



Relion® 630 series

Feeder protection and control REF630

Flexibility for demanding utility distribution and industrial applications

REF630 is a comprehensive feeder management IED for protection, control, measuring and supervision of utility and industrial distribution substations. REF630 is a member of ABB's Relion® product family and a part its 630 protection and control product series characterized by functional scalability and flexible configurability. REF630 also features necessary control functions constituting an ideal solution for feeder bay control. The supported communication protocols including IEC 61850 offer seamless connectivity to various station automation and SCADA systems.

Application

REF630 provides main protection for overhead lines and cable feeders of distribution networks. REF630 fits both isolated neutral networks and networks with resistance or impedance earthed neutral. Four pre-defined configurations to match typical feeder protection and control requirements are available. The pre-defined configurations can be used as such or easily adapted or extended with freely selectable add-on functions, by means of which the IED can be fine-tuned to satisfy the specific requirements of your present application.

Protection

REF630 offers selective short circuit, overcurrent, unbalance and thermal overload protection. It also accommodates distance protection supporting circular (mho), quadrilateral or combined zone characteristics, three independent zones with separate reach settings for the phase-to-phase and phase-to-earth measuring elements and two zones for controlling autoreclose functions. REF630 also features several selective earth-fault protection alternatives. Conventional non-directional and directional earth-fault protection functions are included. Admittance-based or wattmetric earth-fault protection can be used instead of directional earth-fault protection. For compensated networks, the admittance-based earth-fault protection ensures sensitive and correct operation of the protection even without the status information from the Petersen coil. The transient/intermittent earth-fault protection detects low-ohmic insulation faults in underground cable networks. Multiple stages of overvoltage and undervoltage protection are also provided. Overfrequency, underfrequency and rate-of-change of frequency protection can be used e.g. in load shedding and network restoration applications. Finally, the REF630 incorporates a flexible multi-shot auto-reclose function for arc fault clearance on overhead line feeders.

The optional RTD/mA module incorporates eight analog RTD/mA measuring inputs and four scalable mA outputs. The RTD/mA inputs can be used for measuring the ambient air temperature or for supervision of analog signals provided by external transducers. Any of the RTD/mA inputs can be alternatively used also as a resistance input or as an input for a voltage transducer. The mA outputs can be used for transferring freely selectable measured or calculated analog values to other devices provided with mA input capabilities.

Control

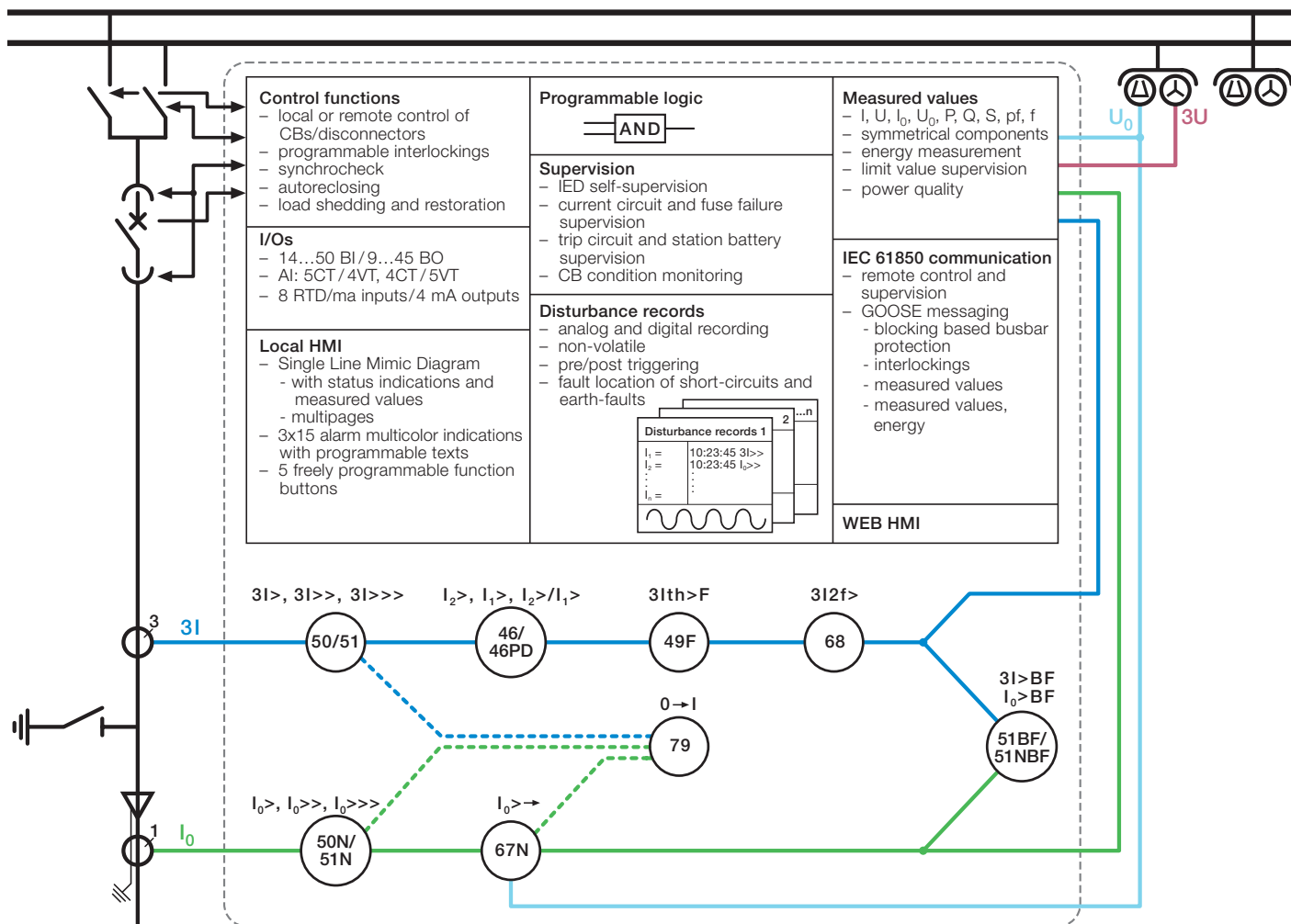
REF630 incorporates local and remote control functions. In addition to control functions, the REF630 features a set of logical functions allowing automation and logic operations to be integrated into the unit. The REF630 also offers a number of freely assignable binary inputs/outputs, logic circuits for establishing bay control and interlocking functions for circuit breakers and motor operated switch-disconnectors. REF630 supports both single and double busbar substation layouts. The number of controllable primary apparatuses depends on the number of available inputs and outputs in the selected configuration. Besides conventional hardwired signaling, also GOOSE messaging according to IEC 61850-8-1 can be used for signal interchange between IEDs to obtain required interlocking information.

To protect the IED from unauthorized access and to maintain information integrity the device is provided with an authentication system including unique passwords for each user, which in turn are organized into user groups with different access levels.

Communication

REF630 features support for the IEC 61850 standard for communication in substations. The feeder management IED also supports the DNP3 (TCP/IP) and 60870-5-103 communication protocols. All operational information and controls are available through these protocols.

The implementation of the IEC 61850 substation communication standard in REF630 covers both vertical and horizontal communication, including GOOSE messaging. Analog GOOSE messaging enables fast transfer of analog measurement values over the station bus, thus facilitating for example sharing of RTD input values, such as surrounding temperature values, to other IED applications. Analog GOOSE



REF630 functional overview of the pre-configuration B.

messages can also be used in load shedding applications. The IED interoperates with other IEC 61850 compliant IEDs, tools and systems. The substation configuration language enables smooth configuration and commissioning of substation devices. For accurate time stamping REF630 supports synchronization over Ethernet using SNTP or over a separate bus using IRIG-B.

Fault location

REF630 features an impedance-measuring fault location function suitable for locating short circuits in radial distribution systems. It uses advanced load compensation methods to provide accurate fault distance estimates. Earth-faults can be located in effectively and low-resistance earthed networks. Under circumstances where the fault current magnitude is at least of the same order of magnitude or higher than the load current, earth faults can also be located in isolated neutral distribution networks. The fault location function identifies the type of the fault and then calculates the distance to the fault point. An estimate of the fault resistance value is also calculated. The estimate provides information about the possible fault cause and the accuracy of the estimated distance to the fault point.

Power quality

In the standards the power quality is defined through the characteristics of the system voltage. Transients, voltage variations of short and long duration, unbalance, and waveform distortion are the key characteristics describing the power quality. The power quality is, however, a customer-related issue. It can be said that any power problem concerning voltage or current that results in the failure or maloperation of the customer equipment is a power quality issue. REF630 has five power quality monitoring functions: voltage variation, voltage unbalance, current harmonics, and voltage harmonics (phase-to-phase and phase-to-earth).

Customizable device

The user-friendly graphical configuration tool of the PCM600 Protection and Control IED Manager supports flexible development of application-specific configurations. To facilitate effective IED engineering a set of pre-configuration templates are available, offering smart re-use of configuration data. REF630 incorporates a customizable graphical display for visualizing single line mimic diagrams for various switchgear bay solutions.

REF630 feeder protection and control pre-configurations

Pre-configurations	
Description	Pre-configuration
Pre-configuration A for open/closed ring feeder	A
Pre-configuration B for radial overhead/mixed line feeder	B
Pre-configuration C for ring/meshed feeder	C
Pre-configuration D for bus sectionalizer	D
Maximum number of instances available	n

Supported functions with codes and symbols								
Functionality	IEC 61850	IEC 60617	ANSI	A	B	C	D	n
Protection								
Three-phase non-directional overcurrent, low stage	PHLPTOC	3I>	51P-1	1	1	1	1	1
Three-phase non-directional overcurrent, high stage	PHHPTOC	3I>>	51P-2	2	2	2	2	2
Three-phase non-directional overcurrent, instantaneous stage	PHIPTOC	3I>>>	50P/51P	1	1	1	1	1
Three-phase directional overcurrent, low stage	DPHLPDOC	3I> →	67-1	2	-	-	-	2
Three-phase directional overcurrent, high stage	DPHHPDOC	3I>> →	67-2	1	-	-	-	1
Non-directional earth-fault, low stage	EFLPTOC	I0>	51N-1	-	1	-	1	1
Non-directional earth-fault, high stage	EFHPTOC	I0>>	51N-2	1	1	1	1	1
Non-directional earth-fault, instantaneous stage	EFIPTOC	I0>>>	50N/51N	-	1	-	1	1
Directional earth-fault, low stage	DEFLPDEF	I0> →	67N-1	2	1	3	-	3
Directional earth-fault, high stage	DEFHPDEF	I0>> →	67N-2	1	-	1	-	1
Transient/intermittent earth-fault	INTRPTEF	I0> → IEF	67NIEF	1	-	-	-	1
Admittance-based earth-fault protection	EFPADM	Yo> →	21YN	-	-	-	-	3
Wattmetric earth-fault protection	WPWDE	Po> →	32N	-	-	-	-	3
Negative-sequence overcurrent	NSPTOC	I2>	46	2	2	2	2	2
Three-phase thermal overload for feeder	T1PTTR	3Ith>F	49F	1	1	1	-	1
Phase discontinuity	PDNSPTOC	I2/I1>	46PD	1	1	1	-	1
Three-phase current inrush detection	INRPHAR	3I2f>	68	1	1	1	1	1
Three-phase overvoltage	PHPTOV	3U>	59	-	-	3	-	3
Three-phase undervoltage	PHPTUV	3U<	27	-	-	3	-	3
Positive-sequence overvoltage	PSPTOV	U1>	47O+	-	-	-	-	2
Positive-sequence undervoltage	PSPTUV	U1<	47U+	-	-	-	-	2
Negative-sequence overvoltage protection	NSPTOV	U2>	47O-	-	-	-	-	2
Residual overvoltage	ROVPTOV	U0>	59G	-	-	3	-	3
Frequency gradient	DAPFRC	df/dt>	81R	-	-	-	-	5
Overfrequency	DAPTOF	f>	81O	-	-	-	-	5
Underfrequency	DAPTUF	f<	81U	-	-	-	-	5
Load shedding	LSHDPPFRQ	UFLS/R	81LSH	-	-	-	-	6
Fault locator	SCEFRFLO	FLOC	21FL	-	-	-	-	1
Circuit-breaker failure	CCBRBRF	3I>/I0>BF	51BF/51NBF	1	1	1	1	2
Autoreclosing	DARREC	O → I	79	1	1	1	-	2
Tripping logic	TRPPTRC	I → O	94	1	1	1	1	2
Distance protection	DSTPDIS	Z<	21, 21P, 21N	-	-	1	-	1
Automatic switch onto fault logic	CVRSOFF	SOTF	SOTF	-	-	1	-	2
Multipurpose analogue protection function	MAPGAPC	MAP	MAP	-	-	-	-	16
Protection related functions								
Local accelerat. logic	DSTPLAL	LAL	LAL	-	-	1	-	1
Communication logic for residual OC	RESCPSCH	CLN	85N	-	-	1	-	1
Scheme communic. logic	DSOCPSC	CL	85	-	-	1	-	1
Current reversal and WEI logic	CRWPSCH	CLCRW	85CRW	-	-	1	-	1
Current reversal and WEI logic for residual OC	RCRWPSCH	CLCRWN	85NCRW	-	-	1	-	1

Supported functions with codes and symbols								
Functionality	IEC 61850	IEC 60617	ANSI	A	B	C	D	n
Control								
Bay control	QCCBAY	CBAY	CBAY	1	1	1	1	1
Interlocking interface	SCILO	3	3	4	4	4	1	10
Circuit breaker/disconnector control	GNRLCSWI	I ↔ O CB/DC	I ↔ O CB/DC	4	4	4	1	10
Circuit breaker	DAXCBR	I ↔ O CB	I ↔ O CB	1	1	1	1	2
Disconnecter	DAXSWI	I ↔ O DC	I ↔ O DC	3	3	3	-	8
Local remote switch interface	LOCREM	R/L	R/L	-	-	-	-	1
Synchrocheck	SYNCRSYN	SYNC	25	-	-	-	-	1
Generic process I/O								
Single point control (8 signals)	SPC8GGIO	-	-	-	-	-	-	5
Double point indication	DPGGIO	-	-	-	-	-	-	15
Single point indication	SPGGIO	-	-	-	-	-	-	64
Generic measured value	MVGGIO	-	-	-	-	-	-	15
Logic Rotating Switch for function selection and LHMI presentation	SLGGIO	-	-	-	-	-	-	10
Selector mini switch	VSGGIO	-	-	-	-	-	-	10
Pulse counter for energy metering	PCGGIO	-	-	-	-	-	-	4
Event counter	CNTGGIO	-	-	-	-	-	-	1
Supervision and Monitoring								
Circuit breaker condition monitoring	SSCBR	CBCM	CBCM	1	1	1	1	2
Fuse failure supervision	SEQRUFUF	FUSEF	60	1	1	1	-	2
Current circuit supervision	CCRDIF	MCS 3I	MCS 3I	1	1	1	-	2
Trip-circuit supervision	TCSSCBR	TCS	TCM	3	3	3	3	3
Station battery supervision	SPVNZBAT	U<>	U<>	-	-	-	-	1
Energy monitoring	EPDMMTR	E	E	-	-	-	-	1
Measured value limit supervision	MVEXP	-	-	-	-	-	-	40
Power Quality								
Voltage variation	PHQVR	PQMU	PQMV	-	-	-	-	1
Voltage unbalance	VSQVUB	PQMUBU	PQMUBV	-	-	-	-	1
Current harmonics	CMHAI	PQM3I	PQM3I	-	-	-	-	1
Voltage harmonics phase-to-phase	VPPMHAI	PQM3Upp	PQM3Vpp	-	-	-	-	1
Voltage harmonics phase-to-earth	VPHMHAI	PQM3Upe	PQM3Vpg	-	-	-	-	1
Measurement								
Three-phase current	CMMXU	3I	3I	1	1	1	1	1
Three-phase voltage (phase-to-earth)	VPHMMXU	3Upe	3Upe	1	1	1	1	1
Three-phase voltage (phase-to-phase)	VPPMMXU	3Upp	3Upp	-	-	-	-	1
Residual current	RESCMMXU	I0	I0	1	1	1	1	1
Residual voltage	RESVMMXU	U0	Vn	1	1	1	-	1
Power monitoring with P, Q, S, power factor, frequency	PWRMMXU	PQf	PQf	1	1	1	1	1
Sequence current	CSMSQI	I1, I2	I1, I2	1	1	1	1	1
Sequence voltage	VSMSQI	U1, U2	V1, V2	1	1	1	1	1
Disturbance recorder function								
Analog channels 1-10 (samples)	A1RADR	ACH1	ACH1	1	1	1	1	1
Analog channel 11-20 (samples)	A2RADR	ACH2	ACH2	-	-	-	-	1
Analog channel 21-30 (calc val)	A3RADR	ACH3	ACH3	-	-	-	-	1
Analog channel 31-40 (calc val)	A4RADR	ACH4	ACH4	-	-	-	-	1
Binary channels 1-16	B1RBDR	BCH1	BCH1	1	1	1	1	1
Binary channels 17-32	B2RBDR	BCH2	BCH2	1	1	1	1	1
Binary channels 33-48	B3RBDR	BCH3	BCH3	1	1	1	1	1
Binary channels 49-64	B4RBDR	BCH4	BCH4	1	-	1	-	1
Station communication (GOOSE)								
Binary receive	GOOSEBINRCV	-	-	-	-	-	-	10
Double point receive	GOOSEDPRCV	-	-	-	-	-	-	32
Interlock receive	GOOSEINTLKRCV	-	-	-	-	-	-	59
Integer receive	GOOSEINTRCV	-	-	-	-	-	-	32
Measured value receive	GOOSEMVRCV	-	-	-	-	-	-	62
Single point receive	GOOSESRCV	-	-	-	-	-	-	62

Contact us

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