ICA4 analogue output option.
Setup and user guide.

V1.00

1 - Power Connections

The power supply for the ICA4 is 24V dc (within the limits of 13V to 28 V).

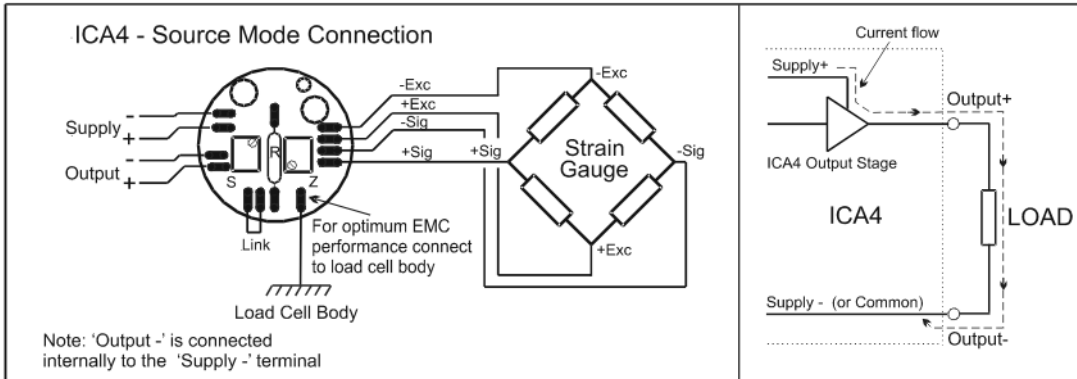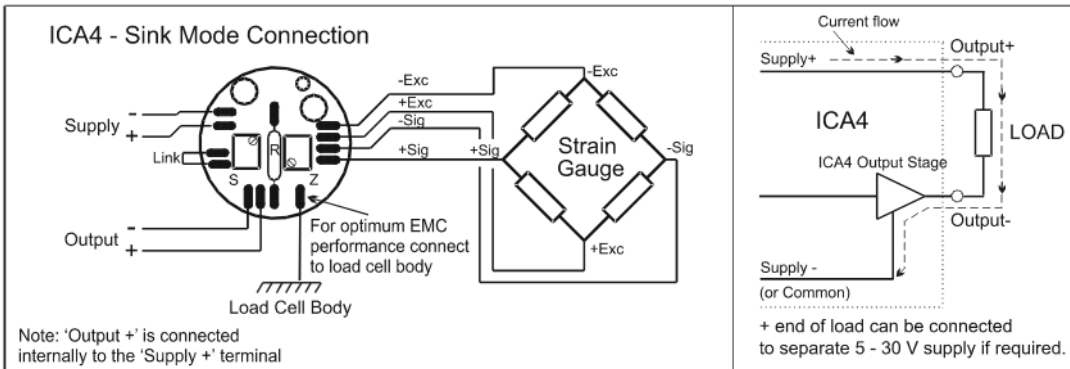## Figure 2.2 Connection Details for Current Source Mode

Figure 2.3 Connection Details for Current Sink Mode

2 - Output Connections

The ICA4 analogue output is 4 to 20 mA (other modules in the ICA range offer DC voltage outputs).

The DC current output supports both 'sink' and 'source' modes of operation. A link provides the means of selecting the desired mode. (See Figures 2.2 and 2.3 for details).
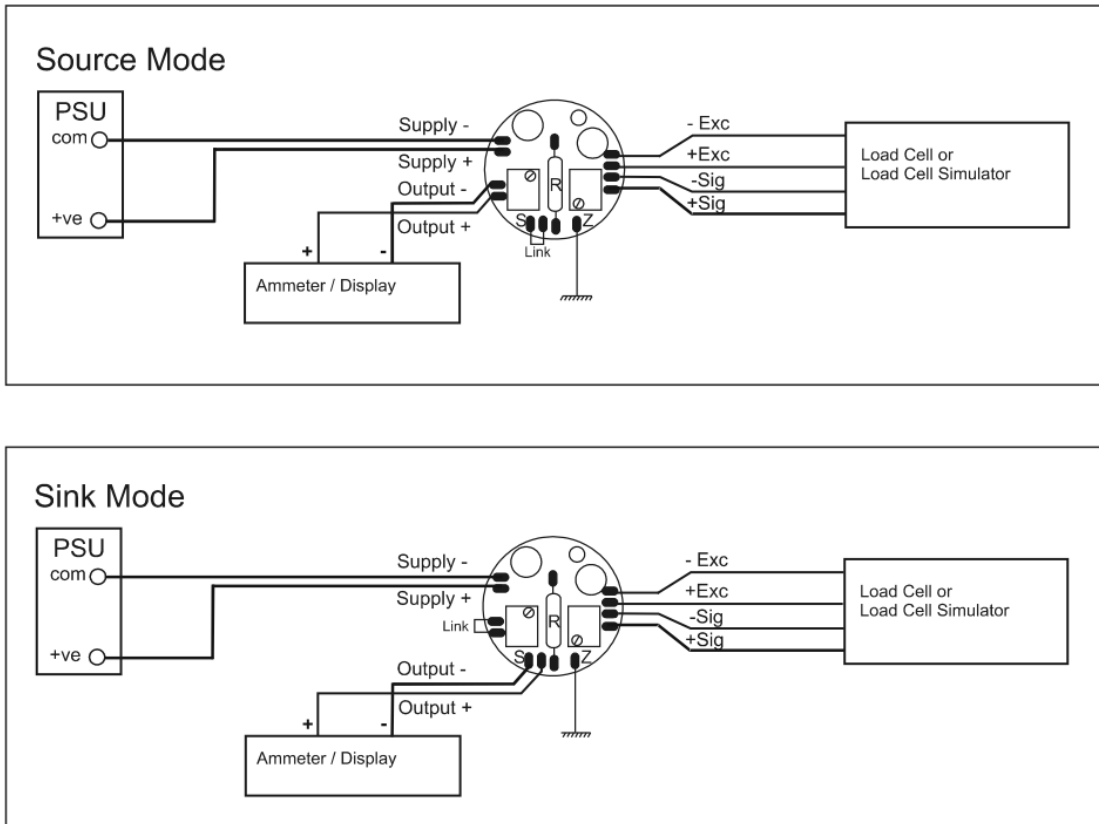
In **'Source'** mode the positive end of the load is connected to the ICA4 output "+" terminal and the current is 'sourced' by the ICA4 output (via the external supply) through the load towards ground (0V). This mode has the advantage that the negative output connection is common to the load cell '- Excitation' terminal.

In **'Sink'** mode the positive end of the load is connected to the positive of the power supply (a separate external power supply may be used if desired) and the negative end of the load is connected to the ICA4 output "-" terminal. The current through the load is 'sunk' by the ICA4 towards the negative of the supply (0V). When in this mode, neither connection to the output load is electrically common to the load cell.

Note. If the ICA4 is required to operate in source mode (common negative – as per the Figure 2.2) then the above 4-wire cabling should be adhered to in order to provide the ICA4 with maximum protection. If, however a 3 wire cabling installation is required or unavoidable, the on-board protection circuit will limit the fault current in the load to approximately 55mA in the event of the negative supply connection to the ICA4 becoming open circuit.

3 - Calibration

Figure 4.1 Connection Details for Calibration

1. Turn both potentiometers fully clockwise. Now turn the "S" potentiometer seven turns anti-clockwise (mid way).

2. Apply the **low** calibration conditions (weight, force or mV/V). Set the output to approximately 4mA using the 'Z' potentiometer. Note the exact reading.

3. Apply the known **high** calibration conditions (ideally between 75% and full scale) and adjust the 'S' potentiometer to give the required **increase** in output current for the known input. (e.g. 16mA increase for 4-20mA final calibration)

4. Apply the **low** calibration conditions again and note the new value. Apply the high conditions and re-adjust the 'S' potentiometer for the required change.

5. Repeat steps 2) and 3) until the span is correct.

6. Apply the **low** calibration conditions and adjust the 'Z' potentiometer for the required output reading

4 - Troubleshooting

1. No Output
a) Check power supply is present and the correct polarity
b) Check the output connections are correct with no open circuit connections
c) Check terminations (ensure there are no dry joints)
d) Check the sensor is connected (typically reading 350 Ohm across output + & -) with the power off
e) Check the Excitation voltage is correct
f) Check the load is connected and is not open or short circuited
g) Check Span and Gain calibration

2. Low Output
This is when an output is present but not of sufficient magnitude to meet the required value. Remember to allow for Tare Weight and ensure it is measured and allowed for in the output from the ICA.
a) Check power supply is within specified limits (i.e. is not low)
b) Check the sensor is connected (typically reading 350 Ohm across output + & -) with the power off.
c) Check the Excitation voltage is at 8V dc
d) Check the calibration
e) Check the Zero (offset) is correct for the sensor, this too is a common reason for low outputs

3. High Output
This is when an output is present but higher (in span or zero) than expected.
High output is not normally a problem. It is most likely to be incorrect connections and as such the output would be high and fixed
a) Check the sensor is connected (typically reading 350 Ohm across output + & -) with the power off
b) Check the Excitation voltage is at 8V dc
c) Check the Zero (offset)
d) Check the calibration.

4. Unstable Output
This is when the output is unstable or varies. The cause could be (a) poor installation or (b) a noisy environment.
Poor Installation -This is when an output is present but higher or lower (in span or zero) than expected:
a) Check the installation for problems and repair where necessary
b) Poor termination
c) High resistance on cable leads
d) Low insulation impedance
e) Proximity to High Voltage Equipment – Transformers, Contactors, Motors etc.
Noisy Environment-
a) Check if the source can be found and remove noise
b) Check the cable shielding and ensure it is correctly installed and terminated.

5. Calibration
This section assumes that the unit is providing an output that is not stuck at top or bottom of the scale.
(See paragraphs 1-3 if this is the case)
Ensure you are connected to the correct sensor and not to another adjacent unit.
Ensure you have the correct calibration data from the sensor manufacturer. This must include a certified table with offset, zero and linearity.
Ensure you have the calibration set-up correctly installed i.e.mV source and output as required.
Ensure the temperature and other environmental parameters are within specification and where necessary taken into account when calibrating should such parameters have an effect on the calibration.

6. Fine Span (Gain) and Zero (Offset)Adjustment Problems
If the adjustment cannot reach the maximum output desired then, check the tare is not too high.
If the potentiometer does not alter the output the unit must be repaired – remove from service.
It is always wise to check a known good ICA against the problem Installation before rejecting the suspect ICA.

5 - Specifications for ICA4 Load Cell Amplifiers

Table 8.1 Output from the ICA4 – 4 - 20mA

Parameter	Minimum	Typical	Maximum	Units
Power supply (reverse protected)	13	24	28	V dc
Bridge excitation	-	8	-	V
Bridge resistance	350	-	-	Ohms
Bridge sensitivity	0.5	2.5	30	mV/V †
Gain adjustment (Pot - fine adj.)	-	+8	-	%FS
Zero adjustment (Pot - fine adj.)	-	+2	-	%FS
Output load	-	-	1000*	Ohms
Bandwidth	0	-	2000	Hz
Zero temperature stability	-	0.002	-	%/ °C
Span temperature stability	-	0.005	-	%/ °C
Linearity	-	0.02	-	%FS
Operating temperature range	-40	-	+85	°C
Humidity	-	-	95	%RH

FS = Full scale. † = set by calibration resistor. * 24V minimum supply/sink mode.

Configuration sink or source mode. **Connections** Solder pads, 4 strain gauge, 3 or 4 for power & signal

Environmental Approvals

Emissions   BS EN 55011:1998

Immunity   BS EN 61000-4-2:1995 IEC 6100-4-2:1995
                             BS EN 61000-4-3:2002
                             BS EN 61000-4-4:2004
                             BS EN 61000-4-11:2004

Output shall not exceed the sum of uncertainties when subjected to an electric field of 10V/m over the frequency range 80 to 600MHz

Safety/Low voltage Directive 73/23/EEC as amended by 93/68/EEC
                             BS EN 61010-1:2001 IEC 61010-1:2001