Status of ELQA equipment and related software

- Reference document (EDMS 788197):
  - Recall of ELQA tests and terminology
- Status of the hardware
- Status of the software
- Long shutdown activities:
  - ELQA campaigns
  - R2E & Collimators in P3

CERN
CH-1211 Geneva 23
Switzerland

the **Large Hadron Collider** project

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Test procedure

ELQA QUALIFICATION OF TH… SUPERCONDUCTING CIRCU… HARDWARE COM…

This document is being revised:

- To add MIC tests
- To revise voltage levels for HVQ
- To refine the cryogenic conditions for each tests
- To add new scenarios (ex. partial warm up of a sector)

The purpose of this … technical require… successful … the … hard… during the … D… TP4 and the ELQA- … an… …its powered via the DFB's … …ectively.
This … …cations of the following hardware … com… …of a sector, from the end of the hardware … asse… …ing tests. b) Technical stop of the cool down at 80 … Kelvin … …tial warm up to ambient temperature. c) Electrical safety … sub-se… …g and reaching the 80 Kelvin. Scenario d) concerning the … individu… …re-qualification during the powering tests phase, is mentioned for … informat… only and is not covered by this specification.

ELQA standard tests during HWC

	Circuits powered via the DFB						Local dipole orbit corrector	
	TP4-A	MIC-W	TP4-B	TP4-C	MIC-C	TP4-E	DOC-W	DOC-C
	At warm	At warm	After flushing	During cool-down	At cold	At cold	At warm	At cold
ORC	■					■	■	■
HVQ			■	■		■	■	■
TFM	■					■	■	■
ICC	■					■	■	■
DPC	■							
MIC		■			■			

Table 1: Summary of qualification tests

Needs for diagnostic in case:

During ORC, we find an open circuit at warm or open/resistive circuit at cold?
During HVQ, we find a frank short/breakdown at warm at cold?
During MIC, we found a broken voltage taps or a defective quench heater (open or too resistive) at warm, at cold?

Standard scenario

Phase	At warm	Flushing	At warm	Cool-down 300 K to 1.9 (4.5) K	Cryogenic conditions
TP4-A					
DOC-W					
MIC-W					
TP4-B					
TP4-C					
TP4-D					
DOC-C					
MIC-C					
TP4-E					

Table 2: Test sequence for a standard cool down phase.

Metallic debris found in dipole's diode pot after flushing!
Is it the end of the story?

HV monitoring RB, RQD, RQF & Spools... We are studying the possibility to measure more circuits

Should we need a special scenario before the long shutdown?

See Mateusz presentation for details

Hardware (1/3):

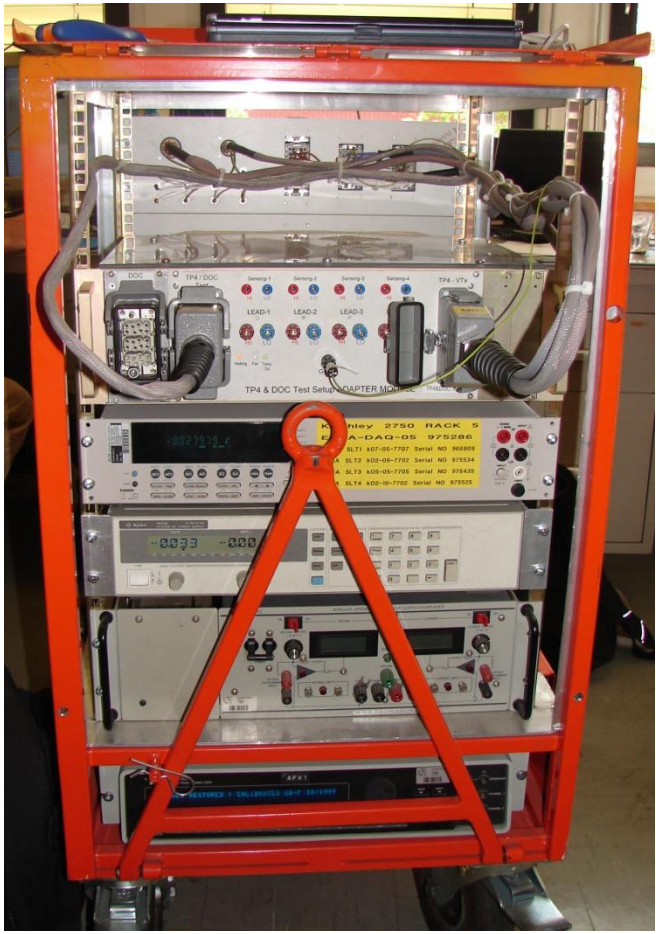
TP4 systems

We have 4 such mobile systems designed to do all TP4, DOC and MIC tests

- Limitation: Max. 8 teams if 2 shifts a day!
- Critical: The Matrix box is “home made” (= black box) built by the Polish collaboration (3 PCBs inside), No spare parts!
- We should build 2 more TP4 in order to have:
  - An improved version of this matrix box
  - To have spare parts
  - Easier logistics (transport = risk of damaging our racks)

Hardware (2/3):

TP4 systems



- Rest is off the shelf equipment but is ageing:
  - Keithley 2750/E (x9)
  - HP power supply (x4)
  - Kepco Amplifier (x4)

- We are buying 6 x “GP-102” Frequency Response Analyser from Powertek UK to replace our Solartron SI-1253 for TFM measurements => New possibilities.

Hardware (3/3)

- Laptops: The older ones will need to be replaced.
- HVQ « Long live crate » used for TP4, DOC, MIC, HVQN, PAQ and Monitoring (20 crates): Not a issue!
- Racks that were used during the assembly phase:
  - AIV1, AIV2: 2 systems available: Too few?
    - We could use our TP4 systems (would need new software)
- Hardware for diagnostic:
  - Time Domain Reflectometer, Megger TDR2000/2
  - Digital Low Resistance Ohmmeter, Megger DLRO 10
  - 2 NI-PXIs: Presently used for IRSM measurements on IPQs (Multipurpose)
  - We want to buy 2 oscilloscopes

Software

- Migration to Win 7 should not be a problem
- Upgrade of all our applications to the latest version of LabVIEW (LabVIEW 2010) should not be a problem for TP4, DOC, MIC, CHVQ applications
- Older applications like AIV, PAQ, HVQN (more than 5 years old) needs to be rewritten
- The Matrix box in TP4 systems is strongly interdependent with all our applications
  - A modification of the matrix box will imply re-witting all applications
    => Polish collaboration
- ELQA Oracle DB up to date (needs to be maintained)
  - All data from previous campaigns are available from our web site
  - Needs to develop new tools for data extraction

Activities during next long shutdown

Rework of 13kA Splices :

At places where TE/MSC will **replace** a magnet:

- We will need to redo AIV1, AIV2 and PAQ tests in close collaboration with TE/MSC group as during assembly phase.

At places where only 13 kA inter-connexions will be redone (spools & Line N not touched):

- We need “only” to check the electrical insulation before closing the hydraulic connections (manchette).

Full ELQA campaigns (at warm & at cold) before LHC restarts.

R2E:

Since this year, we are responsible for the current leads heating system:

Relocation of 3 racks (UJ14, UJ16, UJ56) => Order of non standard cable (thermo-couple), re-commissioning the racks after relocation

Collimators in P3:

Displacement of DFBAE and DFBAF: All the equipment behind the current leads (transformers) including the PE crate will be moved to put a cryogenic extension link to the QRL => Cabling and re-commissioning

Thank you for your attention