

UR Universal Relay Series

Revision 5.20 Release Notes

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Overview

Summary

GE Multilin releases the UR 5.20 version of firmware that introduces a new product to the UR family as well as many new features to existing products. Highlights of this release include:

- New C70 Capacitor Bank Protection and Control System
- Introduction of Synchrophasor Measurements to the D60 and L90 Relays
- New features and functionality in the N60 Network Stability and Synchrophasor Measurement System
- L60 Line Phase Comparison Relay Application Enhancements
- Broader Applications for the IEC61850 and DNP3.0 protocols
- Enhanced CT/VT circuit monitoring that improves the reliability and security of measured and processed power system information

This document contains the release notes for the 5.20 release of the UR Universal Relay series.

- Affected products: UR Universal Relay series
- Date of release: Oct 23rd, 2006
- Firmware revision: 5.20

Description

The version 5.20 release is compatible with the EnerVista UR Setup software versions 5.2x and higher and UR-series relays operating with hardware versions 4.00 and higher. The following relay models are covered by this note:

- B30 Bus Differential Relay
- C30 Controller
- C60 Breaker Management Relay
- C70 Capacitor Bank Relay
- D30 Line Distance Relay
- D60 Line Distance Relay
- F35 Multiple Feeder Management Relay
- F60 Feeder Management Relay
- G30 Generator Management Relay
- G60 Generator Management Relay
- L60 Line Phase Comparison Relay
- L90 Line Differential Relay
- M60 Motor Management Relay
- N60 Network Stability and Synchrophasor Measurement System
- T35 Transformer Management Relay
- T60 Transformer Management Relay

Release details

In the following change descriptions, a revision category letter is placed to the left of the description. Refer to the Appendix at the end of this document for additional details.

C70 Capacitor Bank Relay

N

Product Launch of the C70 Capacitor Bank Protection and Control System

The C70 is an integrated protection, control and monitoring device for capacitor banks based on GE Multilin's well-established and proven UR platform. C70 provides both the bank and system protection schemes for shunt capacitor protection. The current and voltage-based protection functions are designed to provide sensitive protection for grounded, ungrounded single and parallel capacitor banks and banks with taps, for a variety of capacitor bank configurations. Combined with sophisticated built-in control functions, the C70 can switch banks In and Out with relative ease for automatic voltage regulation.

N

Voltage Differential Protection (87V)

The Voltage Differential Protection element is used to detect faults by comparing the magnitudes of the bus voltage (full cap voltage) and a tap voltage, on a per-phase basis.

N

Compensated Bank Neutral Voltage Unbalance Protection (59NU)

The Neutral Voltage Unbalance element detects the Overvoltage condition of the neutral-point voltage of an ungrounded capacitor bank. Additional sensitivity is achieved by compensating for simultaneous system unbalance and inherent bank unbalance.

N

Bank Phase Overvoltage Protection (59B)

The Bank Phase Overvoltage element responds to the voltage drop across capacitors individually in each phase. Capacitor bank neutral-point voltages are compared with the phase to ground voltages measured at the bus, in order to detect voltages that cause stress and damage to the capacitors.

N

Phase Current Balance Protection (60P)

The Phase Current Balance element responds to the unbalance (split-phase) current measured between two parallel banks, typically using sensitive window-type or core-balance CT. This element applies compensation for the inherent bank unbalance.

N

Neutral Current Balance Protection (60N)

The Neutral Current Balance element responds to the unbalance (split-phase) current measured between the neutral currents of two parallel banks. The function applies simplified, but practical, compensation for the inherent bank unbalance.

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Time of Day Control

The Time of Day Control element allows the C70 to perform automatic control of capacitor banks based on Dates and Real Time of day.

N

Voltage Regulator Control

The Voltage Regulator element allows automatic control of capacitor banks through monitoring of voltage, power factor, or reactive power. This advanced control function provides simple ON/OFF controls using individually settable close/open thresholds and timers.

N

Capacitor Control Supervision

The Capacitor Control Supervision scheme uses inputs from various different protection and control element sources to provide capacitor bank control, while also providing Remote/Local and Auto/Man control access rights.

N

New CT/VT Input DSP Module – 8V – 8 VT Inputs

This new 8V module provides an option to order a CT/VT module with all Voltage Inputs. The 8 available voltage inputs are split into two separate groups, each group being intended for measuring the three phase voltages available from one Capacitor bank circuit.

N60 Network Stability and Synchrophasor Measurement System

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Direct Analog Inter-Relay Communications

The Direct Analog communications allow high-speed sharing of analog data between multiple N60 relays. The Direct Analog feature uses the UR Inter-Relay communications modules that allow communication between N60 relays located large distances apart. The Direct Analog outputs co-exist on the same communications channel as the Direct I/O feature, with Direct I/O being given higher priority.

N

FlexMath Summator

Six identical FlexMath Summators are available per relay. Each Summator consists of an Addition block that contains up to six FlexAnalog Inputs and an Output Comparator. Each of the six Analog Inputs can be scaled individually and dynamically included or excluded in the Addition calculation. The comparator can be configured to look at either the signed or the absolute value of output of the addition block and assert when the pickup setting is exceeded.

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New Inter-Relay Communications module – 7V – RS422 with dual synchronization clocks

Independent Clock signal inputs are now available for each RS422 channel of this dual-channel communications module. This permits each RS422 channel to be connected to separate communications networks, each with its own respective synchronization sources.

E

FlexElements™: PMU Voltage value incorrect after setting change

The value that was being shown and evaluated for PMU voltage within FlexElements has been corrected to represent the actual measured value. The previous version of the firmware caused the value to be represented incorrectly once the VT Secondary setting had been changed.

L60 Line Phase Comparison Relay

N

Charging Current Compensation

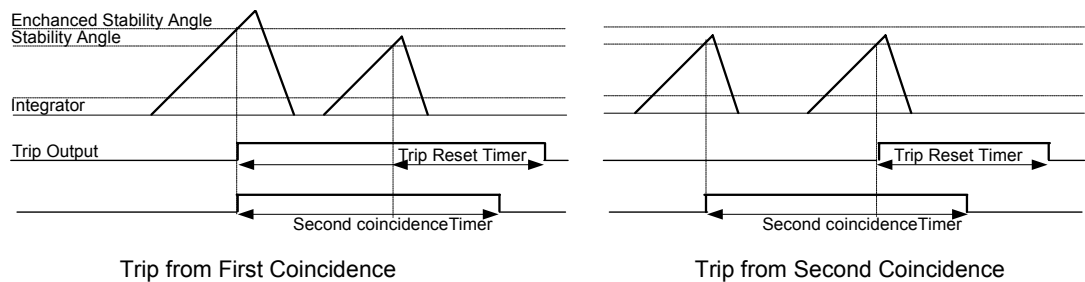
The L60 Charging Current Compensation feature is beneficial when the L60 is applied on a long overhead transmission line or on a cable line. This feature removes charging current from phase currents and as a result from the mixed current too, in both steady state and system transient conditions. When L60 is applied on breaker-and-a-half applications, charging current is removed proportionally from each breaker, based on the current flow through the breaker.

N

Enhanced Tripping Security

The Enhanced Tripping Security increases the security of the L60 Phase Comparison scheme by providing a separate, higher Stability angle setting for the First Coincidence of Phase Comparison signals. Additionally, if the integrated value is above the regular Stability Angle setting, but below the Enhanced Stability Angle setting, the function arms itself toward tripping on the next coincidence. The regular stability angle setting, 87PC STABILITY ANGLE, controls tripping on the next coincidence

This feature operates in both single-phase comparison and dual-phase comparison modes of operation. In dual-phase comparison mode, second coincidence is counted from any of 2 integrators (positive or negative halves of the signal).



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Negative Sequence Overvoltage Protection

The Negative-Sequence Overvoltage element detects Transmission Line faults under weak system conditions by analyzing the $I_2Z - V_2$ term for negative-sequence voltage and current.

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Advanced Starting Protection

The Advanced Starting Protection scheme is used to provide protection on Transmission Lines with a weak-infeed at one end, or on heavily loaded lines that may have significant negative-sequence current. This scheme uses three independently operated elements for detecting faults, including Negative Sequence Overvoltage, Rate of Change of Negative Sequence Current, and Rate of Change of Positive Sequence Current.

E

Enhanced Reference Phase and Angle Selection

The Enhanced Reference Phase and Angle Selection feature allows the L60 to minimize the effect of Corona phenomena on the dependability of the Phase Comparison Blocking Scheme. This feature introduces a phase shift setting that can be used to control the angular position of the operating signal with respect to the phase voltage used by the line carrier.

T60 Transformer Management Relay

E

Enhanced Transformer Differential Protection

The Transformer Differential Protection element Harmonic Restraint function has been improved to include only those measured currents that are greater than the Current Cutoff Level setting in the calculation of the average harmonic restraint current. This affects the second harmonic restraint calculations only when the "Average" INRUSH INHIBIT MODE is selected.

Synchrophasor Measurements (PMU)

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Synchrophasor Measurement available on the D60 and L90

Applicable: D60, L90

The D60 Distance Protection Relay and the L90 Line Differential Relay are now available with the option for including Synchrophasor Measurement in the same device as the protection relay. Measurement of Synchrophasor data will allow accurate measurement and analysis the state of the power system based on real-time data collected from Phasor Measurement Units located across the network. Through collection of this accurately time-tagged Phasor data, System Controllers can quickly identify power system events through visualization of system quantities such as power flow, dynamic phase angle separation, and rate of change of frequency from different parts of the system.

Communications

N

IEC61850: Two Reporting Buffers

Applicable: all UR-Series Relays

The IEC61850 protocol in the UR family was enhanced to support two Buffered Report Control Blocks (BRCB). This enhancement allows two separate IEC61850 clients to receive buffered information from the same UR series relay.

N

IEC61850: GOOSE Communication Enhancements (Analog Data)

Applicable: all UR-Series Relays

The IEC61850 GOOSE Communication was enhanced to allow sending of Analog data to other IEC61850 compatible devices. Individual MMXU deadband values can be set to initiate transmission once the value drifts beyond a preset deadband level.

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IEC61850: Custom Analog Logical Nodes

Applicable: all UR-Series Relays

The IEC61850 protocol has been enhanced to allow mapping of UR Analog data into GGIO Logical Nodes. This mapping function allows the creation of custom Logical Nodes from the many analog parameters available in the UR relays.

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IEC61850: Additional Synchrophasor PMU Logical Nodes

Applicable: D60, L90, N60

Additional IEC61850 Logical Nodes were created that allow accessing of information about the PMU records stored in Synchrophasor-enabled devices. Data items added include Number of Triggers, Max Number of Records, as well as the ability to send commands to Clear all recorded information.

C

Communications: internal enhancements to DNP and IEC 60870-5-104 communications

Applicable to: all UR-series relays

The DNP3.0 slave communications in the UR has been enhanced to allow for the relay to locally buffer more than 500 Binary Input events between requests by the master for new data. In previous firmware versions, delayed requests for new Binary Inputs that can be caused by the link from the master being broken would cause the relay to not report the new events that occurred once it's buffer of 500 events was filled.

C

DNP 3.0 & IEC61870-5-104: Dedicated Scaling Settings for Power Factor

Applicable: all UR-Series Relays

The DNP3.0 and IEC61879-5-104 protocols have been enhanced to provide dedicated scaling and deadband settings for Power Factor quantities.

C

DNP3.0 and IEC61870-5-104: Support for Larger Deadband Settings

Applicable: all UR-Series Relays

The DNP3.0 and IEC61879-5-104 protocols have been enhanced to allow larger settings for the deadbands for analog parameters. All deadband settings have been modified to allow acceptance of a 32 bit integer number.

C

DNP 3.0: Configurable DNP3.0 TCP/IP Connection Timeout

Applicable: all UR-Series Relays

The DNP3.0 protocol has been enhanced to provide the ability to configure the length of time for which a UR will lockout once it has lost communication with it's DNP master.

C

DNP3.0: Binary Counters (Object 20, 21) Responding with Incorrect Data Variation

Applicable: all UR-Series Relays

The DNP3.0 Binary Counters (Object 20 and 21) have been improved to respond with the correct Variation requested by the master. In previous versions, the Binary Counters responded to requests for data in Variation 1, regardless of what Variation was requested.

Platform

N

Enhanced CT/VT Health Diagnostics

Applicable: all UR-Series Relays

This new release of CT/VT input modules (8L, 8M, 8N, 8R, 8V) provides Enhanced CT/VT circuit monitoring, improving the overall reliability and security of measured and processed power system information. These new modules continually monitor the signals being received, measured, and processed, to verify the integrity of the data. If any of the data is deemed to be invalid, the relay does not use the corrupted data and indicates this problem to users using the relay self-test indicators.

N

LED States available as FlexOperands

Applicable: all UR-Series Relays

New FlexLogic Operands have been added to reflect the state of the LED's found on the front panel. The states of the LED's can now be used anywhere Flexlogic operands can be assigned (i.e. Flexlogic).

N

Support for French and Russian Languages

Applicable: all UR-Series Relays

The French and Russian Languages are now available on the UR Platform. These languages are fully supported and can be viewed in the UR Front Panel, the UR Setup Software, and the manuals.

E

Supervision of Wattmetric Zero-Sequence Directional Protection Enhancement

Applicable: F60, D60, L60, L90

The Wattmetric Zero-Sequence Directional element can use either the internally calculated zero-sequence voltage or an externally supplied zero-sequence voltage source (broken delta VT) connected to the auxiliary VT channel. When supplied from an external zero-sequence source, the auxiliary VT channel must be configured under Voltage Bank settings as a neutral voltage (Vn), otherwise the Wattmetric Zero-Sequence Directional element will not operate. Previously, the Wattmetric Zero-Sequence Directional element would operate regardless of the auxiliary VT input setting. This has been resolved in this release.

E

Breaker Fail Seal-In Reset operating incorrectly

Applicable: all UR-Series Relays

The Breaker Failure Seal-In logic has been improved to ensure that once the breaker failure element has been initiated, the initiation signal will remain sealed-in until the current falls below the breaker failure current supervision setting.

E

VT SECONDARY Setting Range Decreased

Applicable: all UR-Series Relays

The minimum setting value for the VT Secondary has been decreased to 25 Volts to allow the UR relays to be connected to a wider range of interposing voltage transformers.

UR Setup Software

N

Ability to view UR Setup Software on PC's with Dual Monitors

Applicable: all UR-Series Relays

The UR Setup software has been enhanced to allow the software to be viewed on computers that have dual monitors installed. Users can now drag the setting windows within the UR Setup Software to a second installed monitor thus increasing the overall size of the workspace and the number of windows that can be viewed at one time.

E

Support for Converting UR Setting Files to version 5.20

Applicable: all UR-Series Relays

The UR Setup program can convert setting files that were created for versions of firmware older than the new 5.20 version. Setting Files created in firmware versions from 2.4X to 5.0X can now be converted to the latest version.

E

Enhanced Printing of Setting Files

Applicable: all UR-Series Relays

The UR Setup software has been enhanced to allow adding of customized Header Information to provide better documenting of revision controlled Setting File Documents. The printing formatting has also been improved to ensure all settings can cleanly fit into the printing area.

Upgrade paths

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, in addition, provides a difference report once this conversion has been completed. This Difference Report identifies new settings and additional information to help the user during the upgrade.

Upgrade path for versions 4.00 and above

For UR-series versions 4.00 and above, the revision 5.20 release can be uploaded to the relay CPU via the EnerVista UR Setup software.

Upgrade path for revisions below version 4.00

For UR-series versions below 4.00, an upgrade package must be obtained from GE Multilin in order to upgrade the relay CPU and CT/VT modules to revision 4.xx.

Benefits of revision 4.00 and above:

The benefits of revision 4.00 and above are as follows:

- Supports many new features and added functionality
 - IEC 61850 communications protocol
 - 100 Mb Ethernet
 - IRIG-B repeater
 - Isolated RS485 and IRIG-B
 - Synchrophasors in the D60, L90, N60 (5.2x firmware and above)
 - Support for Breaker-and-a-Half Transmission Line Protection (D60, L90)
- Exceeds new IEEE C37.90 requirements
 - Transient immunity (2 to 4 kV)

Appendix

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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