

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.

Selection and ordering data

| | | | | | |
|--|--|--|--|---------------------------------------|---|
| Load cell, type WL230 SB-S SA Legal-for-trade according to OIML R60 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.). | | | | Article No. 7MH5107- | |
| Click on the Article No. for the online configuration in the PIA Life Cycle Portal. | | | | ● | ● |
| Rated load | | | | | |
| • 500 kg (1 102.31 lb) | | | | 3 | P |
| • 1 t (0.98 tn. l.) | | | | 4 | A |
| • 2 t (1.97 tn. l.) | | | | 4 | G |
| • 5 t (4.92 tn. l.) | | | | 4 | P |
| Explosion protection | | | | | |
| Without | | | | | 0 |
| Explosion protection | | | | | 1 |

Technical specifications

| SIWAREX WL230 SB-S SA | |
|--|---|
| Possible applications | <ul style="list-style-type: none"> • Hopper scales • Belt scales • Overhead rail scales • Platform scales |
| Type of construction | Shear beam load cell |
| Loads | |
| Rated load/maximum load E_{max} | <ul style="list-style-type: none"> • 500 kg (1 102.31 lb) • 1 t (0.98 tn. l.) • 2 t (1.97 tn. l.) • 5 t (4.92 tn. l.) |
| 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_{iq} | 100% E_{max} |
| Measurement characteristic values | |
| Rated displacement h_n at | |
| • $E_{max} = 500$ kg (1 102.31 lb) | 0.13 mm |

Technical specifications (Continued)

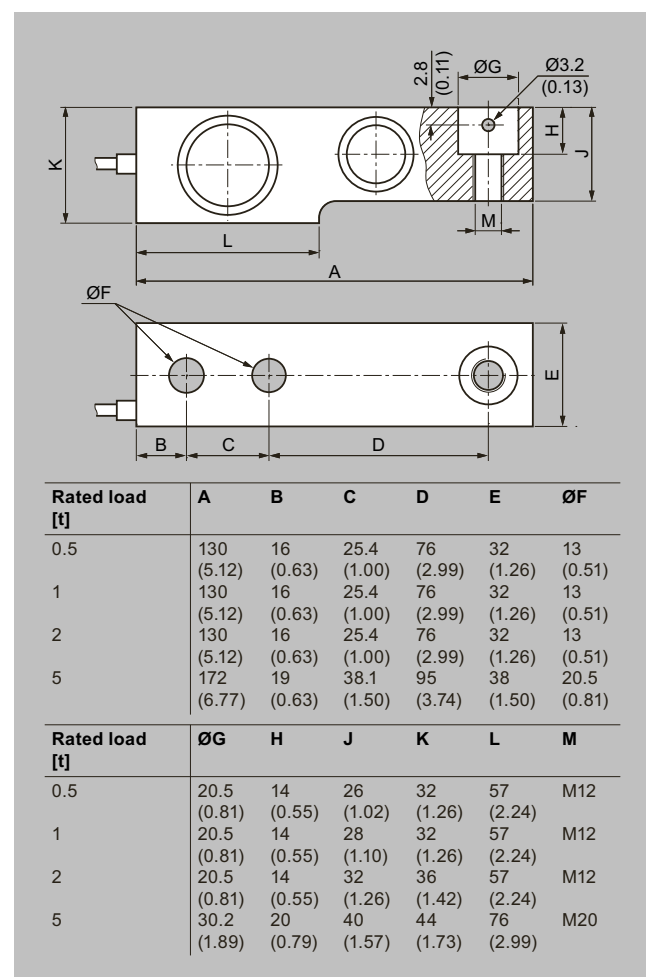
| SIWAREX WL230 SB-S SA | |
|--|-------------------------|
| • $E_{max} = 1$ t (0.98 tn. l.) | 0.21 mm |
| • $E_{max} = 2$ t (1.97 tn. l.) | 0.29 mm |
| • $E_{max} = 5$ t (4.92 tn. l.) | 0.38 mm |
| Rated characteristic value C_n | 2.0 ± 0.002 mV/V |
| Tolerance D_o of zero signal | $\leq \pm 1.0\%$ 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} | $\pm 0.02\%$ C_n |
| Repeatability F_v | $\pm 0.02\%$ C_n |
| Creep error F_{cr} | |
| • 30 min | $\leq \pm 0.02\%$ C_n |
| Temperature coefficient | |

Technical specifications (Continued)

| SIWAREX WL230 SB-S SA | |
|---|---|
| • Zero signal t_{k0} | 0.023% $C_0/5 K$ |
| • Characteristic value t_{kc} | 0.017% $C_0/5 K$ |
| Electrical characteristic values | |
| Recommended reference voltage U_{ref} | 5 ... 12 V DC |
| Input resistance R_i | 1 000 \pm 10 Ω |
| Output resistance R_o | 1 004 \pm 5 Ω |
| Insulation resistance R_{is} | 5 000 M Ω 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 | |
| • $E_{max} = 500 \text{ kg} \dots 2 \text{ t}$ (1 102.31 lb ... 1.97 tn. l.) | 150 Nm ¹⁾ |
| • $E_{max} = 5 \text{ t}$ (4.92 tn. l.) | 550 Nm ¹⁾ |
| Cable connection | |
| <u>Function</u> | <u>Color</u> |
| • 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 R60 | C3 |
| Explosion protection | <ul style="list-style-type: none"> • EU/UK: <ul style="list-style-type: none"> - ATEX/UKEX II 1 G Ex ia IIC T4 - ATEX/UKEX II 1 D Ex ia IIIC T200 135°C D-a - ATEX/UKEX II 3 G Ex ic IIC T4 Gc - ATEX/UKEX II 3 D Ex tc IIIC T73°C Dc - ATEX/UKEX II 3 G Ex ec T4 IIC Gc • USA: <ul style="list-style-type: none"> - IS CL I, II, III, DIV 1, GP A, B, C, D, E, F, G; T4 - IS CL I, ZN 0, AEx ia IIC T4 Ga - Zone 20, AEx ia IIIC T135°C Da - CL I, II, III, DIV 2, GP A, B, C, D, E, F, G; T4 - CL 1, ZN 2, GP IIC T4 - IS CL I, ZN 2, AEx ic IIC T4 Gc • Canada: <ul style="list-style-type: none"> - IS CL I, II, III, DIV 1, GP A, B, C, D, E, F, G; T4 - IS CL I, ZN 0, Ex ia IIC T4 Ga - Ex ia IIIC T135°C Da - CL I, II, III, DIV 2, GP A, B, C, D, E, F, G; T4 - CL 1, ZN 2, GP IIC T4 - Ex ic IIC T4 Gc • China: <ul style="list-style-type: none"> - NEPSI Ex ia IIC T6 Ga; Ex iaD 20 T80 |

¹⁾ The tightening torque is to be selected according to the strength class of the screws.

Dimensional drawings



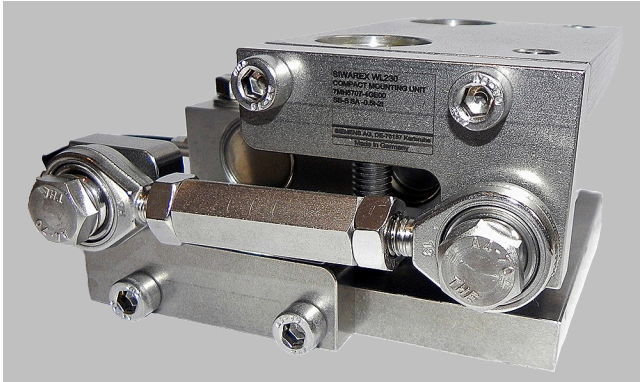
SIWAREX WL230 SB-S SA load cell, dimensions in mm (inch)

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 motions may be associated with the following factors: Start-up of an agitator in a container, braking or acceleration forces of a roller conveyor, or wind forces in the case of outdoor silos.

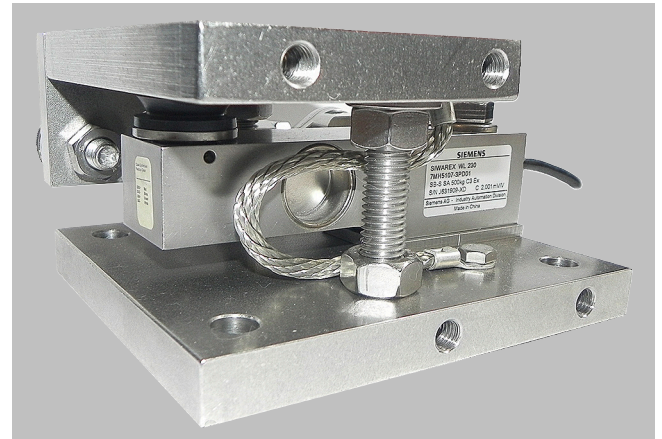
A guide element consists of two flanges and one clamping screw. The clamping screw is adjusted to the correct length. The guide element is attached to the operational mounting unit. A guide element can be mounted on the front or rear of the mounting unit. If necessary, two guide elements can be used 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.

Design (Continued)

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

Load Cells

Shear beam load cells

SIWAREX WL230 SB-S SA Mounting unit with guide element

Selection and ordering data

| | |
|---|---|
| Mounting unit For load cells of the SIWAREX WL230 SB-S SA series Material: Stainless steel EN 1.4301 and EN 1.4112 | Article No. 7MH5707- 4 ● A 0 1 |
| Click on the Article No. for the online configuration in the PIA Life Cycle Portal. | |
| For load cells with a rated load of¹⁾ <ul style="list-style-type: none"> 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 G P |

| Selection and ordering data | Article No. |
|---|--------------------------------|
| 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 ¹⁾ <ul style="list-style-type: none"> 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 | 7MH5707-4GE00 7MH5707-4PE00 |
| 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 ¹⁾ <ul style="list-style-type: none"> 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 | 7MH5713-3JG00 7MH5713-4PG00 |

¹⁾ The load cell is not included in the scope of delivery.

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 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 ¹⁾ | 3 kN | 5 kN |

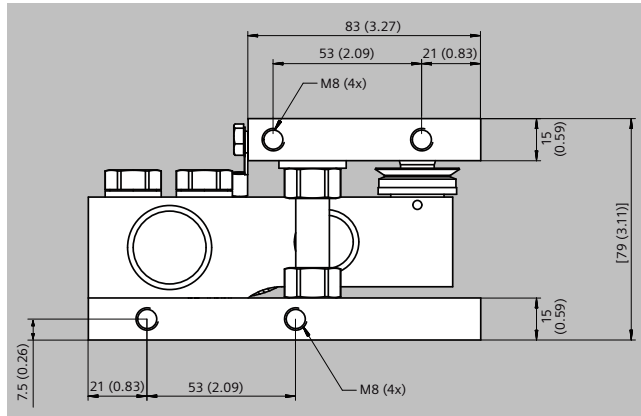
¹⁾ The values apply to one guide element.

Load Cells

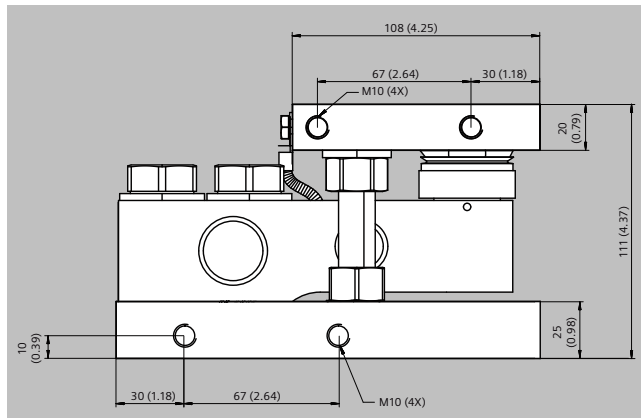
Shear beam load cells

SIWAREX WL230 SB-S SA Mounting unit with guide element

Dimensional drawings

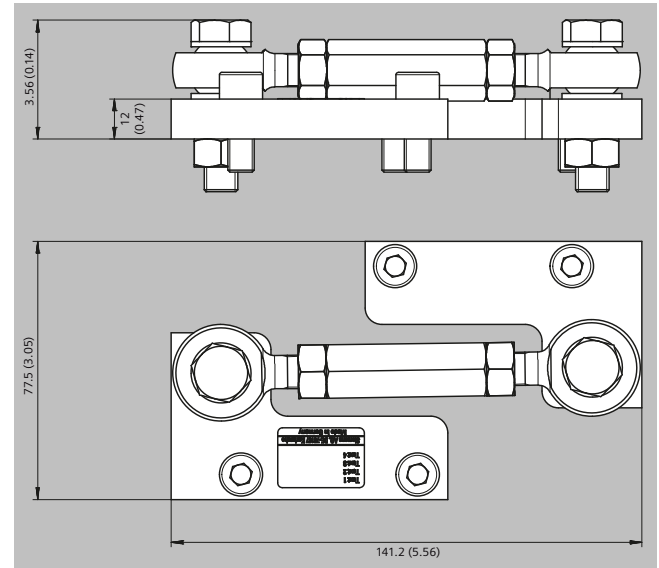


Compact mounting unit for SIWAREX WL230 SB-S SA load cells, mounting state with built-in load cells 0.5 to 2 t (0.49 ... 1.97 tn. l.), dimensions in mm (inch)

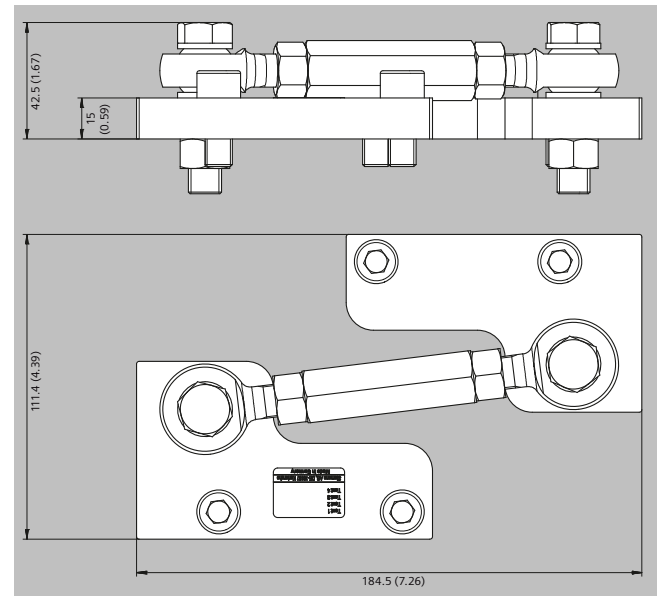


Compact mounting unit for SIWAREX WL230 SB-S SA load cells, mounting state with built-in load cell 5 t (4.92 tn. l.), dimensions in mm (inch)

Dimensional drawings (Continued)

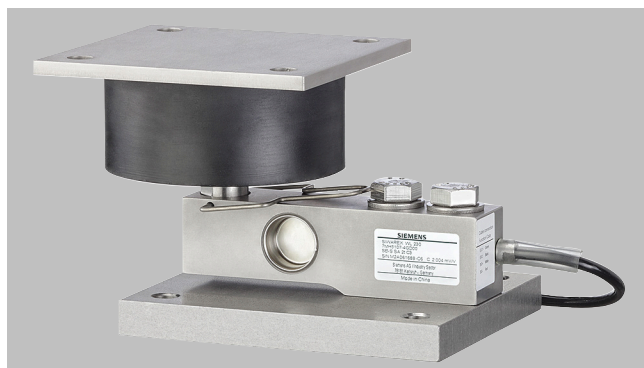


Compact mounting unit for SIWAREX WL230 SB-S SA load cells, guide elements 0.5 to 2 t (0.49 ... 1.97 tn. l.), dimensions in mm (inch)



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

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 side-ways 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.

Selection and ordering data

| | | Article No. 7MH5707- | | | |
|--|--|-------------------------|---|---|-----|
| Base plate For load cells of the SIWAREX WL230 SB-S SA series Material: Stainless steel EN 1.4301 | | 4 | ● | ● | 0 0 |
| Click on the Article No. for the online configuration in the PIA Life Cycle Portal. | | | | | |
| For load cells with a rated load of ¹⁾²⁾ | | | | | |
| • 500 kg, 1 t (1 102.31 lb, 0.98 tn l.) | | | A | B | |
| • 2 t (1.97 tn l.) | | | G | B | |
| • 5 t (4.92 tn l.) | | | P | B | |
| 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 ¹⁾²⁾ | | | | | |
| • 500 kg, 1 t (1 102.31 lb, 0.98 tn l.) | | | A | C | |
| • 2 t (1.97 tn l.) | | | G | C | |
| • 5 t (4.92 tn l.) | | | P | C | |

¹⁾ The load cell is not included in the scope of delivery.

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

Load Cells

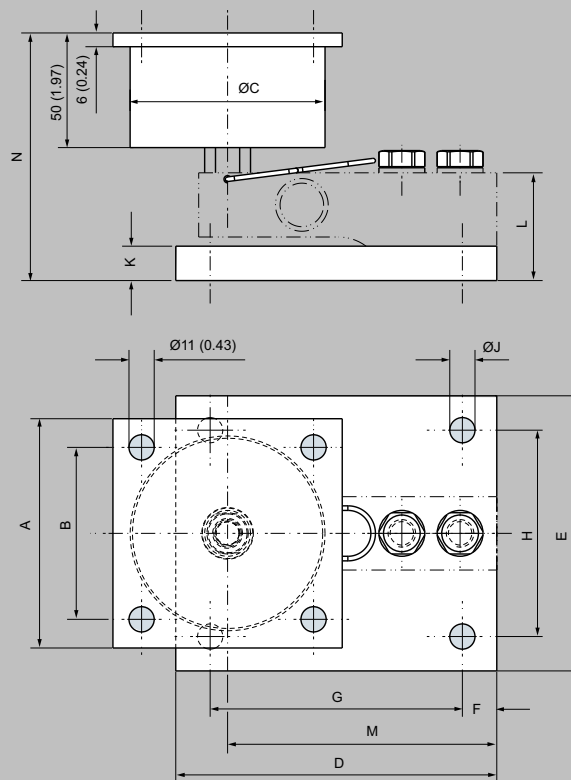
Shear beam load cells

SIWAREX WL230 SB-S SA Base plate with 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) |

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) |

G_WT01_XX_10133

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.

Selection and ordering data

| Load foot | | Article No. |
|---|--|-------------|
| For load cells of the SIWAREX WL230 SB-S SA series | | 7MH5707- |
| Material: Stainless steel EN 1.4542, NBR: Nitrile rubber | | 4 ● H 0 0 |
| Click on the Article No. for the online configuration in the PIA Life Cycle Portal. | | |
| For load cells with a rated load of ¹⁾ | | |
| • 0.5 ... 2 t (0.49 ... 1.97 tn. l.) | | G |
| • 5 t (4.92 tn. l.) | | P |

¹⁾ The load cell is not included in the scope of delivery.

Technical specifications

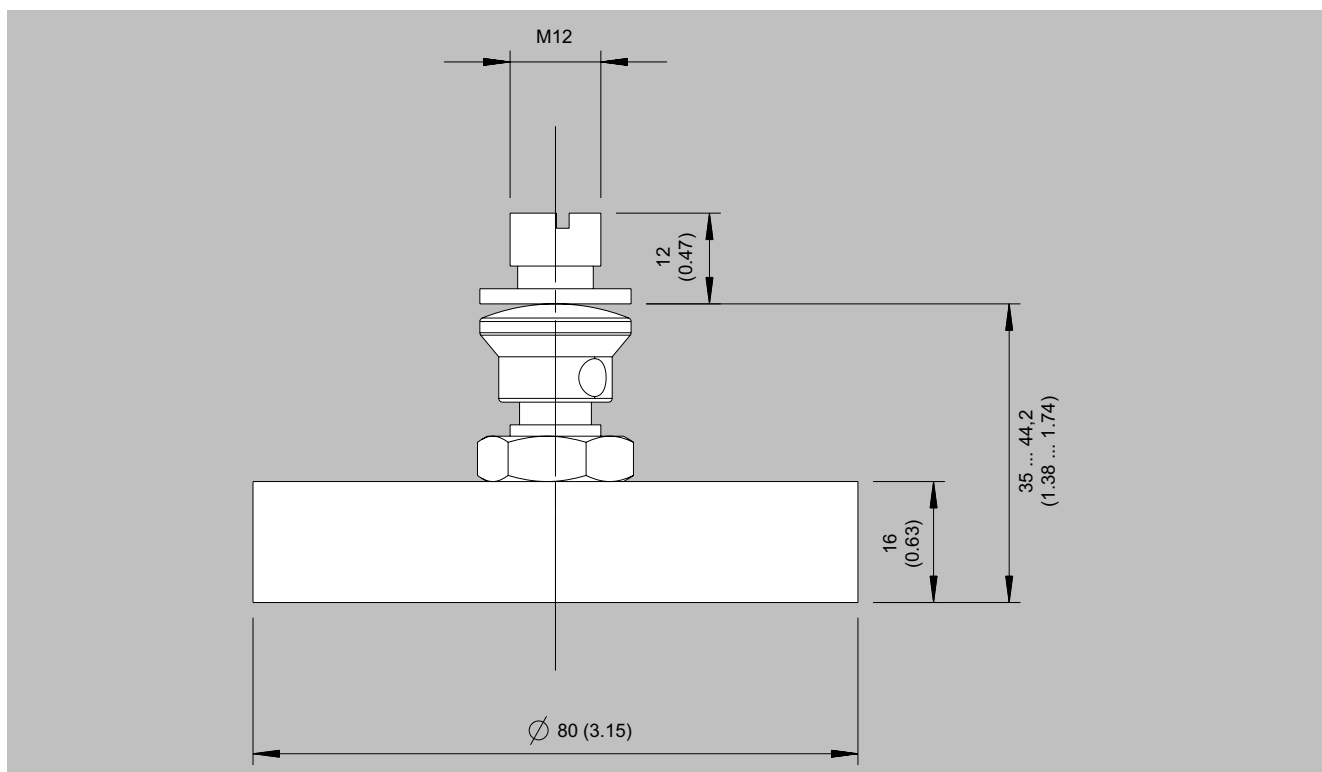
| Load foot for SIWAREX WL230 SB-S SA load cells | | |
|--|---|--------------------|
| Rated load | 500 kg ... 2 t (1 102.31 lb ... 1.97 tn l.) | 5 t (4.92 tn. l.) |
| Maximum permissible lateral deflection | ± 1 mm (0.04 inch) | ± 1 mm (0.04 inch) |
| Maximum vertical load | 30 kN | 70 kN |
| Torques | | |
| • 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 |

Load Cells

Shear beam load cells

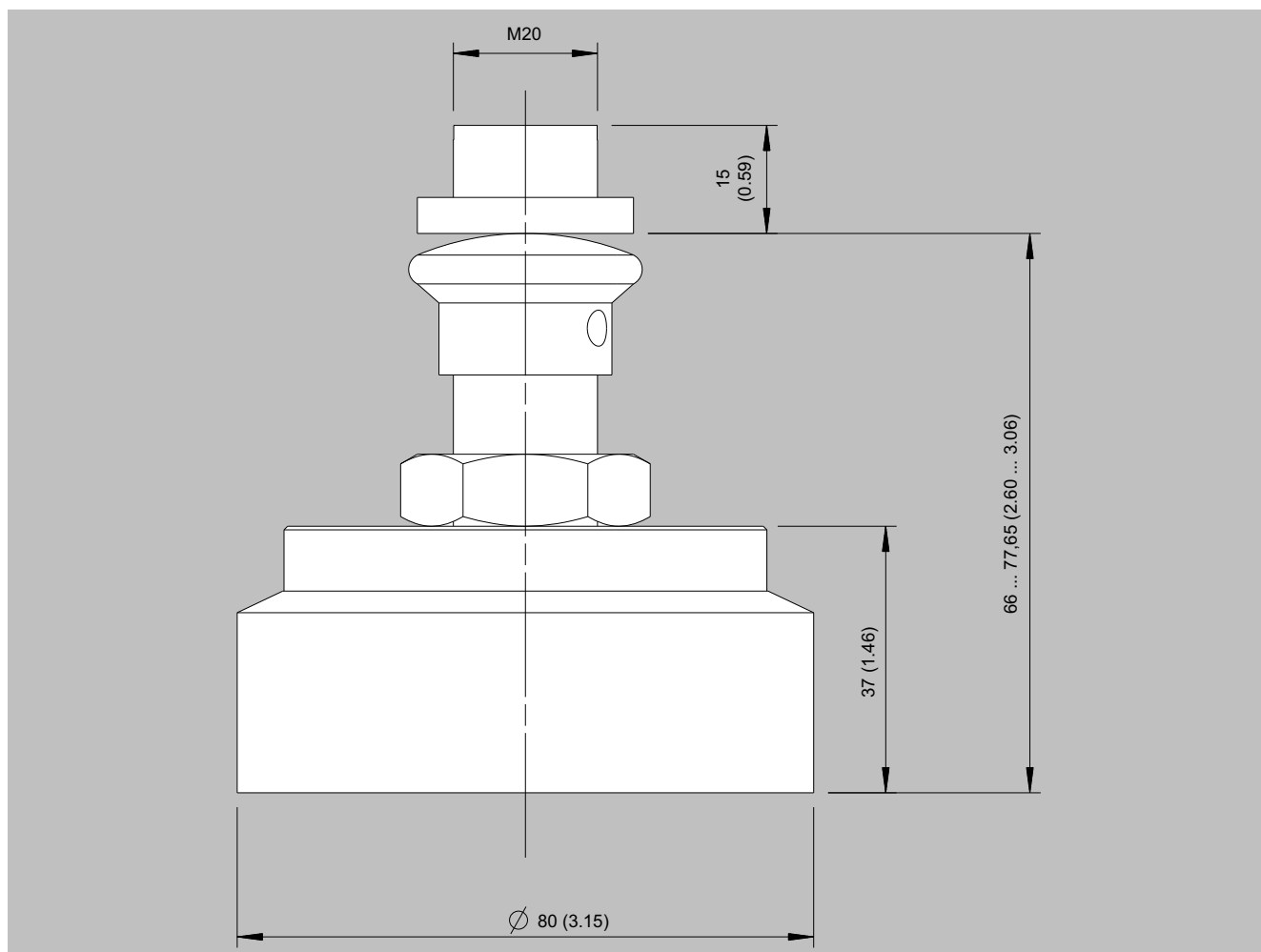
SIWAREX WL230 SB-S SA Load foot

Dimensional drawings



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

Dimensional drawings (Continued)



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