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## Firmware update release 1.3.4 for REX640 PCL4 protection and control relays

### Scope

Update release 1.3.4 concerns REX640 PCL4 protection relays and LHMI's.

To verify whether the update applies to the protection relay at hand, there are two things to check:

1. Product Connectivity Level (PCL) shall be PCL4. This information can be checked from LHMI, WHMI or from the product label. The PCL is a part of product composition code, as the example below shows.

REX640B10Nx + xxxx + COMx + PSMx + BIOx + **PCL4**

2. Relay firmware version is 1.3.3 or earlier. This can be checked from LHMI or from WHMI.

Following figures show how to locate the above-mentioned information from the LHMI Device Information page and from the WHMI Product Identifiers page. The LHMI Device Information page can be accessed by tapping the menu bar on upper part of the LHMI screen and locating the Device Information button from the lower left-hand corner of the screen. The relay Firmware version is referred as "SW version". The "PCL" part of the composition code is pointed out as well.

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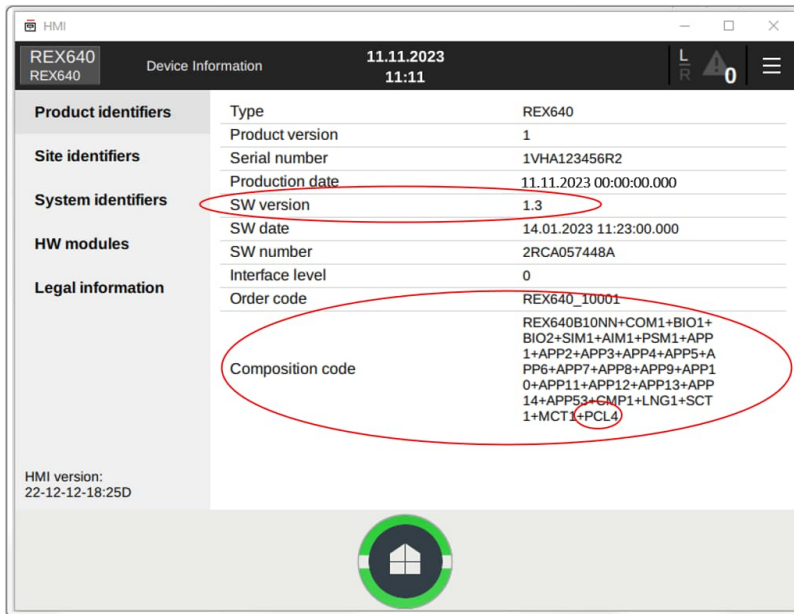


Fig 1. LHMUI Device Information page

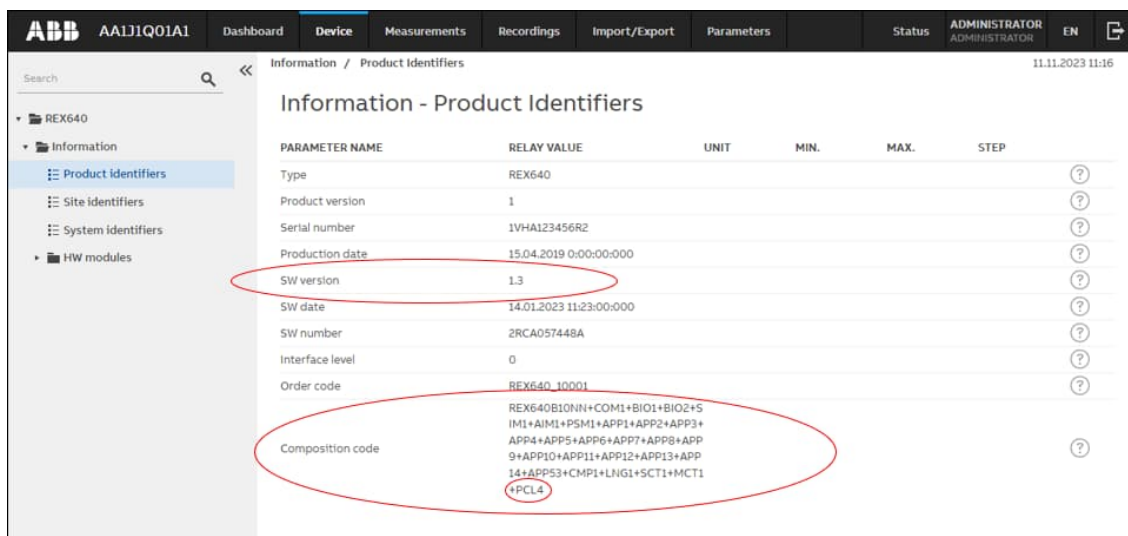


Fig 2. WHMI Product Identifiers page

## Implemented usability improvements

The firmware update release includes usability and operational improvements. The following improvements have been implemented:<sup>1</sup>

### Firmware update release 1.3.4 for relay

#### Communication

- Relay network IP address configuration writing improved.  
Note that even relay network IP addresses are configurable by user, however restriction about colliding subnetwork settings according to Technical manual must be followed.
- *Time master supervision GNRLTMS* behavior fixed. GNRLTMS1 signals do not toggle anymore and follows correctly in case the PTP master is disconnected in PTP slave-only mode.
- Enhanced DNP3 Secure Authentication User Handling. This improves e.g. status management between usernames beginning with similar credentials.
- Improvement to data handling in situations where customer support data is exported several times via WHMI.
- Enhancements to IEEE 1588 v2 Precision Time Protocol (PTP) time synchronization. When using "PTP Slave-only" setting, then parameter values "PTP priority 1/2" are forced to 255 and ignoring user setting values. Note that in "PTP Slave-only" mode relay will not attempt to become the master when the GM clock is lost.

#### HMI

- The HOME button LED indication behavior has been enhanced to reflect acknowledged alarms more accurately.

#### Measurement

- *Phase current preprocessing ILTCTR7* and *ILTCTR8* measurement scaling harmonized with other ILTCTR instances to indicate primary format.
- *Frequency measurement FMMXU (ANSI f)* application configuration output F\_INST mapping correction. Changed from dead banded value to instantaneous value.

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<sup>1</sup> The relay firmware update may also include some minor usability improvements not listed in this note.

## Monitoring

- *High speed bus transfer HSABTC (ANSI I<->O BT)* recorded data correction. Third instance (HSABTC3) busbar voltage recorded data scaling has been corrected. (This had no impact for transfer functionality) Also added one more decimal to all recorded data for busbar voltage in local HMI for improved data clarity.
- Several event handling related enhancements:
  - Improved event list handling when using PCM600 Event Viewer tool.
  - Optimizing event storing by filtering out some unnecessary function event data that could reserve event storing capacity from other visible events. This ensures that storing of visible events are prioritized.
  - Number of stored event capacity corrected from 512 up to 1024.
  - Audit trail event handling enhancement.
  - Enhanced security event handling by improving event comparison for more accurate security event logging
  - Improved *Master trip TRPPTRC (ANSI 94/86)* deactivation event storing. Event about deactivation is now stored and visible in HMI event list also after restart of the relay.
  - Event reporting improved for unfiltered double point control objects in *IEC 60870-5-104 communication protocol (I5CLPRT)*. This requires also use of REX640 Connectivity Package 1.3.2 or later.

## Protection

- *Touch voltage based earth-fault current protection IFPTOC (ANSI 46SNQ/59N)* correction to internal scaling factor of EF validity Min Curr setting for enhanced accuracy.

## Firmware update release 1.3.3 for relay

### Communication

- Incoming GOOSE dataset variation handling improved in situation when same APPID's are in use.

### Control

- *Petersen coil controller PASANCR (ANSI 90)* function enhancement to prevent unnecessary event reporting when operating at low residual voltage levels.

### Protection

- *Touch voltage based earth-fault current protection IFPTOC (ANSI 46SNQ/59N)* PEAK\_IND output reset behavior in switch-onto-fault situation improved by removing unnecessary long reset delay.
- *Three-phase undervoltage protection PHPTUV (ANSI 27)* function internal energization check improvement for preventing unnecessary START signal when not all phases are connected.

## Firmware update release 1.3.2 for relay

### Control

- *Synchronism and energizing check SECRSYN (ANSI25)* Synchrocheck SYNC\_OK activation at phase opposition fixed.  
Earlier it was possible that SECRSYN function indicated that the two network parts were in synchronism (output SYNC\_OK is high) even though the network parts were in full phase opposition (180 degrees apart). The false operation window was very narrow covering a range from 179,90 to 180,10 degrees.

For REX640 PCL4 applications where SECRSYN is used, it is advised to check existing control and protection schemes against the two following conditions:

- The circuit breaker close command is active continuously, resulting circuit breaker closing moment being solely dependent on the synchrocheck function operation.
- The two network parts can be in full phase opposition.

In case these two conditions are fulfilled simultaneously, it is strongly recommended to update to latest firmware at earliest convenience.

### Protection

- *Three-phase thermal protection for feeders, cables and distribution transformers T1PTTR (ANSI 49F)* function precision improvement.
- *Directional earth-fault protection DEFxPDEF (ANSI 67G/N-1 51G/N-1, 67G/N-1 51G/N-2)* function angle calculation to reverse direction enhanced. Improvement prevents possible false operation if function is set to operate to "reverse" direction.

## HMI

User Account Management (UAM) roles and rights to WHMI fault record access rectified.

## Firmware update release 1.3.1 for relay

### Communication

- *Protection communication supervision PCSITPC (ANSI PCS)* improvement by increased Ethernet packet buffer.
- DNP3 protocol Secure Authentication user management improvement
- IEC 61850 Quality bit behavior improved in measurement functions (MMXU) when frequency adaptivity is used. Earlier there was occasionally unnecessary "bad quality" notifications, and HMI measurement values shown in parenthesis ( ).

### Control

- *Circuit breaker control CBXCBR* control function behaviour corrected. Previously SELECTED output remained active in remote mode when Select timeout was elapsed before CLOSE\_ENAD conditions were met.

### Engineering

- Engineering enhancement to Goose control block (GCB) configuration extended to check unique combination of APPID+MAC Address instead of only APPID.  
\* Minimum system requirements for engineering are;  
Relay Firmware: REX640 1.3.1 or later  
Connectivity package: REX640 1.3.1 or later  
PCM600 2.12 + Hotfix 20230915 or later

### Protection

- *High speed bus transfer HSABTC (ANSI I<->O BT)* improvement. Decoupling functionality enhanced for breaker intermediate state handling.

### Supervision

- Improvement to self-supervision watchdog functionality by improved task scheduling and enhanced error handling.
- Disturbance recorder file handling improvement.
- Disturbance record storing strengthened when IEC60870-5-103 protocol in use.

## Tools for updating the REX640 (PCL4) relay

Tools needed to update to SW version 1.3.4.

- PCM600 2.12 + Hotfix 20230915 or later
- REX640 Connectivity package 1.3.2 or later
- Relay Update file version 1.3.3 (REX640\_ALL\_Config\_640\_Version\_1.3.4\_2RCA057448E.cab)

## Update procedure

Firmware updates represent an integral part of ABB's life cycle management of distribution protection and control relays. The updates ensure optimized usability throughout the relay's entire life cycle by offering the latest improvements. The ideal time for a firmware update would be at device commissioning, during periodical testing or during a maintenance break.

Please note that ABB will not be liable for any direct or indirect costs related to the firmware update procedure. The update procedure shall be performed at the sole responsibility of the possessor of the devices.

## Glossary

Abbreviations and acronyms are spelled out in the glossary. The glossary also contains definitions of important terms.

|        |   |
|--------|---|
| APPID  | Application identifier                        |
| CT     | Current transformer                           |
| CVE    | Common Vulnerabilities and Exposures          |
| FW     | Firmware                                      |
| GCB    | Goose Control Block                           |
| GOOSE  | Generic Object-Oriented Substation Event      |
| HMI    | Human-machine interface                       |
| HW     | Hardware                                      |
| LHMI   | Local human-machine interface                 |
| PCL    | Product Connectivity Level                    |
| PCM600 | Protection and Control IED Manager – Software |
| SCADA  | Supervision, control and data acquisition     |
| SMV    | Sampled measured values                       |
| SW     | Software                                      |
| UAM    | User Account Management                       |
| WHMI   | Web human-machine interface                   |