# PCS-222CG

## Circuit Breaker Controller

The PCS-222CG is an intelligent terminal which is used to control primary switching device (including circuit breaker and main transformer) and used as a merging unit for traditional electromagnetic transformers in 110kV and lower voltage level digital substation.

The PCS-222CG can support real-time GOOSE communication,and can realize the opening and closing control functions of circuit breakers and switches by coordinating a protection and bay control unit (BCU). It can locally acquire binary signals of primary equipment (such as breakers and switches) at the same time. It can meet the requirement of GOOSE tripping by P2P mode.

The PCS-222CG also can sample the AC analog values (voltages and currents) locally, and then it can transmit these sampled values (SV) to the protection and bay control unit (BCU) devices through optical communication channels which are based on the IEC61850-9-2 protocol.

The PCS-222CG is equipped with the following advantage:

- Simplify on-site connection wiring and decrease the cost of cables.
- Improve the anti-interference capacity by adopting optical fiber mode of signal transmission.
- Provide alarm signal of channel link failure due to adoption of optical fiber.

# Functions

### Merging Unit Functions

This device can be adopted generally for the bay of line, transformer or bus coupler, and its main functions are listed as below.

- By configuring different AC analog input module, this device can sample two group of three-phase currents for protection, one group of three-phase current for metering, one zero sequence current, one neutral gap current, one group of three-phase voltages for protection, one group of three-phase voltages for metering and one zero sequence voltage.
- Receives the voltage sample values of the busbar over IEC60044-8 or IEC61850-9-2 protocol, and realize the voltage transfer function.
- Supports optical PPS, optical IRIG-B and IEEE1588 time synchronization function
- Transmit sampled values over IEC61850-9-2 protocol (P2P or DL/T860.92) through up to 12 optical output physical channels.
- Supports GOOSE transmission function.
- Supports IEC61850 communication protocol.

### Circuit Breaker Control Functions

This device receives tripping, closing and blocking signals of breakers or switches which are issued by protection device or bay control unit (BCU) via GOOSE network, and then converts them to corresponding output contact outputs of this device. This device can also locally acquire binary status of primary equipment such as circuit breakers, switches and main transformer body, and can upload them to protection device and BCU via GOOSE network. The main control functions of this device are listed as follow.

- Tripping and closing of circuit breakers
  The device is equipped with a group of TJQ tripping outputs (initiating AR), a group of TJR tripping outputs (not initiatingAR), and a group of reclosing outputs.

  This device receives various GOOSE signals from protection device, including TJQ tripping signals (initiating A),TJR tripping signals (not initiating AR) and reclosing signals,and then drives corresponding output relays which converts GOOSE signals to output contacts.
- Remote control outputs

This device provides 44 binary outputs. In addition to tripping/closing and blocking outputs of circuit breaker, it also has remote control tripping, closing and blocking contacts for 4 disconnectors and 4 earth switches, which are 24 output contacts in total.

This device can receive various GOOSE signals from BCU, including the tripping/closing signals from breaker and the tripping/closing/blocking control signals from disconnectors or earth switches. Then the device drives corresponding output relays to operate, which convert GOOSE signals into output contacts.

- Binary input signal inputs
  This device provides 75 binary inputs. It can locally acquire binary quantities such as breaker position, switch position, and signals of circuit breaker mechanism and main transformer body, and transmit them to corresponding protection device or BCU via the GOOSE network.

## Features

- The PCS-222CG is a new generation intelligent terminal which fully supports digital substation. It adopts the UAPC hardware platform which is recently developed by NR, and supports real-time GOOSE communication.
- All plug-in modules in this device can be smoothly upgraded to keep compatible with UAPC platform, thereby provides a solid protection on the user's investment in equipment for a long period.
- Provide virtual LCD, friendly HMI to facilitate installation and commissioning on site.
- This device adopts high-performance DSP, internal highspeed bus, and intelligent I/O. Both hardware and software adopt modular design, allowing flexible configuration, general module for both plug-in module and software modules, and easy expansion and maintenance. Numbers and types of spare plug-in modules that user needs to keep for replacement are largely reduced.
- Adoption of high precision 16 bits A/D converter ensures the measurement calculation with high precision. Two A/D converters are for an AC sampled channel, and the sampling
- rate is 80 samples per fundament wave cycle. The real-time data calculation can be finished within one sampling period.
- The device provides various communication modes. It is equipped with one RS-232 port. It supports IEC61850-9-2 protocol, IEC60044-8 protocol and GOOSE function.
- Supports the PPS and IRIG-B time synchronization via fiber
- optical interface and the IEEE1588 time synchronization. The accuracy of time synchronization is very high and the time error is less than 1us.
- This device can receive GOOSE signals of protection tripping/closing, manual closing/tripping of BCU, and control of disconnectors and earth switch, and output corresponding contacts. It can acquire and upload positions of breakers/disconnectors/earth switch, and breaker body signals etc.
- Output operation is fast. Time between receiving GOOSE message and corresponding operation at output relay is less than 7ms, and this is basically not affected by GOOSE network storm.
- Output relays are blocked by fault detector DSP. This can effectively ensure reliability of the device.
- The device provides flexible communication modes. It is equipped with up to 12 independent GOOSE interfaces and 1 RS-232 commissioning port, and it supports new generation substation communication standard IEC61850.
- The function of measurement of ambient temperature and humidity is integrated.
- Complete event recording function is provided: 256 latest binary state change records, 256 latest self supervision records.
- This device adopts integral panel and fully enclosed chassis. Strong electric circuits and weak electric circuits are strictly separated. Anti-interference is greatly improved, and reaches highest EMC level.
- This device adopts fully enclosed relays which have high impedance and low power consumption, thus its power consumption and heat dissipation is reduced, which improves the security of the device.