Transformer protection and control RET620

The RET620 is a dedicated transformer IED perfectly aligned for the protection, control, measurement and supervision of two- or three-winding power transformers and power generator-transformer blocks in utility and industry power distribution systems. RET620 is a member of ABB's Relion® product family and a part of its 620 series products. The 620 series IEDs are characterized by flexibility and performance for demanding utility distribution and industrial applications. Engineered from the ground up, the 620 series has been designed to unleash the full potential of the IEC 61850 standard for communication and interoperability between substation automation devices.

Unique RET620 ANSI features
– Six setting groups
– Drawout design
– Sensitive differential protection for turn-to-turn faults of two- or three windings
– Restricted earth fault (REF) protection
– Overexcitation (V/Hz) protection
– High-speed (< 1 ms) outputs
– 2 RTD inputs and 1 mA input
– Arc flash detection (AFD)
– Thermal overload protection of transformer
– Ring-lug terminals for all inputs and outputs
– Large, easy to read LCD screen
– Programmable pushbuttons
– Environmentally friendly design with RoHS Compliance

Application
The RET620 is the ultimate protection and control relay for two or three winding power transformers and power generator-transformer blocks. It can be applied for protection and control of the most commonly used power transformer combinations of delta and wye (grounded or ungrounded) windings. Flexible order coding allows for choosing configurations to best fit your transformer application needs.

Protection and control
The RET620 features three-phase, three restraint, multi-slope transformer differential protection with an unrestrained stage and a restrained stage to provide fast and selective protection for phase-to-phase, winding interturn and bushing flash-over faults. Besides second harmonic restraint an advanced wave form-based blocking algorithm ensures stability at transformer energization and a fifth harmonic restraint function ensures good protection stability at moderate overexcitation of power transformers. Sensitive restricted earth-fault protection (REF) completes the overall differential protection to detect even single phase-to-ground faults close to the grounded neutral of the transformer.

When the low-impedance REF protection is used neither stabilizing resistors nor varistors are needed and as a further benefit the ratio of the grounded neutral CT can differ from those of the phase current transformers. Due to its unit protection character and absolute selectivity the REF protection does not need time grading with other protection schemes, and therefore high-speed fault clearance can be achieved. RET620 also incorporates a thermal overload protection function, which supervises the thermal stress of the transformer windings to prevent accelerated aging of the insulations. Multiple stages of phase and ground overcurrents are provided for both transformer windings plus optional voltage metering and protection for one transformer winding. Ground-fault protection based on the measured or calculated residual overvoltage is also available. Finally, RET620 also offers circuit breaker failure protection. Enhanced with an optional plug-in card, RET620 offers a fast three-channel arc fault protection system for arc flash supervision of the switchgear compartments.

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RET620 also integrates control functionality, which facilitates the control of three circuit breakers via the front panel HMI or by means of remote controls. To protect the relay from unauthorized access and to maintain the integrity of information, the device has been provided with a four-level, role-based user authentication system. The access control system applies to the front panel HMI, the web browser based HMI and the PCM600 Protection and Control Relay Manager.
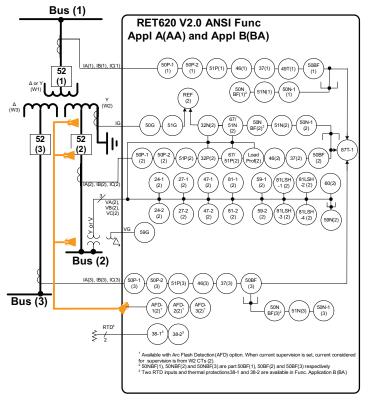
Standardized communication

RET620 genuinely supports the new IEC 61850 standard for inter-device communication in substations. It also supports the industry standard Modbus® and DNP3 protocols.
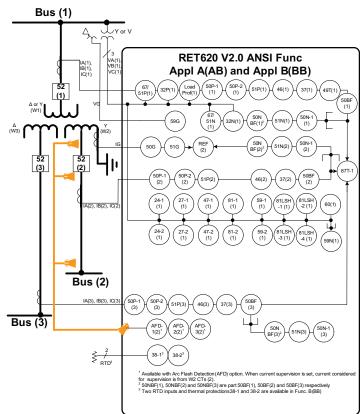
The implementation of the IEC 61850 substation communication standard in RET620 covers both vertical and horizontal communication, including GOOSE messaging and parameter setting according to IEC 61850-8-1. The substation configuration language enables the use of engineering tools for efficient configuration and commissioning of substation devices. For accurate time stamping RET620 supports synchronization over Ethernet using SNTP or over a separate bus using IRIG-B.

Bus protection via GOOSE

The IEC 61850 implementation in RET620 also includes fast peer-to-peer communication over the substation bus. Use GOOSE communication between the IEDs of the incoming and outgoing feeders of a substation co-operate to form a stable, reliable and high-speed busbar protection system. The cost-effective GOOSE-based busbar protection is obtained just by configuring the IEDs and the operational availability of the protection is assured by continuous supervision of the protection IEDs and their GOOSE messaging over the station bus. No separate hard-wiring is needed for the horizontal communication between the switchgear cubicles.

RET620 V2.0 ANSI Functional Applications A & B

Functions and Features		Functional Application	
Included = ●, Optional = O		Firmware version 2.0	
		A	B
Protection	ANSI Function Name		
Phase percentage differential (two windings), restrained and unrestrained	87T, 87H	●	●
Phase overcurrents (Winding 1)	51P (1), 50P (1)	●	●
Phase overcurrents (Winding 2)	51P (2), 50P (2)	●	●
Directional phase overcurrent	67P	●	●
Phase power directional	32P	●	●
Neutral overcurrents (Winding 1)	51N (1), 50N (1)	●	●
Neutral overcurrents (Winding 2)	51N (2), 50N (2)	●	●
Ground overcurrents	51G, 50G	●	●
Directional neutral overcurrent	67N	●	●
Neutral power directional	32N	●	●
Thermal overload	49T	●	●
Undercurrent	37	●	●
Restricted earth fault (REF), low impedance (Winding 2)	87LOZREF (2)	●	●
Negative sequence overcurrent (Winding 1)	46 (1)	●	●
Negative sequence overcurrent (Winding 2)	46 (2)	●	●
Load sheds and restorations	81LSH	●	●
Underfrequencies, overfrequencies, rate-of-changes	81	●	●
Overexcitation	24	●	●
Resistive thermal devices (RTD)	38		●
Phase undervoltage	27	●	●
Phase overvoltage	59	●	●
Phase sequence overvoltage	47	●	●
Ground overvoltage	59G	●	●
Neutral overvoltage	59N	●	●
Circuit breaker failure	50BF, 50NBF	●	●
Electrically latched/self-resetting trip digital outputs	86/94-1, 86/94-2	●	●
Arc flash detection via three lens sensors	AFD-1, AFD-2, AFD-3	O	O
Control			
Circuit breaker control	52 (1), 52 (2)	●	●
Number of pages in HMI		2	2
Customizable HMI		●	●
User programmable LED's		11	11
User programmable push buttons		16	16
Monitoring and Supervision			
Trip circuit monitoring	TCM	●	●
Breaker condition monitoring	52CM	●	●
Advanced current circuit supervision for transformers	MCS, 3I, I2	●	●
Fuse failure 60	60	●	●
Tap changer position 84T	84T	●	●
Measurement			
Three-phase currents (Winding 1)	IA, IB, IC (1)	●	●
Three-phase currents (Winding 2)	IA, IB, IC (2)	●	●
Sequence currents (Winding 1)	I1, I2, I0 (1)	●	●
Sequence currents (Winding 2)	I1, I2, I0 (2)	●	●
Ground current	IG	●	●
Demand values (Windings 1 & 2)		●	●
Maximum and minimum demand values (Windings 1 & 2)		●	●
Three-phase voltages	VA, VB, VC	●	●
Sequence voltages	V1, V2, V0	●	●
Ground voltage	VG	●	●
Power and energy (1-phase, 3-phases) and power factor	P, E and PF	●	●

Functions and Features (continued)		Functional Application	
Included = ●, Optional = O		Firmware version 2.0	
Automation & Communications		A	B
Max number of Digital Inputs		16	16
Max number of Digital Outputs		17	17
Max number of High-Speed Outputs (Optional and take the place of some digital outputs)		6	6
100Base-TX Ethernet (RJ45) port[2]		●	●
Rear 100Base-FX Ethernet (LC) port		O	O
Rear 100Base-TX Ethernet(RJ45) + RS-485(1x4-wire or 2x2-wire) + IRIG-B ports		O	O
Rear 100Base-FX Ethernet(LC) + RS-485(1x4-wire or 2x2-wire) + IRIG-B ports		O	O
Rear 100Base-TX and -FX Ethernet (1 * LC, 2 * RJ45) + serial glass fiber (ST) ports		O	O
Rear 100Base-TX Ethernet (3 * RJ45) + serial glass fiber (ST) ports		O	O
Ethernet 100Base-TX (RJ45) + confi gurable RS232/RS485 + [RS485 or serial glass fiber (ST) + IRIG-B] ports[1]		O	O
All three DNP 3.0, Modbus, and IEC61850 communication protocols		●	●
Records			
Sequence of events recorder	SER	●	●
Fault recorder	FLR	●	●
Digital fault (waveform) recorder	DFR	●	●
Load profile	LoadProf	●	●
Digital Fault Recorder signal channels (Analog/Digital)		12/64	12/64
Events recorder (FIFO), 1ms resolution		1024	1024
Fault records		128	128

1 May not be combined with Arc Flash Detection (AFD) option
2 Front port included, rear port optional

Analog inputs
– Three phase currents: 5/1 A programmable
– Ground current: 5/1 A programmable
– Rated frequency: 60/50 Hz programmable
– Three-phase and ground voltages: programmable nominal secondary voltage
– Two RTD inputs (available as an option)

Binary inputs and outputs
– Eight binary inputs standard
– Thirteen binary outputs available as standard
– One Form C self-check alarm output as standard
– Optional high speed outputs (HSO) available
– Additional binary inputs and outputs available as options

Communication
– IEC 61850-8-1 with GOOSE messaging
– DNP3.0 Level 2+ over TCP/IP
– Modbus over TCP/IP
– Time synchronization via SNTP (primary and backup servers)
– Optional serial RS-485 port programmable for DNP3.0 Level 2+ or Modbus RTU
– Optional IRIG-B time synchronization

Product dimensions and weights
– Frame: 10.32" (262.6 mm) W x 6.97" (177 mm) H
– Case: 9.69" (246 mm) W x 6.30" (160 mm) H x 7.91" (201 mm) D
– Weight: Complete IED – 10.5 lbs. (4.8 kg); Plug-in unit only - 6.0 lbs.(2.8 kg)

Tools
– PCM600 V2.4.1 or later for setting, configuration and data retrieval
– COM600 Station Automation series products V3.5 or later
– Web browser based user interface (IE 7.0 or later)

Control voltage
– Option 1: 48 ... 250 V dc, 100 … 240 V ac
– Option 2: 24 ... 60 V dc

Certificates
– UL Listed product, File E103204

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