

MISSION STATEMENT:

We offer our customers integrated solutions using innovative products, combined with unrivalled service and reliability worldwide.

Solid-Dielectric ACR Installation Improves Distribution Network Reliability *By Kitione Valili (FEA) and Oleg Samarski (NOJA Power)*

With the increase in demand for high reliability power supply to Fiji Electricity Authority's customer base, FEA purchased an initial 20 OSM Recloser units for installation mainly on the rural spurs of several distribution feeders. Offering a circuit exposure of more than 1000 kilometres, these feeders supply approximately 20% of the FEA's customer base.



Recloser & Control Cubicle Installation

In the 12-18 months since the commissioning, over 500 network faults have been registered and successfully restored beyond the recloser installation, with two recloser units accounting for more than 150 of these alone. Previously, an oil circuit breaker rated for 50 operations was used to protect the nearby substation and distribution feeders. The two NOJA Power OSM Recloser units now installed at the location

of the circuit breaker are rated for over 30,000 operations and have performed 150+ operations in the 18 month period since commissioning, representing a substantial decrease in maintenance time and an increase in customer power supply.

The installations in this division have substantially increased the mean time between network power outages and helped the maintenance teams identify feeder inadequacies by highlighting spurs with high fault incidences. By calculating the theoretical impact of a fault without the recloser installed, it has been estimated that the 20 units have saved over 350 minutes in SAIDI, and have enabled a 30% reduction in SAIDI for the FEA

Network Division. Plans have been drawn up to accordingly address these network defects and their impact on the SAIDI performance of the feeders.

The success of this strategy is particularly evident through an approximate 70% improvement in annual SAIDI performance in one of FEA's distribution feeders.

To ensure future reliability of this network division, the reclosers provide functionality extending beyond the current standard for ACR's. The OSM Recloser utilises voltage sensing technology on all six bushings to allow automatic operations to be performed in response to network conditions. Functionality includes Automatic Backfeed Restoration (ABR), where the device automatically closes if supply is interrupted on one side of a normally open recloser and supply on another side is present. Advanced communication capabilities of the recloser are being utilised by the FEA to integrate the devices into their SCADA system. This will have additional benefits in fault locating and supply restoration.

Due to the measureable success of the OSM automatic circuit recloser installation on the FEA Distribution Network, the utility purchased a further 30 OSM Recloser units from NOJA Power in 2007, with the intention of continuing the implementation of Distribution System Automation. This is expected to further reduce SAIDI and improve customer confidence in the reliability of power supply from the FEA.

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OSM Recloser Interface Test Set

The implementation of testing procedures is an integral aspect of both the switchgear manufacturing and servicing processes. Possessing the ability to conduct testing both in house and on the field ensures the safety, lifespan and rated operation of switchgear devices.

Due to the large range of primary fault currents (up to 16000A), relays are generally tested using secondary injection, whereby the relays are subjected to the same currents they would normally receive from the secondary of a CT. However, unlike general protection relays, the OSM recloser does not provide discrete inputs for CT connections, making it difficult

to introduce a secondary signal to the MPM. Furthermore, the recloser utilises Rogowski sensors within the cubicle instead of CT's, which output a voltage signal proportional to the input current. This does not allow for a current signal to be injected into the MPM.

To overcome this problem, NOJA Power provides an Test Set to simulate the current and voltage signals generated by sensors inside the OSM15 and OSM27 recloser bushing.

NOJA Power Awarded for Exporting Success

In 2002, NOJA Power made its first ever sale of medium-voltage reclosing switchgear to China, a country renowned for embracing new technologies.

In just five years NOJA Power has developed markets on every continent on Earth, an impressive feat that has earned the company the title of Queensland Exporter of the Year at the 2007 Premier of Queensland Export Awards. 2007 also saw NOJA Power awarded with the Latin American Business Award and the British Chamber of Commerce Export Award.

Managing Director Neil O'Sullivan describes the company as being "born global", and that the key to NOJA Power's exporting success is the development of a product suitable for the global market rather than any single market.

While Australia traditionally sees itself as a country built on mining exports, Neil states that high-tech innovations offer the same massive export potential.

"We realised early on that our world-first technologies, which increase the reliability of electricity supply, had many global applications so it was always our intention to sell overseas as well as domestically," he said.

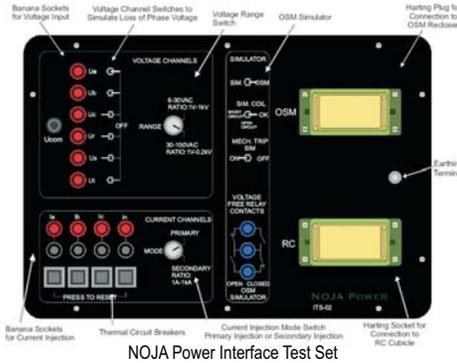
"Our export business has established channels to market in 70 countries and we currently supply switchgear products to 46 of them".

The Interface Test Set uses Rogowski transformers to convert an injected current signal into the voltage signal that the MPM is expecting. When used in conjunction with a power system and three phase test set it can be used to conduct the following tests:

- Three phase short circuit
- Phase to phase short circuit
- Earth fault
- Upstream broken wire
- Low source voltage
- Loss of supply

In addition to this functionality, this device has external voltage free contacts both normally open and normally closed that simulate the positioning of the contacts. The simulator also allows coil faults to be actioned and include; Mechanical Trip / Manual Trip, Simulator Coil Short Circuit, Simulator Coil Open Circuit.

The Interface Test Set allows for either the OSM or Simulator to be selected for coil operation from the MPM. This offers several advantages during application. As the MPM provides directional protection using voltage as a reference to determine current directions, the Interface Test Set provides an interface so that LV can be applied that the MPM will interpret as MV to allow for directional testing. This also provides the means to test UV1, Uv2 and UV3 based protection.



Highly skilled staff and an ongoing commitment to research and development ensure the success of NOJA Power's cutting-edge product range in the worldwide marketplace.

Where other switchgear manufacturers utilise the insulation properties of the environmentally harmful gas SF6, NOJA Power Switchgear remains SF6 free by utilising solid dielectric technology. NOJA Power also holds the patent on the arc fault contained and vented vessel to create a safe and environmentally friendly product.

Since the company was established, their number of employees has grown ten-fold.

"Because of our cutting edge technology, we tend to attract high performers who seek challenges and job satisfaction beyond the monetary rewards".



The NOJA Power Switchgear team at the 2007 Queensland Export Awards

"We offer apprenticeships and traineeships that lead into engineering degrees and our employees can then take on more senior roles," Neil said.

Brazilian Intern Graduates & Joins NOJA Power Distributor

Bruno Kimura is an Electrical Engineering Graduate who has joined NOJA Power's Distributor in Brazil, Festimport Exportação Ltda.

He is an exceptional young man who took it upon himself to make application for an internship with NOJA Power for six months in late 2005. He was successful with this application and in January 2006 he began a six month internship with NOJA Power. In his own words he states, "The six months whilst I had my first and memorable work experience was marked by the trust the company put on me, the incentive I was given in every task and the friendships I made."



NOJA Power Intern Bruno Kimura

During his internship he completed tasks like converting recloser control panel MMI strings from English to Portuguese. Today the control panel is available in Portuguese as a result. He then spent time on the production line and in the electronics laboratory where he assembled reclosers, manufactured cables and tested communications between modules.

As a result of his Portuguese skills he also became an interface with our Brazil Distributor which provided his first introduction that lead to the full time job he has today.

He then embarked on the major task of his internship and designed a new low voltage test bench as well as a 20kV high voltage test source. For both of these tasks his responsibility included research, design, manufacturing drawings, sourcing components and then overseeing the assembly and test of the finished products. The project was completed successfully. During Bruno's time in Australia he made many friends and those friendships will always exist.

He then returned to Brazil to the University of Sao Paulo where he completed the final year of his Engineering Degree successfully and has now graduated as an Electrical Engineer. Because of his internship he made particular focus on the last part of his degree in power engineering.

He has now joined the Festimport Exportação Ltda team to provide technical support for our Brazilian customers and is very well qualified to do so as a result of his internship.

NOJA Power Teams up to Supply PNG Power

NOJA Power was contracted by B&M Engineering to supply control panels for 800kW, 600kW, 250kW and 150kW diesel generators for Popondetta, Vanimo, Maprik and Finschhafen Power Stations in Papua New Guinea.

The PNG Power Specification called for voltage controlled overcurrent / earth fault, under voltage, loss of field or reactive power and reverse / low forward power protection with differential protection required for generators >500kW. Accordingly, the 600 and 800kW panels were fitted with Areva P343 protection relays and custom designed CT's to detect any imbalance arising from an internal generator fault. Since differential protection was not a requirement for the 250 and 150kW panels, they were supplied with Areva P342 relays. Terasaki TemPower2 ACB's were used in all cases to switch the generator onto the load bus.

A Deep Sea Electronics Engine Control Module was integrated into the control panel to allow the generator to synchronise onto a live bus before connecting to it. For the smaller generator sets the DSE5510 also provided engine cranking and overspeed monitoring.

To assist operators in quickly identifying the cause of any ACB or generator shutdown operations, the specification called for an engraved annunciator panel with a mix of coloured warning lights. Each annunciator had different modes of operation specified for alarm, warning and acknowledged states. In order to simplify sourcing future spare parts, the specification deliberately excluded PLC

control resulting in lots of relay logic with more than a kilometre of 2.5mm² control wire in each of the 6 panels. With their high mechanical operations and robust construction, Sprecher and Schuh CS4 control relays were selected to provide long life and trouble free operation.



NOJA Power Control Panels

A critical aspect of the project was to integrate the required control with MDEC and DDEC engine controls of the MTU Detroit generator sets. NOJA Power engineering staff conducted commissioning tests at MTU Detroit's Richlands facility witnessed by representatives from B&M Engineering and PNG Power. The test program involved exercising all protection and generator control functions together with load testing to 110% of generator capacity. Successful testing was a satisfying milestone marking completion of a very challenging design and assembly assignment for NOJA Power.

North Cyprus Electricity Factory Training

A delegation from North Cyprus Electricity recently visited our factory to undertake factory acceptance on a contract for the supply of sixty OSM27 reclosers. During the factory inspection the delegation carried out witness testing in accordance with the routine test requirements specified by ANSI C37.60-2003.

A training session was also conducted for the delegation over an intensive three day period. The course was successfully completed by all the delegates who were then presented with completion certificates.

This is an important follow up contract for North Cyprus Electricity who first installed NOJA Power OSM product in 2003. The successful field performance and reliability of this first delivery is the reason why North Cyprus Electricity has invested more widely in the use of this product.

On the weekend before departure the team had the opportunity to undertake deep sea fishing which is a unique experience off the Queensland Coast of Australia.

Right:
The three day training course is complete and certificates are issued



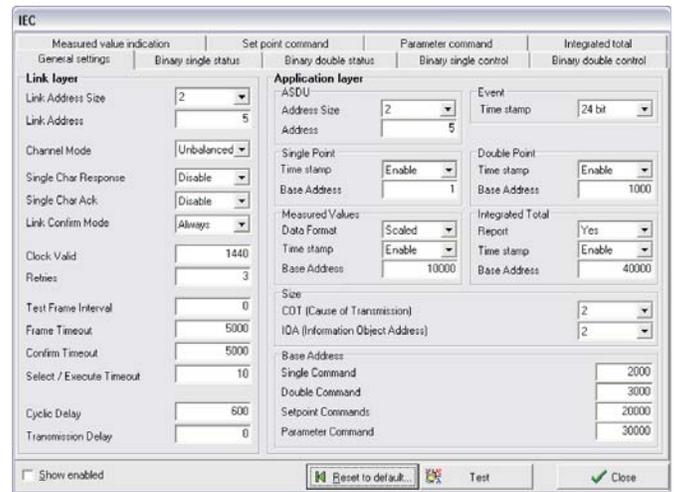
Below:
Rare Queensland deep sea fishing experience rewards successful training



OSM Recloser Software Functionality

As part of NOJA Power's continued commitment to evolving our products to meet the ever increasing demands of our customers, new versions of firmware and PC software have recently been released providing the following additional functionality:

- New DNP3 points (protection Group Trips, Local Control Indication)
- External load reset time
- GMT time support for Scada
- Maximum call duration settings
- Extension of SEF pickup current setting lower limit to 1A
- IEC-60870-5-101 protocol



IEC-60870-5-101 protocol configuration tool

This new functionality is available to all customers by downloading the latest version of firmware into their RC control cubicles as well as upgrading to the latest version on their Telus PC based software. Please contact NOJA Power or your local representative if you would like to upgrade to this latest functionality.

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