
SIWAREX MS manual			Suitable for weighing modules SIWAREX U, CS, MS, FTA and	
Available in a range of languages			FTC. Not approved for use in the EU.	
Free download on the Internet at: http://www.siemens.com/ weighingtechnology			Manual for Ex interface	C71000-T5974-C29
SIWAREX MS configuration	7MH49	30-0AK01	SIWAREX PI	
STEP7 Micro/WIN, version 4.0 SP2 or higher			Ex interface, type SIWAREX IS With ATEX approval, but without UL and FM approvals	
 Software for SIWATOOL MS scale adjustment (available in a range of languages) 	ı		for intrinsically safe connection of load cells, incl. manual Suitable for weighing modules	
 Manuals available on CD (in a range of languages) 			SIWAREX U, CS, MS, FTA, FTC and CF.	
Micro/WIN Library MicroScale			Approved for use in the EU.	
for communication with SIWAR- EX MS	-		With short-circuit current < 199 mA DC	7MH4710-5BA
SIWAREX MS "Getting started"			With short-circuit current < 137 mA DC	7MH4710-5CA
Sample software show begin-			Cable (optional)	
ners how to program the scales. Free download on the Internet at: http://www.siemens.com/			Cables Li2Y 1 x 2 x 0.75 ST + 2 x $(2 \times 0.34$ ST) – CY, orange sheath	7MH4702-8AG
weighingtechnology			to connect SIWAREX U, CS, MS,	
SIWATOOL cable			FTA, FTC and CF to the junction	
from SIWAREX FTA, FTC and MS with serial PC interface, for 9-pin PC interfaces (RS 232)			box (JB), extension box (EB) or Ex interface (Ex-I) or between two JBs, for fixed laying, occa-	
• 2 m long (6.56 ft)	7MH4	702-8CA	sional bending permitted, 10.8 mm (0.43 inch) outer diameter,	
• 5 m long (16.40 ft)	7MH4	702-8CB	for ambient temperature -40 to +80 °C (104 +176 °F)	
Shield clamps for shield termination	6ES57	28-8MA11	Cable Li2Y 1 x 2 x 0.75 ST + 2 x (2 x 0.34 ST) - CY,	7MH4702-8AF
Pack of 10; 1 item required for each shielded cable			blue sheath to connect the junction box (JB)	
Remote displays (option)			or extension box (EB) in a poten-	
The digital remote displays can be connected directly to the SIWAREX MS through the TTY interface.			tially explosive atmosphere to the Ex interface (Ex-I), for fixed laying, occasional bending per- mitted, blue PVC insulating sheath, approx. 10.8 mm	
The following remote display can be used: S102			(0.43 inch) outer diameter, for ambient temperature -40 +80 °C (104 +176 °F)	
Siebert Industrieelektronik GmbH				
P.O. Box 1180 D-66565 Eppelborn Tel.: +49 6806/980-0			Cable LiYCY 4 x 2 x 0.25 mm ² D) for TTY (connect 2 pairs of con- ductors in parallel), for connec-	7MH4407-8BD0
Fax: +49 6806/980-999 Internet: http://www.siebert.de			tion of a remote display	
Detailed information available from manufacturer.			D) Subject to export regulations AL: N	N, EUUN. EARYYH.
Accessories				
SIWAREX JB junction box, aluminium housing	7MH4	710-1BA		
for connecting up to 4 load cells in parallel, and for connecting several junction boxes				
SIWAREX JB junction box, stainless steel housing		710-1EA		
for connecting up to 4 load cells				

for connecting up to 4 load cells in parallel

SIWAREX FTA

Overview



The SIWAREX FTA (Flexible Technology, Automatic Weighing Instrument) is a versatile and flexible weighing module designed for industrial use. It can be used for both automatic and non-automatic weighing, e.g. for the production of mixtures, or for filling, loading, monitoring or bagging.

The SIWAREX FTA function module is integrated in SIMATIC S7 and uses the features of this modern automation system, such as integrated communication, diagnostics and configuration tools.

Benefits

SIWAREX FTA offers the following features:

- Uniform design and totally integrated communication 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/PROFINET using ET 200M
- Measurement of weight or force with high resolution of 16 million intervals
- High accuracy 3 x 6 000 d, legal-for-trade
- Use with analog strain gauge load cells, types SIWAREX R and SIWAREX WL200
- Alternative option available for connection of individual load cells from the manufacturers METTLER TOLEDO, Wipotec and PESA
- Legal-for-trade display with SIMATIC standard operator panels
- Continuous or stepped feed control
- Exact switching of dosing signals (< 1 ms)
- · Parameterizable inputs and outputs
- Parameterizable for highly versatile applications
- Flexible adaptation to different requirements with SIMATIC
- Simple adjustment of scale using the SIWATOOL FTA program
- Theoretical adjustment without adjustment weights
- · Replacement of module without renewed adjustment of scale
- Recording of weighing sequence
- Legal-for-trade alibi memory
- Can be used in Ex applications

Application

The SIWAREX FTA weighing module is the optimum solution wherever high demands are placed on accuracy and speed.

Thanks to its outstanding measuring properties, weights can be measured with extreme accuracy in up to three ranges.

SIWAREX FTA can be used to design dosing systems, such as filling plants, loading stations, bagging stations, rotopackers, mixers or test stations.

Typical fields of application include:

- Filling of liquids
- Bagging of solid matter (also big bag)
- · Proportioning as deduction weighing or fill weighing
- Checking of individual quantities
- Loading or receiving of materials
- Static checkweigher
- Check weigher (in combination with Wipotec load cells)

Design

SIWAREX FTA is a SIMATIC S7-300 function module and can be snapped directly onto the SIMATIC S7-300 or ET 200M backplane bus. The snap-on rail mounting of the 80 mm (3.15 inch) wide weighing module means that it is extremely easy to mount/wire.

The load cells, the RS 485 serial interface, the analog output and the digital inputs and outputs are connected via a standard 40-pin front plug, the PC (RS 232) is connected via a 9-pin sub-D plug and the power supply via a separate 2-pin plug.

The operation of the SIWAREX FTA in SIMATIC ensures the total integration of the weighing technology in the automation system.

Function

The main tasks of the SIWAREX FTA are the high-precision measurement of the current weight in up to three measuring ranges, and exact control of the weighing procedures.

The weighing module controls the weighing procedures fully automatically. However, integration in SIMATIC means that it is also possible to directly influence the weighing procedures using a PLC program. This means that the tasks can be sensibly divided: the very fast weighing functions are implemented in the SIWAREX FTA, the interlocking and logic functions in the SIMATIC CPU.

SIWAREX FTA

Function (continued)

Weighing functions

The SIWAREX FTA is easy to parameterize for the various automatic weighing functions.

The following weighing functions can be parameterized:

- NSW (Non Automatic Weighing Instrument) according to OIML R76
- SWA (Automatic Gravimetric Filling Instrument) according to OIML R61
- SWE (Automatic Catchweighing Instrument) according to OIML R51
- SWT (Discontinuous Totalizing Automatic Weighing Instrument (Totalizing Hopper Weigher)) according to OIML R107

Monitoring and control of the load cell signals and statuses

During the weighing procedure, the SIWAREX FTA weighing module monitors and controls the load cell signals and statuses. The optimized exchange of data within SIMATIC permits direct evaluation of the load cell signals and statuses in the PLC program.

The PLC program can also be used to directly influence weighing procedures, thus allowing easy adaptation of the SIWAREX FTA to any modifications in system technology.

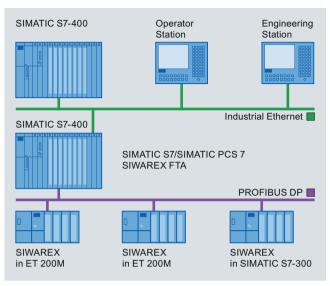
The SIWAREX FTA is already factory-calibrated. This enables the theoretical adjustment of the scale without adjustment weights, and module replacement without readjustment of the scale. When using "active bus modules", replacement is also possible during operation.

Integration in SIMATIC

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

The right combination of SIMATIC components can produce optimum solutions for small, medium-size and large plants. The scales are operated and monitored using SIMATIC standard operator panels. At the same time, these operator panels can also be used for the 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 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 FTA

Software

SIWATOOL FTA commissioning software

SIWATOOL FTA is a special program for commissioning and servicing and runs with Windows operating systems.

The program enables the scales to be set without the need for prior knowledge of the automation system. When servicing, the technician can use a PC to analyze and test the procedures in the scale. Reading out the diagnostics buffer from the SIWAREX FTA is extremely helpful when analyzing events.

The following are just some of the tasks that can be carried out using SIWATOOL FTA:

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

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SIWATOOL FTA commissioning software

SIWAREX FTA

Function (continued)

Fast advanced parameterization of the module can be carried out using the "Fast parameterization" function. Answering just a few questions approximately presets the parameters. It is also extremely helpful to analyze the diagnostics buffer which can be saved together with the parameters after reading out from the module.

The SIWAREX FTA weighing module includes a trace mode for optimization of weighing sequences. The recorded weight values and associated statuses can be displayed as traces using SIWATOOL FTA and MS Excel.

Upgrading of firmware

A further program function can be used to download a new firmware version onto the SIWAREX FTA on site. This means that firmware upgrades can be carried out on site as required anywhere in the world.

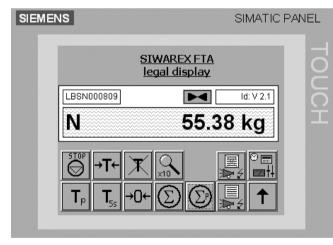
Reading out of weighing reports

The weighing reports are saved on an MMC (Micro Memory Card) inserted in the SIWAREX FTA for the duration specified by the weights and measures act. The weighing results of a specific weighing procedure can be read out of the MMC using SIWA-TOOL.

SIWAREX FTA – simple configuration

Integration in SIMATIC results in freely-programmable, modular weighing systems which can be modified according to operational requirements.

The ready-to-use SIWAREX FTA software "Getting started" is also available free-of-charge and shows beginners how to integrate the module in a STEP 7 program and offers a basis for application programming. A complete SIWAREX FTA scale is then easy to implement in SIMATIC together with a SIMATIC touch panel as operator panel – even for legal-for-trade applications.



Scale faceplate in the SIWAREX FTA software "Getting started"

In addition, the STEP 7 programs SIWAREX FTA Multiscale and SIWAREX FTA Multifill provide a professional basis for implementation of batching plants or filling plants.

Technical specifications SIWAREX FTA Use in automation systems • S7-300 Directly or via ET 200M • S7-400 (H) Via ET 200M PCS 7 (H) Via ET 200M **Communication interfaces** • S7 Through backplane bus For SIWATOOL or printer • RS 232 connection • RS 485 For remote display or digital load cell Module parameterization Via SIMATIC S7 • Via SIWATOOL FTA software (RS 232) **Measuring properties** EU type approval as non-automatic $3 \times 6\ 000\ d \ge 0.5\ \mu V/e$ weighing machine, trade class III Internal resolution 16 million parts Updating rate 400/100 Hz Several parameterizable digital • Critically dampened filters Bessel Butterworth (0.05 ... 20 Hz) Mean-value filter Weighing functions OIML R76 Non-automatic weighing machine Automatic weighing machine OIML R51, R61, R107 Load cells Technical Strain gages in 4-wire or 6-wire system Characteristic value ranges 1, 2 or 4 mV/V Load cell powering 10.3 V DC Supply voltage U_{S} (rated value) Max. supply current 184 mA Permissible load cell resistance • R Lmin > 56 O> 87 Ω with Ex interface • R _{Lmax} $\leq 4\ 010\ \Omega$ Max. distance of load cells when using the recommended cable Standard 1 000 m (3 280 ft) In hazardous area¹⁾ • For gases of group IIC 300 m (984 ft) • For gases of group IIB 1 000 m (3 280 ft) Optionally via SIWAREX IS Ex Connection to load cells in Ex zone 1 interface Ex approvals zone 2 and safety ATEX 95, FM, cUL_{US} Haz. Loc. Auxiliary power Rated voltage 24 V DC Max. current consumption 500 mA Current consumption from back-Typ. 55 mA plane bus

Technical specifications (continued)					
SIWAREX FTA					
Inputs/outputs					
 Digital inputs 	7, electrically isolated				
 Digital outputs 	8, electrically isolated				
Counter input	≤ 10 kHz				
 Analog output Current range Updating rate 	0/4 20 mA 100 Hz				
Approvals	 EU type approval (CE, OIML R76) EU prototype test to MID (OIML R51, R61, R107) 				
Degree of protection according to EN 60529; IEC 60529	IP20				
Climatic requirements					
T _{min (IND)} T _{max (IND)} (operating temperature)					
 Vertical installation 	-10 +60 °C (14 140 °F)				
 Horizontal installation 	-10 +40 °C (14 104 °F)				
EMC requirements	EN 61326, EN 45501, NAMUR NE21, Part 1				
Dimensions	80 x 125 x 130 mm (3.15 x 4.92 x 5.12 inch)				
Weight	600 g (0.44 lb)				

1) For further details see Ex interface SIWAREX IS

SIWAREX FTA

2

Selection and Ordering data	Order No.		Order No.
SIWAREX FTA _egal-for-trade weighing electron-	7MH4900-2AA01	Calibration set for SIWAREX FTA	7MH4900-2AY10
cs for automatic scales for 57-300 and ET 200M.		For verification of up to 5 scales comprising:	
EU type approval 3 x 6 000 d Applications: proportioning, fill-		 3 x inscription foil for labeling 	
ng, bagging, loading.		• 1 x cover foil	
Caution: Observe approval con- ditions for applications with obli- gation of verification. We		 10 x EU verification mark (a black M on a green background) 	
ecommend using our calibration set and contacting our SIWAREX notline.		Guidelines for verification, verifi- cation certificates and approv- als, adaptable label, SIWAREX FTA Manual on CD-ROM	
SIWAREX FTA manual		SIWAREX Multiscale	7MH4900-2AL01
 Available in a range of languages 		STEP 7 software for SIWAREX FTA	7 MI 14300-2ALUT
 Free download on the Internet at: 		Control of one or more scales for	
http://www.siemens.com/ weighingtechnology		a scalable number of compo- nents and any number of recipes. Applications: batching plants,	
SIWAREX FTA "Getting started"		mixers in production process, CD-ROM	
Sample software shows begin-			71114000 041404
ners how to program the scales in STEP 7.		SIWAREX Multifill STEP 7 software for SIWAREX FTA	7MH4900-2AM01
 Free download on the Internet at: 		Control of filling and bagging	
http://www.siemens.com/ weighingtechnology		processes for one or more filling stations and any number of materials, CD-ROM	
SIWAREX FTA configuration package for SIMATIC S7 on CD-ROM	7MH4900-2AK01	SIWAREX FTA with serial PC interface, for 9-pin PC interfaces	
HSP Hardware Support Pack-		(RS 232)	
age for integrating SIWAREX FTA/FTC in STEP 7		• 2 m (6.56 ft) long	7MH4702-8CA
 SIWAREX FTA "Getting started" 		• 5 m (16.40 ft) long	7MH4702-8CB
SIWATOOL FTA commissioning software		Front connectors, 40-pole required for each SIWAREX	
Flexible software for legal-for-		module	
trade display in WinCC		With screw contacts	6ES7392-1AM00-0AA0
Manual		With spring-loaded contacts	6ES7392-1BM01-0AA0
SIWAREX FTA configuration package for PCS 7 V6.x on	7MH4900-2AK61	Shield contact element	6ES7390-5AA00-0AA0
CD-ROM		Sufficient for one SIWAREX FTA module	
 HSP Hardware Support Pack- age for integrating SIWAREX FTA/FTC in STEP 7 		Shield connection terminal Contents: 2 units	6ES7390-5CA00-0AA0
Function block for CFC		(suitable for cable with diameter	
Faceplate		4 13 mm (0.16 0.51 inch))	
SIWATOOL FTA commissioning software		Note: one shield connection terminal each is required for:	
• Manual		 Scale connection 	
SIWAREX FTA configuration	7MH4900-2AK62	RS 485 interface	
package for PCS 7 V7.0 on CD-ROM		RS 232 interface S7 DIN rail	
HSP Hardware Support Pack-			
age for integrating SIWAREX		• 160 mm (6.30 inch)	6ES7390-1AB60-0AA0
Function block for CFC		• 480 mm (18.90 inch)	6ES7390-1AE80-0AA0
Faceplate		• 530 mm (20.87 inch)	6ES7390-1AF30-0AA0
		• 830 mm (32.68 inch)	6ES7390-1AJ30-0AA0
 SIWATOOL FTA commissioning 			

SIWAREX FTA

(only required if DC 24 Visifient available) (Delate Li2Y 1 × 2 × 0.75 ST + 2 × 0.	Selection and Ordering data	Order No.		Order No.
 • PS 307-1B; 2 A • PS 307-1B; 2 A • PS 307-1E; 5 A • PS 307-1E; 5 A • PS 307-1E; 5 A • PS 307-1E; 10 A	PS 307 load power supply (only required if DC 24 V is not available) 120/230 V AC; 24 V DC		Cables Li2Y 1 x 2 x 0.75 ST + 2 x (2 x 0.34 ST) – CY,	7MH4702-8AG
 PS 307-1E; 5 A PS 307-1E; 10 A PS 307-1K; 10 A PS 3		6ES7307-1BA00-0AA0	Ŭ	
 PS 307-1K; 10 A BEST307-1KA00-0AA0 TMH4900-2AY20 TMH4900-2AY20 TMH4900-2AY20 The Sitchert S102 and S302 The Sitchert S102 and S302 The Sitchert S102 and S302 Sitchert Industrise/sktronik GmbH PC Sitchert S102 and S302 Sitchert Industrise/sktronik GmbH PC Sitchert S102 and S302 Tati-480 80050-999 Thire-time Sitchert S102 and S302 Sitchert Industrise/sktronik GmbH PC Sitchert S102 and S302 Sitchert Industrise/sktronik GmbH PC Sitchert S102 and S302 TMH4702-8AF TX + 48 800580-999 Thire-time Sitchert Industrise/sktronik GmbH Sitchert Sitchert S	,			
MMC memory for data recording up to 16 MB TMH4900-24Y20 MMC memory for data recording up to 16 MB TMH4900-24Y20 The Siebert S102 and S302 remote digital display can be directly connected to the SWMREX FIA us an RS 485 inter- face. TMH4900-24Y20 SWMREX FIA us an RS 485 inter- face. TMH4900-24Y20 The Siebert Industrieelektronik GrubH D-66565 Expedion TR1: +49 6800380-0 Fra:	,	6ES7307-1KA00-0AA0	tion box (JB), extension box (EB)	
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Detailed information available from manufacturer. -40+176 °F) SWAREX JB junction box, aluminium housing for connecting up to 4 load cells in parallel, and for connecting several junction boxes 7MH4710-1BA SWAREX JB junction box, stainless steel housing for connecting up to 4 load cells in parallel, and for connecting several junction boxes 7MH4710-1BA SWAREX JB junction box, stainless steel housing for connecting up to 4 load cells in parallel, and FM approvals, but without ATEX approval for intrinsically safe connection of load cells SWAREX PI Ex interface, type SIWAREX IS 7MH4710-1EA 7MH4710-5AA Minut for Ex interface SIWAREX JC, S, MS, FTA and FTC. C71000-T5974-C29 Minut for Ex interface, type SIWAREX IS SWAREX VL, CS, MS, FTA and FTC. C71000-T5974-C29 With ATEX approval, but without U and FM approvals for intrinsically safe connection of load cells, incl. manual SWAREX VL, CS, MS, FTA, FTC and CF. C71000-T5974-C29 With ATEX approval, but without U and FM approvals for intrinsically safe connection of load cells, incl. manual SWAREX U, CS, MS, FTA, FTC and CF. TMH4710-5BA With short-circuit current < 199 mA DC	Siebert Industrieelektronik GmbH P.O. Box 1180 D-66565 Eppelborn Tel.: +49 6806/980-0 Fax: +49 6806/980-999		or extension box (EB) in a poten- tially explosive atmosphere to the Ex interface (Ex-I), for fixed lay- ing, occasional bending permit- ted, blue PVC insulating sheath, approx. 10.8 mm (0.43 inch) outer	
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< 199 mA DC • With short-circuit current 7MH4710-5CA				
		7MH4710-5BA		
		7MH4710-5CA		

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, loss-in-weight scales and bulk flow meters. 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 integrated communication, diagnostics and configuration tools.

Benefits

SIWAREX FTC offers the following features:

- Uniform design, and totally integrated communication 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/PROFINET using ET 200M
- Measurement of weight or force with high resolution of 16 million intervals
- High accuracy 3 x 6 000 d
- Use with analog strain gauge load cells, types SIWAREX R and SIWAREX WL200
- Alternative option available for connection of individual load cells from the manufacturers METTLER TOLEDO, Wipotec and PESA
- Display with SIMATIC standard operator panels
- · Parameterizable inputs and outputs
- · Parameterizable for highly versatile applications
- · Flexible adaptation to different requirements with SIMATIC
- Simple adjustment of scale using the SIWATOOL FTC program
- · Theoretical adjustment without adjustment weights
- Replacement of module without renewed adjustment of scale
- · Recording of weighing sequence
- 8 totalization memories with different digit intervals
- Can be used in Ex applications

Application

The SIWAREX FTC weighing module is the optimum solution wherever high demands are placed on continuous weighing procedures. Thanks to its outstanding measuring properties, weights can be measured with extreme accuracy in up to three ranges. In the case of force measurements, the value can be measured bidirectionally.

Typical applications for SIWAREX FTC include:

- Flowrate/flow measurement
- · Belt volume measurement
- · Material loading, summation
- Flowrate/flow control
- Belt load measurement

Design

SIWAREX FTC is a SIMATIC S7-300 function module and can be snapped directly onto the SIMATIC S7-300 or ET 200M backplane bus. The snap-on rail mounting of the 80 mm (3.15 inch) wide weighing module means that it is extremely easy to mount/wire.

The load cells, the RS 485 serial interface, the analog output and the digital inputs and outputs are connected via a standard 40-pin front plug, the PC (RS 232) is connected via a 9-pin sub-D plug and the power supply via a separate 2-pin plug.

Operation of the SIWAREX FTA in SIMATIC ensures the total integration of the conveyor scale in the automation system.

Function

The main tasks of SIWAREX FTC are the high-precision measurement of the actual weight in up to three measuring ranges, and the exact calculation of the conveyed quantity and flow. In "Force measurement" mode, the force is measured bidirectionally.

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

Weighing functions

The following operating modes can be set:

Weight measurement and force measurement

In this operating mode, the weight value/force is determined, processed in the PLC and then displayed.

Function (continued)

Conveyor scale / weighfeeder

The functions of a conveyor scale are implemented in this operating mode. Calculations are performed for the typical process values; belt load, flowrate and belt speed. Commands can be used to control the belt and display the required values. A weighfeeder can be implemented by activating the SIMATIC-PID controller.



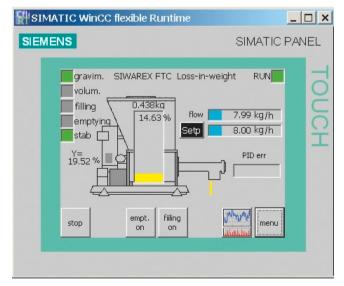
Scale faceplate of a conveyor scale

Loss-in-weight scale

The functions of a loss-in-weight scale are implemented in this operating mode. The actual weight of the container is measured and the flow rate is regulated according to the preset setpoint.

Application-specific parameters, such as proportioning parameters, device and material characteristics, can be set directly in SIWAREX FTC. Various commands are available that have been fine-tuned to the requirements of the loss-in-weight scale, such as proportioning (manual, automatic, gravimetric, volumetric), filling and emptying.

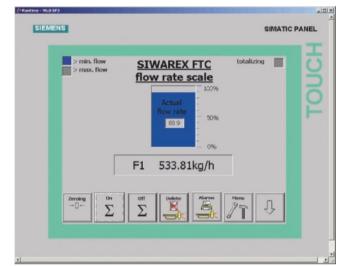
The high measurement resolution, real-time signal processing, detection and filtering of signals in the weighing electronics enable extremely high proportioning accuracy.



Scale faceplate of a loss-in-weight scale

Bulk flow meter

The functions of a bulk flow meter are implemented in this operating mode. The calculations for the typical process values; flow and conveyed quantity, are performed in the SIWAREX module. Application-specific parameters for setting the scales and commands for their operation are also available.



View of a bulk flow meter

Monitoring and control of the load cell signals and statuses

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 PLC program can also be used to directly influence weighing procedures, thus allowing easy adaptation of the SIWAREX FTC to any modifications in system technology.

Modules can be replaced without the need to readjust the scale. When using "active bus modules", replacement is also possible during operation.



Applications of SIWAREX FTC

2

SIWAREX FTC

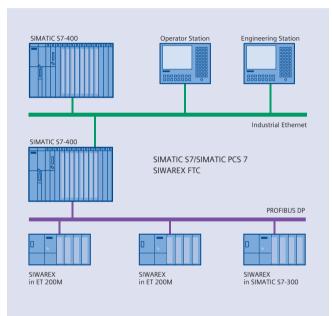
Function (continued)

Integration in SIMATIC

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

The right combination of SIMATIC components can produce optimum solutions for small, medium-size and large plants. The scales are operated and monitored using SIMATIC standard operator panels. At the same time, these operator panels can also be used for the 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.



Configuration of SIMATIC S7 with SIWAREX FTC (medium-sized plant)

Software

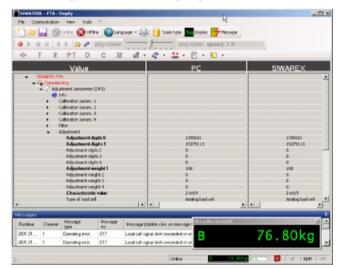
Adjustment of the scale using SIWATOOL FTC

SIWATOOL FTC is a special program for adjusting and servicing the scale and runs with Windows operating systems.

The program enables the scales to be commissioned without the need for prior knowledge of the automation system. When servicing, the technician can use a PC to analyze and test the procedures in the scale. Reading out the diagnostics buffer from the SIWAREX FTC is extremely helpful when analyzing events.

The following are just some of the tasks that 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.

The SIWAREX FTC weighing module includes a trace mode for optimization 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 as required anywhere in the world.

Reading out of weighing reports

The weighing reports can be saved on an MMC (Micro Memory Card) inserted in the SIWAREX FTC.

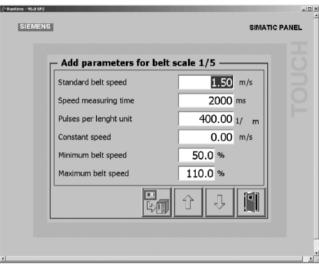
SIWAREX FTC – simple configuring

Integration in SIMATIC can result in freely-programmable, modular weighing systems for conveyor scales, bulk flow meters and loss-in-weight scales, which can be modified to meet operational requirements.

A free version of the ready-to-use SIWAREX FTC software "Getting started" is also available respectively for the belt scale, bulk flow meter and loss-in-weight feeder modes. It shows beginners how to integrate the module into a STEP 7 program and provides a basis for application programming. A SIWAREX FTC belt scale can then be easily implemented in SIMATIC together with a touch panel as the operator panel.

SIWAREX FTC

Function (continued)



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 **Communication interfaces** • S7 Through backplane bus • RS 232 For SIWATOOL or printer connection • RS 485 For remote display or digital load cell Via SIMATIC S7 Module parameterization • Via SIWATOOL FTC software (RS 232) Measuring properties $3 \times 6\ 000\ d \ge 0.5\ \mu V/e$ Accuracy to EN 45501 Internal resolution ± 8 million parts Internal/external updating rate 400/100 Hz Several parameterizable • Critically dampened digital filters • Bessel • Butterworth (0.05 ... 20 Hz) Mean-value filter Weighing functions • Non-automatic weighing machine, force measurement · Conveyor scale · Loss-in-weight scale · Bulk flow meter Load cells Strain gages in 4-wire or 6-wire system

1, 2 or 4 mV/V

Characteristic value ranges

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} $\leq 4\ 010\ \Omega$ Max. distance of load cells when using the recommended cable 1 000 m (3 280 ft) Standard In hazardous area¹⁾ - For gases of group IIC 300 m (984 ft) - For gases of group IIB 1 000 m (3 280 ft) Optionally via SIWAREX IS Ex interface Connection to load cells in Ex zone 1 ATEX 95, FM, cUL_{US} Haz. Loc. Ex approvals zone 2 and safety Auxiliary power Rated voltage 24 V DC Max. current consumption 500 mA Current consumption from back-Typ. 55 mA plane bus Inputs/outputs Digital inputs 7. electrically isolated Digital outputs 8, electrically isolated • Counter input $\leq 10 \text{ kHz}$ Analog output 0/4 ... 20 mA - Current range - Updating rate 100 Hz Degree of protection according to EN 60529; IEC 60529 IP20 **Climatic requirements** T_{min (IND)} ... T_{max (IND)} (operating temperature) Vertical installation -10 ... +60 °C (14 ... 140 °F) Horizontal installation -10 ... +40 °C (14 ... 104 °F) EN 61326, EN 45501, **EMC** requirements NAMUR NE21, Part 1 Dimensions 80 x 125 x 130 mm (3.15 x 4.92 x 5.12 inch)

1) For further details, see Ex interface, type SIWAREX IS

600 g (0.44 lb)

Weight

SIWAREX FTC

Selection and Ordering data	Order No.		Order No.
SIWAREX FTC	7MH4900-3AA01	SIWAREX FTC_L configuration	7MH4900-3AK02
Weighing electronics for S7-300 and ET 200M.		package for SIMATIC S7 on CD-ROM (bulk flow meter and loss in weight feeder)	
Applications: Conveyor scales,		Ioss-in-weight feeder)HSP Hardware Support	
force measurement, Loss-in- weight scale and bulk flow		Package for integrating SIWAREX FTA/FTC in STEP 7	
meters SIWAREX FTC_B manual for		"Getting started" for loss-in- weight feeders	
conveyor scalesAvailable in a range of lan-		"Getting started" for loss-in- weight feeders	
GuagesFree download on the Internet		Commissioning software	
at: http://www.siemens.com		SIWATOOL FTC_L for bulk flow meters and loss-in-weight	
/weighingtechnology		feeders • Manual	
SIWAREX FTC_L manual for			71414000 041/01
bulk flow meters and loss-in- weight scales		SIWAREX FTC_B V6.x configuration package on CD-ROM (conveyor scale)	7MH4900-3AK61
 Available in a range of lan- guages 		HSP Hardware Support Package for integrating	
 Free download on the Internet at: 		SIWAREX FTA/FTC in STEP 7	
http://www.siemens.com/		 Function block for CFC Faceplate 	
weighingtechnology		SIWATOOL FTC B commis-	
SIWAREX FTC "Getting started" for conveyor scales		sioning software for conveyor scales	
 Sample software shows begin- ners how to program the scales 		Manual	
in STEP 7 for conveyor scale		SIWAREX FTC_B configura-	7MH4900-3AK63
mode		tion package for PCS 7 V7.0	
 Free download on the Internet at: 		and V7.1 on CD-ROM (con- veyor scale)	
http://www.siemens.com/ weighingtechnology		HSP Hardware Support Package for integrating SIWAREX FTA/FTC in STEP 7	
SIWAREX FTC "Getting started" for bulk flow meters		Function block for CFC	
		Faceplate	
 Sample software shows begin- ners how to program the scales 		SIWATOOL FTC_B commis-	
in STEP 7 for conveyor scale mode		sioning software for conveyor scales	
 Free download on the Internet 		Manual	
at: http://www.siemens.com/		SIWAREX FTC_L configuration	7MH4900-3AK64
weighingtechnology		for PCS 7 V7.0 and V7.1 on CD-	
SIWAREX FTC "Getting started" for loss-in-weight		ROM (loss-in-weight feeder)HSP Hardware Support	
• Sample software shows begin-		Package for integrating SIWAREX FTA/FTC in STEP 7	
ners how to program the scales		Function block for CFC	
in STEP 7 for conveyor scale mode		Faceplate	
 Free download on the Internet 		Commissioning software	
at: http://www.siemens.com/		SIWATOOL FTČ_L for bulk flow meters and loss-in-weight	
weighingtechnology		feeders • Manual	
SIWAREX FTC_B configura- tion package for SIMATIC S7	7MH4900-3AK01	SIWATOOL cable from	
on		SIWAREX FTC with serial	
CD-ROM (conveyor scale)		PC interface, for 9-pin PC interfaces (RS 232)	
 HSP Hardware Support Package for integrating 		• 2 m long (6.56 ft)	7MH4702-8CA
SIWAREX FTA/FTC in STEP 7		• 5 m long (16.40 ft)	7MH4702-8CB
 "Getting started" for conveyor scales 		40-pin front plug required for	
SIWATOOL FTC_B commis-		each SIWAREX module	
sioning software for conveyor scales		With screw contacts	6ES7392-1AM00-0AA0
• Manual		 With spring-loaded contacts 	6ES7392-1BM01-0AA0

SIWAREX FTC

Bioled connection terminal souther 2 units (suitable for add cells, incl. manual builds (or use) in the U. 6ES7390-5CA00-0AA0 Stelled connection terminal sets in sequence 4 13 mm or distributed for use in the EU. 7HH4710-5EA Stelled connection terminal sets in sequence for resolution for use in the EU. 7HH4710-5EA Stelled connection terminal sets in sequence for resolution for use in the EU. 7HH4710-5EA Stelled connection for Stall sector resolution sets insertion for sets insertion sets insertion for sets insertion for sets insertion sets insertion for sets insertion for sets inser	Shield contact element	6ES7390-5AA00-0AA0	Ex interface, type SIWAREX IS	
Sinder Contraction Designed Control Of B (1, 0) in (m) Designed Control Sinder Contraction Sinder Control PS (4, 0) in (m) Designed Control PS (4, 0) in (m) <td>Sufficient for one SIWAREX FTC nodule</td> <td></td> <td>With ATEX approval, but without UL and FM approvals</td> <td></td>	Sufficient for one SIWAREX FTC nodule		With ATEX approval, but without UL and FM approvals	
0.160.51 mch) Weie: Procession (Comparison of the second of the	Shield connection terminal Contents: 2 units (suitable for	6ES7390-5CA00-0AA0	of load cells, incl. manual Suitable for weighing modules	
and a bill downection terminal age is a sequence is Gate connection YMH4710-56A YMH4710-56A Scale connection Scale connection YMH4710-56A IS 455 interface YMH4710-56A ST DIN rail 6E57390-1A800-0AA0 6450 interface 6E57390-1A800-0AA0 650 rm (0.30 inch) 6E57390-1A800-0AA0 653 0rm (28.6 inch) 6E57390-1A800-0AA0 655 307 locd power supply only required if Loc 24 V is not available iii 6E57390-1B200-0AA0 52 000 rm (78.74 inch) 6E57390-1B200-0AA0 655 307 locd power supply only required if Loc 24 V is not available iii 6E57397-1BA00-0AA0 655 307 locd power supply only required if Loc 24 V is not available iii 6E57397-1BA00-0AA0 655 307 locd power supply on data recording up to 16 MB 6E57397-1BA00-0AA0 75 307 locd power supply or data recording up to 16 MB 6E57397-1BA00-0AA0 865 res 300 r lb 22 A 6E57397-1BA00-0AA0 95 307 lb 2 A 6E57397-1BA00-0AA0 655 307 lb 2 A 6E57397-1BA00-0AA0 95 307 lb 2 A	0.16 0.51 inch)		and CF.	
• Sate connection • Sate interface 7MH4710-SCA • PS 448 interface • With stort-circuit current • 137 mA DC • Sole interface • Sate interface 7MH4710-SCA • Sole interface • Sate interface • With stort-circuit current • With stort-circuit current • Sole interface • Sate interface • Sate interface • Sate interface • Sole interface • Sate interface • Sate interface • Sate interface • Sate interface • Sate interface • Sate interface • Sate interface • PS astricts interface • Sate interface • Sate interface • Sate interface • PS astricts interface • Sate interface • Sate interface • Sate interface • PS astricts interface • Sate interface • Sate interface • Sate interface • Sate interface • PS astricts	one shield connection terminal		With short-circuit current	7MH4710-5BA
PRS 222 interface Cable (optional) S7 DIN rail 6ES7390-1A680-0AA0 6400 mm (18:90 inch) 6ES7390-1A680-0AA0 6530 mm (20:87 inch) 6ES7390-1A690-0AA0 6ES7390-1A690-0AA0 6ES7390-1A690-0AA0 620 mm (20:87 inch) 6ES7390-1A690-0AA0 6ES7390-1BC00-0AA0 6ES7390-1BC00-0AA0 95 307 fold power supply only required II C2 44 V is not ivaliable) 6ES7397-1BA00-0AA0 95 307 fold power supply only required II C2 44 V is not ivaliable) 6ES7397-1BA00-0AA0 9FS 307-1E; S A 6ES7307-1BA00-0AA0 6ES7307-1EA00-0AA0 6ES7397-1EA00-0AA0 6ES7307-1EA00-0AA0 6ES7307-1EA00-0AA0 6ES7307-1EA00-0AA0 6ES7307-1EA00-0AA0 6ES7307-1EA00-0AA0 6ES7307-1EA00-0AA0 6ES7307-1EA00-0AA0 6ES7307-1EA00-0AA0 6ES7307-1EA00-0AA0 6ES7393-0.1EA00-0AA0 6ES7307-1EA00-0AA0 6ES7393-0.1EA00-0AA0 6ES7307-1EA00-0AA0 6ES7393-0.1EA00-0AA0 6ES7307-1EA00-0AA0 6ES7393-0.1EA00-0AA0 6ES7307-1EA00-0AA0 6ES7393-0.1EA00-0AA0 6ES7307-1EA00-0AA0 6ES7393-0.1EA00-0AA0 6ES7307-1EA00-0AE 6ES73930-1EA00-0AA0 <td< td=""><td></td><td></td><td>With short-circuit current</td><td>7MH4710-5CA</td></td<>			With short-circuit current	7MH4710-5CA
97 DN rail Cables L2Y 1 x 2 x 0.75 ST + 2 x (2 x 0.34 ST) - CY, or x 2 x 0.76 ST + 2 x (2 x 0.34 ST) - CY, or x 2 x 0.76 ST + 2 x (2 x 0.34 ST) - CY, or x 2 x 0.76 ST + 2 x (2 x 0.34 ST) - CY, or x 2 x 0.76 ST + 2 x (2 x 0.34 ST) - CY, or x 2 x 0.76 ST + 2 x (2 x 0.34 ST) - CY, or x 2 x 0.76 ST + 2 x (2 x 0.34 ST) - CY, or x 2 x 0.76 ST + 2 x (2 x 0.34 ST) - CY, or x 2 x 0.76 ST + 2 x (2 x 0.34 ST) - CY, or x 2 x 0.76 ST + 2 x (2 x 0.34 ST) - CY, or x 2 x 0.76 ST + 2 x (2 x 0.34 ST) - CY, or x 2 x 0.76 ST + 2 x (2 x 0.34 ST) - CY, or x 2 x 0.76 ST + 2 x (2 x 0.34 ST) - CY, or x 2 x 0.34 ST) - CY, or x 2 x 0.34 ST) - CY, or x 2 x 0.34 ST) - CY, bit x 2 x 0.76 ST + z x 0 x 0 x 0 - 10 x + 176 °F - Cable L2Y 1 x 2 x 0.75 ST + z x 0 x 0 x 0 - 10 x + 176 °F - Cable L2Y 1 x 2 x 0.75 ST + z x 0 x 0 x 0 - 10 x + 176 °F - Cable L2Y 1 x 2 x 0.75 ST + z x 0 x 0 x 0 - 10 x + 176 °F - Cable L2Y 1 x 2 x 0 x 0 - 10 x + 176 °F - Cable L2Y 1 x 2 x 0 x 0 x ST + bit x 0 x 0 - 10 x + 176 °F - Cable L2Y 1 x 2 x 0 x 0 x ST + bit x 0 x 0 - 10 x + 176 °F - Cable L2Y 1 x 2 x 0 x 0 x ST + bit x 0 x 0 - 10 x + 176 °F - Cable L2Y 1 x 2 x 0 x 0 x ST + bit x 0 x 0 x 0 - 10 x + 176 °F - Cable L2Y 1 x 2 x 0 x ST + bit x 0 x 0 x 0 x 0 - 10 x + 176 °F - Cable L2Y 1 x 2 x 0 x 0 x ST + bit x 0 x 0 x 0 x 0 - 10 x 0 x 0 - the C x 0 x 0 x 0 x 0 - 10 x 0 x 0 - the C x 0 x 0 x 0 x 0 - 10 x 0 - the C x 0 x 0 x 0 - 10 x 0 - the C x 0 x 0 x 0 - 10 x 0 - the C x 0 x 0 x 0 - 10 x 0 - the C x 0 x 0 - 10 x 0 - the C x 0 x 0 - 10 x 0 - the C x 0 x 0 - 10 x 0 - the C x 0 - 10 x 0 - t	 RS 232 interface 			
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+480 mm (18.90 inch) 6E57390-1AE80-0AA0 orange sheath +530 mm (28.75 inch) 6E57390-1AJ30-0AA0 orange sheath >200 mm (78.77 inch) 6E57390-1AJ30-0AA0 orange sheath >200 mm (78.77 inch) 6E57390-1AJ30-0AA0 orange sheath >FS 307 load power supply orange sheath orange sheath orange sheath Ye 200 mm (78.77 inch) 6E57390-1AB00-0AA0 orange sheath orange sheath Ye 200 mm (78.77 inch) 6E57397-1BA00-0AA0 orange sheath orange sheath Ye 307 lize / AV DC FS 307-1E; S A 6E57397-1EA00-0AA0 orange sheath orange sheath Ye S 307 lize / AV DC FS 307-1E; S A 6E57397-1EA00-0AA0 orange sheath orange sheath Ye S 307 lize / AV DC FS 307-1E; S A 6E57397-1EA00-0AA0 orange sheath orange sheath Ye S 307 lize / AV DC FS 307-1E; S A 6E57397-1EA00-0AA0 of setration box (EB) in eptotention to (JE) in eptotention box (JE) in eptotention to (JE) in eptotention box (JE) in eptotentio	• 160 mm (6.30 inch)	6ES7390-1AB60-0AA0		/MITH4/02-8AG
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 Bistorm (32.68 inch) BEST390-1AJ30-0AA0 BEST390-1BC00-0AA0 BEST390-1AC00-0AA0 BEST390-1AC00-0AC0 BEST390-1AC00-0	. , ,		to connect SIWAREX U, CS, MS,	
Color mm (Gal2A finch) Gelor Gor Mode ORAC PS 307 lead power supply (only required if DC 24 V is not available) Es 7390-1BC00-0AA0 PS 307 lead power supply (only required if DC 24 V is not available) Es 7390-1BC00-0AA0 PS 307-1B; 2 A GES7307-1BA00-0AA0 PS 307-1B; 2 A GES7307-1EA00-0AA0 PS 307-1B; 2 A GES7307-1EA00-0AA0 PS 307-1B; 2 A GES7307-1EA00-0AA0 Ges 7953-8LG11-0AA0 GES7307-1KA00-0AA0 Gor data recording up to 16 MB GES7953-8LG11-0AA0 Remote displays (option) GES7953-8LG11-0AA0 The Siebert S102 and S302 GES7807-1KA00-0AA0 Gribert Industriee/Extingting per- finited, bue PVC insulating per- directly connected to the SWAREX FIA waa nES 485 TMH4700-1BA Siebert Industriee/Bixtronik Grobert annulacture: For TW (connect 2 pairs of con- ductors in parallel), for connecting sheath, approx. 108 mm D) TMH4407-8BD0 For TW (connect 2 pairs of con- ductors in parallel), and for connecting several junction boxs TMH4710-1BA SiWAREX JB junction box, stainless steel houghing modules SiVAREX JB junction box, stainless steel houghing modules SiVAREX V, CS, MS, FTA and TC. TMH4710-1EA With UL and FM approvalio for intimiscial/JB we do cells n parallel, and for connection sivatable for weighing modules SiVAREX V, CS, MS, FTA and TC. TMH4710-1EA <td>, , ,</td> <td></td> <td></td> <td></td>	, , ,			
PS 307 load power supply (only required if DC 24 V is not available) sional bending permitted. 10.8 mm (0.43 inch) outer diameter, for ambient temperature PS 307-1E; 5 A sES7307-1BA00-0AA0 • PS 307-1E; 5 A sES7307-1BA00-0AA0 sES7307-1EA00-0AA0 • PS 307-1E; 5 A sES7307-1KA00-0AA0 • PS 307-1E; 5 A sES7307-1KA00-0AA0 • PS 307-1E; 5 A sES7953-8LC11-0AA0 • PS 307-1E; 5 A sES7953-8LC11-0AA0 • PS 307-1E; 5 A setars in briding permitted italy ing, occasional bending per- mitted, bite PVC insulating sheath, and pock (JB) in a poten- tially explosive atmosphere to the Ex interface (Sr), for fixed laying, occasional bending per- mitted, bite PVC insulating sheath, and pock (JB) in a poten- tially explosive atmosphere to the Ex interface (Sr), for insed laying, occasional bending per- mitted, bite PVC insulating sheath, and pock of a set as the form ambient temperature of a remote display D 7MH400-58D0 TMH400-58D0 Fax: +49 6806/980-099 TMH407-5EA Fax: +49 6806/980-099 TMH4710-1BA For connecting up to 4 load cells in parallel, and for connecting several junction boxes TMH4710-1EA With UL			Ex interface (Ex-I) or between	
PS 307 Indu prove the DC 24 V is not available mm (0.43 inch) outer diameter, for ambient temperature -40 to +80 °C (-104+176 °F.) 120/230 VAC; 24 V DC ES 307-1E, 00-0AA0 ES 307-1E, 00-0AA0 • PS 307-1E; 5 A ES 307.1EA00-0AA0 ES 307.1E, 00-0AA0 • PS 307-1E; 0 A ES 307.1EA00-0AA0 ES 307.1E, 00-0AA0 • PS 307-1E; 0 A ES 307.1EA00-0AA0 ES 307.1E, 00-0AA0 • PS 307-1E; 0 A ES 307.1EA00-0AA0 ES 307.1E, 00-0AA0 • PS 307-1E; 0 A ES 307.1EA00-0AA0 ES 307.1E, 00-0AA0 • PS 307.1E; 0 A ES 307.3E, 10-0X, 10-0X ES 307.3E, 10-0X, 10-0X Im S iopert S102 and S302 ES 302.2E, 10-0X ES 307.1E, 10-0X remote dipital display can be directly connected to the SIMMEREX FTA via an RS 485 For TIY (connect 2 pairs of conductors in parallel), for connecting averaliable for connection an inacactor for the deletes for connection averalia		0237390-10C00-0AA0		
available) 120/2030 V AC; 24 V DC FS 307-118.000-00A0 FPS 307-115; 5 A 6ES7307-116.000-00A0 FPS 307-115; 5 A 6ES7307-116.000-00A0 of data recording up to 16 MB 6ES7953-8LG11-0AA0 Remote displays (option) 6ES7953-8LG11-0AA0 The Sibeert S102 and S302 6ES7953-8LG11-0AA0 Grabe Lit2Y to via an RS 485 6ES7953-8LG11-0AA0 Stabert Industrieelektronik Group 0.4 Sinch youth outer diameter, for amblent temperature -40 407 (-104 +176 °F) Cable LitY to via an RS 485 7MH4702-8BAF NWAREX TFA to via an RS 485 7MH4702-8BAF The Siebert Industrieelektronik Group 0.4 Sinch youth diameter, for amblent temperature -40407 (-104+176 °F) Cable LitYCY 4 x 2 x 0.25 mm² D) The Siebert Industrieelektronik Group 7MH4407-8BD0 Fax: +49 6606980-999 for TTY (connect 2 pairs of conductors in parallel), for connec- SilvaREX JB junction box, satistice stelled housing 7MH4710-1BA SilvaREX JB junction box, satistices stelled housing 7MH4710-1EA Yith Uu and FM approvals, but without ATEX Approval 7MH4710-5AA With UL and FM approvals, but without ATEX Approval 7MH4710-5AA Ori conscion up to 4 load cells on parallelle for weiphi	· · · ·		mm (0.43 inch) outer diameter,	
• PS 307-1B; 2 A 6ES7307-1BA00-0AA0 • PS 307-1E; 5 A 6ES7307-1EA00-0AA0 • PS 307-1E; 10 A 6ES7307-1EA00-0AA0 6ES7307-1EA00-0AA0 6ES7307-1EA00-0AA0 6ES7307-1E , 10 A 6ES7307-1EA00-0AA0 6ES7307-1E , 10 A 6ES7307-1EA00-0AA0 6ES7307-1E , 10 A 6ES7307-1EA00-0AA0 6ES7307-1E , 20 A 70144407-80ED0 7011-1101 70144407-80ED0 7011-1101 70144407-80ED0 7011-1110 7014710-1EA 7011-11110 7014710-1EA 7014710-1EA 7014710-5A 7014710-1EA 7014710	available)		-40 to +80 °C (-104 +176 °F)	
Selection Inter-Characteristic Solution State Selection State PS 307-1E; SA 6ES7307-1EA00-0AA0 PS 307-1K; 10 A 6ES7307-1KA00-0AA0 6ES7307-1EA00-0AA0 6ES7307-1KA00-0AA0 6F0 data recording up to 16 MB 6ES7307-1KA00-0AA0 6ES7307-1KA00-0AA0 6ES7307-1KA00-0AA0 6F0 6ES7307-1K-10A0 7 7014407-36ED0 7 70144407-36ED0 7 7014407-36ED0 7 7014710-1EA 7 7014710-1EA 7 </td <td>. ,</td> <td>6ES7307-1BA00-0AA0</td> <td></td> <td>7MH4702-8AF</td>	. ,	6ES7307-1BA00-0AA0		7MH4702-8AF
PS 307-1K; 10 A 6ES7307-1KA00-0AA0 MMC memory 6ES7307-1KA00-0AA0 or data recording up to 16 MB 6ES7953-8LG11-0AA0 Remote displays (option) 6ES7953-8LG11-0AA0 The Siebert S102 and S302 6ES7953-8LG11-0AA0 emote displays (option) 6ES7953-8LG11-0AA0 The Siebert S102 and S302 6ES7953-8LG11-0AA0 emote displays (option) 6ES7963-8LG11-0AA0 The Siebert S102 and S302 6ES7963-8LG11-0AA0 emote displays (option) 6ES7963-8LG11-0AA0 The Siebert S102 and S302 6ES7963-8LG11-0AA0 genetic displays (option) 7MH4407-8BD0 Siebert Industrieelektronik GmbH 6ES655 Expelborn P0. Box 1180 7MH4407-8BD0 For TTY (connect 2 pairs of con- ductors in parallel), for connec- tion of a remote display 7MH4407-8BD0 Sobert de information available for manufacturer. 7MH4710-1BA Stainless steel housing or connecting up to 4 load cells n parallel, and for connecting several junction boxs 7MH4710-1EA WithOUL and FM approvals, but without ATE Approval or intinsically safe connection of load cells 7MH4710-1EA NWAREX U, CS, MS, FTA and TC. 7MH4710-5AA Silvable for weighing modules 7MH4710-5AA				
MWC memory 6ES7953-8LG11-0AA0 Final recording up to 16 MB 6ES7953-8LG11-0AA0 Remote displays (option) mited, bisepressive atmosphere to the Ex interface. The Sibert S102 and S302 remote digital display can be directly connected to the SiWAREX FTA via an RS 485 interface. Sibert Industrieelektronik GrobH Sibert Industrieelektronik GrobH P.O. Box 1180 7MH4407-8BD0 De56555 Eppelborn Tet:.+94 6806/980-0 7MH4407-8BD0 Fax: +49 6806/980-0 Fax: +49 6806/980-0 7MH4407-8BD0 SiWAREX JB junction box, aluminum housing ro connecting up to 4 load cells in parallel, and for connecting several junction boxes 7MH4710-1EA SiWAREX JB junction box, stainled in parallel, and for connecting several junction boxes 7MH4710-1EA Without ATEX approval for insciently safe connection of load cells in parallel, safe connection for connecting several junction boxes 7MH4710-1EA SiWAREX JB junction box, stainled for connecting several junction boxes 7MH4710-1EA Without ATEX approval for use in the EU. 7MH4710-1EA Not approved for use in the EU. 7MH4710-1EA	,			
The Siebert S102 and S302 the Ex interface (Ex.I), for fixed laying, occasional bending permitted, blue PVC insulating sheath, approx. 10.8 mm (0.43 inch) outer diameter, for ambient temperature directly connected to the SiWAREX FTA via an RS 485 SiWAREX FTA via an RS 485 Image: the Ex interface (Ex.I), for fixed laying, occasional bending permitted, blue PVC insulating sheath, approx. 10.8 mm (0.43 inch) outer diameter, for ambient temperature directly connected to the SiWAREX FTA via an RS 485 SiWAREX FTA via an RS 485 Image: the Ex interface (EX.I), for fixed laying, occasional bending permitted, blue PVC insulating sheath, approx. 10.8 mm (0.43 inch) outer display Does 1180 Siebert Industrieelektronik GmbH P.O. Box 1180 TMH4407-3BD0 for TY (connect 2 pairs of conductors in paralle), for connection of a remote display D) Subject to export regulations AL: N, ECCN: EAR99H. SiWAREX JB junction box, aluminium housing for connecting up to 4 load cells in parallel, and for connecting several junction boxes TMH4710-1BA SiWAREX JB junction box, stainless steel housing for connecting up to 4 load cells in parallel, and for connecting of to do ad cells in parallel, set connection of the Mapproval, but without ATEX approval for use in the EU. TMH4710-1EA With UL and FM approvals, but without ATEX approval TMH4710-5AA SiWAREX US, SK, FTA and CTC. Not approved for use in the EU. SiWAREX US, SK, FTA and CTC. TMH4710-5A	· · · · · · · · · · · · · · · · · · ·			
The Siebert S102 and S302 File remote digital display can be directly connected to the SIWAREX FTA via an RS 485 Siebert Industrieelektronik Siebert Industrieelektronik GmbH <i>RO. Box 1180</i> De6565 Eppelborn De6565 Eppelborn Tel: +49 6806/390-09 Fax: +49 6806/390-09 For TTY (connect 2 pairs of conductors in parallel), for connection of a remote display D) Subject to export regulations AL: N, ECCN: EAR99H. Sitement Industrieelektronik group to 4 load cells in parallel for connecting up to 4 load cells in parallel for connecting up to 4 load cells in parallel for connecting up to 4 load cells in parallel for intrinsically safe connection of in termical up to 4 load cells in parallel for intrinsically safe connection of load cells in parallel for weighing modules SivaREX JB junction box, stainlees steel housing for intrinsically safe connection of load cells in parallel for weighing modules SivaREX Pi With UL and FM approvals, but without ATEX approval for use in the EU. TMH4710-1EA SivaREX C, S. MS, FTA and FTC. TMH4710-5AA Not approved for use in the EU. TMH4710-5AA	for data recording up to 16 MB	6ES7953-8LG11-0AA0	the Ex interface (Ex-I), for fixed laying, occasional bending per-	
Intersection 7MH4710-1EA SWAREX JB junction box, stainless steel housing for connecting up to 4 load cells in parallel 7MH4710-1EA SWAREX JB junction box, stainless steel housing for connecting up to 4 load cells in parallel 7MH4710-1EA SWAREX JB junction box, stainless steel housing for connecting up to 4 load cells in parallel 7MH4710-1EA SWAREX JB junction box, stainless steel housing for connecting up to 4 load cells in parallel 7MH4710-1EA Not approved for use in the EU. 7MH4710-5AA				
Interface. Siebert Industrieelektronik TMH4407-8BD0 Siebert Industrieelektronik for TTY (connect 2 pairs of con- ductors in parallel), for connec- tion of a remote display TMH4407-8BD0 P.0. Box 1180 De6565 Eppelborn for TTY (connect 2 pairs of con- ductors in parallel), for connec- tion of a remote display TMH4407-8BD0 Detailed information available from manufacturer. SiWAREX JB junction box, aluminium housing D) Subject to export regulations AL: N, ECCN: EAR99H. SIWAREX JB junction box, aluminium housing for connecting up to 4 load cells in parallel, and for connecting several junction boxes TMH4710-1BA SIWAREX JB junction box, atainless steel housing for connecting up to 4 load cells in parallel TMH4710-1EA TMH4710-1EA TMH4710-5AA With UL and FM approvals, but without ATEX approval for intrinsically safe connection of load cells SWAREX U, CS, MS, FTA and FTC. TMH4710-5AA	remote digital display can be directly connected to the		(0.43 inch) outer diameter, for ambient temperature	
GmbH PO. Box 1180 D-66565 Eppelborn Te1: +49 6806/980-099 Fax: +49 6806/980-099 Internet: http://www.siebert.de D) Subject to export regulations AL: N, ECCN: EAR99H. Detailed information available from manufacturer. D) Subject to export regulations AL: N, ECCN: EAR99H. SIWAREX JB junction box, aluminium housing for connecting up to 4 load cells in parallel, and for connecting several junction boxes TMH4710-1BA SIWAREX JB junction box, stainless steel housing for connecting up to 4 load cells in parallel TMH4710-1EA With UL and FM approvals, but without ATEX approval for intrinsically safe connection of load cells SWAREX U, CS, MS, FTA and FTC. TMH4710-5AA			Cable LiYCY 4 x 2 x 0.25 mm ² D)	7MH4407-8BD0
D-66565 Eppelborn Tel.: +49 6806/390-0 Tel.: +49 6806/390-0999 D) Subject to export regulations AL: N, ECCN: EAR99H. Internet: http://www.siebert.de Detailed information available Detailed information available romanufacturer. SIWAREX JB junction box, aluminium housing for connecting up to 4 load cells for connecting up to 4 load cells TMH4710-1BA SIWAREX JB junction box, stainless steel housing TMH4710-1EA for connecting up to 4 load cells TMH4710-5AA With UL and FM approvals, but without ATEX approval for intrinsically safe connection of load cells TMH4710-5AA SilvaREX U, CS, MS, FTA and FTC. NSH4710-5AA	GmbH			
Internet: http://www.siebert.de Detailed information available from manufacturer. SIWAREX JB junction box, aluminium housing for connecting up to 4 load cells in parallel, and for connecting several junction boxes SIWAREX JB junction box, stainless steel housing for connecting up to 4 load cells in parallel Ex interface, type SIWAREX Pi With UL and FM approvals, but without ATEX approval for intrinsically safe connection of load cells SIWAREX U, CS, MS, FTA and FTC. Not approved for use in the EU.	D-66565 Eppelborn Tel.: +49 6806/980-0			N, ECCN: EAR99H.
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without ATEX approval for intrinsically safe connection of load cells Suitable for weighing modules SIWAREX U, CS, MS, FTA and FTC. Not approved for use in the EU.	Ex interface, type SIWAREX Pi	7MH4710-1EA		
SIWAREX U, CŠ, MŠ, FTA and FTC. Not approved for use in the EU.	without ATEX approval for intrinsically safe connection of load cells	7MH4710-5AA		
EU.	SIWAREX U, CŠ, MŠ, FTA and FTC.			
	EU.			

Weighing Electronics Force Measurements

SIWAREX CF

Overview



SIWAREX CF is a transmitter for connecting strain-gauge sensors for tasks such as measuring force and torque. The compact module is easy to install in all SIMATIC automation systems. Complete data access to the current measured values is then possible via the SIMATIC.

Benefits

SIWAREX CF offers the following key advantages:

- Uniform design technology and consistent communication thanks to integration in SIMATIC
- Uniform configuration with SIMATIC
- Use in distributed plant concept through connection to PROFIBUS DP/PROFINET using ET 200S
- Bidirectional measuring with a resolution of 16 000 parts and accuracy of 0.15 %

Application

SIWAREX CF is the optimum solution wherever strain gage sensors, such as force sensors or torque measuring shafts, are used for measuring tasks. The following are typical SIWAREX CF applications:

- Monitoring of crane and cable loads
- · Measuring of conveyor belt loads
- Overload protection for rolling mills
- Monitoring of belt tension
- · Force measurement in testing machines
- Torque and pressure measurement

Design

SIWAREX CF is a compact function module (FM) in the SIMATIC S7 and can be snapped directly onto the ET 200S backplane bus. The snap-on rail mounting means that it is extremely easy to mount/wire.

The sensor and power supply are connected via the standard terminal housing

Function

SIWAREX CF provides the voltage supply required by the EMS. The force produces a corresponding measuring signal, which is then further processed in the SIWAREX CF module.

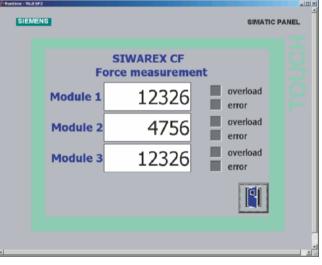
The signal is amplified, coarse-filtered, and then converted to a digital value. A connectable digital filter can additionally reduce noise on the measuring signal.

The digital value is available to the user internally in SIMATIC and can be processed in the control program. For example, the user could further suppress noise by averaging in the SIMATIC CPU or by converting to physical units. The result can be displayed on an operator panel according to requirements.

Consistent and uniform communication between all system components enables fast, reliable and cost-effective integration and diagnosis in industrial processes.

SIWAREX CF can be integrated into the plant software using the classic PLC programming languages; STL (Statement List), LAD (Ladder Diagram) FBD (Function Block Diagram) or SCL (Structured Control Language).

Integration into SIMATIC can result in freely-programmable, modular force measuring systems which can be modified according to operational requirements. The ready-to-use SIWAREX CF software "Getting started" is available free-of-charge and shows beginners how to integrate the module into a STEP 7 program and offers a basis for application programming. This supports the display of the measured values in a SIMATIC panel (TP/OP/MP).



Measured values from three modules in the SIWAREX CF "Getting started" software

Unlike analog or digitally connected transmitters, SIWAREX CF does not need costly additional modules to link it to SIMATIC.

After the module has been configured in SIMATIC and installed, it is ready for immediate operation. An additional parameterization tool is not required.

The current data are read into the SIMATIC via the I/O area.

SIWAREX CF

2

recimical specifications	
SIWAREX CF	
Integration in automation systems	
S7-400, S7-300, C7	Via ET 200S
Automation systems from other vendors	Via ET 200S with IM 151-1
Communication interfaces	SIMATIC S7 (ET 200S backplane bus), 8 bytes, I/O area
Module parameterization	Not required (module is pre- parameterized)
Measuring properties	
Error limit acc. to DIN 1319-1 of full-scale value at 20 $^\circ C$ \pm 10 K (68 $^\circ F$ \pm 10 K)	≤ 0,15 %
Signal resolution	14 bits plus 1 bit sign
Number of measurements/s	50
Low-pass filter	Without or 2 Hz
Sensors	In accordance with the principle of expansion measurement (full bridge) 4-wire connection
Sensor feed	
Supply voltage, short-circuit-proof	6 V DC ± 5 %
Permissible sensor resistance	
• R _{Lmin}	> 250 Ω
• R _{Lmax}	< 4 010 Ω
Permissible sensor cell coefficient	Up to 4 mV/V
Permissible range of the measuring signal	-25.2 +25.2 mV
Auxiliary power	
Rated voltage	24 V DC
Maximum current consumption	150 mA
Connection to sensors in Ex zone 1	Optionally via SIWAREX IS Ex interface
Ex approval zone 2 and safety	ATEX 95, cUL _{us} Haz. Loc.
IP degree of protection to EN 60529; IEC 60529	IP20
Climatic requirements T _{min (IND)} T _{max (IND)} (operating temperature)	
 Vertical installation 	0 60 °C (32 140 °F)
 Horizontal installation 	0 40 °C (32 104 °F)
EMC requirements according to	NAMUR NE21, Part 1 89/386/EEC
Dimensions	30 x 80 x 50 mm (1.18 x 3.15 x 1.97 inch)

SIWAREX CF

Selection and Ordering data	Order No.		Order No.
SIWAREX CF	7MH4920-0AA01	Accessories	
Weighing module for strain-gauge sensors in SIMATIC ET 200S		SIWAREX EB extension box for extending sensor cables	7MH4710-2AA
(SIWAREX CF configuration 'package not required)		Ex interface, type SIWAREX IS With ATEX approval, but without	
SIWAREX CF manual		UL and FM approvals, for intrin-	
• German		sically-safe connection of load cells.	
• English		including manual	
Free download on the Internet at: http://www.siemens.com/ weighingtechnology		suitable for the SIWAREX U, CS, MS, FTA, FTC and CF weighing modules. Approved for use in the EU.	
SIWAREX CF "Getting started" Sample software shows begin-		With short-circuit current < 199 mA DC	7MH4710-5BA
ners how to program in STEP 7		With short-circuit current	7MH4710-5CA
Free download on the Internet at: http://www.siemens.com/		< 137 mA DC	
weighingtechnology		Cable (optional)	
Installation material (mandatory)		Cables Li2Y 1 x 2 x 0.75 ST + 2 x (2 x 0.34 ST) – CY,	7MH4702-8AG
Terminal module	6ES7193-4CG20-0AA0	orange sheath	
TM-E 30 mm (1.18 inch) wide (required for each SIWAREX module)	or compatible	to connect SIWAREX U, CS, MS, FTA, FTC and CF to the junction box (JB), extension box (EB) or	
Shield contact element	6ES7193-4GA00-0AA0	Ex interface (Ex-I) or between two JBs, for fixed laying, occasional	
Contents 5 items, sufficient for 5 cables		bending permitted, 10.8 mm (0.43 inch) outer diameter, for	
Shield connection terminal	6ES7193-4GB00-0AA0	ambient temperature -40 to +80 °C (-104 +176 °F)	
Contents: 5 items, sufficient for 5 cables			
One shield terminal element is required per sensor cable			
N busbar, galvanized	8WA2842		
3 x 10 mm (0.12 x 0.39 inch), 1.5 m (4.92 ft) long			

Feeder terminal for N busbar

8WA2868

Siemens WT 10 · 2012

Weighing Electronics Force Measurements

Application

The SIWAREX FTC module is the optimum solution wherever high demands are placed on force measurement. As a result of its exceptional measuring properties, bidirectional force can be measured at high accuracy.

More information

Further descriptions and additional technical specifications on SIWAREX FTC can be found on page 2/50.





The SIWAREX FTC (Flexible Technology for Continuous Weighing) can be used flexibly for a wide variety of purposes in complex weighing tasks. Simply set the operating mode to turn it into a force measurement module. 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.

Benefits

- Uniform design and totally integrated communication 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/PROFINET using ET 200M
- Bidirectional force measurement with ±8 million parts at a measuring rate of 100 measurement per second
- Display with SIMATIC standard operator panels
- · Parameterizable inputs and outputs
- Can be parameterized for a huge range of situations
- · Flexible adaptation to different requirements with SIMATIC
- · Simple adjustment using the SIWATOOL FTC program
- · Supports replacement of module without renewed adjustment
- Recording of measuring sequence
- Can be used in Ex applications

Weighing Electronics Accessories for PLC-based weighing modules

Overview



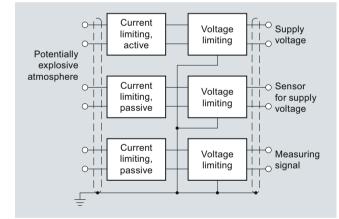
The Ex interface, type SIWAREX Pi, can be used for the SIWAREX U, CS, MS, FTA and FTC weighing modules. It contains 6 safety barriers and has FM approval for devices of Class I Div.1. The Ex interface must be installed outside the potentially explosive area.

Not approved for use in the EU.

Function

Mode of operation

The safety barriers limit current and voltage in the power, sensor and measuring signal lines of load cells installed in potentially explosive areas



Function chart SIWAREX Pi

Technical specifications

Ex interface, type SIWAREX Pi		
Non-intrinsically-safe circuits		
Load cell powering		
Rated voltage Un1	10 V DC	
Permissible error voltage	250 V AC	
Internal resistance of the load cells	\geq 87 Ω	
Total	< 4 010 Ω	
Sensor line		
Rated voltage Un2	10 V DC	
Permissible error voltage	250 V AC	
Measuring signal line		
Rated voltage Un3	10 40 mV DC	
Permissible error voltage	250 V AC	
Intrinsically-safe circuits		
Load cell powering		
No-load voltage U01	≤ 13.2 V DC	
Voltage against equipotential bond- ing cond.	$\leq 6.6 \text{ V DC}$	
Short-circuit current IK1	≤ 122 mA	
Sensor line		
No-load voltage U ₀₂	≤ 14.4 V DC	
Voltage against equipotential bond- ing cond.	≤ 7.2 V DC	
Short-circuit current IK2	≤ 25 mA	
Measuring signal line		
No-load voltage U ₀₃	≤ 12.6 V DC	
Voltage against equipotential bond- ing cond.	≤ 6.3 V DC	
Short-circuit current IK3	≤ 72 mA	
Total connection values		
(when circuits are connected together)		
No-load voltage U_0	≤ 14.4 V DC	
Short-circuit current IK	≤ 219 mA	
Power P _O	≤ 1.93 W	
For gas group II C		
Max. permissible external capacitance $C_{\rm a3}$	210 nF	
Max. permissible external induc- tance L_a	0.3 mH	
For gas group II B		
Max. permissible external capacitance $C_{\rm a3}$	890 nF	
Max. permissible external inductance $L_{\rm a}$	1 mH	
Electrical connections	2 Pg screwed glands and terminals	

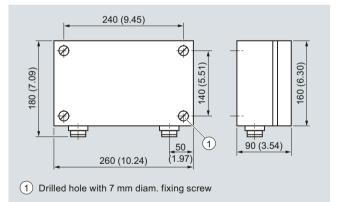
Weighing Electronics Accessories for PLC-based weighing modules

Ex interface SIWAREX Pi

Technical specifications (conti	nued)	Selection and ordering data	Order No.
Ex interface, type SIWAREX Pi		Ex interface, type SIWAREX Pi	7MH4710-5AA
Intrinsically-safe circuits		With UL and FM approvals, but	
General data		 without ATEX approval For intrinsically-safe connection 	
Housing dimensions	See the section "Dimensional drawings"	of load cells, Suitable for the SIWAREX U, CS, MS, FTA, FTC and CS weighing	
Weight, approx.	2.2 kg (4.85 lb)	modules.	
Enclosure material	die-cast aluminum	Not approved for use in the EU.	
UL/CSA certification	Yes	Manual for Ex interface type	C71000-T5974-C29
Permissible ambient temperature		SIWAREX Pi	
 During operation 	-10 +70 °C (14 +158 °F)	Cable (optional)	
During operation for legal-for-trade medium accuracy weighing ma- chines	-10 +40 °C (14 +104 °F)	Cables Li2Y 1 x 2 x 0.75 ST + 2 x (2 x 0.34 ST) – CY, orange sheath to connect SIWAREX U, CS, MS,	7MH4702-8AG
• During transportation and storage	-40 +85 °C (-40 +185 °F)	FTA, FTC and CF to the junction box (JB), extension box (EB) or	
Permissible relative humidity	≤ 95 %	Ex interface (Ex-I) or between two	
Degree of protection	IP54	JBs, for fixed laying, occasional bending permitted, 10.8 mm	
Type of explosion protection	Intrinsic safety "i" FM Class I Div. 1	(0.43 inch) outer diameter, for ambient temperature -40 +80 °C (-104 +176 °F)	
		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)	7MH4702-8AF

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 permitted, blue PVC insulating sheath, approx. 10.8 mm (0.43 inch) outer diameter, for ambient temperature -40 ... +80 °C (-104 ... +176 °F)

Dimensional drawings



SIWAREX Pi, Ex-Interface, dimensions in mm (inch)

Weighing Electronics Accessories for PLC-based weighing modules

Ex interface SIWAREX IS

Overview



The Ex interface, type SIWAREX IS, can be used for the SIWAREX U, CS, MS, FTA, FTC and CF weighing modules. It contains 6 safety barriers and is labeled according to ATEX and EN 5001U 2D/ II(2)G[EEx ib] IIC. The Ex interface must be installed outside the potentially explosive area. It should be accommodated in the switchgear cabinet, preferably underneath the weighing electronics, and is secured using a 35-mm rail to EN 50 022.

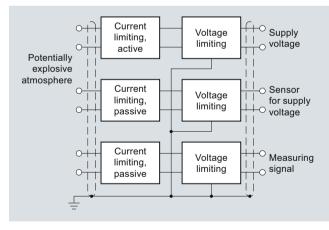
Influence of the SIWAREX IS on the load cell signal is negligible so it is approved for scales requiring verification.

The connection is made at the front using two clamp-type plugs. A separate screw terminal is available for connection of the equipotential bonding conductor (EBC).

Function

Mode of operation

The safety barriers limit current and voltage in the power, sensor and measuring signal lines of load cells installed in potentially explosive areas



Function chart SIWAREX Pi

Technical specifications

Ex interface, type SIWAREX IS	Standard	Low current version
Non-intrinsically-safe c	ircuits	
Load cell powering		
Rated voltage Un1	10 V DC	10 V DC
Permissible error voltage	250 V AC	250 V AC
Internal resistance of the load cells	\geq 87 Ω	\geq 180 Ω
Total	< 4 010 Ω	< 4 010 Ω
Sensor line		
Rated voltage Un2	10 V DC	10 V DC
Permissible error voltage	250 V AC	250 V AC
Measuring signal line		
Rated voltage Un3	10 40 mV DC	10 40 mV DC
Permissible error voltage	250 V AC	250 V AC
Intrinsically-safe circuit	s	
Load cell powering		
No-load voltage U ₀₁	≤ 13.1 V DC	≤ 13.1 V DC
Voltage against equipo- tential bonding cond.	\leq 6.6 V DC	≤ 6.6 V DC
Short-circuit current IK1	≤ 120 mA	≤ 58 mA
Sensor line		
No-load voltage U ₀₂	\leq 14.4 V DC	\leq 14.4 V DC
Voltage against equipo- tential bonding cond.	≤ 7.2 V DC	≤ 7.2 V DC
Short-circuit current $I_{\rm K2}$	≤ 25 mA	≤ 25 mA
Measuring signal line		
No-load voltage U_{03}	≤ 12.8 V DC	≤ 12.8 V DC
Voltage against equipo- tential bonding cond.	≤ 6.4 V DC	≤ 6.4 V DC
Short-circuit current $I_{\rm K3}$	≤ 54 mA	\leq 54 mA
Total connection values		
(when circuits are con- nected together)		
No-load voltage U_0	\leq 14.4 V DC	\leq 14.4 V DC
Short-circuit current $I_{\rm K}$	≤ 199 mA	≤ 137 mA
Power P _O	≤ 1.835 W	≤ 1.025 W
For gas group II C		
Max. permissible external capacitance $C_{\rm a3}$	500 nF	450 nF
Max. permissible external inductance L_a	0.15 mH	0.5 mH
For gas group II B		
Max. permissible external capacitance $C_{\rm a3}$	2 000 nF	2 000 nF
Max. permissible external inductance L_a	1 mH	2 mH

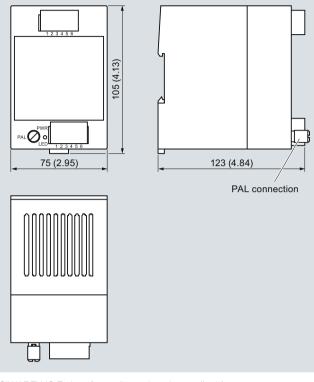
Dimensional drawings

Weighing Electronics Accessories for PLC-based weighing modules

Ex interface SIWAREX IS

Technical specifications (continued)

Ex interface, type SIWAREX IS	Standard	Low current version
Intrinsically-safe circuit	S	
General data		
Housing dimensions	See "Dimensional drawings"	See "Dimensional drawings"
Weight, approx.	0.5 kg (1.10 lb)	0.5 kg (1.10 lb)
Permissible ambient temperature		
During operation	-10 +60 °C (14 +140 °F) (for vertical installa- tion)	-10 +60 °C (14 +140 °F) (for vertical installa- tion)
• During operation for le- gal-for-trade medium accuracy weighing machines	-10 +40 °C (14 +104 °F) (for vertical installa- tion)	-10 +40 °C (14 +104 °F) (for vertical installa- tion)
 During transportation and storage 	-40 +85 °C (-40 +185 °F)	-40 +85 °C (-40 +185 °F)
Permissible relative humidity	≤95 %	≤ 95 %
Degree of protection	IP20	IP20
Type of explosion pro- tection	Intrinsic safety "i" [EEx ib] II C to ATEX	Intrinsic safety "i" [EEx ib] II C to ATEX



SIWAREX IS Ex interface, dimensions in mm (inch)

Selection and ordering data	Order No.
Ex interface, type SIWAREX IS	
With short-circuit current < 199 mA DC	7MH4710-5BA
With short-circuit current < 137 mA DC	7MH4710-5CA
With ATEX approval, but without UL and FM approvals For intrinsically-safe connection of load cells, including manual Suitable for the SIWAREX U, CS, MS, FTA, FTC and CF weighing modules.	
Approved for use in the EU.	
Cable (optional)	
Cables Li2Y 1 x 2 x 0.75ST + 2 x (2 x 0.34 ST) – CY, orange sheath to connect SIWAREX U, CS, MS, FTA, FTC and CF to the junction box (JB), extension box (EB) or Ex interface (Ex-I) or between two JBs, for fixed laying, occasional bending permitted, 10.8 mm (0.43 inch) outer diameter, for ambient temperature -40 +80 °C (-104 +176 °F)	7MH4702-8AG
Cables Li2Y 1 x 2 x 0.75ST + 2 x (2 x 0.34 ST) – CY, blue sheath to connect the junction box (JB) or extension box (EB) in a poten- tially explosive atmosphere to the Ex interface (Ex-I), for fixed lay- ing, occasional bending permit- ted, blue PVC insulating sheath, approx. 10.8 mm (0.43 inch) outer diameter, for ambient temperature	7MH4702-8AF

Weighing Electronics

Notes