

# Hall C NPS Phoebus Screens Testing

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## Hall C – NPS Phoebus Screens Testing

The NPS detector's crystal zone, electronics zone, frame and chillers will be monitor to make sure that thermal conditions are adequate during operations. A control system based on LabVIEW was developed to control and monitor all temperature, humidity and dew point sensors. A LabVIEW program after performing the readout, scaling and unit conversion for each sensor measurement, outputs each readout into a shared variable, which then are available to be monitored and controlled on EPICS CSS-Phoebus screens. Therefore, the testing of the developed Phoebus screens is critical to ensure the NPS detector operation under the desired thermal conditions.

There are a total of seventeen CSS-Phoebus screens developed to monitor and control the thermal conditions on the detector. The screens were divided mainly into two groups based on the usability of the screens, monitoring and control screens. There are six for the temperatures in the crystal zone ( back, front and cooling circuit zones), two screens for the temperatures in the electronic zone, two screen for the detector frame temperatures, two screens for the temperature, humidity and dew point sensors in the Hall environment, two screens for the chiller coolant thermal conditions, two screens to monitor and control chiller communications and settings, and finally, a menu screen to show navigate to all screens and display the overall status for each zone of the detector.

Prior to the test I set up a computer in Hall C Dev subnet with the necessary software such as CSS-Phoebus and LabVIEW, I performed a communication test between shared variables (running on the connected cRIO with the EPICS server for testing version) and process variables to ensure proper data transfer.

- Completed the testing of seventeen CSS-Phoebus screens
- Found issues that allowed to improve the monitoring and controls made by the LabVIEW program
- Generated documentation to allow debugging of issues found for each screen

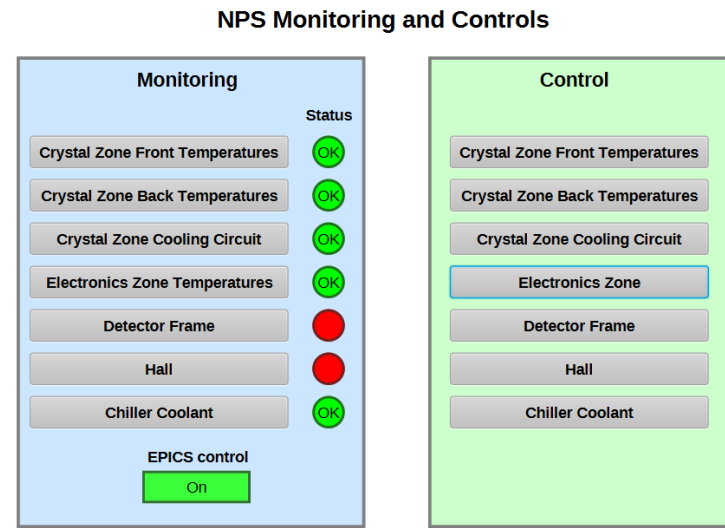


Fig.1. NPS Menu CSS-Phoebus screen

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For the test, I have studied and evaluated the LabVIEW program to understand the operation conditions and logic to ensure a proper test of the screens. I had the LabVIEW front panel indicators running in parallel during the test to make sure that the EPICS controls, precisely input values for limits matched with the values written in the LabVIEW shared variables, I performed the same operation for the indicators.

I generated a spreadsheet with details and comments of the incorrect behavior found during the test for each screen. The spreadsheet allowed to speed the debugging process and keep a record of the issues found.

It is important to mention that both versions of the developed screens were tested, the full version of the screens with more control and monitoring features and testing version that will be use during the NPS test prior to final installation and commissioning in Hall C.

I completed the test for all seventeen screens, I plan to re-test all the screen that were pointed with issues to ensure that all fixes were done properly.

Front Crystal Zone Temperature Sensor Monitoring [°C]											
Crystal	T	Avg	SD	Out of limit		Crystal	T	Avg	SD	Out of limit	
				high	low					high	low
0	10.26	10.26	0.000	●	●	540	20.57	20.57	0.000	●	●
5	21.78	21.78	0.000	●	●	550	15.54	15.54	0.000	●	●
10	22.09	22.09	0.000	●	●	560	19.58	19.58	0.000	●	●
15	19.64	19.64	0.000	●	●	570	18.10	18.10	0.000	●	●
20	18.07	18.07	0.000	●	●	684	21.62	21.62	0.000	●	●
25	10.38	10.38	0.000	●	●	689	11.86	11.86	0.000	●	●
30	15.04	15.04	0.000	●	●	694	19.27	19.27	0.000	●	●
35	22.10	22.10	0.000	●	●	699	18.04	18.04	0.000	●	●
180	13.41	13.41	0.000	●	●	704	11.24	11.24	0.000	●	●
185	22.96	22.96	0.000	●	●	709	16.29	16.29	0.000	●	●
190	17.64	17.64	0.000	●	●	714	14.17	14.17	0.000	●	●
195	14.83	14.83	0.000	●	●	719	15.08	15.08	0.000	●	●
200	13.66	13.66	0.000	●	●	864	14.90	14.90	0.000	●	●
205	14.97	14.97	0.000	●	●	869	18.21	18.21	0.000	●	●
210	12.56	12.56	0.000	●	●	874	22.42	22.42	0.000	●	●
215	14.29	14.29	0.000	●	●	879	12.15	12.15	0.000	●	●
360	12.74	12.74	0.000	●	●	884	15.55	15.55	0.000	●	●
365	13.83	13.83	0.000	●	●	889	11.65	11.65	0.000	●	●
370	19.12	19.12	0.000	●	●	894	18.92	18.92	0.000	●	●
375	15.76	15.76	0.000	●	●	899	16.00	16.00	0.000	●	●
380	15.61	15.61	0.000	●	●	1044	15.53	15.53	0.000	●	●
385	22.42	22.42	0.000	●	●	1049	22.27	22.27	0.000	●	●
390	19.92	19.92	0.000	●	●	1054	10.96	10.96	0.000	●	●
395	16.22	16.22	0.000	●	●	1059	11.07	11.07	0.000	●	●
509	15.96	15.96	0.000	●	●	1064	18.12	18.12	0.000	●	●
519	16.30	16.30	0.000	●	●	1069	18.98	18.98	0.000	●	●
529	22.53	22.53	0.000	●	●	1074	21.95	21.95	0.000	●	●
539	13.70	13.70	0.000	●	●	1079	13.95	13.95	0.000	●	●

Fig.1. NPS Crystal Zone Temperature Sensor Monitoring CSS-Phoebus screen