



MBRDS1c - Protection studies

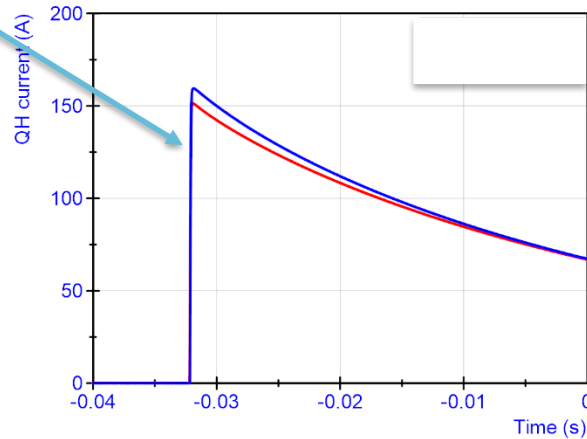
Gerard Willering

D2 short model test results – 3 September 2020 - Additional slides

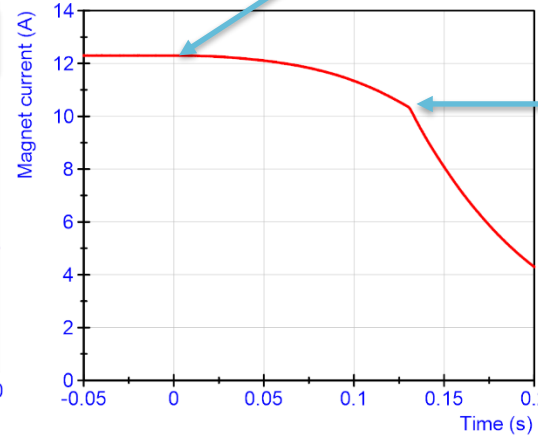


Provoked quench at nominal current

QH firing

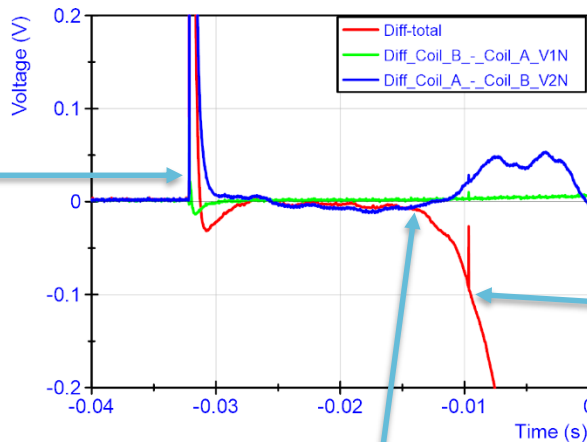


Power converter off at 0 s. Could give small perturbations in voltage signals.



Energy extraction is activated with a delay up to 1 second. Clearly visible in the current decay change.

Perturbation in voltage signal due to QH firing

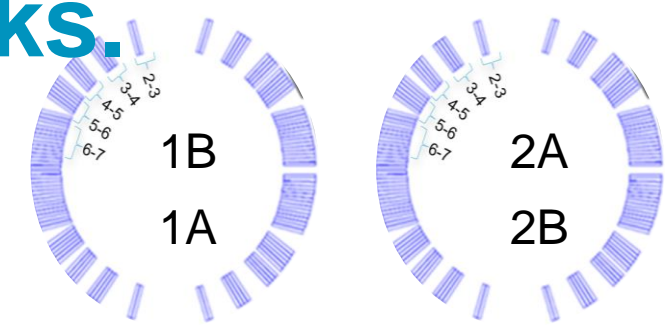
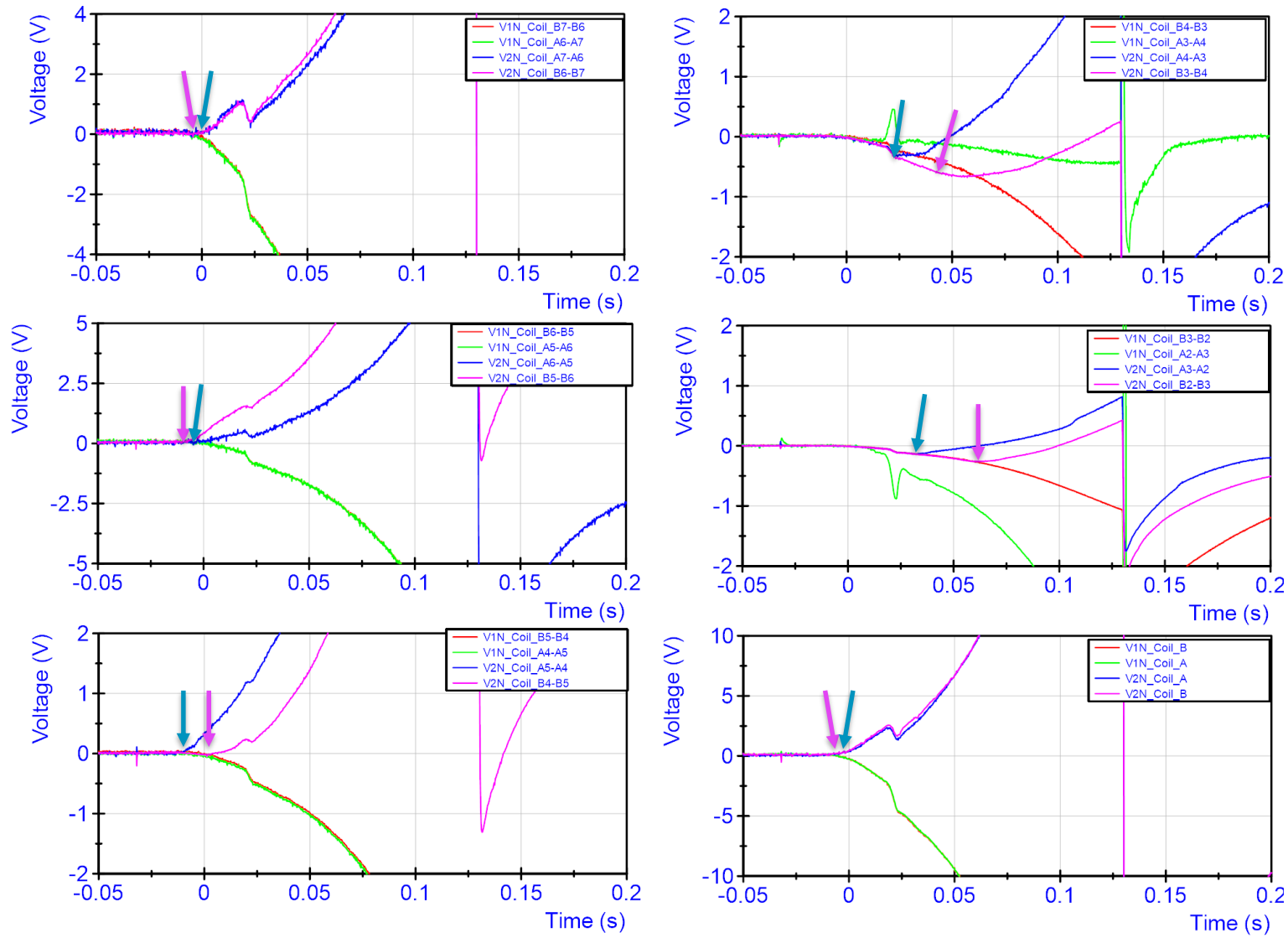


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Voltage reached ± 100 mV threshold and after 10 ms validation the detection triggers the data acquisition and Power Converter off. Time 0s is at the trigger moment.

Quench start visible in differential voltage signal (aperture 1 – aperture 2 in red). Only heater firing in aperture 2.

Provoked quench at nominal current: voltage in different coil blocks.

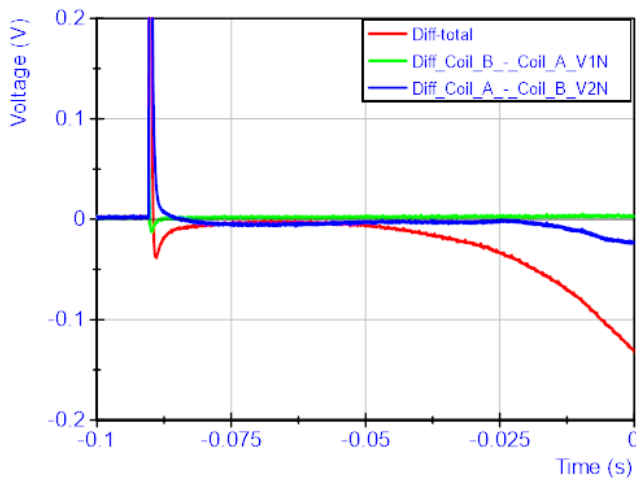
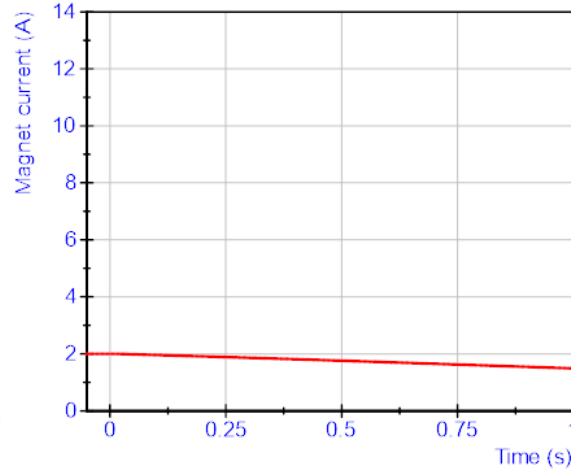
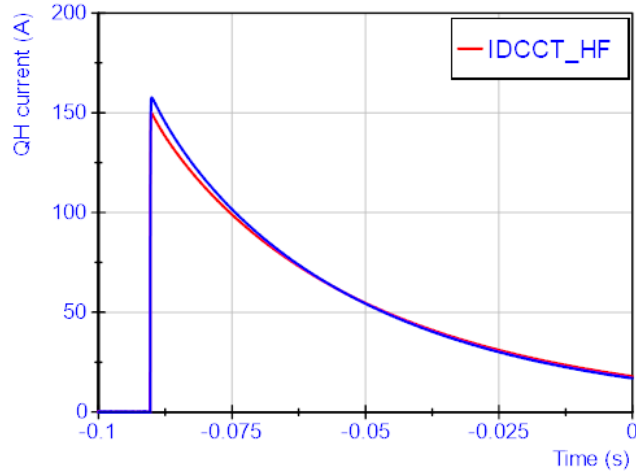


With the arrows I noted the moments when the quench starts in my opinion.

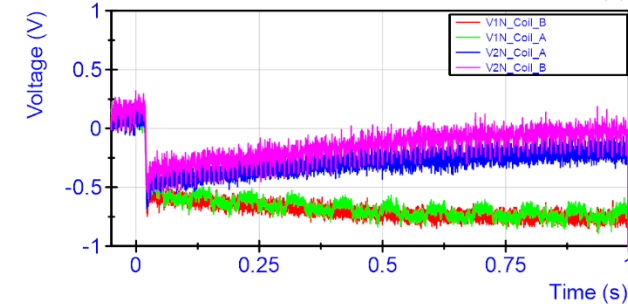
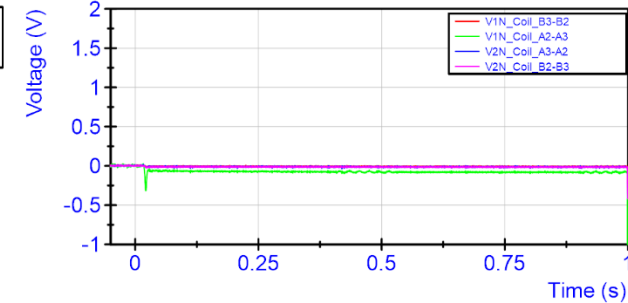
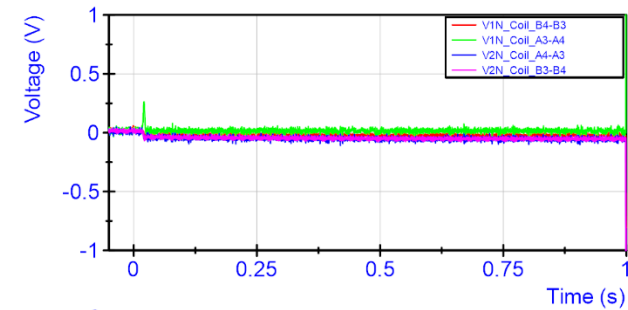
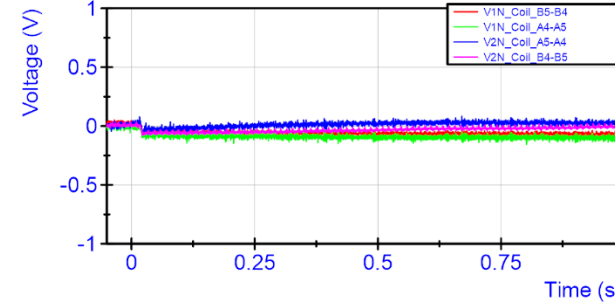
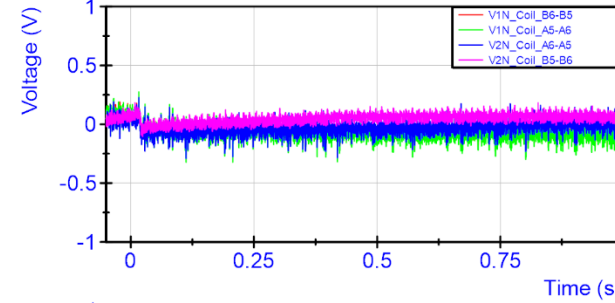
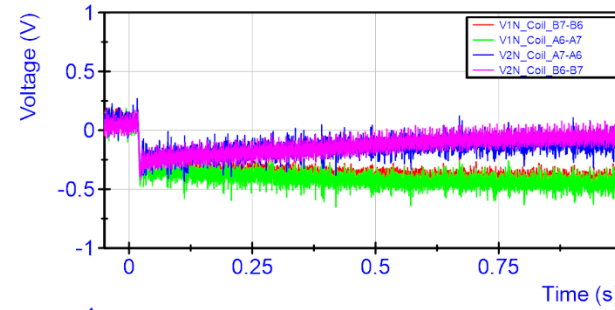
(the idea is to compare the voltage in a specific block for all coils. Coils in aperture 1 should only show inductive voltage, in coil 2 also resistive when the quench starts.)

**The plots for the tests at 2, 4, 6, 10 and 13.3 kA
are placed in the next slides for reference**

Data for 2 kA

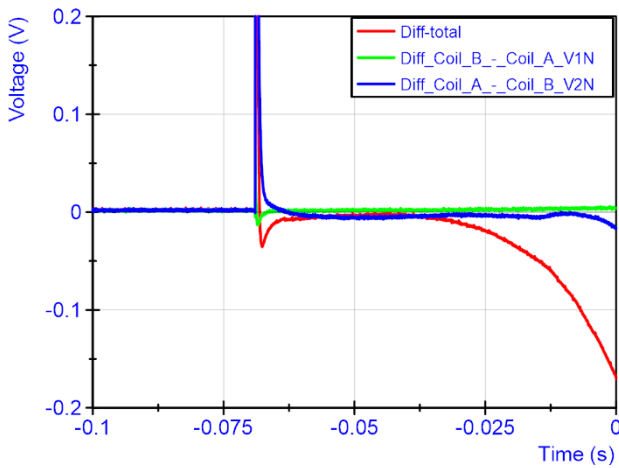
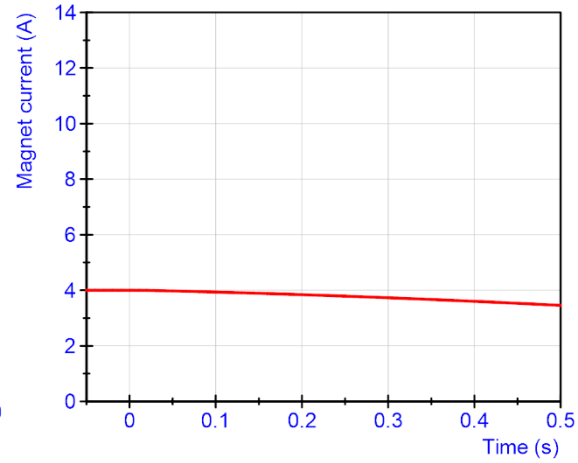
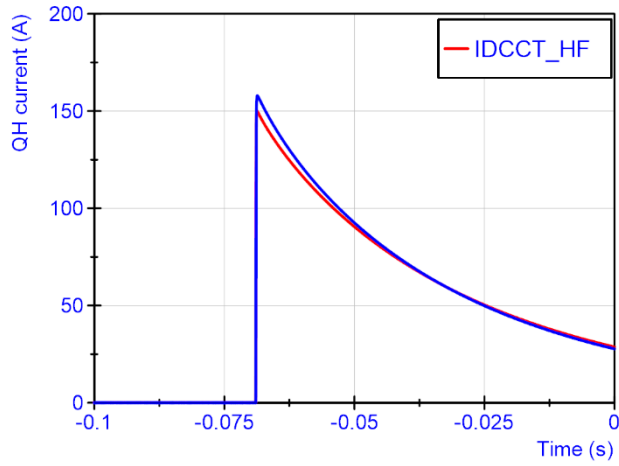


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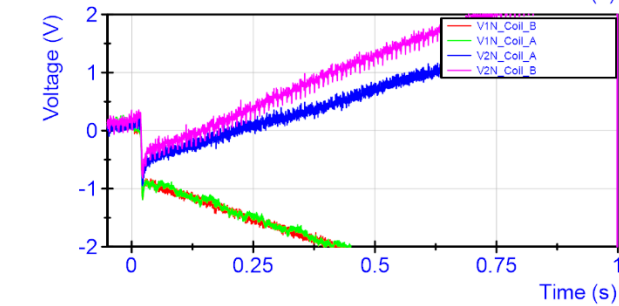
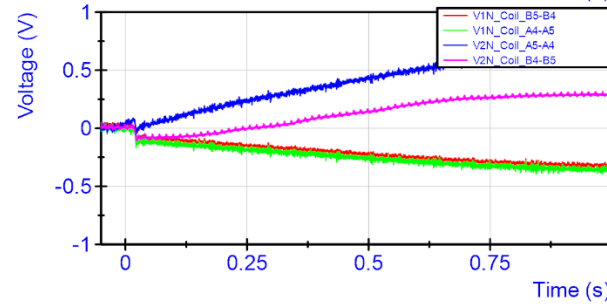
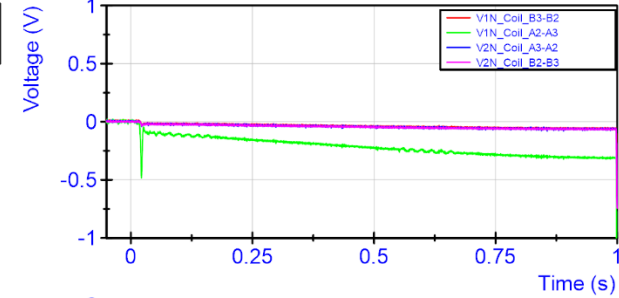
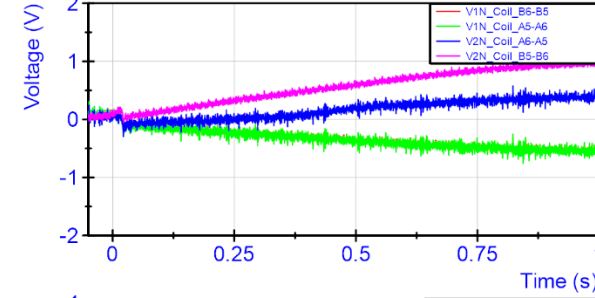
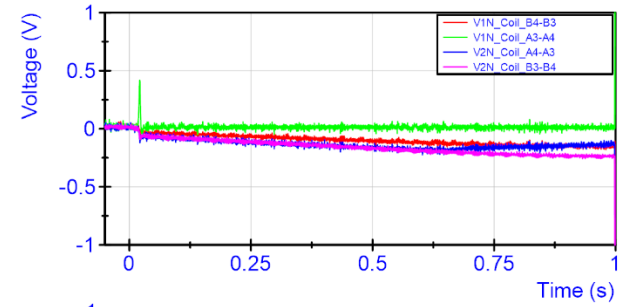
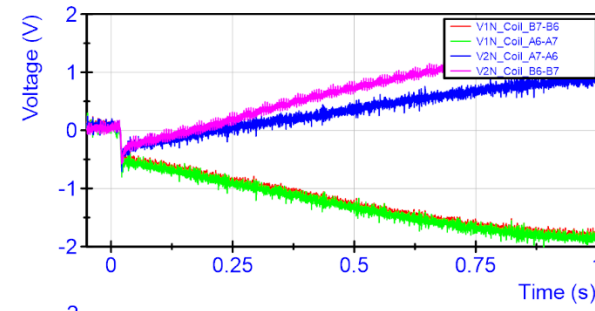


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Data for 4 kA

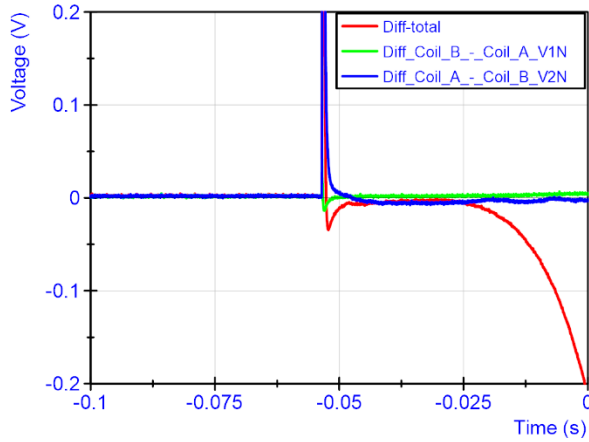
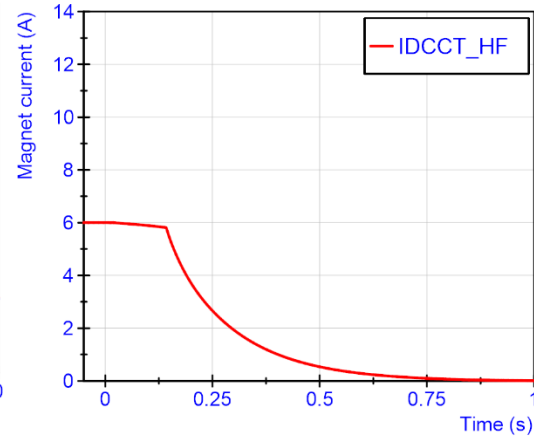
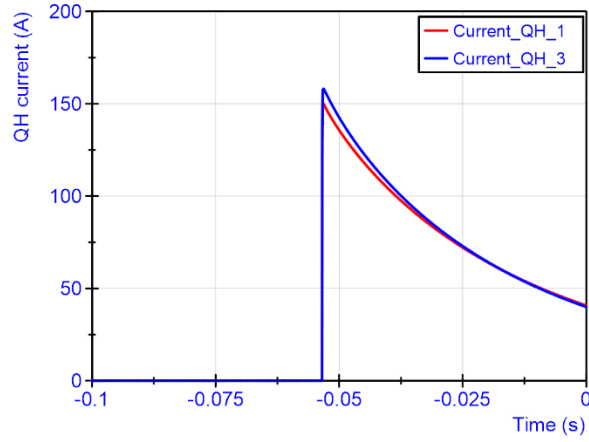


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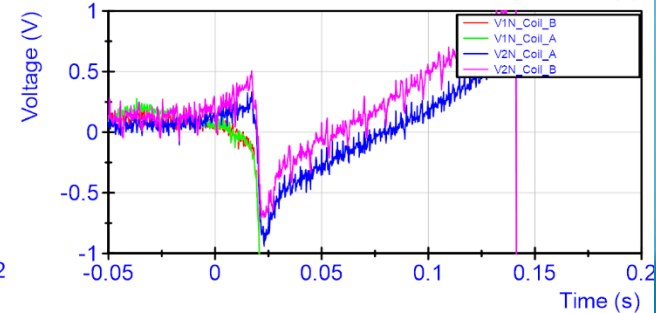
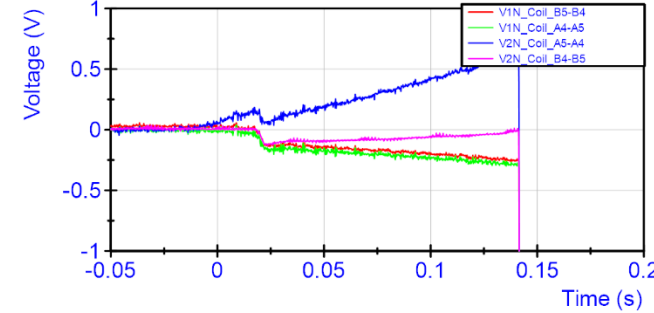
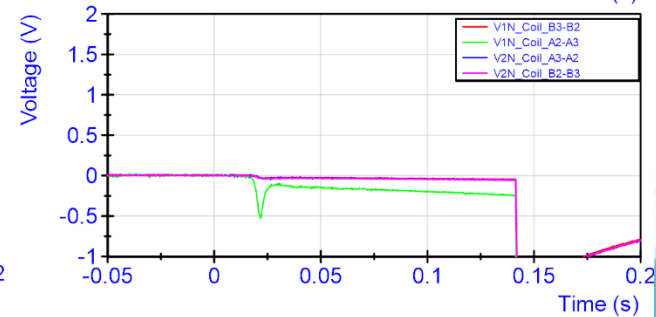
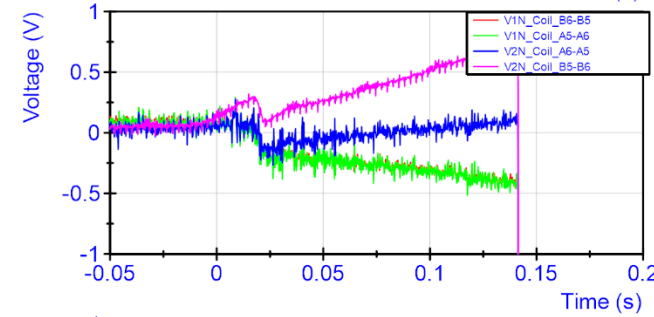
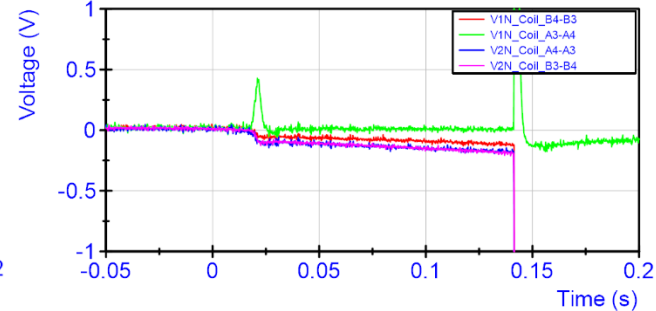
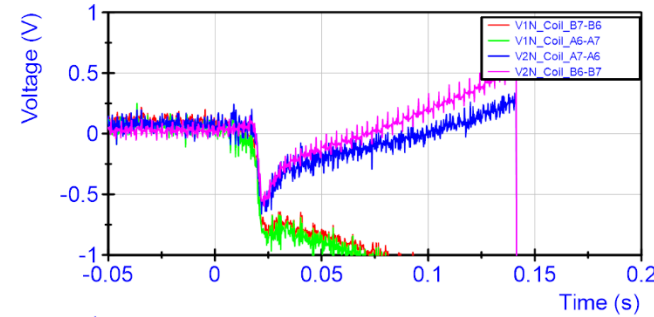


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Data for 6 kA

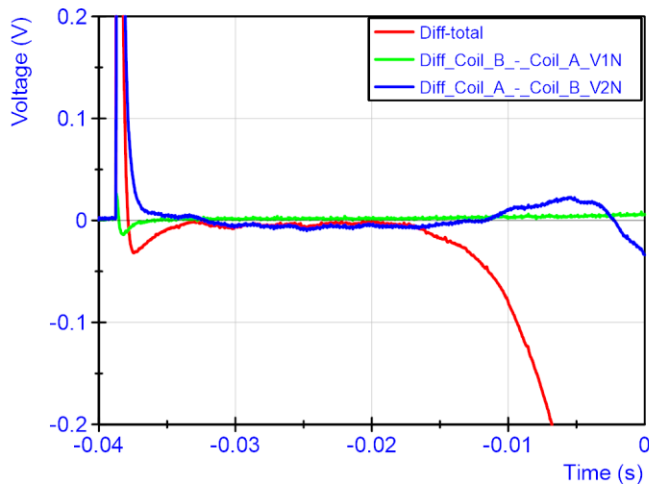
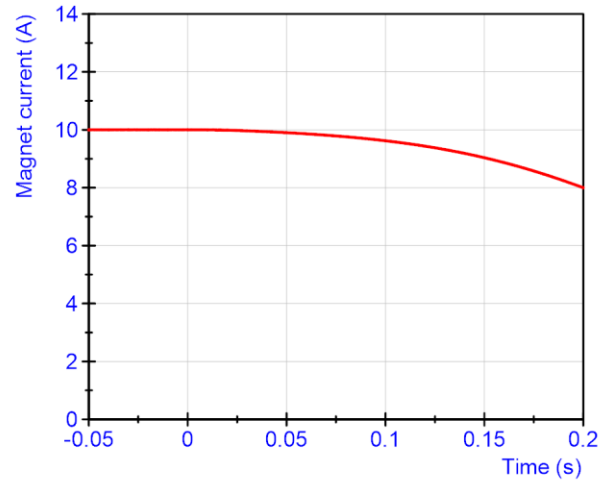
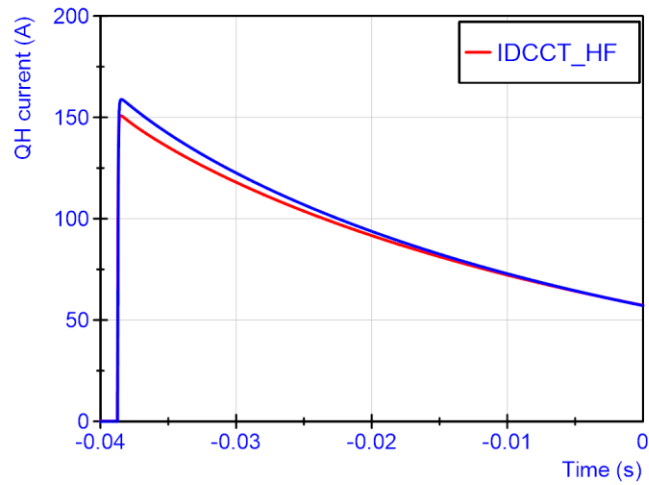


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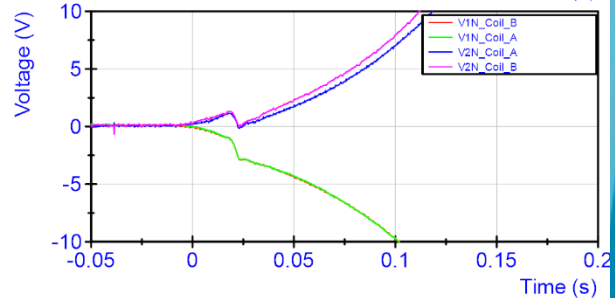
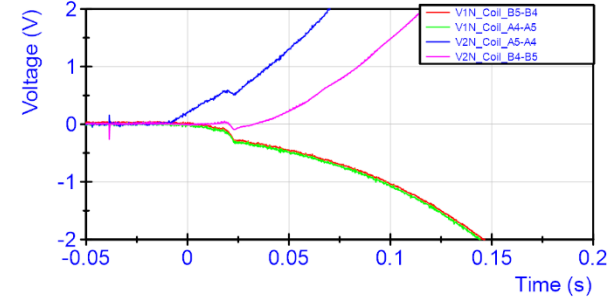
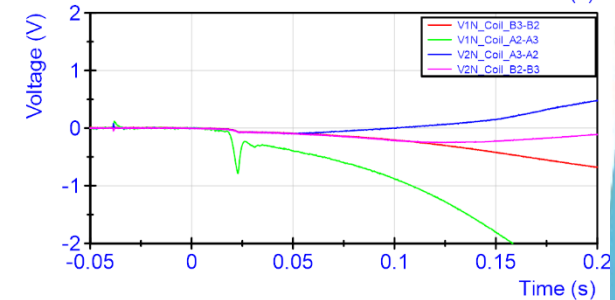
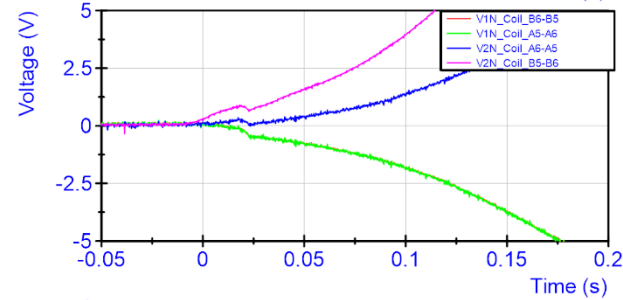
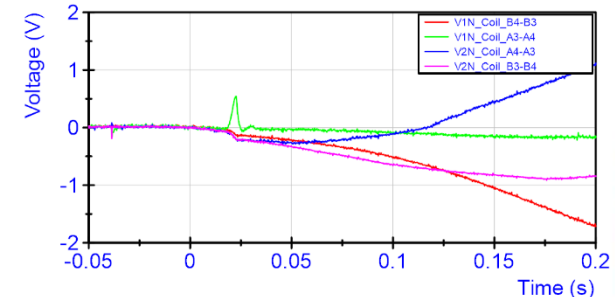
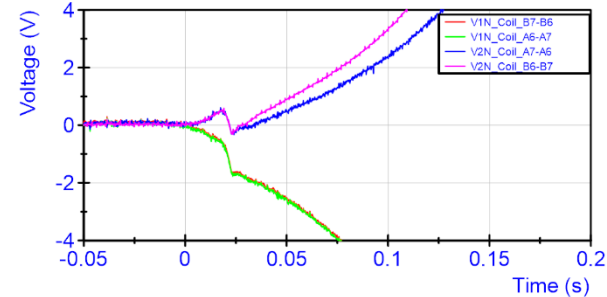


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Data for 10 kA

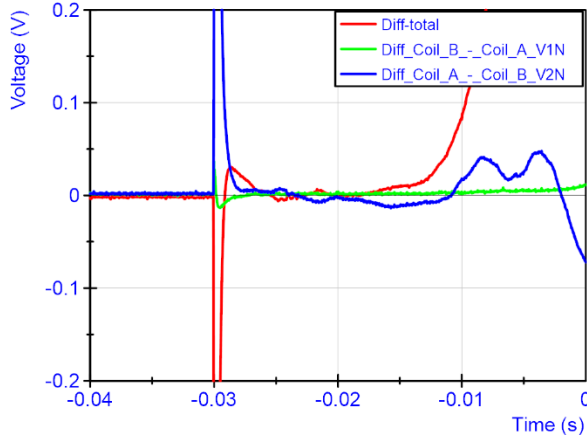
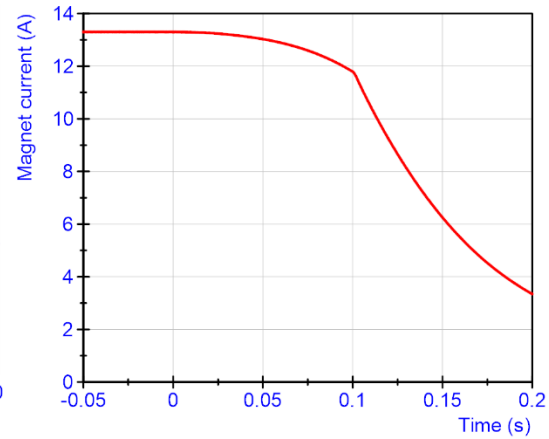
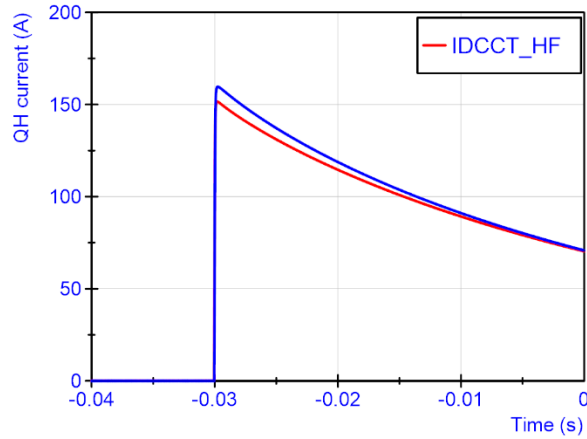


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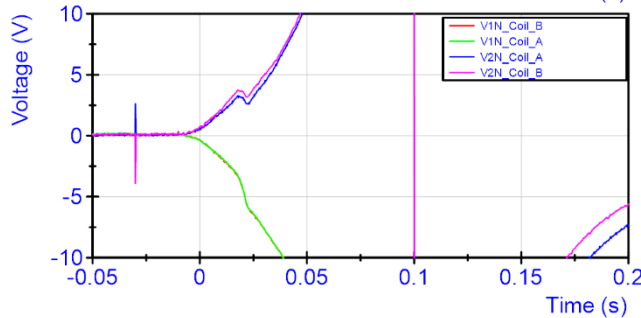
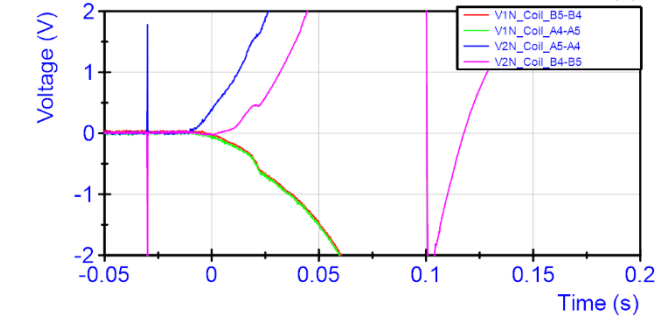
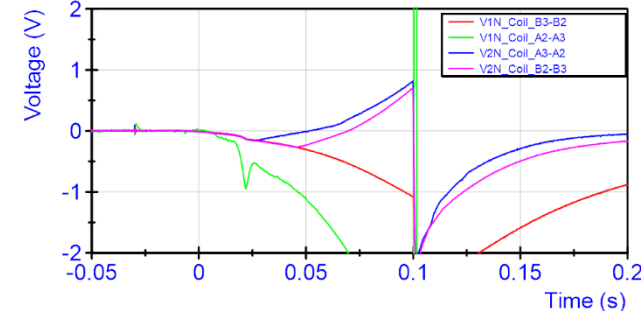
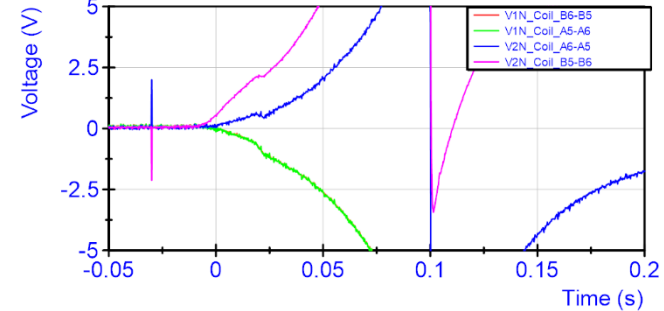
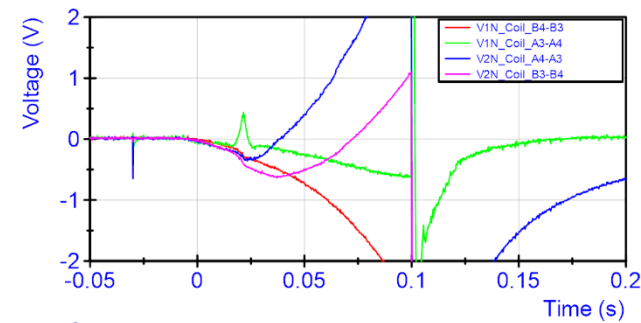
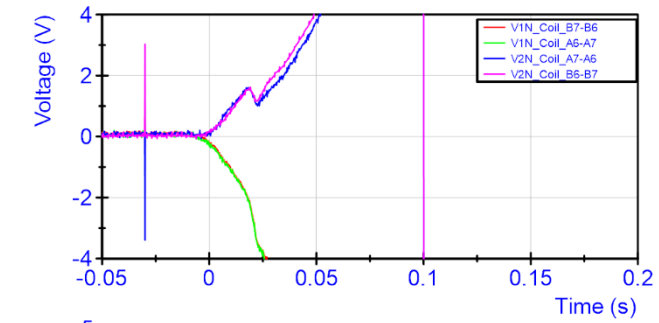


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Data for 13.3 kA (ultimate)



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