MBRDS1c test results – 2nd down

Salvador Ferradas, Raphael Bouvier, Vincent Desbiolles, Jerome Feuvrier, Jean-Luc Guyon, Franco Mangiarotti, Gerard Willering

Test plan: EDMS #224267

*D2 short model test results – 2 September 2020*

Contents

Reminder:
Main results of CD 1 were presented by Salvador on 12 August, see https://indico.cern.ch/event/944842/

Naming convention

- MBRDS1c arrived at SM18 in early June.

- During assembly, the front plate was installed rotated 180 degrees. The new naming convention is shown.

- The new coil is then V1NA
- The old aperture is V2N.

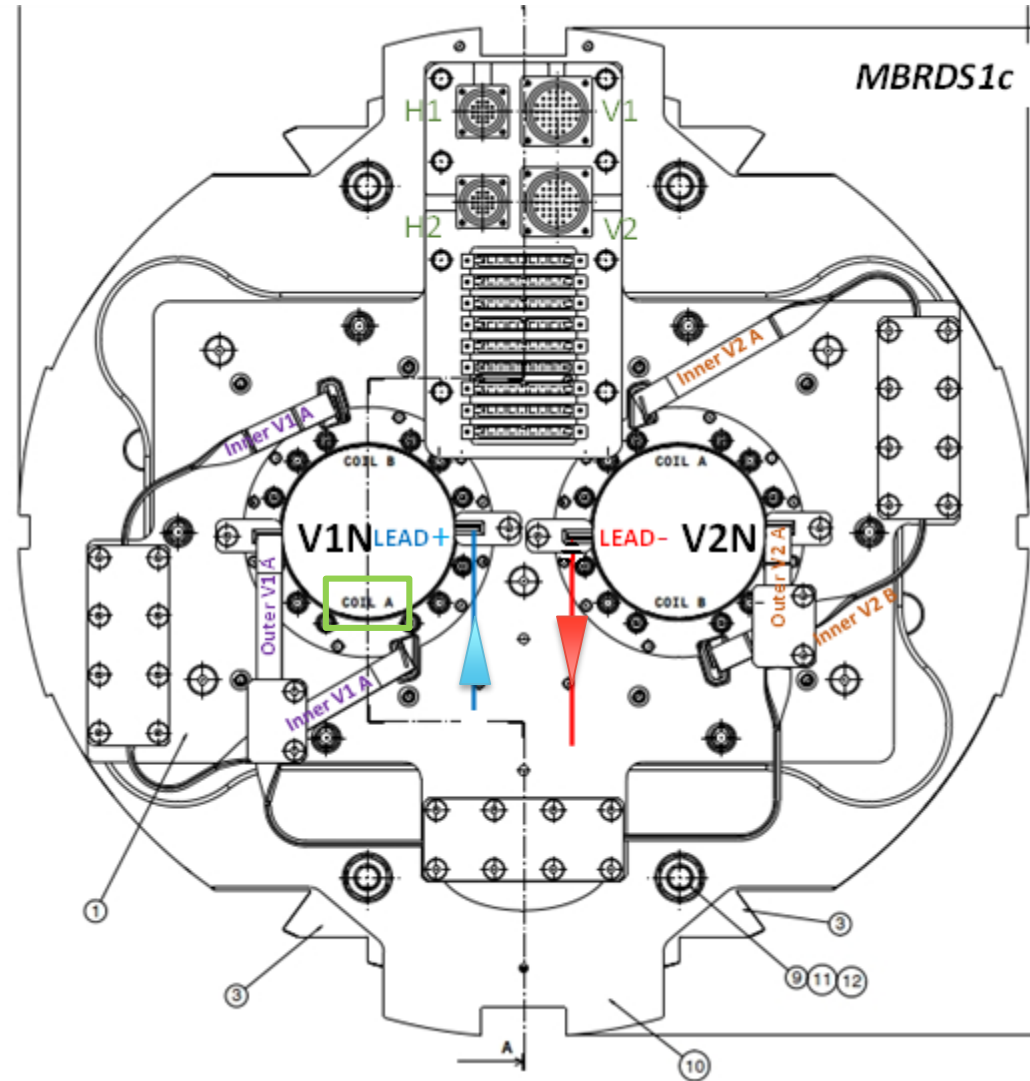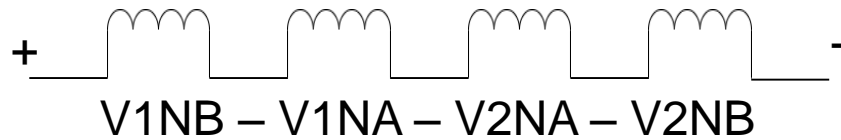- The magnetic measurement shaft was installed in V2N.

Naming convention

- MBRDS1c arrived at SM18 in early June.

- During assembly, the front plate was installed rotated 180 degrees. The new naming convention is shown.

- The new coil is then V1NA
- The old aperture is V2N.

- The magnetic measurement shaft was installed in V2N.

V1NB – V1NA – V2NA – V2NB
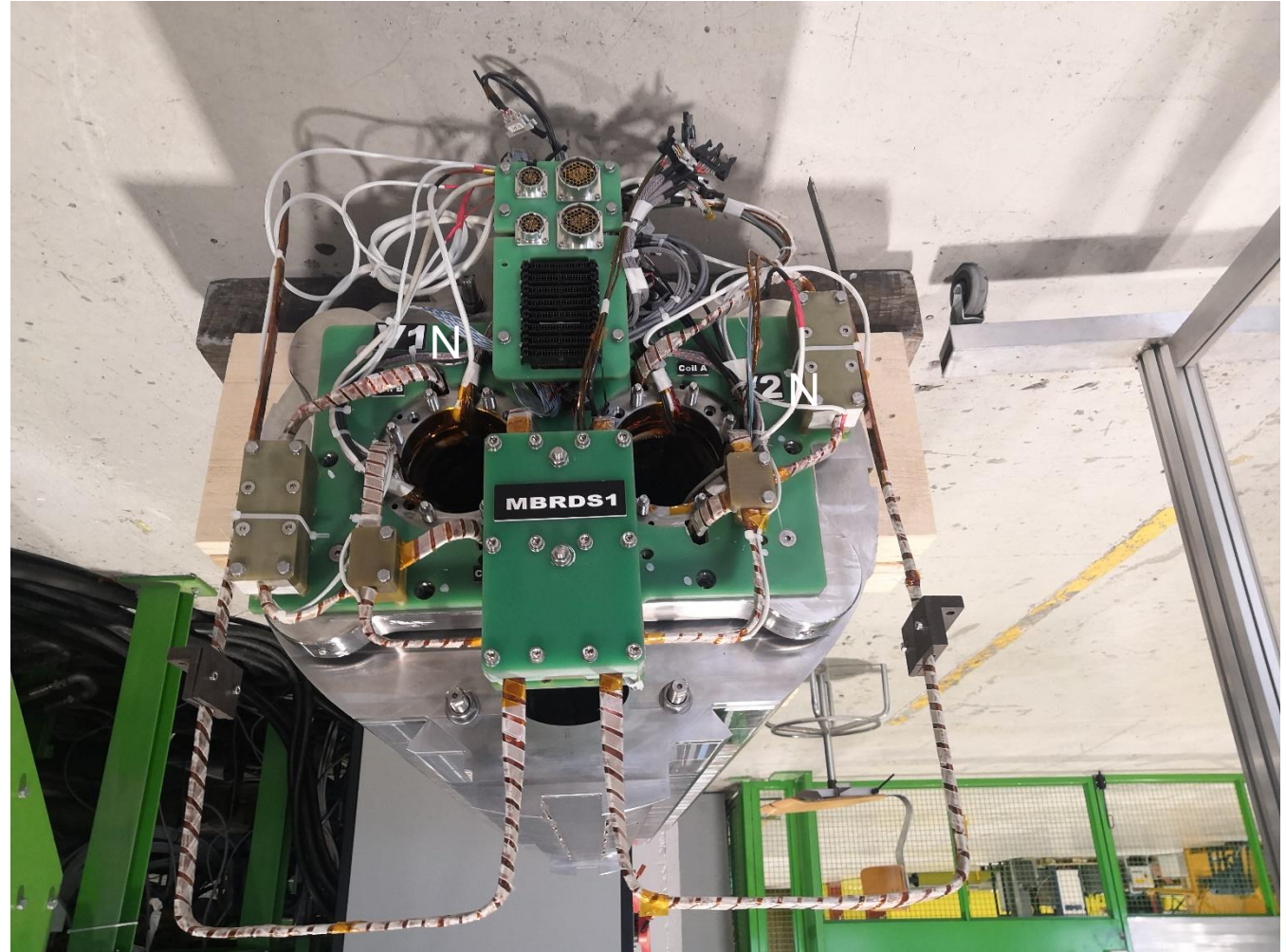
Retraining after thermal cycle

MBRDS1 Training, 10 A/s
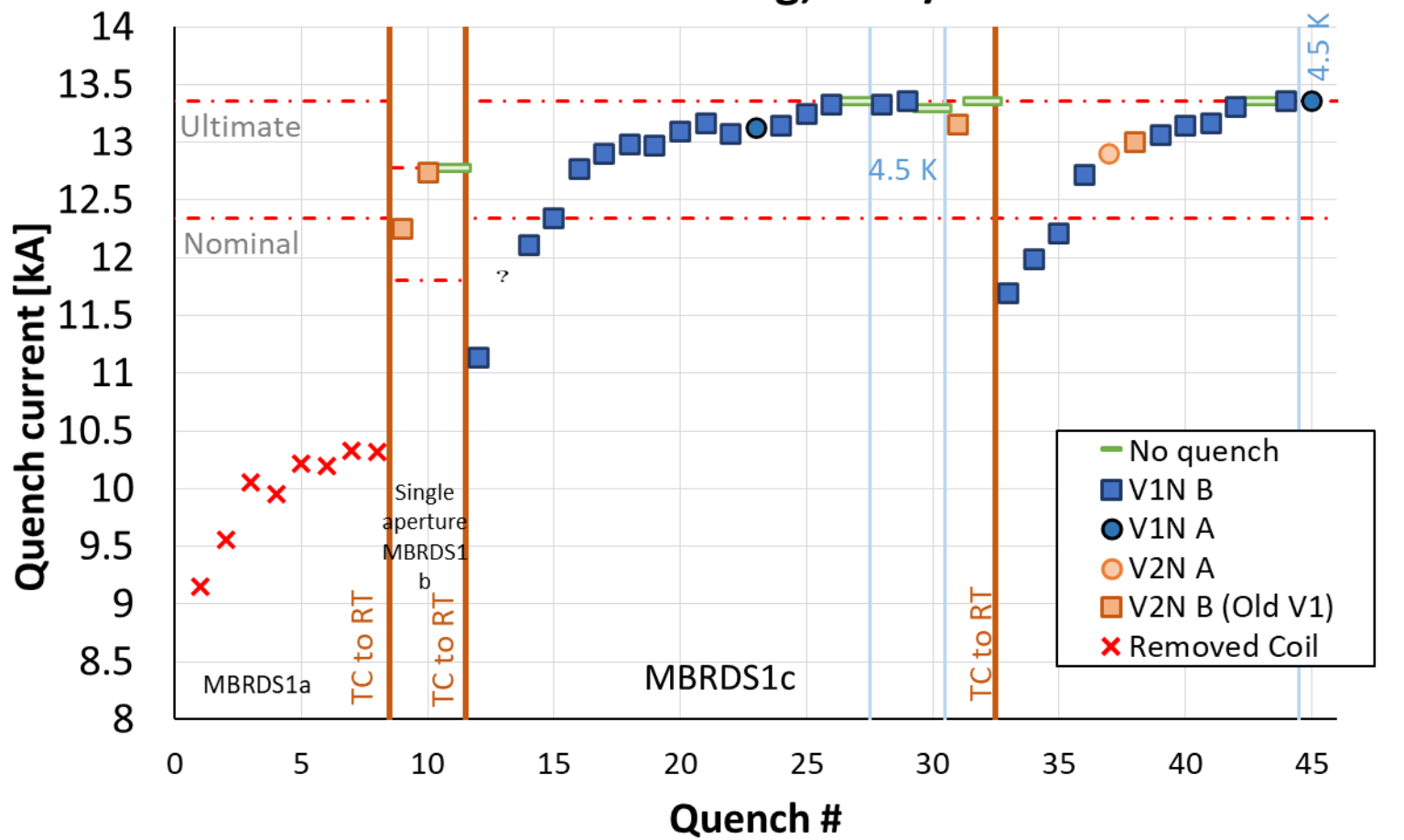
Short summary table

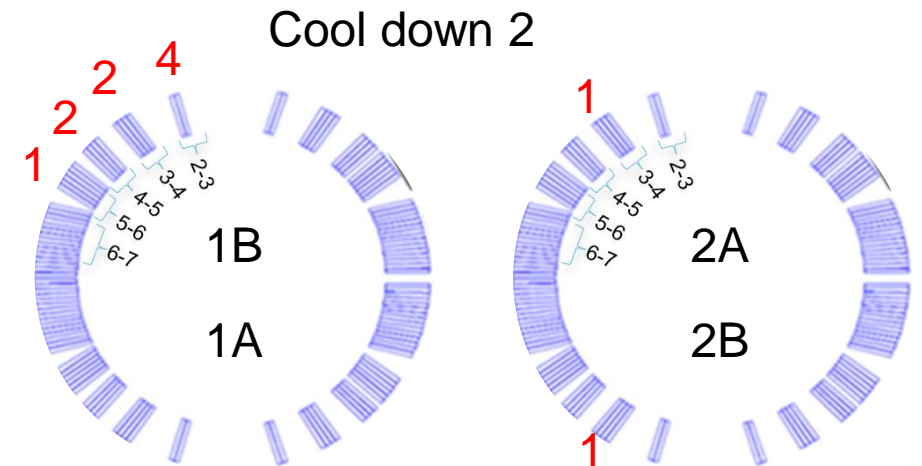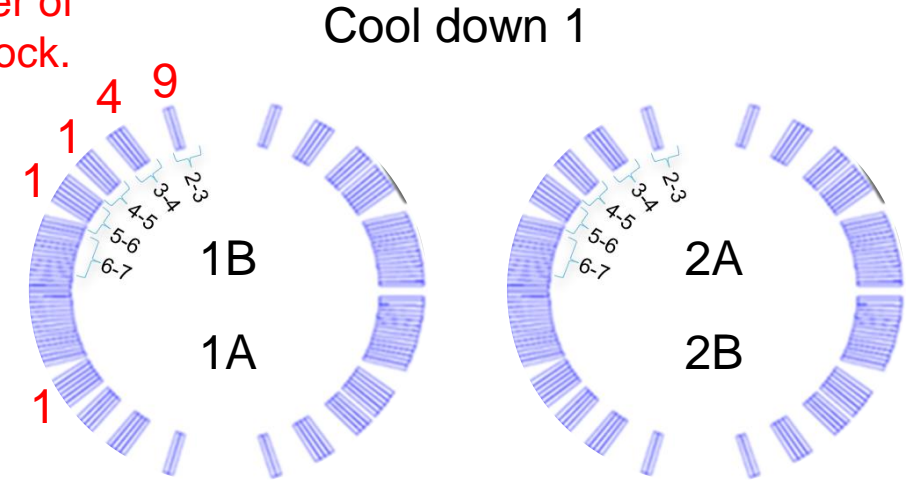|	# Quench to I_nominal	# Quench to I_ultimate
MBRDS1c CD 1	3	15
MBRDS1c CD 2	3	10

- 10 quenches to ultimate current.
- An additional quench at ultimate current during protection studies, just at start of plateau.
- An additional quench at 4.5 K, just when reaching ultimate current.

Summary training quench locations
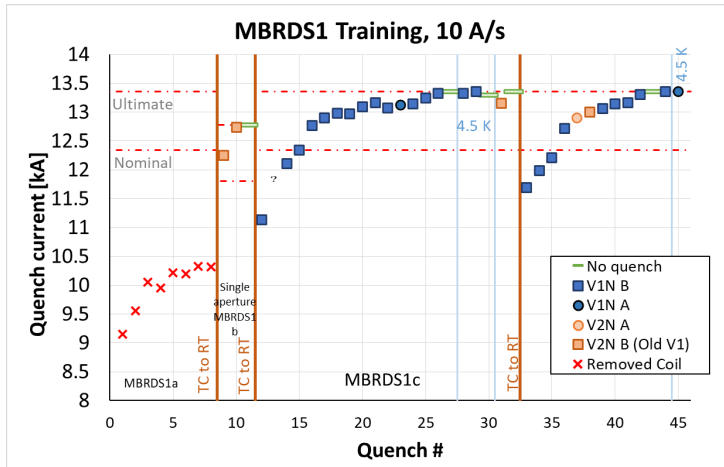
In red the number of quenches per block.

Cool down 1

Quench location	CD 1 # quench	CD 2 # quench
1B 2-3	9	4
1B 3-4	4	2
1B 4-5	1	2
1A 5-6	1	
2A 3-4		1
2B 3-4		1
Data missing	1	
Total	15	10

Cool down 2

Note: Only the block number of the quench is known. If it is left or right half is not known.

Protection studies

In CD 2 protection studies were performed:
QH firing of 2 QH circuit (with delayed Energy Extraction)

The data is available for comparison with models.
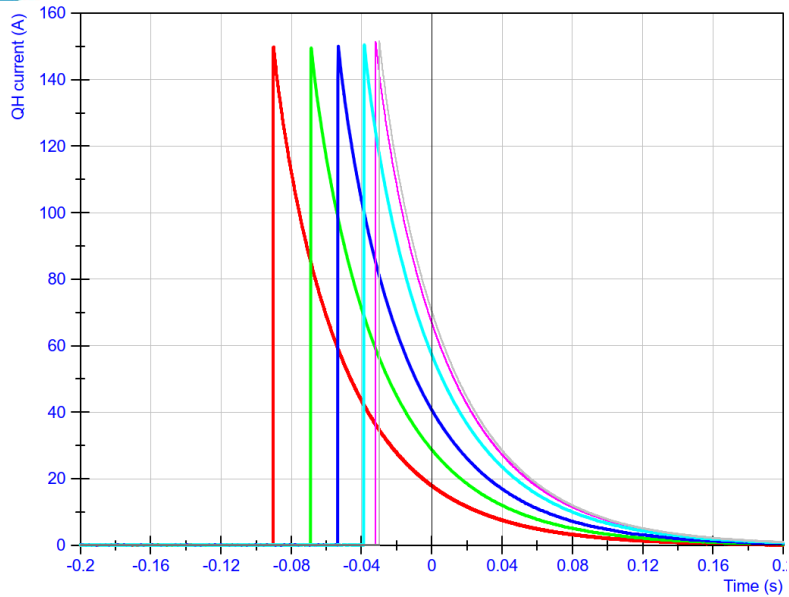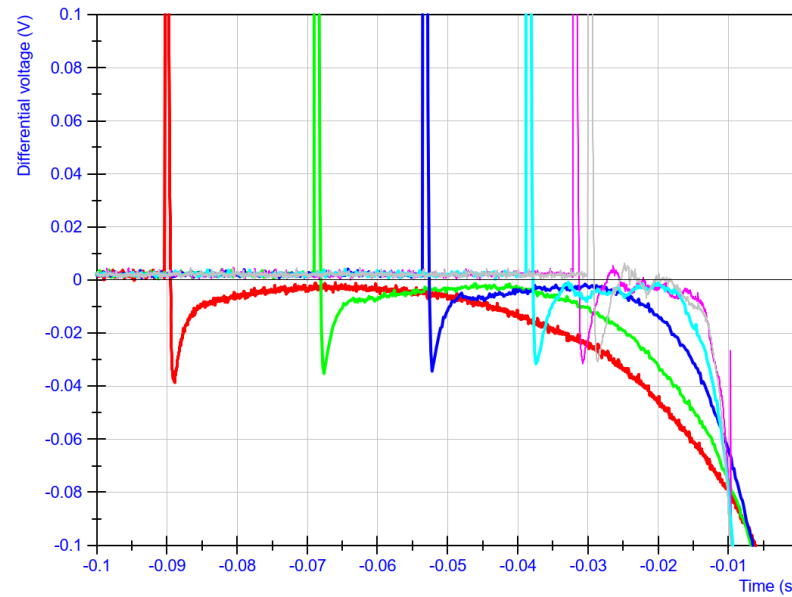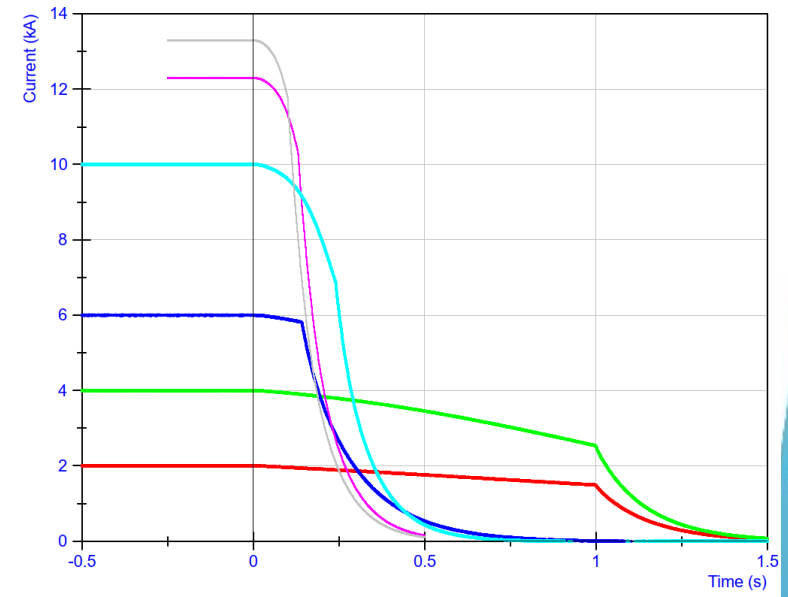

Example of QH firing (multiple tests)

Example of voltage build up due to quench (multiple tests)

Example of current decay (multiple tests)

Magnetic measurements

After CD 1 the planned insertion of the magnetic measurement shaft in the second aperture proved impossible.

No magnetic measurements were performed in CD 2

Electrical insulation test

	Resistance [GΩ]			
Circuit	CD 1 before powering	CD 1 after powering	CD 2 Before powering	CD 2 After powering
Coil – GND (1710 V)	15.9	Humidity issue	11.3	6.9
Coil – QH (2355 V)	586	539	9.3	143
QH – GND (2352 V)	424	1150	0.154	40.5

Cold tests in LHe

	Resistance [GΩ]			
Circuit	Reception Stand alone	Before CD 1 On insert	After CD 2 On insert	After CD 2 Stand alone
Coil – GND (370 V)	3.5	1.3	29.9	To be done
Coil – QH (460 V)	30	20	74.7	To be done
QH – GND (460 V)	21	21	77.2	To be done

Warm tests in air

Fluctuations in the insulation test results. In the test station there could be impact of a large amount of wiring and humidity, and in the GΩ range this may impact the results. With good results in the last tests we have confidence that the magnet insulation is OK.

Conclusions

- In cool down 2 the magnet reached ultimate current again. Training was faster than in CD 1.

- Also at 4.5 K ultimate current was reached.

- Magnetic measurements in second aperture could not be performed.

- Protection studies performed.

- HV test showed some difficulties, but we think this is related to test conditions, not to the magnet or QH circuits.

The magnet is now warm, cold tests are finished.