The NEMO phase 2
DC/DC Converter

KM3Net WP5 meeting Paris 15-16 October 2008
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Testo
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.
MVC

Single Board
2 subconverters

Stack
8 subconverters
1 Control Board

Assembled
Converter

Housed Unit

Internal Unit
### MVC Features

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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

Power Supply
10 kW
ARTIFICIAL LINE
100 km

MVC
10 kW
10 kV / 400 V

SW1

Cable 1 - 4
500 m
4 x 4 mm²

Cable 5 - 8
500 m
4 x 4 mm²

Cable 9 - 12
500 m
4 x 4 mm²

Cable 13 - 16
500 m
4 x 4 mm²

Cable 17 - 19
500 m
4 x 4 mm²

SW2

NEMO TOWER

LOADS 1 - 4

LOADS 5 - 8

LOADS 9 - 12

LOADS 13 - 16

LOAD 1

LOAD 2

LOAD 3

LOAD 4

LOAD 17

LOAD 18

T1

DC/DC
35 μF
VICOR 600 W
500 W

T18

DC/DC
35 μF
VICOR 600 W
500 W
MVC - NEMO Operational Test

- **Power Supply**: 10 kW
- **ARTIFICIAL LINE**: 100 km
- **MVC**
  - 10 kW
  - 10 kV / 400 V
MVC - NEMO Operational Test
MVC - NEMO Operational Test

18 Towers equivalent loads
MEASUREMENTS POINTS

- Vout MVC
- Iout MVC
- Vin Tower

- MVC - NEMO Operational Test

- Power Supply: 10 kW, 10 kV / 400 V
- MVC: 10 kW, 10 kV / 400 V
- Cable 1 - 4: 500 m, 4 x 4 mm²
- Cable 5 - 8: 500 m, 4 x 4 mm²
- Cable 9 - 12: 500 m, 4 x 4 mm²
- Cable 13 - 16: 500 m, 4 x 4 mm²
- Cable 17 - 19: 500 m, 4 x 4 mm²
- SW1

- NEMO TOWER
- MVC - NEMO Operational Test

- LOAD 1
- LOAD 2
- LOAD 3
- LOAD 4
- LOADS 5 - 8
- LOADS 9 - 12
- LOADS 13 - 16
- LOAD 17
- LOAD 18

- DC/DC: 35 μF, VICOR 600 W
- DC/DC: 35 μF, VICOR 600 W

Rosanna Cocimano
MVC - NEMO Operational Test

- **Start and stop**

  **Start** (when V input $\geq 5.7$ kV)

  **Stop** (when V input $<5.3$ kV)

  400 V DC output voltage

  400 V DC output voltage
MVC - NEMO Operational Test

Switch BT on (tower backbone on)

Vout MVC
Iout MVC
Vin TOWER
Vin LOAD 1

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

Vout MVC
Iout MVC
Vin TORRE
Vin LOAD 1

Tower on 1,7 A
Tower off

100 V  500 mA  100 V
4,00 ms  11,940 ms  250 kS/s  10k points
12 Aug 2008 11:33:06
MVC - NEMO Operational Test

Switch on a Tower Equivalent load

- Vout MVC
- Iout MVC
- Vin TOWER
- Vin LOAD 1

Tn-1 on

Tn on
MVC Time Schedule

• Test of final prototype successfull

• Factory Acceptance Test: 15 November 2008

• Frame Integration: December 2008

• Sea installation: Mid January 2009