

SIEMENS

SIWAREX WL230

Load foot
SB-S CA

Manual

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7MH5721-4GH10 (load foot 0.1 to 2 t)
7MH5721-4PH10 (load foot 2.5 to 5 t)
7MH5721-5AH10 (load foot 10 t)

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
indicates that minor personal injury can result if proper precautions are not taken.

NOTICE
indicates that property damage can result if proper precautions are not taken.

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 product/system described in this documentation may be operated only by **personnel qualified** for the specific task in accordance with the relevant documentation, in particular its warning notices and safety instructions. Qualified personnel are those who, based on their training and experience, are capable of identifying risks and avoiding potential hazards when working with these products/systems.

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 complied with. The information in the relevant documentation must be observed.

Trademarks

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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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Introduction

1.1 Purpose of this documentation

These instructions contain all information required to commission and use the device. Read the instructions carefully prior to installation and commissioning. In order to use the device correctly, first review its principle of operation.

The instructions are aimed at persons mechanically installing the device, connecting it electronically, configuring the parameters and commissioning it, as well as service and maintenance engineers.

1.2 Document history

The most important changes in the documentation when compared with the respective previous edition are given in the following table.

Table 1-1 Editions

Edition	Comment/Change
05/2019	Initial release

1.3 Checking the scope of delivery

1. Check the packaging and the delivered articles for visible damage.
2. Report any claims for damages immediately to the shipping company.
3. Retain the damaged parts until clarification.
4. Check the consignment by comparing your order with the shipping documents for correctness and completeness.

1.4 Security information

Siemens provides products and solutions with industrial security functions that support the secure operation of plants, systems, machines and networks.

In order to protect plants, systems, machines and networks against cyber threats, it is necessary to implement – and continuously maintain – a holistic, state-of-the-art industrial security concept. Siemens' products and solutions constitute one element of such a concept.

Customers are responsible for preventing unauthorized access to their plants, systems, machines and networks. Such systems, machines and components should only be connected to an enterprise network or the internet if and to the extent such a connection is necessary and

only when appropriate security measures (e.g. firewalls and/or network segmentation) are in place.

For additional information on industrial security measures that may be implemented, please visit <https://www.siemens.com/industrialsecurity>.

Siemens' products and solutions undergo continuous development to make them more secure. Siemens strongly recommends that product updates are applied as soon as they are available and that the latest product versions are used. Use of product versions that are no longer supported, and failure to apply the latest updates may increase customer's exposure to cyber threats.

To stay informed about product updates, subscribe to the Siemens Industrial Security RSS Feed under <https://www.siemens.com/industrialsecurity>.

1.5 Notes on warranty

The contents of this manual shall not become part of or modify any prior or existing agreement, commitment or legal relationship. The sales contract contains all obligations on the part of Siemens as well as the complete and solely applicable warranty conditions. Any statements regarding device versions described in the manual do not create new warranties or modify the existing warranty.

The content reflects the technical status at the time of publishing. Siemens reserves the right to make technical changes in the course of further development.


Safety notes

2.1 Prerequisites for safe use

This device left the factory in good working condition. In order to maintain this status and to ensure safe operation of the device, observe these instructions and all the specifications relevant to safety.

Observe the information and symbols on the device. Do not remove any information or symbols from the device. Always keep the information and symbols in a completely legible state.

2.1.1 Improper device modifications

 WARNING
Improper device modifications
Risk to personnel, system and environment can result from modifications to the device, particularly in hazardous areas.
<ul style="list-style-type: none">• Only carry out modifications that are described in the instructions for the device. Failure to observe this requirement cancels the manufacturer's warranty and the product approvals.

2.2 Requirements for special applications

Due to the large number of possible applications, each detail of the described device versions for each possible scenario during commissioning, operation, maintenance or operation in systems cannot be considered in the instructions. If you need additional information not covered by these instructions, contact your local Siemens office or company representative.

Note

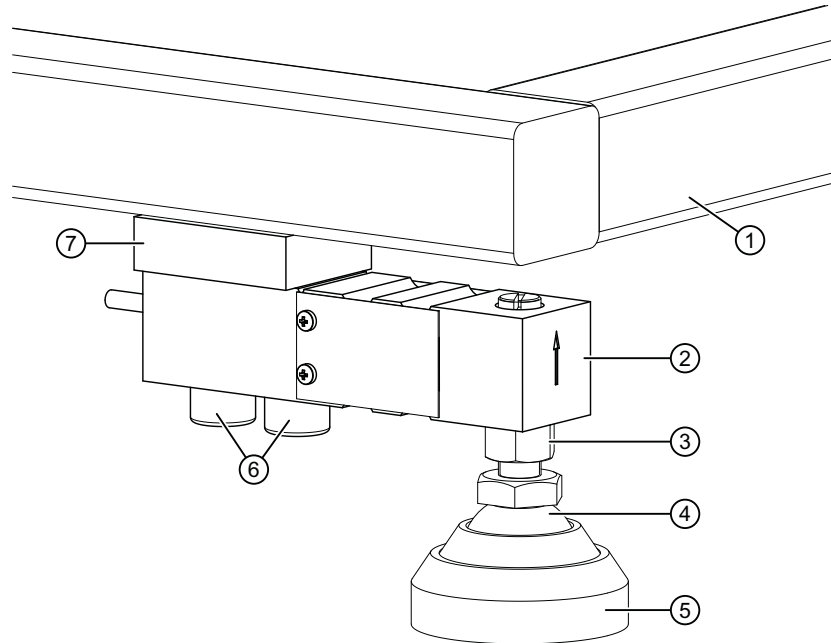
Operation under special ambient conditions

We highly recommend that you contact your Siemens representative or our application department before you operate the device under special ambient conditions as can be encountered in nuclear power plants or when the device is used for research and development purposes.

Description

3.1 SIWAREX WL230 SB-S CA design

The self-aligning load foot for SIWAREX WL230 SB-S CA load cells is particularly suitable for installation in platform and bin scales.



- ① Load bearing
- ② Load cell
- ③ Locknut
- ④ Ball joint with pendulum function
- ⑤ Lower part with rubber cap
- ⑥ Mounting screws
- ⑦ Bracket plate

Figure 3-1 Load foot and load cell and load bearing implement

3.2 Characteristics

The load foot has the following characteristics:

- Easy installation of the load cell
- Self-aligning effect on the load bearing implement
- Height compensation via screw thread

3.2 Characteristics

Application planning

4.1 Load cell dummies

Load cells are sensitive sensors. To protect the load cells from becoming damaged during installation and transport, install the load cells only at the last minute. Replace the load cells during installation and transport with placeholders, so-called dummies or phantoms.

4.2 Lifting protection

The following figure shows a proposed solution for lifting protection. The X designates the possible lifting path of the load bearing implement. The bore $\varnothing D$ must be larger than the diameter of the bolt $\varnothing d$. The movement of the load bearing implement must not be hindered.

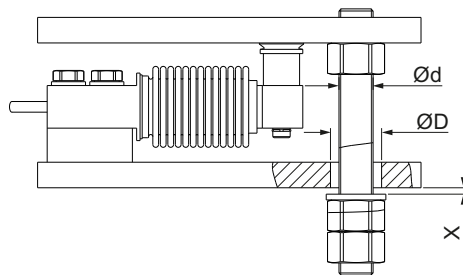


Figure 4-1 Proposed solution for lifting protection

4.3 Load pick-up

Mounting surfaces

The following requirements apply to the installation areas:

- The positional and angular deviations of the mounting areas to each other correspond to the general tolerances for welded constructions in EN ISO 13920.
- Ensure that the foundations are absolutely firm and free of depressions. Mount the installation elements in concrete foundations on evenly cast steel plates.
- The mounting surfaces must be vertical to the measuring direction and preferably in one plane.
- A plane of ≤ 0.2 mm is required for the mounting surfaces.

More than three support points

For more than three support points, the load bearing implement is usually statically indeterminate. With firm foundations and load bearing implements, the load is not evenly distributed to all load cells. The same applies to unstable mounts such as a steel construction. Two diagonal load cells bear the main load. The other load cells only support the load bearing implement.

There are two ways to take this into consideration:

- Over-dimensioning of the load cells
- Height compensation of the support points

Over-dimensioning of the load cells

The rated load of the load cells is calculated such that with, for example, four support points the entire weight can be borne by two load cells.

This also prevents an overload of the load cells if depressions in the foundation have to be taken into consideration, e.g. for racks in the steel structure.

Height compensation of the support points

The output signals of the individual load cells correspond to the load distribution.

Compensate for the differences in height as described in the section Compensating differences in height (Page 24).

4.4 Overload protection

NOTICE

Irreparable faults and damage to the load cells

If load cells are used beyond the maximum working load or the maximum transverse load, this can cause irreparable faults and even fracturing of the load cell or the compact mounting unit.

- When using load cells with small rated loads, always provide overload protection in order to protect the load cells from becoming damaged. You need overload protection for both the measuring direction and the transverse direction.

Overload protection in the measuring direction

You protect load cells against vertical overload by placing a stop screw under the point where force is introduced. The stop screw limits the measuring path of the load cell.

For load cells with high rated loads, the risk of an unintentional overload is not as great. Take into consideration possible additional loads when dimensioning the load cells.

Another method for protecting load cells from an overload is to over-dimension the load cells.

Overload protection in the transverse direction

For the load cells with a load foot, the weight force is introduced into the load cells via bearing surfaces. Up to a certain degree, these bearing surfaces allow lateral movement of the load bearing implement or a change in its length as a result of expansion due to heat. They generate a restoring force corresponding to the deflection, which re-centers the load bearing implement. This freedom of movement is desired and necessary for accurate weighing.

If the transverse force is so great that it exceeds the restoring force of the bearing unit and thus the deflection limit, appropriate protective measures are required. Pendulum limiters or guide elements are suitable for this, for example.

Set the pendulum limiters in such a way that the maximum deflection is not exceeded in any direction. The figure below shows the overload protection in the transverse direction using two examples.

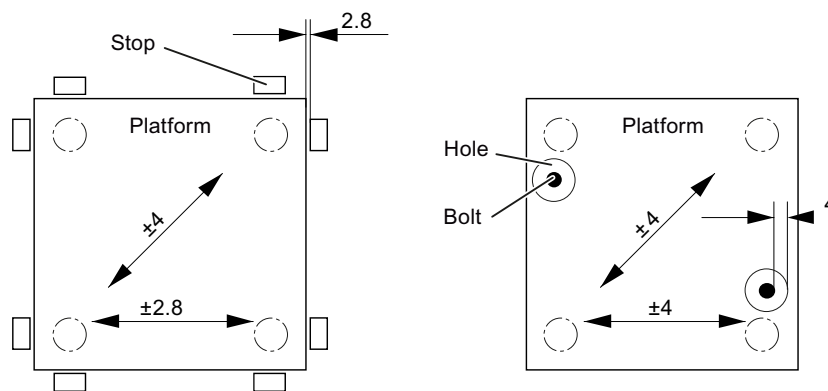


Figure 4-2 Pendulum limitation with a maximum deflection of 4 mm as exemplified by two weighing platforms

4.5 Guide elements

Use the guide elements in the following cases:

- A weight should be determined under the influence of transverse forces.
- Horizontal movement of the load bearing implement should be prevented.

A change in the distance between the support points, for example, as a result of expansion of the load bearing implement due to heat, must not lead to mutual tensioning of the guide elements.

The following figure shows the ideal arrangement of guide elements.

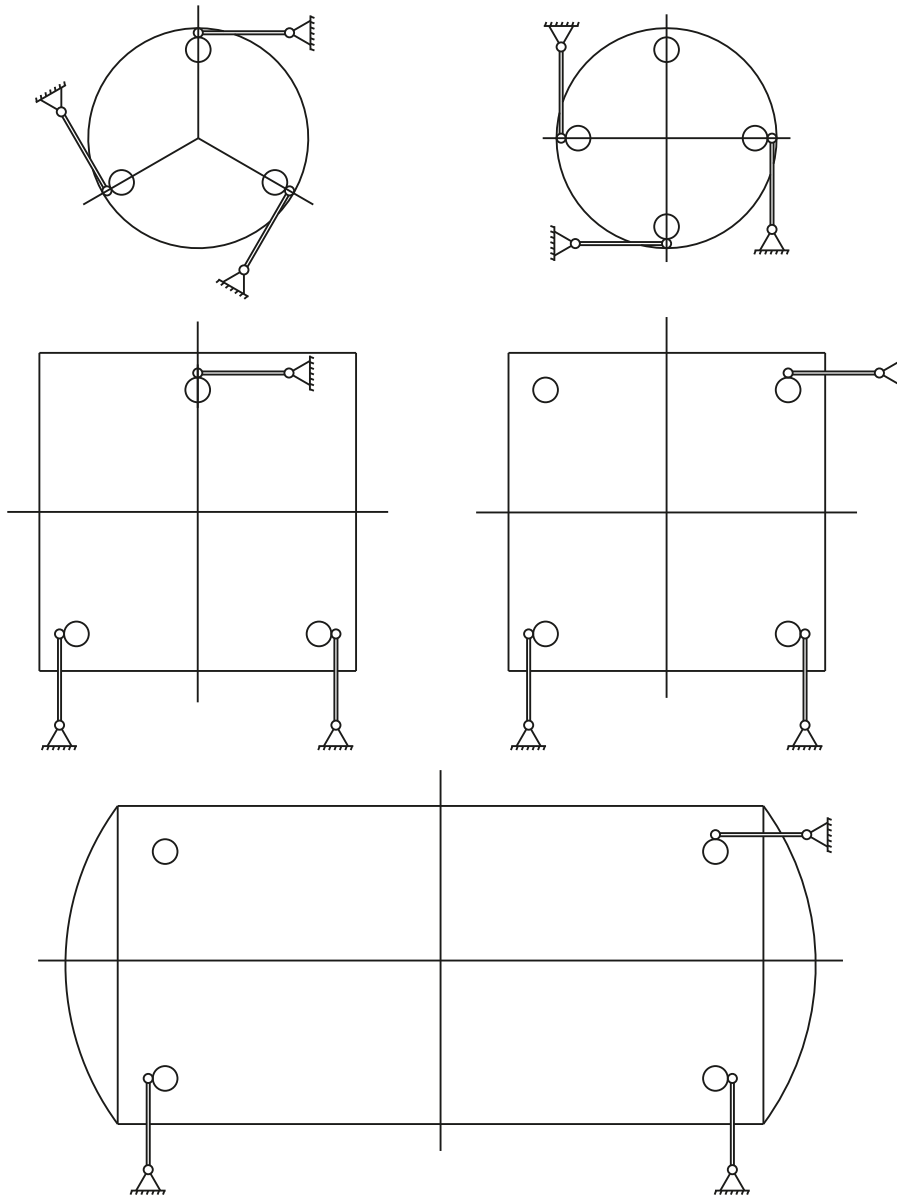


Figure 4-3 Arrangement of guide elements

To ensure that no force components occur in the measuring direction, you must install guide elements at precise right angles to the effective direction of the load cells.

Three guide elements are sufficient to statically fix a weighing platform or container.

Note

Weighing errors

With four guide elements, there is a risk of the guide elements mutually tensioning, which in turn induces weighing errors. If you nevertheless want to use four guide elements, the guide elements must be installed with a sufficient amount of play.

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

4.6 Grounding cable

The grounding cable is used to protect the load cells from undesired currents. The causes of such currents are, for example:

- Equalizing currents with missing or faulty equipotential bonding conductors
- A lightning strike nearby
- Welding work
- Static charge

Installing/mounting

5.1 Basic safety instructions

⚠ WARNING
Falling loads Risk to life! Load cells are not machine components which have been constructed with the normal safety factors. <ul style="list-style-type: none">• Install fall protection or disaster protection according to the potential risk.• Lift the load bearing implement using suitable hoisting equipment.

NOTICE
Improper handling of the load cell The load cell can be damaged when being handled improperly. Load cells are precision components. <ul style="list-style-type: none">• Observe the operating instructions for the load cell. SIWAREX WL200 Operating instructions (https://support.industry.siemens.com/cs/ww/en/view/109749190)• Do not drop the load cell.• Protect the load cells from shocks.• Do not carry the load cell by its connecting cables.• Do not damage any cables of the connecting cables.• Do not damage any cables of the load cell.• As long as the installation work on the scale structure is not completed, replace the load cells with dummies. Load cell dummies (Page 11)

NOTICE
Incorrect assembly of the load cell
Damaging of load cells, installation parts or load bearing implement
With load cells of smaller rated loads, there is a risk of stretching the load cell bodies when attaching force transfer devices, e.g. when tightening locknuts.
Torsional and bending moments, eccentric loads and transverse loads are disturbance variables. These disturbance variables cause errors in the measuring result and can damage the load cells and compact mounting units if the maximum limits are exceeded.
<ul style="list-style-type: none">• To ensure safe use of the hoisting gear, provide indented claws or crane eyebolts on the load bearing implement.• Do not overload the load cells.• Put the load bearing implement down slowly.• Use overload protection that securely absorbs the desired loads. The overload protection permits a rise in weight unhindered until the setpoint weight is reached.• Introduce the load in the measuring direction of the load cell.• The mounting components normally allow so much room for movement that heat expansion will not result in lateral loading.

NOTICE
Incorrect welding
Incorrect welding can damage the load cell.
<ul style="list-style-type: none">• Do not conduct the welding current over the load cells.<ul style="list-style-type: none">– Attach the grounding clamp of the welding unit making reliable contact close to the weld.– Bridge the load cells with a highly flexible grounding cable. See the section Grounding cable (Page 15).– Disconnect the individual load cells.

NOTICE
Missing grounding of the load cell
Undesirable electrical currents can arise during lightning and damage the load cell.
<ul style="list-style-type: none">• Bridge the load cells with highly flexible grounding cables. See the section Screw on the grounding cable (Page 25).

5.2 General notes on mounting

The installation conditions vary widely. The dead load of the load bearing implement can be very low or relatively high. You might be dealing with a container, platform or a roller table. The following installation instructions therefore only describe the general procedures.

To protect the load cells from damage during installation, always set up the load bearing implement on dummies.

Depending on the installation conditions, the detailed procedure deviates from the following description.

5.3 Mounting the load foot

Introduction

In this section, you will learn how to mount the load foot step-by-step.

Before you start, note the following safety information:

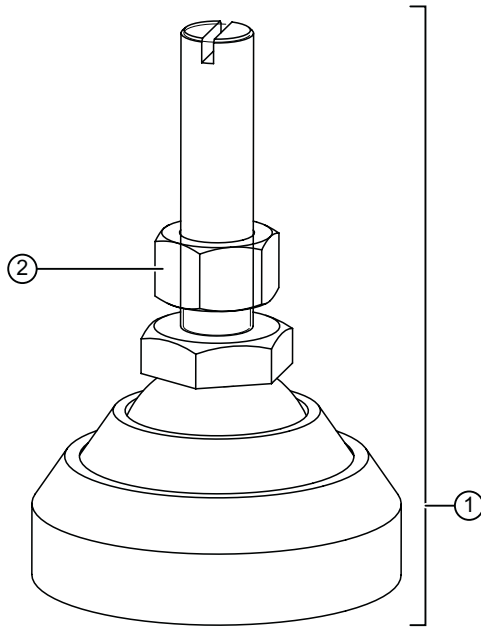
- General safety information (Page 7)
- Basic safety information: Installation (Page 17)

For optimum performance of the load foot, read the complete equipment manual.

Procedure

1. Check the scope of delivery for the load foot:
Check the scope of delivery (Page 20)
2. Create a bracket plate.
Create bracket plate (Page 21)
3. Screw the load cell to the load bearing implement upside down.
Screw the load cell to the load bearing implement. (Page 22)
4. Install the load foot in the load cell.
Installing the load foot in the load cell (Page 23)
5. Compensate for the differences in height:
Compensating differences in height (Page 24)
6. Check the mounting.
Checking the mounting (Page 24)
7. Fasten the grounding cable.
Screw on the grounding cable (Page 25)

5.4 Check the scope of delivery

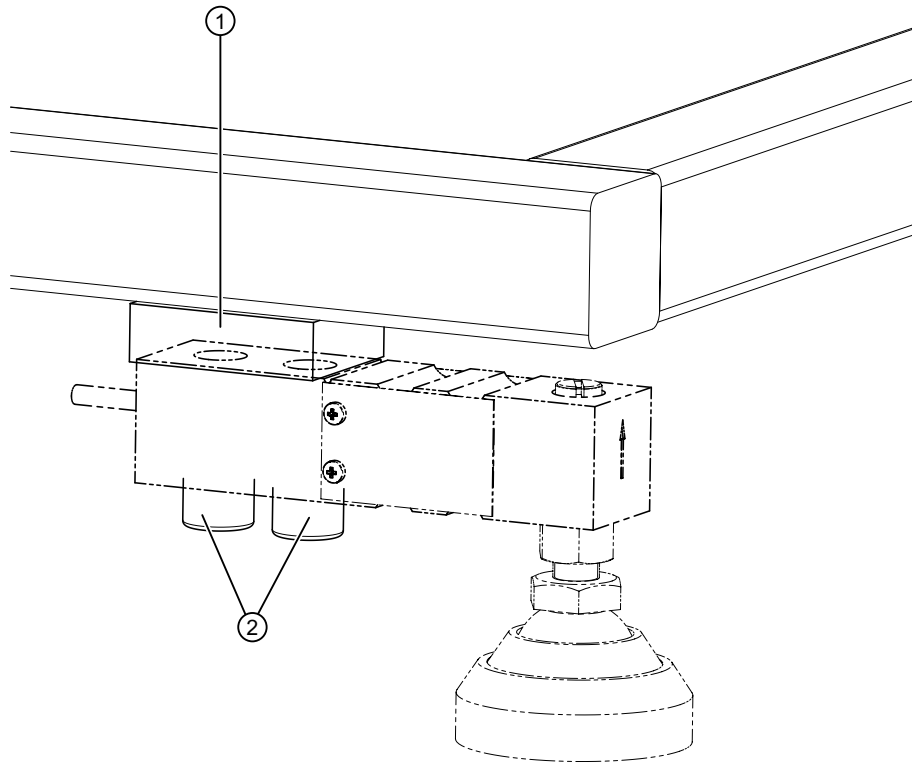


- ① Load foot
- ② Locknut

Figure 5-1 Product package

5.5 Create bracket plate

Procedure



- ① Bracket plate opening for load arm of the load cell
- ② Mounting screws

Figure 5-2 Size of the bracket plate

- Note the following for creating the bracket plate:
 - Mounting of the load cell to the bracket plate can be upside down.
 - The dimensions of the bracket plate are based on the dimensions of the load cell.
 - The load arm of the load cell can be free-standing.
 - The supports of the load cells on the bracket plate are machined.
 - The tightening torques (Page 29).

5.6 Screw the load cell to the load bearing implement.

Procedure

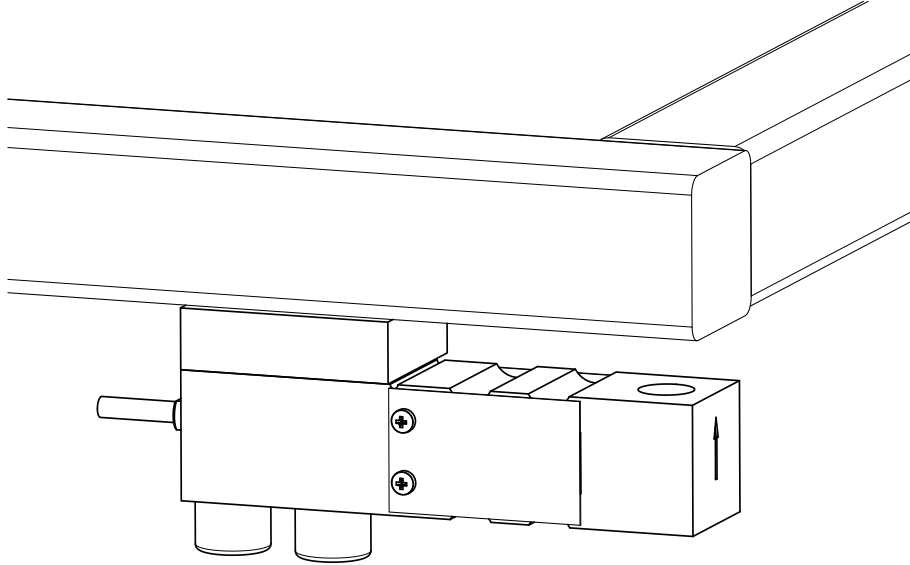


Figure 5-3 Screw the load cell to the load bearing implement.

1. Screw in the fastening screws.
2. Tightening the fixing screws to the recommended torque (Page 29).

5.7 Installing the load foot in the load cell

Procedure

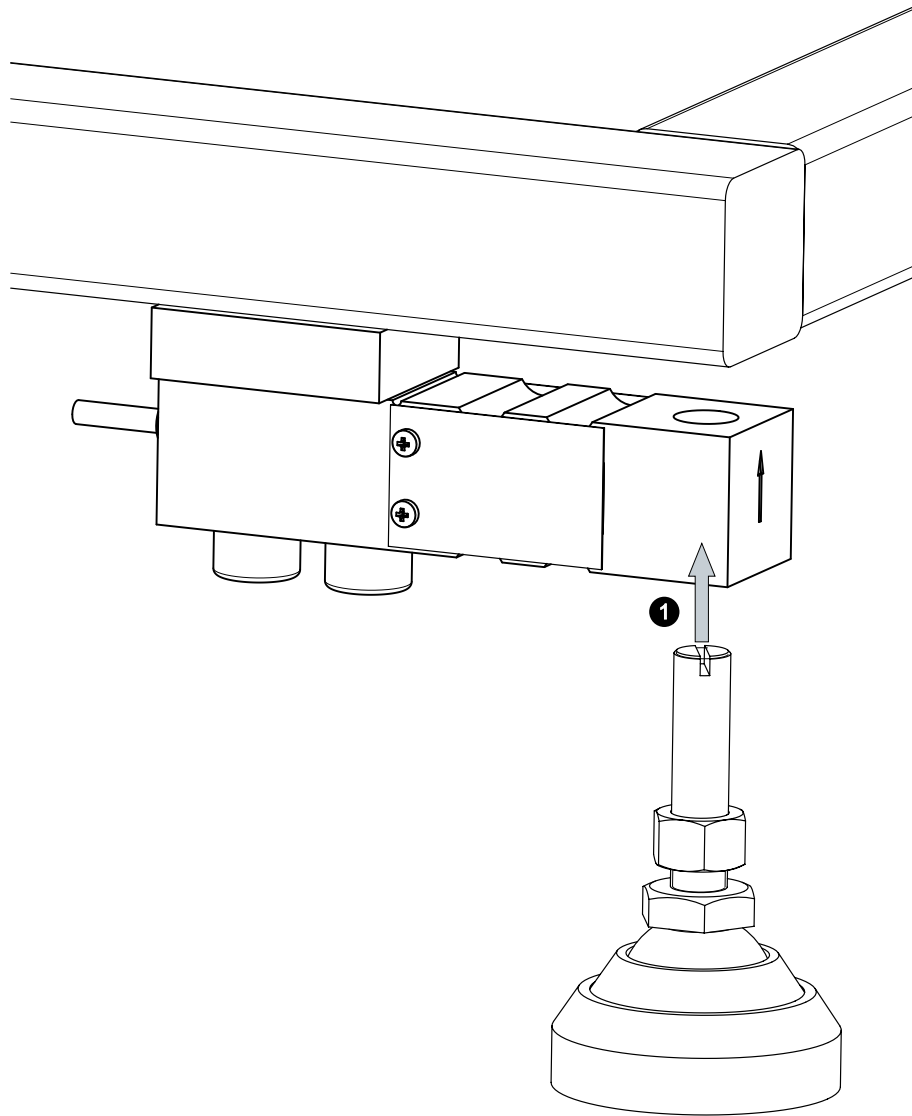


Figure 5-4 Installing the load foot in the load cell

1. Screw the load foot from below into the load cell.
2. Do not place the locknut yet.

5.8 Compensating differences in height

Introduction

At the time of installation, check whether it makes sense to compensate for differences in height. If load bearing implements and/or the foundation are elastic, it is not advisable to compensate for differences of height.

In the following cases, you need to compensate for differences in height:

- Rigid load bearing implement and rigid foundation.
- A load cell is not loaded.
- Two diagonally opposite load cells with full scales are overloaded.

Requirement

Before you compensate for differences in height, the following requirements must be met:

- The mounting surfaces lie (approximately) in one plane to each other.
- The maximum inclination of the paving surfaces is 2 %.
- The compressive strength of the mounting surfaces is designed for the contact surfaces of the load foot.

Procedure

1. Determine which load cell has the lowest load.
 - Connect load cells in the junction box.
 - Disconnect the load cell cables SIG+ and SIG-.
 - Supply the load cells with a supply voltage, e.g. via electronic weighing system.
 - Measure the output voltages of the individual load cells between SIG+ and SIG-.
2. Compensate for the differences in height:
 - Calibrate the measuring signals by turning the screw shafts.
 - Tightening the locknuts of the load feet to the recommended torque (Page 29).
3. Check the output voltages of the load cells again.
4. Repeat the sequence if necessary.

5.9 Checking the mounting

Procedure

To avoid destroying the load cell and load foot, check the mounting procedure as follows:

Freedom of movement is essential for the proper functioning of the scale.

1. Check that the load bearing implement can oscillate freely within the pendulum travel of the load feet.
 - Slightly lift the load cells one after the other.
 - Center the load feet.
2. If there are more than three load points, check that the load is distributed evenly across all load cells.
3. Check the weight display at the load points.
4. Correct any deviations before commissioning.

5.10 Screw on the grounding cable

1. Prepare a permanently contacting bolted connection such as M10 on the load bearing implement and foundation for securing the grounding cable.
2. Screw the grounding cable tight.

5.11 Dismantling

For dismantling the load cells, the same safety rules (Page 17) apply as for installation.

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. If you intend to reinstall the load cell or send it for repair, do not cut the load cell cable.
7. Do not carry the load cell by the cable.

Service and maintenance

NOTICE

Damage to load cells and load feet, measurement errors

- Dirt must not be allowed to accumulate in the vicinity of a load cell.
- Do not subject cable glands and seals directly to the jet of a pressure washer.
- Do not clean the load cell and installed parts with aggressive cleaning agents. Aggressive cleaning agents can also cause corrosion on stainless steel parts if used improperly.
- Clean the area around the load foot with running water. The load foot is not protected against ingress of water.

6.1 Care and maintenance of elastomer components

6.1.1 Environmental influences/storage

General information

The physical properties of most rubber products change under poor storage conditions or with improper treatment. The following examples of changes, however, can make them unusable:

- Excessive hardening
- Softening
- Permanent deformation
- Peeling, cracking and/or other surface damage

Such changes may be caused by external influences, for example:

- Environmental factors (ozone, heat, light, humidity)
- Solvents
- Storage under stress

Properly stored and treated rubber products will remain unchanged in their properties for a period of several years.

6.1 Care and maintenance of elastomer components

6.1.2 Service life / Control

General information

The service life of elastomer components depends on the design and the stress it experiences. Rubber is subject to a natural aging process. If it is stressed within a permitted range, you can expect a service life of more than 6 years.

The rubber-metal parts are maintenance-free during their operational use.

Components should be visually inspected 6 months after installation and once a year thereafter.

6.1.3 Cleaning

General information

The following applies to cleaning:

- We recommend the use of a pH-neutral detergent. Do not use cleaning agents containing non-polar solvents (e.g., gasoline)!
- Rinse the components with water after cleaning, if needed.
- Protect the rubber-metal bonding from contact with detergents using constructive measures.
- Do not clean with sharp objects, for example, a wire brush or sandpaper.

Technical specifications

Variable	Value at rated load		
	0.1 ... 2 t	2.5 ... 5 t	10 t
Maximum permitted lateral deflection	±1 mm	±1 mm	±1 mm
Maximum vertical load	30 kN	70 kN	130 kN
Torques			
• Tightening torques of mounting screws for load cell	75 Nm	500 Nm	700 Nm
• Tightening torques of locknut for load foot	60 Nm	210 Nm	290 Nm
Material			
• Steel, nickel-plated			
• NBR: Nitrile rubber			

Dimension drawings

8.1 Dimension drawing of the load foot

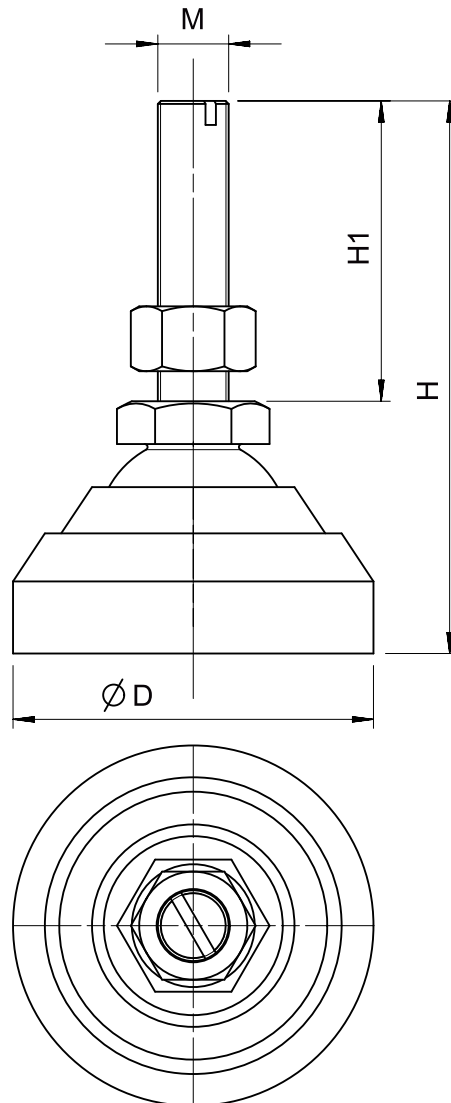


Figure 8-1 SIWAREX WL230 SB-S CA load foot

8.2 Dimension drawing of grounding cable

Table 8-1 Dimensions SB-S CA 0.1 t ... 2 t¹⁾, 2.5 t ... 5 t, 10 t

	ØD	H	H1	M
SB-S CA: 0.1 t ... 2 t ¹⁾	60	92	50	M12 x 1.75
SB-S CA: 2.5 t ... 5 t ¹⁾	80	105	50	M18 x 1.5
SB-S CA: 10 t ¹⁾	86	112	50	M24 x 2

1) All dimensions are in millimeters.

8.2 Dimension drawing of grounding cable

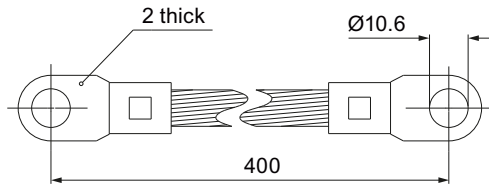


Figure 8-2 Dimension drawing of grounding cable, dimensions in mm

Certificates and approvals

A.1 Technical support

Technical support

If this documentation does not provide complete answers to any technical questions you may have, contact Technical Support at:

- Support request (<http://www.siemens.com/automation/support-request>)
- More information about our Technical Support is available at Technical support (<http://www.siemens.com/automation/csi/service>)

Internet Service & Support

In addition to our documentation, Siemens provides a comprehensive support solution at:

- Service&Support (<http://www.siemens.com/automation/service&support>)

Personal contact

If you have additional questions about the device, please contact your Siemens personal contact at:

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

To find the personal contact for your product, go to "All Products and Branches" and select "Products & Services > Industrial Automation > Process Instrumentation".

Documentation

You can find documentation on various products and systems at:

- SIWAREX (<https://support.industry.siemens.com/cs/ww/en/ps/17781/man>)

See also

Process instrumentation catalog (<http://www.siemens.com/processinstrumentation/catalogs>)

SIWAREX support

- E-mail (<mailto:hotline.siwarex@siemens.com>)
- Phone: +49 (721) 595-2811 CET 8:00 to 17:00

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