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Page	1/8
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## Firmware update release 2.0.9 for REC615 / RER615 protection and control relays

### Scope

The firmware update release 2.0.9 is for the following REC615 / RER615 products:

- REC615 IEC/ANSI & CN version 2.0
- RER615 IEC/ANSI & CN version 2.0

To verify that the firmware update applies to the protection relay version, ensure that the first and last two characters of the order code on the label on top of the human-machine interface (HMI) match the corresponding characters of the order code in Fig. 1.

HXXXXXXXXXXXXXXXXX1G  


Fig 1. Order code of the REC615 / RER615 control and protection relays

To identify the current firmware (SW) revision of the REC615 / RER615 protection and control relay, please Refer to Fig. 2.

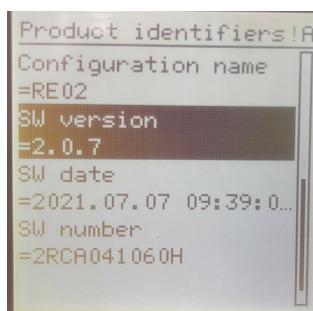


Fig. 2 The firmware revision of the REC615/RER615 control and protection relay

## Implemented usability improvements

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

### Firmware update release 2.0.9

#### Cyber Security

- Cyber security improvement  
The following vulnerability (CVE, Common Vulnerabilities and Exposures) has been identified in the product and fixed by the update:
  - CVE-2021-22283: MMS file transfer vulnerability.

Additional details and mitigation methods can be found from mentioned (CVE, Common Vulnerabilities and Exposures) advisory.

- Cyber Security related update to webserver.

#### Communication

- Improving MMS (IEC 61850) dual COTP connection requests handling.
- Improvements to status and quality reporting when binary input is oscillating.

#### Engineering

- Analog and sensor input Angle correction range change. Current and voltage angle correction factors setting range has been adjusted to -8.0000...8.0000 degrees.

#### Measurement

- Reactive power (Q) measurement accuracy correction by enhanced phase angle measurement at *three-phase power and energy measurement PEMMXU*.  
(Applicable only if SIM0001 Sensor Input Module and *voltage input type* "CVD sensor" setting in use.)

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

## Protection

- *Three-phase undervoltage protection PHPTUV* function START output reset behavior improved under drop-off situation.
- Fault current disconnection detection improvement to *Multifrequency admittance-based earth-fault protection MFADPSDE*. Function tripping is not allowed if fault current is disconnected.
- Enhancement to *Multifrequency admittance-based earth-fault protection MFADPSDE* cyclic reset operation when fault direction changes.

## Supervision

- Improvements to Load profile record LDPRLRC function stability. Previously when using Load Profile Recorder it might have caused occasionally some self-supervision IRF indications (e.g. IRF2 & IRF82 seen).
- Improvement to self-supervision watchdog function, by enhanced task scheduling.

## Firmware update release 2.0.8

### Communication

- Improvement to Modbus IEEE-754 float32 register reading.

## Firmware update release 2.0.7

### Cyber Security

- Cyber Security improvements to the "Ripple20" vulnerability in TCP/IP communication stack for normal product usage conditions. The following vulnerabilities (CVE, Common Vulnerabilities and Exposures) have been identified in the product and fixed by the update:
  - CVE-2020-11907
  - CVE-2020-11909
  - CVE-2020-11910
  - CVE-2020-11911
  - CVE-2020-11912

*Note! Some of the security scanners might still report existence of Ripple20 vulnerability after the update. This is a false positive, since the scanners indicate the presence of the IP stack, without being able to check the vulnerability and its fixes.*

### Supervision

- Improving Time counter rollover in relay's communication module that may have caused internal relay fault with error code *IRF116 COM card error* and relay to self-reboot after time interval(s) which is divisible by ~50 days from previous restart.
- Self-supervision improvement for composition detection.
- Improvement to watchdog supervision by optimizing timer clearance during parallel tasks.
- Improvement enables generic control point SPCGAPC data preservation during a watchdog reset
- Self-supervision recovery time improved in case of IRF Code 83 or 116 after 1 hour since previous.

### Control

- Preserving L/R control state during Firmware Updates.
- Application function Autorecloser (DARREC) final trip during discrimination time improved.

### HMI

- Improvements to LHMI firmware updating to prevent unwanted downgrade. Earlier it was possible that LHMI firmware updated in SW patch by FUT got downgraded when factory restore was done.

## Protection

- The improvement to the Multifrequency admittance-based earth-fault protection MFADPSDE in “Intermittent EF” -setting mode requires one more peak detection after operation timer elapsed before operate output activation.

## Communication

- Improvement to the Frequency measurement FMMXU avoids unnecessary reporting during momentary vector shift situations.
- Internal time synchronization startup improvement.
- Improvement on GOOSE receiving. In a system where one relay is receiving GOOSE communication from multiple senders, it is possible that a communication break in one sender might impact handling of received values from other senders.
- SNTP improvement to possible time synchronization interrupt alarms in HSR Ethernet topology.
- Improving IEEE 1588 (PTPv2) Time synchronization when using non-zero (ID>0) PTP Domain ID. Enhancement at transparent clock peer-to-peer measurement and improving Path delay compensation. (Compensating delay for long communication cables).
- Improvement of controls between SBO mode and direct control mode with IEC60850-5-104 protocol. In control mode SBO (Select Before Operate) the command sequence is enforced with select command and followed with operate command.
- IEC60850-5-101/104: Support of 5 clients (increased from previously 2 (Ver. <2.0.6)
- Improvement of the disconnection logic along with the usage of IEC60850-5-104 protocol, it can be adjusted as separate parameter
  - TCP keep-alive logic can be adjusted by the (HMI only) parameter "Legacy Mode"
    - TCP keep alive can be seen from Wireshark
  - Timeout Disconnect logic can be adjusted separately by "Legacy Mode Discon" (HMI only) parameter
    - Disconnect from timeout can be tested e.g. by setting IEC104 ACK responses OFF and seeing that relay then disconnects the socket connection when e.g. t1 timeout expires (30sec) when no ACK to spontaneous events is received during the period.

## Firmware update release 2.0.6

### Communication

- Improvement along with DNP3.0: Settable address range for Master station changed to 0 ... 65519 from 1 ... 65519 (as per DNP3.0 standard / Section 9.2.5.1)
- Additional instance of function SCA4GAPC (4 channel analog value scaling) 12 instances => 24 instances (transferable measurement values from 48 to 96)  
Valid for all configuration variants of REC615/RER615 Ver. 2.0.6
- Additional instance of function MVGAPC (8 channel binary signal) 8 instances => 16 instances (transferable binary values from 64 to 128)  
Valid for all configuration variants of REC615/RER615 Ver. 2.0.6
- Improvement along with IEC60870-5-104: Adding in time stamped events bit to indicate when DST (Daylight saving time) is in use.

## Firmware update release 2.0.5

### Communication

- Improvement along with IEC60870-5-104, Timer t3 for TCP Keep alive signal can be set from previously maximum 60 sec. to max. > 48h.

## Firmware update release 2.0.4

### Communication

- Improvements in handling DNP3.0 events triggered when datapoint exceeds its configured deadband. With the improvement only the latest time tagged event will be transmitted in case of multiple changes before a renewed transmission.
- Support of DNP3.0 over UDP
- Improvement along with IEC60870-5-104, TCP Keep alive signal can be enabled and disabled.

## Firmware update release 2.0.3

- REC615 2.0 variants has been extended with an additional variant "H" supporting 7 conventional current inputs plus 6 mixed voltage inputs (conventional VT or voltage sensors). (This requires the use of Connectivity package Ver. 2.0.2 or newer).

### Protection

- The improvement for the Wattmetric-based earth-fault protection WPWDE increases the function sensitivity in intermittent earth-faults when the fault has fault resistance > 100 Ohm.
- Improvement for Multifrequency admittance based earth-fault protection MFADPSDE for resistive mode.

### Measurement

- Improvement: The zero-clamping value for phase current measurement has been reduced/ adapted from 1.0% to 0.3% of nominal ( $I_n$ ).

### Communication

- Improved stability for front port interface recognized during cyber security tests.
- Correction of MVI4GAPC function behavior when mapped to IEC60870-5-104
- Improvement to the 1588 time synchronization master switch-over situation.
- Time synchronization performance improvement for less accurate time master setups causing unwanted Synch status up/down events.
- Limitation to the maximum number of files that can be opened by the MMS client. This improves the situation with certain types of MMS clients stressing the relay's filesystem and then causing the Internal Fault "File system error" (Fault code 7).
- SNTP time synchronization performance improvement with time masters those are drifting approx. more than 200 ppm from the GPS time which could cause unwanted Synch status up/down events.
- Internal GOOSE performance improvement.

### Supervision

- Self-supervision recovery handling improved in case of IRF Code 79.
- Internal diagnostic improvement for the self-supervision.
- Handling of the RTD card internal fault situation improved.
- Warning Code 2 during relay start-up situations with higher load configurations.
- Correction that avoids unexpected self-restarting of the relay during specific start-up situations.
- Self-supervision performance improvement to the internal CPU memory supervision.

## Firmware update release 2.0.2

### Communication

- Support of ModBus Master functionality along with Battery charger of Powernet Type ADC8490, to read diagnostic information and measurement values.
- The Modbus Master functionality is not limited to ADC8490 but only with it is verified in PVC.

## Firmware update release 2.0.1

### Protection

- Frequency function:  $df/dt$  minimum step value in FRPFRQ has been improved from 0.0025 to 0.0001  $f_n/s$ .



Date	19.03.2024
Page	8/8
Subject	Firmware update release

## **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 a maintenance break.

Please also install the latest version of the connectivity package for PCM600. (This is available via the update manager tool within PCM600)

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.