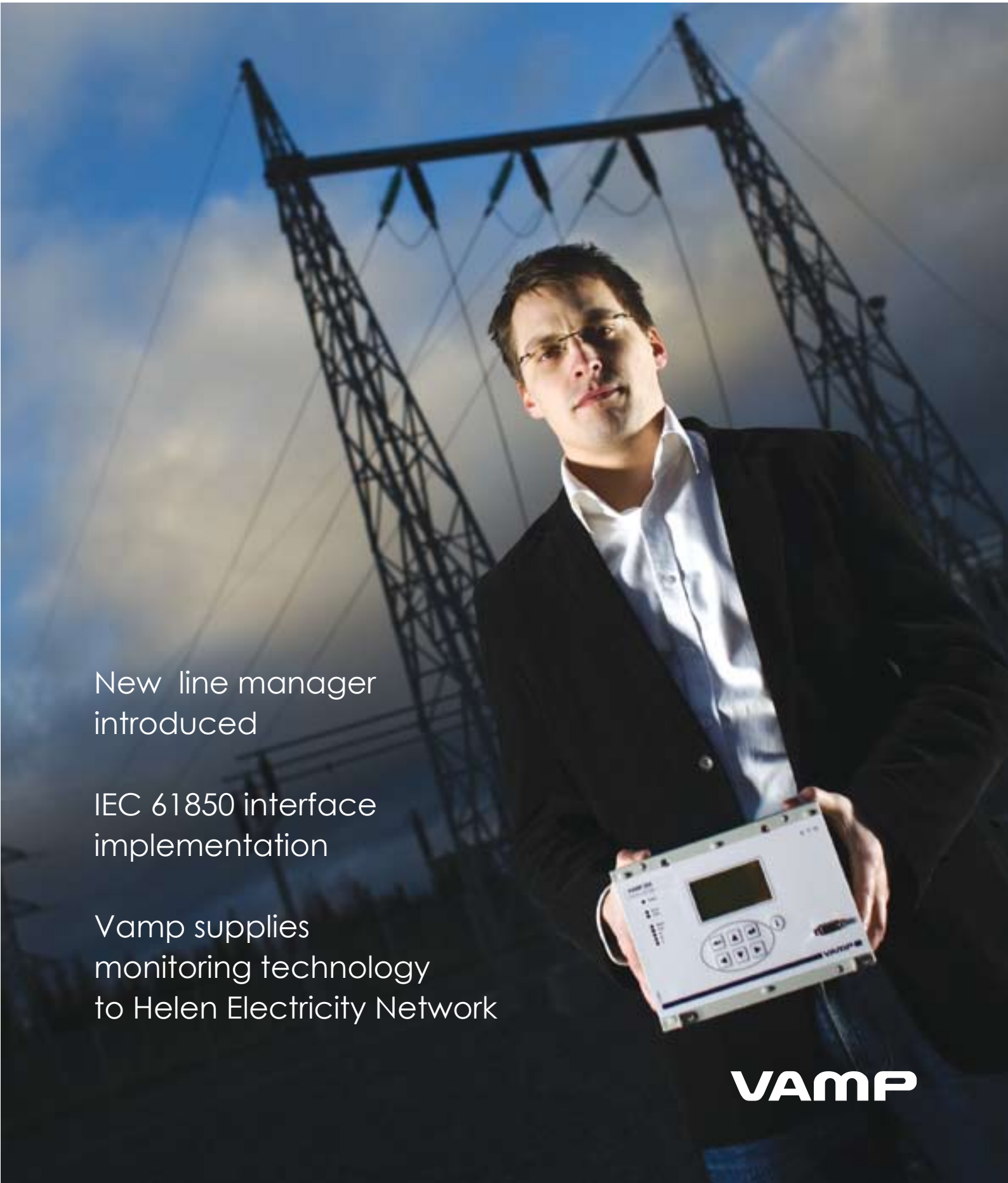
Protection & Control

1 I 2009



New line manager introduced

IEC 61850 interface implementation

Vamp supplies monitoring technology to Helen Electricity Network

VAMP

We keep
electricity running

Vamp Ltd

Vamp Ltd specialises in protection relays, arc protection systems and measuring and monitoring systems for power distribution networks. The company's Vamp medium-voltage and sub-transmission protection relays are used in a number of applications, from overhead line feeders and substations to power plants and industrial power systems. Their unique integrated arc fault protection functionality enhances the safety of both people and property and has made Vamp a leading brand in arc protection worldwide. The company's measuring and monitoring systems cover a wide range of measurement functions for industry and utility applications and for secondary substations.

With its headquarters in Vaasa, Finland, Vamp has an international network of subsidiaries and partners. R&D operations are based on close cooperation with customers and leading universities and research institutes. Customer and market requirements are closely followed and efficiently transferred into product features in terms of accuracy, user-friendliness and easy communication.

All Vamp products meet the latest international standards and regulations. They are flexible and widely customisable and come with 24-hour after sales support. They are also based on a certified quality system according to ISO 9001:2000.

Vaasa Electronics Group

VAMP

Vamp Ltd, Vaasa
P.O.Box 810, FI-65101 Vaasa
Visiting address: Yrittäjänkatu 15, Vaasa, Finland
Tel: +358 20 753 3200, Fax: +358 20 753 3205

Vamp Ltd, Vantaa
Postal and visiting address:
Äyritie 8C, 5th Floor, 01510 Vantaa, Finland
Tel: +358 20 753 3200, Fax: +358 20 753 3205

Vamp Ltd
Email: vamp@vamp.fi
www.vamp.fi



CONTENTS

COVER

Jussi Vihersalo, sales engineer at Vamp Ltd, at Mäntsälän Sähkö's 110/20 kV Mattila substation. Vamp relays with integrated arc flash protection protect the substation's power transformer, switchgear and distribution feeders.

Photo: Mikko Lehtimäki

Protection & Control

1 | 2009

The magazine for business partners of Vamp Ltd

Editor-in-chief: Pekka Hämäläinen, pekka.hamalainen@vamp.fi

Editorial board:
Erkki Raunio, Pekka Hämäläinen, Elina Pensas, Anneli Frantzén

Editorial assistance by Impact Communications
Design by Bock's Office Oy
Printed by Waasa Graphics Oy

Refined technique

Vaasan Sport, the local ice hockey team in Vaasa, is one of Vamp's sponsorship partners in 2009. Jaakko Suomalainen, the team's goalkeeper, is Vamp's appointed player.

2008 a record year,
new challenges to growth ahead

The year 2008 was a record one for our company with respect to both net sales and financial performance. In terms of deliveries to customers, we achieved growth of more than 30 per cent, which corresponds to our long-term goals. On the one hand, our growth was based on geographical expansion; for example our long-term investments in the South American market began to bring results. On the other, it was based on focused market efforts, of which the wind power sector is an example. New products also boosted our growth.

No longer so small, but still not very big. Where should we be heading?

Our goal is to become a significant player in our sector. We want to keep growing at a faster rate than the markets and to consolidate our position as the market leader in arc protection. In fact, growth expectations focus in particular on arc protection, where we are seeking expansion for example by bringing new, innovative products onto the market.

But not everything can be measured by size. For us it is also important that our products are recognized on as many markets as possible, and that they contain special features that also create demand for them. An example of this is their user-friendliness, which is in a class apart compared with the competition.

Real improvements needed, day by day

Vamp Ltd has been operating for 15 years. Although our company is relatively young, the cumulative experience of our personnel is many times greater. This experience is also apparent in our innovative products. Many of the company's founders are still actively involved in operations.

Apart from our own sector, our company needs more vision and experience from other areas of life. This issue introduces Vamp Ltd's board of directors, the members of which have long experience in various business areas. The role of the board in the development of the company is clear, just as is that of the operative management and the entire organization: together we draw up an annual strategy that is eventually approved by the board along with the operational plan.

Figures come and go, and we began each year from zero. With respect to success it is decisive how we fare in this turbulent world and how we manage to change, adapt and improve our operations. This also concerns our partnership network, the systematic development of which is an essential part of our company's strategy.

The markets still offer potential for growth

The economic downturn of the second half of 2008 gives us cause to consider how the developing recession will affect us. Paradoxically, our sales during the second half of the year were at record levels. But what about the future? To summarize, we can say that long-term growth will remain our steadfast goal. In the present situation, some projects will likely be postponed and others perhaps even cancelled. New investment by industry may be limited although retrofit projects may also increase in the grip of recession. The energy and wind power sector will, however, continue to grow as will the power plant sector, where growth of 20 per cent is expected. During the first half of the year we will be introducing Expert Service, a new area of business operations that will concentrate mainly on relays. We will begin with Finland and then consider where to expand the service in the future.

Predicting the future – especially in the present situation – is difficult. That is why it is best to prepare for the recession by keeping costs under tight control. We will concentrate on the essential and for example continue at full strength in product development. Our goal is to offer a complete series of relays and arc protection systems to our customers and thereby to become a major relay supplier!

We wish our customers a successful year 2009.

Erkki Raunio
Chairman of the Board

The Vamp 259

– a new line manager with distance and line differential protection

by ***Jarkko Holmlund***
Product Manager
Vamp protection relays

The latest addition to Vamp's product portfolio, the Vamp 259, is a line manager designed for applications where combined protection, remote and local control, measurement, power quality, alarming and status indication functions are needed. The Vamp 259 is appropriate for full-scheme distance protection. It incorporates all functions usually required for protection of sub-transmission cables and overhead lines. Furthermore, it has the features required for line differential protection.

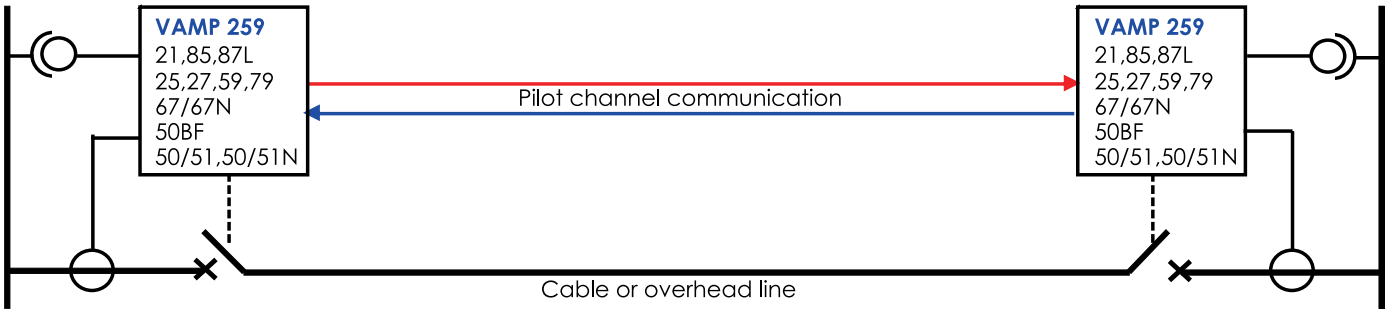


Figure 1. A principle protection diagram of line differential function.

The Vamp 259 – main features

- Medium voltage/sub-transmission line differential protection (87L)
- Medium voltage/sub-transmission distance protection including full-distance functionality based on 30 independent distance elements and 6 measuring systems (21/21E)
- Optical pilot-wire for transmitting and receiving tripping and interlocking signals (85)
- Complete set of time-delayed and instantaneous overcurrent, overvoltage, undervoltage and frequency protection functions
- Sensitive earth fault protection functions suitable for compensated, isolated networks and solidly grounded networks.
- Programmable protection stages
- Auto-recloser function
- Synchrocheck function
- Switch-onto-fault (SOTF) functionality
- Digital input support for trip circuit supervision
- Frequency stage df/dt (ROCOF)
- Fault value, alarm led display, event buffer, blackout data and disturbance recording storage in non-volatile memory
- Improved and inbuilt Ethernet interface as an option
- Native solution for IEC61850 communication with support for Goose messages as an option.
- Removable / interchangeable communication modules for connecting the relay to various system communication solutions and medias as an option.

Distance protection, ANSI 21

The distance protection function of the Vamp 259 calculates the impedance Z = U/I for each of the distance elements. If the impedance is inside the tripping zone (normally presented in the R-X plane, figure 2), the distance function operates. For short circuit and earth fault protection the relay contains 15 independent distance elements. The distance protection function calculates impedances in each of the fault loop continuously, thus assuring high precision and accuracy for demanding sub-transmission applications.

There are 5 zones (Z1<, Z2<, Z3<, Z4< and Z5<) for distance protection. These are implemented for short circuit and earth fault protection separately.

The distance protection's zones implement polygonal characteristics. Additionally, the function supports load blocking area (i.e. load encroachment area) settings, which are possible to enable for each zone individually. See figure 4 for details.

Figure 3 shows an application where all of the distance zones are utilized for sub-transmission distance protection. Also, the load blocking area can be activated for any of the distance zones.

The Vamp 259 distance protection is applicable for power systems where the grounding (earthing) star point can be solid- or low-resistance -grounded, resonant-earthed via Petersen coil or isolated, the network can be protected with sensitive directional earth fault protection.

The distance protection tripping can also operate with the use of tele protection schemes, if e.g. POTT (permissive underreaching zone transfer trip) or PUTT (permissive overreaching zone transfer trip) is required.

Line differential protection, ANSI 87L

Line differential protection Ldi> / 87L provides high-speed clearing for faults occurring at any point on a protected area of the transmission line or cable. A principle diagram of the relays and protected zone can be seen in figure 1.

Technical product manager Tero Virtala has been responsible for internal and external tests of the distance and line differential functionality.

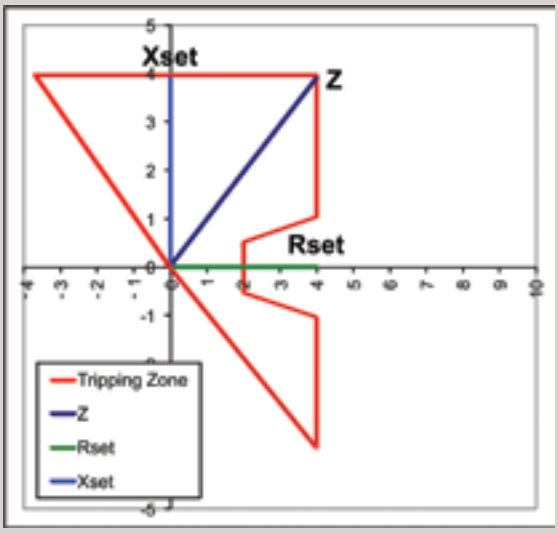
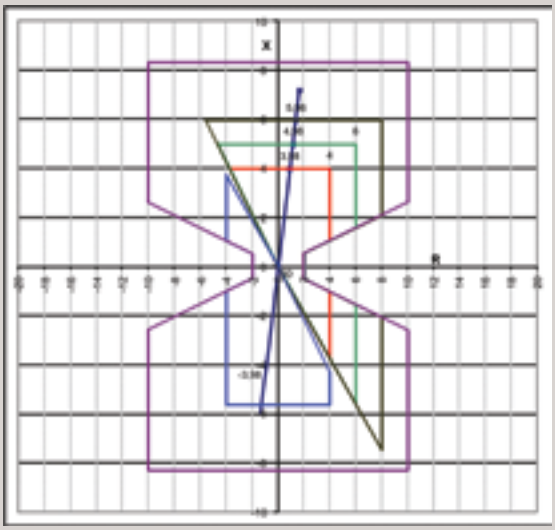


Figure 2. An example of a tripping zone presented in an RX-plane.

Figure 3. Distance protection application polygonal characteristic. In this example zone 4 is in reverse direction and zone 5 is non-directional.



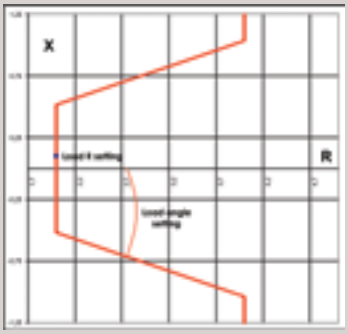


Figure 4. Load blocking area settings.

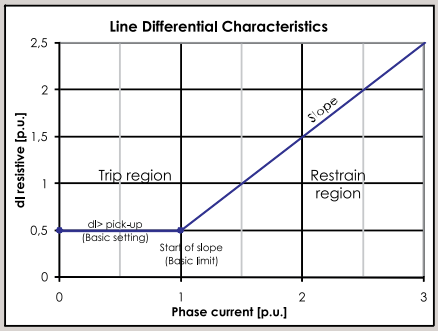


Figure 5. The biasing curve of the line differential protection function.

The line differential protection unit uses voltage measurements to calculate the resistive part of each of the three phase currents. A dedicated communication channel, called a pilot channel, is used between two relays to exchange information on resistive phase currents and to determine whether the fault is internal or external to the protected area.

In each piloting relay the difference between the corresponding resistive phase currents from this unit and from the remote unit is computed and compared against the configured threshold. In case any of the phases shows a difference in resistive currents that is greater than the threshold, the relay trips after the configurable operation time.

Using resistive currents for comparison assures good insensitivity to line charge currents. Definite operation time of the Ldi> / 87L stage can be configured, starting with 20 ms as the minimum value. When the difference between resistive current has been greater than the threshold for at least 20 ms the line differential stage starts to count the operation time according to the configured parameter. If the difference between resistive currents drops below the threshold while counting, the counting to trip is stopped. If the difference between resistive currents remains below the threshold level for the time defined (default 5 ms), the counting is cleared and the relay pick-up is also cleared. The threshold characteristics is biased for CT saturation as presented in figure 5.

The recommended solution for the pilot channel is supervised fibre optic wiring. With multimode fibre cables and fibre optic modems the communication distance can be up to 1 km. When using single mode fibre cables and third party modems the distance can be up to 40 kilometres.

Fortum Distribution selects Vamp 259 for distance protection

Fortum Distribution of Karlstad, Sweden, has placed orders for six Vamp 259 line managers for installation at several subtransmission substations. The first delivery was a pilot installation commissioned in the spring of 2008 at the 40 kV Hova substation in the Västra Götaland region. Two Vamp 96 measuring and monitoring units for metering of the substation's 12 kV incoming transformer feeders became operational at the same time.

The choice of supplier was based on the positive experience of the 11 Vamp 255 feeder managers supplied earlier for the 12kV outgoing feeders at the same substation. The Vamp 259 unit replaced an old distance relay. The protection relays and measuring units at the Hova substation communicate through a fiber optic SPA-loop, which is connected to a dial-up modem that is configured to the dispatch center.

According to Mr. Lars Öhman, project manager at Fortum Distribution, the protection functionality of the Vamp 259 units has met expectations. "Disturbance and event recordings are conveniently transferred and stored with Vampset, thus providing for easy fault analysis. Also, it's easy to collect power quality parameters and metering registrations when you need them", he explains.

The serial remote port of the relay is used by line differential protection pilot communication. In the event of a pilot channel failure, the line differential protection is inactive and the relay will automatically switch from main protection to distance protection (21).

Arc fault protection

The Vamp 259 can be equipped with an arc fault protection card. If the arc protection option is selected, the relays also measure light via arc sensor channels monitoring the whole switchgear. Should an arcing fault occur in the switchgear, the arc protection system provides an extremely fast tripping of the circuit breaker. The fault is prevented from spreading and is quickly isolated, which may save human lives and valuable assets.

Inbuilt IEC 61850

The Vamp 259 can also be equipped with a new in-built IEC 61850 interface. The IEC 61850 solution is a 'native implementation', which means that the functionality is implemented with software.

The interface allows peer-to-peer communication between the relays – this is the GOOSE communication.

Inbuilt Ethernet

The Vamp 259 also supports full Ethernet connectivity, with optional hardware. The Ethernet option interface is RJ-45 (10-Base T Port) and has status leds to indicate availability and activity on the LAN network.

The benefits of Ethernet-based communication compared to serial RS232 or RS485 are undeniable when it comes to data throughput, speed and bandwidth. This enables several services to be connected to the relays in parallel, such as SCADA or PLC systems, LAN-based time synchronization (SNTP) from timer server and Vampset parameterization tool.

Focus on expert services and easy communication in Finland

Visa Yliluoma
Sales Manager
Finland

Finnish integrators and their clients appreciate the user-friendliness of Vamp products. Another feature valued by customers is Vamp's flexible and customer-oriented approach in various fields of operation. These elements will now be further emphasized by a range of new expert services and, on the product level, by integration of the IEC 61850 communication protocol with Vampset software.

New service concept to be launched in 2009

The business in Finland for Vamp's type of products is changing, as many customers no longer maintain their own design, commissioning and testing capacity but rely instead on cooperation with subcontractors. In the protection relay segment this has resulted in a situation where manufacturers are increasingly requested to provide support services such as arc and relay application consultation, site supervision, training, simulation, pre-made relay settings and configuration. To meet these customer needs Vamp has decided to introduce a new range of customized expert services. Introduction of the new concept will be done step by step, starting from the beginning of 2009. Many of the modules included in the concept are already in operation.

User-friendliness with the new IEC 61850

Right from the start, Vamp has delivered protection relays with in-built SCADA communication with systems offered by Netcontrol, ABB and other manufacturers. In Finland there has not been an urgent need to adopt the IEC 61850 protocol as most of the functions and features offered by this protocol can be obtained with an alternative and more cost-efficient method. However, the IEC 61850 communication protocol with its horizontal GOOSE communication facility between the relays finally offers something new technically. In addition to the communication media independency, software-based interlocking instead of the hardwire principle is a significant benefit with the new protocol. This feature has convinced Vamp to integrate the IEC 61850 in the relays and to the free Vampset configuration and setting software. The decision has been well received by Finnish integrators and interest is further boosted by the successful results gained from communication tests with the converter between the IEC 61850 and IEC 104 provided by Netcontrol, Sprecher and ABB. The first projects utilizing this feature will be commissioned in early 2009.

Strengthening positions in Finland

Inclusion of the native IEC 61850 in the Vamp 50 overcurrent and earth fault relays, the Vamp 257 feeder manager and the Vamp 259 distance/ line differential protection devices will definitely strengthen Vamp's position in Finland and internationally. The increased functionality in Vamp's family of arc protection systems will also boost the entire arc protection business. Combined with the new range expert services, this will ensure further growth for Vamp in Finland during 2009.

A secondary substation located in the Lauttasaari district of Helsinki is part of the pilot project. Visiting the substation Markku Hyvärinen head of R&D at Helen Electricity Network Ltd (right), and Vamp Ltd's technology director Seppo Pettissalo.

Vamp supplies the monitoring technology

Helsinki Energy introduces the world's first system for smart control of secondary substations

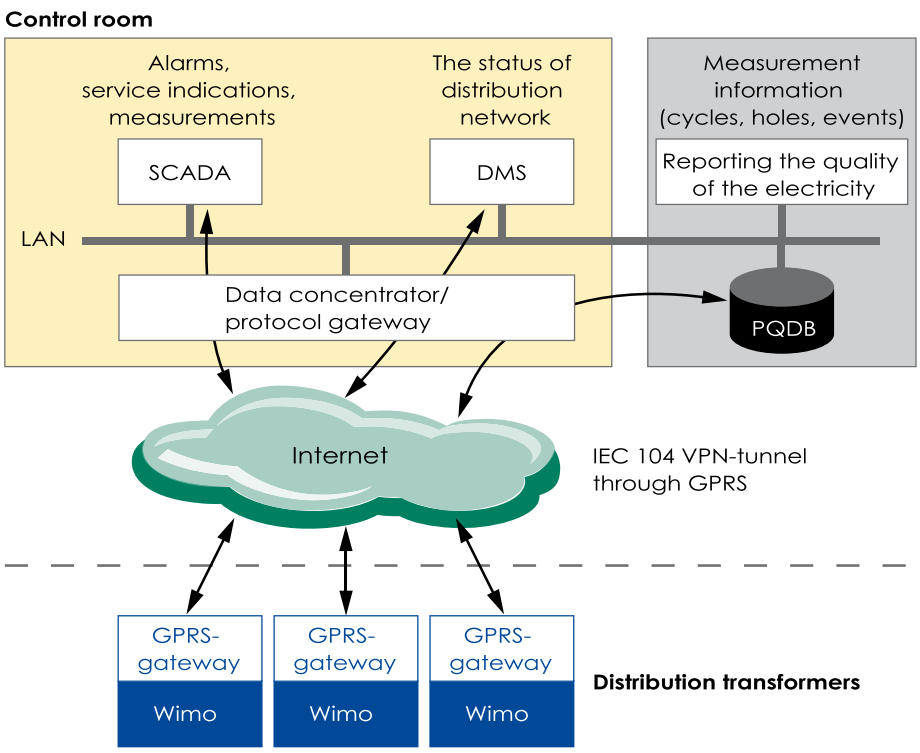
Together with three Finnish hardware and software suppliers, Helen Electricity Network Ltd, a subsidiary of Helsinki Energy, has developed an internationally unique smart system for secondary substation (MV/LV) monitoring. The pilot phase of the project began in March 2008 and to date the system has been installed at five secondary substations in Finland. Operational experience has confirmed the efficiency and cost-effectiveness of the solution.

To minimize outages and disruptions to supply, network companies must be able to locate disruptions more quickly and to develop condition monitoring in a more preventive direction. The medium voltage network together with its secondary substations plays a key role with respect to interruptions in supply experienced by customers. Nevertheless, secondary substations are at present the least monitored element in a distribution network because the methods available for their remote operation, control and condition monitoring have not been as cost-effective as those available to substations. Moreover, secondary substations situated in basements in particular are often located where manual switching is difficult and where faults – and in the worst case transformer fires – can cause serious damage. In the Helen Electricity Network Ltd project, the idea was to combine the forces of leading suppliers from different sectors to find a comprehensive smart solution for this particular segment.

Cost effectiveness the key criterion

The primary goal of the pilot project was to determine the costs and technical effectiveness of the system. Helen Electricity Network Ltd had previously tested various kinds of secondary substation equipment and data transfer technologies and followed developments in technology and costs until a remote control and monitoring system appeared to be a sensible investment in both technical and economic terms. Due to the costs involved, it made sense to link the new system to existing systems and to use their standard interfaces. This would also ensure that the new system would remain technically and economically manageable in the future. Public wireless networks were chosen for data transfer for the same reasons. Five secondary substations were included in the project. One of these was equipped for remote control and the rest for remote monitoring.

On the basis of competitive bidding, the design and implementation of communications and control room functions for the transformer stations was awarded to Netcontrol Oy. PowerQ Oy was chosen to provide the software for the measurement database and for reporting on power quality. Vamp Oy was chosen to supply the monitoring equipment and fault location technology. For communications in the project, a secure communications link using IP technology and the IEC 104 protocol was chosen. Netcontrol's Netcon®Gateway communications hardware and software and Netcon®NFE communication software



A new smart system that enables extensive monitoring of secondary substations and the medium voltage system.

were used for communications between the control centre and the secondary substations.

Individual measurement and monitoring of secondary substations

In the pilot project, Vamp Wimo 6CP10 measurement and monitoring units are used for management and monitoring of loads on secondary substations, monitoring of transformer compartments and measurement and recording of the power quality. In addition to these functions, the units also contain short circuit detectors for the MV network at secondary substations and measurement and detection of earth faults. Information from Wimo is conveyed to the upper level via a GPRS communications channel. At the control room level, information from Wimo unit is divided so that critical alarm-type data such as short circuit and earth fault detections, overtemperature alarms for transformers, and alarms of nonconformities in power quality are directed to SCADA. The less critical measurement data relating to power quality is transferred to the measurement database.

Results of the Helen pilot project match expectations

Markku Hyvärinen, head of R&D at Helen Electricity Network Ltd, points out that the technical efficiency of the system and equipment has met all expectations and the tight timetable for the project has held. Moreover, data transfer reliability in the pilot project was high compared with information obtained from similar systems in other countries, according to Hyvärinen.

Earth faults occurring in two of the medium voltage feeders during the pilot phase have demonstrated the effectiveness of the system in fault detection. In both cases, the fault occurred in a line section behind the secondary substation equipped with monitoring and could therefore be indicated. In the control centre it was also possible to see the magnitude of the earth fault current. In one case, this information could be used for fault isolation, which required disconnection due to a high earth fault current. In the other case, control of the disconnectors succeeded as planned. According to Hyvärinen, fault location is a critical factor in system development.

"The primary goal of development is to shorten outage times, and here fault location plays the key role. It is also essential for fault isolation with remote controllable isolators. The other features are by-products of fault control," he points out.

For the future development of the system, Hyvärinen singles out two key areas of priority:

"To make hundreds of installations possible, the costs of installing and commissioning the system have to be focused. Another factor is location of earth faults in a compensated network. Also, it should be established that the solution is technologically sustainable, especially with respect to wireless data transfer," he emphasizes.

Applications

- Remote monitoring and operation of secondary substations
- Location of earth faults and short circuit faults
- Monitoring of transformers and transformer compartments
- Monitoring of the quality of the electricity supplied to customers
- Analysis of disturbance recordings captured by the monitoring units
- Transfer of information to different departments within the network company.

Interfaces with other systems

- Uses existing communications networks
- Applicable in control room SCADA systems and in the measurement database for power quality

Factory acceptance test with the client's representative present.

The Vamp 221

– now also available with door-mounted I/O units

by ***Samuel Dahl***
Product Manager
Arc protection systems

Mounting and control of the Vamp 221 arc protection systems is now even easier, thanks to the new door-mounted Vam I/O units. The new series comprises the Vam 4CD and the Vam 10LD, which represent a further development of the established Vam 4C and 10L modules, and the entirely new Vam 12L and 12LD.

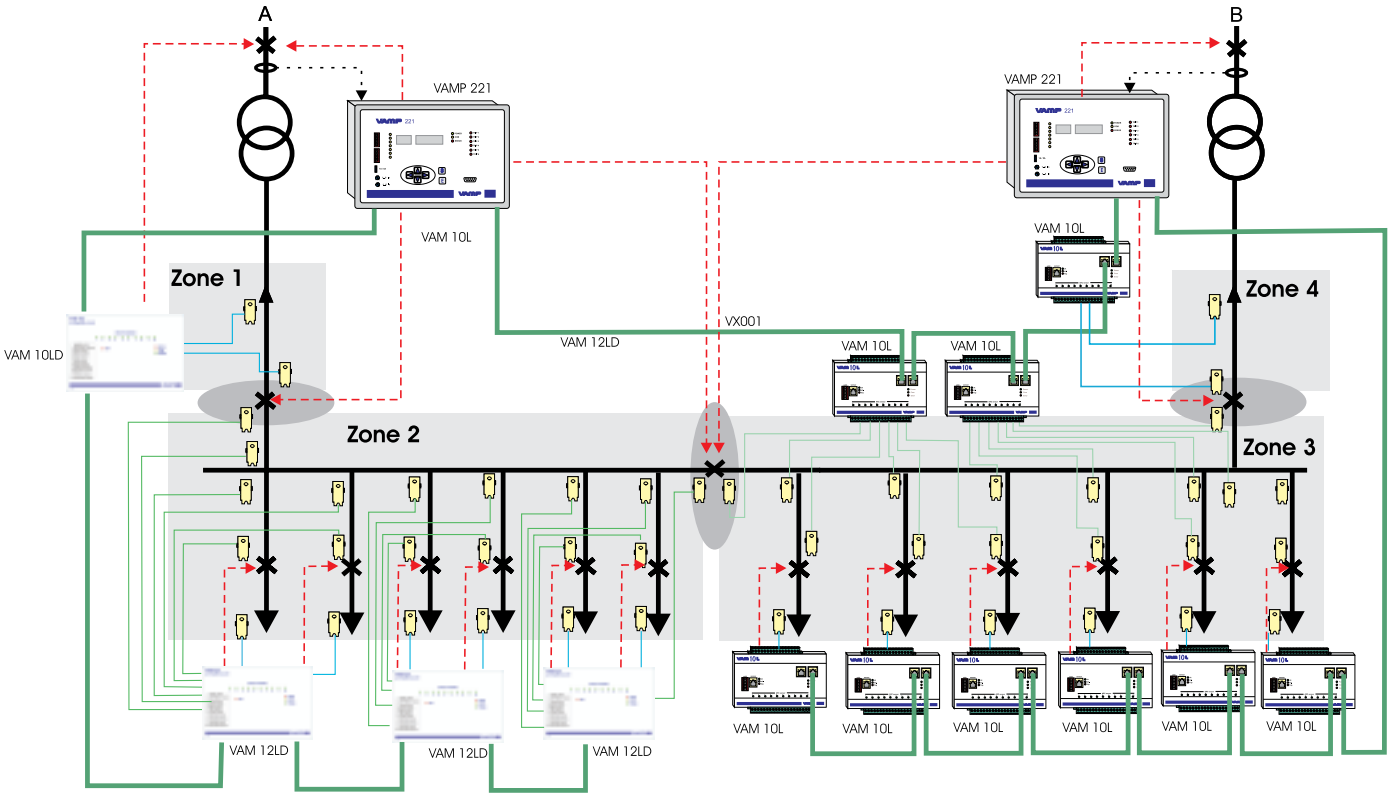
The D-type Vam units were designed to meet an existing customer need. They can be mounted directly in the switchgear door instead of inside the compartment. All D-type units have indication leds in the front panel, while all connectors are at the back. The front panel also has a text pocket where the end user can attach e.g. setting values, the unit address, and also sensor-specific information, as is the case for the 10LD and 12LD.

The features of the units are somewhat different. The Vam 4CD unit has the same functional specifications as the Vam 4C, and is used as a second current module in arc schemes with more than one incomer. The Vam 10LD has the same functionality as the Vam 10L, and is primarily used for protection of busbar and breaker compartments.

The door-mounted Vam 12LD and the din-rail mounted Vam 12L represent a completely new design with three electromechanical trip outputs and one trip alarm change-over contact.

Ten arc sensor inputs

The Vam 12 LD arc protection unit has 10 sensor channel inputs, the first sensors of which (1, 2 and 3) have dedicated trip outputs (T1, T2 and T3). T1 to T3 can also be tripped by external zone information through the com connection or through their own sensors 4..10 if the "ext" mode is selected with the dipswitch. The unit can also receive I> (overcurrent) information from the Vam 4C and Vam 4CD I/O units or Vamp 221 central units through the communication connection.
In contrast to the Vam 10L, 10LD, 3L, 4C and 4CD, the Vam 12L and 12LD units have no BI or BO connection. Also, the RS485 and CAN connection on the X2 have been removed and replaced with DO (relay) connections.



Selective feeder trip scheme using Vam 12 LD or alternatively Vam 10L.

Four output contacts

The Vam 12 L/LD has three electromechanical trip outputs and one trip alarm output. All trip outputs are of the heavy duty NO type and can control the circuit breaker directly. The trip alarm relay is of the change-over type; T1 is controlled by the sensor channel 1, T2 is controlled by the sensor channel 2, and T3 by the sensor channel 3. These are designed to supervise their own dedicated cable compartments in the outgoing feeders. Hence up to three cable feeders can be supervised with the same Vam 12L/LD unit.

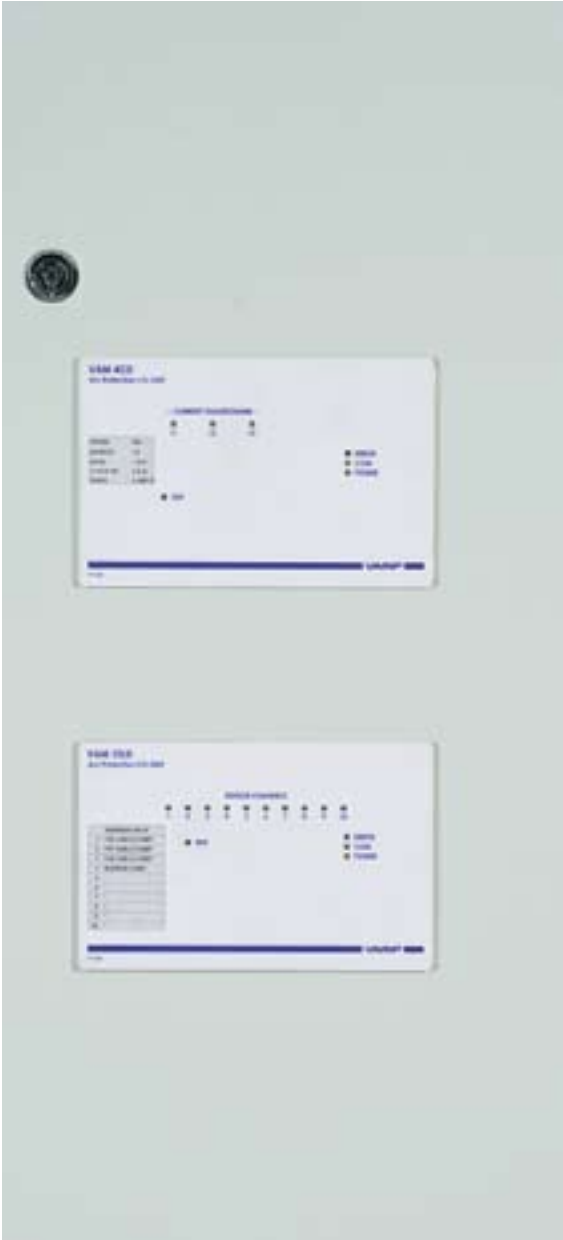
Sensors 4 to 10 are used for monitoring the busbar and breaker compartments.

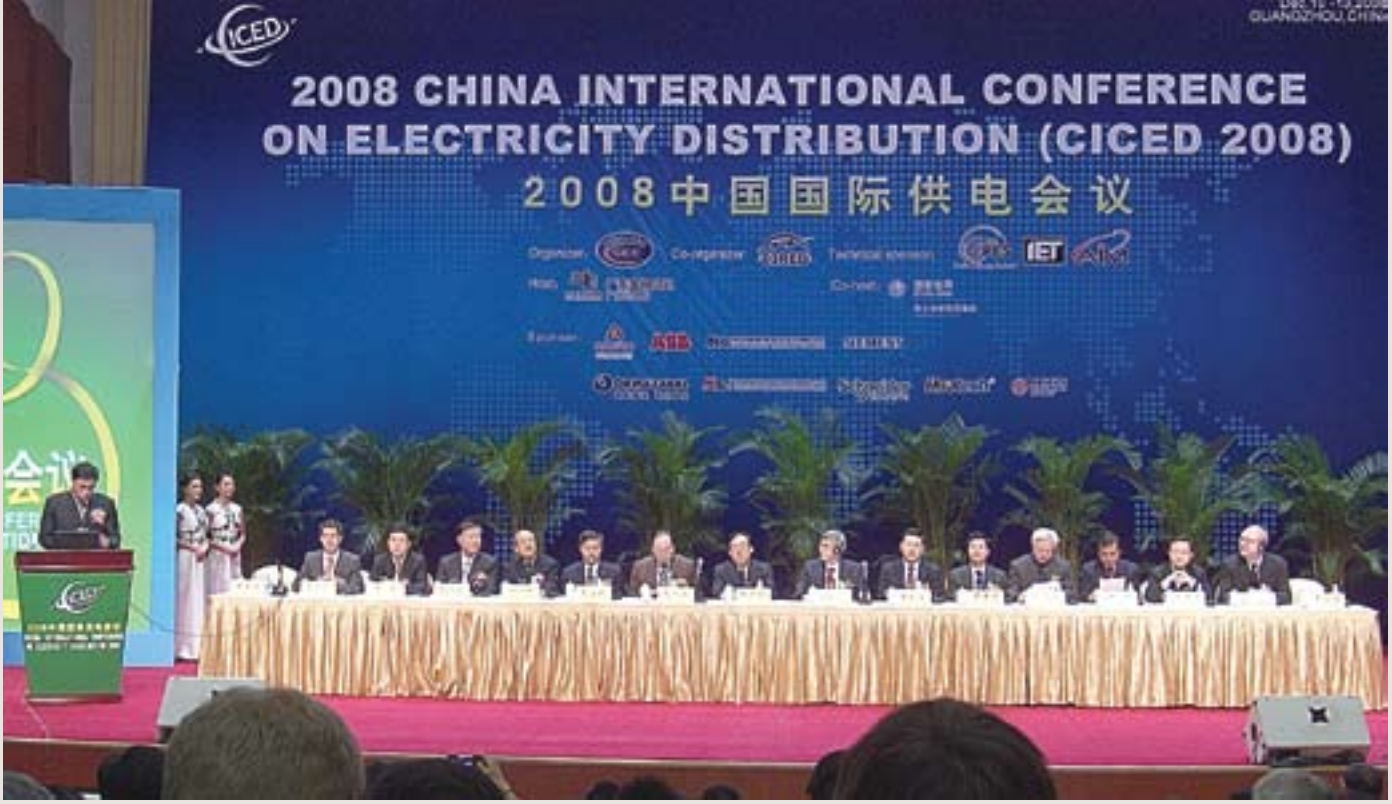
By setting L>int/ext dipswitch to ext mode, all three trip outputs will trip for a fault in zone and will therefore also isolate outgoing feeders for fault in busbar compartments.

The Vam 12 L/LD is mainly used when a selective feeder trip is needed and is one component in the Vamp 221 scheme.

	VAM 3L	VAM 10L	VAM 10LD	VAM 12L	VAM 12LD	VAM 4C	VAM 4CD
Mounting	DIN rail	DIN rail	Door	DIN rail	Door	DIN rail	Door
No. of point sensors		10	10	10	10		
No. of loop sensors	3						
No. of protection zones supported	1	1	1	4	4		
No. of trip contacts	1	1	1	3	3	1	1
No. of alarm contacts				1	1		
No. of current inputs						3	3
BI (24-48Vdc) Zone shift	yes	yes	yes				
BI (24-48Vdc) L>						yes	yes
BO (24Vdc) trip	yes	yes	yes			yes	yes
Sensor channel indication	LED	LED	LED	LED	LED (and customized text)	LED	LED
Connection for portable sensor	yes	yes	yes	yes	yes		
Other			Sensor-channel specific text pocket		Sensor-channel specific text pocket		Text pocket for setting values

Table 1: Selection table for Vam I/O modules





Getting ready for future challenges

Lauri Kumpulainen
Research Director, Vamp Ltd

Vamp will continue to grow. Growth in turn requires continuous development of our products and product families. Such development must be based on a vision of future market requirements and opportunities, a vision that comprises information collected from various sources. Contacts with our customers and partners are extremely valuable in this respect, although keeping up with advances in technology is equally vital. To stay in the forefront of innovation, we must continuously scan the research environment and academic world, for example by attending scientific conferences. During the past couple of months we have attended conferences on all five continents. We have also presented the results of our own R&D at these conferences. This wide perspective is complemented by active participation in specialist organizations such as CIGRE, CIRED and IEEE.

Long-term development

In arc-flash protection it has been gratifying to note that Vamp's long-time vision of the technology has proven right. Detection of arc-flash light combined with instantaneous overcurrent detection provides a solution to this demanding protection issue that is both technically and economically solid. We must, however, continue working in order to maintain our leading status in this field. Studies and tests carried out in cooperation with various universities and industrial partners will support this effort.

Another example of the successful selection of a development path is our 'native implementation' of IEC 61850 technology. It eliminates the need for gateways and will most likely lead to more reliable operation. Making this complicated technology user-friendly

Attending scientific conferences is part of Vamp's research activity.

is a positive challenge for our software designers.

Distributed power generation calls for new concepts

The power engineering business today is to a great extent driven by environmental issues. Renewable power generation sources, such as bio and wind power, are on the rise. As the size of power plants decreases, the cost-efficiency and flexibility of components become more important. Distributed power generation also requires new protection systems, for example to detect islanding. Vamp is prepared to meet the changing requirements with new innovations. Participation in research projects and collaboration with both DG manufacturers and network companies are an important part of the process. Neither technology nor resources are obstacles; our present product portfolio is proof of that.

An ever increasing requirement for power system reliability and aging networks in many countries have led to the development of new network philosophies. Vamp can prepare solutions not only for power system protection, but also for fault location. In this field, however, determined work including simulations, field tests and pilot projects will be needed if we are to verify methods worth practical implementation.

The IEC 61850

– a new interface implemented with software

Testing the IEC 61850 interface at Sprecher Automation in Austria.

Olavi Vähämäki
Product Development Director

The Vamp 257 feeder manager and the Vamp 259 line manager can now be equipped with a new in-built Ethernet interface. This interface can be used for either ModbusTCP, Dnp 3.0 or IEC 61850 communication. The new 61850 solution is a 'native implementation', which means that the IEC 61850 functionality is implemented with software. The software requires only the main CPU of the relay – no additional processor or gateway module is needed.

The IEC 61850 protocol can be used to read or write static data or to receive events sent spontaneously from the relay. In addition, the interface allows peer-to-peer communication between the relays – this is GOOSE communication. The IEC 61850 interface is configured with familiar, user-friendly Vampset software. The protocol data model, data sets, report control blocks and the GOOSE communication are configured according to the requirements of the system configuration. Vampset is also used to produce ICD files, which may be needed for the substation RTU configuration.

The IEC 61850 communication can be tested with the Info Tech 61850 Avenue tool or with Vamp's 61850 Simple Tester. In addition to the 61850 Avenue tool, Info Tech also offers the 61850 Software Library.

The native IEC 61850 solution has been tested for example with Netcontrol GW502 RTU and Sprecher Automation Sprecon RTU. The results of the tests were successful: transfer of measurement values, indications, protection events and control commands were verified. The events were sent using predefined data sets.

Mr. ***Tero Hyväkkä***

Mr. ***Risto Lehto***

Mr. ***Mika Loukonen***

Mr. ***Anders Nylund***

Ms. ***Elina Pensas***

Mr. ***Joonas Virta***

Mr. ***Visa Yliluoma***

Mr. ***Roberto J. Chávez Vega***

Mr. ***Tero Hyväkkä****, M.Sc. (Eng.), has been appointed Project Manager with responsibility for electronic and software design of numerical protection relays. He previously completed his master's thesis at Vamp Ltd.*

Mr. ***Risto Lehto****, B.Sc. (Eng.), has been appointed Regional Sales Director for Asia-Pacific. He previously worked as Sales Manager for Vaasa Engineering Oy.*

Mr. ***Mika Loukonen****, B.Sc. (Eng.), has been appointed Customer Support Engineer. He previously completed his bachelor's thesis at Vamp Ltd.*

Mr. ***Anders Nylund****, B.Sc. (Eng.), has been appointed Software Engineer. He previously worked as a Design Architect for ABB Oy Distribution Automation.*

Ms. ***Elina Pensas****, B.BA, has been appointed Marketing and Sales Assistant. She previously worked as a Sales Assistant for ABB Oy Motors.*

Mr. ***Joonas Virta****, M.Sc. (Eng.), has been appointed Area Sales Manager for Europe. He previously worked as Chief Project Engineer at Wärtsilä Finland Oy.*

Mr. ***Visa Yliluoma****, B.Sc. (Eng.), has been appointed Sales Manager with responsibility for sales in Finland. He previously worked as Sales Manager for electrical distribution systems at Vaasa Engineering Oy.*

Mr. ***Roberto J. Chávez Vega****, M.Sc.(Eng.), has been appointed Regional Sales Manager for Russian-speaking and Latin American countries. He previously worked in R&D, sales and marketing at ABB and Epec Oy.*

PARTNER IN FOCUS

Hikari Trading Co Ltd, Japan

Hikari Trading Co Ltd specialises in the manufacture and marketing of electrical equipment. The company was founded in 1949 and has 165 employees today. In addition to its headquarters in Tokyo, Hikari Trading has a manufacturing plant in Ibaragi and branch offices in Nagoya, Osaka and Fukuoka. The company does product development of its own and manufactures protection relays for the domestic market. The range of trading products includes electrical equipment from almost ten international manufacturers of which Vamp is the only supplier of protection relays that include arc protection.

Vamp subsidiary established in Russia

*Mr. **Guennady Kislov** (in the middle), managing director at ZAO Vamp. Mr. Kislov has eleven years of experience in the promotion of relay devices on the Russian market and CIS countries.*

*Mr. **Renat Nasyrov** (left), sales director. Mr. Nasyrov previously worked for six years as sales engineer and product manager in the field of relay protection.*

*Mr. **Nikolay Svyatkin** (right), technical director. Mr. Svyatkin is a specialist in protection relay technology and has vast experience in designing auxiliary electrical circuits for relay protection in various applications.*

Economic growth and extensive programmes for modernization of electric power systems in Russia are preparing the ground for Vamp's new Russian subsidiary. Based in Moscow, ZAO Relay Protection Vamp will market and sell Vamp products and services across the country as well as in CIS countries. Operations were started in September 2008 by a team of local specialists, all of whom worked previously for one of the largest electrical companies in Russia.

"To succeed in Russia, you have to adapt your products to the requirements of the local market there. This will be an important goal for us and assistance and support from the parent company will be crucial in achieving it. We are a strong team, capable of promoting Vamp products on the Russian market and of achieving the set sales targets," says the managing director Mr. Guennady Kislov. "The main market segments and customer groups for us will be panel builders, retrofit partners and design institutes, with whom we are already working actively. We are also focusing on energy and network companies and various industries in Russia and the CIS countries," he says.

"The Russian Federation is an extremely interesting market and has the potential to become one of the main market areas for Vamp Ltd," emphasizes Vamp President Mr. Jerker Kullberg. "For example, the new Vamp 50 and the Vamp 200 series of protection relays as well as the Vamp 221 arc protection system are well suited to the needs of major customer groups in Russia," he says.

ZAO Relay Protection Vamp
Serebryakova 14/10 office 108,
Moscow, Russia
Phone / fax: +7 495 663 33 68
e-mail: gkislov@post.ru

Koji Nakamura, Section Chief

After graduating in mechanical engineering from the Nagoya Institute of Technology, I worked for an electrical equipment manufacturer for almost ten years, eight years as a substation designer and two years as a switchboard designer. Thanks to this experience, I have a business license for both mechanical and electrical engineering.

When I was designing low voltage switchboards for Hong Kong Electric, HEC, I used Vamp relays supplied by Hikari Trading. Afterwards I learned that it was the first Japanese order for Vamp relays. Later Hikari Trading invited me to work for market development of their trading products. Now I have worked with Vamp for almost seven years.

Unfortunately, the Japanese market accepts only protection relays based on local standards. We can therefore offer Vamp products purely for export projects where the switchboards are based on international standards.

Besides the highly competitive market for substation applications, we have also targeted the marine segment since 2002. Certificates such as Lloyd's, GL, ABS, NK are required in this segment and Vamp expends considerable effort to obtain them and to take care of our new customers. When the Vamp 40 was developed, we had several customer reviews to meet the marine requirements. Today almost all major Japanese marine switchboard manufacturers use Vamp. It is a great honour for us to work between our customers and Vamp.

We continue to develop new markets, both domestic and international, for Vamp relays and arc protection. I expect to obtain the next major business from some of our new customers in cooperation with Vamp.

Vamp board of directors. From the left, Esa Pennanen, Jukka Marttila, Erkki Raunio and on the far right Seppo Pettissalo. Second from the right Vamp president Jerker Kullberg.

The Vamp Ltd Board of Directors in 2009

Erkki Raunio, B.Sc. (Eng.), chairman of the board. Mr. Raunio had a long career at Strömberg Oy in the 1970s and 80s, first as production engineer for high-voltage apparatus, then as head of materials management at the switchgear factory with responsibility for purchasing, warehousing, shipping and forwarding, and for development of logistics, and as head of purchasing for project operations. In 1986 he became head of materials management at ABB Strömberg Distribution Ltd. and was responsible for the company's development projects and capital rationalization until 1991. He subsequently worked in international purchasing for ABB Corporate and as ABB Oy's purchasing manager until 1994. He is one of the founders of the frequency converter manufacturer Vacon Ltd and served as the company's deputy CEO and marketing director until 2004.

Erkki Raunio was one of the founders of Vamp Ltd in 1994 and has served since then on the company's board of directors. He was CEO of the company from 2003 to 2005, when he became chairman of the board. Apart from Vamp Ltd, he is also on the boards of several other companies. Other companies in the group headed by Erkki Raunio are Vaasa Electronics Group Ltd, the parent of Vamp Ltd, and West Coast Innovative Solar Systems Ltd, which specializes in solar energy solutions.

Seppo Pettissalo, M.Sc. (Eng.), Vamp's technology director. Seppo Pettisalo was a member of the first class to graduate from the University of Oulu with an M.Sc. degree in the field of electronics. Mr. Pettissalo was one of the founders of the company in 1994 and also served as CEO for the first five years. He has had a long career in the service of the Finnish electronics industry. He has worked in product development for Strömberg Ltd and ABB. He is also known as the developer of the market's first digital protection relays equipped with communication.

Jukka Marttila, B.Sc. (IT). Mr. Marttila has worked for more than 25 years in banking and insurance, and in both financial and management capacities in industry. In banking he has extensive experience in planning functions in accounting and as a bank director for corporate financing. From 1997 to 2004 he worked as sales director for the corporate services of the insurance company Tapiola in Ostrobothnia. He is also a shareholder and the chairman of the board of Alumecon Oy, a company specialising in glass aluminium structures.

Esa Pennanen, M.Sc. (Eng.). Mr. Pennanen has worked in the Finnish electrical and electronics industry since 1971. He has extensive knowledge of international business, particularly in the field of energy metering. Under his leadership Enermet Group Oy became one of the leading companies in its sector in Europe. He retired from the Enermet Group in 2004. Apart from his membership on the board of Vamp Ltd, he is also chairman of the board and a shareholder in Aidon Oy, which specializes in energy metering.

Vamp relays gaining ground on the Japanese marine market

In 2003 the Japanese marine equipment manufacturer JRCS MFG. Co. LTD. applied the first Vamp multi protection relays to their switchgears. Four years later the company standardized Vamp for their protection systems. Today, approximately 500 Vamp units have been installed in JRCS switchgears for about 30 vessels, including LNG carriers and container vessels – and the number is increasing.

Flexibility and reliability required

Mr. Atsushi Sora, Leader of the Power Systems Technical Team at JRCS, considers flexibility one of Vamp's strengths in competition.

"We have supplied 6.6 kV medium voltage switchgears with applied power generating systems to many vessels in recent years. For protection of the generators, electric motors, loading apparatus and cables, the Vamp multi relay has been adopted as our standard model. One of the factors we require from our suppliers is rapid response. In this regard, the flexible attitude of Vamp helps us significantly," he says.

As to product features, safety and reliability are highly emphasized by JRCS.

"For manufacturers like us who provide switchgears related to vessel navigation, safety and reliability are of great importance. Besides these, protection relays for our projects are selected on the basis of function and cost performance," explains Sora.

Product development according to customer needs

Vamp's cooperation with JRCS is also reflected in product development. The first deliveries to JRCS comprised 100-series over-current, earth fault and motor protection relays and 200-series generator protection relays. However, the specifications of these relays were more than sufficient in relation to requirements, which is why a decision was made to develop a cost efficient multi protection relay with functions appropriate for its use. The result was the Vamp 40.

"When it comes to development of a product, Vamp is capable of collecting detailed requests from us quickly. Their motivation is also reflected in the Vamp 40. For future projects, we expect Vamp to not only maintain their high quality but also to further understand the marine industry. It will enable Vamp to develop and provide stable products which meet the user's needs," Sora says.

Products certified by international marine societies

Institution	Vamp relay types approved						
Lloyd's Register	40	210	230	245	255	260	265
GlassNK	40						
American Bureau of Shipping		210	230	245	255	260	265
Germanischer Lloyd	40	210	230	245	255	260	265
Bureau Veritas		210	230	245	255	260	265

Vamp 40 feeder protection relays protect power systems at Kuala Lumpur's central station

Kuala Lumpur Sentral is the central station of Malaysia's rail transport nucleus, and an extension of the capital's international airport. It fully supports the vision of Kuala Lumpur as a metropolis that is efficient, harmonious and spiritually inspiring. This prominent landmark features a wide selection of equipment and infrastructure with Vamp 40 feeder protection relays protecting the power supply. The Vamp relays, which have integrated arc protection, have been installed in three of the facility's substations.

Technically, KL Sentral makes use of the Vamp 40's most advanced features, such as fault and event recorder, programmable LED indication, measurement and monitoring function and printable data recording. In the selection process, the criteria that supported the Vamp 40 were its integrated arc protection and overcurrent protection for transformers.

Vamp protection relays for a hospital project in the Kingdom of Saudi Arabia

The King Fahad Hospital of the University in Al-Khobar, Saudi Arabia, has selected Vamp to supply protection relays for a complete upgrade of their electrical system. The upgrade will replace the existing equipment and handle future loads.

The scope of the project includes new MV and LV switchgears, step-down transformers and generators for emergency power. The Vamp relays selected cover a wide range of products including Vamp 255 for MV incomers and a bus tie, Vamp 230 for MV feeders, LV utility incomers and a bus tie, Vamp 210 for LV generator incomers and Vamp 40 with arc protection for all LV feeders. All the relays are equipped with Modbus RS485 communication for remote monitoring and control.

The customer was convinced by the arc protection functionality that was included in the products to increase electrical installation safety. Another factor contributing to the decision was the expertise of Al-Mashariq, Vamp's local partner in Saudi Arabia, who will be responsible for the project execution, testing and commissioning during 2009.

Vamp Ltd obtains Saudi Aramco approval

Vamp products have passed Saudi Aramco's stringent quality control procedure and are now included in the company's latest materials system specifcation for protective devices. The relay types approved are the Vamp 255, 230 and 40 for incoming and outgoing feeder protection and the Vamp 265 for transformer differential protection. The approval was obtained with the support of Vamp's local partner Al-Mashariq and entitles Vamp to deliver protection relays for the highly demanding applications within the Saudi oil refinery industry.

Saudi Aramco is the state-owned national oil company of Saudi Arabia. It is the largest oil corporation in the world with the largest proven crude oil reserves and production. Headquartered in Dhahran, Saudi Arabia, Saudi Aramco also operates the world's largest single hydrocarbon network, the Master Gas System. As of the end of 2007, Saudi Aramco's yearly production of crude oil alone was 3.11 billion barrels (540,000,000 m^3) and the company managed over 100 oil and gas fields in Saudi Arabia.

Vamp protection relays to the Swiss Alps

Vamp 230 feeder managers and Vamp 265 differential protection relays protect the power supplied by the Robiei hydro power plant in the Italian speaking part of the Swiss Alps. Ten Vamp units were installed in the plant's medium-voltage power generation and distribution system as a part of its new switchgear. Vamp relays were selected for the project on the basis of functional tests where all the major protection procedures were analyzed. Other features contributing to the final choice were the cost-efficient total package offered by Vamp and the availability of the Italian language on the display. Commissioning of the project took place in December. The location of the power plant at an altitude of 2000 metres above sea level made the project particularly challenging since all equipment had to be transported to the site by cable cars.

The Robiei power plant is owned by Ofima, one of the largest hydropower producers in Switzerland. It is the second major reference for Vamp in the country. Since 2003, Vamp feeder managers with fault location have performed successfully in the AIL Elettricità power distribution network in Lugano, southern Switzerland.

CigaProject SAGL to represent Vamp in Switzerland

Vamp Ltd and CigaProject Sagl of Balerna, Switzerland, have agreed on cooperation in the Swiss market. According to the agreement, CigaProject will market and sell Vamp products for utility and hydro power projects in Switzerland.

Founded in 2005, CigaProject Sagl is a company specializing in turnkey substation projects including delivery of transformers, switchgears and yards, high voltage cabling, automation and protection relay systems.

Vamp arc protection installed at Colombian power plant

Vamp technology is used to protect the TermoSuria power plant in Villavicencio, central Colombia. Two Vamp 221 arc protection systems were installed on the Siemens low-voltage switchgear of the 69 MVA combined heat and power plant. Besides the arc protection units, Vamp's delivery also comprised a number of Vamp 4C and Vamp 3L modules and fibre optic loops.

Commissioning of the systems took place in September and was carried out by the Vamp representative in Colombia, P.T.I Ltda, in cooperation with Vamp's local specialist. The site tests exceeded all expectations and prepared ground for further similar projects in the Colombian oil industry.

The TermoSuria power plant supplies power to the Apiay oil wells south-east of the city of Villavicencio. The plant is owned by Ecopetrol S.A., a commercially oriented company under the Colombian Ministry of Mines and Energy and dedicated to exploration, production, transport, supply, marketing and research related to the Colombian oil industry.

A standard exhibition stand design available for all Vamp partners.

Responding to changing market requirements

Pekka Hämäläinen
Marketing Director and After-Sales Manager

Vamp's strategic choice is to work close to customers and to provide new solutions for their needs. Over the years, this approach has resulted in a range of user-friendly products and pioneering solutions; one example is the market's first protection relay family with integrated arc protection. Flexible design of arc protection schemes by using relays with an integrated arc option module, a dedicated system based on a central unit or a combination of these two has also laid the technology track for other manufacturers. The vision created in the mid 1990s is now becoming an international requirement.

Inspiration from customers

Customers provide us with inspiration and we are consequently delighted to get feedback from them. Even though their visions sometimes seem to be sky-high, they eventually appear in new product functions and features. Exhibitions, seminars, technology workshops and customer visits are typical sources for these ideas.

Vamp will celebrate its 15th anniversary in 2009 and will observe the occasion by actively participating in international exhibitions, seminars and conferences. Our products and services will be presented at Verkosto 2009 in Tampere, Finland; Middle East Electricity 2009 in Dubai, the United Arab Emirates; Elfack 2009 in Gothenburg, Sweden; Electro 2009 in Moscow, Russia, Cired 2009 in Prague, the Czech Republic, and a number of local events. At these gatherings we will introduce new products, product features and expert services. You are most welcome to challenge us at those events.

Expanding technical services

The technical support service set up in 2003 is a link between the headquarters, business partners and customers. We are delighted with the positive and sympathetic feedback this service has received. Although many of the technical services have been complimentary, customers seem prepared to compensate for the additional effort. There is also a growing need on the market for services of these kinds. As a result, we have decided to continue developing and expanding our scope, including arc and relay application consultation, site supervision, training and pre-made relay settings, configurations and simulation.

2009 will also witness the launch of Vamp's updated home page communication portal. Our aim is to provide customers with improved access to the business applications and solutions that interest them. Our partnership network will also be able to use the system for their local home pages by providing clients with the information in their own language.

Photos on this page were taken at the Vamp sales meeting and other events during 2008.

EVENTS

	Event	Location	Date	Exhibitor / host
January	Product training – English	Vaasa, Finland	27.-29.1.2009	Vamp Ltd
	GridTech	New Delhi, India	29.-30.1.2009	
February	Verkosto 2009	Tampere, Finland	4.-5.2.2009	
	MEE 2009	Dubai, UAE	8.-10.2.2009	
Mars	Product training – Finnish	Vaasa, Finland	10.-12.3.2009	Vamp Ltd
	Amper 2009	Prague, Czech Republic	31.3.-3.4.2009	
April	Product training – English	Vaasa, Finland	21.-23.4.2009	Vamp Ltd
May	Elfack 2009	Gothenburg, Sweden	4.-8.5.2009	
	Product training – Finnish	Vaasa, Finland	5.-7.5.2009	Vamp Ltd
June	Cired, Prague 2009	Prague, Czech Republic	8.-11.6.2009	
	Electro 2009	Moscow, Russia	8.-11.6.2009	
September	Product training – Finnish	Vaasa, Finland	1.-3.9.2009	Vamp Ltd
October	Product training – English	Vaasa, Finland	6.-8.10.2009	Vamp Ltd
November	Biel Light + Building 2009	Buenos Aires, Argentina	3.-6.11.2009	
	Vamp 15 years	Helsinki, Finland	9.11.2009	Vamp Ltd
	Sales meeting #6	Helsinki, Finland	9.-12.11.2009	Vamp Ltd
December	Product training – English	Vaasa, Finland	1.-3.12.2009	Vamp Ltd






Vamp products

Arc protection systems

Vamp offers extremely fast arc protection systems for LV and MV switchgears. They are designed especially to maximize personnel safety and to minimize material damage caused by arc faults. Minimized damage also means less repair work and rapid restoration of the power supply.

A Vamp arc protection system can be implemented in four different ways: as an autonomous central unit system, as part of a Vamp protection relay system, as an integration of these two, or as a system based solely on light detection.

Protection relays

Vamp protection relays are used for selective protection of subtransmission lines, medium voltage overhead and cable feeders, motor feeders, transformer feeders, capacitor banks, reactors and busbars in power system distribution substations, power plants, industrial power systems, and marine and offshore installations. In addition to a comprehensive range of standard protection functions, the Vamp series also offers bay control, measurements, primary circuit monitoring and communication functionality.

Measuring and monitoring units

Vamp metering devices are designed for industrial and utility applications where power quality or energy consumption and billing are monitored by cost centre. Demand and power factor control, equipment monitoring, alarms for preventive maintenance and disturbance capturing are standard features in Vamp 96 and Vamp 260 units.

Wimo measuring and monitoring units are optimized for secondary power distribution substations.

ARC PROTECTION SYSTEMS

Vamp 120 unit

Vamp 221 system

PROTECTION RELAYS

Vamp 40

Vamp 50 series

Vamp 100 series

Vamp 200 series

MEASURING AND MONITORING UNITS

Vamp 96

Wimo 6CP10

Vamp 260

Communication in Vamp relays

All protection relays and measuring and monitoring units come with a wide range of communication protocols, including IEC 60870-5-103, DNP 3.0, Modbus TCP, Modbus RTU, Profibus DP, TCP/IP, SPA bus slave, and as the latest additions IEC 61850 and IEC 60870-5-101.

EXTERNAL OPTION MODULES

Vam16D LED module

The external Vam16D LED module provides 16 extra led indicators for Vamp 230, Vamp 245, Vamp 255, Vamp 257 feeder/motor managers and Vamp 259 line manager where a large number of alarms needs to be displayed, each on individual LED. A Vamp feeder/motor manager together with the optional Vam 16D LED module is an optimised arrangement which replaces the traditional combination of separate alarm panel/unit and feeder protection relays. Mounting of the Vam 16D is flexible since it can either be done directly on the feeder/motor manager or directly beside it in the switchgear door. The module is normally connected to the serial port of the relays front panel.

External communication modules

A complete set of communication adaptor modules are available to ensure that all needed substation communication bus and media requirements are met. The modules offered provide interfaces varying from traditional electrical RS485 (twisted pair) and fibre optics to modern Ethernet enabling new possibilities in terms of data rates and bandwidth. Some of the available communication modules also support flexibility in terms of multiple interfaces, e.g. one for the substation process bus and another for relay maintenance i.e. uploading and downloading of settings and uploading of disturbance recordings. All communication modules are easy to install with simple dip-switch settings.

		Communication media:	Fiber optic	RS-485			Ethernet/RS-485		Profibus	Ethernet	IEC 61850
Relay	VAM 16D	Protocol	VSE 001	VSE 002	VSE 003	VSE 004	VSE 005-1	VSE 005-2	VPA 3CG	VEA 3CG	VSE 006
VAMP 135		SPA	X(1				X				
VAMP 140		IEC 60870-5-103	X(1				X				
VAMP 150		Modbus		X			X				
		Modbus TCP								X	
		Profibus DP							X		
		IEC 61850									X
		Ethernet Vampset					X			X	
VAMP 40		SPA	X				X				
VAMP 96		IEC 60870-5-103	X								
		IEC 60870-5-101		X(3		X	X(3				
VAMP 50		Modbus		X(3		X	X(3				
series		Modbus TCP								X(3	
		Profibus DP							X		
		DNP 3.0		X(3		X	X(3				
		IEC 61850									X(3
		External I/O				X	X(3				
		Ethernet Vampset					X(3			X(3	
VAMP 210	X(2	SPA	X(1					X			
VAMP 260	X(2	IEC 60870-5-103	X(1								
VAMP 265	X(2	IEC 60870-5-101		X(1	X			X			
VAMP 230	X(2	Modbus		X(1	X			X			
VAMP 245	X(2	Modbus TCP								X	
VAMP 255	X(2	Profibus DP							X(1		
VAMP 257	X(2	DNP 3.0		X(1	X			X			
		IEC 61850									X(1
		External I/O			X			X			
		Ethernet Vampset						X		X	

External communication and LED module selection table

(1 Integrated communication modules are available as options. External modules VSE001 and VSE002 have support for external auxiliary power supply to prevent communication bus interruption due to relay maintenance etc.
(2 The LED module is optional.
(3 In Vamp 50 series integrated communication options are recommended.

SOFTWARE TOOLS

VAMPSET

Vampset is user-friendly, free-of-charge relay management software for setting, parameterising, and configuring of Vamp relays. Via the Vampset software relay parameters, configurations and recorded relay data can be swapped between the operator's PC and the Vamp relays. Apart from supporting the Comtrade format, Vampset also incorporates tools for analysing relay events, waveforms and trends from data recorded by the relays, e.g. during a network fault situation.

VAMP COLLECT

Vamp Collect is a substation monitoring system (SMS) software implemented utilising Vamp relays' TCP/IP communication capability. The software automatically collects events, measurements, voltage sag & swell information and disturbance records through TCP/IP protocol allowing more comprehensive data for planning and operating networks.

Selection table for Vamp protection relays

				Feeder protection											Machine protection								Other				
				VAMP 40	VAMP 50	VAMP 51	VAMP 52	VAMP 135	VAMP 140	VAMP 230	VAMP 245	VAMP 255	VAMP 257	VAMP 259	VAMP 40	VAMP 52	VAMP 150	VAMP 210	VAMP 230	VAMP 245	VAMP 255	VAMP 257	VAMP 265	VAMP 120	VAMP 121	VAMP 220	VAMP 221	VAMP 260
Type of fault	**IEEE Device No.**	**IEC Symbol**	**Protection function/measurement**																								
Short circuit	50/51	3I >	Three-phase non-directional overcurrent, low-set stage, definite or inverse time	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	x	x	x					
	50/51	3I >>	Three-phase non-directional overcurrent, high-set stage, definite time	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	x	x	x					
	50/51	3I >>>	Three-phase non-directional overcurrent, high-set stage, definite time	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	x	x						
	67N or 50N/51N	3I > →	Three-phase directional or non dir. o/c, low-set stage, definite or inverse time							x		x	x	x				x	x		x	x					
	67N or 50N/51N	3I >> →	Three-phase directional or non dir. o/c, high-set stage, definite or inverse time							x		x	x	x				x	x		x	x					
	67N or 50N/51N	3I >>> →	Three-phase directional or non dir. o/c, high-set stage, definite time							x		x	x	x				x	x		x	x					
	67N or 50N/51N	3I >>>> →	Three-phase directional or non dir. o/c, high-set stage, definite time							x		x	x	x				x	x		x	x					
	21	Z <	Distance protection, 5 zones polygonal characteristic											x													
Earth-fault	50N/51N	I_0 >/ SEF	Non-directional earth-fault, low-set stage, sensitive, definite or inverse time	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x					
	50N/51N	I_0 >>	Non-directional earth-fault, high-set stage, definite time	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	x	x	x					
	50N/51N	I_0 >>>	Non-directional earth-fault, high-set stage, definite time	x	x	x	x			x	x	x	x	x	x	x		x	x	x	x	x					
	50N/51N	I_0 >>>>	Non-directional earth-fault, high-set stage, definite time	x	x	x	x			x	x	x	x	x	x	x		x	x	x	x	x					
	67N or 50N/51N	$I_{0\varphi}$ >/ SEF	Directional or non dir. earth-fault, low-set stage, sensitive, definite or inverse time	x			x			x	x	x	x	x	x	x		x	x	x	x	x					
	67N or 50N/51N	$I_{0\varphi}$ >>	Directional or non dir. earth-fault, high-set stage, definite or inverse time	x			x			x	x	x	x	x	x	x		x	x	x	x	x					
	59N	U_0 >	Residual overvoltage, low-set stage	x			x	x		x	x	x	x	x	x	x		x	x	x	x	x					
	59N	U_0 >>	Residual overvoltage, high-set stage	x			x	x		x	x	x	x	x	x	x		x	x	x	x	x					
Overload	49M	T >	Three-phase thermal overload (motors & generators)												x	x	x	x	x	x	x	x					
	49F	T >	Three-phase thermal overload (feeders & cables)	x	x	x	x		x	x	x	x	x	x														
Voltage	59	1U>/ 3U>	One-/Three-phase overvoltage, low-set stage	1			1	3		3		3	3	3	1	1		3	3		3	3						
	59	1U>>/ 3U>>	One-/Three-phase overvoltage, high-set stage	1			1	3		3		3	3	3	1	1		3	3		3	3						
	59	1U>>>/ 3U>>>	One-/Three-phase overvoltage, high-set stage	1			1	3		3		3	3	3	1	1		3	3		3	3						
	27	1U</ 3U<	One-/Three-phase undervoltage, low-set stage	1			1	3		3		3	3	3	1	1		3	3		3	3						
	27	1U<</ 3U<<	One-/Three-phase undervoltage, high-set stage	1			1	3		3		3	3	3	1	1		3	3		3	3						
	27	1U<<</ 3U<<<	One-/Three-phase undervoltage, instantaneous stage	1			1	3		3		3	3	3	1	1		3	3		3	3						
	27P	U_1 <, U_1 <<	Positive sequence undervoltage for generator applications															3										
Arc protection	50ARC/50NARC	3 I> / I_0>, L>	Electrical arc protection stage, point sensors, Optional	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x					
	50ARC/50NARC	3 I> / I_0>, L>	Electrical arc protection with point sensor slave																				x	x	x	x	
	50ARC/50NARC	3 I> / I_0>, L>	Electrical arc protection with point, fiber or current sensors slave																							x	
Other functions	79	O --> I	Auto-reclosure	x		x	x			x	x	x	x	x														
	68	I_{f2} >	Inrush and cold load detection	x	x	x	x		x	x	x	x	x	x	x	x		x	x	x	x	x						
	46	I_2 /I_1 >	Phase unbalance / discontinuity protection (broken conductor)	x	x	x	x		x	x	x	x	x	x														
	46	I_2 >	Phase unbalance protection			x									x	x		x	x	x	x	x	x					
	47	I_2 >>	Phase sequence / reversal protection												x	x			x	x	x	x						
	48	I_{ST} >	Stall protection												x	x	x		x	x	x	x						
	37	3I <	Loss of load / under current protection	x			x			x	x	x	x	x	x	x	x	x	x	x	x	x						
	86		Latched trip	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
	87	3 d I >	Three-phase biased differential stage, low-set stage, 2nd harmonic blocking																			x					
	87	3 d I >>	Three-phase differential stage, high-set stage																			x					
	66	N>	Frequent start protection												x	x	x		x	x	x	x					
	64F3	U_{0f3}>	100 % stator earth fault protection															x									
	40	Q <	Underexcitation protection															x									
	40	X <, X < <	Loss of excitation protection															x									
	32	P <, P < <	One-/Three-phase reverse power and underpower protection	1						3		3	3	3				3										
	24	U_f >	Volts/hertz overexcitation protection															x									
	50BF	CBFP	Circuit breaker failure protection	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x			x	x	
	81H/81L	f >, f >><	Overfrequency and underfrequency protection					x		x		x	x	x				x	x		x	x						

	81L	f <, f <<	Underfrequency protection					x		x		x	x	x				x	x		x	x						
	81R	df/dt	Rate of change of frequency (ROCOF) protection							x		x	x	x				x	x		x	x						
	21	Z <, Z <<	Under-impedance protection, circle characteristic															x										
	51V	$I_V>$	Voltage restrained or controlled overcurrent protection															x										
	25	df, dv	Synchrocheck							x		x	x	x					x		x	x						
			Short circuit fault location							x		x	x	x				x	x		x	x						
			8 Programmable stages	x		x	x			x	x	x	x	x	x	x		x	x	x	x	x	x					x
		DR	Disturbance recorder	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x					x

Type of measurement

Primary current	3I		Three-phase current	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x			x	x	x
	3 d I >		Three-phase differential current																				x					
	I_0		Neutral current	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x					x
	I_2		Current unbalance	x	x	x	x		x	x	x	x	x	x	x	x	x		x	x	x	x	x					x
	IL		Average and maximum demand current	x	x	x	x		x	x	x	x	x	x	x	x		x	x	x	x	x	x					x
Primary voltage	U/3U		One-/Three-phase and line voltages	1			1	3		3		3	3	3	1	1		3	3	3	3	3						3
	U_0		Residual voltage	x			x	x		x	x	x	x	x	x	x		x	x	x	x	x						x
	U_2		Voltage unbalance							x		x	x	x					x		x	x						x
Short-circuit fault reactance	Xfault		Short-circuit fault reactance							x		x	x	x					x		x	x						
Frequency	f		System frequency	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x					x
Power	P		Active power	(x)						x		x	x	x	(x)			x	x		x	x						x
	Q		Reactive power	(x)						x		x	x	x	(x)			x	x		x	x						x
	S		Apparent power	(x)						x		x	x	x	(x)			x	x		x	x						x
Energy	E+, E-		Active Energy, exported / imported	(x)						x		x	x	x	(x)				x		x	x						x
	Eq+, Eq-		Reactive Energy, exported / imported	(x)						x		x	x	x	(x)				x		x	x						x
Power factor	PF		Power factor	(x)						x		x	x	x	(x)			x	x		x	x						x
Harmonics	I		2nd to 15th and THD of phase currents	x	x	x	x			x	x	x	x	x	x	x		x	x	x	x	x	x					x
	U		2nd to 15th and THD of measured voltages							x		x	x	x				x	x		x	x						x
Voltage sags / swells	U		Voltage sags / swells							x		x	x	x				x	x		x	x						
Analog mA output, 1 channel	AO		Any measured or calculated value, freely scalable		x1	x1	x1	x	x							x1	x											
Analog mA output, 4 channels	AO		Any measured or calculated value, freely scalable, Optional							x	x	x							x	x	x							x

(x): Based on one-phase voltage measurement, x1 = option

Control

Digital inputs			Number of digital inputs (max), with DI19 & DI20	2	6	6	6	1	1	8	8	20	28	28	2	6	1	8	8	8	20	28	8	1				6
Output relays			Number of trip relays	4	4	4	4	2	2	2	2	4	8	8	4	4	2	2	2	2	4	8	2	2	1	4	4	2
			Number of alarm relays	1	1	1	1	3	3	5	5	5	5	5	1	1	3	5	5	5	5	5	5	3		2	2	5
Object status indication			Single line diagram, 8 objects		x	x	x			x	x	x	x	x		x			x	x	x	x	x					
Local and remote control			Number of controllable objects	6	6	6	6			6	6	6	6	6	6	6		6	6	6	6	6	6					
Interlocking and logic			Configurable	x	x	x	x			x	x	x	x	x	x	x		x	x	x	x	x	x					

Condition monitoring

Trip circuit		TCS	Trip Circuit Supervision	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x					
		TCS	Trip Circuit Supervision with DI for T5...T8		x(1	x (1	x (1						x	x		x (1						x						
CT Supervision			CT Supervision	x						x	x	x	x	x	x	x		x	x	x	x		x					
VT Supervision	60		VT Supervision/Fuse failure supervision							x		x	x	x				x	x		x							
CB Wear			Breaker wear	x						x	x	x	x	x	x	x		x	x	x	x		x					

x(1: option (T5)

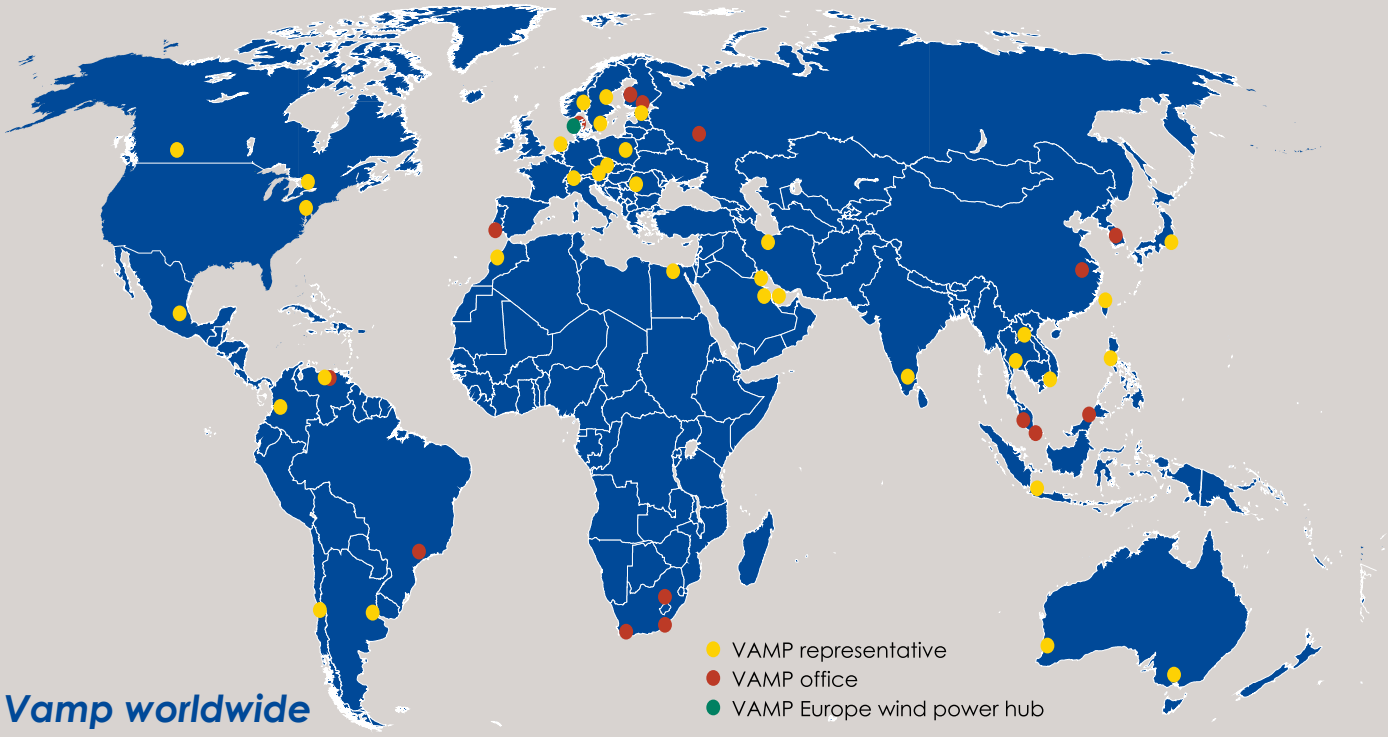
Communication

IEC 60870-5-101				x	x	x	x			x	x	x	x	x	x	x			x	x	x	x	x					
IEC 60870-5-103				x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x					x
Modbus TCP				x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x					x
Modbus RTU				x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x					x
Profibus DP				x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x					x
DNP 3.0				x	x	x	x			x	x	x	x	x	x	x		x	x	x	x	x	x					x
SPA-bus communication				x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x					x
IEC 61850				(x)	x	x	x	(x)	(x)	x	x	x	x	x	(x)	x	(x)	x	x	x	x	x	x					x
Human-Machine-Communication, display				x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x			x	x	x
Human-Machine-Communication, PC				x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x					x

(x): with external IEC 61850 interface module

General functions

Selfsupervision				x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x			x	x	x
Annunciating, event generating and value recording				x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x					x
Measurement and parameter display				x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x			x	x	x
Real time clock			Year, month, day, hour, minutes, seconds, milliseconds	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x					x



Vamp worldwide

EUROPE

Finland
Vamp Ltd
+358 20 753 3200
vamp@vamp.fi
Sales: visa.yliluoma@vamp.fi
www.vamp.fi

Austria
e2solution Schitz GmbH
+43 (0)676 972 72 69
peter.schitz@e2solution.at
www.e2solution.at

Czech Republic
EL-INSTA CZECH s.r.o.
+420 777 550 189
akarban@el-insta.cz
www.el-insta.cz

Denmark
Vamp Protection Systems Aps
+45 51 53 89 25
troels.davidsen@vamp.dk
www.vamp.dk

Estonia
AS Martem
+372 639 7979
andres.kask@martem.ee
www.martem.ee

The Netherlands
Santon Holland B.V.
+31 10 283 26 72
gvzeijl@santonswitchgear.com
www.santonswitchgear.com

Norway
CEE Energiteknik As
+47 6791 1950
svein.weideborg@cee.no

Poland
SAE Sp.z.o.o
+48 22 853 86 01
j.noga@sae.com.pl
www.sae.com.pl

Portugal
VAMP IBERIA
+ 351 96 324 6336, + 351 281 952 970
timo.poranen@vamp.fi

Romania
S.C. Comranado S.R.L.
+40 25 141 8220
gmarinescu@comranado.ro
office@comranado.ro
www.comranado.ro

Russia
ZAO "VAMP"
+7 495 663 3368, +7 916 3922 375
gkislov@post.ru

Spain
VAMP IBERIA
+ 351 96 324 6336, + 351 281 952 970
timo.poranen@vamp.fi

Switzerland
CIGAProject Sagl
+41(0)91 682 4270, +41(0)79 658 1363
info@cigaproject.ch
www.cigaproject.ch

Sweden
European Electric Technology
+46 40 711 42
thomas.hansson@eet-teknik.se
www.eet-teknik.se
Jowic Elteknik AB
+46 60 52 58 90
rickard.johansson@jowic.se
www.jowic.se

THE AMERICAS

Argentina
SAAT Electropower S.A.
+54 11 4545 9559
saat@saatelectropower.com.ar
www.saatelectropower.com.ar

Brazil
Vamp Brazil
+55 11 8357 6066
evaldo.sousa@vamp.fi

Canada East
CD Nova Ltd
(Arc Flash Protection only)
+1 905 940 8338
sbonser@cdnova.com
www.cdnova.com

Canada West
Eecol Electric Corp.
(Arc Flash Protection only)
+1 403 253 1952
marcusce@eecol.com
www.eecol.com

Chile
Prosolec Eirl
+56 2 7465433
prosolec@gmail.com

Colombia
P.T.I. Ltda.
+57 2 336 6461, +57 2 336 8522
ventas@ptiltda.com
www.ptiltda.com

Mexico
Allectro S.A de CV
+52 55 5688 5912
martha.leonm@allectro.com
www.allectro.com

USA
MET Test / Substation Solutions
(Arc Flash Protection only)
+1 301 967 3500
john.matthews@met.lincfs.com
www.met-test.com

Venezuela
Inversiones MR Vamp VE CA
+58 212 373 6776, +58 212 373 7239,
marcosrondonr@cantv.net
Suminicor, S.A. (Authorized Integrator)
+58 212 761 0635 / 2064 / 2074 / 1368,
+58 416 6091090
issa@cantv.net./
aortega@suminicor.com
www.suminicor.com

AFRICA

Egypt
Egyptian German Electrical
Manufacturing Co.
+202 2282 9141
egemac2@link.net
www.egemac.com.eg

Morocco
Maghreb-Electro-Technique (M-E-T)
+212 22 240 883
m.elghani@met.ma

South-Africa
Vamp Solutions (Pty) ltd
+27 11 914 2393
bristowr@mweb.co.za
info@vamp.co.za
www.vamp.co.za

MIDDLE EAST

Iran
Runin FG
+98 21 763 63 61 & 2
mousa.ahmadian@runinltd.com

Kuwait
Rezayat Trading Co.
+965 481 6836
kmoryani@rezayatkwt.com

Saudi-Arabia
Al-Mashariq Company
+966 3887 8017, +966 50 495 8486
adeebrahmeh@almashariq.com

Qatar (utility segment)
Gulf Lights Electrical Engineering WLL
+974 514 1180
glet@qatar.net.qa

ASIA & PACIFIC

Australia
Digsilent Pacific Pty., Ltd
+61 3 9820 2320
koos@digsilent.com.au
info@digsilent.com.au
www.digsilent.de/pacific

Brunei
VAMP Malaysia Sdn. Bhd.
+603 6186 0046
sales@vamp.com.my

China
Vamp Ltd
+86 21 6391 5177
jason.ma@vamp.fi

India
Voltech Controls and Automation
Pty., Ltd
+91 44 4286 8115, +91 99 4101 6812
vcapl@voltechgroup.com
umapathi.m@voltechgroup.com

Indonesia
P.T. Winindo Karya Dinamika
+62 21 750 7767
winindo@cbn.net.id

Japan
Hikari Trading Co Ltd
+81 3 357 31392
koji.nakamura@hikari-gr.co.jp
kaihatsu@hikari-gr.co.jp
www.hikari-gr.co.jp

Korea
Vamp Korea Co., Ltd
+82 31 715 3101
jbkim@vamp.co.kr
www.vamp.co.kr

Laos
Savankham Electrical Equipments &
Machineries Supplier (SEMS)
+856 21 453 188

Malaysia
Vamp Malaysia Scln. Bhd.
+603 6188 0046
sales@vamp.com.my

New Zealand
Digsilent Pacific
+61 3 9820 2320, +61 408 996 742
koos@digsilent.com.au

Philippines
Taurex Exponent
+63 88 859 2604
taurex88@rocketmail.com

Singapore
VAMP (Singapore) Pte., Ltd
sales@vamp.com.my

Taiwan
Baufarm Enterprise Co., Ltd
+886 2 2753 1109
baufarm@ms32.hinet.net

Thailand
Power Testing Product Co., Ltd
+66 2 447 6228, +66 1 937 4834
sales@ptp.co.th

Vietnam
JNP Tech Pte., Ltd
+84 8 9802 520 955
pauljeong@jnptech.com