Configuring and Reading the Keysight Unit for the Neutral Particle Spectrometer Control and Monitor Software

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This note presents details of the part of the LabVIEW code written to control and monitor the Neutral Particle Spectrometer (NPS) that configures and reads the Agilent Keysight measurement unit.

LabVIEW code was written to control and monitor the front and back crystal zones, the electronics zone, the detector frame, and the Hall [1]. Figure 1 is a flowchart of the code to configure and read the Keysight unit that reads the temperature sensors.
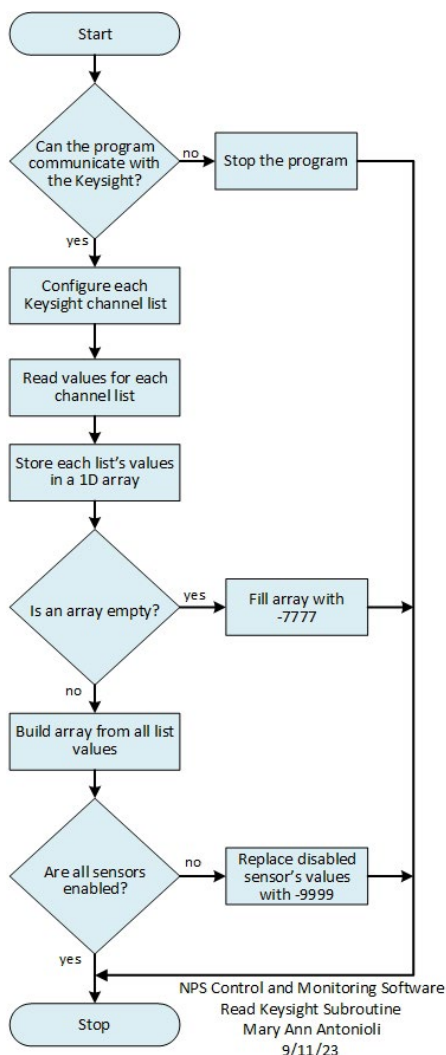

FIG. 1. Flowchart of the code to configure and read the Keysight unit.

To start, communication with the Keysight is checked. If there is no communication, the user stops the program and debugs the system.

Once communication is verified, each list of Keysight channels is configured according to sensor type, Table I. Thermocouples are configured as ⁰C, K-type, and internal reference junction, humidity sensors with auto range and default resolution, resistance temperature detector (RTD) sensors as ⁰C and highest resolution, and flow meters with auto range and default resolution.

Sensor type	Configuration
Thermocouples	⁰C, K-type, internal reference junction
Humidity	auto range, default resolution
RTD	⁰C, highest resolution
Flow meters	auto range, default resolution

TABLE I. Configuration of Keysight channels.

Temperatures are read for each channel list and the values are stored in a one-dimensional array, one array for each list. Each array is checked to ensure it is filled, and if an array is empty, it is filled with the placeholder number -7777. A single array is then built from all values.

All sensors are checked to verify if any sensor is disabled. If there are disabled sensors, the disabled sensors' values are replaced with -9999.

To conclude, a section of the overall LabVIEW code that controls and monitors the NPS configures the Keysight channels and reads the temperatures from the Keysight unit; this part of the code has been tested.

[1] M.A. Antonioli, et al., *Overview of Control and Monitoring Software for the Neutral Particle Spectrometer*, DSG-Note 2023-36, 2023.