

DE LA RECHERCHE À L'INDUSTRIE

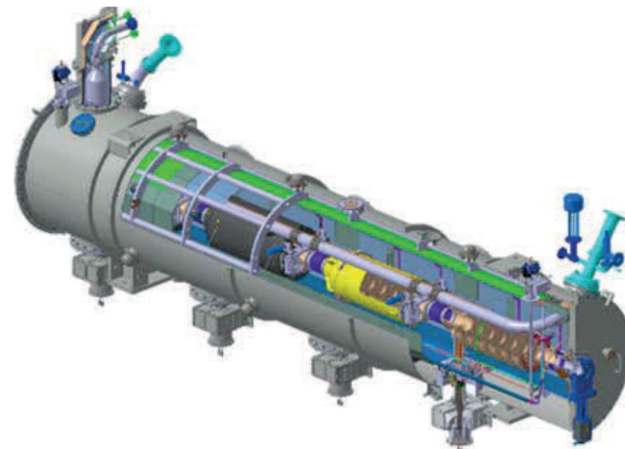


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www.cea.fr

THE CONTROL SYSTEM OF THE ELLIPTICAL CAVITY AND CRYOMODULE TEST STAND DEMONSTRATOR FOR ESS



ICALEPCS October 10th 2019



ESS (European Spallation Source):

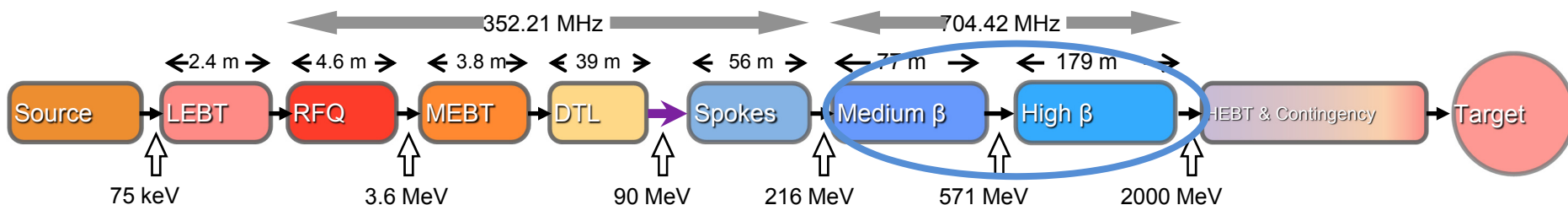
- European collaboration

The European Spallation Source (ESS) is a European Research Infrastructure Consortium (ERIC), a multi-disciplinary research facility based on the world's most powerful neutron source



CEA IRFU Involved in the control system of the following systems :

- Source and LEBT
- RFQ (couplers conditioning, cooling system, vacuum)
- Diagnostics nBLM (MOMPL008)
- Elliptical cavities and cryomodule



Cryogenic

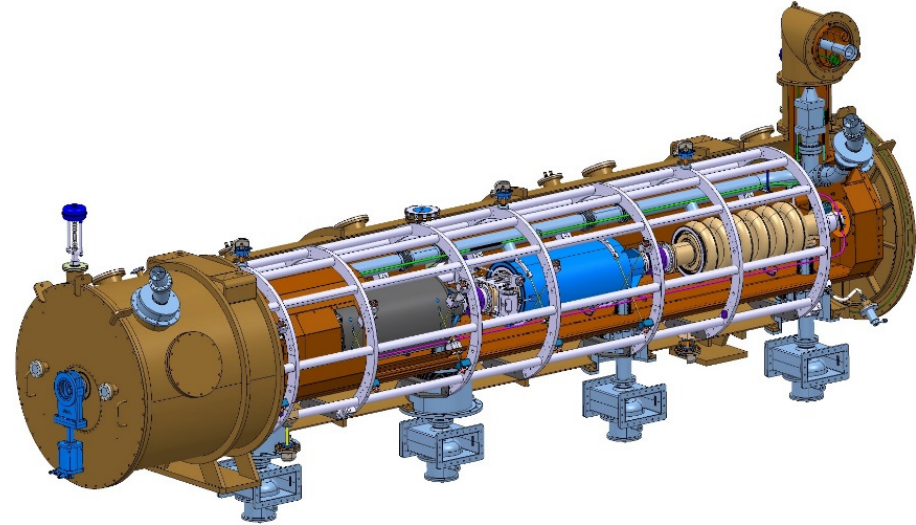
- Automatic sequences for cooling down
- Nitrogen and helium tanks management

Vacuum

- Isolation and beam vacuum control

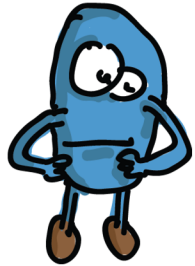
Cavities tuning

- Controlling Phytron motors for slow motion
- ETS200S technology
- Controlling Piezoelectric motor for fast motion
- Automatic sequences for cavities characterization



Warm and cold conditioning

- RF signal measurement
- PM / PUE- measurement
- Automatic sequences for coupler conditioning



SIEMENS

PLC

EPICS

The EPICS logo features the word "EPICS" in a bold, dark blue, sans-serif font. Below it is a graphic element consisting of three vertical bars of varying heights, also in dark blue.

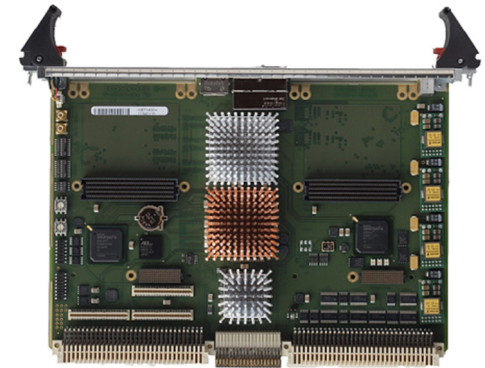
Fast Acquisition

loxos IFC1210 VME Card

- CPU
- VME 64x
- 2 mezzanine card slots
- Realtime Linux

loxos ADC3111

- Mezzanine card
- Up to 250MSamples/s
- 8 channels
- +/- 0,5V



Remote I/O

Beckoff EtherCAT Modules

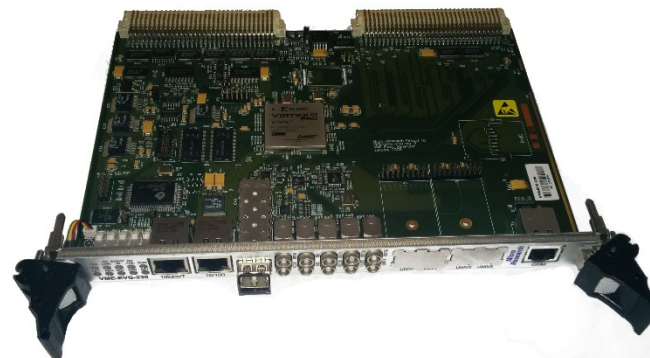
- Wide variety (0-10V, 4-20mA, PT100 ...)



Timing system

MRF EVG/EVR 230

- Optical fiber
- EPICS driver



Siemens PLC 1500 generation

- Made for control automatic process
- Fieldbus ready: Profinet, Profibus, TCP-IP, Modbus
- Wide variety (0-10V, 4-20mA, PT100 ...)
- EPICS drivers : S7PLC (Rd) / Modbus (Wr)



Laboratory standards

- Standard hardware and software solutions
- Standard code writing rules
- Standard naming convention
- Quality process

PID	Channels fail	EPICS
PT100	Flow meter	Vacuum gauges
Analog valve	Motor control	Pumps control

Cryogenic

- Automatic sequences for cooling down
- Nitrogen and helium tanks management

Vacuum

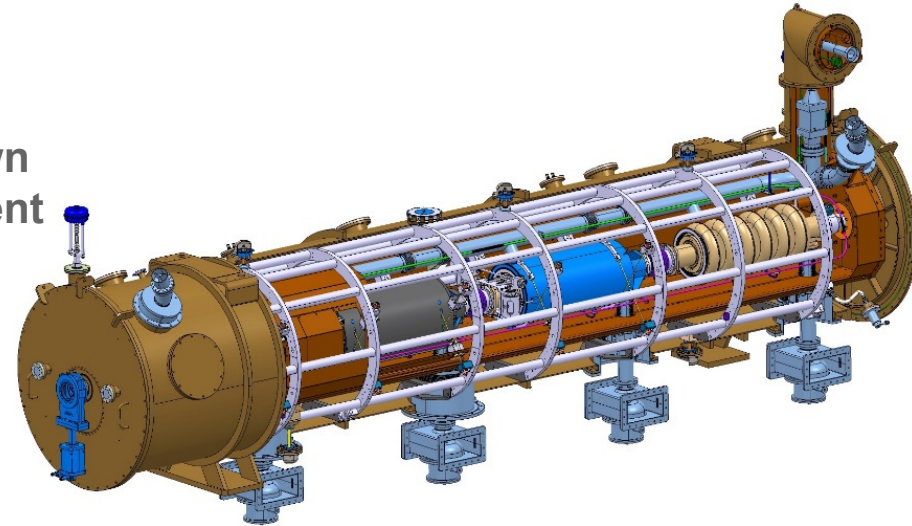
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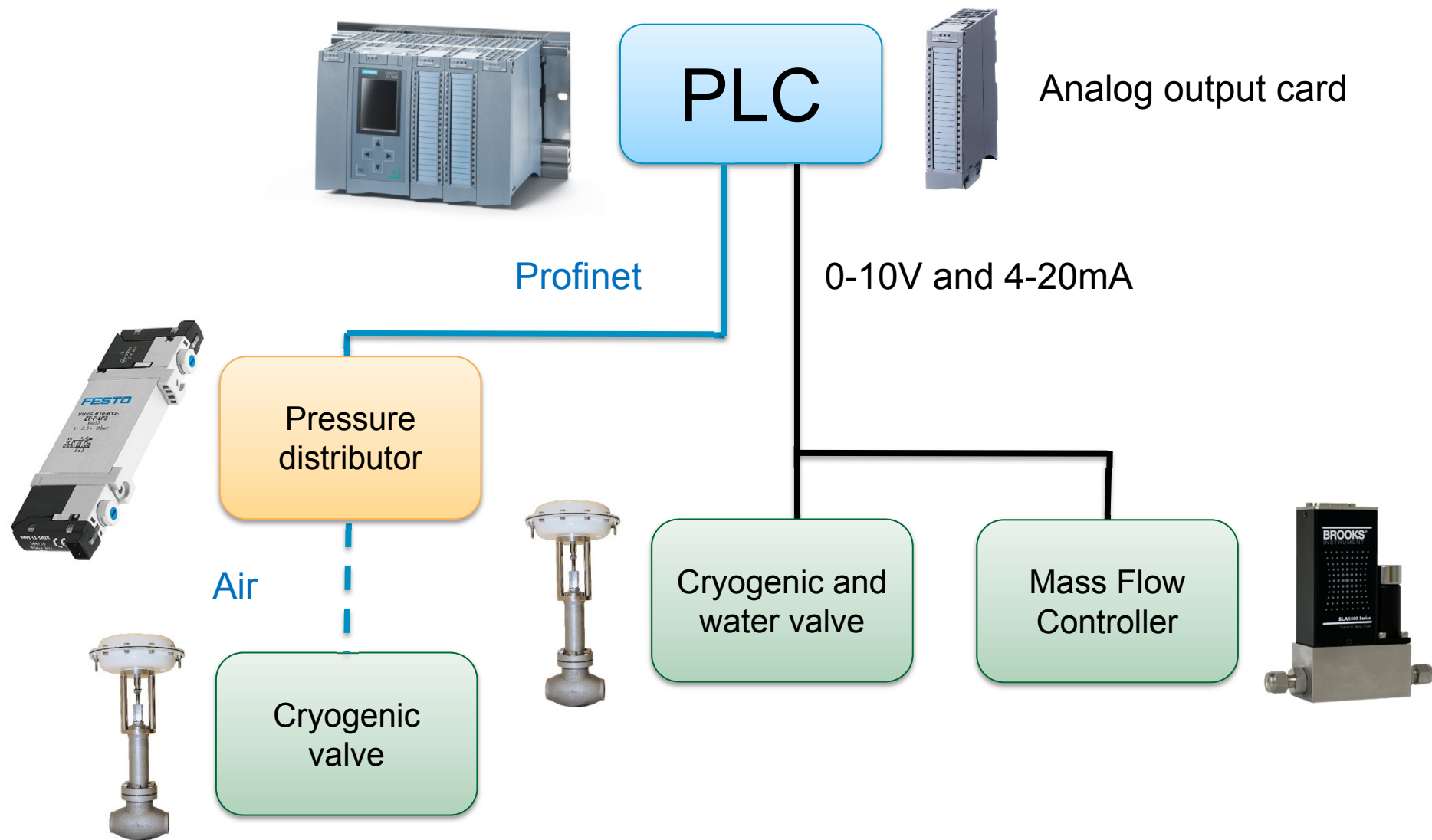
Cavities tuning

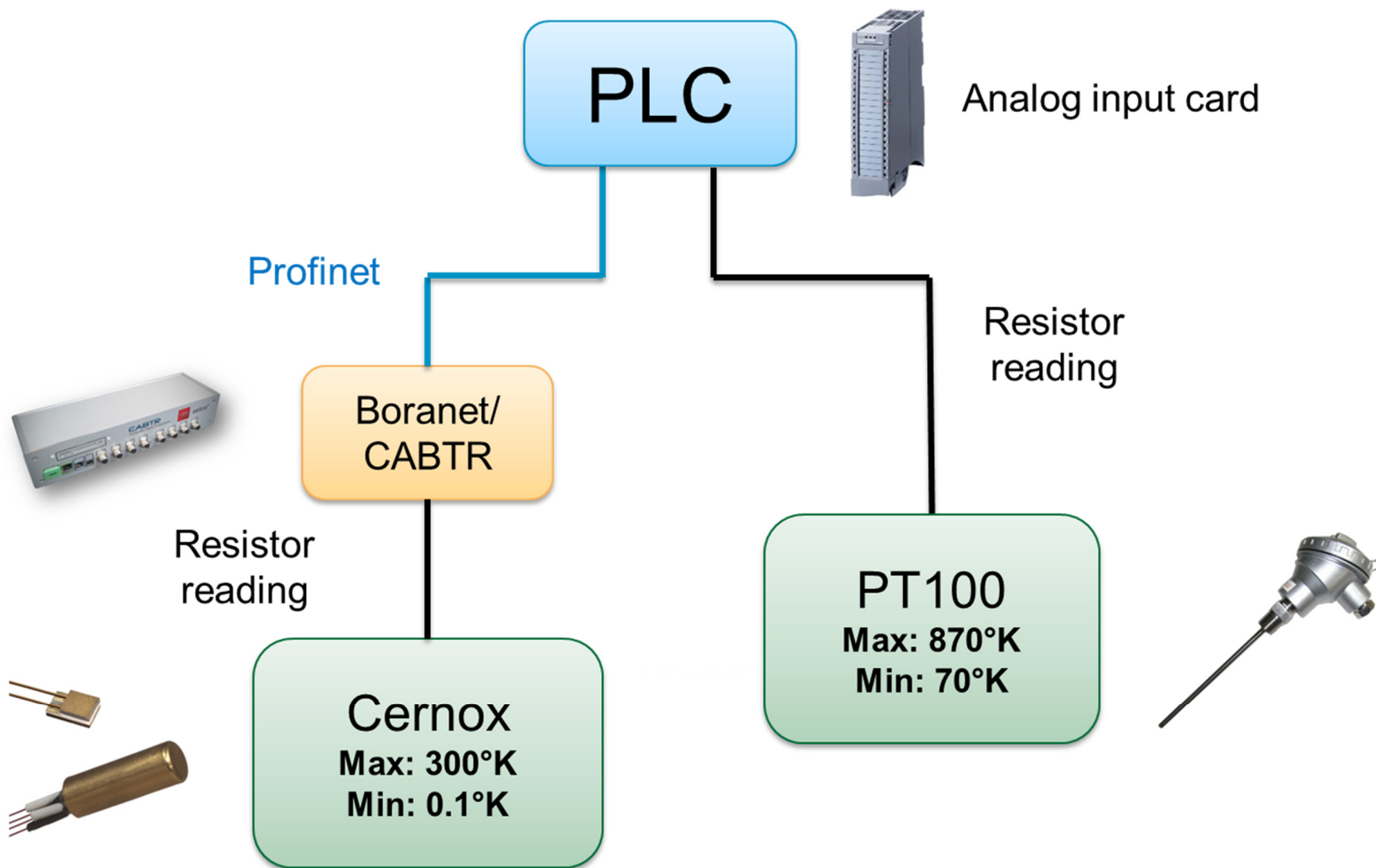
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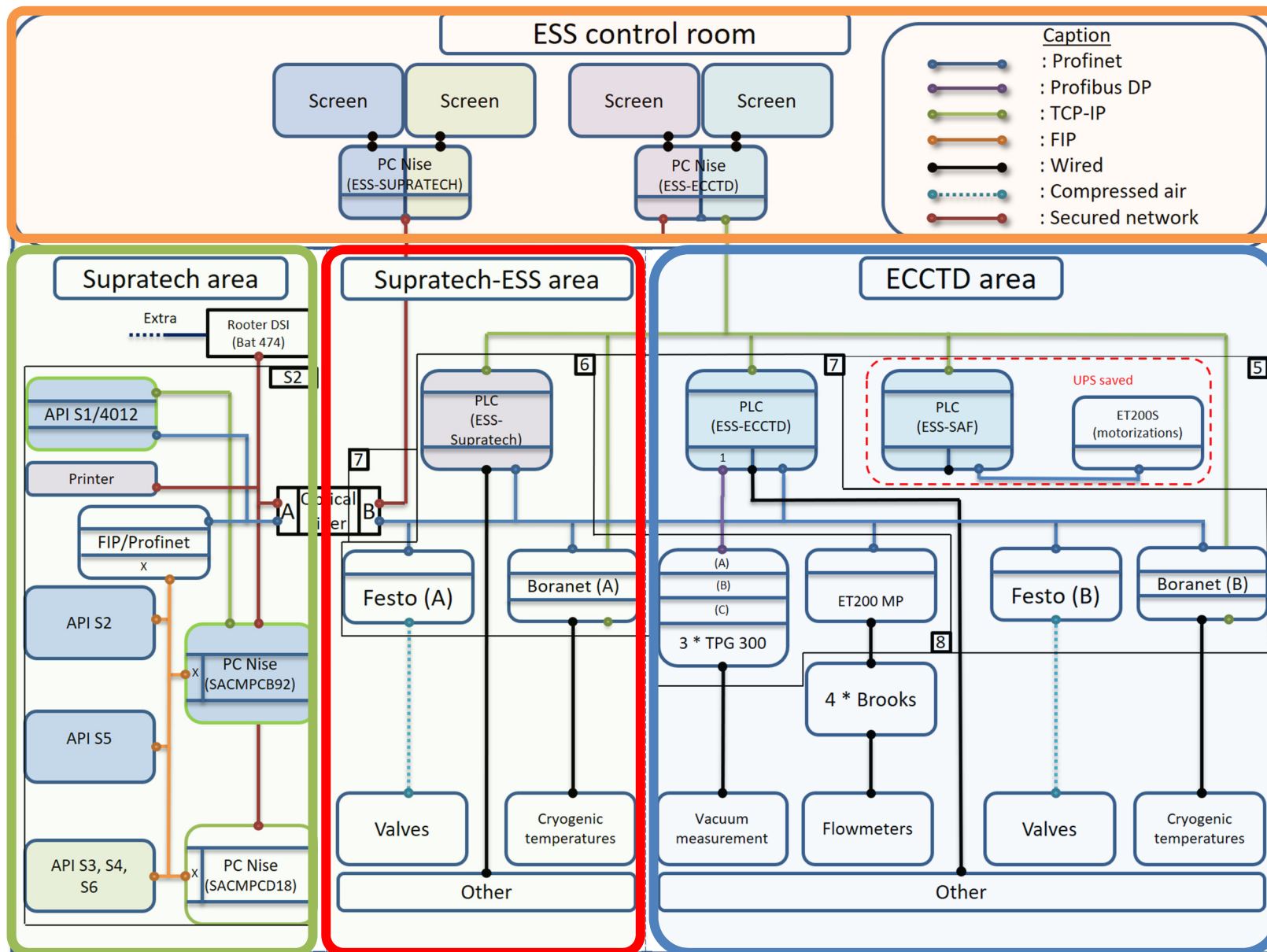
Warm and cold coupler conditioning

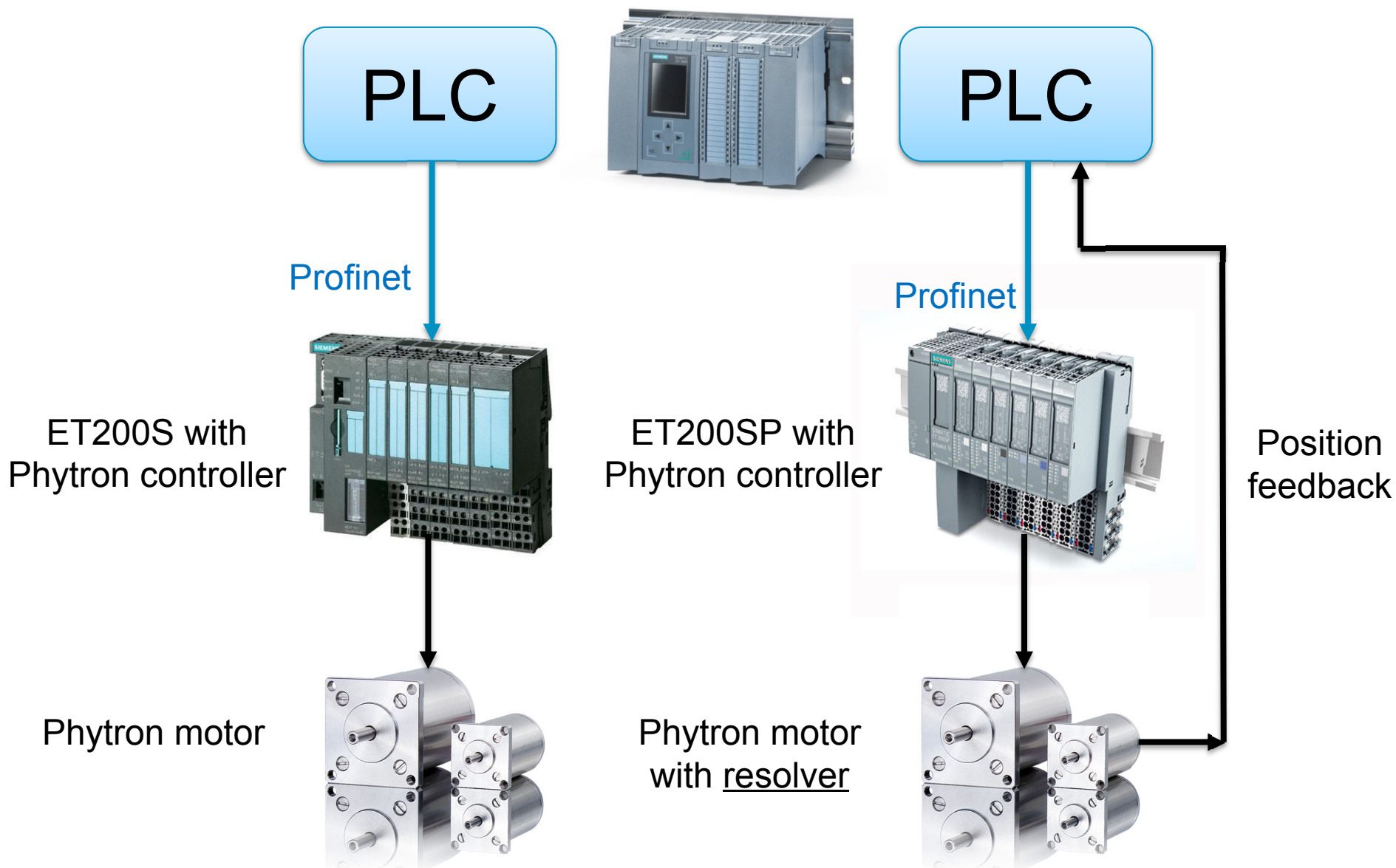
- RF signal measurement
- PM / PUE- measurement
- Automatic sequences for couplers conditioning











Cryogenic

- Automatic sequences for cooling down
- Nitrogen and helium tanks management

Vacuum

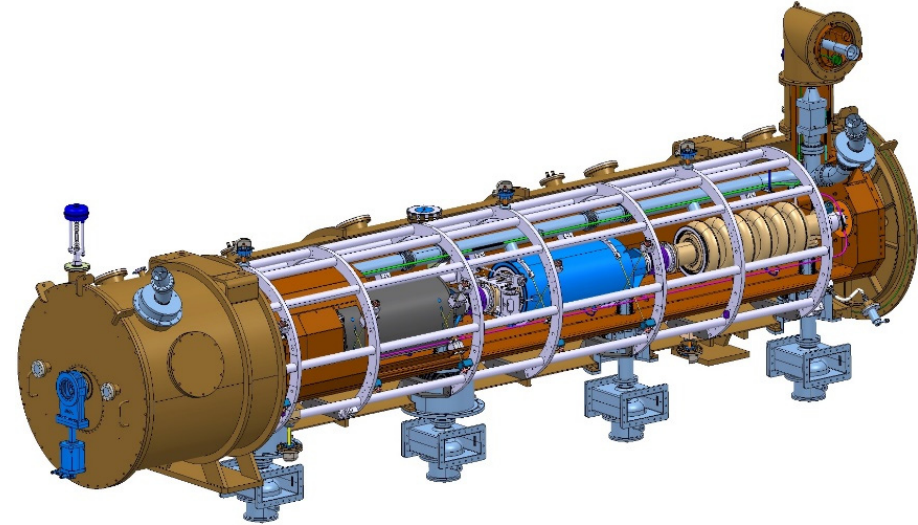
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Cavities tuning

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- **Controlling Piezoelectric motor for fast motion**
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Warm and cold coupler conditioning

- RF signal measurement
- PM / PUE- measurement
- **Automatic sequences for couplers conditioning**



EPICS

streamDevice

MRF
Timing System

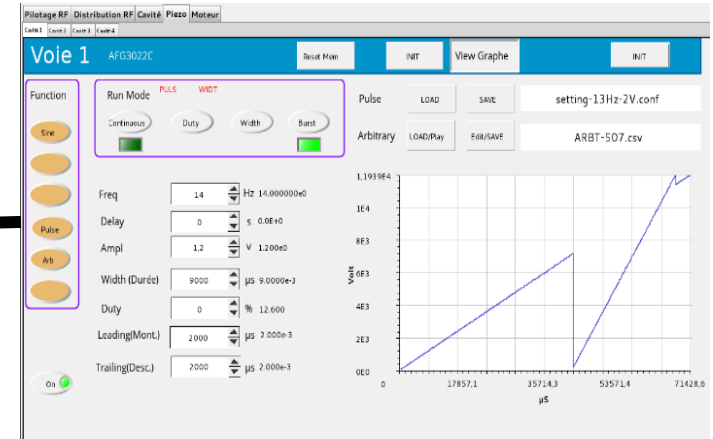
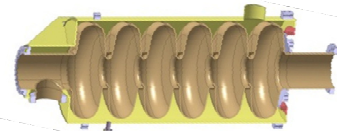
trigger

Function Generator
Agilent AFG3252C

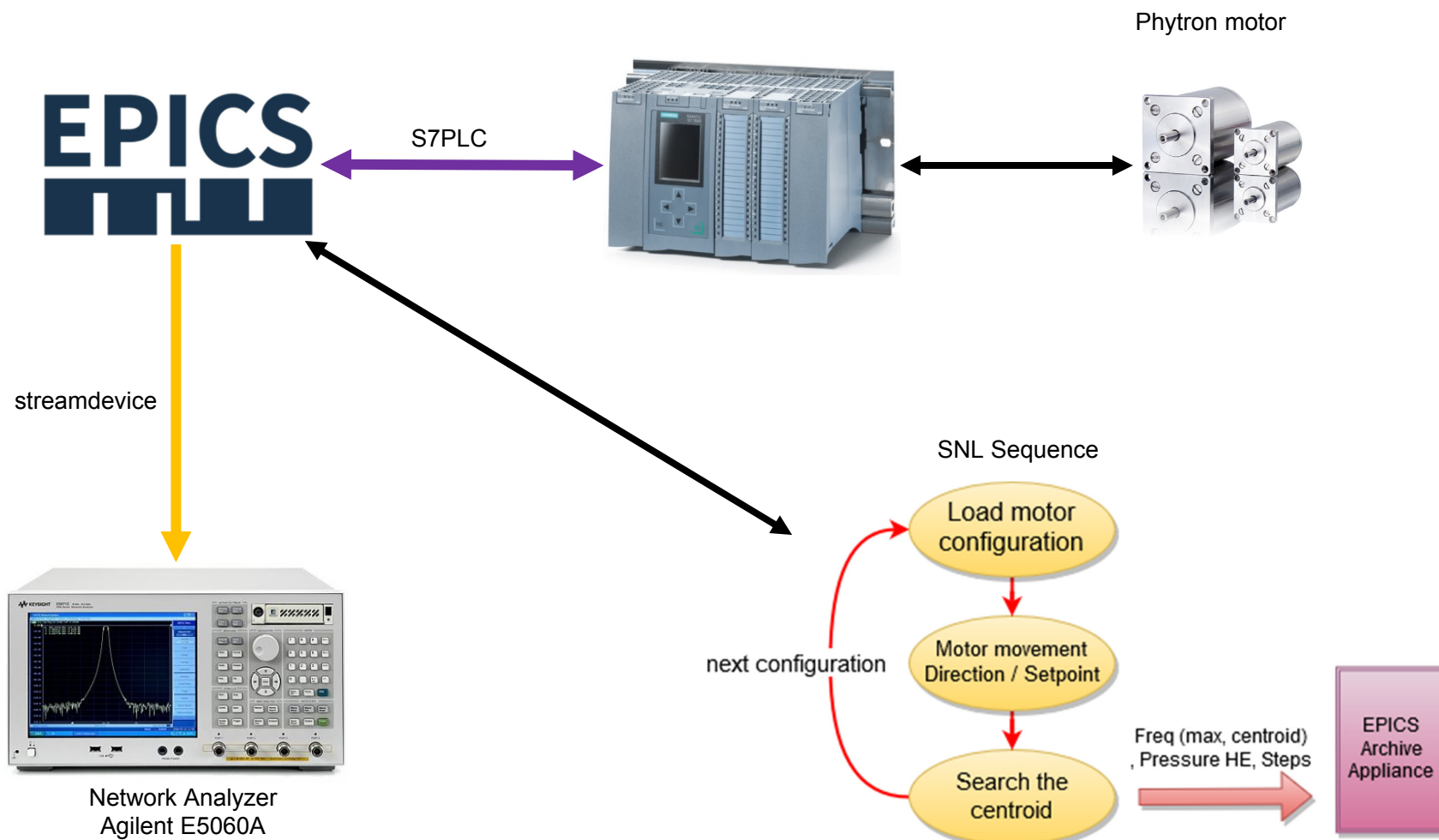
Piezo Driver
Noliac NDR6220

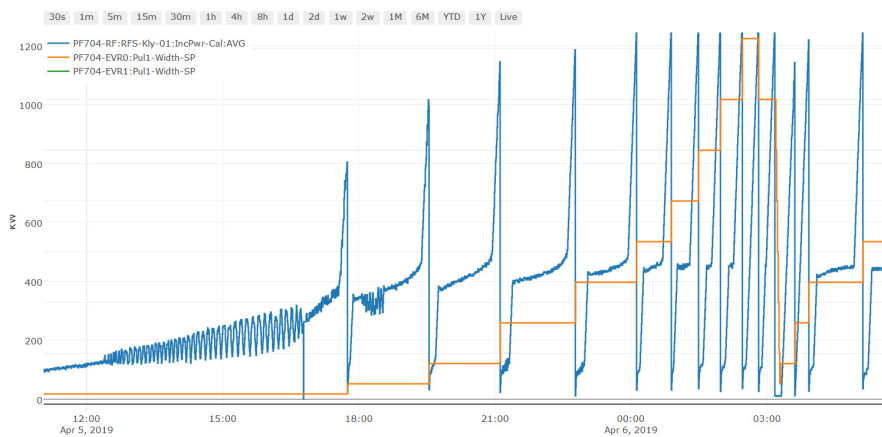
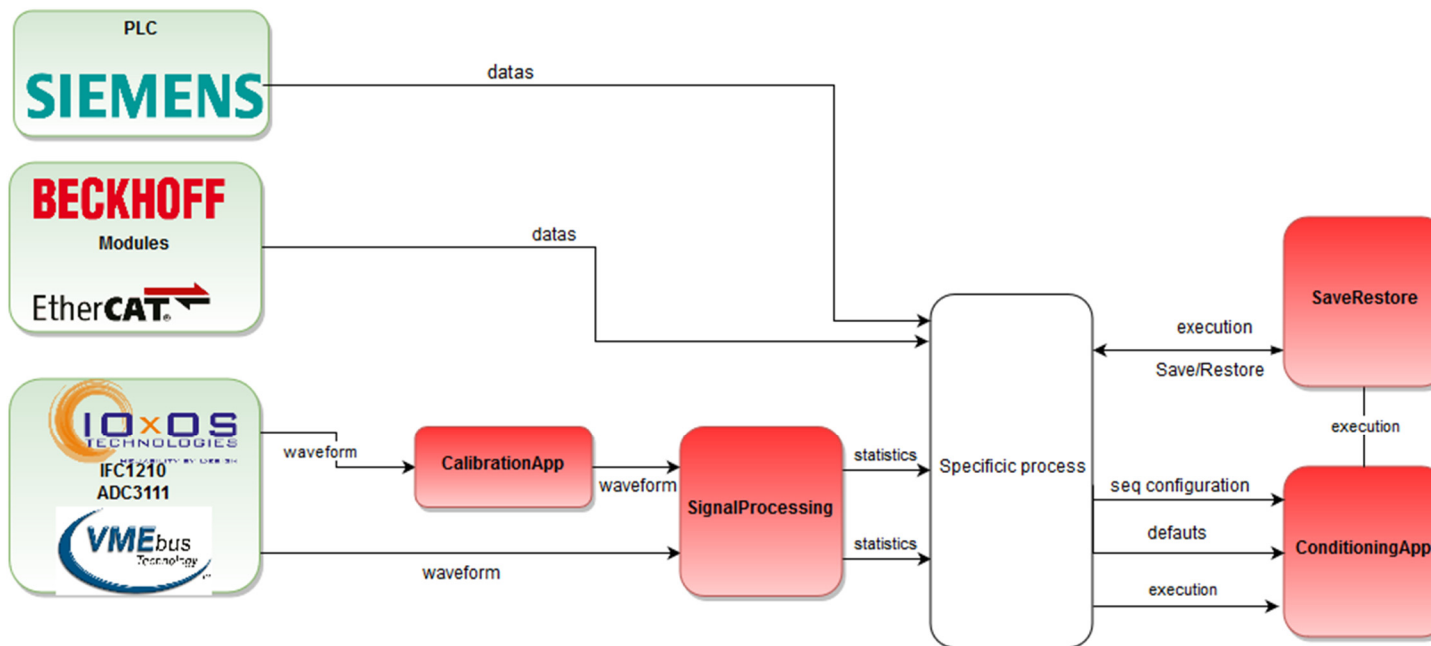
Piezo

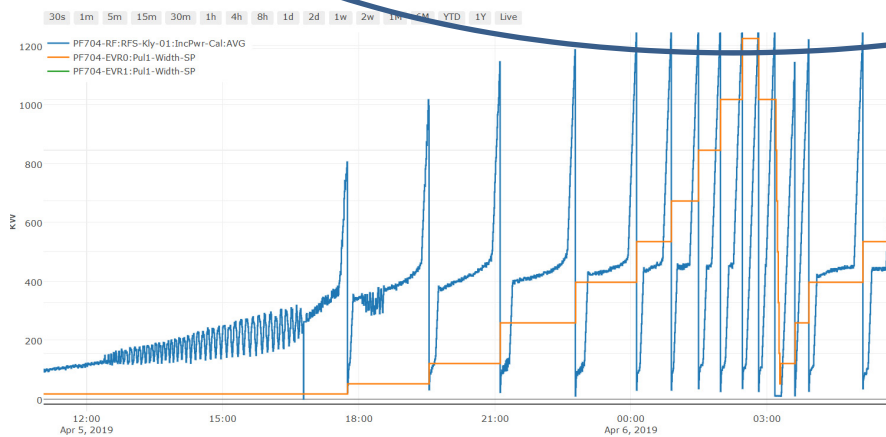
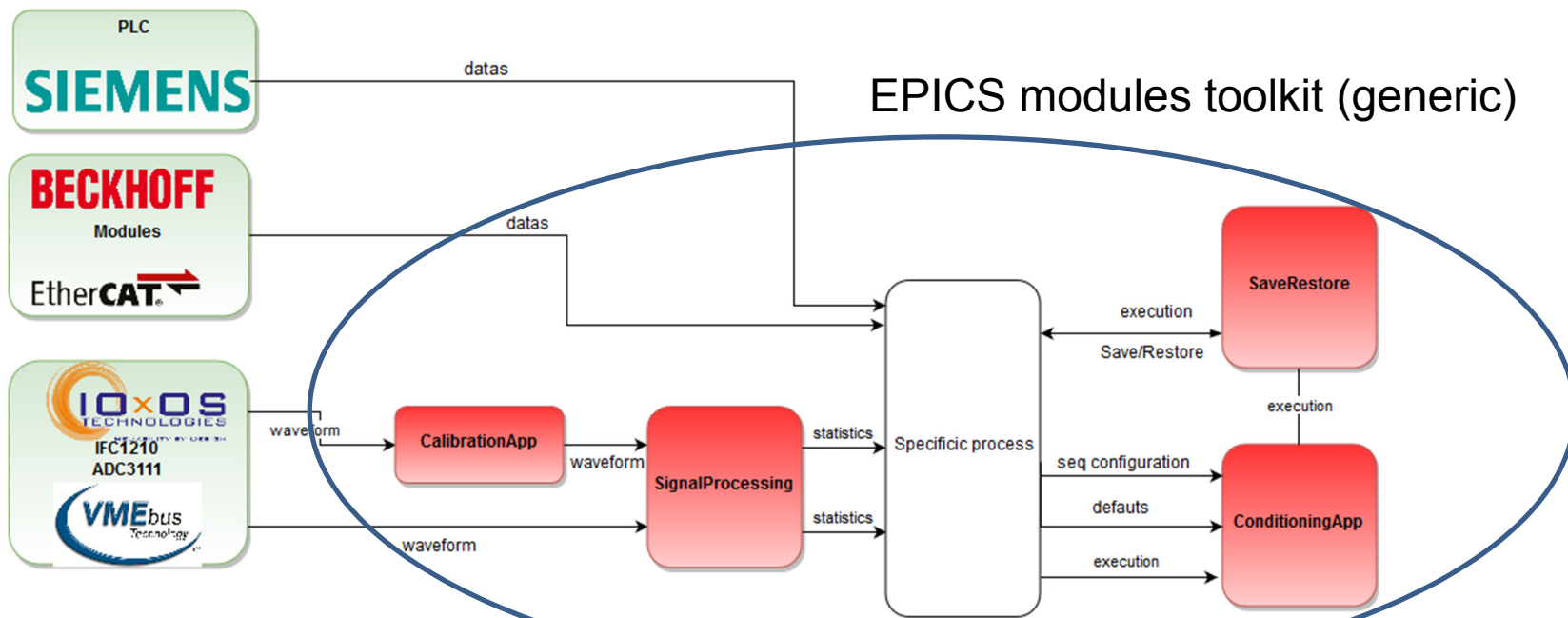
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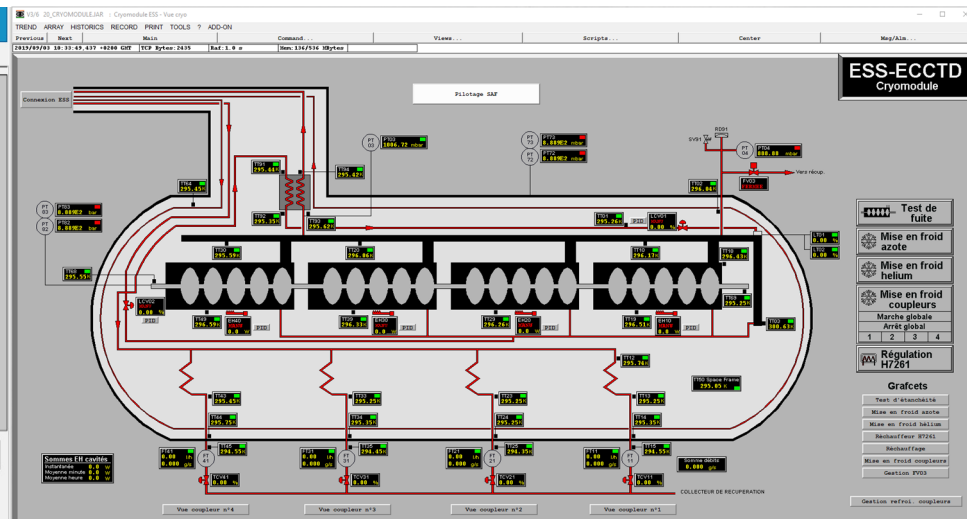
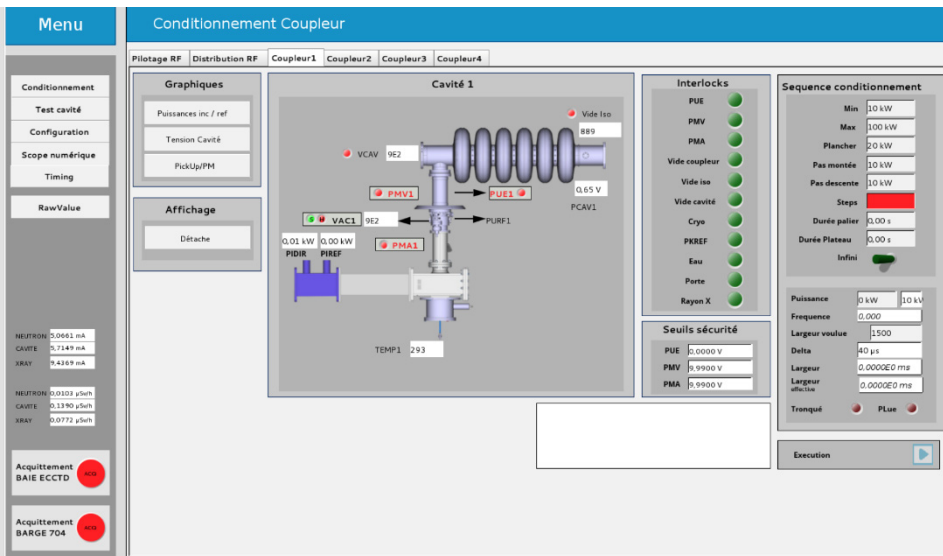


Automatic cavities characterization









- Cryomodule control system working and in use
- Technology knowledge improvement
- Ready for next cryomodules

Acknowledgments :

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Thanks for
your attention

Questions ?

