

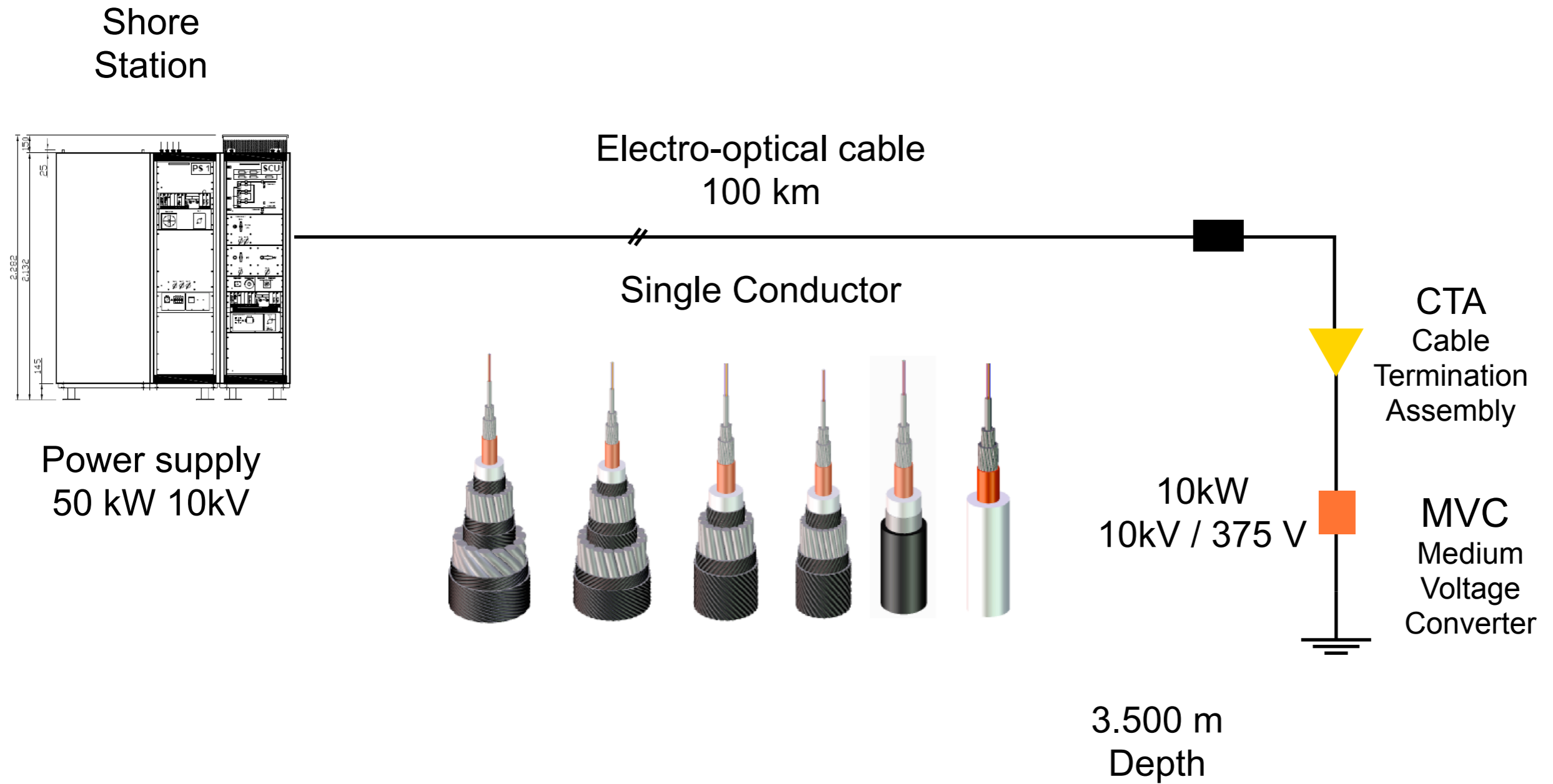
The NEMO phase 2 DC/DC Converter

KM3Net WP5 meeting Paris 15-16 October 2008

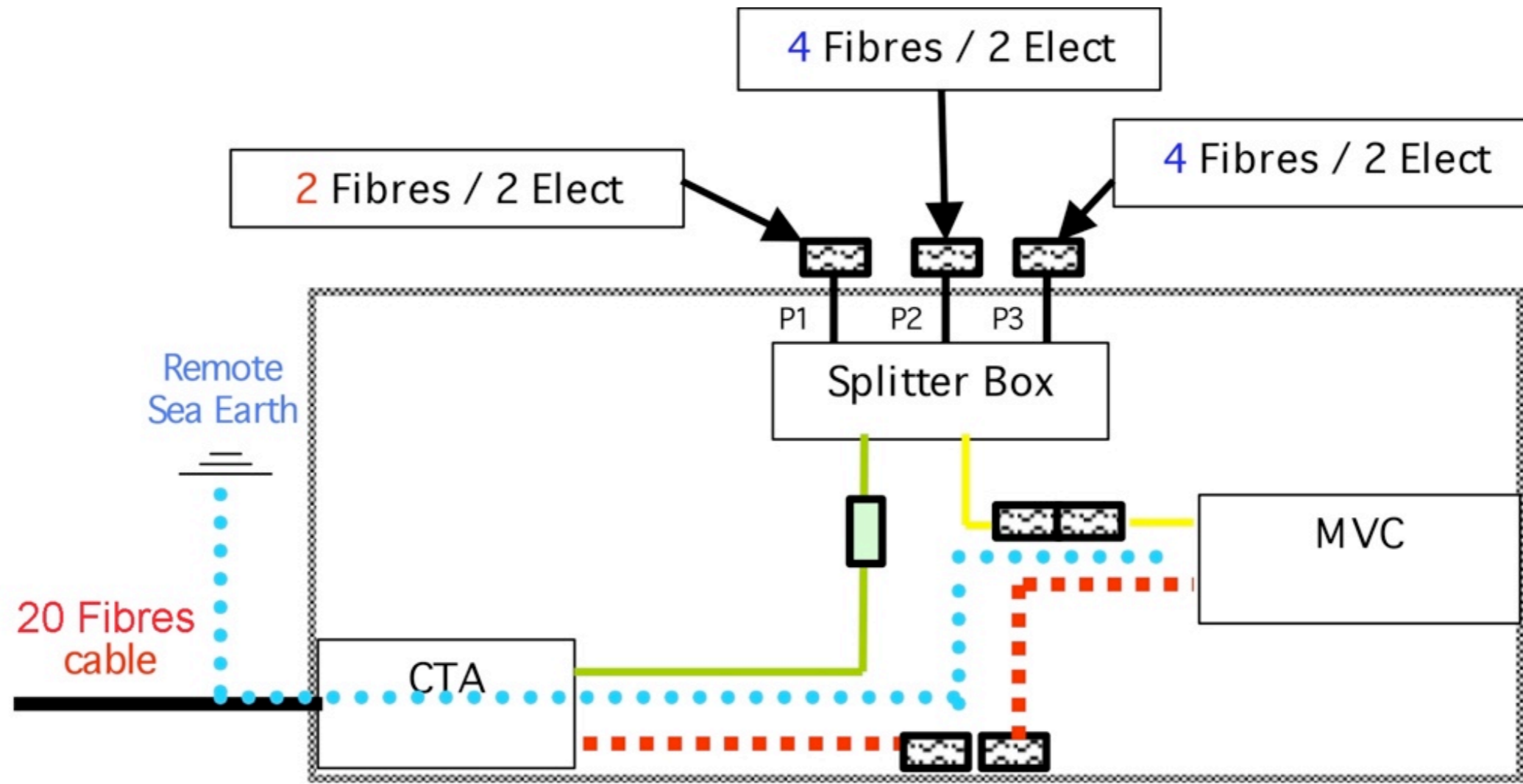
Rosanna Cocimano

~~INTELLIS~~
Testo

NEMO Phase 2 System Lay-Out

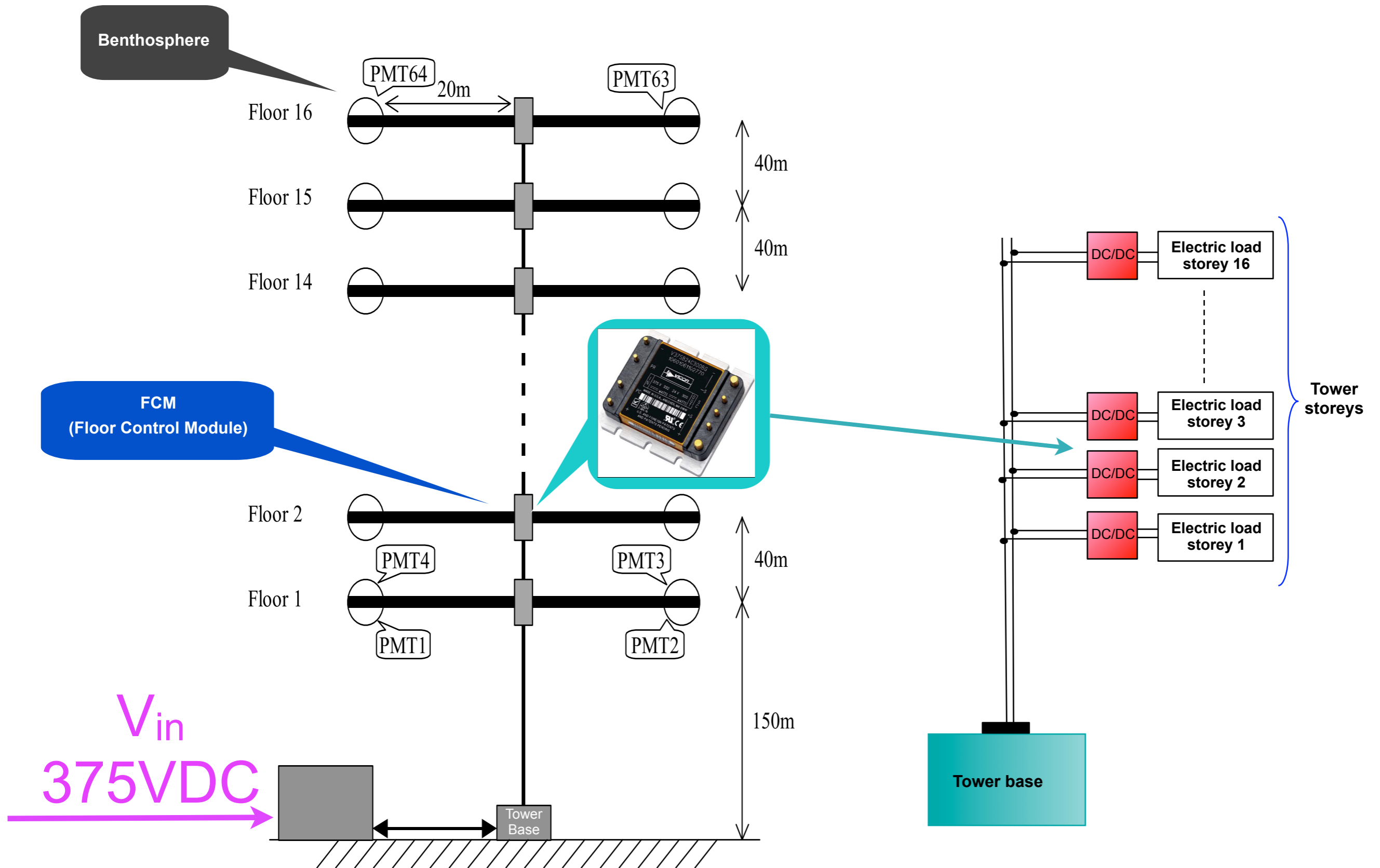


NEMO Phase 2 Cable End

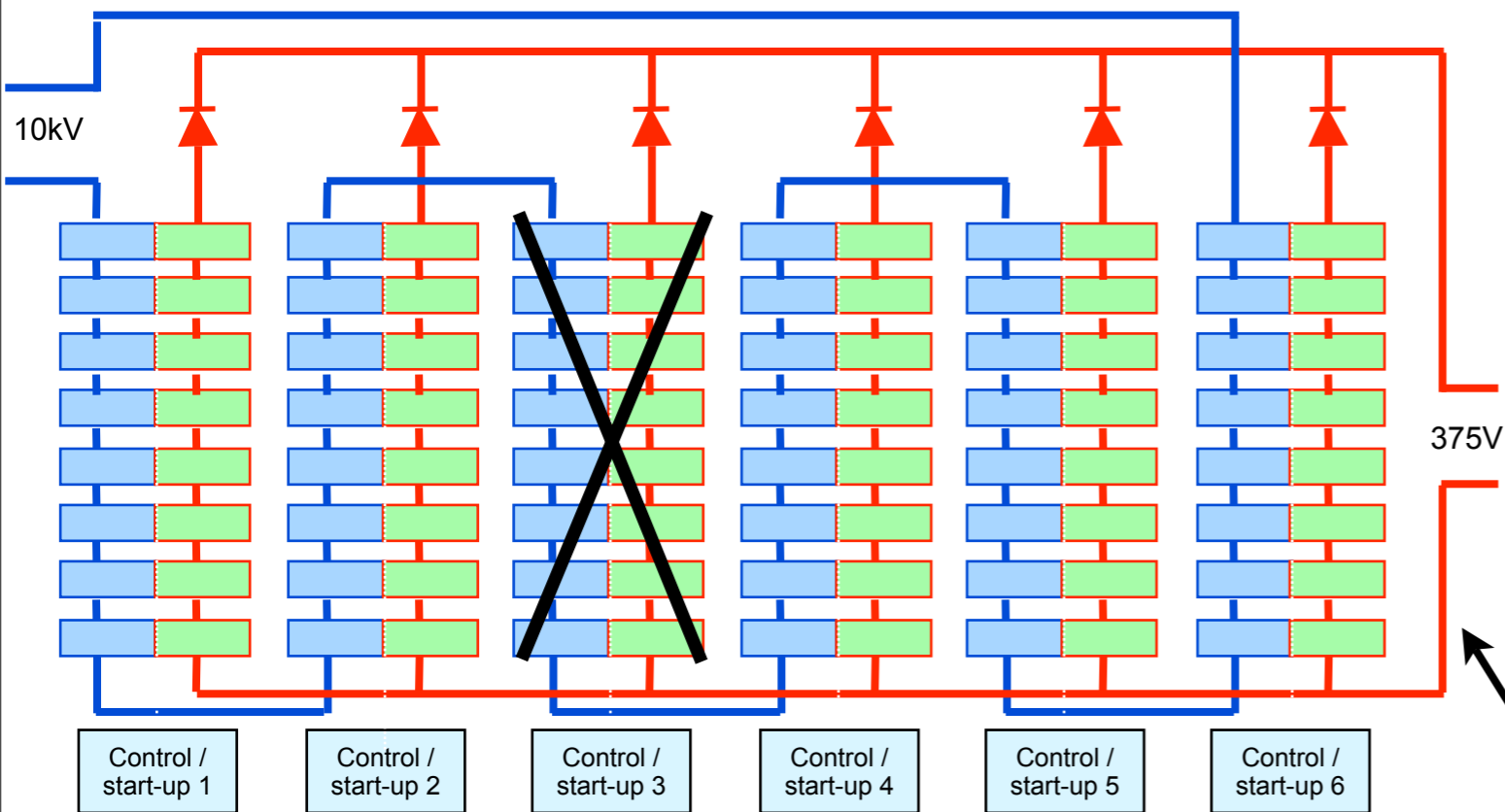


- - - - - High Voltage cable
- 400 V cable
- 8-ft braided cable
- Splice Canister
- Mate-able connectors
- Sea earthing cable

Tower Power Distribution 375 VDC



MVC Features



Designed and built by Alcatel

48 sub converters (200Vin - 50Vout) divided in to 6 stacks each with a control unit.

The 48 sub converters have:

- Inputs in series ■
- Outputs in series/parallel matrix ■

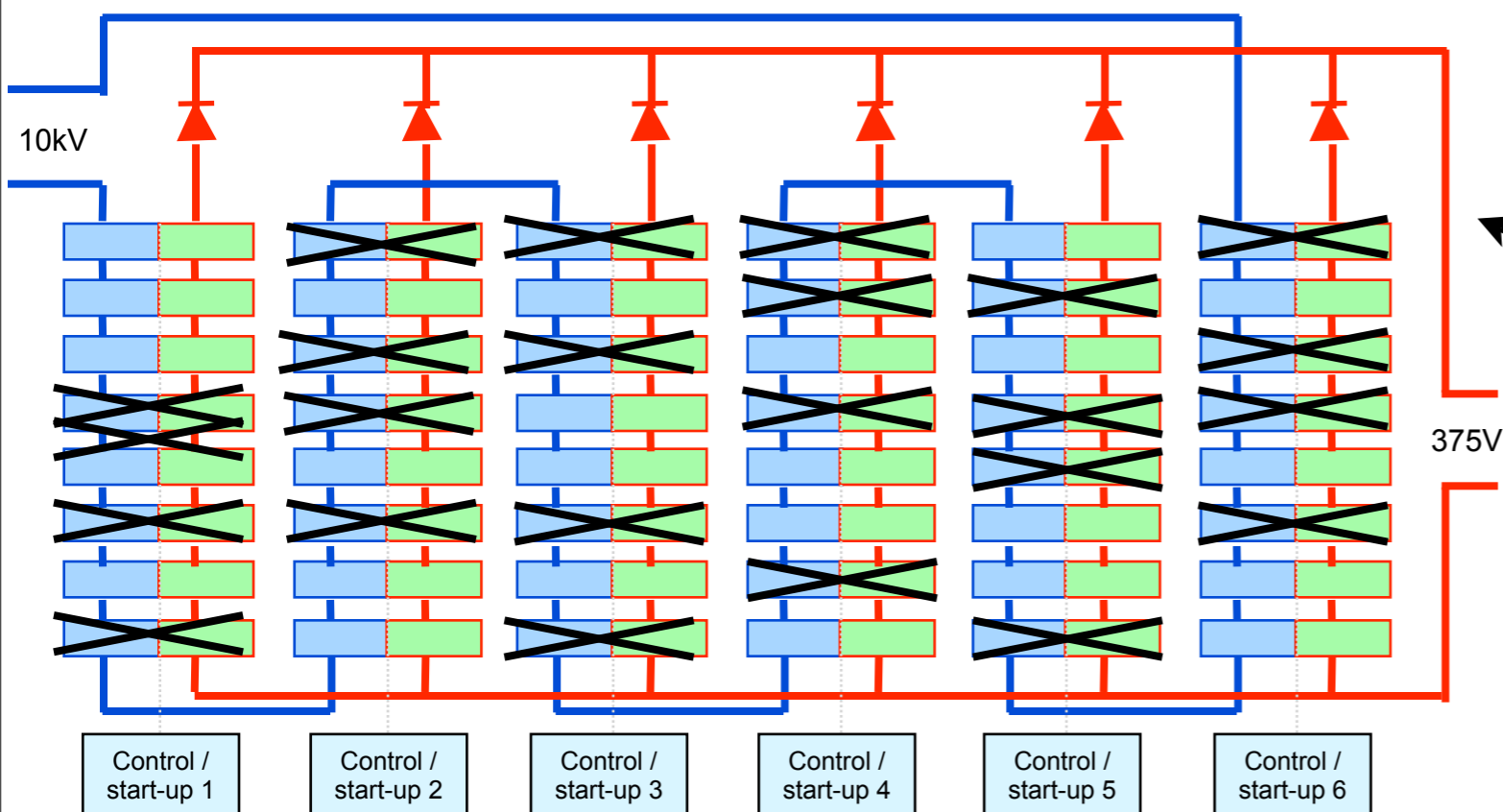
Modular design allows for flexibility in input and output voltages.

A large scale failure (a stack or control failure) has the only result of decreasing the output current.

Large number of Sub Converters can fail without loss of output current, (50%).

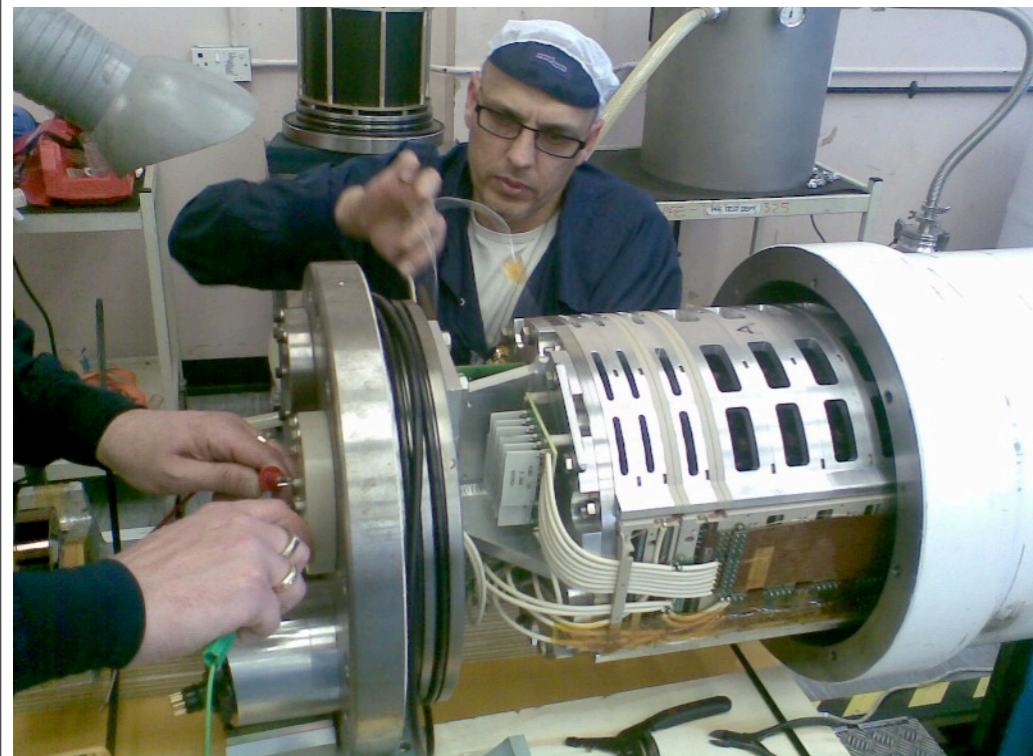
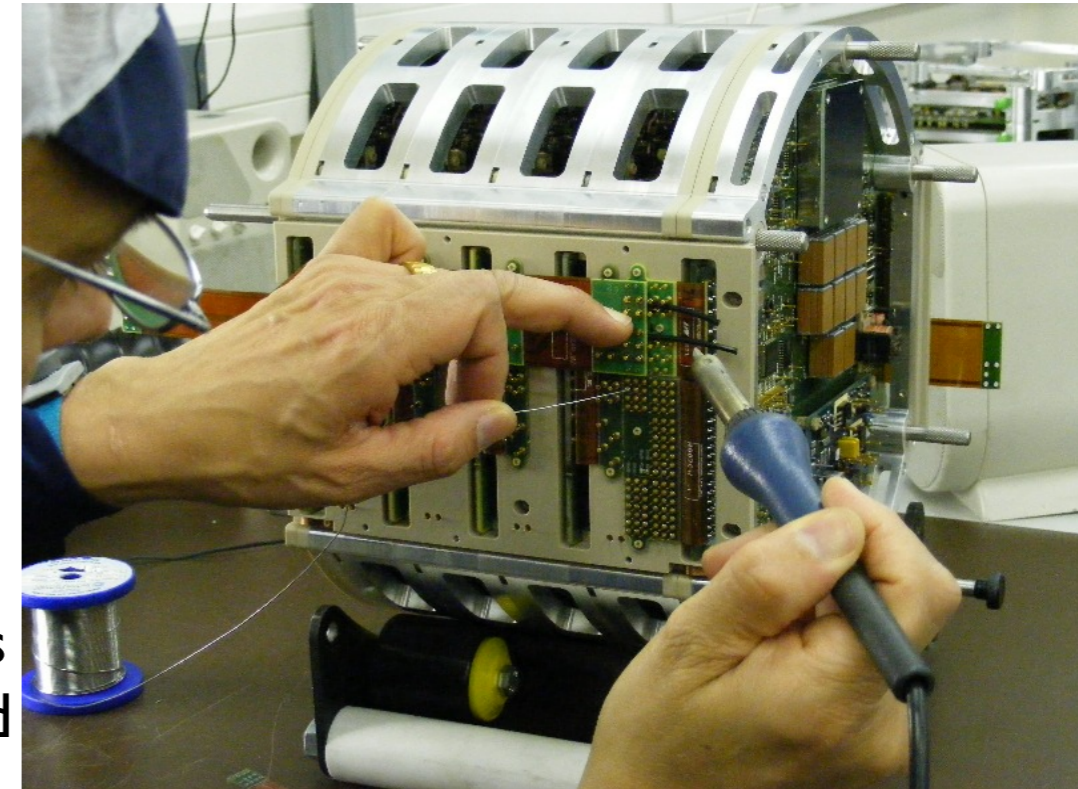
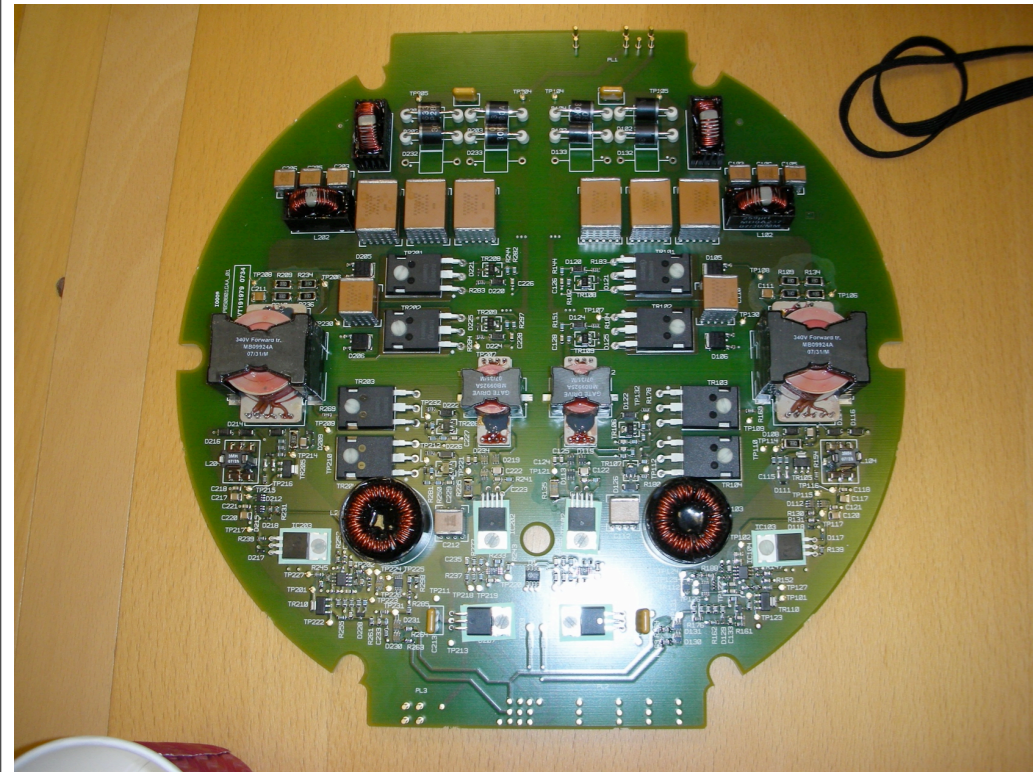
Cooling system in Fluorinert.

Topology used in space craft by JPL NASA and designed for the Neptune Project.



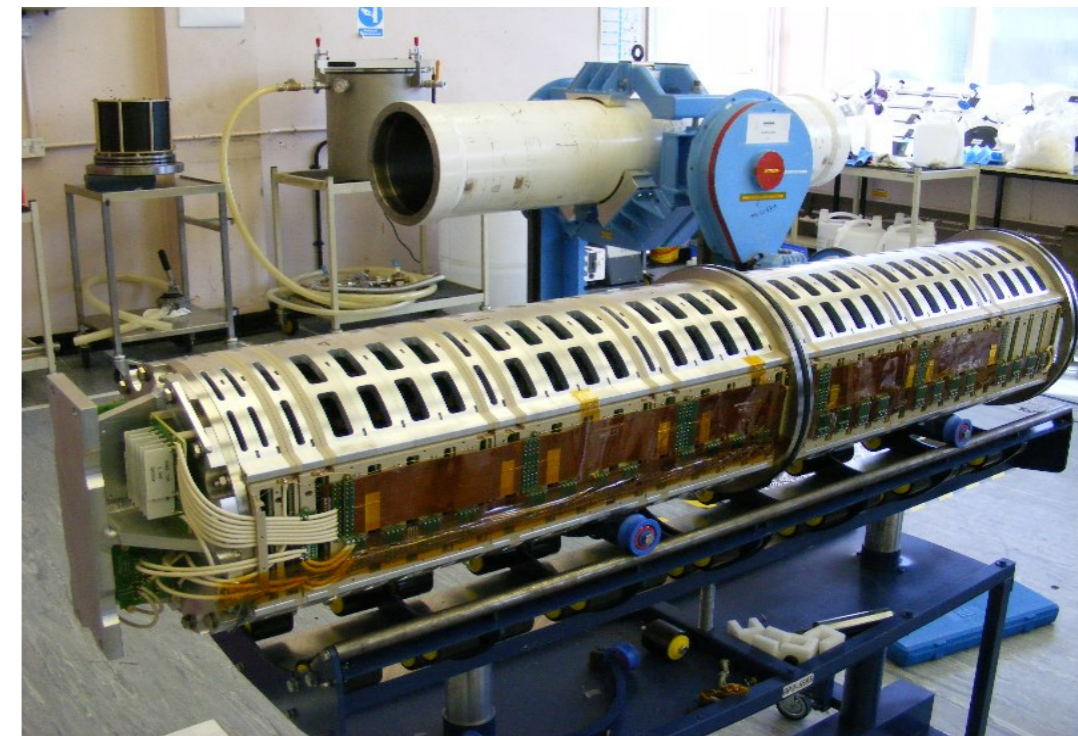
Single Board
2 subconverters

Stack
8 subconverters
1 Control Board



Housed Unit

Assembled
Converter



Internal Unit

MVC Features

	Characteristics
Input Voltage	10 kV DC
Output Voltage	375V DC
Output Power	9,3 kW.
Output current	25 A
Output Voltage Undershoot	10% > 90% step load shows an undershoot of 7,5% and 5 ms of settling time
Output Voltage Overshoot	90% > 10% step load shows an overshoot of 8,5% and 5 ms of settling time
Minimum load	It can operate without any output load
Over Current Protection	MVC stop after 30 μ s : current limited to 100A
Output Ripple Voltage	1,5 V _{pp}
Efficiency	86% at full load

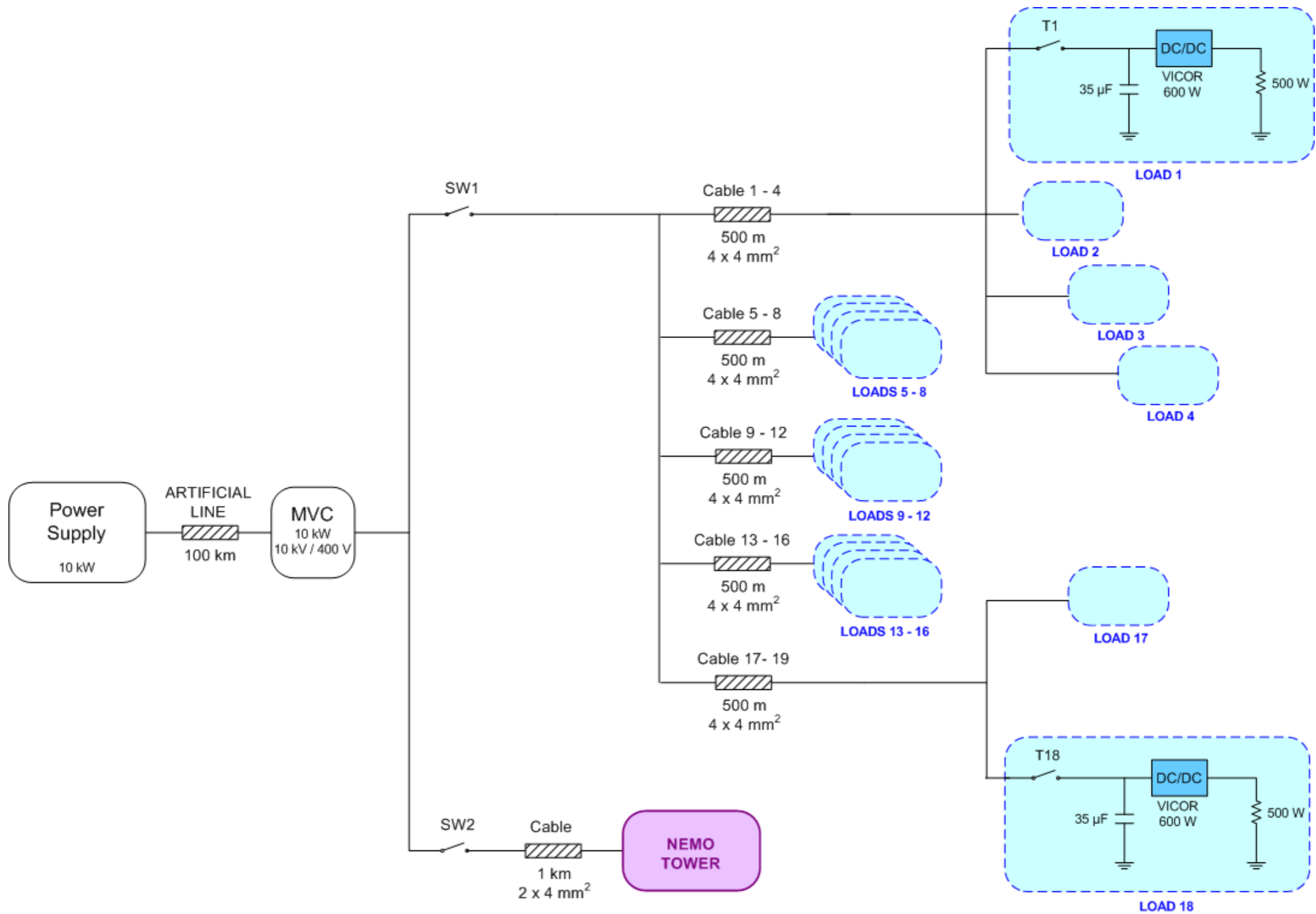
MVC - NEMO Operational Test

August 2008

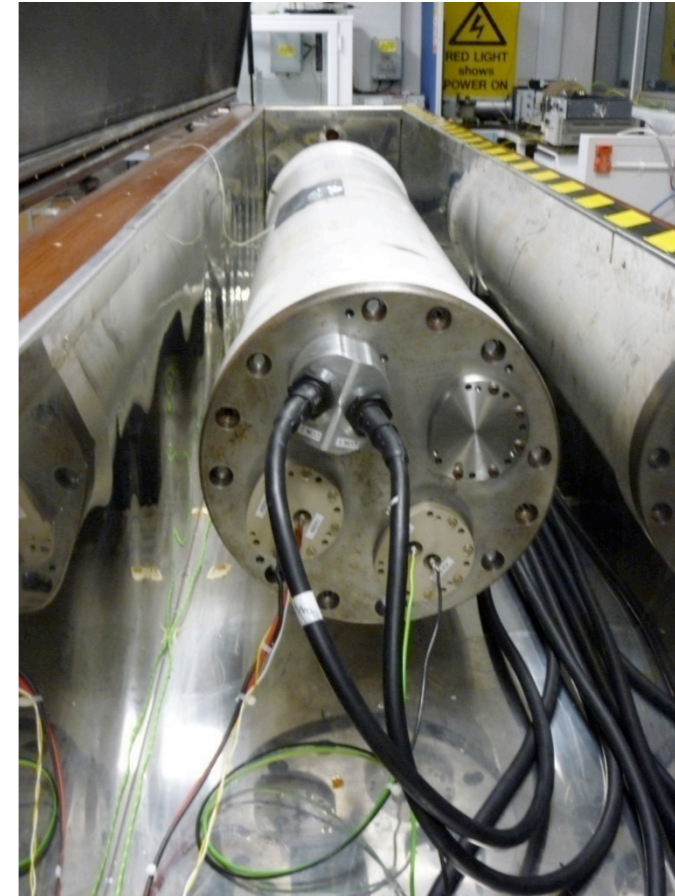
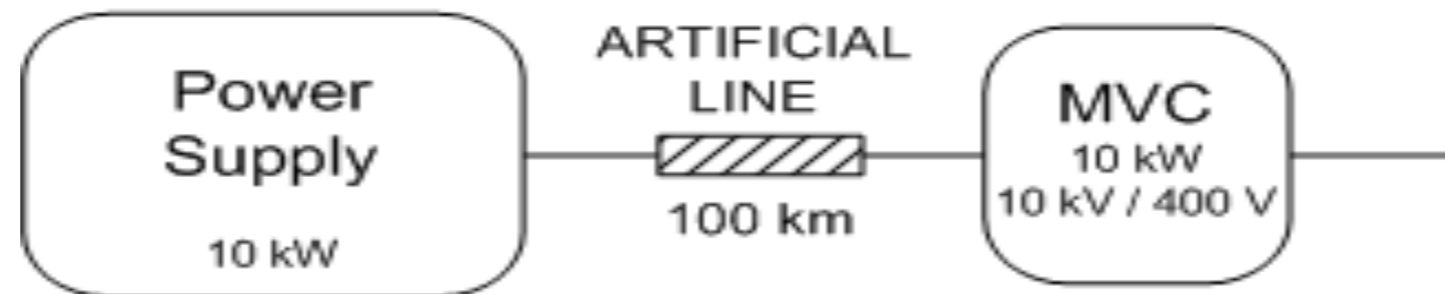
Test of final MVC prototype at full load
in “realistic” conditions:

- HV power supply
- 100 km artificial line
- 1 full tower (power modules)
- 18 equivalent towers

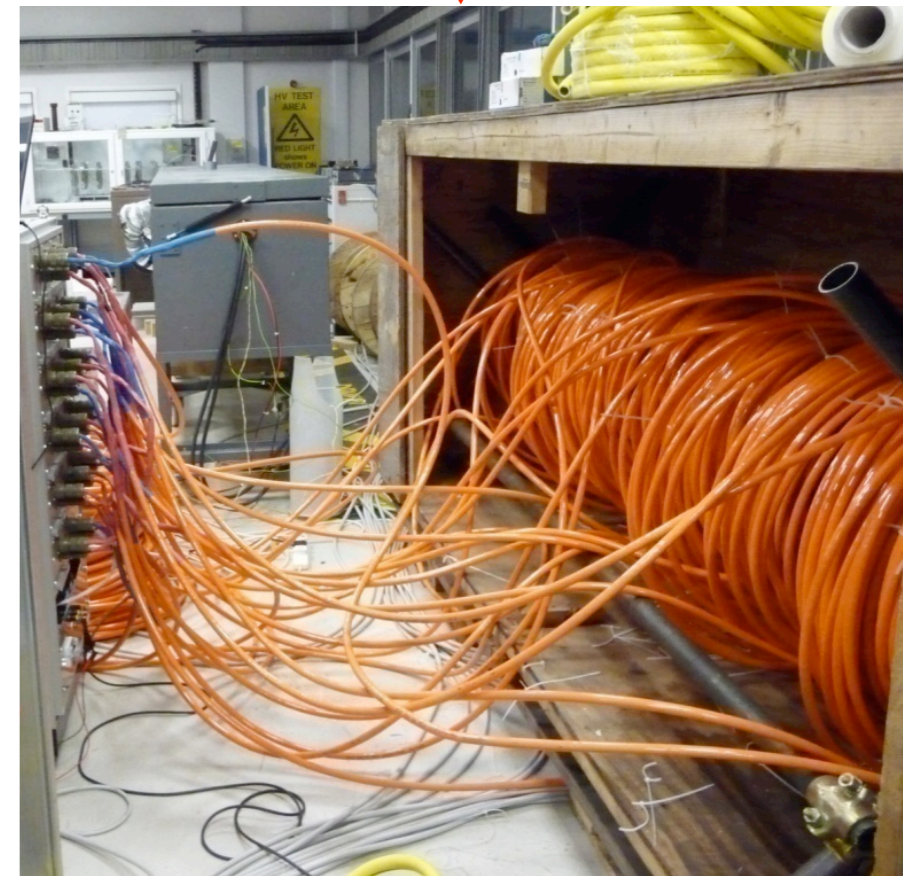
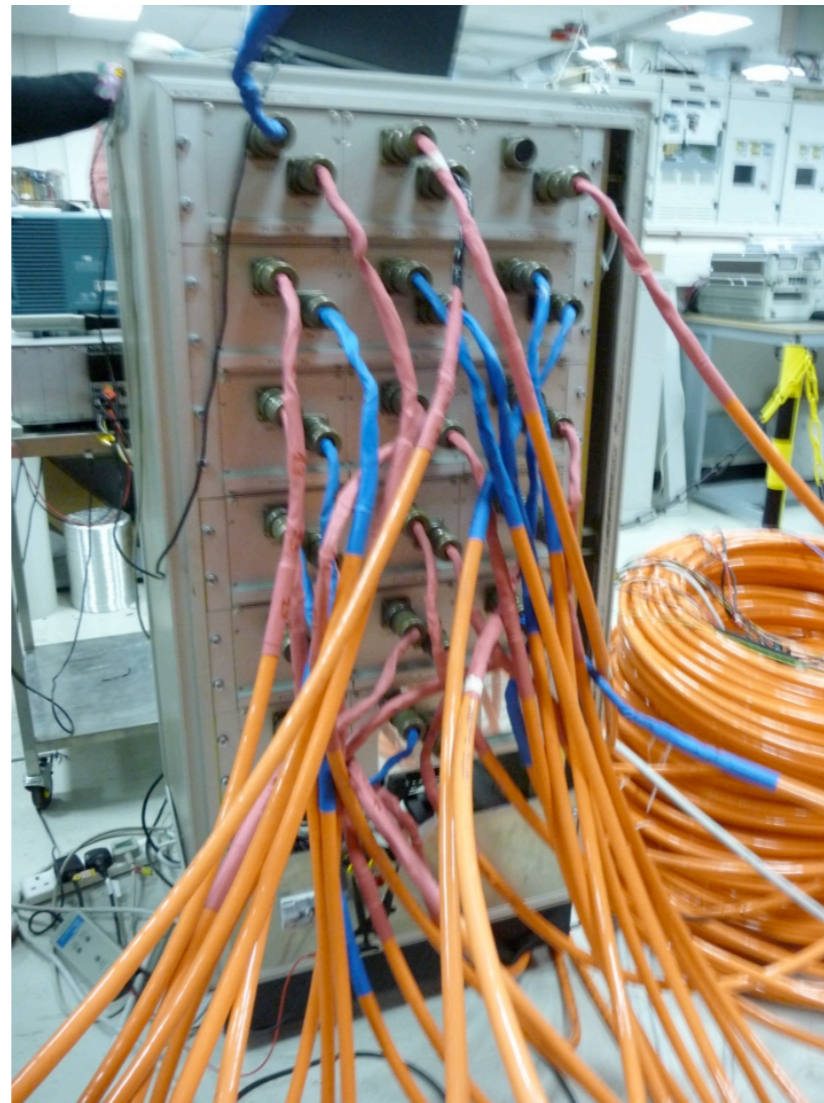
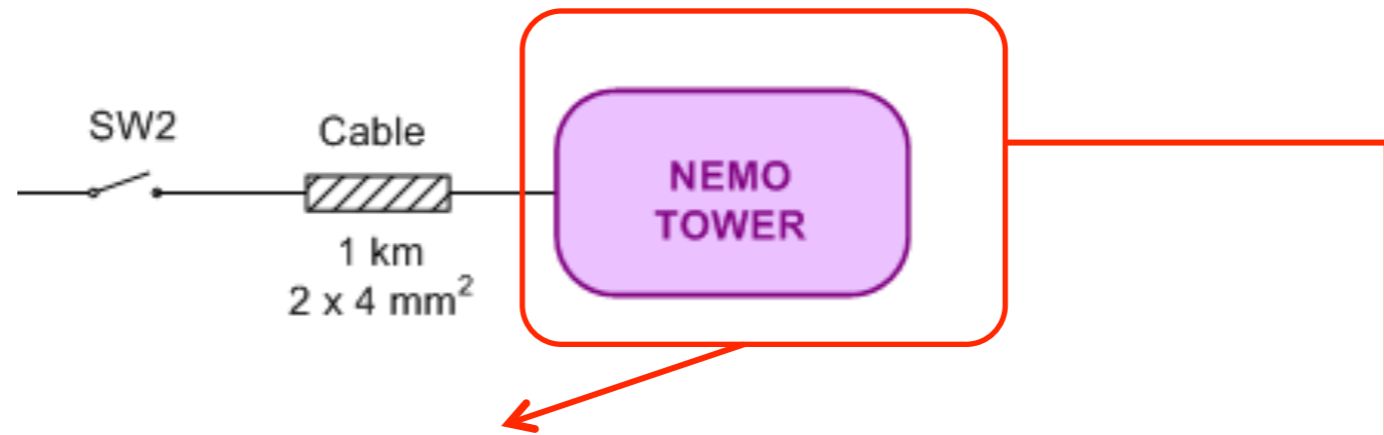
MVC - NEMO Operational Test layout



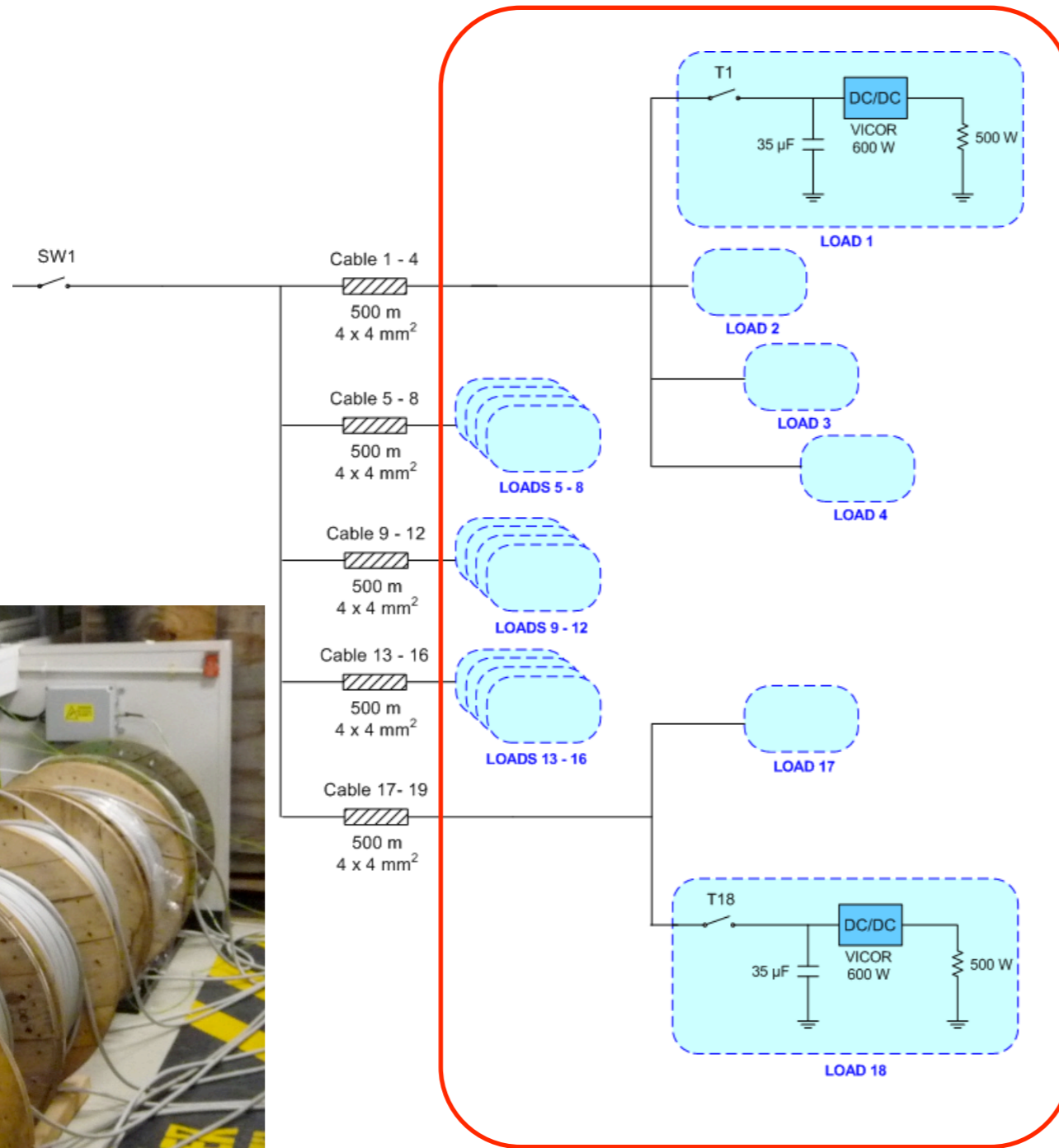
MVC - NEMO Operational Test



MVC - NEMO Operational Test



MVC - NEMO Operational Test



18 Towers
equivalent loads



MVC - NEMO Operational Test

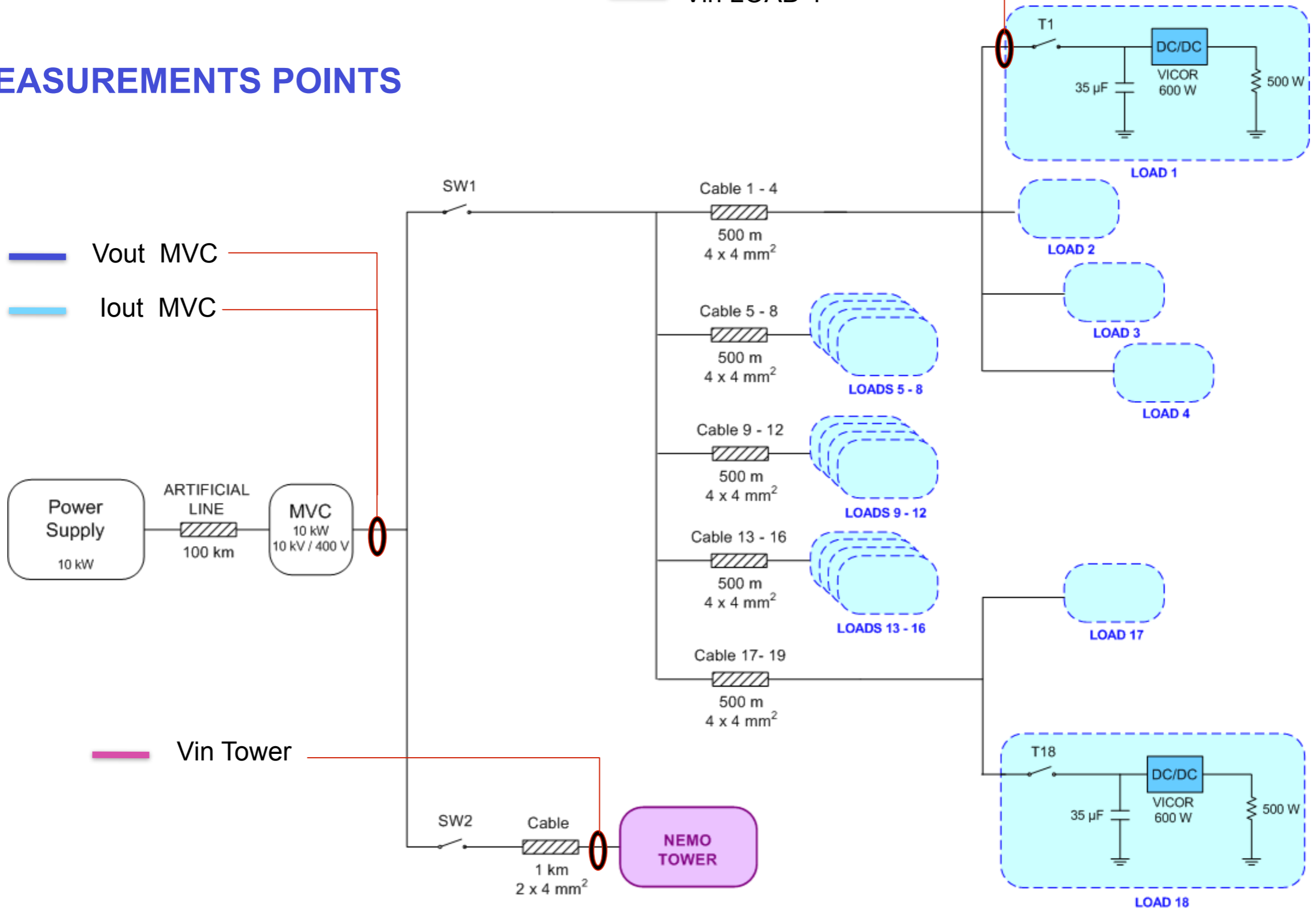
Vin LOAD 1

MEASUREMENTS POINTS

Vout MVC

Iout MVC

Vin Tower



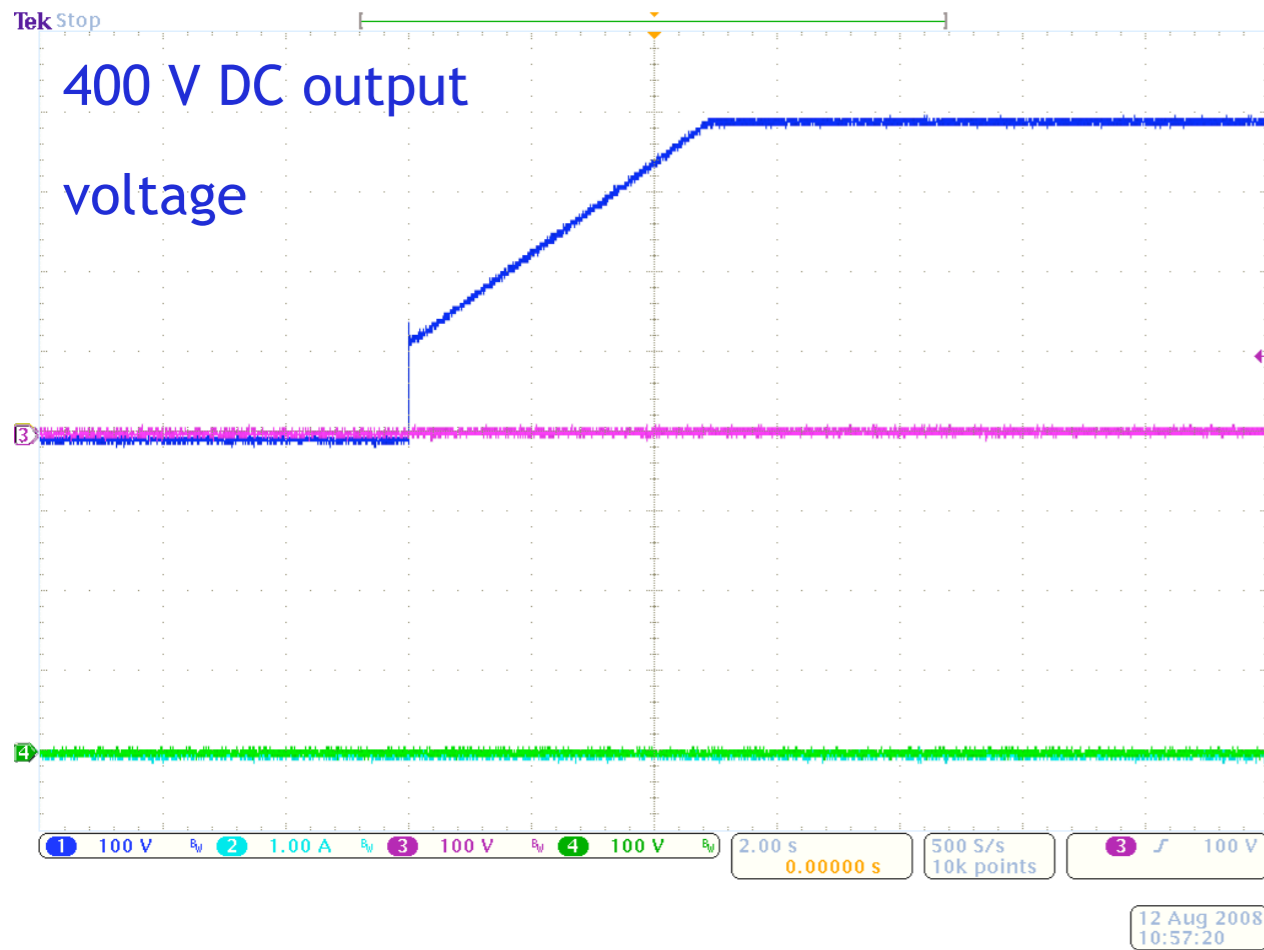


MVC - NEMO Operational Test

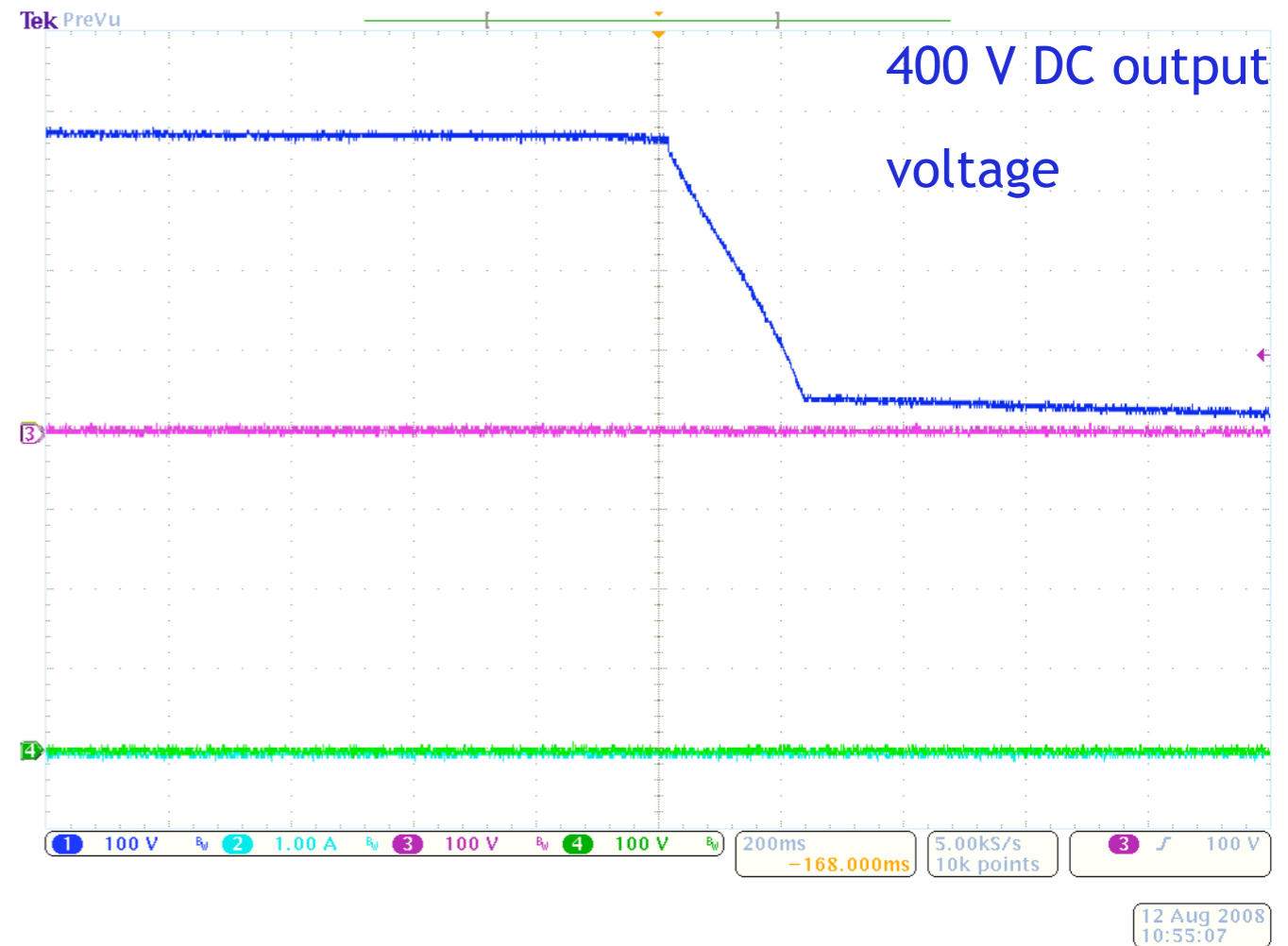
- Start and stop



Start (when V input ≥ 5.7 kV)

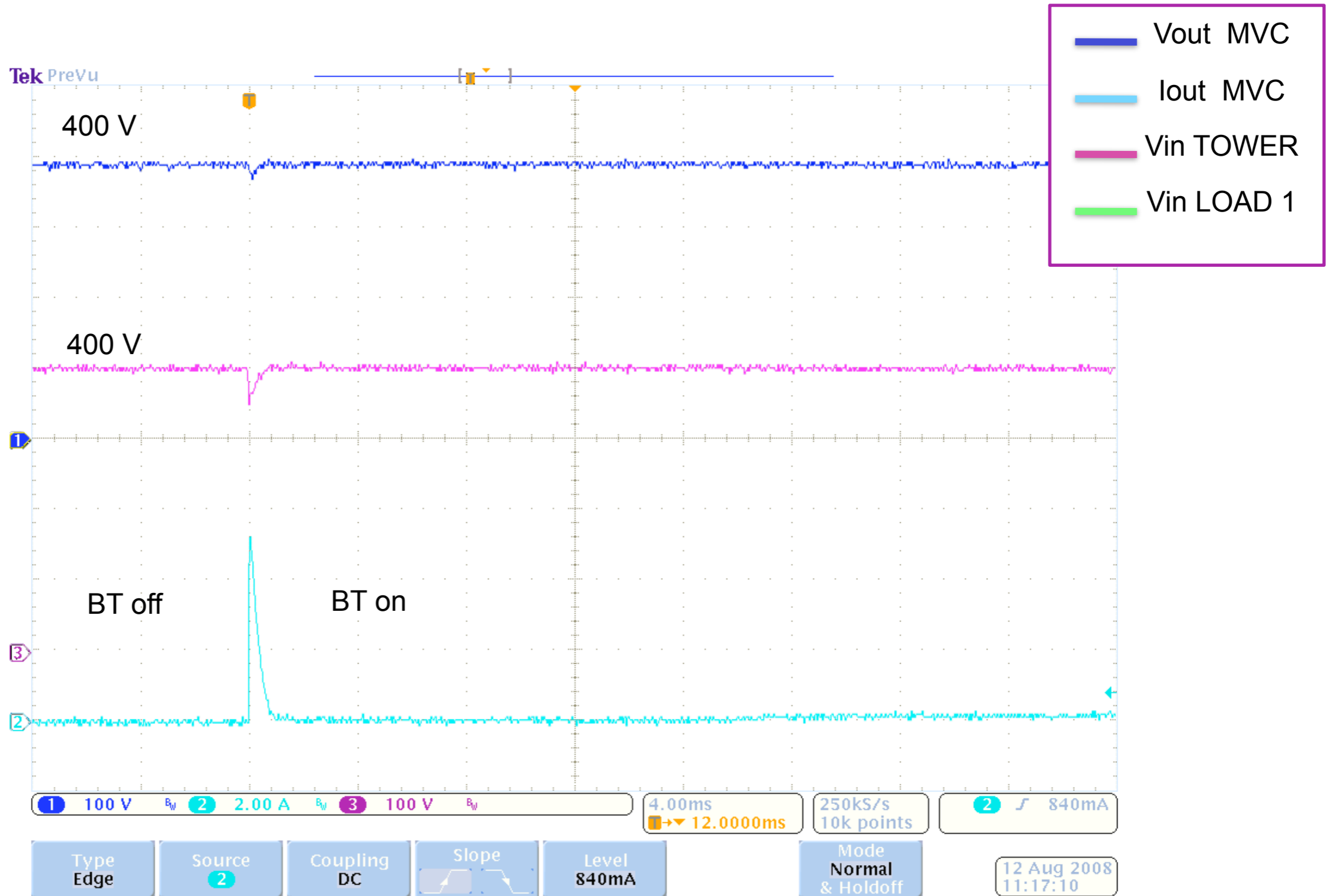


Stop (when V input < 5.3 kV)



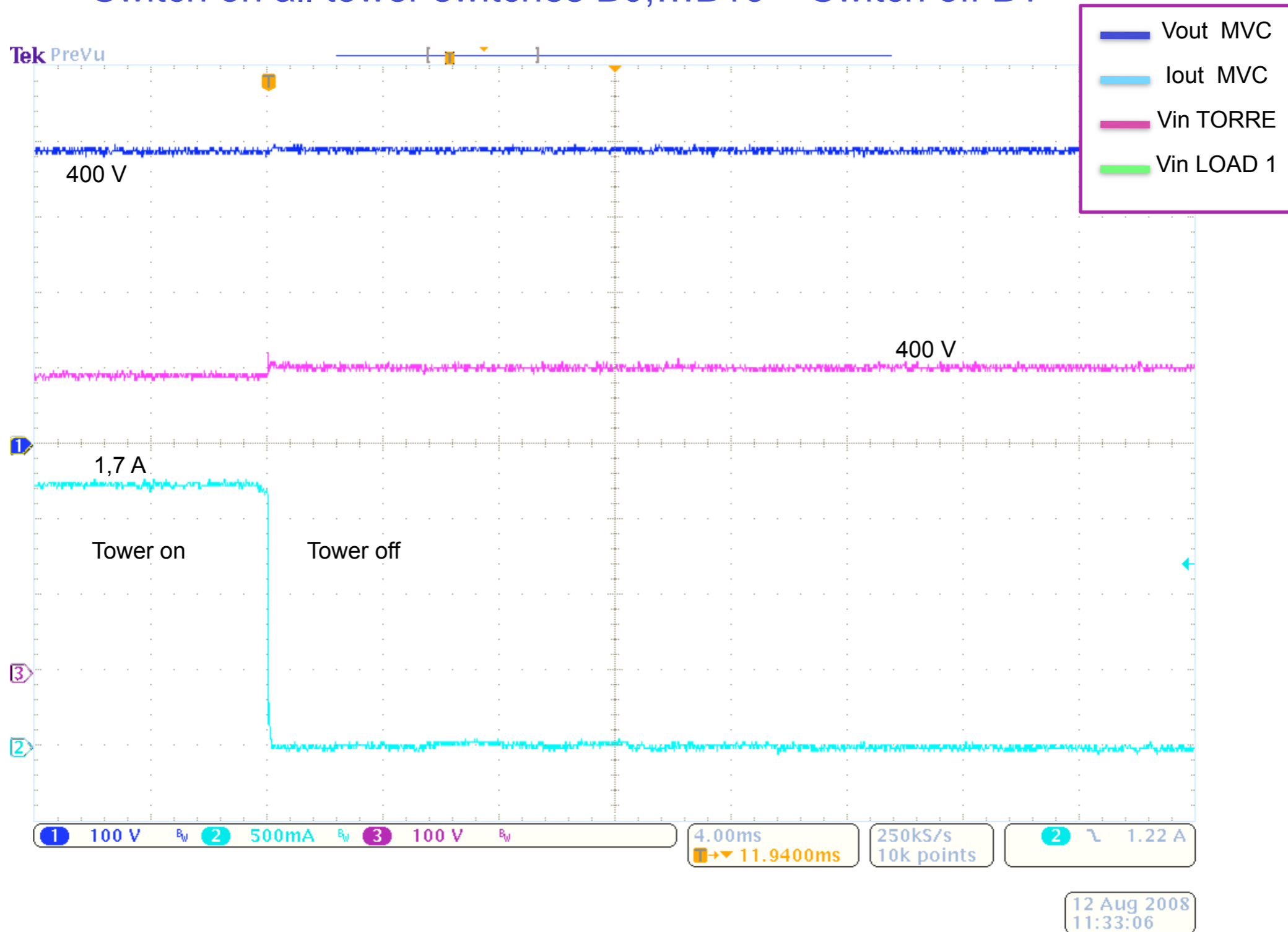
MVC - NEMO Operational Test

Switch BT on (tower backbone on)



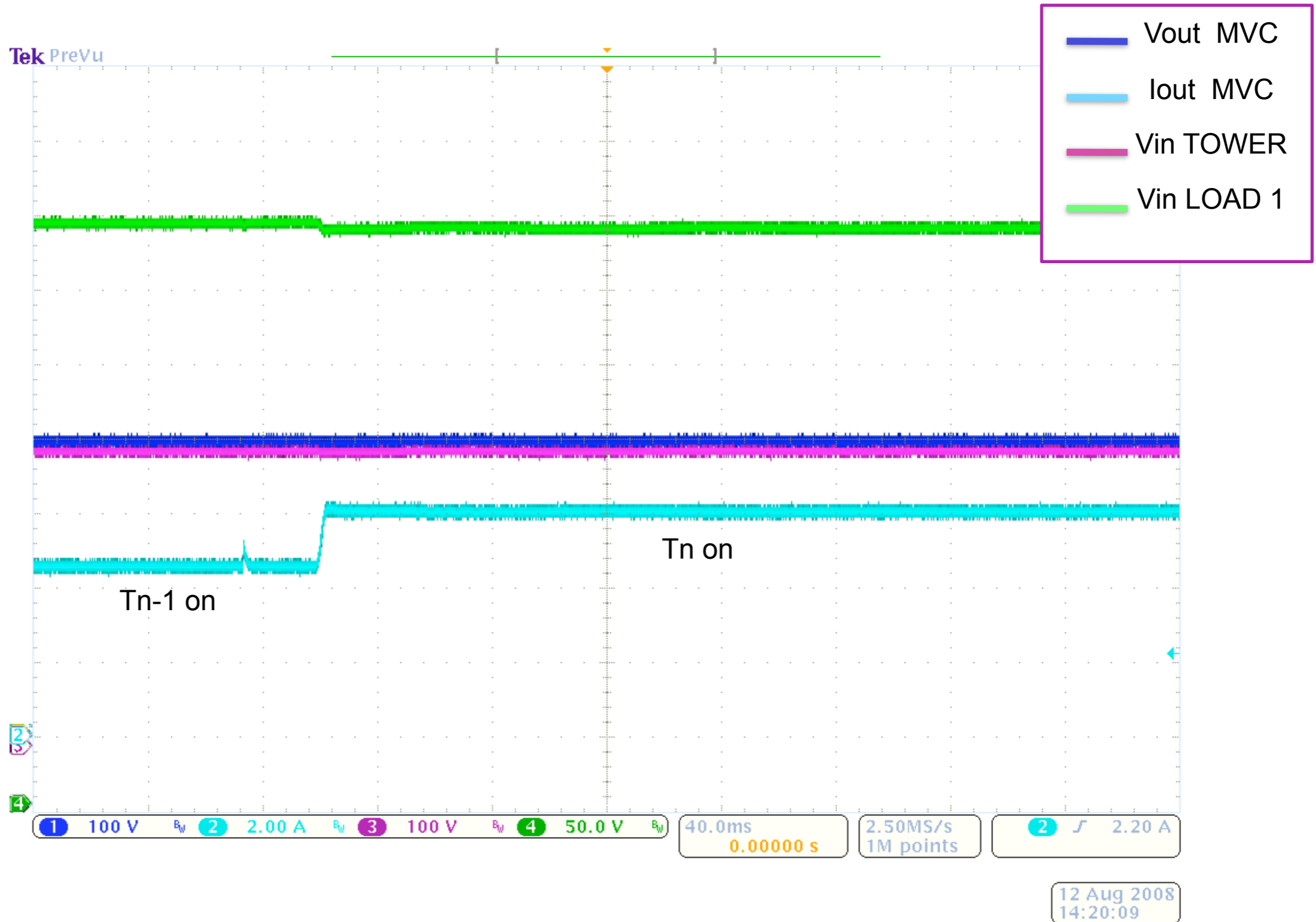
MVC - NEMO Operational Test

Switch on all tower switches B0,...B16 – Switch off BT



MVC - NEMO Operational Test

Switch on a Tower Equivalent load



MVC Time Schedule

- Test of final prototype successfull
- Factory Acceptance Test: 15 November 2008
- Frame Integration: December 2008
- Sea installation: Mid January 2009