

Temperature Gradient System (TemGraS)

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Requirements

- RTD of choice for PT-102 (samples in hand – both calibrated and non-calibrated)
- Currently readout using the Lakeshore temperature monitor
- Un-calibrated sensors affordable, while absolutely calibrated expensive.
- Solution – the mixture of two with mostly uncalibrated sensors and a few calibrated ones combined with cross-calibration.
- Each sensor requires 4 point measurement → four wires per sensor.

Feedthroughs

- Flange to be used: 9.6 for the first array (if we want the second array, 14.4 does not appear to be a good spot).
- The second array is desirable, BUT we need another flange assignment!
- TemGraS even for one column will take a large number of sensors 30-75 with 120-280 wires
- Feedthroughs planned: D-sub connectors with 50 pins. Connectors should not be a problem.

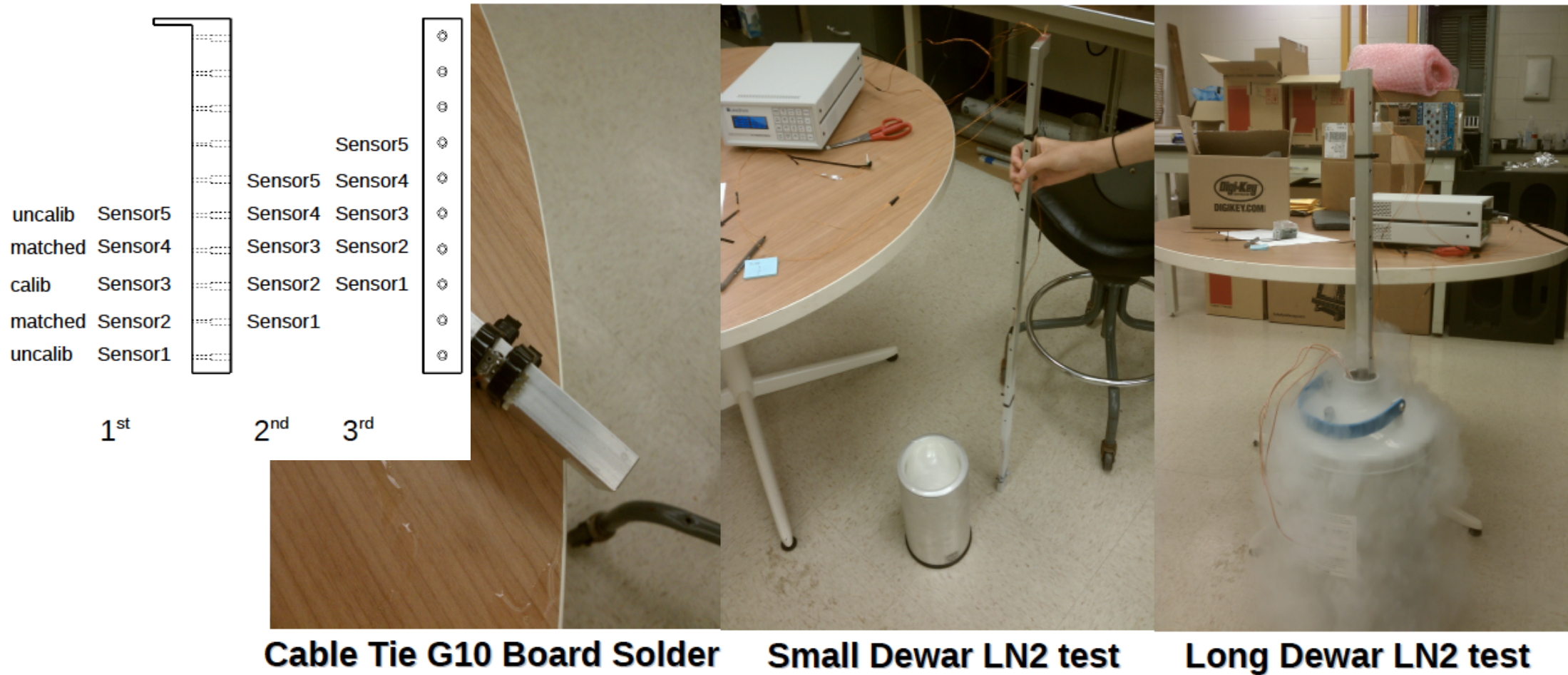
Where does the signal go from there?

- In the lab, we read the temperature directly from the temperature monitor. (Lakeshore temp. monitor)
- In case of calibrated sensors, calibration curve must be loaded in the monitor to achieve its precision.
- Understanding is that slow control takes over from here.
- Should we provide them with calibration curves for a subset of calibrated RTDs?

Signals continued

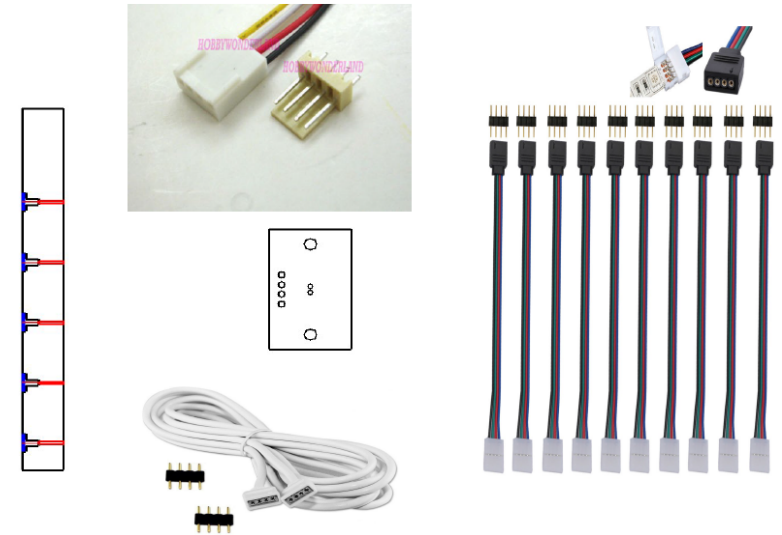
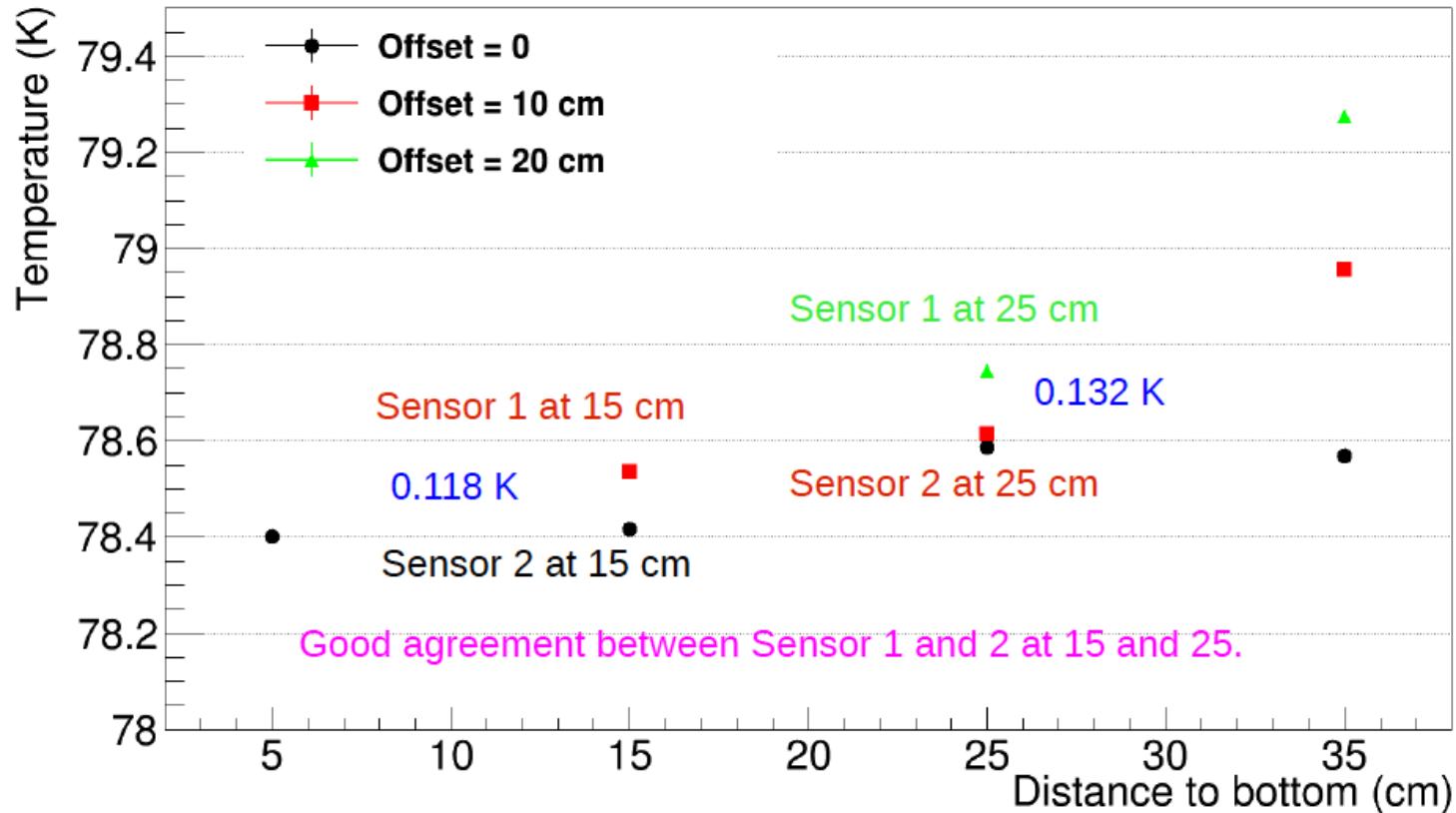
- We are not aware of the plan where to store DAQ monitoring data.
- Based on the measurements, temperature profile will be built with cross-calibration of all sensors.
- This data will be used to check for convection patterns as well as measure the electron drift life.

Cross-calibration test (method + test – Yujing Sun)



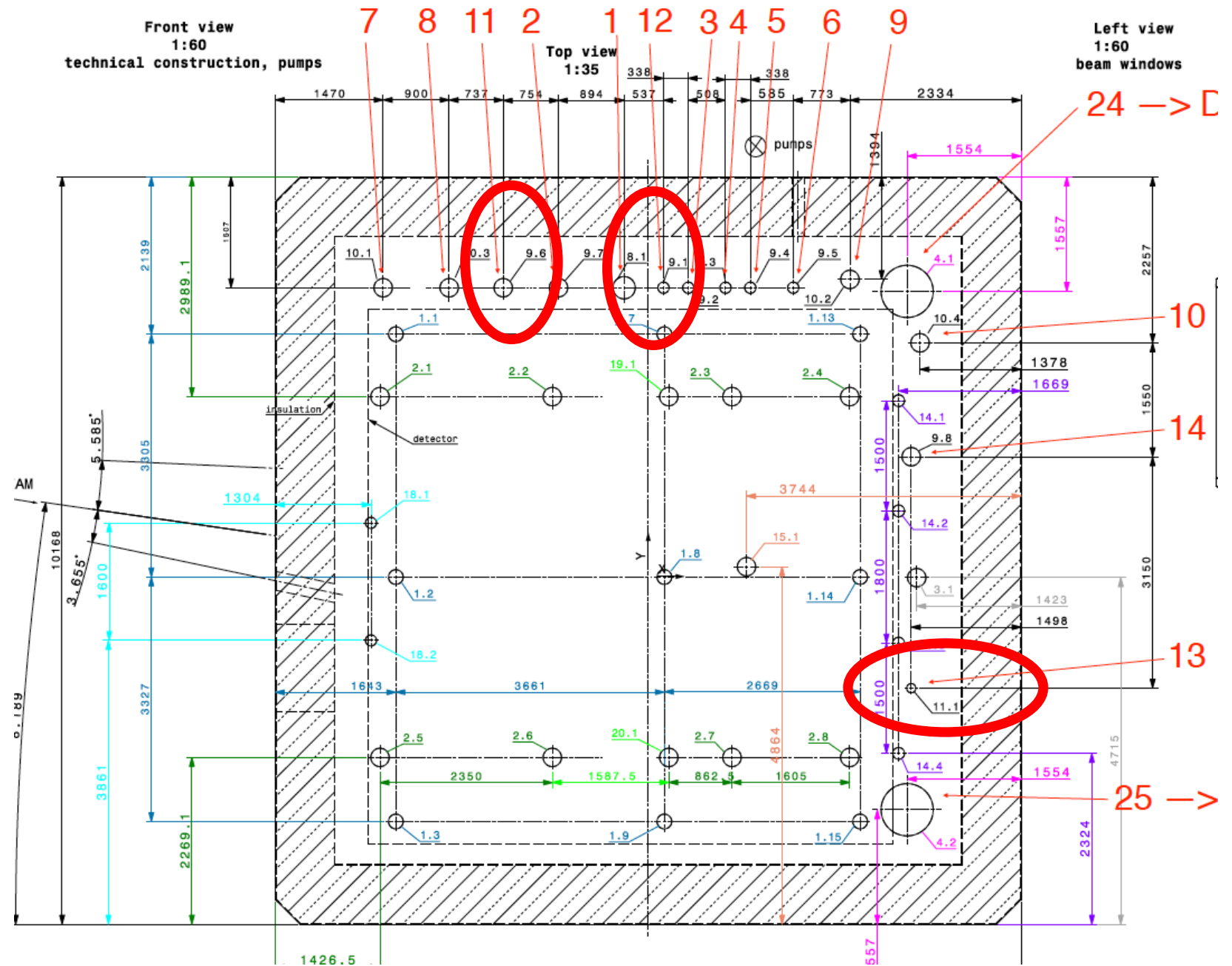
TemGras test measurement.

Sensor at 45 cm was at the neck which can be fully immersed but too close to the surface. As time went, Sensor at 35 cm was getting closer and closer to the surface which affect the precision.



Flanges

- Currently assigned a flange close to the cathode 11.1 – not viable
- Contacted David Montanari to change it and share the flange with L and P sensor flange (9.6. or 91.) → request still pending



Sensors

- Lakeshore Cryotronics produces high precision platinum RTD sensors (like in 35 ton)
- Temperature range: 14 K to 873 K (model dependant)
- High reproducibility: ± 5 mK at 77 K
- Low magnetic field dependence above 40 K
- Excellent for use in ionizing radiation
- [SoftCal™](#) calibration available (just at 2-3 temperatures)
- PT-102 and PT-103 are the same, except that PT-102 is larger but cheaper (chosen for now)

Ideally, all sensors should be calibrated (10 mK)

for accurate and precise temperature gradient measurement

Absolute calibration is very expensive (\$92 vs.

