VAMP 50 - The versatile new relay series

During the past year, Vamp Oy has launched the Vamp 50 series of small, yet high-capacity protection relays. The product family comprises four different versions, which are the following:

VAMP 50 – overcurrent and earth fault protection relay

VAMP 52 – feeder and motor protection relay

VAMP 55 – three-phase voltage, residual voltage, frequency and synchrocheck relay

Relays in the Vamp 50 series are suited for feeder protection of various medium voltage substations, for protection of bus bars, and for short circuit and earth fault protection of transformers. In industry, the Vamp 50 relays can be used for the protection of transformer feeders at secondary distribution transformers and for high-voltage motors.

Relays in the Vamp 50 series can be categorized as low-end protection relays. Nevertheless, they offer features that facilitate multiple uses and connections.

Interface

- a large, easy-to-use graphic display
- allows for all language versions
- eight alarm channels with user-specific legend text
- a USB port for local communication
- two programmable function buttons

Communication

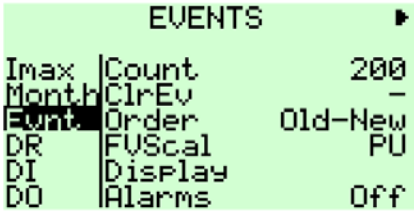
- three inbuilt interface communication terminals for
- IEC 61850
- Modbus RTU, IEC 60870-5-103 or -101, Profibus DP
- DNP 3.0, SPA, Modbus TCP
- a USB port in the front panel for fast local communication

Special functions

- integrated arc protection

- three arc sensor interfaces
- a bio serial interface for the arc protection system
- one mA output

English



Russian

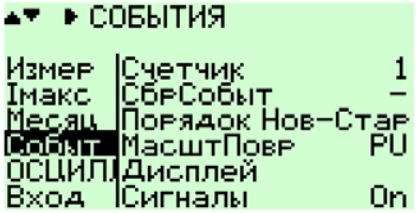


Figure 1. An easy-to-use, menu-based graphic display with Unicode

Relays in the Vamp 50 series have a 128x64 pixel matrix display. Thanks to its size and good background light, the display is clear and easy-to-read. The human-machine interface is equipped with Unicode (UTF-8), which enables display of even complex codes and all language versions.

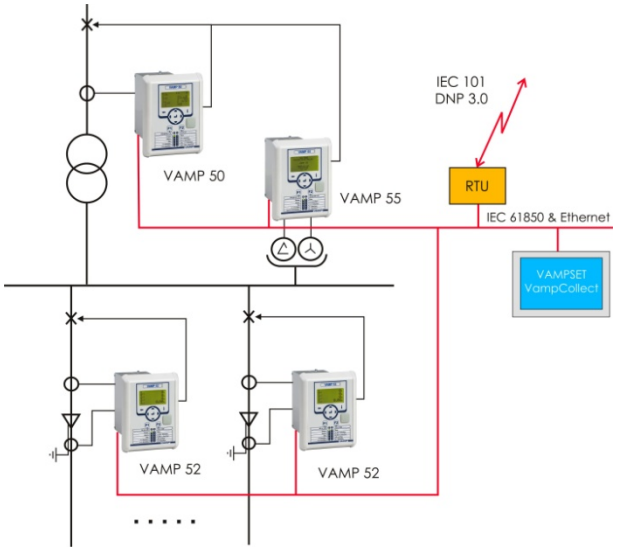


Figure 2. In a typical substation, the Vamp 50, Vamp 52 and Vamp 55 relays communicate with the remote terminal unit via an IEC 61850 interface. Vampset and Vamp Collect software is also connected to the same interface.

The protection relays of the Vamp 50 series are an economical solution when conventional protections relays are used for substation protection. Vamp 52 relays are normally used for feeder protection; they include short circuit protection, directional earth fault protection, and auto-reclosers. The Vamp 50 is suitable for transformer feeder protection and includes short circuit and earth fault protection. Added protection can be provided with relays of the Vamp 200 series. The Vamp 50 relays also offer top-level communication features such as an inbuilt IEC1850 serial interface, which was previously included only in the most expensive relays.

When the Ethernet interface is used with the relay both IEC 61580 protocol and service bus can be connected simultaneously. It is easy to connect a PC equipped with Vampset and Vamp Collect software for centralized setting of Vamp relays and collection of disturbance recordings. Communication with a remote control room can take place directly or via a separate RTU, which converts the IEC 61580 protocol of the substation to the IEC 60870-5-101 standard or the DNP 3.0 remote communication protocol if needed.

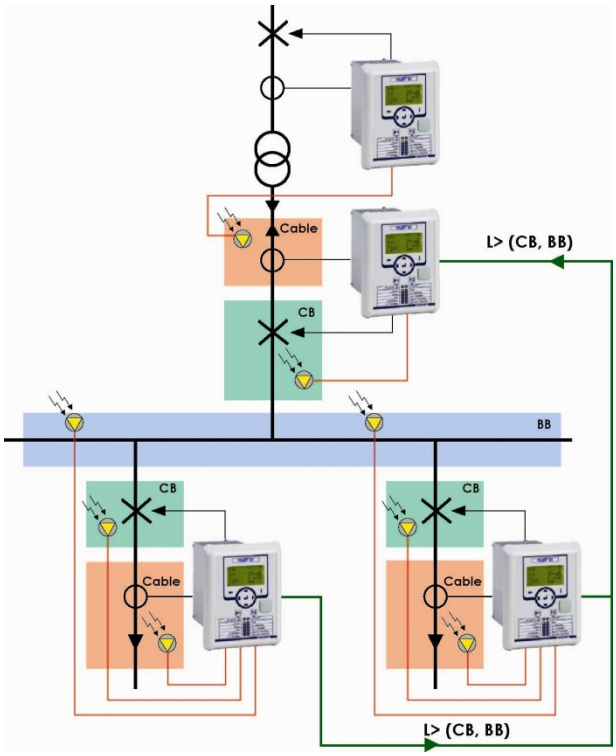


Figure 3. Utilization of integrated arc protection with relays of the Vamp 50 series

Relays in the Vamp 50 series have two optional cards. One of them is for communication cards and the other for either an arc protection card or a digital input card.

The substation protection in Figure 3 was implemented with relays in the Vamp 50 series that utilize integrated arc protection. The relays' arc protection includes the option for three arc sensors, an independent overcurrent stage Arcl >, and a one-way B1/0 communication interface between the relays with which the indication data on the arc are conveyed from the feeder relays to the incoming breaker.

Arc protection operates selectively as follows: arcs occurring in the cable compartment of the outgoing feeder activate the light sensor, the operations of which are connected to the overcurrent stage (Arcl >). Should both activate simultaneously, the relay triggers only its own outgoing feeder (appox. 10 ms). The other short circuit protection relays at the substation do not have time to activate.

All other activations of arc sensors in the circuit breaker compartment or in the bus together with the overcurrent stage (Arcl >) trigger the incoming breaker. In earthed networks, the arc protection for the earth fault current can also be trigged by activating the overcurrent stage (Arcl 01>) reserved for this purpose. Arc locations can be determined by reading the alarm registers of the relays locally, although it is more convenient to connect the relays via a serial communication bus to the station PC, from which there is a quick link to all substation relays.

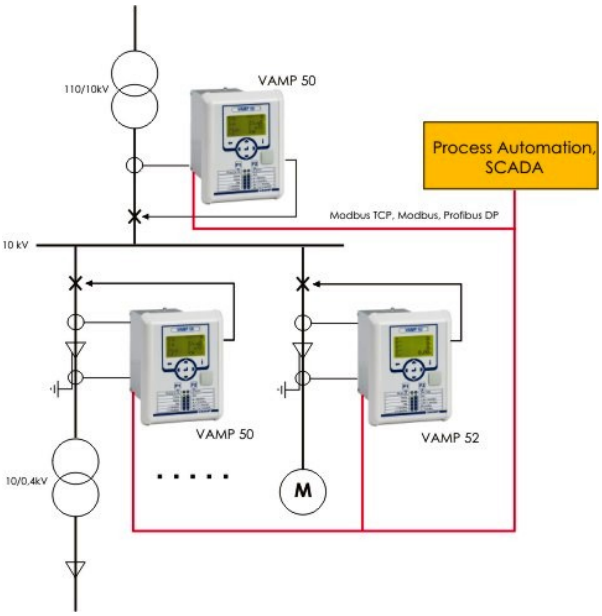


Figure 4. Vamp 50 and 52 relays provide protection for industrial distribution substations and high voltage motors

The transformer feeders in an industrial distribution network can be protected with Vamp 50 relays. Thanks to their diverse features, Vamp 52 relays can provide effective protection for high voltage motors. The relay's under voltage function is necessary, for example in situations where the feeding network is rather week compared with the pick-up current of the motor. Communication from and to protection relays is generally connected to interfaces used by the industrial automation or logic. The most commonly available serial interfaces are Profibus DP and Modbus. Both protocols can be used with relays of the Vamp 50 series and the Modbus protocol can also be run in a TCP/IP network.

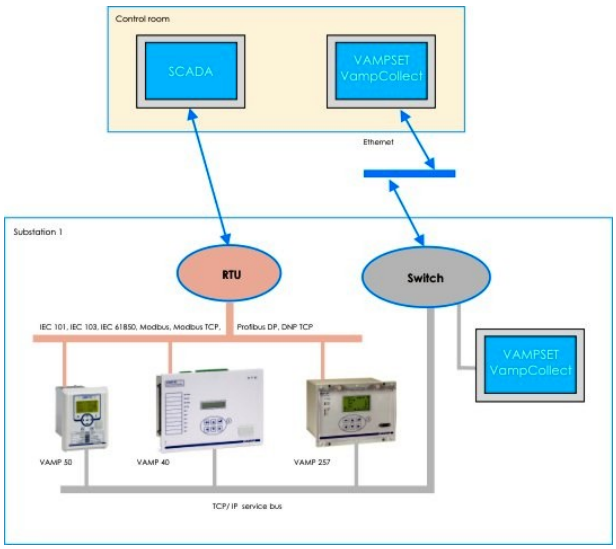


Figure 5. Two interfaces are often used in substation protection applications, one as a remote control interface and the other as a service interface.

Relays in the Vamp 50 series can have two in-built communication ports, one of which is a conventional serial communication bus for the Modbus RTU, IEC 870-5-103, Profibus DP, and SPAbus protocols. The other port is for TCP/IP-based traffic in the Ethernet network. The TCP/IP interface is in general used for centralized data collection and remote setting. In the application of Figure 4, the substation has a local centralized PC equipped with Vampset and Vamp Collect software. It also has a remote-controlled PC with Vampset and Vamp Collect software that is connected to the network via the Ethernet switch.

The Ethernet TCP/IP network enables fast data transfer between the centralized PC and the relays and is hence suited for collection of disturbance recordings or other similar data and also for transfer of the rather large amounts of data required for demanding software updates.

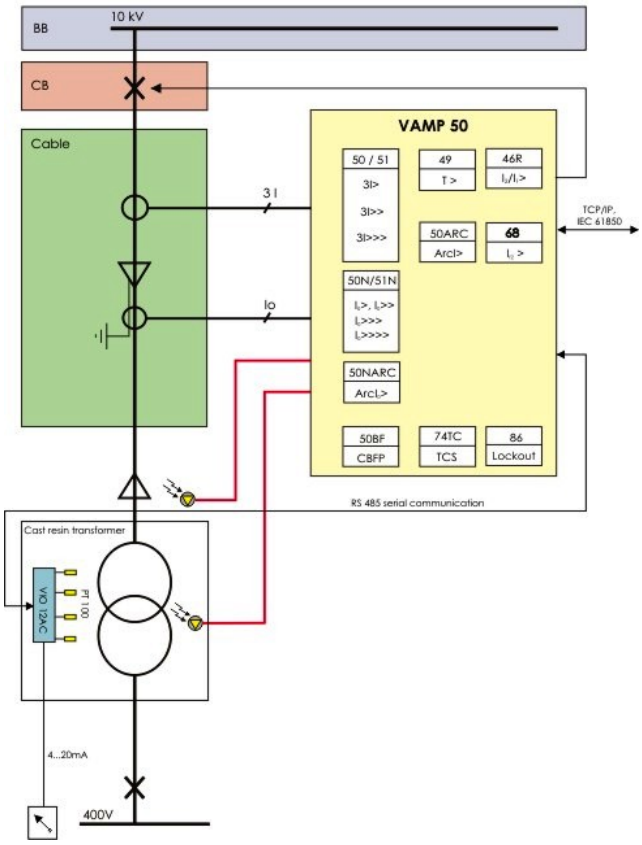


Figure 6. Protection and monitoring of a cast resin transformer with a Vamp 50 + VIO 12 AC solution

For environmental reasons, the oil-filled transformers used in industrial distribution are being replaced with cast resin transformers. Cooling of cast resin transformers is based on natural or controlled air circulation, which is not nearly as efficient as the oil cooling solution. For this reason, cast resin transformers need more comprehensive temperature control and protection.

Cast resin transformers used as distribution transformers generally have four Pt100 sensors for temperature control and an overcurrent relay for short circuit and earth fault protection. In addition to the protection mentioned above, there are also grounds for equipping cast resin transformers with arc protection (for example integrated with an overcurrent relay). Pt100 sensors are connected to a VIO 12 AC control unit, which is in turn connected to a Vamp 50 protection relay with an RS485 type or optic-fibre-based serial communication bus. An alarm limit for the heat sensors is set in the protection relay, and also a releasable output contact, which does not necessarily have to be an overcurrent or earth fault feeder relay. This approach ensures a cost-effective protection solution that is supplemented with a decentralized VIO 12 AC 1/0 unit for Pt100 measurements.

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