Temperature and Humidity Monitor for CMS Tracker Electronics

Testing

Peter Carney

Dr. Alessandro Di Mattia

[Logos for INFN and CERN]
CMS Tracker System

Front End Hybrid Electronics

- Used to gather and deliver binary data from silicon sensor
- Phase-2 upgrade desires less bulk electronics
Testing of the Hybrids

- Tests of the Hybrid Electronics must be done in Climatic Chamber
- Testing done at 25 °C and -40 °C
- Temperature, dew point, and relative humidity monitor needed to conduct testing.
Why is the monitoring needed?

- Condensation ruins electronics → can cause a short circuit
- Climatic Chamber relative humidity sensor broken → We supply another

- Two Monitoring Systems used:
  - Built in chamber sensors
  - Strip sensors placed inside chamber
Set up in chamber
Getting Buckets

Temperature / Humidity Sensor

influxdb

Grafana

Climatic Chamber Data

- Temperature: 22.20 °C
- Rel. Humidity: 8.10 %
- DewPoint: -13.59 °C
- Current time: 08:07 14:46
Creating Temperature Monitor pt. 1

Climatic Chamber Conditions

![Graph showing temperature and humidity changes over time.](image-url)
Creating Temperature Monitor pt. 2

Climatic Chamber Data (on teledaq002)

- Temperature: 22.20 °C
- Rel. Humidity: 7.80 %
- DewPoint: -13.93 °C

Current time: 08-07 14:47
Accomplished

What’s Next

- Run through cold cycle with monitoring system
- Debug minor issues with sensors
- Create some sort of warning system upon threshold crossing
- Add barometric sensors
- Actual Hybrid test starts beginning of 2024!
Sources

A High Throughput Production Scale Front-End Hybrid Test System for the CMS Phase-2 Tracker Upgrade.
Mark Istvan Kovacs, Georges Blanchot, et. al.
https://www.researchgate.net/publication/340832281_A_High_Throughput_Production_Scale_Front-End_Hybrid_Test_System_for_the_CMS_Phase-2_Tracker_Upgrade

Application Note: Dewpoint Calculation
Sensirion: The Sensor Company.

Flexible front-end hybrids for the CMS outer tracker upgrade
M. Kovacs1, G. Blanchot1, A. Honma1, A. Kokabi2 and M. Raymond3
https://iopscience.iop.org/article/10.1088/1748-0221/10/01/C01046

InfluxDB Documentation.
https://docs.influxdata.com

Power, Readout and Service Hybrids for the CMS Phase-2 Upgrade

Thank you / Merci