

UR Series

Revision 5.83 Release Notes

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Overview

Summary

Release 5.83 of the Universal Relay (UR) series introduces improvements for general and protection functions. Highlights of version 5.83 include:

- Capacitor Bank Protection and Control System – C70
 - Changes to the Neutral Voltage Unbalance Autosest and Voltage Differential Autosest on C70 with voltage inputs only
- Line Protection Systems – L30, L90
 - Displayed values of 87LG restraint current have been improved – L30, L90
 - Increased availability of the line differential element – L30
 - Line differential element when set with 50DD SV supervision and operating in master slave mode – L30, L90
 - Distance polarization in L90 to ensure only actual voltage values are used when there is an important difference between system and sampling frequencies – L90
 - Distance protection has been changed to prevent operation when setting changes are made with relays in service
 - Increased security for line differential protection when experiencing Phase and Frequency Locked Loop (PFLL) transition errors
- Motor Protection System – M60
 - Added security to the Voltage Dependent thermal overload element when starting very high inertia motors
- Common Protection and Control Elements
 - Changes to the Restricted Ground Fault algorithm timers during transformer energization and operation
 - Fixed potential inaccurate frequency measurement at low root mean square (RMS) metered values
 - Changes to the Negative Sequence and Neutral Directional Overcurrent elements deliver enhanced security
 - Changes to the “Fault Type” comparator logic of distance protection elements
 - Changes to the Neutral Directional Overcurrent element
 - Changes to the UR FlexElements when using analog GOOSE
- Communications
 - New GOOSE Dynamic VLAN Priority
 - Changes to the Breaker and Switch elements
 - Changes to IEC6870-5-104 implementation
 - Changes to the IEC104 Point Lists element
 - Changes to the Last Setting Change Date Modbus register
 - Changes to indication of IEC61850 supported services

- Changes to the Real Time Clock element
- Cyber Security
 - UR operating system debug port to reject Ethernet traffic
 - New keyboard command for password reset and default settings
- Events and Records
 - UR operating system debug port to reject Ethernet traffic
 - Events-time-stamping when the DST function is active and power is cycled
 - UR event recorder to avoid events flooding
 - New event description added to distinguish event types in an Event Report
- Platform
 - Transduced outputs accuracy when used to represent fault location
 - Loopback mode to allow channel monitoring
 - Changes to logic of the Latching type Contact outputs
- HardFiber
 - Brick improved resilience against Flash memory corruption

This document contains the release notes for firmware version 5.83 of the UR family.

- Affected products: B30, B90, C30, C60, C70, D30, D60, F35, F60, G30, G60, L30, L60, L90, M60, N60, T35, T60
- Date of release: Apr 24th, 2014
- Firmware revision: 5.83

This document also contains the release notes of previous 5.8x firmware versions.

If users have existing UR devices installed with older version of firmware (version 4.0x or higher), they can download and install this new firmware to benefit from the enhancements described in this document. If users do not require these new features and enhancements, no upgrade of the relays is required.

Products Affected

This release encompasses the following UR products:

- B30 Cost-Effective Bus Differential System
- B90 Low-Impedance Bus Differential system
- C30 Controller System
- C60 Breaker Protection System
- C70 Capacitor Bank Protection and Control System
- D30 Line Distance Protection System
- D60 Line Distance Protection System
- F35 Multiple Feeder Protection System
- F60 Feeder Protection System
- G30 Generator and Transformer Protection System
- G60 Generator Protection System
- L30 Line Current Differential System
- L60 Line Phase Comparison System
- L90 Line Current Differential System
- M60 Motor Protection System
- N60 Network Stability and Synchrophasor Measurement System
- T35 Transformer Protection System
- T60 Transformer Protection System

Firmware Compatibility

The 5.83 firmware release is compatible with the UR series hardware versions 4.00 and higher.

The use of the 5.83 firmware requires the EnerVista UR Setup software to be version 6.0x or higher.

FW 5.83 Release Details

In the following enhancement descriptions, a revision category letter is placed to the left of the description. See the Appendix at the end of this document for a description of the categories displayed.

Capacitor bank P&C system – C70

P Neutral Voltage Unbalance Autosest and Voltage Differential Autosest operational when C70 has only voltage inputs, for example only 8V CT/VT DSPs

720-04

Applicable: C70

UR FW versions 6.02/7.20 introduce the following fixes to the Neutral Voltage Unbalance and Voltage Differential elements:

- The Autosest functionality of these elements does not change any of the coefficients as expected if the C70 has only voltage inputs, hence this is not an issue if the C70 has any CT bank inputs in its order code.

Line differential protection systems – L30, L90

M Displayed values of 87LG restraint current has been improved to meet +/- 5% accuracy when sensing low values

601-3

Applicable: L30, L90

The restraint current values of the ground differential element are accurately derived and used by the line differential algorithm. However, the restraint values of the ground differential element that are displayed by the relay might not meet the design accuracy of +/- 5% when restraint current values are below $0.11 \times I_n$.

These changes do not affect the operation of the ground line differential element, but only restraint current values that are displayed.

This change applies to UR devices with FW version 6.01 or newer.

E Increased availability of the line differential element when experiencing short communication disruptions

601-1

Applicable: L30

When the line differential element 87L is enabled, the interval between consecutive incoming packets on the inter-relay communication channels is monitored. When this interval between packets exceeds 66 milliseconds, a channel failure is declared.

This FW version extends the allowed interval between packets from 66 to 100 milliseconds. This change reduces the sensitivity of the channel failure detector and prevents short communication disruptions from repeatedly taking the line differential protection out of service.

This change applies to UR devices with FW version 6.01 or newer.

H Line differential element to ensure all three terminals correctly trip when the differential scheme is set with 50DD SV supervision and is operating in master slave mode

601-2

Applicable: L30, L90

In a three-line terminal system, the Line Differential Element operates in master-master mode provided there is not any channel failure. If one communication channel fails, the 87L element changes to master-slave mode. When in that mode, the channel failure blocks the disturbance detector element 50DD SV in the slave relays, and the master relay (relay with no channel failure) trips the slave relays by sending DTT commands if a fault within the differential zone is detected.

Therefore, if the disturbance detector element "50DD SV" is set to supervise the line differential element "87L" and there is a line fault while the 87L element is in Master-Slave mode, the slave relays do not trip after receiving the DTT signal issued by the Master relay.

This FW version introduces a change to the 87L element so a local source disturbance detector "SCRx 50DD" is used in parallel to supervise the 87L element when the "50DD SV" element is not available. This allows the slave relays trip after receiving the DTT command from the Master relay upon the condition described above.

This fix only affects users who have L30 or L90 devices applied to a three-line terminal system and have enabled both the master-slave mode and the 50DD SV supervision.

Affected users can either upgrade their UR device firmware with FW version 6.01/5.83 or use the UR FlexLogic to implement the parallel supervision explained.

F The voltage memory for distance polarization in L90 relays has been changed to ensure only actual voltage values are used when there is an important difference between system and sampling frequencies

710-11

Applicable: L90

Inter-relay communication (IRC) between L90 devices located at each line terminal is primarily required for line differential and pilot scheme applications. Single or redundant communication channels can be applied.

After recovering from a channel failure, L90 devices must synchronize for the Line Differential Element to go back to normal operation. The synchronization process can cause the tracking (sampling) frequency to deviate from the system frequency. A significant difference between the “system frequency” and “sampling frequency” can cause the distance element to operate if voltage memory is used for distance polarization.

This FW release prevents the use of voltage memory for distance polarization when under the described condition.

This issue only affects users who have both (line differential and distance) protection elements enable.

Users who set both distance and line differential elements to enable simultaneously are advised to upgrade their relay firmware version with version 6.02 /7.1x.

For further information on the voltage memory for distance polarization, see the L90 instruction manual.

F The Distance protection element has been changed to ensure that setting changes to Line protection elements, made when the relays is in service, do not cause the phase distance element to operate

710-12

Applicable: L90

Setting changes to UR devices can be carried out by uploading a complete setting file or editing individual setting fields via front panel or UR setup software.

When editing individual settings to a relay that is in service and reading close-to-nominal current and voltage signals, changing any of the line differential or distance protection setting fields can cause the phase distance element to operate.

This FW release ensures the phase distance element does not operate under the described conditions.

Standard operating procedures require users to remove the relay from service when protection related settings are changed or updated. Users who follow this type of procedure are not at risk of experiencing a miss operation.

E Increased security for line differential protection when experiencing Phase and Frequency Locked Loop (PFLL) transition errors

720-7

Applicable: L30, L90

When line differential protection (87L) schemes are exposed to extremely noisy or unreliable channel conditions, the PFLL element can lose synchronism and then re-synchronize. GE strongly recommends that, for maximum security, the disturbance detector element (50DD) be assigned to supervise operation of the 87L element.

Failing to follow this recommendation can potentially cause the 87L element to misoperate during re-synchronizing attempt.

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Firmware version 6.02/7.20 improves the 87L element security to prevent misoperation when, under the described conditions, the 50DD element is not supervising the 87L element.

Customers who have followed GE recommendations for heavily noisy channels or having reliable inter-relay communication are not required to take action.

Motor protection system - M60

F Changes to Voltage Dependent Thermal overload element add security when starting very high inertia motors

572-1

Applicable: M60

Two key variables of the Thermal overload protection element have been changed to increase the element's security:

- The "Voltage Dependent Thermal Overload curve" has been modified (10% more Stall current at 100% volts) to give motors a longer acceleration time. This is especially useful when protecting very high inertia motors
- Negative sequence currents are now filtered to properly bias the equivalent motor heating current "Ieq" when the relay senses significant motor load changes.

If either your thermal overload element is not set for voltage dependent or your relay FW version matches any of the listed below, no action is required.

FW versions that fix this issue: 5.72, 5.83

Common protection and control elements

P The Restricted Ground fault algorithm has been changed to correctly apply timers that determine the value of negative sequence restraining current used during transformers energization and operation

710-13

Applicable: G30, G60, L90, T60

The Restricted Ground Fault element uses the maximum among the three current components as restraining signal:

$$I_{rest} = \max(I_{RO}, I_{R1}, I_{R2})$$

Where, the negative-sequence component of the restraining signal (IR2) is calculated as follows:

$$I_{R2} = 1 \times |I_{L2}| \quad \text{or} \quad I_{R2} = 3 \times |I_{L2}|$$

Multiplier "1" is used right after five cycles of complete transformer de-energization, while multiplier "3" is used right after two cycles of complete transformer energization (during transformer's normal operation). UR devices with previous FW versions showed timers were set to 10 and four cycles instead.

This FW version fixes this out-of-spec issue.

For details on the "Restricted Ground Fault" element, see the Instruction manual of any applicable UR device.

P Changes to the “IEEE Very Inverse overcurrent curve” ensure accurate tripping times when configured with very low pickup value

590-15

Applicable: B30, C60, C70, D30, D60, F35, F60, G30, G60, L30, L60, L90, T35, T60

This firmware version introduces changes to the “IEEE Very Inverse Overcurrent Curve” that make its operating time to better match the specification when the configured pickup value is lower than 0.1 per unit.

Devices with previous firmware versions can operate faster than the specified time under such conditions.

Users for whom Time Overcurrent applications require pickup values higher than 0.1 per unit are not affected by this issue and a firmware update is not required.

F Potential Overfrequency misoperation at low RMS metered values

720-57

Applicable: D60, F60, G30, G60, L90, M60, N60, T60; however mostly Generator Protection applications

At very low signal sources (less than 5%), the measured frequency value can be incorrectly perceived as much higher than actual, at low frequency levels. This effect is experienced typically during static generator startup. The measured frequency is based on zero-crossings, which can be invalid.

The following changes were made to correct the frequency metering at low signal and frequency levels:

- Hysteresis is increased to 5% of the signal RMS cutoff threshold
- Five consecutive cycles of good RMS waveform metered signal are checked to validate a good signal

U The “Negative Sequence and Neutral Directional Overcurrent” elements have been modified to deliver enhanced security and dependability when sensing very low levels of V2 (V0) and significant levels of I2 (I0)

572-2

Applicable: C70, D30, D60, F60, G30, G60, L30, L60, L90, M60, T60

This firmware version introduces important changes to the “Negative sequence directional” and the “Neutral directional” overcurrent elements, which improve the element’s security and dependability.

(1) Polarizing voltage compensation with offset impedance is only applied when the current magnitude I2 or I0 exceeds 0.2pu. This avoids overcompensation that might lead to possible directionality errors when in presence of conditions with low levels of I2 or I0 currents.

(2) Both polarizing and operating quantities are now checked against cutoff level settings that are selectable by the user at “Product Setup\Display Properties” for application flexibilities.

P The “Fault Type” comparator logic, that is part of distance protection elements, has been changed to correctly block the ground distance elements when sensing a double-line-to-ground fault

710-8

Applicable: D30, D60, G60, L60, L90, T60

In order to maintain selectivity during a double-line-to-ground fault, the ground distance element is supervised by the “Fault Type” comparator that uses phase angle between the negative and zero-sequence currents.

However, the “Fault Type” comparator can also be removed when under the following conditions:

- a. During an open pole condition or
- b. When “ $3I_0 > OC\ Supv$ and $I_2 < CutOff$ ”

Any of these conditions prevents the “Fault type” comparator from blocking of the ground distance elements.

Devices with previous firmware versions show the CutOff level is not correctly scaled, which breaks the condition “b” described above.

End users who set the distance element to enabled are advised to upgrade their relay firmware version with version 7.1x or later.

For additional details on the “Fault type” comparator, see the Instruction manual of any applicable UR device.

P Neutral directional overcurrent detection error

720-26

Applicable: C70, D30, D60, F60, G30, G60, L30, L60, L90, M60, T60

Neutral Directional overcurrent element flags NTRL DIR OC FWD and NTRL DIR OC REV do not operate as expected when polarization is selected as Dual.

When IG is not supplied, the V0 and I0 comparator had a small error, reducing the operate region by 20 to 40 degrees (from the limit angle) and was found to be smaller for the NTRL DIR OC REV operand, ensuring adequate security. This applies to all previous firmware versions and is fixed in 7.20.

Communications

C New GOOSE Dynamic VLAN Priority

583-01

Applicable: B30, B90, C30, C60, C70, D30, D60, F35, F60, G30, G60, L30, L60, L90, M60, N60, T35, T60

IEC 61850 GOOSE messages contain the IEEE 802.1Q extension for the inclusion of Ethernet Priority and VLAN addresses in an Ethernet data frame. The existing implementation allows users to set a single value of priority that applies to all GOOSE messages. That singular value of priority is embedded in the extended Ethernet frame.

Firmware version 5.83 includes a “Dynamic VLAN Priority” feature that allows dynamic change of the priority level of published GOOSE messages. This feature is included only with firmware version 5.8x, starting with 5.83.

Existing settings for “GOOSE VLAN priority” remain as a single digit setting; however, the single digit now represents a “Dynamic Priority Range”. The following table shows all new “Dynamic Priority range” and “VLAN Priority” settings.

VLAN Priority Setting	Dynamic Priority Range
7	7 to 4
6	6 to 4
5	5 to 4
4	4 static
3	7 to 5
2	6 to 5
1	5 static
0	6 static

The first time a GOOSE message is published (triggered on a state change), it has the highest priority of the “Dynamic Priority Range”, and then each subsequent GOOSE re-transmission (based on the re-transmission profile setting) has a priority that is decremented by one count. This repeats until the actual priority value reached the “end” of the Dynamic Priority Range.

For Instance, a VLAN priority setting of 7 sets the priority of the first GOOSE publishing to 7. The priority of the first re-transmission of the GOOSE is 6, the priority of the next re-transmission is 5, and then finally 4.

For further information on the GOOSE Dynamic VLAN Priority, see the instruction manual of any applicable UR device.

R **IRIG-B clock synchronization to properly update time when time is set on Dec-31st of a leap year**

601-8

Applicable: B30, B90, C30, C60, C70, D30, D60, F35, F60, G30, G60, L30, L60, L90, M60, N60, T35, T60

If the date and time settings were provided to an UR devices on December 31st of a leap year, the relay showed the “Maintenance Alert: IRIG-B error” and did not update its date and time.

This FW version ensures the relay’s date and time are properly updated regardless when these parameters are set and the type of year.

This change applies to UR devices with FW version 6.01 or newer.

C **Breaker and switch elements have been changed to ensure they show the right status when there is no feedback from the breaker/switch auxiliary contacts and to comply with the IEC61850 standard**

590-12

Applicable: B30, C30, C60, C70, D30, D60, F35, F60, G30, G60, L30, L60, L90, M60, N60, T35, T60

“Breaker” and “Switch” elements declare status depending on the breaker’s / Switch’s auxiliary contact feedback (normally open and normally close contacts).

This FW version introduces changes to the Breaker and Switch elements logic that ensure the proper status indication when there is no feedback from the auxiliary contacts (no DC voltage on both normally open and normally close contacts).

In addition, the logic related to both “Bad” and “Intermediate” status was modified to comply with the IEC61850 standard (00 = “intermediate”, 11 = “Bad”).

For further information, see the UR device instruction manual.

C UR IEC6870-5-104 implementation has been changed to prevent slave devices from issuing start request command

572-7

Applicable: B30, B90, C60, C70, D30, D60, F35, F60, G30, G60, L30, L60, L90, M60, N60, T35, T60

IEC60870-5-104 determines that only master devices are to issue StartDT requests. UR relays are 60870-5-104 slave devices and are not issue this request.

Previous FW versions allow UR devices to issue a StartDT request when receiving a connect request from the IEC60870-5-104 master.

If the IEC60870 protocol is not being used or your relay's FW version matches any of the listed below no action is required.

Firmware versions that fix this issue: 5.72

E UR IEC6870-5-104 implementation has been enhanced to support "Test command with Date/Time"

572-3

Applicable: B30, B90, C60, C70, D30, D60, F35, F60, G30, G60, L30, L60, L90, M60, N60, T35, T60

IEC60870-5-104 determines that slave devices are to respond with a 16-bit value (test sequence counter) and its corresponding timestamp when a test command is received.

This firmware version enhances the UR IEC60870-5-104 protocol implementation to the described test command.

C The "IEC104 Point Lists" element has been changed to properly display analog values when only one analog point is programmed

572-4

Applicable: B30, B90, C30, C60, C70, D30, D60, F35, F60, G30, G60, L30, L60, L90, M60, N60, T35, T60

The IEC60870-5-104 protocol supports a configurable point list element that can be programmed with binary or analog inputs.

Previous firmware versions may not display analog values properly when only one analog point is programmed.

If your relay firmware version matches any of those listed below, no action is required.

FW versions that fix this issue: 5.72, 5.83

C The "IEC104 Point Lists" element has been changed to ensure the entire list is retrieved when all analog points are being used.

572-5

Applicable: B30, B90, C30, C60, C70, D30, D60, F35, F60, G30, G60, L30, L60, L90, M60, N60, T35, T60

The IEC60870-5-104 protocol supports a configurable point list element that can be programmed with binary or analog inputs.

Previous firmware versions may not allow IEC60870-5-104 masters to retrieve all the analog values when all the 255 analog points are programmed.

If your relay firmware version matches any of those listed below, no action is required.

FW versions that fix this issue: 5.72, 5.83

C UR FlexElements have been changed to properly operate when programmed to use IEC61850 GOOSE analogs inputs

572-6

Applicable: B30, B90, C30, C60, C70, D30, D60, F35, F60, G30, G60, L30, L60, L90, M60, N60, T35, T60

The UR FlexElements are universal comparators that can calculate net difference or monitor UR actual analog values.

Previous firmware versions can allow Flexelements to improperly apply the unit base value when IEC61850 GOOSE analog are set as the FlexElement's input, which can lead to an incorrect operation of the FlexElement.

If your relay firmware version matches any of those listed below, no action is required.

FW versions that fix this issue: 5.72, 5.83

C The "Last Setting Change Date" Modbus register has been modified to prevent its update when the "Setting_Changes.log" is read

583-02

Applicable: B30, B90, C30, C60, C70, D30, D60, F35, F60, G30, G60, L30, L60, L90, M60, N60, T35, T60

The "Last Setting Change Date" Modbus register is updated with every setting change action.

Previous UR firmware versions show that this Modbus register was incorrectly updated when customers connected to the UR device and read the "setting_changes.log."

This firmware version ensures that the "Last Setting Change Date" is correctly updated.

C IEC 61850 server has been changed to correctly indicate supported services

721-02

Applicable: B30, B90, C30, C60, C70, D30, D60, F35, F60, G30, G60, L30, L60, L90, M60, N60, T35, T60

After a 61850 client initiates communication with a UR device, the UR indicates all supported MMS client-server services. This can cause unnecessary client-server traffic.

UR devices with previous FW versions incorrectly indicate that MMS "DefineNamedVariableList" is a supported service.

This FW version fixes this issue.

C The UR real time clock element has been changed to correctly calculate UTC when receiving IRIG-B time code signal with IEEE1344 extension

583-03

Applicable: B30, B90, C30, C60, C70, D30, D60, F35, F60, G30, G60, L30, L60, L90, M60, N60, T35, T60

UR devices do support receiving IRIG-B signals with or without IEEE1344 extension. The IEEE1344 extension adds additional information (such as year, DST, and time zone) to the IRIG-B signal.

Prior firmware versions have evidenced that UR devices receiving IRIG-B signals with IEEE1344 extension may not accurately calculate UTC, which directly affects GOOSE messages time stamp (must use UTC reference).

This FW version ensures UTC is correctly calculated under the described conditions.

For more details on the UR real time clock functionality, see the UR instruction manual of any applicable device.

Cyber security – CyberSentry™

C The UR operating system debug port has been changed to reject Ethernet traffic

592-1

Applicable: B30, B90, C60, C70, D30, D60, F35, F60, G30, G60, L30, L60, L90, M60, N60, T35, T60

All UR devices equipped with an Ethernet port support the logical port #17185. This logical port is a debug port dedicated to the device operating system. This port is used for factory service only.

Any port scanner connected to a UR Ethernet port detects that port as “open,” however UR devices with firmware version 5.92 do support a data filter that discards any data for the debug port. The debug port traffic is only allowed when a factory service password requirement is met.

End users having UR devices with an Ethernet port and concerned about cyber security in their substation LAN can upgrade their devices with UR firmware version 5.92. UR devices with no Ethernet port are not affected.

N New keyboard command for password reset and default settings aligned to NERC-CIP requirements

592-2

Applicable: B30, B90, C30, C60, C70, D30, D60, F35, F60, G30, G60, L30, L60, L90, M60, N60, T35, T60

UR devices have an encrypted version of the “Setting” and “Command” passwords that can be used to retrieve the actual password when users forget any of the passwords. To use the previous encrypted passwords, users have to contact GE Multilin’s technical support team and provide their encrypted passwords (one or more per relay), then technical support provides a decrypted version for each submitted password.

This firmware version introduces a new mechanism for password reset (not password retrieval) that gives users independence and complete ownership of the password reset procedure. One key code can be used on all UR devices.

To reset the password, users must now submit a key via the front panel (users can obtain their key by contacting GE technical support). This “password reset command” also clears all settings and event records, which is actually aligned to the NERC-CIP R7.1 and R7.2 requirement.

Users are advised backup the relay data previous to submitting the password reset command.

For details, see any UR instruction manual. This change affects UR devices with FW version 5.92 and 5.83.

Events and records

R **The “Real Time Clock” element has been modified to ensure that the events-timestamp is correct when the DST function is active and power is cycled**

590-14

Applicable: B30, B90, C30, C60, C70, D30, D60, F35, F60, G30, G60, L30, L60, L90, M60, N60, T35, T60

The Real Time Clock element has Daylight Saving Time (DST) functionality that allows the device to follow the DST local rules.

Previous FW versions show that if the DST function is active and the device auxiliary power is cycled, the events timestamp can shift one hour from the actual time.

This FW version ensures the DST time is preserved when the auxiliary power is removed from the relay. Furthermore, the DST function setting is correctly applied to the timestamp that is shown on the fault report summary page when accessed through UR Setup Software or web browser.

P **The timestamp routine has been changed to prevent timestamp discrepancies and a longer protection pass period when daylight savings time (DST) is enabled**

591-1

Applicable: B30, B90, C30, C60, C70, D30, D60, F35, F60, G30, G60, L30, L60, L90, M60, N60, T35, T60

When the DST function is enabled, the timestamp routine checks whether the timestamp needs to be updated according to DST for every UR event record.

On a relay generating dozens of events within one protection pass period; this routine can make the protection pass longer than the relay specification. Therefore, the communication elements running at the end of the protection pass use the latest protection pass time, which forces a discrepancy between the internal event recorder and communication protocol time stamp.

A UR relay generating dozens of events within one protection pass period can also lead protection and control elements to operate out of specification.

This firmware version prevents timestamp discrepancies and allows a longer pass period when DST is enabled.

R **UR Event recorder to avoid events flooding when there is an Ethernet port failure**

601-6

Applicable: B30, B90, C30, C60, C70, D30, D60, F35, F60, G30, G60, L30, L60, L90, M60, N60, T35, T60

The UR Event Recorder registers all UR self-test events that include Ethernet Port Failures “Pri Ethernet Fail/Sec Ethernet Fail”.

Relays with previous firmware versions show the event recorder properly registers Ethernet Failure events when they appear. However, as long as the Ethernet failure condition remains, this event is generated every two seconds, which floods the event recorder.

This firmware version fixes the event recorder to prevent event flooding by registering only one event per Ethernet port failure.

UR devices with no Ethernet ports are not affected by this issue.

E Event description added to distinguish event types in an Event Report

720-44

Applicable: B30, B90, C30, C60, C70, D30, D60, F35, F60, G30, G60, L30, L60, L90, M60, N60, T35, T60

Event descriptions of contact inputs and outputs, virtual inputs and outputs, direct inputs and outputs, remote inputs, double point inputs, field contact inputs and outputs, field latching outputs, shared inputs and outputs, FlexElements, and digital elements now include added abbreviated text to distinguish among various event types with the same name. For example, Contact Input 1 ON with default settings is presented as Cont Ip 1 ON(CI1).

Platform

M Transduced outputs have been modified to show the accurate values when used to represent fault location

601-07

Applicable: B30, B90, C30, C60, C70, D30, D60, F35, F60, G30, G60, L30, L60, L90, M60, N60, T35, T60

The UR Transducer output elements “DCMA Outputs” can be programmed to represent a number of analog values available in the UR relay. One of the choices is fault location (distance to fault).

Relays with previous firmware versions show transduced distance to fault values that do not match the calculated distance.

This firmware version makes DCMA output elements use the “line length” setting as the element’s base unit when a DCMA output is used to represent fault location, thus providing accurate transduced fault location.

This firmware change only affects users who have configured the UR DCMA outputs to represent fault location.

This change applies to UR devices with FW version 6.01 or newer.

E Loopback mode has been enhanced to allow channel monitoring

601-04

Applicable: L30, L90

Upon detection of a loopback test, a UR device goes into Loopback Mode which, among other elements, disables the channel monitoring. Without channel monitoring commissioning or troubleshooting, procedures with loopback tests can become complex.

This firmware version changes the UR devices loopback mode to allow channel monitoring while a loopback test is performed. This allows users access to the channel status data (channel 1/2 status, number of lost packets, and so on), which simplifies commissioning and/or troubleshooting procedures.

This change applies to UR devices with FW version 6.01 or newer.

C Logic of the Latching type Contact outputs has been modified to ensure contact outputs correctly exit from Test Mode

590-22

Applicable: B30, B90, C30, C60, C70, D30, D60, F35, F60, G30, G60, L30, L60, L90, M60, N60, T35, T60

The UR test mode functionality allows users to force the actual state of programmable contact outputs. However, latching type contact outputs found in the I/O modules did not update their state to the real condition when returning from Test Mode.

This FW version ensures the latching type contact outputs effectively update their state to the actual device condition after coming back from Test Mode.

HardFiber

E Brick firmware has been changed to improve the resilience against Flash memory corruption

720-60

Applicable: B30, B90, C30, C60, C70, D30, D60, F35, F60, G30, G60, L30, L60, L90, M60, N60, T35, T60

HardFiber Brick firmware has improved resiliency against Flash memory corruption during boot-up. This firmware release ensures that the firmware in the Brick is maintained when connecting a Brick to URs with earlier firmware versions.

(Previous) FW 5.81 Release Details

In the following enhancement descriptions, a revision category letter is placed to the left of the description. Refer to the Appendix at the end of this document for a description of the categories displayed.

Line Differential Systems L90, L60, L30

N The Line Current Differential Systems to support hybrid conventional–HardFiber line terminal wiring

581-1

Applicable: L30, L90

This FW version enables the L90 Line Current Differential System to support hybrid wiring configurations where one line terminal uses traditional wiring and the other line terminal uses the HardFiber technology. This applies for two and three-line terminal schemes.

Previous firmware versions supported either traditional or HardFiber wiring when both line terminals had the same kind of wiring (both traditional or both HardFiber).

Common Protection Elements

P Ground Time Overcurrent elements have been changed to use the correct signal input when set to “phasor”

581-2

Applicable: B30, C60, C70, D30, D60, F35, F60, G30, G60, L30, L60, L90, M60, T35, T60

The “input setting” within the overcurrent elements determines the type of signal input the elements use for operation. Phasors or RMS current can be set to the “input setting.”

Changes to the Ground Time Overcurrent elements ensure that they operate based on the ground current phasor magnitude when their “input setting” is “phasor.”

Previous firmware versions have the Ground Time Overcurrent elements operating based on the “RMS” current value whether “RMS” or “phasor” were set to the “input setting.”

P The Synchrocheck elements have been changed to correctly detect a dead source when set to “DV1 XOR DV2”

581-3

Applicable: C60, D30, D60, F60, G30, G60, L30, L60, L90, N60, T60

When the “Dead Source Select” setting within the Synchrocheck element is set to “DV1 XOR DV2,” the element has to determine two conditions: a) one of the sources is dead evaluating existing voltage vs. the “Dead V1/2 Max Volts” setting, and b) the other source is live evaluating existing voltage vs. the “Live V1/2 Min Volts” setting.

Previous firmware versions have the Synchrocheck elements verifying dead source by evaluating the existing voltage vs. the “Live V1/2 Min Volts” setting when set as mentioned above. And then the element incorrectly declares dead source.

Changes to the Synchrocheck elements ensure that they evaluate the existing voltage vs. the right setting.

This issue does not affect customers who have the “Dead Source Select” setting set different to “DV1 XOR DV2.”

P The Autoreclose element has been changed to ensure it goes to “lockout” state when the element is blocked and unblocked while in “reclose in progress”

581-4

Applicable: D30, F35, F60, L30

If the operand set to the “AR Block” setting is activated when a reclose cycle is in progress, the autoreclose element goes to “Lockout” state.

If the “AR Block” is subsequently removed, previous firmware versions can allow the reclose element to execute reclose shots.

Changes to the autoreclose element ensure that the element stays on “lockout” state when the described conditions are present.

P The “Non-Volatile Latches” elements have been changed to ensure they will maintain the output status when cycling power to the relay

581-5

Applicable: B30, B90, C30, C60, C70, D30, D60, F35, F60, G30, G60, L30, L60, L90, M60, N60, T35, T60

Changes to the Non-volatile Latches ensure that those elements maintain the output status (on or off) when the relay is powered off and on.

Previous firmware versions can allow the elements’ output to momentarily change state when the relay power cycles.

Customers using the “non-Volatile Latches” for protection or control purposes are advised to upgrade their relay firmware version.

Communications

C Changes to the GGIO4 data set prevent "Data Access Errors" in its unbuffered report control block 581-6

Applicable: B30, B90, C60, C70, D30, D60, F35, F60, G30, G60, L30, L60, L90, M60, N60, T35, T60

GGIO_4 and GGIO_1 data sets have three report control blocks each. When at least four or more data items are configured in GGIO_4 and eight or more within GGIO_1, firmware versions 5.71 and 5.80 can allow the GGIO_4 Un-buffered Report Control Block to show the following message "Data Access Error: type-inconsistent."

The changes implemented to GGIO_4 with this release fix this communication issue.

EnerVista UR Setup Software

G Software exceptions

Applicable: UR Setup and UR Engineer

The following software exceptions have been corrected with software release 5.81:

Software Exceptions
<ul style="list-style-type: none">Overcurrent elements were being inadvertently removed when the relay order code had software option # 12 or 13 and the process bus (HardFiber) module.
<ul style="list-style-type: none">C70 Phase Unbalance Operands not appearing correctly in FlexLogic graphical view when printing
<ul style="list-style-type: none">Random crashes occurring while customer was modifying B90 settings filesB90 IOC Operands not appearing correctly in FlexLogic graphical view when printingFor B90, the values in the Bus Metering screen were not being shown correctly

(Previous) FW 5.80 Release Details

In the following enhancement descriptions, a revision category letter is placed to the left of the description. See the Appendix at the end of this document for a description of the categories displayed.

Generator Protection Systems G30, G60

N **Extended monitoring capabilities on Generator Protection Systems “G60 and G30” comprise Voltage and Current Harmonic components and THD**

580-3

Applicable: G30, G60

G30 and G60 have been enhanced with new monitoring functionality that allows metering and supervising current and voltage THD and harmonic component values.

Harmonic component values from 2nd to the 25th are available including THD.

Both THD and Harmonics components are individually available on a per-source and per-phase basis and are supported by the FlexElements, which allows creating advance application schemes.

This new functionality allows customers to monitor, trend, detect, and analyze Power Quality issues that can affect the generator performance.

Bus Differential Systems B30, B90

E **Bus Differential System B30 has been enhanced to have individual phase instantaneous overcurrent elements per current source**

580-4

Applicable: B30

Four additional phase instantaneous overcurrent elements “50P” have been added to the B30 protection functions, so that there is one 50P element available per current source.

This enhancement expands the protection capabilities of the B30 Bus Differential System.

Capacitor Bank P&C Systems C70

N Extended protection capabilities have been given to the C70 Capacitor Bank Protection System through the addition of current directional elements

580-5

Applicable: C70

New phase and negative sequence directional elements "67P" and "67_2" have been added to the C70 protection functions.

This enhancement enables the C70 capacitor bank protection system to fit advanced applications that require detection of the faulted section in a double-wye or H-bridge capacitor configuration.

Two independent elements are available per each one of them, phase (67P_1, 67P_2) and negative sequence (67_21, 67_22) directional functions.

E C70 has been enhanced to always have three sets of voltage elements independently of the quantity of voltage sources

580-6

Applicable: C70

Enhancements on the C70 allow three sets of voltage elements to be always available regardless the number of voltage banks configured in the C70.

The Voltage elements that have been enhanced to always have three elements available are: Phase under-voltage "27P", Auxiliary over-voltage "59X", Neutral Over-voltage "59N", Negative sequence Over-voltage "59_2"

This enhancement allows the C70 to fit those applications where more than two voltage elements are required per a single voltage source, for example 59N alarm settings, 59N low-level trip, and 59N High-level setting.

E Thermal overcurrent curve "I2T type" has been enhanced with the addition of a new reset operand

580-7

Applicable: C70

The capacitor bank protection system C70 has a new operand for the I2T overcurrent curve. The operand indicates the reset status of the I2T overcurrent curve (cooling portion of the thermal curve or thermal memory).

Since the new operand takes into account the thermal status, it can be used in a permissive scheme to allow re-energizing a capacitor bank after tripping on an overload condition.

Feeder Protection Systems F35, F60

- N** **Extended protection capabilities have been given to the F35 Multi Feeder Protection System through the addition of Negative Sequence Overcurrent elements**

580-8

Applicable: F35

New negative sequence overcurrent elements "50_2 and 51_2" have been added to the F35 protection functions.

This enhancement enables the F35 multiple feeder protection system to better fit protection schemes where early detection of negative sequence overcurrent condition are required.

Line Differential Systems L30, L60, L90

- G** **The Phase Comparison Element "87PC" has been modified to ensure the transient block pickup is active only when the phase coincidence detector picks up**

580-9

Applicable: L60

The L60 Phase Comparison Element "87PC" has been modified to ensure the "transient block pickup delay timer" starts only after the 87PC pickup delay timer has expired.

On previous firmware versions, L60 users needed to increase the "transient block delay timer" (by adding the "87PC pickup delay timer" value) to get an optimal timing, so users doing the upgrade to the latest firmware version do not have to compensate this way.

- N** **New operation mode for the Phase Comparison Elements enable the L60 to interface with other manufacturers legacy phase comparison devices**

580-10

Applicable: L60

The Phase Comparison operation mode can be set through the type of "signal" setting. A new mode of operation "mixed $I_1 + I_2/K$ " has been added to the other two existing choices. The L60's K factor range is 0.08 to 0.25, therefore this mode is equivalent to other manufacturers' mode "mixed $I_1 + K * I_2$ " for which K factor range is 4 to 12.5.

This new operation mode makes the L60 compatible with other manufacturers' installed legacy phase comparison relays that use the operation mode indicated above. So the Phase Comparison Element can interface with those devices (for example, L60 at one end of the line and another manufacturer's legacy device installed at the opposite end of the line).

U L90 inter-relay communication for three-terminal schemes has been changed to ensure communication is restored between all L90 devices when a channel failure condition is cleared

553-3

Applicable: L90

As standard behavior, a three terminal line differential scheme raises “PFL Fail” (synchronization status) and “CH fail” operands at all three terminals when both communication channels fail on at least one terminal.

However, if only one channel goes back to normal, L90s at all terminals can still show PFL fail and CH Fail, and neither the communication nor the differential protection are restored.

This issue only affects relays with FW version 4.9x, 5.2x, 5.4x, 5.6x and 5.7x. If your relay firmware version is different to the ones mentioned, no action is required.

Motor Protection Systems M60

F Changes on the Thermal Model element prevents inadvertent operation while the relay is in maintenance for the purpose of replacing a CPU module

554-1

Applicable: M60

The Thermal Model protection element has been modified to ensure that the element does not operate when the relay is powered up after replacing the CPU module.

Previous firmware versions can allow the element to operate when under the described maintenance condition.

If your maintenance procedure requires the motor to be stopped or your trip command to be isolated when working on the protection relay, the described exception does not affect your motor normal operation, however the thermal element can operate so that your relay has to be reset before putting it in service.

FW version 5.54 and 5.80 properly address this behavior.

Transformer Protection Systems T35, T60

E The “Five windings” software options on the T60 relay have been enhanced to have a Load Encroachment element

580-13

Applicable: T60

T60 software options number 20, 21, 22, and 23 enable the T60 to support five winding transformer schemes. These software options now also support the Load Encroachment element, which is not available in previous firmware releases.

With this firmware version, the Load Encroachment element is supported by all “five windings software options.”

Common Protection Elements

- E The Negative Sequence Directional Overcurrent element has been enhanced to deliver additional security during phase-to-phase**

580-14

Applicable: D30, D60, F60, G30, G60, L60, L90

The Negative Sequence Directional Overcurrent “67_2” element has been enhanced with a restraint factor that increases the element security when positive sequence current values are higher than 0.8pu (high fault-currents that are typical for phase-to-phase faults). This restriction is enabled when the element is set to operate on the “Zero-sequence” current.

In addition, the operating current formula has been modified to consider a bigger portion of the positive sequence current when compared with the negative sequence component. This also increases the element security.

Communications

- N Line Differential Systems L30 and L90 to support the IEC61850 logical node for differential elements “PDIF”**

580-15

Applicable: L30, L90

A new IEC61850 logical node “PDIF” has been added to the L30 and L90 Line differential Systems. The pickup and operate states of the line differential elements “87L” are now mapped to the “PDIF” logical node.

- C Changes to the IEC61850 generic logical node prefixes prevents GOOSE transmission from getting frozen when prefixes are four or five characters long**

580-16

Applicable: B30, B90, C30, C60, C70, D30, D60, F35, F60, G30, G60, L30, L60, L90, M60, N60, T35, T60

IEC61850 implementation allows customers to configure prefixes on all the supported logical nodes. Prefixes can be from one to six characters long.

Previous firmware versions showed that GOOSE messages can freeze when any Generic Logical Node was given prefixes that were four or five characters long. Generic logical nodes supported by the UR family are GGIO1, GGIO2, GGIO3, GGIO4 and GGIO5.

Customers that are using these logical nodes and have prefixes that are four or five characters long can detect this issue during commissioning tests and are advised to upgrade the firmware version of their units. Customers can also increase or reduce the prefixes length, so this issue does not affect them.

C Enhanced DNP 3.0 protocol to properly report internal time delays under DNP object 52

504-5

Applicable: B30, B90, C30, C60, C70, D30, D60, F35, F60, G30, G60, L30, L60, L90, M60, N60, T35, T60

The DNP3.0 protocol was enhanced to accurately estimate and report the value of “time delay fine” that is comprised within the DNP 52 object. This time represents the period between the time of message reception and the time of message reply by the UR relay and helps the DNP master to calculate the delay in the serial wire.

Firmware versions not affected: 5.04, 5.54.

PMU - Synchrophasors

E The N60 PMU recorder capabilities have been enhanced to have eight additional analog channels

580-19

Applicable: N60

The N60 has been enhanced with the addition of eight analogs channels to the PMU Recording element.

Taking into account this enhancement, the quantities of channels within a single PMU recorder are:

14 for phasors

16 analogs

16 digital

Adding the eight additional analog channels demanded changes to the Modbus addresses related to the PMU recording settings. All PMU actual values and other PMU settings have not been affected. See the N60 instruction manual for details.

M Changes to the PMU data recording function ensure an accurate time stamping of the PMU record trigger

554-3

Applicable: N60, D60, L90, G60

The PMU recorder function has been modified to ensure that its trigger is time-stamped accurately.

Previous firmware versions can time-stamp the trigger event with the time of the previous PMU reporting interrupt. All the other PMU functions (for example, data generation and recording) work correctly.

All customers using the PMU recording functionality can upgrade their devices so that the trigger event is time-stamped properly.

Events and Records

R **Changes on the Oscillography recorder ensure the event sampling rate follows the set sampling rate**

580-21

Applicable: L60

Oscillography settings on the L60 allow the user to choose sampling rates from eight to 64 samples per cycle. However, previous firmware versions, regardless of this setting, always record oscillography events at 64 samples per cycle. This limits the length of the record.

Firmware version 5.80 ensures oscillography events are recorded as per the sampling rate set by users.

L60 users who require a sampling rate below 64 samples per cycle are advised to upgrade their device firmware.

E **The Fault Report element has been enhanced to accommodate neutral current values**

580-22

Applicable: C60, D30, D60, F35, F60, L30, L60, L90

The Fault Report element is now able to capture and show pre-fault and fault phasors (magnitude and angle values) of the neutral current.

This implementation makes analysis of fault events easier.

N **New self-test FlexLogic operand has been added to indicate a “Brick Trouble” condition**

580-23

Applicable: B30, C30, C60, C70, D30, D60, F35, F60, G30, G60, L30, L90, M60, N60, T35, T60

“Brick Trouble” is a self-reset minor self-test warning message available on UR devices when configured with the IEC61850 Process Bus module (HardFiber Brick).

The message activates the “Any self-tests” and “Any minor error” operands. With firmware version 5.80, a new operand “Brick Trouble” has been created to specifically identify this self-test alarm.

Like any other FlexLogic operand, this new operand is available to be used across the full range of protection and control elements (FlexLogic, digital elements, and so on).

EnerVista UR Setup Software

N The new “Simplified GOOSE Configurator” reduces number of steps required for configuring IEC61850 GOOSE messages

580-24

Applicable: UR Setup, UR Engineer

A new software tool named “Simplified GOOSE Configurator” has been added to the UR Setup and UR Engineer software. This routine gives users a seamless way to configure IEC61850 GOOSE messages.

The configurator requires settings files to be located in a new “GOOSE site” that can be created within the offline window. Users can drag any of the existing relay logic-operands from the relays at the “GOOSE Site” (publisher) and drop them into any of the other devices (subscriber). All the UR internal operands are supported (digital, analogs, integers).

This tool also supports a column for Generic IEDs that allows for easy configuration of GOOSE publishing only, this intended for those GOOSE messages which subscribers are not UR devices.

Once the operands have been dragged and dropped, the Configurator automatically updates the relay (both publisher and subscriber) setting files by configuring the required fields (remote devices, GOOSE data sets and data Items, remote inputs, Generic logical nodes).

This software tool reduces the number of steps required for IEC61850 GOOSE configuration and enables customers with limited communication experience to set their GOOSE messages.

N New “Backup / Restore” modes for UR Setup software environment file

580-25

Applicable: UR Setup, UR Engineer

A new software tool named “Environment Backup” mode has been added to the UR Setup and UR Engineer software.

The environment file contains information on the Online and Offline windows, so in the cases of moving or damaged computer, customers can easily restore their UR Setup Software configuration by reading the file.

The backup file can be created and read from the **File** menu.

N UR Setup Offline windows to support setting file “Sites”

580-26

Applicable: UR Setup, UR Engineer

A new feature in the UR Setup and UR Engineer software enables users to group settings file into settings “Sites.”

“Setting sites” can be created in the Offline window area, and like the “Device Sites,” are used to organize settings files into different groups as per customer needs (location, application, order-code, and so on).

N New software tool allows users to shift among supported languages and front panel types

580-27

Applicable: UR Setup, UR Engineer

A new maintenance feature in the UR Setup and UR Engineer software enables users to change the relay language and upgrade the type of front panel that the relay has.

The supported languages are: English, French, Russian, and Chinese.

The supported front panels are: Basic, Basic with Push-buttons, Enhanced and Enhanced with push-buttons.

One the language and front panel are changed by the user, the software tool updates the order code, which erases all the settings. Settings must be previously saved and uploaded to the relay after the changed is done.

E UR Engineer software to support the "IEC 61850 configurator" tool

580-28

Applicable: VP UR Engineer

The traditional **Viewpoint Engineer** software (version 3.30) supports the following functionality.

Standard Functionality	Optional-Advanced functionality "System Designer" option
Logic Designer	System Designer
Logic Monitor	System Monitor
Front Panel Report	Connectivity Report
Comtrade Viewer	IEC61850 configurator

With UR firmware version 5.80, the standard functionality (Logic designer, Logic monitor, Front panel report and Comtrade Viewer) of **VP Engineer 3.30** evolved to **VP UR Engineer 5.80**.

All the advanced functionality (System Designer option) of **VP Engineer 3.30** is already released and listed as follows.

Optional-Advanced functionality "System Designer" option	Software Version - period
System Designer	5.80 – now available ✓
System Monitor	5.80 – now available ✓
Connectivity Report	5.80 – now available ✓
IEC61850 Configurator	5.71 – previous release ✓

Customers having UR devices with FW version 5.7x or 5.8x should use VP UR Engineer 5.80.

Applicable: UR Engineer

The following software exceptions have been corrected with firmware release 5.80.

Software Exceptions
<ul style="list-style-type: none"> In the FlexLogic Equation Editor, clicking on the 'type' field occasionally resets the 'syntax' field to its default value
<ul style="list-style-type: none"> When printing a settings file, incorrect operands were printed affecting the following operands: <ul style="list-style-type: none"> 37141302: RESTD GND FT1 OP, RESTD GND FT1 DPO, and RESTD GND FT1 PKP 34616770: BUS 1 BIASED OP A
<ul style="list-style-type: none"> When viewing FlexLogic, incorrect operands were displayed. The following operands were affected: 37618332: FCO Ux/OUT x DOn, FCO Ux/OUT x IOx, FCO Ux/OUT x VOn33774133: IOC1 OP, IOC1 PKP, IOC1 DPO
<ul style="list-style-type: none"> PMU channels 2 through 7 are not printed
<ul style="list-style-type: none"> Enabling pushbuttons fails when using a basic front panel
<ul style="list-style-type: none"> Phase current metering displays incorrect component designations
<ul style="list-style-type: none"> Incorrect Russian translations
<ul style="list-style-type: none"> Removing a DSP module during file conversion results in a blank setting and no warning message
<ul style="list-style-type: none"> The order code and firmware version were not verified when reading settings from the device, resulting in an invalid settings file

Upgrade Paths

GE recommends that all customers upgrade to the latest version of the UR firmware to take advantage of the latest developments and feature enhancements. You download the firmware file, then upgrade the firmware on the UR device using the EnerVista UR Setup software. This software can also convert settings files from an older version to the latest version and provides a Difference Report once the conversion has been completed. This Difference Report identifies new settings and additional information to assist during the upgrade.

Upgrade path for versions 4.00 and above

For UR devices installed with versions 4.00 firmware and above, upload of the 5.9x release to the relay can be done using the EnerVista UR Setup software.

Upgrade path for revisions below version 4.00

For UR devices installed with versions of firmware below 4.00, an upgrade package must be obtained from GE to upgrade the relay CPU and CT/VT modules.

Benefits of revision 4.00 and above:

The benefits of revision 4.00 and above are as follows:

- Supports many new features and functionality
 - IEC 61850 communications protocol
 - 100 Mb Ethernet
 - IRIG-B repeater
 - Isolated RS485 and IRIG-B
 - Synchrophasors in the D60, L90, N60, G60, F60, and T60
 - Support for breaker-and-a-half transmission line protection (D60, L90)
 - Motor health diagnostics (M60)
 - Enhanced front panel
 - L30 line differential device
- Exceeds IEEE C37.90 requirements
 - Transient immunity (2 to 4 kV)

Appendix

Change Categories

This document uses the following categories to classify changes.

Table 1: Revision categories

Code	Category	Comments
N	New feature	A separate feature added to the relay. Changes to existing features even if they significantly expand the functionality are not in this category.
G	Change	A neutral change that does not bring any new value and is not correcting any known problem
E	Enhancement	Modification of an existing feature bringing extra value to the application
D	Changed, incomplete, or false faceplate indications	Changes to, or problems with text messages, LEDs, and user pushbuttons
R	Changed, incomplete, or false relay records	Changes to, or problems with relay records (oscillography, demand, fault reports, and so on)
C	Protocols and communications	Changes to, or problems with protocols or communication features
M	Metering	Metering out of specification or other metering problems
P	Protection out of specification	Protection operates correctly but does not meet published specifications (example: delayed trip)
U	Unavailability of protection	Protection not available in a self-demonstrating way so that corrective actions can be taken immediately
H	Hidden failure to trip	Protection does not operate when appropriate
F	False trip	Protection operates when it is not appropriate
B	Unexpected restart	Relay restarts unexpectedly

GE Technical Support

GE contact information for product support is as follows:

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