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# Relay Retrofit Program

## Product Guide



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## Relay Retrofit Program

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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.

The Relay Retrofit program is based on using protection relays belonging to the Relion® product family as replacement devices, pre-designed installation accessories and the IED Migration Support tool. The carefully engineered program provides a controlled and repeatable procedure for replacing existing protection relays with modern protection relays. Various retrofit phases can be accurately scheduled and timely executed to minimize downtime of production or power distribution processes.

A number of ABB experts in power system protection have been involved in developing the program. The aim is to enable controlled and repeatable execution of relay retrofit projects. The tools and accessories simplify the work procedures.

The Relay Retrofit program for replacing selected relays with Relion 615 protection relays consists of a set of tools and accessories, documentation and training.

- IED Migration Support Tool
- Relion Test Box RTB615 with masking plates
- Test templates for replacement protection relays
- Wire markings and wiring harnesses
- Cover plates
- Cutting tool
- Documentation
- Training

Table 1. Supported retrofit project phases

Retrofit project phases	Tools and accessories
Engineering	IED Migration Support Tool Documentation
Installation	Wire markings and wiring harness Cutting tool Cover plates Documentation
Testing	Relion Test Box RTB615 Test templates for replacement protection relays Documentation

**2. Existing relays and replacement IEDs**

The selection of replacement IEDs for existing relays has been carefully considered based on expert knowledge of previous product generations and recent developments in protection and control technology. All selected replacement IEDs belong to the 615 series and their functionality corresponds to that of the existing 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 compact size of the IEDs minimizes the need for additional space in a retrofit installation.

The globally recognized product series features native support for the IEC 61850 standard for communication in substations, Parallel Redundancy Protocol (PRP) and the High-availability Seamless Redundancy (HSR) protocol included. Legacy protocols are also widely supported.

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

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Table 2. Existing relay types and replacement IEDs

Relay type to be retrofitted	Replacement IED	Order code <sup>1)</sup>
SPAJ 140 C	REF615 standard configuration "C"	#BFCAC#####1E
SPAJ 141 C	REF615 standard configuration "C"	#BFCAD#####1E
SPAJ 142 C	REF615 standard configuration "C"	#BFCAD#####1E
SPAM 150 C	REM615 standard configuration "A"	#BMAAC#####1E
		#BMAAG#####1E <sup>2)</sup>
SPAU 130 C	REU615 standard configuration "A"	#BUAEA#####1E
SPAU 320 C1	REU615 standard configuration "A"	#BUAEA#####1E
SPAU 330 C1	REU615 standard configuration "A"	#BUAEA#####1E
MCX 912	REM615 standard configuration "A"	#BMAAC#####1E
MCX 913		#BMAAG#####1E <sup>2)</sup>

1) The order code for a replacement IED includes a fixed (in capital letters) and a non-fixed (in hashes (#)) part. The non-fixed part can be freely selected as when ordering any 615 series IED.  
 2) With RTD inputs

3. Engineering and testing tools for replacement IEDs

IED Migration Support Tool

IED Migration Support Tool (MST) processes the parameters of the existing relay and maps them to the selected replacement IED. It also defines the configuration of the IED. The result of the migration is therefore a fully parameterized and configured replacement IED, with the exception of communication configuration.

MST uses the information provided by the retrofit migration packages, which contain the existing relay-specific migration rules. MST runs on PCM600 and is included in the retrofit connectivity package together with the retrofit migration packages.

The parameters of the existing relay can be read from a file or manually entered in the template. The method depends on the capabilities of the existing relay.

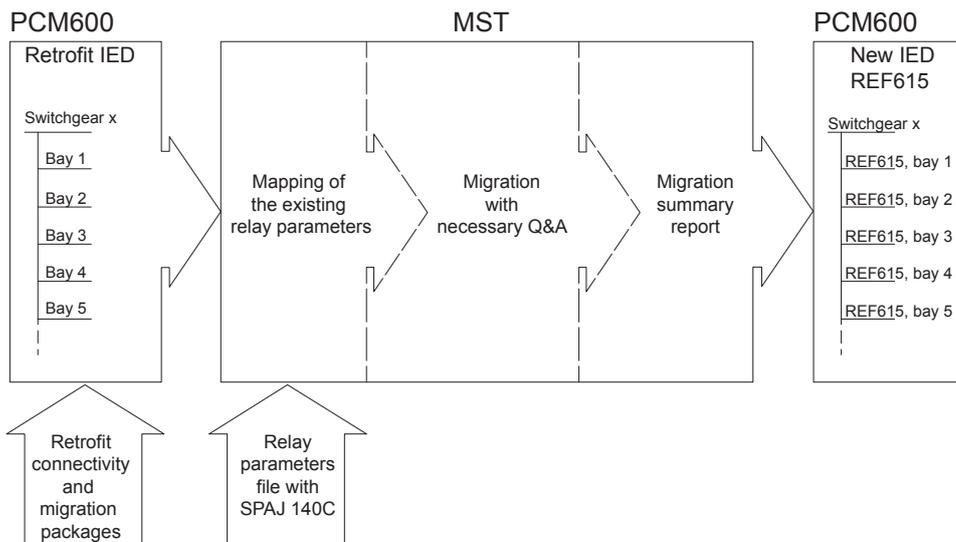


Figure 1. Migration process from SPAJ 140 C to REF615 using PCM600 and MST

## Relay Retrofit Program

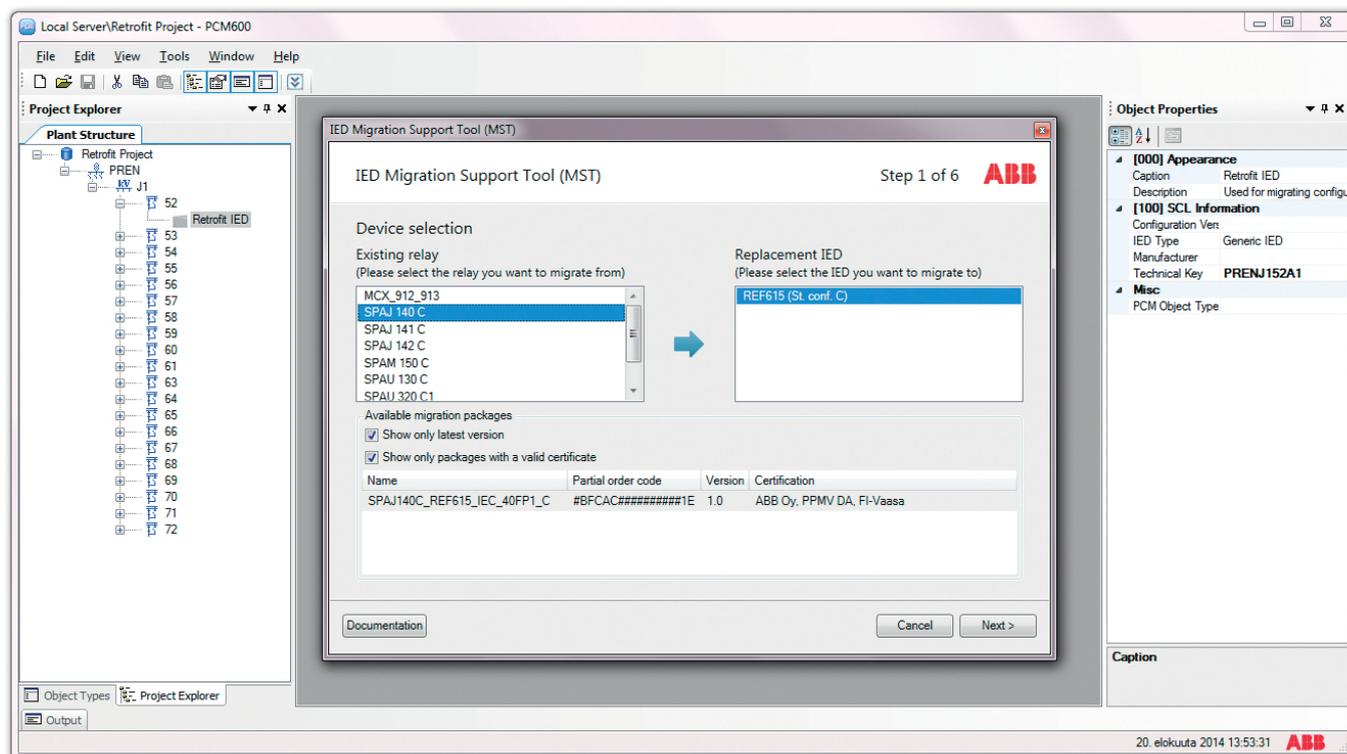


Figure 2. Existing relay migration with MST

### Relion Test Box RTB615

RTB615 is a test box for the 615 series' plug-in units. RTB615 provides auxiliary power for the plug-in unit and an interface for a secondary test device, such as Omicron. RTB615 is equipped with an IED type-specific masking plate leaving only those terminals accessible which are needed for testing the selected IED. [1]

The basic functionality of the replacement IED can be easily verified in the project laboratory before entering the site. The

same functionality can be tested at the site using the RTB615 test box, thus reducing the amount of tests to be carried out when the 615 series plug-in unit is inserted into its original case and installed. [2] Using the XRIO-based test templates for replacement IEDs together with RTB615 and the secondary test device Omicron will considerably simplify and speed up the testing.

[1] 615 product variants where X130 card slot is in use are not currently supported.

[2] RTB615 can also be used for periodical testing, commissioning, demonstrations and training.

## Relay Retrofit Program

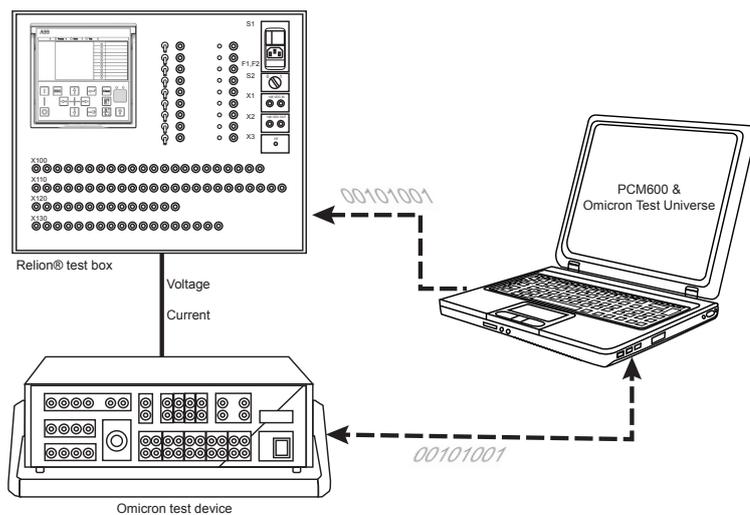


Figure 3. Test set-up for replacement IEDs

**Test templates for replacement IEDs**

The IED-specific replacement test templates include test rules used by the Omicron Test Universe for testing replacement IEDs once the IED has been configured and parameters migrated. The test templates specify the content and format of the test report.

The test templates for replacement IEDs correspond to the functionality of the existing relays. Together with Omicron, the templates create a semi-automated testing procedure to ensure that the replacement IEDs have the same functionality as the existing relays. The templates receive the IED settings from PCM600 in XRIO-based format.

## Relay Retrofit Program

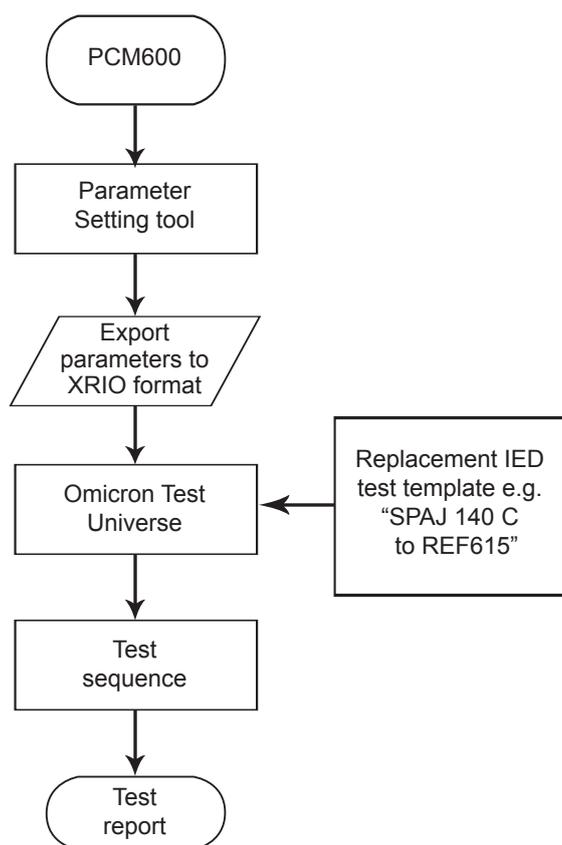


Figure 4. Test workflow for replacement IEDs

#### 4. Retrofit installation accessories

##### Wire markings and wiring harnesses

Wire markings are provided as complete sets. The sets correspond to the terminal set-up of the existing relay and the replacement IED. The press-on type markers are in white color with a printed black text. Wire markings sets are available for all of the relays supported in the Relay Retrofit program.

A wiring harness is a type-specific wire set of an existing relay including marked wires for each terminal of the replacement IED. The wire set is delivered inside a gray protective plastic braided sleeve. The length of the wire set is four meters and the color of the wires is black. The wires have white printed wire markings at 15-cm intervals.

#### 5. Retrofit mounting accessories

##### Cutting tool

The cutting tool is a handheld device for machining the existing panel cutout to the required size. The tool consists of a battery-

operated power unit and a cutting head. The cutting head consists of two parts, a punch and a die. The cutting tool can cut a panel metal sheet with a thickness of a maximum of 2.5 mm.

The cutting tool enables a precise quality cut. Neither time-consuming measurements or 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.

The cutting tool is delivered in a cutting tool kit. The tool kit is a plastic case containing the power unit, either a SPACOM or an MCX cutting head, two batteries and a battery charger.



Figure 5. Cutting tool

### Cover plates

If the existing panel cutout is larger than that of the replacement IED, or if it has a different format, the cover plate can be used for adjusting the size of the cutout. The cover plates are in light

grey color (RAL7035 flat). For more information about the design details, refer to Relay Retrofit Program Application Manual.

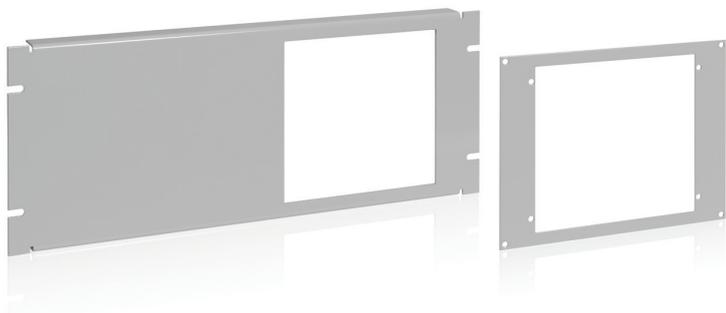


Figure 6. Cover plates

### 6. Selection and ordering data

When ordering replacement IEDs and accessories, please specify the order code and quantity. The order code identifies

the IED type and consists of a string of letters and digits generated from the IED's hardware and software modules.

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Table 3. Order codes for replacement IEDs

Item	Existing relay type	Order code
REF615 standard configuration "C"	SPAJ 140 C	#BFCAC#####1E
REF615 standard configuration "C"	SPAJ 141 C	#BFCAD#####1E
REF615 standard configuration "C"	SPAJ 142 C	#BFCAD#####1E
REM615 standard configuration "A"	SPAM 150 C	#BMAAC#####1E
		#BMAAG#####1E <sup>1)</sup>
REU615 standard configuration "A"	SPAU 130 C	#BUAEA#####1E
REU615 standard configuration "A"	SPAU 320 C1	#BUAEA#####1E
REU615 standard configuration "A"	SPAU 330 C1	#BUAEA#####1E
REM615 standard configuration "A"	MCX 912	#BMAAC#####1E
	MCX 913	#BMAAG#####1E <sup>1)</sup>

1) With RTD inputs

## Relay Retrofit Program

## 7. Accessories and ordering data

Table 4. Order code for retrofit installation accessories

Item	Item description	Order Code
SW Support for retrofit	REF615 SW support for retrofit	2RCA031973
	REM615 SW support for retrofit	2RCA031974
	REU615 SW support for retrofit	2RCA031975
Wiring harnesses and wire marking sets and cover plates		
Cover plates	MCX 912 and MCX 913	2RCA031788A0001
	SPACOM 300 series	2RCA027885A0001
Cutting tool kit <sup>1)</sup>	MCX 912 and MCX 913	2RCA032474
	SPACOM 100 and 300 series	2RCA031784
Wiring harnesses	MCX 912 and MCX 913	2RCA031795A0001
	SPAJ 140 C, 141 C and 142 C	2RCA031581A0001
	SPAM 150 C	2RCA031644A0001
	SPAU 130 C	2RCA031792A0001
	SPAU 320 C1	2RCA031793A0001
	SPAU 330 C1	2RCA031794A0001
Wire markings	MCX 912 and MCX 913	2RCA031800P0001
	SPAJ 140 C, 141 C and 142 C	2RCA031628P0001
	SPAM 150 C	2RCA031762P0001
	SPAU 130 C	2RCA031796P0001
	SPAU 320 C1	2RCA031798P0001
	SPAU 330 C1	2RCA031799P0001
Cutting tool accessories		
	Additional battery for the power unit	2RCA031785
	Battery charger for a cutting tool	2RCA032140
	Cutting tool power unit	2RCA032139
	Cutting head for SPACOM 100 and 300 series	2RCA031786
	Cutting head for MCX 912 and MCX 913	2RCA031978
SPACOM accessories	CAP 505 communication cable for SPACOM 100 and 300 series	SPA-ZP 5A3

1) The cutting tool kit includes a power unit, one cutting head, two batteries, a battery charger and a plastic case.

Table 5. RTB615 and accessories

Item	Description	Order Code
Relion Test Box RTB615 (including masking plates)		2RCA031791
RTB615 masking plate	REF615 #BFCACAB#####1E and #BFCADAB#####1E	2RCA032077
RTB615 masking plate	REM615 #BMAACAD#####1E	2RCA032078

## Relay Retrofit Program

## 8. Tools

Table 6. Tools

Description	Version
PCM600	2.6 or later
615 series IED connectivity package	4.1.1 or later
Retrofit connectivity package	1.1 or later

## 9. Documentation

Table 7. Customer documentation

Material	Content	Document ID
Relay Retrofit Program Application Manual	Presents a technical approach to applying the Relay Retrofit Program deliverables to a retrofit project	1MRS757638 B
Relay Retrofit Program Migration Support Tool Tutorial	Explains the role of MST and how to use it	1MRS757634 A
Relay Retrofit Program Testing Tutorial	Presents how to use RTB615 and the XRIO-based test templates for replacement IEDs	1MRS757639 A
RTB615 Technical Manual	Presents the features of RTB615	1MRS758004 A
Relay Retrofit Program Cutting Tool Assembly Guide	Demonstrates step by step how to assembly the cutting tool	1MRS757994 A
Relay Retrofit Program Cutting Tool Assembly Guide (video)	Demonstrates step by step how to assembly the cutting tool	1MRS757993 A
Relay Retrofit Program Cutting Tool Safety Guide	Introduces how to safely use the cutting tool	1MRS757995 B
Relay Retrofit Program Cutting Tool Operating Guide SPACOM 100	Demonstrates step by step how to operate the SPACOM 100 series	1MRS757998 A
Relay Retrofit Program Cutting Tool Operating Guide SPACOM 100 (video)	Demonstrates step by step how to operate the SPACOM 100 series	1MRS758001 A
Relay Retrofit Program Cutting Tool Operating Guide SPACOM 300	Demonstrates step by step how to operate the SPACOM 300 series	1MRS7577999 A
Relay Retrofit Program Cutting Tool Operating Guide SPACOM 300 (video)	Demonstrates step by step how to operate the SPACOM 300 series	1MRS758002 A
Relay Retrofit Program Cutting Tool Operating Guide BBC Std. casing size 1	Demonstrates step by step how to operate the BBC Std. casing size 1	1MRS758000 A
Relay Retrofit Program Cutting Tool Operating Guide BBC Std. casing size 1 (video)	Demonstrates step by step how to operate the BBC Std. casing size 1	1MRS758003 A
Relay Retrofit Program Quick Start Guide	Presents the overview of the retrofit process	1MRS758005 A

Table 8. Marketing documentation

Material	Content	Document ID
Relay Retrofit Program General Presentation	Presents a brief overview of program deliverables	1MRS757635 B

## Relay Retrofit Program

### 10. Training

A one-day training course for Relay Retrofit Program is available in the Distribution Automation 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.

The course code is P271. For additional information please visit the [training page](#) and the [program page](#).

### 11. References

The [www.abb.com/mediumvoltage](http://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.

### 12. Document revision history

Document revision/date	History
A/2014-04-15	SPAJ 140 C, SPAJ 141 C, SPAJ 142 C, SPAM 150 C and SPAU 130 C added to the Relay Retrofit Program.
B/2015-01-07	Added support for SPAU 320 C1, SPAU 330 C1, MCX 912 and MCX 913.
C/2015-06-10	Cutting head assembly corrected in figures.
D/2019-07-01	Content updated









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