



Operating temperature of Q5 in Point 6 based on 2018 hardware tests

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Thanks A. Verweij

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RQ5.L6/R6

Current needs for Q5.L/R6

* Currents include 50 A as a stability margin

7 TeV

- Taking all possible sets of ATS optics which are developed for LHC for 7 TeV (S. Fartoukh) and converting them in currents with the magnetic models (F. Hagen), we get for the four circuits:

Circuit	I _{nom} [A]	I _{lay@7} [A]	Difference
RQ5.L6B1	3910	3610	-300
RQ5.L6B2	3742	3610	-132
RQ5.R6B1	3543	3610	167
RQ5.R6B2	3410	3610	200

7.5 TeV

- From all possible optics and configurations for HL-LHC@7.5 TeV (R. De Maria), not necessarily corresponding to the the previous one, and converting them in currents, we get for the four circuits:

Circuit	I _{nom} [A]	I _{lay@7.5} [A]	Difference	HL-LHC@7.5 TeV	
				I _{nom@7TeV} [A]	Difference
RQ5.L6B1	4025.6	3900	-125.6	3754.6	145.4
RQ5.L6B2	4205.9	3900	-305.9	3928.2	-28.2
RQ5.R6B1	3977.3	3900	-77.3	3708.3	191.7
RQ5.R6B2	3940.4	3900	-40.4	3673.3	226.7

HLLHCv1.4

<https://indico.cern.ch/event/750135/contributions/3104578/attachments/1702836/2742909/HL14-WP2>



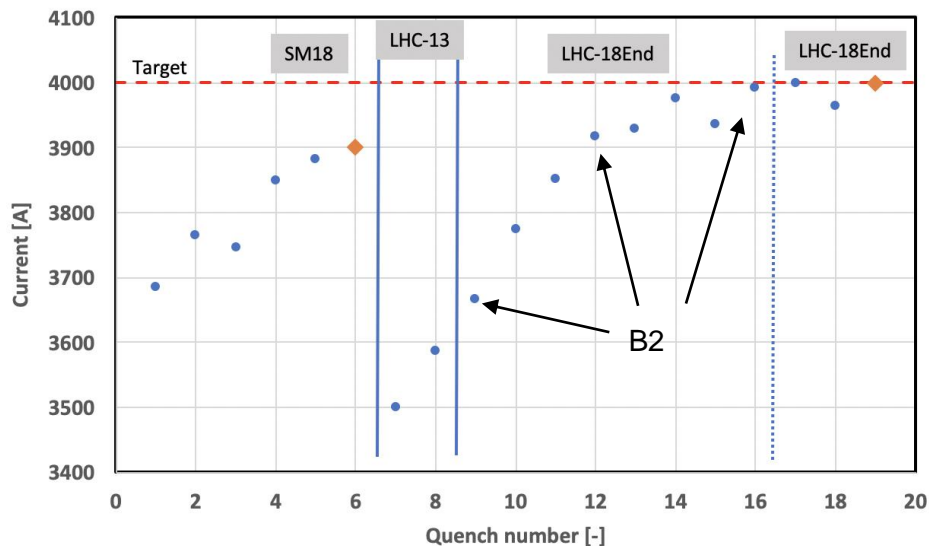
30/08/18

56th HL-LHC TCC

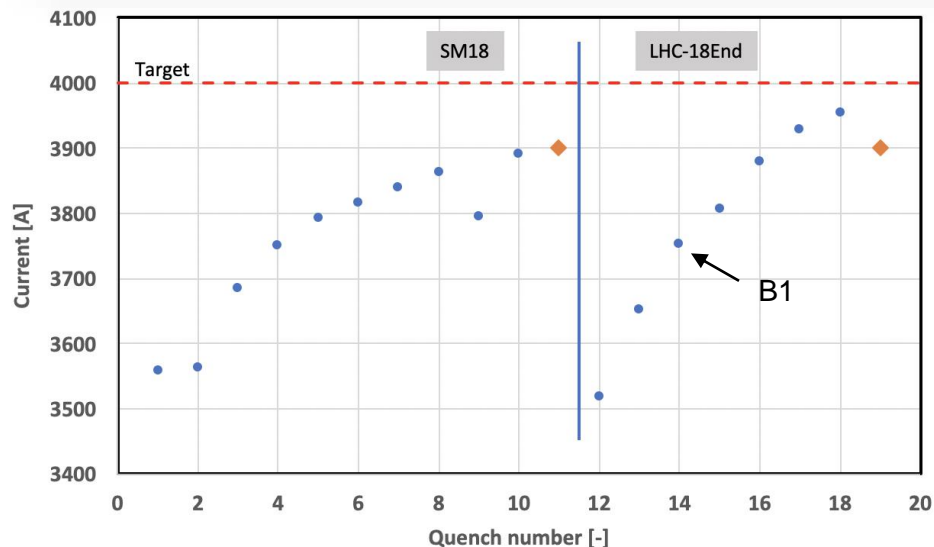
Mirko Pojer – BE/OP

- Somehow erratic behavior at high current as we are at 90-95% of short sample. (M. Pojer)
- Great majority of SC magnets do not show erratic behaviour at 90-95%, including almost all MB's during the SM18 reception tests. (A. Verweij)

RQ5.L6



RQ5.R6



Tests and requests

Hardware test	Date	Ultimate [A]	Quenches	Last Quench [A]	Stable Plateau [A]
Q5.L6	21/3/2018	3900	10	3999	3950
Q5.R6	7/12/2018	3900	7	3956	3900

- 95% confidence Q5.L6, Q5.R6 will reach 3900 A +50 A after LS2.
- A margin of 50 A seems to be sufficient from what we know from the past years.
- Energy deposition could bring the reliable operating current down.

A. Verweij

	Ideal field +1% at 7TeV B1/B2			Operational current B1/B2	
	Round $\beta^*=15/15$ cm	FlatCC $\beta^*=7.5/18$ cm	Flat $\beta^*=7.5/30$ cm	[A, 7 TeV]	[A, 7.5 TeV]
HLLHCV1.4 (w. MS in Q10)					
Q5.L6 [T/m]	165/167	161/168	150/172	3705/3879	3975/4157
Q5.R6 [T/m]	160/153	162/152	163/149	3659/3427	3928/3679

- Operation at 7 TeV: 4.5 K is sufficient for Q5.L6 and Q5.R6 assuming 3900 A stable current.
- Operation 7.5 TeV: Q5.L6 needs 1.9 K, Q5.R6 is borderline (flat optics needs tighter margins)

Backup

Optics transitions

