Non-conformities and their consequences

M. Giovannozzi

- **Non-conformities for sector 5-6**
- **Non-conformities for sector 4-5**
- **Follow up of powering strategies during hardware commissioning**

Acknowledgements: R. Bailey, M. Lamont, S. Russenschuck, A. Siemko, W. Venturini Delsolaro.

Introduction

- Information available from the LHC HC web page

http://hcc.web.cern.ch/hcc/nonconform.html

- The non-conformities can be split in two classes:
  - ELQA: polarity, instrumentation, etc.
  - Powering: magnet performance
- Most of the non-conformities are closed. However, the system (MTF) allows closing a non-conformity with disposition "Decision pending"!
- NB: a LTC presentation by S. Russenschuck is scheduled to report about ELQA status.

Non-conformities for sector 5-6 - I

- Short statistics:
  - 16 NCs found
  - 13 NCs closed (but 8 With disposition “Decision pending”)
  - 3 NCs still opened
  - 14 ELQA-related NCs
  - 1 POW-related NCs
  - 1 remaining NC (test of the MBs)

Non-conformities for sector 5-6 - II

Non Conformities in Sector 56; 16 items found:

Non Conformity	MTF Entry	Type	Importance	Disposition	Non Conformity Description
QN-ELQA-TP4C-HVQ-MBB.A56-001	DE.RB.A56	Electrical / Instrumentation	Critical	Decision Pending	Short circuit to ground in the main dipole circuit MBB.A56. The short circuit to ground has been detected at the level of DFBAK, Lead 5, at the beginning of the cool down of sector 5-6. The resistance to ground is 45 Ohms at the level of DFB Lead #5. The problem is localized in cell 14.L6. Further investigation will localize the problem more precisely. Finally, the problem is located in magnet 2264, cell B15L6, at the level of the half-moon pieces.
QN-MPP-POW-RCBCV10.L6B1-001	DE.RCBCV10.L6B1	Electrical / Instrumentation	Critical	Decision Pending	EE811 voltage tap was found open inside the IFS box at the level of the pin 16 coming directly from the cover flange, the problem is therefore located inside the cold mass. The warm part of the routing of this Vtap was tested OK (PCB + harting connector P25).
QN-ELQA-DOC-W-RCBCV9.L6B2-001	DE.RCBCV9.L6B2	Electrical / Instrumentation	Critical	Repair	Polarity error on circuit RCBCV9.L6B2 The DC warm cables are cross-connected at the level of the current leads.
QN-ELQA-TP4A-TFM-RCBXH1.R5-001	DE.RCBXH1.R5	Electrical / Instrumentation	Critical	Repair	Short to ground (a few ohms) detected during the measurement of the transfer function (TFM) of the impedance of the circuit RCBXH1.R5 vs. ground. The short has been localized in the warm instrumentation cable routing the voltage taps from the lead to the instrumentation rack (the short could be in the connector or along the cable). The corresponding connector is K2-P87-1.
QN-ELQA-TP4A-ICC-RCBYH5.L6B1-001	DE.RCBYH5.L6B1	Electrical / Instrumentation	Critical	Decision Pending	Wrong routing of the instrumentation cable associated to the circuits RCBYH5.L6B1 and RCBYV5.L6B2. This cable routes the voltage-taps of the leads from the instrumentation rack (DFBMM.5L6) to the power converter. According to the LHC reference DB the instrumentation cable (ID = 1606920A) should be routed as follows: - Cable from DFBMM.5L6 Instrumentation Rack to the rack RYLC04 During the HV qualification of the cable it has been found installed as follows: - Cable from DFBMM.5L6 Instrumentation Rack to the rack RYLC01 (that corresponds actually to the circuits powered via the DFBMM.4L6)
QN-ELQA-TP4A-POL-RCOX3.R5-001	DE.RCOX3.R5	Electrical / Instrumentation	Critical	Decision Pending	Wrong polarity of the circuit RCOX3.R5 powered via the DFBXF.R5 due to a turn of the corrector magnet assembly inside the Q3R5 cold mass. Inversion of the labels at the level of the patch panel is required.
QN-ELQA-TP4A-POL-RCSSX3.R5-001	DE.RCSSX3.R5	Electrical / Instrumentation	Critical	Decision Pending	Wrong polarity of the circuit RCSSX3.R5 powered via the DFBXF.R5 due to a turn of the corrector magnet assembly inside the Q3R5 cold mass. Inversion of the labels at the level of the patch panel is required.
QN-ELQA-TP4A-HVQ-RQ10R5-001	DE.RQ10.R5	Electrical / Instrumentation	Critical	Repair	Short to ground of the mid-point cable wires routing the mid-point voltage pick-ups from the Instrumentation Box of the Q10R5 to the DFBAJ. The short was discovered during the HV test of all the wires connected together versus ground. The cable ID is 1505653.
QN-ELQA-TP4A-TFM-RQ7.R5-001	DE.RQ7.R5	Electrical / Instrumentation	Critical	Repair	Short to ground revealed during the measurement of the transfer function of the impedance of the circuit RQ7.R5. The short (around 100 ohm) has been localized at the level of the proximity equipment of the DFBAJ. The short disappears when disconnecting the Fischer connector from the lead DFLCS.7R5.10.
QN-ELQA-TP4A-ICC-RQ7R5-001	DE.RQ7.R5	Electrical / Instrumentation	Critical	Decision Pending	Le resultat de la QITEN.AE7R5.TT821 sur DFLCS.C7R5 montre sa non disponibilite (=OVL) a la sortie de la boite de regroupement. Current lead #10: DFBAJ.DFLCS10.07R5/TT891A
QN-ELQA-TP4A-ICC-RQ9.R6-001	DE.RQ9.R5	Electrical / Instrumentation	Critical	Decision Pending	The instrumentation cable (Nr.1611974) routing the mid point voltage taps from the magnet to the proximity equipment is open. The 4 wires of the cable are open, only the shield is continuous. This cable should be replaced.
QN-ELQA-MPAQ-26L6/12L6-001	DE.RQD.A56	Electrical / Instrumentation	Critical	Use-as-is	During the HV test of the main BB M2 ext. along 14 half-cells, the non-standard shape of the current leakage curve has been observed (see attached file MPAQ_26L6_12L6_main_BB_M2_ext_300s.jpg). The abnormal current leakage curve shape has been also previously noticed during the PAQ test of the half-cell 25L6. For the details see the TR-ELQA-PAQ-25L6-001 report, EDMS No 828527 and file 25L6_main_BB_M2_ext.jpg.
QN-ELQA-TP4A-	DE.RQSX3.R5	Electrical /	Critical	Decision	Wrong polarity of the circuit RQSX3.R5 powered via the DFBXF.R5 due to a cross of the bus-bars inside the DFBXF helium enclosure.

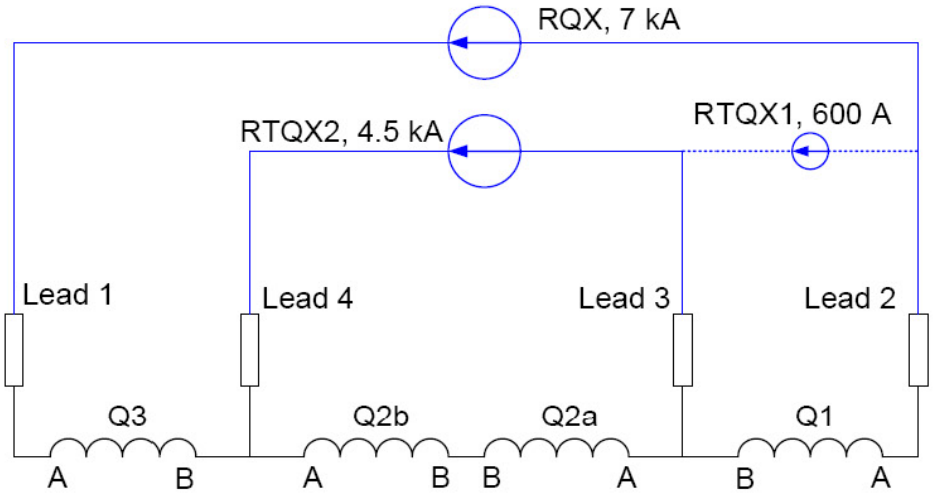
Non-conformities for sector 5-6 - III

POL-RQSX3.R5-001		Instrumentation		Pending	inversion of the labels at the level of the patch panel is required.
QN-ELQA-TP4A-POL-RQX.R5-001	DE.RQX.R5	Electrical / Instrumentation	Critical	Decision Pending	Circuit RQX.R5 powered via the DFBXF.R5: The electrical position of the current leads DFLX.3R5.1 and 2 connected to the Q3, Q2b, Q2a and Q1 coils is not consistent with respect to the LHC_Ref_DB (version 6.501). During the ELQA qualification the following connection has been identified: - Lead DFLX.3R5.1 connected to the Q1, terminal A; - Lead DFLX.3R5.2 connected to the Q3, terminal A; According to the LHC_Ref_DB: - Lead DFLX.3R5.1 shall be connected to the Q3, terminal A; - Lead DFLX.3R5.2 shall be connected to the Q1, terminal A; The electrical layout of the actual equipment (see attached file) is based on the measurements of the sequence of voltage-taps and current leads. The magnetic polarity is thus based on the definition of the voltage taps. The second attached file gives an overview of the electrical layout of the RQX circuits (machine assembly and LHC Reference DB). The inversion of the leads (on the extremities of the RQX circuit) is systematic.
QN-ELQA-TP4A-ICC-RQX.R5-001	DE.RQX.R5	Electrical / Instrumentation	Critical	Repair	Request from the QPS team for modifying the routing of the instrumentation (voltage-tap signals) for the protection of the RQX/RTQX2 circuits of the inner triplet. The requested changes require a rewiring of the interface module installed in the instrumentation rack of the DFBX. The first attached drawing gives the new protection scheme requested by the QPS team. The second table gives the new detailed routing along the proximity equipment (extracted from the DFXF instrumentation specification v.8). All RQX circuits are concerned.
Test	RB.A56	Electrical / Instrumentation	Critical	Decision Pending	–

Non-conformities for sector 5-6 - III

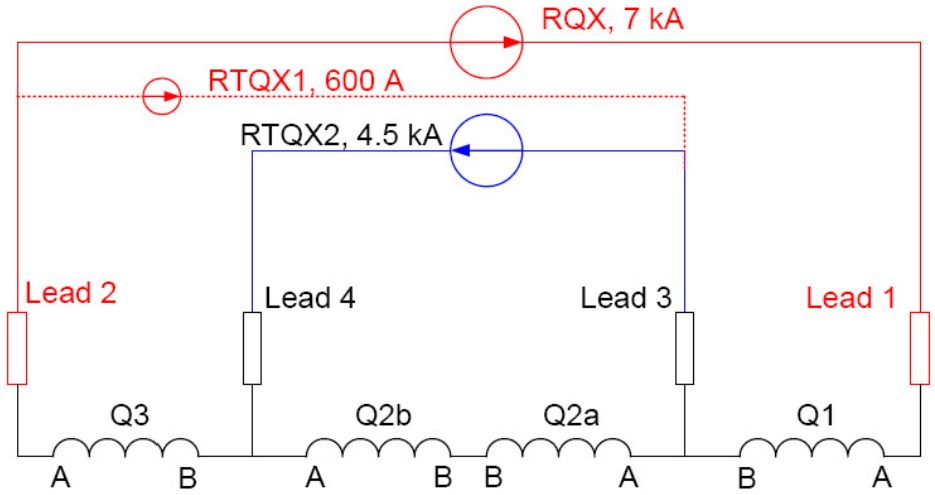
- Two main issues:
  - MCBCV10.L6.B1 (comments by A. Siemko): problem with its protection. One voltage tap is lost. Some extra tests should be performed to assess whether:
    - Repairing action possible
    - Limit current
  - Triplet quadrupoles (and correctors) polarity error (comments by S. Russenschuck): known and systematic error (e.g., MQSX). Only solution is to change the polarity at the level of the patch panel. Presentation at the MPP given (14/04/08).

Non-conformities for sector 5-6 - IV



Electrical Layout v.6.501

From NC report.



Machine assembly
Position of the current leads and polarity given according to the measured sequence of voltage-taps

Non-conformities for sector 4-5 - I

- Short statistics:
  - 35 NCs found
  - 34 NCs closed (but 19 With disposition "Decision pending")
  - 1 NCs still opened
  - 32 ELQA-related NCs
  - 2 POW-related NCs
  - 1 NC: BPM at Q22.R4.B1

Non-conformities for sector 4-5 - II

Non Conformities in Sector 45; 35 items found:

Non Conformity	MTF Entry	Type	Importance	Disposition	Non Conformity Description
INC BPM Secteur 4-5	BPM.22R4.B1	Electrical / Instrumentation	Critical	Repair	Out of tolerance (non symetry in phase and amplitude) signals on B1 HOR when checked from QJQ outputs. BPM V1 is not usable.
QN-ELQA-TP4E-HVQ-RB.A45-001	DE.RB.A45	Electrical / Instrumentation	Critical	Decision Pending	Partial discharge at around 1850 V while testing the dipole circuit at cold (nominal voltage level 1900 V). The problem was identified on the side of the electronics monitoring the temperature sensors of the current leads in point 4R. When disconnecting the cryo instrumentation cable from the proximity equipment of the DFBAH.R4, the HV test has been successfully performed. Action from ACR/IN is expected.
QN-ELQA-TP4B-HVQ-MB.A45-001	DE.RB.A45	Electrical / Instrumentation	Critical	Repair	Short to ground detected at 300V on the MBA line of the dipole circuit of the sector 45. Investigation has revealed that the faulty location is on slot B.30L5 and concerns the dipole 3186 nad the exact location in the interanl connections between bus bars and the diode box.
QN-ELQA-DOC-W-RCBCV10.R4B2-001	DE.RCBCV10.R4B2	Electrical / Instrumentation	Critical	Decision Pending	Continuity error in the instrumentation cable routing the voltage-taps of the 60A circuits from the IFS interface box of the Q10R4 to the PC rack. Wires 3 and 4 are cross-connected: - Pin 3 (Harting) is connected to pin 4 (Burndy); - Pin 4 (Harting) is connected to pin 3 (Burndy); The cable ID is 1410875A.
QN-ELQA-DOC-C-RCBH11.L5B2-001	DE.RCBH11.L5B2	Electrical / Instrumentation	Critical	Repair	Current lead resistance higher than the threshold set to 1 mohm. Both current leads DFLDS.11L5.1 and 2 of the circuit RCBH11.L5B2 are concerned.
QN-ELQA-DOC-RCBH17.L5B2-001	DE.RCBH17.L5B2	Electrical / Instrumentation	Critical	Decision Pending	Short-circuit in the instrumentation cable routing the voltage-taps of the 60A circuits from the IFS interface box of the Q17L5 to the PC rack. Wires connected to pins 1 and 2 in Harting connector are squeezed together. The cable ID is 1507166
QN-ELQA-DOC-RCBH20.L5B1-001	DE.RCBH20.L5B1	Electrical / Instrumentation	Critical	Decision Pending	Polarity error on the circuit RCBH20.L5B1. The DC warm cables are cross-connected at the level of the current leads. Repetition of the ELQA-DOC test at warm after TS-HDO intervention. Polarity OK
QN-ELQA-DOC-RCBH25.L5B2-001	DE.RCBH25.L5B2	Electrical / Instrumentation	Critical	Decision Pending	Leakage current higher than the limit (1uA) measured on the circuit RCBH25.L5B2 during high voltage qualification at warm (300 V). The trend shows a resistive insulation. High voltage qualification repeated successfully. Final leakage current and trend are OK (see report TR_ELQA_DOC_W_RCBH25.L5B2_002)
QN-ELQA-DOC-C-RCBH30.R4B1-001	DE.RCBH30.R4B1	Electrical / Instrumentation	Critical	Repair	Current lead resistance below the threshold set to 1 mohm. However the powering test (10 % of the nominal current) failed due to a resistance too low. Intervention done on the current leads.
QN-ELQA-DOC-C-RCBH33.L5B2-001	DE.RCBH33.L5B2	Electrical / Instrumentation	Critical	Repair	Current lead resistance higher than the threshold set to 1 mohm. Both current leads DFLDS.33L5.1 and 2 of the circuit RCBH33.L5B2 are concerned.
QN-ELQA-DOC-W-RCBH33.L5B2-001	DE.RCBH33.L5B2	Electrical / Instrumentation	Critical	Decision Pending	Polarity error on circuit RCBH33.L5B2. The DC warm cables are cross-connected at the level of the current leads.
QN-ELQA-DOC-C-RCBV19.L5B1-001	DE.RCBV19.L5B1	Electrical / Instrumentation	Critical	Repair	Current lead resistance higher than the threshold set to 1 mohm. Only the current lead DFLDS.19L5.4 of the circuit RCBV19.L5B1 is concerned.
QN-ELQA-DOC-C-RCBV28.L5B2-001	DE.RCBV28.L5B2	Electrical / Instrumentation	Critical	Repair	Current lead resistance higher than the threshold set to 1 mohm. Only the current lead DFLDS.28L5.2 of the circuit RCBV28.L5B2 is concerned.
QN-ELQA-DOC-C-RCBV30.R4B2-001	DE.RCBV30.R4B2	Electrical / Instrumentation	Critical	Repair	Current lead resistance higher than the threshold set to 1 mohm. Only the current lead DFLDS.30R4.1 of the circuit RCBV30.R4B2 is concerned.
					Abnormal resistance has been measured on the current lead DFLDS.30R4.2 during ELQA at warm of the 60 A closed orbit corrector circuit RCBV30.R4B2 housed in the SSS155. The measured resistance is 0.1602 ohm compared to 0.0639 ohm measured on lead #1 (between warm and cold voltage-taps). A bad electrical contact

Non-conformities for sector 4-5 - III

QN-ELQA-DOC-W-RCBV30.R4B2-001	DE.RCBV30.R4B2	Electrical / Instrumentation	Critical	Decision Pending	between the heat sink and the current lead itself is suspected since the warm voltage tap is connected to the heat sink. After the intervention of AT/MCS (tightening of the screws of the heat sink), the test has been successfully repeated.
QN-ELQA-DOC-C-RCBV31.R4B1-001	DE.RCBV31.R4B1	Electrical / Instrumentation	Critical	Repair	Current lead resistance higher than the threshold set to 1 mohm. Only the current lead DFLDS.31R4.3 of the circuit RCBV31.R4B1 is concerned.
QN-ELQA-DOC-W-RCBV33.L5B1-001	DE.RCBV33.L5B1	Electrical / Instrumentation	Critical	Decision Pending	Polarity error on circuit RCBV33.L5B1. The DC warm cables are cross-connected at the level of the current leads.
QN-ELQA-DOC-C-RCBV33.R4B1-001	DE.RCBV33.R4B1	Electrical / Instrumentation	Critical	Repair	Current lead resistance higher than the threshold set to 1 mohm. Only the current lead DFLDS.33R4.3 of the circuit RCBV33.R4B1 is concerned.
QN-MPP-POW-RCBYH6.R4B1-001	DE.RCBYH6.R4B1	Cold performance	Critical	Decision Pending	During PNO.a1 the postmortem analysis gives an error message: magnet resistance too high!
QN-ELQA-DOC-W-RCBYH6.R4B1-001	DE.RCBYH6.R4B1	Electrical / Instrumentation	Critical	Decision Pending	Wrong polarity of the 120 A closed orbit corrector circuit RCBYH6.R4B1 discovered during ELQA at warm (all voltage-taps reversed). Additional electrical measurements have confirmed the following correspondence between current leads and magnetic terminals of the magnet (conform to the connection scheme applied during interconnection and cryostating operations on surface, AT/MCS): - Lead DFLES.6R4.3 is connected to terminal A of the MBC; - Lead DFLES.6R4.4 is connected to terminal B of the MCB. This is not consistent with the information given in the LHC Reference Database: - Lead DFLES.6R4.3 shall be connected to terminal B of the MBC; - Lead DFLES.6R4.4 shall be connected to terminal A of the MCB. Connections of the DC warm cables and labeling (TS/HDO) have been done according to the LHC database.
QN-ELQA-DOC-W-RCBYV5.R4B1-002	DE.RCBYV5.R4B1	Electrical / Instrumentation	Critical	Decision Pending	The 120 A closed orbit corrector circuit RCBYV5.R4B1 is connected to the coil located on the wrong aperture (Beam 2). The same is for the circuit RCBYH5.R4B2. As the SSS.5R4 is turned, there is a non-consistency between the LHC Ref Database and the connection scheme applied during interconnection and cryostating operations on surface, AT/MCS. According to the LHC database the circuit RCBYV5.R4B1 shall be connected to the leads DFLES.5R4.3 and DFLES.5R4.4. However leads 3 and 4 are (always) internally connected to the coil on the aperture V2. As the SSS is turned in the tunnel, V2 becomes the external aperture (Beam 2). The routing of the voltage-taps from the Instrumentation Box to the power converter is also wrong for the same reason. The routing of the warm instrumentation cable has to be modified. Note: All circuits locally powered on one SSS that is turned in the tunnel are affected.
QN-ELQA-DOC-W-RCBYV5.R4B1-001	DE.RCBYV5.R4B1	Electrical / Instrumentation	Critical	Repair	HV breakdown occurred on circuit RCBYV5.R4B1 during ELQA at warm (voltage level 300 V). After the hi-pot test, the resistance of the short circuit has been measured and is about 180 ohm. DC warm cables have been disconnected but the problem remains. First diagnostic to localize the short has been performed: the short circuit is on the B (terminal) of the circuit corresponding to lead DFLES.5R4.2. The short is not between warm and cold voltage-taps but on the coil side thus the lead and bus-bar can be excluded. The short is likely on the MCB coil. Advanced diagnostic is going to be done. 4th February 2008. Decision to not power this magnet and launch repair actions during the consolidation phase of 4-5 after run1.
QN-MPP-POW-RCBYV6.R4B2-001	DE.RCBYV6.R4B2	Cold performance	Critical	Decision Pending	During PNO.a1 the postmortem analysis gives an error message: magnet resistance too high!
QN-ELQA-TP4A-	DE.RCOX3.L5	Electrical /	Critical	Decision	Wrong polarity of the circuit RCOX3.L5 powered via the DFBXE.L5 due to a turn of the corrector magnet assembly inside the Q3L5 cold mass.

Non-conformities for sector 4-5 - IV

POL-RCOX3.L5-001		Instrumentation		Pending	Inversion of the labels at the level of the patch panel is required.
QN-ELQA-TP4E-HVQ-RCS.A45B1-001	DE.RCS.A45B1	Electrical / Instrumentation	Critical	Repair	Solid short to ground discovered during the HV qualification at cold. Fault localized in the instrumentation cable attached to the lead DFLBS.7R4.45 (Fischer connector).
QN-ELQA-TP4A-POL-RCSSX3.L5-001	DE.RCSSX3.L5	Electrical / Instrumentation	Critical	Decision Pending	Wrong polarity of the circuit RCSSX3.L5 powered via the DFBXE.L5 due to a turn of the corrector magnet assembly inside the Q3L5 cold mass. Inversion of the labels at the level of the patch panel is required.
QN-ELQA-TP4E-ICC-RQ7.R4-001	DE.RQ7.R4	Electrical / Instrumentation	Critical	Decision Pending	Missing cold voltage tap EE41 on the lead DFLCS.7R4.12 when measuring from the instrumentation rack. After investigation the voltage taps on the lead are still alive. The problem was localized in the connector between the cable segment and the instrumentation rack.
QN-ELQA-TP4A-POL-RQSX3.L5-001	DE.RQSX3.L5	Electrical / Instrumentation	Critical	Decision Pending	Wrong polarity of the circuit RQSX3.L5 powered via the DFBXE.L5 due to a cross of the bus-bars inside the DFBXE helium enclosure. Inversion of the labels at the level of the patch panel is required.
QN-ELQA-TP4E-HVQ-RQTF.A45B2-001	DE.RQTF.A45B2	Electrical / Instrumentation	Critical	Repair	Solid short to ground discovered during the HV qualification at cold. The short had disappeared before the investigation. HV test repeated successfully.
QN-ELQA-TP4A-POL-RQX.L5-001	DE.RQX.L5	Electrical / Instrumentation	Critical	Decision Pending	Circuit RQX.L5 powered via the DFBXE.L5: The electrical position of the current leads DFLX.3L5.3 and 4 connected to the Q3, Q2b, Q2a and Q1 coils is not consistent with respect to the LHC_Ref_DB (version 6.501). During the ELQA qualification the following connection has been identified: - Lead DFLX.3L5.3 connected to the Q1, terminal A; - Lead DFLX.3L5.4 connected to the Q3, terminal A; According to the LHC_Ref_DB: - Lead DFLX.3L5.3 shall be connected to the Q3, terminal A; - Lead DFLX.3L5.4 shall be connected to the Q1, terminal A; This non-consistency is systematic for each RQX circuit. The attached EDMS doc. which concerns the circuit RQX.R5 gives an overview of the actual configuration of the RQX circuits and describes the corrective actions.
QN-ELQA-TP4E-HVQ-RSD1.A45B1-001	DE.RSD1.A45B1	Electrical / Instrumentation	Critical	Repair	Discharge at 380 V during the HV qualification at cold. Fault localized in the instrumentation cable attached to the lead DFLBS.7R4.29 (Fischer connector).
QN-ELQA-TP4E-HVQ-RSF1.A45B2-001	DE.RSF1.A45B2	Electrical / Instrumentation	Critical	Repair	Solid short to ground discovered during the HV qualification at cold. The short disappeared during the investigation; the source of the problem is unknown. HV test repeated successfully.
QN-ELQA-TP4A-ONC-MU.R4-001	DE.RU.R4	Electrical / Instrumentation	Critical	Decision Pending	DC warm cables of the circuit RU.R4 (DFBMK.5R4) must be positionned on leads DFLBS.5R4.1 and DFLBS.5R4.4 due to the non-conformity affecting the continuity of the circuit (cold circuit connected to lead 4 instead of lead 2, see attached EDMS document). Cables are now positionned on leads 1 and 2 so the galvanic insulation cannot be installed.
QN-MPP-POW-RCBYH6.R4B1-001	RCBYH6.R4B1	Cold performance	Critical	Decision Pending	During PNO.a1 the postmortem analysis gives an error message: magnet resistance too high!
QN-MPP-POW-RCBYV6.R4B2-001	RCBYV6.R4B2	Cold performance	Critical	Decision Pending	During PNO.a1 the postmortem analysis gives an error message: magnet resistance too high!

Non-conformities for sector 4-5 - V

- Three main issues:
  - BPM in Q22.R4.B1: repairing decided.
  - Triplet quadrupoles (and correctors) polarity error: similar to sector 5-6.
  - Closed orbit correctors:
    - RCBYH6.R4B1 and RCBYV6.R4B2: reported problematic, but situation not clear. Feedback from Andrzej awaited.
    - RCBYH5.R4B1: it was reported problematic at LTC (R. Wolf 30/01/08). Due to its importance, a repairing action was launched and completed. Special tests should be envisaged to assess the final status.

Follow up of powering strategies during hardware commissioning - I

- Powering level for 80 A, 120 A, 600 A elements proposed and presented at the LTC (MG 23/04/08).
- After-LTC refinements.
- Documents for sectors 5-6 and 7-8 prepared (W. Venturini Delsolaro) and ready for formal approval.
- Remaining issue: parameters used for the HC of the various circuits and their compatibility with operation. In particular: dI/dt, and d^2I/dt^2.
- Meeting with HC people organised (31/04/08).

CIRCUIT	ACC_PNO (A/s^2)	ACC_PNO NOMINAL (A/s^2)	DIDT_PNO (A/s)	DIDT_PNO NOMINAL (A/s)	I_PNO (A)	I_PNO "NOMINAL" (A)	Last passed
RQS.A56B2	0.1	0.1	5	5	550	550	PNO.a3
RQT12.R5B1	0.1	0.1	5	5	400	400	PNO.a3
RQT12.R5B2	0.1	5	5	5	550	550	PNO.a3
RQT13.R5B1	0.1	0.1	5	5	400	400	PNO.a3
RQT13.R5B2	0.1	0.1	5	5	400	400	PNO.a3
RQT12.L6B1	0.1	0.1	5	5	400	400	PNO.a3
RQT12.L6B2	0.1	0.1	5	5	400	400	PNO.a3
RQT13.L6B1	0.1	0.1	5	5	400	400	PNO.a3
RQT13.L6B2	0.1	0.1	5	5	400	400	PNO.a3
RCD.A56B1	0.1	0.1	5	5	550	400	PNO.a3
RCS.A56B1	0.1	0.1	5	5	400	400	PNO.a3
RCS.A56B2	0.1	0.1	5	5	400	400	PNO.a3
RQTD.A56B1	0.1	0.1	5	5	550	550	PNO.a3
RQTD.A56B2	0.1	0.1	5	5	550	550	PNO.a3
RSD2.A56B2	0.1	0.1	5	5	400	400	PNO.a3
RCBXH1.R5	0.1	0.1	1.667	5	550	550	24 HOUR HEAT RUN
RCBXH2.R5	0.1	0.1	5	5	550	550	24 HOUR HEAT RUN
RCBXH3.R5	0.1	0.1	5	5	550	550	24 HOUR HEAT RUN
RCBXV1.R5	0.1	0.1	1.667	5	550	550	24 HOUR HEAT RUN
RCBXV2.R5	0.1	0.1	5	5	550	550	24 HOUR HEAT RUN
RCBXV3.R5	0.1	0.1	5	5	550	550	24 HOUR HEAT RUN
RQSX3.R5	0.1	0.1	5	5	550	550	PCS

Courtesy W. Venturini Delsolaro

CIRCUIT	ACC_PNO (A/s^2)	ACC_PNO NOMINAL (A/s^2)	DIDT_PNO (A/s)	DIDT_PNO NOMINAL (A/s)	I_PNO (A)	I_PNO "NOMINAL" (A)	Last passed
RQTL11.R5B2	0.01	0.1	1	5	400	400	PNO.d3
RSD1.A56B1	0.01	0.1	1	5	400	400	PNO.a3
RSD2.A56B1	0.01	0.1	1	5	400	400	PNO.a3
RSF1.A56B1	0.01	0.1	1	5	400	400	PNO.a3
RQS.R5B1	0.03	0.1	3	5	550	550	PNO.a3
RQTL11.L6B1	0.03	0.1	2	5	300	300	PNO.a3
RQTL11.L6B2	0.03	0.1	3	5	400	400	PNO.a3
RQTL11.R5B1	0.03	0.1	2	5	400	400	PNO.a3
RCD.A56B2	0.03	0.1	3	5	400	550	PNO.a3
RQS.L6B1	0.03	0.1	3	5	550	550	PNO.a3
RQTF.A56B1	0.03	0.1	3	5	550	550	PNO.a3
RQTF.A56B2	0.03	0.1	3	5	550	550	PNO.a3
RSD1.A56B2	0.03	0.1	3	5	400	400	PNO.a3
RSF1.A56B2	0.03	0.1	3	5	400	400	PNO.a3
RSF2.A56B1	0.03	0.1	3	5	400	400	PNO.a3
RSF2.A56B2	0.03	0.1	3	5	400	400	PNO.a3
RCO.A56B1	0.1	0.1	1	5	80	45	PCS
RCO.A56B2	0.1	0.1	1	5	80	45	PNO.a3
ROD.A56B1	0.1	0.1	5	5	400	45	PNO.a3
ROD.A56B2	0.1	0.1	5	5	400	45	PNO.a3
ROF.A56B1	0.1	0.1	5	5	400	45	PNO.a3
ROF.A56B2	0.1	0.1	5	5	400	45	PNO.a3
RSS.A56B1	0.1	0.1	5	5	400	45	PNO.a3
RSS.A56B2	0.1	0.1	5	5	400	45	PNO.a3

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Follow up of powering strategies during hardware commissioning - II

- Next steps:
  - Evaluate time-dependent parameters based on operational requirements. In particular, elements used for feedback should be considered in detail.
  - Iterate with HC people (meeting in 10 days).