Premset

Medium Voltage Distribution
15 kV
Compact Modular Vacuum Switchgear

Shielded Solid Insulation System

Smart-grid ready, distributed intelligence
Scalable, high level of functionality
Protection, monitoring & control

december 2011
Efficiency
Smart grid and advanced management solutions across your networks

- Intelligent, smart grid-ready solutions
  - Feeder automation, with switchgear including built-in communication and local intelligence
  - Load management, with integrated smart metering
  - Asset management with advanced switchgear and transformer monitoring
  - Automatic Transfer System with integrated source transfer solution to reduce power supply interruption

- Architecture with distributed intelligence
  - Easy integration, based on a standard communications protocol, with a plug-and-play scanning system for easy configuration
Index

- Smart grid-ready solutions
- Distributed architecture
- Protections
- IEDs
In the 80s and 90s, RTUs (Remote Terminal Units) were mainly used in feeder automation applications to improve energy availability and reduce the number and duration of outages. Today RTUs have evolved to integrate functions such as automatic meter reading and load management.

Ready for the future, the Premset system R200 RTU has downloadable firmware to keep pace with these and other evolving possibilities of Smart Grids. It will concentrate meter readings via PLC (Power Line Carrier) and be upgraded to add advanced features like predictive maintenance and self healing.

- Feeder automation
- Load management
- Asset management
Feeder automation

- Switchgear ready for communication
  - Communicating FPI
  - Smart switchgear controller
  - Communicating Protection

- Remote communication with Distributed Management System
  - Remote Alarming
  - Remote control

- Local automatism
  - Recloser
  - Source transfer

- Optimized protection relay for CB in MV ring
Load management

- Integrated smart metering
  - Power meter
  - Optimized metering cubicle
  - Low power voltage and current sensors

- Remote communication to load flow management solution
Asset management

- Monitoring of switchgear
  - Overcurrent and breaking profile
  - Backup power supply monitoring
  - Motorization monitoring
- Monitoring of transformer
  - Load
  - Temperature
  - Trends and alarming
  - Ageing monitoring
- LV network monitoring
  - LV Load
  - Phases unbalance
  - Lack of voltage on one phase
- Maintenance
  - Protection chain test
  - Remote alarming by mail, SMS, …
  - Type stamped events recorded
- Easy diagnostic on local web pages
The IEDs (Intelligent Electrical Devices) used in Premset system have been designed to optimise substation performance and compactness

- Modular architecture for scalable solutions from local control up to complex feeder automation
- Each IED is fully integrated in a functional unit with a dedicated location and cabling
- Pre-engineered, pre-tested and cost effective, the system includes the necessary sensors, switchgear interfaces, power supplies, communication solutions and HMI
- Easy integration based on field bus communication between IEDs with a plug and play auto adaptive system
- RJ45 local network open to third-part devices
- Each IED has a compatible XML description file based on CIM (Common Information Model) / IEC 61850 standard. This allows easy configuration to communicate with any RTU (Remote Terminal Unit) or SCADA (Supervisory Control And Data Acquisition) system.

- Distributed intelligence
- Embedded intelligence
- Integrated in solutions
- Web technology
- Architecture example
Distributed intelligence

- Today: set of products to connect
  - Protections: Sepam
  - Measurement metering: Power Logic
  - Local fault monitoring & Remote control: Easergy
Distributed intelligence

- Easy installation, configuration and exploitation thanks to
  - Modular and plug-and-play architecture
  - Local network
  - Web interface
Embedded intelligence

- Functional approach based on optional and independent modules to cover various combination
  - Protection, Control, Measurement …

- Modules fully integrated in functional unit
  - Including sensors, switchgear interface, power supply, communication, HMI
  - Pre-engineered, factory-tested, cost Effective
  - Easy integration based on:
    - Field bus communication between modules
    - Pre-cabling inside cubicle
  - Gradual solution: from local control up to complex feeder automation
Integrated in solutions

- SCADA and DMS for feeder automation
  Telvent DMS, L500 or legacy SCADA with standard protocols (through R200, T200)

- Energy monitoring, energy management, building management
  With Remote Energy Management (REM), IONe

- MV loop automation solution

- IEC61850 access to substation automation
  Through gateway (C264 and PACiS)

Field engineer using mobile computing device Wired
Web technology

Access to information on the electrical installation is as easy as opening a Web page.

- Need just a PC with a standard web browser:
  - local area network
  - pluggable connection to the Premset switchboard
  - mobile network access (3G, GPRS, etc.)
Architecture example

- **Solutions**
  - SCADA DMS
  - Distribution Management System
  - Meter Data Management

- **Functions**
  - Protection
  - Feeder automation (FPI, switchgear control, sectionnalizer, LV monitoring)
  - Load management
  - Alarms management

Distributed architecture

DMS - L500
R200
PS100
F23D
F23D
PM800 VIP

IEC 101
IEC 104
DNP3 over radio, GSM, GPRS, ...

LV network monitoring
● Panorama
● Self powered protection
● VIP40 / VIP45
● VIP400 / VIP410
● Selection table
Panorama

● **VIP**, optimized performance for Premset
  - Self powered
  - Optimized for Premset
  - Specific CT, Mitop actuator
  - Simple protection, easy to implement
  - Perfectly adapted to dedicated application

● **Sepam**, open protection & monitoring
  - External power
  - Open range
  - Standard CT, shunt trip actuation
  - From basic to sophisticated protection
  - Existing catalog
Self powered protection

- VIP relays are **self-powered** while traditional relays require an auxiliary power supply

- Self-powered protection relays **increase** the availability of the MV network and are perfectly suited to most applications
  - Insensitive to voltage drop due to faults
  - Not dependent on UPS systems (weak point of electrical installations)
  - Less dependent on the external environment (EMC, LV overvoltages) because they require no external connections

- In addition, the VIP offers **optimized performances** due to integrated protection chain
  - Complete and pre-tested protection system: special CT and Mitop actuator savings on space and cabling time
  - Fast clearing time in case of transformer short-circuit (< 60 ms): no fuse needed
  - High sensitivity sensors
VIP40 / VIP45

Entry level MV/LV transformer protection

- **Self-powered operation**
  - Energized by the CTs: no auxiliary power needed
- **Complete pre-tested protection system**
- **Designed for RMU to protect transformers**
  - Designed for RM6, RMR and future others circuit breakers to replace fuse-switch solutions
  - Setting is as simple as fuse selection
- **Phase over current protection**
  - Dependent-time phase over current tripping curve dedicated to MV/LV transformer protection
  - Discrimination with LV circuit breakers or LV fuses
  - Compliant with TFL (Time Fuse Link) operating criteria
- **Earth fault protection**
  - Definite-time tripping curve
- **Measurement**
  - Load current on each phase
  - Peak demand current
- **Primary injection test**
  - A primary injection circuit is permanently installed through the CTs, to test the complete protection system including the CTs
VIP400 / VIP410

- **VIP400**: Self-powered protection relay
  - It is energised by the CTs. It does not require an auxiliary power supply to operate protection
  - Thermal overload protection
  - Load current and peak demand measurement functions

- **VIP410**: Dual powered protection relay
  Same self-powered functions as the VIP400 plus an AC or DC auxiliary supply to power certain additional functions that cannot be self-powered:
  - Sensitive earth fault protection;
  - External tripping input;
  - Cold load pick up;
  - Communication (Modbus RS485 port);
  - Signaling

- **Common features**
  - Designed for RM6, RMR and future others circuit breakers to replace fuse-switch solutions
  - Complete pre-tested solution that eliminates complicated CT selection
  - Complies with MV protection relay standard IEC 60255

- **Primary injection test**
  *A primary injection circuit is permanently installed through the CTs, to test the complete protection system including the CTs*
## Selection table

<table>
<thead>
<tr>
<th>Protection functions</th>
<th>VIP series</th>
<th>Sepam series</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>VIP 40</td>
<td>VIP 45</td>
</tr>
<tr>
<td>Phase overcurrent (ANSI 50-51)</td>
<td>●</td>
<td>●</td>
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<tr>
<td>Earth fault (ANSI 50N-51N)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Standard (sum of current method)</td>
<td>●</td>
<td></td>
</tr>
<tr>
<td>High sensitivity (earth fault CTs)</td>
<td></td>
<td></td>
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<tr>
<td>Thermal overload (ANSI 49)</td>
<td>●</td>
<td>●</td>
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<tr>
<td>Cold load pick-up</td>
<td></td>
<td></td>
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<tr>
<td>Other protection functions</td>
<td>●</td>
<td>●</td>
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</table>

<table>
<thead>
<tr>
<th>Measurement functions</th>
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<th></th>
<th></th>
<th></th>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Phase and earth currents</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
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<tr>
<td>Phase peak demand current</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
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<tr>
<td>Load history</td>
<td>Cumulative time</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
<td>●</td>
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</tbody>
</table>
## Selection table

<table>
<thead>
<tr>
<th>Control and monitoring functions</th>
<th>VIP series</th>
<th>Sepam series</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trip indication</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Local (with origin of the fault)</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>Remote (one contact)</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>3 output relays</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Top circuit supervision (ANSI 74TC)</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>Time-tagged events</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Local on display (5 last trips)</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>Remote via communication</td>
<td></td>
<td></td>
</tr>
<tr>
<td>External tripping input</td>
<td></td>
<td>•</td>
</tr>
<tr>
<td>Overcurrent and breaking profile</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of phase and earth trips</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>Serial communication port</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Modbus RS485</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>Digital inputs/outputs for control functions</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## Power supply

<table>
<thead>
<tr>
<th>Type of supply</th>
<th>Self-powered or auxiliary</th>
<th>Self</th>
<th>Self</th>
<th>Self</th>
<th>Dual</th>
<th>Auxiliary</th>
<th>Auxiliary</th>
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</thead>
<tbody>
<tr>
<td>Minimum load current to activate the VIP</td>
<td>5A</td>
<td>5A</td>
<td>7A</td>
<td>7A</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
With Premset, intelligence can be added to functional units by integrating protection, control and monitoring IEDs (Intelligent Electrical Devices). The IEDs have dedicated locations and cabling and are daisy-chained throughout the various functional units using RJ45 connectors and Modbus protocol.

A gateway can be used to connect the IEDs to supervision systems via Ethernet, TCP-IP and/or radio communication.

Premset is web-enabled to let you access information on your electrical installation via a PC with a standard Web browser.

- Fault Passage Indicator (FPI)
- Voltage relay
- Switchgear control
- Backup power supply
- Remote Terminal Unit
- Measurement
- Sensors
Fault Passage Indicator (FPI)

● **Stand alone FPI**
  - Fault passage detection
  - Local indication: Led + external lamp
  - Remote indication: Dry contact
  - Current, peak demand: local

● **Communicating FPI**
  - Fault passage detection
  - Local indication: Led + external lamp
  - Remote indication: Communication
  - Current, peak demand: local & remote
  - Voltage relay for ATS & ESW lock
  - Auto adaptative configuration

- **Flair 21D**
  - Self power
  - 4 h indication
- **Flair 22D**
  - Battery
  - 16 h indication

- **Flair 23DM-V**
  - 12-48V power supply
  - 16 h indication
  - Communication port
  - Voltage relay
Voltage relay

- **Earthing switch locking**

**ESL100**
- 24-230V power supply
- Fit with VPIS
- Live cable interlock

- **Versatile Voltage relay for ATS**

**VD23**
- 24-48V power supply
- Fit with VPIS
- Local indication: Led + external lamp
- 2 outputs:
  - Voltage presence (ATS)
  - Voltage absence (earthing switch)
Switchgear control

● **Switchgear opening and closing**
  - Remote orders through communication
  - Local orders, including HMI
  - Remote/local mode selection
  - Compatible with different mechanisms and voltages
  - Compatible with anti-pumping, anti-reflex and external interlocking

● **Switchgear monitoring**
  - Diagnostic information
  - Auxiliary contacts
  - Logging of time-stamped events
  - Modbus communication
Backup power supply

Solution for micro breaks and power interruption up to 12 hours

- High level of insulation to protect electronic devices
- Easy maintenance
  - Only one battery is easier to replace
  - Integrated into the LV cabinet
  - Monitoring of the battery

Communication devices
- RTU
- Modem

PS100

Battery

Charging or supplying

25 W

Uninterrupted power supply
12 Vdc

MV switchgear:
- Motor mechanisms
- Control unit
- Protection relays
- Other devices

90W + 300W 1mn
Remote Terminal unit R200

Including a dedicated Automatic Transfer Switches version (= ATS100)

- “plug and play” devices configuration
  - Scan the network
  - Configure the data base using files description
  - Create an automatic web display with the single line diagram

- Smart Grids consistency
  - A dedicated product for remote monitoring of MV substations
  - Open to all SCADA systems
  - PT100 for transfo monitoring
  - Archives, indications and alerts for optimum operation and maintenance
Measurement

- Basic ammeter **Amp 21D**
- Communicating ammeter **Amp 23D**
- Energy Monitoring & Power quality **PM800 & ION 8800**
Sensors

An opportunity to bring energy monitoring at MV/LV level

- Traditional MV sensors restrain metering functions
  - Heavy and Expensive
  - Need extra volume in cubicle

- New: Premset sensors:
  - Optimized for each functions: Protection, measurement, billing, FPI
  - Integrated in the functional architecture
  - Compliant to old and new standards

Current Transformer for protection
- Self power
- LPCT
- CT
- Zero sequence

Current Transformer for measurement
- CT for Power meters
- CT for FPI

Voltage Transformer
- LPVT
- VT

LPVT
VRT 4