

### Introduction

To ensure proper and consistent operation, some sensors require the use of either a pull up or pull down resistor. These resistors can easily be added either at the DVC module itself, or locally at the sensors location. The DVC's Analog and Universal Inputs use a  $1M\Omega$  pull up to +5 volts with reference to Ground (SIG COM). This will source up to  $5\mu A$  to the sensor. For most digital switching sensors this will work fine and no external circuitry is required. The DVC's Digital Inputs are internally pulled down to Ground (SIG COM) with a  $32K\Omega$  resistor. For most switching sensors that require a pull up / pull down resistor, these inputs work fine without the addition of an external resistor. However, some sensors require a minimum amount of internal current to function properly. Be sure to read the sensor datasheet thoroughly and follow the manufacturer's recommendations.

To calculate the required pull up / pull down resistor, simply use ohms law,  $E = IR$ . Where  $E$  is the voltage used to power the sensor,  $I$  is the required or target current and  $R$  is the resistor. To solve for  $R$ , simply divide  $E$  into  $I$ ,  $R = \frac{E}{I}$ . Therefore a sensor requiring  $10\text{ mA}$  using a 24 Volt supply would require a  $2.4K\Omega$  pull up / pull down resistor.  $\frac{24}{0.01} = 2400$

#### NOTES:

- Rarely will the ideal calculated resistance be available; the closest standard approximation will work fine.
- A  $\frac{1}{2}$  Watt resistor should be fine in most circumstances, if you find it getting too warm, a 1 Watt resistor should work fine.

### Wiring Diagram

