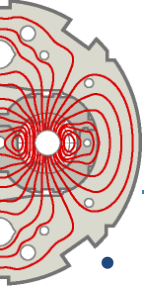


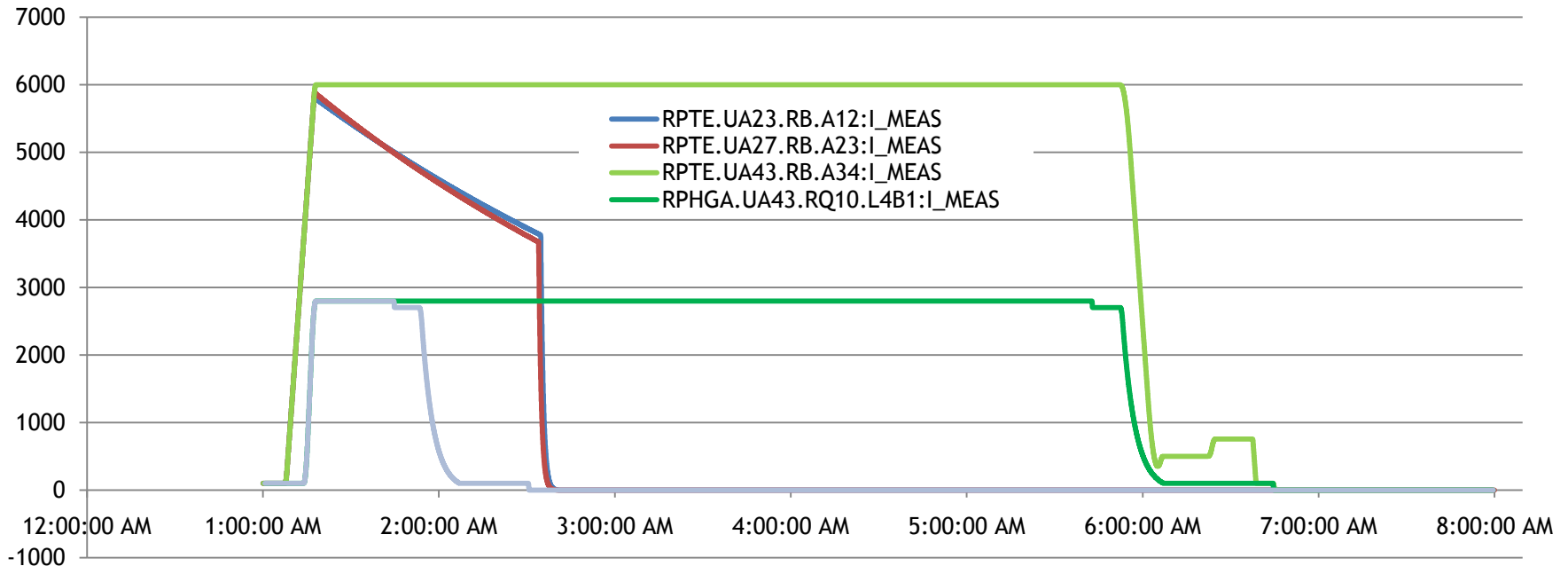
Current Leads regulation during Heat Runs

S. Le Naour,
MP3 meeting : 8/3/2011

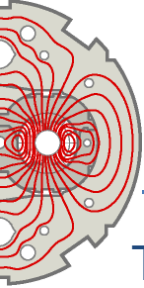


Heat Run of the 18th feb. 2011

- All sectors were powered up to PNO current, but at ~5800A, RB.A12 & RB.A23 failed and discharged into a slow abort mode.



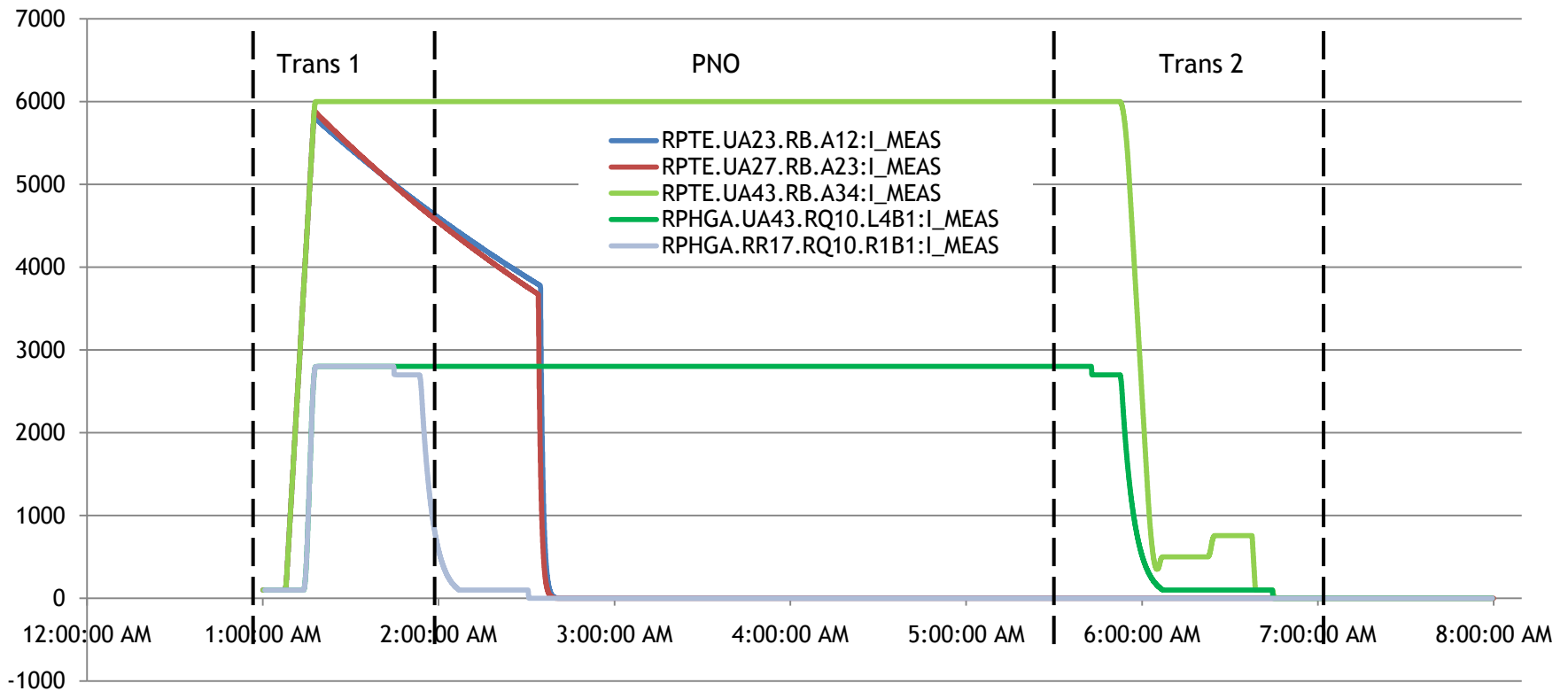
- Other circuits were not powered or tripped after few minutes
 - All circuits in sectors 12 and 23
 - All triplets, RCBX, RQSX circuits included
 - RSS, ROD, ROF, RSD2, RSF2, RSD1, RSF1.A78B1
 - RSS.A81B1, RQT12.R8B1, RQT13.L7B1
 - RQ9.R4
 - RU.L4/R4
 - RCO.A56; RCO.A78

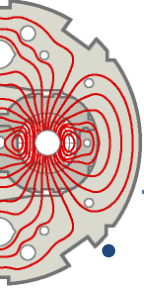


Heat Run of the 18th feb. 2011

To analyse the signals of the heat run, 3 periods are considered

- Trans 1 : Ramp to nominal
- PNO : Stationary regime at PNO current
- Trans 2 : Ramp down to 0A

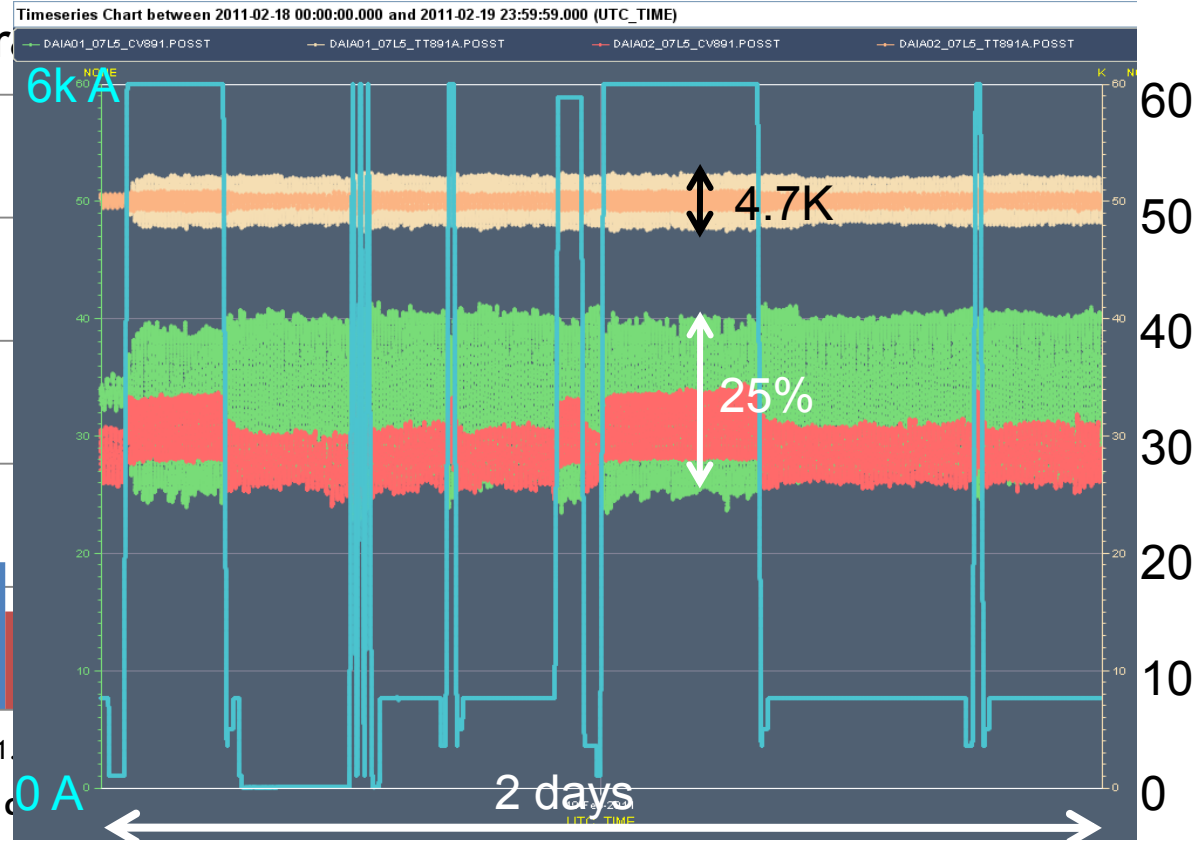
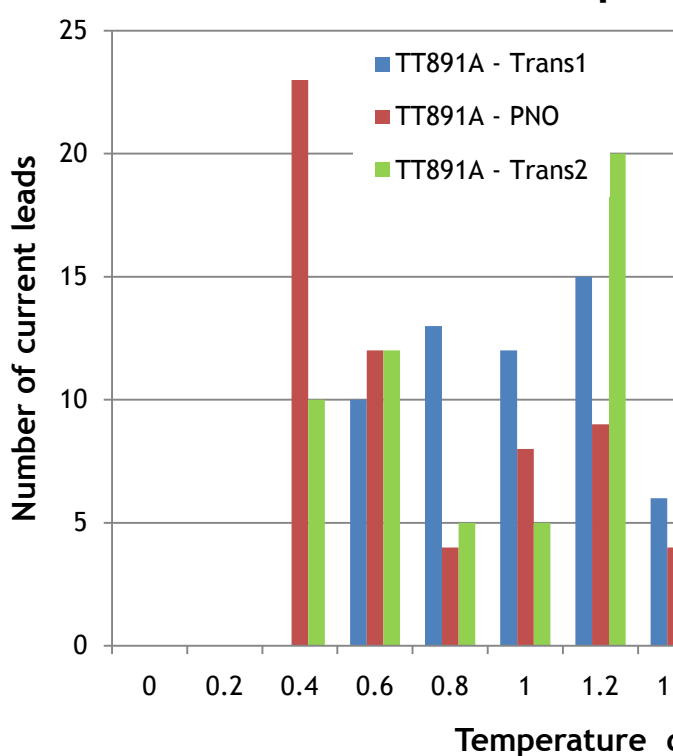




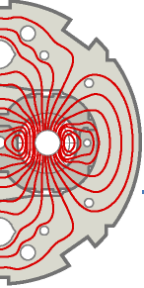
CL Type A (RB, RQD/F)

- Histogram of temperature variation (Tmax-Tmin) around the 50K of regulation (TT891A) for the 3 powering periods RB.A45 (DAIA01)

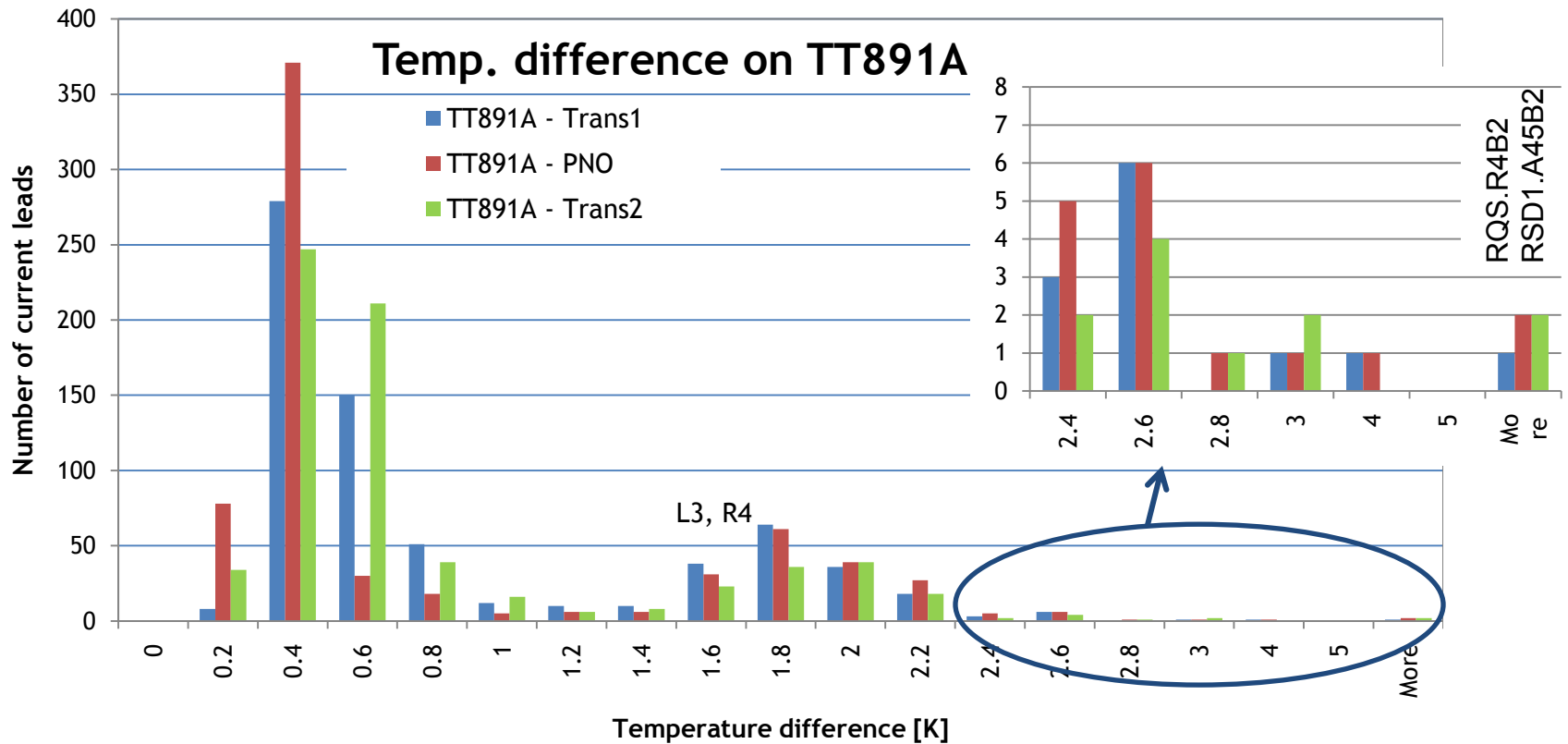
Difference of temperature



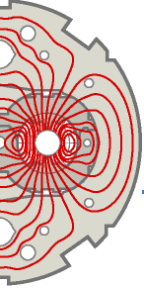
- During the transient phases, the temperature difference is around 1.2K, but is less during PNO phase except for CL DAIA01



CL Type B (600A circuits)



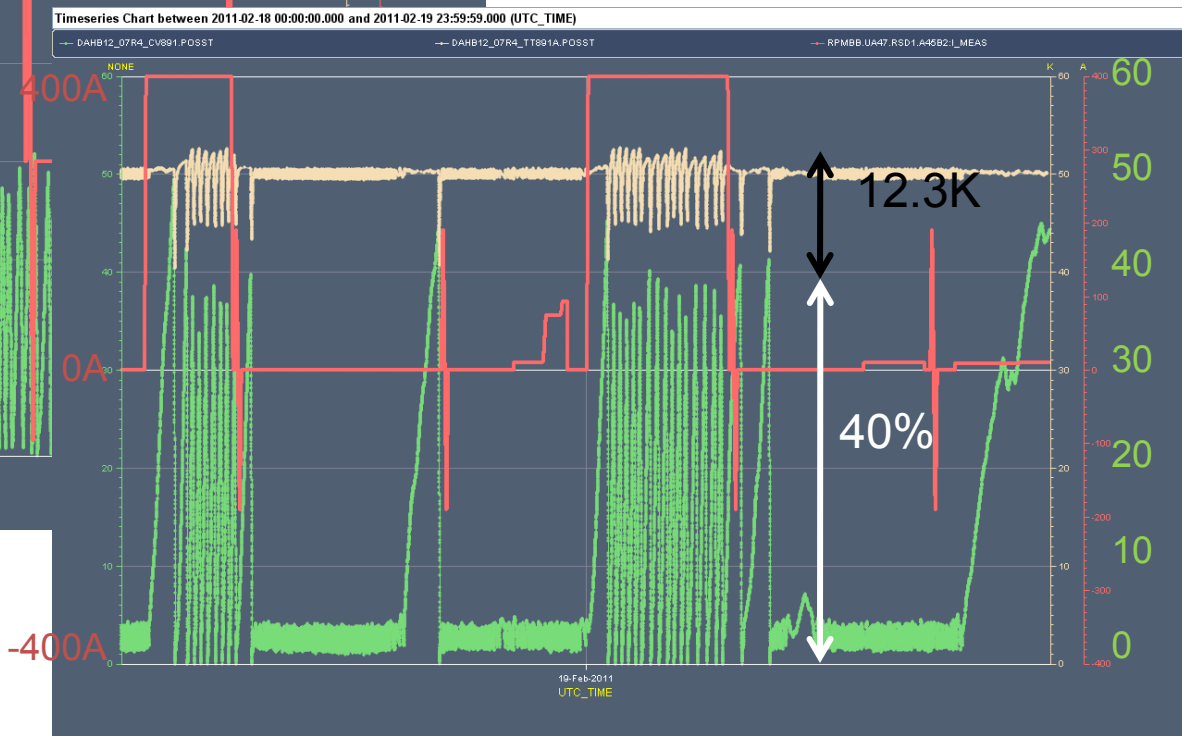
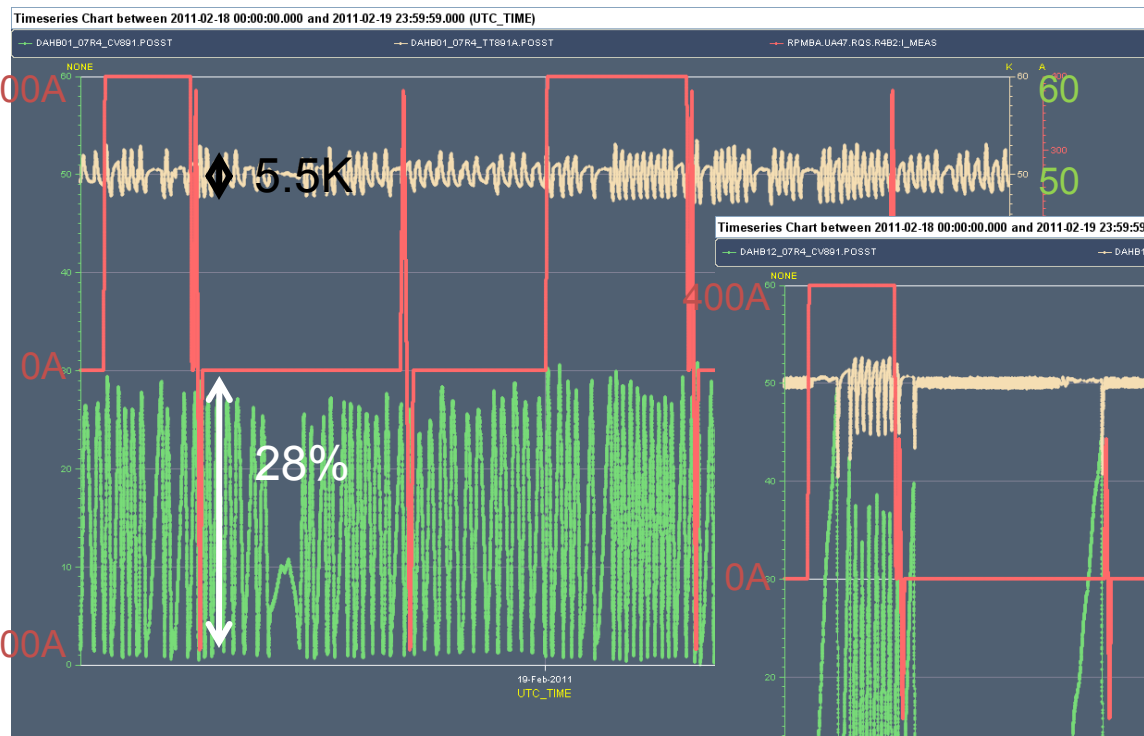
- For 73% of current leads, $\Delta T \leq 1K$
- For 25% of current leads, $1 < \Delta T \leq 2.2K$
- 2 circuits with ΔT more than 4K



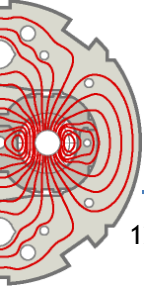
CL Type B (600A circuits)

– RQS.R4B2 (DAHB01)

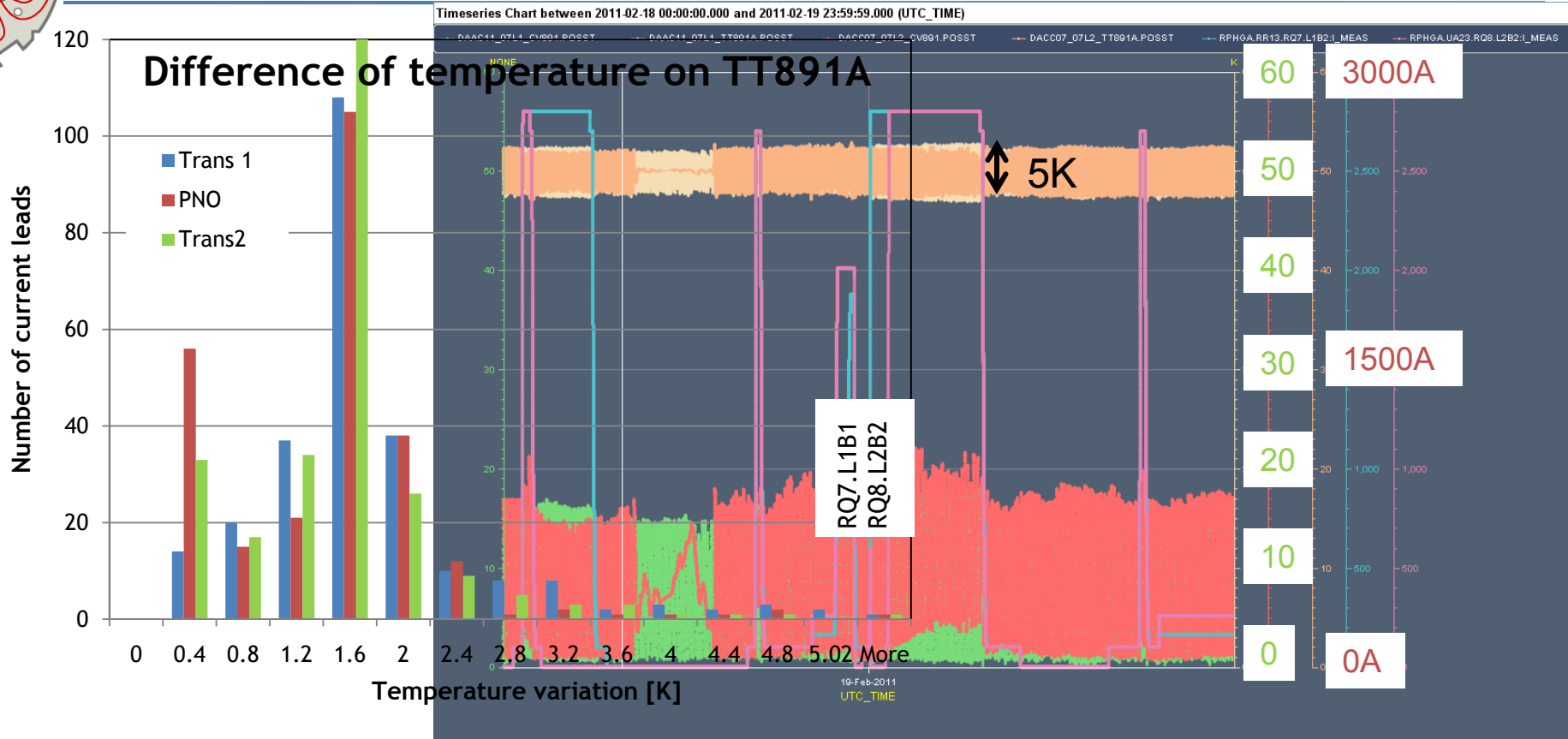
– RSD1.A45B2 (DAHB12)



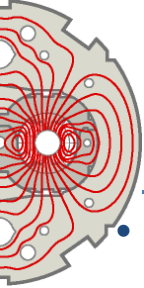
- -Current [A]
- -Valve opening [%]
- - Temperature [K]



CL Type C (IPD/IPQ)

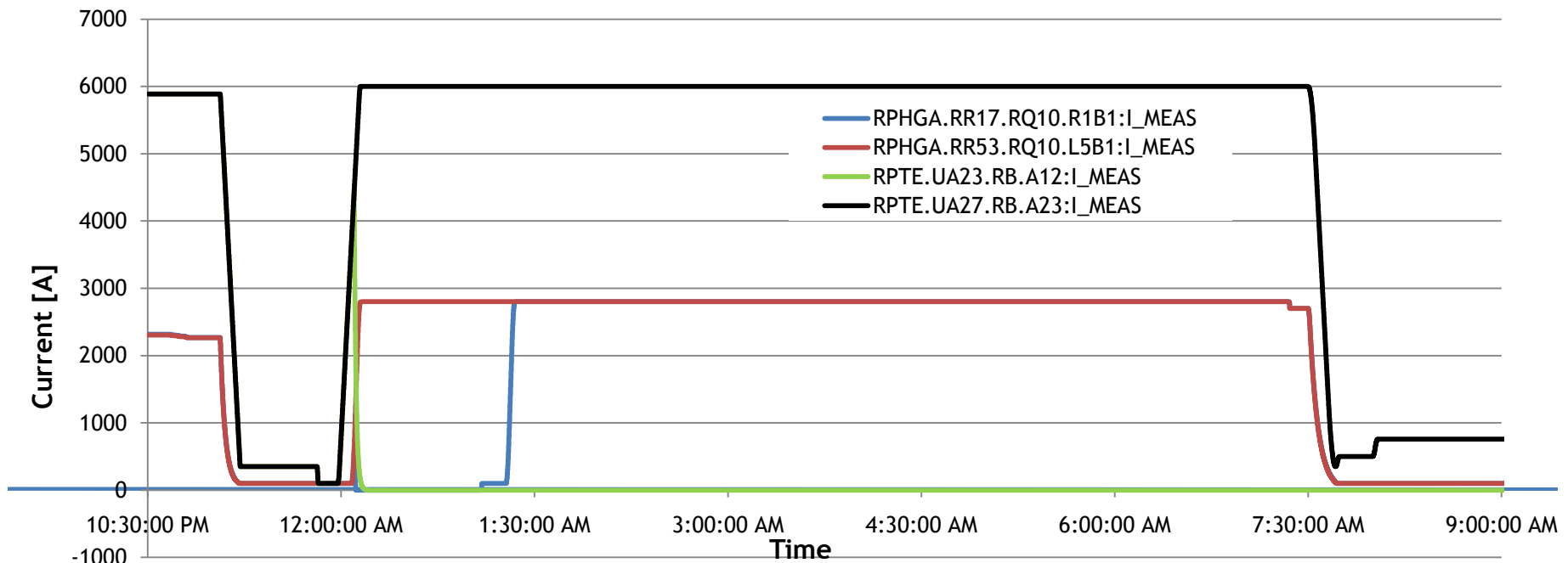


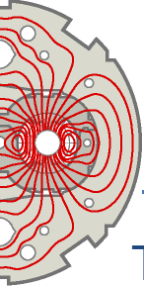
- For 90% of current leads, $\Delta T \leq 2.5K$
- 2 circuits with ΔT more than 4K and constant with or without current



Heat Run of the 19th feb. 2011

- All sectors were powered up to PNO current, but RB.A12 failed at 4200A. All circuits but RB were repowered later on
 - RSS,ROD,RSFD/F.A78B1 and B2 later on and RQTL9.L7B1 at the end
 - RQTD/F,RSD/F,RSS,ROD/F.A67B2
- Were not powered during PNO period
 - RB.A12
 - RSF2.A12B1,RQS.A67B1,RQT13.L7B1
 - RSS.A78B1,RSF2.A78B2,RSS.A81B1
 - RCO.A56; RCO.A78
 - RU.L4/R4

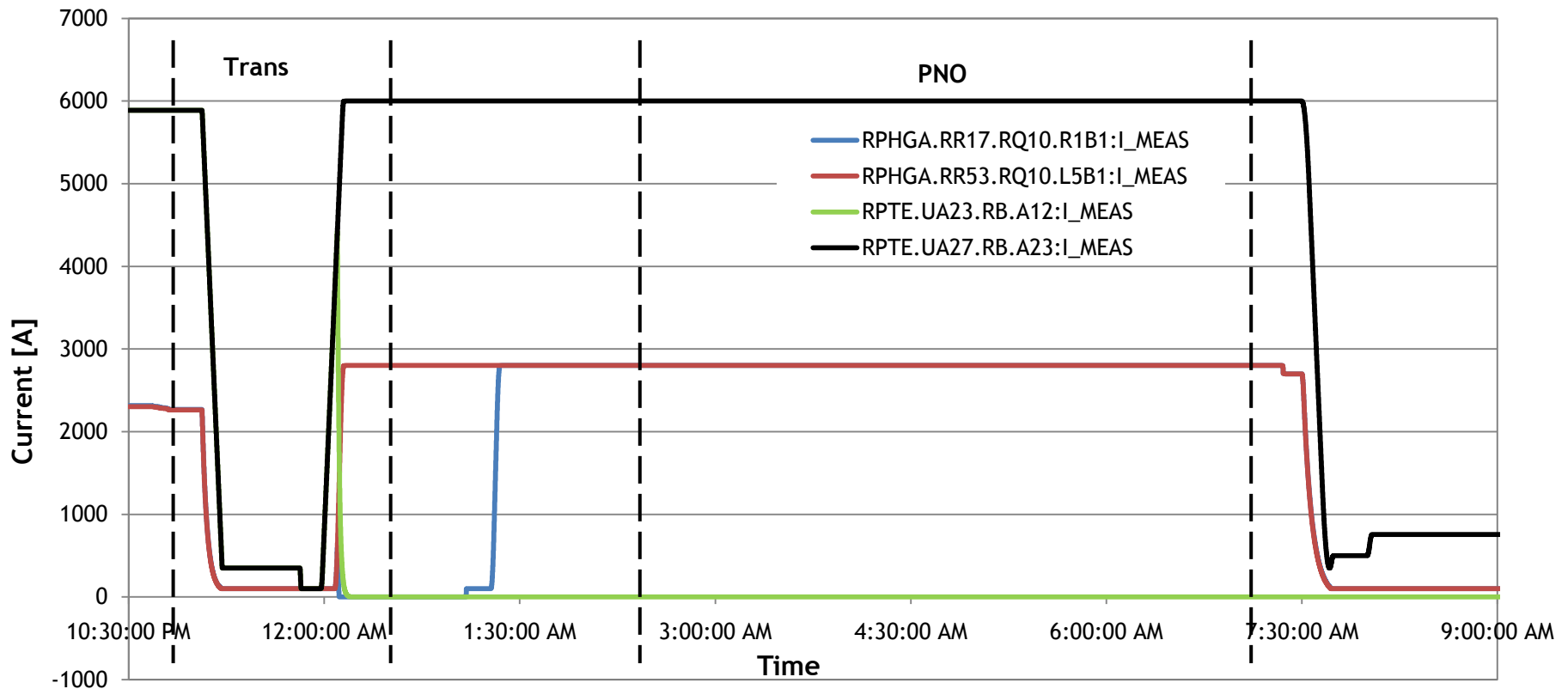




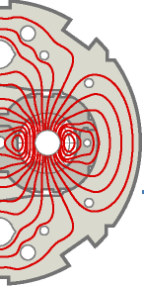
Heat Run of the 19th feb. 2011

To analyse the signals of the heat run, 2 periods are considered

- Trans : Ramp down and Ramp up to nominal
- PNO : Stationary regime at PNO current

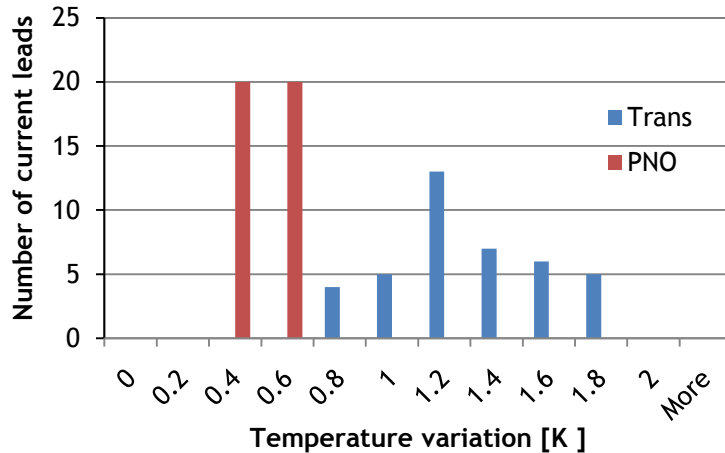


Nothing special to point out on current leads type A,B and C for this heat run

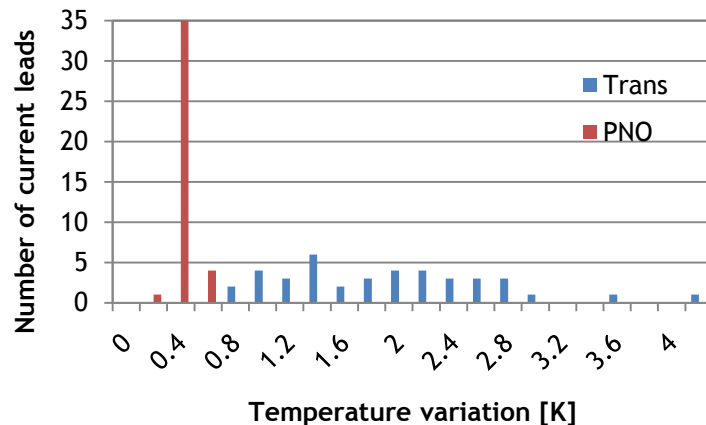


CL Type X (RQX, RD)

Difference of temperature on TT891A



Difference of temperature on TT893

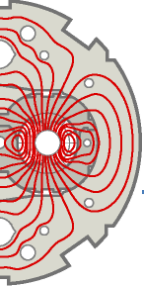


- **TT891A**

Temp.variation between 0.8 to 1.8K during transient regime, but less than 0.8K during PNO

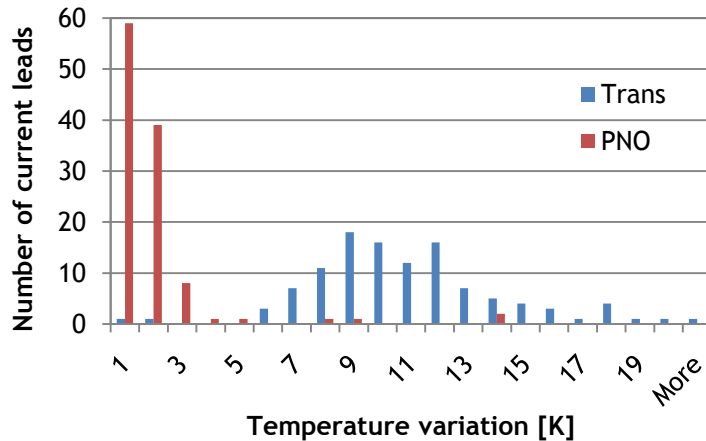
- **TT893 (top end)**

Temp.variation between 0.8 to 4K during transient regime, but less than 0.8K during PNO.
Maximum value : 308K



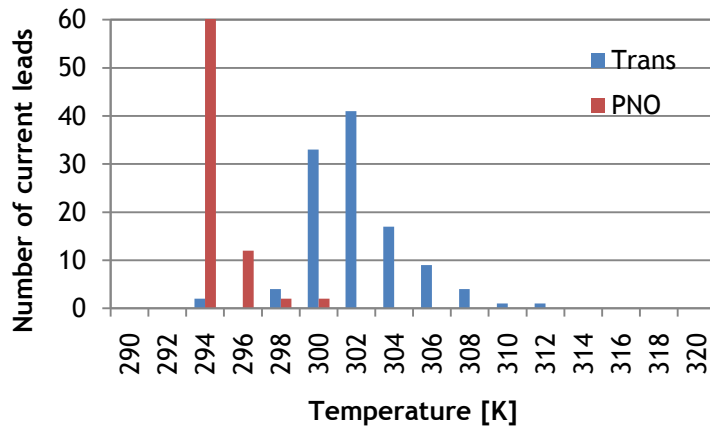
CL Type Y (RCBX, RQ SX)

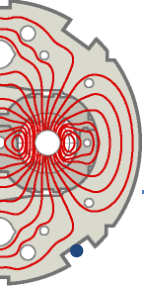
Difference of temperature on TT893



- No HTS current lead!
- Large variation of the temperature of the top of the current lead (up to 20K!) but the maximum temperature is less than 312K

Temperature on TT893





Conclusions

In order to identify abnormal regulation on the current leads, temperature difference ($T_{max}-T_{min}$) over transient or stationary regims were calculated and compared inside a same type of current lead types

- Nothing dramatic was observed only few circuits with a larger temperature variation, but no overheating and no out of control temperature drift.
 - No overheating but overcooling current leads !
 - RCS.A34B1 powered to 400A
 - No CV values
 - $43 < DAGB43-TT891A < 45K$
 - RD2.R1 powered to 2300A
 - No CV values (Leaking valve?)
 - $45,6K < DLBC01 - TT891A < 50.4K$
-