

Load Cell Applications Notes

This application note covers most load cells in general, but specifically, it is meant to give the user some important points when using compression load cells, such as: LPM 510, LKCP 410, LGP 310, LGP 312/320 and the LKCP donut series load cells. Please keep in mind, that these suggestions are very general, and do not apply to all applications.

LGP 310 – Please note: The LGP 310 must be mounted on a surface that is flat to within 0.0002 (0.005mm) TIR (Total Indicator Reading) On universal load cells, the mating stud must have class 3A thread (ISO metric thread class 4H). FAILURE TO OBSERVE THESE INSTALLATION NOTES MAY IRREPARABLY DAMAGE THE LOAD CELL AND WILL ALTER PERFORMANCE SPECIFICATION.

Force Cell Setup

The ideal way to set up force cells is to mount them on a rigid (secure) base. This base could be a thick flat steel plate which should be hardened to Rockwell 44C or higher and ground flat with a standard grinder. The top plate should be just as strong as the bottom one.

Compression transducers should always be fully supported on the bottom outside diameter. Failure to support the device in this way can cause damage. The center portion, underneath the load cell is either a welded or cemented cover and will not support a load.

Load Buttons

Whenever possible, use load buttons with spherical surfaces. These will concentrate the applied force on the center of the force cell. If there is no room for load buttons, then it is important to make sure that the two surfaces that come in contact with the force cell are parallel. If they are not, the load will be placed off center, resulting in less accurate results.

Load Cell Capacity

The practical usable range of a force cell is generally 10% to 100% capacity. If you exceed the capacity, then obviously the unit is overloaded and a permanent deformation in the structure of the load cell may occur resulting in a high zero balance shift.

Dropping calibration weights on the cell even from a small height could crush the force cell. Carefully and slowly placing the load on the force cell will help insure no damage occurs.

Make sure the force cell is not slanted at an angle since it is important that it is positioned perfectly vertical or in line with the applied force (within ± 0.05 degrees or better). Make sure there are no side loads applied to the force cell unless it is specially designed to withstand side loading.

If the force or weight is below 10% of the load cell capacity, then the percentage of error increases relative to low range. For example, a 10,000 pound capacity force cell with an accuracy of 0.2% full scale will give a 100 lb loaded weight, ± 20 lb. accuracy. This is usually unacceptable. To get accurate results the force to be measured should be near the full capacity of the force cell. Of course, other requirements may make this impractical.

Zero Drift

When the force cell is connected to the readout/power supply, the display or output may drift due to the warm-up requirements of the instruments and force cell. Even though the force cell is usually temperature compensated, some zero drift is to be expected as the temperature changes.

Readings and tests should be done after the entire system reaches a uniform temperature. Then the zero balance may be adjusted. Creep in twenty minutes is to be expected in the range of 0.2-0.3% FS.

Test Runs

For accurate data, (tests, calibration runs, etc.) make several test runs. A minimum of three to five test runs would be adequate most of the time. A minimum of three calibration points should be selected (20%, 60%, 100% FS). Of course the more points you have selected the more information you will have about the performance of the unit. For reliable data, the load is never less than 10% of capacity. Usually ten test runs are sufficient to get very reliable and accurate results.

Force Washers

Force Washers are small force cells and it is important that a spherical radius is used whenever possible for best performance. If no buttons are used, the accuracy of the results will suffer.

If you use force washers to measure bolt tension, make sure you use hardened washers between the underside of the bolt head and the Force Washer. These washers should be as thick as possible.

When using the readout instruments and/or power supplies, make sure they are connected properly. After waiting for a few minutes (15 to 30), to allow the instrument and the transducer to warm up, the zero should be adjusted and the reading recorded. Now you can start the test run and record your measurements.

These recommendations are very general. If you have any specific question, call us toll-free at 1-800-344-3921, and we will be glad to help you.