Features
• Fully IEC 61850 compliant, Edition 1 and Edition 2
• Extensive I/O capability
• Protection and monitoring integrated in one IED
• Extensive self-supervision including analog channels
• Six independent parameter setting groups
• Ethernet interface for fast and easy communication with PC and Substation Automation System
• Large HMI for visualization of single line diagrams
• Settings via IEC 61850 for some protections
• Cyber security support for compliance to NERC CIP and IEC 62351-8 with Centralized Account Management
• Protection of several primary objects with a single IED

Pre-configured solutions
• Pre-configured and type tested solutions including default settings for:
  – Generator main and back-up protection with 12 and with 24 analog inputs
  – Generator and block transformer main and back-up protection with 24 analog inputs

Most important protection functions
• Generator differential protection
  – Percentage bias restraint with up to 4 restraint inputs
  – Internal/external fault discriminator (negative sequence based)
  – Higher harmonic blocking
  – DC biasing
  – Suitable for split phase differential protection
• Transformer differential protection
  – High sensitivity for interturn faults
  – Fast differential protection with up to 6 restraint CT inputs
  – Automatic CT ratio matching and vector group compensation
  – Waveform and second harmonic restraint for transformer inrush
  – Fifth harmonic restraint for overexcitation
• 3-phase high impedance differential protection
• Restricted earth-fault protection
  – Extremely fast operation
  – High and/or low impedance based
• Injection-based protection using REX060 injection unit
  – 100% stator earth-fault protection
  – Sensitive rotor earth-fault protection
• Back-up underimpedance protection
• Pole slip protection
  – Detection of slips in power system from 0.2 Hz to 8 Hz
  – Discrimination between generating and motoring direction of rotor phase angle
  – Discrimination between local and external power swing center
• Trip after a set number of slips
• Trip within a set rotor angle
• Loss of/under excitation
  – Positive sequence measurement
  – Two offset-mho zones
  – Directional element for zone restriction
• Directional power protection
  – Reverse power, low forward, active and reactive power protection
  – Phase angle compensation
  – Two steps (alarm/trip)
• Current
  – Rotor and stator overload protection
  – Instantaneous phase- and residual overcurrent protection
  – Four-step phase- and residual directional/ non-directional overcurrent protection with definite and inverse time characteristics
  – Negative sequence overcurrent protection for machines
  – Split phase overcurrent protection
  – Accidental energizing protection for synchronous generator
  – Pole discordance protection
  – Breaker failure protection
  – Voltage controlled/restraint overcurrent protection
• Voltage
  – Two step phase- and residual overvoltage protection
  – Two step undervoltage protection
  – Overexcitation protection
  – 3rd harmonic based 100% stator earth-fault protection
  – 95% stator earth-fault protection
• Secondary system supervision
  – Fuse failure supervision
  – Fuse supervision based on voltage differential principle
  – Current circuit supervision
• Frequency functions
  – Over- and under-frequency protection
  – Frequency time accumulation protection
  – Rate-of-change frequency protection
• Multipurpose function
  – Multi-purpose filter with possibility to detect, alarm, and trip for special operating conditions, e.g. SSR
  – General current and voltage protection
  – Voltage controlled/restraint overcurrent protection
  – Rotor earth-fault protection using COMBIFLEX RXTE4 injection unit
**Control functions**
- Synchrocheck, energizing check and synchronizing
- Tap position reading via mA or BCD code
- Control and interlocking for up to 30 switching devices
- Selectable operator place allocation
- Software based multiple position selector switches

**Logic**
- Tripping logic
- Trip matrix logic
- Extensive logic block library for application customization

**Monitoring**
- Adjustable breaker monitoring with capability to handle multiple breaker types
- Disturbance recorder and disturbance report
  - Up to 10 seconds of data before the trigger
  - Up to 100 disturbances
  - 40 analog channels, 30 physical and 10 derived
  - 128 binary channels
- Event list for 1000 events
- Event and trip value recorders
- Event counters
- Running hour meter
- Supervision of AC and mA input quantities
- Large HMI with virtual keyboard, function push buttons, and three color LED indications with alarm descriptions

**Measurements**
- U, I, P, Q, S, f and cos φ
- Frequency measurement with accuracy of ± 2 mHz
- Inputs for mA measuring

**Metering**
- Energy metering function for energy statistics
- Pulse counting support for energy metering

**Communication**
- IEC 61850-8-1 including GOOSE messaging
- Process Bus communication IEC61850-9-2
- IEC 62439-3 parallel redundancy protocol (PRP)
- IEC 60870-5-103 serial communication
- DNP 3.0, LON, and SPA protocols
- Remote end communication for transfer of up to 192 binary signals in each direction

**Engineering, testing, commissioning, and maintenance**
- Protection and control IED manager PCM600 for configuration, parameterization, online debugging and disturbance handling
- Forcing of binary inputs and outputs for faster and easier test and commissioning
- Flexible product naming by mapping utility IEC 61850 model to that of 670 series model

**Hardware**
- 1/1 x 19", 3/4 x 19" or 1/2 x 19", 6U height case selected according to the number of required I/O modules
- Power supply modules from 24 to 250 V DC ± 20%
- TRM input module with 12 analog inputs and optional measurement transformers
- Up to 14 I/O modules in 1/1 x 19" case