

# Shearing force load cell

## Safety warnings



When mounting, initiating and operating this load cell the safety precautions and regulations have to be observed. Only staff with a corresponding qualification should work with the load cell. A non-observance of the safety regulations may cause serious injuries and/or damages. Check before initial operation the suitability of the load cell for this area of application. The technical data of this manual have to be followed.

## Characteristics



Material: alloy steel (type L) / stainless steel (type E)  
aluminium alloy (type A)

Range: 20.....10000 kg

Output: 3 mV/V ( $\pm 0,004$ ) / 2 mV/V ( $\pm 0,1$ )

Bridge supply: 10 V AC/DC

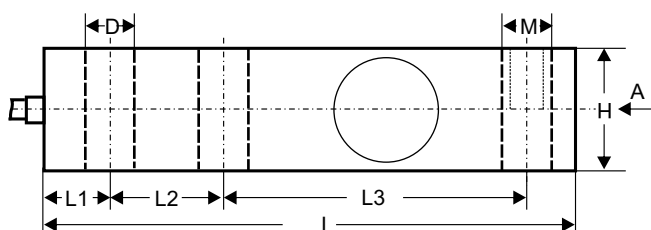
Accuracy: 0,02% of end scale value

Degree of protection: IP 66 / IP 67

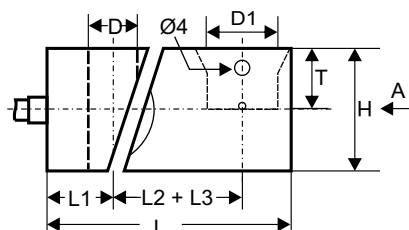
Connection cable: 6 m / 3 m (4-wire)

## Dimensions

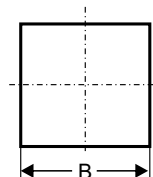
load introduction with thread



load introduction with blind hole (type E only)



A-view



model	capacity	L	L1	L2	L3	H	B	D	M	D1	T
type A	20...500 kg	130	15,8	25,4	76,2	32	32	Ø13,5	M12 x 1,75	-	-
type E / L	500...2000 kg	130	15,8	25,4	76,2	31,8	31,8	Ø13,5	M12 x 1,75	18	15
type E / L	2500...5000 kg	171,5	19,1	38,1	95,3	38,1	38,1	Ø19,8	M20 x 1,5	25	20,5
type E / L	7500...10000 kg	222,2	25,4	50,8	120,6	50,8	50,8	Ø26,2	M24 x 2,0	30	31

## Instructions for correct assembling of loadcells

### General

- Keep the certificate (if existing) of the load cell in your file.
- Before mounting the load cell, make sure the load cell capacity corresponds with the requirements.
- Mark-up in your file the serial number of the load cell and their location in your installation.
- Never handle the load cell by lifting it at the cable.
- Do not over-bend the load cell cable.
- Avoid using welding units after fitting the load cells, because the current passing directly through the load cell or induction can seriously damage the loadcell. The risc can be limited by connecting a flexible copper earth lead (approx. 1 cm) between the upper construction and the lower support of the load cell.

**It is always better to replace the load cell for a "Dummy" during welding operations close to the load cell.**

**Instructions for correct assembling of load cells (continued)****Instruction for laying cables**

- The connection cables, whenever necessary, must be protected by conduit pipes.
- The load cell cables must be laid separately and on a suitable distance from high-voltage and power cables.
- If the electronics are to be placed more than 20 meters from the loadcell, use an extension cable, double shielded, of 4 x 1 mm<sup>2</sup> by way of a watertight connection box.

**Environment conditions**

- Temperature: The load cell is normally calibrated for defined operating temperatures (operation and compensated temperature range). These values can be taken from technical data. On request the load cell can be calibrated for operating at different temperature ranges. When the load cell is used at temperatures below 0°C, avoid washing with steam or hot liquids because that will cause condensation inside the load cell.
- Water, damp etc.: The load cell is produced to a standard with a protection rating of at least IP 65 (other protection ratings can be delivered on request). Take care that the load cell is not be used at a location where a higher protection rating is needed. If the load cell is to be used in holes, use drainage pipes, bilge pumps or other protection devices. Take care the load cell cable will not be soaked by water.
- Aggressive chemical environments: Make sure there are no substances in the environment that could damage the load cell.

**Mechanical installation**

- Always handle with care, when you mount a load cell. Never use a hammer, the load cell is a precision measuring device.
- To ensure weighing accuracy, make sure the only force transmitted to the load cell is the weight. Other forces produced by the surrounding environment, such as vibration, shocks, wind force and temperature can give a false measurement or even damage the load cell.
- Take care, the load cell is loaded in only one direction, marked-up with an arrow (except for tension / compression cells) on the load cell.

**Checking the load cell on location**

- The measured values of a correctly working load cell and the colour wiring code can be taken from test certificate (if existing), and/or type plate, and/or data sheet and/or manual):
- Resistance measurement of the load cell bridge, disconnected from the amplifier. Between the supply wires the resistance (input resistance) has to be measured according load cells documentation. Between the output wires of the bridge the resistance (output resistance) has to be measured according documentation.
- Check the resistance between loadcell body and the supply and output wires. The resistance value measured with a multi-meter must be higher than 3000 Mohms.
- With the load cell connected to the amplifier, the mV output from the load cell, when the load cell is unloaded, must be approx. 0 mV. If this output is higher than 10% of the maximum output, the loadcell must be replaced. Check the output at several loading stages (example with connected bridge supply see page 3).

## Checking the loadcell on location (continued)

Example: Sensitivity of load cell: 2 mV/V  
 Bridge supply of load cell: 10 V  
 Measured value bridge output without load (0%): 0 mV  
 Measured value bridge output with nominal load (100%): 20 mV  
 Measured value bridge output 0,5 nominal load (50%): 10 mV

For other loads the values are calculated correspondingly.

- Because of the robust and simple construction the load cell will not need any maintenance if mounted in the right way. Operation is guaranteed for years. However, because of the problems mentioned above a failure can appear.

The most frequent failure causes are:

- overload or other mechanical stress beyond load cell limits
- welding activities close to the load cell
- overheating
- humidity inside the load cell due to sudden temperature fluctuations (washing the load cell with jets of boiling water or steam)
- chemical attack
- damage of load cell cables

- To order a new load cell, always mention the type and serial number from the damaged load cell.

### Input

Nominal load:  
 Type A: 20 / 30 / 50 / 100 / 200 / 350 / 500 kg  
 Type E / L: 500 / 1000 / 1500 / 2000 / 2500 / 3000 / 5000 / 7500 / 10000 kg  
 Input resistance:  
 Type A: 410 ohms  $\pm 10$   
 Type E / L: 400 ohms  $\pm 5$   
 Insulation resistance: >5000 Mohms (50 VDC)  
 Overload:  
 Type A: safe overload 120% FS  
 ultimate load 150% FS  
 Type E / L: safe overload 150% FS  
 ultimate load 200% FS

### Output

Sensitivity:  
 Type A: 2,0 mV/V  $\pm 0,1$   
 Type E / L: 2,0 mV/V / 3 mV/V  $\pm 0,004$   
 Output resistance: 350 ohms  $\pm 3$

### Accuracy

Combined error: 0,02% FS  
 option type L: OIML R60 C3  
 Linearity / hysteresis: 0,02% FS  
 Repeatability: 0,01% FS  
 Creep: 0,02% FS / 30 min  
 Temperature coefficient:  
 On output: 0,02% FS / 10°C  
 On zero: type A: 0,02% FS / 10°C  
 type E / L: 0,03% FS / 10°C  
 Zero unbalance:  $\pm 1\%$  FS

### Voltage supply

Recommended: type A: 9...12 V AC/DC  
 type E / L: 10 V AC/DC  
 Maximum: type A: 18 V AC/DC  
 type E / L: 15 V AC/DC

### Ambient temperature

Compensated: type A: -10...+40°C  
 type E / L: -10...+55°C  
 Operating: type A: -35...+65°C  
 type E / L: -35...+70°C

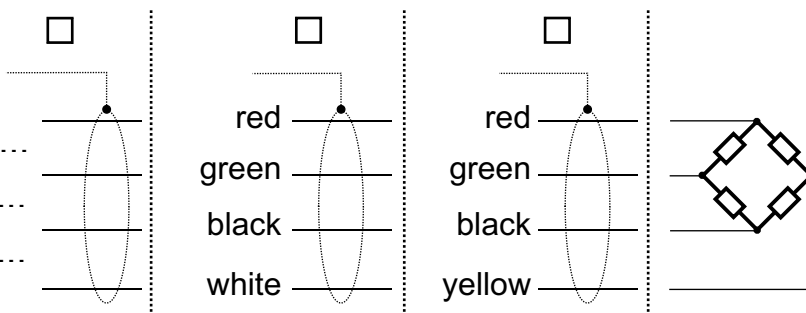
### Mechanics

Dimension: see table  
 Material: type A: aluminium alloy  
 type E: stainless steel  
 type L: alloy steel  
 Surface: type A: anodized  
 type L: nickel plated  
 Protection: type A / E / L: IP 66  
 type E / L: IP 67  
 IP 67: laser welded sealing  
 Weight:  
 type A: 20...500 kg: approx. 1 kg  
 type E / L: 500...1500 kg: approx. 1,3 kg  
 type E / L: 2000 kg: approx. 1,5 kg  
 type E / L: 2500...3000 kg: approx. 1,8 kg  
 type E / L: 5000 kg: approx. 3 kg  
 type E / L: 7500...10000 kg: approx 5,8 kg  
 Cable:  
 Type A: 3 m polyurethan, shielded, 4 wire  
 Type E / L: 6 m polyurethan, shielded, 4 wire  
 option: 6 wire

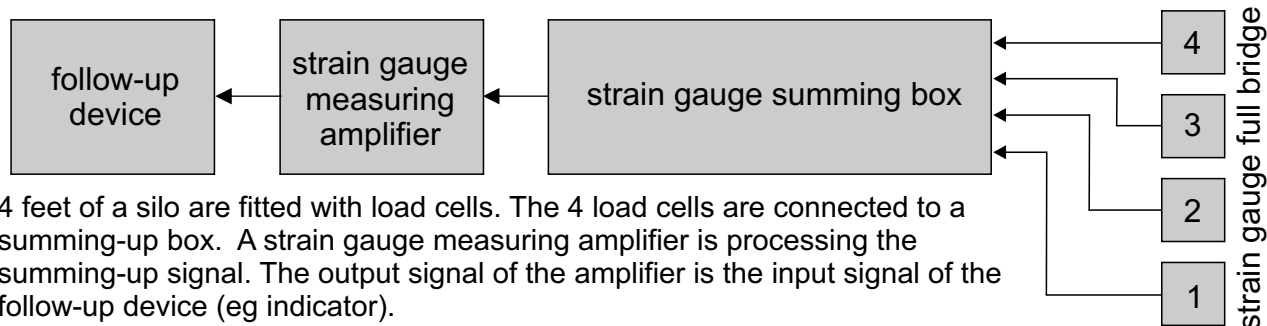
**Type A: aluminium alloy / Typ E: stainless steel / Typ L: alloy steel**

## Colour wiring code

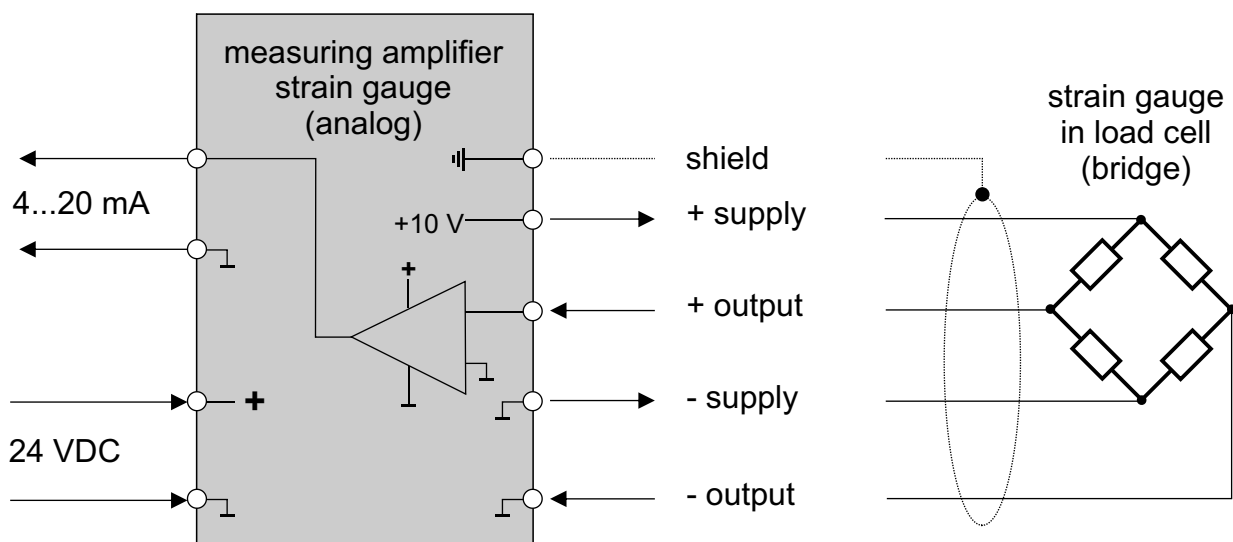
shield  
+ supply  
+ output  
- supply  
- output



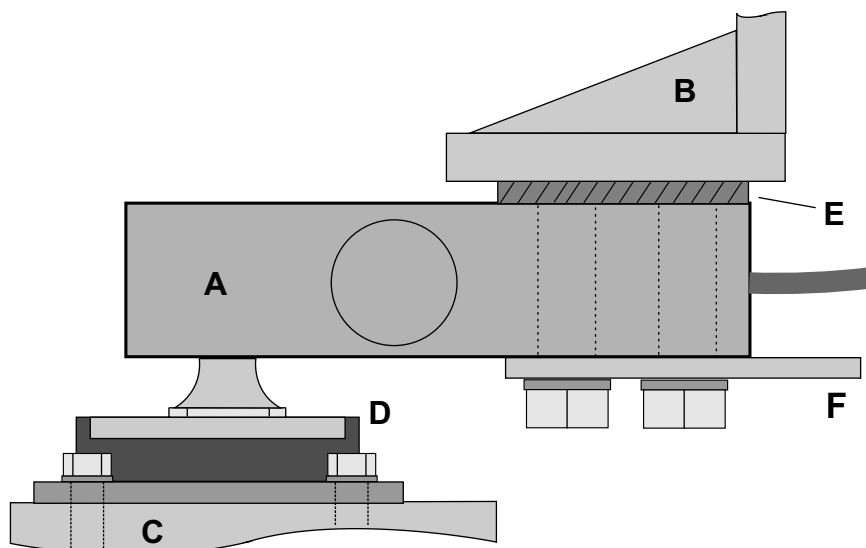
## Example installation



## Example connection



## Example application



Legend:  
A: load cell  
B: base (eg platform, silo, tank)  
C: bottom construction (eg floor)  
D: load food  
E: spacer  
F: guard plate