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## HL-LHC 11T Trim Powering (WP6b) Meeting Minutes n # 2

*Date:* 2017-11-01

*Project/Activity:* HL-LHC



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**Attendees:** Vicente Raul Herrero Gonzalez (VH), Quentin King (QK), Michele Martino(MM), Hugues Thiesen (HT), Yves Thurel (YT), Benjamin Todd (BT), Samer Yammine (SY)

**Agenda:**

- Discussions on the connection of the 11T trim power converter to 4 conduction cooled cables

**DISCUSSION**

SY presented the scheme of powering the 11T trim circuit by using a 4 conduction cooled cables configuration. SY stated that this could permit of using the already developed LHC conduction cooled cables and would be very important to the HL-LHC project due to lack of time to developing a new technology for the trim leads.

The initial requirements from WP6a (Cold Powering Work Package) to use the leads are the following:

- Current balancing in operation (could be in a passive manner)
- Ensure protection of leads by a voltage threshold of 100 mV
- Ensure that the current does not surpass 130 A per lead via passive balancing during operation
- When either of the threshold are surpassed (100 mV or 130 A), a power abort (FPA or SPA to be determined) of the trim circuits shall be generated.

For operation, SY mentioned that the proposed solution is imposing identical DC cables for the connection. YT commented that this is a requirement to transfer to EN-EL (WP17). In addition, they must estimate the maximal resistance deviation of the DC cables.

SY mentioned that the demand of ensuring the protection of the leads with a voltage threshold should be implemented to the 4 leads. YT and BT informed that, in contrary to 60 A and 120A PCs, the functionality of the voltage threshold does not exist in the R2E-LHC600A-10V power converter.

To insure that the currents do not surpass the 125 limit in each lead, SY showed a proposal of using current sensors on each cable. A new radiation-tolerant card would receive the signals and would generate a slow power abort (remove the PC Permit) in case of unbalance or a 125 limit is surpassed (strategy to be determined).

SY showed that in order not to create any perturbation, an SPA with a maximum 30 A/s should be generated. A power failure generated on the external fault chain could be also used but this will generate a high di/dt in the circuit. In addition, an SPA should be sent to the RB power converter. Therefore, this functionality should be integrated inside the global quench protection strategy of the RB circuit.

After the input, BT informed that the development of additional cards is not taken into account in the R2E project and from first estimation considers that this is not feasible in the required time for installation in LS2.

BT, MM and YT remarked that the design of the system without an additional margin from the CLs includes a high risk since a perfect equilibrium cannot be ensured in a passive way.

**ACTION**

Report to the MCF that on the discussions of the CLs protection	MM, SY
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**Documents:**



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**Prepared by:** S. Yammine

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**Approved by:** Attendees

**Date:** 201Y-MM-DD

**Distribution List:**