Protection and control REX640

Product introduction presentation
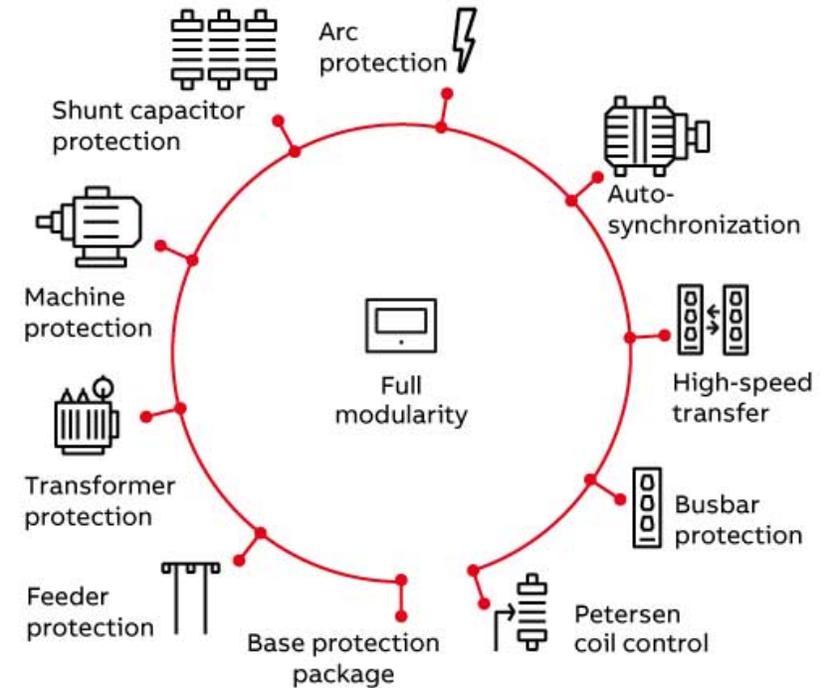
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Protection and control REX640

Complete coverage for advanced power distribution and generation applications

Complete application coverage with one device for optimal flexibility and cost-effectiveness

Application package concept for maximum convenience and flexibility

Designed to support the increasing digitalization of substations

– Supports a variety of digital switchgear solutions

– Suitable for both single and double-busbar applications

Innovative design – setting a new standard for what is possible with a single protection and control device

Protection and control REX640

Unmatched flexibility with fully modular hardware and software

Fully modular and scalable hardware and software for maximum flexibility throughout the entire relay life cycle

- Freedom of customization to meet specific protection requirements
- Easy adaptation to changing protection requirements
- Continuous access to the latest software and hardware developments

Smooth and easy ordering with ready-made application packages

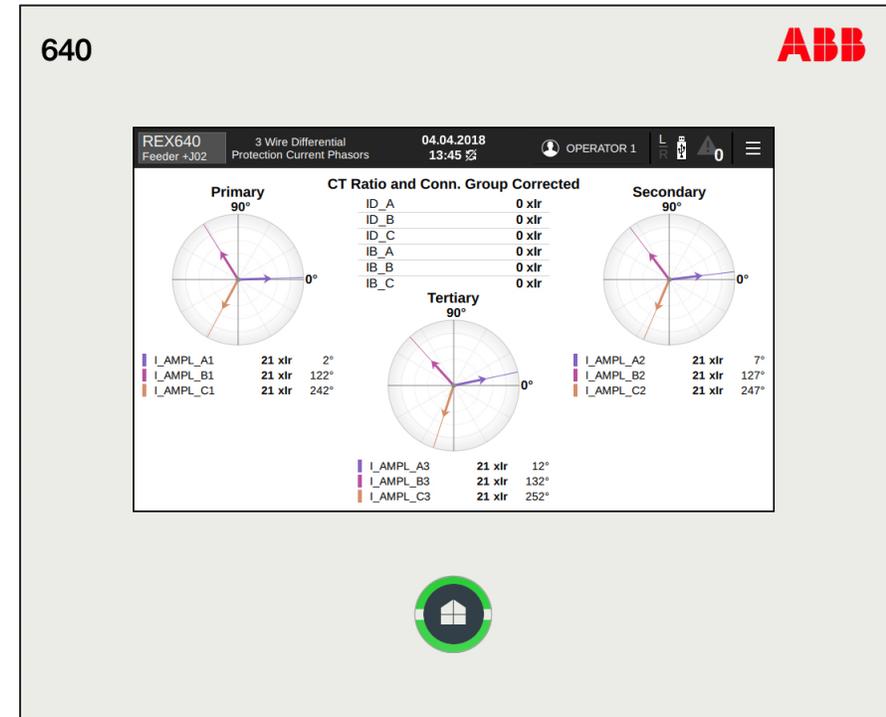**Unmatched flexibility – helping customers stay ahead of the evolving power network requirements**

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Protection and control REX640

Long-awaited ease of use with intuitive human-machine interface (HMI)

Increased situational awareness and optimal usability with application-driven local HMI (LHMI)/switchgear HMI (SHMI)

Novel 7-inch color touch screen for visualization of power distribution process information in an entirely new way

Ready-made application-based LHMI pages – saving both time and efforts

Long-awaited ease of use – supporting customers to make sense of complexities in evolving distribution networks

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Application coverage

Supported applications

Base functionality*	Power transformer protection and control	Machine protection	Interconnection protection	Shunt capacitor protection	Busbar protection
- Overcurrent protection - Earth-fault protection - Voltage protection - Frequency protection - Load-shedding	- Protection for two and three-winding power transformers - On-load tap-changer control - Automatic voltage regulation	- Protection of synchronous and asynchronous machines - Monitoring of diesel generator sets running in parallel	- Protection of interconnection points of distributed generation units	- Protection of single Y, double Y and H-bridge-connected capacitor banks - Protection of harmonic filter circuits	- High impedance-based busbar protection

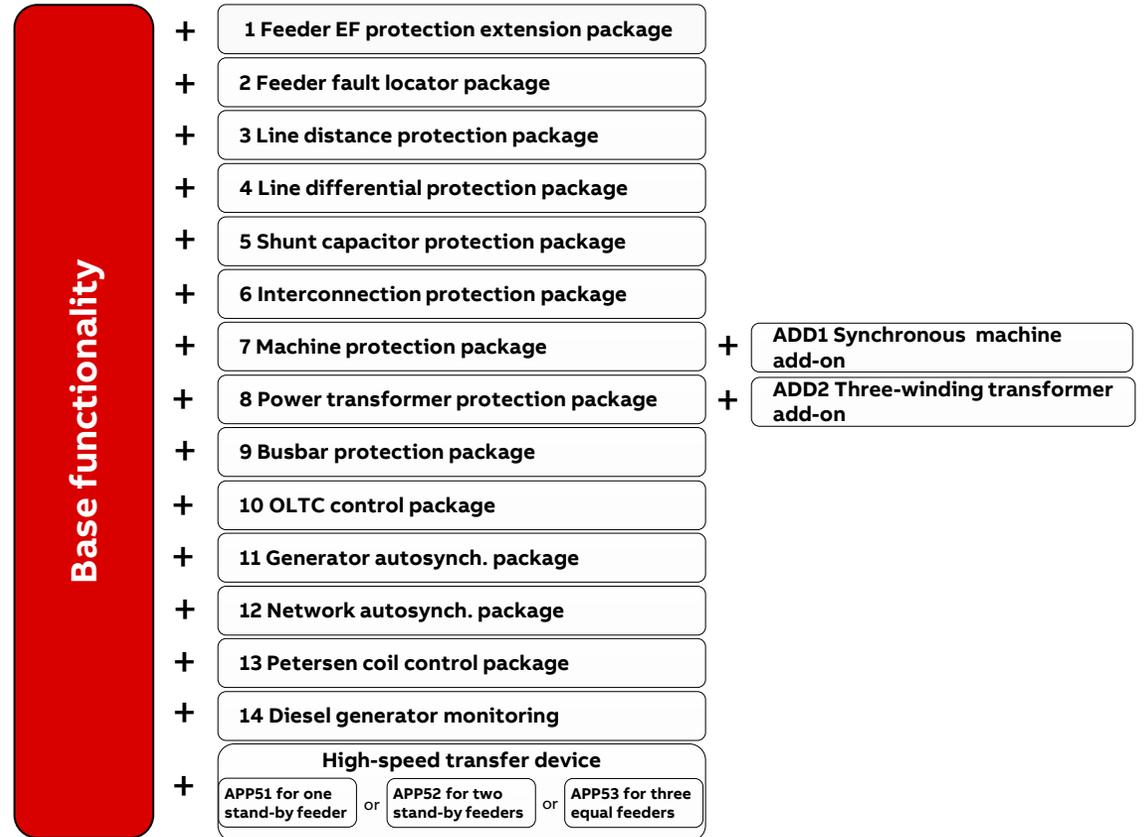| Feeder / line protection	High-speed transfer	Generator auto-synchronizer	Network auto-synchronizer	Petersen coil control	Arc protection
- Extensive earth-fault protection - Fault locator - Line distance protection - Line differential protection	- Automatic high-speed transfer between main and alternative feeder(s) - 4 transfer modes: fast, first coincidence, residual voltage-based and time delay-based	- Automatic, semi-automatic and manual generator synchronization - Fully visualized process with LHMI/SHMI	- Synchronized closing of non-generator CB by actively adjusting selected generators - Fully visualized process with LHMI/SHMI	- Automatic control of Petersen coil - Control of additional fixed parallel coil - Control of parallel resistor	- Four lens or loop-type sensors supported in any combination - Both sensor types supervised

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Application packages

The functionality is divided into:

- **Comprehensive base functionality** – always included

- **17 application packages** (optional) – freely selected as required by the intended application (none, some or all)

- **2 additional protection add-ons** (for selected application packages) – the add-on packages offer even more functionality on top of the selected application package

Note! The software options can be customized, modified and added at a later stage, even on site after installation.

Base functionality

- \+ 1 Feeder EF protection extension package
- \+ 2 Feeder fault locator package
- \+ 3 Line distance protection package
- \+ 4 Line differential protection package
- \+ 5 Shunt capacitor protection package
- \+ 6 Interconnection protection package
- \+ 7 Machine protection package \+ ADD1 Synchronous machine add-on
- \+ 8 Power transformer protection package \+ ADD2 Three-winding transformer add-on
- \+ 9 Busbar protection package
- \+ 10 OLTC control package
- \+ 11 Generator autosynch. package
- \+ 12 Network autosynch. package
- \+ 13 Petersen coil control package
- \+ 14 Diesel generator monitoring
- \+ **High-speed transfer device**
  - APP51 for one stand-by feeder | or | APP52 for two stand-by feeders | or | APP53 for three equal feeders

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Application coverage

Application package content (1/3)

Base functionality (always Included)

General functions and features	Protection functions	Feeder earth-fault extension package APP1	Line distance protection package APP3	Shunt capacitor protection package APP5
LHMI/SHMI/WHMI	Dir. and non-dir. overcurrent protection (50P, 51P, 67P)	Neutral power directional element (67N-TC)	Distance protection (21P, 21N)	Overload protection (51,37,86C)
Control and condition monitoring of primary devices	Dir. and non-dir. earth-fault protection (50N, 51N, 67G)	Admittance-based earth-fault prot. (21NY)	Local acceleration logic (21LAL)	Current unbalance protection (60N)
Measurements_3I/3V/In/Vn/f/…	Dir. and non-dir. negative-seq. overc. prot. (67Q, 46M)	Multi-frequency admittance-based. earth-fault protection (67_NYH)	Scheme communication logic (85 21SCHLGC)	3-phase current unbalance protection (60P)
Fault recorder	Phase discontinuity protection (46PD)		Current reversal, weak infeed (85 21CREV, WEI)	Switching resonance protection (55ITHD)
Disturbance (oscillograph) recorder	Voltage protection (27, 59, 59G. 59N)	Wattmetric-based earth-fault prot. (32N)	Communication logic for residual overcurrent (85 67G/N SCHLGC)	Neutral unbalance protection (59NU)
IEC61850-9-2LE SMV receiving	Frequency protection (81)	Transient-based earth-fault prot. (67NTEF)		
IEC61850-8-1 GOOSE	Load-shedding and restoration (1LSH)	Harmonics-based earth-fault prot. (51NH)	Current reversal, weak infeed for residual overcurrent (85 67G/N CREV, WEI)	
Advanced logics and equations	Voltage-dependent overcurrent protection (51V)	High-impedance earth-fault detection (HIZ)		
Alarms, events and audit log	Thermal protection for lines and cables (49F)	Touch voltage-based earth-fault protection (46SNQ, 59N)	Binary signal transfer (BST)	
IEC 61850 Ed. 1 and 2.1	Multipurpose protection (MAP)		Out-of-step protection (78PS)	
IEC 60870-5-103/104, DNP3, Modbus	Inrush detection (68HB)		Power swing detection (68)	
Time synchronization with IEEE 1588 v2	Circuit breaker failure protection (50BF)	**Feeder fault locator package APP2**	**Line differential protection package APP4**	**Interconnection protection package APP6**
PRP/HSR redundant communication	Restricted earth-fault protection (87N)	Fault locator (FLOC)	Line differential protection (87L)	Power directional element (67P-TC)
Dedicated optical protection communication link	Switch onto fault (SOTF)		Binary signal transfer (BST)	Overvoltage variation protection (59.S1)
Auto-reclosing (79)	Load blinder (21LB)			Low-voltage ride-through protection (27RT)
Power quality	Arc protection (AFD)			Voltage vector shift protection (78VS)
Synchronism and energizing check (25)	Loss of phase, undercurrent protection (37)			Dir. reactive power undervolt. prot. (32Q,27)
	Dir. negative-sequence impedance protection (Z2Q)			Dir. overpower protection (32R/32O)
				Under power factor protection (55U)

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Application coverage

Application package content (2/3)

Base functionality (always Included)

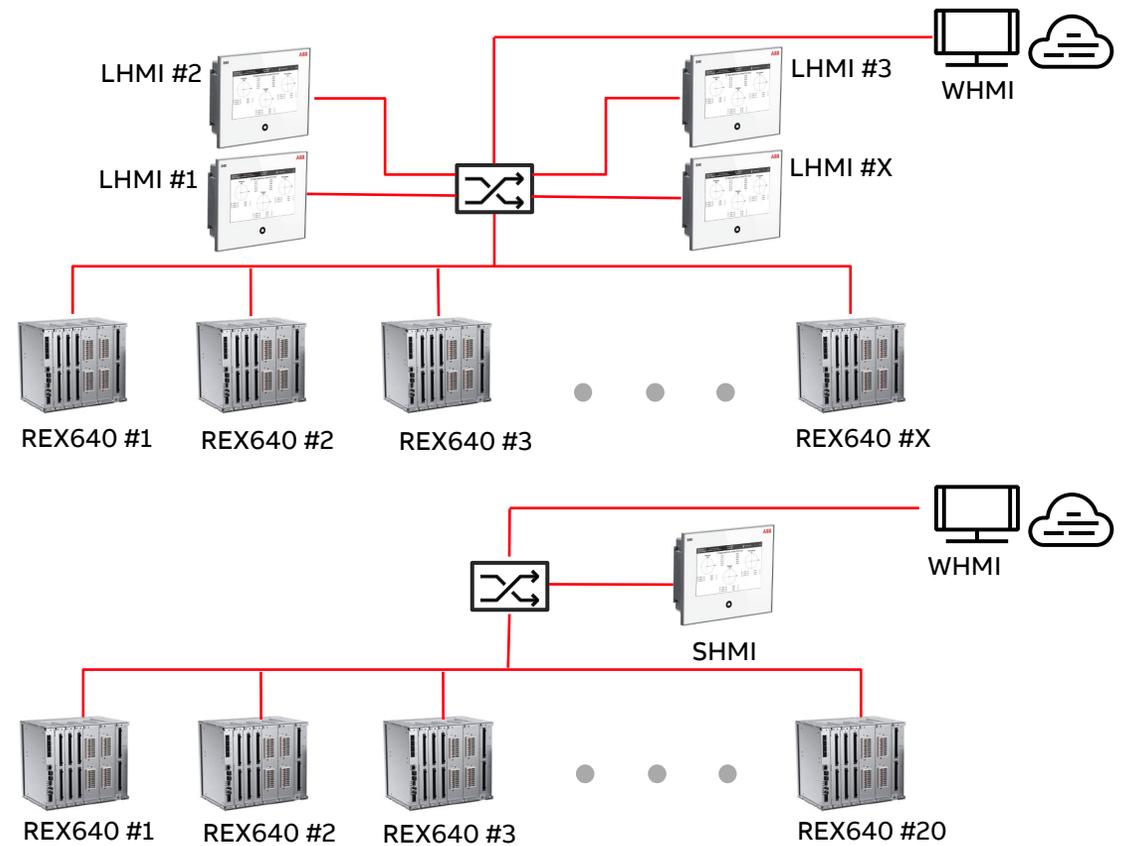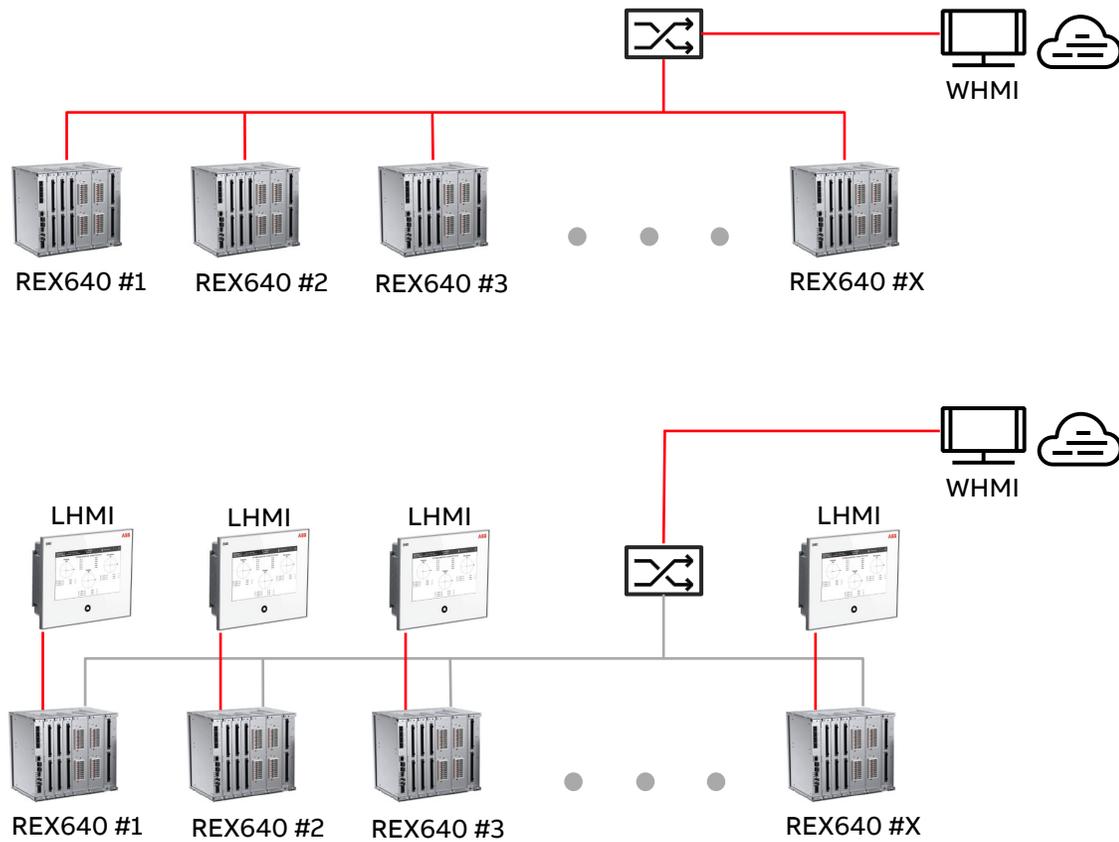| General functions and features	Protection functions	Machine protection package APP7	Synchronous machine add-on ADD1	Power transformer protection package APP8
LHMI/SHMI/WHMI	Dir. and non-dir. overcurrent protection (50P, 51P, 67P)	Reverse power protection (32R/32O)	Overexcitation protection (24)	Overexcitation protection (24)
Control and condition monitoring of primary devices	Dir. and non-dir. earth-fault protection (50N, 51N, 67G)	Flux-balance based differential prot. (87HIM)	Thermal overload protection with two time constants (49T/G/C)	Thermal overload protection with two time constants (49T/G/C)
Measurements_3I/3V/In/Vn/f/...	Dir. and non-dir. negative-seq. overc. prot. (67Q, 46M)	Negative-seq. overcurrent protection (46M)		
Fault recorder	Phase discontinuity protection (46PD)	Loss-of-load supervision (37)	Underpower protection (32U)	Directional overpower protection (32R/32O)
Disturbance (oscillograph) recorder	Voltage protection (27, 59, 59G. 59N)	Load jam protection (50TDJAM)	Underimpedance protection (21G)	Underpower protection (32U)
IEC61850-9-2LE SMV receiving	Frequency protection (81)	Start-up supervision (49, 66, 48, 50TDLR)	Underexcitation protection (40)	Underimpedance protection (21G)
IEC61850-8-1 GOOSE	Load-shedding and restoration (1LSH)	Start-up counter (66)	Harmonic-based stator earth-fault prot. (64TN)	Stabilized differential protection for 2-winding transformers (87T)
Advanced logics and equations	Voltage-dependent overcurrent protection (51V)	Phase reversal protection (46R)	Injection-based rotor earth-fault prot. (64R)	
Alarms, events and audit log	Thermal protection for lines and cables (49F)	Thermal overload protection (49M)	Out-of-step protection (78PS)	High-impedance differential protection (87)
IEC 61850 Ed. 1 and 2.1	Multipurpose protection (MAP)	Rotor thermal overload protection (49R)	Shaft current leakage protection (38, 51)	Hotspot and ageing monitoring (26/49HS)
IEC 60870-5-103/104, DNP3, Modbus	Inrush detection (68HB)	Stabilized differential protection (87M, 87G)	Under power factor protection (55U)	Tap-changer position indication (84T)
Time synchronization with IEEE 1588 v2	Circuit breaker failure protection (50BF)	High-impedance differential protection (87)	Accidental energization protection (27, 50)	
PRP/HSR redundant communication	Restricted earth-fault protection (87N)	Emergency start-up (EST, 62)		
Dedicated optical protection communication link	Switch onto fault (SOTF)			
Auto-reclosing (79)	Load blinder (21LB)			
Power quality	Arc protection (AFD)			
Synchronism and energizing check (25)	Loss of phase, undercurrent protection (37)			
	Dir. negative-sequence impedance protection (Z2Q)			

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Application coverage

Application package content (3/3)

Base functionality (always Included)

General functions and features	Protection functions
LHMI/SHMI/WHMI	Dir. and non-dir. overcurrent protection (50P, 51P, 67P)
Control and condition monitoring of primary devices	Dir. and non-dir. earth-fault protection (50N, 51N, 67G)
Measurements_3I/3V/In/Vn/f/...	Dir. and non-dir. negative-seq. overc. prot. (67Q, 46M)
Fault recorder	Phase discontinuity protection (46PD)
Disturbance (oscillograph) recorder	Voltage protection (27, 59, 59G. 59N)
IEC61850-9-2LE SMV receiving	Frequency protection (81)
IEC61850-8-1 GOOSE	Load-shedding and restoration (1LSH)
Advanced logics and equations	Voltage-dependent overcurrent protection (51V)
Alarms, events and audit log	Thermal protection for lines and cables (49F)
IEC 61850 Ed. 1 and 2.1	Multipurpose protection (MAP)
IEC 60870-5-103/104, DNP3, Modbus	Inrush detection (68HB)
Time synchronization with IEEE 1588 v2	Circuit breaker failure protection (50BF)
PRP/HSR redundant communication	Restricted earth-fault protection (87N)
Dedicated optical protection communication link	Switch onto fault (SOTF)
Auto-reclosing (79)	Load blinder (21LB)
Power quality	Arc protection (AFD)
Synchronism and energizing check (25)	Loss of phase, undercurrent protection (37)
	Dir. negative-sequence impedance protection (Z2Q)

Three-winding transformer add-on ADD2
Stabilized differential protection for 3-winding transformers (87T3)

Busbar protection package APP9
High-impedance differential protection (87)
Current transformer supervision (CCM)

Tap-changer control package APP10
Power directional element (67P-TC)
Voltage regulator (90V)
Tap-changer position indication (84T)

Generator autosynchronizer package APP11
Autosynchronizer for generator circuit breaker (25AUTOSYNCG)

Network autosynchronizer package APP12
Autosynchronizer for network circuit breaker (25AUTOSYNCBT/T)

Petersen coil control package APP13
Petersen coil controller (90)

Diesel generator monitoring package APP14
Diesel generator monitoring (32/40G)

High-speed transfer device package APP51
High-speed bus transfer for one stand-by feeder (I<-->O BT)

High-speed transfer device package APP52
High-speed bus transfer for two stand-by feeders (I<-->O BT)

High-speed transfer device package APP53
High-speed bus transfer for three equal feeders (I<-->O BT)

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HMI options

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Switchgear HMI (SHMI)

Switchgear level

Switchgear primary object position statuses

Alarm status indications

Internal status indications

Backups of relay configurations and settings

SHMI

Single panel/bay level

Bay primary object control

Bay primary object position status

Measurements

Alarm indication

Alarm listing

Relay status indication

Event listing

Fault records

Disturbance records

Settings

Commissioning and testing support

Backup of relay configuration and settings

SHMI

The complete switchgear lineup status is visible via the SHMI – in addition to all LHMI functionality.

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Protection and control REX640

Summary

REX640 – innovative, flexible and easy to use

The outcome of a long-standing evolution – building on ABB's strong heritage of freely configurable multifunctional relays

Complete application coverage with one device for optimal flexibility and cost-effectiveness

Designed to support the increasing digitalization of substations

Fully modular and scalable hardware and software for maximum flexibility throughout the entire relay life cycle – from customizing your relay to adapting to changing protection requirements

Continuous access to the latest software and hardware developments

Increased situational awareness and optimal usability with application-driven LHMI/SHMI

Member of ABB's Relion® protection and control family of relays – reinforcing Relion's position as the family of relays to rely on

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