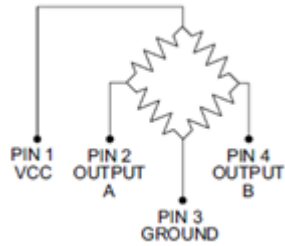# Tech 3821
Lab #5
Ver 0.91

Background:

The Honeywell 24PCDFB6G:
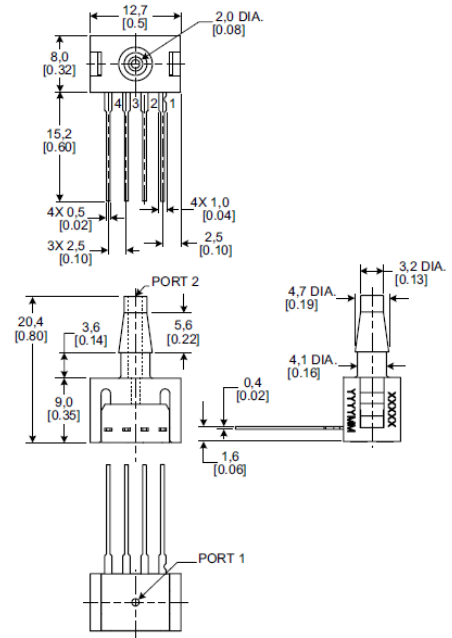

Output "A" increases as P2 pressure increases.
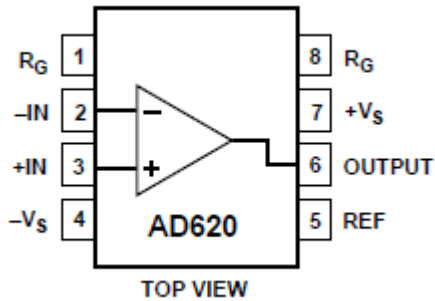
Output "B" deceases as P2 pressure increases.

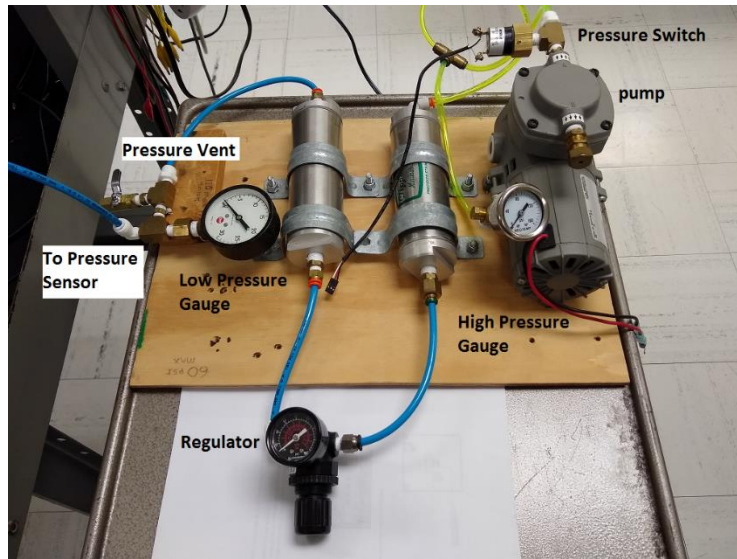| Symbol	Description
Vcc	supply
OUTPUT A	bridge positive output
GROUND	ground
OUTPUT B	bridge negative output

AD620 Instrumentation Amp:

TOP VIEW

To calculate required Gain Resistor (R$_G$)
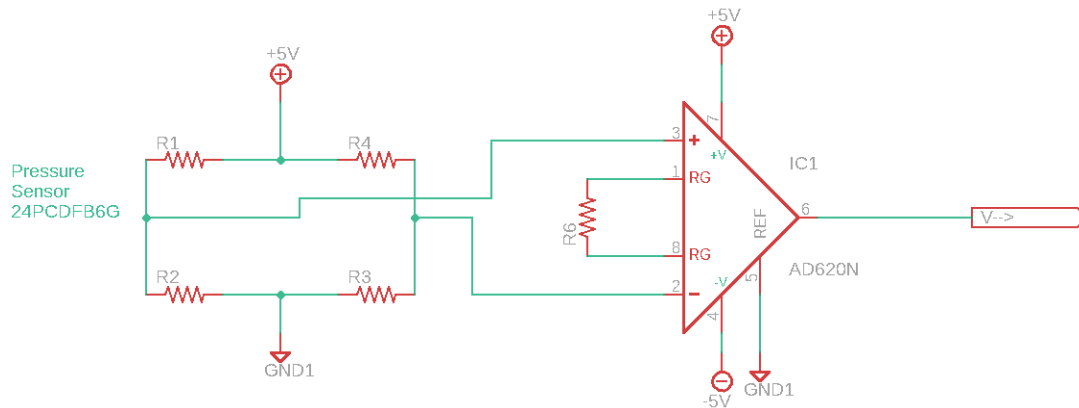
$$R_G = \frac{49.4k\Omega}{G-1}$$

Note: $R_G = \infty$ sets G = 1.

Note: Dual Supplies MUST BE used even though a negative voltage will NOT be produced by the pressure sensor.

Pneumatic System:

Electronic Circuit (Pressure Sensor / Instrumentation Amp Hookup):

Procedure:

Using a Honeywell 24PCDFB6G pressure sensor, an AD620 Instrumentation Amplifier and pneumatic setup supplied by the instructor, do the following:

1. Build a relay driver to turn on and off the compressor (see previous lab for circuit)

2. Build the circuit (above). Do NOT connect a resistor to pins 1 and 8 (this will give you a gain of 1 allowing you to collect the data needed to calculate the proper resistor)

3. Create a LabVIEW VI to run the compressor while both a control (user input) is on **AND** the pressure switch (Nason SM-2b-115R/443) is at it's NC position. Display the output signal (V) from the Instrumentation Amplifier and the status for the Nason Pressure Switch.

4. Pressurize the system and get the data needed to generate a calibration curve for the (0-30 psi) by pressurizing the high-pressure side of the system to >70psi and using the pressure regulator to adjust the low-pressure side from 30psi to 0 psi. (Please keep the low-pressure side of the system <32 psi or you might damage the low pressure gauge). Create an appropriate Excel spreadsheet (including appropriate graph).

5. Add the necessary calculation(s) to the Excel spreadsheet to calculate the gain (and R_G needed) convert the output from the instrumentation amplifier and Honeywell pressure sensor so that the circuit outputs a 0-5v signal for 0-30 psi. Add the appropriate resistor to the circuit before proceeding.

6. Repeat Step 4 to obtain the data needed to show Pressure instead of Voltage. Put this in the SAME excel spreadsheet, but on a 2nd sheet.

7. Adding a Control to represent the Pressure Set Point (SP), create a control that will maintain the pressure to the desired Setpoint (in PSI), by turning the compressor on or off (you will have to wire the compressor into the relay for the control). Your VI should also display the current Pressure Measured Value (MV) as well as a Waveform Chart (displaying both MV and SP in PSI). Please make it so the control loop runs every 500ms.
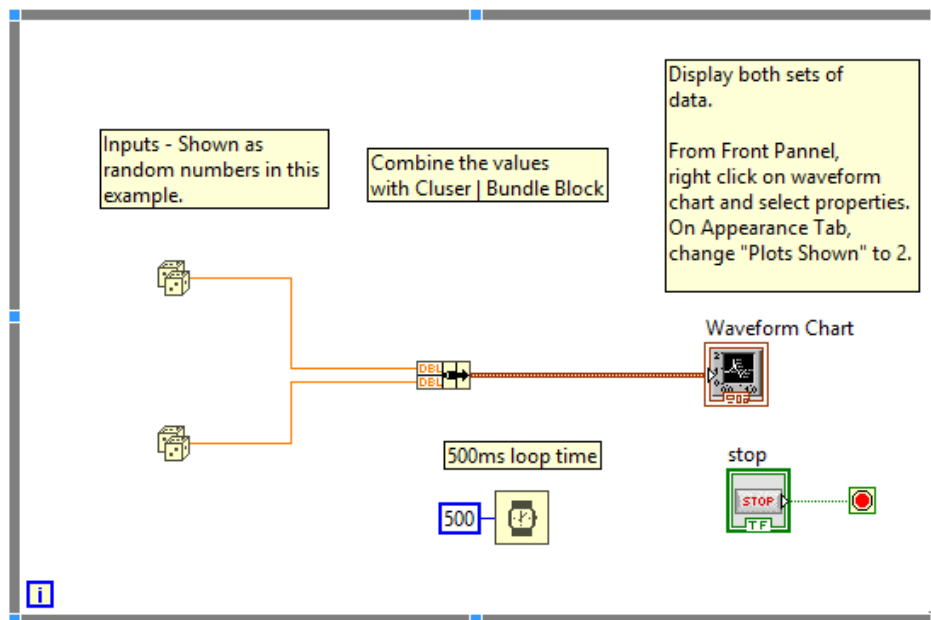

Figure 1- Example for Waveform Chart and Loop time

8. To test the control, (and with the system depressurized), remove the Air Regulator from between the two air tanks and replace with an air hose as shown below:

With Regulator In   With Regulator Out

9. Set the setpoint between 10-20 psi (and turn on the VI) and see if the control works (note you will probably see a saw tooth waveform, this is typical of this type of "Bang/Bang or ON/OFF" control)

Demonstrate the control to the instructor. Submit the Excel containing calibration and gain calculations, the VI and the VI documentation via online submission.