



# PCS-915ID

## Distributed Busbar Relay

The PCS-915ID distributed-type busbar protection system is designed for flexible installation and easy system extension. In this protection system one central unit is connected to certain number of bay units depends on different bus scheme and bay number. It adopts distributed structure, consisting of one Central Unit (CU) and a number of Bay Units (BUs). The Central Unit is linked to up to 32 Bay Units via optical fibers in point-to-point communication mode. The Central Unit is responsible for the protection calculation and relay management, the Bay Unit acquires and transmits the analog and binary data and executes the trip/close commands issued by Central Unit.

The device provides fast and secure low impedance busbar protection with sub-cycle tripping time. It integrates advanced and patented features to improve its sensitivity and security, such as innovative DPFC current differential protection and unique weighted CT saturation detection method.

The PCS-915ID 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.

## 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.
- 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 32 optical point-to-point communication ports from Central Unit to Bay Units
- 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 32 bays.
- CT ratio compensation is adapted to balance CT ratio difference of current samplings.
- 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 disconnecter 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.