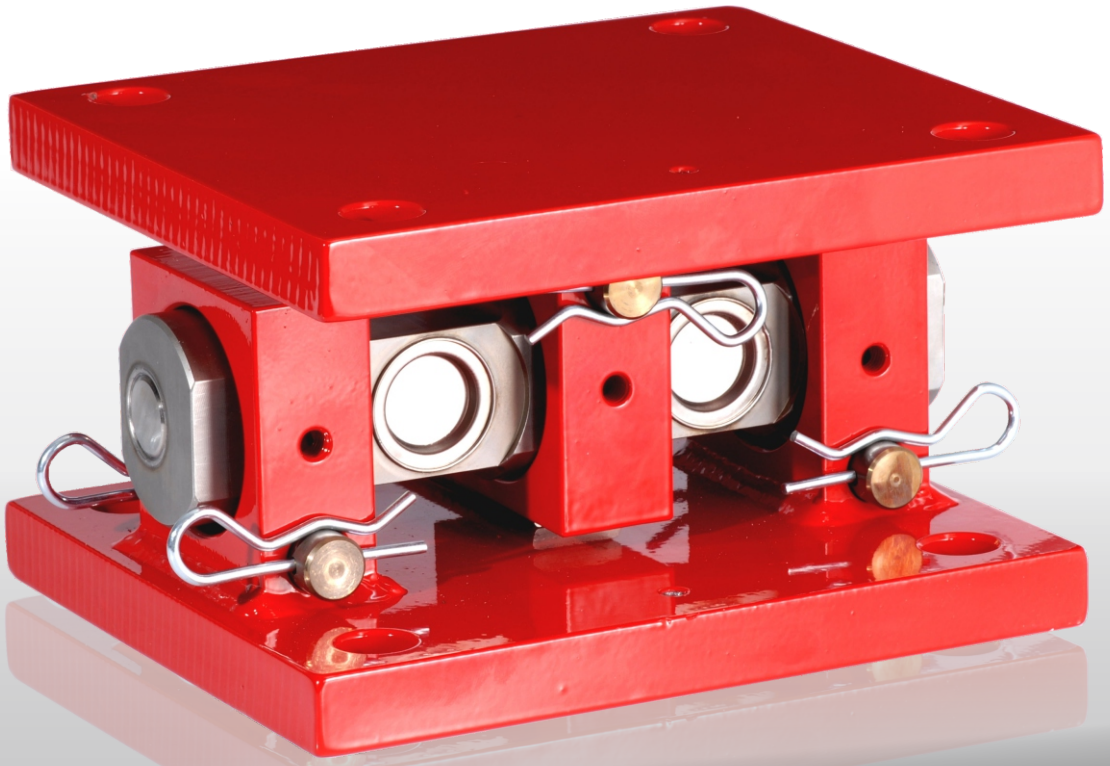
Manual | **Load Cell SM60/61**



SOEMER

Ideen & Messtechnik.

Vessel weighing problems solved simply and cost effectively. The SM60/61 incorporates lift off prevention and holding bolts for routine maintenance.

SM60/61 Series Load Cell Assembly

The SM60/61 family of load cells are available in capacities ranging from 2.000 kg to 200.000 kg. They are especially suitable for high capacity vessel weighing and feature a combined error specification of < +/- 0,05 %.

The loading assembly is an integral part of the SM60/61 and eliminates the need for vessel restraints or check rods (except in extreme environmental conditions).

The critical sensor element of the SM60/61 unit is a fully welded double ended shear beam, manufactured from high tensile stainless steel (1.4548), heat treated to give a high ultimate tensile strength. This treatment provides an extremely stable platform for the strain gauges.

The strain gauged element is temperature compensated to ensure accuracy is maintained throughout a wide temperature range. Stainless steel diaphragms are TIG welded into position to provide total environmental sealing.

Vessel Design And Support Structures

When designing support structures for vessel weighing, the following should be considered:

- Thermal expansion and contraction of the vessel can induce significant errors. Where large temperature changes are expected, steps should be taken to reduce the effect on the load cells.

- Support structures should be rigid, with minimal deflection under full vessel load. Flexible structures have lower natural frequencies which could result in unstable weight indications. Furthermore, deflection of the support structure under load will change the angle of the force through the cell assembly, resulting in additional errors. Any unavoidable deflection in the support structure should be uniform in character.

- Unstable or non-uniform flooring under a tank support structure can cause a shift of the structure under load, which could cause a side loading.

Installation

SIDE LOADS

Side loads will cause errors in a load cell installation and care must be taken to avoid or minimise possible causes:

- All pipe work to and from the vessel, including electrical conduit and trunking, should be installed using flexible connections. Where flexible connections are not possible, an unrestrained horizontal length of pipe work could be used (a length of at least twenty times the diameters of the pipe is usually considered a minimum).

- Common catwalks and other shared structure may cause interaction between vessels and should be avoided or isolated as far as practicable. Ladders and other attachments to the vessel should be included as part of the weighed system (not connected to ground or non-weighed structure).

MOUNTING VARIATIONS

- Most applications that use load cells in compression have either three or four support points, depending on vessel geometry. Vertical cylindrical vessels can utilise a three or four point support, whereas square vessels demand a four point support (unless mounted on to a circular base frame). If possible, the cells should be mounted such that the line across the cell, along the length of the loading pin, passes through the geometric centre of the tank.

- To achieve the greatest accuracy with horizontal or cylindrical vessels, cells should be mounted under all supports. In order to minimise the effects of vessel deflection the load cell should be aligned parallel to the length of the vessel.

Load Cell Capacity Selection

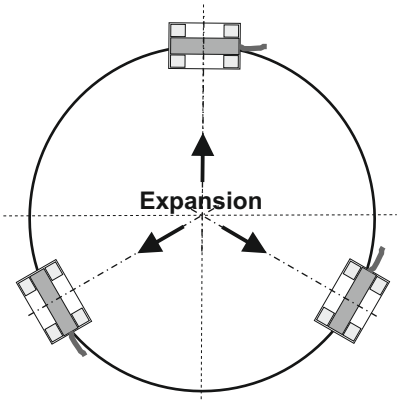
To determine the capacity requirements of compression cells:

- Determine the empty weight of the vessel, including any fixed equipment such as motors, agitators and piping. This is generally known as the DEAD WEIGHT or TARE WEIGHT.
- Determine the weight of the MAXIMUM contents of the vessel, not the normal or operating capacity. This is usually referred to as the LIVE WEIGHT.
- Add these two figures to obtain the GROSS WEIGHT. Divide this figure by the number of vessel support points. The resulting number is the LOWEST capacity cell that should be specified. In general, no more than 80% of the cell capacity should be utilised in order to accommodate possible unequal load distribution, errors in weight estimates, and the effects of agitators, mixers, wind forces and shock loading. If extreme environmental factors are to be considered (such as high wind loading or seismic effects) it may be necessary to incorporate load cells of a higher capacity (also see page 3, vessel restraint & check rods).

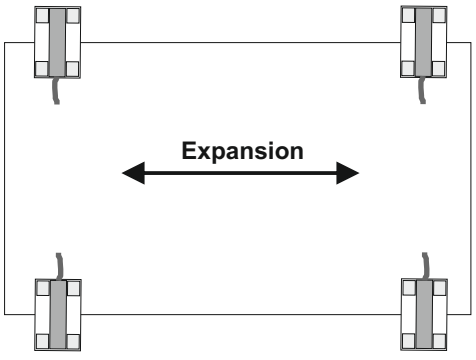
Environmental Considerations

The range of conditions to which a weighing system is exposed is as wide and varied as the industry itself. To ensure a long and dependable service life, it is important to consider wider aspects of the application:

- Is the weighing system exposed to chemical or corrosive agents (airborne or spillage potential)?
- Does the presence of chemicals in the tank or surrounding area create a potentially hazardous environment?
- Will the tank weighing system see extremes in temperature or humidity?
- Will the load cells be located in an area where flooding can occur?
- Can vehicles, cranes, or other mobile machinery impact with any part of the weighing system?
- Is the vessel subject to wind loading, shock or seismic activity?
- Is the vessel located in an area where lightning strikes occur frequently?



Silo mount 3 load cell installation



Silo mount 4 load cell installation

Assembly expansion

The unit is manufactured in 4 sizes as follows:
SM60 : 2 - 20t
SM61 : 10 - 50t
SM61 : 100t
SM61 : 200t

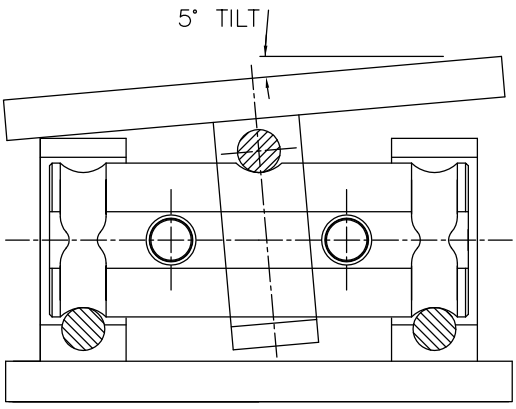
The standard mounting kit is fabricated from Alloy steel, powder coated. A Stainless steel mounting assembly is available as an option.

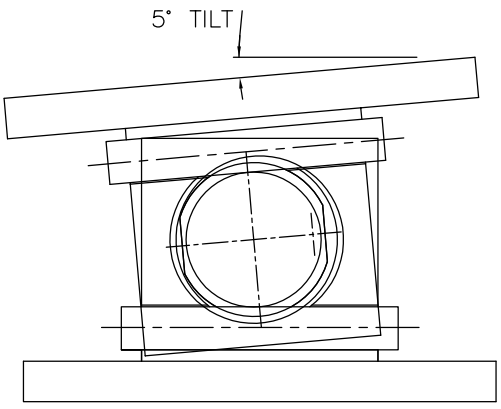
The bi-directional freedom of movement of the top plate allows for a high degree of misalignment in the structure. This is particularly important in large structures where dimensional accuracy, rigidity and angular conformity cannot be guaranteed, or where large changes in ambient temperature are anticipated.

The complete assembly incorporates built in lift off protection, reducing the need for additional restraints. Integrated holding bolts facilitate routine maintenance and calibration. This feature eliminates the need for expensive installation work, giving a very cost effective total solution.

Maximum deflection and Expansion across load cell assembly

Model	Capacity (t)	Maximum deflection (mm)	Expansion across load cell assembly
SM60-2	2	0,40	+/- 4 mm
SM60-5	5	0,40	+/- 4 mm
SM60-10	10	0,40	+/- 6 mm
SM60-15	15	0,40	+/- 6 mm
SM60-20	20	0,40	+/- 6 mm
SM61-30	30	0,40	+/- 6 mm
SM61-50	50	0,40	+/- 6 mm
SM61-100	100	0,40	+/- 8 mm
SM61-200	200	0,40	+/- 8 mm





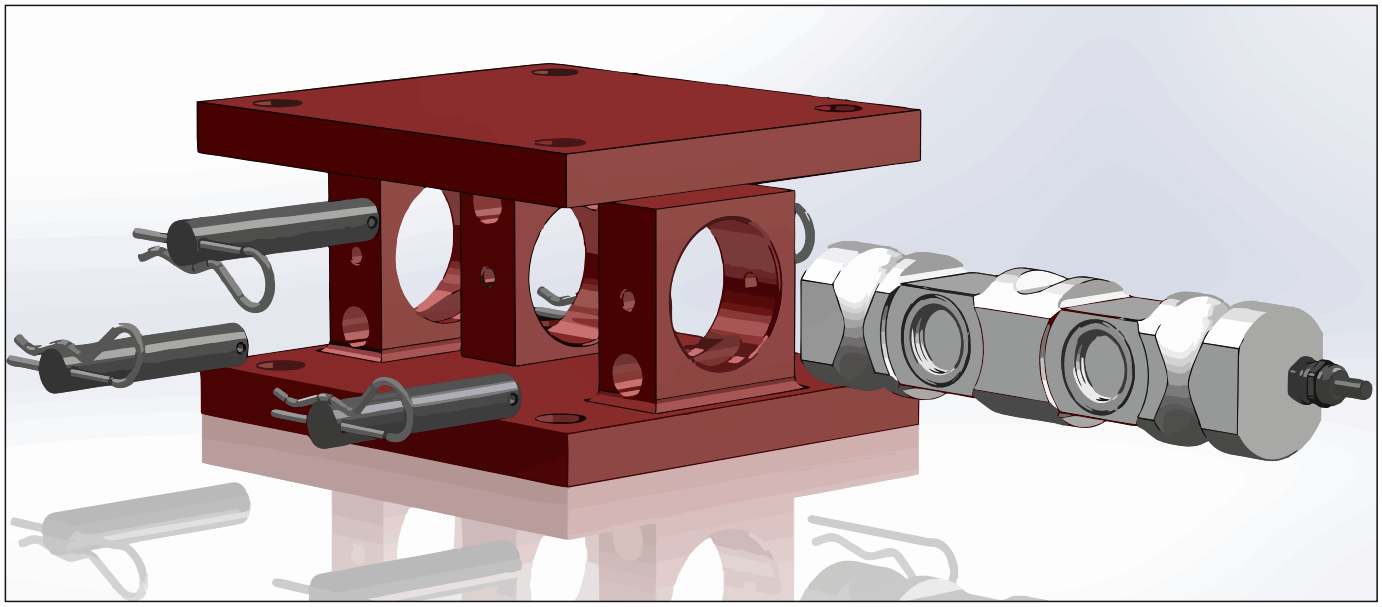
Load Cell Installation

1. Loading assemblies should be level. A solid concrete pier or foundation is preferred. If mounting on a concrete pad, ensure the pad is level. Utilise shims or grout to keep the loading assemblies level at both the attachment locations, where the vessel support meets the top mounting surface and where the assembly meets the foundation.

2. Ensure the cell is located in the assembly with adequate clearance on all vertical faces.

3. Errors could be introduced if the cell is allowed to rub against the loading assembly.

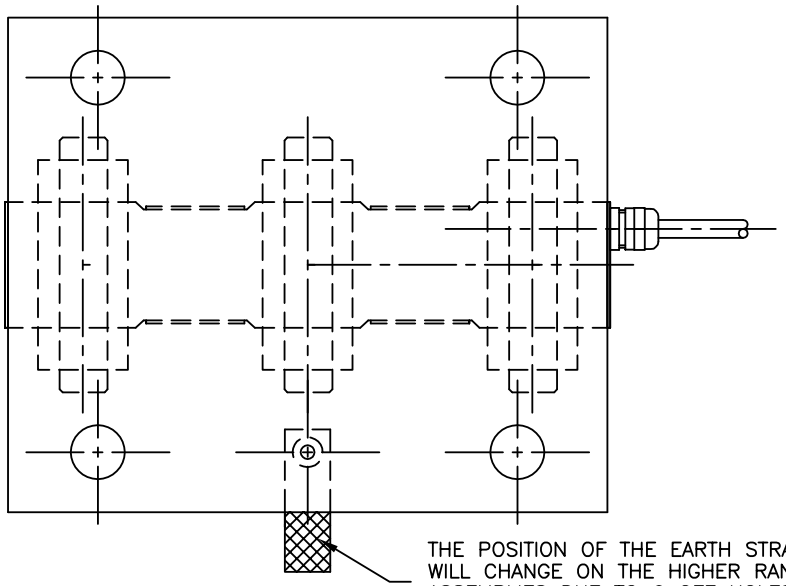
4. Use high pressure grease on all pins.



Maximum forces lift-off protection and lateral forces

Load cell capacity:	5 t	10/15/20 t	30 t	50 t	75 t	100 t	200 t
max. lift-off protection:	8,2 t	12,6 t	26 t	26 t	33 t	36 t	40 t
max. lateral forces:	9,2 t	12,6 t	26 t	26 t	27 t	36 t	40 t

TOP VIEW



BILL of MATERIALS

TOP BRACKET	1 OFF
BASE BRACKET	1 OFF
LOADING SHAFTS	3 OFF
R–CLIPS	6 OFF
CENTRALISING CAP HEAD SCREWS	6 OFF
CENTRALISING PLAIN WASHER	6 OFF
CENTRALISING LOCKWASHER	6 OFF
EARTH STRAP	1 OFF
EARTH STRAP CAP HEAD SCREW	2 OFF
EARTH STRAP PLAIN WASHER	2 OFF
EARTH STRAP LOCKWASHER	2 OFF

ASSEMBLY DETAILS

STEP 1. POSITION THE TOP BACKET WITH ITS LUG CENTRALLY BETWEEN THE BASE BRACKETS LUGS.

STEP 2. INSERT THE LOAD CELL THROUGH EACH LUGS CENTRAL HOLES.

STEP 3. ENSURE THE LOAD CELL IS POSITIONED WITH THE ENGRAVED ARROW ON ITS END FACE POINTING IN DIRECTION OF THE WORKING LOAD i.e DOWNWARDS.

STEP 4. INSERT THE THREE LOADING SHAFTS THROUGH THE LUGS. THE OUTER TWO WILL SUPPORT THE LOAD CELL AND THE CENTRAL ONE WILL APPLY THE LOAD ONTO THE LOAD CELL.

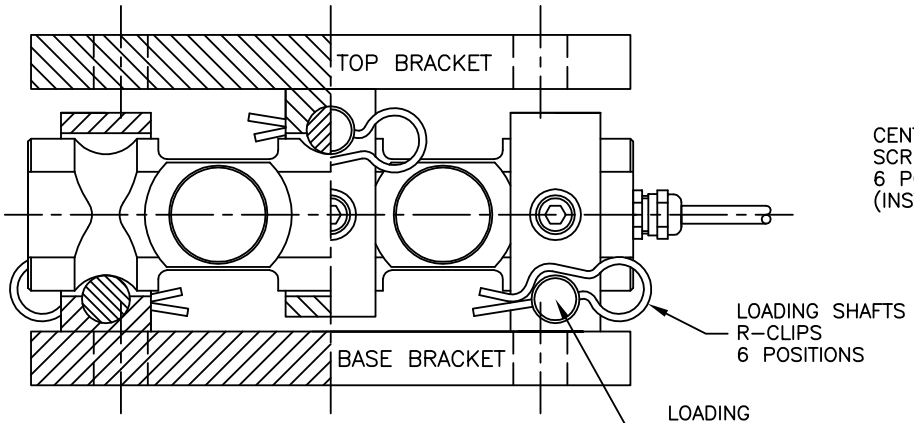
STEP 5. THE CENTRALISING SCREWS AND WASHERS ARE INSTALLED INTO BOTH SIDES OF EACH OF THE LUGS AND SCREWED FULLY HOME. THIS WILL CENTRALISE THE BRACKETS ABOUT THE LOAD CELL.

STEP 6. INSERT THE R–CLIPS INTO EACH END OF THE LOADING SHAFTS.

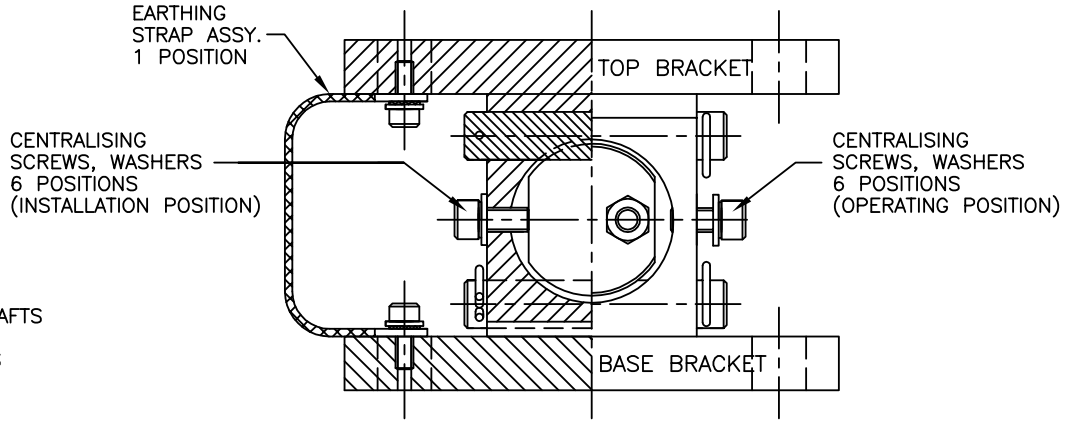
STEP 7. THE COMPLETED LOADING ASSEMBLY IS NOW READY FOR INSTALLATION INTO THE WEIGHING APPLICATION.

STEP 8. AFTER INSTALLATION THE CENTRALISING SCREWS ARE TO BE UNSCREWED UNTIL CLEAR OF THE LUGS CENTRAL HOLES ALLOWING MAX SIDE MOVEMENT DUE TO VESSEL EXPANSION.

STEP 8. IF REQUIRED THE EARTH STRAP MAY BE INSTALLED USING THE M6 SCREWS AND WASHERS TO ATTACH TO THE TOP AND BASE BRACKET AS SHOWN.



SIDE VIEW – PART SECTION
EARTH STRAP POSITION NOT SHOWN ON THIS VIEW.



CABLE END VIEW – PART SECTION