4-WIRE LOAD CELLS CONNECTIONS

**SG-EQ4 4 LOAD CELLS JUNCTION BOX**

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**User Manual**

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**4-WIRE / 6-WIRE LOAD CELLS**

A load cell may have a cable with four or six wire. A six wire cable, besides having + excitation and - signal lines also has + and - sense lines. It is a common misconception that the possibility to sense the actual voltage at the load cell is the only difference between 4-wire and 6-wire load cells. A load cell is compensated to perform within specifications over a certain temperature range (usually -10 to +40 °C). Since cable resistance is a function of temperature, the cable response to temperature-change must be eliminated. The 4-wire cable is part of the temperature compensating system of the load cell. The load cell is calibrated and compensated with a certain amount of cable attached. Never cut a 4-wire load cell cable.

The 4-wire cable is not part of the temperature compensating system of the load cell. The sense lines are connected to the sense terminals of the signal conditioning device, to feedback the actual voltage at the load cell. The signal conditioning device either adjusts its output voltage or adjusts its amplifier to compensate for any resistance-change in the cable. The advantage of using this “active” system is the possibility to cut (or extend) the 4-wire load cell cable to any length.

The 4-wire load cell will not perform within specifications if the sense lines are not used.

**ELECTRICAL CONNECTIONS**

The following figures represent the two basic configurations, using four- or six-wire (sense) load cells and 2-5G as signal conditioning device (measurer). With 4-wire extension cables the load cell output should be connected to pairs of diagonally opposite wires.

Sometimes it is necessary to trim the output of each individual load cell to avoid corner load differences, which are caused by:

1) The parallel connection. Each load cell will be loaded with the resistance of the other load cells. As a result, the individual load cell output tolerances will be increased by the individual output resistance tolerance.
2) Unequal load distribution.

All load cells should be placed on the same horizontal level. Check for mechanical unequal load conditions before trimming the load cells.

**GROUNDING AND SHIELDING**

Proper grounding and shielding can be critical to the successful application of load cells which are generating low level signals (<5 µV/scale division). The basic rule is:

Avoid continuous ground loops; a system should not be grounded at multiple points. This may occur, for example, if the shield of the load cell cable is connected to earth at both ends.

The great part of load cell cables are provided with a braided shield which provides protection from electrostatic interference when properly used. This shield is floating (not connected) at the load cell avoiding the inadvertent creation of a ‘ground loop’. A basic system configuration is represented in the figure below:

**4-WIRE LOAD CELLS TRIMMING**

The following tables are used:

1) The parallel connection. Each load cell will be loaded with the resistance of the other load cells. As a result, the individual load cell output tolerances will be increased by the individual output resistance tolerance.
2) Unequal load distribution.

All load cells should be placed on the same horizontal level. Check for mechanical unequal load conditions before trimming the load cells.

There are two methods of trimming with excitation. The first method is to adjust the potentiometers by trial and error whilst moving calibration weights around from corner to corner. All potentiometers should be adjusted to have the maximum sensitivity for each cell by completely turning clockwise all them.

Then once the lowest output corner is located, the other cell are trimmed down to match this lowest output. This method may be very time-consuming, particularly for high capacity scales, or vessel scales where the use of test weights at the corners is not practical. In these cases the second and best method “pretrimming” the potentiometers with the use of a sensitive voltmeter (at least 4 - 5 digit). The following procedure can be used:

1) Determine the exact mV/V rating of each load cell, which can be found on the load cell’s calibration certificate.
2) Determine the exact excitation voltage supplied by the signal conditioning device/measurer (2-5G for example) by measuring this voltage with the voltmeter (for example 10.05 V)
3) Multiply the lowest mV/V-value (step 1) by the excitation voltage (step 2).
4) Divide the trimming-factor found in step 3 by the mV/V-value for the remaining load cells.
5) Measure and adjust the excitation voltage of the three remaining load cells with each respective potentiometer. Verify the results and make the final adjustment while moving a testload cell to corner.

Some internal jumpers are available on the internal board, inside the external case. Their position in the board is illustrated in the following figures.

**Internal Jumpers**

The jumpers may be set in order to establish some particular settings as it is illustrated in the tables in the next page.