

## Fault finding tips

### Sender units

All Smiths gauges require a matching sender to read correctly and there are a host of different ones available. Some are resistive and others are voltage driven, with both linear and non-linear characteristics.

All of the gauges listed on this website have the matching sender in their description.

If you have another CAI/Smiths gauge and need to know what sender is required then email [technical@caigauge.com](mailto:technical@caigauge.com) with the gauge part number, printed either on a paper label on recent gauges or often in small print on either the dial or just under the shroud if it is an old gauge. Close up photos of front and rear may help us to find the details for you.

Engine or coolant style senders with a single wire connection on top require a good connection to Earth, so DO NOT use any sealant or PTFE type tape on the threads as it compromises the connection, causing the gauges to misread or not read at all. Generally, they have tapered threads so self-seal, if they do leak slightly try using a copper washer between sender and engine.

PTR type Oil pressure senders with a single tab connector; you should take great care not to bend the connector or use the body of the sender to screw it in and out as either action can move delicate internal parts and damage the unit. Only use a spanner on the nut at the top of the threads. Any item found to have been damaged this way will not be covered under our standard warranty.

PTTR Pressure & Vacuum sensors with a multi wire connection and a larger chrome plated thread DO require PTFE tape to seal, as often they are reading either very small pressures, for fuel systems, or very high for oil pressure. The earth to this type of sender comes from the black wire and not the threads.

Ambient Temperature senders, TT6820 or PT1000 are very sensitive, so any connection between sender and gauge **must be soldered** to stop the inherent resistance of crimped connection making the gauge inaccurate. Keep the cable between gauge and sender as short as reasonably possible to keep drop through the wire to a minimum.

## Gauges

Bimetal 52mm gauges.

Normally these have 2 threaded or spade connections on the rear. If they are for measuring Temperature, either Oil or Coolant or for Fuel content, they MUST be run off a 10-volt regulator, +/- 0.3 volts or they will not be accurate.

Bimetal Pressure or Voltage gauges run at 12 volts.

If using our current BRxxx-xxx range of voltage regulators, then connect a Maximum of 2 gauges per regulator.

A quick test of a Bimetal gauge is when disconnected it should read approximately 60 Ohms between the 2 terminals.

Because Bimetal gauges are all resistive it does not matter which way round the power and sender wires are connected.

Air Cored gauges mostly have 3 connections, if looking at the rear of the gauge with the lamp tube to the top, the right-hand connector (often labelled 2) is for the power connection, the centre is wired to ground and the left most one should go to the sender.

There are just a few exceptions, notably Landrover, who earth via the case.

Generally, most Air Cored gauges are 12 volts unless the part number has a "2" at the start of the centre section on the part number xxxx-2xxx-xxxx as this indicates it is 24 volts, (common numbering on all current CAI gauges).

Air Cored gauges should be mounted so they lean back approx. 10 degrees. If they are mounted leaning forward, the silicon used in the pointer damping moves away from the mechanism making the gauge mis-read.

In a 1970's Smith's test document it said that if an Air cored gauge had been placed face down or face up and then moved to the correct 10 degree lean back mounting position it can take over 60 hours for the silicon to stabilise.

The following test can be performed on all resistance driven gauges to check for functionality. It is not a calibration test.

Conventional Smiths characteristics: With the gauge powered up, disconnect the sender from the gauge. The pointer should go to the low end of the scale. Then short the sender terminal of the gauge to ground, the pointer should now move to the top end of the dial scale. VDO type fuel senders are the opposite, with sender disconnected the pointer should read full, with the sender shorted to ground it should read empty.