PCS-915IC

Centralized Busbar Relay

The PCS-915IC centralized-type relay is a compact and comprehensive busbar protection system which is adaptive to various busbar arrangement of various voltage levels. The relay provides flexible configuration of the busbar topologies to meet specific applications. Due to its extensive CT input and I/O capability, the PCS-915IC is capable to protect up to 25 bays.

It provides fast and secure low impedance busbar protection with sub-cycle tripping time. Check zone and discrimination zone of differential protection are equipped in the relay to minimize the outage zone. Advanced and patented technologies are incorporated to improve sensitivity and security, such as weighted CT saturation detection method, DPFC current differential protection.

The PCS-915IC is compatible with IEC 61850 station bus and process bus applications. It supports IEC 61850-8-1 MMS, GOOSE and IEC 61850-9-2 Sampling Value. The RJ-45 faceplate port is provided for testing and setting, allowing for easier commissioning and maintenance.

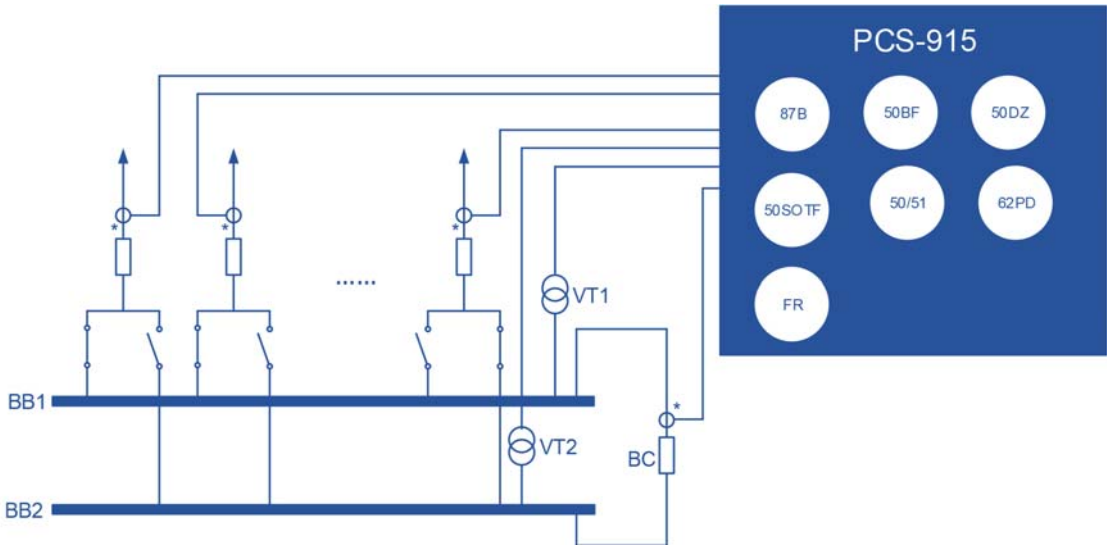

Figure 1 PCS-915IC Functional Block Diagram

Functions

Protection and Control

- Busbar current differential protection (87B)
  It consists of phase current differential protection and DPFC differential protection. Voltage control element and CT saturation blocking element are available to supervise the current differential protection.
  - Phase current differential protection
    Dual restraint coefficients are provided to enhance the sensitivity of weak-sourced busbar with opened bus coupler/section.
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  - DPFC differential protection
    DPFC differential protection is sensitive to high resistance fault and is immune to load fluctuations.
  - Voltage control element
    The used voltage can be phase voltage, zero sequence voltage or negative sequence voltage.
  - Detection of CT saturation
    Two principles for CT saturation detection are provided: patented adaptive weighted anti-saturation algorithm and harmonic algorithm. It keeps the current differential protection stable to external faults and quickly clears internal faults and external-to-internal evolving faults during CT saturation.
  - Check zone and discrimination zone
    The check zone differential element is used to distinguish between internal and external fault of the overall busbar system, the discriminating zone differential elements are used to select faulty zone.

- Bus coupler/section protection
  - Breaker failure protection (50BF)
    It can be supervised by voltage control element. Re- tripping, bus coupler/bus section tripping and feeder tripping are executed in sequence.
  - Dead zone protection (50DZ)
    It is provided to clear the dead zone faults between CT and breaker.
  - Pole disagreement protection (62PD)
    Pole disagreement detection element is used to protect pole disagreement.
  - Switch-onto-fault protection (50SOTF)
    Switch-onto-fault logic of bus coupler/section is used for bus energizing.
  - Overcurrent protection (50/51)
    Phase and ground overcurrent protection are both provided.

- Feeder protection
  - Breaker failure protection (50BF)
    It can be supervised by voltage control element. Re-tripping, bus coupler/bus section tripping and feeder tripping are executed in sequence.
  - Dead zone protection (50DZ)
    It is provided to clear the dead zone fault between CT and breaker.
  - Pole disagreement protection (62PD)
    Pole disagreement detection element is used to protect pole disagreement.
  - Overcurrent protection (50/51)
    Overcurrent protection consists of phase overcurrent element and ground overcurrent element, each can be set as inverse-time or definite-time.

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

Monitoring and Measurement

- Dynamic busbar replica
- CT circuit supervision
- VT circuit supervision
- Self diagnostic
- Event recorder including 1024 change-of-binary-input events, 1024 supervision events and 1024 device logs
- Disturbance recorder including 32 disturbance records with waveforms (The format is compatible with COMTRADE)
- Clock synchronization using IRIG-B, SNTP, PPS (Pulse-Per-Second) and PPM (Pulse-Per-Minute)

Communication

- Up to four 10Base-T/100Base-TX copper Ethernet ports using IEC 61850, DNP3.0 or IEC 60870-5-103 over TCP/IP
- Up to two 100Base-FX optical Ethernet ports using IEC 61850, DNP3.0 or IEC 60870-5-103 over TCP/IP (Sharing two copper Ethernet ports)
- Two RS-485 serial ports using IEC 60870-5-103
- One RS-485 serial port for clock synchronization
- Optional Sampling Value and GOOSE communication module using IEC 61850-9-2 and IEC 61850-8-1 GOOSE

User Interface

- HMI interface with large-size LCD and 9-button keypad on the front panel
- One front RJ-45 port for testing and setting
- One RS-232 or RS-485 rear port for printer

- Language selection – English + selected language
- Assistant software - PCS-Explorer

Features

- Besides conventional current differential element, the relay also integrated with NR Electric's innovative DPFC differential element for fast and sensitive fault clearance. The differential protection typical operation time is within 20ms after fault.
- This device provides all-in-one busbar protection solution with up to 25 bays. Cross phase algorithms such as negative/zero sequence voltage and negative/zero sequence overcurrent elements are available.
- CT ratio compensation is adapted to balance CT ratio difference of current samplings.
- Patented adaptive weighted anti-saturation algorithm is employed, together with traditional harmonic algorithm, to provide fast and reliable CT saturation detection.
- With patented adaptive-weight anti-saturation algorithm and harmonic restrain algorithm, this relay guarantees fast and reliable performance during CT saturation.
- Check zone element and discrimination zone element coordination make sure the relay can identify and trip the faulty bus only when there are more than one bus protected by the relay, so as to minimize outage area.
- Continuous feeder disconnector status monitoring are available for automatic feeder current pulling out in differential current calculation.
- NR Electric's unique two-out-two hardware design significantly improves relay reliability. The redundant hardware including two independent data acquisition and processing circuits, one is fault detector and the other for protection tripping. All tripping outputs are supervised by both circuits to prevent the relay from mal-tripping caused by component error.
- Programmable hardware and logic are helpful for flexible operation. Modular and unified hardware, selective function table and configurable I/Os allow users to utilize the relay for customized applications. Most of the 20 IED indications can be defined by software, with 3 color options.
- IEC-61850 including IEC-81850-8-1 MMS/GOOSE and IEC-61850-9-2 Sample Value are supported in the relay. Maximum 6 Ethernet ports are equipped as IEC-61850 station bus and process bus communication interface.