UR Universal Relay series
Revision 4.20 release note

GE Publication Number: GER-4029

Overview

Summary

- Affected products: UR Universal Relay series
- Date of release: June 30, 2004
- Firmware revisions: 4.20
- Boot code revision: 3.01

Release summary

This document contains the release notes for the 4.20 release of the UR Universal Relay series. The following relay models are covered by this note:

- B30 Bus Differential Relay
- C30 Controller
- C60 Breaker Management Relay
- D30 Line Distance Relay
- D60 Line Distance Relay
- F35 Multiple Feeder Management Relay
- F60 Feeder Management Relay
- G60 Generator Management Relay
- L90 Line Differential Relay
- M60 Motor Relay
- N60 Network Stability and Security Relay
- T35 Transformer Management Relay
- T60 Transformer Management Relay

New features and modifications to existing features listed in the following section with corresponding revision categories and reference numbers. A change list for the Instruction Manuals is also included.

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 code letter is placed to the left of the description. An internal GE reference number is placed to the right of the description. This number may be used to reference the modification when contacting GE Multilin.

GE Multilin technical support

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

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Release details

New features

N **Breaker-and-a-Half: implement breaker-and-a-half functionality on the L90 relay** 8813 12030 12075 12115 12146 12284 12285 12474 12817 12864 13052

The L90 algorithm was modified to allow handling of breaker-and-a half configurations, taking advantage of the two CT/VT module capability of the new hardware. Before this enhancement, currents from two breakers had to be summed externally. With release 4.20, up to four local currents can be summed internally. An advanced restraint algorithm selects the maximum local current as a restraint current, preventing possible misoperation resulting from CT saturation during an external bus fault behind one of the breakers. This enhancement allows distributed bus protection, where up to 12 breakers can be included in the bus zone over a wide physical area.

N **Breaker Arcing Current: feature added to additional UR-series models** 12288

The breaker arcing current feature has been added to all the F35, T35, and T60 relays.

N **Breaker Flashover: feature implemented on C60, D60, F60, L90, and M60 relays** 12287

Breaker flashover is declared when the following conditions are satisfied:

1. Breaker is open.
2. A voltage drop is measured from either side of the breaker during the flashover period.
3. There is voltage difference drop.
4. A flashover current is measured through the breaker.

N **Communications: EGD protocol added to the B30 relay** 12690

The EGD Protocol has been added to the B30 relay with release 4.20.

N **Digital Counters: feature added to the F35 and T35 relays** 12289

A total of eight (8) digital counters have been added to both F35 and T35 relays.

N **Ground Time Overcurrent: feature added to T35 relay** 12470

Ground time overcurrent protection (ANSI 51G) has been added to the T35 relay to satisfy requirements for ground fault trip coordination with same or similar protections from upstream and downstream power system.

N **Hardware: new module type for redundant power supply** 12540

Release 4.20 allows for the addition of a second power supply in the “X” slot of the relay chassis. The module types are:

redundant high voltage power supply = RH
redundant low voltage power supply = RL

Modified features

E **Autoreclose: number of shots for single-pole autoreclosure increased from 2 to 4** 11800

The number of autoreclosure shots was increased from 2 to 4. In either the "1 Pole" or "1 & 3 Pole" mode, the first shot is single-pole, while the consequent three shots are three-pole. In "3 Pole" mode all shots are always three-pole. The dead for each shot is individually set. These changes are applicable to the 4.20 release for the C60, D60, and L90 relays.

R **Auxiliary Undervoltage: no Auxiliary Undervoltage DPO event generated when blocked** 10978

The Auxiliary Undervoltage protection element did not generate a DPO event in the event recorder when the BLOCK operand was asserted. This issue has been fixed for the 4.20 release.

N **Breaker Arcing Current: the breaker arcing current feature to include calculation of fault duration** 12290

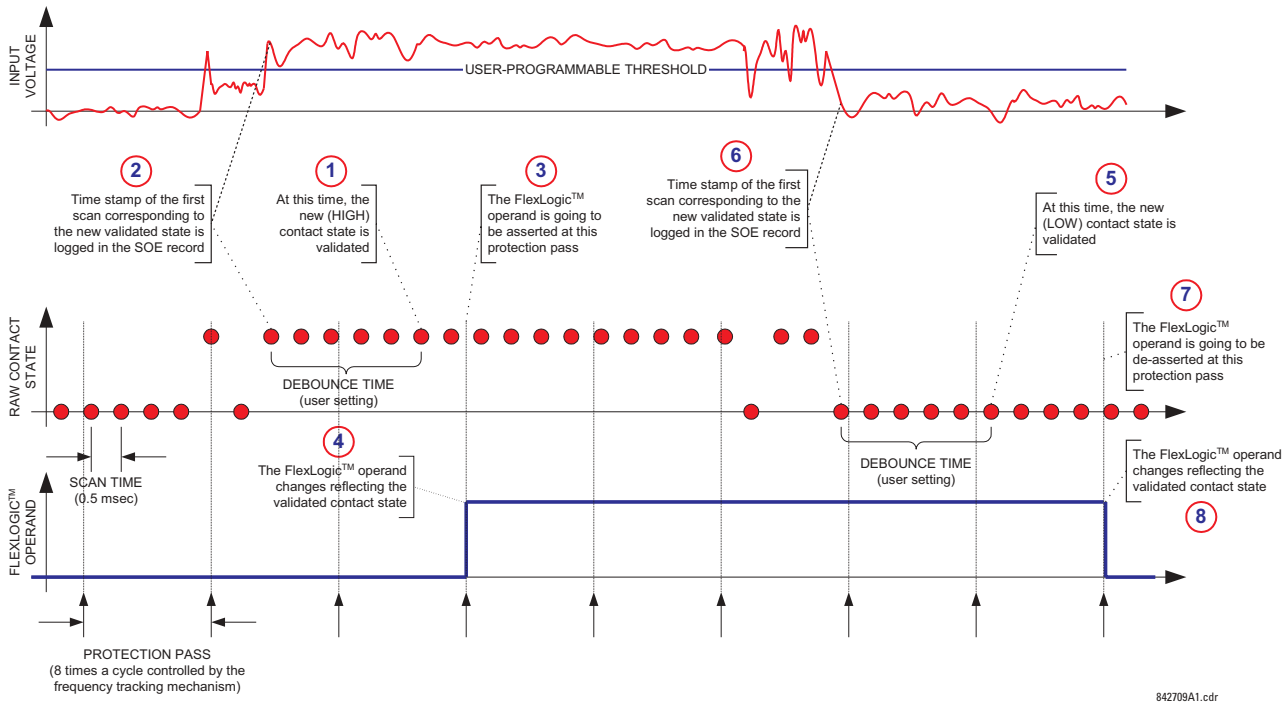
A new feature has been added to the Breaker Arcing Current function that performs fault duration calculations. Fault duration is defined as the time between the operation of the disturbance detector (occurring before a trigger) and the reset of a low-set overcurrent detector.

R **Communications: DNP Binary Inputs Change timestamps for Contact Inputs** 8739

A firmware update has been made to the assignment of timestamps for contact input state changes when reported as DNP Binary Input Change events. The firmware now provides the same timestamp for DNP Binary Input Change events as recorded in the UR event record. The UR event record was not changed. The timestamps reported via DNP Binary Input Change events now match the event record.

Previously the timestamp reported via DNP Binary Input Change events for contact inputs was delayed by the contact input debounce time plus up to 1/8 cycle.

The timestamp algorithm is shown below for reference.



R **Communications: IEC 60870-5-104 timestamps for Contact Input point changes** 11958

A firmware update has been made to the assignment of timestamps for contact input state changes when reported via IEC 60870-5-104 protocol. The firmware now provides the same timestamp for IEC 60870-5-104 Binary Input Change events as recorded in the event record. The event record was not changed. The timestamps reported via IEC 60870-5-104 now match the event record.

Previously the timestamp reported via IEC 60870-5-104 for contact inputs was delayed by the contact input debounce time plus up to 1/8 cycle.

C **Communications: RS422 and G.703 communication cards fixed to run only at 64 kbaud** 12517

The 4.20 release ensures that direct input/output communication cards containing RS422 and/or G.703 communication interfaces run only at 64 kbaud. The **DIRECT I/O DATA RATE** setting has no effect for these cards.

In previous revisions, the **DIRECT I/O DATA RATE** setting could be used to change the data rate for these cards. However, due to clocking requirements. these cards must be run at only 64 kbaud.

C **Communications: settings added for DNP default variations** 6972

Settings have been added to allow the user to select the DNP default variation number for object types 1, 2, 20, 21, 22, 23, 30, and 32. In previous releases, the default variations for these object types were fixed.

C **Communications: speed up the shut-down process for dead TCP connections** 10379

When a client connection to a UR-series relay becomes inactive (e.g. if the client computer crashes, or if the physical network connection is broken), the relay could take approximately 10 minutes to close this 'dead' connection. This could cause the relay to take over 10 minutes to switch from a primary to a backup client (e.g. switching from a primary DNP master to a secondary DNP master). With the 4.20 release, this network delay has been reduced to approximately 2½ minutes (2 minutes to detect that the connection is dead, and 30 seconds to close the network connection).

R **Contact Inputs/Outputs: delay in contact input response time** 12253

An unexpected latency of contact input response time has been fixed for the 4.20 release. It was found that a change in contact input status might not be recognized until the next protection pass has elapsed.

D **Direct Devices: direct device status display incomplete** 12100

The direct device status displays would show only a maximum of 8 devices instead of the correct value of 16. This has been fixed for the 4.20 release.

G **Direct Inputs/Outputs: Channel ID and direct input/output changes for the L90 relay** 10825

The following changes were implemented for the L90 direct input/output feature:

1. The **CHANNEL 2 ID** is validated for 3-terminal systems only. In previous releases, the Channel 2 ID had to be programmed and was checked for 2-terminal/2-channel systems as well.
2. For 2-terminal/2-channel systems, the **TERMINAL 1 ID** setting has to be checked against received Channel ID at both channels.
3. For 2-terminal/2-channel systems, the direct inputs/outputs have to be processed at Channel 2 in the case that Channel 1 fails. In previous releases, the direct inputs returned to their default states when Channel 1 failed.

C **Direct Inputs/Outputs: errors in Channel 2 of direct input/output cards** 13019

The firmware was changed to correctly set an internal microprocessor register used during the transmission of data through channel two of direct input/output cards. Previously this register was set incorrectly, which resulted in occasional transmission errors. The error rate was low, and the re-transmission scheme of direct input/output made the problem difficult to detect. Channel one was not affected by this change.

R **Direct Inputs/Outputs: incorrect or missing FlexLogic™ operands for type 2A, 2E and 2F communications modules for the L90 relay** 12747

The following issues were present with the 2A, 2E and 2F communications modules:

Module	Issue	Solution
2A	This is a single channel module, but FlexLogic™ operands were made available for two channels.	Only FlexLogic™ operands for a single channel are now available.
2E	No FlexLogic™ operands were available for this module.	FlexLogic™ operands are now available for this module.
2F	No FlexLogic™ operands were available for this module.	FlexLogic™ operands are now available for this module.

M **Energy Metering: incorrect reporting of energy data** 10617

The stored energy data for watt-hours and var-hours would change if the source CT or VT primary settings were changed. Release 4.20 ensures that these energy values remain constant during CT or VT setting changes.

R **Fault Locator: fault location report updates** 10751

The "Event Record Number at Trigger" item in the fault location report text file was corrected to agree with the "Event Record Number at Trigger" item in the corresponding web page. In previous releases, the text file value was off by one.

The name "Post fault" data was changed to "Fault" data to more accurately reflect the nature of the data. No changes to functionality were made.

N **Fault Locator: fault location reports to include fault duration** 12291

The fault duration times for each of the breakers (created by Breaker Arcing Current feature) have been added to the "Fault Location" report.

D **Fault Report: incorrect Fault Report 1 length units display** 12911

The display for **FAULT REP 1 LENGTH** would incorrectly place the units name, ex. "miles", in the display field. This has been fixed for the 4.20 release.

R, F **Frequency Rate of Change: incorrect operation of the Frequency Rate of Change element** 11252

When the BLOCK operand was asserted and then de-asserted, the Frequency Rate of Change element did not reset its pickup timer. Also, the Auxiliary Undervoltage element did not generate a DPO event in the event recorder when the BLOCK operand was asserted. These issues have been fixed for the 4.20 release.

F **Generator Unbalance: Generator Unbalance Thermal Memory not cleared when the element is disabled in the G60 relay** 10598

The thermal memory of the Generator Unbalance element would not reset when the element was disabled. If the element were to be subsequently enabled, the thermal memory would be at the level it was when last disabled. This could result in an inadvertent operation immediately upon

enabling the element if the element were operated when it was last disabled. Release 4.20 fixes this issue.

D **High Impedance Detection: Armed and Timeout states in Actual Values Status menu** 6661

The status of the Hi-Z algorithm is displayed in the **ACTUAL VALUES ⇨ STATUS ⇨⇩ HI-Z** menu. Although the Hi-Z element operates as per specification, the "Coordination Timeout" or the "Armed" state of the algorithm are not displayed as actual values. The 4.20 release fixes this issue.

G **Internal Enhancement: internal resource modification** 12583

Modifications have been made to internal firmware structures for release 4.20. These changes are transparent to the user.

G **Internal Enhancement: modifications to internal development tools** 10868

Modifications have been made to firmware required for internal product development. These changes are transparent to the user.

P **Mechanical Jam: Mechanical Jam pickup/reset time delay inaccuracy in M60 relay** 10817

The Mechanical Jam Pickup/Reset Time Delay accuracy was out of stated specifications of ±3% or ±20 ms, whichever is greater, for timer settings greater than 65.5 seconds. This has been fixed for the 4.20 release.

G **Motor Acceleration Time: Acceleration Time DPO operand correction in the M60 relay** 11217

The ACCELERATION TIME DPO operand should be the inverse of the ACCELERATION TIME OP operand, but remained "On" regardless of the OP state. This has been fixed for the 4.20 release.

P **Motor Protection: lockout timers being cleared** 10829

In previous releases, the Starts/Hour Lockout, Restart Delay Lockout, and Time Between Starts Lockout timers would reset to zero when relay control power is cycled. The values of these timers are now retained and their values decremented for the duration that control power had been removed from the M60 relay.

R **Motor Start Inhibit: Motor Start Inhibit event record updated in the M60 relay** 11238

In previous releases, the assertion of the MOTOR START INHIBIT operand would record "Invalid" in the event recorder. This has been fixed for the 4.20 release.

D **Motor Status: incorrect motor status display in the M60 relay** 13082

The Motor Status display on the faceplate could possibly show "BAD ENUM", rather than "Offline", "Starting", "Running", or "Overload", after downloading a newer release into the M60. Consultation with the factory was required to correct this situation. This has been fixed for the 4.20 release.

R **Negative-Sequence Overvoltage: the Negative-Sequence Overvoltage element does not create a DPO event when switching setting groups** 10999

The relay did not produce a DPO event record when switching settings from a group where the Negative-Sequence Overvoltage element was operated to a group where the element was in the DPO condition. This has been fixed for the 4.20 release.

R **Phase Overvoltage: no Phase Overvoltage DPO event generated when blocked** 11253

The Phase Overvoltage element did not generate a DPO event in the event recorder when the BLOCK Operand was asserted. This has been fixed for the 4.20 release.

G **Restart Delay: minimum delay range change for the M60 Restart Delay element** 11914

The range of the **RESTART DELAY MINIMUM DELAY** setting has changed from "0 to 300 minutes" with a step value of 1 minute to "0 to 50000 seconds" with a step value of 1 second.

G **Thermal Model: operand name change and missing display units added** 12164

The MOTOR OP FlexLogic™ operand has been re-named as MOTOR THERMAL OP.

The units for the **ACCELERATION CURRENT** and **ACCELERATION TIME** settings were missing from the front panel display. These units are now displayed with release 4.20.

G **Thermal Model: Start Inhibit and Thermal Lockout Time enhancements in M60 relay** 9120 12769 12925

In operational conditions where a motor is stopped or tripped by thermal overload protection, the Thermal Model operation does not assert the MOTOR START INHIBIT FlexLogic™ operand for the duration of the thermal lockout time. With release 4.20, the Thermal Model logic has been modified to assert the MOTOR START INHIBIT FlexLogic™ operand when appropriate. Please refer to the *Thermal Model* section in the M60 Motor Relay manual for a detailed description.

D **Transducer Inputs/Outputs: dcmA output source name display incorrect** 11375

The display for the dcmA source name did not match the text as described in the user manual. This has been fixed for the 4.20 release.

R **User-Programmable Fault Report: add User-Programmable Fault Report newest record number counter to MMS "UR" domain** 13021

The "Newest Record Number" data item from the User-Programmable Fault Report feature has been made available as the MMS protocol data item "UR/UserFaultRep$NewestRecNum".

R **User-Programmable Fault Report: missed triggering on user-programmable fault reporting** 7602

A user-programmable fault report should be created when the fault trigger transitions to active high less than 1 second after the pre-fault trigger transitions to active low. In some instances, the user-programmable fault report failed to be generated when the trigger transitions occurred as per specification. The 4.20 release has been modified to fix this issue.

N **User-Programmable Fault Report: reports to include fault duration** 12291

The fault duration times for each of the breakers (created by Breaker Arcing Current feature) have been added to the user-programmable fault report.

M **Voltage Metering: error in FlexAnalog voltage metering data** 11741

The FlexAnalog voltage metering values were found to be outside of specifications when the programmed VT Ratio was low. Errors were found when the non-integer portion of the ratio was substantial compared to the ratio primary, i.e. 2.5:1, 0.5 / 2 = 25%. The error diminished as the VT ratio was increased. The metered value when this error occurred would be read as below the expected value. In previous releases, any FlexElements™ using FlexAnalog voltages as their inputs would need the thresholds to be modified (lowered) to compensate for this metering error. This has been fixed for the 4.20 release.

enerVista UR Setup changes

The enerVista UR Setup software 4.20 supports UR-series released 1.80 through 4.20.