SIEMENS

Weighing systems

SIWAREX WL200 load cells

Operating Instructions

04/2009
A5E02199611B-03

Legal information

Warning notice system

This manual contains notices you have to observe in order to ensure your personal safety, as well as to prevent damage to property. The notices referring to your personal safety are highlighted in the manual by a safety alert symbol, notices referring only to property damage have no safety alert symbol. These notices shown below are graded according to the degree of danger.

⚠DANGER
indicates that death or severe personal injury **will** result if proper precautions are not taken.

⚠WARNING
indicates that death or severe personal injury **may** result if proper precautions are not taken.

⚠CAUTION
with a safety alert symbol, indicates that minor personal injury can result if proper precautions are not taken.

CAUTION
without a safety alert symbol, indicates that property damage can result if proper precautions are not taken.

NOTICE
indicates that an unintended result or situation can occur if the corresponding information is not taken into account.

If more than one degree of danger is present, the warning notice representing the highest degree of danger will be used. A notice warning of injury to persons with a safety alert symbol may also include a warning relating to property damage.

Qualified Personnel

The device/system may only be set up and used in conjunction with this documentation. Commissioning and operation of a device/system may only be performed by **qualified personnel**. Within the context of the safety notes in this documentation qualified persons are defined as persons who are authorized to commission, ground and label devices, systems and circuits in accordance with established safety practices and standards.

Proper use of Siemens products

Note the following:

⚠WARNING
Siemens products may only be used for the applications described in the catalog and in the relevant technical documentation. If products and components from other manufacturers are used, these must be recommended or approved by Siemens. Proper transport, storage, installation, assembly, commissioning, operation and maintenance are required to ensure that the products operate safely and without any problems. The permissible ambient conditions must be adhered to. The information in the relevant documentation must be observed.

Trademarks

All names identified by ® are registered trademarks of the Siemens AG. The remaining trademarks in this publication may be trademarks whose use by third parties for their own purposes could violate the rights of the owner.

Disclaimer of Liability

We have reviewed the contents of this publication to ensure consistency with the hardware and software described. Since variance cannot be precluded entirely, we cannot guarantee full consistency. However, the information in this publication is reviewed regularly and any necessary corrections are included in subsequent editions.

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Table of contents

Introduction

1

1.1 History

The following versions of this documentation have been released to date. The changes apply to the previous version:

Edition	Comment / change
10/2008	Initial release
04/2009	Load cell SP-S SA 30 t added. Designation updated: WL200 instead of WL 200. Corrections made mainly to the technical data. Additions for explosion protection and ATEX approval

1.2 Environmental protection

Environmental protection

Devices described in this programming manual can be recycled owing to the low content of noxious substances in their version. Please contact a certified waste disposal company for eco-friendly recycling and to dispose of your old devices.

Notes on handling the product

2

Proper use

Proper use means that this product must only be used within the limits of the technical specifications and intended purposes of these operating instructions.

If this device is used properly in compliance with the safety notices, this device will not present any danger.

This device can only function correctly and safely if it is transported, stored, set up and mounted correctly.

Correct operation of the device must be ensured by complying with the technical specifications.

Improper handling can result in death, personal injury or property damage.

Notes on responsibility for defects

We expressly point out that the product quality is exclusively and conclusively described in the sales contract. The content of this product documentation is neither part of a previous or existing agreement, promise or legal relationship, nor is it intended to modify these. All obligations on the part of Siemens AG are contained in the respective sales contract, which also contains the complete and solely applicable liability provisions. The provisions defined in the sales contract for the responsibility for defects are neither extended nor limited by the remarks in this document.

Delivery information

The current scope of delivery is listed on the shipping documents enclosed with the delivery in accordance with the valid sales contract.

When opening the packaging, please observe the relevant information. Check the delivery for completeness and undamaged condition. In particular, the order number on the rating plate must be compared to the ordering data.

Before you start work, please read these operating instructions. They contain important information and data whose observation ensures the general safety and functionality of this device. The manual will help you to handle this product more easily and efficiently, allowing you to achieve reliable results.

Qualified personnel

In the context of this documentation, qualified personnel are people who are familiar with the installation, mounting, commissioning, and operation of the product.

These people must have the following qualifications:

- They must be trained, instructed and authorized to operate and maintain devices and systems in accordance with their place of work and in compliance with the safety engineering standards for
  - Electrical circuits
  - High pressures
  - Corrosive and hazardous media
- They must be trained, instructed and authorized to maintain and use appropriate safety equipment according to the standards for safety engineering.
- In the case of devices with explosion protection, qualified persons must be trained, instructed and authorized to perform work on electrical circuits in plants subject to explosion hazards.

Important notes on cleaning

CAUTION
Damage to load cells, measurement errors
Dirt must not be allowed to accumulate in the vicinity of a load cell.
Do not subject cable glands and seals to the jet from a high-pressure hose.

Protection against explosion

⚠ WARNING
Risk of explosion
For applications in hazardous areas please observe the following information as otherwise there is a risk of explosion.
If used in hazardous areas the device requires an ATEX approval with test certification. The information in these documents must be observed when using the load cells in hazardous areas.
Keep to the national regulations and laws applicable in your country when making electrical connections in hazardous areas. In Germany, these include, for example: • Working reliability regulation • The directive for "Installation of electrical systems in hazardous areas", DIN EN 60079-14 (previously VDE 0165,T1) • The EC type examination certificate
If auxiliary power is required, check that it corresponds with that on the rating plate and with the test certification valid for your country.

Electrostatic Sensitive Devices - ESD

CAUTION
Damage to electrostatic sensitive devices This device contains electrostatic sensitive devices. Modules susceptible to electrical discharge can be destroyed by voltages that fall far below the limits of human perception. Voltages of this kind occur as soon as a component or an assembly is touched by a person who is not grounded against static electricity. The damage to a module as a result of overvoltage cannot usually be detected immediately. It may only become apparent after a long period of operation.

Trademarks

SIWAREX ® is a registered trademark of Siemens AG.

All other names appearing in these instructions may be trademarks; use of such names by third parties for their own purposes may infringe upon owners rights.

Description

3

3.1 Range of application

SIWAREX load cells are used for measuring forces and weights statically and dynamically. You can use SIWAREX load cells for almost all applications in industrial weighing technology. Examples include:

- Container weighers, hopper scales or platform scales,
- Roller table, conveyor or crane scales,
- Plants for bottling/packing, dosing and mixing,
- for checking levels and completeness,
- Equipment for monitoring pressing or stretching processes,
- Dynamic scales

All applications can be implemented in equipment requiring official calibration or in areas subject to explosion hazards.

3.2 Design and principle of operation

Design

SIWAREX load cells are based on strain gauges. Strain-gauge load cells are transducers which convert mechanical forces into electrical signals. The principle of operation is the same regardless of variations in design.

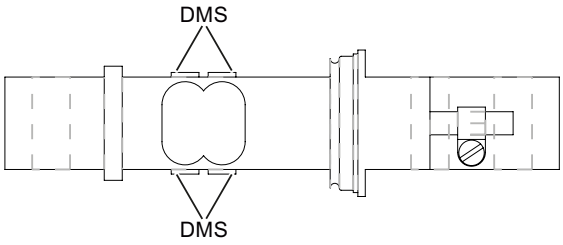


Figure 3-1 Design, based on the example of an unloaded bending beam load cell

Principle of operation

The basic component in each case is a special type of spring body. The application of force elastically deforms the spring body. The ohmic resistance of the strain gauges changes as a result.

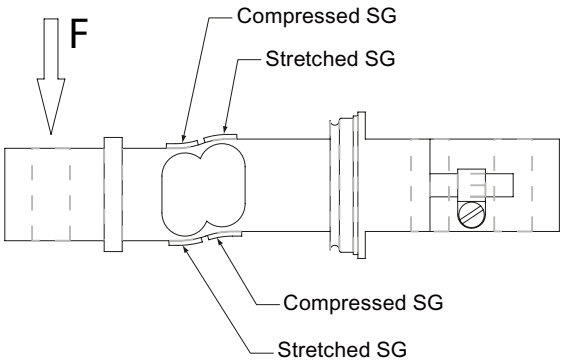


Figure 3-2 Principle of operation, based on the example of a loaded bending beam load cell

For each load cell, at least four strain gauges are connected together as a complete Wheatstone bridge. The stretched or compressed strain gauges are connected in such a manner that the positive or negative resistance changes are summed to produce an overall imbalance of the bridge.

The supply voltage is applied across one diagonal of the bridge and, in the case of the six-wire connection method, also the sensor voltage SENSE. The measured voltage is tapped across the other diagonal.

For a constant supply voltage EXC, therefore, the measured voltage SIG changes proportionally to the introduced load. In practice, load cells contain additional resistors for temperature compensation and for zero-signal and characteristic-value compensation. Depending on their type and the requirements, these resistors can be arranged at the input or output of the load cell.

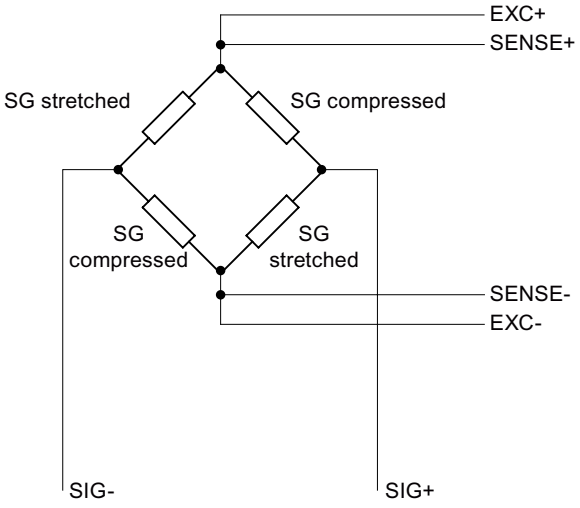


Figure 3-3 The principle of a Wheatstone bridge

3.3 Product overview

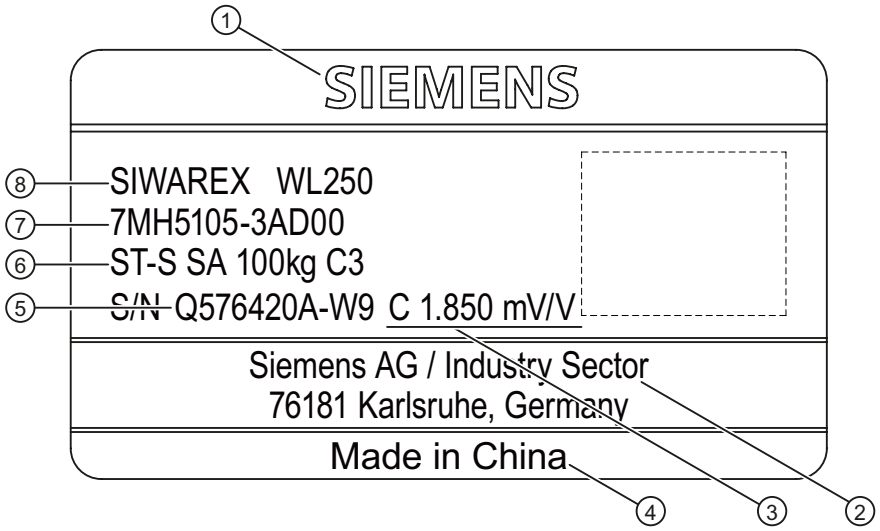
Table 3- 1

Designation	Rated load																	
	kg									t								
	3	5	10	20	50	100	200	250	500	1	2	2,5	5	10	20	50	100	200
SIWAREX WL260 SP-S AA	3	5	10	20		100												
SIWAREX WL260 SP-S AB					50	100	200		500									
SIWAREX WL260 SP-S SA		5	10	20	50	100	200											
SIWAREX WL250 ST-S SA					50	100		250	500	1		2,5	5	10				
SIWAREX WL230 BB-S SA			10	20	50	100	200		500									
SIWAREX WL230 SB-S SA									500	1	2		5					
SIWAREX WL270 CP-S SA														10	20	50		
SIWAREX WL270 CP-S SB																	100	
SIWAREX WL270 CP-S SC																		200

Designation	Image	Construction type	Material	Platform size in mm	Accuracy class
SIWAREX WL260 SP-S AA		Single point load cell	Aluminum	400 x 400	OIML R60 C3
SIWAREX WL260 SP-S AB		Single point load cell	Aluminum	600 x 600	OIML R60 C3
SIWAREX WL260 SP-S SA		Single point load cell	Stainless steel	400 x 400	OIML R60 C3
SIWAREX WL250 ST-S SA		S type load cell	Stainless steel	-	OIML R60 C3
SIWAREX WL230 BB-S SA		Bending beam	Stainless steel	-	OIML R60 C3
SIWAREX WL230 SB-S SA		Shear beam	Stainless steel	-	OIML R60 C3
SIWAREX WL270 CP-S SA		Compression load cell	Stainless steel	-	OIML R60 C3
SIWAREX WL270 CP-S SB		Compression load cell	Stainless steel	-	OIML R60 C3
SIWAREX WL270 CP-S SC		Compression load cell	Stainless steel	-	0,1 %

3.4 Rating plate and ATEX plate

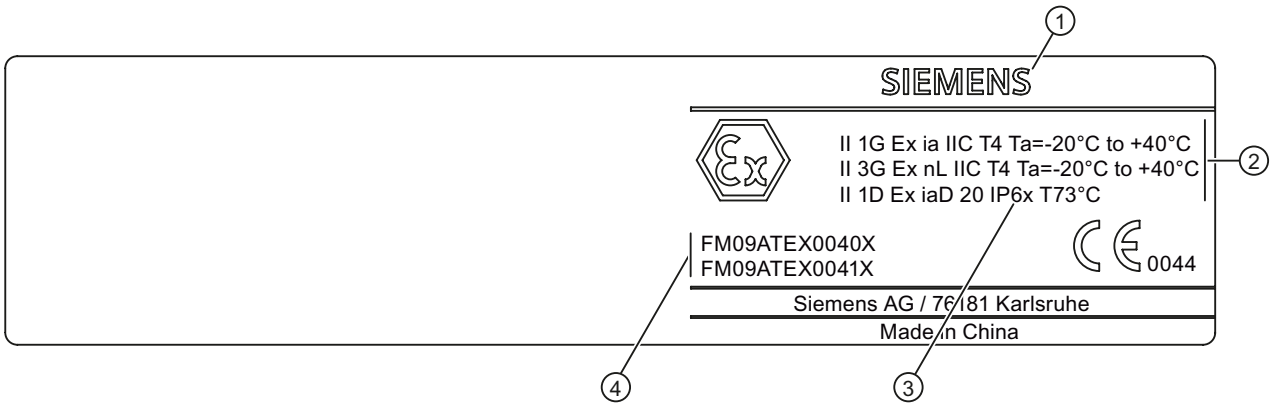
Layout of the rating plate



① Company logo
② Manufacturer
③ Rated characteristic value C_{Rated} of the load cell
④ Country of origin
⑤ Serial number
⑥ Identification of product
⑦ Order No.
⑧ Product group designation

Figure 3-4 Rating plate (example)

Layout of ATEX plate



① Company logo

② Type of protection to ATEX

③ Degree of protection according to EN 60 529, e.g. IP67
The degree of protection depends on the type of load cell.

④ Numbers of ATEX approvals

Figure 3-5 ATEX plate (example)

Marking of application area on ATEX plate

The types of protection ② for which the load cell is certified are indicated on the ATEX plate.

Prior to commissioning the irrelevant types of protection on the ATEX plate have to be permanently erased. In the event of a power supply that is not intrinsically safe or if the load cell has not been supplied with intrinsically safe power the type of protection - intrinsically safe is no longer valid. See Installation (Page 27)

Application planning

4

4.1 Planning

⚠ WARNING
Danger to life from falling loads
Load cells are not machine components which have been constructed with the normal safety factors. For this reason, appropriate protection against falling and catastrophes must be implemented in accordance with the potential risks.

Version

SIWAREX load cells are usually manufactured from stainless steel and hermetically sealed. This provides a high degree of corrosion resistance and a high degree of protection.

Most type series are approved for use in scales requiring official calibration of Class III to DIN EN 45501 and comply with the accuracy class OIML R60 C3.

If necessary, load cells can be supplied with ATEX approval.

SIWAREX load cells are current-calibrated as standard. This means that, for example, when a platform scale is commissioned, corner load adjustment is not necessary. A load cell can therefore be replaced without recalibration of the scale.

This may not apply to load cells that are available outside the standardized delivery spectrum. For these load cell types, the relevant technical specifications apply.

Parallel connection of load cells

In weighing systems, one or more load cells are connected to a weighing module for evaluation of the measured signal. Several load cells of a scale are connected in parallel to a junction box to supply a joint output signal.

CAUTION
Overloading of load cells
When more than one load cell is connected to a scale, if the load distribution is uneven, it cannot be established whether individual load cells are overloaded.

NOTICE
Measurement errors Load cells are only permitted to be connected in parallel when they have the same characteristic value, the same rated load and the same internal resistance. The total resistance of load cells connected in parallel must not undershoot the minimum resistance from the technical data of the weighing module to which it should be connected.

The maximum number of load cells that can be connected to a weighing module depends on the total resistance of the load cells connected in parallel. This must lie within the load resistance limits specified for the weighing module.

The maximum length of the cables and the specifications for other components, e.g. Ex i interface, must also be complied with. For details, see the section Lengthening and shortening the connecting cable (Page 21)

Environmental requirements at the mounting location

The foundations must be unyielding when the expected loads are applied. The maximum roughness permitted for the mounting surface is 1.6 µm.

The values specified in the technical data for the ambient conditions must be complied with.

NOTICE
Measurement errors The load cell must be protected against direct solar radiation. Otherwise, the permissible operating temperature may be exceeded. One-sided heating will result in less accurate measurements or even measurement errors.

Grounding protection

CAUTION
Damaging of load cells Undesirable electrical currents can arise during welding or lightning. To protect the load cells against such currents, bridge the load cells using highly flexible grounding cables, see also Accessories (Page 74).

4.2 Transverse forces and overload protection

Overloading of load cells

NOTICE
Risk of overloading
If you connect more than one load cell to a scale, if the load distribution is uneven, it cannot be established whether individual load cells are overloaded.

CAUTION
Damage to load cells through overloading
In the case of load cells with small rated loads, overload protection must be implemented to protect the cells against damage.
If load cells are used beyond the maximum working load or the maximum lateral load, this can cause irreparable errors and even fracturing of the load cell.
When mounting components are fitted, the load cells must not be overloaded, e.g. by overtightening bolts.

Note

Error message on overload

If load cells are loaded beyond their rated load, this can result in an error message in the weighing module.

Overloading can occur as a result of:

- Uneven load distribution due to mounted components or cones of bulk material
- Rolling/pushing up the load on platform or roller table scales
- Forceful application of the load
- Application of the load in free fall
- Persons supporting themselves on or climbing onto the scale
- Wind against the leeward side of a silo

Dimensioning for overload

When step changes in load cannot be excluded during measuring, for example, due to application of a load in free fall, you must take appropriate precautions to avoid damage to the load cell, e.g. by using elastomer bearings or load cells dimensioned for higher rated loads.

When dimensioning load cells, include a safety margin to guard against overloading:

- Use a safety margin of 20% in the case of three support points.
- If more than three support points are used in a statically indeterminate manner, the safety margin must be a minimum of 50% if it is not possible to rule out a situation in which the load rests on two diagonally opposite load cells only. Reasons for this include sinking of the foundations or incorrect mounting.
- When calculating the safety margin, include unintentional overloads or overloading caused by the course of the process, or use overload protection.

Lifting protection

Overloads can also occur in the lifting direction when the force introducer is attached to the load cell.

If there is a risk of the load bearing being lifted or toppled, lifting protection may be necessary. This is required in the case of lightweight containers and tall, outdoor silos.

Mounting components and guide elements to counteract lateral forces, torsional and bending moments

The load must be introduced in the measuring direction of the load cell. Torsional and bending moments, eccentric loads and lateral forces are disturbances that on the one hand falsify the measured result and on the other hand can damage the load cell if the permissible limits are exceeded. Load cells must therefore be fitted with specially adapted mounting components, e.g. with SIWAREX mounting parts. This largely prevents the above-mentioned sources of error. The mounting components allow so much room for movement that heat expansion will not result in lateral loading.

Lateral forces which are generated by wind, acceleration or conveyor friction can be diverted by guide elements or stops.

Guide elements must be installed perpendicular to the measuring direction to ensure that no force components are generated in the measuring direction. The guide elements must be installed such that they do not stretch if, for example, the mounting points spread apart. This is easily achieved by arranging the guide elements in the same direction of rotation.

Ensure that the selected guide elements comply with the principles applicable to weighing technology.

Force bypasses must not arise due to filling and emptying devices or supply lines.

4.3 Lengthening and shortening the connecting cable

Load cells can be equipped with connecting cables with four or six cores.

NOTICE
Measurement errors Connecting cables are only permitted to be extended using electro-magnetically compatible housings, such as the SIWAREX JB junction box.

Single load cells

If a scale is equipped with a single load cell, the scale can be directly connected to the weighing module if space permits. To bridge longer distances, the connecting cable can be extended using a junction box.

Several load cells are connected in parallel in a junction box.

Connecting cable in four-wire system

NOTICE
No calibration approval In scales requiring official calibration, the connecting cables for load cells in a four-wire system must not be shortened or lengthened.

When the length of the connecting cable is altered, the input and output resistance changes. This change can be corrected by adjusting the scale, but temperature-dependent resistance changes are not compensated for the missing or additional length of cable.

The value of the residual temperature error is presented in the diagram below. The investigation was based on the SIWAREX measurement cable 7MH4702-8AG / -8AF. The supply cables are connected in parallel (double).

Figure 4-1 Residual temperature error for a load cell per 10 K temperature change when shortening or lengthening the connecting cable

If three or four load cells are operated in parallel and the cable for a cell is lengthened, the additional error is approximately one third or one quarter. This assumes that the load is distributed evenly across the load cells.

Connecting cable in six-wire system

For connecting cables in the six-wire system, the supply voltage is fed back to the weighing module as the reference voltage. Shortening or lengthening has no effect on the measuring result.

Additional connecting cables

The maximum permissible cable length between the load cell and the weighing module is stated in the technical specifications for the weighing module. In Ex applications, you must also take into account the specifications of the Ex i interface.

For connecting the junction box to the weighing module, to extend a load cell connecting cable or for cross-connection of two junction boxes, a shielded, six-core cable must be used, e.g. Li2Y2x0.75St+2x(2x0.34St)-CY Siemens Order No.: 7MH4 702-8AG or, for intrinsically safe Ex applications, 7MH4 702-8AF.

Further information: see section: Accessories (Page 74)

Mounting and connecting 5

5.1 Safety information/instructions

5.1.1 General safety instructions

Load cells are precision components and must therefore be handled carefully. Particular care must be taken during transport and installation.

⚠ WARNING

Danger to life from falling loads

- Load cells are not machine components which have been constructed with the normal safety factors. For this reason, appropriate protection against falling and catastrophes must be implemented in accordance with the potential risks.
- Use suitable hoisting equipment to lift the load carrier. Observe the appropriate safety regulations.

CAUTION

Damage to load cells through incorrect handling

- SIWAREX load cells are only permitted to be mounted and connected by qualified personnel.
- Mechanical shocks or falls can irreparably damage the load cell.
- When mounting the load cell, ensure that you do not damage or cut the cables of the load cell. Load cells must not be carried by their connecting cables.
- Protect the load cells from shocks and welding currents. Replace the load cells with dummies until the installation work on the scale structure is completed.

CAUTION

Damage to load cells through high currents

- If welding is undertaken after the load cells have been installed, ensure that the welding current is not diverted through the load cells.
  - You can do this by attaching the grounding clamp of the welding unit making reliable contact close to the weld.
  - Bridge the load cells with a ground cable, see Accessories (Page 74)
  - Disconnect the individual load cells.
- Undesirable electrical currents can arise during lightning. To protect the load cell against such currents, bridge the load cells using highly flexible grounding cables, see also Accessories (Page 74).

CAUTION

Damage to load cells through incorrect mounting

- Provide indented claws or crane eyebolts on the load carrier to ensure that hoisting gear can be used safely.
- Load cells must never be overloaded. Put the load carrier down slowly for this reason. With load cells of smaller rated loads in particular, there is a risk of stretching the load cell bodies when attaching force transfer devices, e.g. when tightening locknuts.
- Adjust the existing overload protection to ensure that it can still reliably sense transfer of the required load. The overload protection must permit a rise in weight unhindered until the setpoint weight is reached.
- Protect the gap between the load cell and overload protection from the build up of dirt or ice.
- The load must be introduced in the measuring direction of the load cell. Torsional and bending moments, eccentric loads and lateral forces are disturbances. These disturbances falsify the measured result and can damage the load cell if the permissible limits of the load cell and mounting components are exceeded.

  The mounting components normally allow so much room for movement that heat expansion will not result in lateral loading.

5.1.2 Safety instructions when connecting in hazardous areas

Protection against explosion

⚠WARNING

Risk of explosion

For applications in hazardous areas please observe the following information as otherwise there is a risk of explosion.

If used in hazardous areas the device requires an ATEX approval with test certification. The information in these documents must be observed when using the load cells in hazardous areas.

Keep to the national regulations and laws applicable in your country when making electrical connections in hazardous areas. In Germany, these include, for example:

- Working reliability regulation
- The directive for "Installation of electrical systems in hazardous areas", DIN EN 60079-14 (previously VDE 0165,T1)
- The EC type examination certificate

If auxiliary power is required, check that it corresponds with that on the rating plate and with the test certification valid for your country.

Zone 0 and 20 in type of protection intrinsic safety

Only connect the load cell to devices that are certified as intrinsically safe in accordance with the EC-type examination certificate FM09ATEX0040X.

⚠WARNING

Risk of explosion and loss of ATEX approval

Only connect the device to certified intrinsically safe circuits. These circuits must comply with the technical data specified on the rating plate, or in the certificates and approvals. If the circuits do not correspond with the information in the certificates and approvals, the safety which is required for approval can no longer be warranted. The "ia" protection level of the device is decreased to the "ib" protection level when intrinsically safe circuits having the "ib" protection level are connected.

Be sure to observe the respective values.

Maximum values of the auxiliary power supply and signal circuits		
U_i = DC 20 V	I_i = 600 mA	P_i = 6 W
L_i = 40 µH	C_i = 12 nF	

Zone 2 in type of protection "nL" - limited energy resources

- Connect the load cell only to devices that have been approved as "nL" certified devices (limited energy resources) in category 3.
- Be sure to observe the respective values.

Maximum values of the auxiliary power supply and signal circuits		
U_i = DC 20 V	I_i = 600 mA	P_i = 6 W
L_i = 40 µH	C_i = 12 nF	

5.2 Installation

⚠ WARNING
Danger to life from falling loads
Load cells are not machine components which have been constructed with the normal safety factors. For this reason, appropriate protection against falling and catastrophes must be implemented in accordance with the potential risks.

CAUTION
Destruction of load cells
Proceed carefully with installation. The load cells can be destroyed if they are installed incorrectly.

Marking of application area on ATEX plate

The types of protection for which the load cell is certified are indicated on the ATEX plate. See Rating plate and ATEX plate (Page 15)

Prior to commissioning the irrelevant types of protection on the ATEX plate have to be permanently erased. In the event of a power supply that is not intrinsically safe or if the load cell has not been supplied with intrinsically safe power the type of protection - intrinsically safe is no longer valid.

Procedure for installation

1. Observe the installation guidelines for the mounting components.
   - You will also find dimension drawings for mounting components at Dimension drawings (Page 61)
   - Lay the cables for the load cells through cable glands in the form of a vertical downwards loop to discourage the penetration of water.
2. Check that the load cells and mounting components are installed correctly, e.g. by checking the mounting dimensions and oscillation distances.

5.3 Connecting principle

Load cells can be equipped with connecting cables with four or six cores.

⚠ WARNING

Risk of explosion

Please observe that in the case of shielded cables of intrinsically safe circuits in hazardous areas only one grounding is permissible.

If grounding is to be on both sides an equipotential bonding conductor with at least 4 mm² must be connected.

Load cells with four-wire system

Do not shorten or length connecting cables in the four-wire system, because the cable resistance is temperature compensated. When the length of the connecting cable is altered, the input and output resistances change. This change can be corrected by adjusting the scale, but temperature-dependent resistance changes are not compensated for the missing or additional length of cable.

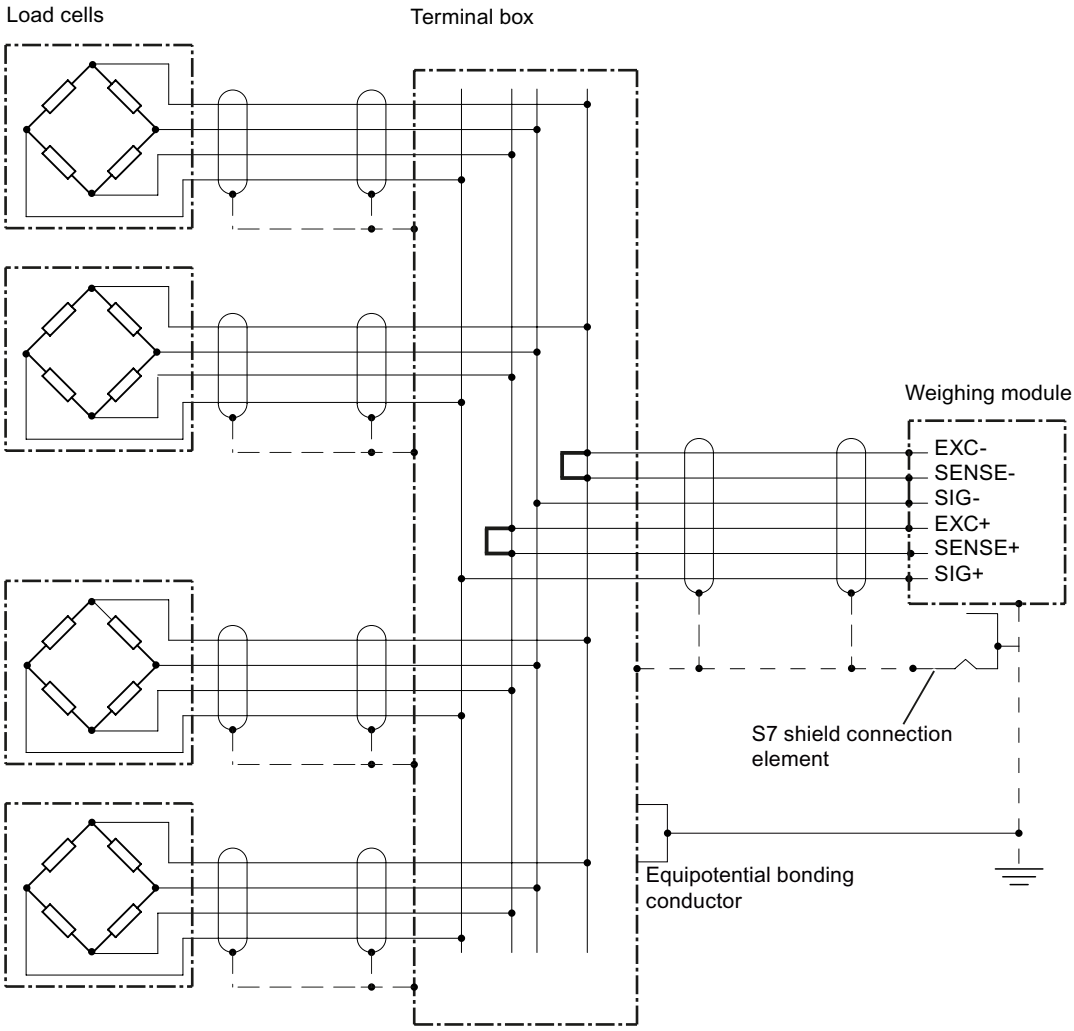


Figure 5-1 Connecting principle for load cells with four-wire system

NOTICE
No calibration approval In scales requiring official calibration, the connecting cables for load cells in a four-wire system must not be shortened or lengthened.

Load cells with six-wire system

For connecting cables in the six-wire system, the supply voltage is fed back to the weighing module as the reference voltage. Shortening or lengthening has no effect on the measuring result.

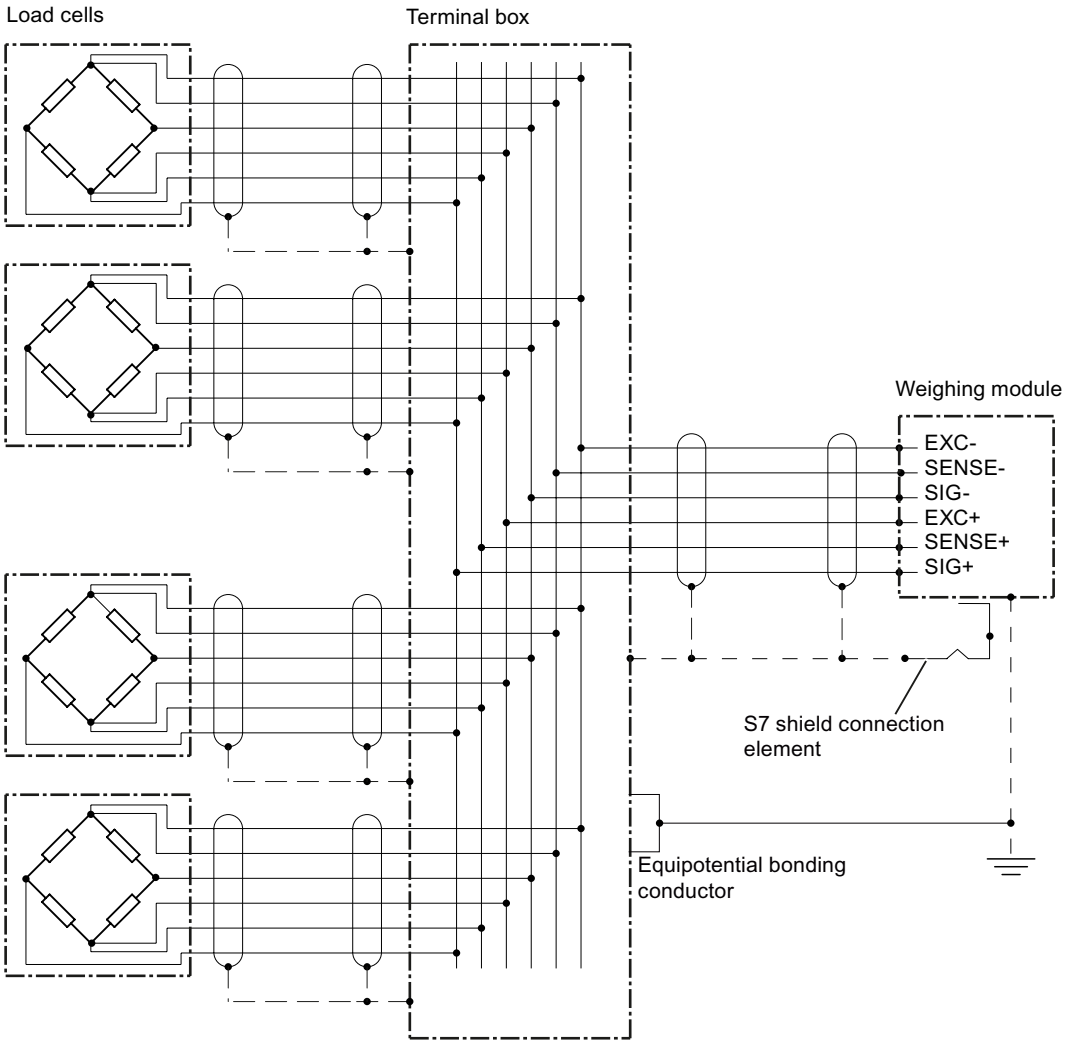


Figure 5-2 Connecting principle for load cells with six-wire system

5.4 Connecting up

Signal assignment for the load cell connecting cable

Table 5- 1 Identifying colors and signal assignment for the load cell connecting cable

Load cell	Connecting cable	
	Function	Color
SIWAREX WL260 SP-S AA	EXC+	Red
	EXC-	Black
	SIG+	Green
	SIG-	White
	Sense+	Blue
	Sense-	Brown
	Shield	Transparent
SIWAREX WL260 SP-S AB	EXC+	Red
	EXC-	Black
	SIG+	Green
	SIG-	White
	Sense+	Blue
	Sense-	Brown
	Shield	Transparent
SIWAREX WL260 SP-S SA	EXC+	Red
	EXC-	Black
	SIG+	Green
	SIG-	White
	Shield	Transparent
SIWAREX WL250 ST-S SA	EXC+	Red
	EXC-	Black
	SIG+	Green
	SIG-	White
	Shield	Transparent
SIWAREX WL230 BB-S SA	EXC+	Green
	EXC-	Black
	SIG+	White
	SIG-	Red
	Shield	Transparent
SIWAREX WL230 SB-S SA	EXC+	Green
	EXC-	Black
	SIG+	White
	SIG-	Red
	Shield	Transparent

Load cell	Connecting cable	
	Function	Color
SIWAREX WL270 CP-S SA	EXC+	Red
	EXC-	Black
	SIG+	Green
	SIG-	White
	Shield	Transparent
SIWAREX WL270 CP-S SB	EXC+	Green
	EXC-	Black
	SIG+	White
	SIG-	Red
	Sense+	Yellow
	Sense-	Blue
	Shield	Transparent
SIWAREX WL270 CP-S SC	EXC+	Green
	EXC-	Black
	SIG+	White
	SIG-	Red
	Shield	Transparent

Identifying colors and signal assignment for the connecting cables of load cells not listed: See the data sheet for the appropriate load cell.

Procedure

NOTICE
Measurement errors Please note the warnings against extending or shortening the connecting cable in section Lengthening and shortening the connecting cable (Page 21) If at all possible, do not shorten the connecting cable in a four-wire system.

NOTICE
No calibration approval In scales requiring official calibration, the connecting cables for load cells in a four-wire system must not be shortened or lengthened.

1. Connect the recommended grounding cable. See section Planning (Page 17)
2. Connect up the load cells in accordance with the connection principle and with reference to the specified signal assignments. For details of how to do this see section Connecting principle (Page 28)
3. For load cells with a four-wire system, position the jumpers in the junction box as follows:

Jumper	From terminal	To terminal
1	EXC-	SENSE-
2	EXC+	SENSE+

NOTICE
Malfunction The SIWAREX weighing module signals a wire break when the jumpers are missing.

5.5 Dismantling

For the disassembly of load cells, the same safety rules and requirements apply as for installation and assembly.

1. Disconnect all the supply voltages and auxiliary voltages.
2. Secure the load carrier against falling.
3. Use appropriate hoisting gear and tools.
4. Take the load off the load cell.
5. Carefully remove the load cell without using force. Do not pull on the cable of the load cell.
6. Do not cut the cable if the load cell is to be re-used or sent in for repair.
7. Do not carry the load cell by the cable.

Adjustment and initial commissioning

6

⚠ WARNING
Missing type of protection and loss of approval If the load cell is not operated with an intrinsically safe power supply, the type of protection - intrinsically safe is no longer guaranteed and the intrinsically safe approval may be revoked. Permanently erase, therefore, the irrelevant types of protection on the rating plate before commissioning, so that erroneous deployment can be avoided.

6.1 Height compensation

6.1.1 When is height compensation necessary?

If you are using up to three load cells, all the load cells will always be under load. Height compensation is not necessary in this case.

When an elastic base or elastic foundations are used, the height from the base or foundations is compensated. Height compensation is not necessary in this case.

For more than three load cells or support points, the load bearing is statically indeterminate. When the foundation and the base are rigid, the total weight can load two diagonally mounted load cells and cause overloading of the load cells. Height compensation is necessary in this case.

6.1.2 Procedure for height compensation

Determining the load on the load cells

1. Bring the force transfer points to the same height.

   The output signals for all load cells should be approximately identical when the load is evenly distributed; and they will indicate the load distribution in the case of uneven distribution.
2. Measure the loading on the load cells as follows:
   - Disconnect the load cell cables SIG+ and SIG-.
   - Connect the supply voltage, e.g. 10.2 V, to the load cells.
   - Measure the output voltages between SIG+ and SIG- for the individual load cells.
3. Determine which load cell has the lowest output voltage.

Height compensation of the load cells

1. Insert as many distance plates underneath the load cell with the lowest value as necessary to equalize the output voltages.

6.2 Initial commissioning

1. Align the load cell site horizontally and level over the complete area.
2. Clean the load cell site and load cell base until both are absolutely clean.
3. Grease the contact surfaces of the force transfer elements with bearing grease.
4. Adjust the overload protection, if used, to ensure that it can still reliably sense transfer of the required load. The overload protection must permit a rise in weight unhindered until the setpoint weight is reached.
5. Ensure dirt and ice cannot build up on the overload protection.

6.3 Corner load adjustment

6.3.1 When is cut-off load compensation necessary?

SIWAREX load cells are current-calibrated as standard. The type series WL250 and WL260 are the exception. Corner load adjustment is not necessary in the case of current-calibrated load cells.

This may not apply to load cells that are available outside the standardized delivery spectrum. For these load cell types, the relevant technical specifications apply.

Corner load adjustment is only necessary in the case of load cells that are not current-calibrated or load cells that are not synchronized.

6.3.2 General procedure for corner load adjustment

The load cells are passive sensors: You should therefore follow the instructions in the manual for the weighing module primarily. When they are installed in hazardous areas, the instructions for the Ex i interface or for the Ex barrier must also be followed.

When the corner load for a scale has to be checked, impermissibly large deviations in the weight indication can occur in the case of load cells that are not current-calibrated.

The corner load errors can be electrically compensated. This is done by matching the individual measured values to the smallest measured value by connecting additional resistors. For details of how to do this see section Example for corner load adjustment (Page 38)

The resistors are connected in series with the load cell measuring signal. The appropriate resistor will reduce the measuring voltage until it is equal to the smallest voltage. The temperature coefficient must be suitably small, due to connection of the resistors in the measuring circuit: 0.25 ppm/K to 10 ppm/K.

6.3.3 Example for corner load adjustment

Example data for corner load adjustment

Variable	Value / Design
Scale design	Platform scale with 4 load cells
Rated load E_{max}	500 kg
Rated characteristic value C_{Rated}	2.0 mV/V
Test weight	150 kg

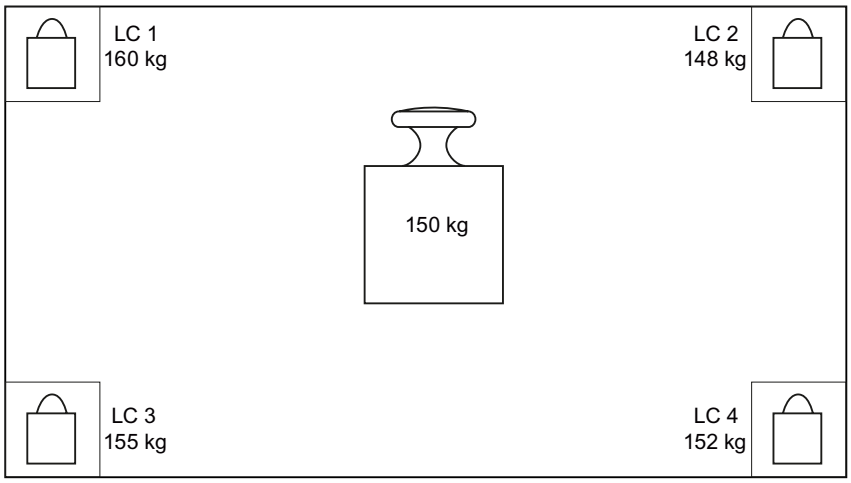


Figure 6-1 Test layout

Procedure

- Measure the output resistances Ra for the load cells LC or obtain the values from the corresponding data sheet

  LC 1: 1004.52 Ω
  LC 2: 1003.64 Ω
  LC 3: 1010.70 Ω
  LC 4: 1028.12 Ω

- Place the test weights on all four corners and note the values:

  LC 1: 160 kg
  LC 2: 148 kg
  LC 3: 155 kg
  LC 4: 152 kg

- Determine the differences from the lowest value

Lowest value:	LC 2:	= 148 kg
LC 1 - LC 2:	160 kg - 148 kg	= 12 kg
LC 3 - LC 2:	155 kg - 148 kg	= 7 kg
LC 4 - LC 2:	152 kg - 148 kg	= 4 kg

- Calculate the compensating resistances:

$R_{comp} = R_o \times L_{err} / L_{test}$

R_{comp}: Determined compensation resistance, to be connected in the measuring lead SIG+

R_o: Output resistance of the load cells; can also be measured under load

L_{err}: Weight error: Differential value from the lowest weight value

L_{test}: Test load; placed on all four corners

LC 1:	R_{comp} = R1	= 1004.52 Ω x 12 kg / 150 kg	approx. 80 Ω
LC 2:	Lowest value	No resistance necessary	
LC 3:	R_{comp} = R3	= 1010.70 Ω x 7 kg / 150 kg	approx. 47 Ω
LC 4:	R_{comp} = R4	= 1028.12 Ω x 4 kg / 150 kg	approx. 27 Ω

- Install the calculated resistances
- Repeat the test

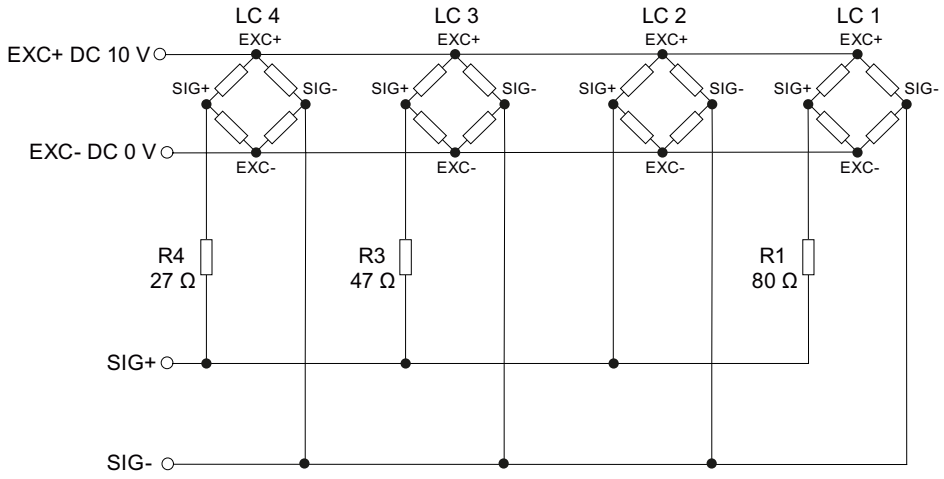


Figure 6-2 Circuit diagram for corner load adjustment

Servicing and maintenance

7

Servicing and maintenance of the load cells

The load cells are in general maintenance free. Regular inspection and checking of the mechanisms for force transfer, oscillation limitation, lifting and overloading will however improve their reliability. The inspections should also be performed after serious environmental events such as storms, floods or earthquakes.

If signs of corrosion appear, we recommend a suitable protective coating.

CAUTION
Damage to load cells, measurement errors • Dirt must not be allowed to accumulate in the vicinity of a load cell. • Do not subject cable glands and seals to the jet from a high-pressure hose.

Regular maintenance of overload protection

Overload protection mechanisms must be protected against deposits of dirt and ice.

The correct operation of overload protection must be tested during periodic maintenance work.

Error messages and troubleshooting

8

8.1 Repair

NOTICE
Unnecessary costs for repairs Please only return faulty load cells to our repair center accompanied by an accurate description of the fault. This simplifies the diagnostics.

8.2 Error messages

Rated load exceeded

If load cells are loaded beyond their rated load, this can result in an error message in the weighing module.

When step changes in load cannot be excluded during measuring, for example, due to application of a load in free fall, appropriate precautions to avoid damage to the load cell must be made, e.g. by using elastomer bearings or load cells dimensioned for higher rated loads.

Wire break

The weighing module reports a wire break if the jumpers are not installed in load cells with four-wire technology. For details, see Section Connecting up (Page 31).

8.3 Checking the mechanical and electrical configuration

In the case of faulty measurements, check the following:

- Do any force bypasses exist, e.g. due to cables, pipes or guides, that generate forces in the measuring direction?
- Are there any other disturbances due to soiling or thermal expansion?
- Have all load cells been correctly aligned horizontally and at the same height?
- Has moisture penetrated the junction box?
- Are the cables connected correctly?
- Are the cables damaged?

8.4 Checking the load cells

CAUTION
Damaging of load cells Do not use an Ohmmeter to measure resistances that feeds a higher voltage into the load cell than is permitted in the technical data.

Locate and check faulty load cells

1. You can locate a faulty load cell in a weighing system by corner loading or by disconnecting the load cells individually.
2. To check a load cell for a defect, you must measure the following values:
   - zero signal
   - Insulation resistance
   - Input and output resistance
   - Jumper resistance

   The procedure for measuring the individual values is described below.

Measure the zero signal

1. Completely remove the load from the load cell to be checked.
2. Disconnect all the load cells.
3. Supply the load cell to be checked with approximately 10 V DC. Use the weighing module or an external power supply for this purpose.
4. Measure the voltage between SIG+ and SIG-.
5. Divide the measured voltage by the supply voltage.

The result must correspond to the value in the data sheet.

Measure the insulation resistance

1. Disconnect the load cell.
2. Connect all cables together.
3. Measure the insulation resistance between the cables and the load cell housing.
4. Measure the insulation resistance between the cables and the cable shield.
5. The following measurement is only possible when the shield is not connected to the load cell housing.
   Measure the insulation resistance between the cable shield and the load cell housing.

The insulation resistance must correspond to the value specified in the technical data.

Measure the input and output resistance

1. Disconnect the load cell.
2. Measure the input voltage between EXC+ and EXC-.
3. Measure the output voltage between SIG+ and SIG-.

The resistances must correspond to the values specified in the data sheet or in the technical data.

Measure the jumper resistance

1. Disconnect the load cell.
2. Measure the resistance between SIG- and EXC-.
3. Measure the resistance between SIG+ and EXC+.
4. The difference between the two values must be no greater than 1 Ω.

8.5 Measures in the event of overloaded load cells

A frequent fault that can result in failure of load cells is overloading due to

- dynamic overload
- transverse forces

When you establish that the cause of the fault was overloading, further measures are necessary.

Dynamic overload

Example:

Unintentional falling of a relatively low weight onto the load carrier from a great height.

Possible measure:

- Install shock-absorbing components, e.g. elastomer bearings
- Overdimension the load cells

Transverse forces

Example:

Accelerating or braking loads onto a platform.

Possible measures:

- Install guide elements
- Install oscillation limitation or set it to a lower value.

Technical data

9

9.1 Functional data

9.1.1 SIWAREX WL260 SP-S AA

Table 9- 1

Variable	Value
Type series	WL260
Designation	SP-S AA
Construction type	Single point load cell
Possible applications	Platform scales, small conveyor scales
Rated load E_{max}	3; 5; 10; 20; 50; 100 kg
Accuracy class according to OIML R60	C3
Max. scale interval n_{LC}	3000
Min. scale interval V_{min} for E_{max} = 3; 5; 10 kg for E_{max} = 20; 50 kg for E_{max} = 100 kg	 E_{max} / 15000 E_{max} / 7500 E_{max} / 12000
Combined error F_{comb}	± 0.02 % C_n
Deviation F_V	± 0.017 % C_n
Creepage error F_{cr} 30 min	 0.02 % C_n
Temperature coefficient Characteristic value T_{Kc} Zero signal T_{Ko}	 0.014 % C_n / 10 °C 0.017 % C_n / 10 °C
Min. initial loading E_{min}	0 kg
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 h_n at E_{max}	≤ 0.6 mm
Recommended supply voltage	5 to 12 V DC
Rated characteristic value C_{Rated}	2.0 ± 0.2 mV/V
Tolerance of zero signal D_o	< ± 2.0 % C_n
Input resistance R_i	409 ± 6 Ω
Output resistance R_o	350 ± 3 Ω
Insulation resistance R_{is}	5000 MΩ at 50 V DC
Rated temperature range B_{tn}	- 10 ... + 40 °C

Variable	Value
Operating temperature range B_{tu}	- 35 ... + 65 °C
Storage temperature range B_{ts}	- 35 ... + 65 °C
Sensor material	Aluminum
Degree of protection according to EN 60 529	IP65
Maximum tightening torque of the fixing screws	15 ... 20 Nm
Cable connection	Six-core, shielded 3 m

9.1.2 SIWAREX WL260 SP-S AB

Variable	Value
Type series	WL260
Designation	SP-S AB
Construction type	Single point load cell
Possible applications	Platform scales, small conveyor scales
Rated load E_{max}	50; 100; 200; 500 kg
Accuracy class according to OIML R60	C3 [1]
Max. scale interval n_{LC}	3000
Min. scale interval V_{min}	E_{max} / 10000
Combined error F_{comb}	± 0.02 % C_n
Deviation F_V	± 0.017 % C_n
Creepage error F_{cr} 30 min	 0.02 % C_n
Temperature coefficient Characteristic value T_{Kc} Zero signal T_{Ko}	 0.014 % C_n / 10 °C 0.017 % C_n / 10 °C
Min. initial loading E_{min}	0 kg
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 h_n at E_{max}	≤ 1.22 mm
Recommended supply voltage	5 to 12 V DC
Rated characteristic value C_{Rated}	2.0 ± 0.2 mV/V
Tolerance of zero signal D_o	< ± 2.0 % C_n
Input resistance R_i	409 ± 6 Ω
Output resistance R_o	350 ± 3 Ω
Insulation resistance R_{is}	5000 MΩ at 50 V DC
Rated temperature range B_{tn}	- 10 ... + 40 °C
Operating temperature range B_t	- 35 ... + 65 °C
Storage temperature range B_{ts}	- 35 ... + 65 °C
Sensor material	Aluminum
Degree of protection according to EN 60 529	IP65
Maximum tightening torque of the fixing screws	35 ... 40 Nm
Cable connection	Six-core, shielded 3 m

[1] Type approval to OIML for SIWAREX WL260 SP-S AB available soon

9.1.3 SIWAREX WL260 SP-S SA

Variable	Value
Type series	WL260
Designation	SP-S SA
Construction type	Single point load cell
Possible applications	Platform scales, conveyor scales
Rated load E_{max}	5; 10; 20; 50; 100; 200 kg
Accuracy class according to OIML R60	C3 [1)]
Max. scale interval n_{LC}	3000
Min. scale interval V_{min}	E_{max} / 7500
Combined error F_{comb}	± 0.02 % C_n
Deviation F_V	± 0.017 % C_n
Creepage error F_{cr} 30 min	 0.02 % C_n
Temperature coefficient Characteristic value T_{Kc} Zero signal T_{Ko}	 0.014 % C_n / 10 °C 0.017 % C_n / 10 °C
Min. initial loading E_{min}	0 kg
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 h_n at E_{max}	0.27 ± 0.05 mm
Recommended supply voltage	5 to 12 V DC
Rated characteristic value C_{Rated}	2.0 ± 0.2 mV/V
Tolerance of zero signal D_o	< ± 1.0 % C_n
Input resistance R_i	383 ± 4 Ω
Output resistance R_o	351 ± 2 Ω
Insulation resistance R_{is}	5000 MΩ at V DC
Rated temperature range B_{tn}	- 10 ... + 40 °C
Operating temperature range B_{tu}	- 35 ... + 65 °C
Storage temperature range B_{ts}	- 40 ... + 70 °C
Sensor material	Stainless steel
Degree of protection according to EN 60 529	IP67
Maximum tightening torque of the fixing screws for E_{max} = 5; 10; 20; 50; 100 kg for E_{max} = 200 kg	 14 Nm 16 Nm
Cable connection	Six-core, shielded 1 m

[1)] Type approval to OIML for SIWAREX WL260 SP-S SA available soon

9.1.4 SIWAREX WL250 ST-S SA

Variable	Value
Type series	WL250
Designation	ST-S SA
Construction type	S type load cell
Possible applications	Tension and compression applications, suspended scales, hybrid scales, container scales
Rated load E_{max}	50; 100; 250; 500 kg 1; 2.5; 5; 10 t
Accuracy class according to OIML R60	C3
Max. scale interval n_{LC}	3000
Min. scale interval V_{min}	
for E_{max} = 50; 100 kg	E_{max} / 7000
for E_{max} = 250; 500 kg; 1; 2.5 t	E_{max} / 10000
for E_{max} = 5; 10 t	E_{max} / 12000
Combined error F_{comb}	± 0.02 % C_n
Deviation F_V	± 0.02 % C_n
Creepage error F_{cr} 30 min	 0.02 % C_n
Temperature coefficient Characteristic value T_{Kc} Zero signal T_{Ko}	 0.014 % C_n / 10 °C 0.017 % C_n / 10 °C
Min. initial loading E_{min}	0 kg
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 h_n at E_{max}	
for E_{max} = 50; 100 kg	0.18 mm
for E_{max} = 250; 500 kg	0.24 mm
for E_{max} = 1 t	0.37 mm
for E_{max} = 2.5; 5 t	0.8 mm
for E_{max} = 10 t	0.57 mm
Recommended supply voltage	5 to 12 V DC
Rated characteristic value C_{Rated}	3.0 ± 0.008 mV/V
Tolerance of zero signal D_o	< ± 1.0 % C_n
Input resistance R_i	430 ± 60 Ω
Output resistance R_o	350 ± 3.5 Ω
Insulation resistance R_{is}	5000 MΩ at 50 V DC
Rated temperature range B_{tn}	- 10 ... + 40 °C
Operating temperature range B_{tu}	- 35 ... + 65 °C
Storage temperature range B_{ts}	- 35 ... + 65 °C

Variable	Value
Sensor material	Stainless steel
Degree of protection according to EN 60 529	IP67
Cable connection	Four-core, shielded PU cable 6 m

9.1.5 SIWAREX WL230 BB-S SA

Variable	Value
Type series	WL230
Designation	BB-S SA
Construction type	Bending beam
Possible applications	Platform scales, overhead rail scales, container weighers, conveyor scales
Rated load E_{max}	10; 20; 50; 100; 200; 500 kg
Accuracy class according to OIML R60	C3 [1]
Max. scale interval n_{LC}	3000
Min. scale interval V_{min} for E_{max} = 10 [1]; 20; 50; 100 kg for E_{max} = 200; 500 kg	 E_{max} / 15000 E_{max} / 6000
Combined error F_{comb}	≤ 0.02 % C_n
Deviation F_V	0.017 % C_n
Creepage error F_{cr} 30 min	 0.02 C_n
Temperature coefficient Characteristic value T_{Kc} Zero signal T_{Ko}	 0.014 % C_n / 10 °C 0.017 % C_n / 10 °C
Min. initial loading E_{min}	0 kg
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 h_n at E_{max}	0.3 mm
Recommended supply voltage	5 to 10 V DC
Rated characteristic value C_{Rated}	2.0 ± 0.02 mV/V *
Tolerance of zero signal D_o	< ± 1.0 % C_n
Input resistance R_i	460 ± 50 Ω
Output resistance R_o	350 ± 3.5 Ω
Insulation resistance R_{is}	5000 MΩ at 50 V DC
Rated temperature range B_{tn}	- 10 ... + 40 °C
Operating temperature range B_{tu}	- 35 ... + 65 °C
Storage temperature range B_{ts}	- 35 ... + 65 °C
Sensor material	Stainless steel
Degree of protection according to EN 60 529	IP68

Variable	Value
Maximum tightening torque for the fixing bolts: for E_{max} = 10; 20; 50; 100; 200 kg for E_{max} = 500 kg	 23 Nm 70 Nm
Cable connection	Four-core, shielded PU cable, 3 m

* Output is current-calibrated

1) Type approval to OIML for SIWAREX WL230 BB-S SA, E_{max}: 10 kg available soon

9.1.6 SIWAREX WL230 SB-S SA

Variable	Value
Type series	WL230
Designation	SB-S SA
Construction type	Shear beam
Possible applications	Platform scales, overhead rail scales, container weighers, conveyor scales
Rated load E_{max}	500 kg 1; 2; 5 t
Accuracy class according to OIML R60	C3 [1)]
Max. scale interval n_{LC}	3000
Min. scale interval V_{min}	
for E_{max} = 500 kg	E_{max} / 10000
for E_{max} = 1; 2; 5 t [1)]	E_{max} / 15000
Combined error F_{comb}	± 0.02 % C_n
Deviation F_V	± 0.02 % C_n
Creepage error F_{cr} 30 min	± 0.02 % C_n
Temperature coefficient Characteristic value T_{Kc} Zero signal T_{Ko}	 0.017 % C_n / 10 °C 0.023 % C_n / 10 °C
Min. initial loading E_{min}	0 kg
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 h_n at E_{max}	
for E_{max} = 500 kg	0.13 mm
for E_{max} = 1 t	0.21 mm
for E_{max} = 2 t	0.29 mm
for E_{max} = 5 t	0.38 mm
Recommended supply voltage	5 to 12 V DC
Rated characteristic value C_{Rated}	2.0 ± 0.002 mV/V *
Tolerance of zero signal D_o	< ± 1.0 % C_n
Input resistance R_i	1000 ± 10 Ω
Output resistance R_o	1004 ± 5 Ω
Insulation resistance R_{is}	5000 MΩ at 50 V DC
Rated temperature range B_{tn}	- 10 ... + 40 °C
Operating temperature range B_{tu}	- 35 ... + 65 °C
Storage temperature range B_{ts}	- 35 ... + 65 °C
Sensor material	Stainless steel
Degree of protection according to EN 60 529	IP68

Variable	Value
Maximum tightening torque for the fixing bolts	
for E_{max} = 500 kg, 1 t, 2 t	150 Nm
for E_{max} = 5 t	550 Nm
Cable connection	Four-core, shielded
for E_{max} = 500 kg, 1 t	3 m
for E_{max} = 2 t, 5 t	6 m

* Output is current-calibrated

1) Type approval to OIML for SIWAREX WL230 SB-S SA, E_{max}: 5 t available soon

9.1.7 SIWAREX WL270 CP-S SA

Variable	Value
Type series	WL270
Designation	CP-S SA
Construction type	Compression load cell
Possible applications	Vehicle scales, platform scales, container weighers
Rated load E_{max}	10; 20; 30; 50 t
Accuracy class according to OIML R60	C3
Max. scale interval n_{LC}	3000
Min. scale interval V_{min}	E_{max} / 10000
Combined error F_{comb}	± 0.02 % C_n
Creepage error F_{cr} 30 min	 ± 0.023 % C_n
Temperature coefficient Characteristic value T_{Kc} Zero signal T_{Ko}	 0.017 % C_n / 10 °C 0.023 % C_n / 10 °C
Min. initial loading E_{min}	0 kg
Maximum working load L_u	150 % E_{max}
Break load L_d	150 % E_{max}
Maximum lateral load L_{lq}	75 % E_{max}
Rated measuring path h_n at E_{max}	0.5 mm
Recommended supply voltage	5 to 12 V DC
Rated characteristic value C_{Rated}	2.0 ± 0.02 mV/V *
Tolerance of zero signal D_o	< ± 1.0 % C_n
Input resistance R_i	700 ± 7 Ω
Output resistance R_o	700 ± 7 Ω
Insulation resistance R_{is}	5000 MΩ at 50 V DC
Rated temperature range B_{tn}	- 10 ... + 40 °C
Operating temperature range B_{tu}	- 35 ... + 65 °C
Storage temperature range B_{ts}	- 35 ... + 65 °C
Sensor material	Stainless steel
Degree of protection according to EN 60 529	IP68
Cable connection	Four-core, shielded 15 m

* Output is current-calibrated

9.1.8 SIWAREX WL270 CP-S SB

Variable	Value
Type series	WL270
Designation	CP-S SB
Construction type	Compression load cell
Possible applications	Container weighers
Rated load E_{max}	100 t
Accuracy class according to OIML R60	C3
Max. scale interval n_{LC}	3000
Min. scale interval V_{min}	E_{max} / 9000
Combined error F_{comb}	± 0.02 % C_n
Deviation F_V	± 0.02 % C_n
Creepage error F_{cr} 30 min	 0.023 % C_n
Temperature coefficient Characteristic value T_{Kc} Zero signal T_{Ko}	 0.017 % C_n / 10 °C 0.023 % C_n / 10 °C
Min. initial loading E_{min} Dead load	0 kg
Maximum working load L_u	150 % E_{max}
Break load L_d	300 % E_{max}
Maximum lateral load L_{lq}	10 % E_{max}
Rated measuring path h_n at E_{max}	0.36 mm
Recommended supply voltage	5 to 12 V DC
Rated characteristic value C_{Rated}	2.0 ± 0.02 mV/V *
Tolerance of zero signal D_o	< ± 1.0 % C_n
Input resistance R_i	700 ± 7 Ω
Output resistance R_o	700 ± 7 Ω
Insulation resistance R_{is}	5000 MΩ at 50 V DC
Rated temperature range B_{tn}	- 10 ... + 40 °C
Operating temperature range B_{tu}	- 35 ... + 65 °C
Storage temperature range B_{ts}	- 35 ... + 65 °C
Sensor material	Stainless steel
Degree of protection according to EN 60 529	IP68
Cable connection	Six-core, shielded 20 m

* Output is current-calibrated

9.1.9 SIWAREX WL270 CP-S SC

Variable	Value
Type series	WL270
Designation	CP-S SC
Construction type	Compression load cell
Possible applications	Container weighers
Rated load E_{max}	200 t
Accuracy class according to OIML R60	0,1 %
Combined error F_{comb}	0.1 % C_n
Deviation F_V	± 0.017 % C_n
Creepage error F_{cr} 30 min	 0.02 % C_n
Temperature coefficient Characteristic value T_{Kc} Zero signal T_{Ko}	 0.014 % C_n / 10 °C 0.017 % C_n / 10 °C
Min. initial loading E_{min}	0 kg
Maximum working load L_u	150 % E_{max}
Break load L_d	300 % E_{max}
Maximum lateral load L_{lq}	10 % E_{max}
Rated measuring path h_n at E_{max}	0.36 mm
Recommended supply voltage	5 to 12 V DC
Rated characteristic value C_{Rated}	2.0 ± 0.02 mV/V *
Tolerance of zero signal D_o	< ± 1.0 % C_n
Input resistance R_i	450 ± 5 Ω
Output resistance R_o	480 ± 5 Ω
Insulation resistance R_{is}	5000 MΩ at 50 V DC
Rated temperature range B_{tn}	- 10 ... + 40 °C
Operating temperature range B_{tu}	- 35 ... + 65 °C
Storage temperature range B_{ts}	- 35 ... + 65 °C
Sensor material	Stainless steel
Degree of protection according to EN 60 529	IP68
Cable connection	Four-core, shielded 20 m

* Output is current-calibrated

9.2 Approval to OIML R60

SIWAREX load cells comply with OIML R60.

Most SIWAREX load cells are approved for use in scales requiring official calibration of Class III, EN 45501.

This is determined by the technical data of the respective type.

The above statements do not apply to load cells outside the standard product range.

Descriptions of load cell variants that are not included in the standard product range can be found on the appropriate data sheet.

9.3 Electromagnetic compatibility

To maintain the electromagnetic compatibility:

- Ensure that the cables are routed with electromagnetic compatibility, even within cabinets
- Lay the signal cable segregated from cables with voltages > 60 V or high currents
- Avoid sites neighboring large electrical systems
- Use a shielded cable
- Ensure proper grounding

9.4 Certificates and approvals for explosion protection

In hazardous areas, it is only permitted to use load cells and components with the appropriate ATEX approval.

When connecting up the load cells in hazardous areas, the appropriate EC-type examination certificates and any supplements must be observed.

Certificates and approvals	
Protection against explosion according to ATEX	
The technical data listed in the EC type examination certificate FM09ATEX0040X and FM09ATEX0041X apply exclusively for applications in potentially explosive atmospheres.	
"Intrinsically safe" type of protection	II 1 G Ex ia IIC T4 II 1 D Ex iaD 20 IP6x T73°C
"Power-limited resources" type of protection	II 3 G Ex nL IIC T4

Dimension drawings

10

10.1 SIWAREX WL260 SP-S AA

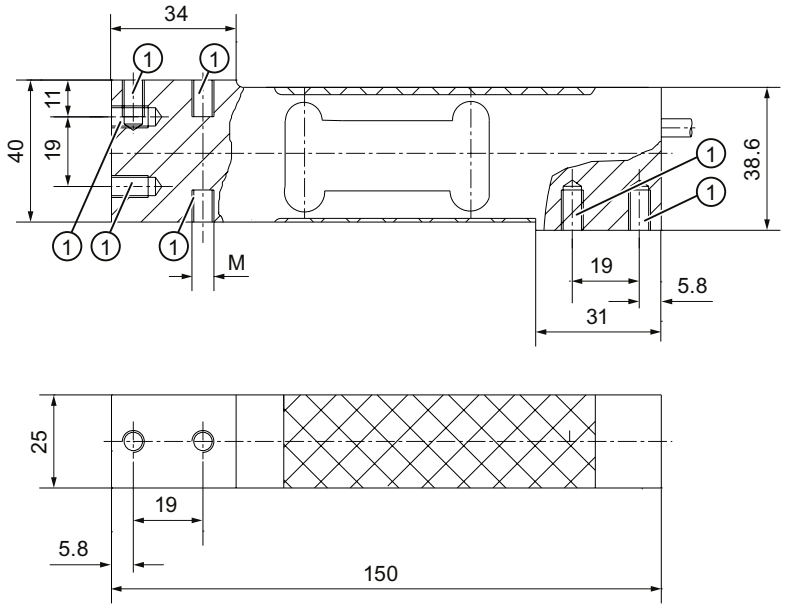


Figure 10-1 SIWAREX WL260 SP-S AA dimension drawing

Threaded holes		
Designation	**Thread**	**Thread depth**
①	M6	15 mm

10.2 SIWAREX WL260 SP-S AB

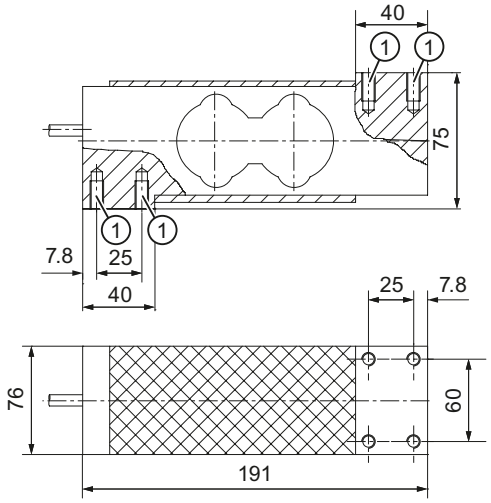


Figure 10-2 SIWAREX WL260 SP-S AB dimension drawing

8 threaded holes		
Designation	**Thread**	**Thread depth**
①	M8	15 mm

10.3 SIWAREX WL260 SP-S SA

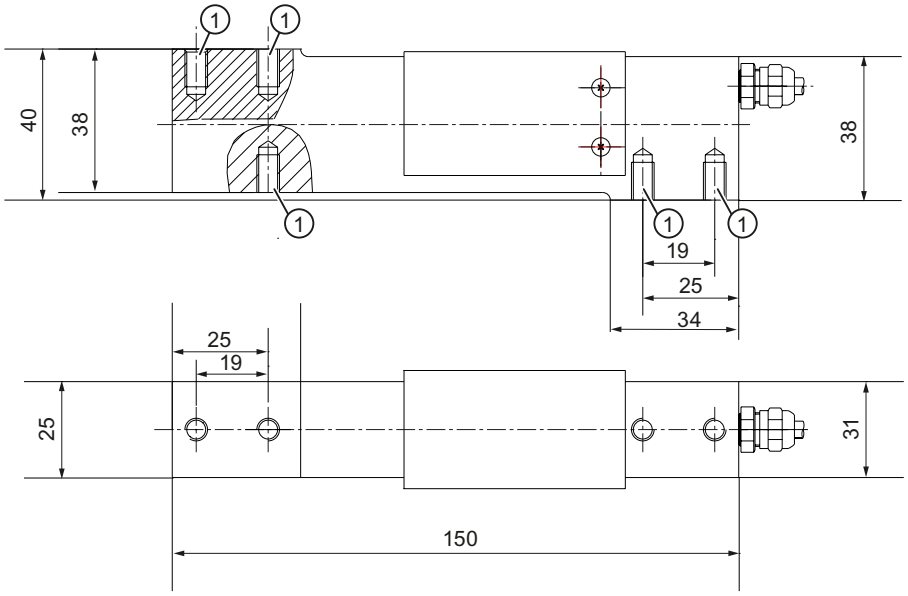


Figure 10-3 SIWAREX WL260 SP-S SA dimension drawing

Threaded holes			
Designation	**Thread**	**Thread depth**	**Hole depth**
①	M6	15 mm	18 mm

10.4 SIWAREX WL250 ST-S SA

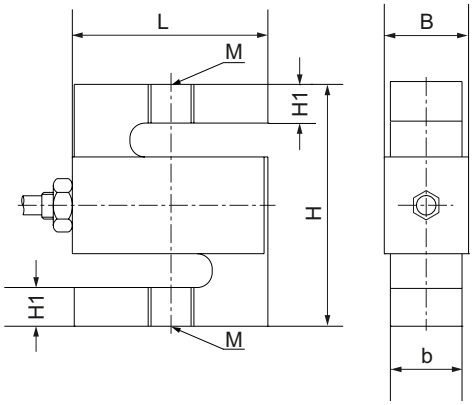


Figure 10-4 SIWAREX WL250 ST-S SA dimension drawing

Rated load	Dimensions in mm					
	L	H	b	B	M	H1
50 kg, 100 kg	51	64	13	16	M8	10
250 kg, 500 kg	51	64	19	22	M12	10
1 t	51	64	25	29	M12	10
2.5 t	51	102	25	29	M20x1.5	15
5.0 t	76	102	25	29	M20x1.5	20
10 t	127	178	51	54	M30x2	40

10.5 SIWAREX WL230 BB-S SA

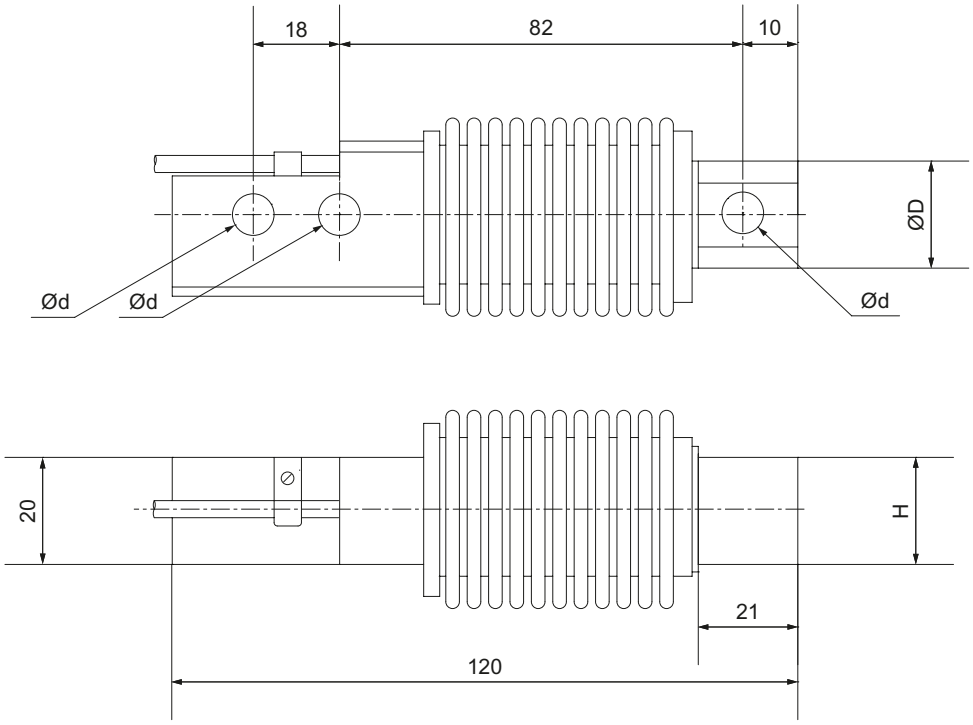


Figure 10-5 SIWAREX WL230 BB-S SA dimension drawing

Rated load	d in mm	D in mm	H in mm
10; 20; 50; 100; 200 kg	8,2	23	20
500 kg	10,3	24	19

10.6 SIWAREX WL230 SB-S SA

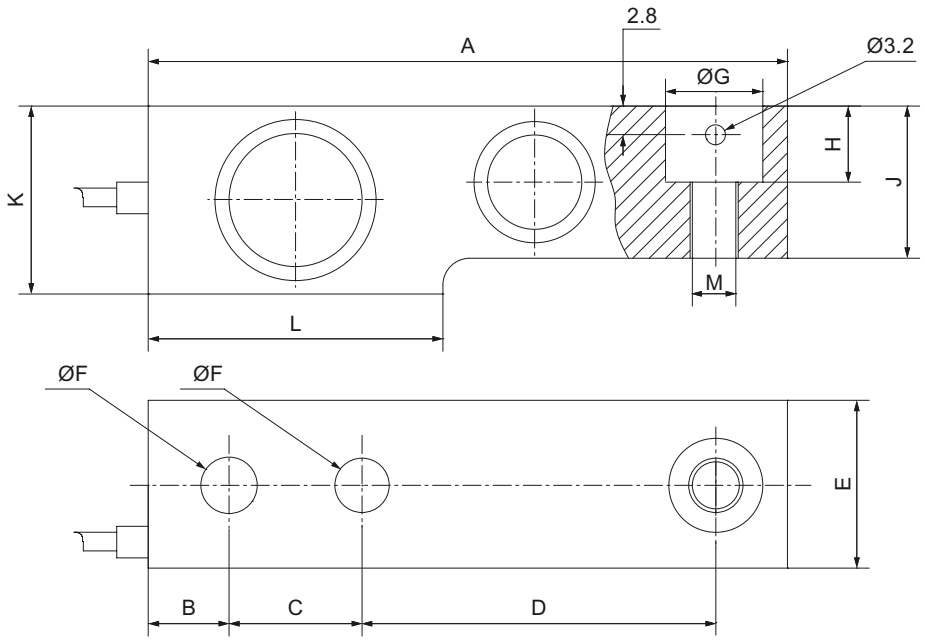


Figure 10-6 SIWAREX WL230 SB-S SA dimension drawing

Rated load	Dimensions in mm											
	A	B	C	D	E	F	G	H	I	K	L	M
500 kg	130	16	25,4	76	32	13	20,5	14	26	32	57	M12
1.0 t	130	16	25,4	76	32	13	20,5	14	28	32	57	M12
2.0 t	130	16	25,4	76	32	13	20,5	14	32	36	57	M12
5.0 t	172	19	38,1	95	38	20,5	30,2	20	40	44	76	M20

10.7 SIWAREX WL270 CP-S SA

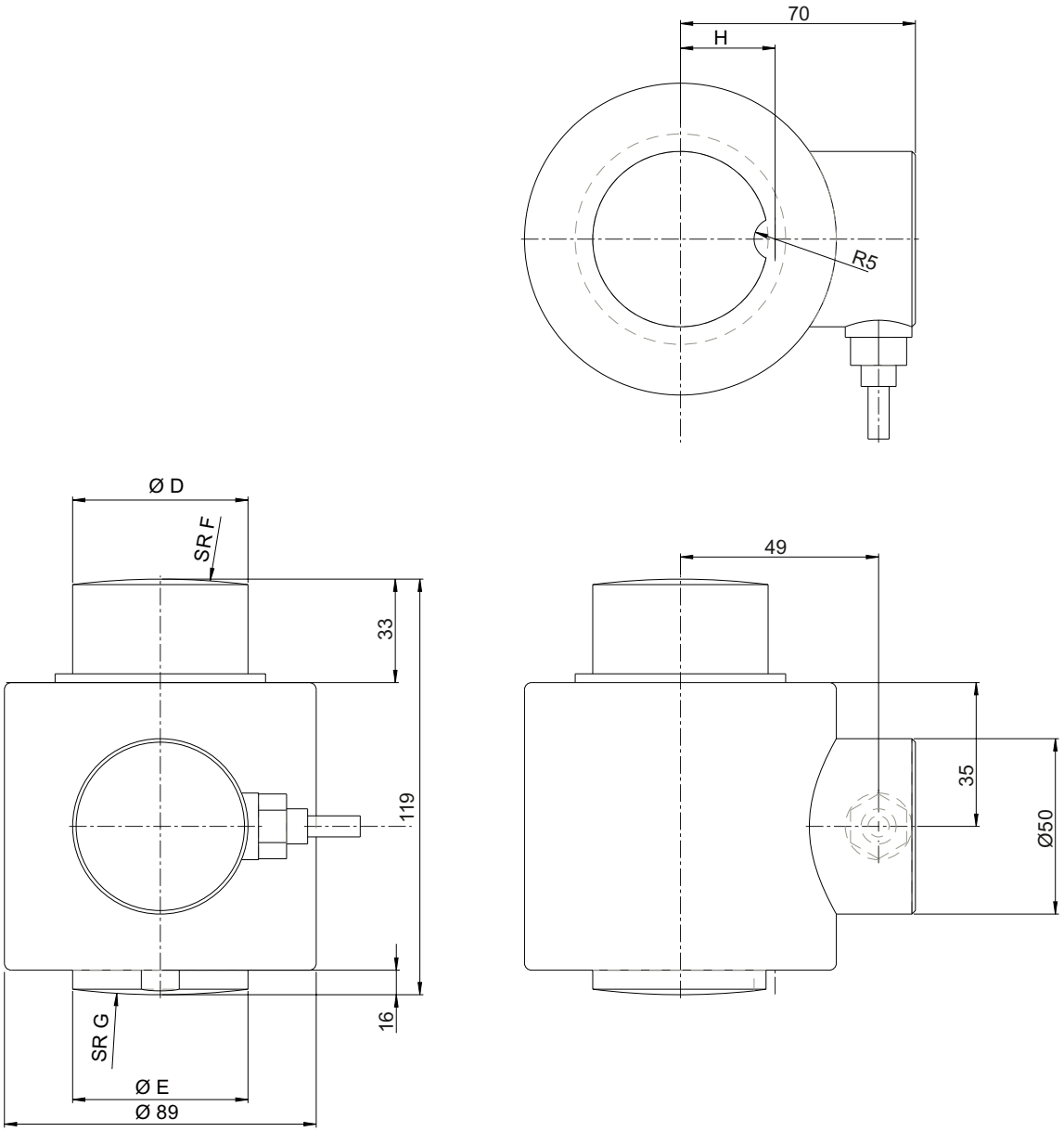


Figure 10-7 SIWAREX WL270 CP-S SA dimension drawing

Table 10- 1 New:

Rated load	Dimensions in mm				
	D	E	F	G	H
10 t; 20 t; 30 t	40	40	38	150	22
50 t	50	50	200	200	27

10.8 SIWAREX WL270 CP-S SB

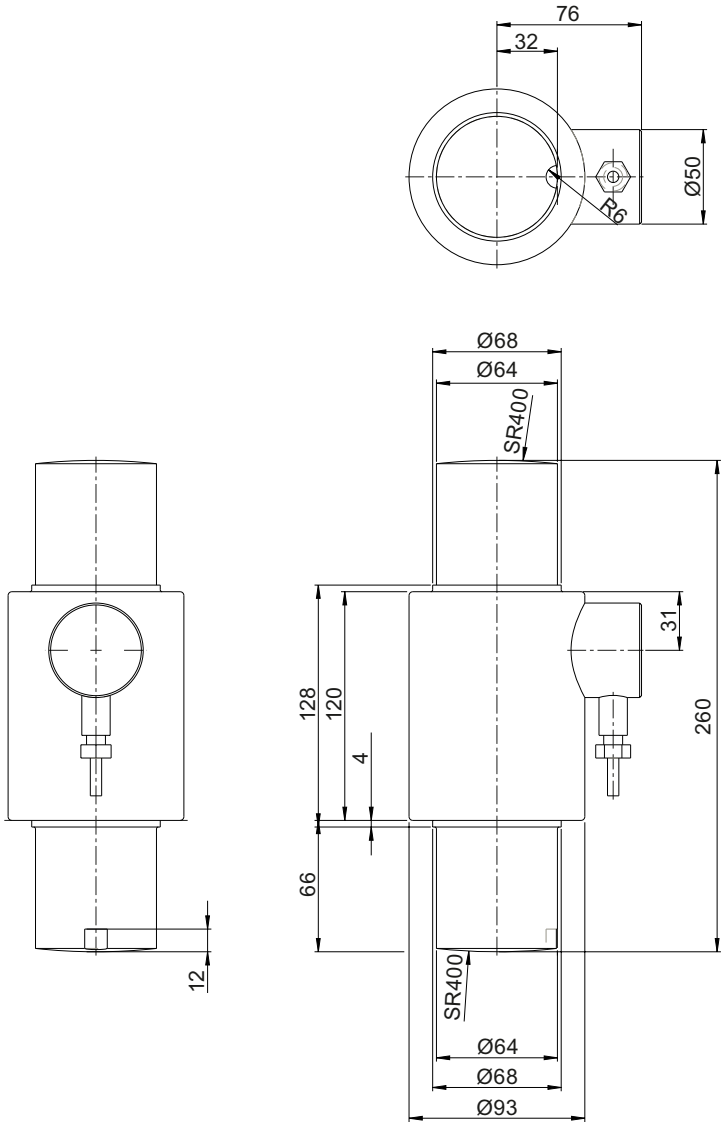


Figure 10-8 SIWAREX WL270 CP-S SB dimension drawing

10.9 SIWAREX WL270 CP-S SC

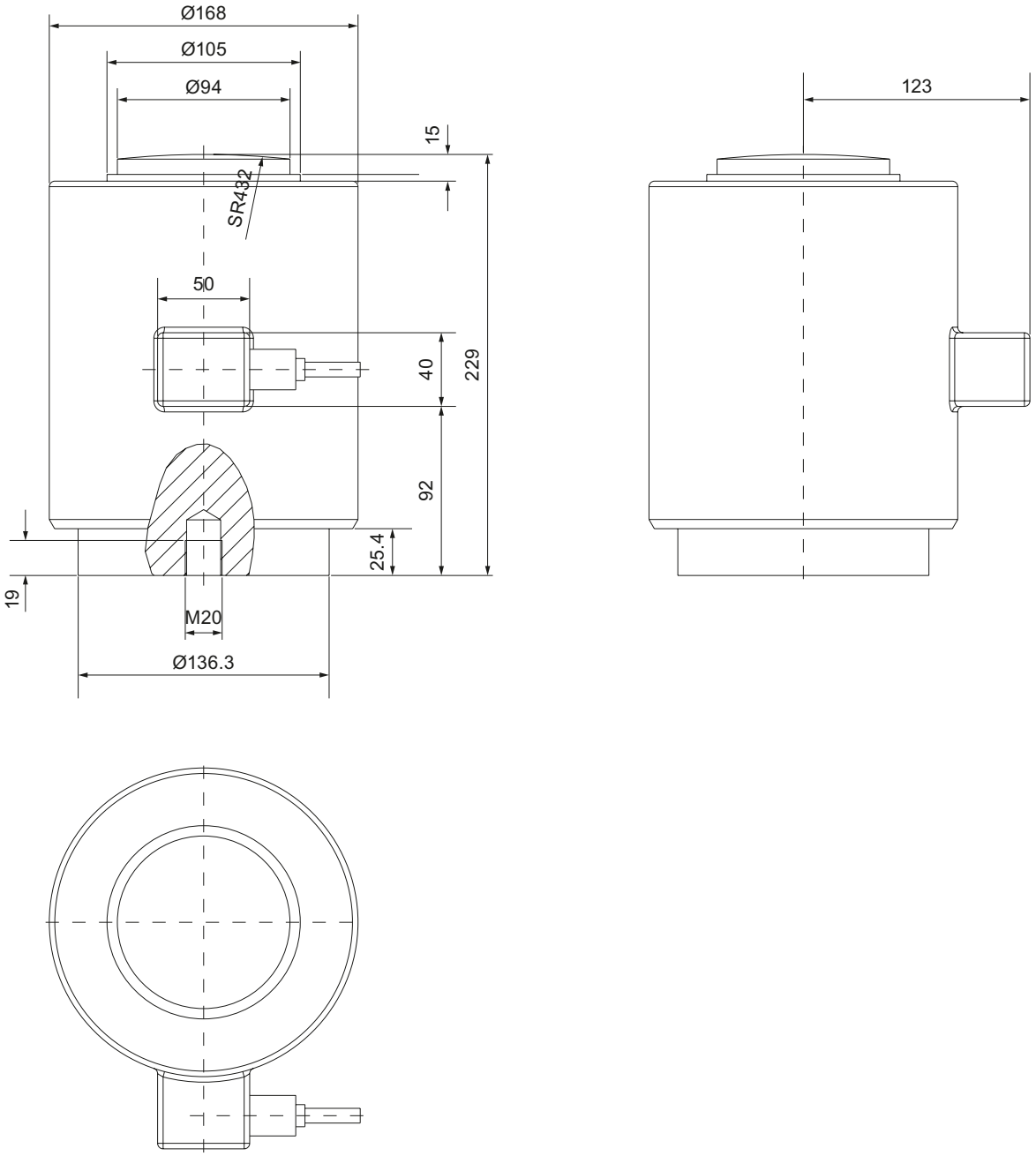


Figure 10-9 SIWAREX WL270 CP-S SC dimension drawing

Ordering data

11

11.1 Load cells

SIWAREX WL230

SIWAREX WL230 BB-S SA			
Type series	**Designation**	**Rated load**	**Order No.**
WL 230	BB-S SA 10kg C3	10 kg	7MH5106-2AD00
WL 230	BB-S SA 10kg C3 Ex	10 kg	7MH5106-2AD01
WL 230	BB-S SA 20kg C3	20 kg	7MH5106-2GD00
WL 230	BB-S SA 20kg C3 Ex	20 kg	7MH5106-2GD01
WL 230	BB-S SA 50kg C3	50 kg	7MH5106-2PD00
WL 230	BB-S SA 50kg C3 Ex	50 kg	7MH5106-2PD01
WL 230	BB-S SA 100kg C3	100 kg	7MH5106-3AD00
WL 230	BB-S SA 100kg C3 Ex	100 kg	7MH5106-3AD01
WL 230	BB-S SA 200kg C3	200 kg	7MH5106-3GD00
WL 230	BB-S SA 200kg C3 Ex	200 kg	7MH5106-3GD01
WL 230	BB-S SA 500kg C3	500 kg	7MH5106-3PD00
WL 230	BB-S SA 500kg C3 Ex	500 kg	7MH5106-3PD01

SIWAREX WL230 SB-S SA			
Type series	**Designation**	**Rated load**	**Order No.**
WL 230	SB-S SA 500kg C3	500 kg	7MH5107-3PD00
WL 230	SB-S SA 500kg C3 Ex	500 kg	7MH5107-3PD01
WL 230	SB-S SA 1t C3	1 t	7MH5107-4AD00
WL 230	SB-S SA 1t C3 Ex	1 t	7MH5107-4AD01
WL 230	SB-S SA 2t C3	2 t	7MH5107-4GD00
WL 230	SB-S SA 2t C3 Ex	2 t	7MH5107-4GD01
WL 230	SB-S SA 5t C3	5 t	7MH5107-4PD00
WL 230	SB-S SA 5t C3 Ex	5 t	7MH5107-4PD01

SIWAREX WL250

SIWAREX WL 250 ST-S SA			
Type series	**Designation**	**Rated load**	**Order No.**
WL 250	ST-S SA 50kg C3	50 kg	7MH5105-2PD00
WL 250	ST-S SA 50kg C3 Ex	50 kg	7MH5105-2PD01
WL 250	ST-S SA 100kg C3	100 kg	7MH5105-3AD00
WL 250	ST-S SA 100kg C3 Ex	100 kg	7MH5105-3AD01
WL 250	ST-S SA 250kg C3	250 kg	7MH5105-3HD00
WL 250	ST-S SA 250kg C3 Ex	250 kg	7MH5105-3HD01
WL 250	ST-S SA 500kg C3	500 kg	7MH5105-3PD00
WL 250	ST-S SA 500kg C3 Ex	500 kg	7MH5105-3PD01
WL 250	ST-S SA 1t C3	1 t	7MH5105-4AD00
WL 250	ST-S SA 1t C3 Ex	1 t	7MH5105-4AD01
WL 250	ST-S SA 2.5t C3	2.5 t	7MH5105-4HD00
WL 250	ST-S SA 2.5t C3 Ex	2.5 t	7MH5105-4HD01
WL 250	ST-S SA 5t C3	5 t	7MH5105-4PD00
WL 250	ST-S SA 5t C3 Ex	5 t	7MH5105-4PD01
WL 250	ST-S SA 10t C3	10 t	7MH5105-5AD00
WL 250	ST-S SA 10t C3 Ex	10 t	7MH5105-5AD01

SIWAREX WL260

SIWAREX WL260 SP-S AA			
Type series	**Designation**	**Rated load**	**Order No.**
WL260	SP-S AA 3kg C3	3 kg	7MH5102-1KD00
WL260	SP-S AA 5kg C3	5 kg	7MH5102-1PD00
WL260	SP-S AA 10kg C3	10 kg	7MH5102-2AD00
WL260	SP-S AA 20kg C3	20 kg	7MH5102-2GD00
WL260	SP-S AA 50kg C3	50 kg	7MH5102-2PD00
WL260	SP-S AA 100kg C3	100 kg	7MH5102-3AD00

SIWAREX WL260 SP-S AB			
Type series	**Designation**	**Rated load**	**Order No.**
WL260	SP-S AB 50kg C3	50 kg	7MH5103-2PD00
WL260	SP-S AB 100kg C3	100 kg	7MH5103-3AD00
WL260	SP-S AB 200kg C3	200 kg	7MH5103-3GD00
WL260	SP-S AB 500kg C3	500 kg	7MH5103-3PD00

SIWAREX WL260 SP-S SA			
Type series	**Designation**	**Rated load**	**Order No.**
WL 260	SP-S SA 5kg C3	5 kg	7MH5104-1PD00
WL 260	SP-S SA 5kg C3 Ex	5 kg	7MH5104-1PD01
WL 260	SP-S SA 10kg C3	10 kg	7MH5104-2AD00
WL 260	SP-S SA 10kg C3 Ex	10 kg	7MH5104-2AD01
WL 260	SP-S SA 20kg C3	20 kg	7MH5104-2GD00
WL 260	SP-S SA 20kg C3 Ex	20 kg	7MH5104-2GD01
WL 260	SP-S SA 50kg C3	50 kg	7MH5104-2PD00
WL 260	SP-S SA 50kg C3 Ex	50 kg	7MH5104-2PD01
WL 260	SP-S SA 100kg C3	100 kg	7MH5104-3AD00
WL 260	SP-S SA 100kg C3 Ex	100 kg	7MH5104-3AD01
WL 260	SP-S SA 200kg C3	200 kg	7MH5104-3GD00
WL 260	SP-S SA 200kg C3 Ex	200 kg	7MH5104-3GD01

SIWAREX WL270

SIWAREX WL270 CP-S SA			
Type series	**Designation**	**Rated load**	**Order No.**
WL 270	CP-S SA 10t C3	10 t	7MH5108-5AD00
WL 270	CP-S SA 10t C3 Ex	10 t	7MH5108-5AD01
WL 270	CP-S SA 20t C3	20 t	7MH5108-5GD00
WL 270	CP-S SA 20t C3 Ex	20 t	7MH5108-5GD01
WL 270	CP-S SA 30t C3	30 t	7MH5108-5KD00
WL 270	CP-S SA 30t C3 Ex	30 t	7MH5108-5KD01
WL 270	CP-S SA 50t C3	50 t	7MH5108-5PD00
WL 270	CP-S SA 50t C3 Ex	50 t	7MH5108-5PD01

SIWAREX WL270 CP-S SB			
Type series	**Designation**	**Rated load**	**Order No.**
WL 270	CP-S SB 100t C3	100 t	7MH5110-6AD00
WL 270	CP-S SB 100t C3 Ex	100 t	7MH5110-6AD01

SIWAREX WL270 CP-S SC			
Type series	**Designation**	**Rated load**	**Order No.**
WL270	CP-S SC 200t 0.1%	200 t	7MH5111-6GA00
WL270	CP-S SC 200t 0.1% Ex	200 t	7MH5111-6GA01

11.2 Accessories

Signal cable

Recommended cable

SIWAREX cable Li2Y2x0.75St+2x(2x0.34St)-CY		
Application	**Sheath color**	**Order No.**
Standard application	Orange	7MH4702-8AG
Intrinsically safe Ex application	Light blue	7MH4702-8AF

Grounding cable

Highly flexible grounding cable		
Designation	**Description**	**Order No.**
SIWAREX R grounding cable	Highly flexible grounding cable for diverting parasitic currents	7MH3701-1AA1

Appendix

A

A.1 Technical support

Technical Support

You can contact Technical Support for all IA and DT products:

- Via the Internet using the **Support Request:**
  Support request (http://www.siemens.com/automation/support-request)
- E-mail (mailto:support.automation@siemens.com)
- Phone: +49 (0) 180 5050 222
  (0.14 €/min on German landlines, prices may vary for mobile systems)
- Fax: +49 (0) 180 5050 223
  (0.14 €/min on German landlines, prices may vary for mobile systems)

Further information about our technical support is available in the Internet at
Technical Support (http://www.siemens.com/automation/csi/service)

Service & Support on the Internet

In addition to our documentation, we offer a comprehensive knowledge base online on the Internet at:

Services & Support (http://www.siemens.com/automation/service&support)

There you will find:

- The latest product information, FAQs, downloads, tips and tricks.
- Our newsletter, providing you with the latest information about your products.
- A Knowledge Manager to find the right documents for you.
- Our bulletin board, where users and specialists share their knowledge worldwide.
- You can find your local contact partner for Industry Automation and Drives Technologies in our partner database.
- Information about field service, repairs, spare parts and lots more under "Services."

Additional Support

Please contact your local Siemens representative and offices if you have any questions about the products described in this manual and do not find the right answers.

Find your contact partner at:

Partner (http://www.automation.siemens.com/partner)

A signpost to the documentation of the various products and systems is available at:

Documentation (http://www.siemens.com/weighing/documentation)

Index

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