



## Nokian Capacitors' Static Var Utility Compensator to stabilize voltage at Campos substation near Rio de Janeiro

Nokian Capacitors has delivered a Static VAR compensator (SVC) to Furnas Centrais Elétricas, the biggest Brazilian utility. The turnkey project included the design, delivery of thyristor controlled reactors, four filter banks, step down transformers, control & protection and monitoring system, civil construction, installation, testing and commissioning of the SVC and RTDS simulation of the system.

Furnas Centrais Elétricas SA supplies power to Rio de Janeiro, Sao Paulo and their surroundings - the most heavily populated area of the country. After competitive bidding in 2000, Furnas Centrais Elétricas ordered the SVC from Nokian Capacitors Ltd. The SVC was installed in the 345-kV Campos substation, 300 km north of Rio de Janeiro, to stabilize the voltage level at peak loads and in fault situations. The project incorporated the latest technical solutions and digital control. The thyristor valves, cooling unit and control & protection system are mounted in containers, which can easily be relocated if needed.

Campos SVC was commissioned in 2001. The customer reports that everything works reliably and smoothly.

For the Brazilian project, we introduced our newly acquired RTDS (Real Time Digital Simulator) to test the correct behavior of the control & protection system. Tests for this project were made in the RTDS laboratory in Winnipeg, Canada and at Nokian Capacitors' plant. RTDS models the network with various operating conditions in real time. By connecting an actual control & protection system to the simulator, it is possible to test system faults, which for safety reasons would be dangerous or impossible to test in field conditions.

Our cooperation with Furnas Centrais Elétricas SA began in 1998. Good partnership and many successful projects have given rise to a number of new initiatives.



### TECHNICAL DATA

Rated voltage	345 kV
Rated power	-60...+100Mvar
Rated frequency	60 Hz
Step-down transformers	3*33MVA /15 kV
Thyristor-controlled reactor	2*80Mvar
Filter banks	5th 20.5Mvar 7th 35.2Mvar 11th 13.6Mvar 13th 21.0Mvar

Logic for switching 16 MSRE (mechanically switched reactive elements). Response time 50ms.

Maintenance monitoring system.