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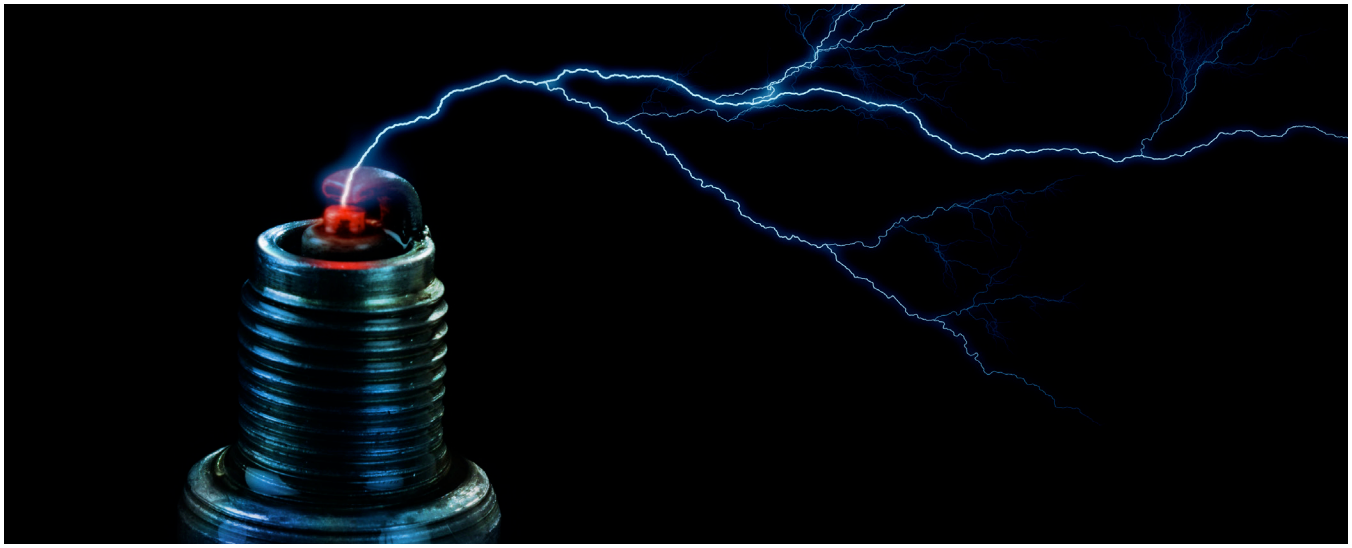


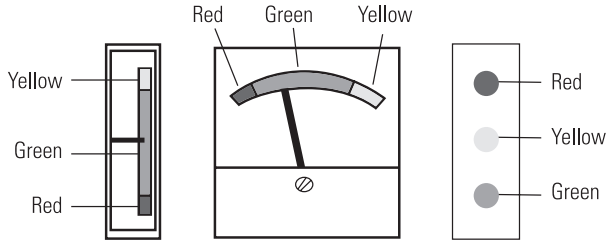
TN-4

Using the Bias Voltage As a Diagnostic Tool

Using the Bias Voltage as a Diagnostic Tool

USING THE BIAS VOLTAGE AS A DIAGNOSTIC TOOL

The bias voltage of an ICP® sensor can be an effective diagnostic tool. Most ICP® sensor signal conditioners, and data collection devices that supply ICP® sensor excitation power, have some means for monitoring or displaying the sensor's turn-on bias voltage. These monitors can be in the form of a meter or diode. A segmented meter may be color coded to indicate the operation of the sensor. Red indicates a short circuit, green indicates normal operation, and yellow indicates an open circuit. These meters are simply voltage monitoring devices. The full scale of the meter is typically that of the excitation voltage supplied by the signal conditioner.



Type of Fault Indicators

ICP® sensors are usually supplied with a certificate of calibration that reports their actual bias voltage. This voltage can differ slightly from sensor to sensor but will typically fall between 8 and 12 VDC. When properly energized by the signal conditioner, the sensor will "turn on" and settle out with the bias voltage being measurable at the sensor connector. The signal conditioner monitors this bias voltage and displays it with its meter or diode. If the sensor cable is not properly connected from the signal conditioner to the sensor, an open circuit condition will exist. If there is a short circuit in the cable or connector, a short circuit condition will exist. The bias voltage can give clues to assist with troubleshooting system performance and to zero in on the root cause of a problem.

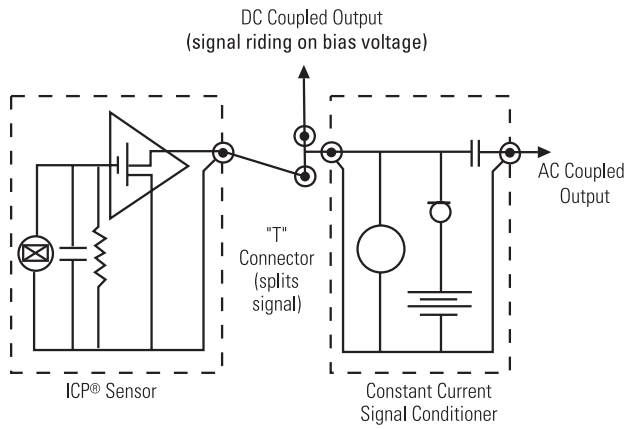
Here are a few tips which will help to troubleshoot a measurement system:

If a short circuit condition is encountered, disconnect the sensor cable and examine all electrical connectors for metal burrs, or other foreign objects, that may be causing the connector pins to short out to each other. If the shorted condition exists with only the sensor cable connected to the signal conditioner (no sensor connected) then the cable is at fault. Again, inspect the connectors for foreign material. Inspect the cable and see if it has been pinched or kinked. Wiggle the cable around while viewing the fault meter and see if any fluctuation out of the red can be seen. Disconnect the cable from the signal conditioner. The fault meter should read yellow, or open circuit. If there is no way to maintain a open circuit with just the sensor cable connected to the signal conditioner, then the cable is at fault and should be discarded or repaired.

If an open circuit condition is encountered, check the sensor cable connections at the sensor and signal conditioner to ensure that they are proper and tight. If this does not resolve the condition, remove the sensor and short out the cable connector with a piece of wire, paper clip or other metal object. The meter should go to red, or short circuit. If it does not, then there is a discontinuity in the cable and it should be discarded or repaired. If the cable checks out okay, yet an open circuit condition still exists, then there may be a problem with the sensor. Try another sensor on the same cable to verify if this may be the case.

Never try to troubleshoot the sensor with any other electronic device than the fault meter provided on the signal conditioner. VOM's may subject the sensor to improper voltage or unregulated current and cause permanent failure.

If a bias monitoring meter is unavailable, you may with to "tee" off the measurement signal and look at the bias voltage with a voltmeter.



Teeing the Measurement Signal to Monitor the Bias

By "teeing" off the input into a DC volt meter, the bias voltage can be measured.

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