

Humidity Sensor Testing

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2022-10

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Relative humidity sensors will be used inside of the detector frame of the Neutral Particle Spectrometer (NPS). Four locations have been chosen, with two humidity sensors in each location. To this end, I have developed a LabVIEW program to test the Ohmic Industries SC-600 relative humidity sensors.

Twelve sensors have been tested using the LabVIEW program *check-RH-sensor.vi* I have developed. This program uses a Honeywell HIH-030/31 Series humidity sensor (previously used on the SVT project) as the control and the SC-600 as the test relative humidity. Both of these relative humidity sensors return a voltage which is read out using the Keysight mainframe. A four-wire RTD is also read out using the Keysight mainframe and this value is used to calculate the relative humidity. The same temperature value is used to calculate the relative humidity for both sensors.

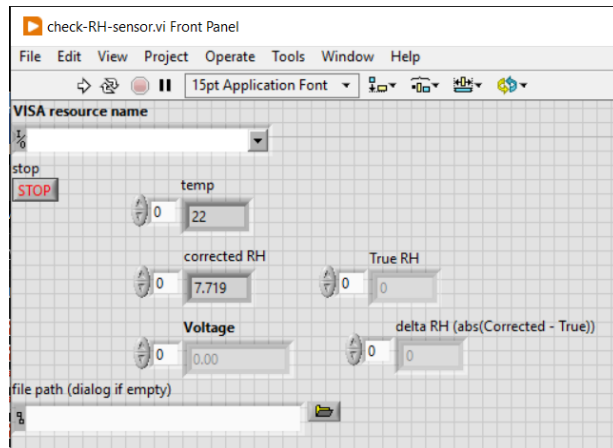


FIG.1. Screenshot of front panel of *check-rh-sensor.vi* LabVIEW test program

- **Testing relative humidity sensors to be used in NPS detector frame**
- **Used Honeywell relative humidity sensors from SVT as control**
- **Tested 12 humidity sensors – all within 3% of control**

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Conversion equations are applied to the readback voltages of both the control and test relative humidity sensors. These equations adjust the readback voltage to account for other than optimal temperature values. The humidity sensors are designed to operate at an optimal temperature of 25°C. If the temperature is anything other than 25°C, the conversion factor must be used.

Twelve sensors have been tested so far. The relative humidity and temperature was logged every 10 s and the values for both the control and test relative humidity as well as the temperature were saved to a .csv file.

A Python program, *RH-sensor-test-plot.py*, was developed to plot the results. This program reads in the .csv file into a data frame using the Pandas Python package. The both the control and test relative humidity is plotted along with the temperature. The accuracy of the SC-600 sensor is $\pm 3\%$. The accuracy of the Honeywell control sensor is $\pm 2\%$. For the purposes of this test, we are saying that as long as the test sensor relative humidity is with $\pm 5\%$ the sensor is good. All 12 sensors have passed the test.

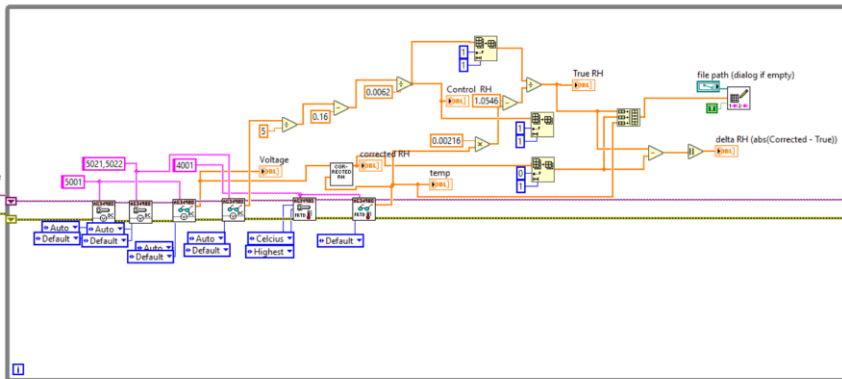
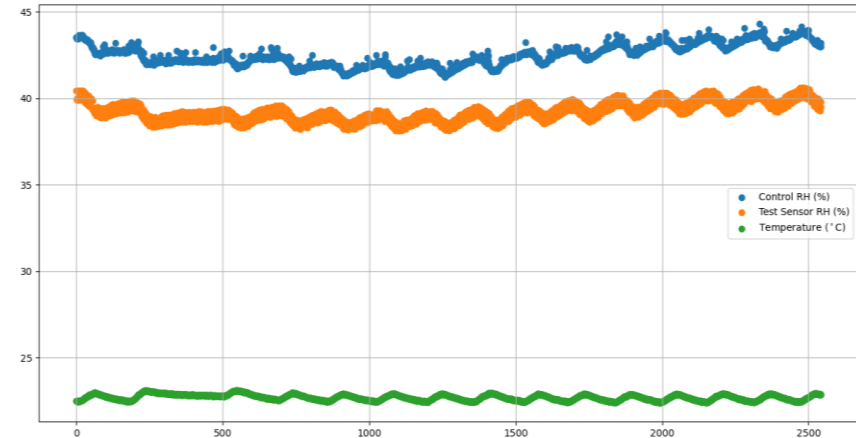


FIG.2. Block diagram of check-rh-sensor.vi LabVIEW program

FIG.3. Plot of the control and test relative humidity and the temperature