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Firmware update release 5.1.4 for 615 series CN product version 5.0 FP1 protection relays

Scope

Firmware update release 5.1.4 is for the following 615 series CN protection relays:

- RED615
- REF615
- REG615
- REM615
- RET615
- REU615
- REV615

To verify that the firmware update applies to the protection relay version, ensure that the second 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.

XCXXXXXXXXXXXXX1G

Fig 1. Order code of the 615 series CN 5.0 FP1 protection relays

To identify the current firmware (SW) version of the 615 series protection relay, please refer to Fig. 2.

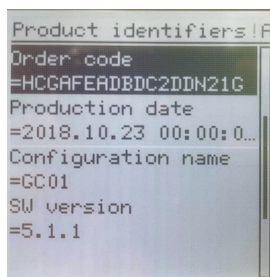


Fig. 2. Product identifiers of the 615 series protection relay

Implemented usability improvements

The firmware update releases include usability and operational improvements. The following improvements have been implemented:¹

Firmware update release 5.1.4:

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.
- Improvement to self-signed certificates with Google Chrome web browser. Previously when accessing WHMI, starting from Chrome version 106, web browser did not show "Proceed to page" option anymore.
- Enabling TLS 1.2 (Transport Layer Security) protocol support.
Note: With TLS 1.2 protocol relay WHMI is performing slower than before.

Communication

- Improving MMS (IEC 61850) dual COTP connection requests handling.
- Improvements to status and quality reporting when binary input is oscillating.
- FTPS communication enhancement with Windows 11 operating system.
- Unnecessary redundancy trailer removed from PTP messages in PRP mode.

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.

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.

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

- *Three-phase underexcitation protection UEXPDIS* function timer reset improvement. In switch onto fault situation, it could be possible that operate delay time not fully waited, when Definite Time (DT) mode selected.
- Enhancement to *Three-phase voltage-dependent overcurrent protection PHPVOC*. Earlier there has been narrow current range where PHPVOC start could have resetted incorrectly and such affecting function operation.
- RED615: *Line differential protection with in-zone power transformer LNPLDF*, improving CT connection type 2 measurement buffer handling and such stabilizing LNPLDF operation.
- RED615: *Line differential protection with in-zone power transformer LNPLDF* weighted average 2nd harmonic calculation improvement.
- REG615: Correction to *three-phase underexcitation protection UEXPDIS* delay timer after EXT_LOS_DET (external loss detection) signal deactivation.
- REM615: *Stabilized and instantaneous differential protection for machines MPDIF* improvement on fault indication clearance conditions. Before it has been possible that fault has been cleared, but fault LED might have been still active at HMI, until motor is stopped.
- REM615: *Stabilized and instantaneous differential protection for machines MPDIF* improvement to CT ratio correction handling. Now also Sample Based MPDIF calculation can take account CT ratio correction.

Supervision

- Multiple improvements to relay self-supervision.
 - Improvements areas including, but not limited to
 - fault self-recovery improvements and harmonization
 - fast self-recoveries
 - HMI indications
 - RAM & EEPROM supervision improvements
 - composition detection improvement

More information and details are found in the latest product Technical Manual under chapter Self-supervision.

- Improving handling of custom Goose communication dataset configuration.
- 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).
- Self-supervision indication adjustment. IRF Code 80 (RAM error) visible from HMI also after successful recovery reboot.
- Improvement to self-supervision watchdog function, by enhanced task scheduling.
- RED615: Line Differential log file improvements.

Firmware update release 5.1.3:

Measurement

- Analog input angle accuracy improvement.
- Enhanced CT frequency response.

Firmware update release 5.1.2:

General

- China region product variant update to support Chinese language Local HMI front panel and CN language package only.

Firmware update release 5.1.1:

Cyber Security

- Cyber Security improvements to the "Ripple20" vulnerability in TCP/IP communication stack for normal product usage conditions. The following vulnerabilities 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.
- 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.
- Improvement to watchdog supervision by optimizing timer clearance during parallel tasks.

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.
- RED615: 2nd harmonic de-blocking condition improved in Line differential protection with in-zone power transformer LNPLDF function to use vector group matched, CT ratio corrected currents instead of directly measured primary currents. Using the directly measured primary currents may have caused the 2nd harmonic blocking to be deactivated too soon.

Communication

- 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.
- Improvement to the Frequency measurement FMMXU avoids unnecessary reporting during momentary vector shift situations.
- Improvement to time synchronization in IEEE1588 PTP systems - improved handling of PTP configuration parameters.
- SNTP improvement to possible time synchronization interrupt alarms in HSR Ethernet topology.
- Internal time synchronization startup improvement.
- Improvement enables the cyclic reporting of the unbalance currents from the Capacitor bank protection CUBPTOC and HCUBPTOC.
- RED615: The relay allows the use of line differential communication modules COM0008 and COM0010, revision M.

Control

- Preserving L/R control state during Firmware Updates.

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.

Tools for updating the IED

Tools needed to update to SW version 5.1.4:

- PCM600 2.9 + Hotfix1 or later
- 615 Series Connectivity package 5.1.3 or later
- Relay Update file version 5.1.4
 - Example: REF**615**_CN_Config_**C**_Version_**5.1.4**_2RCA046061D.bin
 - F refer to: Feeder protection and control REF615
 - 615 refer to: 615 product series
 - CN refer to: China region product
 - C refer to: Standard Configuration C
 - 5.1.4 refer to: Update file version 5.1.4

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 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.