

## Load Cells

Shear beam load cells  
SIWAREX WL230 SB-S SA

### Load cell

#### Overview



The shear beam load cell is particularly suitable for use in hopper, overhead rail and platform scales.

#### Design

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

#### Technical specifications

SIWAREX WL230 SB-S SA	
<b>Possible applications</b>	<ul style="list-style-type: none"> <li>Hopper scales</li> <li>Belt scales</li> <li>Overhead rail scales</li> <li>Platform scales</li> </ul>
<b>Type of construction</b>	Shear beam load cell
<b>Loads</b>	
Rated load/maximum load $E_{max}$	<ul style="list-style-type: none"> <li>500 kg (1 102.31 lb)</li> <li>1 t (0.98 tn. l.)</li> <li>2 t (1.97 tn. l.)</li> <li>5 t (4.92 tn. l.)</li> </ul>
Minimum initial loading $E_{min}$	0 kg
Max. working load $L_u$	150% $E_{max}$
Breaking load $L_d$	300% $E_{max}$
Safe side load $L_{lq}$	100% $E_{max}$
<b>Measurement characteristic values</b>	
Deflection $h_n$ at	
• $E_{max} = 500$ kg (1 102.31 lb)	0.13 mm
• $E_{max} = 1$ t (0.98 tn. l.)	0.21 mm
• $E_{max} = 2$ t (1.97 tn. l.)	0.29 mm
• $E_{max} = 5$ t (4.92 tn. l.)	0.38 mm
Rated characteristic value $C_n$	2.0 ± 0.002 mV/V
Tolerance $D_0$ of zero signal	≤ ± 1.0% $C_n$
Max. scale interval $n_{LC}$	3 000
Min. scale interval $V_{min}$ at	
• $E_{max} = 500$ kg (1 102.31 lb)	$E_{max}/10\ 000$
• $E_{max} = 1 \dots 5$ t (0.98 ... 4.92 tn. l.)	$E_{max}/15\ 000$
Minimum application range $R_{min(LC)}$ at	
• $E_{max} = 500$ kg (1 102.31 lb)	30%
• $E_{max} = 1 \dots 5$ t (0.98 ... 4.92 tn. l.)	20%
Combined error $F_{comb}$	± 0.02% $C_n$
Repeatability $F_v$	± 0.02% $C_n$
Creep error $F_{cr}$	
• 30 min	≤ ± 0.02% $C_n$
Temperature coefficient	
• Zero signal $t_{K0}$	0.023% $C_n/5$ K
• Characteristic value $t_{Kc}$	0.017% $C_n/5$ K

#### SIWAREX WL230 SB-S SA

##### Electrical characteristic values

Recommended reference voltage $U_{ref}$	5 ... 12 V DC
Input resistance $R_e$	1 000 ± 10 Ω
Output resistance $R_a$	1 004 ± 5 Ω
Insulation resistance $R_{is}$	5 000 MΩ at 50 V DC

##### Connection and environmental conditions

Rated temperature range $B_{Tn}$	-10 ... +40 °C (14 ... 104 °F)
Operating temperature range $B_{Tu}$	-35 ... +65 °C (-31 ... +149 °F)
Storage temperature range $B_{Ts}$	-35 ... +65 °C (-31 ... +149 °F)
Sensor material (DIN)	Stainless steel EN 1.4542
Degree of protection according to EN 60529; IEC 60529	IP68

Recommended tightening torque of the fixing screws

• $E_{max} = 500$ kg ... 2 t (1 102.31 lb ... 1.97 tn. l.)	150 Nm <sup>1)</sup>
• $E_{max} = 5$ t (4.92 tn. l.)	550 Nm <sup>1)</sup>

##### Cable connection

Function	Color
• EXC + (supply +)	Green
• EXC - (supply -)	Black
• SIG + (measured signal +)	White
• SIG - (measured signal -)	Red
• Shield (not connected to the load cell body)	Transparent

##### Certificates and approvals

Accuracy class according to OIML R-60	C3
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<sup>1)</sup> The tightening torque is to be selected according to the strength class of the screws.

#### Selection and ordering data

##### Load cell, type WL230 SB-S SA

Legal-for-trade according to OIML R-60 up to 3 000d, connecting cable 3 m (9.84 ft) at 500 kg (1 102.31 lb) up to 1 t (0.98 tn. l.), connecting cable 6 m (19.68 ft) at 2 t (1.97 tn. l.) up to 5 t (4.92 tn. l.).

Click on the Article No. for the online configuration in the PIA Life Cycle Portal.

##### Rated load

• 500 kg (1 102.31 lb)	<b>3 P</b>
• 1 t (0.98 tn. l.)	<b>4 A</b>
• 2 t (1.97 tn. l.)	<b>4 G</b>
• 5 t (4.92 tn. l.)	<b>4 P</b>

##### Explosion protection

Without	<b>0</b>
Explosion protection for zones 0, 1, 2, 20, 21, 22	<b>1</b>

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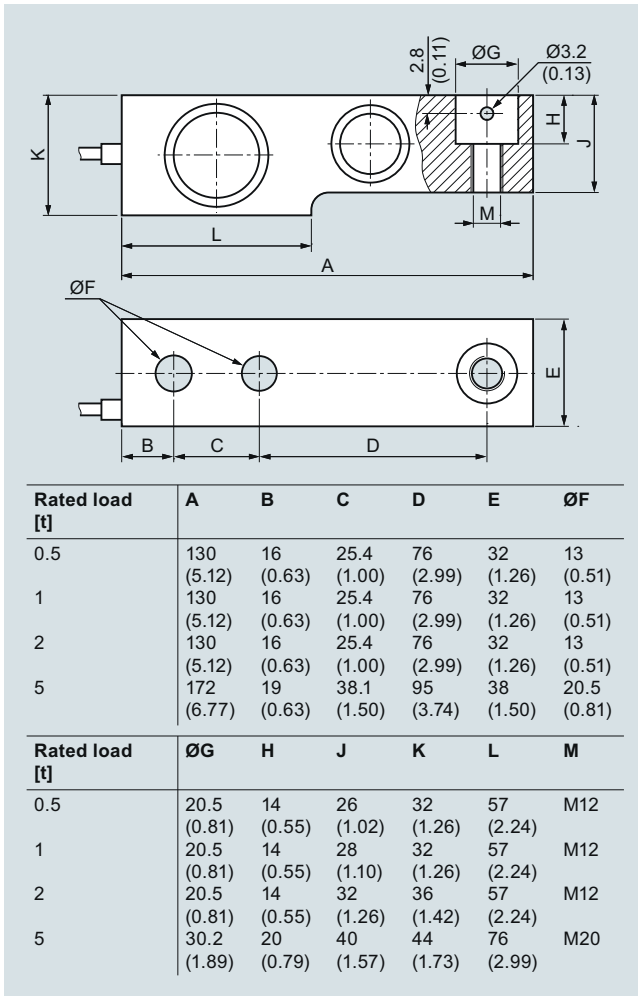
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## Dimensional drawings



SIWAREX WL230 SB-S SA load cell, dimensions in mm (inch)

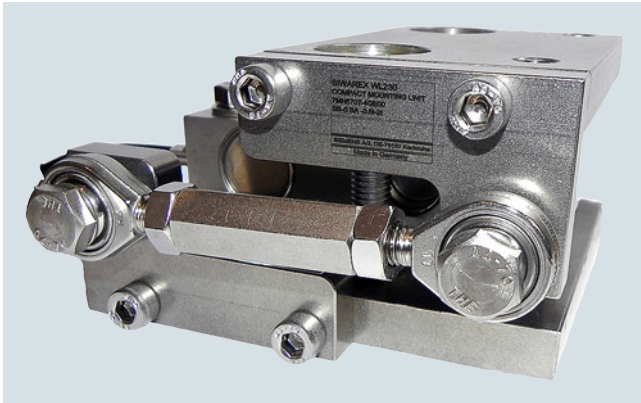
## Load Cells

Shear beam load cells

SIWAREX WL230 SB-S SA

### Mounting unit with guide element

#### Overview



The self-centering mounting unit for SIWAREX WL230 SB-S SA load cells is particularly suitable for implementation in container, platform and roller conveyor scales.

#### Design

The mounting unit comprises a base plate and a top plate, a pendulum bolt and two countersunk screws.

A highly flexible grounding cable between the top and base plate conducts any fault currents past the load cell. On both sides of the base and top plate there are threaded holes for the later flange-fitting of guide elements.

The top plate is aligned and fixed above the base plate with the two countersunk screws. This results in a stable unit. The height of the top plate is adjusted so that it is three millimeters above the installation height with load cell.

In this state, the mounting unit serves as an installation aid and can be used as a dummy for light installation jobs.

The load cell is inserted with the pendulum bolt into the mounting unit. The load cell can be inserted in the scale before mounting the mounting unit. It is also possible to insert the load cell in the mounting unit after mounting. After the mounting unit has been mounted in the scale, the load bearing implement is ideally aligned. The load cells are not yet loaded.

Finally, the load bearing implement is lowered by loosening the two hexagon nuts under the top plate. The weight now rests on the load cells.

In this state the load cell and the pressure pieces together form a self-centering unit. The mounting unit permits sideways displacement of the top plate, and hence of the load bearing implement, by up to three millimeters.

The countersunk head screws prevent the load bearing implement from being lifted off or tipping.

Using the mounting unit as an installation aid results in optimum alignment of the load cells. This is essential to enable the load cells to perform at their best in terms of accuracy. For maintenance or troubleshooting purposes, the load cell can be relieved again by tightening the hexagon nuts. After loosening the fixing screws, it can be replaced easily.

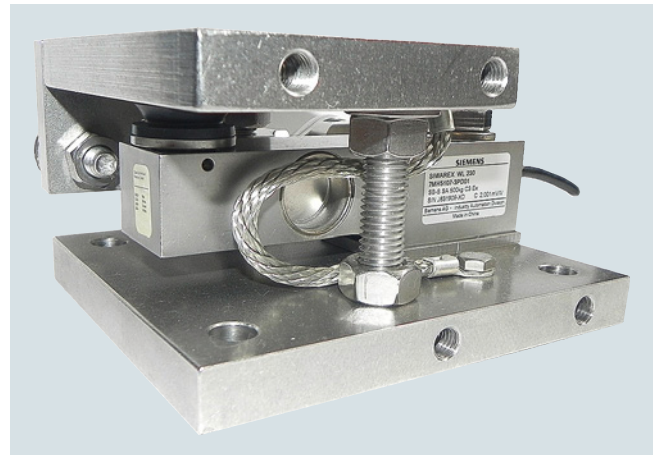
#### Guide element

Guide elements are used if the lateral movement of a load bearing implement is to be prevented. Lateral movements can be initiated by agitator start-up in a container, by braking or accelerating forces in a roller conveyor, or through forces exerted by the wind on outdoor silos. A guide element consists of two flanges and one clamping screw. The clamping screw is adjusted to the correct length. The guide element is attached to the operational mounting unit. A guide element can be mounted on the front or rear of the mounting unit. If necessary, two guide elements can be used in parallel in order to double the transferrable lateral force.

In the case of scales with four load cells, only three mounting units may be equipped with guide elements.

#### Shim

Shims are used to compensate for angular errors and delays in the lug plates. If more than three load cells are used, the shims are also used to adjust the height of the lugs.



Mounting unit with guide element, rear view

## Selection and ordering data

## Article No.

**Mounting unit**

For load cells of the SIWAREX WL230 SB-S SA series  
Material: Stainless steel EN 1.4301 and EN 1.4112

➤ Click on the Article No. for the online configuration in the PIA Life Cycle Portal.

For load cells with a rated load of<sup>1)</sup>

- 500 kg, 1 t (1 102.31 lb, 0.98 tn. l.)
- 2 t (1.97 tn. l.)
- 5 t (4.92 tn. l.)

**Guide elements (optional)**

For mounting units of the SIWAREX WL230 SB-S SA series

Material: Stainless steel EN 1.4301

For load cells with a rated load of<sup>1)</sup>

- 500 kg ... 2 t (1 102.31 lb ... 1.97 tn. l.); permissible lateral force: 3 kN
- 5 t (4.92 tn. l.); permissible lateral force: 5 kN

**Shims (accessories)**

For mounting units of the SIWAREX WL230 SB-S SA series

Material: Stainless steel EN 1.4301

For load cells with a rated load of<sup>1)</sup>

- 500 kg ... 2 t (1 102.31 lb ... 1.97 tn. l.) content: 16 units, each 0.5 mm thick
- 5 t (4.92 tn. l.) content: 4 units, each 0.5 mm thick, 16 units each 1 mm thick

<sup>1)</sup> The load cell is not included in the scope of delivery.

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A  
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4PG00

## Technical specifications

**Mounting unit for load cells of the SIWAREX WL230 SB-S SA series**

Rated load	0.5 ... 2 t (0.49 ... 1.97 tn. l.)	5 t (4.92 tn. l.)
Maximum lateral deflection with load cell	± 3 mm (0.12 inch)	± 3 mm (0.12 inch)
Lifting path of the top plate	3 mm (0.12 inch)	3 mm (0.12 inch)
Restoring force per millimeter of lateral deflection of the top plate in % of the applied load with load cell	13 %/mm	10 %/mm
Permissible supporting load with fixed top plate	25 kN	35 kN
Permissible lifting force on the top plate	25 kN	50 kN
Permissible lateral force on the top plate with fixed top plate	3 kN	5 kN

**Guide element**

Rated load	0.5 ... 2 t (0.49 ... 1.97 tn. l.)	5 t (4.92 tn. l.)
Permissible lateral force <sup>2)</sup>	3 kN	5 kN

<sup>2)</sup> The values apply to one guide element.

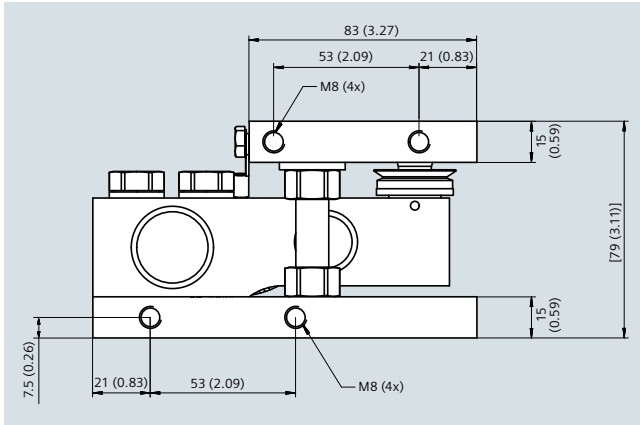
## Load Cells

Shear beam load cells

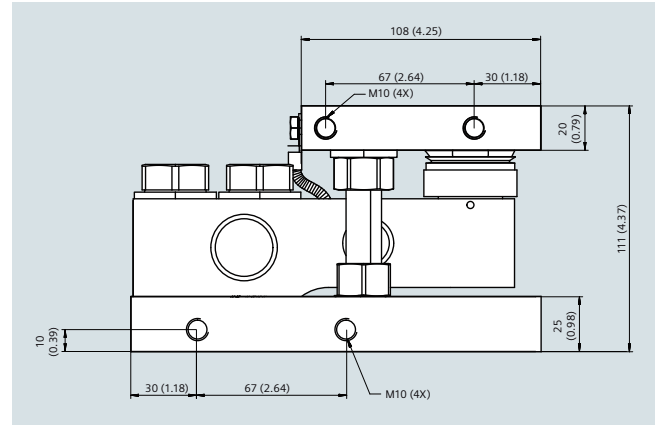
SIWAREX WL230 SB-S SA

### Mounting unit with guide element

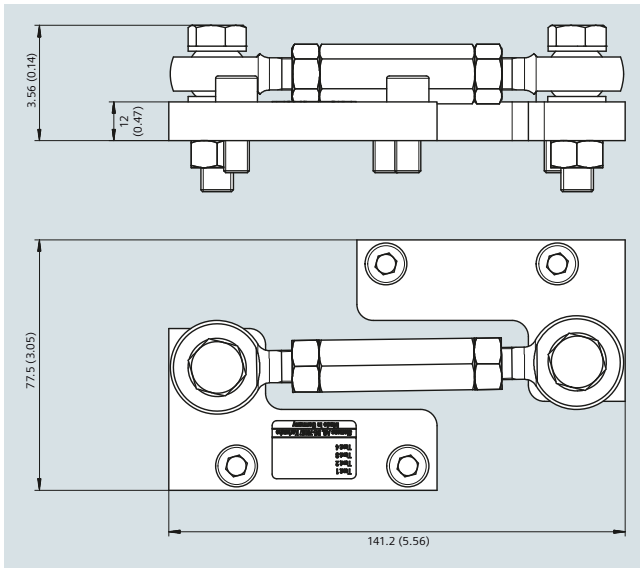
#### Dimensional drawings



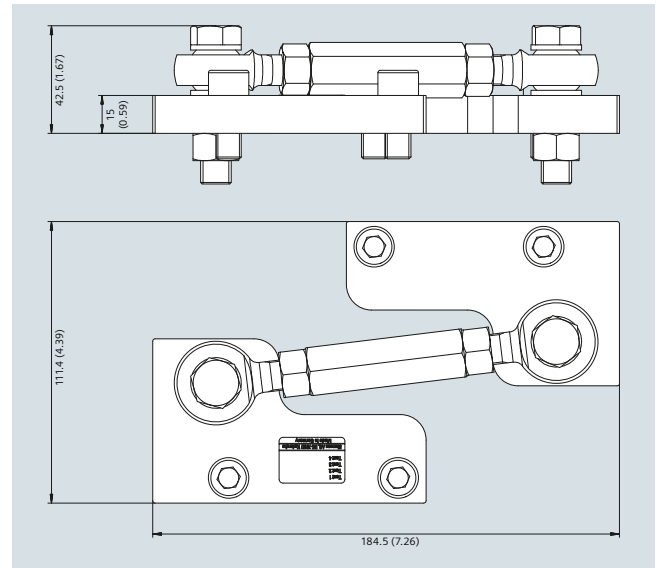
Compact mounting unit for SIWAREX WL230 SB-S SA load cells, mounting state with built-in load cells 0.5 to 2 t (0.49 ... 1.97 tn. L.), dimensions in mm (inch)



Compact mounting unit for SIWAREX WL230 SB-S SA load cells, mounting state with built-in load cell 5 t (4.92 tn. L.), dimensions in mm (inch)



Compact mounting unit for SIWAREX WL230 SB-S SA load cells, guide elements 0.5 to 2 t (0.49 ... 1.97 tn. L.), dimensions in mm (inch)



Compact mounting unit for SIWAREX WL230 SB-S SA load cells, guide element 5 t (4.92 tn. l.), dimensions in mm (inch)

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#### Overview



The base plate and the elastomer bearing form a self-centering bearing unit together with the load cells of the SIWAREX WL230 SB-S SA series. It suppresses oscillations and shocks to a certain extent.

#### Design

Elastomer bearings are rubber-metal composites made of neoprene and stainless steel. Their special design means that lateral movement of the load bearing implement does not result in high transverse force on the load cell.

If the load bearing implement is displaced by more than 4 mm (0.16 inch) in the horizontal direction, measures for restricting sideways play (e.g. stops) must be provided in the construction of the load bearing implement.

The base plate of stainless steel is used for suitable fixing of the load cell on the base.

The load cell is not included in the scope of delivery of the base plate or elastomer bearing.

#### Technical specifications

Base plate with elastomer bearing for SIWAREX WL230 SB-S SA load cells				
Rated load	500 kg (1 102.31 lb)	1 t (0.98 tn. l.)	2 t (1.97 tn. l.)	5 t (4.92 tn. l.)
Maximum permissible lateral deflection	± 4 mm (0.16 inch)	± 4 mm (0.16 inch)	± 4 mm (0.16 inch)	± 4 mm (0.16 inch)
Vertical rigidity	5.9 kN/mm	5.9 kN/mm	29.98 kN/mm	29.98 kN/mm
Horizontal rigidity	0.16 kN/mm	0.16 kN/mm	0.54 kN/mm	0.54 kN/mm
Compression at rated load	0.68 mm (0.037 inch)	1.28 mm (0.050 inch)	0.62 mm (0.024 inch)	1.46 mm (0.057 inch)

#### Selection and ordering data

#### Article No.

##### Base plate

For load cells of the SIWAREX WL230 SB-S SA series

Material: Stainless steel EN 1.4301

Click on the Article No. for the online configuration in the PIA Life Cycle Portal.

For load cells with a rated load of<sup>1)2)</sup>

- 500 kg, 1 t (1 102.31 lb, 0.98 tn l.)
- 2 t (1.97 tn l.)
- 5 t (4.92 tn. l.)

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A B

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##### Elastomer bearings

For load cells of the SIWAREX WL230 SB-S SA series

Material: neoprene, stainless steel EN 1.4301

For load cells with a rated load of<sup>1)2)</sup>

- 500 kg, 1 t (1 102.31 lb, 0.98 tn l.)
- 2 t (1.97 tn l.)
- 5 t (4.92 tn. l.)

A C

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<sup>1)</sup> The load cell is not included in the scope of delivery.

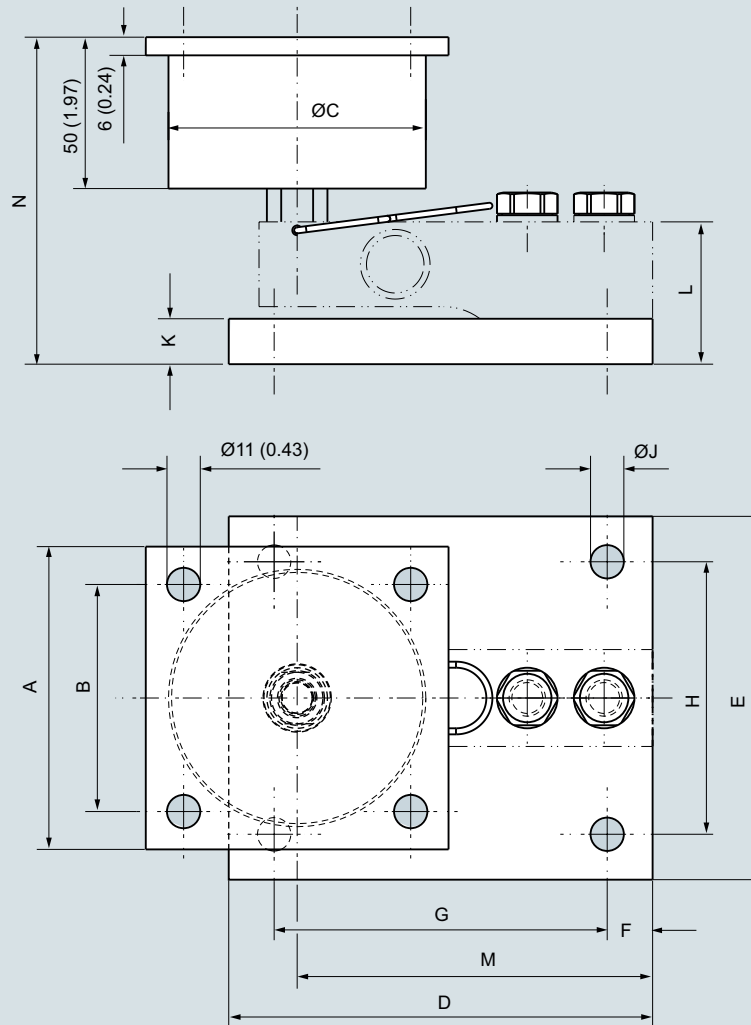
<sup>2)</sup> It is highly recommendable to use a grounding cable (7MH3701-1AA1) in order to protect the load cell.

### Load Cells

Shear beam load cells  
SIWAREX WL230 SB-S SA

#### Base plate with elastomer bearing

#### Dimensional drawings



Rated load [t]	A	B	ØC	D	E	F	G
0.5, 1	100 (3.94)	75 (2.95)	85 (3.35)	140 (5.51)	120 (4.72)	15 (0.59)	110 (4.33)
2	120 (4.72)	90 (3.54)	100 (3.94)	140 (5.51)	120 (4.72)	15 (0.59)	110 (4.33)
5	120 (4.72)	90 (3.54)	100 (3.94)	185 (7.28)	150 (5.91)	20 (0.79)	145 (5.71)

Rated load [t]	H	ØJ	K	L	M	N
0.5, 1	90 (3.54)	11 (0.43)	15 (0.59)	47 (1.85)	117.4 (4.62)	108 (4.25)
2	90 (3.54)	11 (0.43)	15 (0.59)	51 (2.01)	117.4 (4.62)	112 (4.41)
5	110 (4.33)	13.5 (0.53)	25 (0.98)	69 (2.72)	153.1 (6.03)	134 (5.28)

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Base plate with elastomer bearing for SIWAREX WL230 SB-S SA load cells, dimensions in mm (inch)

### Overview



Load foot for SIWAREX WL230 SB-S SA load cells

This self-aligning load foot for SIWAREX WL230 SB-S SA load cells can be used for the quick and easy construction of platform and hopper scales.

The load foot transmits the force directly into the load cell.

The load foot is designed for rated load cell ranges from 500 kg to 5 t (0.49 ... 4.92 tn. l.).

### Design

Height compensation is possible using the screw thread.

Together with the pressure piece which is screwed into the load cell, this facilitates an oscillation function which prevents stresses in the load cells. Stresses can arise during installation or when the length of the load bearing implement changes due to thermal expansion.

The rubber cap prevents the load foot from slipping.

### Technical specifications

#### Load foot for SIWAREX WL230 SB-S SA load cells

Rated load	500 kg ... 2 t (1 102.31 lb ... 1.97 tn. l.)	5 t (4.92 tn. l.)
Maximum permissible lateral deflection	± 1 mm (0.04 inch)	± 1 mm (0.04 inch)
Maximum vertical load	30 kN	70 kN
Torques		
• Tightening torques of pressure piece for load cell	100 ... 110 Nm	100 ... 110 Nm
• Tightening torques of fixing screws for load cell	M12: 100 Nm	M20: 450 Nm
• Tightening torques of locknut for load foot	10 ... 15 Nm	10 ... 15 Nm

### Selection and ordering data

#### Article No.

#### Load foot

For load cells of the SIWAREX WL230 SB-S SA series  
Material: Stainless steel EN 1.4542, NBR: Nitrile rubber

Click on the Article No. for the online configuration in the PIA Life Cycle Portal.

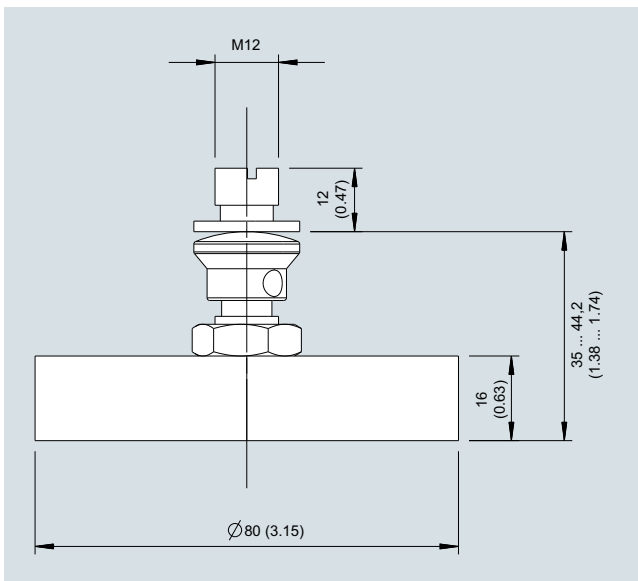
For load cells with a rated load of<sup>1)</sup>

- 0.5 ... 2 t (0.49 ... 1.97 tn. l.)
- 5 t (4.92 tn. l.)

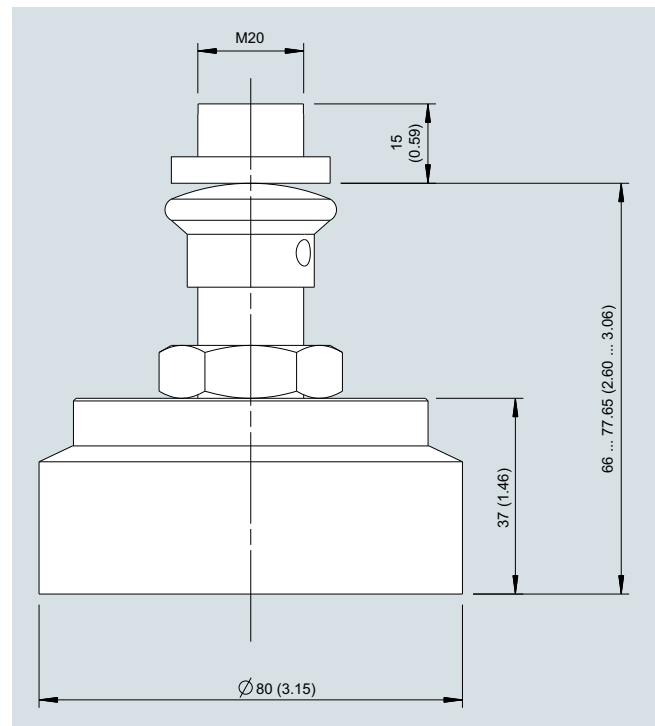
<sup>1)</sup> The load cell is not included in the scope of delivery.

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### Dimensional drawings



SIWAREX WL230 SB-S SA load foot, 0.5 ... 2 t (0.49 ... 1.97 tn. l.), dimensions in mm (inch)



SIWAREX WL230 SB-S SA load foot, 5 t (4.92 tn. l.), dimensions in mm (inch)