# TN 17.418 Load Cell Cable Cutting-Lengthening.

Technical Support

## General

Load cells with 6 core cables use two sense wires to sense the actual excitation voltage at the load cell when converting the electrical signal into a weight or value to display. Small changes in cable resistance from cutting or extending the cable length do not affect performance.

For load cells with 4 core cables have to be compensated to take into account the resistance of the cable and how that resistance changes because the excitation is not sensed at the load cell but at the end of the cable. When you change the length of the 4 core cable the compensation for the previously length is no longer applicable to the new length and the load cell will be out of compensation and errors will be introduced.
When the cable length changes;

- the sensitivity (mV/V) changes
- and also a temperature coefficient of sensitivity error is introduced (the mV/V changes with temperature.

Depending upon your application, the errors introduced from changing the length of a 4 core cable may or may not be significant.
PT recommends coiling excess cable instead of cutting it, and extending 4 core cable with 6 core cable so sensing is performed at the end of the factory calibrated length of cable.
For load cells with 4 core cables that have approvals, the cable should be left at the factory supplied length.

## What is the effect?

The resistance of our load cell cable is 93.7 Ω/km (at 20C). This means 0.0937 Ω/m.
Because the current flows through excitation+ and excitation- wires you must double this for total cable resistance/m, or 0.1874 Ω/m. The temperature coefficient of copper wire at 20 degrees C can be assumed to be 0.00393 per C
You can check the load cell certificate for the factory excitation resistance or measure with a meter.

For the effect of cutting the cable, calculate as per the below example.
Example:
Load cell excitation resistance = 453.7Ω
Reduce the cable by 1m, % effect = 0.1874/453.7*100 = 0.04130

As you can see this has a small effect. If you reduce the cable by 2.5m it will be about 0.1% increase in signal.

Cutting the cable also has the effect of changing the temperature characteristic, but this is a smaller amount and not so noticeable except with larger temperature changes.
The 1m of cable above has a resistance of 0.1874 Ω/m at 20C but at 40C this would be;

$$R_{40} = 0.1874 * (1 + 20 * 0.00393) \text{ or } 0.2021296\ \Omega/m$$

Using the above equation
Reduce the cable by 1m, % effect = 0.2021/453.7*100 = 0.04454

From these figures it shows with a 1m change in cable length and a 20 degree temperature change the compensation of the load cell sensitivity vs temperature is now changed by 0.0032%. A temperature change of +/- 20C will now cause a span change of +/- 0.0032%. With larger cable length changes and temperature variations this could see undesirable effects.

In relation to a product specification, cut a 4 core cable on a load cell with excitation 453.7Ω by 1m;
Original specification Temperature Effect On Span/10°C < 0.0100% FSO,
new specification Temperature Effect On Span/10°C < 0.0116% FSO.

The above effects are the reason it is recommended to coil excess 4 core cable up and tie in a stable position rather than cutting it.