GE
Grid Solutions

UR Family

Version 7.2x

Release Notes

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Overview

This document contains the release notes for firmware and software versions 7.20, 7.21, 7.23, 7.24, 7.25, 7.26, 7.27, and 7.28 of the GE Universal Relay (UR) family of products.

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

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Date of release 7.27: 25 June 2019

Date of release 7.28: 14 April 2021

In the following descriptions, a category letter is placed to the left of the title. See the table at the end of this document for descriptions of the categories.

Firmware

Firmware 7.20

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  - IEC 61850-90-5 MSV control blocks have been changed to ensure the ConfRev default value is set to 1
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  - IEC 61850 buffered and unbuffered report control blocks available for LLNO and GGIO1 have been changed to scan and capture event changes every two milliseconds
- Phasor Measurement Unit (PMU) - Synchrophasors
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Breaker Controller System – C60

N **C60 Breaker Controller systems support two PMU elements**

720-1

Applicable: C60

This FW revision adds Synchrophasor measuring and streaming capabilities to the C60 breaker controller system.

This implementation matches the "2 PMU" Synchrophasor functionality that is already supported by the N60 device.

The Synchrophasor "PMU" functionality can be ordered through the following software options:

Device	SW	Option
C60	14	2 PMU
	15	IEC 61850 + 2 PMU
	AE	CyberSentry UR Lvl 1 + 2 x PMU
	AF	CyberSentry UR Lvl 1 + IEC 61850 + 2 x PMU
	BE	IEEE 1588 + 2 x PMU
	BF	IEEE 1588 + IEC 61850 + 2 x PMU

There are additional software options available that mix the "2PMU" with other major software options (for example, 2 PMU + PRP, 2PMU + IEC103, and so on).

For details on the "2 PMU" software option, see the C60 instruction manual.

Capacitor Bank Protection and Control Systems – C70

E **Phase Current Unbalance element changes**

720-02

Applicable: C70

UR FW version 7.20 introduces the following enhancements to the Phase Current Unbalance element as follows:

- The current energization threshold is changed from 0.25 pu to 0.1 pu. This allows for a higher CT ratio to avoid saturation of the Phase Current Unbalance element values.

E **Neutral Current Unbalance element changes**

720-03

Applicable: C70

UR FW version 7.20 introduces the following enhancements to the Neutral Current Unbalance element as follows:

- The current energization threshold is changed from 0.25 pu to 0.1 pu. This allows for a higher CT ratio to avoid saturation of the Neutral Current Unbalance element values.

P **Neutral Voltage Unbalance Autoset and Voltage Differential Autoset 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 Autoset 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.

Feeder Protection System – F60

N **F60 supports Restricted Ground Fault (87G/RGF) elements**

720-64

Applicable: F60

UR FW version 7.20 extends the F60 Feeder Protection System capabilities by adding a Restricted Ground Fault element (87G/RGF).

This implementation shares the standard UR series logic and settings for 87G/RGF elements.

For details on the Restricted Ground Fault element, see the F60 instruction manual and UR Setup software.

Generator Protection Systems – G30, G60

P **Third harmonic Neutral UV element setting range changes**

720-05

Applicable: G30, G60

UR FW version 7.20 introduces the following changes to the Third harmonic Neutral UV element:

UV pickup changed from 0 – 30 pu to 0 – 3 pu in steps of 0.0001

Max Power changed from 0 – 30 pu to 0 – 1.25 pu

Min Power changed from 0 – 30 pu to 0 – 1.25 pu

These are changes only to the setting ranges, and nothing changed on the element algorithm.

G **Accidental Energization element setting changes**

720-06

Applicable: G30, G60

UR FW version 7.20 introduces the following changes to the Accidental Energization element:

Accidental Energization OC PKP changed from 0.300 to 0.300 pu

Accidental Energization UV PKP changed from 0.500 to 0.500 pu

These changes were incorporated into the UR settings file and EnerVista UR Setup to indicate clearly the unit of these settings is per unit, and the changes have no impact on the element algorithm.

Line Differential Systems – L30, L90

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 a re-synchronizing attempt.

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.

E **Enhanced line differential with In-zone Transformer protection element to allow schemes where not all line differential devices have the In-zone Tx option**

720-08

Applicable: L90, L30

The In-Zone Transformer (Tx) software option enables line differential devices to support a power transformer between line terminals.

All L30 or L90 devices deployed for protecting this kind of scheme must have the In-Zone transformer software option.

If there is no power transformer between terminals, none of the UR relays should have the In-zone transformer software option.

UR FW version 7.20 allows using devices with In-Zone Tx on one terminal and without In-Zone Tx on the other terminals on schemes with no power transformer between line terminals, provided devices with In-Zone Tx are set to "TX connection = None."

End users having line differential schemes with UR devices supporting the same software option are not affected by this change.

For details on the "In-Zone Tx" software option, see the L90 or L30 instruction manual.

Motor Protection System – M60

E **Motor Thermal Lockout Times to be displayed regardless of motor state**

720-09

Applicable: M60

UR FW version 6.02/7.20 introduces the following enhancements to the Actual Values of Motor data:

Thermal Lockout Time

Start/Hour Lockout Time

Time-Between-Starts Lockout Time

Restart Delay Lockout Time

Total Motor Lockout Time

These times are calculated and displayed whether the motor is running or stopped. Calculated values are updated and displayed continuously while the motor is running. These calculations and displays have no impact on the Thermal element algorithm. These displayed times were not available in previous firmware releases.

P **Asserted Motor Emergency Restart operand resets the Restart Delay operand**

720-10

Applicable: M60

UR FW version 6.02/7.20 introduces the following fixes to the Motor Restart Delay function:

- The Motor Emergency Restart operand (logical 1) resets the Restart Delay OP operand. This change has no impact on the Thermal element algorithm. It allows restart of the motor without the need for the Restart Delay Timer to time out.

P **Motor Restart Delay Lockout and Emergency Restart of a Motor**

720-11

Applicable: M60

UR FW version 6.02/7.20 introduces the following fixes to the Motor Restart Delay function.

Issue:

After a successful motor start when an Emergency Restart function is used, the Emergency Restart operand is de-asserted but then the Restart Delay OP operand is re-asserted and the Restart Delay Lockout timer is loaded with the previous motor stop remaining balance of the Restart Delay Lockout timer value, which is incorrect.

Fix:

After a successful motor start when an Emergency Restart function is used, the Emergency Restart operand is de-asserted and the Restart Delay OP operand remains de-asserted and the Restart Delay Lockout timer initializes from 0 only if the Restart Delay OP operand asserts when the motor goes offline.

Network Stability System – N60

N **New "6 PMU" software option and "8 voltage-inputs" DSP module support extend N60 multiple feeder capabilities**

720-12

Applicable: N60

This FW version enhances the N60 Network Stability and Synchrophasor Measurement System to support new software options that increase the number of PMU elements to six and voltage-only DSP modules for special synchrophasor-based applications.

New "6 PMU" software options are as follows:

Device	SW	Option
N60	I0	6 PMU
	I1	IEC 61850 + 6 PMU
	I2	CyberSentry UR Lvl 1 + 6 x PMU
	I3	CyberSentry UR Lvl 1 + 6 x PMU + IEC 61850
	I4	IEEE 1588 + 6 x PMU
	I5	IEEE 1588 + IEC 61850 + 6 x PMU
	I6	PRP + 6 x PMU
	I7	PRP + 6 x PMU + IEC 61850

There are additional software options available that mix "6 PMU" with other major software options (for example, 6 PMU + IEC 103, and so on). Six PMU elements enable independent data streaming from up to six feeders.

N60 devices can now be ordered with up to three "8V" type DSP modules, which allows for connecting

to 12 independent VT banks.

For details on the “6 PMU” software option and “8V” DSP module, see the N60 instruction manual.

N **Extended N60 recording capabilities through the addition of fault report elements**

720-13

Applicable: N60

Two new “User-programmable Fault Report” elements have been added to the N60.

These fault report elements are a replica of existing user-programmable fault report elements supported by other UR devices (for example, the T60) and are part of the standard recording functionality (no software option required).

For details on the “User-programmable Fault Report” elements, see the N60 instruction manual.

Transformer Protection Systems –T60

G **Setting menu has been changed to remove unsupported POTT element**

720-14

Applicable: T60

The setting menu of the T60 has been changed to remove the POTT element from the list of available control elements. The POTT element is one of the pilot-schemes available for line protection applications, so it is not required for transformer protection.

Previous 7.0x and 7.11 FW versions mistakenly show that a POTT element is available within the T60 settings. This condition does not present any performance issue.

N **T60 supports Rate of Change of Frequency (ROCOF) elements**

720-15

Applicable: T60

UR FW version 7.20 extends the T60 capabilities by adding a dedicated protection element for detecting rate of change of frequency (ROCOF). Prior to this FW version, implementing limited ROCOF functionality required manual FlexLogic configuration, so supporting a dedicated ROCOF element simplifies and standardizes settings.

The ROCOF elements added to the T60 shares the standard UR logic and settings for ROCOF elements.

For details on the ROCOF element, see the T60 instruction manual and UR Setup software.

E **Restrictions related to six windings software options have been modified to allow T60 with three DSP module configurations for four windings applications**

720-16

Applicable: T60

As standard functionality, T60 devices can be applied to four winding power transformers (up to four current sources used by the transformer differential algorithm).

However, when additional windings or current sources are required, T60 relays can be ordered with any of the six-winding software options available (three DSP modules required).

With previous FW versions, T60 with three DSP modules were restricted to order codes having six winding software options.

This FW version changes the restrictions to allow T60 devices to support three DSP modules regardless of the six winding software option. Instead, the software options restrict the maximum number of

current sources allowed for transformer differential as follows:

Option	Max # of DSP	Max # sources/Tx Diff
6 winding	3	6
No	3	4

For details on the six winding software options, see the T60 instruction manual.

Common Protection and Control Elements

E **Distance protection has been enhanced for faster operation**

720-17

Applicable: D30, D60, G60, L90, T60

Phase and ground distance protection elements have been modified to allow shorter operating times to distance zones 1 and 2. An improved distance algorithm (fast distance) now runs in parallel to the existing one (standard distance). The fast distance functionality can also be disabled via settings, so distance protection elements can be set to operate exactly as before if required.

This fast distance functionality is a standard feature on applicable UR devices. The change applies to UR devices with FW version 7.20 or newer.

For details and operating curves on the new fast distance functionality, see the applicable instruction manual.

N **New Directional Comparison Blocking (DCB1) element extends UR pilot scheme capabilities**

720-18

Applicable: D60, L90

UR FW version 7.20 introduces the new "DCB1" element that allows for additional pilot scheme flexibility.

The DCB1 pilot scheme element operates the same way that the regular DCB scheme does, except for the hard-coded connections to distance and directional overcurrent elements that were changed to allow users to select from any supported FlexLogic operand (for example, Neutral directional OC).

This allows a user to implement DCB schemes using solely directional elements to achieve better coordination or to fit other DCB non-traditional applications.

This change applies to UR devices with FW version 7.20 or newer.

For details on the new DCB1 element, see the D60 or L90 instruction manual.

E **Three phase overvoltage elements becomes a standard implementation on selected UR devices**

720-19

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

Firmware version 7.20 increases the number of phase overvoltage elements that UR devices support to three elements.

With this implementation, UR devices that currently support Phase Overvoltage have the same number of elements regardless of the number of VT inputs.

E **Two new polarizing methods added to existing Neutral Directional Overcurrent elements to improve protection selectivity**

720-20

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

Neutral Directional Overcurrent elements depend on Zero sequence voltage (V_0) or Ground current (Ig) for polarization, and users can choose among three polarization methods: "Current" (which uses Ig), "Voltage" (which uses V_0) or "Dual" (Ig or V_0).

With this FW version, two new polarization options have been added:

- "Dual-V" gives priority to V_0 polarization but uses Ig polarization if no V_0 signal is present
- "Dual-I" gives priority to Ig polarization but uses V_0 polarization if no Ig is present
- Regardless of the selected methods, if neither V_0 nor Ig are present, the element does not provide directionality

For details on the neutral directional polarization options, see the applicable instruction manual.

E **Phase selector to supervise phase distance elements for improved protection selectivity**

720-22

Applicable: D60, L90

Phase distance elements can operate when sensing the following fault types: three-phase, phase-to-phase, phase-to-phase-to-ground (PPG), and single phase-to-ground (SLG).

With this FW release, the phase selector element supervises the operation of the phase distance element when sensing an SLG or PPG fault type. Thus once ground distance elements have picked up, it prevents phase-to-phase elements from tripping. For instance, a phase A to ground fault makes the ground distance element operate (phase A), but prevents operation of phase distance elements (phases A-B and/or C-A).

This new supervisor also maintains selectivity for evolving faults that go from SLG/PPG type to phase-to-phase type.

For details on the phase selector supervisor, see the applicable instruction manual.

E **New negative sequence current supervisor improves selectivity of the power swing element**

720-23

Applicable: D60, L90

The power swing element is generally used to ensure distance protection selectivity by blocking distance elements in those cases where the impedance locus goes into any distance zone as a result of a power swing event.

However, since specific fault types can seem like a power swing event, the power swing element has been changed to be supervised by negative sequence current. This supervisor prevents the operation of the power swing element when negative sequence current exceeds a pickup value.

This new supervisor increases selectivity of the power swing element.

For details on the power swing element, see the applicable instruction manual.

N **Phase selector element supports a user-configurable reset timer**

720-24

Applicable: D60, L90

The phase selector element is used to determine which phases are affected by a fault event. Once any of the phase selector operands has been activated, a reset sequence starts. Phase selector operands are reset in half a cycle after an open pole condition, or after the phase selector "reset delay" timer is over.

Prior to this FW release, the "reset delay" timer was fixed to 500 ms.

FW 7.20 adds a new setting field called "Phase Selector Reset" that makes this timer user-configurable, from 0.5 to 3 seconds. This setting field is available at the Trip Output element menu.

This new configurable timer is helpful for schemes with long tripping times, such as step tripping on distance protection.

For details on the phase selector element, see the D60 or L90 instruction manual.

P **Neutral directional overcurrent detection error fix**

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.

P **VT Fuse Fail Element reset changes**

720-27

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

The VT Fuse Fail Latch Reset timer dropout is changed from 0.5 to 0 cycles, allowing quicker re-arming of the VT fuse fail element after a reset.

Common Platform Functions

N **German language support**

720-46

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

This FW version adds the German language to the five already supported languages. Firmware, UR Setup software, and instruction manuals are available in German.

The languages supported by UR devices are:

- English
- French
- Chinese
- Russian
- Turkish
- German

New codes for ordering UR devices with German language are as follows:

Code	Description
I	Enhanced German Front Panel
J	Enhanced German Front Panel with User-Programmable Pushbuttons

N **New inter-relay communication (IRC) modules**

720-47

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

UR version 7.20 release introduces two new types of inter-relay communication (IRC) modules. These modules combine existing communication interfaces (Direct fiber and C37.94) to enable hybrid channel redundancy.

New codes and description for the new IRC modules are as follows:

Codes	Description

2I	Channel 1 - IEEE C37.94, 820 nm, Multimode fiber, 64/128 kbps; Channel 2 - 1300 nm, single-mode, LASER
2J	Channel 1 - IEEE C37.94, 820 nm, Multimode, 64/128 kbps; Channel 2 - 1550 nm, single-mode, LASER

For details on the new "IRC modules", see the UR instruction manuals.

D **Updated description for "Communication Status - Remaining connections" actual values**

720-50

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

UR version 7.20 adds the script "TCP" to the description of "Communication Status - Remaining connections" actual values. This updated description indicates that those remaining connections refer to TCP connections.

The updated description for the actual values is as follows:

- Modbus TCP (Max 4)
- DNP TCP (Max 2)
- MMS TCP (Max 5)
- IEC-104 TCP (Max 2)
- PMU TCP

D **Fixing French translation of "Dataset"**

720-51

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

Previous FW versions translate English text "Dataset Item 1" to French "Elem donneesû1." This FW version correctly translates the English text to "Elem donnees 1."

UR version 720 fixes the French translation of "Dataset."

C **Template mode has been fixed**

720-53

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

UR version 720 fixes the setting template mode functionality that was inadvertently broken on FW version 7.01 and 7.11.

D **Fixing Turkish translation of Autoreclose 1P 3P Bkr Sequence enumeration**

720-54

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

UR version 720 fixes the Turkish translation of Autoreclose 1P 3P Bkr Sequence enumeration "1-2" and "2-1."

Previous FW versions translate English text "1-2" and "2-1" to Turkish "02-Oca" and "01-Feb". This FW version correctly /translate show those number as "1-2" and "2-1" correspondingly.

D **The Critical Fail relay and In-service LED now operate simultaneously when relays boot or are in test mode**

720-55

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

When UR devices boot, the “Critical Fail” auxiliary relay and “In-service” LED are de-energized and operate towards the end of the booting process. Operate state indicates the relay is in service.

Previous FW versions show that the “Critical Fail” relay operates about 24 seconds before the “In-service” LED does. In addition, the “in-service” LED can temporarily turn on when putting the UR relay in test mode.

This FW version ensures that the “Critical Fail” relay and the “In-service” LED operate simultaneously and prevents the “In-service” LED from turning on when the UR relay is in test mode.

For details on the “Critical Fail” relay and “In-service” LED operation, see the UR instruction manuals.

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

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 FW release ensures that the firmware in the Brick is maintained when connecting a Brick to URs with earlier firmware versions.

U **UR firmware (FW) upgrade process has been changed to ensure UR devices detect and alarm for corrupted FW image of process card and Brick**

720-61

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

At the end of the UR relay FW upgrade process, CRC is calculated to check the integrity of the FW image written to the device. If a corrupted image was detected, the UR device must alarm and interrupt the upgrade process. Restarting the FW upgrade clears this condition.

UR devices with HardFiber technology use three FW images: one for the UR CPU, a second for the computer module, and a third one for the Brick.

UR devices with previous FW versions deviate from the standard behavior. When the FW image for the computer module or Brick is corrupted, the UR device goes out of service and no alarm is provided.

This FW release fixes this issue.

This only affects end users who upgrade UR devices with HardFiber technology.

C **Latched Virtual Inputs status now keeps current state during loss of power to UR**

720-62

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

With the current firmware, the status of virtual Inputs of the “Latched” type is saved in non-volatile memory and hence does not change state when power is cycled to the UR.

C **Web page Front Panel display report**

720-63

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

In firmware 7.01 and 7.11, viewing of the web page front panel display report caused communications delays or failures, so it was disabled.

This was fixed in firmware 7.20 and is available.

N **Firmware revision 7.20 requires new boot revision 7.01**

720-65

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

Existing UR FW revisions 7.0x and 7.1x use UR boot revision 7.00. The new UR firmware revision 7.20 requires UR boot revision 7.01. Therefore, prior to upgrading existing UR devices with FW revision 7.20, users are required to update the boot revision to version 7.01.

Updating UR boot revision is done by following the procedure for Upgrading FW that is available via help menu of the EnerVista UR Setup software. However, when being asked to select the binary (.bin) FW file that contains the upgrade for the UR device, users must select the boot revision file instead (UrBootBuild36-701-Release.bin).

Once the UR boot revision is updated, users can upgrade the FW revision.

This affects UR devices being upgraded from FW revisions 7.0x or 7.1x to FW revision 7.2x. Users downgrading their UR devices from FW revision 7.2x to FW revision 7.1x or 7.0x are also affected.

Events and Records

P **Oscillography read/clear delayed GOOSE messages**

720-42

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

The mechanism of saving settings, including read/clear of Oscillography, can delay the GOOSE task to run later than intended, resulting in delayed GOOSE messages.

Release 7.20 fixes this problem that exists in releases 7.01 and 7.11.

P **Real Time Clock fix to report correct time stamps on the webpage**

720-43

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

Some of the events indicated in the product webpage can have incorrect time stamps.

This issue was corrected in version 7.20. This is not an issue in the UR event recorder.

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).

E **Enhancements to the Fault Report**

720-45

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

The following information is added to each fault report:

- Full UR order code
- Module code and serial number
- Last setting change date and time
- Extra events consisting of:
  - 10 Pre-fault events
  - 10 Post fault events
- Metered values of all configured sources at time of trigger

Cyber Security

E **Enhancements to the cyber security functionality**

720-39

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

Firmware version 7.20 introduces the following changes to the standard cyber security functionality:

- The "Change Local Password" setting name has been changed to "Change Device Password" for easier understanding

For details on standard cyber security implementation, see the UR instruction manuals.

C **Cyber security Sequence of Events (SOE) have been changed to ensure the captured IP address is correct**

720-40

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

Some of the events that are recorded by the cyber security SOE (such as login, logoff, and setting changes) capture the IP address of the computer executing the actions.

FW version 7.01 and 7.11 show that captured IP addresses always defaulted to 127.0.0.1.

FW version 7.20 ensures that IP addresses are correctly captured for the described type of events.

The cyber security SOE requires the "CyberSentry UR Lvl 1" software option.

End users not having UR devices with the "CyberSentry UR Lvl 1" software option are not required to take any action.

For details on the "CyberSentry UR Lvl 1" software option, see the UR instruction manuals.

C **The "CyberArmor" setting field has been removed**

720-41

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

This firmware version removes the "CyberArmor" setting field that was previously available at the

"Product Setup->Security->Supervisory" menu. This menu is available on UR devices with the "CyberSentry™" software option.

Since the "CyberArmor" setting field was not connected to any code, its removal does not affect existing functionality.

For details on the "CyberSentry UR Lvl 1" implementation, see the UR Instruction manuals.

Communications

N **UR devices support the IEC 60870-5-103 communication protocol**

720-28

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

This FW version adds the IEC 60970-5-103 (IEC 103) protocol to the supported communication protocols.

This new protocol is available via the RS485 port.

New software options for ordering UR devices with the IEC 103 protocol are as follows:

Software Option	Description
J0	IEC 60870-5-103
K0	IEC 60870-5-103 + PRP + IEEE 1588
L0	IEC 60870-5-103 + PRP + IEEE 1588 + CyberSentry™ UR Lvl 1

There are additional software options available that mix IEC 103 with other major software options.

For details on the IEC103 protocol, see the applicable instruction manual.

G **Customer support information and links have been updated**

720-29

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

The customer service information is updated to:

GE Digital Energy

650 Markland Street

Markham, Ontario

Canada L6C 0M1

Worldwide telephone: +1 905 927 7070

Europe/Middle East/Africa telephone: +34 94 485 88 54

North America toll-free: 1 800 547 8629

Fax: +1 905 927 5098

Worldwide e-mail: multilin.tech@ge.com

Europe e-mail: multilin.tech.euro@ge.com

Website: http://www.gedigitalenergy.com/multilin

M **IEC 61850-90-5 MSV control blocks have been changed to ensure the ConfRev default value is set to 1**

720-30

Applicable: N60

Reporting PMU data using IEC 61850-90-5 requires synchrophasors to be mapped into MSV control blocks (MSVCB) via independent PMU aggregator (AGG) elements. Each PMU AGG element requires a dedicated MSVCB, which supports an independent configuration revision (ConfRev) number.

Firmware versions released prior to version 7.20 show that the default value of confrev number was set to 7.

This FW revision ensures that the default value of the ConfRev number is set to 1.

Users not reporting PMU data using IEC 61850-90-5 are not affected by this issue.

C **Communications ports PRT1, PRT2, and PRT3 default subnet mask changed**

720-33

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

The default subnet mask setting for Ethernet ports PRT1, PRT2, and PRT3 is changed to 255.0.0.0. This is to ensure that the default subnet mask settings allow access to a wider range of networks by default.

C **Tx Configurable GOOSE correction for Russian language**

720-34

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

The dataset item in Tx configurable GOOSE if configured to MMXU1.MX.Hz.mag.f is incorrect in the Russian firmware version. It was incorrectly assigned to MMXU1.MX.PPV.phsAB.cVal.mag.f.

This is corrected in version 7.20.

C **Strict Power Profile default setting corrected in Precision Time Protocol (1588) settings**

720-35

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

The default setting of the Strict Power Profile is changed to disabled in Precisions Time Protocol (1588) settings.

C **Port 2 failover redundancy corrections**

720-36

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

With port 2 redundancy set to Failover, communications to devices past a router is not re-established after failover if the Default Gateway is used and no static routes. Using static routes allows failover.

This failover issue is corrected in version 7.20.

Failover is not an issue with three independent ports or Parallel Redundancy Protocol (PRP) configurations on Network Port 2.

Phasor Measurement Unit (PMU) – Synchrophasors

C **PMU recorder elements have been changed to ensure its "last cleared date" registry is accurate**

720-38

Applicable: C60, D60, F60, G60, L30, L90, N60, T60

The "last cleared date" registry shows when a Phasor Measurement Unit (PMU) recorder element was

cleared (there is one registry per PMU recorder element). Rebooting the UR relay also clears the PMU recorder.

UR devices with FW version 7.01 and 7.11 show that “last cleared date” registries of PMU elements 1, 2, and 3 can be inaccurate after rebooting.

This FW version fixes this issue.

End users who do not use PMU elements are not affected by this issue.

For details on the PMU recorder elements, see the applicable instruction manual.

C **IEC 61850 buffered and unbuffered report control blocks available for LLNO and GGIO1 have been changed to scan and capture event changes every two milliseconds**

720-37

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

UR firmware version 6.02 speeds up to 2 milliseconds the scanning and capture period of reporting services available for LLNO and GGIO1 data sets. At the end of each scanning period, data is buffered. However, likewise previous versions, reports are still generated and sent at the end of every MMS Reporting period
(~32 ms).

Multiple reports can be created but only one is sent at the end of each MMS reporting period; thus multiple reports require multiple periods to complete transmission.

Prior to this FW version, the LLNO and GGIO1 data sets were scanned and buffered every ~32 ms, which caused the following behaviors:

- If multiple status changes occurred within one scanning period, these events could show a common time stamp value
- Status changes that reset within the same scanning period may not be captured

This FW version fixes the behavior outlined.

End users who do not use LLNO or GGIO1 report control blocks are not affected by this issue.

Firmware 7.21

Summary

Highlights of UR FW version 7.21 include

- Network Stability System – N60
  - Changes to the initialization process prevent unnecessary reboot after a firmware upgrade
- Communications
  - IEC 61850 server has been changed to correctly indicate supported services
  - Latitude and longitude actual values for IEC 61850-90-5 have been changed to correctly show negative values
  - UR Ethernet failover redundancy functionality has been changed to successfully reconnect after power-cycling Ethernet switches associated with the UR primary Ethernet port
- EnerVista UR Setup Software
  - Fixed exceptions

Network Stability System – N60

B **Changes to the initialization process prevent unnecessary reboot after a firmware upgrade**

721-01

Applicable: N60

When upgrading firmware (FW), UR devices execute a single reboot at the end of the upgrade process.

Previous FW versions show that N60 devices can reboot twice at the end of the process because of minor initialization issues. Once the second reboot completes, the N60 is back to normal operation.

This FW version ensures that the FW upgrade process is completed with the first reboot (no second reboot is required).

Communications

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 an IEC 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 **Latitude and longitude actual values for IEC 61850-90-5 have been changed to correctly show negative values**

721-03

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

The UR IEC 61850 server element has latitude and longitude settings and actual values associated with the UR embedded IEC 61850-90-5 capabilities.

Previous FW versions show that actual values of negative latitude or longitude display inaccurately.

This firmware release uses signed integers to display actual values of latitude and longitude, which fixes this issue.

End users who do not use the UR IEC 61850-90-5 capabilities are not affected by the issue.

C **UR Ethernet failover redundancy functionality has been changed to successfully reconnect after power-cycling Ethernet switches associated with the UR primary Ethernet port**

721-04

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

When UR devices are configured for failover redundancy, Ethernet port 2 becomes primary and Ethernet port 3 becomes redundant Ethernet port.

If power is cycled to the Ethernet switch connected to the primary port, the UR device switches to the redundant port correctly. However, once the Ethernet switch is back to normal, the primary port may not reconnect.

This FW version ensures that the primary Ethernet port reconnects once the associated Ethernet switch is back online.

Firmware 7.23

Summary

Highlights of UR FW version 7.23 include:

- Bus Differential System – B90
  - Oscillography functionality has been changed to accurately show current values of the 7th analog channel of 8K type DSP modules
- Capacitor Bank Protection and Control System – C70
  - The automatic-setting feature of voltage differential (87V) has been changed to prevent potential blocking of 87V
- Feeder Protection System – F60
  - Forcing a fault report in the F60 has been fixed to ensure no relay reboot
- Line Differential System – L90
  - Distance impedance angle metering has been corrected to reduce metering fluctuations when 87L is enabled
- Common Protection and Control Elements
  - Distance element changes if used with power transformers
  - Phase selector to supervise phase distance elements for improved protection selectivity
  - Selectivity of the "fast distance" algorithm has been improved for quad phase to ground fault characteristic
  - Mutual coupling compensation not to be supported with sensitive ground CT input types
  - Distance impedance loop metering values corrected when displaying secondary values
  - Mutual coupling compensation calculation has been corrected when fast distance is used
  - Fast distance ground distance actual values resolution improved
  - Fast distance actual values improved to prevent freezing when some zones disabled
  - Setting Group elements have been changed to prevent taking relays out of service when switching setting groups
- Common Platform Function
  - Distance FlexAnalog value function has been corrected to ensure correct distance value
  - The "Equipment Mismatch" self-test warning alarm has been changed to prevent settings from being defaulted and to prevent continuous rebooting when triggered by I/O modules
- Communications
  - Time synchronization source selection has been changed to ensure most accurate source is used
  - Scaling factor of IEC 61850 analog GOOSE values have been changed for correct accuracy when used by FlexElements, Data Logger, and Oscillography elements
  - Ethernet failover redundancy logic has been improved to reduce switch-back time
- Phasor Measurement Unit (PMU) - Synchrophasors
  - UR PMU functionality has been improved to comply with Dec 2014 version of IEEE C37.118
  - UR synchrophasor filtering has been improved to eliminate reporting erroneous data during system disturbances and faults

Bus Differential System – B90

R **Oscillography functionality has been changed to accurately show current values of the 7th analog channel of 8K type DSP modules**

603-1

Applicable: B90

Analog values shown on an oscillography record are a scaled representation of captures values. The scale is user-adjustable when viewing the file.

B90 devices with previous FW versions showed that scale factors were incorrectly applied to the 7th analog channel of any 8K type Digital Signal processor (DSP) module installed in the relay.

This FW version ensures accurate values are shown and scale factors are correctly applied to all analog channels regardless the type of DSP module installed.

Performance of protection elements is not compromised by this issue.

For additional details on the B90 oscillography, see the B90 instruction manual.

Capacitor Bank Protection and Control System – C70

U **The automatic-setting feature of voltage differential (87V) has been changed to prevent potential blocking of 87V**

723-1

Applicable: C70

The voltage differential (87V) automatic-setting feature has been changed to prevent blocking of the 87V element when conditions for calculating match factor are not met, instead the 87V element goes back to operate with pre-set user settings.

If the automatic-setting determines that the matching factors are invalid, the element reverts back to pre-existing balancing factors and does not block 87V.

This was typically an issue if applied voltage were zero or exceeded 0.25 pu, and in all previous firmware releases.

Feeder Protection System – F60

B **Forcing a fault report in the F60 has been fixed to ensure no relay reboot**

723-2

Applicable: F60

The fault report element has been changed to prevent unexpected rebooting when forcing a fault report trigger.

This was an issue in firmware versions 7.01 to 7.22

Line Differential System – L90

M **Distance impedance angle metering has been corrected to reduce metering fluctuations when 87L is enabled**

723-3

Applicable: L90

Distance impedance angle metering presented fluctuations when actual values of angles were read via Modbus registers (actual value issue). This was due to incorrect reference angle used.

Distance protection is not affected by this issue.

Common Protection and Control Elements

G **Distance element changes if used with power transformers**

723-4

Applicable: D30, D60, L90, G60, T60

Distance elements have been changed to disable the “fast distance” parallel-algorithm when a power transformer is within the protection distance zone. High-speed distance is not necessary if a power transformer is within the zone.

E **Phase selector to supervise phase distance elements for improved protection selectivity**

723-5

Applicable: D60, L90

The phase selector was improved to ensure single line to ground faults (FLG) are accurately addressed in single-pole tripping applications.

With this FW release, supervision of the fast distance is included.

For details on the described phase selector supervisor, refer to applicable instruction manuals.

P **Selectivity of the “fast distance” algorithm has been improved for quad phase to ground fault characteristic**

723-6

Applicable: D30, D60, L90, G60, T60

Accuracy of the Ground Distance quadrilateral characteristics between the RCA angle and left blinder were improved.

G **Mutual coupling compensation not to be supported with sensitive ground CT input types**

723-7

Applicable: D30, D60, L90

Mutual coupling compensation of ground distance elements are not to be supported with sensitive ground CT input types.

M **Distance impedance loop metering values corrected when displaying secondary values**

723-8

Applicable: D30, D60, L90, G60, T60

The distance impedance loop metering function has been changed to provide accurate actual values. (Actual value issue, so distance protection is not compromised.)

P **Mutual coupling compensation calculation has been corrected when fast distance is used**

723-16

Applicable: D30, D60, L90, G60, T60

Mutual coupling compensation has to be calculated and applied to distance elements to prevent overreaching. The compensation calculation was incorrect with the fast distance, but corrected in this release. Only firmware releases 7.20 and 7.21 are affected.

M **Fast distance ground distance actual values resolution improved**

723-9

Applicable: D30, D60, L90, G60, T60

Fast distance algorithm has been changed to provide higher-resolution actual values of phase-to-ground impedance.

M **Fast distance actual values improved to prevent freezing when some zones disabled**

723-10

Applicable: D30, D60, L90, G60, T60

The actual values function of the fast distance algorithm has been changed to prevent freezing when any distance zone is set to disable (actual value issue, so distance protection is not compromised).

U **Setting Group elements have been changed to prevent taking relays out of service when switching setting groups**

603-3

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

Setting group switching is a fast operation that, under normal conditions, should not trigger any self-test alarm.

Some UR devices with previous firmware (FW) revisions have shown that switching setting groups can activate a major self-test alarm (Module failure 5) that takes the relay out-of-service. The relay has to be rebooted to get it back in service.

This FW release ensures UR relays does not trigger unnecessary alarms when switching setting groups.

End users, whose UR relays are not configured for switching setting groups, are not affected by this issue.

For additional details on setting group switching, see the instruction manual of any applicable UR device.

Common Platform Functions

M **Distance FlexAnalog value function has been corrected to ensure correct distance value**

723-15

Applicable: D30, D60, L90, G60, T60

The Distance FlexAnalog function has been changed to use the correct base unit (this does not affect distance protection performance).

U **The "Equipment Mismatch" self-test warning alarm has been changed to prevent settings from being defaulted and to prevent continuous rebooting when triggered by I/O modules**

603-05

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

A defective input and output (I/O) module can trigger an "Equipment Mismatch" self-test alarm.

Previous firmware revisions have shown that, under this condition, the relay settings can be defaulted

and, if an “update order code” command is submitted, the relay can fall into continuous rebooting.

This firmware release ensures that settings are not defaulted and prevents continuous reboot when UR relays are under the described conditions.

Users having URs with a previous firmware version can detect that settings have been defaulted when an “Equipment Mismatch” alarm and a “Relay out-of-service” alarm are active simultaneously. A continuous rebooting condition can be detected by identifying intermittent and consistent communication in and out events.

For details on self-test warning functionality, see the instruction manual of any applicable UR device.

Communications

C **Time synchronization source selection has been changed to ensure most accurate source is used**

723-11

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

Changes to the time synchronization elements were implemented to improve coordination between IEEE 1588 and IRIG-B time sources, ensuring most accurate source is used.

C **Scaling factor of IEC 61850 analog GOOSE values have been changed for correct accuracy when used by FlexElements, Data Logger, and Oscillography elements**

603-04

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

Previous FW revisions have shown that small values of analog GOOSE were inaccurate due to issues with the applied rescale factor.

This FW release corrects rescale factors applied to small values of analog GOOSE, ensuring accuracy.

If GOOSE values are not configured for UR FlexElements, Data Logger, or Oscillography, a FW upgrade is not required.

For additional details on the “Analog GOOSE values,” see the instruction manual of any applicable UR device.

C **Ethernet failover redundancy logic has been improved to reduce switch-back time**

723-12

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

Ethernet failover redundancy (hot-standby) logic has been improved to reduce the switch-back time to 2 ms (switch from redundant back to primary Ethernet port).

Phasor Measurement Unit (PMU) – Synchrophasors

E **UR PMU functionality has been improved to comply with Dec 2014 version of IEEE C37.118**

723-13

Applicable: **C60, D60, F60, G60, L30, L90, N60, T60**

PMU functionality of UR devices has been improved to comply with the new version of the IEEE C37.118.1a-2014 standard to be released Dec 2014.

M **UR synchrophasor filtering has been improved to eliminate reporting erroneous data during system disturbances and faults**

723-14

Applicable: **C60, D60, F60, G60, L30, L90, N60, T60**

UR synchrophasor filtering has been improved to prevent reporting of erroneous data during system disturbances such as fault, switching, or other conditions.

Firmware 7.24

Summary

Highlights of UR FW version 7.24 include

- Line Differential System – L90
  - FlexLogic operand used to indicate the faulted line section. This operand turns high at the relay at the faulted line section in a three-terminal application only.
- Common Protection and Control Elements
  - Phase selector improvements – Distance logic improvements, phase-to-phase selector improvements, Supervision is disabled during first 0.5 seconds after power-up
- Communications
  - Session monitor password protection is removed from "FACTORY_EVENT.TXT" and "SETTING_CHANGES.LOG"

Line Differential System – L90

E **FlexLogic operand used to indicate the faulted line section**

724-1

Applicable: L90

A FlexLogic operand is to be used to indicate the faulted line section in a three-terminal application only. This operand turns high at the relay at the faulted line section. Virtual output 96 is used to indicate the faulted line section. A service command 112 enables virtual output 96 to be used for the L90 tap local fault and a service command 113 disables it.

This works only for L90 with three terminals. For any other configuration, the service commands do not affect functionality.

Common Protection and Control Elements

H **Phase selector improvements – Distance logic improvements, phase-to-phase selector improvements, Supervision is disabled during first 0.5 seconds after power-up**

724-2

Applicable: D30, D60, L90, G60, T60

The distance phase selector logic potentially misoperates when the pre-fault current is <0.05 pu and the fault is >0.05 pu. The logic is corrected to use the vectoral difference of magnitudes and angles of the I1 component instead of scalar difference.

Phase-to-phase fault detector scheme logic did handle phase distance zones set incorrectly, and resulted in constant pick-up. A three-second timer was added to the individual zones pickup detector to the zone distance operand path in the phase selection supervision logic to reset on detection of such condition.

I1mem may not be correctly updated after power up or after DSP error blocking is removed. To fix this, no phase selection supervision is given to the phase distance elements in the first 0.5 seconds after power-up or after DSP error blocking is removed, to ensure phase distance elements are not mis-blocked due to the wrong I1mem value in this 0.5 second duration.

Communications

C **Session monitor password protection is removed from "FACTORY_EVENT.TXT" and "SETTING_CHANGES.LOG"**

724-3

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

Password protection is removed from "FACTORY_EVENT.TXT" and "SETTING_CHANGES.LOG" security log files with the CyberSentry option, to allow Gateways (D400) without SSH port forwarding capabilities to write MODBUS operations and enable access to these security log files.

Firmware 7.25

Summary

Highlights of version 7.25 include

- Bus Differential System – B90
  - B90 TOC operate time corrected during boot or in-service
- Line Differential System – L90
  - L90 with HardFiber reboot command structure improved
- Common Protection and Control Elements
  - Breaker Arcing element corrections
  - Active settings group corrections during reboot
  - CT fail element corrections
  - Phase distance operation corrected with time delay more than three seconds
  - Volts per Hz element operating time corrected
  - Phase Overvoltage element operating time corrected
  - Ground distance zone 1 operating time corrected
  - Phase and ground distance zone 1 fast distance disabled for non-directional mode
  - UR setting group elements have been changed not to reset when power cycling the relay
- Common Platform Functions
  - Transformer 2nd harmonic metering corrections in FlexElements
  - CPU high-utilization monitor enhanced
- Events and Records
  - Overfrequency element logging corrections
  - GOOSE analogs logging corrections
  - URinfo.txt file corrections
- Cyber Security
  - SYSLOG events removed for MODBUS/TCP initiation
- Communications
  - DCmA output base PU corrected if configured to GOOSE analog
  - UR FlexElements have been changed to properly operate when programmed to use IEC 61850 GOOSE analog inputs
  - IEC 61850 buffered and unbuffered report control block reservation clear is random on disconnection
  - Allow write to unsupported IEC 61850 buffered and unbuffered report control block trigger options TrgOps
  - IEC 61850 double status points (DPS) out of order configuration issue corrected
  - IEC 61850 logical node XCBR intermediate status corrected
- HardFiber
  - Fast distance has been added to include UR devices communicating to HardFiber Brick
  - UR PMU functionality has been improved in UR devices communicating to HardFiber Brick
  - IEC 60870-5-103 protocol has been added to C70, D60, and L90 devices communicating to HardFiber Brick

  - Protection element corrections in C70, D60, and L90 devices communicating to HardFiber Brick
  - Phase and ground distance zone 1 and 2 operating time corrected for UR devices communicating to HardFiber Brick
  - PMU phasor angles corrected for UR devices communicating to HardFiber Brick
- Phasor Measurement Unit (PMU) - Synchrophasors
  - UR PMU frequency and rate of change of frequency (ROCOF) functions have been corrected
  - UR PMU frequency corrected if signal source is Vx or Ig
  - Reported synchrophasor frequency corrected with delta VT connection

Bus Differential System – B90

P **B90 TOC operate time corrected during boot or in-service**

731-06

Applicable: B90

If a B90 is exposed to a fault current during a reboot or when in service, the TOC operate times are incorrect.

FW versions that fix this issue: 7.25, 7.31, 6.04.

Line Differential System – L90

R **L90 with HardFiber reboot command structure improved**

725-1

Applicable: L90

During the reboot of a L90 with HardFiber, “System Integrity Recovery” events are logged due to incorrect shutdown sequence.

This firmware release fixes the problem.

FW versions that fix this issue: 7.25, 7.31.

Common Protection and Control Elements

M **Breaker Arcing element corrections**

604-4

Applicable: C60, D30, D60, F35, F60, L30, L60, L90, T35, T60

The Breaker Arcing element has a setting labeled **BKR 1 ARC AMP DELAY**, which is used to program the delay interval between the time the tripping sequence is initiated and the time the breaker contacts are expected to part. Integration of currents starts after this delay timer expires and when configured breaker contacts are received, on a per-phase basis.

The check for tripping sequence initiation is every **BKR 1 ARC AMP DELAY** setting. This is corrected to monitor the input conditions to the tripping sequence every run of the element and restart the initiation when conditions are satisfied. With this change, the breaker arcing element integrates every 100 ms regardless of the timer delay setting.

This problem existed since firmware revision 4.20 and is fixed in 6.04 and 7.25.

P **Active settings group corrections during reboot**

725-2

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

During the reboot of a UR, when the active settings group is other than group 1 and the settings group BLK operand is ON, the UR incorrectly switches to group 1 on a power cycle.

This firmware release fixes the problem.

FW versions that fix this issue: 7.25, 7.31.

P **CT fail element corrections**

725-3

Applicable: G30, G60, L30, L60, L90, M60, T35, T60

CT fail element 2 uses incorrectly the timer of CT fail detector 1 under certain circumstances.

This firmware release fixes the problem.

FW versions that fix this issue: 7.25, 7.31.

P **Phase distance operation corrected with time delay more than 3 s**

725-4

Applicable: D30, D60, G60, L60, L90

Phase distance incorrectly resets and picks up based on phase selector supervision during a delay of more than three seconds during a sustained fault condition.

This firmware release fixes the problem.

P **Volts per Hz element operating time corrected**

725-5

Applicable: G30, G60, T60

The Volts per Hertz element operates faster than expected if the operating curve is set to definite time at low voltages and frequencies (tested at 14% of pickup). The operate time is correct when V/Hz is 25% above nominal voltage/frequency.

This firmware release fixes the problem.

P **Phase Overvoltage element operating time corrected**

725-6

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

The Phase Overvoltage element operates slower than expected due to the incorrect number of security counts used.

This firmware release fixes the problem.

P **Ground distance zone 1 operating time corrected**

725-7

Applicable: D30, D60, L60, L90, T60

Ground distance zone 1 element operates slower than expected due to incorrect limit angles used in the QUAD characteristic for certain input waveforms.

This firmware release fixes the problem.

G **Phase and ground distance zone 1 fast distance disabled for non-directional mode**

725-8

Applicable: D30, D60, L60, L90, T60

Phase and ground zone 1 fast distance is disabled if directional mode is set to non-directional, since non-directional is typically not used for instantaneous applications.

This firmware release fixes the problem.

P **UR setting group elements have been changed not to reset when power cycling the relay**

605-9

Products: All

Impacted firmware: All to 6.04, 7.0x to 7.24, 7.30

Corrected firmware: 6.05, 7.25, 7.31

Workaround: None

Description: Default settings in UR relays make “setting group #1” always active. When configuration is changed to enable another setting group (for example, Setting group #3) and the setting group element is in “Blocked” state, then the active setting group may reset to default (group #1) after power cycling the relay.

Common Platform Functions

M **Transformer 2nd harmonic metering corrections in FlexElements**

725-21

Applicable: T35, T60

FlexAnalogs Xfmr harm2 Iad, Ibd, and Icd metering per unit correction factors are corrected when used in FlexElements. This issue caused incorrect metering values for the mentioned quantities.

E **CPU high-utilization monitor enhanced**

605-8

Products: All

Impacted firmware: All to 6.04, 7.0x to 7.24

Corrected firmware: 6.05, 7.25, 7.31

Workaround: None

Description: The CPU utilization monitor available on the UR webpage has been enhanced with four counters to provide a trend.

GE tracking numbers: 605-8

Events and Records

R **Overfrequency element logging corrections**

725-18

Applicable: D60, F60, G30, G60, L90, M60, N60, T60

Overfrequency DPO event is logged incorrectly for Overfrequency OP FlexLogic operand reset, and not for Overfrequency PKP FlexLogic operand reset.

This firmware release fixes the problem.

R **GOOSE analogs logging corrections**

725-19

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

The logging of GOOSE analogs in all types of logs was changed to per unit, to be consistent with FlexElements and other FlexAnalogs.

R **URinfo.txt file corrections**

725-20

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

The boot revision, serial number and CPU module serial number is corrected in the urinfo.txt file retrieved by the EnerVista UR Setup software.

All previous firmware releases are affected.

Cyber Security

R **SYSLOG events removed for MODBUS/TCP initiation**

725-17

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

The system log generates an event for every MODBUS/TCP initiation request, which has “Unknown” username.

This event was removed from SYSLOG, however events will be logged for successful or failure of MODBUS/TCP connections.

Communications

C **DCmA output base PU corrected if configured to GOOSE analog**

725-9

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

The base per unit of DCmA output is incorrect if configured to a GOOSE analog, causing signal clamping.

This firmware release fixes the problem.

C **UR FlexElements have been changed to properly operate when programmed to use IEC 61850 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.

Some previous FW versions allow FlexElements to apply improperly the unit base value when IEC 61850 GOOSE analogs are set as the FlexElement’s input, which can lead to an incorrect operation of the FlexElement.

No action is required for UR devices with the following FW versions.

FW versions that fix this issue: 5.72, 7.25, 6.00, 5.92, 5.83, 5.48

C **IEC 61850 buffered and unbuffered report control block reservation clear is random on disconnection**

725-10

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

Removing reservation of a buffered or unbuffered report control block upon loss of client communications is corrected to 2 minutes, where it was previously random between 2 and 10 minutes.

C **Allow write to unsupported IEC 61850 buffered and unbuffered report control block trigger options TrgOps**

725-11

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

Write operation to all bits of the trigger options TrgOps operand of all buffered and unbuffered control blocks was corrected. The device supports the pre-listed TrgOps even though it allowed the write operation.

C **IEC 61850 double point status (DPS) out of order configuration issue corrected**

725-12

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

IEC 61850 double point status operand bits are incorrect if configured out of order.

This firmware release fixes the problem.

C **IEC 61850 logical node XCBR intermediate status corrected**

725-13

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

IEC 61850 logical node XCBR intermediate state is assigned incorrectly to the attribute position.

FW versions that fix this issue: 7.31 and 7.25.

HardFiber

P **Fast distance has been added to include UR devices communicating to HardFiber Brick**

725-22

Applicable: D30, D60, L60, L90

The fast distance protection functionality has been added to UR devices communicating to HardFiber Brick.

E **UR PMU functionality has been improved in UR devices communicating to HardFiber Brick**

725-23

Applicable: C60, D60, F60, G60, L30, L90, N60, T60

Frequency and ROCOF PMU functionality of UR devices communicating to a HardFiber Brick have been improved to comply with the new version of the IEEE C37.118.1a-2014 standard released December 2014.

N **IEC 60870-5-103 protocol has been added to C70, D60, and L90 devices communicating to HardFiber Brick**

725-24

Applicable: C70, D60, L90

IEC60870-5-103 protocol has been added to C70, D60, and L90 devices communicating to a HardFiber Brick, which was previously available only in these devices with conventional configuration.

FW versions that fix this issue: 7.31, 7.25.

P **Protection element corrections in C70, D60, and L90 devices communicating to HardFiber Brick**

725-25

Applicable: C70, D60, L90

Protection element operands remain engaged after the element is disabled in C70, D60, and L90 devices communicating to HardFiber Bricks. This was corrected by changing the sequence of the schedule and ensuring that the element is disabled before it is run. Conventional URs are not affected.

FW versions that fix this issue: 7.31, 7.25.

P **Phase and ground distance zone 1 and 2 operating time corrected for UR devices communicating to HardFiber Brick**

725-26

Applicable: D30, D60, L60, L90, T60

Phase and ground distance zone 1 and 2 elements operate slower than zone 3 and 4 due to improper phasor compensation.

This firmware release fixes the problem.

M **PMU phasor angles corrected for UR devices communicating to HardFiber Brick**

725-27

Applicable: C60, D60, F60, G60, L30, L90, N60, T60

Phase angles of PMUs are off by 30 degrees if more than one PMU is used in a UR communicating to a HardFiber Brick.

This firmware release fixes the problem.

Phasor Measurement Unit (PMU) - Synchrophasors

M **UR PMU frequency and ROCOF functions have been corrected**

725-14

Applicable: C60, D60, F60, G60, L30, L90, N60, T60

Current and voltage cutoff levels have been corrected in PMU frequency and ROCOF functions.

M **UR PMU frequency corrected if signal source is Vx or Ig**

725-15

Applicable: C60, D60, F60, G60, L30, L90, N60, T60

UR PMU frequency is always reported as nominal if signal source is selected as Vx or Ig. It is now corrected to follow the signal source input.

M **Reported synchrophasor frequency corrected with delta VT connection**

725-16

Applicable: C60, D60, F60, G60, L30, L90, N60, T60

Reported synchrophasor frequency is incorrect for delta VT connections. This is due to incorrect cutoff value (phase to neutral VT secondary) used.

This firmware release fixes the problem.

Firmware 7.26

Summary

Highlights of version 7.26 include

- Line Differential Systems – L30, L90
  - Corrected 87L Max asymmetry alarms
- Transformer Protection Systems – T35, T60
  - Improved percent differential 2nd harmonic inhibit mode at low differential currents
  - Corrected transformer percent differential and phase IOC misoperation due to late settings change detector report
- Common Protection and Control Elements
  - Phase selector improvements
  - Distance FlexAnalogs corrections
  - Fault-type supervision modified for phase distance
  - Fixed comparators failure in the Fast Distance element when angle is 180.00 degrees
  - Corrected UR fast phase distance quad characteristic calculation in versions 7.2x and 7.3x
  - Corrected Breaker Arcing element
  - Corrected DCmA intermittent metering
  - Corrected FlexElement actual value metering when using Volts per Hertz element 2
- Common Platform Functions
  - Corrected Module Failure #31 caused by DSP. Hardware change may be required.
  - Fixed DSP self-test error to record events during DSP failure and allow user pushbuttons to operate
  - Changed Autoreclose element timer, connected to Phase Select Multi-P operand pickup time, from 0 to 10 ms
  - Corrected Voltage LED latching
  - Reset of Virtual Inputs when set to Self-Reset corrected
  - Corrected pushbutton LEDs to turn ON sequentially during LED test
  - Corrected operation of optional user-programmable pushbuttons 4 to 7 with basic front panel via EnerVista software
  - Improvement to DSP checksum diagnostic
  - Changed Module Failure 08 behavior to auto-recover the DSP
- Events and Records
  - Modbus register 0xF222 to show settings default cause
  - Fault locator improvements
  - Increased accuracy of fault locator element
- Cyber Security
  - CyberSentry Administrator login corrections
  - CyberSentry security and login/logout event logging for serial communication corrected
  - CyberSentry concurrent access of Observer roles corrected
  - CyberSentry multiple observer login event logging during startup corrected
- Communications
  - Fixed issue in PRP transmission that can cause an unexpected diagnostic message System Exception

in systems with GOOSE
  - Corrected PRP that takes a long time to switch ports
- HardFiber
  - Corrected UR HardFiber protection being blocked while “in service” after firmware upgrade
- Phasor Measurement Unit (PMU) - Synchrophasors
  - Corrected FlexElement using PMU rate of change of frequency
  - Phase angles of PMU assigned to UR 2nd signal source corrected

Line Differential Systems – L30, L90

C **Corrected 87L Max asymmetry alarms**

726-1

Applicable: L30, L90

During 87L re-synchronization, or when transmission packets are occasionally lost or corrupted, incorrect GPS timestamps can be used, potentially causing 87L Max Asymmetry nuisance alarms.

This does not cause relay malfunction.

This firmware release fixes the issue.

This issue exists in all previous firmware revisions.

Transformer Protection Systems – T35, T60

P **Improved percent differential 2nd harmonic inhibit mode at low differential currents**

726-2

Applicable: G30, T35, T60

A cutoff of 0.04 pu prevents inaccurate measurement, for example when the differential current is less than 0.04 pu, the differential current and its 2nd harmonics component are forced to zero. This can lead to a false trip during transformer energization when both components in any phase (specifically Ibd and Icd) drop below 0.04 pu in two out-of-three inhibit mode.

This firmware release fixes the issue. The two-out-of-three 2nd harmonic inhibit logic is applied only if all three phase differential currents exceed the cutoff level of 0.04 pu. In cases where differential current in any phase drops below 0.04 pu, the logic is reverted to one-out-of-two logic, ensuring reliable inhibit during energization.

This issue exists in all previous firmware revisions.

M **Corrected transformer percent differential and phase IOC misoperation due to late settings change detector report**

726-29

Applicable: All but L60

The settings change detector reports too late to prevent IOC misoperation in a new setting group. The relay misoperates, initiates recovery mechanism, reboots, and goes back into service.

This firmware release fixes the issue. The relay checks before data transfer.

This issue exists in v5.70 to 7.25.

Common Protection and Control Elements

P **Phase Selector corrections**

726-3

Applicable: D60, L60, L90

The phase selector can incorrectly declare the fault type as PHASE SELECT 3P after all currents are reduced to zero during switch-off events, where the phase selector was to declare PHASE SELECT VOID. There is no impact on the protection performance unless PHASE SELECT 3P is used in logic, for example to inhibit reclosure for three-phase faults.

This firmware release fixes the issue.

This issue exists in all previous firmware revisions.

P **Distance FlexAnalogs corrections**

726-4

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

The distance FlexAnalog values get truncated at large apparent distance measurements, potentially causing FlexElements to operate unexpectedly when used as input in a FlexElement. Therefore it is limited to 655.35 Ohm in the corrected firmware.

This firmware release fixes the issue.

This issue exists in firmware revisions 7.20 to 7.25, 7.30, and 7.31.

P **Modified Phase Selector fault type supervision for phase distance**

726-5

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

Fault type supervision was changed for phase distance as follows.

Products with five phase distance elements (D30, D60, L90, T60):

- Phase distance Z4 and Z5 are not supervised by the fault type characteristic
- Phase distance Z1, Z2, and Z3 are supervised by the fault type characteristic, however they can be disabled as follows:
    - In firmware version 7.26 and 7.32, set a non-zero value to **Volt Level** of phase distance Z5
    - In firmware revision 7.4 and later, a new setting is introduced

Products with three phase distance elements (G60, L60):

- None of the phase distance zones are supervised by the fault type characteristic

Phase selector supervision exists in firmware revisions 7.20 to 7.25 and 7.31.

F **Fixed comparators failure in the Fast Distance element when angle is 180.00 degrees**

726-6

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

During firmware 7.2 implementation, a numerical bug was introduced inadvertently in the fast distance comparators. When comparing two vector angles (based on voltage and current phasors and impedance settings), resulting in exactly +180.00° or -180.00°, the output is returned as -180.00°, which is below 90°, resulting in the comparator erroneous operation and distance operation. Phase and ground distance are impacted. See Service Bulletin URSB1215.pdf, available in LaunchPad, for details.

This firmware release fixes the issue.

This issue exists in firmware revisions 7.20 to 7.25, 7.30, and 7.31, where fast distance, both phase and ground, can be disabled by using the minimum value of the **Volt Level** setting.

P **Corrected UR fast phase distance quad characteristic calculation in versions 7.2x and 7.3x**

726-7

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

The left and right blinders of all fast phase distance characteristics are calculated incorrectly and cause only the regular distance to operate close to boundary conditions. This causes distance operation to be slightly slower than expected.

This firmware release fixes the issue.

This issue exists in firmware revisions 7.20 to 7.25, 7.30, and 7.31.

P **Corrected Breaker Arcing element**

726-8

Applicable: C60, D30, D60, F35, F60, L30, L60, L90, T45, T60

The following changes were implemented in the breaker arcing elements:

- Integration of kA^2-cycle is now fixed to a 100 ms window that starts after BKR ARC AMP DELAY expires, which was initiated by ARC AMP INT. Previously, integration continued until ARC AMP INT dropped out, regardless of the 100 ms window.
- In previous versions when breaker operating time is measured, the timer resets to 0 if current is present for more than 100 ms. This was now changed to only stop the timer.

This firmware release fixes the issue.

This issue exists in all previous firmware revisions.

P **Corrected DCmA intermittent metering**

726-9

Applicable: All with DCmA inputs

DCmA metered values drift by up to 6% for 1 mA and 1.7% for 20 mA inputs for up to one second, where the required accuracy is 0.2% full scale. This is a temporary, out-of-specification issue, up to one second at a time. This is more apparent if steady state DCmA input is less than 50% full scale. It can happen at any time and is not linked to a particular condition.

This firmware release fixes the issue.

This issue exists in firmware revisions 7.00 and up.

P **Corrected FlexElement actual value metering when using Volts per Hertz element 2**

726-10

Applicable: G30, G60, T60

FlexElements using Volts per Hertz element #2 meters values incorrectly by a factor of 1000 (too high). Volts per Hertz element 1 is not affected.

This firmware release fixes the issue.

This issue exists in firmware revisions 2.80 and up.

Common Platform Functions

A, U **Corrected Module Failure #31 caused by DSP**

726-20

Products: All UR devices manufactured between 1 September 2011 and 1 December 2015

Impacted firmware: 7.25, 7.26, 7.32, 7.4x

Corrected firmware: Not applicable

Workaround: None

Description: Module Failure #31 can potentially occur in URs due to incorrect signal handling in the digital signal processor (DSP). It does not remove the UR from service and some functions remain available. This issue applies when upgrading from version 7.0x, 7.1x, 7.20 to 7.24, 7.30, 7.31 to firmware version 7.25, 7.26, 7.27, 7.28, 7.32, 7.4x, 7.60 and up. If a relay has already been upgraded to any version higher than 7.25, 7.26, 7.27, 7.28, 7.32, 7.4x, 7.60 and up and does not exhibit the issue, no action is required, and the relay can be upgraded to any version.

Factory updates to the DSP correct the issue. Any DSP manufactured between 1 September 2011 and 1 December 2015 with impacted firmware must be sent back to the factory for updates before updating the firmware. Contact GE technical support at ga.supportNAM@ge.com for details.

U **Fixed DSP self-test error to record events during DSP failure and allow user pushbuttons to operate**

726-21

Applicable: All UR devices except C30

No events are recorded when the relay experiences DSP self-test error, for example Module Failure 08. After powering up the relay, depending on the firmware version, the timestamps are the same as the Module Failure 08 timestamp or no events are recorded at all.

This firmware release fixes the issue.

This issue exists in firmware revisions 5.40 and up.

U **Changed Autoreclose element timer, connected to Phase Select Multi-P operand pickup time, from 0 to 10 ms**

726-22

Applicable: C60, D60, L60, L90

If the Autoreclose mode is selected as Mode 3: 3Pole-A, the recloser can go to lockout incorrectly during switch-off transients. During breaker pole opening, the phase selector can assert the PHASE SELECT MULTI-P operand transiently, causing the autorelcoser to lock out.

This firmware release fixes the issue. In the Autoreclose element, pickup time for the timer connected to FlexLogic operand PHASE SELECT MULTI-P is changed from 0 to 10 ms. Dropout time remains unchanged (5 ms).

This issue exists in firmware revisions 2.90 and up.

D **Corrected Voltage LED latching**

726-23

Applicable: C70

The voltage LED goes on if Neutral Voltage Unbalance operates, however it does not latch.

This firmware release fixes the issue so that latching occurs.

This issue exists in all firmware revisions.

C **Correction of reset of Virtual Inputs when set to Self-Reset**

726-24

Applicable: All UR devices

Virtual Inputs are not always activated for at least one protection pass (2 ms at 60 Hz) when resetting is set to Self-Reset. This is evident when the event recorder shows the same time-stamp for VI On and VI Off in the case a Virtual Input is configured as Self-Reset.

This firmware release fixes the issue. Self-resetting Virtual Inputs now hold their value for at least one protection pass and the events are logged accordingly.

This issue exists in all firmware revisions.

G **Corrected pushbuttons LEDs to turn ON sequentially during LED test**

726-25

Applicable: All UR devices

When an LED test is performed on a UR relay with an enhanced front panel and user programmable pushbuttons, some of the pushbutton LEDs turn on, but not sequentially.

This firmware release fixes the issue.

This issue exists in all firmware revisions.

D **Corrected operation of optional user-programmable pushbuttons 4 to 7 with basic front panel via EnerVista software**

726-27

Applicable: All UR devices with basic front panel and optional user-programmable pushbuttons (types P, G, S and B)

Optional user-programmable pushbuttons 4 to 7 on the basic front panel can be operated from the front panel but not using the EnerVista UR Setup or Engineer software.

This firmware release fixes the issue so that the pushbuttons operate with the software too.

This issue exists in firmware revisions 5.40 and above.

E **Improvement to DSP checksum diagnostic**

605-13

Products: All

Impacted firmware: All after 5.20

Corrected firmware: 6.05, 7.26

Workaround: None

Description: Improvements applied to increase relay dependability.

E **Improvement to DSP internal diagnostic timestamp**

605-14

Products: All

Impacted firmware: All after 5.70

Corrected firmware: 6.05, 7.26

Workaround: None

Description: Improvements applied to time stamp of internal diagnostic events.

E **Changed Module Failure 08 behavior to auto-recover the DSP**

726-31

Products: All except C30

Impacted firmware: All to 7.25, 7.30, 7.31

Corrected firmware: 7.26, 7.32

Workaround: None

Description: Module Failure 08 indicates that CT/VT module (DSP) is not responsive. The UR initiated Module Failure 08 when the DSP became unresponsive momentarily.

In the new release, the behavior of Module Failure 08 has been changed to auto-recover the DSP by rebooting the relay to bring the relay back into a healthy state.

Events and Records

N **Modbus register 0xF222 to show settings default cause**

602-3

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

UR settings can be defaulted by any of the following commands:

1. Update order code
2. New major FW revision
3. Bad setting detected during start up

UR FW 6.02 and 7.26 releases allow UR devices to record the cause of the last settings default using Modbus register 0xF222.

UR devices with FW versions other than 6.02 and 7.26 did record the settings default event but did not capture the cause.

This record is accessible via Modbus register 0xF222 and via the HTTP protocol.

M **Fault locator improvements**

726-19

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

The distance to fault accuracy of the fault locator is improved by enhanced filtering, making it more accurate even during evolving faults.

R **Increased accuracy of fault locator element**

605-4

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

Impacted firmware: All to 6.04

Corrected firmware: 6.05, 7.26

Workaround: None

Description: Accuracy of the Fault Report and fault locator elements has been improved by applying more filtering to the fault location results and by continuing calculation during evolving faults. Prior to the changes, fault location accuracy did not meet specification.

Cyber Security

C **CyberSentry Administrator login corrections**

726-15

Applicable: All UR devices with CyberSentry

When logging in with the "Administrator" role, the description is truncated as "Administrato" and the IP address is not recorded correctly in the security_events.csv file.

This firmware release fixes the issue.

This issue exists in firmware revisions 7.00 and up.

C **CyberSentry security and login/logout event logging for serial communication corrected**

726-16

Applicable: All UR devices with CyberSentry

When logging in or out over a serial interface, no role login/logout events are generated, and all other events generated via a serial interface have a blank user name field in the security_events.csv file.

This firmware release fixes the issue.

This issue exists in firmware revisions 7.00 and up.

C **CyberSentry concurrent access of Observer roles corrected**

726-17

Applicable: All UR devices with CyberSentry

The UR allows concurrent access of Observer roles, however if one disconnects, all others are also disconnected and blocked from further login.

This firmware release fixes the issue and allows remaining Observers to remain logged in when one Observer logs out.

This issue exists in firmware revisions 7.00 and up.

C **CyberSentry Observer login event logging during startup corrected**

726-18

Applicable: All UR devices with CyberSentry

The UR logs multiple Observer login events in the security events file during startup instead of logging it only once.

This firmware release fixes the issue.

This issue exists in firmware revisions 7.00 and up.

Communications

C **Fixed issue in PRP transmission that can cause an unexpected diagnostic message System Exception in systems with GOOSE**

726-11

Applicable: All with the IEC 61850 software option and/or PRP

A bug in the PRP component can corrupt the outgoing MMS CLNP frame headers. A relay with the IEC 61850 software option with firmware 7.0x, 7.1x, and 7.20 to v7.25 can stop working when receiving the corrupt frames, which results in a soft reboot of the system and diagnostic message "System Exception" appearing after successful boot up.

This firmware release fixes the issue.

This issue exists in firmware revisions 7.10, 7.11, 7.20 to 7.25, 7.30, and 7.31.

C **Corrected PRP that takes a long time to switch ports**

726-30

Applicable: All with PRP software option

When a relay with PRP software option is pinged from a SAN device attached to RedBox, if the communication to port 2 or 3 is interrupted, it takes approximately two minutes to re-establish the connection and resume pinging.

This firmware release fixes the issue.

This issue exists in firmware revisions 7.00 to 7.31, except 7.26.

HardFiber

U **Corrected UR HardFiber protection being blocked while "in service" after firmware upgrade**

726-28

Applicable: All UR devices with Process Bus Card

After a firmware upgrade, a UR used with HardFiber can potentially be in service, meter correctly but not perform protection functions. The issue potentially happens after UR firmware upgrade and subsequent initial startup, and the relay does not indicate out of service status. The issue can be checked by operating any of the protection elements after the upgrade. If the relay shows correct operation there are no further checks required while the relay is in operation.

This firmware release fixes the issue.

This issue exists in firmware revisions 5.60 and up.

Phasor Measurement Unit (PMU) - Synchrophasors

P **Corrected FlexElement using PMU rate of change of frequency**

726-13

Applicable: All UR devices with PMU

A FlexElement using PMU rate of change of frequency as an input can potentially operate incorrectly in the presence of internal CPU errors. This can be mitigated by blocking the FlexElement with FlexLogic operand PROTSUPR.

This firmware release fixes the issue.

This issue exists in firmware revisions 7.20 to 7.25, 7.30, and 7.31.

P **Phase angles of PMU assigned to UR 2nd signal source corrected**

726-14

Applicable: All UR devices with PMU

When a PMU is assigned to the UR second signal source and the first signal source is not used, the

PMU phase angle is off by three degrees.

This firmware release fixes the issue.

This issue exists in all firmware revisions with PMU.

Firmware 7.27

Summary

Improvements include the following.

- Bus Differential Systems – B30, B90
  - Corrected firmware to prevent unexpected restart in B30, B90
  - Fixed unexpected reboot in B90s with mismatch between hardware configuration and software option
- Capacitor Bank Protection and Control Systems – C70
  - Corrected firmware to use 87V Autoset function setting in the 87V element
  - Changed firmware to apply consistently the “Bank Voltage Differential 1 Target” setting
  - Corrected C70 Voltage Differential element calculation
- Transformer Protection Systems – G30, T35, T60
  - Corrected firmware to prevent latching of “XFMR PCNT DIFF PKP” and “XFMR PCNT DIFF 5TH" operands for Transformer Percent Differential element
- Common Protection and Control Elements
  - Corrected firmware to restore correctly the latched Virtual Inputs state at power-up
  - Corrected the use of “REVERSE PH ROTATION” settings when relay boots up
  - Corrected echo logic in the 1P POTT pilot scheme
  - Corrected the scaling of “V0 3rd Harmonic” FlexAnalog in VT Fuse Failure element 2 and higher
  - Corrected breaker autoreclose trigger for breakers 3 and 4
  - Corrected Thermal Overload Protection operation when the pre-fault current is very close to the base current pickup
  - Corrected operation of Volts/Hz element with definite time
  - Fixed C60 and N60 Autoreclose and VTFF elements to use correctly the Open Pole OP operand
  - Corrected functioning of Breaker Restrike elements 2 and 3
  - Corrected Thermal Overload element to prevent early trip on hot curve at marginal thermal pickup level
  - Corrected use of Voltage Cut-off Level setting in calculation of polarizing voltage for Negative Sequence Directional Overcurrent and Neutral Directional Overcurrent elements
  - Corrected firmware to prevent applying an IEC 61850 CSWI control command when XCBR#.BlkOpn or XCBR#.BlkCls is active
  - Corrected IEC 61850 GOOSE input analogs to use RxGoose PU Base
- Common Platform Functions
  - Corrected firmware to prevent erroneous assertion of Storage Media Alarm at startup
  - Corrected firmware to save the state of the non-volatile latches on every state change and before rebooting the unit after a reboot command was issued
  - Corrected issue when settings group function is enabled with IEC 61850 software option that causes relay to reboot in rare instances
  - Corrected timestamp of first events at startup when Daylight Savings Time is enabled
  - Corrected IRIG-B signal lost alarm to trigger when relays with IEEE 1588 PTP are time synchronized through IRIG-B and signal is lost
  - Improved IEEE 1588 PTP switchover time over Parallel Redundancy Protocol network

  - Corrected firmware to prevent incorrect triggering of Equipment Mismatch self-test error
  - Fixed relays with PTP (1588) software option to synchronize to valid IRIG-B on start-up
  - Corrected operate time accuracy for Volts per Hertz element for Inverse Curves
  - Improved Virtual Inputs functionality to improve CPU usage
  - Corrected user-programmable pushbuttons to respond when the “Pushbutton Set” input FlexLogic operand is asserted for a very short time
  - Corrected FlexLogic operands “Access Local CMND On” and “Access Local SETG” when local passwords are set
  - Corrected oscillography start time when “AC Input Waveforms” setpoint is set to “Off”
  - Fixed unexpected reboot after sending CID file to a relay with more than two CT banks and with Breaker Arcing element
  - Corrected firmware to display time with Daylight Savings Time on the front panel
- Cyber Security
  - Corrected Syslog reporting format to conform to RFC 5424
  - Corrected firmware so that it does not log a CyberSentry role login from the front panel as a setting change
- Communications
  - Corrected IEC 60870-5-104 IV (valid/invalid) bit in timestamp
  - Blocked clock synchronization by communication protocols (DNP, IEC 60870-5-103, IEC 60870-5-104) if IRIG-B is active
  - Improved network connectivity of relay when Ethernet switch is rebooted
  - Changed firmware to return "File non-existent" error when requesting a User Fault Report from a relay with no such file
  - For a relay with IEEE 1588, corrected the firmware so that it does not turn on the "Clock Unsynchronized" FlexLogic operand during the one-minute holdover time
  - Corrected routing of network frames using Default Gateway and Static Routes in Failover or PRP redundant modes
  - Changed firmware to restore Ethernet communication after a reboot of a network switch for relays with optical SFP modules
  - Corrected potential unexpected restart at bootup in relays using IEC 60870-5-104
  - Corrected Rx GOOSE analogs assigned to DCmA output that show zero after a power cycle
  - Improved failover switching time between ports 2 and 3
- Phasor Measurement Unit (PMU) – Synchrophasors
  - Updated year in the PMU header frame to 2014
- Transducer Inputs and Outputs
  - Corrected transducer output when configured to use GOOSE analog with a value above 2,000,000
- Self-Test Diagnostic Alarms
  - Added alarms and improved functionality

Bus Differential Systems – B30, B90

B **Corrected firmware to prevent unexpected restart in B30, B90**
Products: B30, B90
Impacted firmware: All to 6.05, 7.00 to 7.26
Corrected firmware: 6.06, 7.27, 7.30 and up
Workaround: None

Description: A B30 or B90 relay can experience an unexpected restart when zone 2 or higher LEDs are turned on.

In the new releases, this issue is resolved.

GE tracking number: 606-12

B **Fixed unexpected reboot in B90s with mismatch between hardware configuration and software option**

Products: B90

Impacted firmware: All to 6.05, 7.00 to 7.26, 7.30 to 7.31

Corrected firmware: 6.06, 7.27, 7.32, 7.40 and up

Workaround: Update hardware configuration to match software option

Description: If there is a mismatch between the number of CT banks in the relay and the software option indicating the number of feeders in the order code, the relay experiences unexpected, continuous rebooting shortly after going into service.

In the new releases, the firmware prevents unexpected rebooting in a B90 relay when the hardware configuration (number of CT banks) does not match the software option (number of feeders). The device goes into service and no alarm generates about a mismatch.

GE tracking number: 732-1

Capacitor Bank Protection and Control Systems – C70

G **Corrected firmware to use 87V Autoset function setting in the 87V element**

Products: C70

Impacted firmware: 5.20 to 7.26, 7.30 to 7.72

Corrected firmware: 7.27, 7.80 and up

Workaround: After changing this setting, confirm that it was applied correctly

Description: The relay applies the Current Unbalance Autoset function setting to the 87V element and not its own.

The new releases correct the issue.

GE tracking number: 727-2

G **Changed firmware to apply consistently the "Bank Voltage Differential 1 Target" setting**

Products: C70

Impacted firmware: 5.20 to 7.26, 7.30 to 7.71

Corrected firmware: 7.27, 7.80 and up

Workaround: After changing this setting, confirm that it was applied correctly

Description: Sometimes the relay does not apply correctly the "Bank Voltage Differential 1 Target" setting, for example the setting is updated only the second time the setting is changed.

The new releases correct the issue. The relay applies the setting value correctly and consistently.

GE tracking number: 780-7

C **Corrected C70 Voltage Differential element calculation**

Products: C70

Impacted firmware: All to 6.05, 7.00 to 7.26, 7.30 to 7.32

Corrected firmware: 6.06, 7.27, 7.40

Workaround: Enter the K factor manually

Description: The 87V element does not calculate K factors correctly, when K factor is close to 1 or below 1.

The new releases fix the issue.

GE tracking number: 740-18

Transformer Protection Systems – G30, T35, T60

P **Corrected firmware to prevent latching of "XFMR PCNT DIFF PKP" and "XFMR PCNT DIFF 5TH" operands for Transformer Percent Differential element**

Products: G30, T35, T60

Impacted firmware: All to 6.05, 7.00 to 7.26, 7.30 to 7.61

Corrected firmware: 6.06, 7.27, 7.70 and up

Workaround: None

Description: The "XFMR PCNT DIFF PKP" and "XFMR PCNT DIFF 5TH" operands of the Transformer Percent Differential element can remain latched after activation and are reset only by rebooting the relay.

The new releases correct the issue.

GE tracking number: 770-16

Common Protection and Control Elements

G **Corrected firmware to restore correctly the latched Virtual Inputs state at power-up**

Products: All

Impacted firmware: 7.26, 7.32, 7.41

Corrected firmware: 7.27, 7.42 and up

Workaround: Avoid using self-reset Virtual Inputs in affected firmware versions. If this is not possible, assign all self-reset Virtual Inputs and all latched Virtual Inputs to two separate groups of 32 Virtual Inputs.

Description: The UR has a total of 64 Virtual Inputs, which are divided in two groups of 32 Virtual Inputs. In previous versions, if a self-reset Virtual Input in one of these two groups changes state before the relay is powered-down, on power-up the relay fails to correctly restore the state of the latched Virtual Inputs in the respective group.

The new releases fix the issue.

GE tracking number: 742-1

F **Corrected the use of "REVERSE PH ROTATION" settings when relay boots up**

Products: G30, G60

Impacted firmware: All to 6.05, 7.00 to 7.26, 7.30 to 7.60

Corrected firmware: 6.06, 7.27, 7.61 and up

Workaround: None

Description: The relay incorrectly uses the state of FlexLogic operand assigned to "REVERSE PH ROTATION" setting at start up. This causes incorrect Phase rotation to be used by the relay. The issue occurs during relay power-up only and not during runtime.

The new releases fix the issue.

GE tracking number: 761-50

P **Corrected echo logic in the 1P POTT pilot scheme**

Products: D60, L90

Impacted firmware: All to 6.05, 7.00 to 7.26, 7.30 to 7.32

Corrected firmware: 6.06, 7.27, 7.40 and up

Workaround: Adding an MMS client that polls for data prevents the issue

Description: In the one-pole POTT pilot scheme, if the Permissive RX signal is continuously ON, the echo signal oscillates (echo signal is repeated following ECHO DURATION and ECHO DURATION settings timers).

The new releases fix the issue. Echoed logic is modified so that the received RX signal is echoed once only with a settable duration and a lockout period.

GE tracking number: 740-12

M **Corrected the scaling of "V0 3rd Harmonic" FlexAnalog in VT Fuse Failure element 2 and higher**

Products: C60, C70, D30, D60, F35, F60, G30, G60, L30, L60, L90, M60, N60, T60

Impacted firmware: 6.00 to 6.05, 7.00 to 7.26, 7.30 to 7.60

Corrected firmware: 6.06, 7.27, 7.61 and up

Workaround: None

Description: The VTFF element setting configuration includes "VT Fuse Failure Alarm Delay," "Neutral Wire Open Detection," and "Neutral Wire Open 3 Harm PKP." Any changes to these settings from default are not applied in VTFF element 2 or higher.

The new releases fix the issue.

GE tracking number: 761-6

F **Corrected breaker autoreclose trigger for breakers 3 and 4**

Products: All

Impacted firmware: All to 7.26, 7.30 to 7.42

Corrected firmware: 7.27, 7.60 and up

Workaround: None

Description: Breakers with index higher than 2 are activated incorrectly by an autoreclose command.

The new releases fix the issue. Breakers 3 and 4 are not activated by the autoreclose function.

GE tracking number: 727-1

P **Corrected Thermal Overload Protection operation when the pre-fault current is very close to the base current pickup**

Products: All with Thermal Overload Protection - B30, C60, C70, D30, D60, F35, F60, G30, G60, L30, L60, L90, N60, T35, T60

Impacted firmware: All to 6.05, 7.00 to 7.26, 7.30 to 7.32

Corrected firmware: 6.06, 7.27, 7.40 and up

Workaround: None

Description: The Thermal Overload Protection element operates much faster than expected when the pre-fault current is very close to the base current pickup value.

The new releases fix the issue.

GE tracking number: 740-2

P **Corrected operation of Volts/Hz element with definite time**

Products: G30, G60, L90, T60

Impacted firmware: All to 6.05, 7.00 to 7.26, 7.30 to 7.32

Corrected firmware: 6.06, 7.27, 7.40 and up

Workaround: None

Description: The Volts/Hz element with a small definite time setting (for example 0.05TD) can assert pickup and operate operands at the same time.

The new releases fix the issue.

GE tracking number: 740-5

D **Fixed C60 and N60 Autoreclose and VTFF elements to use correctly the Open Pole OP operand**

Products: C60, N60

Impacted firmware: All to 6.05, 7.00 to 7.26, 7.30 to 7.31

Corrected firmware: 6.06, 7.27, 7.32, 7.40 and up

Workaround: None

Description: Open Pole operands are not mapped correctly to Autoreclose and VTFF elements in C60 and N60 relays. This can result in inadvertent lockout of the Autoreclose when Open Pole is set to 'I AND V only' mode, or erroneous VTFF operation in a single-pole tripping application.

The new releases fix the issue.

GE tracking number: 732-3

P **Corrected functioning of Breaker Restrike elements 2 and 3**

Products: B30, C60, C70, D60, F35, F60, G60, L60, L90, M60, T60

Impacted firmware: 5.50 to 7.26, 7.30 to 7.71

Corrected firmware: 7.27, 7.80 and up

Workaround: None

Description: In previous versions, only the first Breaker Restrike protection element is operational.

The new releases correct the issue. All Breaker Restrike elements are operational.

GE tracking number: 780-15

P **Corrected Thermal Overload element to prevent early trip on hot curve at marginal thermal pickup level**

Products: All except B90, C30, M60

Impacted firmware: All to 6.05, 7.00 to 7.26, 7.30 to 7.60

Corrected firmware: 6.06, 7.27, 7.61 and up

Workaround: None

Description: In previous releases, early thermal tripping occurs to the hot curve at marginal thermal pickup level.

The new releases fix the issue.

GE tracking number: 761-49

P **Corrected use of Voltage Cut-off Level setting in calculation of polarizing voltage for Negative Sequence Directional Overcurrent and Neutral Directional Overcurrent elements**

Products:

Negative Sequence Directional OC: C70, D30, D60, F60, G30, G60, L60, L90, T60

Neutral Directional OC: C70, D30, D60, F60, G30, G60, L30, L60, L90, M60, N60, T60

Impacted firmware: All except those listed in corrected firmware

Corrected firmware: 5.72, 5.83, 5.92, 6.00 to 6.05, 7.27, 7.61

Workaround: None

Description: In the affected versions, the relay uses a fixed cutoff of 0.02 pu for the calculation of the polarizing voltage for the Negative Sequence Directional Overcurrent and Neutral Directional Overcurrent elements.

In the revisions corrected, the relay uses the value of the display voltage cutoff setting for the polarizing voltage.

GE tracking number: 761-13 – this item was rolled back; see 728-1

G **Corrected firmware to prevent applying an IEC 61850 CSWI control command when XCBR#.BlkOpn or XCBR#.BlkCls is active**

Products: All with the IEC 61850 software option

Impacted firmware: All to 6.05

Corrected firmware: 6.06, 7.27

Workaround: None

Description: An IEC 61850 CSWI control command is not blocked when Bkr0XCBR#.BlkOpn or Bkr0XCBR#.BlkCls is active.

In the new releases, this issue is fixed.

GE tracking number: 606-14

C **Corrected IEC 61850 GOOSE input analogs to use RxGoose PU Base**

Products: All with the IEC 61850 software option and DCmA outputs

Impacted firmware: All to 6.04, 7.00 to 7.24, 7.30, 7.31

Corrected firmware: 6.05, 6.06, 7.25, 7.27, 7.32, 7.40

Workaround: None

Description: The base per unit of FlexElements or DCmA output is incorrect if configured to GOOSE analog inputs, causing incorrect operation.

The new releases fix this issue to use received Analog Goose per unit base.

GE tracking number: 725-9

Common Platform Functions

G **Corrected firmware to prevent erroneous assertion of Storage Media Alarm at startup**

Products: All

Impacted firmware: 7.00 to 7.26, 7.30 to 7.60

Corrected firmware: 7.27, 7.61

Workaround: Restart the relay

Description: In previous versions, on very rare occasions, it is possible that the relay mistakenly asserts the Storage Media Alarm self-test at startup. A Storage Media Alarm self-test error prevents the relay from storing the following data to non-volatile memory event records, oscillography, data logger, non-volatile actuals, fault report, settings monitor, and security events.

In the corrected firmware, this issue is fixed.

GE tracking number: 761-32

E **Changed firmware to save the state of non-volatile latches in non-volatile memory on every state change**

Products: All

Impacted firmware: 7.00 to 7.26, 7.30 to 7.81

Corrected firmware: 7.27

Workaround: None

Description: In 7.xx versions, the state of the non-volatile (NV) latches is saved to non-volatile memory (Compact Flash). If the unit experiences an unexpected restart before the states of the NV latches are saved to CF, on startup they are not restored correctly.

The new release fixes the issue. The state of the non-volatile latches is saved to CF on every state change.

GE tracking number: 727-5

G **Corrected firmware to save the state of the non-volatile latches before rebooting the unit after a reboot command**

Products: All

Impacted firmware: 7.00 to 7.26, 7.40 to 7.42

Corrected firmware: 7.27, 7.60 and up

Workaround: Avoid issuing a reboot command after the state of a non-volatile latch changes

Description: The state of the non-volatile latches is stored regularly to Compact Flash (CF). In impacted versions, if the state of a non-volatile latch is changed and the unit is rebooted by a reboot command,

from front panel or Modbus, the relay does not store the state of the non-volatile latches and fails to correctly restore it after the reboot.

The new releases correct the issue. Upon receiving a reboot command, from front panel or Modbus, the state of the non-volatile latches is stored before the unit is rebooted.

GE tracking number: 760-6

B Corrected issue when settings group function is enabled with IEC 61850 software option that causes relay to reboot in rare instances

Products: All with the IEC 61850 software option

Impacted firmware: 7.00 to 7.26, 7.30 to 7.60

Corrected firmware: 7.27, 7.61

Workaround: None

Description: The setting group state set via IEC 61850 control operation is saved in non-volatile storage. On rare occasions, the read value from the non-volatile storage can be out of bounds, causing the relay to reboot.

In the new releases, this has been corrected. Upgrading causes a one-time loss of non-volatile actual values stored in compact flash.

GE tracking number: 761-10

R Corrected timestamp of first events at startup when Daylight Savings Time is enabled

Products: All

Impacted firmware: All to 7.26, 7.30 to 7.60

Corrected firmware: 7.27, 7.61 and up

Workaround: None

Description: A delay in update of Daylight Savings Time (DST) after powerup of the relay causes a few entries in the event recorder to use UTC timestamp. The POWER OFF event timestamp is correct, while the POWER ON event and possibly a few more events (depending on the order code) have a timestamp lagging one hour behind the actual time.

In the new releases, this has been corrected.

GE tracking number: 761-9

G, D Corrected IRIG-B signal lost alarm to trigger when relays with IEEE 1588 PTP are time synchronized through IRIG-B and signal is lost

Products: All with the IEEE 1588 software option

Impacted firmware: 7.00 to 7.26, 7.30 to 7.60

Corrected firmware: 7.27, 7.61 and up

Workaround: Use an IRIG-B source connected to a GPS antenna

Description: In previous versions, a relay with the IEEE 1588 (PTP) software option synchronized by an IRIG-B signal from a source without a GPS antenna does not correctly detect loss of IRIG-B signal and continues to indicate that the relay is synchronized by IRIG-B.

In the new releases, this has been corrected.

GE tracking number: 761-11

C Improved IEEE 1588 PTP switchover time over Parallel Redundancy Protocol network

Products: All with IEEE 1588 and Parallel Redundancy Protocol (PRP) software options

Impacted firmware: 7.0 to 7.26, 7.30 to 7.80

Corrected firmware: 7.27, 7.81 and up

Workaround: None

Description: A relay using PRP and IEEE 1588 Precision Time Protocol (PTP) time synchronization has a 60 second holdover time when switching from one port to the other.

The new firmware shortens the holdover time to three seconds.
GE tracking number: 781-3

U **Corrected firmware to prevent incorrect triggering of Equipment Mismatch self-test error**

Products: All
Impacted firmware: 7.20 to 7.26, 7.30 to 7.41
Corrected firmware: 7.27, 7.42, 7.60 and up
Workaround: None
Description: Incorrect serial peripheral interface (SPI) initialization of the coprocessor in the CPU module can prevent the CPU from correctly identifying one or more of the installed modules and incorrectly trigger the Equipment Mismatch self-test.
The new releases fix the issue.
GE tracking number: 742-8

D **Fixed relays with PTP (1588) software option to synchronize to valid IRIG-B on start-up**

Products: All with the Precision Time Protocol (PTP) IEEE 1588 software option
Impacted firmware: All to 7.26, 7.30 to 7.31
Corrected firmware: 7.27, 7.32, 7.40
Workaround: None
Description: In some instances, after a reboot of a relay with the IEEE 1588 software option that is using a valid IRIG-B signal for synchronization, the relay does not lock onto the IRIG-B signal, but activates the "Clock Unsynchronized" operand (without displaying IRIG-B failure).
The new releases fix the issue and the IRIG-B signal is used on start-up or reboot.
GE tracking number: 732-34

P **Corrected operate time accuracy for Volts per Hertz element for Inverse Curves**

Products: G30, G60, L90, T60
Impacted firmware: 2.60 to 6.05, 7.00 to 7.26, 7.30 to 7.61
Corrected firmware: 6.06, 7.27, 7.70 and up
Workaround: None
Description: The operate time for the Volts per Hertz element for inverse curves does not meet the specification at 1.15 times pickup setting.
The new releases correct the issue.
GE tracking number: 770-7

G **Improved Virtual Inputs functionality to improve CPU usage**

Products: All
Impacted firmware: 7.26, 7.30 to 7.71
Corrected firmware: 7.27, 7.80 and up
Workaround: None
Description: The Virtual Inputs functionality is improved to lower the CPU usage.
GE tracking number: 780-19

D **Corrected user-programmable pushbuttons to respond when the "Pushbutton Set" input FlexLogic operand is asserted for a very short time**

Products: All
Impacted firmware: All to 7.26, 7.30 to 7.60
Corrected firmware: 7.27, 7.61 and up
Workaround: Assert the "Pushbutton Set" operand for longer than 100 msec

Description: In previous versions, the relay can fail to operate a user-programmable pushbutton when the "Pushbutton Set" input FlexLogic operand is asserted for less than 100 msec, even though the manual specifies a minimum of 50 msec.

In the new releases, this issue is fixed.

GE tracking number: 761-45

G **Corrected FlexLogic operands "Access Local CMND On" and "Access Local SETG" when local passwords are set**

Products: All without the CyberSentry software option

Impacted firmware: All to 7.26, 7.30 to 7.60

Corrected firmware: 7.27, 7.61

Workaround: None

Description: If a local setting password and a local command password are set, the operands "Access Local CMND On" and "Access Local SETG" are On even without entering the respective password.

In the new releases, this issue is fixed.

GE tracking number: 761-38

R **Corrected oscillography start time when "AC Input Waveforms" setpoint is set to "Off"**

Products: All

Impacted firmware: All to 7.26, 7.30 to 7.60

Corrected firmware: 7.27, 7.61

Workaround: None

Description: In previous versions, if the "AC Input Waveforms" is set to "Off," the oscillography start time is incorrect.

In the new releases, this issue is fixed.

GE tracking number: 761-47

B **Corrected possible unexpected restart in relays with Breaker Arcing elements and order code with more than two CT banks**

Products: C60, D30, D60, F35, F60, L30, L60, L90, T35, T60

Impacted firmware: 4.20 to 6.05, 7.00 to 7.26, 7.30 to 7.31

Corrected firmware: 6.06, 7.27, 7.32, 7.40 and up

Workaround: None

Description: In previous versions, a relay with Breaker Arcing elements and more than two CT banks can possibly experience an unexpected restart.

In the new releases, this issue is fixed by correcting the initialization of the Breaker Arcing elements.

GE tracking number: 732-7

D **Corrected firmware to display time with Daylight Savings Time on the front panel**

Products: All

Impacted firmware: 7.00 to 7.26

Corrected firmware: 7.27

Workaround: None

Description: When Daylight Saving Time (DST) is in effect, the front panel menu COMMANDS > SET DATE AND TIME > SET DATE AND TIME and the corresponding Modbus register ("Real Time Clock Set Time," Modbus address 0x41A0 in version 7.27) presented the time without DST. The event recorder timestamps do include DST.

In the new release, this issue is fixed. The LCD display menu and the associated Modbus register display the time with DST.

The following items do not include the DST:
Time of Day Timer Start Time
Time of Day Timer Stop Time
Event Recorder Last Cleared Date
Source x Demand VAR Maximum Date
Source x Demand WATT Maximum Date
Source x Demand VA Maximum Date
Source x Demand Ia Maximum Date
Source x Demand Ib Maximum Date
Source x Demand Ic Maximum Date
PMU x Last Cleared Date
PMU One-Shot Time
Data Logger Newest Time
Data Logger Oldest Time
Oscillography Last Cleared Date
Last Settings Change Date
User Programmable Fault Report Cleared Date
Digital Counter x Frozen Time Stamp
HIZ RMS Capture x Time
HIZ Capture x Time
GE tracking number: 727-3

Cyber Security

C **Corrected Syslog reporting format to conform to RFC 5424**

Products: All with a CyberSentry software option

Impacted firmware: 7.00 to 7.26, 7.30 to 7.61

Corrected firmware: 7.27, 7.70 and up

Workaround: None

Description: A relay with a CyberSentry software option supports security event reporting through the Syslog protocol. In previous versions, the syslog fields of priority value and timestamp are not formatted according to RFC 5424.

In the new releases, the fields priority value and timestamp in the syslog produced by the UR conform to RFC 5424. The severity of the security events also has been changed, as detailed in the instruction manual.

GE tracking number: 770-20

R **Corrected firmware so that it does not log a CyberSentry role login from the front panel as a setting change**

Products: All

Impacted firmware: 7.00 to 7.26, 7.30 to 7.61

Corrected firmware: 7.27, 7.70 and up

Workaround: None

Description: In previous versions, the relay records a login from the front panel of a CyberSentry role as a settings change in the “Settings_changes.log” file.

The new releases correct the issue. A CyberSentry login from the front panel is not recorded as a settings change.

GE tracking number: 770-22

Communications

C **Corrected IEC 60870-5-104 IV (valid/invalid) bit in timestamp**

Products: All using the IEC 60870-5-104 software option

Impacted firmware: All to 6.05, 7.20 to 7.26, 7.30 to 7.32

Corrected firmware: 6.06, 7.27, 7.40 and up

Workaround: None

Description: The IEC 60870-5-104 invalid/valid (IV) bit in the timestamp is inconsistent for different transmissions. For example, the single-point with date/time transmission might have a bit value different from the integrated totals with date/time transmission.

The new releases fix the issue.

GE tracking number: 740-100

E **Blocked clock synchronization by communication protocols (DNP, IEC 60870-5-103, IEC 60870-5-104) if IRIG-B is active**

Impacted firmware: All to 6.05, 7.00 to 7.26, 7.30 to 7.32

Corrected firmware: 6.06, 7.27, 7.40 and up

Workaround: None

Description: In previous releases, clock synchronization by communications protocols is allowed when IRIG-B is active.

In the new releases, if IRIG-B is enabled and active, clock synchronization by communication protocols (DNP, IEC 60870-5-103, IEC 60870-5-104) is blocked. Clock synchronization from the front panel and over Modbus is always enabled.

GE tracking number: 740-54

C **Improved network connectivity of relay when Ethernet switch is rebooted**

Products: All

Impacted firmware: 7.00 to 7.26, 7.30 to 7.60

Corrected firmware: 7.27, 7.61 and up

Workaround: None

Description: On rare occasions, the relay does not reconnect to the switch after the switch is rebooted. In this case, connectivity is restored only by rebooting the relay or by reconnecting the network cable.

In the new releases, this issue is fixed.

GE tracking number: 761-27

C **Changed firmware to return "File non-existent" error when requesting a User Fault Report from a relay with no such file**

Products: B30, B90, C70, G30, G60, M60, N60, T35, T60

Impacted firmware: All to 7.26, 7.30 to 7.60

Corrected firmware: 7.27, 7.61 and up

Workaround: None

Description: In previous versions, a relay returns an empty User Programmable Fault Report file if no such file exists.

In the new releases, the firmware returns a “File non-existent” message if there are no User Fault Report files in the relay. This affects both MMS communication and TFTP.

GE tracking number: 761-24

C **For a relay with IEEE 1588, corrected the firmware so that it does not turn on the "Clock Unsynchronized" FlexLogic operand during the one-minute holdover time**

Products: All with the IEEE 1588 software option

Impacted firmware: 7.00 to 7.26, 7.30 to 7.60

Corrected firmware: 7.27, 7.61 and up

Workaround: None

Description: For relays with the IEEE 1588 software option, if the clock source is lost, a one-minute holdover time is applied. At the end of this minute, the relay selects the next best clock to use as a source. In previous versions, the "Clock Unsynchronized" operand turned on during the one-minute holdover time.

In the new releases, this issue is fixed. The "Clock Unsynchronized" operand does not turn on during the one-minute period.

GE tracking number: 761-23

C **Corrected routing of network frames using Default Gateway and Static Routes in Failover or PRP redundant modes**

Products: All

Impacted firmware: All to 7.26, 7.30 to 7.60

Corrected firmware: 7.27, 7.61 and up

Workaround: None

Description: In previous versions, the routing of network frames using Default Gateway and Static Routes fails with any broken path in redundancy modes (PRP or Failover).

In the new releases, this issue is fixed. The relay detects that the respective network path is broken and in Failover/PRP redundancy mode correctly route the Ethernet packets to the port that has a working network path. The detection of the broken network path can take up to 5 seconds.

GE tracking number: 761-55

C **Changed firmware to restore Ethernet communication after a reboot of a network switch for relays with optical SFP modules**

Products: All with 9T or 9U CPU module using fiber Avago HFBR-57E5APZ SFP and a Cisco network switch

Impacted firmware: 7.00 to 7.26, 7.30 to 7.61, 7.70

Corrected firmware: 7.27, 7.62, 7.71, 7.80

Workaround: None

Description: For relays using a 9T or 9U CPU module with Avago fiberoptic small form-factor pluggable ports (SFPs), the Ethernet connection over fiber is not restored after a reboot of a Cisco network switch. Unplugging and replugging the cable restores the connection. Ethernet connections from other switch vendors or using copper SFPs with RJ45 are not affected by this issue.

A corrected firmware version fixes the issue. It restores Ethernet communications after reboot of any network switch regardless of the type of SFP transceiver used.

GE tracking number: 762-1

B **Corrected potential unexpected restart at bootup in relays using IEC 60870-5-104**

Products: All relays configured to use IEC 60870-5-104

Impacted firmware: All to 6.05, 7.00 to 7.26, 7.30 to 7.32

Corrected firmware: 6.06, 7.27, 7.40 and up

Workaround: None

Description: In relays configured to use IEC 60870-5-104 under Settings > Product Setup > Communications, there is a low possibility of an unexpected restart during bootup.

The new releases fix the issue.

GE tracking number: 740-32

M **Corrected Rx GOOSE analogs assigned to DCmA output that show zero after a power cycle**

Products: All with the IEC 61850 software option

Impacted firmware: All to 6.05, 7.00 to 7.26, 7.30 to 7.31

Corrected firmware: 6.06, 7.27, 7.32, 7.40 and up

Workaround: None

Description: When the DCmA source setting is assigned with an RxGOOSE Analog, the DCmA Output shows a zero value in other than the first DCmA element after a power cycle.

In the corrected releases, all DCmAs operate correctly with RxGOOSE assigned as an input, not just the first DCmA element.

GE tracking number: 732-38

C **Improved failover switching time between ports 2 and 3**

Products: All

Impacted firmware: 7.00 to 7.26, 7.30 to 7.42

Corrected firmware: 7.27, 7.60 and up

Workaround: None

Description: When port 2 is configured for Failover, port 3 is in standby mode and does not actively communicate on the Ethernet network but monitors its link to the switch. If port 2 detects a problem with the link, communications is switched to port 3.

In the corrected releases, the failover switching time between ports 2 and 3 is improved.

GE tracking number: 727-4

Phasor Measurement Unit (PMU) – Synchrophasors

C **Updated year in the PMU header frame to 2014**

Products: All with the PMU software option

Impacted firmware: 6.00 to 6.06, 7.00 to 7.26, 7.30 to 7.61

Corrected firmware: 7.27, 7.70 and up

Workaround: None

Description: The year in the PMU header frame is 2005 in impacted versions to 7.60 and is 2011 in version 7.61.

In the new releases, the year in the PMU header frame is 2014.

GE tracking number: 770-12

Transducer Inputs and Outputs

P **Corrected transducer output when configured to use GOOSE analog with a value above 2,000,000**

Products: All with the IEC 61850 software option and DCmA outputs

Impacted firmware: All to 7.26, 7.30 to 7.32

Corrected firmware: 7.27, 7.40 and up

Workaround: None

Description: The transducer output does not work correctly if DCmA Output is configured to use a GOOSE analog value with a value higher than two million.

The new releases fixe the issue.

GE tracking number: 740-66

Self-Test Diagnostic Alarms

C **Added alarms and improved functionality**

Products: All except C30

Impacted firmware: All to 6.05, 7.00 to 7.26, 7.30 to 7.42

Corrected firmware: 6.06, 7.27, 7.60 and up

Workaround: None

Description: Prior to the corrected releases, the UR produced visible alarms for most internal diagnostic events, even when relay protection availability was not compromised. In the corrected firmware, the UR alarm design has been changed to generate user alarms only when protection is compromised. In addition, internal diagnostics are revised for lower sensitivity to internal alarms, such as redundancy checks, to allow for more secure, robust protection with fewer nuisance alarms.

The UR design continues to maintain extensive monitoring on availability of all protection elements. The design also provides robustness through a recovery mechanism that is initiated to minimize downtime for protection availability. As a result of this change, new self-tests are added to the design. See the manual for more information.

GE tracking number: 760-20

Firmware 7.28

Summary

Improvements include the following.

- Bus Differential Systems – B30, B90
  - Improved accuracy of bus differential pickup in the region between Low and High breakpoints
  - Differential and restraint currents in B30 and B90 are displayed without any cutoff
- Capacitor Bank Protection and Control System – C70
  - Changed firmware to apply consistently the "Phase Current Unbalance 1 Target" setting
- Distance Protection Systems – D30, D60, L90
  - Corrected dropout of Operate operand for the Ground Distance element for zones 2 and up
  - Corrected 87L Trip Logic
- Common Protection and Control Elements
  - Rolled back use of Voltage Cut-off Level setting in calculation of polarizing voltage for Negative Sequence Directional Overcurrent and Neutral Directional Overcurrent elements
  - Corrected Overvoltage Supervision for Frequency Rate of Change element in systems with delta configured VT
  - Modified Ground Distance current supervision
  - Corrected inactive non-directional ground distance element for zones 2 to 5
  - Corrected echo duration and lockout feature in pilot schemes
  - Corrected drop-out of phase distance operate FlexLogic operands when TRIP Z2PH TMR INIT operand is on
  - Improved phase selection supervision to phase distance zone 3 element during switch-off
  - Corrected number of settings menus for the following elements: Negative Sequence TOC/IOC/Directional OC, and Cold Load Pickup
- Common Platform Functions
  - Corrected Diagnostic Alarm error messages caused by DSP. Hardware changes may be required.
  - Corrected Actual Value calculation after a Settings Group change for several elements
  - Corrected display of FlexElements Actual Values in 16-bit COMTRADE files
  - Corrected phase-to-phase voltage metering for WYE connection
  - Improved Breaker Flashover element
  - Fixed firmware to prevent an unexpected restart when accessing the Default Settings Diagnostic webpage or text file after a firmware upgrade
  - Enhanced firmware security and robustness to single event upsets by adding ECC support
  - Corrected timestamp in settings monitor log file for large number of events
  - Corrected recording of "BATTERY FAIL" event multiple times
  - Corrected angle wrapping to FlexElements angle subtraction to the range -180 deg to +180 deg
  - Improved Restricted Ground Fault (RGF) element
  - Corrected potential lockout of CyberSentry role after losing communication while role is logged in
  - Made security enhancements to IOC elements
  - Made security enhancements to differential elements
  - Improved security by adding rule to prevent entering the "<" character in text-based settings

- Communications
  - Added support for PTP Power Profile C37.238-2017 to slave functionality on main CPU (station bus ports)
  - Corrected firmware to prevent rare unexpected restart when using IEC 61850 buffered reports
  - Fixed VxWorks network stack vulnerabilities listed in GE publication GET-20047A, ICS-CERT Advisory ICSA-19-211-01
  - Corrected firmware to prevent loss of connectivity in PRP/failover mode after rebooting certain network switches
  - Corrected memory leak in "Routing and ARP Tables Information" webpage
  - Corrected firmware to not record Date/Time Changed events for SNTP time changes when the Real Time Clock Events setting is disabled
  - Resolved DNP3 vulnerability published in ICSA-20-105-02
  - Corrected potential failure to synchronize to SNTP server when duplicate frames are present in the network
  - Corrected firmware to prevent dropped connection when relay generates IEC 61850 report without polling from client
  - Resolved Wind River TCP/IP stack (IPnet, Urgent/11) vulnerabilities published in ICSA-19-211-01
  - Corrected IEC 61850 buffered reports to send first buffered event after connection loss
  - Changed firmware to automatically reset the AUTHENTICATION FAIL operand
  - Improved security of UR web pages
- Phasor Measurement Unit (PMU) – Synchrophasors
  - Corrected issue with synchrophasor Power Triggering for delta connected systems
  - Improved synchrophasor frequency and ROCOF measurement

Bus Differential Systems – B30, B90

P **Improved accuracy of bus differential pickup in the region between Low and High breakpoints**

Products: B30, B90

Impacted firmware: All to 7.28, 7.30 to 7.82

Corrected firmware: 7.28, 7.90

Workaround: None

Description: The accuracy of bus differential pickup in the region between Low and High breakpoints is improved.

GE tracking number: 790-46

G **Differential and restraint currents in B30 and B90 are displayed without any cutoff**

Products: B30, B90

Impacted firmware: All to 7.27, 7.30 to 7.91

Corrected firmware: 7.28, 8.02

Workaround: None

Description: The relay applies current cut-off to the metering of differential and restraint currents but does not apply it to the differential element itself.

In the new releases, the cutoff current is removed from the metering of the differential and restraint current to match the algorithm of the differential element.

GE tracking number: 802-7

Capacitor Bank Protection and Control System – C70

D **Changed firmware to apply consistently the "Phase Current Unbalance 1 Target" setting**

Products: C70

Impacted firmware: 5.20 to 7.27, 7.30 to 7.71

Corrected firmware: 7.28, 7.80

Workaround: After changing this setting or after applying an IEC 61850 CID file, confirm that this setting was applied correctly.

Description: Sometimes the relay does not apply correctly the "Phase Current Unbalance 1 Target" setting, for example the setting is updated only the second time an IEC 61850 CID file is sent.

The new release corrects the issue. The relay applies the setting value correctly and consistently.

GE tracking number: 780-6

Distance Protection Systems – D30, D60, L90

P **Corrected dropout of Operate operand for the Ground Distance element for zones 2 and up**

Products: D30, D60, L90

Impacted firmware: All to 7.27, 7.30 to 7.82

Corrected firmware: 7.28, 7.90

Workaround: None

Description: For zones 2 and higher, the Operate and the Pickup operands drop out at the same time. The specification is for the Operate operand to drop out 20 msec later than the Pickup operand.

The new release corrects the issue.

GE tracking number: 790-47

P **Corrected 87L Trip Logic**

Products: L90

Impacted firmware: All to 7.32

Corrected firmware: 7.28, 7.40 and up

Workaround: None

Description: In previous versions, in rare situations when unfaulted phase Open Pole operand is asserted slightly earlier than the faulted phase Open Pole operand during single-line-to-ground fault clearance, 87L TRIP can issue a 3-pole trip instead of 1-pole trip in a single-pole tripping application.

In the new releases, a one-cycle pickup delay timer is added in the Open Pole OP operand path to prevent 3-pole operation during single-line-to-ground fault due to racing between Open Pole phase operands.

GE tracking number: 728-5

Common Protection and Control Elements

P **Rolled back use of Voltage Cut-off Level setting in calculation of polarizing voltage for Negative Sequence Directional Overcurrent and Neutral Directional Overcurrent elements**

Products:

Negative Sequence Directional OC: C70, D30, D60, F60, G30, G60, L60, L90, T60

Neutral Directional OC: C70, D30, D60, F60, G30, G60, L30, L60, L90, M60, N60, T60

Impacted firmware: 5.72, 5.83, 5.92, 6.00 to 6.05, 7.27, 7.61

Corrected firmware: 7.28

Workaround: None

Description: In previous versions, the firmware was changed inadvertently to use the value of the display voltage cutoff setting for the calculation of the polarizing voltage for the negative sequence directional overcurrent and neutral directional overcurrent elements.

In the revision corrected, the relay uses a fixed cutoff of 0.02 pu for the calculation of the polarizing voltage for the negative sequence directional overcurrent and neutral directional overcurrent elements.

GE tracking number: 728-1 - this item was rolled back from 761-13

P Corrected Overvoltage Supervision for Frequency Rate of Change element in systems with delta configured VT

Products: All with Frequency Rate of Change (D30, D60, F60, G30, G60, L30, L90, N60, T60)

Impacted firmware: All to 7.27, 7.30 to 7.82

Corrected firmware: 7.28, 7.90

Workaround: None

Description: The calculation of the Overvoltage Supervision for the Frequency Rate of Change element in systems with delta configured VT is incorrect.

The new release corrects the issue.

GE tracking number: 790-60

E Modified Ground Distance current supervision

Products: D30, D60, L60, L90, T60

Impacted firmware: 5.7 to 7.27, 7.30 to 7.32

Corrected firmware: 7.28, 7.40

Workaround: For single-pole applications, use Open Pole element, which ensures reset from seal-in.

Workaround: For single-pole applications, use Open Pole element, which ensures reset from seal-in

Description: Prior to this release, the pickup (GND DIST PKP) operand is correctly supervised by both neutral and phase OC, but the operate (GND DIST OP) operand is supervised by neutral OC only.

In the new release, current supervision logic in the ground distance elements is modified to include both neutral and phase current supervision for both pickup and operate operands. There are three new FlexLogic operands in ground distance elements GND DIST Zn SUPN IA, GND DIST Zn SUPN IB, and GND DIST Zn SUPN IC are additionally added.

GE tracking number: 740-45

H Corrected inactive non-directional ground distance element for zones 2 to 5

Products: D30, D60, L30, L90, T60

Impacted firmware: 7.27, 7.32, 7.41

Corrected firmware: 7.28, 7.42, 7.60

Workaround: None

Description: The non-directional ground distance element is inactive for zones 2 to 5. The functionality for zone 1 is correct.

The new release fixes the issue. All zones are active.

GE tracking number: 742-5

P Corrected echo duration and lockout feature in pilot schemes

Products: All with POTT, POTT, POTT1, hybrid POTT: D60, L90

Impacted firmware: All to 7.27, 7.30 and above

Corrected firmware: 7.28

Workaround: None

Description: The echo duration and lockout features in POTT, POTT1, and hybrid POTT schemes are not as per design. The Tx signal from Echo strictly follows Rx, instead of providing a deterministic pulse per “Echo Duration” and “Echo Lockout” settings regardless of the shape of the Rx.

The new release corrects the issue.
GE tracking number: 728-4

P **Corrected drop-out of phase distance operate FlexLogic operands when TRIP Z2PH TMR INIT operand is on**

Products: D30, D60, G60, L60, L90
Impacted firmware: All to 7.27, 7.30 to 7.91
Corrected firmware: 7.28, 8.02
Workaround: None
Description: The phase distance Z2 FlexLogic PH DIST Z2 OP operate operands do not drop out when the distance pickup operands drop out, while TRIP Z2PH TMR INIT is on.
The new releases correct the issue.
GE tracking number: 802-32

E **Improved phase selection supervision to phase distance zone 3 element during switch-off**

Products: D30, D60, G60, L60, L90
Impacted firmware: All to 7.27, 7.30 to 7.91
Corrected firmware: 7.28, 8.02
Workaround: None
Description: In previous versions, during SLG fault current clearance (switching off), the phase distance zone 3 element can accidentally pick up for less than one power cycle.
The new releases improve phase selection supervision to the phase distance zone 3 element during switch-off to prevent accidental phase distance zone 3 pickup.
GE tracking number: 802-15

D **Corrected number of settings menus for the following elements: Negative Sequence TOC/IOC/Directional OC, and Cold Load Pickup**

Products:
Negative Sequence IOC/Directional OC: C70, D30, D60, F35, F60, L30, L60, L90, T60
Negative Sequence TOC: C70, D30, D60, F60, L30, L60, L90, T60
Cold Load Pickup: F35, F60
Impacted firmware: 7.27, 7.4x, 7.60
Corrected firmware: 7.28, 7.61
Workaround: None
Description: In previous versions, the number of settings menus on the front panel for the following elements exceed the actual number of elements in the relay: Negative Sequence TOC/IOC/Directional OC, and Cold Load Pickup. These extra elements are available on the front panel only but the extra elements do not provide protection function in the relay.
The new release corrects the issue. The number of menus for these elements matches the actual number of elements. The number of elements available for configuration now match the number of elements that provide the protection function in the relay. Note that Cold Load Pickup was addressed already in version 7.27.
GE tracking number: 761-8

Common Platform Functions

A, U **Corrected Diagnostic Alarm error messages caused by DSP**

Products: All UR devices manufactured between 1 September 2011 and 1 December 2015
Impacted firmware: 7.27, 7.28, 7.60 and up

Corrected firmware: Not applicable

Workaround: None

Description: A Diagnostic Alarm can occur in URs due to incorrect signal handling in the digital signal processor (DSP). The Diagnostic Alarm does not remove the UR from service and some functions remain available. This issue applies when upgrading from version 7.0x, 7.1x, 7.20 to 7.24, 7.30, 7.31 to firmware version 7.25, 7.26, 7.27, 7.28, 7.32, 7.4x, 7.60 and up. If a relay has already been upgraded to any version higher than 7.25, 7.26, 7.27, 7.28, 7.32, 7.4x, 7.60 and up, and does not exhibit the issue, no action is required, and the relay can be upgraded to any version.

Factory updates to the DSP correct the issue. Any DSP manufactured between 1 September 2011 and 1 December 2015 with impacted firmware must be sent back to the factory for updates before updating the firmware. Contact GE technical support at ga.supportNAM@ge.com for details.

GE tracking number: 728-6

M Corrected Actual Value calculation after a Settings Group change for several elements

Products: C60, D60, F60, G30, G60, L90, M60, N60, T60

Impacted firmware: All to 7.27, 7.30 to 7.82

Corrected firmware: 7.28, 7.90

Workaround: None

Description: Corrected relay metering performance when switching Setting Groups for protection elements where Signal Source setting changes between groups. The elements are Subharmonic Stator Ground, Stator Differential, Stator Ground, Field Current, and Sensitive Directional Power.

GE tracking number: 790-56

D Corrected display of FlexElements Actual Values in 16-bit COMTRADE files

Products: All

Impacted firmware: All to 7.27, 7.30 to 7.82

Corrected firmware: 7.28, 7.90

Workaround: Use 32-bit COMTRADE format

Description: FlexElement Actual Values saturate at much lower values than expected in 16-bit COMTRADE files (oscillography, datalogger).

The new release corrects the issue. The FlexElement Actual Values do not saturate for the full range of -90 pu to +90 pu.

GE tracking number: 790-55

M Corrected phase-to-phase voltage metering for WYE connection

Products: All except C30

Impacted firmware: All to 7.27, 7.30 to 7.82

Corrected firmware: 7.28, 7.90

Workaround: None

Description: Phase-to-phase voltage metering is incorrect when the injected phase-to-ground voltages are greater than 160 V and the Phase VT secondary setting is less than 140 V.

The new release corrects the issue.

GE tracking number: 790-41

G Improved Breaker Flashover element

Products: All with Breaker Flashover (B30, C60, C70, D60, F35, F60, G60, L60, L90, M60, T60)

Impacted firmware: All to 7.27, 7.30 to 7.82

Corrected firmware: 7.28, 7.90

Workaround: None

Description: Breaker Flashover logic can produce incorrect assertion of the element under breaker close scenario if all 6 VTs are configured but only 3 VTs are used.

In the new release, this has been corrected and the logic diagram in the instruction manual is updated.

GE tracking number: 790-32

B **Fixed firmware to prevent an unexpected restart when accessing the Default Settings Diagnostic webpage or text file after a firmware upgrade**

Products: All

Impacted firmware: 6.02 to 6.05, 7.26, 7.27, 7.32, 7.40 and above

Corrected firmware: 6.06, 7.28

Workaround: None

Description: In previous 6.0x versions, accessing the Default Settings Diagnostics webpage or text file after a firmware upgrade might cause the relay to experience an unexpected restart.

In the new release, this issue is fixed.

GE tracking number: 606-3

N **Enhanced firmware security and robustness to single event upsets by adding ECC support**

Products: All

Impacted firmware: 7.00 to 7.27

Corrected firmware: 7.28, 8.10

Workaround: None

Description: CPU firmware code execution security is improved to detect and correct memory bit errors, to prevent incorrect relay operation. The new release adds support for Error-Correction Code (ECC) to protect against inadvertent changes in RAM memory due to Single Event Upset (SEU), which changes the state of the memory bit due to an energetic particle. Inadvertent changes in RAM memory due to SEU have very low statistical probability. ECC detects and corrects single-bit errors. This feature requires upgrading to the latest UR 7 bootloader versions 703 and 704, depending on the CPU type without or with graphical front panel connection, respectively. Look for the boot files at https://www.gegridsolutions.com/app/viewfiles.aspx?prod=urfamily&type=7&test=yes

GE tracking number: 810-22

R **Corrected timestamp in settings monitor log file for large number of events**

Products: All

Impacted firmware: All to 7.27, 7.30 to 7.91

Corrected firmware: 7.28, 8.02

Workaround: None

Description: The timestamp in the settings monitor SETTING_CHANGES.LOG file is incorrect when the number of events exceeds 1024 events.

The new releases correct the issue.

GE tracking number: 802-42

R **Corrected recording of "BATTERY FAIL" event multiple times**

Products: All

Impacted firmware: 7.00 to 7.27, 7.30 to 7.91

Corrected firmware: 7.28, 8.02

Workaround: None

Description: The event recorder can record repeatedly the "BATTERY FAIL" event.

In the new releases, only one "BATTERY FAIL" event is recorded.

GE tracking number: 802-44

G **Corrected angle wrapping to FlexElements angle subtraction to the range -180 deg to +180 deg**

Products: All

Impacted firmware: All to 7.27, 7.30 to 7.91

Corrected firmware: 7.28, 8.02

Workaround: None

Description: FlexElements do not apply angle wrapping correctly when comparing angles of two analog values. For example, the difference between an angle of 170 degrees and one of -170 degrees was 340 degrees.

In the new releases, subtraction of angles by FlexElements is done by applying angle wrapping to the range of -180 to 180 degrees (-0.5 pu to +0.5 pu). In the example used, the difference is now 20 degrees. This applies if both settings "Flexelement +IN" and "Flexelement -IN" are set and are angle quantities.

GE tracking number: 802-29

E **Improved Restricted Ground Fault (RGF) element**

Products: All with Restricted Ground Fault element (F60, G30, G60, L90, T35, T60)

Impacted firmware: All to 7.27, 8.00 to 8.02

Corrected firmware: 7.28, 8.03

Workaround: None

Description: The new releases improve the Restricted Ground Fault element by adding supervision of the ground current to prevent misoperation due to unbalanced phase currents during normal load conditions.

GE tracking number: 803-6

G **Corrected potential lockout of CyberSentry role after losing communication while role is logged in**

Products: All with a CyberSentry option

Impacted firmware: 7.27

Corrected firmware: 7.28

Workaround: None

Description: After a user role successfully logs in to the relay and communication loss to the relay while the role is logged in, the role can be locked out from logging in again.

The new release corrects the issue.

GE tracking number: 728-8

F **Made security enhancements to IOC elements**

Products: All except B90, C30, T35

Impacted firmware: All to 7.27, 7.30 to 8.21

Corrected firmware: 7.28

Workaround: None

Description: In previous releases, in a very rare case of bit flip in the DSP memory or current drop, Phase, Neutral, and Negative-sequence IOC can inadvertently misoperate before a self-test error is detected.

In the new release, a new trip security element is added to supervise IOC operation to confirm independently from IOC itself that the operate quantity follows the "system fault" signature. This element monitors phasors and raw samples in each phase and, based on the changes of these quantities, validates "the fault" presence. The element does not have any settings and can be disabled during testing if needed, using the Test Mode Function.

GE tracking number: 728-10

F **Made security enhancements to differential elements**

Products: B30, B90, G30, G60, M60, T35, T60

Impacted firmware: All to 7.27, 7.30 to 8.21

Corrected firmware: 7.28

Workaround: None

Description: In previous releases, in a very rare case of bit flip in the DSP memory or current drop, the differential element can inadvertently misoperate before a self-test error is detected.

In the new release, a new trip security element is added to supervise differential element operation to confirm independently from the differential element itself that the operate quantity follows the "system fault" signature. This element monitors phasors in each phase and each source and, based on the changes of these quantities, validates "the fault" presence. The element does not have any settings and can be disabled during testing if needed, using the Test Mode Function.

GE tracking number: 728-11

E **Improved security by adding rule to prevent entering the "<" character in text-based settings**

Products: All

Impacted firmware: All to 7.27, 7.30 to 8.03

Corrected firmware: 7.28, 8.10

Workaround: Avoid using the "<" character in text-based settings

Description: In the new release, for improved security, the less-than sign "<" is invalid for text-based settings, such as IED names and sources names.

GE tracking number: 810-13

F **Corrected potential ground fast distance Z1 misoperation during switch-off transients**

Products: D30, D60 and L90

Impacted firmware: 7.20 and up

Corrected firmware: 7.28

Workaround: When using a firmware version without this fix, it is recommended to disable fast ground distance zone 1. In firmware versions 7.2x and 7.3x. This can be done by applying 0.001pu setting to the ground distance zone **VOLTAGE LEVEL** settings (this change will have minimal effect on the functionality but will disable fast distance). In firmware versions 7.4x and above fast distance can be disabled using setting **FAST DISTANCE**: Disabled.

Description: In firmware versions 7.20-7.27, during close to the ground distance zone 1 reach external fault clearance with possible switch-off transients, fast distance zone 1 can transiently operate for a ⅛ to ¼ power cycle duration. This could happen because extra security counts for switch-off transients was in error not applied to the fast distance, while being applied to the regular zone ground distance algorithm.

In 7.28, this issue is corrected, extra security counts for switch-off transients are applied to the fast zone 1 distance in the same way as those for the regular zone 1 ground distance.

GE tracking number: 728-13

Communications

E, C **Added support for PTP Power Profile C37.238-2017 to slave functionality on main CPU (station bus ports)**

Products: All with PTP software option

Impacted firmware: 7.00 to 7.27, 7.30 to 7.82

Corrected firmware: 7.28, 7.90

Workaround: None

Description: In previous versions, the relay does not support PTP Power Profile C37.238-2017 for the main CPU PTP slave.

The new release adds this support.

GE tracking number: 790-26

B, C Corrected firmware to prevent rare unexpected restart when using IEC 61850 buffered reports

Products: All with an IEC 61850 software option and using buffered reports

Impacted firmware: All to 7.27, 7.30 and above

Corrected firmware: 7.28

Workaround: None

Description: The relay can experience a rare, unexpected restart when IEC 61850 buffered reports are configured. The higher the rate of generating buffer reports, the higher the probability of an unexpected restart.

The new release corrects the issue.

GE tracking number: 728-2

C Fixed VxWorks network stack vulnerabilities listed in GE publication GET-20047A, ICS-CERT Advisory ICSA-19-211-01

Products: All

Impacted firmware: All to 7.27, 7.30 to 7.91

Corrected firmware: 7.28

Workaround: None

Description: A number of Wind River VxWorks vulnerabilities were published in ICS-CERT Advisory: ICSA-19-211-01. URs use the Wind River VxWorks Real-Time Operating System (RTOS) and are affected by some of the published vulnerabilities as outlined in GE publication GET-20047A.

The new release includes the VxWorks changes issued by Wind River to fix these vulnerabilities.

GE tracking number: 728-3

C Corrected firmware to prevent loss of connectivity in PRP/failover mode after rebooting certain network switches

Products: All

Impacted firmware: 7.00 to 7.27, 7.30 to 7.63, 7.70 to 7.81, 8.00 to 8.02

Corrected firmware: 7.28, 7.64, 7.82, 8.03

Workaround: None

Description: In previous versions, in PRP/failover mode, rebooting certain network switches can cause the relay to lose connectivity on one of the ports and possibly also cause CPU overload.

In the new releases, the firmware is corrected to prevent network failure and CPU overload in PRP/failover mode when a network switch is rebooted.

GE tracking number: 803-9

C Corrected memory leak in “Routing and ARP Tables Information" webpage

Products: All

Impacted firmware: 7.00 to 7.27, 7.30 to 7.64, 7.70 to 7.81

Corrected firmware: 7.28, 7.66, 7.82, 8.04 and up

Workaround: Avoid refreshing the “Routing and ARP Tables Information” webpage many times

Description: The “Routing and ARP Tables Information” webpage included a small memory leak. Refreshing the web page a large number of times can cause unnecessary loss of memory. This issue has not been reported by any customer.

The new releases correct the issue.

GE tracking number: 766-1

C Corrected firmware to not record Date/Time Changed events for SNTP time changes when the Real Time Clock Events setting is disabled

Products: All when using SNTP

Impacted firmware: All to 7.27, 8.00 to 8.03

Corrected firmware: 7.28, 8.10

Workaround: None

Description: In previous versions, SNTP time synchronization events are recorded as Data/Time Changed events, even when the Settings > Product Setup > Real Time Clock > Real Time Clock Events setting is disabled.

The new release corrects the issue.

GE tracking number: 810-45

C Resolved DNP3 vulnerability published in ICSA-20-105-02

Products: All using DNP3 protocol

Impacted firmware: 6.06, 7.21 to 7.27, 7.30 to 7.63, 7.70 to 7.81, 7.90, 7.91

Corrected firmware: 7.28, 7.64, 7.82, 8.02

Workaround: None. Apply the mitigations recommended in the ICS advisory.

Description: In April 2020, ICS-CERT published ICS advisory ICSA-20-105-02 affecting the DNP3 protocol.

The new releases correct the issue.

GE tracking number: 802-10

C Corrected potential failure to synchronize to SNTP server when duplicate frames are present in the network

Products: All using SNTP

Impacted firmware: All to 7.27, 7.30 to 7.81, 7.90, 7.91

Corrected firmware: 7.28, 7.82, 8.02

Workaround: None

Description: In previous versions, if duplicate frames are present in the network the relay can fail to synchronize correctly to the Simple Network Time Protocol (SNTP) server.

The new releases correct the issue.

GE tracking number: 802-17

C Corrected firmware to prevent dropped connection when relay generates IEC 61850 report without polling from client

Products: All with an IEC 61850 option

Impacted firmware: 7.00 to 7.27, 7.3x

Corrected firmware: 7.28, 7.40 and up

Workaround: None

Description: If the relay is set up for IEC 61850 reports (buffered or unbuffered), without an MMS client polling for data, the relay drops the connection every two minutes.

The new releases correct the issue.

GE tracking number: 728-7

C Resolved Wind River TCP/IP stack (IPnet, Urgent/11) vulnerabilities published in ICSA-19-211-01

Products: All

Impacted firmware: 7.00 to 7.27, 7.30 to 7.63, 7.70 to 7.81, 7.90, 7.91

Corrected firmware: 7.28, 7.64, 7.82, 8.02

Workaround: None. Potential mitigation is possible for some vulnerabilities according to the Wind River security advisory.

Description: Previous versions are affected by the Wind River TCP/IP stack (IPnet, Urgent/11) vulnerabilities published in the July 2019 in ICS advisory ICSA-19-211-01.

The new releases correct the issue.

GE tracking number: 802-9

C **Corrected IEC 61850 buffered reports to send first buffered event after connection loss**

Products: All with an IEC 61850 software option

Impacted firmware: All to 7.27, 7.30 to 8.10

Corrected firmware: 7.28, 8.20

Workaround: None

Description: In certain scenarios and depending on the IEC 68150 client, after a connection loss the first buffered event is not sent out by the relay.

The new releases correct the issue.

GE tracking number: 820-14

G **Changed firmware to automatically reset the AUTHENTICATION FAIL operand**

Products: All with a CyberSentry software option

Impacted firmware: 7.00 to 7.27, 7.30 to 8.10

Corrected firmware: 7.28

Workaround: None

Description: In relays with CyberSentry, if the number of failed authentication attempts for a role reaches the threshold set by the "Session Lockout" setting, the relay asserts the AUTHENTICATION FAIL operand and blocks further login attempts for a period equal to the "Session Lockout Period" setting.

In previous versions, this operand remains asserted and can be cleared only by issuing the "Clear Security Data" command, which also clears the UNAUTH FW ATTEMPT and UNAUTH SETTING WRITE operands.

In the new release, the firmware automatically resets the AUTHENTICATION FAIL operand when the "Session Lockout Period" is inactive for any role.

GE tracking number: 728-12

C **Improved security of UR web pages**

Products: All

Impacted firmware: All to 7.27, 7.30 to 8.03

Corrected firmware: 7.28, 8.10

Workaround: Secure access to the relay's web pages by strong security practices in the substation

Description: The new release includes a number of security enhancements to prevent possible corruption of the relay's web pages by a malicious user.

GE tracking number: 810-10

Phasor Measurement Unit (PMU) – Synchrophasors

M **Corrected issue with synchrophasor Power Triggering for delta connected systems**

Products: All with PMU software option (C60, D60, F60, G60, L30, L90, N60, T60)

Impacted firmware: All to 7.27, 7.30 to 7.82

Corrected firmware: 7.28, 7.90

Workaround: None

Description: The PMU Power Trigger is calculated incorrectly for delta connected systems.

The new release corrects the issue.

GE tracking number: 790-58

P **Improved synchrophasor frequency and ROCOF measurement**

Products: C60, C95, D60, F60, G60, L30, L90, N60, T60

Impacted firmware: All to 7.27, 7.30 to 7.91

Corrected firmware: 7.28, 8.02

Workaround: None

Description: In previous versions, the synchrophasor frequency and ROCOF measurements are sensitive to the synchronization clock jitter. UR relays can report occasionally high frequency and Rate of Change of Frequency (ROCOF) values for a very short time due to such jitter.

The new releases improve the robustness of the algorithm in the presence of synchronization clock jitter.

GE tracking number: 802-5

Software

Software 7.21

G Software exceptions

Applicable: UR Setup and UR Engineer

The following software exceptions have been corrected with software release 7.21.

Software Exceptions
When connected to UR devices with firmware version lower than 5.70, UR Setup fails to retrieve some of the existing diagnostic files
All files retrieved by Service Report are stored in a password-protected FDG file. No password protection is required.
EGD client does not get installed, if the .Net Framework v1.1 is not installed with Windows OS.
Different data logger window (display) for firmware versions lower than 4.80. UR Setup now uses a common Data Logger window for all the firmware versions.
UR ICD file did not pass 61850 schema standard validation. Information related to the IEC 81850-90-5 functionality, which is non-compliant to IEC 61850 schema revision 1.6, was removed from the ICD file.

Upgrade

GE recommends that customers upgrade to the latest UR firmware to take advantage of the latest developments and enhancements. Upgrade the firmware using the EnerVista UR Setup software. This software can also convert settings files from an older version to the latest version and creates a Difference Report once the conversion has been completed. This Difference Report identifies new settings and additional information to assist the user during the upgrade.

Upgrade path for versions 4.00 and above

Firmware version 7.xx requires T, U, or V type CPU modules. Upgrading existing UR devices with firmware versions 4.xx, 5.xx, or 6.xx requires the CPU module to be replaced with T, U, or V type.

Depending on the original order code and age of the relay, replacement of additional modules can be required. Contact our technical support team for details (order code and serial number of existing devices required).

Upgrade path for versions below 4.00

For UR devices with firmware versions below 4.00, new CPU and digital signal processor (DSP) modules are required to upgrade the relay to version 7.xx.

Depending on the original order code and age of the relay, replacement of additional modules can be required.

Benefits of version 7.01 and above

The benefits of revision 7.01 and above are as follows:

- Support to the latest market standards and requirements
  - Hardware support for IEEE 1588 – PTP for time synchronization, IEC62439-3 PRP
  - Three independent Ethernet ports
  - Ethernet ports with pluggable transceivers
  - CyberSentry cyber security in line with industry standards (Radius, Syslog)
  - Multicast synchrophasors in line with IEC 61850-90-5
  - Connection to primary domain controller (PDC) devices when reporting synchrophasor data on C37.118 – N60
  - Complete line protection (distance and line differential) in a single device – L90
  - Additional synchro check elements
  - CT fail detection for all current differential UR devices
  - Five distance zones for transformer protection
- Exceeds NERC-CIP password requirements
  - Up to 20 digits. Support for numbers, letters, and special characters.

Categories

This document uses the following categories to classify changes.

Revision categories

Code	Category	Description
A	Hardware change	This change may require hardware to be updated and/or replaced
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 add 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

For further assistance

For product support, contact the information and call center as follows:

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