Weighing Systems SIWAREX

Catalog WT 01 · 2008

Supersedes:
Catalog WT 01 · 2005

The products contained in this catalog are also contained in Catalog CA 01 available on CD-ROM or DVD
Order No.:
E86060-D4001-A110-C6-7600 (CD)
E86060-D4001-A510-C6-7600 (DVD)

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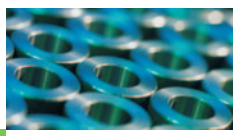
Learn for yourself the potential our products and systems offer. And discover how you can permanently increase your productivity with us.

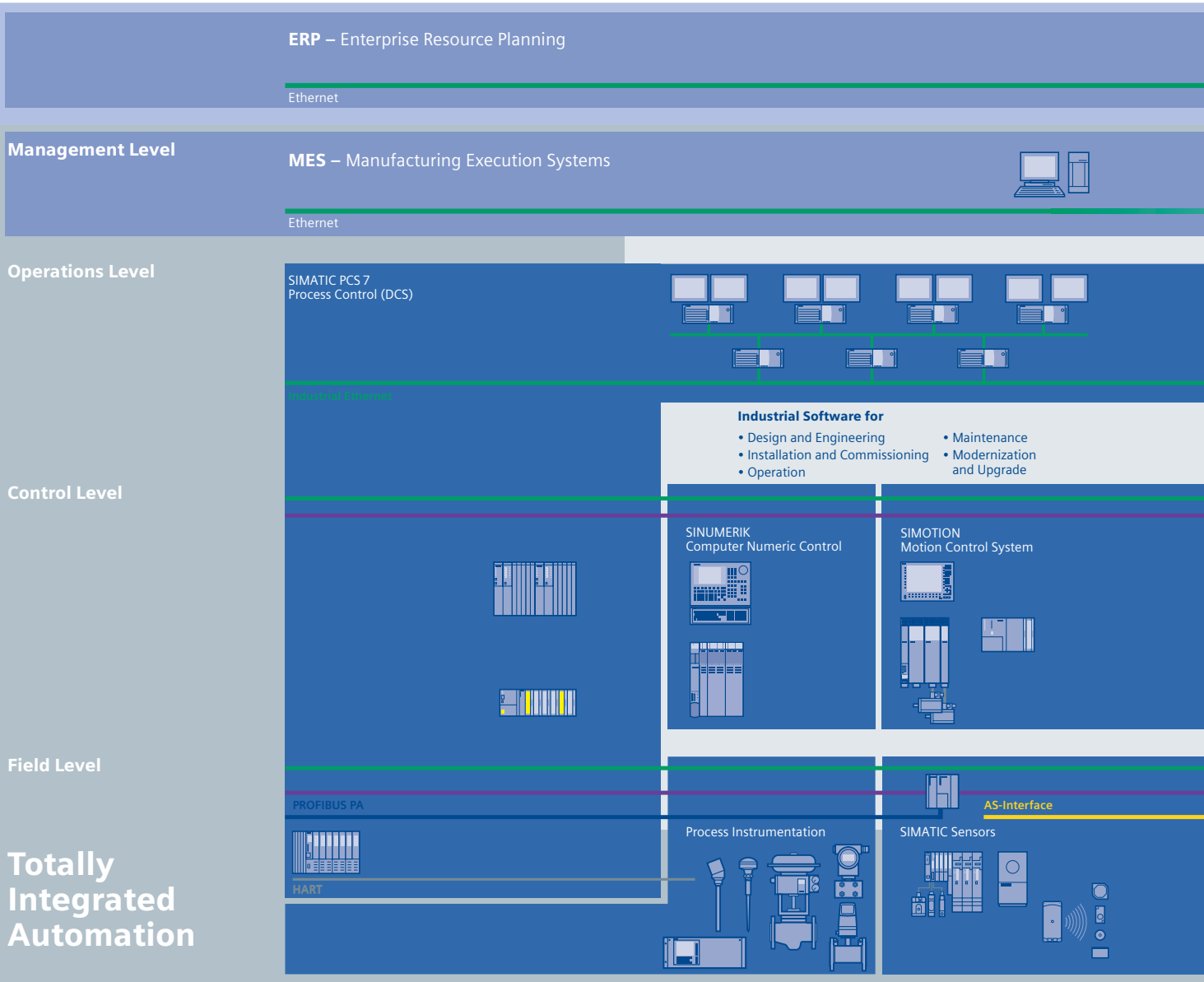
Your regional Siemens contact can provide more information. He or she will be glad to help.



Sharpen your competitive edge. Totally Integrated Automation

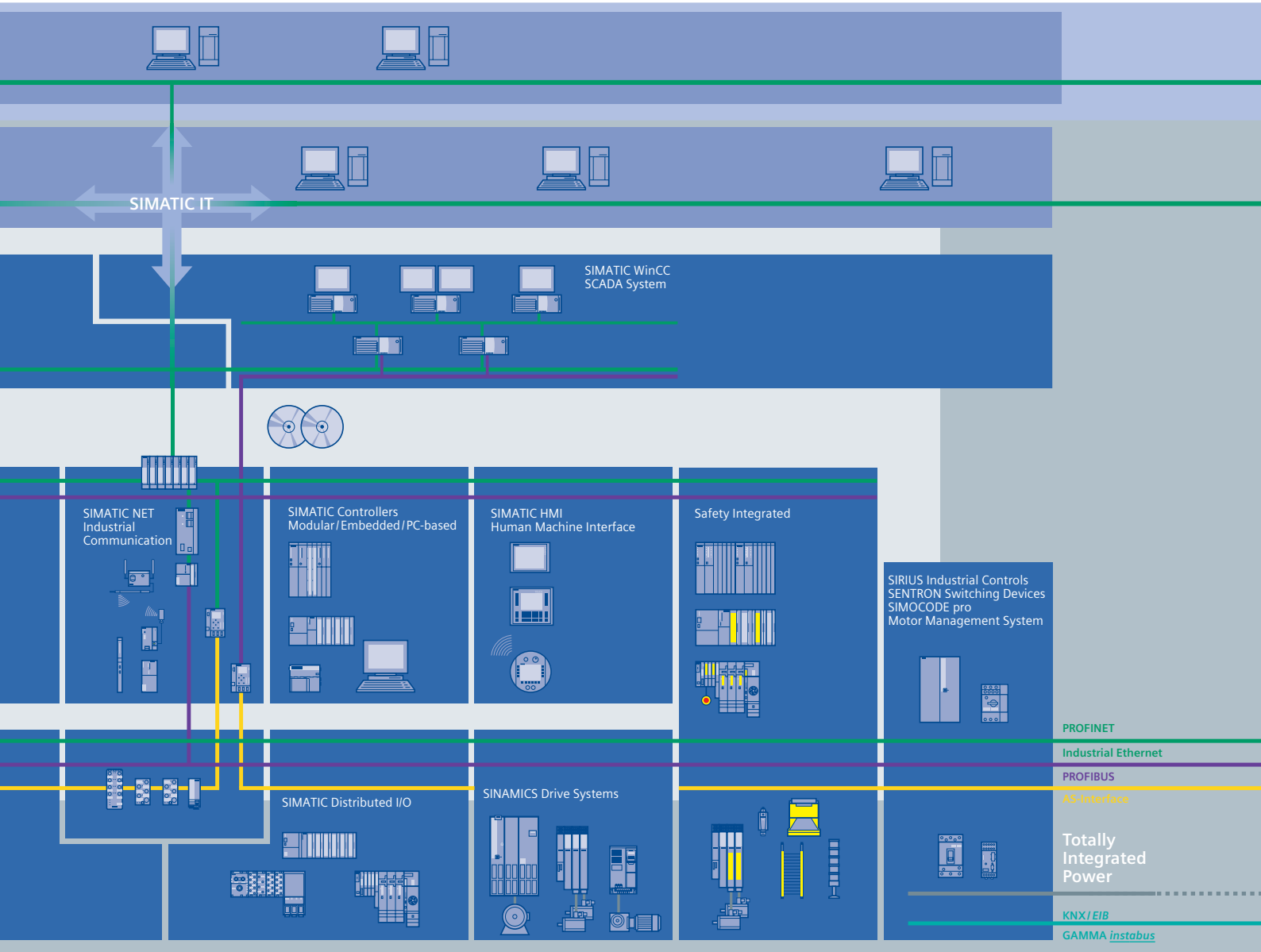
With Totally Integrated Automation (TIA), Siemens is the only manufacturer to offer an integrated range of products and systems for automation in all sectors - from incoming goods to outgoing goods, from the field level through the production control level to connection with the corporate management level.

On the basis of TIA, we implement solutions that are perfectly tailored to your specific requirements and are characterized by a unique level of integration. This integration not only ensures significant reductions in interface costs but also guarantees the highest level of transparency across all levels.

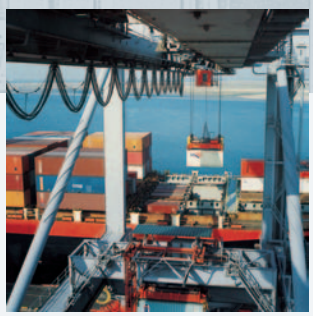


It goes without saying that you profit from Totally Integrated Automation during the entire life cycle of your plants - from the first planning steps, through operation, right up to modernization. Consistent integration in the further development of our products and systems guarantees a high degree of investment security here.

Totally Integrated Automation makes a crucial contribution towards optimizing everything that happens in the plant and thus creates the conditions for a significant increase in productivity.



SIWAREX – weighing technology for automation



	Goods in	Production
Process stage/ weighing application	Weight recording when unloading bulk materials, liquids and also weight units such as sacks, pallets, crates.	Various weighing processes in proportioning, mixing and batch processes – but also force measurement
Type of scale	– Truck scale – Weighbridges – Emptying scales	– Batch system – Loss-in-weight feeders
Appropriate SIWAREX weighing system	**SIWAREX FTA** (automatic/non-automatic weighing machine) **SIWAREX CS** (non-automatic weighing machine) **SIWAREX R** (load cells, mounting parts)	**SIWAREX FTA** (batch processes) **SIWAREX FTC** (continuous processes and force measurement) **SIWAREX CF** (force measurement) **SIWAREX R** (load cells, mounting parts) **SIWAREX IS** (Ex barriers)

Stores for raw materials, end products, intermediate stores
Static weight monitoring for example of stored bulk material, barrels, sacks, pallets, crates etc.

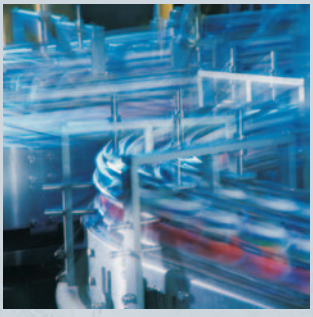
– Hopper weighing
– Weighbridges

SIWAREX U, CS, MS
(static weight recording)
SIWAREX R (load cells, mounting parts)
SIWAREX IS (Ex barriers)

Quality assurance
In-house transport
– Control of material flow
– Weight checks for quality assurance purposes
– Completeness check of packaging units
– Weight value for in-house calculations

– Conveyor scales
– Dynamic and static control scales

SIWAREX FTC
(conveyor scales, bulk flowmeter)
SIWAREX U, CS, MS
(static weight recording)
SIWAREX R (load cells, mounting parts)



Goods out

Weight recording/checking
– When filling or bagging bulk goods and liquids, for example, into sacks or tanks
– For units such as pallets or crates

– Sacking scales
– Filling machine
– Truck scale
– Weighbridges
– Loading scales

SIWAREX FTA (automatic/non-automatic weighing machine)
SIWAREX CS
(non-automatic weighing machine)
SIWAREX R (load cells, mounting parts)

From incoming goods, through the entire chain of production, transport and storage, to outgoing goods, there are numerous and varied weighing tasks to be performed.

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 of 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 with respect to typical scale functions,
- simple expansion of the 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,
- controller and
- actuator technology

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

SIWAREX FTA weighing electronics in the S7 300 system

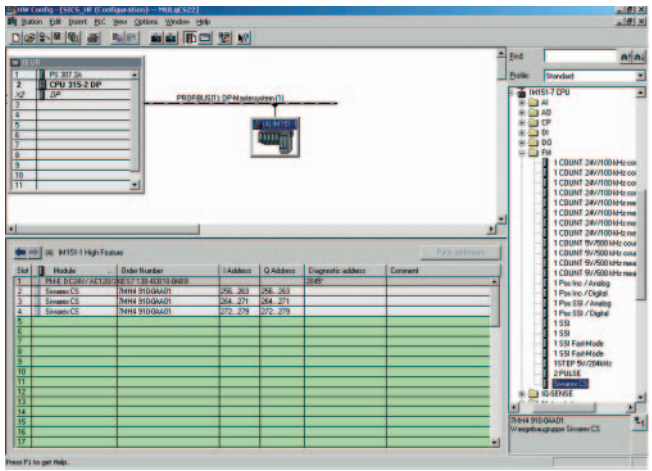
Distribution of weighing functions within automation system

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. The demands placed on a modern weighing solution include the following scale-related requirements:

- high operational reliability,
- simple operation,
- very good reproducibility, and
- high accuracy

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

- uniformity (hardware/software),
- flexibility, and
- standardization.



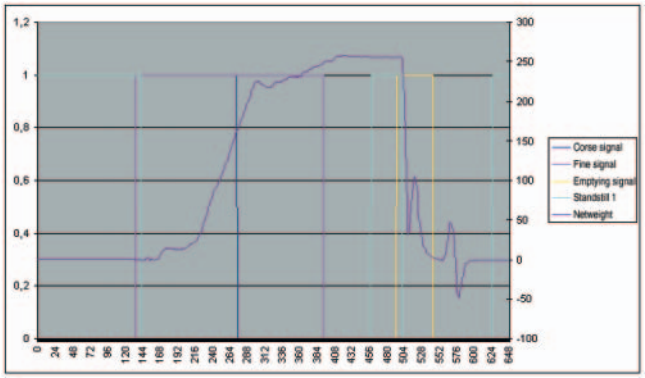
SIMATIC hardware configuration using the SIWAREX CS weighing electronics

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).
- 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. With a distributed architecture, i.e. with integration of the components into the scale, the weighing system simply becomes an autonomous "field device" connected to the automation technology via the open PROFIBUS or PROFINET.



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

SIWAREX weighing systems in automation

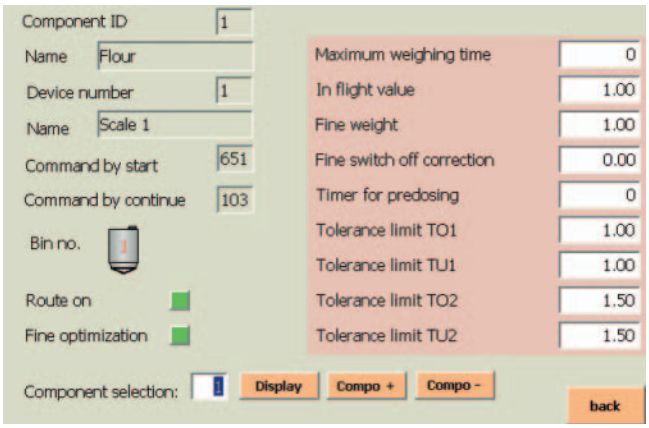
Totally Integrated Automation plays an essential role in SIWAREX weighing systems.

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

This means:

- Implementation of central automation concepts by 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
- Uniform configuring and programming through SIMATIC software.

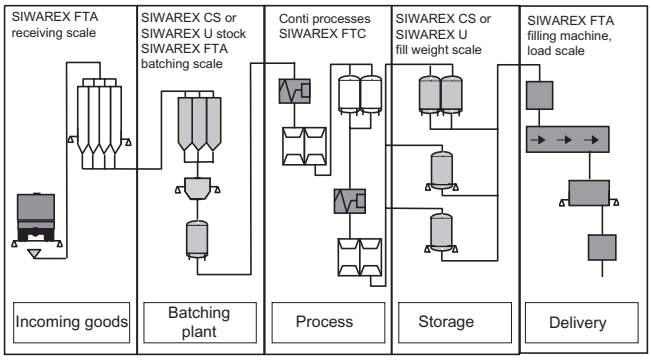
Material parameters



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 which encompasses all hierarchic levels from the human-machine interface to the PROFIBUS DP 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

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!

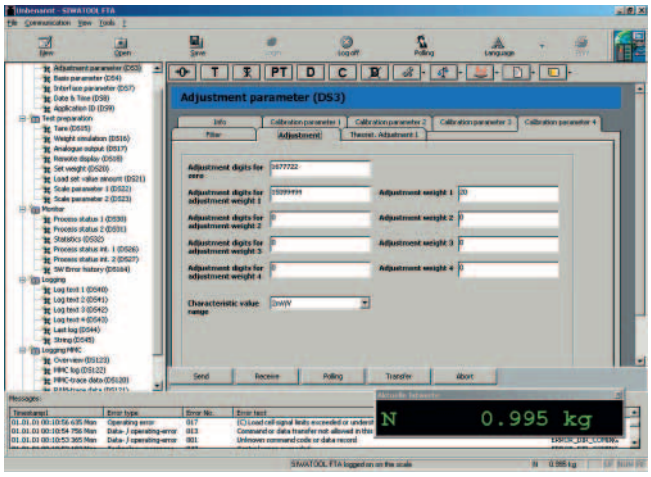
The ET 200 I/O station is designed as a modular system. The weighing electronics are selected from the module catalog and placed in the rack of the modular I/O station. The software addresses the weighing electronics as if they were modules plugged into the central controller of an automation system.

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 due to expansion with standard SIMATIC components
- High plant availability
- Easy installation due to snap-on technique
- Low space requirements due to compact design



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.

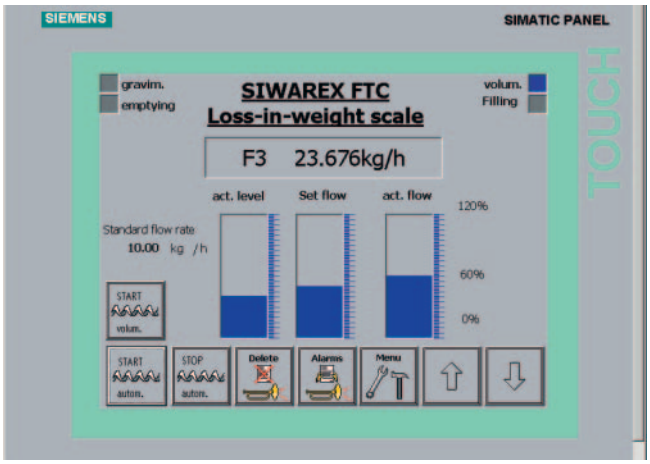
In the SIMATIC S7, for example, faults (measuring range exceeded, proportioning fault, sensor fault, etc.) are reported to the automation system via diagnostic interrupts without the need to input a single line of programming code.

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 legal-for-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.



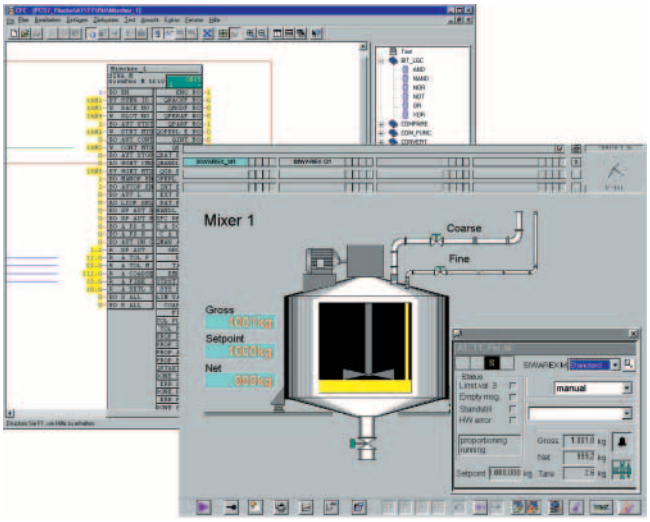
Scale faceplate of a loss-in-weight scale

The SIMATIC PCS 7 process control system is exactly the same 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.

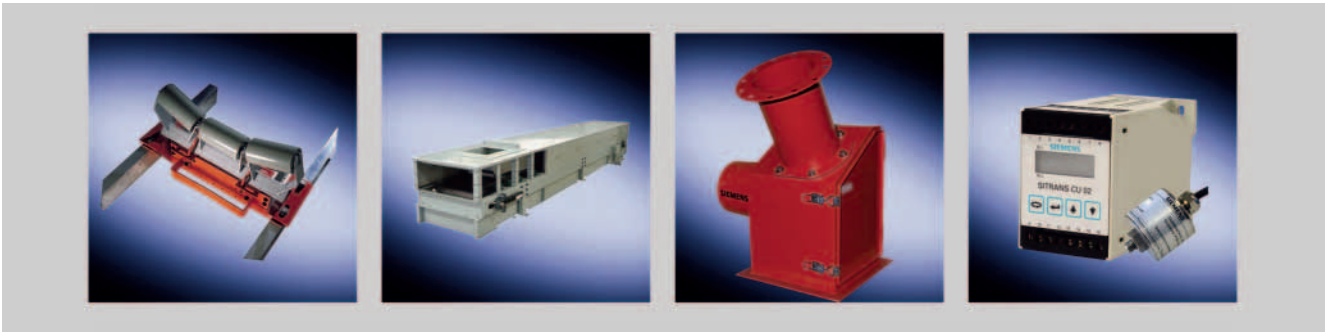


Scales displayed in the ES engineering system (on the left) and on the OS operator station (on the right)

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 SIWAREX MS for S7 200
Force and torque measurements	Rolling mills, monitoring of loads and belt tensions, overload protection, torque measurements	SIWAREX FTC (bidirectional) SIWAREX CF for ET 200S (bidirectional) SIWAREX MS for S7 200 (bidirectional)
Proportioning (intermittent)	Batching plants, batch processes, proportioning recipes, single-scale and multi-scale systems	SIWAREX FTA[1)] (OIML R-51)
Proportioning (continuous)	Batching plants, in continuous operation, proportioning recipes, single-scale and multi-scale systems	SIWAREX FTC (operating mode - loss-in-weight)
Filling, fast filling	Filling machines, weighing and sack filling machines, big bag	SIWAREX FTA[1)] (OIML R-61)
Loading, fast loading	Loading scales for receiving and load operations	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 measurement (continuous)	Bulk flow meter (baffle plate)	SIWAREX FTC (operating mode - flow meter)
Conveyor scale	Measurement of belt load, conveyed quantity, loading according to setpoint	SIWAREX FTC (operating mode - conveyor scale)
STEP 7 application software	SIWAREX "Getting started" for beginners SIWAREX MULTISCALE for batching plants, mixers SIWAREX MULTIFILL for filling/weighing and sack filling in multi-head plants	Ready-to-use STEP 7 software packages are available especially for applications based on SIWAREX FTA, SIWAREX FTC and SIWAREX CS.

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



Continuous weighing

The Milltronics line of continuous weighing products from Siemens is found in almost any industry that handles bulk materials. Siemens reliable, field-proven conveyor belt scales, weigh-feeders, solids flowmeters, and integrators are rugged – built for tough operating conditions in the aggregate, cement, and mining industries as well as the food and dry chemical industries. They are easy to install and maintain, and expert technical support is available if you need it.

Belt scales

Belt scales help maximize the use of raw materials, control inventories, and aid in the manufacturing of a consistent product. The system consists of a speed sensor that operates in conjunction with a conveyor belt scale, providing signals to a BW100 or BW500 integrator for calculation of belt speed, belt loading, rate, and totalized weight.

Weighfeeders

A weighfeeder system is a custom-engineered conveyor integrated with a belt weigh bridge and speed sensor. A variable speed drive, motor and gearbox allow the flow of material to be controlled by a given setpoint chosen in the BW500 integrator. This allows the feeder to provide precision weighing accuracies, and to improve blend consistencies, accountability, and record keeping. Weighfeeders are indispensable when automated production processes require continuous in-line weighing and feeding.

Solids flowmeters

Solids flowmeters enhance process control, improving the quality of the end product. The heavy-duty, low maintenance solids LVDT type flowmeters provide continuous in-line weighing of dry bulk solids, free-flowing powders, or granular material. An SF500 integrator completes the system processing a sensor signal into operating data for flow measurement.

Communication

SmartLinx modules provide direct digital connection to commonly used industrial communication buses (PROFIBUS DP, Allen-Bradley® Remote I/O, and DeviceNet™). Modbus® communication is built into the BW500 and SF500 integrators.

Modbus is a registered trademark of Schneider Electric.
Allen-Bradley is a registered trademark of Rockwell Automation.
DeviceNet is a trademark of Open DeviceNet Vendor Association.

Process protection

Process protection devices can be an early warning system to avoid costly process interruptions and breakdowns of equipment. Non-invasive acoustic sensors detect solids flow problems, blockages, screen faults, or burst filter bags immediately. Motion sensors detect changes in motion and speed of conveying, reciprocating and rotating machinery. Their rugged construction makes them impervious to dust, dirt, build-up, and moisture.

Acoustic sensors

The SITRANS AS100 acoustic sensor monitors flow/no flow or high/low flow conditions by detecting high frequency acoustic emissions generated by friction and impact of materials in motion. The SITRANS CU02 controller processes signals from the sensor, providing relay and analog outputs for interface into a process.

Motion sensors and speed switches

Non-contacting motion sensors and speed switches protect by detecting changes in motion and speed of rotating machinery. The Milltronics MFA 4p is used with MSP and XPP probes to provide adjustable alarm setpoint motion sensing even in hazardous, high temperature, and harsh conditions. Milltronics speed switches are used for zero speed and motion sensing, providing relay contacts or solid state switch outputs to PLCs.

Information on Continuous Weighing and Process Protection

More details on continuous weighing and process protection systems are available in the catalog “Continuous Weighing and Process Protection”, WT 02, in the electronic catalog CA 01 or on our web site at www.siemens.com/continuous-weighing.

Weighing electronics

2

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 the SIMATIC.

certified Quality see Appendix

Benefits

SIWAREX U offers the following key advantages:

- Uniform design technology and consistent communication in SIMATIC
- Use in distributed plant concept through connection via ET 200M
- Measurement of weight or force with a high resolution of 65000 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 gauge 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
- Measurement of load of conveyor belts
- Overload protection in industrial elevators and rolling mills
- Scales for potentially explosive areas (can be implemented by using an Ex interface)
- Monitoring of belt tension

Design

The SIWAREX U is a compact function module (FM) of the SIMATIC S7-300 and can be snapped directly onto the SIMATIC S7-300 or ET 200M backplane bus. Assembly and wiring are also greatly simplified by using rails with snap-on technology.

The load cells, the power supply and the serial interfaces are connected through the 20-pin standard front plug.

Operation of the SIWAREX U in SIMATIC means that complete integration of the weighing technology into the automation system is provided.

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 not only be integrated in the plant software using the classic PLC programming languages; STL (Statement List), LD (Ladder Diagram) SFC (Sequential Function Chart) or SCL (Structured Control Language), it can also be integrated by means of graphical configuration with CFCs (Continuous Function Chart), where faceplates are provided in PCS 7 for visualization of the scales.

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

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

The "SIWATOOL U" software uses the familiar Windows interface and can be used to set the 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 via an optional Ex interface.

Technical specifications

SIWAREX U	
Integration in automation systems:	
• 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 scales settings	Over SIMATIC (P bus) or PC using SIWATOOL U (RS 232)
Measuring properties	
• Error limit to DIN 1319-1 of full-scale value at 20 °C ± 10 K	0.05%
• Internal resolution ADC Data format of weight values	65535 2 byte (fixed-point)
Number of measurements/second	50
Digital filter	0.05 ... 5 Hz (in 7 steps), mean-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_s (rated value)	6 V DC[1]
• Max. supply current	≤ 150 mA per channel
• Permissible load impedance	
- R_{Lmin}	> 40 Ω per channel
- R_{Lmax}	< 4010 Ω
	With Ex(i) interface:
- R_{Lmin}	> 87 Ω per channel
- R_{Lmax}	< 4010 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 (see SIWAREX IS Manual)
Intrinsically-safe load cell powering	Optional (Ex interface) with SIWAREX IS
Supply voltage 24 V DC	
• Rated voltage	24 V DC
• Max. current consumption	150 mA (single-channel) / 240 mA (two-channel)
Voltage supply from backplane bus	≤ 100 mA
Certification	ATEX 95, FM, cUL_{US} Haz. Loc. (all available soon)
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
• Horizontal installation	0 ... +40 °C
EMC requirements according to	NAMUR NE21, Part 1 EN 61326

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

[2] Up to 1000 m possible under certain conditions, provided the recommended cable is used (see Accessories).

Selection and Ordering Data

		Order No.
SIWAREX U for SIMATIC S7 and ET 200M, incl. bus connector, weight 0.3 kg		
• Single-channel version for connecting one scale	A)	**7MH4950-1AA01 compatible with 7MH4601-1AA01[1]**
• Two-channel version for connecting two scales	A)	**7MH4950-2AA01 compatible with 7MH4601-1BA01[1]**
SIWAREX U Manual		
• available in a range of languages		
Free download on the Internet at: www.siemens.com/weighing-technology		
SIWAREX U configuration package[3] for SIMATIC S7 version 5.4 or higher		**7MH4950-1AK01 replaces 7MH4683-3AA63**
on CD-ROM		
• PC SIWATOOL U software (available in a range of languages), new design		
• Sample program "Getting started" – ready to use application for SIMATIC S7		
• SIWAREX U Manual on CD (in a range of languages), new design		
• HSP Hardware Support Package for integrating SIWAREX U in STEP 7		
SIWAREX U configuration package for PCS 7, version 6.x in German and English on CD-ROM, module for the CFC and faceplate		**7MH4683-3BA64**
SIWATOOL cable from SIWAREX U/CS with serial PC interface, for 9-pin PC interfaces (RS 232), 3 m long	A)	**7MH4607-8CA**

[1] Supply of load cells changed to 6 V DC.

A) Subject to export regulations AL: N, ECCN: EAR99H

2

SIWAREX U

	Order No.
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 connection terminal Contents: 2 units (suitable for cable with diameter 4 ... 13 mm) Note: one shield connection terminal each is required for: • Scale connection • RS 485 interface • RS 232 interface	**6ES7390-5CA00-0AA0**
S7 DIN rail	
• 160 mm	**6ES7390-1AB60-0AA0**
• 480 mm	**6ES7390-1AE80-0AA0**
• 530 mm	**6ES7390-1AF30-0AA0**
• 830 mm	**6ES7390-1AJ30-0AA0**
• 2000 mm	**6ES7390-1BC00-0AA0**
Accessories (optional)	
PS 307 load power supplies (only required if 24 V DC not available) 120/230 V AC; 24 V DC, incl. power connector	
PS 307-1B; 2 A	**6ES7307-1BA00-0AA0**
PS 307-1E; 5 A	**6ES7307-1EA00-0AA0**
PS 307-1K; 10 A	**6ES7307-1KA00-0AA0**
Labeling strips (10 units, spare part)	**6ES7392-2XX00-0AA0**
Remote displays (option) The digital remote displays can be connected directly to SIWAREX U through a TTY interface. The following remote displays can be used: S102, S302 *Siebert Industrieelektronik GmbH P.O. Box 1180 D-66565 Eppelborn Tel.: +49 6806/980-0 Fax: +49 6806/980-999 Internet: http://www.siebert.de* Detailed information available from manufacturer.	
SIWAREX JB junction box, aluminium housing for connecting up to 4 load cells in parallel, and for connecting several junction boxes	**7MH4710-1BA**
SIWAREX JB junction box, stainless steel housing for connecting up to 4 load cells in parallel	**7MH4710-1EA**

	Order No.
Ex interface, type SIWAREX Pi With UL and FM approvals, but **without ATEX approval** for intrinsically-safe connection of load cells, suitable for the SIWAREX U, CS, MS, FTA, FTC and M weighing modules. Not approved for use in the EU.	**7MH4710-5AA**
Manual for Ex interface type SIWAREX Pi	**C71000-T5974-C29**
SIWAREX IS Ex interface With ATEX approval, but **without UL and FM approvals**, for intrinsically-safe connection of load cells, including manual, suitable for the SIWAREX U, CS, MS, FTA, FTC, M 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)	
Cable Li2Y 1 x 2 x 0.75 ST + 2 x (2 x 0.34 ST) - CY, orange sheath to connect SIWAREX U, CS, MS, FTA, FTC, M 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 outer diameter, for ambient temperature -40 ... +80 °C	**7MH4702-8AG**
Cable Li2Y 1 x 2 x 0.75 ST + 2 x (2 x 0.34 ST) - CY, blue sheath to connect the junction box (JB) or extension box (EB) in a potentially explosive atmosphere to the Ex interface (Ex-I), for fixed laying, occasional bending permitted, blue PVC insulating sheath, approx. 10.8 mm outer diameter, for ambient temperature -40 ... +80 °C	**7MH4702-8AF**
Cable LiYCY 4 x 2 x 0.25 mm² A) for TTY (connect 2 pairs of conductors in parallel), for connection of a remote display	**7MH4407-8BD0**

A) Subject to export regulations AL: N, ECCN: EAR99H

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.

certified Quality see Appendix

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 65000 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 gauge 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 of industrial lifts and roll trains
- Weighing in potentially explosive areas (zone 2 direct, 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 into a terminal module. The power supply is connected through a power module and the internal power rail.

The load cells and the serial interfaces are connected through the terminals of the terminal module. Using the terminal module enables the module to be replaced without disconnecting the connecting 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.

The following tables show the accessible functions.

Communication in SIMATIC

	Supports the readout of data through peripherals	Supports the readout of data and settings using record communication
IM151-1 Basic	Yes	No
IM151-1 Standard	Yes	Yes
IM151-1 High Feature	Yes	Yes
IM151-7 CPU	Yes	Yes

Alarms in SIMATIC

	Group diagnostics	Process alarm
IM151-1 Basic	Yes	No
IM151-1 Standard	Yes	Yes
IM151-1 High Feature	Yes	Yes
IM151-7 CPU	Yes	Yes

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.

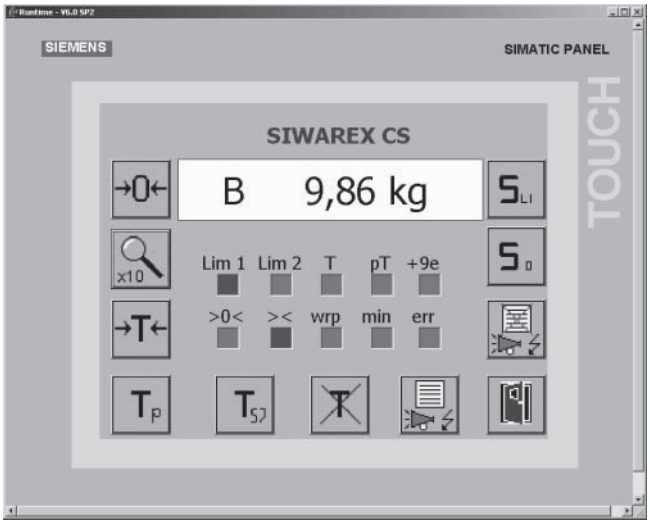
To parameterize the SIWAREX CS, a PC can be connected over the RS 232 interface.

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-of-charge and shows beginners how to integrate the module into a STEP 7 program and offers a basis for application programming. A SIWAREX CS scale can then be simply implemented in SIMATIC together with a touch panel (TP/OP/MP) as the 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	Through ET 200S
• IM151-7 CPU	Through backplane bus
• Automation systems from other manufacturers (available soon)	Through 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 scales settings	Using SIMATIC S7/C7 IM151-7 CPU or SIWATOOL CS PC parameterization software (RS 232)
Measuring properties	
• Error limit to DIN 1319-1 of full-scale value at 20 °C ± 10 K	0.05%
• Internal resolution Data format of weight values	65535 2 byte (fixed-point)
Number of measurements/second	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_s (rated value)	6 V DC typ.
• Max. supply current	≤ 68 mA
• Permissible load impedance	
- R_{Lmin}	> 87 Ω
- R_{Lmax}	< 4010 Ω
	With SIWAREX IS Ex interface:
- R_{Lmin}	> 87 Ω
- R_{Lmax}	< 4010 Ω
Load cell characteristic	1 mV/V ... 4 mV/V
Permissible range of measuring signal (at greatest set characteristic value)	-2,4 ... +26.4 mV
Max. distance of load cells	1000 m
Intrinsically-safe load cell powering	Optional (SIWAREX IS Ex interface)
External load cell powering	Possible up to 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.
Supply voltage 24 V DC	
• Rated voltage	24 V DC
• Max. current consumption	150 mA
IP degree of protection to EN 60529; IEC 60529	IP20
Climatic requirements	
$T_{min\ (IND)}$ to $T_{max\ (IND)}$) (operating temperature)	
• Vertical installation	-10 ... +60 °C
• Horizontal installation	-10 ... +40 °C
EMC requirements according to	EN 61326, EN 45501 NAMUR NE21, Part 1

Selection and Ordering Data

	Order No.
SIWAREX CS Weighing electronics for scales in SIMATIC ET 200S	**7MH4910-0AA01**
SIWAREX CS Manual • available in a range of languages Free download on the Internet at: www.siemens.com/weighing-technology	
SIWAREX CS "Getting started" Sample software shows beginners how to program the scales in STEP 7. Free download on the Internet at: www.siemens.com/weighing-technology	
Configuration package SIWAREX CS on CD-ROM for SIMATIC S7, version V5.4 or higher • Software for SIWATOOL CS scale adjustment (in a range of languages) • Manuals available on CD (in a range of languages) • SIWAREX CS "Getting started"	**7MH4910-0AK01**
SIWATOOL cable from SIWAREX U/CS with serial PC interface, for 9-pin PC interfaces (RS 232), 3 m long A)	**7MH4607-8CA**
Installation material (mandatory)	
Terminal module TM-E 30 mm wide (required for each SIWAREX module)	**6ES7193-4CG20-0AA0** **or compatible**
Shield contact element Contents 5 items, sufficient for 5 cables	**6ES7193-4GA00-0AA0**
Shield connection terminal Contents: 5 items, sufficient for 5 cables Note: one shield connection terminal is required each for the • scales connection and • TTY interface or • RS 232 interface	**6ES7193-4GB00-0AA0**
N busbar, galvanized 3 x 10 mm, 1.5 m long	**8WA2842**
Feeder terminal for N busbar	**8WA2868**

A) Subject to export regulations AL: N, ECCN: EAR99H

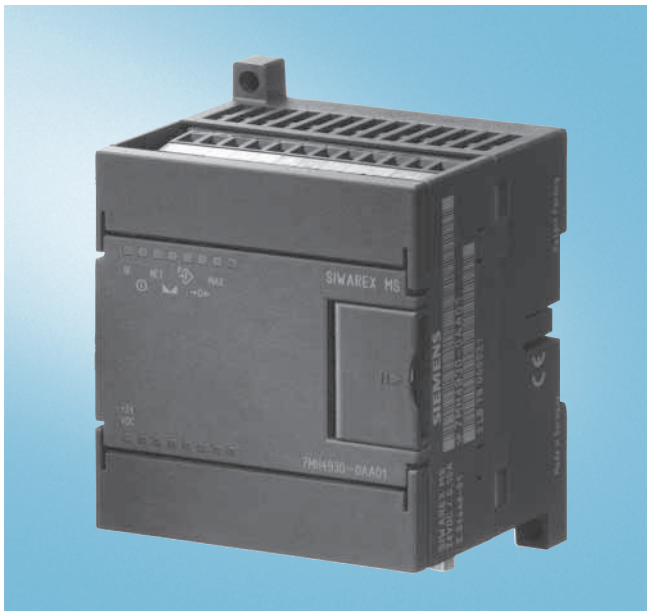
	Order No.
Remote displays (option) The digital remote displays can be connected directly to the SIWAREX CS through the TTY interface. The following remote display can be used: S102 *Siebert Industrieelektronik GmbH* *P.O. Box 1180* *D-66565 Eppelborn* *Tel.: +49 6806/980-0* *Fax: +49 6806/980-999* *Internet: http://www.siebert.de* Detailed information available from manufacturer.	
Accessories	
SIWAREX JB junction box, aluminium housing for connecting up to 4 load cells in parallel, and for connecting several junction boxes	**7MH4710-1BA**
SIWAREX JB junction box, stainless steel housing for connecting up to 4 load cells in parallel	**7MH4710-1EA**
Ex interface, type SIWAREX Pi With UL and FM approvals, but **without ATEX approval** for intrinsically-safe connection of load cells, suitable for the SIWAREX U, CS, MS, FTA, FTC and M weighing modules. Not approved for use in the EU.	**7MH4710-5AA**
Manual for Ex interface type SIWAREX Pi	**C71000-T5974-C29**
Ex interface, type SIWAREX IS 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, M 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**

SIWAREX CS

	Order No.
Cable (optional)	
Cable Li2Y 1 x 2 x 0.75 ST + 2 x (2 x 0.34 ST) - CY, orange sheath to connect SIWAREX U, CS, MS, FTA, FTC, M 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 outer diameter, for ambient temperature -40 ...+80 °C	**7MH4702-8AG**
Cable Li2Y 1 x 2 x 0.75 ST +2 x (2 x 0.34 ST) - CY, blue sheath to connect the junction box (JB) or extension box (EB) in a potentially explosive atmosphere to the Ex interface (Ex-I), for fixed laying, occasional bending permitted, blue PVC insulating sheath, approx. 10.8 mm outer diameter, for ambient temperature -40 ... +80 °C	**7MH4702-8AF**
Cable LiYCY 4 x 2 x 0.25 mm² A) for TTY (connect 2 pairs of conductors in parallel), for connection of a remote display	**7MH4407-8BD0**

A) Subject to export regulations AL: N, ECCN: EAR99H

Overview



SIWAREX MS weighing electronics

SIWAREX MS is a versatile weighing module for all simple weighing and force measuring tasks. The compact module is easy to install in the 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 65000 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 over Ex interface
- Supports direct connection of a remote display to TTY interface

Application

SIWAREX MS is the optimum solution wherever strain gauge 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
- Weighing in potentially explosive areas (zone 2 or zone 1 using Ex interface SIWAREX IS or Pi)
- Monitoring of belt tension
- Force measuring, weighing hoppers, platform scales and crane scales

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.

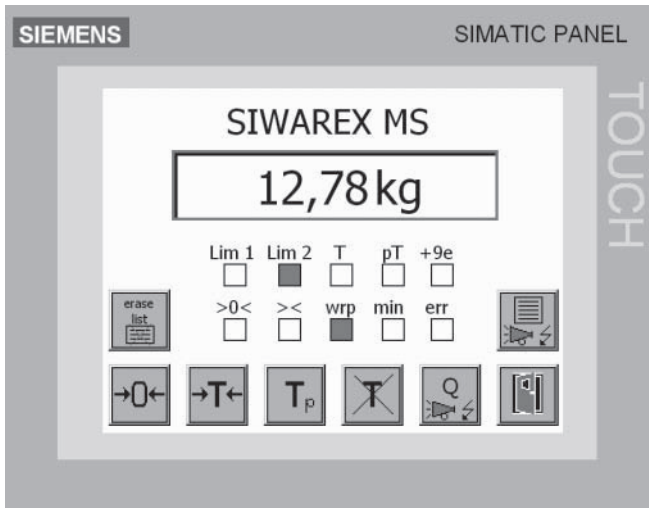
Consistent and uniform communication between all system components enables fast, reliable and cost-effective integration and diagnosis in industrial processes.

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 through 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 into the plant software over 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.



Scale faceplate in the SIWAREX MS software "Getting started"

In addition to the configuration package, the ready-to-use SIWAREX MS 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. A complete SIWAREX MS scale is then easy to implement in SIMATIC together with a touch panel (TP/OP/MP) as the operator panel. It is also used in the Micro Automation Set 6.

SIWAREX MS

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 weigh beams 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). It can also be used in zone 1 by implementing an optional Ex interface, although SIWAREX MS must be installed in a safe area. The following certification conditions must be observed.

Technical specifications

SIWAREX MS	
Integration in S7-200 automation systems	
• CPU 222 (6ES7212-1*B23-0XB0)	
• CPU 224 (6ES7214-1*D23-0XB0)	
• CPU 224XP (6ES7214-2*D23-0XB0)	
• CPU 226 (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 scales settings	Using PC parameterization software SIWATOOL MS (RS 232)
Measuring properties	
• Error limit to DIN 1319-1 of full-scale value at 20 °C ± 10 K	0.05%
• Internal resolution Data format of weight values	65535 2 byte (fixed-point)
Number of measurements/second	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_s (rated value)	6 V DC typ.
• Max. supply current	≤ 150 mA
• Permissible load impedance	
- R_{Lmin}	> 40 Ω
- R_{Lmax}	< 4010 Ω
	With SIWAREX IS Ex interface or SIWAREX Pi:
- R_{Lmin}	> 87 Ω
- R_{Lmax}	< 4010 Ω
Load cell characteristic	1 mV/V ... 4 mV/V
Permissible range of measuring signal (at greatest set characteristic value)	-2,4 ... +26.4 mV
Max. distance of load cells	500 m
Intrinsically-safe load cell powering	
Connection to load cells in Ex zone 1	Optionally over SIWAREX IS Ex interface or SIWAREX Pi:
Ex approvals and safety	CE, ATEX 95, FM, cUL_{US} Haz. Loc.
Supply voltage 24 V DC	
• Rated voltage	24 V DC
• Max. current consumption	130 mA
Supply voltage 5 V DC (from CPU)	
• Rated voltage	5 V DC
• Max. current consumption	145 mA
IP degree of protection to EN 60529; IEC 60529	IP20
Climatic requirements $T_{min\ (IND)}$ to $T_{max\ (IND)}$) (operating temperature)	
• Vertical installation	0 ... +55 °C
• Horizontal installation	0 ... +40 °C
EMC requirements according to	EN 61326, EN 45501 NAMUR NE21, Part 1

Selection and Ordering Data

	Order No.
SIWAREX MS Weighing electronics for scales in SIMATIC S7-200 for applications without obligation of verification	**7MH4930-0AA01**
SIWAREX MS Manual • available in a range of languages Free download on the Internet at: *www.siemens.com/weighing-technology*	
Configuration package SIWAREX MS on CD-ROM for STEP7 Micro/WIN, version 4.0 SP2 or higher • Software for SIWATOOL MS scale adjustment (in a range of languages) • Manuals available on CD (in a range of languages) • Micro/WIN Library MicroScale for communication with SIWAREX MS	**7MH4930-0AK01**
SIWAREX MS "Getting started" Sample software show beginners how to program the scales. Free download on the Internet at: *www.siemens.com/weighing-technology*	
SIWATOOL cable from SIWAREX M, FTA, FTC, MS with serial PC interface, for 9-pin PC interfaces (RS 232)	
• 2 m long	**7MH4702-8CA**
• 5 m long	**7MH4702-8CB**
Shield clamps for shield termination Pack of 10; 1 item required for each shielded cable	**6ES5728-8MA11**
Remote displays (option)	
The digital remote displays can be connected directly to the SIWAREX MS through the TTY interface. The following remote display can be used: S102 *Siebert Industrieelektronik GmbH* *P.O. Box 1180* *D-66565 Eppelborn* *Tel.: +49 6806/980-0* *Fax: +49 6806/980-999* Internet: *http://www.siebert.de* Detailed information available from manufacturer.	

	Order No.
Accessories	
SIWAREX JB junction box, aluminium housing for connecting up to 4 load cells in parallel, and for connecting several junction boxes	**7MH4710-1BA**
SIWAREX JB junction box, stainless steel housing for connecting up to 4 load cells in parallel	**7MH4710-1EA**
Ex interface, type SIWAREX Pi With UL and FM approvals, but **without ATEX approval** for intrinsically safe connection of load cells, suitable for weighing modules SIWAREX U, CS, MS, FTA, FTC and M. Not approved for use in the EU.	**7MH4710-5AA**
Manual for Ex interface type SIWAREX Pi	**C71000-T5974-C29**
Ex interface, type SIWAREX IS 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, M 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)	
Cable Li2Y 1 x 2 x 0.75 ST + 2 x (2 x 0.34 ST) - CY, orange sheath to connect SIWAREX U, CS, MS, FTA, FTC, M 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 outer diameter, for ambient temperature -40 ... +80 °C	**7MH4702-8AG**
Cable Li2Y 1 x 2 x 0.75 ST + 2 x (2 x 0.34 ST) - CY, blue sheath to connect the junction box (JB) or extension box (EB) in a potentially explosive atmosphere to the Ex interface (Ex-I), for fixed laying, occasional bending permitted, blue PVC insulating sheath, approx. 10.8 mm outer diameter, for ambient temperature -40 ... +80 °C	**7MH4702-8AF**
Cable LiYCY 4 x 2 x 0.25 mm² A) for TTY (connect 2 pairs of conductors in parallel), for connection of a remote display	**7MH4407-8BD0**

A) Subject to export regulations AL: N, ECCN: EAR99H

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SIWAREX FTA

Overview

SIWAREX FTA weighing module

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

It has been assigned appropriate scale approvals and is also suitable for calibration plants.

The SIWAREX FTA 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.

certified Quality see Appendix

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 via ET 200M
- Measurement of weight or force with high resolution of 16 million intervals
- High accuracy 3 x 6000 d, legal-for-trade
- Optimized measuring accuracy through use of METTLER TOLEDO weighing modules and Modulo WM and Modulo WMH weighing platforms
- Optimized measurement speed through use of Wipotec load cells
- Optional connection to PESA load cells
- 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 legal-for-trade 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

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

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

Operation of the SIWAREX FTA in SIMATIC means that complete integration of the weighing technology into the automation system is guaranteed.

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.

Weighing functions

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

The following weighing functions can be parameterized:

- Non Automatic Weighing Instrument according to OIML R76
- Automatic Gravimetric Filling Instrument according to OIML R61
- Automatic Catchweighing Instrument according to OIML R51
- 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.

Influencing of the weighing sequences by the PLC means that the SIWAREX FTA can be easily adapted to any modifications in system technology.

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

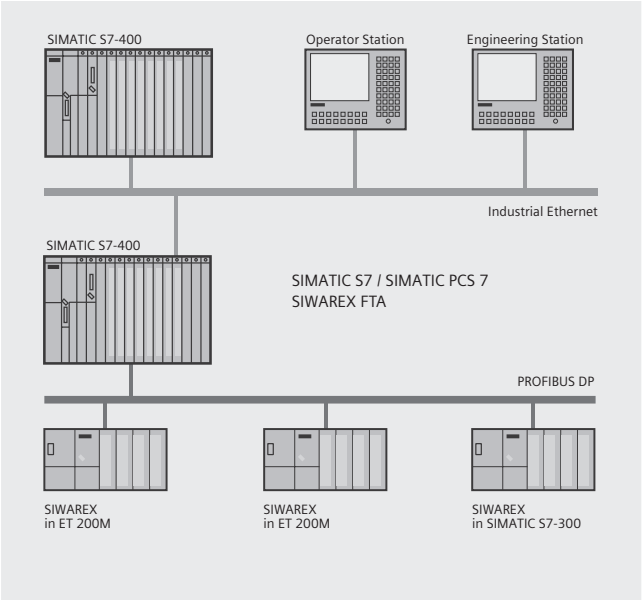
Integration in SIMATIC

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. These operator panels (also touch panels such as the TP177B) can also be simultaneously 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 following Figure shows a typical configuration of a medium-size plant.

The ready-to-use function blocks for the automation system and the faceplates for the operator station are used for the configuration in SIMATIC PCS 7.



SIMATIC S7/PCS 7 configuration with SIWAREX FTA

Software

SIWATOOL FTA commissioning software

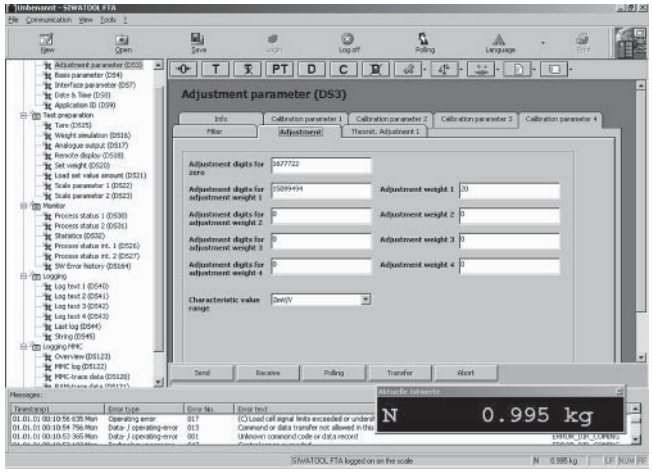
SIWATOOL FTA is a special program for commissioning and servicing and runs with Windows operating systems.

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

The following Figure shows the design of the individual program windows.



SIWATOOL FTA commissioning software

Fast advanced parameterization of the module can be carried out using the "Fast parameterization" function. Answering just a few questions approximately presets the parameters.

SIWAREX FTA

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 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.

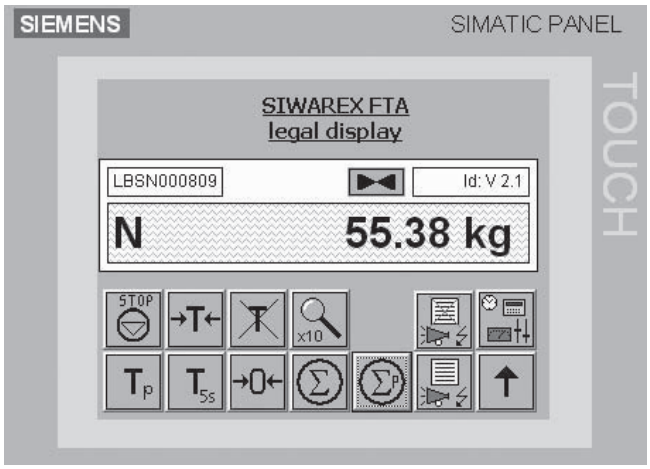
Reading out of weighing reports

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. If complaints are received concerning a particular weighing procedure, the associated data can be read out of the MMC using SIWATOOL.

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 into a STEP 7 program and offers a basis for application programming. A SIWAREX FTA scale can then be simply implemented in SIMATIC together with a touch panel (TP/OP/MP) as the 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	SIMATIC S7, RS 232, RS 485
Module parameterization	Using SIMATIC S7 Using SIWATOOL FTA software (RS 232)
Measuring properties	
• EU type approval as non-automatic weighing machine, trade class III	3 x 6000 d ≥ 0.5 µV/e
• Accuracy to DIN 1319-I by 2 mV/V and 4 mV/V	0.005%
• Internal resolution	16 million parts
• Internal/external updating rate	400/100 Hz
Several parameterizable digital filters	Critically dampened, Bessel, Butterworth (0.05 ... 20 Hz), mean-value filter
Weighing functions	
• Non-automatic weighing machine	OIML R76
• Automatic weighing machine	OIML R51, R61, R107
Load cells	Strain gages in 4-wire or 6-wire system
• 3 characteristic value ranges	1, 2 or 4 mV/V
Load cell powering	
• Supply voltage U_S (rated value)	10.3 V DC
• Max. supply current	184 mA
• Permissible load cell resistance	
- R_{Lmin}	> 56 Ω > 87 Ω with Ex interface
- R_{Lmax}	≤ 4010 Ω
Max. distance of load cells	
When using the recommended cable:	
• Standard	1000 m (500 m legal-for-trade)
• In hazardous area[1)]	
- For gases of group IIC	300 m
- For gases of group IIB	1000 m
Connection to load cells in Ex zone 1	Optionally via SIWAREX IS Ex interface
Ex approvals zone 2 and safety	ATEX 95, FM, cUL_{US} Haz. Loc.
Power supply	
• Rated voltage	24 V DC
• Max. current consumption	500 mA
• Current consumption from backplane bus	Typ. 55 mA
Inputs/outputs	
• Digital inputs	7 DI electrically isolated
• Digital outputs	8 DO electrically isolated
• Counter input	Up to 10 kHz
• Analog output	
- Current range	0/4 ... 20 mA
- Updating rate	100 Hz

Approvals	EU type approval (CE, OIML R76) EU prototype test to MID (OIML R51, R61, R107)
Degree of protection to DIN EN 60529; IEC 60529	IP20
Climatic requirements $T_{min\ (IND)}$ ... $T_{max\ (IND)}$ (operating temperature)	
• Vertical installation	-10 ... +60 °C
• Horizontal installation	-10 ... +40 °C
EMC requirements	EN 61326, EN 45501, NAMUR NE21, Part 1
Dimensions in mm	80 x 125 x 130
Weight	600 g

[1] For further details, see Ex interface, type SIWAREX IS

Selection and Ordering Data

	Order No.
SIWAREX FTA Legal-for-trade weighing electronics for automatic scales for S7-300 and ET 200M. EU type approval 3 x 6000 d Applications: proportioning, filling, bagging, loading. Note: Observe approval conditions for applications with obligation of verification. We recommend using our calibration set and contacting our SIWAREX hotline.	**7MH4900-2AA01**
SIWAREX FTA Manual • available in a range of languages Free download from the Internet at: *www.siemens.com/weighing-technology*	
SIWAREX FTA "Getting started" Sample software shows beginners how to program the scales in STEP 7. Free download from the Internet at: *www.siemens.com/weighing-technology*	
SIWAREX FTA configuration package for SIMATIC S7 on CD-ROM • SETUP for S7 link with Step 7 V5.2 or higher • SIWAREX FTA "Getting started" • SIWATOOL FTA commissioning software • Flexible software for legal-for-trade display in WinCC • Manual	**7MH4900-2AK01**
SIWAREX FTA configuration package for PCS 7 V6.x on CD-ROM • SETUP for S7 link • Function block for CFC • Faceplate • SIWATOOL FTA commissioning software • Manual	**7MH4900-2AK61**

	Order No.
Calibration set for SIWAREX FTA For verification of up to 5 scales comprising: • 3 x inscription foil for labeling • 1 x protection foil • 10 x EU verification marks (black M on green background) • Guidelines for verification, verification certificates and approvals, adaptable label, SIWAREX FTA Manual on CD-ROM	**7MH4900-2AY10**
SIWAREX Multiscale STEP 7 software for SIWAREX FTA. Control of one or more scales for a scalable number of components and any number of recipes. Applications: batching plants, mixers in production process, CD-ROM	**7MH4900-2AL01**
SIWAREX Multifill STEP 7 software for SIWAREX FTA. Control of filling and bagging processes for one or more filling stations and any number of materials, CD-ROM	**7MH4900-2AM01**
SIWATOOL cable from SIWAREX FTA with serial PC interface, for 9-pin PC interfaces (RS 232)	
• 2 m long	**7MH4702-8CA**
• 5 m long	**7MH4702-8CB**
40-pin front plug with screw contacts (required for each SIWAREX module), alternatively with spring-loaded contacts	**6ES7392-1AM00-0AA0**
40-pin front plug with spring-loaded contacts (required for each SIWAREX module), alternatively with screw contacts	**6ES7392-1BM01-0AA0**
Shield contact element Sufficient for one SIWAREX FTA module	**6ES7390-5AA00-0AA0**
Shield connection terminal Contents: 2 units (suitable for cable with diameter 4 ... 13 mm) Note: one shield connection terminal each is required for: • Scale connection • RS 485 interface • RS 232 interface	**6ES7390-5CA00-0AA0**
S7 DIN rail	
• 160 mm	**6ES7390-1AB60-0AA0**
• 480 mm	**6ES7390-1AE80-0AA0**
• 530 mm	**6ES7390-1AF30-0AA0**
• 830 mm	**6ES7390-1AJ30-0AA0**
• 2000 mm	**6ES7390-1BC00-0AA0**

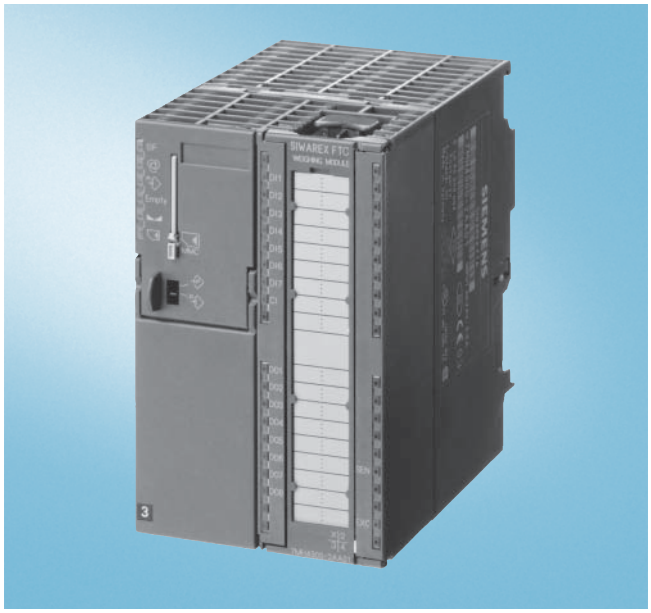
SIWAREX FTA

	Order No.
PS 307 load power supply (only required if DC 24 V is not available) 120/230 V AC; 24 V DC	
• PS 307-1B; 2 A	**6ES7307-1BA00-0AA0**
• PS 307-1E; 5 A	**6ES7307-1EA00-0AA0**
• PS 307-1K; 10 A	**6ES7307-1KA00-0AA0**
MMC memory for data recording up to 16 MB	**6ES7953-8LG11-0AA0**
Remote display (optional) The Siebert S102 and S302 remote digital display can be directly connected to the SIWAREX FTA via an RS 485 interface. Siebert Industrieelektronik GmbH P.O. Box 1180 D-66565 Eppelborn Tel.: +49 6806/980-0 Fax: +49 6806/980-999 Internet: http://www.siebert.de Detailed information available from manufacturer.	
SIWAREX JB junction box, aluminium housing for connecting up to 4 load cells in parallel, and for connecting several junction boxes	**7MH4710-1BA**
SIWAREX JB junction box, stainless steel housing for connecting up to 4 load cells in parallel	**7MH4710-1EA**
Ex interface, type SIWAREX Pi With UL and FM approvals, but **without ATEX approval** for intrinsically-safe connection of load cells, suitable for the SIWAREX U, CS, MS, FTA, FTC and M weighing modules. Not approved for use in the EU.	**7MH4710-5AA**
Manual for Ex interface type SIWAREX Pi	**C71000-T5974-C29**
Ex interface, type SIWAREX IS 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, M 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**

	Order No.
Cable (optional)	
Cable Li2Y 1 x 2 x 0.75 ST + 2 x (2 x 0.34 ST) - CY, orange sheath to connect SIWAREX U, CS, MS, FTA, FTC, M 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 outer diameter, for ambient temperature -40 ... +80 °C	**7MH4702-8AG**
Cable Li2Y 1 x 2 x 0.75 ST + 2 x (2 x 0.34 ST) - CY, blue sheath to connect the junction box (JB) or extension box (EB) in a potentially explosive atmosphere to the Ex interface (Ex-I), for fixed laying, occasional bending permitted, blue PVC insulating sheath, approx. 10.8 mm outer diameter, for ambient temperature -40 ... +80 °C	**7MH4702-8AF**
Cable LiYCY 4 x 2 x 0.25 mm² A) for TTY (connect 2 pairs of conductors in parallel), for connection of a remote display	**7MH4407-8BD0**

A) Subject to export regulations AL: N, ECCN: EAR99H

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 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 via ET 200M
- Measurement of weight or force with high resolution of 16 million intervals
- High accuracy 3 x 6000 d
- Optimized measuring accuracy through use of METTLER TOLEDO weighing modules and Modulo WM and Modulo WMH weighing platforms (specially for loss-in-weight scales and small mass flows)
- 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
- Flow rate control
- Belt load measurement

Design

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

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

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

Function

The main tasks of 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:

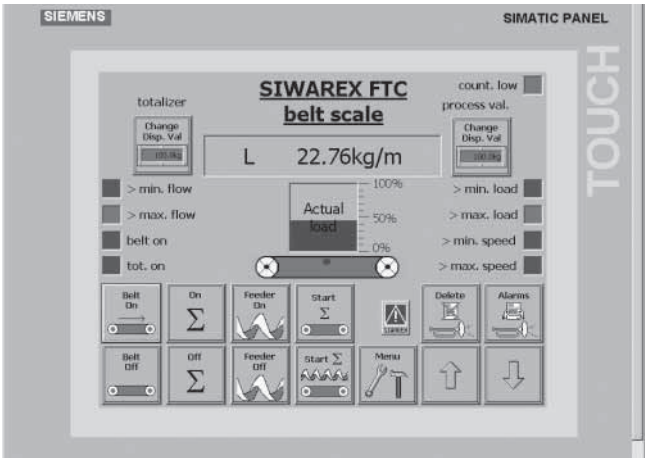
Weight measurement and force measurement

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

SIWAREX FTC

Belt scale

The functions of a conveyor scale are implemented in this operating mode. Calculations are performed for the typical process values; belt load, flow rate and belt speed. Commands can be used to control the belt and display the required values.



Scale faceplate of a belt 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 flowrate is regulated according to the preset setpoint.

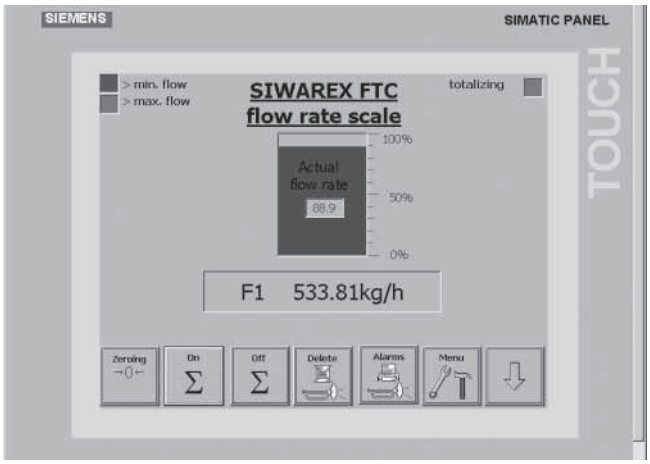
Application-specific parameters, such as proportioning parameters, device and material characteristics, can be set directly in SIWAREX FTC. Various commands are available that have been fine-tuned to the requirements of the loss-in-weight scale, such as proportioning (manual, automatic, gravimetric,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

Influencing of the weighing sequences by the PLC means that the SIWAREX FTC can be easily adapted to any modifications in system technology.

The SIWAREX FTC is already factory-calibrated. This means that the theoretical adjustment of the scale is possible without adjustment weights, and that modules can be replaced without readjustment of the scale. If "active bus modules" are used, modules can also be hot-swapped.

Applications of SIWAREX FTC

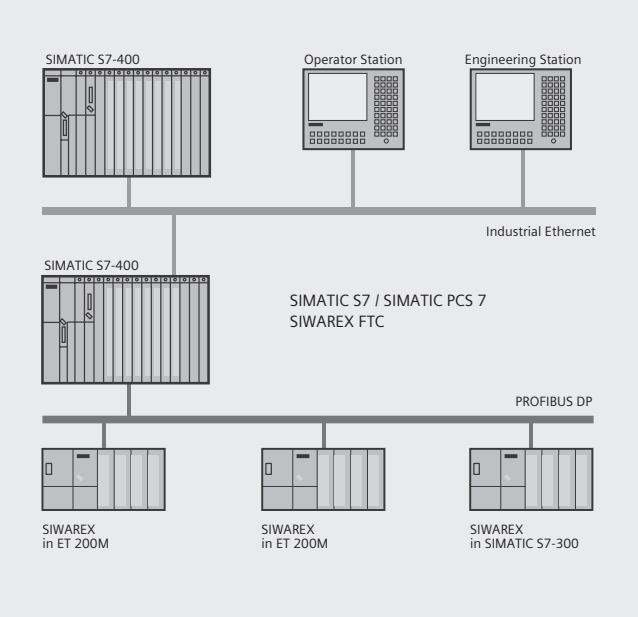
Integration in SIMATIC

SIWAREX FTC 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. These operator panels (also touch panels, such as the TP177B) can also be simultaneously 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 following Figure shows a typical configuration of a medium-size plant.

The ready-to-use function blocks for the automation system and the faceplates for the operator station are used for the configuration in SIMATIC PCS 7.



SIMATIC S7/PCS 7 configuration with SIWAREX FTC

Software

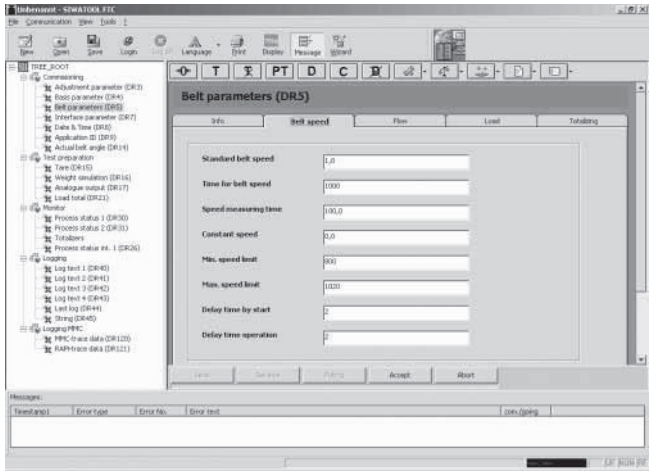
Adjustment of the scale using SIWATOOL FTC

SIWATOOL FTC is a special program for 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 checking of weighing sequences. The recorded weight values and associated statuses can be displayed as traces using SIWATOOL FTC and MS Excel.

Upgrading of firmware

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

Reading out of weighing reports

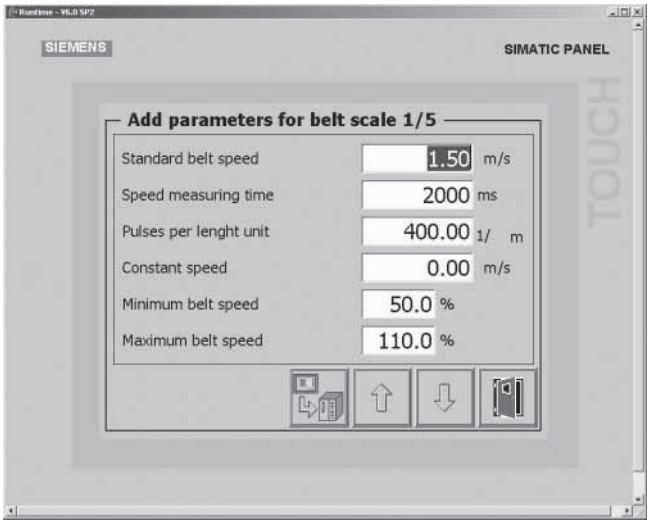
The totalization memories can be saved on a MMC (Micro Memory Card) inserted into the SIWAREX FTC.

SIWAREX FTC – simple configuring

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

In addition to the configuration package, the ready-to-use SIWAREX FTC software "Getting started" is also available free-of-charge for operating modes conveyor scales, bulk flow meters and loss-in-weight scales, and shows beginners how to integrate the module into a STEP 7 program and offers a basis for application programming. A SIWAREX FTC conveyor scale can then be easily implemented in SIMATIC together with a touch panel (TP/OP/MP) as the operator panel.

SIWAREX FTC



Scale faceplate in the SIWAREX FTC software "Getting started"

Technical specifications

SIWAREX FTC	
Use in automation systems	
• S7-300	Directly or via ET 200M
• S7-400 (H)	Via ET 200M
• PCS 7 (H)	Via ET 200M
Communications interfaces	SIMATIC S7, RS 232, RS 485
Module parameterization	Using SIMATIC S7 Using SIWATOOL FTC software (RS 232)
Measuring properties	
• Accuracy to EN 45501	3 x 6000 d ≥ 0.5 µV/e
• Accuracy to DIN 1319-I by 2 mV/V and 4 mV/V	0.005%
• Internal resolution	+/- 8 million parts
• Internal/external updating rate	400/100 Hz
Several parameterizable digital filters	Critically dampened, Bessel, Butterworth (0.05 ... 20 Hz), mean-value filter
Weighing functions	
• Non-automatic weighing machine, force measurement	
• Conveyor scale	
• Loss-in-weight scale	
• Bulk flow meter	
Load cells	Strain gages in 4-wire or 6-wire system
• 3 characteristic value ranges	1, 2 or 4 mV/V
Load cell powering	
• Supply voltage U_S (rated value)	10.3 V DC
• Max. supply current	184 mA
• Permissible load cell resistance	
- R_{Lmin}	> 56 Ω > 87 Ω with Ex interface
- R_{Lmax}	≤ 4010 Ω
Max. distance of load cells	
When using the recommended cable:	
• Standard	1000 m
• In hazardous area[1)]	
- For gases of group IIC	300 m
- For gases of group IIB	1000 m
Connection to load cells in Ex zone 1	Optionally via SIWAREX IS Ex interface
Ex approvals zone 2 and safety	ATEX 95, FM, cUL_{US} Haz. Loc.
Power supply	
• Rated voltage	24 V DC
• Max. current consumption	500 mA
• Current consumption from backplane bus	Typ. 55 mA
Inputs/outputs	
• Digital inputs	7 DI electrically isolated
• Digital outputs	8 DO electrically isolated
• Counter input	Up to 10 kHz
• Analog output	
- Current range	0/4 ... 20 mA
- Updating rate	100 Hz
Degree of protection to DIN EN 60529; IEC 60529	IP20
Climatic requirements	
$T_{min\ (IND)}$ ... $T_{max\ (IND)}$ (operating temperature)	
• Vertical installation	-10 ... +60 °C
• Horizontal installation	-10 ... +40 °C
EMC requirements	EN 61326, EN 45501, NAMUR NE21, Part 1
Dimensions in mm	80 x 125 x 130
Weight	600 g

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

Selection and Ordering Data

	Order No.
SIWAREX FTC Weighing electronics for S7-300 and ET 200M. Applications: Conveyor scales, force measurement, loss-in-weight scales and bulk flow meters	**7MH4900-3AA01**
SIWAREX FTC_B Manual for belt scales • available in a range of languages Free download from the Internet at: www.siemens.com/weighing-technology	
SIWAREX FTC_L Manual for bulk flow meters and loss-in-weight scales • available in a range of languages Free download from the Internet at: www.siemens.com/weighing-technology	
SIWAREX FTC "Getting started" for conveyor scales Sample software shows beginners how to program the scales in STEP 7 for conveyor scale mode Free download from the Internet at: www.siemens.com/weighing-technology	
SIWAREX FTC "Getting started" for bulk flow meters Sample software shows beginners how to program the scales in STEP 7 for bulk flow meter mode Free download from the Internet at: www.siemens.com/weighing-technology	
SIWAREX FTC "Getting started" for loss-in-weight scales Sample software shows beginners how to program the scales in STEP 7 for loss-in-weight scale mode Free download from the Internet at: www.siemens.com/weighing-technology	
SIWAREX FTC_B configuration package for SIMATIC S7 on CD-ROM • SETUP for S7 link with Step 7 V5.2 • "Getting started" for conveyor scales • Commissioning software SIWATOOL FTC_B for conveyor scales • Manual	**7MH4900-3AK01**
SIWAREX FTC_L configuration package for SIMATIC S7 on CD-ROM • SETUP for S7 link • "Getting started" for bulk flow meters • "Getting started" for loss-in-weight scales • Commissioning software SIWATOOL_L for bulk flow meters and loss-in-weight scales • Manual	**7MH4900-3AK02**
SIWAREX FTC_B configuration package for PCS 7 V6.x on CD-ROM • SETUP for S7 link • Function block for CFC • Faceplate • Commissioning software SIWATOOL FTC_B for conveyor scales • Manual	**7MH4900-3AK61**
SIWAREX FTC_L configuration package for PCS 7 V6.x on CD-ROM (available soon) • SETUP for S7 link • Function block for CFC • Faceplate • Commissioning software SIWATOOL FTC_L for bulk flow meters and loss-in-weight scales • Manual	**7MH4900-3AK62**
SIWATOOL cable from SIWAREX FTC with serial PC interface, for 9-pin PC interfaces (RS 232)	
• 2 m long	**7MH4702-8CA**
• 5 m long	**7MH4702-8CB**
40-pin front plug with screw contacts (required for each SIWAREX module), alternatively with spring-loaded contacts	**6ES7392-1AM00-0AA0**
40-pin front plug with spring-loaded contacts (required for each SIWAREX module), alternatively with screw contacts	**6ES7392-1BM01-0AA0**
Shield contact element Sufficient for one SIWAREX FTC module	**6ES7390-5AA00-0AA0**
Shield connection terminal Contents: 2 units (suitable for cable with diameter 4 ... 13 mm) Note: one shield connection terminal each is required for: • Scale connection • RS 485 interface • RS 232 interface	**6ES7390-5CA00-0AA0**

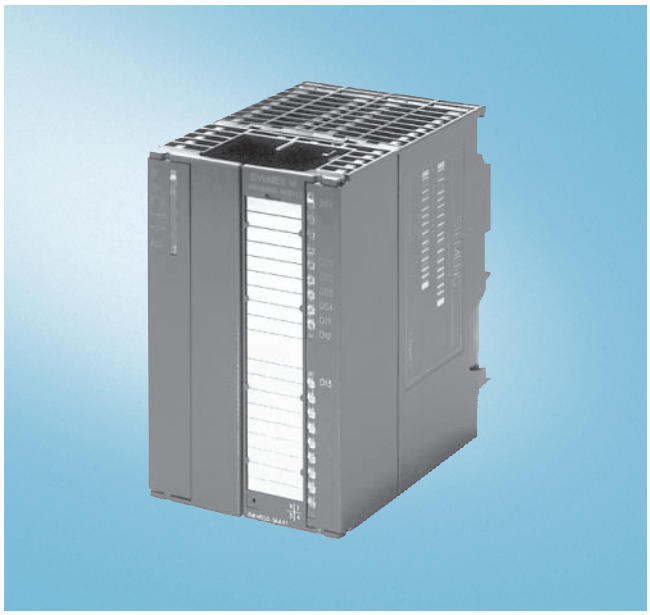
SIWAREX FTC

	Order No.
S7 DIN rail	
• 160 mm	**6ES7390-1AB60-0AA0**
• 480 mm	**6ES7390-1AE80-0AA0**
• 530 mm	**6ES7390-1AF30-0AA0**
• 830 mm	**6ES7390-1AJ30-0AA0**
• 2000 mm	**6ES7390-1BC00-0AA0**
PS 307 load power supply (only required if DC 24 V is not available)	
120/230 V AC; 24 V DC	
• PS 307-1B; 2 A	**6ES7307-1BA00-0AA0**
• PS 307-1E; 5 A	**6ES7307-1EA00-0AA0**
• PS 307-1K; 10 A	**6ES7307-1KA00-0AA0**
MMC memory for data recording up to 16 MB	**6ES7953-8LG11-0AA0**
Remote display (optional)	
The Siebert S102 and S302 remote digital display can be directly connected to the SIWAREX FTC via an RS 485 interface. (not suitable for mode "Conveyor scale")	
Siebert Industrieelektronik GmbH P.O. Box 1180 D-66565 Eppelborn Tel.: +49 6806/980-0 Fax: +49 6806/980-999 Internet: http://www.siebert.de	
Detailed information available from manufacturer.	
SIWAREX JB junction box, aluminium housing	**7MH4710-1BA**
for connecting up to 4 load cells in parallel, and for connecting several junction boxes	
SIWAREX JB junction box, stainless steel housing	**7MH4710-1EA**
for connecting up to 4 load cells in parallel	
Ex interface, type SIWAREX Pi	**7MH4710-5AA**
With UL and FM approvals, but **without ATEX approval** for intrinsically-safe connection of load cells, suitable for the SIWAREX U, CS, MS, FTA, FTC and M weighing modules. Not approved for use in the EU.	
Manual for Ex interface type SIWAREX Pi	**C71000-T5974-C29**
Ex interface, type SIWAREX IS	
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, M 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**

	Order No.
Cable (optional)	
Cable Li2Y 1 x 2 x 0.75 ST + 2 x (2 x 0.34 ST) - CY, orange sheath	**7MH4702-8AG**
to connect SIWAREX U, CS, MS, FTA, FTC, M 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 outer diameter, for ambient temperature -40 ... +80 °C	
Cable Li2Y 1 x 2 x 0.75 ST + 2 x (2 x 0.34 ST) - CY, blue sheath	**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 outer diameter, for ambient temperature -40 ... +80 °C	
Cable LiYCY 4 x 2 x 0.25 mm² A)	**7MH4407-8BD0**
for TTY (connect 2 pairs of conductors in parallel), for connection of a remote display	

A) Subject to export regulations AL: N, ECCN: EAR99H

Overview



Weighing electronics SIWAREX M

SIWAREX M is a legal-for-trade weighing module for exact weighing and proportioning, and can be used in SIMATIC automation systems without problem. The module controls the proportioning of individual setpoints independent of the cycle time of the automation system, and therefore achieves a high proportioning accuracy.

Benefits

SIWAREX M 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 via ET 200M
- Measurement of weight or force with high resolution of ± 524288 intervals
- High accuracy 6000 d, legal-for-trade
- User-definable inputs and outputs
- Flexible adaptation to different requirements with SIMATIC
- Simple adjustment of scale using the SIWATOOL M program
- Theoretical adjustment without adjustment weights
- Replacement of module without renewed adjustment of scale
- Intrinsically-safe load cell power powering for Ex zone 1 through Ex interface

Application

SIWAREX M is the optimum solution wherever weighing or proportioning have to be carried out at high accuracy. The following are typical SIWAREX M applications:

- Non-automatic weighing machines
- Exact fill level monitoring of silos and bunkers
- Single-component proportioning weigher
- Multi-component scales (with the SIWAREX Batch software)
- Weighing in potentially explosive areas (zone 1 using SIWAREX IS Ex interface)

Design

SIWAREX M is a compact function module (FM) of the SIMATIC S7-300 and can be snapped directly onto the SIMATIC S7-300 backplane bus. Direct integration into the automation system permits complete integration of weighing and proportioning functions into the SIMATIC S7-300. Furthermore, the weighing module can be connected to the PROFIBUS-DP via the ET 200M modular I/O device and operated as a distributed I/O on the SIMATIC S7 or SIMATIC C7.

The load cells are connected via the 20-pin front plug.

Function

The primary task of SIWAREX M is the measurement of sensor voltage and its conversion into a weight value. 2 interpolation points are used for the weight calculation. The signal can also be digitally filtered if required.

SIWAREX M monitors three user-definable limits (min./max.) and quickly signals any out-of-range values to the SIMATIC.

The SIWAREX M controls proportioning independent of the cycle time of the automation system. Functions such as coarse or fine proportioning, automatic reproportioning, with or without inching mode, and auto-optimization for the fine flow switch-off point, enable optimum proportioning accuracy.

The SIWAREX M 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 M has two serial interfaces. Digital remote displays can be connected to the TTY interface.

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

SIWAREX M 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). Graphical configuration is also possible with CFCs (Continuous Function Chart), where faceplates have been provided in PCS 7 for visualization of the scales.

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

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

Using the SIWATOOL M PC parameterization 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 wide range of SIWATOOL M diagnostic options ensure fast fault locating in online mode.

If connected to a remote legal-for-trade display/logging printer, the SIWAREX M can be operated as legal-for-trade within SIMATIC. The complete automation system does not require approval.

The SIWAREX M weighing module can be used for potentially explosive areas (zone 1) whereby an optional Ex interface must be used and SIWAREX M installed in a safe area.

SIWAREX M

Technical specifications

SIWAREX M	
Main applications	• Platform scales • Fill level (containers/bins) • Proportioning and batching scales • Legal-for-trade scales
Intrinsically-safe load cell powering	Optional (Ex-I)
Stand-alone (without SIMATIC)	Yes
Integration in:	
• S7-300	Direct integration
• S7-400	Via ET 200M
• PCS 7	Via ET 200M
• C7	Via IM or ET 200M
• TELEPERM M (AS 388/488/TM)	Via ET 200M
Communication interfaces	SIMATIC S7 (P bus) RS 232, TTY
Process interfaces	
• Digital inputs	3 (assignable)
• Digital outputs	4 (assignable)
• Analog output/analog input	Yes / No
Remote display connection (via serial interface)	Yes (legal-for-trade) Gross/net/setpoint Remote display with operator control
Printer connection	Yes (legal-for-trade)
Measuring properties	
• EU type approval for medium accuracy weighing machines Class III (certified as legal-for-trade)	6000 d
• Error limit to DIN 1319-1 of full-scale value at 20 °C ± 10 K	0.01%
• n_{ind} in acc. with EN 45501	6000
• Min. measuring signal Δu_{min} per d	0.5 µV
• Internal resolution	± 524288
• Data format for weight values	4 byte (fixed-point)
Number of measurements/second	50
Filter	Exponent filter: 0.05 ... 5 Hz Mean-value filter
Weighing functions	
• Weight values	Gross/net/tare
• Limit values	4 (min./max./empty/overfill)
• Scale standstill	Yes
• Zero setting function	Via command or automatically
Proportioning functions	• Control of coarse/fine flow valves • Tolerance monitoring • Material flow monitoring • Autom. proportioning optimization • Autom. reproportioning • Inching mode
Module parameterization	Via SIMATIC S7/C7 or SIWATOOL M PC parameterization software
UL/CSA/FM certification	Yes
IP degree of protection to DIN EN 60529; IEC 60529	In S7 frame: IP20 Stand-alone: IP10

Load cell powering	
• Supply voltage U_s (rated value)	10.2 V DC
• Max. supply current	≤ 180 mA
• Permissible load resistance:	
- R_{Lmin}	> 60 Ω
- R_{Lmax}	< 4010 Ω
	With Ex(i) interface:
- R_{Lmin}	> 87 Ω
- R_{Lmax}	< 4010 Ω
Permissible load cell characteristic	Up to 4 mV/V
Permissible range of measuring signal (at greatest set characteristic value)	-41,5 ... 41.5 mV
Max. distance of load cells	1000 m (300 m in Ex area[1])
Supply voltage 24 V DC	
• Rated voltage	24 V DC
• Max. current consumption	300 mA
Voltage supply from backplane bus	typ. 50 mA
Serial port 1	RS 232:
• Baud rate	2400/9600 baud
• Parity	Even/odd
• No. of data bits/stop bits	8/1
• Signal level	In acc. with EIA-RS 232
• Protocols	SIWAREX protocol 3964R XON/XOFF (printer)[2]
Serial port 2	TTY:
• Baud rate	9600 baud
• Parity	straight
• No. of data bits/stop bits	8/1
• Signal level	Active/passive (floating)
• Protocols	Remote display protocol SIWAREX protocol 3964R
Binary inputs	Number: 3 Rated voltage: 24 V Switching frequency: 10 Hz
Binary outputs	Number: 4 (digital) Rated voltage: 24 V Rated current: 0.5 A Total max.: 1 A Electrical isolation: 500 V
Analog output	
• Output range	0/4 ... 20 mA
• Total error at 25 °C	0.15%
• Updating rate	Approx. 350 ms
• Resolution	16 bits (0 ... 20 mA)
• Burden including line resistance	≤ 600 Ω
Climatic requirements	
$T_{min(IND)}$ ... $T_{max(IND)}$ (operating temperature)	
• Vertical installation	-10 ... +60 °C
• Horizontal installation/certified legal-for-trade	-10 ... +40 °C
MTBF (SN 29500)	172000 h at +40 °C

[1] Up to 1000 m, depending on the gas group.

[2] Serial printer, ANSI-, EPSON-, IBM-compatible

Selection and Ordering Data

	Order No.
SIWAREX M Medium accuracy weighing machine Class III, 6000 d, for the SIMATIC S7 and ET 200M, incl. bus connector, weight 0.6 kg Note: Observe approval conditions for applications with obligation of verification. We recommend that you contact the SIWAREX hotline.	**7MH4553-1AA41**
SIWAREX M Manual • available in a range of languages Free download on the Internet at: *www.siemens.com/weighing-technology*	
SIWAREX M configuration package for SIMATIC S7 version 5.1 or higher available in German and English on CD-ROM • SIWATOOL PC parameterization software • SIMATIC S7 function blocks • SIWAREX M Manual on CD • Setup for incorporation of SIWAREX M into STEP 7	**7MH4583-3FA63**
SIWAREX M configuration package for PCS 7, version 5.2 available in German and English on CD-ROM Block for the CFC and faceplate	**7MH4583-3EA63**
SIWAREX M configuration package for PCS 7, version 6.x available in German and English on CD-ROM Block for the CFC and faceplate	**7MH4583-3EA64**
SIWAREX Batch Recipe control for proportioning processes with SIWAREX M modules • STEP 7 program for SIMATIC S7 (CPU 314 or better) • Example programs for GUI for OP7 and OP27 (configuration with ProTool) • Documentation in German and English	**7MH4553-4GS01**
SIWAREX Batch secondary license Connection of SIWAREX M to serial PC interface for 9-pin PC interface • 2 m long • 5 m long	**7MH4583-4KL01** **7MH4702-8CA** **7MH4702-8CB**

	Order No.
Installation material (mandatory)	
Front connector for SIWAREX M 20-pin, with screw contacts (required for each SIWAREX module)	**6ES7392-1AJ00-0AA0**
Shield contact element One shield contact element is sufficient for one SIWAREX M module	**6ES7390-5AA00-0AA0**
Shield connection terminal Contents: 2 units (suitable for 1 cable with diameter 4 ... 13 mm) **Note:** one shield connection terminal is required each for the • Scale connection • TTY interface • RS 232 interface • Analog output • Digital inputs/outputs	**6ES7390-5CA00-0AA0**
S7 DIN rail	
• 160 mm	**6ES7390-1AB60-0AA0**
• 480 mm	**6ES7390-1AE80-0AA0**
• 530 mm	**6ES7390-1AF30-0AA0**
• 830 mm	**6ES7390-1AJ30-0AA0**
• 2000 mm	**6ES7390-1BC00-0AA0**
Accessories (optional)	
PS 307 load power supplies 120/230 V AC; 24 V DC, incl. power connector	
PS 307-1B; 2 A	**6ES7307-1BA00-0AA0**
PS 307-1E; 5 A	**6ES7307-1EA00-0AA0**
PS 307-1K; 10 A	**6ES7307-1KA00-0AA0**
Labeling strips (10 units, spare part)	**6ES7392-2XX00-0AA0**
Cables and connectors (optional)	
Sub-D connector, 9-pin (female) Quantity: 1 unit, for PC interface (RS 232)	**6ES5750-2AB11**
Sub-D connector, 9-pin (male) Quantity: 1 unit, for RS 232 interface of SIWAREX M	**6ES5750-2AA11**
Sub-D connector, 15-pin (male) Quantity: 1 unit, for TTY interface of SIWAREX M	**6ES5750-2AA21**
Sub-D connector, 25-pin (male) • Quantity: 1 unit, for printer interface (RS 232)	**6ES5750-2AA31**
Sub-D connector, 25-pin (female) • Quantity: 1 unit, for PC interface (RS 232)	**6ES5750-2AB31**
Cable LiYCY 4 x 2 x 0.25 mm² for TTY or RS 232 interface	**7MH4407-8BD0**

SIWAREX M

	Order No.
Remote displays (option)	
Remote displays The digital remote displays can be connected directly to SIWAREX M through a TTY interface. The following remote displays can be used: S102 and S302 *Siebert Industrieelektronik GmbH* *P.O. Box 1180* *D-66565 Eppelborn* *Tel.: +49 6806/980-0* *Fax: +49 6806/980-999* *Internet: http://www.siebert.de* Detailed information available from manufacturer. Accessories for remote displays	
Legal-for-trade memory The OmniScale legal-for-trade memory can be connected to the SIWAREX M instead of the printer. There are 2 device versions: • for mounting rails - Horizontal, part number 522 201 - Vertical, part number 522 202 CSM GmbH Raiffeisenstr. 34 D-70794 Filderstadt Tel.:+49 711/77964-20 Fax: +49 711/77964-40 Internet: http://www.csm.de Detailed information available from manufacturer.	
Printers (optional)	
T 2240/24 printer Needle matrix printer, 24 needles, DIN A4 and continuous form Note: An RS 232 interface must also be ordered separately.	**6GF6520-1LM**
RS 232 interface for T 2240/24 See Catalog ST PC for further printers	**6GF6520-2HA**
Printer accessories	
Connection of SIWAREX M to serial printer interface (RS 232, 25-pin) • 5 m long • 10 m long	**7MH4702-8CH** **7MH4702-8CK**
Accessories for SIWAREX M	
SIWAREX JB junction box, aluminium housing for connecting up to 4 load cells in parallel, and for connecting several junction boxes	**7MH4710-1BA**
SIWAREX JB junction box, stainless steel housing for connecting up to 4 load cells in parallel	**7MH4710-1EA**

	Order No.
Ex interface, type SIWAREX Pi With UL and FM approvals, but **without ATEX approval**, for intrinsically-safe connection of load cells, suitable for the SIWAREX U, CS, MS, FTA, FTC, M and CF weighing modules. Not approved for use in the EU.	**7MH4710-5AA**
Manual for Ex interface type SIWAREX Pi	**C71000-T5974-C29**
SIWAREX IS Ex interface With ATEX approval, but **without UL and FM approvals**, for intrinsically-safe connection of load cells, including manual, suitable for the SIWAREX U, CS, MS, FTA, FTC, M 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)	
Cable Li2Y 1 x 2 x 0.75 ST + 2 x (2 x 0.34 ST) - CY, orange sheath to connect SIWAREX U, CS, MS, FTA, FTC, M 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 outer diameter, for ambient temperature -40 ... +80 °C	**7MH4702-8AG**
Cable Li2Y 1 x 2 x 0.75 ST + 2 x (2 x 0.34 ST) - CY, blue sheath to connect the junction box (JB) or extension box (EB) in a potentially explosive atmosphere to the Ex interface (Ex-I), for fixed laying, occasional bending permitted, blue PVC insulating sheath, approx. 10.8 mm outer diameter, for ambient temperature -40 ... +80 °C	**7MH4702-8AF**
Cable LiYCY 4 x 2 x 0.25 mm² A) for TTY (connect 2 pairs of conductors in parallel), for connection of a remote display	**7MH4407-8BD0**

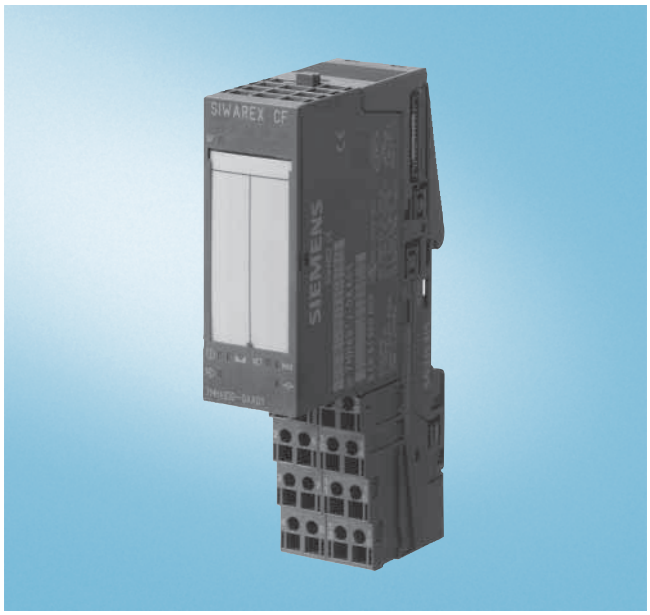
A) Subject to export regulations AL: N, ECCN: EAR99H

Force measurement

3

SIWAREX CF

Overview



SIWAREX CF force transmitter

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 or PROFINET via ET 200S
- Bidirectional measuring with a resolution of 16000 parts and accuracy of 0.15%

Application

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

- Monitoring of crane and cable loads
- Measurement of load of conveyor belts
- Overload protection in rolling mills
- Monitoring of belt tension
- Force measurement in testing machines
- Torque and pressure measuring

Design

SIWAREX CF is a compact function module (FM) of the SIMATIC S7 and can be snapped direct onto the SIMATIC ET 200S backplane bus. Assembly and wiring are also greatly simplified by using rails with snap-on technology.

The sensors and the power supply are connected via the standard connection block.

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.

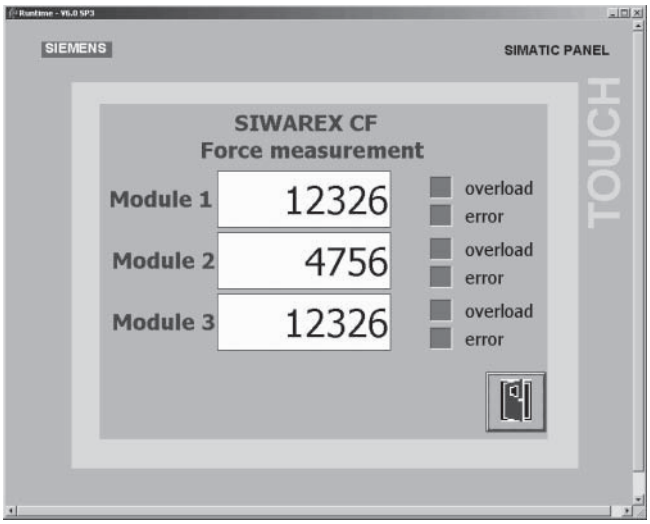
The signal is amplified, coarse-filtered, and then converted to a digital value. A connectable digital filter can additionally reduce noise on the measuring signal.

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 through averaging in the SIMATIC CPU or perform a conversion 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

In contrast to analog or digitally connected transmitters, SIWAREX M 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.

Technical specifications

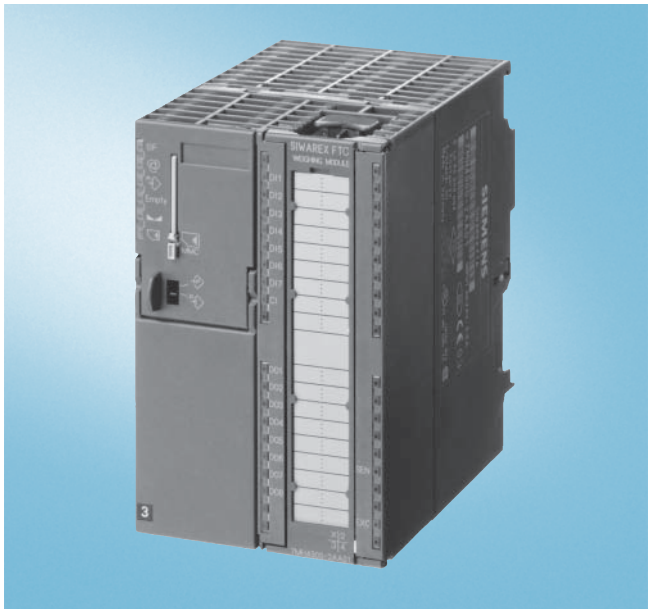
SIWAREX CF	
Integration in automation systems	
• S7-400, S7-300, C7	Through ET 200S
• Automation systems from other vendors	Possible through ET 200S with IM 151-1
Communication interfaces	SIMATIC S7 (ET 200S backplane bus), 8 bytes, I/O area
Module parameterization	Not required (module is pre-parameterized)
Measuring properties	
• Error limit to DIN 1319-1 of full-scale value at 20 °C ± 10 K	≤ 0.15%
• Signal resolution	14 bits plus 1 bit sign
Number of measurements/second	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}	< 4010 Ω
Permissible sensor cell coefficient	Up to 4 mV/V
Permissible range of the measuring signal	-25,2 ... +25.2 mV
Supply voltage 24 V DC	
• Rated voltage	24 V DC
• Max. current consumption	150 mA
Voltage supply from backplane bus	Typ. 10 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 $T_{min\ (IND)}$ to $T_{max\ (IND)}$ (operating temperature)	
• Vertical installation	0 ... +60 °C
• Horizontal installation	0 ... +40 °C
EMC requirements according to	NAMUR NE21, Part 1 89/386/EEC

Selection and Ordering Data

	Order No.
SIWAREX CF Weighing module for strain-gauge sensors in SIMATIC ET 200S (SIWAREX CF configuring package not required)	**7MH4920-0AA01**
SIWAREX CF manual • German, English Free download on the Internet at: *www.siemens.com/weighing-technology*	
SIWAREX CF "Getting started" Sample software for easy acquaintance with programming in STEP 7. Free download on the Internet at: *www.siemens.com/weighing-technology*	
Installation material (mandatory)	
Terminal module TM-E 30 mm wide (required for each SIWAREX module)	**6ES7193-4CG20-0AA0** **or compatible**
Shield contact element Contents 5 items, sufficient for 5 cables	**6ES7193-4GA00-0AA0**
Shield connection terminal Contents: 5 items, sufficient for 5 cables One shield terminal element is required per sensor cable	**6ES7193-4GB00-0AA0**
N busbar, galvanized 3 x 10 mm, 1.5 m long	**8WA2842**
Feeder terminal for N busbar	**8WA2868**
Accessories	
SIWAREX EB extension box for extending sensor cables	**7MH4710-2AA**
SIWAREX IS Ex interface With ATEX approval, but **without UL and FM approvals**, for intrinsically-safe connection of load cells, including Manual, suitable for the SIWAREX U, CS, MS, FTA, FTC and M 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)	
Cable Li2Y 1 x 2 x 0.75 ST + 2 x (2 x 0.34 ST) - CY, orange sheath to connect SIWAREX U, CS, MS, FTA, FTC, M 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 outer diameter, for ambient temperature -40 ... +80 °C	**7MH4702-8AG**

SIWAREX FTC

Overview



The SIWAREX FTC (Flexible Technology for Continuous Weighing) can be flexibly used for a wide variety of purposes in complex weighing tasks. The SIWAREX FTC module becomes a force measurement module by simply setting the operating mode. 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 via ET 200M
- Bidirectional force measurement with ± 8 million parts at a measuring rate of 100 measurement per second
- Display with SIMATIC standard operator panels
- User-definable 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

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

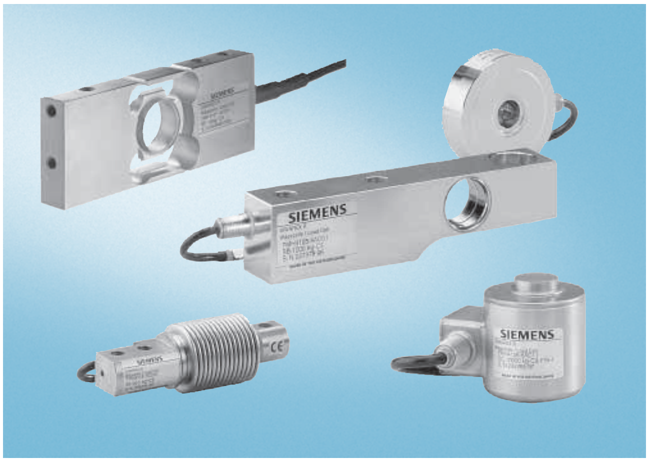
A more detailed description and additional technical specifications on SIWAREX FTC can be found under "Weighing electronics", page 2/17.

Load cells

4

Introduction to load cells

Overview



SIWAREX R load cells are equipped with strain gauges. They are used for static and dynamic weight measurements.

The range of SIWAREX R load cells covers rated loads from 6 kg to 280 t.

The variety of modules available and their outstanding characteristics, including

- the use of stainless steel components to provide a high degree of corrosion protection (not with K series),
- hermetically sealed housing to permit use even in harsh and aggressive environments (not with K series) and
- compact modules for easy installation,

make SIWAREX R load cells suitable for virtually all applications in industrial weighing, e.g. container and hopper scales, platform scales, vehicle scales, hybrid scales etc.

All series with the exception of the K series have been approved for use with Class III commercial scales requiring verification in accordance with DIN EN 45501 and conform to OIML R60 C3.

Load cells can also be supplied for other rated loads, higher accuracy, and/or with Ex protection.

Series	SP	BB	SB	RN			CC		K
Possible applications	Small platform scales	Container, conveyor and platform scales	Container, conveyor, overhead rail and platform scales	Container, conveyor, platform and roller table scales			Container, hopper and vehicle scales		Container and hopper scales
Design	Single point	Bending beam	Shear beam	Bending ring			Multiple posts		Single posts
Rated load (E_{max})	6 kg, 12 kg	10 ... 350 kg	0,5 ... 5 t	60 ... 280 kg	0,5 ... 10 t	13 ... 60 t	10 ... 60 t	100 t	2,8 ... 280 t
Accuracy class	C3 [1]	C3 [1]	C3 [1]	C3 [1]	C3 [1]	C3 [1]	C3 [1]	C1 [1]	0,1 %
Max. scale interval (n)	3000	3000	3000	3000	3000	3000	3000	1000	-
Min. scale interval (V_{min})	E_{max}/12000	E_{max}/15000	E_{max}/10000	E_{max}/17500	E_{max}/10000	E_{max}/17500	E_{max}/12500	E_{max}/10000	-
Supply voltage (U_{sr})	5 ... 15 V	5 ... 15 V	5 ... 18 V	5 ... 30 V	5 ... 30 V	5 ... 30 V	5 ... 25 V	5 ... 25 V	6 ... 12 V
Rated characteristic value	2 mV/V	2 mV/V	2 mV/V	1 mV/V	2 mV/V	2 mV/V	2 mV/V	2 mV/V	1.5 mV/V
Degree of protection [2]	IP66/IP68	IP66/IP68	IP66/IP68	IP66/IP68	IP66/IP68	IP66/IP68	IP66/IP68	IP66/IP68	IP65
Material	Stainless steel	Stainless steel	Stainless steel	Stainless steel	Stainless steel	Stainless steel	Stainless steel	Stainless steel	Steel, painted
Ex protection to ATEX (optional)	II 2 G EEx ib IIC T6/T4 II 3 G EEx nA/nL IIC T6/T4 II 1D/2D/3D T 70 °C	III 2 G EEx ib IIC T6/T4 II 3 G EEx nA/nL IIC T6/T4 II 1D/2D/3D T 70 °C	II 2 G EEx ib IIC T6/T4 II 3 G EEx nA/nL IIC T6/T4 II 1D/2D/3D T 70 °C	II 2 G EEx ib IIC T6/T4 II 3 G EEx nA/nL IIC T6/T4 II 1D/2D/3D T 70 °C	II 2 G EEx ib IIC T6/T4 II 3 G EEx nA/nL IIC T6/T4 II 1D/2D/3D T 70 °C	II 2 G EEx ib IIC T6/T4 II 3 G EEx nA/nL IIC T6/T4 II 1D/2D/3D T 70 °C	II 2 G EEx ib IIC T6/T4 II 3 G EEx nA/nL IIC T6/T4 II 1D/2D/3D T 70 °C	II 2 G EEx ib IIC T6/T4 II 3 G EEx nA/nL IIC T6/T4 II 1D/2D/3D T 70 °C	-

[1] According to OIML R60
[2] According to DIN EN 60529, IEC 60529

Introduction to load cells

Design

Load cells are sensors that convert a mechanical variable (i.e. weight) into an electrical signal.

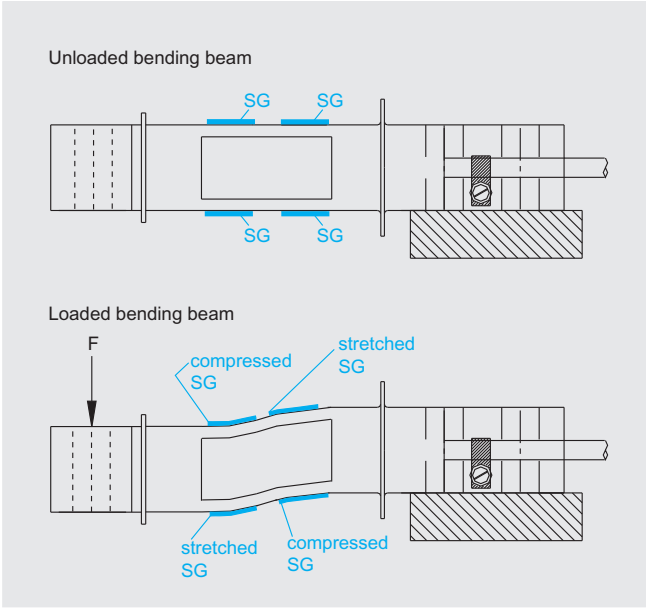
The basic element is a special type of spring body to which friction-locked strain gauges are attached. Strain gauges are made of thin insulation material in which a resistance film has been integrated.

Under the influence of a weight force F, the spring body is deformed (see schematic presentation) and as a result the strain gauge deforms elastically. Due to the change in the external shape of the strain gauge, the ohmic resistance of its conductor also changes. The top left and bottom right strain gauges are compressed, their resistance films are shortened and the ohmic resistance is reduced accordingly. The top right and bottom left strain gauges are stretched, their resistance films are extended and the ohmic resistance is increased.

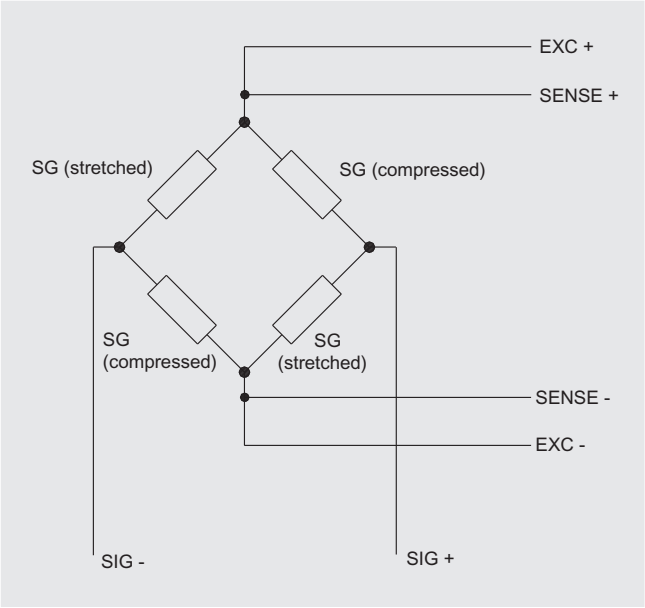
For each load cell, at least 4 strain gauges are connected together to form a complete Wheatstone bridge. The stretched or compressed strain gauges are connected so that the positive or negative resistance changes are added together to form a total imbalance in the bridge.

On one bridge diagonal, the power voltage is applied (with 6-conductor technique, also the sensor voltage, SENSE) and on the other diagonal, the measured voltage is tapped.

With a constant power voltage (EXC), the measured voltage (SIG) changes proportionally to the introduced load.



Principle of a bending load cell

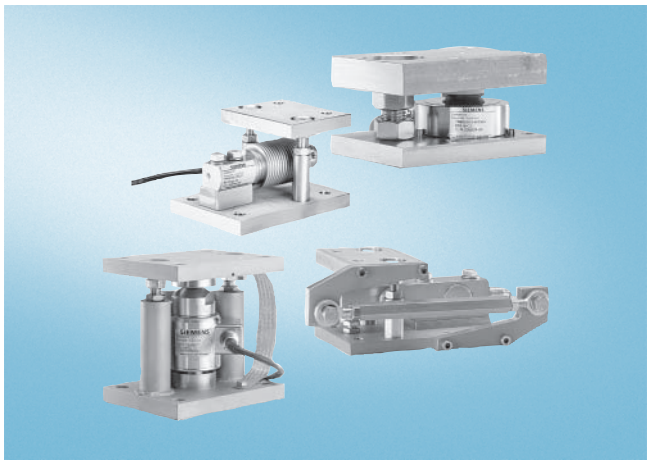


Principle of a Wheatstone bridge

4

Introduction to mounting components

Overview



Standardized SIWAREX R mounting components are always precisely adapted to the requirements of the individual load cell series. This ensures that the force to be measured is directed to the load cells in the best possible way.

Since use of SIWAREX R mounting accessories prevents incorrect loading of the load cells (e.g. eccentric load transfer, torsional torques etc.), the measuring accuracy of the load cells can be fully utilized.

The wide variety of mounting components permits all primary applications of industrial weighing technology to be implemented. In addition to the mounting components already mentioned, a wide range of special accessories is available for special requirements.

Self-aligning bearing for load cells of the RN series

Design

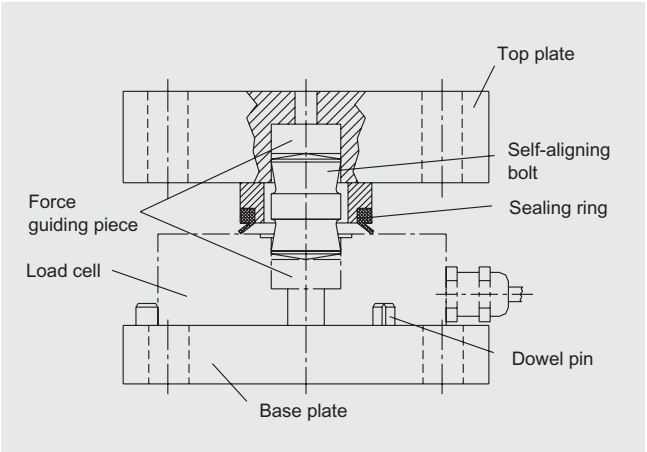
The self-aligning bearing consists of a self-aligning bolt, a top plate (top of the self-aligning bearing) and a base plate (bottom of the self-aligning bearing).

The self-centering, self-aligning bolt allows the top plate and thus the load carrier to follow horizontal displacements (e.g. due to temperature fluctuations).

The construction of the self-aligning bolt creates a restoring force which is dependent on the size of the displacement and the applied load.

The load cell is not included in the scope of delivery.

Schematic diagram



Self-aligning bearing for load cells, RN series

Self-aligning bearing for load cells, CC and K series

The self-aligning bearings for the load cells of the CC and K series are particularly suitable for installation in container, hopper and vehicle scales.

Design

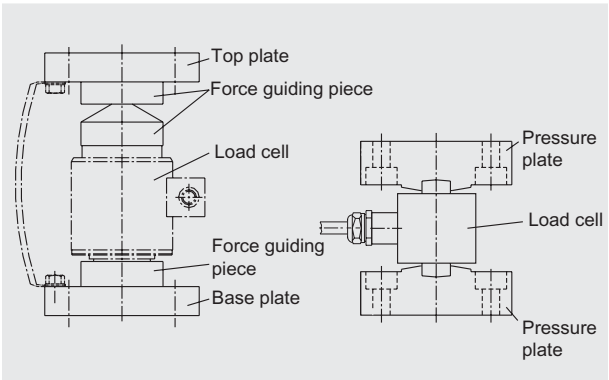
The self-aligning bearing of the CC series consists of three force guiding pieces, a base plate and a top plate.

The self-aligning bearing of the K series consists of two pressure plates.

These components, in combination with the load cell, form a complete self-centering unit. The top plate or top pressure plate and thus the load bearing implement is able to follow horizontal displacements (e.g. due to temperature fluctuations) with a swivel movement. The construction of the self-aligning bearing creates a restoring force which is dependent on the amount of displacement and the applied load.

The load cell is not included with the self-aligning bearing.

Schematic diagram



Self-aligning bearing for CC and K series load cell

Introduction to mounting components

External oscillation limiters/protective mechanism against raising up

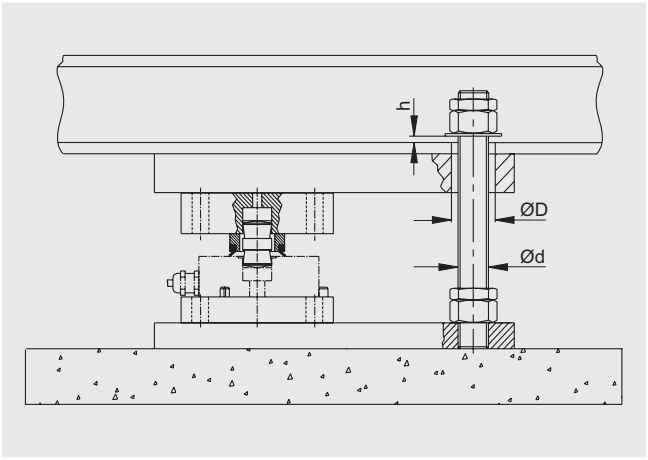
External oscillation limiters minimize horizontal displacement of the weighing system and can be installed separately in the load carrier unit by the customer.

Design

The oscillation limiter can be implemented with a bolt which is centered in a large drilled hole.

In the schematic diagram, a protective mechanism against raising up has also been integrated which limits raising up of the load carrier.

Schematic diagram



Schematic diagram of external oscillation limitation with lift-off protection

Combination mounting unit for load cells of the BB, SB, RN and CC series

The function of the combination mounting unit corresponds to that of the self-aligning bearing. In addition, the functions for oscillation limitation and lift-off protection are directly integrated in the mounting unit.

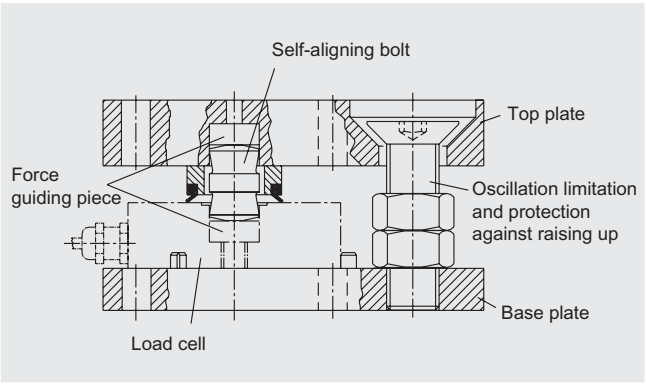
Design

The combination mounting unit consists of a self-aligning bolt, one or two countersunk screws as oscillation limit and protection against raising up, a top plate and a base plate.

The self-centering, self-aligning bolt allows the top plate and thus the load carrier to follow horizontal displacements (e.g. due to temperature fluctuations). The construction of the self-aligning bolt creates a restoring force which is dependent on the size of the displacement and the applied load. Oscillation limitation prevents the occurrence of excessive displacement and reliably protects the load cell from damage. The protection against raising up prevents lifting up of the load carrier.

The load cell is not included in the scope of delivery of the combination mounting unit.

Schematic diagram



Layout of the combination mounting unit using RN series load cell as an example

Base plate with overload protection for load cells of the BB and SB series

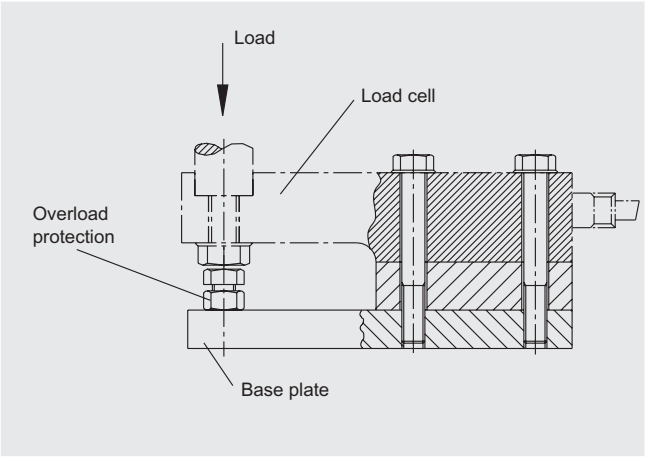
This mounting unit permits function-adapted and torque-adapted installation of these load cell series. The integral overload protection ensures that the load cell is not permanently damaged by static overload.

Design

The load cells can be installed on the base plate and aligned even before final installation of the scales. This ensures that the permissible spring excursion of the load cell is precisely set, up to contact with the overload protection.

The load cell is not included in the scope of delivery of the base plate with overload protection.

Schematic diagram



Layout of the base plate with overload protection using SB series load cell as an example

4

Introduction to mounting components

Elastomer bearings for load cells of the BB, SB and RN series

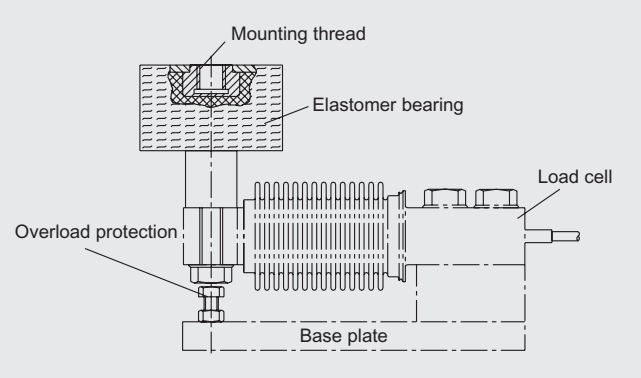
Self-centering elastomer bearings are ideal load transfer elements for scales without guiding elements. They are also used to damp oscillations and shocks.

Design

Elastomer bearings are rubber-metal composites made of neoprene and stainless steel. They ensure large spring excursions (i.e. a high degree of damping) despite small dimensions.

The load cell and base plate are not included in the scope of delivery of the elastomer bearing.

Schematic diagram



Layout of the elastomer bearing using BB series load cell as an example

Guide element for load cells of the SB and RN series

Design

The guide element consists of two ball joint heads, a spacer and two flanges for installation on the combination mounting unit.

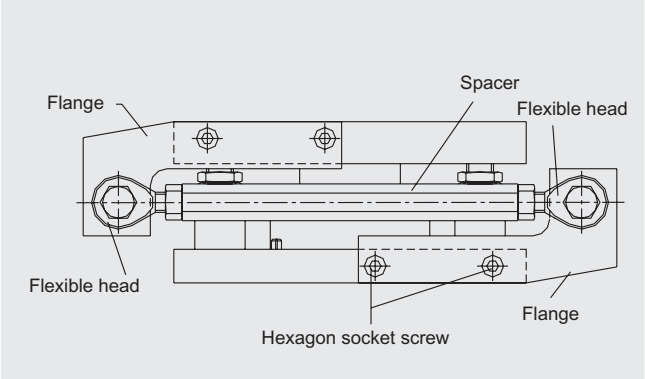
The additive guide element can also be retrofitted on combination mounting units if unexpected lateral forces occur during operation of the scales and the combination mounting unit was installed in accordance with the requirements (see "Guide elements").

The guide element diverts horizontal forces up to 1.7 kN to the foundation and therefore minimizes effects on the load cells and the mounting components. The load cell and combination mounting unit are not included in the scope of delivery of the guide element.

Horizontal forces occur e.g. during mixing operations with container scales or when the material to be weighed with roller table scales creates acceleration forces.

Depending on the individual requirements and mechanical design of the scales, other guide elements that are precisely matched to specific mounting conditions are available on request (e.g. round-head bolt guides).

Schematic diagram



Basic installation

Guide elements are used to maintain the position of the scales with reference to the foundation.

Guide elements are used when undesirable horizontal forces occur during the weighing process (e.g. due to mixing operations with container scales or acceleration of the material to be weighed with conveyor scales). Guide elements can be used to maintain precision and reliability of the load cells and mounting accessories despite the occurrence of undesirable lateral forces.

The guide elements must ensure total freedom of movement of the load carrier in the vertical direction for weight acquisition. At the same time, the lateral forces which may cause measurement errors or damage to the load cell must be absorbed. The guide elements must therefore absorb the maximum lateral forces in the horizontal direction.

The guide elements should be as long as possible because this reduces the frictional forces and the likelihood of reciprocal tension at the same time.

In general, a set of scales with three guide points is statically determined.

The position of the guide elements depends on the number of bearing points and the construction of the scales.

To prevent measurement errors, the following conditions always apply to the models listed:

- The guide elements must lie in the plane of load introduction into the load cell and on the same horizontal level
- The guide elements must be installed before adjustment of the scales
- It must be possible to move the ball joint heads or ball pins easily by hand at every filling level of the scales
- The guide elements must not transfer any forces in the measuring direction
- The guide elements must resist any lateral forces that arise.

Depending on requirements, various types of guide elements can be used (e.g. ball joint heads and round-head bolt guides).

Basic arrangement of guide elements with

3 load cells (plan view)

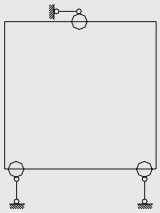


Fig. 1: Square area

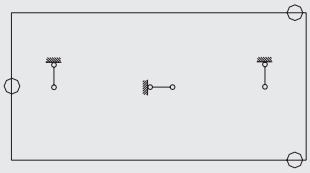


Fig. 2: Rectangular area

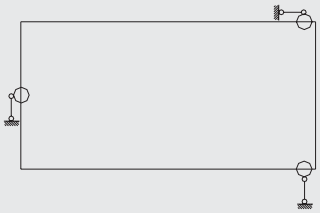


Fig. 3: Rectangular area

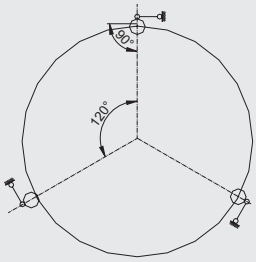


Fig. 4: Circular area

4 load cells (plan view)

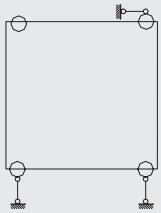


Fig. 5: Square area

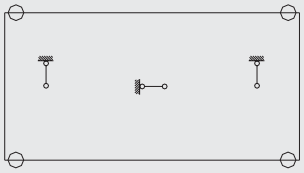


Fig. 6: Rectangular area

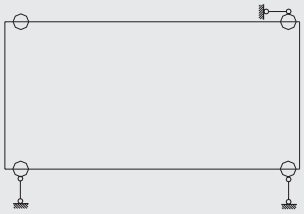
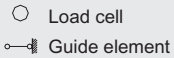


Fig. 7: Rectangular area



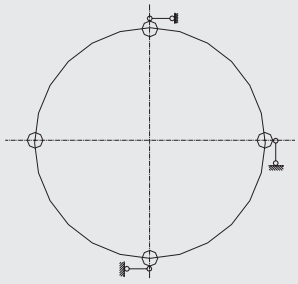


Fig. 8: Circular area

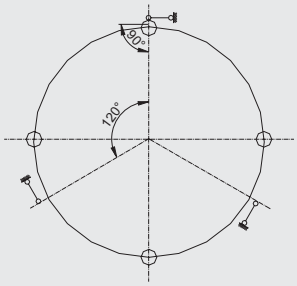


Fig. 9: Circular area

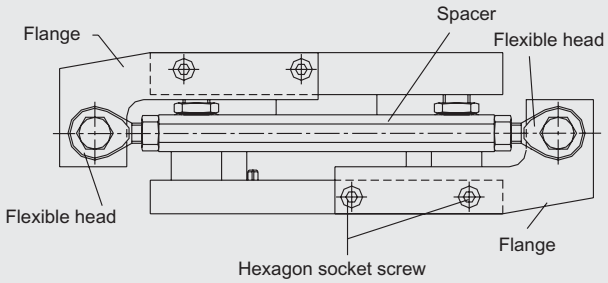
Basic representation of force guidance with three- and four-point bearing position

Introduction to mounting components

Lateral guide rods

Lateral guide rods consist of two ball joint heads which are linked via a connecting piece, and provide a very economical solution in comparison to round-head bolt guides.

Lateral guide rods can be mounted as standard mounting components either directly on the combination mounting units of load cells of the RN and SB series to divert horizontal forces up to 1.7 kN to the foundation.



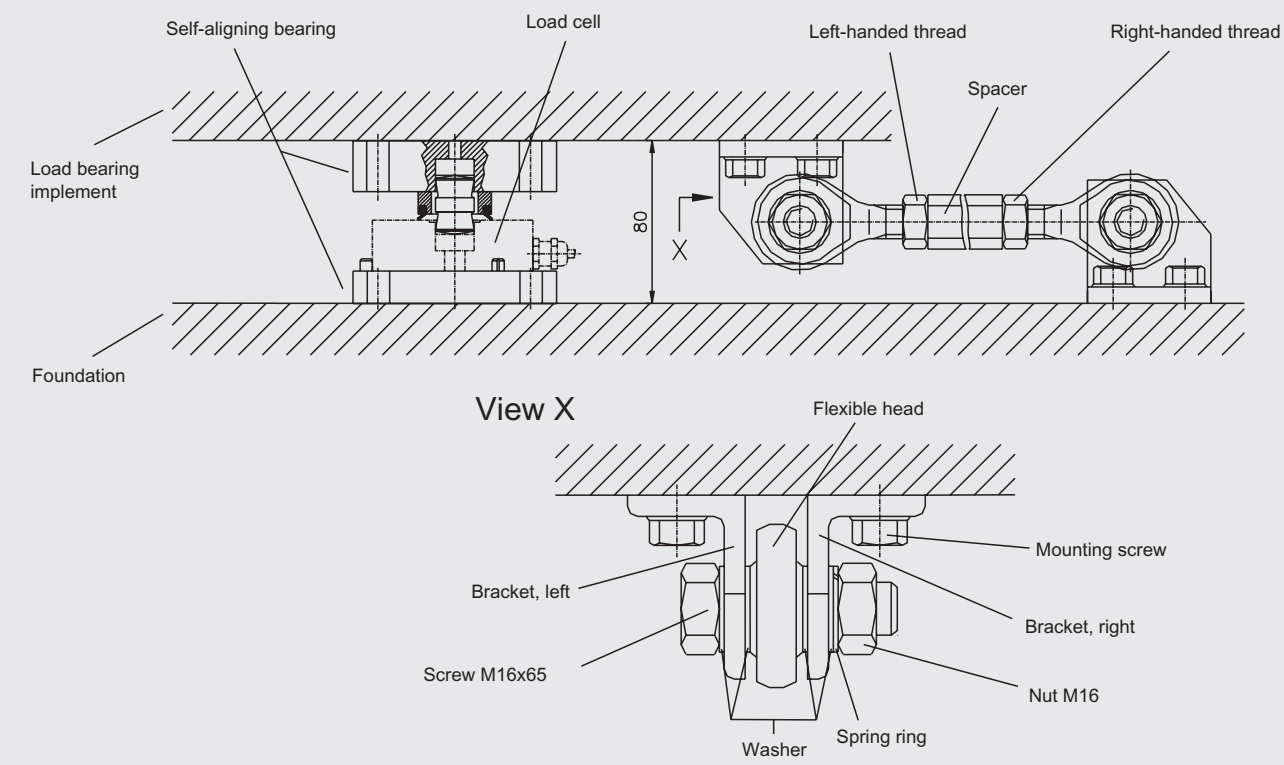
Additive guidance for combination mounting unit (only of stainless steel)

Lateral guide rods can be mounted between the load bearing implement and the foundation with the mounting bracket.

Separate mounting of the lateral guide rod permits the layout to be individually adapted to on-site conditions.

It is important to note the following on installation:

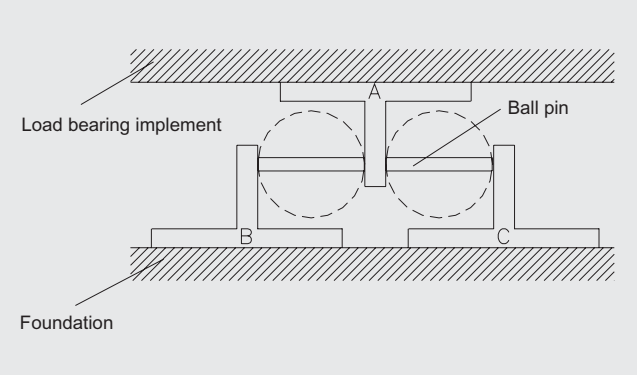
- The flexible head must be mounted before the scales are adjusted and its flexibility must be checked.
- The ball joint head must be easy to move at every filling level of the scales.



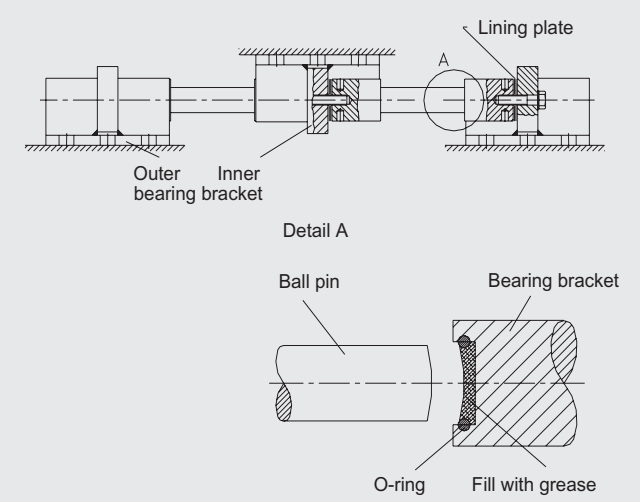
External lateral guide rod with self-aligning bearing for load cells of the RN series

Introduction to mounting components

Round-head bolt guide



Principle of the ball pin



Ball pin guide

Bearing A of the load bearing implement is supported by two ball pins, and the two opposing bearings (B and C) are supported by the foundation. This means that A is fixed in the direction of the opposing bearing but can roll away force-free in the vertical direction.

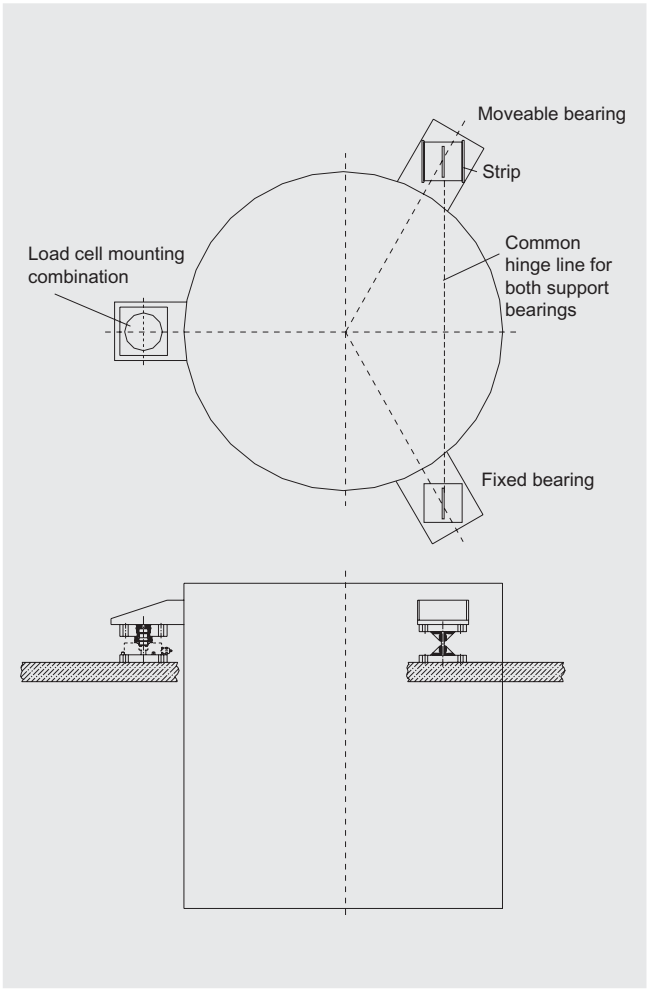
Round-head bolt guides have the following characteristics:

- The measuring result is only affected by the relatively small rolling friction
- Since the bearing is guided precisely in the vertical direction, it is able to allow relatively wide vertical movements without rotational movement of the load bearing implement
- Great lateral forces can be transferred despite extremely compact construction.

The following should be adhered to during configuration:

- The longitudinal axis of the round-head bolt guide should be located at the same height as the load introduction of the weighing cells and at the same horizontal level
- The internal and external bearing brackets must lie at right angles to the longitudinal axis.

Bending support points



Container weighing with two bending support points and one load cell

For scales with less stringent demands on precision (e.g. fill level weighing applications), only one load cell and two bending support points can be used for a three-point bearing instead of three load cells.

With a four-point bearing, two load cells and two bending support points can be used for fill level weighing.

The layout with bending support points is a particularly economical solution in which horizontal forces can be absorbed at the bearing level. This means that additional fixing is not necessary. If large horizontal forces occur outside the bearing plane (e.g. wind forces), additional precautions must be taken.

Under the following conditions, a set of scales that is equipped with bending support points can achieve an accuracy of between 1% and 2%:

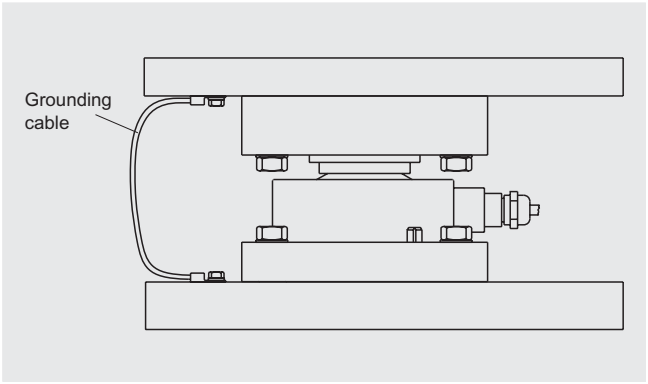
- The container must be of symmetrical design
- Equal load distribution must be ensured even with a full container
- No variations in the center of gravity are permitted (e.g. caused by heaped objects)
- The distance between the load cell and bending support point must be as great as possible
- The bending support points must be mounted so that a tilting line results. For example, two bending support points must lie with their arms on a common line or the surfaces of their arms must lie on a common surface.

Introduction to mounting components

If there is are differences in temperature between the container and the foundation, the resulting differences in distance between the support points must be compensated by one fixed bearing and one moveable bearing. The fixed bearing and the moveable bearing have the same dimensions. The fixed bearing is bolted to both the foundation and the load carrier. The moveable bearing is only secured to the foundation or only to the load carrier. The contact surface which is not secured serves as a sliding surface. The direction of sliding is determined by two side guides that are mounted on the load carrier or foundation.

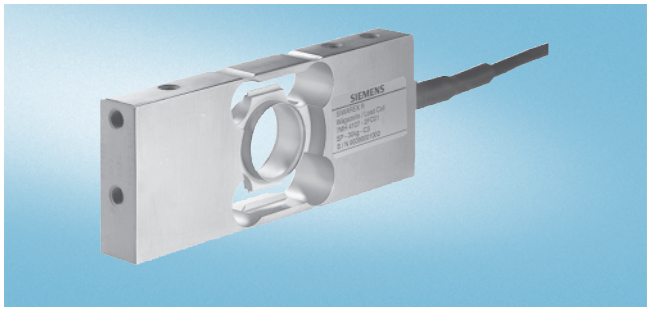
Grounding cable

The flexible grounding cable is used to discharge parasitic currents (e.g. created by welding or overvoltage).



Application example

Overview



The load cell is suitable for small platform scales with one load cell (max. platform size 350 x 350 mm) as well as for use in medium accuracy weighing machines of Class III with a max. scale interval number n_{max} = 3000 d.

Design

The measuring element is hermetically encapsulated and has a calibrated output current.

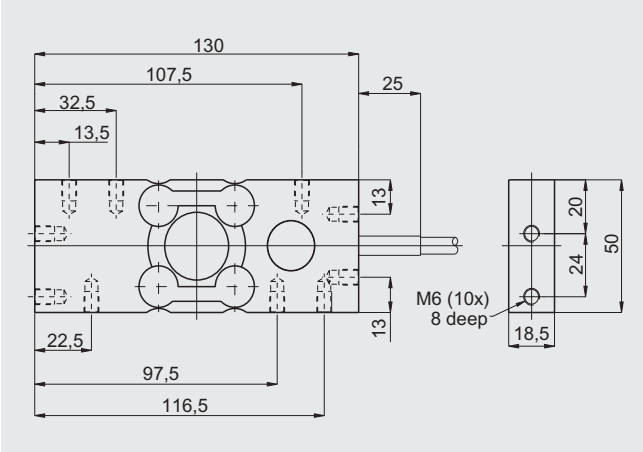
Technical specifications

SIWAREX R load cell, SP series	
Possible applications	Smaller conveyor scales, small platform scales
Form	Single point
Rated load Emax.	6/12 kg
Accuracy class according to OIML R60	C3
Maximum scale interval n_{lc}	3000
Minimum scale interval v_{min}	E_{max}/12,000
Combined error F_{comb}	≤ ± 0.02% C_n
Deviation F_v	≤ ± 0.01% C_n
Return of zero signal	≤ ± 0.0167% C_n [1]
Creepage error F_{cr}	
• 30 min	≤ ± 0.0245% C_n [1]
• 20 ... 30 min	≤ ± 0.0053% C_n [1]
Temperature coefficient	
Zero signal T_{Ko}	≤ ± 0.0058% C_n/5K
Characteristic value T_{Kc}	≤ ± 0.0045% C_n/5K
Min. initial loading E_{min}	0% E_{max}
Maximum working load L_u	150% E_{max}
Break load L_d	300% E_{max}
Maximum lateral load L_{lq}	100% E_{max}
Rated measuring path hn at E_{max} 6 kg	0.24 ± 0.02 mm
Rated measuring path hn at E_{max} 12 kg	0.19 ± 0.01 mm
Supply voltage U_{sr} (reference value)	10 V
Supply voltage (range)	5 ... 15 V
Rated characteristic value C_n	2 mV/V
Tolerance D_c of characteristic value	± 10%
Tolerance D_o of zero signal	≤ ±1% C_n
Input resistance R_e	410 Ω ± 6 Ω
Output resistance R_a	350 Ω ± 7 Ω
Insulation resistance R_{is}	≥ 5000 MΩ
Rated temperature range B_{tn}	-10 ... +40 °C
Operating temperature range B_{tu}	-40 ... +80 °C
Storage temperature range B_{ts}	-40 ... +90 °C
Sensor material (DIN)	Stainless steel, mat. no. 1.4542
Degree of protection to EN 60 529	IP66/IP68
Maximum tightening torque of the fixing screws	6 Nm
Ex protection to ATEX (optional)	II 2 G EEx ib IIC T6/T4 II 3 G EEx nA/nL IIC T6/T4 II 1D/2D/3D T 70 °C

Cable connection	
Function	Color
EXC + (supply +)	green
EXC - (supply -)	Black
SIG + (measured signal +)	White
SIG - (measured signal -)	red
Sense + (sensor line +)	Yellow
Sense - (sensor line -)	Blue
Shield (not connected to housing)	Transparent

[1] For rated temperature -10 ... +40 °C

Dimensional drawings



SIWAREX R load cell, SP series, dimensions

Selection and Ordering data	Order No.
SP series Verification capability to OIML R60 up to 3000 d, connecting cable 7 m [1]	7MH4107-■■C■1
Nominal load	
6 kg	1L
12 kg	2B
Explosion protection	
Without	0
Ex protection for zone 1, 2, 20, 21, 22	1

[1] Length tolerance ± 100 mm

Load cells

Overview

The bending beam load cell is particularly suitable for use in small-scale container and platform scales.

Design

The measuring element is a double bending beam made of stainless steel to which 4 strain gauges are applied.

The strain gauges are arranged so that two are stretched and two are compressed.

Under the influence of the load acting in the measuring direction, the spring bodies and therefore the friction-locked strain gauges are elastically deformed. This generates a measuring signal voltage that is proportional to the load.

Technical specifications

SIWAREX R load cell, BB series

Possible applications	Container, conveyor and platform
Form	Bending beam
Rated load / maximum load $E_{max.}$	10/20/50/100/200/350 kg
Accuracy class acc. to OIML R60	C3
Max. scale interval n_{LC}	3000
Min. scale interval V_{min}	$E_{max.}$/15000
Minimum application range $R_{min(LC)}$	20%
Combined error F_{comb}	≤ ± 0,02% C_n
Deviation F_v	≤ ± 0,01% C_n
Return of zero signal	≤ ± 0,0167% C_n [1]
Creepage error F_{cr}	
• 30 min	≤ ± 0,0245% C_n [1]
• 20 ... 30 min	≤ ± 0,0053% C_n [1]
Temperature coefficient	
• Zero signal T_{Ko}	≤ ± 0,0045% C_n/5K
• Characteristic value T_{Kc}	≤ ± 0,0045% C_n/5K
Min. initial loading E_{min}	≥ 0% $E_{max.}$
Max. working load L_u	150% $E_{max.}$
Break load L_d	300% $E_{max.}$
Max. lateral load L_{lq}	100% $E_{max.}$
Rated measuring path h_n at $E_{max.}$	0.3 ± 0.03 mm
Supply voltage U_{sr} (reference value)	10 V
Supply voltage (range)	5 ... 15 V
Rated characteristic value C_n	2 mV/V
Tolerance D_c of characteristic value	± 1%
Tolerance D_o of zero signal	≤ ± 1,0% C_n
Input resistance R_e	460 Ω ± 50 Ω
Output resistance R_a	350 Ω ± 3.5 Ω
Insulation resistance R_{is}	≥ 5000 MΩ
Rated temperature range B_{tn}	-10 ... +40 °C
Operating temperature range B_{tu}	-40 ... +80 °C
Storage temperature range B_{ts}	-40 ... +90 °C

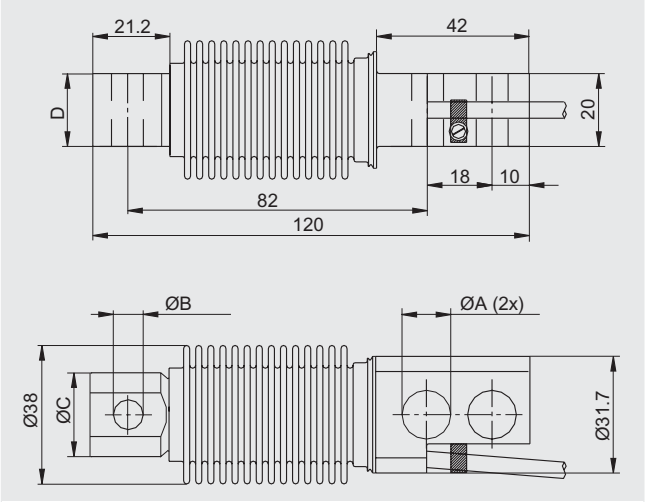
Sensor material (DIN)	Stainless steel, mat. no. 1.4542
Degree of protection to DIN EN 60,529; IEC 60,529	IP66/IP68
Max. tightening torque of the fixing screws	23 Nm
Current calibration [2]	Standard
Ex protection to ATEX (optional)	II 2 G EEx ib IIC T6/T4 II 3 G EEx nA/nL IIC T6/T4 II 1D/2D/3D T 70 °C

Cable connection

Function	Color
• EXC + (supply +)	• green
• EXC - (supply -)	• Black
• SIG + (measured signal +)	• White
• SIG - (measured signal -)	• red
• Shield (shield connection on housing available soon)	• Transparent

1) For rated temperature -10 ... +40 °C.
2) "Current calibration": nominal characteristic value and output resistance are adjusted so that the output current is calibrated within 0.05% of a reference value. This makes it easier to connect several load cells in parallel.

Dimensional drawings



Rated load	ØA	ØB	ØC	D
10 ... 200 kg	8.2	8.2 $^{+0,1}$	23	20
350 kg	10.3	10.3 $^{+0,1}$	24	19

SIWAREX R load cell, BB series, dimensions

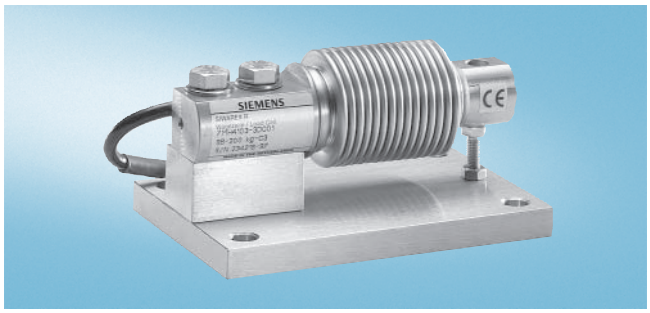
Selection and Ordering data

	Order No.
BB series Verification capability to OIML R60 up to 3000 d, connecting cable 3 m [2]	7MH4103-■■C■1
Nominal load	
10 kg	2A
20 kg	2D
50 kg	2K
100 kg	3A
200 kg	3D
350 kg [1]	3G
Explosion protection	
Without	0
Ex protection for zone 1, 2, 20, 21, 22	1

1) Mounting accessories on request.
2) Length tolerance ± 100 mm.

Base plate with overload protection

Overview



The base plate with integral overload protection for load cells of the BB series ensures easy, correct installation of the load cell.

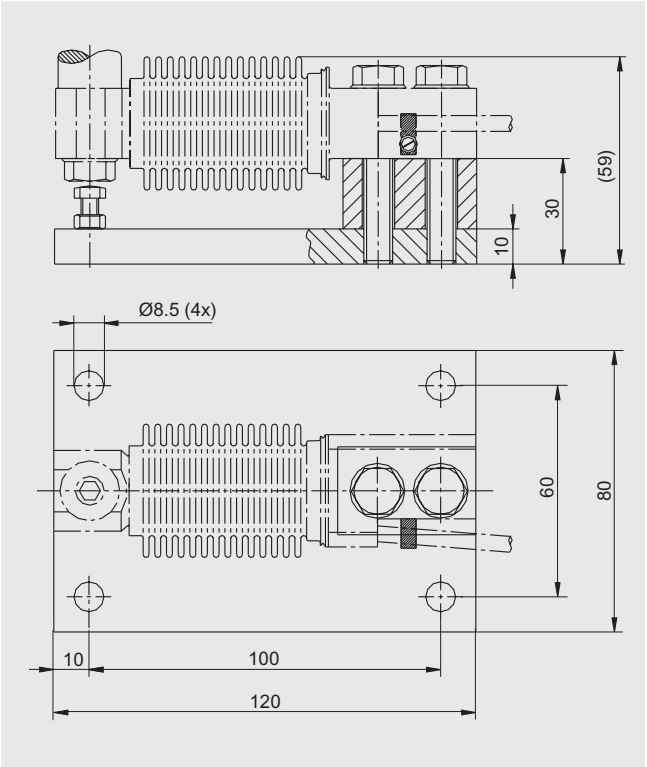
Design

The integral overload protection ensures that the load cell is not damaged by static overloading with vertical forces of up to 5 kN.

The load cells can be installed on the base plate and aligned even before final installation of the scales. This ensures that the permissible spring excursion of the load cell is precisely set, up to contact with the overload protection.

The load cell is not included in the scope of delivery of the base plate with overload protection.

Dimensional drawings



Base plate with overload protection for SIWAREX R load cells of the BB series, 10 ... 200 kg, dimensions

Selection and Ordering Data

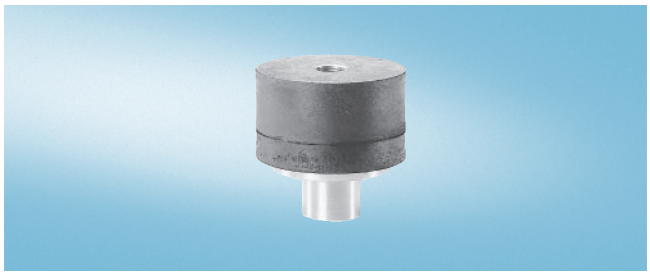
		Order No.
Base plate with overload protection		
for load cells of the BB series[1)2)]		
Material: Stainless steel		
For load cells with a rated load of		
• 10 ... 200 kg	A)	**7MH4133-3DG11**

1) The load cell is not included in the scope of delivery.
2) It is highly recommendable to use a grounding cable (7MH3701-1AA1) in order to protect the load cell.
A) Subject to export regulations AL: N, ECCN: EAR99H.

4

Elastomer bearing

Overview



The self-centering elastomer bearing for load cells of the BB series is the ideal load introduction element for scales without guide elements and serves to damp vibrations and shocks.

Design

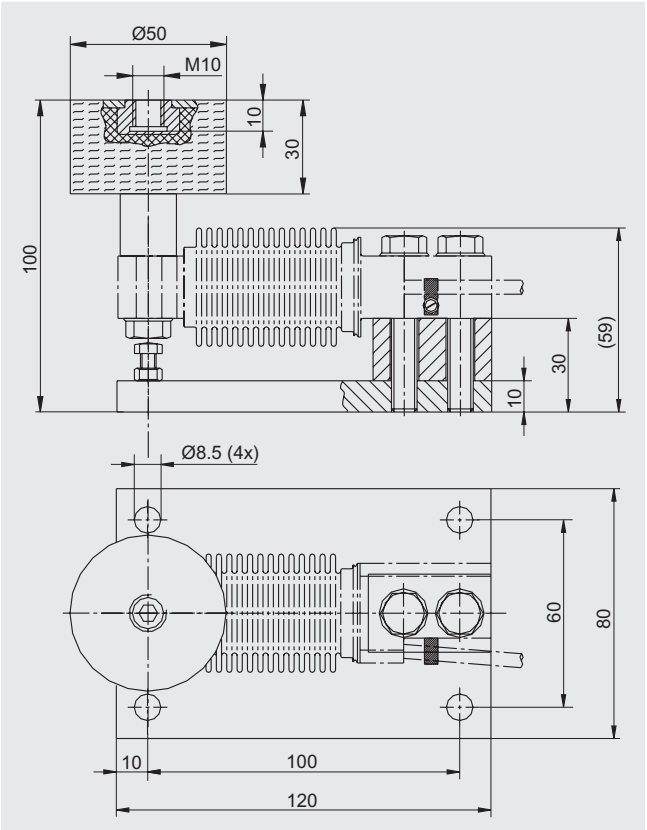
Elastomer bearings are rubber-metal composites made of neoprene and stainless steel. They ensure large spring excursions (i.e. a high degree of damping) despite small dimensions.

If the load carrier is displaced by more than 4 mm in the horizontal direction, measures for restricting sideways play (e.g. stops) must be implemented in the construction of the load carrier.

In combination with the base plate and integral overload protection, it is ensured that the load cell is not damaged by static overloading with vertical forces of up to 5 kN.

The load cell and base plate are not included in the scope of delivery of the elastomer bearing.

Dimensional drawings



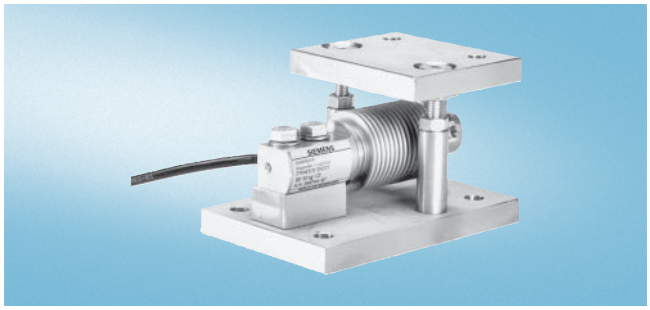
Elastomer bearings for SIWAREX R load cells of the BB series, 10 ... 200 kg, dimensions

Selection and Ordering Data

		Order No.
Elastomer bearing		
for load cells of the BB series[1)]		
Material: Stainless steel, Neoprene		
For load cells with a rated load of		
• 10 ... 50 kg	A)	**7MH4133-2KE11**
• 100 ... 200 kg	A)	**7MH4133-3DE11**

1) The load cell and base plate are not included in the scope of delivery.
A) Subject to export regulations AL: N, ECCN: EAR99H.

Overview



The self-aligning combination mounting unit for load cells of the BB series is particularly suitable for implementation in small-scale container, platform and roller table scales.

Design

The combination mounting unit consists of a self-aligning bolt, oscillation limit, protection against raising up, a top plate and a base plate.

The self-centering, self-aligning bolt allows the top plate and thus the load carrier to follow horizontal displacements (e.g. due to temperature fluctuations). The construction of the self-aligning bolt creates a restoring force which is dependent on the size of the displacement and the applied load.

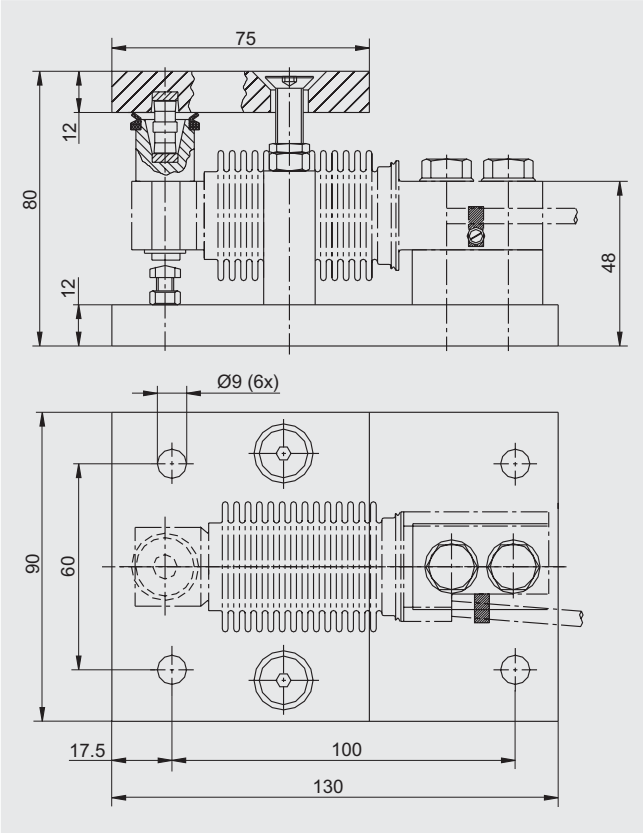
Oscillation limitation prevents the occurrence of excessive sideways displacement and reliably protects the load cell from damage. It can absorb a maximum horizontal force of F_h = 5 kN. The max. sideways displacement is ±1.5 mm

Protection against raising up prevents the load carrier from raising up, up to a maximum vertical force of F_v = 6 kN.

The integral overload protection ensures that the load cell is not damaged by static overloading with vertical forces of up to 5 kN.

The load cell is not included in the scope of delivery of the combination mounting unit.

Dimensional drawings



Combination mounting unit for SIWAREX R load cells of the BB series, 10 ... 200 kg, dimensions

Selection and Ordering Data

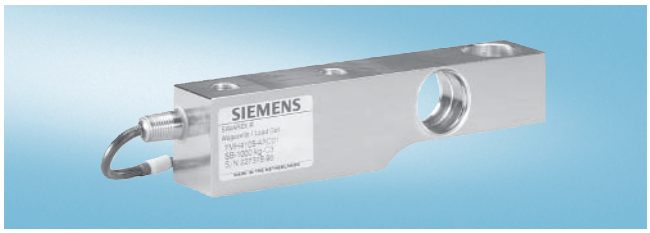
		Order No.
Combination mounting unit		
for load cells of the BB series[1)2)]		
Material: Stainless steel		
for load cells with a rated load of		
• 10 ... 200 kg	A)	**7MH4133-3DC11**

1) The load cell is not included in the scope of delivery.
2) It is highly recommendable to use a grounding cable (7MH3701-1AA1) in order to protect the load cell.
A) Subject to export regulations AL: N, ECCN: EAR99H.

4

Load cells

Overview



The shear beam load cell is particularly suitable for implementation in container, overhead rail conveyor and platform scales.

Design

The measuring element is a shear tension spring made of stainless steel to which strain gauges are applied. The strain gauges are arranged at 45° to the longitudinal axis on the side of the spring body and are therefore subject to shear forces. Under the influence of the load acting in the measuring direction, the spring bodies and therefore the friction-locked strain gauges are elastically deformed. This generates a measuring signal voltage that is proportional to the load.

Technical specifications

SIWAREX R load cell, SB series

Possible applications	Container, conveyor, overhead rail and platform scales
Form	Shear beam
Rated load / maximum load $E_{max.}$	0.5/1/2/5 t
Accuracy class acc. to OIML R60	C3
Max. scale interval n_{LC}	3000
Min. scale interval V_{min}	$E_{max.}$/10000
Minimum application range $R_{min(LC)}$	30%
Combined error F_{comb}	≤ ± 0,02% C_n
Deviation F_v	≤ ± 0,01% C_n
Return of zero signal	≤ ± 0,0167% C_n [1]
Creepage error F_{cr}	
• 30 min	≤ ± 0,0245% C_n [1]
• 20 ... 30 min	≤ ± 0,0053% C_n [1]
Temperature coefficient	
• Zero signal T_{Ko}	≤ ± 0,007% C_n/5K
• Characteristic value T_{Kc}	≤ ± 0,0045% C_n/5K
Min. initial loading E_{min}	≥ 0% $E_{max.}$
Max. working load L_u	150% $E_{max.}$
Break load L_d	300% $E_{max.}$
Max. lateral load L_{lq}	100% $E_{max.}$
Rated measuring path h_n at $E_{max.}$	≤ 0.5 mm
Supply voltage U_{sr} (reference value)	10 V
Supply voltage (range)	5 ... 18 V
Rated characteristic value C_n	2 mV/V
Tolerance D_c of characteristic value	± 1%
Tolerance D_o of zero signal	≤ ± 1,0% C_n
Input resistance R_e	350 Ω ± 3.5 Ω
Output resistance R_a	350 Ω ± 3.5 Ω
Insulation resistance R_{is}	≥ 5000 MΩ
Rated temperature range B_{tn}	-10 ... + 40 °C
Operating temperature range B_{tu}	-40 ... + 80 °C
Storage temperature range B_{ts}	-40 ... + 90 °C

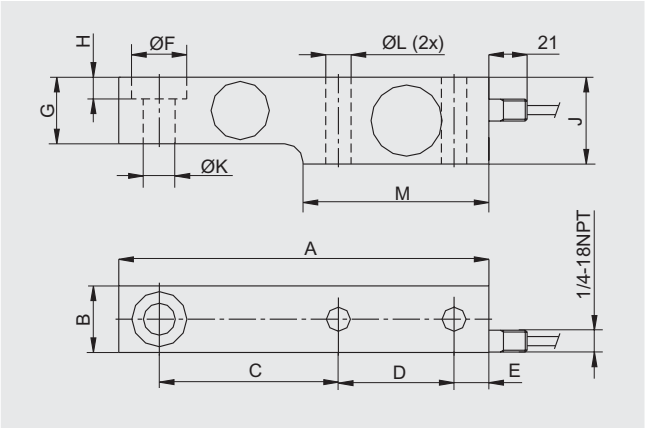
Sensor material (DIN)	Stainless steel, mat. no. 1.4542
Degree of protection to DIN EN 60,529; IEC 60,529	IP66/IP68
Recommended tightening torque of the fixing screws	110 Nm (0.5 - 2 t) 540 Nm (5 t)
Current calibration [2]	Standard
Ex protection to ATEX (optional)	II 2 G EEx ib IIC T6/T4 II 3 G EEx nA/nL IIC T6/T4 II 1D/2D/3D T 70 °C

Cable connection

Function	Color
• EXC +	• green
• EXC -	• Black
• SIG +	• White
• SIG -	• red
• Shield (shield connection on housing available soon)	• Transparent

1) For rated temperature -10 ... +40 °C.
2) "Current calibration": nominal characteristic value and output resistance are adjusted so that the output current is calibrated within 0.05% of a reference value. This makes it easier to connect several load cells in parallel.

Dimensional drawings



Rated load	A	B	C	D	I	ØF
0,5 ... 2 t	203,2	36,5	98,4	63,5	19,1	$30,2^{+0,2}$
5 t	235,0	47,5	123,8	66,7	20,6	$41,3^{+0,2}$

Rated load	G	H	J	ØK	ØL	M
0,5 ... 2 t	36,5	11,9	47,6	$17,5^{H11}$	14	101,6
5 t	47,6	15,8	69,9	$25,5^{H11}$	22	111,2

SIWAREX R load cell, SB series, dimensions

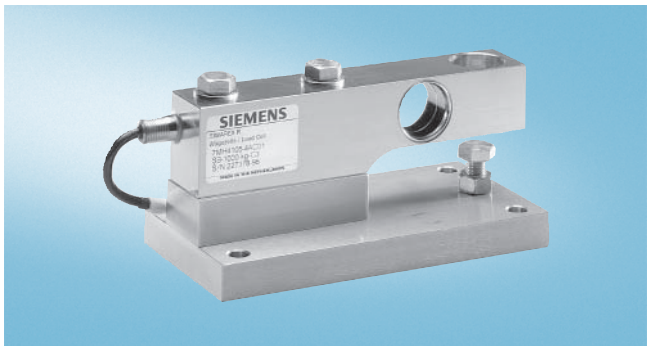
Selection and Ordering data

	Order No.
SB series Verification capability to OIML R60 up to 3000 d, connecting cable 5 m [1]	7MH4105-■■C■1
Nominal load	
500 kg	3K
1 t	4A
2 t	4D
5 t	4K
Explosion protection	
Without	0
Ex protection for zone 1, 2, 20, 21, 22	1

1) Length tolerance ± 100 mm

Base plate with overload protection

Overview



The base plate with integral overload protection for load cells of the SB series ensures easy, correct installation of the load cell.

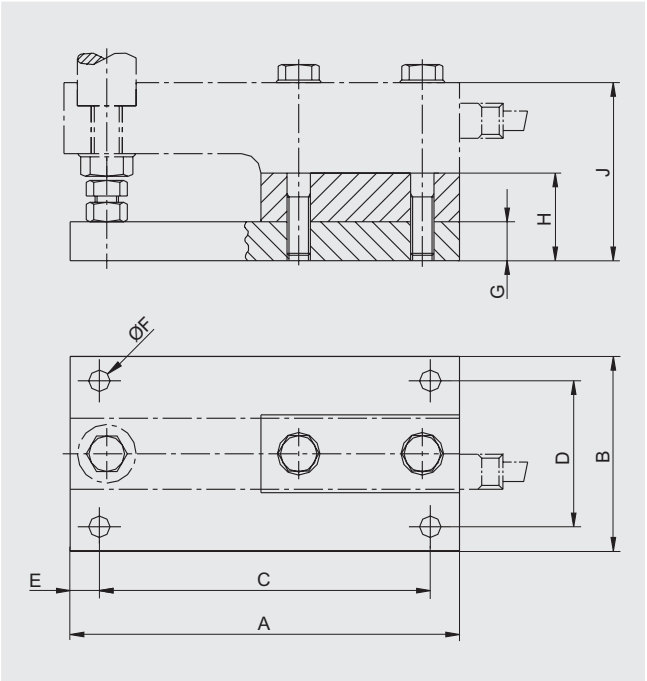
Design

The integral overload protection ensures that the load cell is not damaged by static overloading with vertical forces of up to 40 kN (for load cells with up to 2 t rated load) or 60 kN (for load cells with 5 t rated load).

The load cells can be installed on the base plate and aligned even before final installation of the scales. This ensures that the permissible spring excursion of the load cell is precisely set, up to contact with the overload screw.

The load cell is not included in the scope of delivery of the base plate with overload protection.

Dimensional drawings



Rated load	A	B	C	D	I	ØF	G	H	J
0,5 ... 2 t	200	100	170	75	15	11	20	45	92,6
5 t	235	120	205	90	15	14	20	40	109,9

Base plate with overload protection for SIWAREX R load cells of the SB series, dimensions

Selection and Ordering Data

		Order No.
Base plate with overload protection		
for load cells of the SB series[1)2)]		
Material: Stainless steel		
For load cells with a rated load of		
• 0.5 t, 1 t, 2 t	A)	**7MH4135-4DG11**
• 5 t	A)	**7MH4135-4KG11**

1) The load cell is not included in the scope of delivery.
2) It is highly recommendable to use a grounding cable (7MH3701-1AA1) in order to protect the load cell.
A) Subject to export regulations AL: N, ECCN: EAR99H.

4

Elastomer bearing

Overview

The self-centering elastomer bearing for load cells of the SB series is the ideal load introduction element for scales without guide elements and serves to damp vibrations and shocks. It is used with container and platform scales.

Design

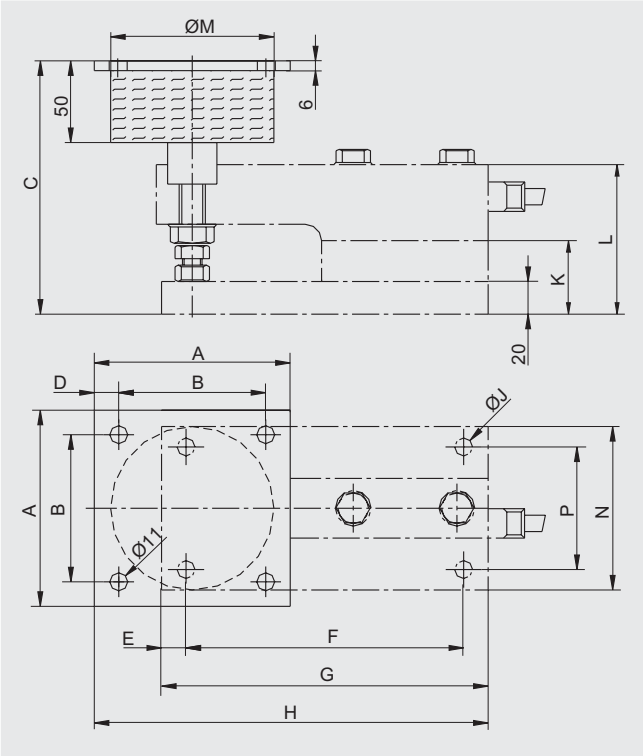
Elastomer bearings are rubber-metal composites made of neoprene and stainless steel. They ensure large spring excursions (i.e. a high degree of damping) despite small dimensions.

If the load carrier is displaced by more than 4 mm in the horizontal direction, measures for restricting sideways play (e.g. stops) must be implemented in the construction of the load carrier.

In combination with the base plate and integral overload protection, it is ensured that the load cell is not damaged by static overloading with vertical forces of up to 40 kN (for load cells with up to 2 t rated load) or 60 kN (for load cells with 5 t rated load).

The load cell and base plate are not included in the scope of delivery of the elastomer bearing.

Dimensional drawings



Rated load	A	B	C	D	I	F	G
0.5 t, 1 t	100	75	156	12,5	15	170	200
2 t	120	90	156	15	15	170	200
5 t	120	90	184	15	15	205	235

Rated load	H	ØJ	K	L	ØM	N	P
0.5 t, 1 t	231	11	45	92,6	85	100	75
2 t	241	11	45	92,6	100	100	75
5 t	271	14	40	109,9	100	120	90

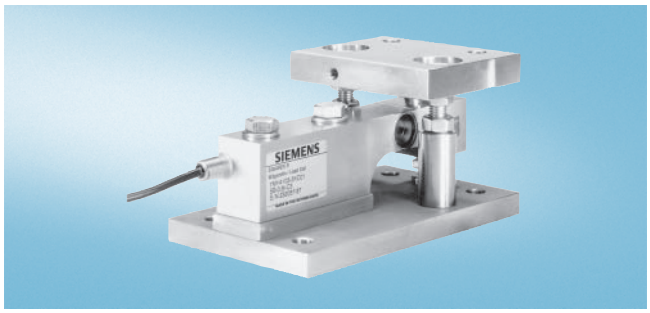
Elastomer bearings for SIWAREX R load cells of the SB series, dimensions

Selection and Ordering Data

		Order No.
Elastomer bearing for load cells of the SB series[1)] Material: Stainless steel, Neoprene For load cells with a rated load of		
• 500 kg, 1 t	A)	**7MH4135-4AE11**
• 2 t	A)	**7MH4135-4DE11**
• 5 t	A)	**7MH4135-4KE11**

1) The load cell and base plate are not included in the scope of delivery.
A) Subject to export regulations AL: N, ECCN: EAR99H.

Overview



The self-aligning combination mounting unit for load cells of the SB series is particularly suitable for implementation in container, platform and roller table scales.

Design

The combination mounting unit consists of a self-aligning bolt, oscillation limit, protection against raising up, a top plate and a base plate.

The self-centering, self-aligning bolt allows the top plate and thus the load carrier to follow horizontal displacements (e.g. due to temperature fluctuations). The construction of the self-aligning bolt creates a restoring force which is dependent on the size of the displacement and the applied load.

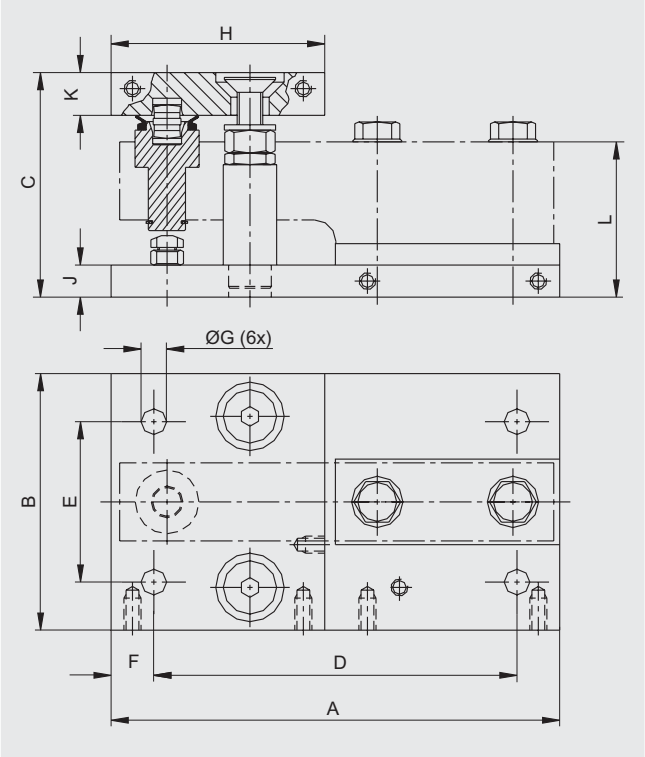
Oscillation limitation prevents the occurrence of excessive sideways displacement and reliably protects the load cell from damage. It can absorb a maximum horizontal force of F_h = 10 kN. The max. sideways displacement is ± 3 mm.

The protection against raising up prevents excessive lifting up of the load carrier. For load cells of up to 2 t rated load, protection against raising up can absorb a maximum vertical force of F_v = 10 kN and for load cells of 5 t rated load it can absorb F_v = 25 kN.

The integral overload protection ensures that the load cell is not damaged by static overloading with vertical forces of up to 40 kN (for load cells with up to 2 t rated load) or 60 kN (for load cells with 5 t rated load).

The load cell is not included in the scope of delivery of the combination mounting unit.

Dimensional drawings



Rated load	A	B	C	D	I	F	ØG	H	J	K	L
0,5 ... 2 t	210	120	105	170	75	20	12	100	15	20	72,6
5 t	250	150	140	205	90	25	14	120	20	20	94,9

Combination mounting unit for SIWAREX R load cells of the SB series, dimensions

Selection and Ordering Data

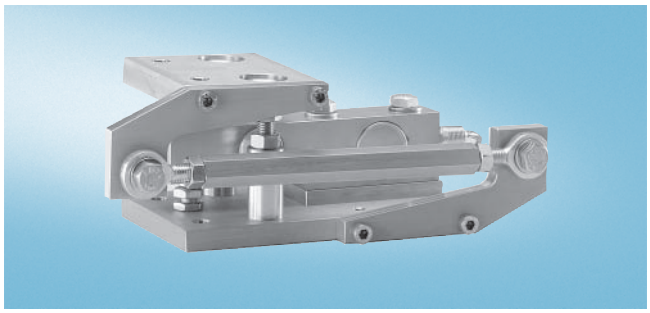
		Order No.
Combination mounting unit for load cells of the SB series[1)2)]		
Material: Stainless steel		
For load cells with a rated load of		
• 0.5 t, 1 t, 2 t	A)	**7MH4135-4DC11**
• 5 t	A)	**7MH4135-4KC11**

1) The load cell is not included in the scope of delivery.
2) It is highly recommendable to use a grounding cable (7MH3701-1AA1) in order to protect the load cell.
A) Subject to export regulations AL: N, ECCN: EAR99H.

4

Guide element for combination mounting unit

Overview



The guide element can be implemented in addition to the combination mounting unit for load cells of the SB series. It is used when undesirable horizontal forces occur during the weighing process, e.g. due to mixing operations with container scales or acceleration of the material to be weighed with conveyor scales.

Design

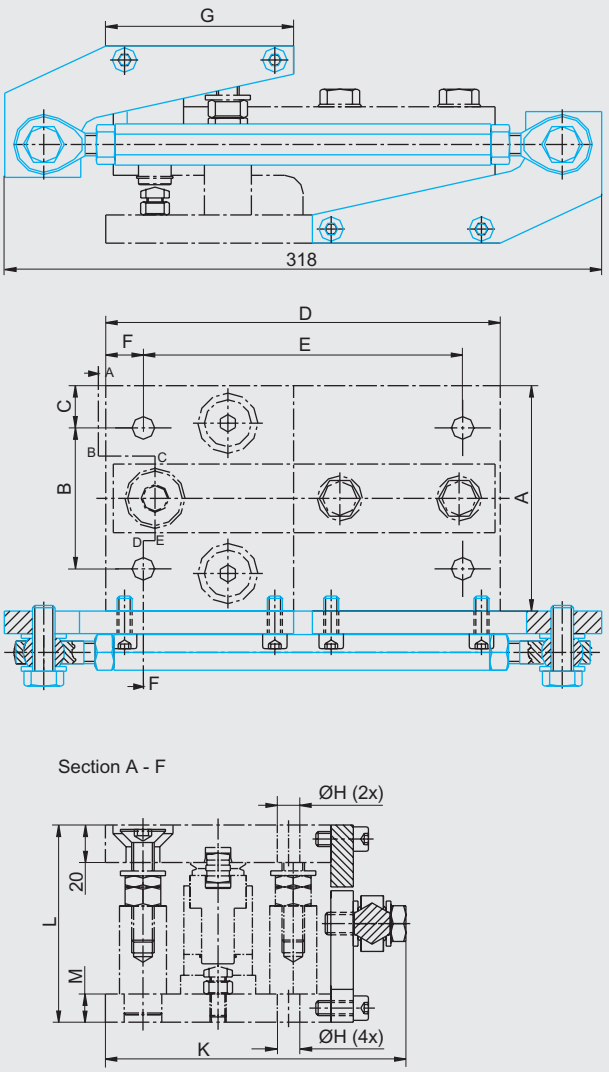
The guide element consists of two ball joint heads, a spacer and two flanges for installation on the combination mounting unit.

The additive guide element can also be retrofitted on combination mounting units if unexpected lateral forces occur during operation of the scales and the combination mounting unit was installed in accordance with the requirements (see "Guide elements").

The guide element diverts horizontal forces up to 1.7 kN to the foundation and therefore minimizes effects on the load cells and the mounting components.

The load cell and combination mounting unit are not included in the scope of delivery of the guide element.

Dimensional drawings



Rated load	A	B	C	D	I	F	G	ØH	K	L	M
0.5 t, 1 t, 2 t	120	75	22,5	210	170	20	100	12	160	105	15
5 t	150	90	30	250	205	25	120	14	190	140	20

SIWAREX R guide element for combination mounting unit for load cells of the SB series, dimensions

Selection and Ordering Data

		Order No.
Guide element for combination mounting unit for load cells of the SB series[1] Consisting of: 2 flanges, 2 pivots, 1 adapter, fixing elements Material: Stainless steel		
For load cells with a rated load of		
• 0.5 t, 1 t, 2 t	A)	**7MH4135-4DQ12**
• 5 t		**7MH4135-4KQ12**

[1] The load cell and combination mounting unit are not included in the scope of delivery.
A) Subject to export regulations AL: N, ECCN: EAR99H.

Overview

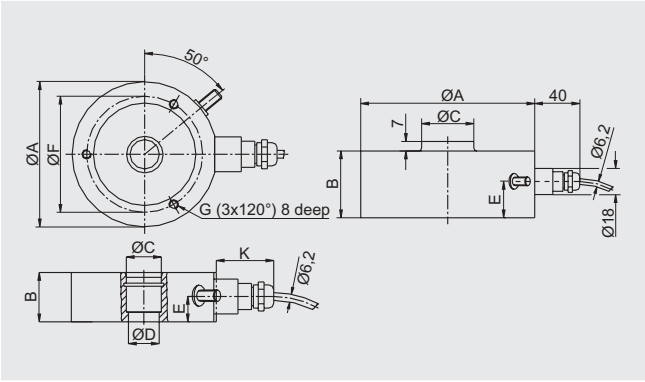
The bending ring load cell is particularly suitable for implementation in container, conveyor, platform and roller table scales.

Design

The measuring element is a bending ring made of stainless steel. Two expansion measuring spirals are applied each to the upper and lower faces of the ring. Under the influence of the centrally acting load in the measuring direction, the bending ring is tilted, i.e. the diameter of the upper ring face is reduced and the diameter of the lower ring face is increased. This causes the bending ring (and the expansion measuring spirals installed with friction-locking) to be elastically deformed. This generates a measuring signal voltage that is proportional to the load.

Load cells with a rated load of up to 13 t are equipped with integral overload protection.

Dimensional drawings



Rated load	ØA	B	ØC	ØD	I	ØF	G	Max. tightening torque	K
60 kg, 130 kg, 280 kg	63	22	15,1	3,2	15	55,5	M 5	8 Nm	34
0.5 t, 1 t	80	25	19	M10	-	70	M6	14 Nm	17,5
2 t, 3.5 t, 5 t	80	30	19	15H7	-	70	M6	14 Nm	17,5
10 t	95	35	29,1	24,9	-	-	-	-	17,5
13 t	95	35	29,1	24,9	20	-	-	-	40
28 t	120	46	35,9	-	25	-	-	-	-
60 t	140	62	47,9		34	-	-	-	-

SIWAREX R load cell, RN series, dimensions

Selection and Ordering data

RN series
Verification capability to OIML R60 up to 3000 d, connecting cable[1)]

Order No.: 7MH5101-■■D0■

Nominal load	Length	
60 kg	3 m	2Q
130 kg	3 m	3D
280 kg	3 m	3J
500 kg	3 m	3P
1 t	3 m	4A
2 t	5 m	4G
3,5 t	5 m	4L
5 t	5 m	4P
10 t	5 m	5A
13 t	10 m	5D
28 t	10 m	5J
60 t	15 m	5Q

Explosion protection	
Without	0
Ex protection for zone 1, 2, 20, 21, 22	1

1) Length tolerance ± 100 mm

4

Load cells

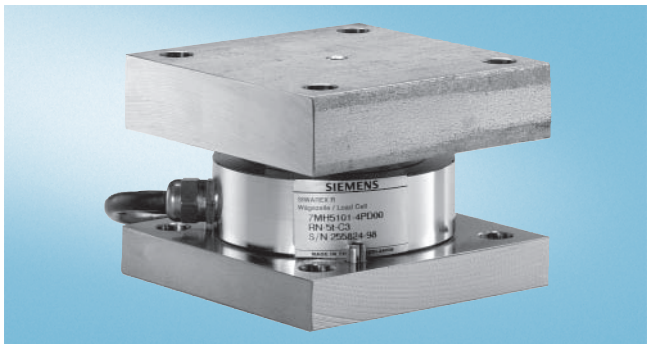
Technical specifications

SIWAREX R load cell, RN series			
Possible applications	Container, conveyor, platform and roller table scales		
Form	Bending ring		
Rated load / maximum load $E_{max.}$	60/130/280 kg	0,5/1/2/3,5/5/10 t	13/28/60 t
Accuracy class according to OIML R60	C3	C3	C3
Max. scale interval n_{LC}	3000	3000	3000
Min. scale interval V_{min}	$E_{max.}$/17500	$E_{max.}$/10000	$E_{max.}$/17500
Minimum application range $R_{min(LC)}$	17%	30%	17%
Combined error F_{comb}	≤ ± 0,018% C_n	≤ ± 0,023% C_n	≤ ± 0,018% C_n
Deviation F_v	≤ ± 0,01% C_n	≤ ± 0,01% C_n	≤ ± 0,01% C_n
Return of zero signal	≤ ±0,0167% C_n [1]	≤ ±0,0167% C_n [1]	≤ ±0,0167% C_n [1]
Creepage error F_{cr}			
• 30 min	≤ ±0,0120% C_n [1]	≤ ±0,0245% C_n [1]	≤ ±0,0120% C_n [1]
• 20 ... 30 min	≤ ±0,0053% C_n [1]	≤ ±0,0053% C_n [1]	≤ ±0,0053% C_n [1]
Temperature coefficient			
• Zero signal T_{Ko}	≤ ± 0,004% C_n/5K	≤ ± 0,007% C_n/5K	≤ ± 0,004% C_n/5K
• Characteristic value T_{Kc}	≤ ± 0,004% C_n/5K	≤ ± 0,005% C_n/5K	≤ ± 0,004% C_n/5K
Min. initial loading E_{min}	≥ 0% $E_{max.}$	≥ 0% $E_{max.}$	≥ 0% $E_{max.}$
Max. working load L_u	200% $E_{max.}$	150% $E_{max.}$	150% $E_{max.}$
Break load L_d	500% $E_{max.}$	300% $E_{max.}$	300% $E_{max.}$
Max. lateral load L_{lq}	75% $E_{max.}$	100% $E_{max.}$	75% $E_{max.}$
Rated measuring path h_n at $E_{max.}$	0.07 mm	0.1 ± 0.02 mm	0.11 ... 0.2 mm
Overload protection	Integrated	Integrated	Integrated for 13 t
Supply voltage U_{sr} (reference value)	15 V	10 V	15 V
Supply voltage (range)	5 ... 30 V	5 ... 30 V	5 ... 30 V
Rated characteristic value C_n	1 mV/V	2 mV/V	2 mV/V
Tolerance D_c of characteristic value	± 0,01 mV/V	± 0,1 mV/V	± 0,1 mV/V
Tolerance D_o of zero signal	≤ ± 1,0% C_n	≤ ± 1,0% C_n	≤ ± 1,0% C_n
Input resistance R_e	1260 ± 100 Ω	1110 ± 50 Ω	13 t: 1200 ± 100 Ω 28 t: 1075 ± 100 Ω 60 t: 1350 ± 100 Ω
Output resistance R_a	1020 ± 2 Ω	1025 ± 25 Ω	13 t: 998 ± 2 Ω 28 t: 928 ± 2 Ω 60 t: 1172 ± 2 Ω
Insulation resistance R_{is}	≥ 20 MΩ	≥ 5000 MΩ	≥ 20 MΩ
Rated temperature range B_{tn}	-10 ... + 40 °C	-10 ... + 40 °C	-10 ... + 40 °C
Operating temperature range B_{tu}	-30 ... + 85 °C	-30 ... + 70 °C	-30 ... + 85 °C
Storage temperature range B_{ts}	-50 ... + 95 °C	-50 ... + 80 °C	-50 ... + 95 °C
Sensor material (DIN)	Stainless steel, mat. no. 14542	Stainless steel, mat. no. 14542	Stainless steel, mat. no. 14542
Degree of protection to DIN EN 60529; IEC 60529	IP66/IP68	IP66/IP68	IP66/IP68
Recommended tightening torque of the fixing screws	8 Nm	14 Nm (0.5 ... 5 t)	–
Current calibration[2]	Standard	Standard	Standard
Ex protection to ATEX (optional)	II 2 G EEx ib IIC T6/T4 II 3 G EEx nA/nL IIC T6/T4 II 1D/2D/3D T 70 °C	II 2 G EEx ib IIC T6/T4 II 3 G EEx nA/nL IIC T6/T4 II 1D/2D/3D T 70 °C	II 2 G EEx ib IIC T6/T4 II 3 G EEx nA/nL IIC T6/T4 II 1D/2D/3D T 70 °C
Cable connection			
Function	Color	Color	Color
• EXC +	Pink	Pink	Pink
• EXC -	Gray	Gray	Gray
• SIG +	Brown	Brown	Brown
• SIG -	White	White	White
• Screening	Transparent (shield connection on housing available soon)	Shield connected to load cell housing. Shield not led out of cable.	Transparent (shield connection on housing available soon)

[1] For rated temperature -10 ... +40 °C.

[2] "Current calibration": nominal characteristic value and output resistance are adjusted so that the output current is calibrated within 0.05% of a reference value. This makes it easier to connect several load cells in parallel.

Overview



The self-aligning bearing for load cells of the RN series is especially suitable for installation in container and platform scales and is characterized by its low mounting height.

Design

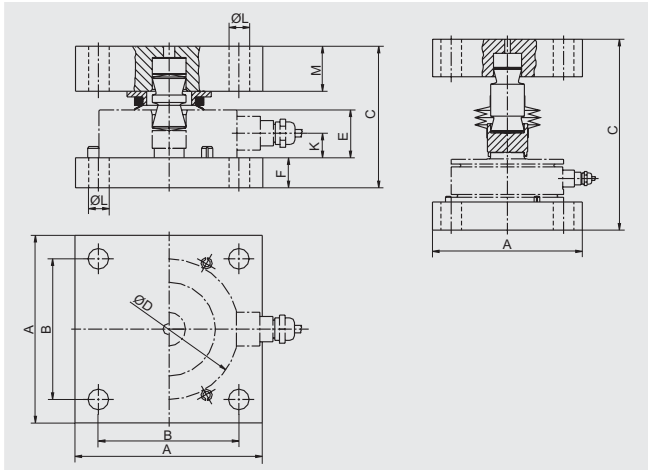
The self-aligning bearing consists of a self-aligning bolt, a top plate (top of the self-aligning bearing) and a base plate (bottom of the self-aligning bearing).

The self-centering, self-aligning bolt allows the top plate and thus the load carrier to follow horizontal displacements (e.g. due to temperature fluctuations). The construction of the self-aligning bolt creates a restoring force which is dependent on the size of the displacement and the applied load. If the load carrier is displaced by more than 4 mm (up to 5 t rated load), 7 mm (up to 13 t rated load) or 10 mm (up to 60 t rated load) in the horizontal direction, measures for restricting sideways play (e.g. stops) must be implemented in the construction of the load carrier. Suitable measures must be provided on the construction of the load carrier to prevent it from raising up.

The load cell is not included in the scope of delivery of the self-aligning bearing.

Dimensional drawings

Self-aligning bearing 0.06 ... 13 t (left) **Self-aligning bearing 28 / 60 t (right)**



Rated load	A	B	C	ØD	I	F	K	ØL	M
60 ... 280 kg	80	60	52	63	22	8	11	9	12
0.5 t, 1 t	100	75	79	80	25	15	10	11	25
2 t, 3.5 t, 5 t	100	75	79	80	30	15	8,5	11	25
10 t, 13 t	120	90	121,2	95	35	20	20	14	40
28 t	160	120	203	120	53	30	25	22	40
60 t	200	140	254	140	69	36	34	26	50

Self-aligning bearings for SIWAREX R load cells of the RN series, dimensions

Selection and Ordering Data

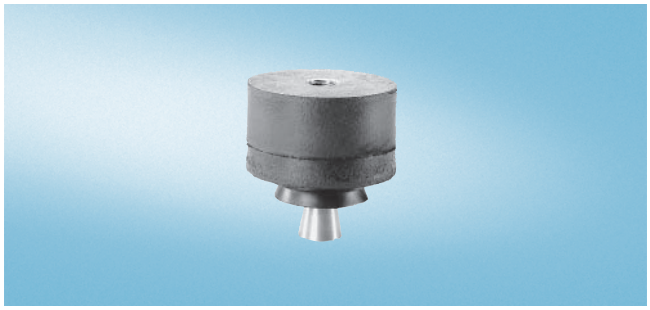
		Order No.
Self-aligning bearing top part[1)2)]		
for RN series load cells, consisting of: Top plate with seal holder and seal ring, top plate pressure piece, self-aligning pin, cell pressure piece (not for 28 t and 60 t)		
Material: Stainless steel		
For load cells with a rated load of		
• 60 kg, 130 kg, 280 kg	A)	**7MH4115-3DB11**
• 0.5 t, 1 t	A)	**7MH4132-4AK11**
• 2 t, 3.5 t, 5 t	A)	**7MH4132-4KK11**
• 10 t, 13 t	A)	**7MH4115-5BB11**
• 28 t	A)	**7MH4115-5DB11**
• 60 t	A)	**7MH4115-5GB11**
Self-aligning bearing bottom part[1)]		
for RN series load cells, consisting of: Base plate, 3 tension pins		
Material: Stainless steel		
For load cells with a rated load of		
• 60 kg, 130 kg, 280 kg	A)	**7MH4115-3DC11**
• 0.5 t, 1 t, 2 t, 3.5 t, 5 t	A)	**7MH4132-4AG11**
• 10 t, 13 t	A)	**7MH4115-5BC11**
• 28 t	A)	**7MH4115-5DC11**
• 60 t	A)	**7MH4115-5GC11**

1) The load cell is not included in the scope of delivery.
2) The self-aligning bearing bottom part is not included in the scope of delivery.
A) Subject to export regulations AL: N, ECCN: EAR99H.

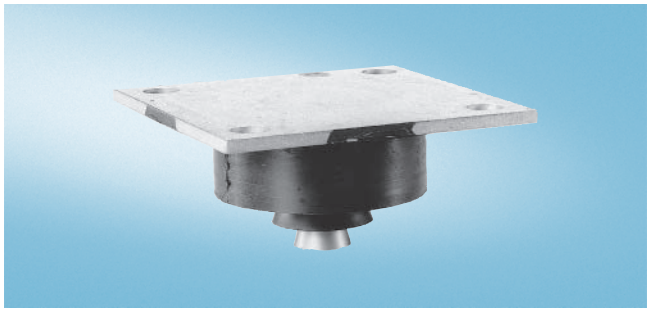
4

Elastomer bearing

Overview



Elastomer bearings for SIWAREX R load cells of the RN series, 60 ... 280 kg



Elastomer bearings for SIWAREX R load cells of the RN series, 0.5 ... 13 t

Together with the bottom part of the self-aligning bearing, the self-centering elastomer bearing for load cells of the RN series is the ideal load introduction element for scales without guide elements and serves to damp vibrations and shocks in container, platform and roller table scales.

Design

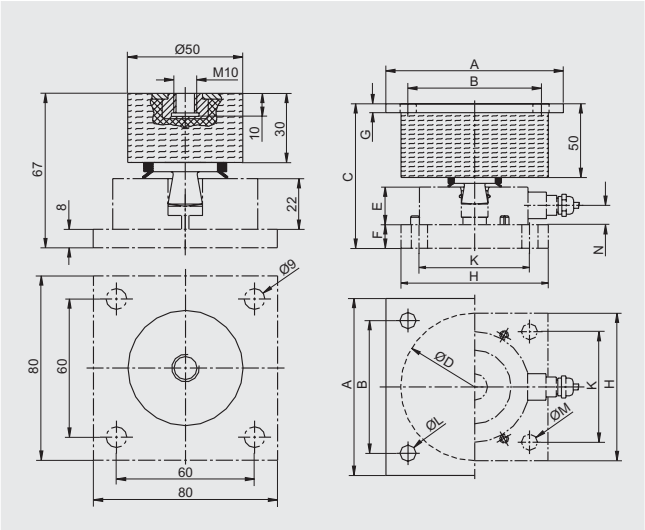
Elastomer bearings are rubber-metal composites made of neoprene and stainless steel. They ensure large spring excursions (i.e. a high degree of damping) despite small dimensions.

If the load carrier is displaced by more than 4 mm (6 mm for rated loads of between 6 t and 13 t) in the horizontal direction, measures for restricting sideways play (e.g. stops) must be implemented in the construction of the load carrier. Suitable measures must be provided on the construction of the load carrier to prevent it from raising up.

The load cell and the bottom part of the self-aligning bearing are not included in the scope of delivery of the elastomer bearing.

Dimensional drawings

Version 60 to 280 kg (left) **Version 0.5 to 13 t (right)**



Rated load	A	B	C	ØD	I	F	G	H	K	ØL	ØM	N
0.5 t, 1 t	100	75	97	85	25	15	6	100	75	11	11	9,5
2 t, 3.5 t, 5 t	120	90	102	100	30	15	6	100	75	11	11	8,5
10 t, 13 t	120	90	120	100	35	20	6	120	90	11	14	20

Elastomer bearings for SIWAREX R load cells of the RN series, dimensions

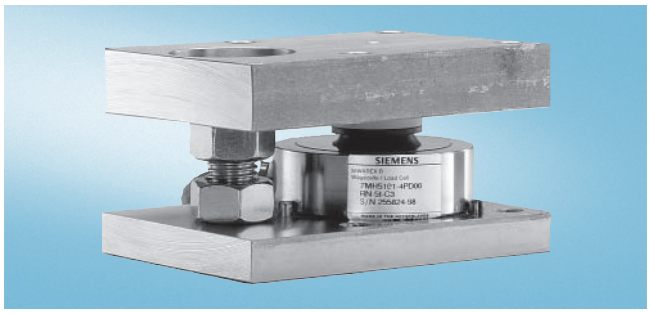
Selection and Ordering Data

		Order No.
Elastomer bearing[1]		
for RN series load cells, consisting of: elastomer package with fixing plate, force transfer, seal		
Material: Stainless steel, Neoprene		
For load cells with a rated load of		
• 60 kg, 130 kg, 280 kg		**7MH4130-3EE11**
• 0.5 t, 1 t	A)	**7MH4130-4AE11**
• 2 t, 3.5 t, 5 t	A)	**7MH4130-4KE11**
• 10 t, 13 t	A)	**7MH4130-5CE11**

[1] The load cell and self-aligning bearing bottom part unit are not included in the scope of delivery.

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

Overview



The self-aligning combination mounting unit for load cells of the RN series is particularly suitable for implementation in container, platform and roller table scales due to its low installation height.

Design

The combination mounting unit consists of a self-aligning bolt, one or two countersunk screws as oscillation limit and protection against raising up, a top plate and a base plate.

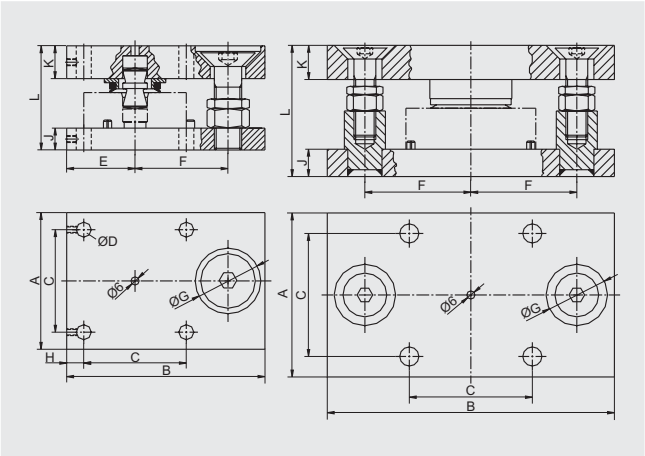
The self-centering, self-aligning bolt allows the top plate and thus the load carrier to follow horizontal displacements (e.g. due to temperature fluctuations). The construction of the self-aligning bolt creates a restoring force which is dependent on the size of the displacement and the applied load. Oscillation limitation prevents the occurrence of excessive sideways displacement and reliably protects the load cell from damage. It can absorb a maximum horizontal force of F_h = 10 kN. The max. sideways displacement is ± 3 mm (60 kg to 5 t) or ± 4.5 mm (10 t, 13 t).

Protection against raising up prevents the load carrier from raising up, up to a maximum vertical force of F_v = 25 kN.

The load cell is not included in the scope of delivery of the combination mounting unit.

Dimensional drawings

Version 0.06 ... 1 t (left) **Version 2 ... 13 t (right)**



Rated load	A	B	C	ØD	I	F	ØG	H	J	K	L
60 kg, 130 kg, 280 kg	80	118	60	9	40	57	39	10	8	12	52
0.5 t, 1 t	100	145	75	11	50	68	48	12,5	15	25	79
2 t, 3.5 t, 5 t	100	190	75	11	-	68	48	-	15	25	79
10 t, 13 t	120	210	90	14	-	77,5	45	-	20	40	121,2

Combination mounting unit for SIWAREX R load cells of the RN series, dimensions

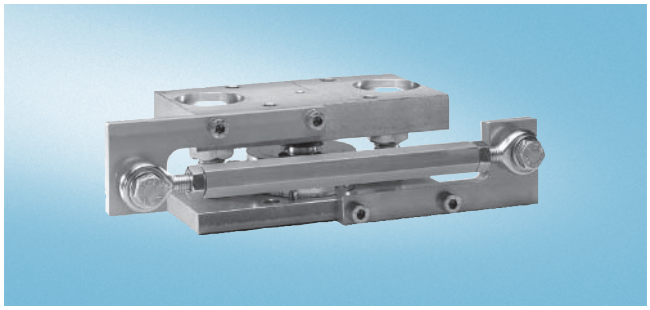
Selection and Ordering Data

		Order No.
Combination mounting unit[1)2)]		
for load cells of the RN series		
Material: Stainless steel		
For load cells with a rated load of		
• 60 kg, 130 kg, 280 kg	A)	**7MH4125-3DA11**
• 0.5 t, 1 t	A)	**7MH4132-4AC11**
• 2 t, 3.5 t, 5 t	A)	**7MH4132-4KC11**
• 10 t, 13 t		**7MH4125-5BA11**

1) The load cell is not included in the scope of delivery.
2) It is highly recommendable to use a grounding cable (7MH3 701-1AA1) in order to protect the load cell.
A) Subject to export regulations AL: N, ECCN: EAR99H.

Guide element for combination mounting unit

Overview



The guide element can be implemented in addition to the combination mounting unit for load cells of the RN series. It is used when undesirable horizontal forces occur during the weighing process, e.g. due to mixing operations with container scales or acceleration of the material to be weighed with conveyor scales.

Design

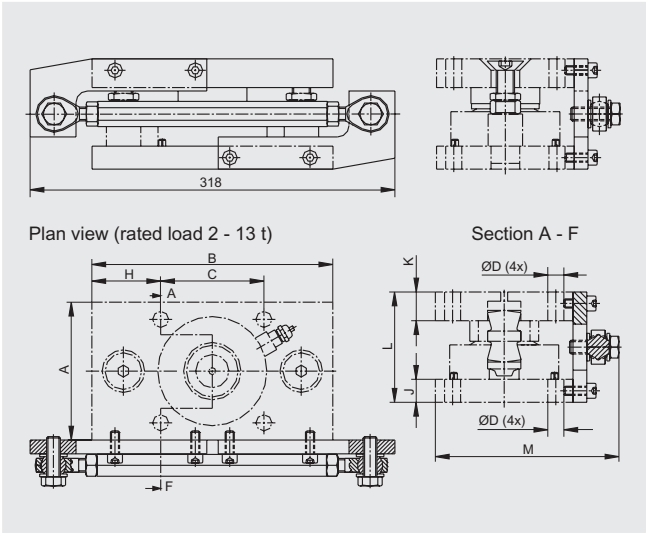
The guide element consists of two ball joint heads, a spacer and two flanges for installation on the combination mounting unit.

The additive guide element can also be retrofitted on combination mounting units if unexpected lateral forces occur during operation of the scales and the combination mounting unit was installed in accordance with the requirements (see "Guide elements").

The guide element diverts horizontal forces up to 1.7 kN to the foundation and therefore minimizes effects on the load cells and the mounting components.

The load cell and combination mounting unit are not included in the scope of delivery of the guide element.

Dimensional drawings



Rated load	A	B	C	ØD	H	J	K	L	M
0.5 t, 1 t	100	145	75	11	12,5	15	25	79	140
2 t, 3.5 t, 5 t	100	190	75	11	57,5	15	25	79	140
10 t, 13 t	120	210	90	14	60	20	40	121,2	160

SIWAREX R guide element for combination mounting unit for load cells of the RN series, dimensions

Selection and Ordering Data

		Order No.
Guide element for combination mounting unit[1] for load cells of the RN series Consisting of: 2 flanges, 2 pivots, 1 adapter, fixing elements Material: Stainless steel		
For load cells with a rated load of		
• 0.5 t, 1 t	A)	**7MH4132-4AQ12**
• 2 t, 3.5 t, 5 t	A)	**7MH4132-4KQ12**
• 10 t, 13 t	A)	**7MH4134-5BQ12**

1) The load cell and combination mounting unit are not included in the scope of delivery.

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

Overview

The compression load cell is particularly suitable for implementation in container, hopper and vehicle scales.

Design

The measuring elements are four square posts made of stainless steel. Four strain gauges are fitted to each post.

The load which acts centrally in the measuring direction causes the spring bodies and therefore the friction-locked strain gauges to be elastically deformed. This generates a measuring signal voltage that is proportional to the load.

Technical specifications

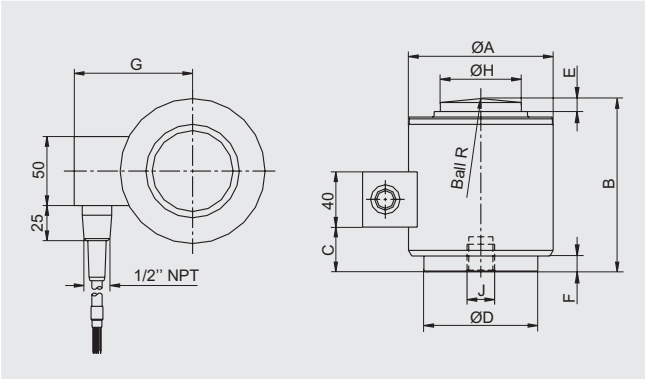
SIWAREX R load cell, CC series		
Possible applications	Container, hopper and vehicle scales	
Form	Pressure force	
Rated load / maximum load $E_{max.}$	10/25/40/60 t	100 t
Accuracy class according to OIML R60	C3	C1
Max. scale interval n_{LC}	3000	1000
Min. scale interval V_{min}	$E_{max.}$/12500	$E_{max.}$/10000
Minimum application range $R_{min(LC)}$	24%	10%
Combined error F_{comb}	≤ ± 0,02% C_n	≤ ± 0,03% C_n
Deviation F_v	≤ ± 0,01% C_n	≤ ± 0,02% C_n
Return of zero signal	≤ ± 0,0167% C_n [1]	≤ ± 0,05% C_n [1]
Creepage error F_{cr}		
• 30 min	≤ ± 0,0245% C_n [1]	≤ ± 0,049% C_n [1]
• 20 ... 30 min	≤ ± 0,0053% C_n [1]	≤ ± 0,0105% C_n [1]
Temperature coefficient		
• Zero signal T_{Ko}	≤ ± 0,0056% C_n/5K	≤ ± 0,007% C_n/5K
• Characteristic value T_{Kc}	≤ ± 0,0045% C_n/5K	≤ ± 0,0085% C_n/5K
Min. initial loading E_{min}	≥ 0% $E_{max.}$	≥ 0% $E_{max.}$
Max. working load L_u	150% $E_{max.}$	150% $E_{max.}$
Break load L_d	400% $E_{max.}$	400% $E_{max.}$
Max. lateral load L_{lq}	10% $E_{max.}$	10% $E_{max.}$
Rated measuring path h_n at $E_{max.}$	Max. 0.36 mm	Max. 0.36 mm
Supply voltage U_{sr} (reference value)	10 V	10 V
Supply voltage (range)	5 ... 25 V	5 ... 25 V
Rated characteristic value C_n	2 mV/V	2 mV/V
Tolerance D_c of characteristic value	± 1%	± 1%
Tolerance D_o of zero signal	≤ ± 1,0% C_n	≤ ± 1,0% C_n
Input resistance R_e	450 Ω ± 4.5 Ω	450 Ω ± 4.5 Ω
Output resistance R_a	480 Ω ± 4.8 Ω	480 Ω ± 4.8 Ω
Insulation resistance R_{is}	≥ 5000 MΩ	≥ 5000 MΩ
Rated temperature range B_{tn}	-10 ... +40 °C	-10 ... +40 °C
Operating temperature range B_{tu}	-40 ... +80 °C	-40 ... +80 °C
Storage temperature range B_{ts}	-40 ... +90 °C	-40 ... +90 °C
Sensor material (DIN)	Stainless steel, mat. no. 1.4542	Stainless steel, mat. no. 1.4542
Degree of protection to DIN EN 60,529; IEC 60,529	IP66/IP68	IP66/IP68
Current calibration [2]	Standard	Standard
Ex protection to ATEX (optional)	II 2 G EEx ib IIC T6/T4 II 3 G EEx nA/nL IIC T6/T4 II 1D/2D/3D T 70 °C	II 2 G EEx ib IIC T6/T4 II 3 G EEx nA/nL IIC T6/T4 II 1D/2D/3D T 70 °C

Cable connection	
Function	Color
• EXC +	• green
• EXC -	• Black
• SIG +	• White
• SIG -	• red
• Shield (shield connection on housing available soon)	• Transparent

1) For rated temperature -10 ... +40 °C.
2) "Current calibration": nominal characteristic value and output resistance are adjusted so that the output current is calibrated within 0.05% of a reference value. This makes it easier to connect several load cells in parallel.

Load cells

Dimensional drawings



Rated load	ØA	B	C	ØD	E
10 t, 25 t	73,0	82,5	12,0	58,0	6,5
40 t, 60 t	105,0	127,0	34,0	82,5	8,0
100 t	152,4	184,2	72,3	123,8	23,6

Rated load	F	G	ØH	J	Ball R
10 t, 25 t	1,8	64,0	31,8	M12x1.75, 11 deep	152
40 t, 60 t	11,0	87,5	58,7	M20x2.5, 20 deep	152
100 t	21,8	108,2	79,2	M20x2.5, 20 deep	432

CC series, dimensions

Selection and Ordering data — Order No.

CC series
Verification capability to OIML R60 up to 3000 d[1], connecting cable[2]) — 7MH4106-■■■■1

Nominal load	Length	
10 t	10 m	5AC
25 t	20 m	5EC
40 t	20 m	5HC
60 t	20 m	5LC
100 t	20 m	6AA

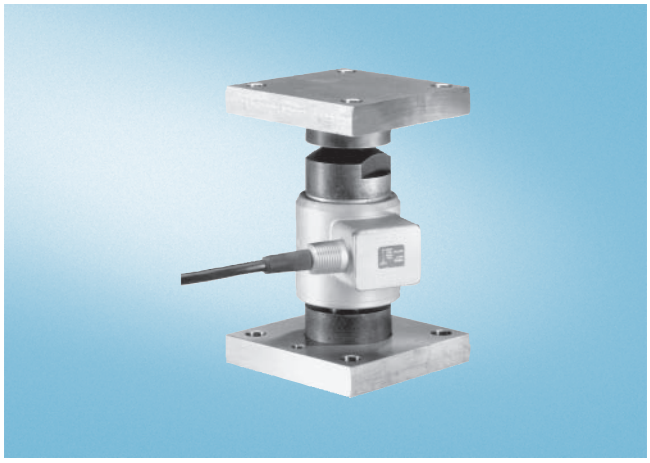
Explosion protection

Without	0
Ex protection for zone 1, 2, 20, 21, 22	1

1) Nominal load 100 t up to 1000 d.
2) Length tolerance ± 100 mm, from 20 m cable length ± 300 mm

4

Overview



The self-aligning bearing for the CC series load cells is particularly suitable for installation in container, hopper and vehicle scales.

Design

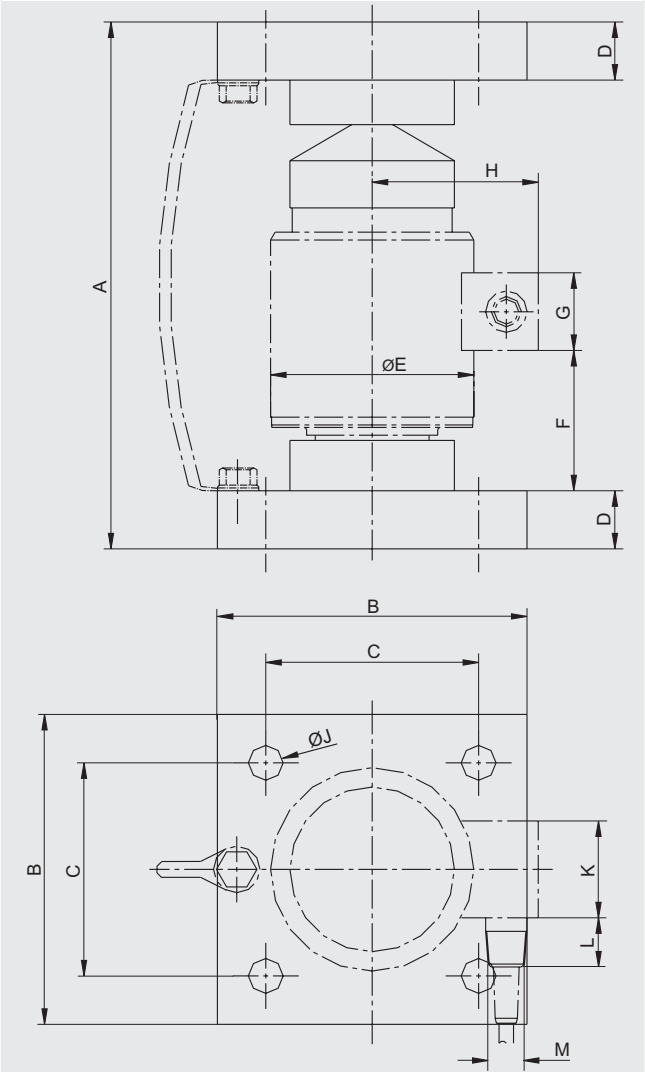
The self-aligning bearing consists of three force guiding pieces, a base plate and a top plate.

These components, in combination with the load cell, form a complete self-centering unit. This allows the top plate and thus the load carrier to follow horizontal displacements (e.g. due to temperature fluctuations). The construction of the self-aligning bearing creates a restoring force which is dependent on the size of the displacement and the applied load.

If the load carrier is displaced by more than 8 mm in the horizontal direction, measures for restricting sideways play (e.g. stops) must be implemented in the construction of the load carrier. Suitable measures must be provided on the construction of the load carrier to prevent it from raising up.

The load cell is not included in the scope of delivery of the self-aligning bearing.

Dimensional drawings



Rated load	A	B	C	D	ØE	F	G	H	ØJ	K	L	M
10 t, 25 t	190	120	90	20	73	32	40	64	14	50	25	1/2" NPT
40 t, 60 t	274	160	110	30	105	72	40	87	18	50	25	1/2" NPT
100 t	385	200	150	40	152	133	40	108	18	50	25	1/2" NPT

Self-aligning bearings for SIWAREX R load cells of the CC series, dimensions

Selection and Ordering Data

	Order No.
Self-aligning bearing [1)2)] For CC series load cells, consisting of top plate, base plate and 3 pressure pieces Material: Stainless steel [3)]	
For load cells with a rated load of	
• 10 t, 25 t	**7MH4136-5EA11**
• 40 t, 60 t	**7MH4136-5LA11**
• 100 t	**7MH4136-6AA11**

1) It is highly recommendable to use a grounding cable (7MH3701-1AA1) in order to protect the load cell.
2) The load cell is not included in the scope of delivery.
3) Pressure pieces made of 1.2083

Combination mounting unit

Overview

The self-aligning combination mounting unit for load cells of the CC series is particularly suitable for implementation in container, platform and roller table scales.

Design

The combination mounting unit consists of three force-guiding pieces, two countersunk screws as oscillation limit and protection against raising up, a top plate and a base plate

These components, in combination with the load cell, form a complete self-centering unit. This allows the top plate and thus the load carrier to follow horizontal displacements (e.g. due to temperature fluctuations). The construction of the self-aligning bearing creates a restoring force which is dependent on the size of the displacement and the applied load.

Oscillation limitation prevents the occurrence of excessive sideways displacement and reliably protects the load cell from damage.

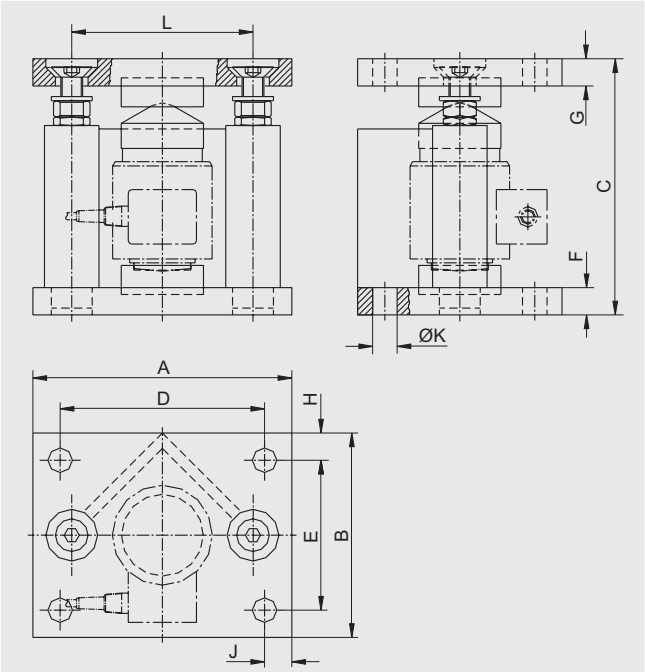
The max. sideways displacement is ± 4 mm.

The protection against raising up prevents lifting up of the load carrier.

Rated load	Max. horizontal force	Max. vertical force
10 t, 25 t	10 kN	20 kN
40 t, 60 t	15 kN	35 kN

The load cell is not included in the scope of delivery of the combination mounting unit.

Dimensional drawings



Rated load	A	B	C	D	I	F	G	H	J	ØK	L
10 t, 25 t	190	150	188	150	110	20	20	20	20	18	133
40 t, 60 t	250	200	273	190	150	30	30	25	30	22	182

Combination mounting unit for SIWAREX R load cells of the CC series, dimensions

Selection and Ordering Data

		Order No.
Combination mounting unit[1] for CC series load cells, consisting of: top plate, base plate, 3 pressure pieces, lift-off protection and oscillation limitation Material: Stainless steel [2]		
For load cells with a rated load of		
• 10 t, 25 t	A)	**7MH4136-5EC11**
• 40 t, 60 t [3]	A)	**7MH4136-5LC11**

1) The load cell is not included in the scope of delivery.
2) Pressure pieces made of 1.2083
3) It is highly recommendable to use a grounding cable (7MH3 701-1AA1) in order to protect the load cell.
A) Subject to export regulations AL: N, ECCN: EAR99H.

Overview

The compression load cell is particularly suitable for implementation in container and hopper scales.

Design

The measuring element is a solid cylinder made of stainless steel to which 4 strain gauges are applied.

The load which acts centrally in the measuring direction causes the spring bodies and therefore the friction-locked strain gauges to be elastically deformed. This generates a measuring signal voltage that is proportional to the load.

The rated measuring path of the load cell is dependent on the rated load and lies between 0.23 and 2.67 mm.

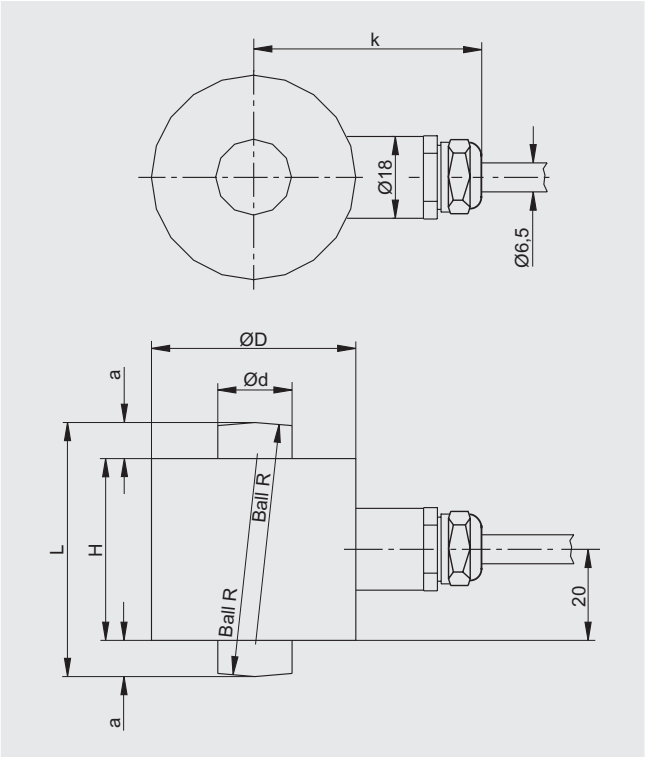
Technical specifications

SIWAREX R load cell, K series	
Possible applications	Container and hopper scales
Form	Pressure force
Rated load / maximum load $E_{max.}$	2.8/6/13/28/60/130/280 t
Accuracy class	0,1%
Combined error F_{comb}	< 0,1% C_n
Temperature coefficient	
• Zero signal T_{Ko}	≤ ± 0,025% C_n/5K
• Characteristic value T_{Kc}	≤ ± 0,025% C_n/5K
Min. initial loading E_{min}	≤ 0% $E_{max.}$
Max. working load L_u	120% $E_{max.}$
Break load L_d	300% $E_{max.}$
Max. lateral load L_{lq}	10% $E_{max.}$
Rated measuring path h_n at $E_{max.}$	0,23 ... 2.67 mm
Overload protection	–
Supply voltage U_{sr} (reference value)	6 V
Supply voltage (range)	6 ... 12 V
Rated characteristic value C_n	1.5 mV/V
Tolerance D_c of characteristic value	± 0,5%
Tolerance D_o of zero signal	≤ ± 1,5% C_n
Input resistance R_e	Approx. 275 Ω
Output resistance R_a	245 Ω ± 0.2 Ω
Insulation resistance R_{is}	≥ 20 MΩ
Rated temperature range B_{tn}	-10 ... +60 °C
Operating temperature range B_{tu}	-20 ... +70 °C
Storage temperature range B_{ts}	-30 ... +80 °C
Sensor material (DIN)	Steel, painted
Degree of protection to DIN EN 60529; IEC 60529	IP65

Cable connection

Function	Color
• EXC +	• red
• EXC -	• White
• SIG +	• Black
• SIG -	• Blue
• Screening	• Transparent

Dimensional drawings



Rated load	a	Ød	ØD	H	k	L	R
2.8 t, 6 t	8	16,7	45	40	54	56	50
13 t	12	24,5	55	44	59	68	66
28 t	14	36	64	46	63,5	74	72
60 t	20	52,7	90	50	76,5	90	100
130 t	26	77,5	121	64	92	116	125
280 t	45	114	165	80	114	170	183

SIWAREX R load cell, K series, dimensions

Selection and Ordering data

		Order No.
K series Accuracy class 0,1, without explosion protection, connecting cable[1)2)]		7MH3105-■■B0
Nominal load	**Length**	
2,8 t	5 m	2A
6 t	5 m	3A
13 t	10 m	1B
28 t	10 m	2B
60 t	10 m	3B
130 t	10 m	1C
280 t	10 m	2C

1) Length tolerance ± 100 mm
2) Cables heat-resistant: -60 ... +180 °C

4

Self-aligning bearing

Overview

The self-aligning bearing for the K series load cells is particularly suitable for installation in container and hopper scales.

Design

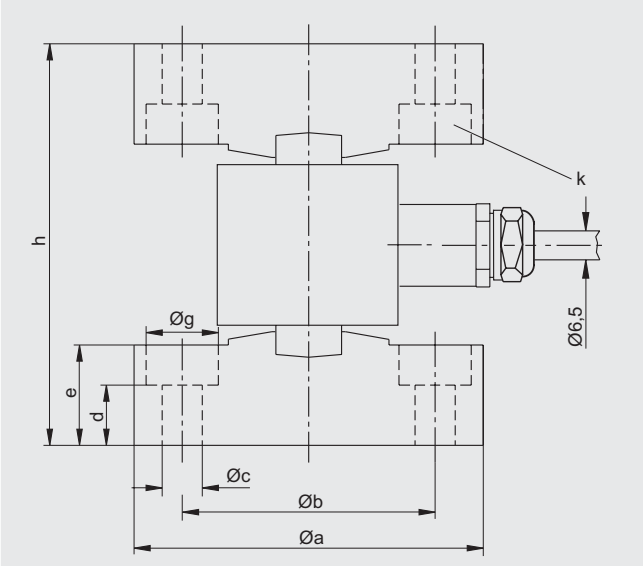
The self-aligning bearing consists of two pressure plates.

In combination with the load cell, the pressure plates form a self-centering unit. This allows the top plate and thus the load carrier to follow horizontal displacements (e.g. due to temperature fluctuations). The construction of the self-aligning bearing creates a restoring force which is dependent on the size of the displacement and the applied load.

If the load carrier is displaced by more than the value s (see table in dimensional drawing) in the horizontal direction, measures for restricting sideways play (e.g. stops) must be implemented in the construction of the load carrier. Suitable measures must be provided on the construction of the load carrier to prevent it from raising up.

The load cell is not included in the scope of delivery of the self-aligning bearing.

Dimensional drawings



Rated load	Øa	Øb ± 0.1	Øc	d	e
2.8 t, 6 t	87	63	11	14	25
13 t	97	73	11	21	32
28 t	108	84	11	-	28
60 t	137	112	11	-	42
130 t	176	148	11	-	52
280 t	226	190	14	-	65

Rated load	Øg	h	k	e
2.8 t, 6 t	18	100 +0,5/-1	Two drilled holes 180°	2
13 t	18	120 +0,5/-1		2,5
28 t	-	136 +0,5/-1		2,5
60 t	-	174 +0,5/-1	Four drilled holes 90°	3
130 t	-	220 +0,5/-1		4
280 t	-	300 +0,6/-1,2		6

Self-aligning bearings for SIWAREX R load cells of the K series, dimensions

Selection and Ordering Data

		Order No.
Pressure plate[1)2)]		
for K series load cells 2 pressure plates are required for a self-aligning bearing, one above and one below the load cell.		
Material: Steel, painted		
For load cells with a rated load of		
• 2.8 t, 6 t		**7MH3115-3AA1**
• 13 t	A)	**7MH3115-1BA1**
• 28 t	A)	**7MH3115-2BA1**
• 60 t	A)	**7MH3115-3BA1**
• 130 t	A)	**7MH3115-1CA1**
• 280 t	A)	**7MH3115-2CA1**

1) The load cell is not included in the scope of delivery.
2) It is highly recommendable to use a grounding cable (7MH3 701-1AA1) in order to protect the load cell.
A) Subject to export regulations AL: N, ECCN: EAR99H.

Overview

Number of load cells

The three-point bearing is static and provides a stable setup for every application.

The three-point bearing should therefore be preferred to the four-point or multi-point bearing wherever possible.

If a four-point or multi-point bearing is used and settling of the foundation expected, and if the supported system (also under load) is resistant to bending and warping, it must be expected in extreme cases that only two load cells lying on the diagonal will support the entire load.

If settling of the foundation can be ruled out, weight distribution on the load cells must be examined when the four-point or multi-point bearing is used. If the load distribution is unequal, compensation can be achieved by under-loading the load cells that carry a less than equal share of the total load.

Force bypass

Force bypasses occur when part of the load is deflected away from the load cells into the foundation.

The reason for force bypasses can vary (e.g. support by foreign bodies, friction, strain, etc.).

Prevention of force bypasses is essential because they cause measurement errors.

Rated load of load cells

The rated load is selected at maximum loading taking into account the center of gravity and load distribution over the individual load cells. The rated load is selected based on the load cell with the maximum load. It must be investigated whether the static load of the load cells is superimposed by a dynamic force. In this case, the rated load for the load cell must be calculated as the sum of the static load and the maximum dynamic peak force.

Example (see also "Configuration example 1")

Number of load cells:	**4**
Empty weight of container:	**1.2 t**
Maximum capacity:	**1.8 t**
Total load:	**3 t**

- For even load distribution, without dynamic interferences

Each of the 4 load cells is loaded with 3 t / 4 = 750 kg since the load is distributed evenly.

When the load cells are rated and selected, the calculated rated load is increased by approximately 20 % for safety reasons. The required rated load for the load cells is therefore 750 kg × 1.2 = 900 kg.

The next higher rated load step of 1 t must therefore be selected.

Configuration example 1

Overview

Example 1: Container weighing

The upright container has a total center of gravity S which lies above the level of the load cells.

It is supported on 4 brackets (specified by the container manufacturer), has an empty weight (i.e. dead load) of 1.2 t and a maximum capacity of 1.8 t. The load is evenly distributed over all 4 load cells.

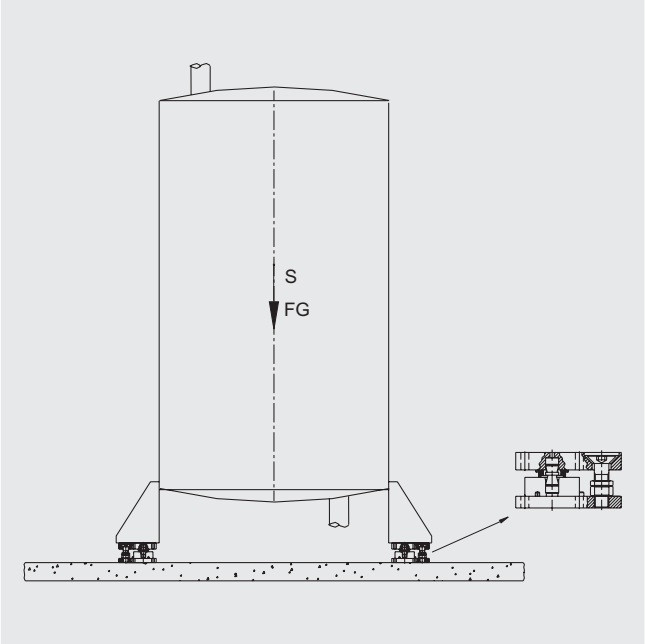
The scales are used in intrinsically-safe areas.

Note

A three-point bearing of the container is static and represents a stable state (see note in introduction).

Selection of load cells and mounting components

The rated load is determined (as described in the introduction) as 1 t.



Container on RN series load cells and combination mounting unit

For the above example, four SIWAREX R load cells of the RN series with a rated load of 1 t were used because the high-quality precision RN load cell features an extremely low constructional height.

Self-aligning combination mounting units were used as the mounting components because, apart from the self-alignment function and oscillation limitation, they also provide protection against raising up. Protection against raising up can absorb a vertical force of up to 10 kN. If larger "raising up" forces occur (e.g. due to high winds), the container must also be equipped with an additional natural disaster protection system.

Configurator for container weighing (basic configuration)

Item	Description	Order No.	Selection criterion	Number in example
1	SIWAREX R RN series, rated load 1 t, C3, with EEx ib II C T6 protection rating	**7MH5101-4AD01**	High-quality ring-torsion load cell with low constructional height, ideal for container weighing	4
2	Combination mounting unit for load cells of the RN series, 1 t, made of stainless steel	**7MH4132-4AC11** A)	Provides the self-aligning function with oscillation limitation as well as protection against raising up	4
3	Grounding cable	**7MH3701-1AA1**	For discharging undesirable currents	4

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

Overview

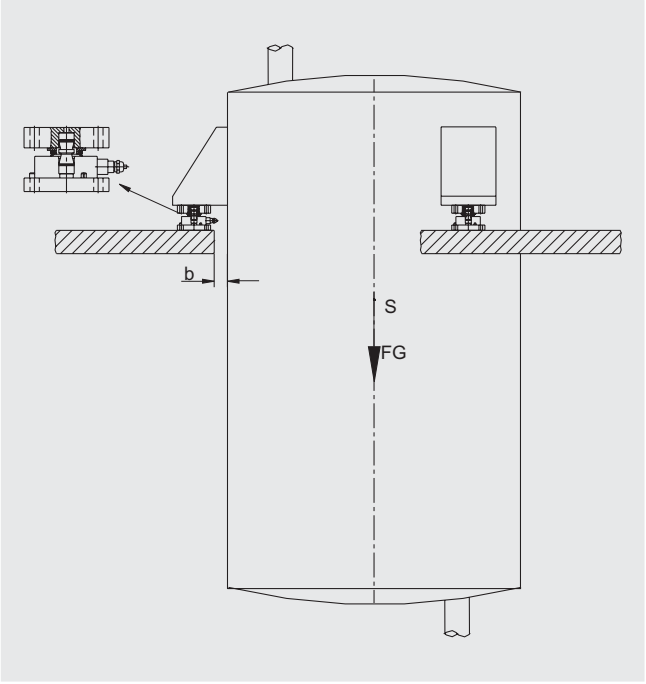
Example 2: Container weighing

The suspended container has a total center of gravity S which lies below the level of the load cells.

It is supported on 3 brackets, has an empty weight (i.e. dead load) of 1.2 t and a maximum capacity of 1.8 t. The container has a diameter of 1 m. While the individual components are being weighed, a chemical reaction occurs which raises the temperature of the container and its contents from 18 °C to 55 °C.

Selection of load cells and mounting components

It is recommended that three SIWAREX R load cells of the RN series with a rated load of 2 t be used (rated load is determined as described in the introduction). The load cells of the RN series were selected due to their low constructional height.



Container weighing with RN series load cells and self-aligning bearing

Self-aligning bearings are used as the mounting components because the container is suspended and cannot raise up off the self-aligning bearing.

The container diameter will increase by 0.4 mm due to the temperature increase of 37 K.

Since the self-aligning bearing permits a maximum oscillating movement of ± 4 mm, it is able to absorb the temperature increase of the container.

Oscillation limitation is not necessary because there is a small gap of b = 3 mm in width between the container and the platform. In this case, the platform acts as the oscillation limitation.

If the width of the gap is larger in other applications, you must decide whether to use combination mounting units instead of the self-aligning bearing or whether an external means of oscillation limitation should be implemented (see configuration example 4).

Configurator for container weighing (basic configuration)

Item	Description	Order No.	Selection criterion	Number in example
1	SIWAREX R RN series, rated load 2 t, C3, without EEx	**7MH5101-4GD00**	High-quality ring-torsion load cell with low constructional height, ideal for container weighing	3
2	Self-aligning bearing bottom unit for load cells of the RN series, 2 t, made of stainless steel	**7MH4132-4AG11** A)	Allows temperature expansions to be followed without interfering reactional forces being directed into the load cell	3
3	Self-aligning bearing top unit for load cells of the RN series, 2 t, made of stainless steel	**7MH4132-4KK11** A)		3
4	Grounding cable	**7MH3701-1AA1**	For discharging undesirable currents	3

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

Configuration example 3

Overview

Example 3: Mixer weighing

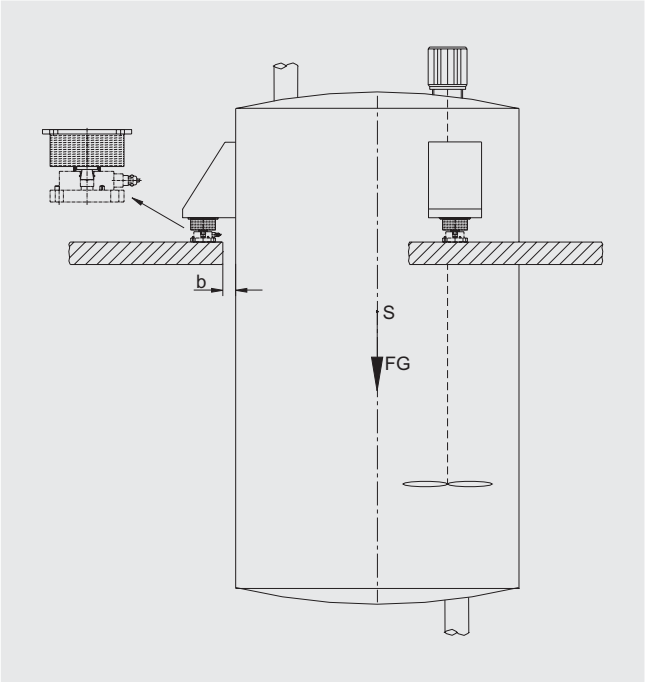
The suspended container has a total center of gravity S which lies below the level of the load cells.

It is supported on three brackets, has an empty weight (i.e. dead load) of 2.8 t and a maximum capacity of 4.5 t.

To improve mixing of the individual components, an agitator is mounted on the container which also operates during the weighing process.

Selection of load cells and mounting components

It is recommended that three SIWAREX R load cells of the RN series with a rated load of 3.5 t be used because the high-quality precision RN load cell has an extremely low constructional height (the rated load is determined as described in the introduction).



Container with agitator on RN series load cell and elastomer bearing

Self-centering elastomer bearings are used as the mounting components to minimize vibrations caused by the mixer.

The elastomer bearing permits a maximum oscillation path of ± 4 mm.

Oscillation limitation is not necessary because there is a small gap of b = 3 mm in width between the container and the platform.

If the width of the gap is larger in other applications, stops or external oscillation limiters (see configuration example 4) must be provided.

4

Configurator for mixer weighing (basic configuration)

Item	Description	Order No.	Selection criterion	Number in example
1	SIWAREX R RN series, rated load 3.5 t, C3, without EEx	**7MH5101-4LD00**	High-quality ring-torsion load cell with low constructional height, ideal for container weighing	3
2	Self-aligning bearing bottom unit for load cells of the RN series, 2 t, made of stainless steel	**7MH4132-4AG11** A)	For vibration damping to minimize the effects on the load cell	3
3	Elastomer bearing for load cells of the RN series, 2 t, made of neoprene and stainless steel	**7MH4130-4KE11** A)		3
4	Grounding cable	**7MH3701-1AA1**	For discharging undesirable currents	3

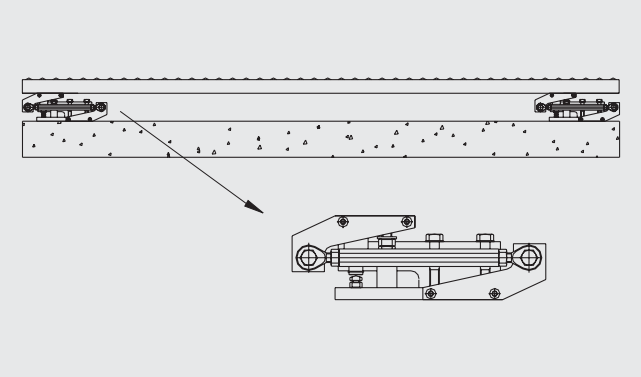
A) Subject to export regulations AL: N, ECCN: EAR99H.

Configuration example 4

Overview

Example 4: Roller table weighing

The roller table is supported on 4 load cells (as specified by the equipment manufacturer), has a weight of 500 kg (i.e. dead load) and weighs containers of up to 1000 kg.



Roller table weighing on SB series load cell and combination mounting unit with guide

The dead load is equally distributed over the 4 load cells. In a worst case scenario, the weight of the container is distributed over only 2 load cells.

For production reasons, the container cannot be halted on the conveyor for the weighing process.

Note

A three-point bearing of the roller table is static and represents a stable state (see note in introduction).

Selection of load cells and mounting components

It is recommended that four SIWAREX R load cells of the SB series with a rated load of 1 t be used because the load cells of the SB series are capable of absorbing high lateral forces in the preferred direction (rated load is determined as described in the introduction).

Self-aligning combination mounting units (only of stainless steel) with additive guide elements which transfer lateral forces of up to 1.7 kN are used as the mounting components.

The guide elements can deflect the lateral forces, caused when the container hits each roller, directly to the foundation. This protects the load cells from interference and the accuracy and reliability of the components are maintained.

The combination mounting unit also offers protection against raising up for vertical forces of up to 10 kN.

Configurator for roller table weighing (basic configuration)

Item	Description	Order No.	Selection criterion	Number in example
1	SIWAREX R SB series, rated load 1 t, C3, without EEx	**7MH4105-4AC01**	Rugged shear beam load cell, ideal for platform and conveyor scales	4
2	Combination mounting unit for load cells of the SB series, 1 t, made of stainless steel	**7MH4135-4DC11** A)	Provides the self-aligning function with oscillation limitation as well as protection against raising up	4
3	Guide element for combination mounting unit for load cells of the SB series, 1 t, made of stainless steel	**7MH4135-4DQ12** A)	Centers the scale in relation to the foundation when lateral forces occur continuously	4
4	Grounding cable	**7MH3701-1AA1**	For discharging undesirable currents	4

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

Accessories

5

Accessories for weighing modules

SIWAREX JB junction box, aluminum housing

Overview

The aluminium JB junction box is required for parallel connection of load cells. A maximum of 4 load cells can be connected in parallel in one junction box.

If more than 4 load cells are to be connected, a second junction box must be connected in parallel via a cross connection. The junction box can be used in potentially explosive areas (grounded, intrinsically-safe circuits).

Design

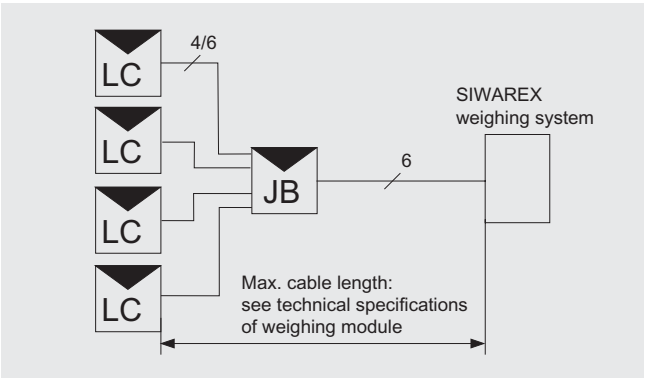
The junction box made of die-cast aluminum consists of a base section and a cover. The housing is sealed against penetration of dust and splashed water in accordance with IP66 degree of protection. The cables enter the casing via metric cable glands. In the housing, there are 28 terminals with spring-mounted contacts. The spring-mounted system results in vibration-resistant, maintenance-free connections.

The internal resistance, characteristic value and nominal load of all load cells connected in parallel must be identical. The values of these variables are not limited by the junction box. Load cells can be connected using a four-wire or six-wire system.

With the four-wire system, two jumpers must be set in addition.

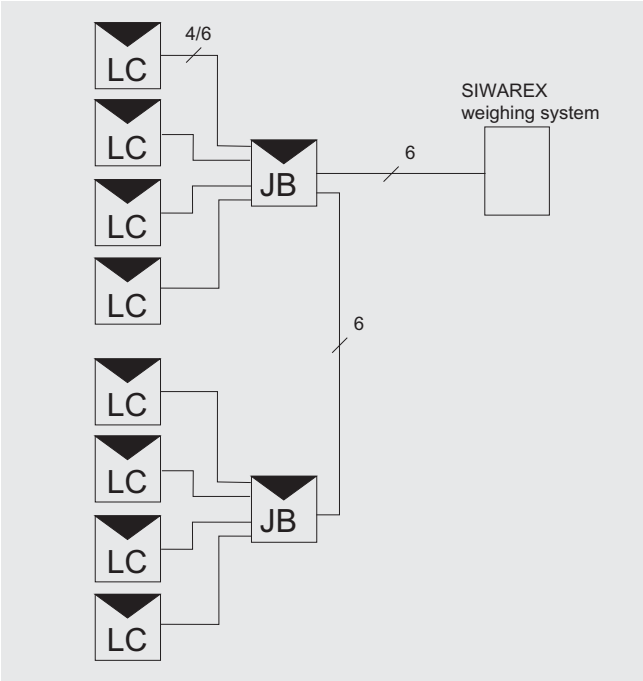
Connection examples

4 load cells



LC: load cell JB: aluminium junction box

8 load cells

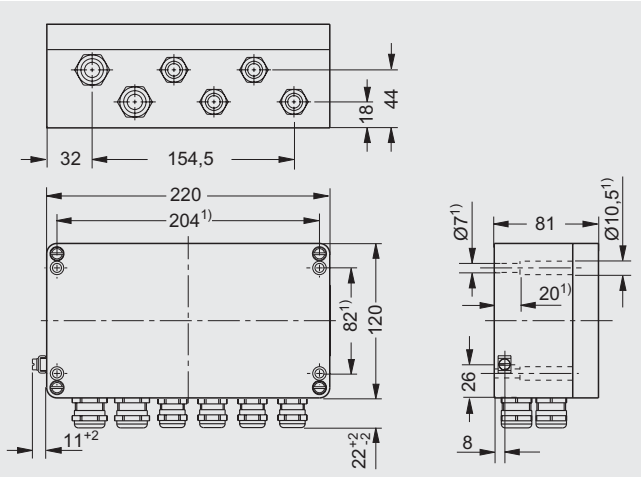


LC: load cell JB: aluminium junction box

Technical specifications

SIWAREX JB junction box, aluminum housing	
Cable glands	
• Load cells	4 x M16
• Electronics	2 x M20
Permissible ambient temperature	
• During operation	-30 ... +85 °C
• During operation for legal-for-trade medium accuracy weighing machine	-10 ... +40 °C
• During transportation and storage	-40 ... +90 °C
Degree of protection	IP66 to EN 60529
Vibration resistance of terminals to DIN VDE 0611 11/77	12 Hz and 50 Hz, amplitude 1 mm
Insulation resistance of terminals	$\geq 10^{12}$ Ω cm

Dimensional drawings



1) Drilled holes for mounting of housing

SIWAREX JB aluminium junction box (7MH4 710-1BA), dimensions

Selection and Ordering Data

	Order No.
SIWAREX JB junction box, aluminium housing for connecting up to 4 load cells in parallel, and for connecting several junction boxes	**7MH4710-1BA**
Cable (optional)	
Cable Li2Y 1 x 2 x 0.75 ST + 2 x (2 x 0.34 ST) - CY, orange sheath to connect SIWAREX U, CS, MS, FTA, FTC, M 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 outer diameter, for ambient temperature -40 ...+80 °C	**7MH4702-8AG**
Cable Li2Y 1 x 2 x 0.75 ST + 2 x (2 x 0.34 ST) - CY, blue sheath to connect the junction box (JB) or extension box (EB) in a potentially explosive atmosphere to the Ex interface (Ex-I), for fixed laying, occasional bending permitted, blue PVC insulating sheath, approx. 10.8 mm outer diameter, for ambient temperature -40 ... +80 °C	**7MH4702-8AF**

SIWAREX JB junction box, stainless steel housing

Overview

The stainless steel JB junction box is required for parallel connection of load cells. A maximum of 4 load cells can be connected in parallel in one junction box.

The junction box can be used in potentially explosive areas (grounded, intrinsically-safe circuits).

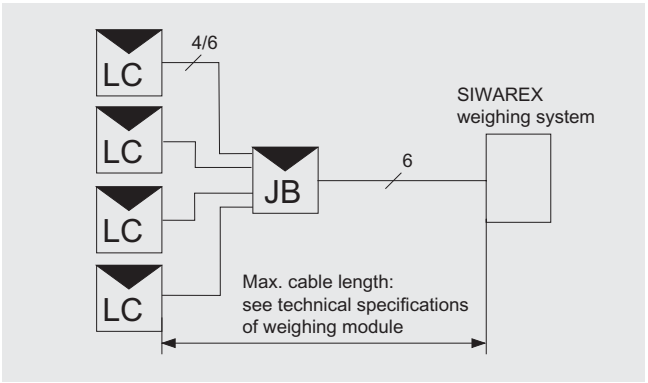
Design

The stainless steel junction box consists of a base section and a cover. The housing is sealed against penetration of dust and splashed water in accordance with IP66 degree of protection. The cables enter the casing via metric EMC cable glands (brass, nickel-plated). In the housing, there are 18 terminals with spring-mounted contacts. The spring-mounted system results in vibration-resistant, maintenance-free connections.

The internal resistance, characteristic value and nominal load of all load cells connected in parallel must be identical. The values of these variables are not limited by the junction box. Load cells can be connected using a four-wire or six-wire system.

With the four-wire system, two jumpers must be set in addition.

Connection example

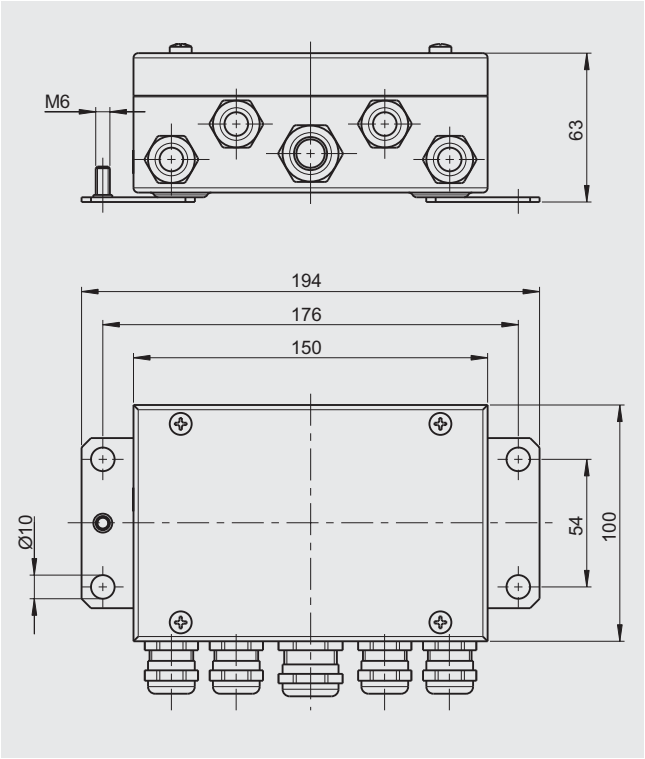


LC: load cell JB: stainless steel junction box

Technical specifications

SIWAREX JB junction box, stainless steel housing	
Cable glands	
• Load cells	4 x M16
• Electronics	1 x M20
Permissible ambient temperature	
• During operation	-30 ... +85 °C
• During operation for legal-for-trade medium accuracy weighing machine	-10 ... +40 °C
• During transportation and storage	-40 ... +90 °C
Degree of protection	IP66 to EN 60529
Vibration resistance of terminals to DIN VDE 0611 11/77	12 Hz and 50 Hz, amplitude 1 mm
Insulation resistance of terminals	$\geq 10^{12}$ Ω cm

Dimensional drawings



SIWAREX JB stainless steel junction box (7MH4710-1EA), dimensions

5

SIWAREX JB junction box, stainless steel housing

Selection and Ordering Data

	Order No.
SIWAREX JB junction box, stainless steel housing for connecting up to 4 load cells in parallel	**7MH4710-1EA**
Cable (optional)	
Cable Li2Y 1 x 2 x 0.75 ST + 2 x (2 x 0.34 ST) - CY, orange sheath to connect SIWAREX U, CS, MS, FTA, FTC, M 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 outer diameter, for ambient temperature -40 ... +80 °C	**7MH4702-8AG**
Cable Li2Y 1 x 2 x 0.75 ST + 2 x (2 x 0.34 ST) - CY, blue sheath to connect the junction box (JB) or extension box (EB) in a potentially explosive atmosphere to the Ex interface (Ex-I), for fixed laying, occasional bending permitted, blue PVC insulating sheath, approx. 10.8 mm outer diameter, for ambient temperature -40 ... +80 °C	**7MH4702-8AF**

SIWAREX EB extension box

Overview

The extension box EB is used to lengthen the connection cable of load cells.

Load cells can be connected using 4-wire and 6-wire systems. The cable connection to the weighing module or to the junction box JB must always be made using a 6-wire system. The SIWAREX cable 7MH4 702-8AG or ...-8AF is recommended.

If load cell cables are extended to a junction box JB, the cable glands M16 x 1.5 must be replaced. The following are required per load cell:

- 1 EMC cable gland M20 x 1.5
- 1 extension M16 x 1.5 male thread to M20 x 1.5 female thread.

The extension box can be used in potentially explosive areas (grounded, intrinsically-safe circuits).

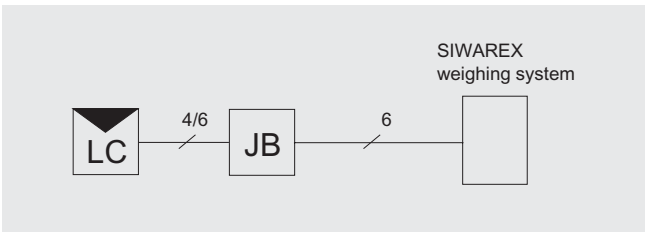
Design

The extension box EB has a housing made of die-cast aluminium. The housing is sealed against penetration of dust and splashed water in accordance with IP66. The cables enter the casing via metric EMC cable glands and are connected to spring-mounted terminals. The spring-mounted system results in vibration-resistant, maintenance-free connections.

When connecting load cells with a 4-wire system, two jumper elements are inserted for feedback of the sense signal.

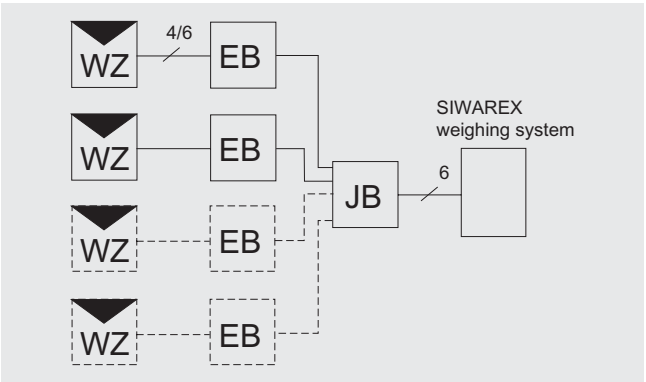
Connection examples

Connection of one load cell



LC: Load cell EB: Extension box

Connection of several load cells

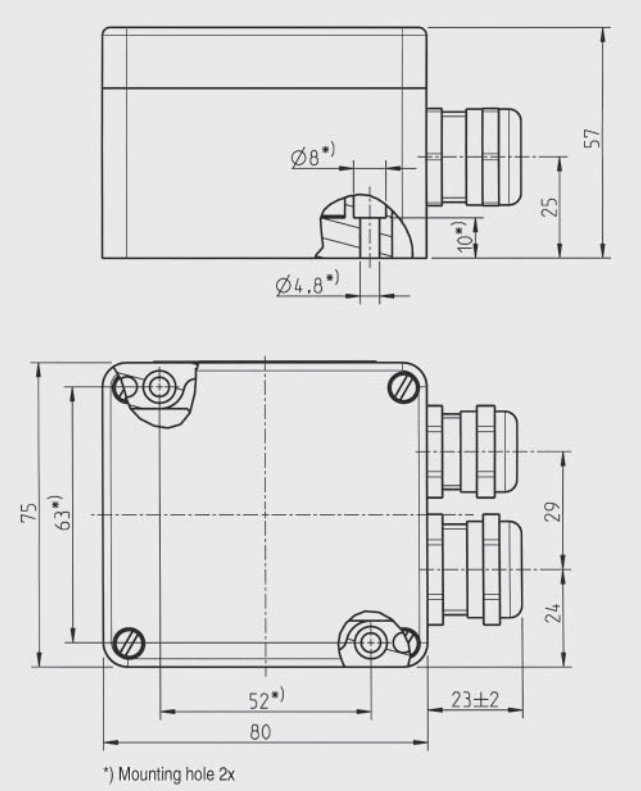


LC: Load cell EB: Extension box JB: Junction box

Technical specifications

SIWAREX EB Extension box	
Cable glands	
• of the load cell cable	M16 x 1.5
• Electronics	M20 x 1.5
Permissible ambient temperature	
• During operation	-30 ... +85 °C
• During operation for commercial scales with verification capability	-10 ... +40 °C
• During transportation and storage	-40 ... +90 °C
Degree of protection to EN 529	IP66
Vibration resistance of terminals to DIN VDE 0611 11/77	12 Hz and 50 Hz, amplitude 1 mm
Insulation resistance of terminals	$\geq 10^{12}$ Ωcm
Dimensions (H x W x D) in mm	80 x 75 x 57

Dimensional drawings



SIWAREX EB extension box (7MH4 710-2AA), dimensions

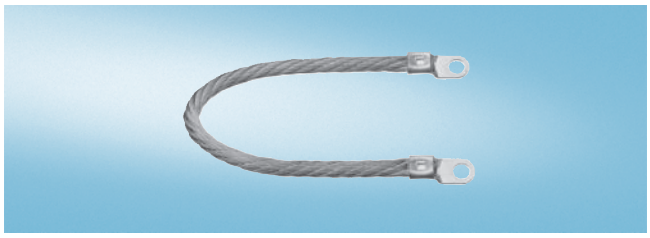
Selection and Ordering Data

	Order No.
SIWAREX EB extension box, aluminium housing to extend the connection cables of load cells	**7MH4710-2AA**
Cable (optional)	
Cable Li2Y 1 x 2 x 0.75 ST + 2 x (2 x 0.34 ST) - CY, orange sheath to connect SIWAREX U, M, P, FTA, FTC and CS to the junction box (JB), extension box (EB) or Ex interface (Ex-I) or between two JBs, for fixed laying, occasional bending is possible, 10.8 mm outer diameter, for ambient temperature -40 ... +80 °C	**7MH4702-8AG**
Cable Li2Y 1 x 2 x 0.75 ST + 2 x (2 x 0.34 ST) - CY, blue sheath to connect the junction box (JB) or extension box (EB) in a potentially explosive atmosphere to the Ex interface (Ex-I), for fixed laying, occasional bending is possible, blue PVC insulating sheath, approx. 10.8 mm outer diameter, for ambient temperature -40 ... +80 °C	**7MH4702-8AF**

Accessories for weighing modules

Grounding cable

Overview



The highly flexible grounding cable is used to discharge parasitic currents.

Design

The grounding cable is 400 mm long and corresponds to an electrical bypass.

It protects the load cell from undesirable voltages which can occur e.g. when welding or as a result of lightning.

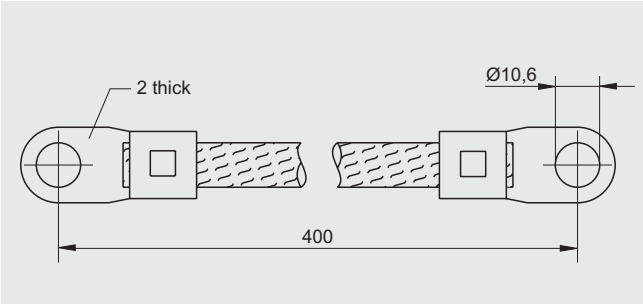
We recommend using one grounding cable for each load cell.

The load cell and/or other mounting elements are not included in the scope of delivery of the grounding cable.

Selection and Ordering Data

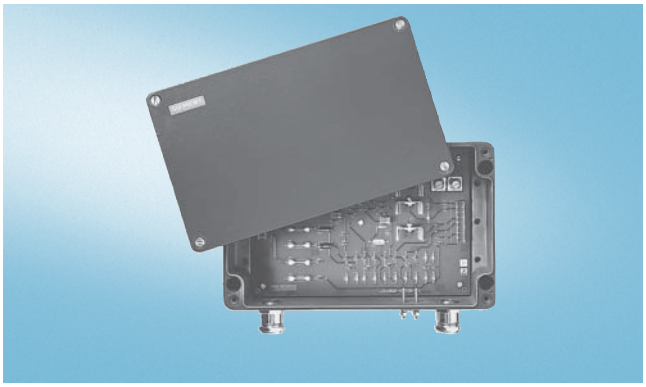
	Order No.
Grounding cable, copper	
For discharging parasitic currents	
400 mm long	**7MH3701-1AA1**

Dimensional drawings



Grounding cable, dimensions

Overview



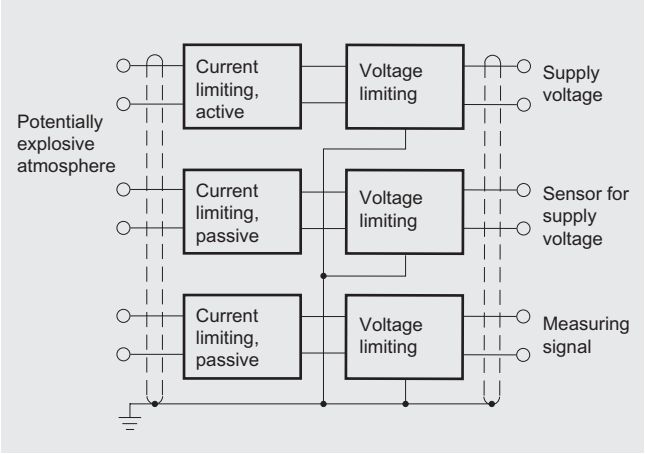
The SIWAREX Pi Ex interface can be used for the SIWAREX U, CS, MS, FTA, FTC and M weighing modules. It contains 6 safety barriers and has FM approval for devices of Class I Div.1. The Ex interface must be installed outside the potentially explosive area.

Not approved for use in the EU.

Function

Principle of operation

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



Function chart

Technical specifications

SIWAREX Pi Ex interface

Non-intrinsically-safe circuits

Load cell powering	
Rated voltage U_{n1}	10 V DC
Permissible error voltage	250 V AC
Internal resistance of the load cells	≥ 87 Ω
(Total)	< 4010 Ω
Sensor line	
Rated voltage U_{n2}	10 V DC
Permissible error voltage	250 V AC
Measuring signal line	
Rated voltage U_{n3}	10 ... 40 mV
Permissible error voltage	250 V AC

Intrinsically-safe circuits

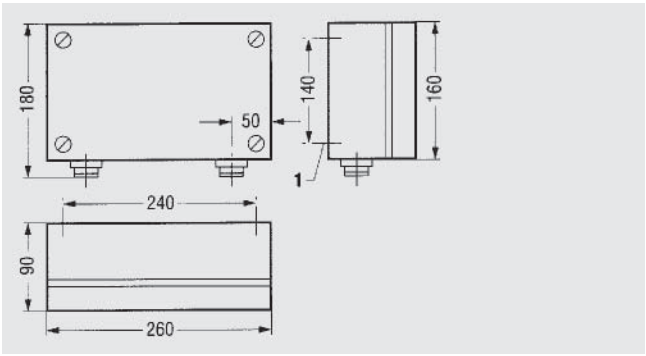
Load cell powering	
No-load voltage U_{01}	≤ 13.2 V DC
Voltageagainst equipotential bonding cond.	≤ 6.6 V DC
Short-circuit current I_{K1}	≤ 122 mA
Sensor line	
No-load voltage U_{02}	≤ 14.4 V DC
Voltage against equipotential bonding cond.	≤ 7.2 V DC
Short-circuit current I_{K2}	≤ 25 mA
Measuring signal line	
No-load voltage U_{03}	≤ 12.6 V DC
Voltage against equipotential bonding cond.	≤ 6.3 V DC
Short-circuit current I_{K3}	≤ 72 mA
Total connection values	
(when circuits are connected together)	
No-load voltage U_0	≤ 14.4 V DC
Short-circuit current I_K	≤ 219 mA
Power P_0	≤ 1.93 W
For gas group II C	
Max. permissible external capacitance C_{a3}	210 nF
Max. permissible external inductance L_a	0.3 mH
For gas group II B	
Max. permissible external capacitance C_{a3}	890 nF
Max. permissible external inductance L_a	1 mH
General data	
Housing dimensions	See dimensional drawing
Weight, approx.	2200 g
UL/CSA certification	Yes
Permissible ambient temperature	
• During operation	-10 ... +70 °C
• During operation for legal-for-trade medium accuracy weighing machine	-10 ... +40 °C
• During transportation and storage	-40 ... +85 °C
Permissible relative humidity	≤ 95%
Degree of protection	IP54
Type of explosion protection	Intrinsic safety "i" FM Class I Div. 1

5

Accessories for weighing modules

Pi Ex interface

Dimensional drawings



1 Drilled hole with 7 mm diam. fixing screw

Electrical connections: 2 Pg screwed glands and terminals
Housing material: die-cast aluminum

SIWAREX Pi Ex interface, dimensions

Selection and Ordering Data

	Order No.
Ex interface, type SIWAREX Pi With UL and FM approvals, but **without ATEX approval** for intrinsically-safe connection of load cells, suitable for the SIWAREX U, CS, MS, FTA, FTC, CS and M weighing modules. Not approved for use in the EU.	**7MH4710-5AA**
Manual for Ex interface type SIWAREX Pi	**C71000-T5974-C29**
Cable (optional)	
Cable Li2Y 1 x 2 x 0.75 ST + 2 x (2 x 0.34 ST) - CY, orange sheath to connect SIWAREX U, CS, MS, FTA, FTC, M 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 outer diameter, for ambient temperature -40 ... +80 °C	**7MH4702-8AG**
Cable Li2Y 1 x 2 x 0.75 ST + 2 x (2 x 0.34 ST) - CY, blue sheath to connect the junction box (JB) or extension box (EB) in a potentially explosive atmosphere to the Ex interface (Ex-I), for fixed laying, occasional bending permitted, blue PVC insulating sheath, approx. 10.8 mm outer diameter, for ambient temperature -40 ... +80 °C	**7MH4702-8AF**

IS Ex interface

Overview

The SIWAREX IS Ex interface can be used for the SIWAREX U, CS, MS, FTA, FTC, M and CF weighing modules. It contains 6 safety barriers and has the designation 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 50022.

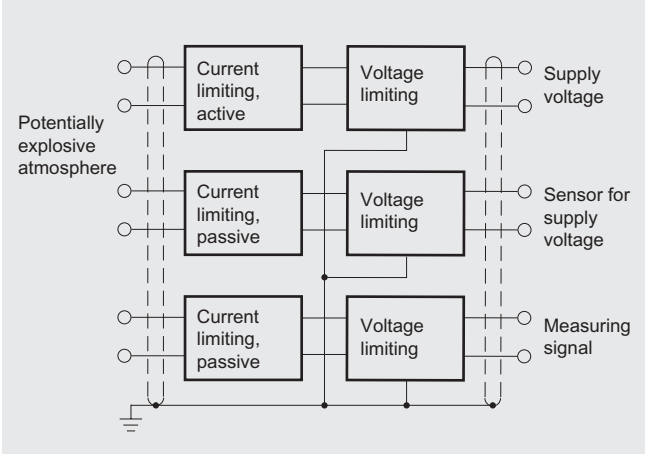
The SIWAREX IS only interferes with the load cell signal to a very small extent and is therefore approved for scales requiring verification.

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

Principle of operation

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



Function chart

Technical specifications

Ex interface, type SIWAREX IS	Standard	Low-current version
Non-intrinsically-safe circuits		
Load cell powering		
Rated voltage U_{n1}	10 V DC	
Permissible error voltage	250 V AC	
Internal resistance of the load cells (Total)	≥ 87 Ω < 4010 Ω	≥ 180 Ω

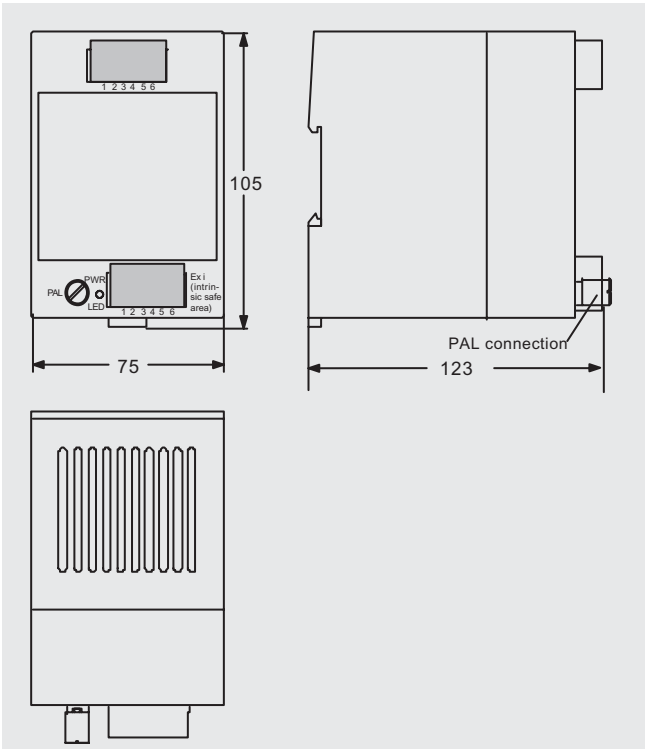
Ex interface, type SIWAREX IS	Standard	Low-current version
Sensor line		
Rated voltage U_{n2}	10 V DC	
Permissible error voltage	250 V AC	
Measuring signal line		
Rated voltage U_{n3}	10 ... 40 mV	
Permissible error voltage	250 V AC	
Intrinsically-safe circuits		
Load cell powering		
No-load voltage U_{01}	≤ 13.2 V DC	
Voltage against equipotential bonding cond.	≤ 6.6 V DC	
Short-circuit current I_{K1}	≤ 120 mA	≤ 58 mA
Sensor line		
No-load voltage U_{02}	≤ 14.3 V DC	
Voltage against equipotential bonding cond.	≤ 7.2 V DC	
Short-circuit current I_{K2}	≤ 25 mA	
Measuring signal line		
No-load voltage U_{03}	≤ 12.8 V DC	
Voltage against equipotential bonding cond.	≤ 6.4 V DC	
Short-circuit current I_{K3}	≤ 54 mA	
Total connection values		
(when circuits are connected together)		
No-load voltage U_0	≤ 14.3 V DC	
Short-circuit current I_K	≤ 199 mA	≤ 137 mA
Power P_0	≤ 1.835 W	≤ 1.025 W
For gas group II C		
Max. permissible external capacitance C_{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_{a3}	2000 nF	
Max. permissible external inductance L_a	1 mH	2 mH
General data		
Housing dimensions	See dimensional drawing	
Weight, approx.	500 g	
UL/CSA certification	Available soon	
Permissible ambient temperature		
• During operation	-10 ... +60 °C (for vertical mounting)	
• During operation for legal-for-trade medium accuracy weighing machine	-10 ... +40 °C (for vertical mounting)	
• During transportation and storage	-40 ... +85 °C	
Permissible relative humidity	≤ 95%	
Degree of protection	IP20	
Type of explosion protection	Intrinsic safety "i" [EEx ib] II C to ATEX FM: Available soon	

5

Accessories for weighing modules

IS Ex interface

Dimensional drawings



SIWAREX IS Ex interface, dimensions

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, M and CF weighing modules. Approved for use in the EU.	
Cable (optional)	
Cable Li2Y 1 x 2 x 0.75 ST + 2 x (2 x 0.34 ST) - CY, orange sheath to connect SIWAREX U, CS, MS, FTA, FTC, M 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 outer diameter, for ambient temperature -40 ... +80 °C	**7MH4702-8AG**
Cable Li2Y 1 x 2 x 0.75 ST + 2 x (2 x 0.34 ST) - CY, blue sheath to connect the junction box (JB) or extension box (EB) in a potentially explosive atmosphere to the Ex interface (Ex-I), for fixed laying, occasional bending permitted, blue PVC insulating sheath, approx. 10.8 mm outer diameter, for ambient temperature -40 ... +80 °C	**7MH4702-8AF**

6 Appendix

Faster and more applicable know-how: Hands-on training from the manufacturer

SITRAIN® – the Siemens Training for Automation and Industrial Solutions – provides you with comprehensive support in solving your tasks.

Training by the market leader in automation and plant engineering enables you to make independent decisions with confidence. Especially where the optimum and efficient use of products and plants are concerned. You can eliminate deficiencies in existing plants, and exclude expensive faulty planning right from the beginning.

First-class know-how directly pays for itself: In shorter startup times, high-quality end products, faster troubleshooting and reduced downtimes. In other words, increased profits and lower costs.

Achieve more with SITRAIN

- Shorter times for startup, maintenance and servicing
- Optimized production operations
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Contact

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www.siemens.com/sitrain

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(0.14 €/min from the German landline network)

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SITRAIN highlights

Top trainers

Our trainers are skilled teachers with direct practical experience. Course developers have close contact with product development, and directly pass on their knowledge to the trainers.

Practical experience

The practical experience of our trainers enables them to teach theory effectively. But since theory can be pretty drab, we attach great importance to practical exercises which can comprise up to half of of the course time. You can therefore immediately implement your new knowledge in practice. We train you on state-of-the-art methodically/didactically designed training equipment. This training approach will give you all the confidence you need.

Wide variety

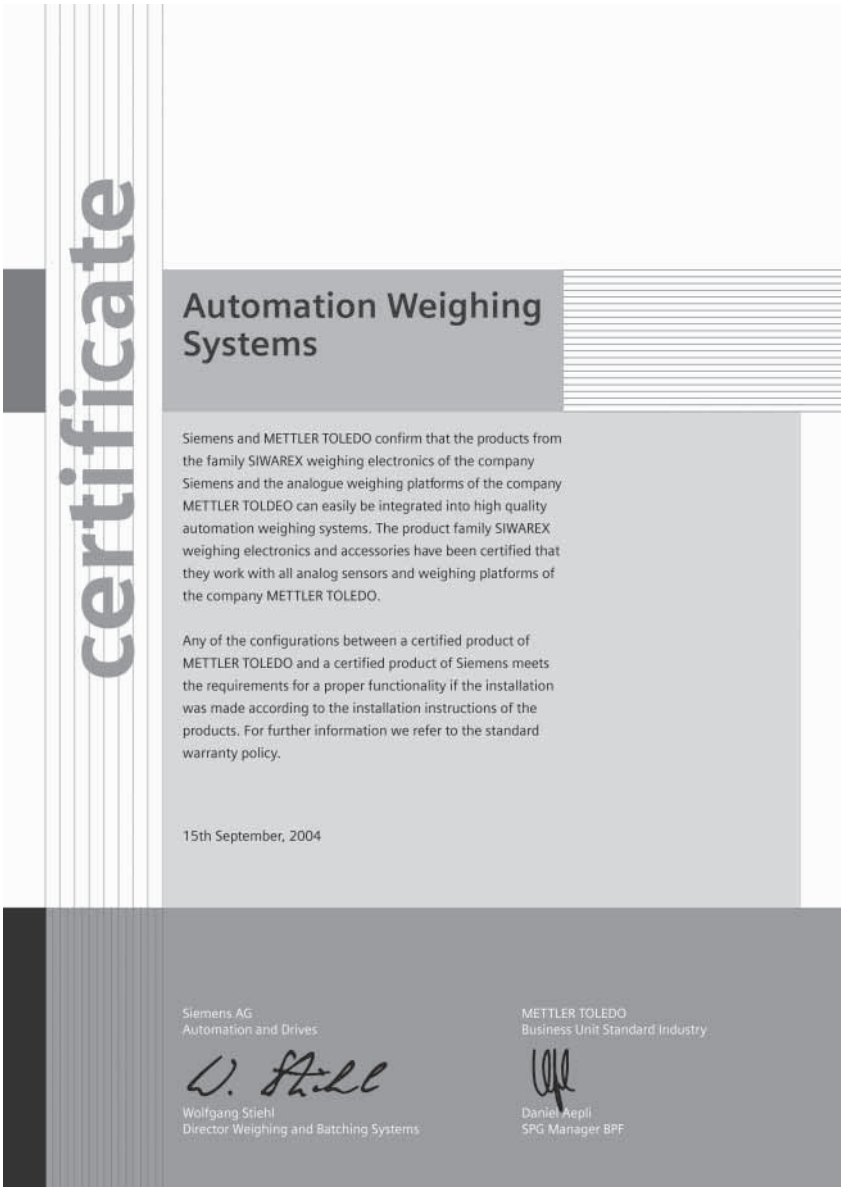
With a total of about 300 local attendance courses, we train the complete range of A&D products as well as interaction of the products in systems. Telecourses, teach-yourself software and seminars with a presenter on the Web supplement our classic range of courses.

Tailor-made training

We are only a short distance away. You can find us at more than 50 locations in Germany, and in 62 countries worldwide. You wish to have individual training instead of one of our 300 courses? Our solution: We will provide a program tailored exactly to your personal requirements. Training can be carried out in our Training Centers or at your company.

The right mixture: Blended learning

"Blended learning" means a combination of various training media and sequences. For example, a local attendance course in a Training Center can be optimally supplemented by a teach-yourself program as preparation or follow-up. Additional effect: Reduced traveling costs and periods of absence.



certificate

Automation Weighing Systems

Siemens and METTLER TOLEDO confirm that the products from the family SIWAREX weighing electronics of the company Siemens and the analogue weighing platforms of the company METTLER TOLDEO can easily be integrated into high quality automation weighing systems. The product family SIWAREX weighing electronics and accessories have been certified that they work with all analog sensors and weighing platforms of the company METTLER TOLEDO.

Any of the configurations between a certified product of METTLER TOLEDO and a certified product of Siemens meets the requirements for a proper functionality if the installation was made according to the installation instructions of the products. For further information we refer to the standard warranty policy.

15th September, 2004

Siemens AG
Automation and Drives

Wolfgang Stiehl
Director Weighing and Batching Systems

METTLER TOLEDO
Business Unit Standard Industry

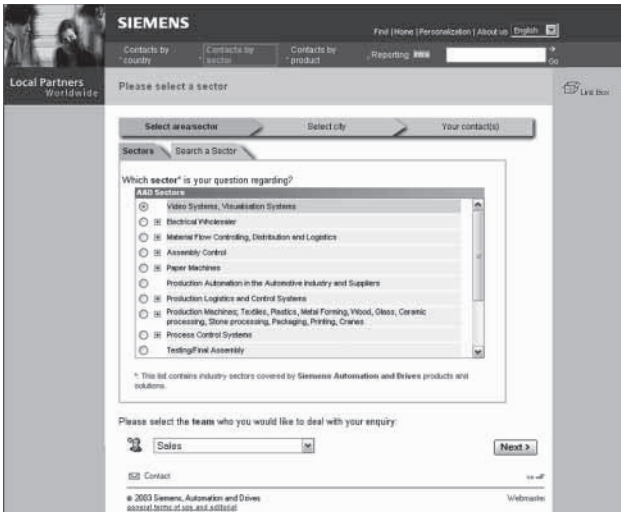
Daniel Aepli
SPG Manager BPF

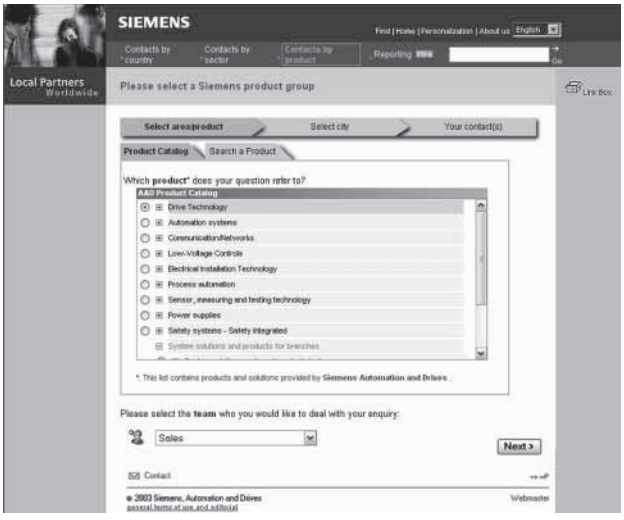
Siemens and METTLER TOLEDO have certified a number of their products which operate together optimally and which are the basis of high-quality automatic weighing systems. These comprise the components of the SIWAREX weighing electronics range and the analog weighing platforms from METTLER TOLEDO.

The corresponding products are identified in this catalog by

certified
Quality

Appendix
Siemens Contacts Worldwide





At

http://www.siemens.com/automation/partner

you can find details of Siemens contact partners worldwide responsible for particular technologies.

You can obtain in most cases a contact partner for

- Technical Support,
- Spare parts/repairs,
- Service,
- Training,
- Sales or
- Consultation/engineering.

You start by selecting a

- Country,
- Product or
- Sector.

By further specifying the remaining criteria you will find exactly the right contact partner with his/her respective expertise.

A&D in the WWW

A detailed knowledge of the range of products and services available is essential when planning and configuring automation systems. It goes without saying that this information must always be fully up-to-date.

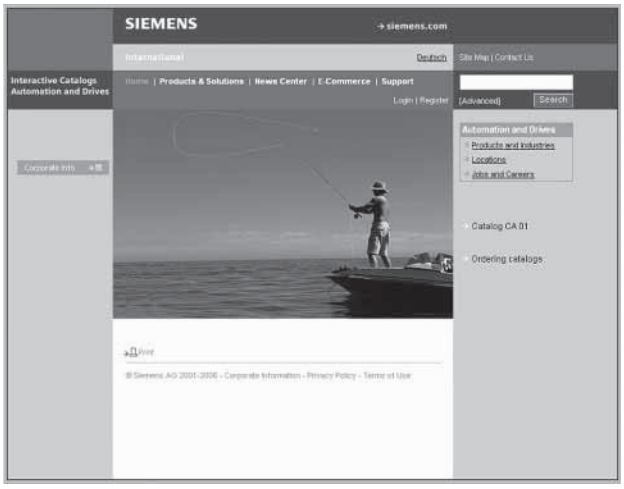
The Siemens Automation and Drives Group (A&D) has therefore built up a comprehensive range of information in the World Wide Web, which offers quick and easy access to all data required.

Under the address

http://www.siemens.com/automation

you will find everything you need to know about products, systems and services.

Product Selection Using the Offline Mall of Automation and Drives



Detailed information together with convenient interactive functions:
The Offline Mall CA 01 covers more than 80,000 products and thus provides a full summary of the Siemens Automation and Drives product base.

Here you will find everything that you need to solve tasks in the fields of automation, switchgear, installation and drives.
All information is linked into a user interface which is easy to work with and intuitive.

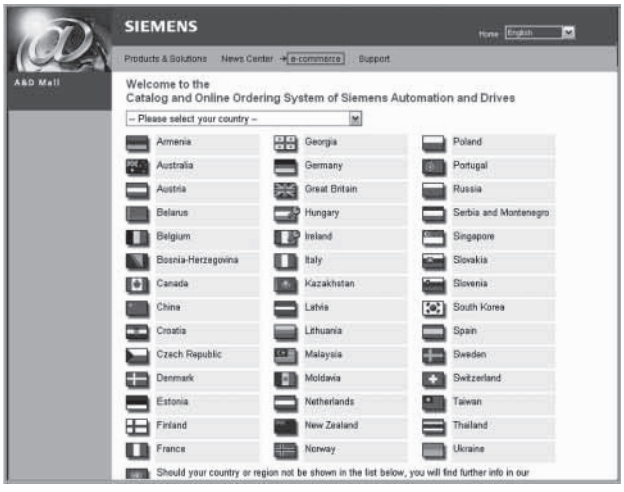
After selecting the product of your choice you can order at the press of a button, by fax or by online link.

Information on the Offline Mall CA 01 can be found in the Internet under

http://www.siemens.com/automation/ca01

or on CD-ROM or DVD.

Easy Shopping with the A&D Mall



The A&D Mall is the virtual department store of Siemens AG in the Internet. Here you have access to a huge range of products presented in electronic catalogs in an informative and attractive way.

Data transfer via EDIFACT allows the whole procedure from selection through ordering to tracking of the order to be carried out online via the Internet.

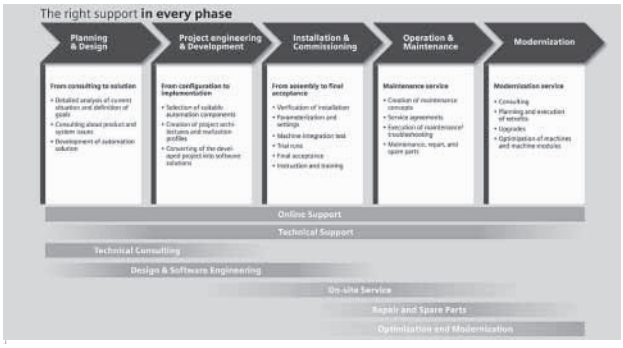
Numerous functions are available to support you.

For example, powerful search functions make it easy to find the required products, which can be immediately checked for availability. Customer-specific discounts and preparation of quotes can be carried out online as well as order tracking and tracing.

Please visit the A&D Mall on the Internet under:

http://www.siemens.com/automation/mall

Our Services for Every Phase of Your Project



In the face of harsh competition you need optimum conditions to keep ahead all the time:
A strong starting position. A sophisticated strategy and team for the necessary support - in every phase.
Service & Support from Siemens provides this support with a complete range of different services for automation and drives.

In every phase: from planning and startup to maintenance and upgrading.

Our specialists know when and where to act to keep the productivity and cost-effectiveness of your system running in top form.

Online Support

The comprehensive information system available round the clock via Internet ranging from Product Support and Service & Support services to Support Tools in the Shop.

http://www.siemens.com/automation/service&support

Technical Support

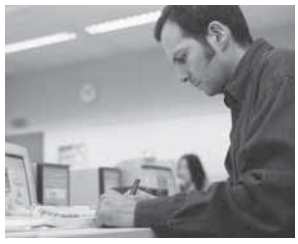
Competent consulting in technical questions covering a wide range of customer-oriented services for all our products and systems.

Tel.: +49 (0)180 50 50 222
Fax: +49 (0)180 50 50 223
http://www.siemens.com/automation/support-request

Technical Consulting

Support in the planning and designing of your project from detailed actual-state analysis, target definition and consulting on product and system questions right to the creation of the automation solution. [1)]

Configuration and Software Engineering



Support in configuring and developing with customer-oriented services from actual configuration to implementation of the automation project. [1)]

Service On Site

With Service On Site we offer services for startup and maintenance, essential for ensuring system availability.

In Germany
0180 50 50 444 [1)]

Repairs and Spare Parts

In the operating phase of a machine or automation system we provide a comprehensive repair and spare parts service ensuring the highest degree of operating safety and reliability.

In Germany
0180 50 50 446 [1)]

Optimization and Upgrading

To enhance productivity and save costs in your project we offer high-quality services in optimization and upgrading. [1)]

[1)] For country-specific telephone numbers go to our Internet site at: http://www.siemens.com/automation/service&support

Knowledge Base on CD-ROM

For locations without online connections to the Internet there are excerpts of the free part of the information sources available on CD-ROM (Service & Support Knowledge Base). This CD-ROM contains all the latest product information at the time of production (FAQs, Downloads, Tips and Tricks, Updates) as well as general information on Service and Technical Support.

The CD-ROM also includes a full-text search and our Knowledge Manager for targeted searches for solutions. The CD-ROM will be updated every 4 months.

Just the same as our online offer in the Internet, the Service & Support Knowledge Base on CD comes complete in 5 languages (German, English, French, Italian, Spanish).

You can order the **Service & Support Knowledge Base** CD from your Siemens contact.

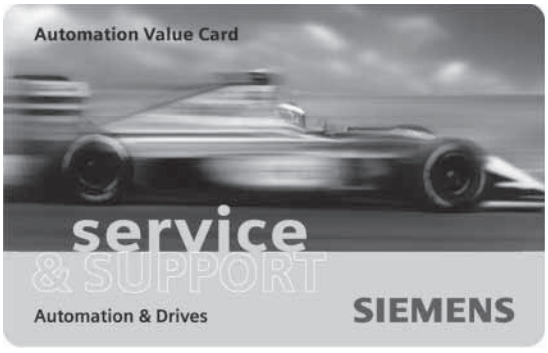
Order no. **6ZB5310-0EP30-0BA2**

Orders via the Internet
(with Automation Value Card or credit card) at:

http://www.siemens.com/automation/service&support

in the Shop domain.

Automation Value Card



Small card - great support

The Automation Value Card is an integral component of the comprehensive service concept with which Siemens Automation and Drives will accompany you in each phase of your automation project.

It doesn't matter whether you want just specific services from our Technical Support or want to purchase high-quality Support Tools in our Online Shop, you can always pay with your Automation Value Card. No invoicing, transparent and safe. With your personal card number and associated PIN you can view the state of your account and all transactions at any time.

Services on card. This is how it's done.

Card number and PIN are on the back of the Automation Value Card. When delivered, the PIN is covered by a scratch field, guaranteeing that the full credit is on the card.

By entering the card number and PIN you have full access to the Service & Support services being offered. The charge for the services procured is debited from the credits on your Automation Value Card.

All the services offered are marked in currency-neutral credits, so you can use the Automation Value Card worldwide.

Automation Value Card order numbers	
Credits	Order no.
200	**6ES7 997-0BA00-0XA0**
500	**6ES7 997-0BB00-0XA0**
1000	**6ES7 997-0BC00-0XA0**
10000	**6ES7 997-0BG00-0XA0**

Detailed information on the services offered is available on our Internet site at:

http://www.siemens.com/automation/service&support

Service & Support à la Card: Examples

Technical Support	
"Priority"	Priority processing for urgent cases
"24 h"	Availability round the clock
„Extended"	Technical consulting for complex questions
Support Tools in the Support Shop	
"System Utilities"	Tools that can be used directly for configuration, analysis and testing
"Applications"	Complete topic solutions including ready-tested software
"Functions & Samples"	Adaptable blocks for accelerating your developments

Overview

Software types

Software requiring a license is categorized into types.
The following software types have been defined:

- Engineering software
- Runtime software

Engineering software

This includes all software products for creating (engineering) user software, e.g. for configuring, programming, parameterizing, testing, commissioning or servicing.

Data generated with engineering software and executable programs can be duplicated for your own use or for use by third-parties free-of-charge.

Runtime software

This includes all software products required for plant/machine operation, e.g. operating system, basic system, system expansions, drivers, etc.

The duplication of the runtime software and executable programs created with the runtime software for your own use or for use by third-parties is subject to a charge.

You can find information about license fees according to use in the ordering data (e.g. in the catalog). Examples of categories of use include per CPU, per installation, per channel, per instance, per axis, per control loop, per variable, etc.

Information about extended rights of use for parameterization/configuration tools supplied as integral components of the scope of delivery can be found in the readme file supplied with the relevant product(s).

License types

Siemens Automation & Drives offers various types of software license:

- Floating license
- Single license
- Rental license
- Trial license

Floating license

The software may be installed for internal use on any number of devices by the licensee. Only the concurrent user is licensed. The concurrent user is the person using the program. Use begins when the software is started.
A license is required for each concurrent user.

Single license

Unlike the floating license, a single license permits only one installation of the software.

The type of use licensed is specified in the ordering data and in the Certificate of License (CoL). Types of use include for example per device, per axis, per channel, etc.

One single license is required for each type of use defined.

Rental license

A rental license supports the "sporadic use" of engineering software. Once the license key has been installed, the software can be used for a specific number of hours (the operating hours do not have to be consecutive).
One license is required for each installation of the software.

Trial license

A trial license supports "short-term use" of the software in a non-productive context, e.g. for testing and evaluation purposes.
It can be transferred to another license.

Factory license

With the Factory License the user has the right to install and use the software at one permanent establishment only. The permanent establishment is defined by one address only.The number of hardware devices on which the software may be installed results from the order data or the Certificate of License (CoL).

Certificate of license

The Certificate of License (CoL) is the licensee's proof that the use of the software has been licensed by Siemens. A CoL is required for every type of use and must be kept in a safe place.

Downgrading

The licensee is permitted to use the software or an earlier version/release of the software, provided that the licensee owns such a version/release and its use is technically feasible.

Delivery versions

Software is constantly being updated.
The following delivery versions

- PowerPack
- Upgrade

can be used to access updates.

Existing bug fixes are supplied with the ServicePack version.

PowerPack

PowerPacks can be used to upgrade to more powerful software. The licensee receives a new license agreement and CoL (Certificate of License) with the PowerPack. This CoL, together with the CoL for the original product, proves that the new software is licensed.
A separate PowerPack must be purchased for each original license of the software to be replaced.

Upgrade

An upgrade permits the use of a new version of the software on the condition that a license for a previous version of the product is already held.
The licensee receives a new license agreement and CoL with the upgrade. This CoL, together with the CoL for the previous product, proves that the new version is licensed.
A separate upgrade must be purchased for each original license of the software to be upgraded.

ServicePack

ServicePacks are used to debug existing products.
ServicePacks may be duplicated for use as prescribed according to the number of existing original licenses.

License key

Siemens Automation & Drives supplies software products with and without license keys.

The license key serves as an electronic license stamp and is also the "switch" for activating the software (floating license, rental license, etc.).

The complete installation of software products requiring license keys includes the program to be licensed (the software) and the license key (which represents the license).

Detailed explanations concerning license conditions can be found in the “Terms and Conditions of Siemens AG” or under http://www.siemens.com/automation/mall
(A&D Mall Online-Help System)

A&D/Software licenses/En 03.08.06

Appendix
Order No. index

Appendix

Appendix
Conditions of sale and delivery, Export regulations

Terms and Conditions of Sale and Delivery

By using this catalog you can acquire hardware and software products described therein from Siemens AG subject to the following terms. Please note! The scope, the quality and the conditions for supplies and services, including software products, by any Siemens entity having a registered office outside of Germany, shall be subject exclusively to the General Terms and Conditions of the respective Siemens entity. The following terms apply exclusively for orders placed with Siemens AG.

For customers with a seat or registered office in Germany

The "General Terms of Payment" as well as the "General Conditions for the Supply of Products and Services of the Electrical and Electronics Industry" shall apply.

For software products, the "General License Conditions for Software Products for Automation and Drives for Customers with a Seat or registered Office in Germany" shall apply.

For customers with a seat or registered office outside of Germany

The "General Terms of Payment" as well as the "General Conditions for Supplies of Siemens, Automation and Drives for Customers with a Seat or registered Office outside of Germany" shall apply.

For software products, the "General License Conditions for Software Products for Automation and Drives for Customers with a Seat or registered Office outside of Germany" shall apply.

General

The dimensions are in mm. In Germany, according to the German law on units in measuring technology, data in inches only apply to devices for export.

Illustrations are not binding.

Insofar as there are no remarks on the corresponding pages, - especially with regard to data, dimensions and weights given - these are subject to change without prior notice.

The prices are in € (Euro) ex works, exclusive packaging.

The sales tax (value added tax) is not included in the prices. It shall be debited separately at the respective rate according to the applicable legal regulations.

Prices are subject to change without prior notice. We will debit the prices valid at the time of delivery.

Surcharges will be added to the prices of products that contain silver, copper, aluminum, lead and/or gold if the respective basic official prices for these metals are exceeded. These surcharges will be determined based on the official price and the metal factor of the respective product.

The surcharge will be calculated on the basis of the official price on the day prior to receipt of the order or prior to the release order.
The metal factor determines the official price as of which the metal surcharges are charged and the calculation method used. The metal factor, provided it is relevant, is included with the price information of the respective products.

An exact explanation of the metal factor and the text of the Comprehensive Terms and Conditions of Sale and Delivery are available free of charge from your local Siemens business office under the following Order Nos.:

- 6ZB5310-0KR30-0BA1
  (for customers based in Germany)
- 6ZB5310-0KS53-0BA1
  (for customers based outside Germany)

or download them from the Internet
http://www.siemens.com/automation/mall
(Germany: A&D Mall Online-Help System)

Export regulations

The products listed in this catalog / price list may be subject to European / German and/or US export regulations.

Therefore, any export requiring a license is subject to approval by the competent authorities.

According to current provisions, the following export regulations must be observed with respect to the products featured in this catalog / price list:

AL	Number of the German Export List Products marked other than "N" require an export license. In the case of software products, the export designations of the relevant data medium must also be generally adhered to. Goods labeled with an "AL" not equal to "N" are subject to a European or German export authorization when being exported out of the EU.
ECCN	Export Control Classification Number Products marked other than "N" are subject to a reexport license to specific countries. In the case of software products, the export designations of the relevant data medium must also be generally adhered to. Goods labeled with an "ECCN" not equal to "N" are subject to a US re-export authorization.

Even without a label or with an "AL: N" or "ECCN: N", authorization may be required due to the final destination and purpose for which the goods are to be used.

The deciding factors are the AL or ECCN export authorization indicated on order confirmations, delivery notes and invoices.

Errors excepted and subject to change without prior notice.

A&D/VuL_ohne MZ/En 05.09.06

Catalogs of the Automation and Drives Group (A&D)

Further information can be obtained from our branch offices listed in the appendix or at www.siemens.com/automation/partner

	Catalog
Automation and Drives	
Interactive catalog on CD-ROM and on DVD	
• The Offline Mall of Automation and Drives	CA 01
Automation Systems for Machine Tools	
SINUMERIK & SIMODRIVE	NC 60
SINUMERIK & SINAMICS	NC 61
Drive Systems	
Variable-Speed Drives	
SINAMICS G110/SINAMICS G120 Inverter Chassis Units SINAMICS G120D Distributed Frequency Inverters	D 11.1
SINAMICS G130 Drive Converter Chassis Units, SINAMICS G150 Drive Converter Cabinet Units	D 11
SINAMICS GM150/SINAMICS SM150 Medium-Voltage Converters	D 12
SINAMICS S120 Drive Converter Systems	D 21.1
SINAMICS S150 Drive Converter Cabinet Units	D 21.3
Asynchronous Motors Standardline	D 86.1
Synchronous Motors with Permanent-Magnet Technology, HT-direct	D 86.2
DC Motors	DA 12
SIMOREG DC MASTER 6RA70 Digital Chassis Converters	DA 21.1
SIMOREG K 6RA22 Analog Chassis Converters	DA 21.2
SIMOREG DC MASTER 6RM70 Digital Converter Cabinet Units	DA 22
SIMOVERT PM Modular Converter Systems	DA 45
SIEMOSYN Motors	DA 48
MICROMASTER 410/420/430/440 Inverters	DA 51.2
MICROMASTER 411/COMBIMASTER 411	DA 51.3
SIMOVERT MASTERDRIVES Vector Control	DA 65.10
SIMOVERT MASTERDRIVES Motion Control	DA 65.11
Synchronous and asynchronous servomotors for SIMOVERT MASTERDRIVES	DA 65.3
SIMODRIVE 611 universal and POSMO	DA 65.4
Low-Voltage Three-Phase-Motors	
IEC Squirrel-Cage Motors	D 81.1
Automation Systems for Machine Tools SIMODRIVE	NC 60
• Main Spindle/Feed Motors	
• Converter Systems SIMODRIVE 611/POSMO	
Automation Systems for Machine Tools SINAMICS	NC 61
• Main Spindle/Feed Motors	
• Drive System SINAMICS S120	
Drive and Control Components for Hoisting Equipment	HE 1
Electrical Installation Technology	
PDF: ALPHA Small Distribution Boards and Distribution Boards, Terminal Blocks	*ET A1*
PDF: ALPHA 8HP Molded-Plastic Distribution System	*ET A3*
PDF: BETA Low-Voltage Circuit Protection	*ET B1*
PDF: DELTA Switches and Socket Outlets	*ET D1*
GAMMA Building Controls	ET G1
Human Machine Interface Systems SIMATIC HMI	ST 80

	Catalog
Industrial Communication for Automation and Drives	IK PI
Low-Voltage	
Controls and Distribution – SIRIUS, SENTRON, SIVACON	LV 1
Controls and Distribution – Technical Information SIRIUS, SENTRON, SIVACON	LV 1 T
SIDAC Reactors and Filters	LV 60
SIVENT Fans	LV 65
SIVACON 8PS Busbar Trunking Systems	LV 70
Motion Control System SIMOTION	PM 10
Process Instrumentation and Analytics	
Field Instruments for Process Automation Measuring Instruments for Pressure, Differential Pressure, Flow, Level and Temperature, Positioners and Liquid Meters	FI 01
PDF: Indicators for panel mounting	*MP 12*
SIREC Recorders and Accessories	MP 20
SIPART, Controllers and Software	MP 31
SIWAREX Weighing Systems	WT 01
Continuous Weighing and Process Protection	WT 02
Process Analytical Instruments	PA 01
PDF: Process Analytics, Components for the System Integration	*PA 11*
SIMATIC Industrial Automation Systems	
SIMATIC PCS Process Control System	ST 45
Products for Totally Integrated Automation and Micro Automation	ST 70
SIMATIC PCS 7 Process Control System	ST PCS 7
Add-ons for the SIMATIC PCS 7 Process Control System	ST PCS 7.1
Migration solutions with the SIMATIC PCS 7 Process Control System	ST PCS 7.2
pc-based Automation	ST PC
SIMATIC Control Systems	ST DA
SIMATIC Sensors	
Sensors for Factory Automation	FS 10
Systems Engineering	
Power supplies SITOP power	KT 10.1
System cabling SIMATIC TOP connect	KT 10.2
System Solutions	
Applications and Products for Industry are part of the interactive catalog CA 01	
TELEPERM M Process Control System	
PDF: AS 488/TM automation systems	*PLT 112*

PDF: These catalogs are only available as pdf files.