

Connecting Different Sensors to your VR Controller.

Today's Presenter: Aaron Offringa



Meet VR



Connecting Different Sensors

- Each sensor/ transducer has its own purpose. The following are examples of different types that can be used by the VR9500.
- If there is one that I didn't cover and you'd like to see it done feel free to contact me.
- I will go over the application and process of connecting each sensor in the software.

Connecting Different Sensors

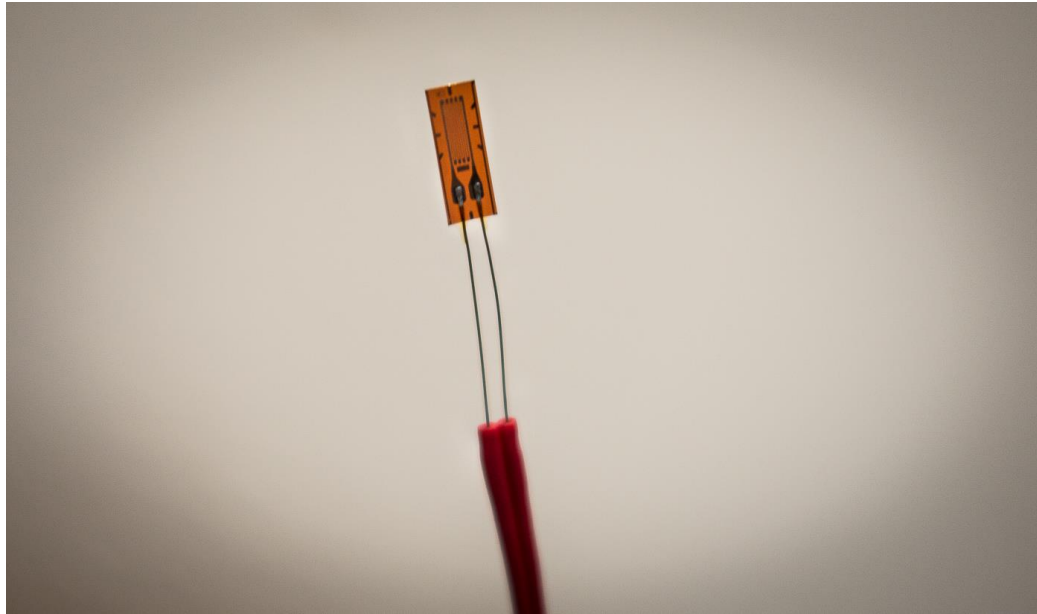
- The VR9500 has the capability to power IEPE accelerometers without the need of an external power source. We also have the ability to read TEDS.
- The VR9500 input voltage limits are $\pm 1\text{v}$, $\pm 10\text{v}$, $\pm 20\text{v}$ peak. Sensors that require an external signal conditioner must be scaled so that they can be read by our system.

Connecting Different Sensors

- Scaling conditioners:
- Max Voltage range (I.E. 0-5 Volts)
- Full Scale range (I.E. -10mm to 10mm. 20mm peak to peak)
- Take Volt/Unit and then scale that down to mV/Unit
- In this case it would be 250mV/1mm

Strain Gauges

- A strain gauge is used to measure strain on an object (just like the name says).

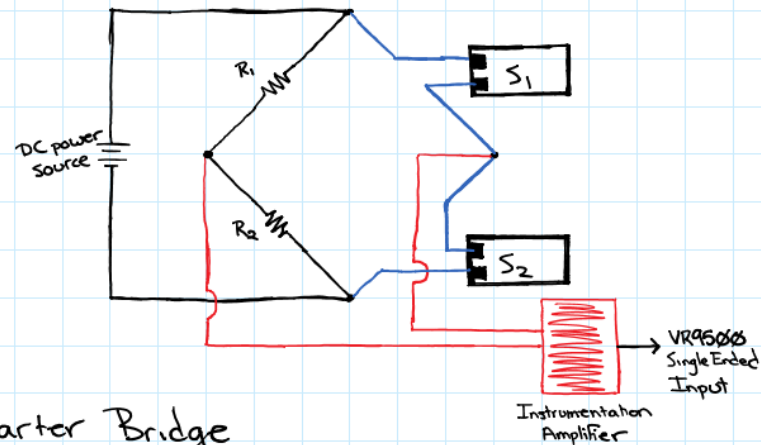


Strain Gauges

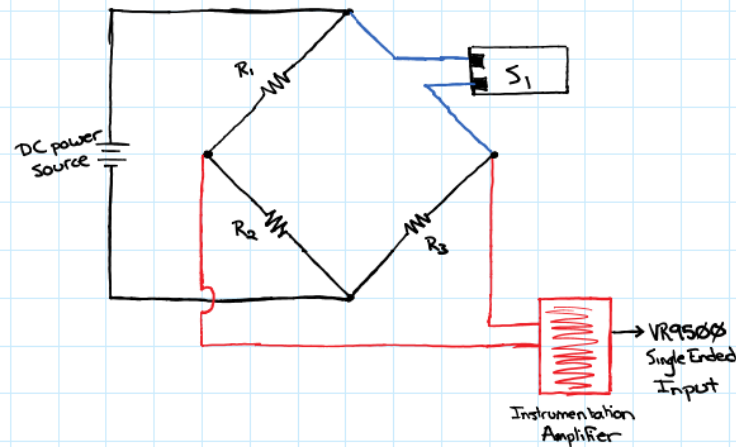
- An example of a specific use would be measuring strain on a bike peddle while it is also subject to vibration. The peddle would also be experiencing either pressure or weight on it as if someone was riding on the bike.
- The foil is bent and twisted on the gauge causing electrical resistance. A Wheatstone Bridge is typically used to measure this.

Strain Gauges

Half Bridge Strain Gauge Circuit



Quarter Bridge



Charge Accelerometers

- A Charge accelerometer is an accel that requires an external power source other than the VR9500 controller.
- An In-line Charge barrel can be used for charge accelerometers. The VR9500 powers the charge barrel and that then charges the accelerometer.



Charge Accelerometers

- Charge Accelerometers are useful in situations where high temperatures are also a factor in the testing.
- What makes these accelerometers useful for those high temperatures is because it lacks the internal electronics unlike an IEPE accelerometer.
- Also, charge accelerometers are useful when extremely high G levels are needing to be reached.
 - 24 Bit electronics match IEPE sensors with charge G ranges.



Charge Accelerometers



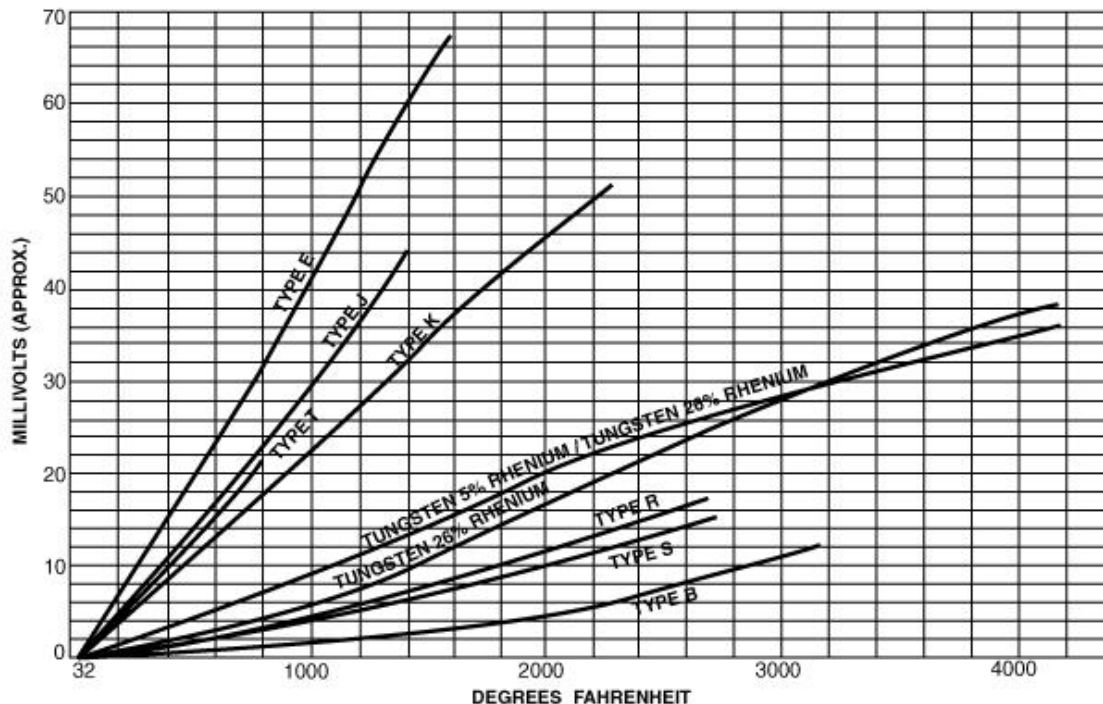
Thermocouples

- A thermocouple is used to measure the temperature in any given environment. This is typically done by measure the difference between two points of the unit.



Thermocouples

- The thermocouple conditioner needs to linearize the thermocouple. Each thermocouple and its appropriate wiring color are attached to a thermocouple curve like the one pictured below.



Displacement Sensors (Contact)

- A contact displacement sensor is also known as a Linear variable differential transformer (LVDT).
- Used in determining position of a hydraulic actuator.



Displacement Sensors (Contact)

- An example of who would use this sensor would be a company that does vibration testing on mirrors.
- When extremely accurate displacement is needed and contact is allowed, a LVDT is the way to go.



Displacement Sensors (Non-Contact)

- Non-Contact displacement sensors can be produced in many ways.
- The reading of the sensor can be done by a laser, infrared, ultrasonic, inductive, and others.
- In my example, I will be using a laser vibrometer.



Displacement Sensors (Non-Contact)

- Non-contact sensors are used when mass or size are an issue.
- If putting on a contact accelerometer affects the parts resonance then a non-contact sensor is needed.
- A normal accelerometer (even tear-drop accels) may be too big to properly fit on the device under test. A non-contact would be needed as well.



Displacement Sensors (Non-Contact)



Displacement Sensors (Non-Contact)



DC Response

- If you wanted to control by acceleration and at low frequency you could use this accelerometer.
- Could be used for low frequency calibration on other low frequency sensors.



DC Response



“T-ing” IEPE Accelerometers

- The purpose of “T-ing” your accelerometer would be to have the VR9500 powering the accel and reading it while another unit is recording that channel.
- Note; it doesn’t have to be another VR9500 to do this. Any other type of hardware recording unit can be used.
- Also, cap coupling must be enabled. Both hardware boxes cannot attempt to power the same accelerometer.



“T-ing” IEPE Accelerometers



Thank You for Attending!

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