

Relay Retrofit Program for REX 521

Product Guide



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Relay Retrofit Program for REX 521

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1. Description

ABB's life cycle extension initiative is aimed at supporting the life cycle management (LCM) of utility and industrial power distribution systems. One strategic consideration of the LCM of a power system is to extend the life cycle of a switchgear panel through retrofit programs targeted at selected switchgear equipment. A timely executed retrofit program for selected devices allows full utilization of the life cycle of the remaining switchgear components.

ABB's Relay Retrofit Program for REX 521 offers smooth and controlled replacement of existing REX 521 protection relays

with new developments from the Relion® 615 series, representing the latest protection and control technology. The result is extended switchgear lifetime, full availability of relay life cycle services, and the possibility to adapt the power protection system to meet new requirements. The selected 615 series replacement devices are provided with pre-designed installation accessories. The specific tools and accessories available in the retrofit program simplify the work procedures. Thus, various retrofit phases can be accurately scheduled and timely executed to minimize the downtime of production or power distribution processes to bare minimum.

Table 1. Supported retrofit project phases

Retrofit project phase	Tools and accessories
Engineering	Configuration template for the replacement relay
	Documentation
Installation	Relion 615 series replacement relay with pre-wired terminals and mounting assembly
	Cutting tool
	Documentation
Testing	Relion 611/615 BIO-Tester ¹⁾

1) Can be used with a stand-alone 615 relay

2. Existing REX 521 relays and replacement relays

The selection of replacement relays for the existing REX 521 relays has been carefully considered based on expert knowledge of previous product generations and recent developments in protection and control technology. The selected replacement relay types belong to the 615 series and their functionality corresponds to that of the existing REX 521 relays. In addition, the 615 series offers the possibility to expand the functionality of the power protection system further, for example, by adding an optional arc flash protection.

The 615 series relays are characterized by their compactness and withdrawable-unit design. Re-engineered from the ground up, the 615 series has been designed to unleash the full

potential of the IEC 61850 standard for communication and interoperability between substation automation devices. Once the standard configuration relay has been given the application-specific settings, it can directly be put into service. The replacement relay is provided with pre-wired terminals that minimize the need for re-wiring as well as reduce the need to update the existing schematic drawings.

The 615 series relays support a range of communication protocols including IEC 61850 with Edition 2 support, process bus according to IEC 61850-9-2 LE, IEC 60870-5-103, Modbus and DNP3. The Profibus DPV1 communication protocol is supported by using the protocol converter SPA-ZC 302.

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Table 2. Existing relay types and replacement relays

Relay type to be retrofitted ¹⁾	Replacement relay	Order code ²⁾
REX521xBxxxB01x	REF615	HBFNAEAG#####E##1G ³⁾ or HBFNAFAG#####E##1G ³⁾
REX521xBxxxB02x		
REX521xMxxxM01x		
REX521xMxxxM02x		
REX521xHxxxH02x		
REX521xHxxxH03x		
REX521xHxxxH04x		
REX521xHxxxH05x ⁴⁾		
REX521xHxxxH06x		
REX521xHxxxH08x ⁴⁾		
REX521xHxxxH09x		
REX521xHxxxH50x		
REX521xHxxxH07x	REM615	HBMCAEAG#####N#1G ⁵⁾ or HBMCAFAG#####N#1G ⁵⁾
REX521xHxxxH51x		

1) Relay Retrofit Program is not available for the REX 521 sensor version.

2) The order code for a replacement relay includes a fixed part in capital letters and a non-fixed part in hashes (#). The non-fixed part can be freely selected when ordering a 615 series relay.

3) Order code Option 1 as letter E (Power Quality and Reclosing) is the minimum requirement to achieve desired functionality in REF615 relays equivalent to REX 521 functionality. If Option 1=E is selected, Option 2 cannot be configured for E and N.

4) Providing that the TOL3Dev protection function is not required

5) Power quality functions are not available in REM615.

3. Replacement relay engineering

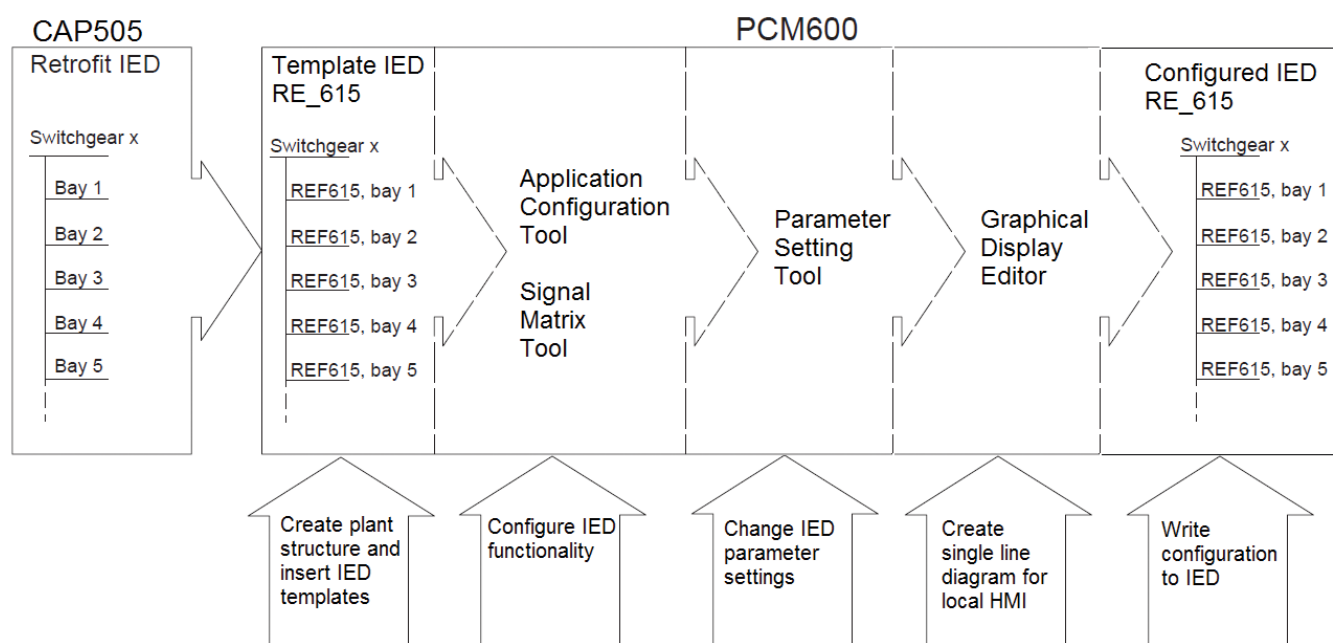


Figure 1. Migration process from REX 521 to REF615 or REM615 using PCM600

Relay Retrofit Program for REX 521

REX 521 is available in fifteen alternative standard configurations. Relay Retrofit Program for REX 521 supports fourteen configuration templates corresponding to the REX 521 standard configurations, excluding configuration H01, and their default settings are available for the REF615 and REM615 relays. The configuration templates are available after ordering Relay Retrofit Program for REX 521.

- REX521 B01 to REF615 template.pcmi
- REX521 B02 to REF615 template.pcmi
- REX521 M01 to REF615 template.pcmi
- REX521 M02 to REF615 template.pcmi
- REX521 H02 to REF615 template.pcmi
- REX521 H03 to REF615 template.pcmi
- REX521 H04 to REF615 template.pcmi
- REX521 H05 to REF615 template.pcmi
- REX521 H06 to REF615 template.pcmi
- REX521 H08 to REF615 template.pcmi
- REX521 H09 to REF615 template.pcmi
- REX521 H50 to REF615 template.pcmi
- REX521 H07 to REM615 template.pcmi
- REX521 H51 to REM615 template.pcmi

The standard configuration parameter settings can be read from REX 521 by using Graphical I/O Setting Tool or Parameter Setting Tool in the CAP501/505 configuration tool.

With Protection and Control IED Manager PCM600 the configuration templates can be used while replacing the REX 521 variant with a corresponding 615 series relay. The template defines the configuration equivalent to the REX 521 standard configuration. Thus, using a template results in a REX 521 equivalent default configuration, with the exception of parameter setting and communication configuration.

In Relay Retrofit Program for REX 521, standard configuration N for REF615 and standard configuration C for REM615 offer the

highest functionality level of all 615 standard configurations. They are delivered from the factory as preconfigured, in the same way as other 615 standard configurations, and are typically reconfigured when taken into use. Standard configuration N for REF615 includes directional and non-directional overcurrent and earth-fault protection with multifrequency neutral admittance, voltage, frequency and power based protection and measurements, high-impedance differential protection, synchro-check and circuit-breaker condition monitoring (optional power quality, fault locator and interconnection protection). Standard configuration C for REM615 includes motor protection with voltage and frequency based protection and measurements.

Depending on the specific application, the appropriate functionality can be selected and own configurations can be created with Application Configuration in PCM600. This own template can be saved and used in other similar applications. Default configurations, connections for binary inputs, binary outputs, function-to-function connections and alarm LEDs are described in the functional diagrams of the 615 series manuals.

All binary inputs and outputs contacts are freely configurable with the signal matrix or application configuration functionality of PCM600. The default single-line diagram can be modified according to user requirements by using Graphical Display Editor in PCM600. The default parameter setting values can be changed from the front panel user interface (local HMI), the Web browser-based user interface (Web HMI) or PCM600 in combination with the relay-specific connectivity package.

Functions that are not configured in templates but are supported by configurations N of REF615 and C of REM615 can be engineered separately depending on the application requirement.

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Table 3. REX 521 functions and the corresponding functions in the 615 series relay configuration templates

REX 521 function	REX 521														615 series function	REF615 template	REM615 template
	B01	B02	M01	M02	H02	H03	H04	H05	H06	H07	H08	H09	H50	H51			
Protection																	
NOC3Low	x	x	x	x	x	x	x	x	x	x	x	x	x	x	PHLPTOC1	x	x
NOC3High	x	x	x	x	x	x	x	x	x	x	x	x	x	x	PHHPTOC1	x	x
NOC3Inst	x	x	x	x		x	x	x		x	x	x	x	x	PHIPTOC1	x	x
NEF1Low	x	x					x	x		x	x	x	x	x	EFLPTOC1 ¹⁾	x	
NEF1High	x	x					x	x		x	x	x	x	x	EFHPTOC1	x	x
NEF1Inst	x	x					x	x			x	x			EFIPTOC1	x	
DEF2Low			x	x	x	x	x			x			x	x	DEFLPDEF1	x	x
DEF2High			x	x	x	x	x			x			x	x	DEFHPDEF1 ¹⁾	x	
DEF2Inst			x	x	x	x	x								DEFLPDEF2	x	
DOC6Low					x		x						x		DPHLPDOC1	x	
DOC6High					x								x	x	DPHHPDOC1 ¹⁾	x	
OV3Low								x	x	x	x	x	x	x	PHPTOV1 ¹⁾	x	
OV3High								x	x	x	x	x	x		PHPTOV2 ¹⁾	x	
UV3Low								x	x	x	x	x	x	x	PHPTUV1	x	x
UV3High								x	x	x	x	x	x		PHPTUV2 ¹⁾	x	
Inrush3	x	x	x	x	x	x	x	x			x	x	x		INRPHAR1	x	
CUB3Low	x	x	x	x	x	x	x								PDNSPTOC1	x	
TOL3Cab	x	x	x	x	x	x	x								T1PTTR1 ²⁾	x	
AR5Func		x		x	x	x	x					x	x		DARREC1	x	
ROV1Low								x	x		x	x	x	x	ROVPTOV1 ¹⁾	x	
ROV1High								x	x		x	x	x		ROVPTOV2	x	
ROV1Inst								x	x		x	x			ROVPTOV3	x	
Freq1St1					x		x		x	x		x	x	x	FRPFRQ1	x	x
Freq1St2									x			x	x	x	FRPFRQ2	x	x
SCVCS1						x									SECRSYN1	x	
MotStart										x				x	STTPMSU1		x
PREV3										x				x	PREVPTOC1		x
NPS3Low										x				x	MNSPTOC1		x
NPS3High										x					MNSPTOC2		x
NUC3St1										x					LOFLPTUC1		x
FuseFail										x				x	SEQSPVC1 ³⁾		x
Tol3Dev								x		x	x			x	MPTTR1 ²⁾		x
PSV3St1										x			x	x	PSPTUV1, NSPTOV1	x	x
Control																	
COCB1	x	x	x	x	x	x	x	x	x	x	x	x	x	x	CBXCBR1, SSCB1	x	x
COIND1	x	x	x	x	x	x	x	x	x	x	x	x	x	x	DCSXSWI1	x	x
COIND2	x	x	x	x	x	x	x	x	x	x	x	x	x	x	ESSXSWI1	x	x
COIND3										x				x	DCSXSWI2		x
COLOCAT	x	x	x	x	x	x	x	x	x	x	x	x	x	x	Control	x	x
MMIALAR1-8	x	x	x	x	x	x	x	x	x	x	x	x	x	x	LED1-8	x	x
Measurement																	
MECU3A	x	x	x	x	x	x	x	x	x	x	x	x	x	x	CMMXU1	x	x
MECU1A	x	x	x	x	x	x	x	x	x	x	x	x	x	x	RESCMMXU1	x	x
MEVO1A			x	x	x	x	x	x	x	x	x	x	x	x	RESVMMXU1	x	x
MEDREC	x	x	x	x	x	x	x	x	x	x	x	x	x	x	RDRE1	x	x
MEVO3A					x	x	x	x	x	x	x	x	x	x	VMMXU1	x	x
MEVO3B ⁴⁾											x	x				x	
-						-									VMMXU2 ⁵⁾	x	
MEFR1					x	x	x	x	x	x	x	x	x	x	FMMXU1	x	x
MEPE7					x	x	x	x	x	x	x	x	x	x	PEMMXU1	x	x

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Table 3. REX 521 functions and the corresponding functions in the 615 series relay configuration templates, continued

REX 521 function	REX 521														615 series function	REF615 template	REM615 template
	B01	B02	M01	M02	H02	H03	H04	H05	H06	H07	H08	H09	H50	H51			
MEAI1 ⁶⁾										x				x			x
Condition monitoring																	
CMBWEAR1	x	x	x	x	x	x	x	x	x	x	x	x	x	x	SSCBR1	x	x
CMTCS1	x	x	x	x	x	x	x	x	x	x	x	x	x	x	TCSSCBR1	x	x
CMCU3	x	x	x	x	x	x	x	x	x	x	x	x	x	x	CCSPVC1 ⁷⁾	x	x
CMVO3					x	x	x	x	x	x	x	x	x	x	SEQSPVC1 ⁷⁾	x	x
CMTIME1										x				x	MDSOPT1		x
Power quality monitoring																	
PQCU3H	x	x	x	x	x	x	x	x	x	x	x	x	x	x	CMHAI1 ¹⁾	x	-
PQVO3H					x	x	x	x	x	x	x	x	x	x	VMHAI1 ¹⁾	x	-
Standard																	
SWGRP ⁸⁾	x	x	x	x	x	x	x	x	x	x	x	x	x	x		x	x

1) Not available in REM615 standard configuration C

2) T1PTTR1 is configured in template for the Tol3Dev function in H05 and H08.

3) Also used for CMVO3

4) MEVO3B shows calculated phase-to-phase voltages in REX 521. In REF615, calculated phase-to-phase voltages are shown by VMMXU1.

5) Additional measurement function in REF615 that shows U12B sync. voltage

6) Not needed, motor status seen from STTPMSU1

7) Works in a different way

8) Available as main applications Input_SWGRP and Output_SWGRP within Application Configuration in PCM600

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4. Installation accessories

Mounting assembly with pre-wired terminals

The deliverables of Relay Retrofit Program for REX 521 comprise a new REF615 or REM615 replacement relay and mounting assembly with pre-wired terminals.

The pre-wired terminals are marked on the top based on the existing REX 521 relay terminal numbers. Thus, the BIO terminals' secondary wiring set can be removed from the existing REX 521 relay and reused on the corresponding pre-wired terminals. The instrument transformers (CTs and VTs) must be manually wired to the corresponding terminals of the replacement relay.

Cutting tool

The cutting tool is a handheld device for machining the existing panel cutout to the required size. It is delivered in a cutting tool kit. The cutting tool consists of a battery-operated power unit and a cutting head which comprises two parts, a punch and a die.

The cutting tool enables a precise quality cut. Neither time consuming measurements nor additional panel surface protection is needed. The enlargement of the existing panel cutout can be done in the most convenient direction. The tool is silent, fast and safe to use and it can cut a panel metal sheet with a thickness of up to 3.0 mm.

In warranty cases, only the correct cutting tool part should be claimed instead of the complete kit.



Figure 2. Mounting assembly with pre-wired terminals



Figure 3. Cutting tool

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5. Selection and ordering data

The deliverables of Relay Retrofit Program for REX 521 can be ordered from the local ABB representative. It always includes a

new REF615 or REM615 protection and control relay and mounting assembly with pre-wired terminals.

Table 4. Relay Retrofit Program for REX 521 ordering data

Item	Order code
Relay Retrofit Program for REX521	REX521RRP



Figure 4. Relay Retrofit Program for REX 521

The replacement relay order code should be defined when ordering Relay Retrofit Program for REX 521. The order code identifies the relay type as either REF615 or REM615 and consists of a string of letters and digits generated from the relays' hardware and software modules. The latest relevant information on the REF615 and REM615 protection and control relays is available on the respective product pages.

Use [ABB Library](#) to access the selection and ordering information and to generate the order number.

[Product Selection Tool](#) (PST), a Next-Generation Order Number Tool, supports order code creation for ABB Distribution Automation IEC products with emphasis on, but not exclusively for, the Relion product family. PST is an easy-to-use, online tool always containing the latest product information. The complete order code can be created with detailed specification and the result can be printed and mailed. Registration is required.

Table 5. Order codes for replacement relays

Item	Order code ¹⁾
REF615	HBFNAEAG#####E##1G ²⁾
REF615	HBFNAFAG#####E##1G ²⁾
REM615	HBMCAEAG#####N#1G ³⁾
REM615	HBMCAFAG#####N#1G ³⁾

1) The order code for a replacement relay includes a fixed part in capital letters and a non-fixed part in hashes (#). The non-fixed part can be freely selected when ordering a 615 series relay.

2) Order code Option 1 as letter E (Power Quality and Reclosing) is the minimum requirement to achieve desired functionality in REF615 relays equivalent to REX 521 functionality. If Option 1=E is selected, Option 2 cannot be configured for E and N.

3) Power quality functions are not available in REM615

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6. Parts and accessories ordering data

Parts under warranty and accessories can be ordered separately from the local ABB representative.

Table 6. Order codes for Relay Retrofit Program for REX 521 parts and accessories

Item	Description	Order code
Replacement relay ¹⁾	REF615	HBFNAEAG#####E##1G
	REF615	HBFNAFAG#####E##1G
	REM615	HBMCAEAG#####N#1G
	REM615	HBMCAFAG#####N#1G
Mounting assembly with pre-wired terminals ¹⁾	Mounting assembly with pre-wired terminals without the 615 relay	1VFR100115A0001
Cutting tool kit ²⁾	Cutting tool kit for REX 521 Relay Retrofit Program	2RCA045405
Cutting tool accessories	Cutting tool power unit	2RCA032139
	Cutting head for REX521RRP	2RCA044959
	Additional battery for the power unit	2RCA031785
	Battery charger for a cutting tool	2RCA032140
REX 521 accessories	REX 521 communication cable	1MKC950001-2

1) For warranty purpose only

2) Includes a power unit, one cutting head, two batteries, a battery charger and a plastic case

7. Tools

Table 7. Tools

Description	Version
PCM600 ¹⁾	2.8 or later
REF615 Connectivity Package	5.1.6 or later
REM615 Connectivity Package	5.1.6 or later
CAP 505	2.5 or later

1) The latest hotfixes must be installed. See ABB Library for more information.

Relay Retrofit Program for REX 521**8. Training**

A one-day training course for Relay Retrofit Program can be organized on request in the Distribution Solutions training center. The aim of the course is to introduce the tools and equipment used in the program. The course also provides practical information on how to effectively carry out relay retrofit projects.

For additional information please visit the [training page](#).

9. References

The www.abb.com/mediumvoltage portal provides information on the entire range of distribution automation products and services.

The latest information on Relay Retrofit solutions is found on the [Relay Retrofit Program](#) page. Scroll down the page to find and download the related documentation.

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Relay Retrofit Program for REX 521	

10. Document revision history

Document revision/date	History
A/2018-05-02	First release



ABB Oy Distribution Solutions

EP Service

P.O. Box 503

FI-65101 VAASA, Finland

www.abb.com/service

www.abb.com/mediumvoltage