

Miniature-Bending-Beam Load Cell Type 8510

Introduction

The load cell of the series Type 8510 are primarily designed for force measurements in the unit N. They are not suitable for use in medical technology. When determining mass it is important to take the local acceleration of free fall ($g \approx 9.81 \text{ m/s}^2$) into consideration if you wish to benefit from maximum measurement quality.



In spite of the integrated mechanical overload protection the sensor must be handled with care particularly in reduced measurement ranges.

1. Unpacking

Carefully check the load cell for damage. Should transport damage be suspected, please notify the supplier within 72 hours. The packaging must be kept for inspection by the manufacturer's representative and/or the supplier. The load cell may only be transported in the original or equivalent packaging.

2. Start-up

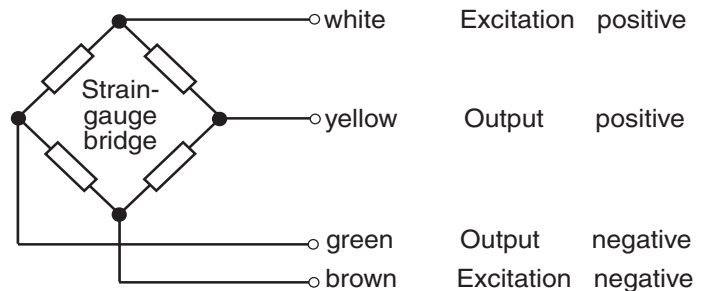
The load cell is connected exclusively to measurement amplifiers equipped with a safety transformer as specified according to VDE 0551. Even the transmitter and devices connected downstream which are electrically connected to the sensor's signal lines, must be equipped with a safety transformer according to VDE 0551.

3. Supply voltage

Supply voltage: AC/DC: $\leq 3 \text{ V}$

4. Connection assignment

In the load cell there are 4 strain gauges connected together into a Wheatstone bridge.



5. Grounding and isolating

All lines are isolated from the housing. The maximum permissible voltage is 30 V. The cable shielding is not connected on the sensor side.

6. Recalibration

The sensor should be recalibrated by the manufacturer no later than 2-3 years subsequent to initial operation.

7. Mounting

The load cell must be attached to a carrier with its entire mounting surface (the side with 2 holes). In order to avoid causing disturbing deformations to the underside, it must be suitably thick. There are two bore holes for fastening. These have been dimensioned for M 3 screws. There are no requirements regarding the property class of the screws.

8. Force application

An optimum measurement quality is attained when the force is applied without any side loads and torques. Side loads primarily arise from eccentric load, oblique load or friction. Relevant friction is avoided when the surface in question has sufficient hardness and quality. Parts applying load must lie with one evenly ground surface on the cell. If the part absorbing the load is convex (e.g. load application knob), then the application of the force must be performed with a plane or flat surface meaning this may not be convex too.

9. Overload

- Overload protection using path or displacement limiting is integrated into the cell.
- When loading is performed with a pneumatic piston a pressure limiting facility must be added.
- Do not subject to abrupt loads. The high spring rate of the cell leads to short "brake paths" of masses in motion. This produces excessively high forces.
- Dynamic loads exceeding 50 % of the nominal load can considerably reduce the working life of sensors made of aluminium.
- When deployed on tanks or vessels (dosing systems) the thermal expansion of the tank which could result in side load must be compensated for by the structural means.

10. Cables

To the extent possible, the cables need to be laid out so that no vibration can arise. Parameter defining components can be integrated into the cable or plug. For that reason the cable cannot be shortened arbitrarily without reinstalling these components.

The cable is equipped with a shielded sheath. For that reason, ensure there are sufficient bending radii. The cable sheath might also develop leakage if exposed to heavy vibration over time. If this occurs the sensor can be damaged from penetrating fluid coming from the capillary effect (e.g. deposits of oil mist). Special measures must be taken in the presence of vapours or fluids. Furthermore the cable may not be exposed to any tensile loads.

11. Electrical features

The output signal of the Type 8510 typically amounts to 3 mV for full deflection. If you wish to measure precisely to 1 % you must obtain a resolution greater than approx. 25 μ V. To accomplish this it is necessary to prevent any corresponding disturbances from affecting the load cell, the cell's lines and the measuring instrument. For that reason please refrain whenever possible from placing the load cell and the measuring instrument in the proximity of powerful switching stations or gears. (Example: Transformers, motors, contactors, frequency converters). The electromagnetic fields could have an unattenuated effect on the measuring instrument and the load cell.

The measurement leads should not be laid in parallel to these lines carrying high power. Otherwise inductive and capacitive disturbances could be coupled into the measurement leads. In some cases it has proven expedient to pull another shield layer over the measurement cable or to lay the cable into a metal pipe or tube.

12. Calibration of a measuring system

An existing measuring configuration comprising load cell + measurement amplifier can be calibrated using various methods. Using methods 12.2 or 12.3 only the measurement amplifier is calibrated, that means only errors in the load cell are tracked. If the corresponding equipment as stated under 12.1 is not available the load cell or the measuring configuration can be calibrated in the factory.

12.1 With physical variables

Operation

The load cell is fed with known physical variables.

Example: A scale or balancing device consisting of a load cell and a display mechanism is relieved of load and the zero point adjusted. Then a known reference weight is placed on the device and the final value is set.

Factory-calibrating certification for the load cell or the entire measuring configuration can be performed on request - also for recalibrations - in the factory on weight measuring systems.

12.2 With strain gauge simulator

Operation

By the strain gauge simulator we mean a substitute bridge circuit comprising precision resistors, which is able to assume various output states. The strain gauge simulator is connected to the measurement amplifier instead of the load cell (e.g. with burster simulator Type 9405).

12.3 With precision voltage source

Operation

The sensor is simulated by a precision voltage source (e.g. DIGISTANT® Type 4405, 4422), which is connected to the measurement amplifier.

Note: Please bear in mind that in strain gauge full-bridge cells the excitation voltage enters the measurement result. It is possible that the actual excitation voltage slightly deviates from the nominal excitation voltage. If you would like to verify the functionality of the measurement amplifier using voltage sources, you must measure the cell excitation voltage with a precision digital voltmeter and then calculate the calibration voltage.

12.4 Shunt calibration

Function

During shunt calibration a precision resistor (calibration shunt) is connected between (-) signal input and (-) excitation. The precision resistor tunes the bridge so that for a certain degree of elongation it corresponds to a certain load of the sensor.

This defined bridge tuning brings about a defined step change of the output signal with which the entire measurement configuration is calibrated. The amplitude of the output signal's step change and the value of the corresponding calibration shunt are specified in the calibration certificate of the sensor.

This method only tests the sensor's electrical function, its properties in a measurement circuit have not yet been verified.

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The authors are always grateful to receive any notification of errors contained herein.

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