PCS-9631
Capacitor Relay

The PCS-9631 relay is a comprehensive protection, control and monitoring unit for shunt capacitor bank on solidly grounded, impedance grounded, Peterson coil grounded and ungrounded system. The PCS-9631 features high performance functional library, programmable logic, configurable I/O and integrated frequency-tracking.

The PCS-9631 can fully support the IEC61850 communication protocol and GOOSE function, and can completely meet customer demands

Functions

Protection and Control

- Four-stage overcurrent protection. (50P/51P)
  PCS-9631 supplies four-stage overcurrent protection. DT or IDMT can be selected by settings. IDMT curves complying with IEC and ANSI standard are provided.

- RMS overcurrent protection. (51RMS)
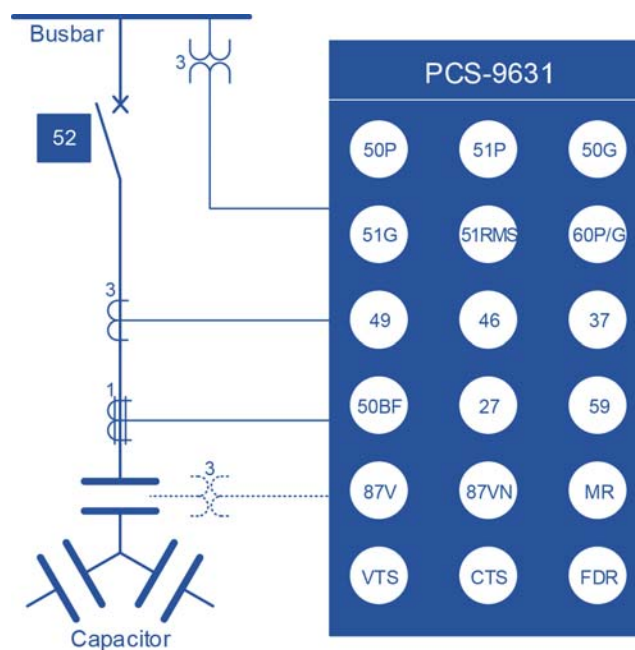 Two-stage RMS overcurrent protection can detect the fault

Figure 1 PCS-9631 Functional Block Diagram

current with harmonic components, and up to 11th harmonic components can be detected in the RMS current.

- Six-stage zero sequence overcurrent protection. (50/51G)
  Six-stage zero sequence DT and IDMT overcurrent protections are provided. IDMT curves complying with IEC and ANSI standard are provided.

- Unbalance current protection. (60P/G)
  PCS-9631 uses three-group unbalance currents to reflect the internal fault in the capacitor bank. Three-group unbalance currents can be used for 60P and 60G.

- Thermal overload element. (49)
  This relay provides a thermal overload model using the RMS value of current.

- Negative sequence overcurrent protection. (46)
  Two-stage negative sequence current protections are provided. Stage I is DT, stage II is IDMT. Each stage can be enabled independently.

- Undercurrent protection. (37)
  One-stage undercurrent protection is used for monitoring the undercurrent of the capacitor.

- Breaker failure protection. (50BF)
  The relay initiate re-tripping and adjacent breaker tripping during breaker failure. Four logics based on the phase current and the circuit breaker state are selectable.

- Two-stage undervoltage protection and two-stage over voltage protection. (27/59)
  The voltage input can select either phase voltage or phase-to- phase voltage. VT failure blocking is integrated in this protection.

- Phase voltage differential protection. (87V)
  The voltage differential elements are used to detect variations in capacitor bank impedance due to loss of individual capacitor elements, a single capacitor unit, or an entire group of capacitor units. Three phase-voltage differential elements are used to measure voltage differences between bus or line phase voltages and the tapped voltage of the grounded wye capacitor bank.

- Neutral voltage differential protection. (87VN)
  Neutral-voltage differential element calculates zero-sequence voltage from three-phase potential inputs of the line or bus. The calculated zero-sequence voltage is then compared with the zero-sequence voltage measured by a potential transformer connected between the capacitor bank neutral and ground.

- Mechanical Protection (MR)
  Up to 4 channels for mechanical protection are provided. It receives the mechanical inputs from transformer tank and issues the tripping or alarm outputs with or without time delay.

- Remote and local tripping/closing of breaker.
  The breaker tripping/closing can be implemented remotely or locally.

- Voltage and current drift auto adjustment.
  The relay continually and automatically traces the voltage and current drift and adjusts the zero point to a normal value.

- Frequency tracking.
  Frequency tracking is integrated to accommodate the frequency shift in power system.

Monitoring and Metering

- Metering of current, voltage, active power, reactive power, power factor, energy, frequency, harmonic.

- Circuit breaker monitoring.

- CT failure supervision.

- VT failure supervision.

- Tripping circuit supervision.

- Self diagnostic.

- Fault Recorder.

- Total 1024 SOE, including tripping, alarm, binary input change and human operation reports.

- User-configurable high resolution oscillography of last 4 oscillograms. (Compatible with COMTRADE format)

Communications

- Up to four 10Base-T/100Base-TX (RJ45) ports or two 100Base-FX ports with IEC 61850-8-1 MMS and GOOSE for

- non-time-critical message, IEC 60870-5-103 over TCP/IP or DNP 3.0

- Two RS-485 rear ports with IEC 60870-5-103

- Up to Six 100Base-FX ports with IEC 61850-9-2 Sampling Value and GOOSE for time-critical message

- One RS-485 rear port for clock synchronization

- One RS-232 rear port for printer

- 1 faceplate RJ45 port for testing and setting

- Clock synchronization via pulse per second(PPS), IRIG-B and SNTP

Features

- Protect grounded and ungrounded, single- and double-wye configurations. Use sensitive phase- and neutral-voltage differential elements and phase- and neutral-current unbalance elements to provide reliable protection.

- Simplify relay settings, application, and inventory by using one relay for all of your capacitor bank needs.

- Sample the analog values from the conventional CT/VT, or receive the sampled values from electronic CT/VT via merging unit.

- Various algorithms for protection and measurement have been completed in PCS-9631 for the feature of electronic transformer sampling, such as the error prevention method of multi-algorithms data anomaly for the digital channels, to realize high accuracy and reliability under various conditions of network faults or communication interruption.

- PCS-9631 has powerful GOOSE functions, and the connection and cooperation between some devices can be realized without using electrical cables.

- Various methods of GPS time synchronization are supported

in this relay, including SNTP, pulse per second (PPS) and IRIG-B synchronization.

- This device can communicate with a SAS or RTU via different communication intermediates: Ethernet network, RS-485 serial ports. The communication protocol of this device is optional: IEC61850, IEC60870-5-103 or DNP3.0.

- This device can detect the tripping circuit of the circuit breaker and monitor the operation (close or trip) time of a circuit breaker by checking the auxiliary contacts of the circuit breaker.

- Complete event recording function is provided: 64 latest protection operation reports, 1024 latest supervision records,

- 1024 latest control operation records, 1024 latest user operation records and 1024 latest records of time tagged sequence of event (SOE) can be recorded.