Measuring a Vin / Vout Voltage Ratio (e.g. with a Strain Gauge or Load Cell)

Application Note #139, 5/22/2003

If working with a Load Cell or Strain Gage, it is recommend that one select that specific sensor type in the SENSOR field (instead of VOLTS), and let the interview guide one through the setting up of that sensor (instead of doing it manually, as described below).

The instruNet Driver Version >=1.22 can read the ratio of the Voltage across a device (e.g. bridge) and the excitation voltage. The returned value is in units of "V/V" (i.e. Volts measured across the bridge per Volt of excitation):

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Vr = Vmeas / Vexc = (Vin+ - Vin- - Vinit) / Vout
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One implements this mode by selecting a VOLTAGE sensor and BRIDGE wiring. If an external power source is used for excitation, one must tell instruNet what voltage is applied by entering this value into the Vout field of the Constants Settings group and making the Ro value negative to indicate an external power supply. The Vinit field is the voltage when the bridge is at its idle state, and is subracted from the measured voltage. This is used to null the bridge; otherwise, it used typically set to 0V. The Ro field is the resistance of the bridge, and helps instruNet know what excitation voltage to apply. The Vout field (in the CONSTANTS area) specifies the excitation voltage. If one wants to scale the output further, please refer to the Mapping Settings area, to implement a linear mapping. When setting fields programmatically via Visual Basic, C, instruNet or LabVIEW; please set them in them in the below listed order since a few of these are dependent on the others (e.g. Ro, Vout, Vrange). The following summarized the settings used with voltage ratio experiments.

SETTINGS	FIELD	VALUE
Hardware	Sensor Type	Volts
Hardware	Wiring Type	Bridge
Hardware	Integration	integration time (e.g. 0.001 secs)
Constants	Vinit	Calibration voltage (e.g. 0.0V)
Constants	Ro	Resistance of Vout's load, in ohms (e.g. 5000)
Constants	Vout	Vout output voltage (e.g. 5V)
Hardware	Range	Voltage input Range (e.g. 5V)

Please see Application Note #75 (i.e. "www.instruNet.com#75") for a detailed example using voltage ratio. InstruNet Script File "Set up channels, digitize, spool ot disk.iBs" (search for this name on your hard disk) shows and example of how to set up voltage ratio sensors with instruNet World+ (iW+).