

UR Universal Relay Series

Revision 5.80 Release Notes

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Overview

Summary

GE Multilin issues the UR 5.80 release that introduces new improvements for general and protection functions in the UR Family. Highlights of this release include:

- Generator Protection Systems G30, G60:
 - G60 - New Stator Protection Module "GPM-S"
 - G60 - New Rotor Protection Module "GPM-F"
 - Voltage and Current Harmonics and THD
- Bus Differential Systems B30, B90:
 - B30 - Individual phase instantaneous over-current elements per current source
- Capacitor Bank P&C Systems C70:
 - Current directional elements added
 - Reset operand for Time overcurrent when using I²T curve
- Feeder Protection Systems F35, F60
 - F35 - Negative sequence overcurrent elements added
- Line Differential Systems L30, L60, L90:
 - L60 - New phase comparison operation mode
 - L90 - Optimized response to channel failures
- Motor Protection Systems M60
 - Thermal element changes
- Transformer Protection Systems T35, T60:
 - T60 - 5 windings option with Load Encroachment
- Communications
 - IEC61850 - Now supports the PDIF logical node
 - IEC61850 - GOOSE prefixes that are 4-5 characters long
 - DNP 3.0
- PMU - Synchrophasor
 - N60 - Eight additional analogs channel for PMU recording
 - PMU recording trigger
- Events and records
 - New operand for Hardfiber
 - Fault report now records neutral current
- Enervista UR Setup and UR Engineer
 - New Simplified GOOSE configurator
 - Environment Backup and Sites within setting windows
 - Language and Front Panel type conversion
 - UR Engineer with full System Designer Functionality
 - Software exceptions

This document contains the release notes for the 5.80 release of the Universal Relay (UR) Family.

- Affected products: B30, B90, C30, C60, C70, D30, D60, F35, F60, G30, G60, L30, L60, L90, M60, N60, T35, T60
- Date of release: Jun 22th , 2010
- Firmware revision: 5.80

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

If users have existing UR Family relays installed with older version of firmware, they can download and install this new firmware to benefit from the enhancements described in this release note. If the user does not require these new features and enhancements, no upgrading of the relays is required.

Products Affected

This release encompasses the following UR Family products:

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

Firmware Compatibility

The new 5.80 firmware that is a part of this release is compatible with the UR series hardware version 4.00 and higher.

The use of the new 5.80 firmware requires the EnverVista UR Setup software to be version 5.80 or higher.

FW 5.80 Release details

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

Generator Protection Systems G30, G60

N **New Stator Protection Module “GPM-S” enables the G60 to detect 100% Stator Ground Faults using the Sub-harmonic injection method.**

580-1

Applicable: G60.

The Stator Ground Protection Module works in combination with UR G60 to provide a 100% stator ground fault protection that is operational during generator start-up, running and stopped conditions. The 100% stator ground fault protection is based on sub-harmonic injection, a 20Hz voltage is injected to detect ground faults at any point across 100% of the winding thereby protecting the complete stator winding and allowing early detection of stator ground fault conditions.

The 100% stator protection module “GPM-S” works in a plug and play mode with the G60, so no software option is required. For information on Hardware and wiring, please refer to the G60 instruction manual.

Additional information of the New 100% Stator Ground Protection module is available at www.GedigitalEnergy.com/Multilin/GPM-S

N **New Rotor Protection Module “GPM-F” enables the G60 to detect Field to Ground Faults.**

580-2

Applicable: G60.

The Field Ground Protection Module detects ground faults in a generator field winding and helps to prevent serious damage to the generator, maximizing operational lifespan. The field ground protection module, GPM-F works in combination with UR G60 to detect ground faults in the field winding of the generator. Providing application flexibility, the field ground protection module can be configured for either single point injection or double point injection based on application requirements. The solution includes: two stage field ground detection, injected voltage and current supervision, brush lift-off detection, field over and under current elements and field ground fault location

The Field Ground protection “GPM-F” module works in plug and play mode with the G60, so no software option is required. For information on Hardware and wiring, please refer to the G60 instruction manual.

Additional information of the New Field Ground Protection module is available at www.GedigitalEnergy.com/Multilin/GPM-F

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

580-3

Applicable: G30, G60

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

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

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

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

Bus Differential Systems B30, B90

E Bus Differential System B30 has been enhanced to have individual phase instantaneous over-current elements per current source.

580-4

Applicable: B30

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

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

Capacitor Bank P&C Systems C70

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

580-5

Applicable: C70

New phase and negative sequence directional elements “67P” and “67_2” have been added to the C70’s protection functions.

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

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

- E C70 Capacitor Bank protection system has been enhanced to always have three sets of voltage elements independently of the qty of voltage sources.**

580-6

Applicable: C70

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

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

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

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

580-7

Applicable: C70

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

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

Feeder Protection Systems F35, F60

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

580-8

Applicable: F35

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

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

Line Differential Systems L30, L60, L90

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

580-9

Applicable: L60

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

On previous firmware versions L60 users needed to increase the “transient block delay timer” (by adding the “87PC pickup delay timer” value) to get an optimal timing, so users doing the upgrade to the latest FW version don’t have to compensate this way

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

580-10

Applicable: L60

The Phase comparison operation mode can be set through the type of “signal” setting. A new mode of operation “mixed I₁ + K*I₂” has been added to the other two existing choices.

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

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

553-3

Applicable: L90.

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

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

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

Motor Protection Systems M60

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

554-1

Applicable: M60.

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

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

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

FW version 5.54 and 5.80 properly address this behavior.

Transformer Protection Systems T35, T60

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

580-13

Applicable: T60

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

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

Common Protection Elements

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

580-14

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

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

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

Communications

N Line Differential Systems L30 and L90 to support the IEC61850 logical node for differential elements "PDIF"

580-15

Applicable: L30, L90

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

C Changes to the IEC61850 generic logical node prefixes prevents GOOSE transmission from getting frozen when prefixes are 4 or 5 characters long

580-16

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

IEC61850 implementation allows customers to configure prefixes on all the supported logical nodes. Prefixes can be from 1 to 6 characters long.

Previous FW versions showed that GOOSE messages could freeze provided that any Generic Logical Node was given prefixes that were 4 or 5 characters long. Generic logical nodes supported by the UR family are GGIO1, GGIO2, GGIO3, GGIO4 and GGIO5.

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

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

504-5

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

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

FW versions not affected: 5.04, 5.54.

PMU - Synchrophasors

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

580-19

Applicable: N60

The Network Stability and Synchrophasor measurement System N60 has been enhanced with the addition of 8 analogs channels to the PMU recording Element.

Taking into account this enhancement, the quantities of channels within a single PMU recorder are:
 14 for phasors
 16 analogs
 16 digital

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

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

554-3

Applicable: N60, D60, L90, G60.

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

Previous FW version may time stamp the trigger event with the time of the previous PMU reporting interrupt. All the other PMU functions (Eg. data generation and recording) work correctly.

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

Events and Records

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

580-21

Applicable: L60

Oscillography settings on the L60 allow user to choose sampling rates from 8 to 64 samples per cycle. However, previous firmware versions regardless this setting, will always record oscillography events at 64 samples per cycle. This limits the length of the record.

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

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

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

580-22

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

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

This implementation makes easier the analysis of fault events.

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

580-23

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

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

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

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

Enervista UR Setup Software

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

580-24

Applicable: UR Setup, UR Engineer.

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

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

A Generic IED allows a publisher only option for those GOOSE messages which subscriber is not an UR device.

Once the operands have been dragged and dropped, the Configurator will automatically update the relays setting files by configuring the required fields (remote devices, GOOSE data sets and data items, remote inputs, Generic logical nodes).

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

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

580-25

Applicable: UR Setup, UR Engineer.

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

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

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

N UR Setup Off-line windows to support setting file "Sites"

580-26

Applicable: UR Setup, UR Engineer.

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

"Setting sites" can be created within the off-line window, and like the "Device Sites", are used to organize settings files into different groups as per customer needs (location, application, order-code, etc)

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

580-27

Applicable: UR Setup, UR Engineer.

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

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

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

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

E **UR Engineer software to support the “IEC 61850 configurator” tool.**
580-28

Applicable: VP UR Engineer.

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

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

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

All the advanced functionality (System Designer option) of **VP Engineer 3.30** is already released and listed below:

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

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

G **Software exceptions.**

Applicable: VP UR Engineer.

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

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

It is our recommendation that all customers upgrade to the latest version of UR-series firmware to take advantage of the latest developments and feature enhancements. Firmware upgrades can be easily performed using the EnerVista UR Setup software. This software can also convert settings files from an older version to the latest version and provides a Difference Report once the conversion has been completed. This Difference Report identifies new settings and additional information to assist the user during the upgrade.

Upgrade path for versions 4.00 and above

For UR-series devices installed with versions 4.00 firmware and above, the revision 5.5x release can be uploaded to the relay using the EnerVista UR Setup software.

Upgrade path for revisions below version 4.00

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

Benefits of revision 4.00 and above:

The benefits of revision 4.00 and above are as follows:

- Supports many new features and functionality
 - IEC 61850 communications protocol
 - 100 Mb Ethernet
 - IRIG-B repeater
 - Isolated RS485 and IRIG-B
 - Synchrophasors in the D60, L90, N60 & G60
 - Support for Breaker-and-a-Half Transmission Line Protection (D60, L90)
 - Motor Health Diagnostics (M60)
 - Enhanced Front Panel
- Exceeds new IEEE C37.90 requirements
 - Transient immunity (2 to 4 kV)

Change categories

This document uses the following categories to classify the changes.

Table 1: Revision categories

Code	Category	Comments
N	New feature	A separate feature added to the relay. Changes to existing features even if they significantly expand the functionality are not in this category
G	Change	A neutral change that does not bring any new value and is not correcting any known problem
E	Enhancement	Modification of an existing feature bringing extra value to the application
D	Changed, incomplete or false faceplate indications	Changes to, or problems with text messages, LEDs and user pushbuttons
R	Changed, incomplete or false relay records	Changes to, or problems with relay records (oscillography, demand, fault reports, etc.)
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 could be taken immediately
H	Hidden failure to trip	Protection may not operate when it should
F	False trip	Protection may operate when it should not
B	Unexpected restart	Relay restarts unexpectedly

The revision category letter is placed to the left of the change description.

GE Multilin technical support

GE Multilin contact information and call center for product support is shown below:

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