Firmware update release 5.1.21 for 615 series IEC product version 5.0 FP1 protection relays

Scope

Firmware update release 5.1.21 is for the following 615 series protection relays:

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

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.

xBxxxxxxxxxxxxxx1G

Fig 1. Order code of the 615 series protection relays

To identify the current firmware revision of the 615 series protection relay, please refer to Fig. 2.

Fig. 2 Current firmware revision of the 615 series protection relay

ABB Oy
Distribution Solutions
P.O. Box 699
FI-65101 Vaasa
FINLAND

Visiting Address
Strömberg Park,
Muottitie 2 A
FI-65320 Vaasa
FINLAND

Phone: +358 10 2211
Fax: +358 1022 41599
e-mail:
first name.last name
@fi.abb.com

Business identity code:
0763403-0
Domicile: Helsinki
www.abb.fi

Implemented usability improvement

The firmware update release includes usability and operational improvement. The following improvements has been implemented:[1]

Firmware update release 5.1.21:

Protection

- *Three-phase underexcitation protection UEXPDIS* function timer reset improvement. In switch onto fault situation, it could been 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.

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.

---

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

Firmware update release 5.1.20:

Cyber Security

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

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

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 at latest product Technical Manual under chapter Self-supervision.

Protection

- 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.
- RED615: *Line differential protection with in-zone power transformer LNPLDF,* improving CT connection type 2 measurement buffer handling and such stabilizing LNPLDF operation.

Communication

- Improvement to the measurement event reporting, to avoid excess measurement overflow under certain network conditions.

Firmware update release 5.1.19:

Cyber Security

- Cyber Security improvements to the "Ripple20" vulnerability in TCP/IP communication stack for normal product usage conditions. Following vulnerabilities has 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.

Protection

- 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.
- 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).

Firmware update release 5.1.18:

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.

Firmware update release 5.1.17:

Communication

- The relay allows the use of line differential communication modules COM0008 and COM0010, revision M.

Supervision
- Improvement enables generic control point SPCGAPC data preservation during a watchdog reset.

Firmware update release 5.1.16:

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 enables the cyclic reporting of the unbalance currents from the Capacitor bank protection CUBPTOC and HCUBPTOC.
- Improvement to the Frequency measurement FMMXU avoids unnecessary reporting during momentary vector shift situations.
- SNTP improvement to possible time synchronization interrupt alarms in HSR Ethernet topology.
- Internal time synchronization startup improvement.

Supervision

- Self-supervision recovery time improved in case of IRF Code 83 or 116 after 1 hour since previous.

Firmware update release 5.1.15:

Supervision

- Self-supervision performance improvement to the internal CPU memory supervision.

Firmware update release 5.1.14:

Communication

- 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

- Handling of the RTD card internal fault situation improved.
- Correction that avoids unexpected self-restarting of the relay during specific start-up situations.
- Internal performance improvement to the SPCGAPC and OLATCC functions avoiding unnecessary Warning Code 2 during relay start-up situations with higher load configurations.

Firmware update release 5.1.13:

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.

Communication

- 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).
- Correction to the Modbus protocol initialization in cases where the Modbus is used together with the Profibus/SPA-ZC302. Correction prevents unexpected self-restarting of the relay in the situations where the Modbus is not first manually initialized by restarting the relay after Modbus is enabled.

Supervision

- Self-supervision recovery handling improved in case of IRF Code 79.
- Internal diagnostic improvement for the self-supervision.

Firmware update release 5.1.12:

Protection

- Time alignment correction for the line differential protection when the IEC 61850-9-2 LE is enabled in one of the RED615 pair devices only which was then previously causing the differential currents measured incorrecly.

Communication

- Improved the SNTP time synchronization tolerance that is avoiding unwanted switching between primary and secondary time sync masters with less accurate time sync masters.
- Improved the IEC 61850 quality attribute handling for the transformer tap changer control (OLATCC) position.

Firmware update release 5.1.11:

Control

- Improvement to the synchrocheck function for preventing unexpected short-period reset of SYNC_OK output. The reset could have be seen in vector shift situations earlier.

Engineering

- Test mode usability improvement allows to select a binary input, from a Local HMI setting parameter, as a source for setting the protection relay to test mode.

HMI

- Improvement to the local HMI reaction to very short and repetitive auxiliary power interruptions.

Communication

- Improvement to the 1588 transparent clock message handling when the 1588 time synch source is not being selected but the Switch or HSR Ethernet topology is being used.
- Improved the communication performance in very rare and high communication load conditiions.

Supervision

- Self-supervision recovery time improved in case of IRF Code 83 or 116.

Firmware update release 5.1.10:

Engineering

- Improved time multiplier setting range from 0.05 to 0.025 in local HMI.

Protection

- The 2nd harmonic blocking takes into account the "CT ratio correction" setting in line differential protection LNPLDF.
- Improvement to the alarm output activation of the current total demand distortion CMHAI and voltage total harmonic distortion VMHAI in case of short duration disturbances.

Firmware update release 5.1.9:

Control

- Improvement to autorecloser (DARREC) function operation with second autoreclosing sequence.

Protection

- Improved third harmonic based stator earth-fault protection H3EFPSEF so that the voltages from different sources are compensated leading to zero differential voltage in healthy situation. Earlier this was the case only if the voltage transformer ratios were same on the both side of the generator.
- Improvement to the third harmonic based stator earth-fault protection H3EFPSEF when network frequency is outside operation range.

Communication

- Improvement to current and voltage harmonics demand value reporting for IEC 61850 communication.

Firmware update release 5.1.8:

Control

- Improvement to the synchrocheck function for preventing unexpected short-period reset of SYNC_OK output. The reset could have be seen in very rare situations earlier even when the synchronism conditions were fulfilled and voltages were aligned on both sides of the breaker.

Engineering

- It is now possible to set IP settings in IEC61850 Edition 1 mode with Parameter Setting Tool of PCM600.

Communication

- Improvement to relay communication stack software to handle if IEC 61850 Edition 2 fixed length GOOSE messages is wrongly configured to the relay.

Tools for updating the IED

Tools needed to update to SW version 5.1.21:
- PCM600 2.8 or later
- 615 Series Connectivity package 5.1.11 or later
- Relay Update file version 5.1.21
  - Example: RE**F615_IEC**_Config_**A**_Version_**5.1.21**_2RCA035012W.bin
    - F   refer to: Feeder protection and control REF615
    - 615   refer to: 615 product series
    - IEC   refer to: International Standard
    - A   refer to: Standard Configuration A
    - 5.1.21   refer to: Update file version 5.1.21

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 during periodical testing or a maintenance break.

All 615 series IEC version 5.0 FP1 (1G) product deliveries manufactured later than 23rd February, 2022 include the stated relay firmware update 5.1.21 or newer.

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.