

IFMIF EVEDA RFQ Local Control System



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*In the IFMIF EVEDA project, normal conducting Radio Frequency Quadrupole (RFQ) is used to bunch and accelerate a 125 mA steady beam to 5 MeV. RFQ cavity is divided into three structures, named super-modules. Each super-module is divided into 6 modules for a total of 18 modules for the overall structure. The final three modules have to be tested at high power to test and validate the most critical RF components of RFQ cavity and, on the other hand, to test performances of the main ancillaries that will be used for IFMIF EVEDA project (vacuum manifold system, tuning system and control system). The choice of the last three modules is due to the fact that they will operate in the most demanding conditions in terms of power density (100 kW/m) and surface electric field (1.8*E_{kp}). The Experimental Physics and Industrial Control System (EPICS) environment provides the framework for monitoring any equipment connected to it. This paper reports the usage of EPICS and industrial controls to the RFQ power tests at Legnaro National Laboratories.*

Object:	Power Test:	Final System:
Server EPICS	3	3
IOCs	6	4
Databases	17	37
EPICS Process Variables	1153	~ 8000
Process Variables Archived	970	~ 1600
HMI	15	14
PLC	3+1	3+1
PLC I/O analog/digital	296 DI 144 DO 102 AI 5 AO	288 DI 178 DO 141 AI 10 AO

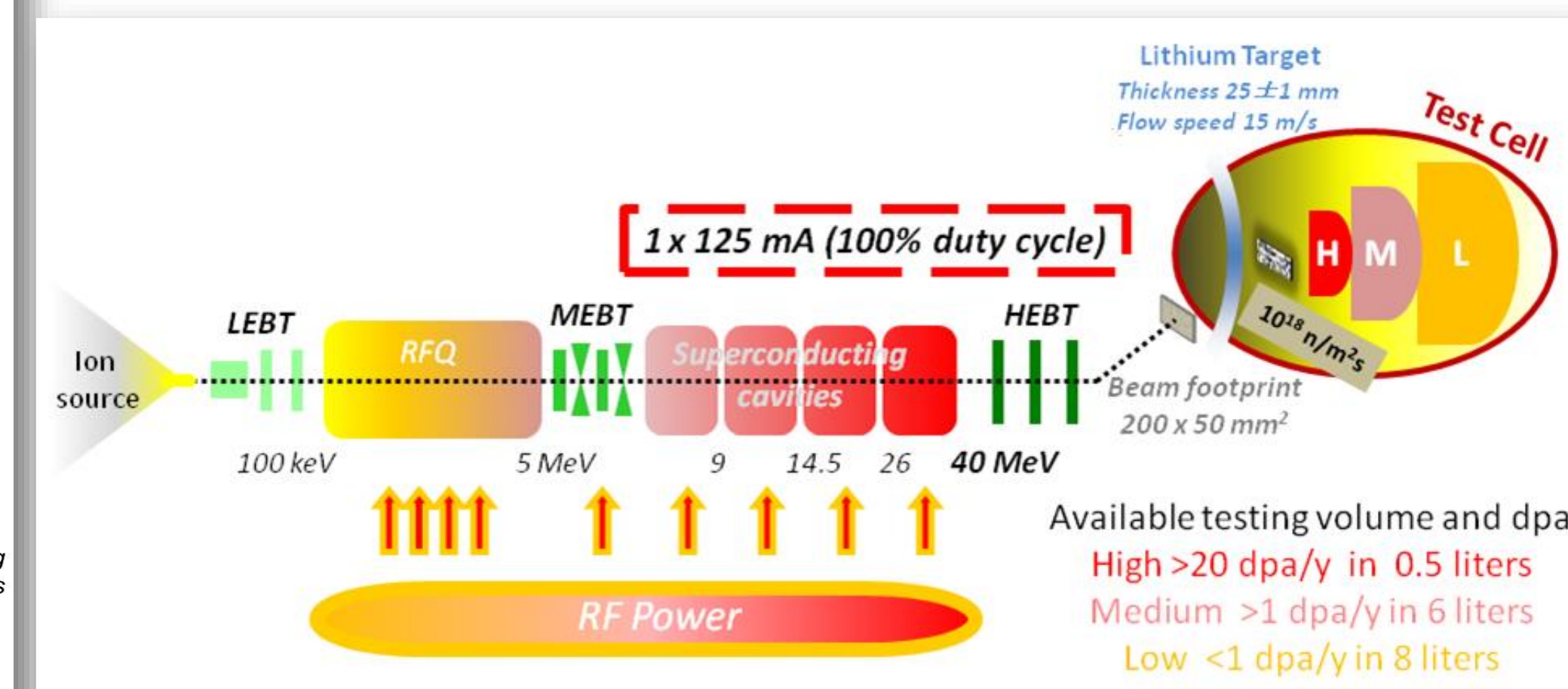
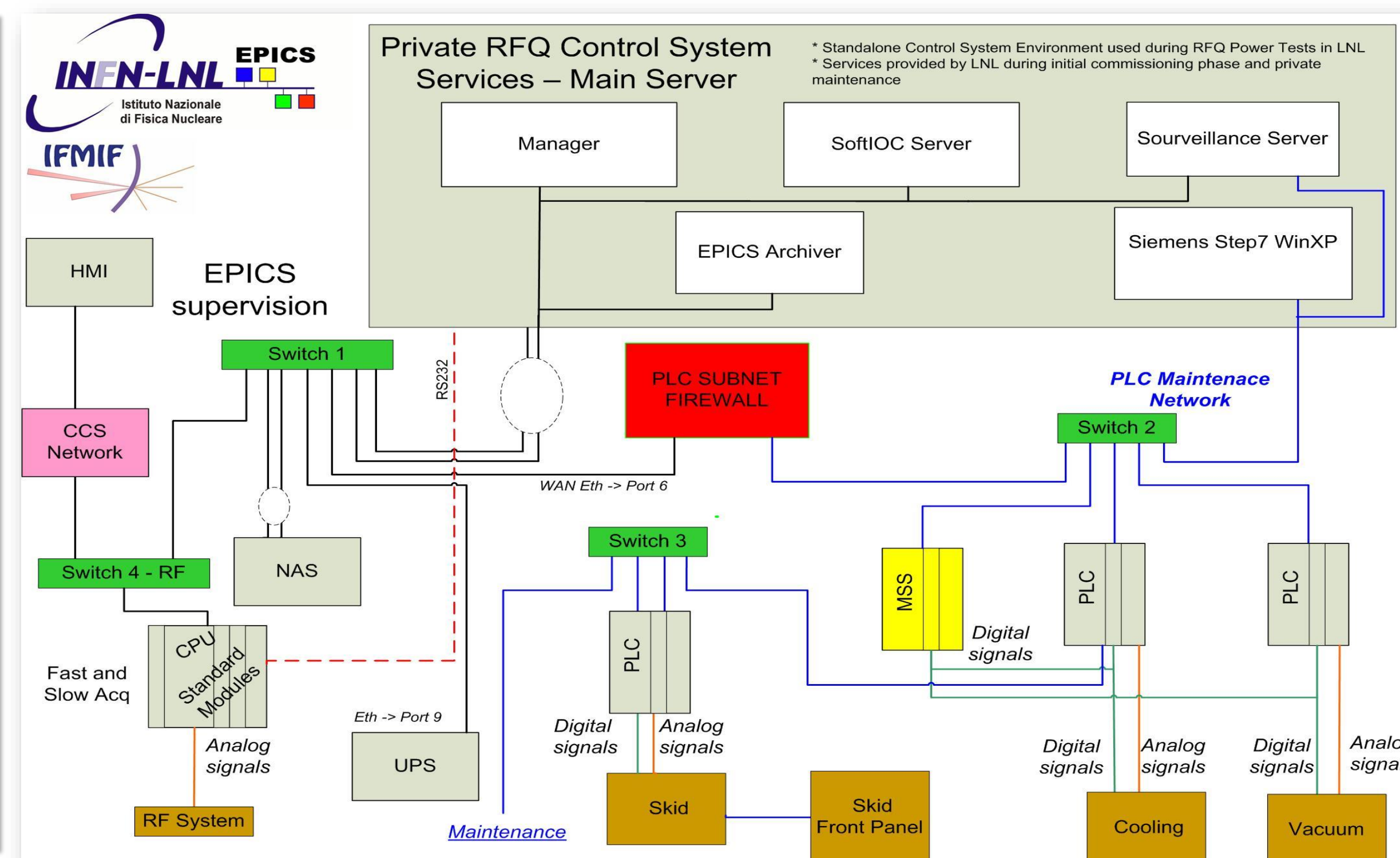


Figure 1: RFQ LCS Architecture

Figure 2: The IFMIF-EVEDA schematic

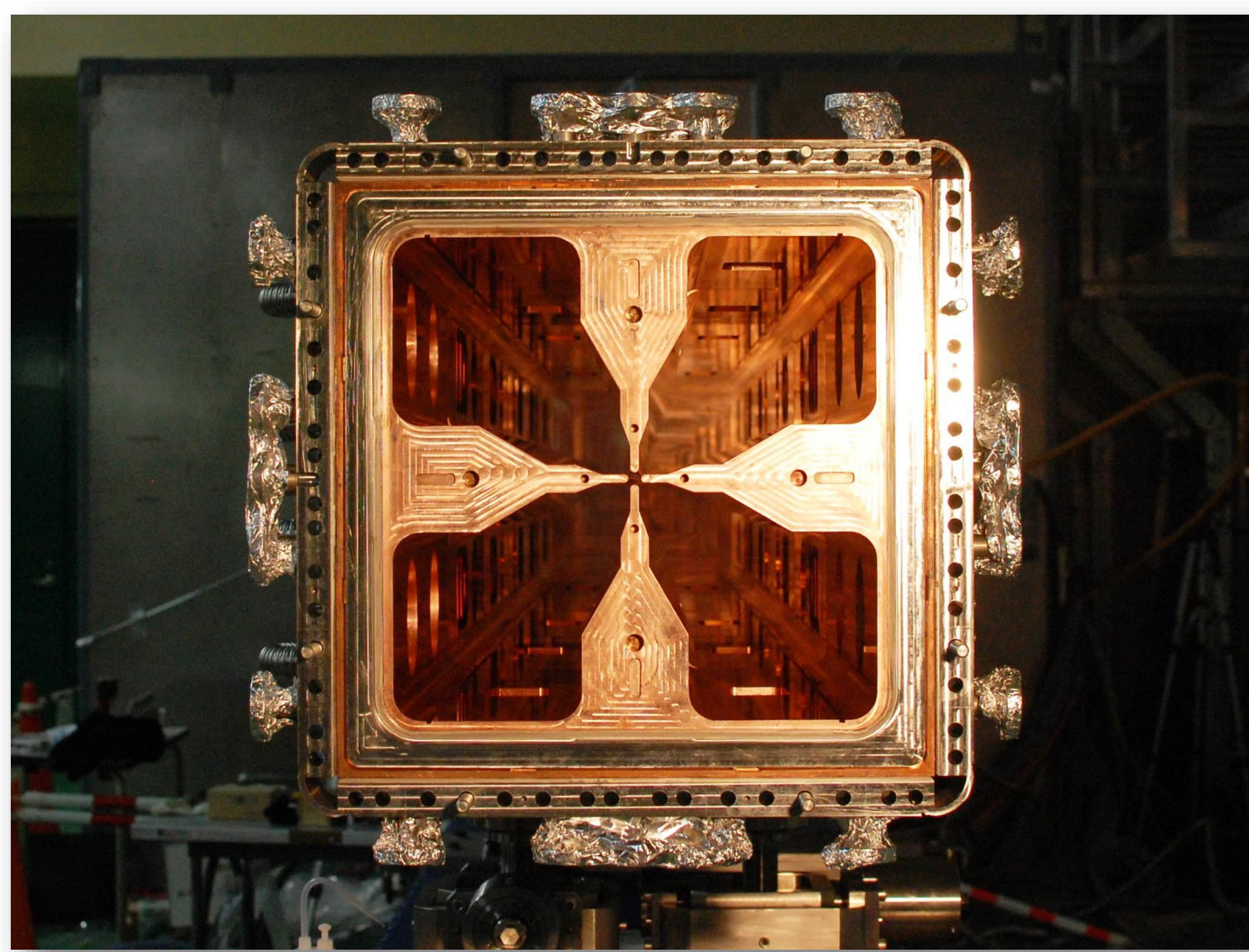


Figure 3: IFMIF EVEDA RFQ Section

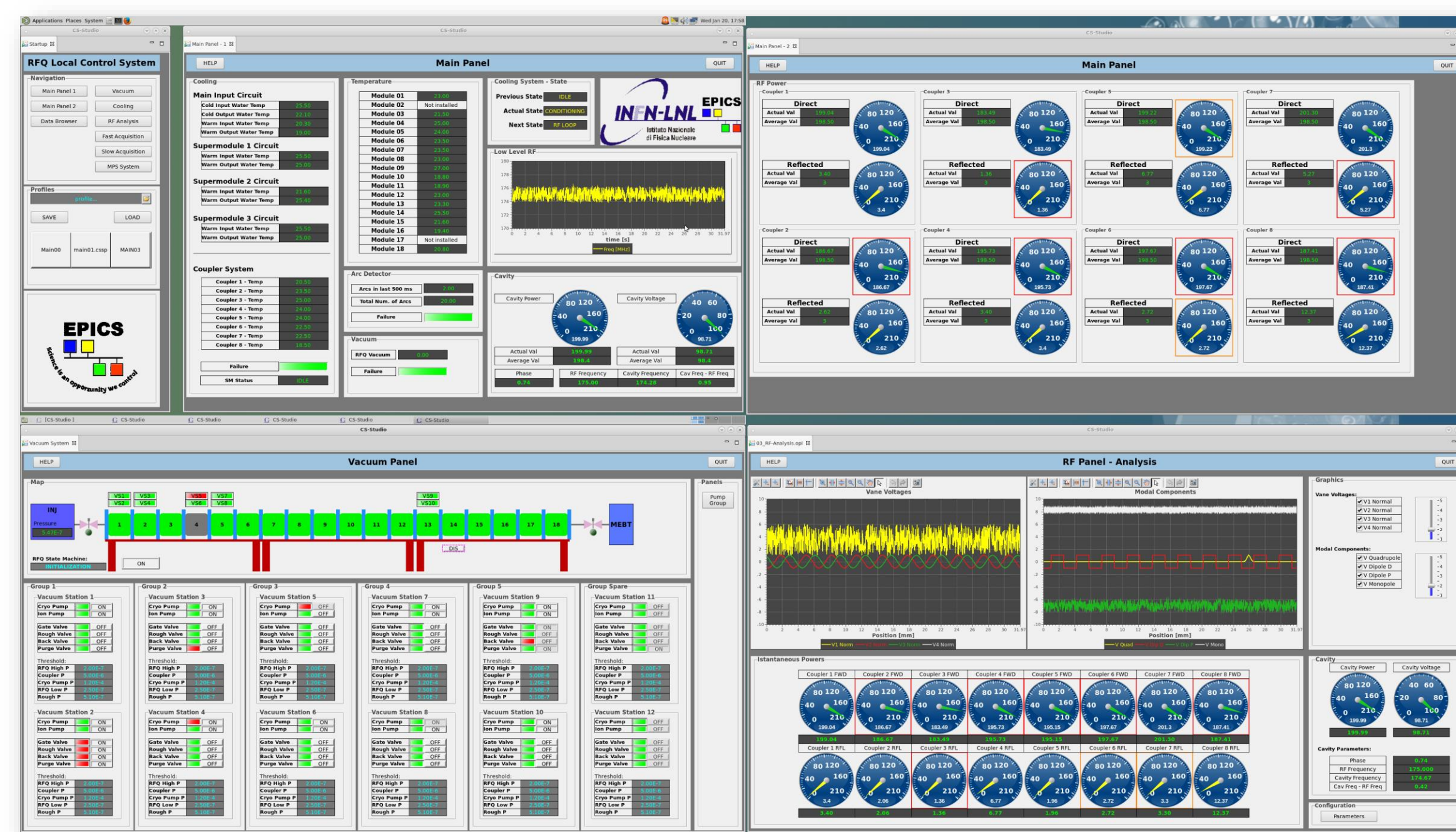


Figure 4: Human-Machine Interface for final RFQ LCS



Figure 5: RFQ Installation in Rokkasho

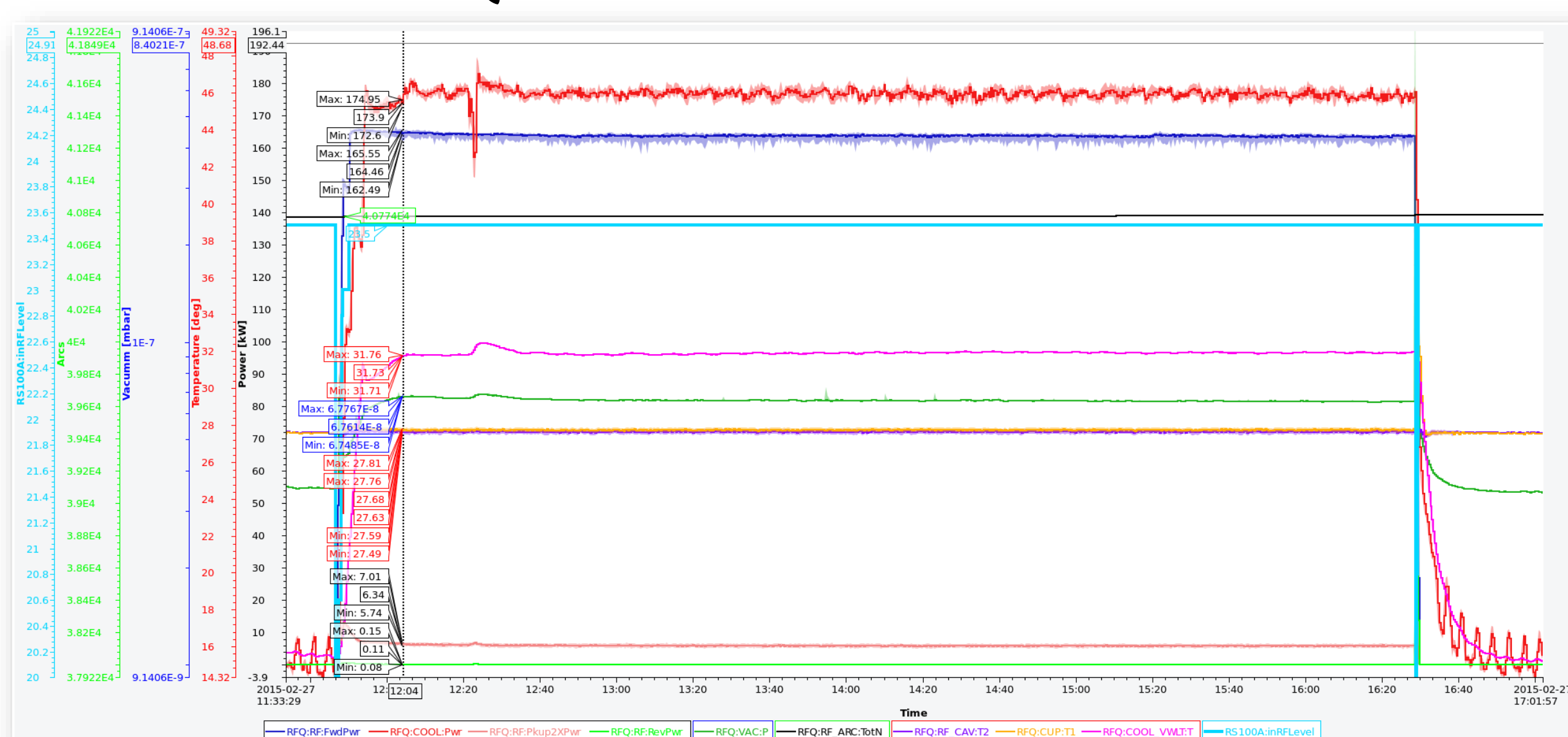


Figure 6: Data archiver through EPICS RDB Archiver. In this particular picture it is possible to observe the successful of the power test made at LNL: the RFQ remained 4 hours at nominal field level (minimum 2 hours required)

Power Tests

Preliminary tests on the singular control system tasks are done with positive results and every subsystem reaches the expected objectives. Because of the importance of the power tests for the RFQ apparatus, this is a great test bench for the entire control system architecture in order to debug the core system and a good feedback for the work realized by the team.

An exhaustive test with the entire apparatus has not been executed but it will be performed when the RFQ will be totally available before the shipment: in this situation we will be able to check if the system modularity will cover all the specifications required by the acceptance tests provided by the agreements with Fusion for Energy (F4E).

Acknowledgments

This work leveraged of years of experience on EPICS use from good engineers of other laboratories around the world: great acknowledgments to them.