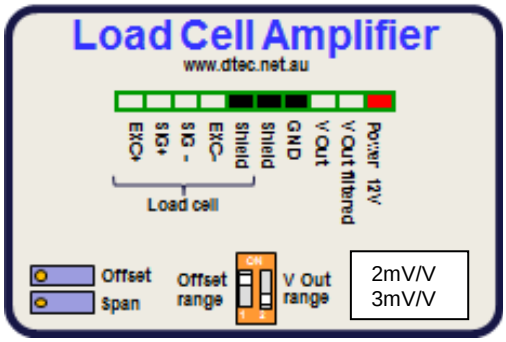
# LCAMP- Load Cell Amplifier


## Overview-

Brake type dyno's apply a load (e.g. using an Eddy current brake) against the engine and the torque applied is measured on a ‘load cell’.

Load cells require an amplifier (also called 'signal conditioner', 'transmitter' or 'strain gauge' amplifier) to provide them with power and to increase their output voltage to an easily measurable range.

This amplifier is suitable for interfacing to DYNertia3 and other data acquisition systems; it has an output in the 0-5V range and can be set for typical 2mV/V (as DTec generally provide) or 3mV/V sensitivity load cells.

This is a precision amplifier circuit with low temperature drift and long-term stability.

- Compatible with ‘S” or ‘beam’ type load cells and is optimised for common 2mV/V or 3mV/V sensitivity load cells.
- Output range 0-5V, either direct or low-pass filtered (special noise reduction circuitry added)
- 'Span' and 'Offset' adjustment is provided to maximise the resolution of your load cell.
- Wide power supply range from 12V to 26V
- Input overvoltage, overcurrent and output short circuit protection
- Easy connection via internal screw type terminal block

## Technical specifications-

| | |
|---|---|
| Input type | Full bridge strain gauge/Load cell |
| Outputs | Voltage 0-5V either direct or low-pass filtered |
| Bridge load input impedance | <2KΩ |
| Sensitivity | 2 or 3mV/V optimally (based on ‘V Out range’ switch) |
| Load capacity | 87 Ω (four 350 ohm sensors parallel possible) |
| Excitation voltage | 5V DC |
| Excitation current | <100mA@12V supply, <50mA@24V supply |
| Power supply | 12 to 26VDC |
| Linearity | 0.3% FS |
| Temperature coefficient | 50ppm@10-30°C, < 100ppm full work temperature range |
| Operating temperature | 0-50°C |
| Weight | 90g |
| Dimensions | 115mm×80mm×35mm (mounting bolt at 97mm centres) |

## Connection diagram-

Load cells consist of 4 ‘strain gauge’ resistors arranged in a ‘bridge’ configuration and bonded to a frame so that force applied will flex them (resistance changes). An excitation voltage is applied and the output signal voltage is amplified.

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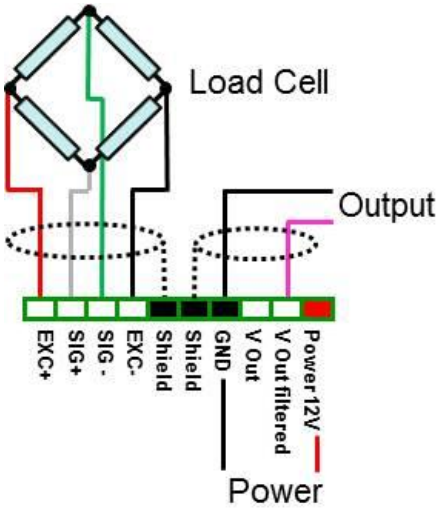



**NOTE:** Connected correctly the output voltage should rise as you apply force in the appropriate direction to the load cell. If the output decreases then reverse either the excitation wires or the signal wires from the load cell!

Avoid running load cell wiring along with others that carry high current and the use of shielded wire for the output and sensor is recommended

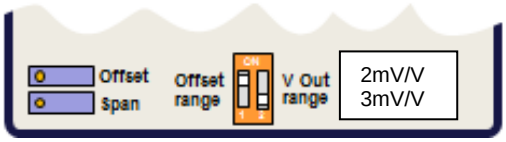
Typical load cell colours- **Red** = excitation +ve, **Black** = excitation –ve
**White** = signal +ve **Green** = signal –ve,

Check your load cell data sheet for colour of wires as there are variations. If unknown they can usually be determined by measuring the resistances.

## General calibration-

**NOTE:** For calibrating to suit DYNertia3, please use the guided function in the software ('File' / 'Sensor Configuration')

Adjustments screws and range switches are found in the lower Left hand corner of the circuit board. They take about 25 turns from full in to out!




Turn the 'Offset' (Zero) or 'Span' in clockwise to increase voltage output.

**Span-** Changes the amount of 'gain' (or 'multiplication') that the amplifier has i.e. how much voltage it gives out for a certain input from the load cell.

**Offset (Zero)-** Is used to compensate for any static error i.e. load cells and tolerances won't be perfect, so there will be a small output voltage even with no force on the load cell. This screw can effectively 'zero' the output.

**NOTE: If using the 'V out Filtered' output (as usual on a dyno application) if the offset screw is turned out too far anti-clockwise (lowering voltage) then the output will limit at approx. 1.7mV i.e. this 'V out Filtered' output can't go negative like 'V out' can.**

**Offset range-** When in the 'up' default position it gives a larger adjustment range for cancelling out any offset, the trade-off is that it has a courser adjustment. We suggest you leave it 'up' or you may not achieve the offset range you need.

**V Out range-** When in the 'up' default position it is optimal for 2mV/V load cells, 'down' for 3mV/V load cells.

1) After mounting the load cell and with no force applied, use the 'Offset' adjustment to set the no load voltage.

2) With a known load on the load cell you can adjust the 'Span' screw to get the desired output voltage. The aim would be to have the maximum desired output voltage occur at the load cells rated capacity i.e. with a 200kg load cell connected the amplifier might be set so at 200kg there is 5V output. The higher the test weights the better, but you are unlikely to apply the full 200kg for calibration, so we could set for say 2V at 80kg (which would therefore give 5V at 200kg).

**NOTE:** There will be an interaction between switch and screw settings, so recheck offset and then check span again! e.g. turning in the 'span' screw during calibration will also raise the no load offset voltage slightly & vice versa.

**Can't get output low enough-?** Check 'V out range' switch is 'down' (lowest gain setting and used for 3mV/V sensors). If too much static weight on the load cell then consider counter weighting opposite side of dyno to reduce this.

**Can't get output high enough-?** Check 'V out range' switch is 'up' (highest gain setting and used for 2mV/V sensors). Contact us if you need assistance or further advice.