# Software developments for detectors' experimental hardware

NICA Days'19, 23.10.2019
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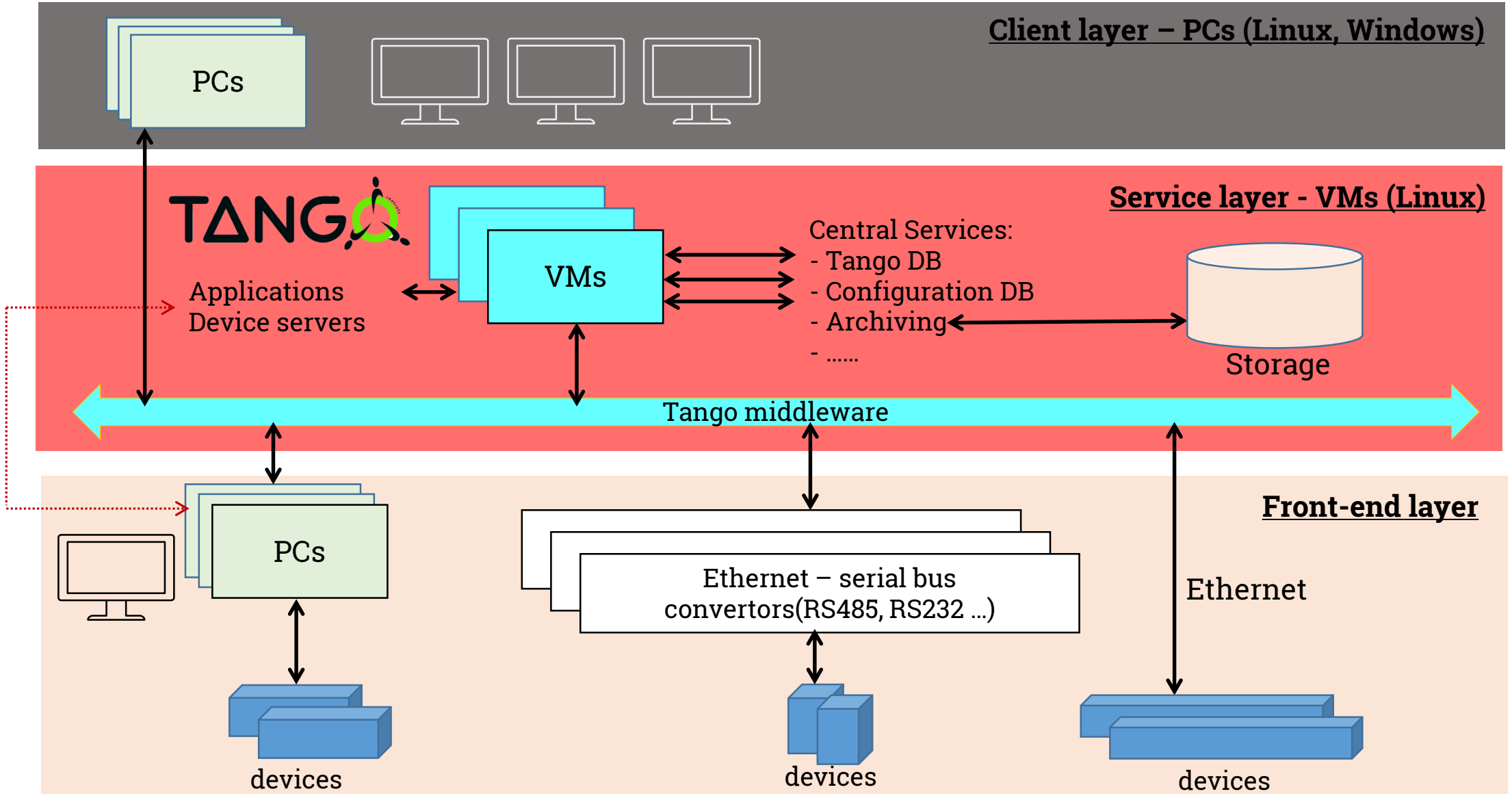
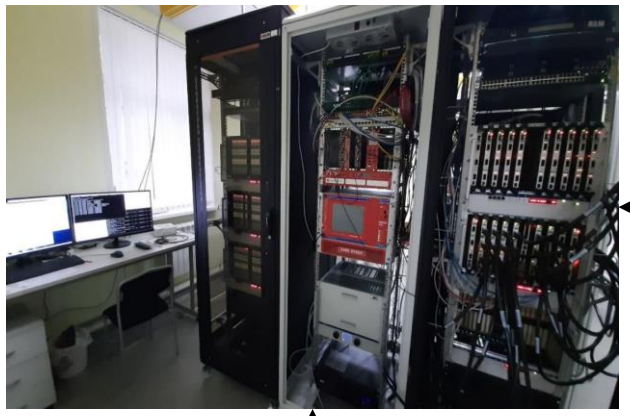
# Tango-based device control system



# Workflow


Monitoring and control applications

# Workflow



Detectors' group applications

Monitoring and control applications

# Workflow

Detectors' group applications

Monitoring applications

# Workflow

**No direct access to devices**

**No data quality check**

Detectors' group applications

**Application status unknown**

Monitoring applications

# Workflow

Hardware or software multiplexer

Detectors' group applications

TANGO controls

Monitoring applications

# Workflow

Hardware or software multiplexer

Config DB

Read values

Control commands and data

Detectors' group applications

Monitoring applications

# Case 1: Trust, but verify


LabVIEW

TANGO controls

# Case 1: Trust, but verify


LabVIEW

What data received from device?

What data comes to us?

TANGO

Archiving DB

???

# Case 2: CERN Experience


LabVIEW

TANGO

CAEN
OPC Server

# Case 2: CERN Experience


LabVIEW

TANGO controls

CAEN
OPC Server

Dedicated Windows VM

OPC service

No reliable open-source up-to-date OPC packages

Licensing?

# Case 3: Manufacturer libraries


LabVIEW

CAEN HV Wrapper

CAEN OPC Server

TANGO controls

# Case 3: Manufacturer libraries


LabVIEW

CAEN HV Wrapper

TANGO controls

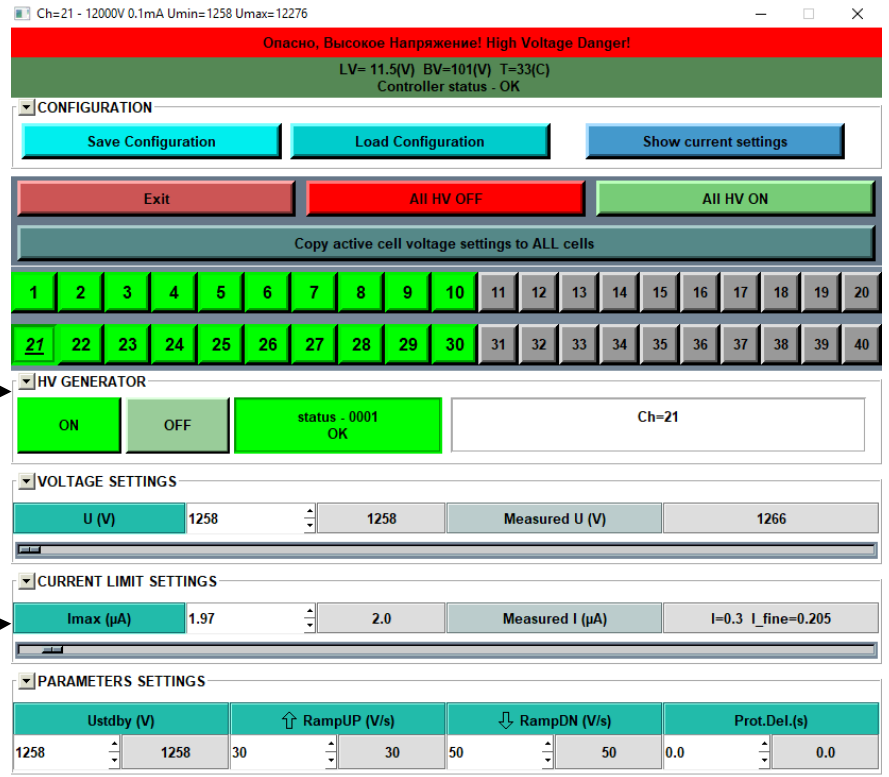
CAEN OPC Server

C/C++

No Python ☹

# HVSys-base power supply systems


HVSys controller



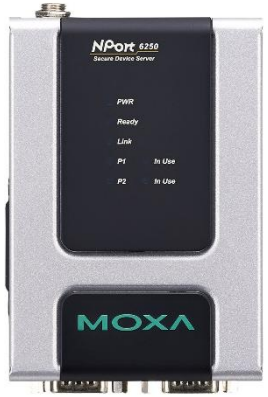

HVSys standalone application

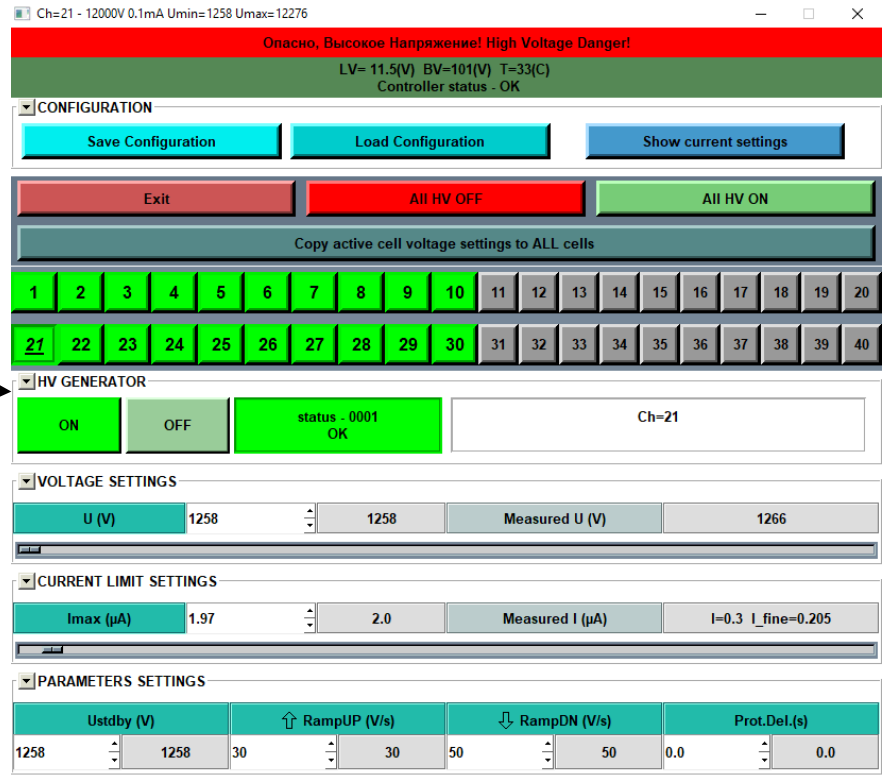
TANGO controls

# HVSys-base power supply systems


HVSys controller

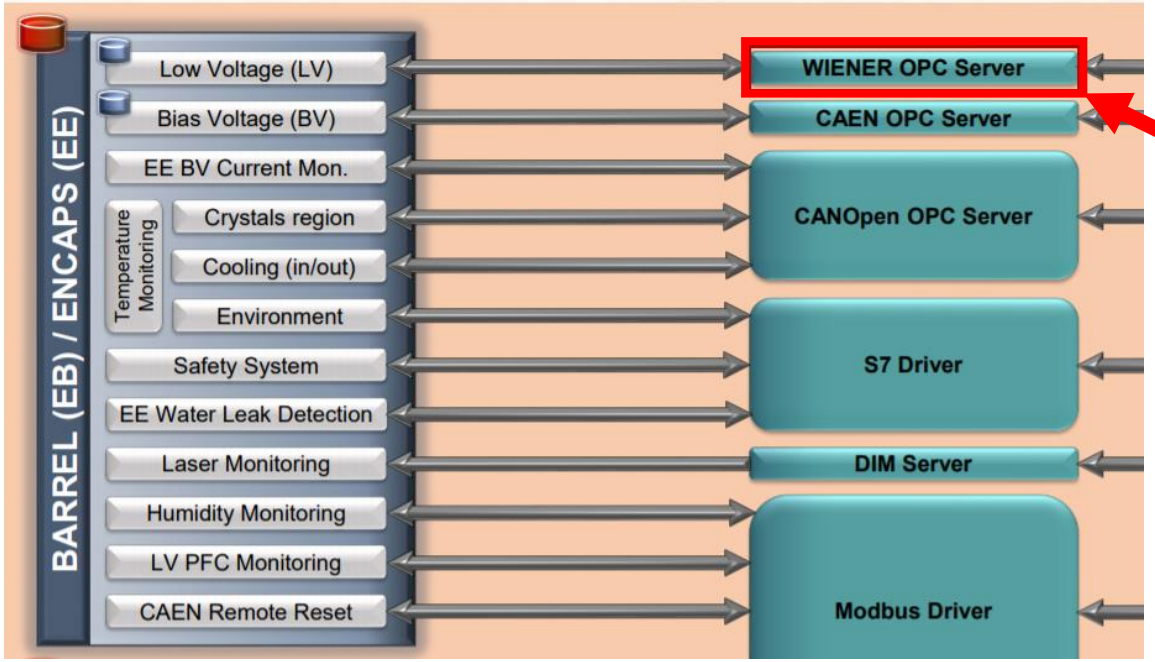
Command by command operation:
store all the commands in the buffer and then send them to serial ports in FIFO (first-in, first-out) order.




HVSys standalone application

# Wiener HV and LV systems




The CMS ECAL Control and Safety Systems Upgrades During the CERN LHC Long Shutdown 2, *ICALEPCS'19, WEPHA041*

**SNMP**

Simple Network Management Protocol

# TOF FEE control and monitoring

GUI application that allows to monitor FEE parameters and temperature and set DAC values. Uses Socket protocol.


⇩ X 20

python

box1 box2

| | V+, mV | V-, mV | Vdelta, mV | Vpower, mV | DAC, mV | Tboard, °C | Tgas, °C |
|---|---|---|---|---|---|---|---|
| 1 | 1946 | 1741 | 1624 | 3248 | 2775 | 45 | 44 |
| 2 | 1693 | 1637 | 1544 | 3287 | 0 | 41 | 36 |
| 3 | 1687 | 1737 | 1735 | 3293 | 0 | 43 | 43 |
| 4 | 1940 | 1649 | 1627 | 3220 | 0 | 48 | 46 |
| 5 | 1914 | 1588 | 1615 | 3265 | 0 | 46 | 38 |
| 6 | 1993 | 1985 | 1741 | 3235 | 0 | 50 | 44 |
| 7 | 1754 | 1906 | 1731 | 3204 | 0 | 40 | 47 |
| 8 | 1777 | 1836 | 1860 | 3272 | 0 | 38 | 48 |
| 9 | 1915 | 1909 | 1655 | 3222 | 0 | 37 | 37 |
| 10 | 1864 | 1969 | 1703 | 3295 | 0 | 46 | 49 |
| 11 | 1855 | 1578 | 1841 | 3268 | 0 | 50 | 46 |
| 12 | 1610 | 1751 | 1908 | 3206 | 0 | 49 | 49 |
| 13 | 1976 | 1686 | 1611 | 3286 | 0 | 39 | 48 |
| 14 | 1693 | 1898 | 1787 | 3250 | 0 | 44 | 47 |
| 15 | 1788 | 1847 | 1517 | 3252 | 0 | 49 | 44 |
| 16 | 1503 | 1645 | 1761 | 3207 | 0 | 46 | 36 |
| 17 | 1711 | 1785 | 1990 | 3268 | 0 | 42 | 35 |
| 18 | 1746 | 1559 | 1676 | 3256 | 0 | 38 | 47 |
| 19 | 1788 | 1579 | 1829 | 3256 | 0 | 40 | 36 |
| 20 | 1514 | 1566 | 1641 | 3296 | 0 | 49 | 46 |

# DAQ VME crates monitoring and control

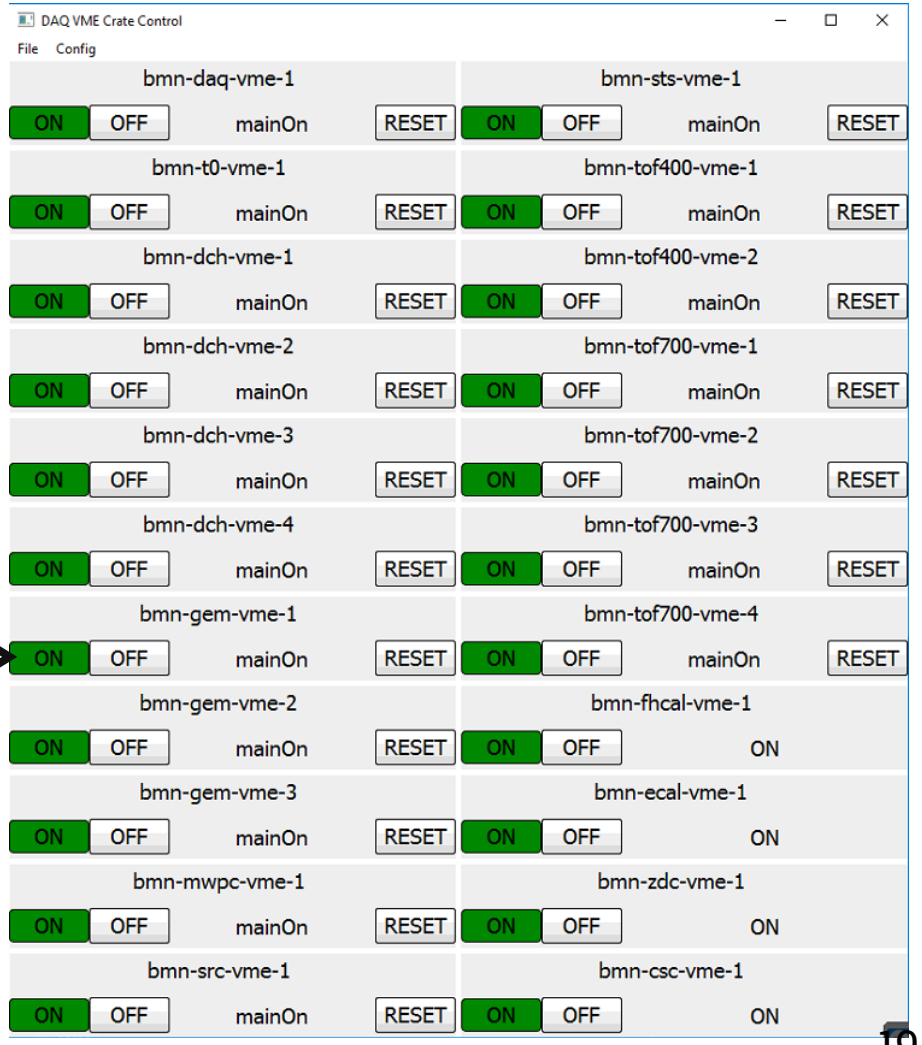
Monitoring and control for Wiener and ELMA VME crates

- Multidevice support;
- Displays state and status for every crate;
- On/off/reset buttons for crates.

...

SNMP

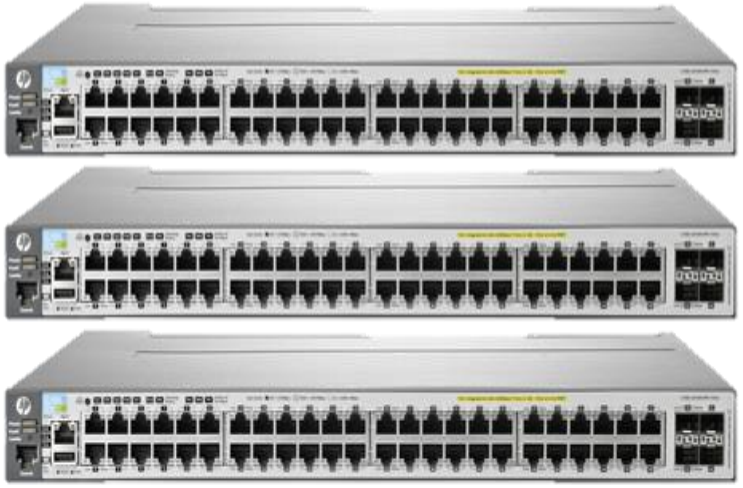
Simple Network Management Protocol



# Network switch monitoring and control

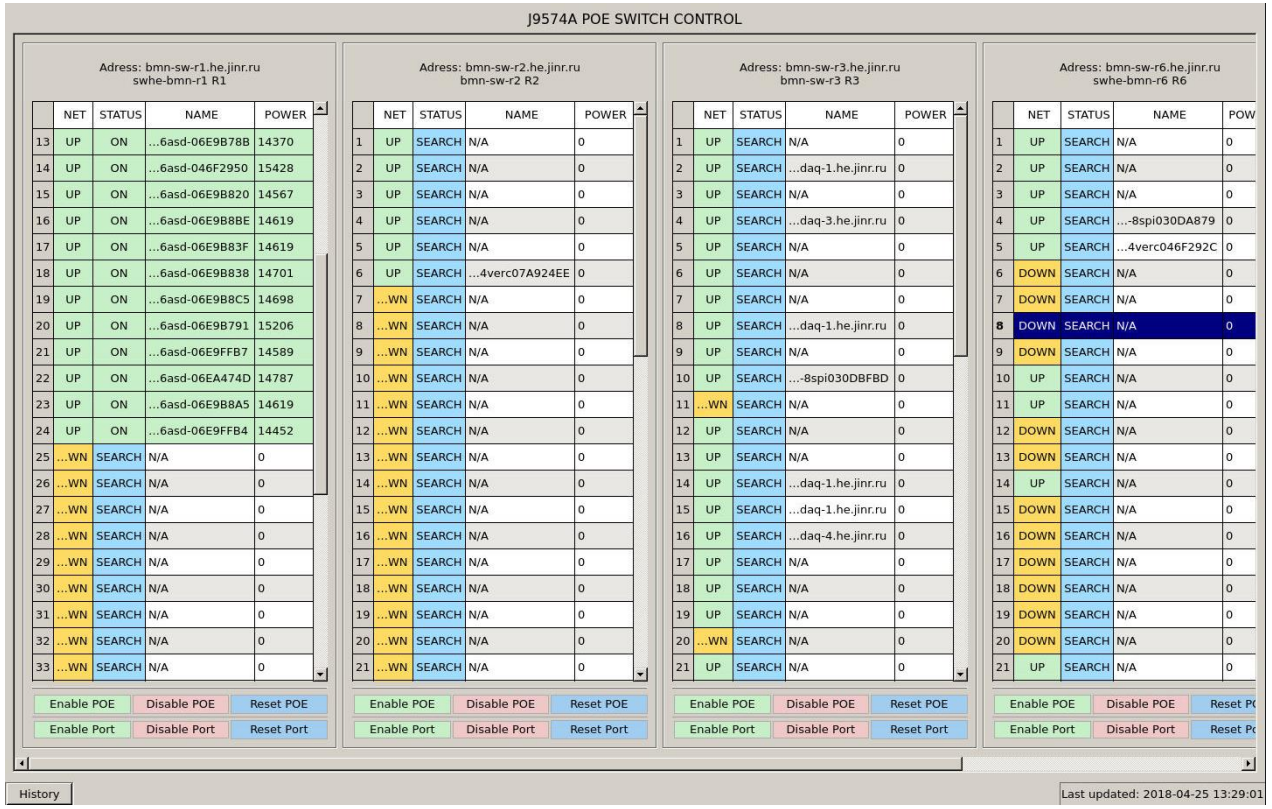
Application for HP Aruba switches control. Uses SNMP protocol.

- Multidevice support;
- Power consumption and status for every connected device;
- Allows to switch on/off network and/or power for every port.

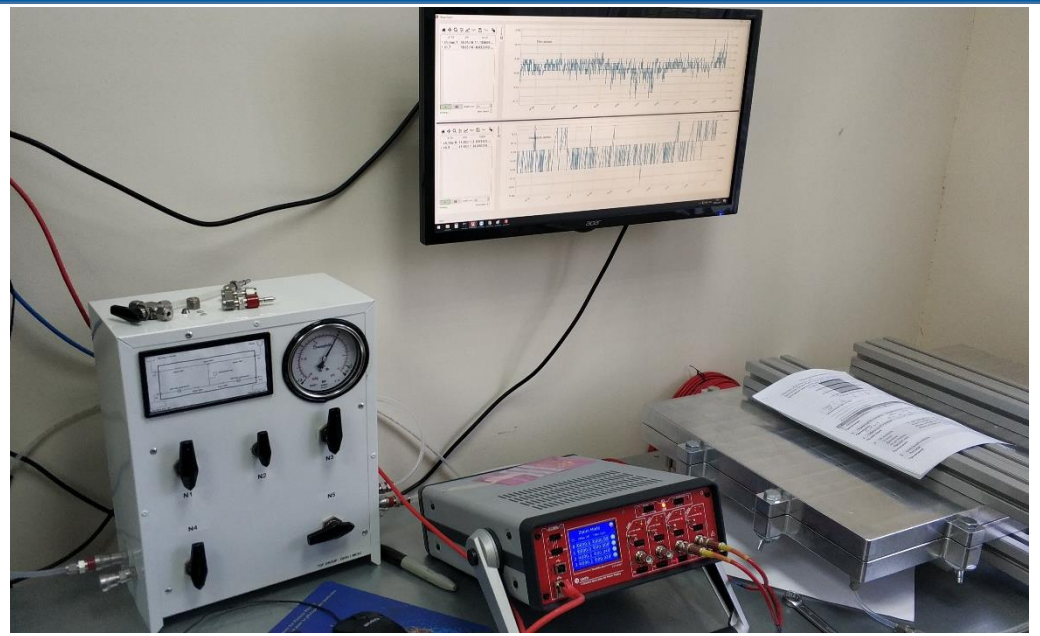


SNMP

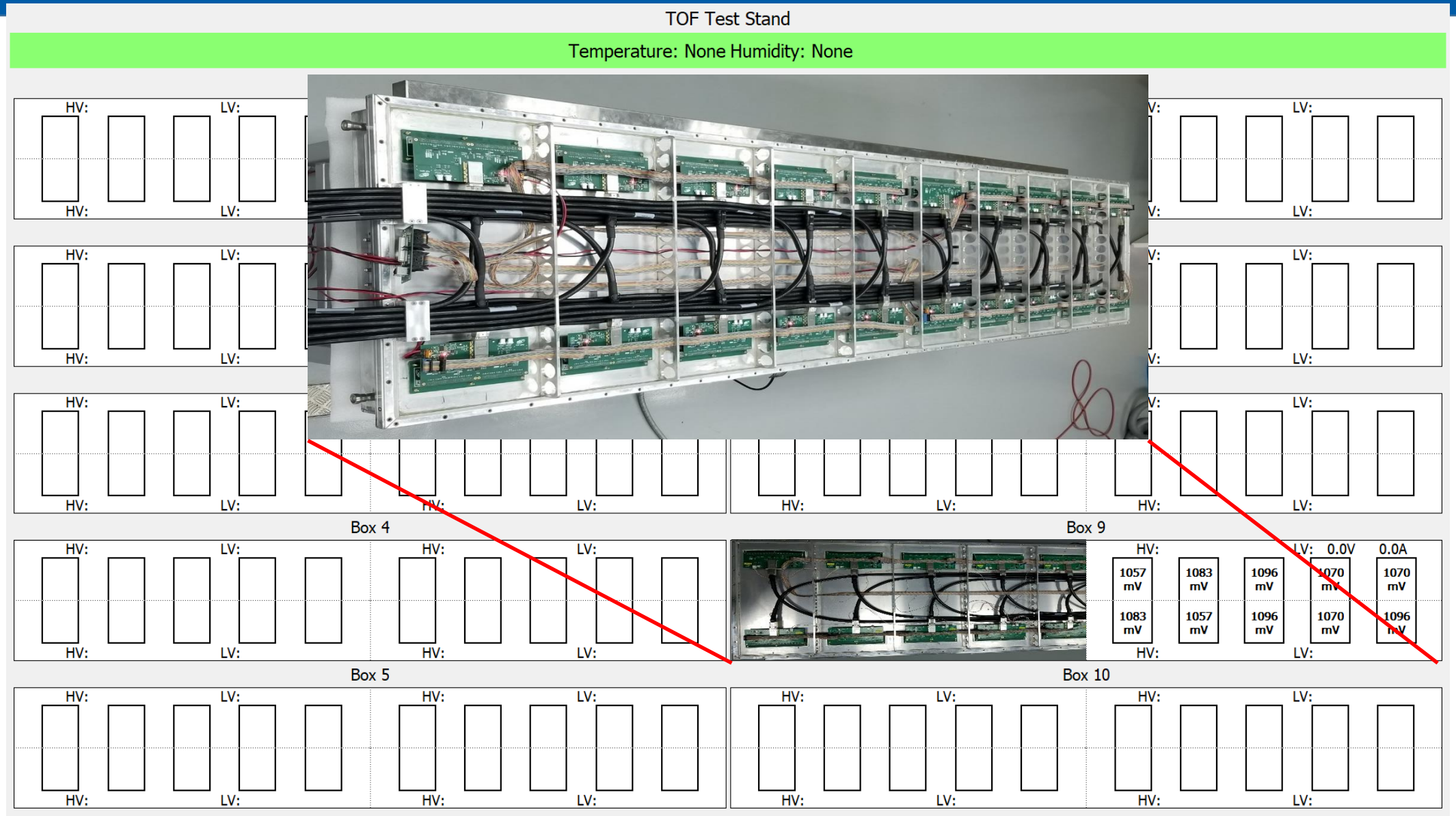
Simple Network Management Protocol



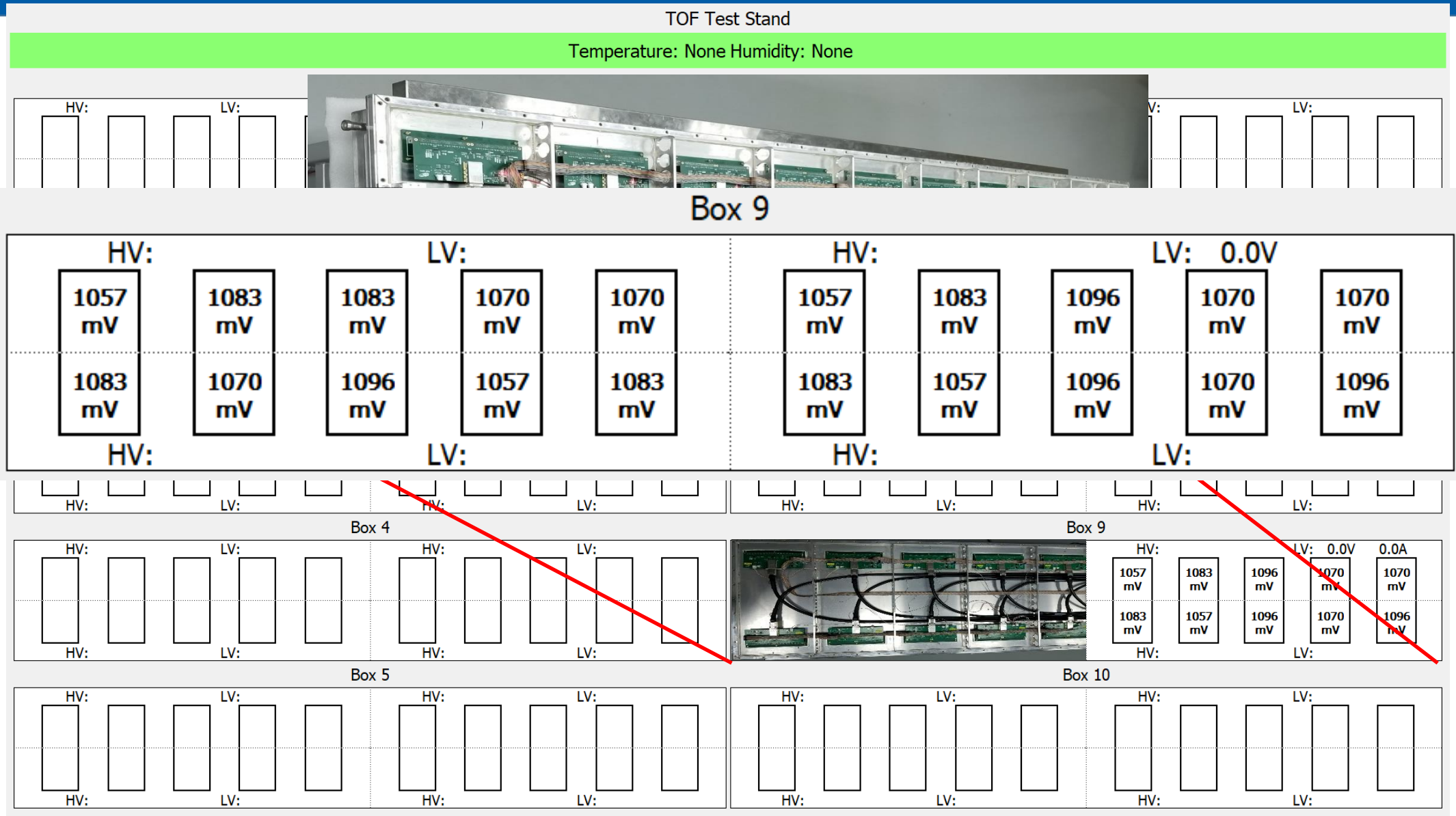
# MPD TOF assembling and test site



# MPD TOF test stand

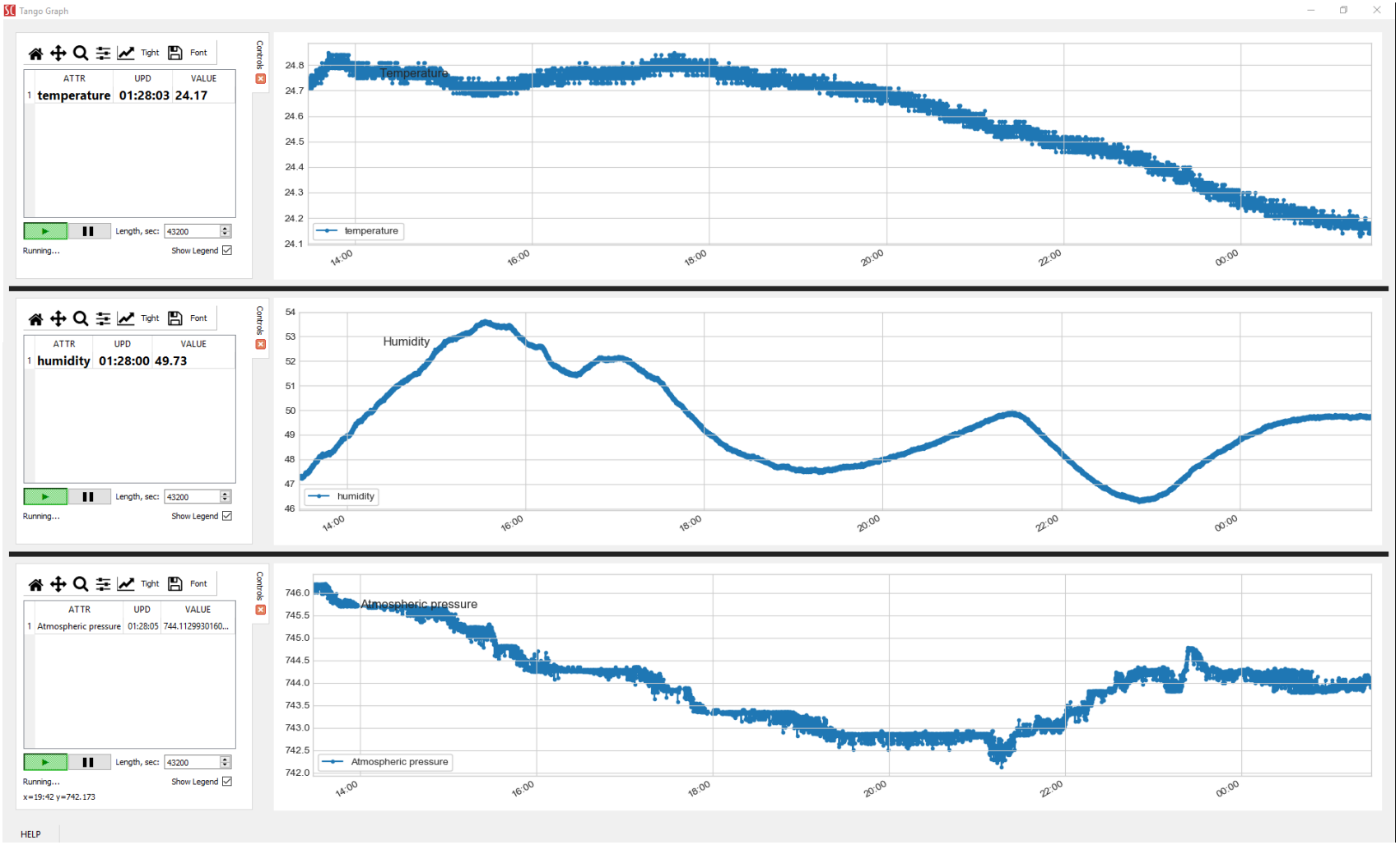


# MPD TOF test stand



# MPD TOF bld. 42 environment monitoring


The module PIR-230-E contain a temperature and humidity sensor for measuring indoor temperature and humidity

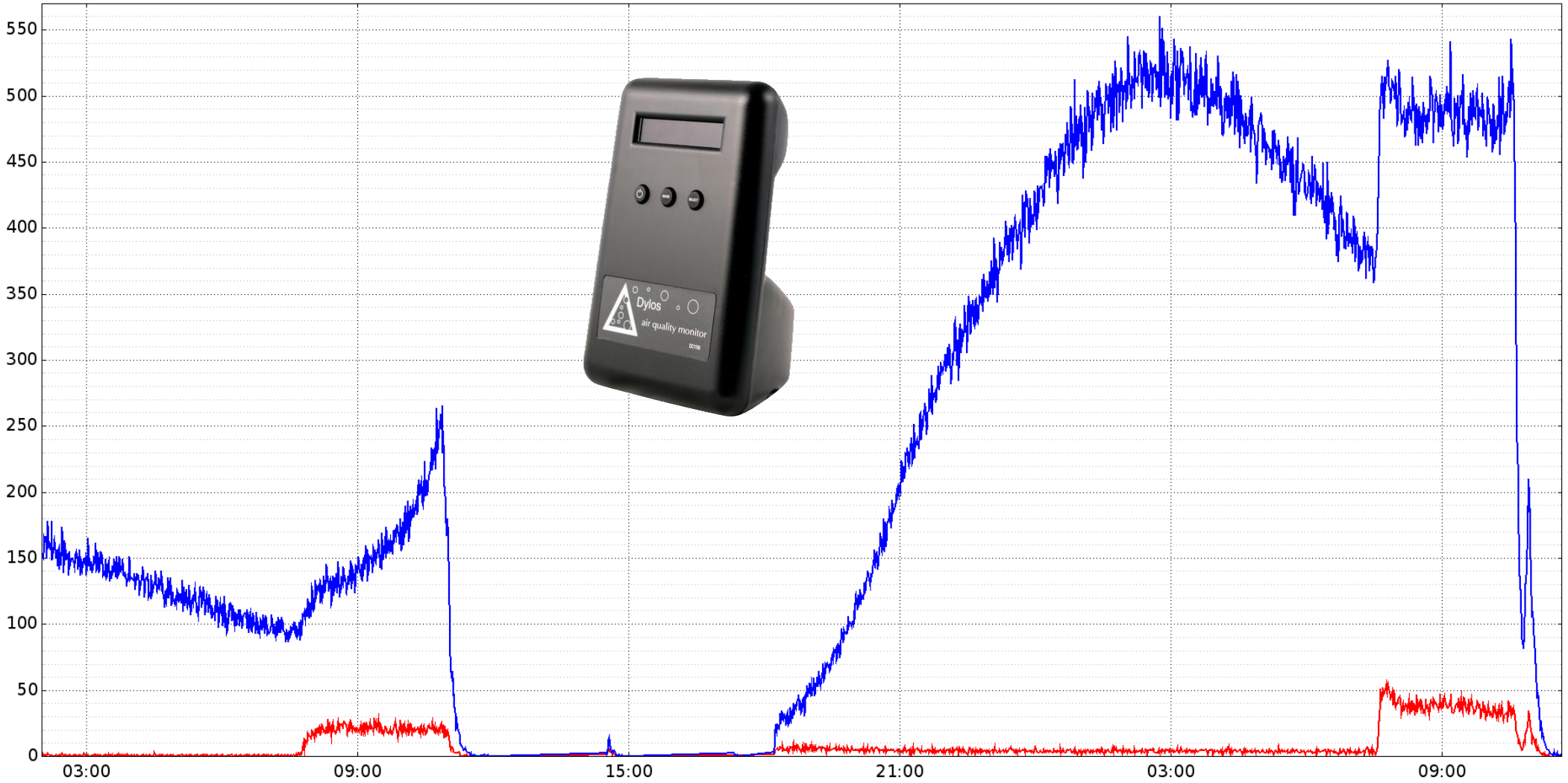



Temperature, humidity and atmospheric pressure plots
12 hours, TOF detectors assembling area

Honeywell Heavy Duty Pressure Transducer 15 psi range, 0.25% accuracy

# Clean room air quality monitoring

MPD TOF assembling and testing stand requires clean room environment.
We use Dylos DC1100 Pro Air Quality Monitor to control number of dust particles.



# THANKS

# FOR YOUR ATTENTION