PCS-9613

Differential Relay

The PCS-9613 relay is a current differential protection and overcurrent protection, control and monitoring unit with auto-reclosing function for distribution feeder lines in solidly grounded, impedance grounded, Peterson coil grounded and ungrounded system.

This relay can fully support the IEC61850 communication protocol and GOOSE function, and can completely meet the demands of a modern digitalized substation.

Functions

Protection and Control

- Current differential protection (87L)
  A dedicated FO channel module is adopted for data interchange in the relay. The fault detector contains three independent elements: the DPFC (Deviation of Power Frequency Component) phase-to-phase current fault detector, the phase overcurrent fault detector and the zero sequence overcurrent fault detector. Superior anti CT saturation measure is applied to insure no maloperation caused by CT saturation during external fault.
- Six-stage phase overcurrent protection (50P/51P/67P)
  All overcurrent element, directional element, voltage control element and harmonic blocking element settings are independent for each of the first four stages. Stages 1, 2, 5 and 6 only have definite time characteristic. Stages 3 and 4 overcurrent protections can be set as either definite time (DT) or inverse definite minimum time (IDMT).

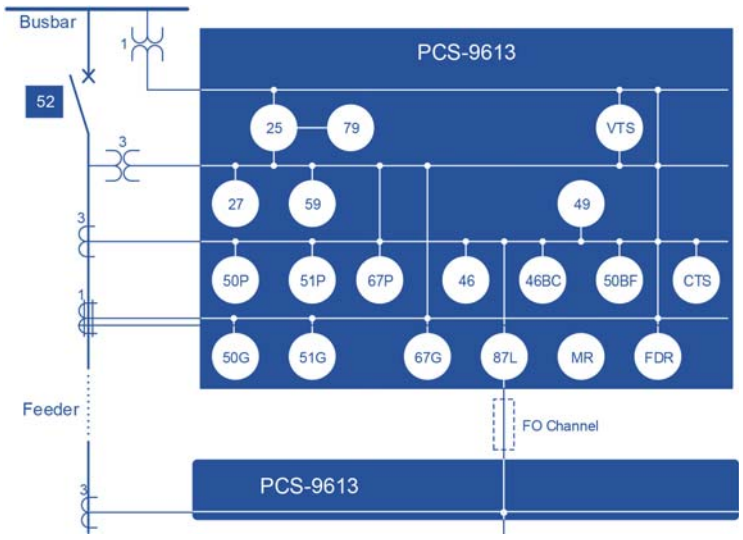

Figure 1 PCS-9613 Functional Block Diagram

- Six-stage zero sequence overcurrent protection (50G/51G/67G)
  Definite time (DT) and inverse definite minimum time (IDMT) zero sequence overcurrent protection are provided. The first four stages can be controlled by directional element and harmonic blocking element respectively.
- Negative sequence overcurrent protection (46)
  Two stages of negative sequence overcurrent protection are provided with definite time characteristic. Stage 2 can be set with either definite time characteristic or inverse definite minimum time characteristic.
- Broken conductor protection (46BC)
  The ratio of negative-sequence current to positive-sequence current (I_2/I_1) is used to detect the broken conductor.
- Breaker failure Protection (50BF)
  The circuit breaker failure protection is specially applied for re-tripping the circuit breaker, when the relay operates, but the fault current is still remaining.
- Thermal overload protection (49)
  Thermal overload protection adopts the thermal overload model based on IEC 60255-8 standard, and the largest phase current is used for the thermal model.
- Undervoltage/Overvoltage protection (27/59)
  Undervoltage/Overvoltage protection has two stages. It can support all kinds of VT connection: three phase voltages (Ua, Ub, Uc), three phase-to-phase voltages (Uab, Ubc, Uca), two phase-to-phase voltages (Uab, Ubc), any one of three phase voltages or any one of three phase-to-phase voltages.
- Switch-onto-fault (SOTF) logic.
  Switch-onto-fault logic is used to clear fault during manually closing or auto-reclosing.
- Synchronism check (25)
- Auto-reclosing (three-pole) (79)
- Mechanical protection(MR)
- Remote control and measurement.
- Voltage and current drift auto adjustment.
  The relay will continually and automatically trace the voltage and current drift and adjust the zero point to a normal value.

Monitoring and Metering

- Tripping circuit supervision.
- CT failure detection logic.
- VT failure detection logic.
- Synchro-check voltage failure supervision.
- Self diagnostic.
- Fault Recorder.
- Total 1024 SOE, including tripping, alarm, binary input change and human operation reports.
- Total 64 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
- 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 PPS, IRIG-B and SNTP

Features

- Fully recognizing the technology to integrate six functions into one device: protection, measurement, control, remote signaling, merging unit function and remote module functions, to improve the reliability.
- Definite time and inverse time characteristics of overcurrent protection are both provided.
- Overcurrent protection could be supervised by directional element and voltage elements.
- Constantly measures a large amount of analog quantities, or receive the sampled values from the electronic transformers, such as phase voltage, phase-to-phase voltage, neutral voltage, phase current, neutral current, active power, reactive power, power factor and frequency.
- Monitor and record the operating times of opening/closingcircuit breakers.
- Various methods of GPS time synchronization are supported, including SNTP, pulse per second (PPS) and IRIG-B synchronization.
- Equipped with Ethernet ports with the IEC 61850 protocol and RS-485 ports with IEC 60870-5-103 protocol.
- 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.
- 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.