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SZK-2. Earth-fault and phase-to-phase fault indicating system in cable networks

Applications of the SZK-2 indicator

Applications of the SZK-2 indicator. The indicator monitors medium-voltage networks, identifying cables runs damaged as a result of an earth fault or a phase-to-phase fault. Fault detection is possible both in single cables, cables with conductors shielded individually, and in traditional ones, with one outer shield. SZK-2 allows for a full diagnosis of the network, detecting the faulted section. The device is dedicated to applications in networks of voltage up to 36kV:

- resonant earthed systems, with a unit forcing the active zero-sequence current component,
- with a neutral point, grounded with a resistor,
- with a neutral point, insulated temporarily or permanently.

The SZK-2 indicator is typically installed in stations, inside buildings.

Security and reliability

Unique offer on the market

The SZK-2 indicator currently constitutes the only solution available in the country which makes it possible to detect earth faults in resonant earthed systems even in lines with high capacity current without costly medium-voltage dividers. An optimisation of the device in its construction and applications and the use of innovative materials resulted in high reliability, mandatory in devices used in the power industry. An important hallmark of the SZK-2 indicator is also its price. The indicator was created in cooperation with the Polish Electricity Board.

Description

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The SZK-2 indicating system is totally autonomous and constitutes a complete monitoring unit. Earth fault parameters are set with the help of a functional keypad and screened on a display unit. Parameters for phase-to-phase faults are set with switches mounted on the phase current transformers. The indicating system consists of:

- a Ferranti transformer,
- comparators (phase current transformers)
- zero-current and phase-to-phase fault indicator
- external alarm and signalling devices.

Ferranti transformer

Ferranti transformer, as an earth fault sensor, with internal core diameter 150mm (window), constitutes a current-voltage transreactor. The output current of the transformer is a function of the value of earth fault current. If there are three single-phase cables at the site and there is no possibility to use a single transformer, the Holmgreen connection may be introduced – three transformers connected in parallel (transformers with a 100mm window diameter).

Comparators

They constitute phase current transformers and monitor the acceptable range of changes in load currents. Occurrence of a phase-to-phase fault, by exceeding the maximum phase current setting, sends a signal to the indicator via optic fibre. The transformers are suitable for mounting on cables with outer diameters ranging between 30 ÷ 50mm and can also be adjusted for the 65mm diameter, to be used especially with oil-filled cable terminations.

Earth-fault and phase-to-phase fault indicator

Earth-fault and phase-to-phase fault indicator is a device that measures the current signal from the Ferranti transformer in the event of an earth fault and receives a binary signal about a phase-to-phase fault from the two transformers mounted on phase cables. Detection of an earth fault or a phase-to-phase fault activates alarm and signaling circuits.

The indicator is equipped with alarm switch modules (separately for earth faults and phase-to-phase faults), a switch panel of the mains supply indicator and allows for remote testing and resetting of the device.

Additional components of the SZK-2 indicating system

Optionally, the SZK-2 indicating system may be equipped with:

- a radio receiver module used in radio-acoustic communication of the signal of the carrier wave allocated for the Electricity Board,
- a radio receiver-transmitter module at 433MHz frequency, used in combination with the SZK Communicator, which allows for monitoring up to 250 SZK-2 indicators mounted in e.g. in inaccessible locations.

External alarm and signalling devices

External alarm and signalling devices provide a good visibility of optic indicators (bright LED lights) and in radio-acoustic communications – a good audibility of the acoustic signal, within the range of operation of the radio receiver of the carrier wave.

Operation in networks with high capacity currents share

Operation of the SZK-2 indicator in networks with high capacity currents share.
The device, suitable for operation on cable runs with low capacity currents share, serves like a level comparator. In resonant earthed systems, with a unit forcing the active zero-sequence current component and with high capacity currents share, the device may operate according to the directional algorithm, and does not require analysis of the network with respect to predicted values of capacity currents which may occur during an earth fault.

Specifications

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- Selection of the mode of operation:
  - threshold operation mode,
  - directional algorithm operation mode (in resonant earthed systems with a unit forcing the active zero-sequence current component).
- Threshold for the earth-fault-current comparator [A]:
  1 ÷ 10 every 1A; 10 ÷ 50 every 5A; 50 ÷ 150 every 10A; settings error: ±5%;
  Response time [ms]: 50 ÷ 9950 every 50ms, response time settings error: ± 5ms.
- Directional algorithm settings:
  ΔI: (1 ÷ 9)A every 1A, + (1 ÷ 9)%I1, Δt: 1000 ÷ 5000 ms every 50ms, ± 1ms
  (I1 – initial value of earth-fault current)
- Threshold for the level comparator of phase-to-phase fault current [A]:
  300 ÷ 1200, every 100A; settings error: ± 5%;
  Response time [ms]: 0 ÷ 1000 every 50ms; ± 5ms
- Maximum length of the optic fibre 10m, standard 5m.
- Indication period: 1 ÷ 5h, every 1h
- Indicator resetting:
  - automatic timed – after the indication period has elapsed,
  - manual – with a button (after the fault is cleared),
  - automatic – upon restoring medium or low voltage,
  - with external voltage of 24V DC or with a potential-free contact.
- AC supply: 230V AC, 50Hz; 8VA + local: battery: 12V, 0.8Ah
- Casing: FIBOX CARDMASTER ABS 17/16-OL II (WxSxG) 200 x 210 x 110mm
- Casing protection:
  - transformers - IP 40,
  - indicator - IP 65,
  - alarm indicators - IP 54.
- Operating temperature range: -25 ÷ +55°C
- Carrier frequency of the radio receiver module: 426.625 MHz or other upon arrangement.
- Operational frequency of the radio receiver-transmitter module: 433 MHz

Warranty

Reliable service and warranty
SOFTIN offers a two-year warranty for the devices it produces and provides a post-warranty service of its products.