



PCS-9659

Synchronizer

PCS-9659 is a digital synchronizer that determines the proper time to initiate closing of the circuit breaker to parallel a generator and bus, or to reclose a line. In order to fulfill different application requirements, it offers three synchronizing modes: automatic synchronizing, semi-automatic synchronizing and manual synchronizing. By monitoring frequency, voltage and phase angle, the PCS-9659 provides correction signals to the governor of prime mover and voltage regulator of generator for voltage matching and frequency matching.

- Automatic Synchronizing Mode: The closing command is issued via remote control center. PCS-9659 monitors slip frequency (frequency difference), slip speed, voltage difference and phase angle difference, issues control signal to adjust frequency and voltage of the generator for voltage

matching and frequency matching and gives close command to the breaker at the appropriate moment.

- Semi-automatic Synchronizing Mode: The closing command is issued manually to initiate synchronism process, the other functions are provided automatically just the same as automatic synchronizing mode.
- Manual Synchronizing Mode: According to the indicator lights of voltage difference and frequency difference in the Synchronizing meter, and the value of voltage difference and frequency difference on the LCD screen, the operator controls the speed and voltage of the generator as well as the closure moment of the circuit breaker.

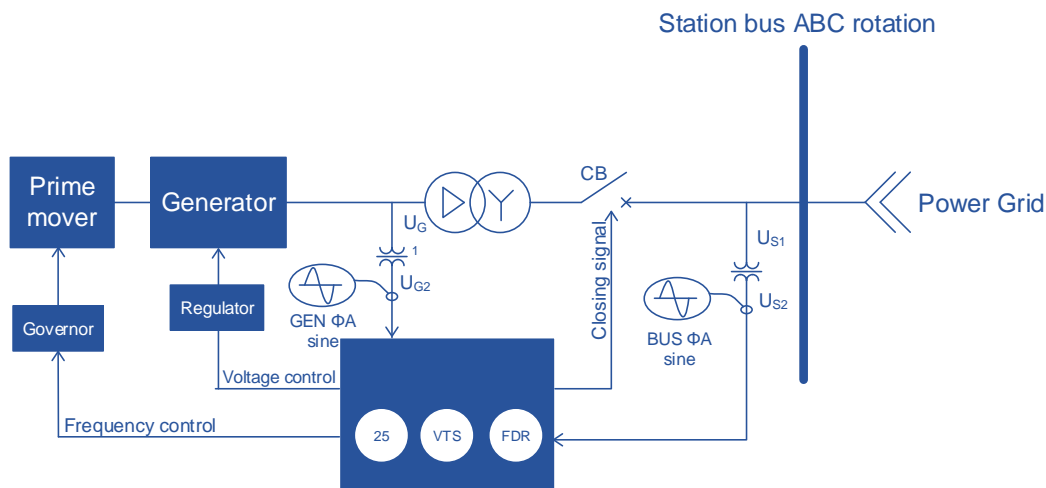


Figure 1 PCS-9659 Functional Block Diagram

Functions

- Automatic synchronizing (25A)
- Semi-automatic synchronizing (25SA)
- Manual synchronizing (25M)
- Multi-generator paralleling solution: capability of 8 circuit breakers' synchronization. To any of the circuit breakers, frequency and voltage regulation can be done separately.
- Blocking signal to other equipment
- Receive blocking signal from other equipment

Monitoring

- Low voltage alarm at system side
- Low voltage alarm at the side to be connected
- PT circuit failure alarm at system side
- PT circuit failure alarm at the side to be connected
- Synchronous mode error alarm
- Over voltage alarm at the side to be connected
- Synchronization failure alarm
- Synchronization counts error alarm
- Remote startup error alarm
- Self diagnostic.
- Fault Recorder.
- Total 1024 SOE, including closing, alarm, binary input change and human operation reports.
- 64 closing records with oscillograms compatible with COMTRADE.

Communications

- Up to four 10Base-T/100Base-TX (RJ45) ports or two 100Base-FX ports with IEC 61850-8-1 MMS for non-time-critical message, IEC 60870-5-103 over TCP/IP or MODBUS TCP.
- Two RS-485 rear ports with IEC 60870-5-103 or MODBUS RTU.
- 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, IRIG-B and SNTP

Features

- High performance hardware assures real time calculation of all relays in each sample interval. Modularized hardware design enables an easy upgrade or repairs.
- PCS-9659 adopts double sampling and independent calculation
- Frequency tracking technology is adopted. By the aid of that, real-time value of frequency, voltage and phase are calculated with high precision on every sampling point.
- Precise capture of synchronization point insures the phase angle error of closing is less than or equal to 0.5° by the mode of difference frequency synchronization.
- PCS-9659 can automatically memorize the operation time of closing circuit.