Substation Automation Products

Transformer protection RET670
Increased grid reliability

Power and productivity
for a better world™

For reliable protection and control of all types of power transformers and reactors

RET670 provides fast and selective protection, monitoring and control for all types of transformers, such as two and three-winding transformers, autotransformers, phase shifting transformers, shunt reactors including switching control, step-up transformers in power stations and special railway transformers. With up to six three phase restraint current inputs into differential protection, multi-breaker substation arrangements on any two sides is permitted. It provides extensive application opportunities and the advanced communication capabilities allow you to integrate this IED into your substation automation system or use it as a stand-alone multifunction unit.

RET670 can be equipped with advanced voltage control functionality for single and up to eight parallel transformers in any combination of parallel groups.

The RET670 IEDs provide you with a future-proof concept based on wide application flexibility, which makes these IEDs an excellent choice for both new and retrofit installations. The integration of the main protection and a wide range of back-up protection functions within these IEDs improve your power system's performance. It also reduces engineering, installation time and space, and spare parts requirements. Furthermore, you can protect and control several objects with a single RET 670 IED. In all, RET 670 increases both the reliability and profitability of your entire power system.

Increase grid reliability – invest in complete protection of your assets

- One RET670 IED fits all power system elements that require unit protection
- RET670 increases productivity and quality from design to operation and maintenance of your installation
- RET 670 is optimized for each application with maximum reliability and a short operate time
- Integration of protection and control functionality in one IED enables cost efficient solutions
- Local HMI provides full status information at any time during operation
- Future proof concept that helps you to be competitive today and in the future

Ready to use IEDs

The RET670 IEDs are delivered pre-configured, type tested and with default parameters for easy handling of products – from ordering, engineering and commissioning to reliable operation. The IEDs are equipped with complete functionality adapted for two winding, single and multi-breaker as well as three winding, single and multi-breaker arrangements. Additionally, the pre-configured packages minimize the engineering since all the needed functionality is integrated in a single IED. If needed, they can be easily adapted to meet the specific requirements of your power system.

Unrivalled sensitivity and speed

The extremely fast differential protection with automatic ratio matching, vector group compensation and tap-changer position reading make RET670 an ideal solution even in the most demanding applications. RET670 offers the best possible coverage for power transformer winding turn-to-turn faults, including low-level internal faults. It places low requirements on the main CTs and no interposing CTs are needed.

Intelligent protection investment

The low impedance restricted ground-fault function for all directly or low impedance grounded windings provides excellent stability for through faults. Having individual protection for each winding without the need for harmonics stabilization ensures high sensitivity and fast tripping. The additional directional zero sequence current criterion of this function increases security.

Intelligent protection investment

RET670 features four-zone full scheme distance protection for phase-to-phase and phase to ground faults. This enables you to protect and control both the transformer and a line with one single IED. The distance protection function can also be used as back-up protection for faults within the transformer. The integrated power swing detection function prevents unwanted trips during power system disturbances.

Non-directional, directional and/or overcurrent functions provide the necessary back-up protection. This, together with fast and sensitive restricted ground-fault protection of stabilized low impedance types, with sensitivity down to 1% of the total number of turns, ensures comprehensive protection for your power transformers.

The advanced logic capabilities and a multipurpose protection function allow you to design special applications, such as automatic operation of disconnectors and load transfer logics for a double busbar. The logic can be easily generated, tested and commissioned with the help of the graphical tool.

Versatile overcurrent and thermal overload functions provide additional back-up protection. Breaker failure protection allows high speed back-up tripping of surrounding breakers and re-tripping of the own breaker, for instance, to avoid operational mistakes during testing.

Advanced voltage control

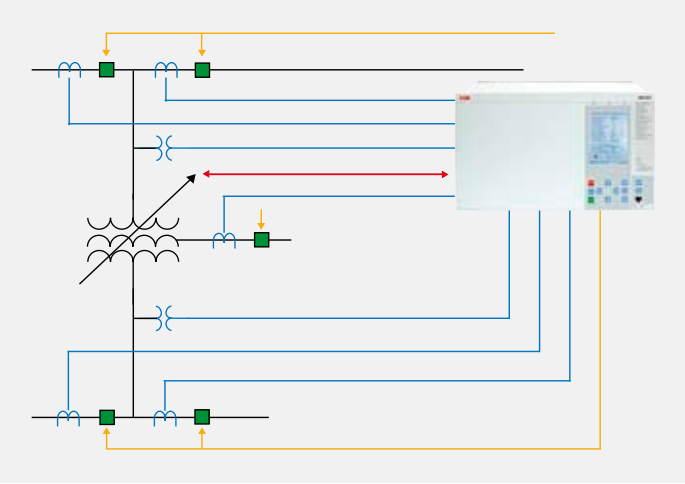
The RET 670 IED can be equipped with advanced voltage control functionality for single and up to eight parallel transformers in any combination of parallel groups. Tap changer control functions include line drop compensation and a load shedding function based on voltage reduction. Tap changer position monitoring with mA- or BCD-signals enables supervision of the correct tap changer operation.

For parallel transformers, RET670 utilizes the minimum circulating current principle, which ensures the correct split of reactive power flow between each transformer in accordance with its rating. Using the average measured voltage between the RET 670 units within each group of transformers ensures the correct tap changer control. This also allows easy and efficient supervision of VTs. Alternatively the master-follower principle can be used for transformers with similar characteristics. Automatic control for a hot-stand-by transformer can also be included.

The right information for the right action

RET670 features also functions for local and remote apparatus control on all sides of the transformer. Secure bay- and station-wide interlocking allows you to avoid dangerous or damaging switchgear operations and to ensure personnel safety.

Application examples



RET 670 ensures enhanced through-fault stability for multi-breaker arrangements

Optimized utilization of transformers

The large HMI allows for local control and instant access of important data, such as settings, events and disturbance information. You can locally control and visualize up to 30 primary apparatuses with one RET 670 IED. The HMI provides you with a quick overview of the status of the substation with position indications and service values. You can easily configure the graphical display to correspond to your substation using a library of symbols.

The two-position versatile switch and the 32-position selector switch functions enable you to easily manage switching operations via an icon on the IED HMI. The versatile switch function allows you to directly change, for instance, a voltage control function from manual to automatic mode without changing the configuration. The function also presents an indication of the selected position.

The selector switch replaces an external mechanical selector switch and allows you to directly select the position you desire. In addition to the IED HMI, these switch functions can be operated from a remote system.

The RET670 is designed to operate correctly over a wide frequency range in order to accommodate power system frequency variations during disturbances and generator start-up and shut-down. The built-in disturbance and event recorders provide you with valuable data for post-fault analysis and corrective actions to increase the security of your power system.

Optimized utilization of transformers

The monitoring functionality of RET 670 provides important information about the state of the transformers to an operator. The RET 670 IED receives information about the transformer temperature and issues an alarm, logs the event and trips if needed.

This gives the operator time to disconnect the transformer in case of an overload during network emergency conditions.

Early actions prevent forced ageing and prolong the transformer lifetime. The information about temperature can also be used to control the cooling system of the transformer.

Fast and efficient system integration

RET 670 is designed for IEC 61850, implementing all aspects of this standard, thus ensuring open, future-proof and flexible system architectures, with state-of-the art performance.

RET670 IEDs are more than just devices. They utilize ABB's unique connectivity package concept, which simplifies the system engineering and reduces the risks of errors in system integration. A connectivity package contains a complete description of the specific IED, consisting of data signals, parameters, addresses and IED documentation.

The signal data is configured automatically based on the information provided by the connectivity package to efficiently integrate the IEDs in ABB's MicroSCADA Pro automation system.

RET670 Technology summary:

Features
- Fully IEC 61850 compliant
- Control, monitoring and protection integrated in one IED
- Extensive self-supervision including analog channels
- Six independent parameter setting groups
- Signal matrix for easy configuration of binary and analog signals
- Ethernet interface for fast and easy communication with PC
- Large HMI for visualization of single line diagrams
- User management and authority handling

Pre-configured solutions
- Pre-configured and type tested solutions including default settings for:
  - Two winding transformer in single breaker arrangements
  - Two winding transformer in multi breaker arrangements
  - Three winding transformer in single breaker arrangements
  - Three winding transformer in multi breaker arrangements
  - Back-up protection for transformers and shunt reactors

Most important protection functions
- Transformer differential protection
  - Percentage bias restraint
  - Waveform and second harmonic restraint for transformer inrush
  - Fifth harmonic restraint for overexcitation
  - Automatic CT ratio matching and vector group compensation
  - High sensitivity for interturn faults
- High impedance differential protection
- Restricted ground fault protection
  - Extremely fast operation
  - High and low impedance based
- Back-up distance protection
  - Full-scheme distance protection with quadrilateral, Mho- or series compensation characteristics for up to four zones, and with load encroachment
- Current
  - Instantaneous phase- and residual overcurrent protection
  - Four-step phase- and residual directional/non-directional over-current protection with definite and inverse time characteristics
  - Sensitive directional ground-fault protection
  - Broken conductor
  - Thermal overload protection
  - Breaker failure protection
  - Pole discordance protection
- Voltage
  - Two step phase- and residual overvoltage protection with definite and inverse time characteristics
  - Two step undervoltage protection with definite and inverse time characteristics
  - Overexcitation protection
  - Loss of voltage
- Secondary system supervision
  - Fuse failure supervision
  - Current circuit supervision
- Frequency functions
  - Over- and under frequency protection
  - Rate-of-change frequency protection
- Multipurpose function
  - General current and voltage protection

Control functions
- Automatic voltage control for a single transformer
- Automatic voltage control for up to four/eight parallel transformers based on the minimum circulating current principle or master-follower principle
- Apparatus control for up to 30 apparatuses
- Ready to use interlocking modules for different switchgear arrangements
- Several alternatives for reservation functionality
- Synchronizing, synchro-check and energizing check
- Versatile switch with two positions
- Selector switch with up to 32 positions

Logic
- Tripping logic
- Trip matrix logic
- Configurable logic blocks

Monitoring
- Disturbance recorder
  - 100 disturbances
  - 40 Analog channels 30 physical and 10 derived
  - 96 Binary channels
- Event list for 1000 events
- Disturbance report
- Event and trip value recorders
- Fault locator
- Event counters
- Supervision of AC and mA input quantities
- Small and large HMI
- LED indications with 6 red and 9 yellow LEDs

Measurements
- V, I, P, Q, S, f, and cosφ
- AC input quantities with accuracy better than 0.5%
- 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
- IEC 60870-5-103
- DNP 3.0 slave protocol
- LON
- SPA
- Remote end communication for transfer of 192 binary signals

Setting, configuration and disturbance handling
- Protection and Control IED Manager PCM 600

Hardware
- 1/1 x 19”, 3/4 x 19” or 1/2 x 19” case selected according to the number of required I/O modules
- Power supply modules from 24 to 250 V DC ± 20%
- Up to 14 I/O modules in 1/1 x 19” case
- Binary input module with 16 inputs
- Binary output module with 24 outputs
- Static binary output module with 12 outputs (6 static)
- Binary input/output module with 8 inputs and 12 outputs
- mA input module with 6 transducer channels
- Accurate time-synchronization through GPS module or IRIG-B-module
- Remote end data communication modules for C37.94 and G.703/G.703E1
- Test switch module

Technical details are available in the RET670 Buyer’s Guide.

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