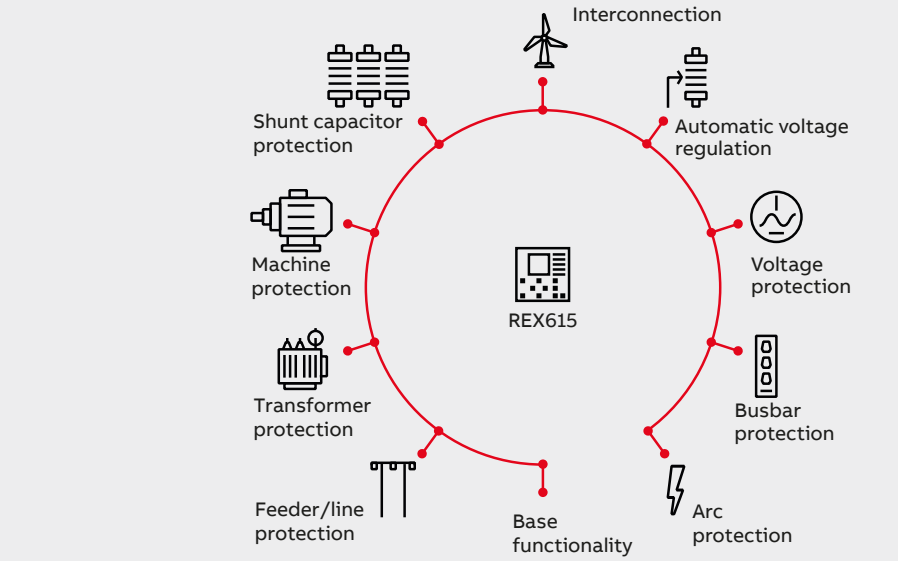
Protection and control REX615

All-in-one protection for power generation and distribution applications



REX615 is a freely configurable all-in-one protection relay for power generation and distribution applications, representing the next step for ABB's 615 and 620 series relays. Multiapplication coverage combined with a fully modular and scalable hardware and software ensures maximum flexibility and optimal cost-effectivity throughout the relay life cycle – and supports sustainability.

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01 Supported applications

Addressing aging infrastructure by future-proofing the grid

- Ideal for one-to-one replacement of 615 and 620 series relays as the next step in terms of technological innovation, flexibility, cost-effectiveness and standardization
- Easy customization and adaptation to changing protection requirements with modular and scalable hardware and software
- Extensive functionality to support the increasing integration of distributed generation and evolving grid codes
- Condition monitoring and supervision for optimized component maintenance and return on investment
- Relay retrofit program for smooth and easy replacement of SPACOM with REX615 relays

Supporting the digitalization of substations

- Designed to support the increasing digitalization of substations – with IEC 61850 9-2-based process bus for future integration with centralized protection
- Standardized IEC 61850-compliant communication – a cost-effective and ecological choice
- Smooth interoperability between substation automation devices with the world's first truly IEC 61850-based protection relay
- Optimal cyber security to safeguard critical infrastructure

Optimizing asset management

- Brand-new relay but with an impressive history – familiar relay saves time and efforts
- Less to learn and less spare devices to store with one relay covering multiple application areas
- Extensive life cycle services – long-term global partner with longtime experience close to you in your language
- Adaptable to changing requirements for the lifetime of the relay through easy adding or replacing of modules or application packages
- Easy access to up-to-date information via the e-business platform ABB Relays-Online
- Latest addition to ABB's renown Relion® relay family – strengthening the REX portfolio

Complying with evolving regulations

- Interconnection protection package for a better way of connecting to renewables
- Compliance with the latest grid codes to ensure renewables remain connected during disturbances
- Extensive protection and fault location functionality to ensure compliance with the regulation of electricity utilities to minimize costly downtime
- Third-party verified Environmental Product Declaration compliant with ISO 14025

Function description	IEC 60617	ANSI	IEC 61850	Instances	Application package
Protection					
Line differential protection with inzone power transformer	3Id/I>	87L	LNPLDF	1	APP6
Binary signal transfer	BST	BST	BSTGAPC	1	APP6
Switch-onto-fault protection	CVPSOF	SOTF	CVPSOF	1	APP1
Three-phase non-directional overcurrent protection, low stage	3I>	51P-1	PHLPTOC	3	APP1
Three-phase non-directional overcurrent protection, high stage	3I>>	51P-2	PHHPTOC	3	APP1
Three-phase non-directional overcurrent protection, instantaneous or definite time stage	3I>>>	50P/51P	PHIPTOC	3	APP1
Three-phase non-directional long time overcurrent protection	3I>	51LT	PHLTPTOC	1	APP1
Three-phase non-directional overcurrent protection, instantaneous only stage	3I>>>>	50P	PHIPIOC	3	APP1
Three-independent-phase non-directional overcurrent protection, low stage	3I_3>	51P_3-1	PH3LPTOC	2	APP1
Three-independent-phase non-directional overcurrent protection, high stage	3I_3>>	51P_3-2	PH3HPTOC	2	APP1
Three-independent-phase non-directional overcurrent protection, instantaneous or definite time stage	3I_3>>>	50P_3/51P_3	PH3IPTOC	2	APP1
Three-phase directional overcurrent protection, low stage	3I> ->	67P/51P-1	DPHLPDOC	2	APP3, APP6, APP8, ADD1, APP10
Three-phase directional overcurrent protection, high stage	3I>> ->	67P/51P-2	DPHHPDOC	2	APP3, APP6, APP8, ADD1, APP10
Directional three-independent-phase directional overcurrent protection, low stage	3I_3> ->	67P_3/51P_3-1	DPH3LPDOC	2	APP3, APP6, APP8, ADD1, APP10
Directional three-independent-phase directional overcurrent protection, high stage	3I_3>> ->	67P_3/51P_3-2	DPH3HPDOC	2	APP3, APP6, APP8, ADD1, APP10
Non-directional earth-fault protection, low stage	Io>	51G/51N-1	EFLPTOC	3	APP1
Non-directional earth-fault protection, high stage	Io>>	51G/51N-2	EFHPTOC	3	APP1
Non-directional earth-fault protection, instantaneous stage	Io>>>	50G/N, 51G/N	EFIPTOC	3	APP1
Non-directional earth-fault protection, instantaneous only stage	Io>>>>	50G/50N	EFIPIOC	3	APP1
Directional earth-fault protection, low stage	Io> ->	67G/N-1 51G/N-1	DEFLPDEF	3	APP1
Directional earth-fault protection, high stage	Io>> ->	67G/N-1 51G/N-2	DEFHPDEF	2	APP1
Three-phase power directional element	I1 ->	67P-TC	DPSRDIR	2	APP3, APP8, ADD1, APP10, APP12
Neutral power directional element	I2 ->, Io ->	67N-TC	DNZSRDIR	2	APP2, APP3
Admittance-based earth-fault protection	Yo> ->	21NY	EFPADM	3	APP2
Multifrequency admittance-based earth-fault protection	Io> -> Y	67NYH	MFADPSDE	3	APP2
Wattmetric-based earth-fault protection	Po> ->	32N	WPWDE	3	APP2
Transient/intermittent earth-fault protection	Io> -> IEF	67NTEF/NIEF	INTRPTEF	1	APP2
Harmonics-based earth-fault protection	Io>HA	51NH	HAEFPTOC	1	APP2
Touch voltage based earth-fault current protection	IF>/UT>	46SNQ/59N	IFPTOC	3	APP2
Negative-sequence overcurrent protection	I2>	46	NSPTOC	3	APP1
Directional negative-sequence overcurrent protection	I2> ->	67Q	DNSPDOC	2	APP3, APP6, APP10
Phase discontinuity protection	I2/I1>	46PD	PDNSPTOC	1	APP1
Residual overvoltage protection	Uo>	59G/59N	ROVPTOV	4	APP1, APP5
Three-phase undervoltage protection	3U<	27	PHPTUV	4	APP5
Single-phase undervoltage protection	U_A<	27_A	PHAPTUV	1	APP5
Three-phase overvoltage variation protection	3Urms>	59.S1	PHVPTOV	2	APP5, APP8
Three-phase overvoltage protection	3U>	59	PHPTOV	4	APP5
Single-phase overvoltage protection	U_A>	59_A	PHAPTOV	1	APP5
Positive-sequence overvoltage protection	U1>	59PS	PSPTOV	2	APP5
Positive-sequence undervoltage protection	U1<	27PS	PSPTUV	2	APP5
Negative-sequence overvoltage protection	U2>	59NS	NSPTOV	4	APP5
Frequency protection	f>/f<, df/dt	81	FRPFRQ	10	APP5
Three-phase voltage-dependent overcurrent protection	3I(U)>	51V	PHPVOC	2	APP3, APP8, ADD1, APP10
Overexcitation protection	U/f>	24	OEPVPH	2	ADD1, APP10

Function description	IEC 60617	ANSI	IEC 61850	Instances	Application package
Three-phase thermal protection for feeders, cables and distribution transformers	3Ith>F	49F	T1PTTR	1	APP1
Three-phase thermal overload protection, two time constants	3Ith>T/G/C	49T/G/C	T2PTTR	1	APP1
Three-phase overload protection for shunt capacitor banks	3I> 3I<	51, 37, 86C	COLPTOC	1	APP7
Current unbalance protection for shunt capacitor banks	dI>C	60N	CUBPTOC	1	APP7
Three-phase current unbalance protection for shunt capacitor banks	3dI>C	60P	HCUBPTOC	1	APP7
Shunt capacitor bank switching resonance protection, current based	TD>	55ITHD	SRCPTOC	1	APP7
Compensated neutral unbalance voltage protection	CNU>	59NU	CNUPTOV	1	APP7
Low-voltage ride-through protection	U<RT	27RT	LVRTPTUV	3	APP8
Voltage vector shift protection	VS	78VS	VVSPPAM	2	APP8
Directional reactive power undervoltage protection	Q> ->, 3U<	32Q, 27	DQPTUV	2	APP8
Reverse power/directional overpower protection	P>/Q>	32R/32O	DOPPDPR	3	APP3, APP8, ADD1, ADD2, APP10
Underpower protection	P<	32U	DUPPDPR	2	APP3, ADD1,ADD2, APP10
Three-phase underimpedance protection	Z<G	21G	UZPDIS	3	ADD1, APP10
Directional negative sequence impedance protection	Z2 ->	Z2Q	DNZPDIS	2	APP3, APP6, APP10
Three-phase underexcitation protection	X<	40	UEXPDIS	2	ADD1
Third harmonic-based stator earth-fault protection	dUo>/Uo3H	64TN	H3EFPSEF	1	ADD1
Rotor earth-fault protection (injection method)	Io>R	64R	MREFPTOC	1	ADD1
Thermal overload protection for rotors	3Ith>R	49R	RPTTR	1	ADD1,ADD2
High-impedance or flux-balance based differential protection	3dIHi>M	87HIM	MHZPDIF	1	ADD1, ADD2
Out-of-step protection with double blinders	OOS	78PS	OOSRPSB	1	ADD1
Negative-sequence overcurrent protection for machines	I2>M	46M	MNSPTOC	2	APP9
Loss of phase (undercurrent)	3I<	37	PHPTUC	3	APP1
Loss of load supervision	3I<	37	LOFLPTUC	2	APP9
Motor load jam protection	Ist>	50TDJAM	JAMPTOC	2	APP9
Motor start-up supervision	Is2t n<	49, 66, 48, 50TDLR	STTPMSU	1	APP9
Motor start counter	n<	66	MSCPMRI	1	APP9
Phase reversal protection	I2>>	46R	PREVPTOC	1	APP9
Thermal overload protection for motors	3Ith>M	49M	MPTTR	1	APP9
Stabilized and instantaneous differential protection for machines	3dI>M/G	87M/87G	MPDIF	1	ADD1, ADD2
Underpower factor protection	PF<	55U	MPUPF	2	APP3, APP8, ADD1, APP10
Stabilized and instantaneous differential protection for two-winding transformers	3dI>T	87T	TR2PTDF	1	APP10
Numerical stabilized low-impedance restricted earth-fault protection	dIoLo>	87NLI	LREFPNDF	2	APP1
High-impedance based restricted earth-fault protection	dIoHi>	87NHI	HREFPDIF	2	APP1
High-impedance differential protection for phase A	dHi_A>	87_A	HIAPDIF	2	ADD1,ADD2, APP10, APP11
High-impedance differential protection for phase B	dHi_B>	87_B	HIBPDIF	2	ADD1, ADD2, APP10, APP11
High-impedance differential protection for phase C	dHi_C>	87_C	HICPDIF	2	ADD1, ADD2, APP10, APP11
Circuit breaker failure protection	3I>/Io>BF	50BF	CCBRBRF	3	APP1
Three-phase inrush detector	3I2f>	68HB	INRPHAR	2	APP1
Master trip	Master Trip	94/86	TRPPTRC	6	Base
Arc protection	ARC	AFD	ARCSARC	3	Base
High-impedance fault detection	HIF	HIZ	PHIZ	1	APP2
Fault locator	FLOC	FLOC	SCEFRFLO	1	APP4
Load-shedding and restoration	UFLS/R	81LSH	LSHDPFRQ	10	APP5
Multipurpose protection	MAP	MAP	MAPGAPC	20	Base
Accidental energization protection	U<, I>	27/50	GAEPVOC	1	ADD1
Load blinder	LB	21LB	LBRDOB	2	APP3, APP6
Cable Fault Detection	CFD	CFD	RCFD	1	APP2, APP3

Function description	IEC 60617	ANSI	IEC 61850	Instances	Application package
Control					
Circuit-breaker control	I <-> O CB	52	CBXCBR	3	Base
Disconnector control	I <-> O DCC	29DS	DCXSWI	4	Base
Earthing switch control	I <-> O ESC	29GS	ESXSWI	3	Base
Disconnector position indication	I <-> O DC	29DS	DCSXSWI	4	Base
Earthing switch position indication	I <-> O ES	29GS	ESSXSWI	3	Base
Emergency start-up	ESTART	EST, 62	ESMGAPC	1	APP9
Autoreclosing	O -> I	79	DARREC	2	APP1
Circuit breaker uncorresponding position start-up	CBUPS	52OU	UPCALH	3	Base
Synchronism and energizing check	SYNC	25	SECRSYN	2	APP5
Tap changer control with voltage regulator, legacy	COLTC	90V	OLATCC	1	APP12
Tap changer control with voltage regulator	COLTC	90V	OL5ATCC	1	APP12
Transformer data combiner	OLGAPC	OLGAPC	OLGAPC	5	APP12
Tap changer position indication	TPOSM	84T	TPOSYLTC	1	APP10, APP12
Condition Monitoring and Supervision					
Circuit-breaker condition monitoring	CBCM	52CM	SSCBR	3	Base
Motor controlled earthing switch and disconnector supervision	ESDCCM	29CM	ESDCSSWI	7	Base
Hot-spot and insulation ageing rate monitoring for transformers	3Ihp>T	26/49HS	HSARSPTR	1	APP10
Trip circuit supervision	TCS	TCM	TCSSCBR	3	Base
Current circuit supervision	MCS 3I	CCM	CCSPVC	2	Base
Current circuit supervision for transformers	MCS 3I, I2	CCM 3I, I2	CTSRCTF	1	APP10
Current circuit supervision for line differential	MCS_L 3I, I2	CCM_L 3I, I2	LNCTSRCTF	1	APP6
Current transformer supervision for high-impedance protection scheme for phase A	MCS I_A	CCM_A	HZCCASPVC	2	APP11
Current transformer supervision for high-impedance protection scheme for phase B	MCS I_B	CCM_B	HZCCBSPVC	2	APP11
Current transformer supervision for high-impedance protection scheme for phase C	MCS I_C	CCM_C	HZCCCSPVC	2	APP11
Fuse failure supervision	FUSEF	VCM, 60	SEQSPVC	2	Base
Protection communication supervision	PCS	PCS	PCSITPC	1	APP6
Runtime counter for machines and devices	OPTS	OPTM	MDSOPT	2	Base
Three-phase remanent undervoltage supervision	3U<R	27R	MSVPR	1	APP5
Voltage presence	PHSVPR	PHSVPR	PHSVPR	2	APP5
Measurement					
Three-phase current measurement	3I	IA, IB, IC	CMMXU	4	Base
Sequence current measurement	I1, I2, I0	I1, I2, I0	CSMSQI	4	Base
Residual current measurement	Io	IG	RESCMMXU	4	Base
Three-phase voltage measurement	3U	VA, VB, VC	VMMXU	4	Base
Single-phase voltage measurement	U_A	V_A	VAMMXU	2	Base
Phase voltage measurement	3UL	VL	VPHMMXU	2	Base
Residual voltage measurement	Uo	VG/VN	RESVMMXU	4	Base
Sequence voltage measurement	U1, U2, U0	V1, V2, V0	VSMSQI	4	Base
Three-phase power and energy measurement	P, E	P, E	PEMMXU	3	Base
Single-phase power and energy measurement	P_A, E_A	P_A, E_A	SPEMMXU	1	Base
Frequency measurement	f	f	FMMXU	3	Base

Function description	IEC 60617	ANSI	IEC 61850	Instances	Application package
Power Quality					
Current total demand, harmonic distortion, DC component (TDD, THD, DC) and individual harmonics	PQM3IH	PQM ITHD, IDC	CHMHAI	2	Base
Voltage total harmonic distortion, DC component (THD, DC) and individual harmonics	PQM3VH	PQM VTHD, VDC	VHMHAI	2	Base
Voltage variation	PQMU	PQMV SWE, SAG, INT	PHQVVR	2	Base
Voltage unbalance	PQUUB	PQMV UB	VSQVUB	2	Base
Programmable LED indication and push buttons					
Individual programmable LED control	LED	LED	LED	11	Base
Standard: Programmable buttons (4 buttons)	FKEY	FKEY	FKEY4GGIO	1	Base
Wide: Programmable buttons (16 buttons)	FKEY	FKEY	FKEYGGIO	1	Base
Logging functions					
Disturbance recorder (common functionality)	DR	DFR	RDRE	1	Base
Disturbance recorder, analog channels 1...12	A1RADR	A1RADR	A1RADR	1	Base
Disturbance recorder, binary channels 1...32	B1RBDR	B1RBDR	B1RBDR	1	Base
Disturbance recorder, binary channels 33...64	B2RBDR	B2RBDR	B2RBDR	1	Base
Fault recorder	FAULTREC	FR	FLTRFRC	1	Base
Sequence event recorder	SER	SER	SER	1	Base
Load profile recorder	LOADPROF	LOADPROF	LDPRLRC	1	Base
Communication					
IEC 61850-1 MMS	MMS	MMS	MMSLPRT	1	
IEC 61850-1 GOOSE	GSE	GSE	GSELPRT	1	
SMV stream receiver (IEC 61850-9-2LE)	SMVRCV	SMVRCV	SMVRCV	2	
SMV stream sender (IEC 61850-9-2LE)	SMVSENDER	SMVSENDER	SMVSENDER	1	
IEC 60870-5-103 protocol	I3C	I3C	I3CLPRT	2	
IEC 60870-5-104 protocol	I5C	I5C	I5CLPRT	5	
DNP3 protocol	DNP 3.0	DNP 3.0	DNPLPRT	5	
Modbus protocol	MBS	MBS	MBSLPRT	5	
IEC 61850 Edition 2.1 and Edition 1					
Redundancy protocols PRP/HSR					
Time synchronization for non-redundant and redundant protocols: SNTP, IRIG-B, PTP IEEE 1588 (redundant only)					
Ethernet communication with dual IP address					

Cyber security
Role-based account management including password hardening
Relay communication hardening with detection and shielding for Denial of Service attacks
Security event logging supporting Central Activity Logging (CAL) via Syslog
Secure communication with WebHMI and relay configuration tool
Central Account Management with Windows AD
Centralised security certificate management with public key infrastructure

Hardware	Amount
Standard	
Current inputs	0-7
Voltage inputs	0-5
Current sensors (according to IEC 61869)	0/3
Voltage sensors (according to IEC 61869)	0/3
Binary inputs/Binary outputs	0-18/6-13
RTD/mA inputs	0-6/0-2
Communication ports RJ45/LC/RS-485/ST	0-3/0-3/0-1/0-1
Wide	
Current inputs	0-8
Voltage inputs	0-6
Current sensors (according to IEC 61869)	0/3
Current inputs (according to IEC 61869)	0/3
Binary inputs/Binary outputs	0-32/6-21
RTD/mA inputs	0-14/0-5
Communication ports RJ45/LC/RS-485/ST	0-3/0-3/0-1/0-1

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