



UR Family Upgrade Guide

Publication reference: GET-8550B

Part Number: 1601-0050-A3

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This document outlines how to assess and upgrade a GE Universal Relay (UR) to the latest hardware version.

Introduction

This document outlines how to upgrade UR hardware and firmware to version 7.x. While GE recommends an upgrade to the version 7.x platform, some upgrades to version 4.x to 6.x can be provided if required. This upgrade guide applies using a Replacement Kit. The Replacement Kit does not include the front panel, backplane, or case assembly.

In 2014, UR versions 1.0 to 3.5 were obsoleted and some replacement parts can no longer be purchased. The earliest version of the UR was sold in 1998 and their design life is estimated at 10 years, hence any UR version 1.0 to 3.5 manufactured prior to 2007 (at time of writing in 2017) is a suitable target for proactive upgrade.

Power supplies degrade over time and also require replacement. For 1H power supplies (used 1998 to 2004) at the 10-year mark, device failure rate is expected to increase at a rate of 1% per year. For RH power supplies (used 2004 to October 2013) at the 15-year mark, device failure rate is expected to increase at a rate of 1% per year. The RH/RL Rev B power supply and the newer SH/SL power supply (both used since October 2013) utilize the latest technology to provide design life of 40 years.

GE does not have a set period after which replacement of the power supply or full relay is recommended. The period is best determined by your asset management group and is typically 10 years or longer.

An upgrade is recommended under the following circumstances:

- The age of the UR IED is longer than a pre-determined period
- The UR was exposed to
 - High temperatures and humidity
 - High electrical stresses
 - Harsh environments
- There is damage or corrosion to the case or backplane of the UR

Evaluate extreme environmental factors

Digital relay components applied in ideal environments typically last 10 to 20 years, with a shorter life in harsh environments.

Degradation of digital protection relays occurs when they are exposed to

- High temperatures and humidity
- High electrical stresses
- Harsh environments

It is recommended to upgrade a UR that is less than 10 years old if it was exposed to one or more of these environmental factors for a prolonged period of time, as follows.

High temperatures and humidity

Maximum life expectancy is achieved when the relay operates at an ambient temperature near 25°C (77°F).

The UR is specified and capable of operating in a temperature range of -40 to 60°C (-40 to 140°F) and humidity up to 95% (non-condensing), however electronic component degradation accelerates if exposed to the outer limit of these ranges for prolonged periods.

Continuous operation at maximum temperatures creates stress on components within modules, such as power supplies, capacitors, and displays.

Continuous operation and start-up at minimum temperatures creates excess stress on displays, particularly liquid crystal displays (LCDs). Powering up LCD displays at low temperatures (below -10°C or 14°F) is stressful on liquid crystals, backlighting, and so on.

Electrical stress

High voltage and high frequency transients that exceed relay specifications affect relay components and ultimately proper performance.

While the UR conforms to applicable dielectric, radio frequency (RF) immunity, and impulse voltage industry standards (such as IEEE and IEC) for protective relays, these levels cannot be exceeded when the UR is connected to an actual power system's current and voltage transformers. Exposure to excessive voltage and frequency transients is not always known, unless some components of the UR, or connected devices to the same current transformer (CT) or potential transformer (PT) circuits, present a failure. In most cases, this is uncovered only during routine maintenance testing.

Harsh environments

A UR used in environments containing high concentrations of chemicals must be treated with an optional conformal coating to prevent corrosion. Environments containing sulfur dioxide, nitrogen dioxide, chlorine, or hydrogen sulfide can cause significant erosion if the UR was not treated with a harsh-environment conformal coating.

UR versions 3.5 and below were not available with a conformal coating for harsh environments (including case assembly and front panel), hence a total UR replacement is recommended with conformal coating if the UR was exposed for a prolonged period.

Maintenance

GE recommends that all URs be maintained at regular intervals (as defined by your local Reliability Coordinator), as per the instruction manuals, or as per the GE Maintenance Handbook, which can be obtained at

<http://www.gegridsolutions.com/multilin/Publications/handbook.htm>

Upgrade process

The upgrade process is as follows:

- Audit your installed base
- Analyze the data
- Outline the required options
- Order the Replacement Kit
- Download settings from the device
- Convert the settings file using the latest available EnerVista UR Setup software
- Take the device out of service
- Power the UR down
- Disconnect CPU communication connections
- Replace modules
- Reconnect CPU communication connections
- Apply labels
- Power up device and update the order code
- Load settings to the device
- Test relay
- Put the device in service

Audit

The purpose of the audit is to gather information on the equipment installed so that the correct upgrade package can be planned. The information can be obtained from a few sources, and none of the information gathering activities impact performance of the device. With key information about the location of the relay being available, a targeted upgrade to the most critical relays can be executed in the shortest amount of time, alleviating risk of failure due to aging, and ensuring continuous protection of assets.

The example shows customer identifiers of substation, relay number, UR order code, serial numbers, and all modules installed. Such detail allows the most accurate analysis and enables a targeted approach to the upgrades.

Figure 1: Relay inventory

Substation/ Site	Relay number	Panel number	UR Device	Order code	Firmware version	Serial number	CPU serial number (D slot)	Power supply serial number (B slot)	Module 1 serial number (F slot)	Module 2 serial number (H slot)	Module 3 serial numbr (M slot)
Substation A	87T	#3 Main Tr. & Feeder	T60	T60-600-HCL-F8H-H6P-M8H- P6P-U6C-WXX	6.01	ABHC14000174	A9GC14000229	ARLC14000229	A8HC14000315	A6PC14000438	A8HC14000514

Identify age, model number, and serial number

Use the product labels, plus the front panel or EnerVista software to determine the age, model number, firmware revision, and serial numbers of all modules. The model number is also referred to as the order code. While gathering this information check the condition of the relay for signs of damage, corrosion, and contamination.

Information on labels of UR

The figure shows the model number/order code, serial number, and manufacturing date of a UR on the rear label. If the rear label is missing or inaccessible, use the label on the inside front panel. In the example shown, the UR was manufactured in December 1998.

Figure 2: UR rear label

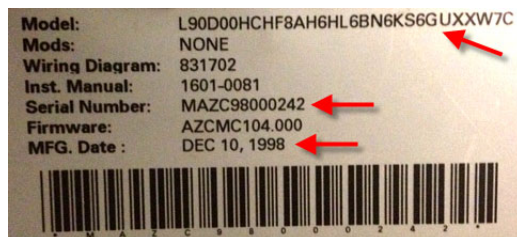


Figure 3: UR product label on inside of front panel



Individual modules have labels specific to them indicating module type and serial number. Once the front panel is opened, you have access to that information. In the previous figure, the information is printed on the modules shown on the right side.

Information on front panel of UR

The front panel allows viewing of the model number, serial number, and manufacturing date. Good practice is to corroborate label information with that contained navigating the front panel or EnerVista software.

To view the information:

1. Press the **MENU** button repeatedly until the **ACTUAL VALUES** menu displays.
2. Press the down arrow key by the word "Message" repeatedly until the **PRODUCT INFO** menu displays.
3. Press the right arrow key to display **MODEL INFORMATION**, then again to display the order code.
4. Press the down arrow key repeatedly to display the **SERIAL NUMBER**, then the **MANUFACTURING DATE**.

Figure 4: Basic front panel display



Figure 5: Information viewable on the front panel

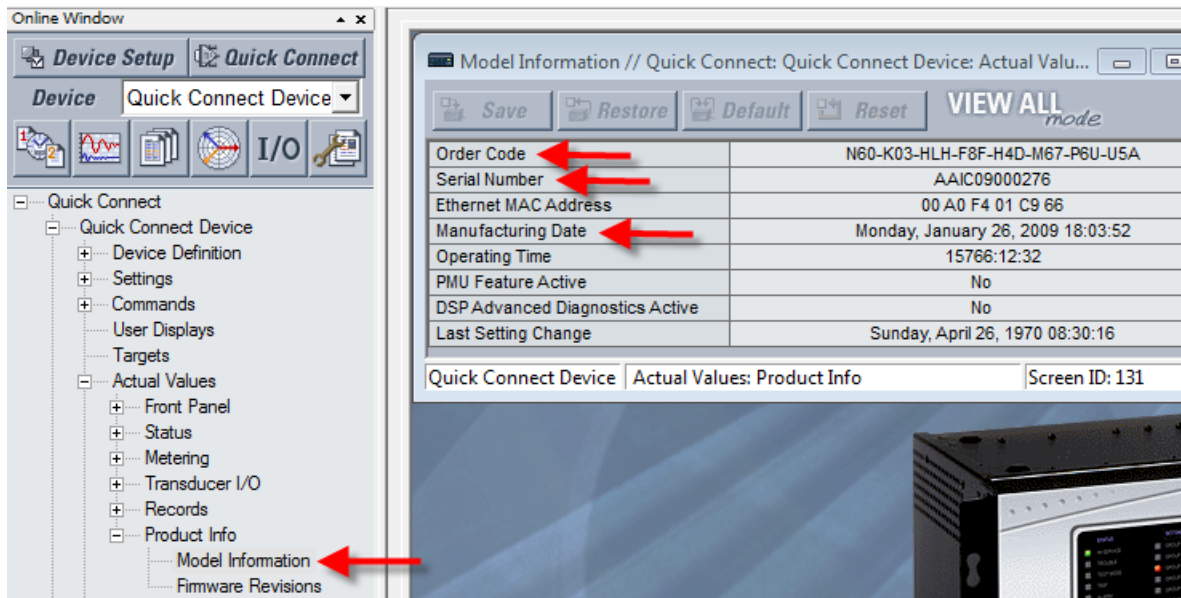
PATH: ACTUAL VALUES ⇒ PRODUCT INFO ⇒ MODEL INFORMATION

■ MODEL INFORMATION	◀▶	ORDER CODE LINE 1: G60-E00-HCH-F8G-H6B	Range: standard GE Multilin order code format; example order code shown
MESSAGE	▲▼	ORDER CODE LINE 2:	Range: standard GE Multilin order code format
MESSAGE	▲▼	ORDER CODE LINE 3:	Range: standard GE Multilin order code format
MESSAGE	▲▼	ORDER CODE LINE 4:	Range: standard GE Multilin order code format
MESSAGE	▲▼	SERIAL NUMBER:	Range: standard GE Multilin serial number format
MESSAGE	▲▼	ETHERNET MAC ADDRESS 000000000000	Range: standard Ethernet MAC address format
MESSAGE	▲▼	MANUFACTURING DATE: 0	Range: YYYY/MM/DD HH:MM:SS

Information in EnerVista software

The EnerVista software displays the model number, serial number, and manufacturing date of the UR. Navigate to **Actual Values > Product Info > Model Information**.

Figure 6: EnerVista display



Data analysis

Once information of the entire installed base is available, begin to plan your upgrade.

Check all devices against published Product Advisories to see if any products are impacted. The Product Advisories are on the web page of each UR product (under Product & Cyber Security Advisories). To check what modules are currently obsolete, review End-of-Life notices (under Support Documents).

An example for the B30 is as follows:

<http://www.gegridsolutions.com/app/ViewFiles.aspx?prod=b30&type=21>

Figure 7: Product advisories

www.gegridsolutions.com/app/ViewFiles.aspx?prod=b30&type=21

Home » Protection & Control » Products » Bus Protection » B30 Bus Differential Relay

B30 Bus Differential Relay Product & Cyber Security Advisories

File Name	Title	Revision Date	Format
ICSA-17-117-01	Product Advisory: Cryptographic Algorithm Weakness	05/10/2017	[100k]
ursb4477	Product Advisory: Universal Relay - Aging 1H & 1L Power Supply Modules Applicable to firmware 6.x and below	11/04/2013	[128k]
ursb4486	Product Advisory: Potential Contact Activation on Power Down	12/10/2013	[245k]
ursb4485	Product Advisory: CPU Utilization Applicable to firmware 6.x and below	05/12/2014	[228k]
ursb4012	Product Advisory GER-4012: Universal Relay Power Supply	01/22/2008	[23k]
ursb4435	Product Advisory: Contact Output Closure	03/20/2012	[148k]
ursb4434	Product Advisory: Potential Transorb Failure on Digital I/O Modules	03/20/2012	[481k]
ursb4431	Product Advisory: UR LCD Display Anomalies	03/12/2012	[128k]
UR2016-001	Product Advisory: MMS Protocol Vulnerability	03/03/2017	[68k]
UR2016-002	Product Advisory: SSH and EAP-TLS Login Vulnerability	03/03/2017	[68k]
GET-20047	Product Advisory: Wind River Systems VxWorks Debug Service Enabled by Default in UR products	03/03/2017	[72k]
GET-20046	Product Advisory: DNP3 Implementation Vulnerability	03/03/2017	[70k]
DESN-2017-001-1	Product Advisory: VxWorks TCP Predictability Vulnerability	04/06/2017	[70k]

Hello,
Would you like us to contact you regarding B30 Bus Differential Relay?

[Contact Me](#)

Now that an audit file exists, and information on the age of the product is available, begin to plan which devices need to be upgraded and when.

Software/hardware options for replacement kits

List the following information and requirements:

- UR model and serial number from the back label, front panel, or EnerVista software (provide all numbers if there are differences between the label and front panel/EnerVista software)
- Preferred CPU-type (if different from the recommendations that follow)
- Specific firmware required (default firmware is the latest available)
- Current software options existing on the product
- Additional software options from order code table/list of new upgraded firmware (if required)

Recommendations are as follows:

- CPU and CT/VT modules must change. That is, version 3 CT/VTs are not compatible with later versions, and the CPU module runs the firmware.
- If existing standards dictate other versions than those recommended, they can be arranged. For example, if two serial RS485 ports are required, an upgrade to CPU UR-9E is available.
- Change any backplane manufactured before 2005. The backplane on the UR was redesigned and, due to risk of bending backplane pins during upgrade, GE recommends that any backplane manufactured before 2005 be changed as part of the upgrade.

Based on the relay order code, you can identify the type of the CPU module, its existing software options, and CT/VT module. See the order code tables in the applicable manual to understand the codes.

Table 1: Identifying modules

Identifier	Order code
Example	L90-C00-HCH-F8A-H6B-W7D
Type of CPU	L90- C00 -HCH-F8A-H6B-W7D
Software options	L90-C 00 -HCH-F8A-H6B-W7D
Type of CT/VT	L90-C00-HCH-F 8A -H6B-W7D (note that the product can have multiple CT/VT modules)

For upgrade, UR 7x is offered with CPU versions T, U, V, and W and with DSP versions L, M, N, R, and S for firmware versions 7.1x and higher.

Table 2: Upgrade paths for UR 3.5 and below

UR 3 CPU	Recommended UR 7.x CPU
9A	W (optionally T, U, or V)
9C	W (optionally T, U, or V)
9D	W (optionally T, U, or V)
UR 3 CT/VT	Recommended UR 7.x CT/VT
8A	8L
8B	8M
8C	8N
8D	8R

Replacement kit

Once it is determined that a UR or multiple URs need to be upgraded, list the requirements and order the products. Use the order codes outlined in the latest instruction manual to decide on CPU, CT/VT, and any additional software options. Instruction manuals for specific products can be downloaded from the web site, a B30 example for which is as follows:

<http://www.gegridsolutions.com/app/ViewFiles.aspx?prod=b30&type=3>

Options are also viewable on the ordering page for the product.

An example is as follows:

L90-C00-HCH-F8A-H6B-W7D with firmware 2.80 converts to

L90-W00-HCH-F8L-H6B-W7D with firmware 7.60 and uses

L9R-W00-HCH-F8L-H6B-W7D as the Replacement Kit

The firmware version, CPU module, and software options can be changed to your requirements.



UR devices using GSSE feature (UCA 2.0), cannot be directly upgraded as that software feature was superseded by the IEC 61850 protocol. To continue using this feature, an upgrade to firmware version 7.2x and software option IEC 61850 are required.

Contact the nearest regional sales office or local distributor and provide the information, request a quote, and place the order. Contacts for the regional sales office or local distributor can be obtained from

<http://www.gegridsolutions.com/multilin/salesoff.htm>

While the UR Replacement Kit is intended for UR upgrades prior to actual failures, it can be used for life extension purposes of the UR in the event that one or more modules exhibits a failure during routine maintenance testing. This ensure that all modules in the UR are of the same vintage.

As the Replacement Kit does not include the relay front panel, backplane, or case assembly, the UR front panel can be ordered separately at

<http://store.gedigitalenergy.com/ViewProd.asp?Model=UR+PANEL>

If any of the terminal blocks are damaged, replacement terminal blocks can be ordered from the online store using the following part numbers:

1866-0001 - replacement for CT/VT module containing 8CTs

1866-0002 - replacement for Digital I/O module

1866-0004 - replacement for CT/VT module containing 4CTs and 4VTs

0609-0002 - replacement for Power Supply module

If it is determined that the UR case assembly or backplane suffered damage or corrosion (during visual inspection or maintenance testing), GE recommends replacement of the complete UR through your local GE sales office, Distributor, or our online store at

<http://store.gegridsolutions.com>



The Replacement Kit cannot contain a redundant power supply or an Ethernet switch module. A complete relay replacement is required in these cases. The reason is because a UR version 3.5 and below case assembly does not have the capability to contain either a redundant power supply or Ethernet switch module.

EnerVista UR Setup software

To begin the actual upgrade, install the latest version of the software, extract the current settings file from the relay, and convert the settings file to the latest firmware version (or firmware version matching the relay purchased for the upgrade).

To upgrade the EnerVista software:

1. Download the EnerVista UR Setup software through EnerVista Launchpad, which can be obtained from

<http://www.gegridsolutions.com/app/ViewFiles.aspx?prod=enervista+3.0&type=7>

or download the software directly from the GE Grid Solutions website at

<http://www.gegridsolutions.com/app/ViewFiles.aspx?prod=urfamily&type=7>

Use the software revision that supports the firmware on the device. For example, if the existing UR is a D60 with firmware 3.50 and needs to be upgraded to firmware 7.4x, then use EnerVista UR Setup version 7.4x or later.

2. Install the software and refresh the order code in the software under Device Setup. Consult the instruction manual for more information on upgrades if required.

Once connection to the device is established, read the device settings (right-click and select **Add Device to Offline Window**) and store it as the original file. Rename the file, to have a separate copy of it, and convert the copy file to new firmware version by right-clicking the Offline window file and selecting the **Convert Device Settings** option. Once the conversion process finishes, you are presented a report showing "Settings no longer available," "Settings reset to factory default," and "New settings." You can save this file as text and review it later to understand the specific changes. Details of this process are as follows.

There are two steps to convert settings: add the file to the Offline Window area of the EnerVista UR Setup software or read the Setting File from the device, then right-click and convert the file to the new version. The recommended process is to perform relay settings file conversion offline and to verify all converted settings prior to uploading to the upgraded UR.

In the example that follows, a D60 settings file order code

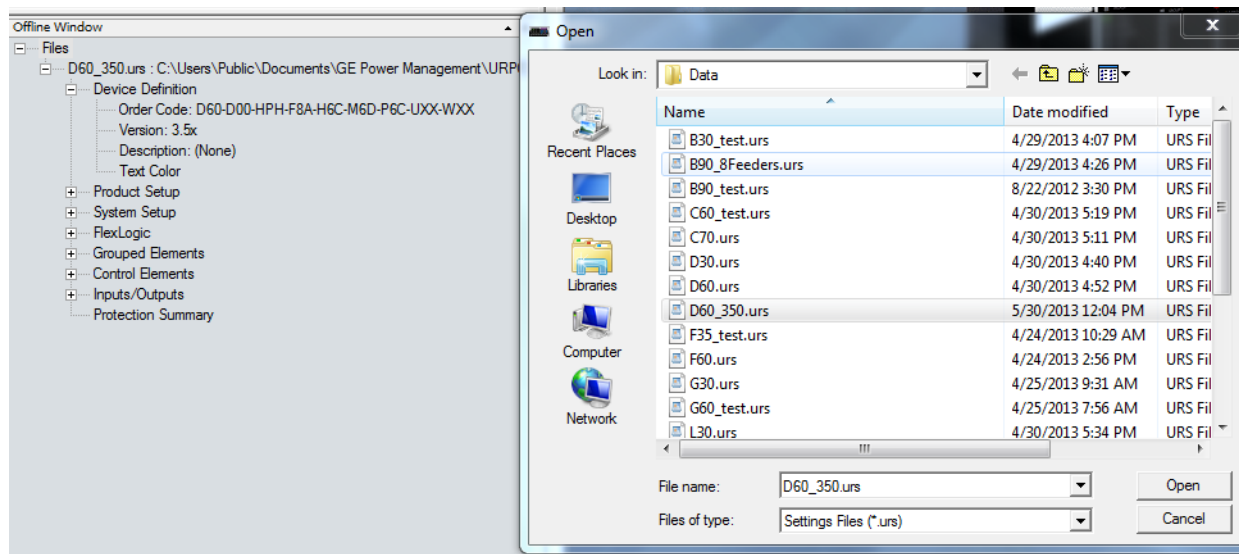
D60-D00HPHF8AH6CM6DP6CUXWXX firmware version **3.50** is converted to a D60 order code

D60-W00HPHF8LH6CM6DP6CUXWXX firmware version **7.1x** using EnerVista UR Setup software version 7.1x.

To convert settings:

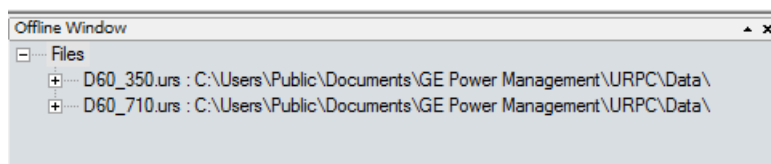
1. In the EnerVista software, add an existing settings file to the Offline Window area. There are several ways to do this, including
 - Right-click the device in the Online Window and select the **Add Device to Offline Window** option, available since UR 7.4x.
 - Right-click the file in the Offline Window, select the **Add Existing Settings File** option, and select the file to be added.
 - Right-click the file in the Offline Window and select the **Add Device from File** option.
 - Drag-and-drop the file, such as a .urs or .cid file, into the Offline Window area.

Figure 8: Save settings file



2. Duplicate the settings file by right-clicking the added file and selecting the **Duplicate Settings File** or **Duplicate Device** option. Duplication ensures that you have your original file.
3. Rename the settings file to be converted by right-clicking the settings file and selecting the **Rename Settings File** or **Rename Device** option.

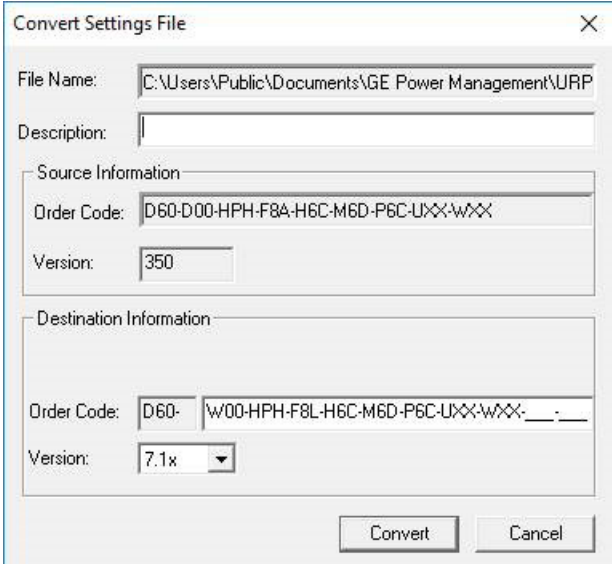
Figure 9: Old and new settings files



Convert settings file

1. Convert the settings file to version 7.1x (for this example) by right-clicking the settings file in the Offline Window and selecting the **Convert Settings File** or **Convert Device Settings** option. Check the new model number/order code and firmware version as shown. Ensure that the Order Code (CPU and DSP) is valid with the firmware selected to ensure conversion. When ready, click the **Convert** button.

Figure 10: Convert settings file



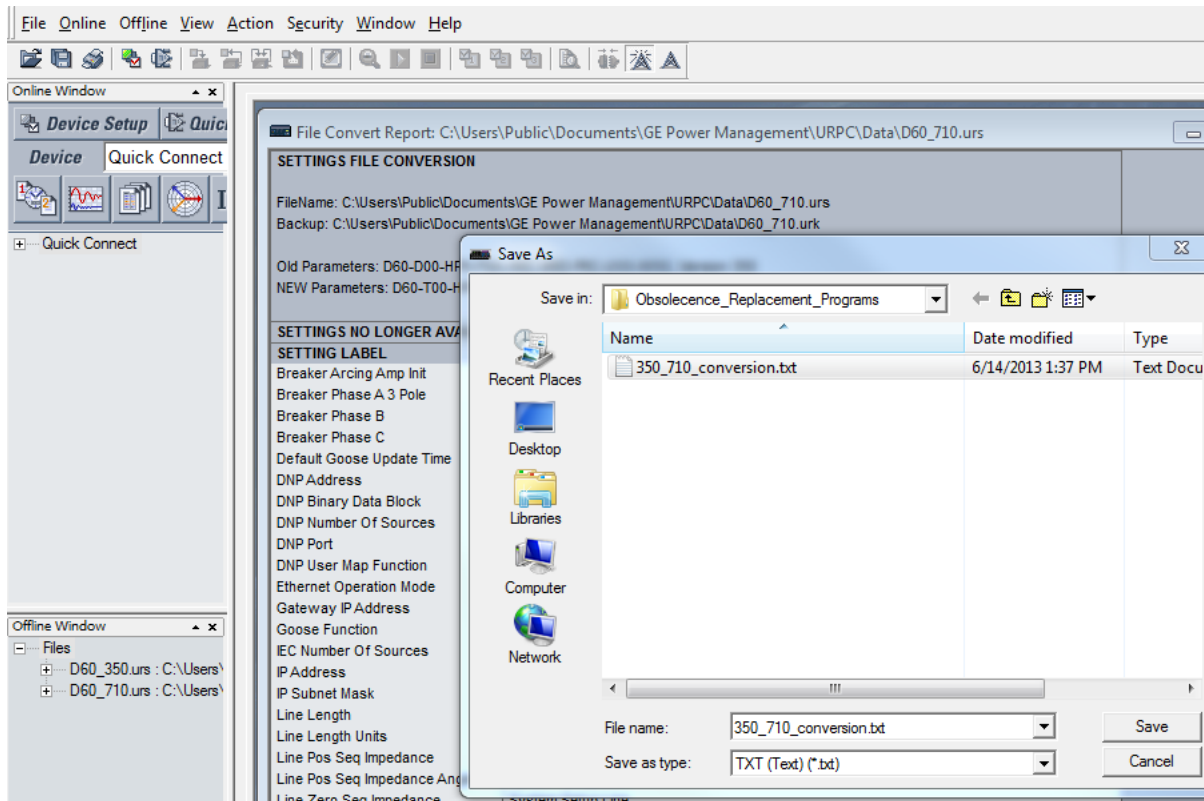
The dialog box is titled "Convert Settings File" and contains the following fields and sections:

- File Name:** C:\Users\Public\Documents\GE Power Management\URP
- Description:** (empty text box)
- Source Information:**
 - Order Code:** D60-D00-HPH-F8A-H6C-M6D-P6C-UXX-WXX
 - Version:** 350
- Destination Information:**
 - Order Code:** D60- W00-HPH-F8L-H6C-M6D-P6C-UXX-WXX-_-_-
 - Version:** 7.1x (dropdown menu)
- Buttons:** Convert, Cancel

The software converts the file and exports a list of differences, first of settings no longer available, then those set to factory defaults, then a list of new settings.

2. Save settings file conversion results as a *.txt file for future reference by clicking **File > Save As** and providing a name.

Figure 11: Save the conversion information

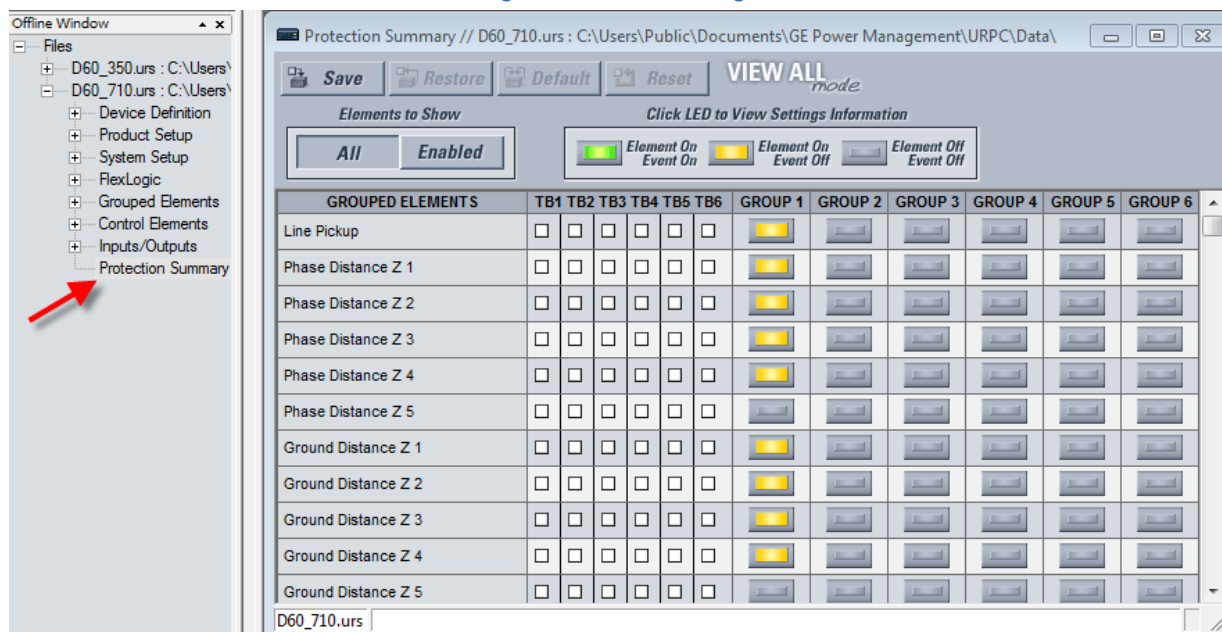


It is possible that certain protection or control elements changed since the original release of the UR. Review the instruction manual for the release upgraded to and investigate any changes to make sure that the product performs to your requirements. Some lines in functions, such as FlexLogic, Oscillography Digital Channels, User Programmable LED Operands, Using Digital Protection, Control, or Monitoring can be set to default, and are listed.

If Modbus or DNP maps are to be used through to SCADA from the upgraded UR, these maps need to be carefully reviewed, since some items can have different addresses. Change the SCADA mapping if required.

3. View and review all settings using the Protection Summary; select the **Protection Summary** option at the bottom of the entry. Compare each grouped and control element with what is wanted from the summary. Product Setup, System Setup, FlexLogic, and Inputs/Outputs have to be verified separately.

Figure 12: Check settings



4. After all settings file components are checked and updated, a good practice is to save the file for each device in a settings database (or similar settings tracking tool) where revision control can be monitored and from which the settings are available for field implementation.

If you require assistance, contact a Technical Support resource as outlined at the end of this document.

Before upgrading a UR device, ensure that the following items are available:

- Replacement Kit — The kit includes replacement modules and two new relay labels (one for the back of the UR, the other for the inside front panel). The labels contain old and new serial numbers, kit order code or model number, module list and location, MOD (if applicable), and other information. (MOD refers to a modification of the firmware and hardware. An example is firmware 7.11 MOD 002, which is indicated on the label.)
- UR device outage approval by all departments including your Reliability Coordinator (RCO) where applicable
- Converted settings file
- Testing instructions and templates

Relay power-down

To begin your upgrade process, take the device out of service.

Before powering down the UR, disable all trip outputs by opening test switches wired to trip contacts of the UR. If not available, verify if any test switches are available on tripping inputs and open. If none are available, determine if there are any other means to disable trip devices and disable if possible. On line differential schemes, ensure that all ends are disabled before powering down the UR.

Disconnect the power from the relay power supply by either pulling fuses or disconnecting power to the panel.

CPU module disconnection

The CPU module can be connected to multiple external devices, such as IRIG-B clock, Remote Terminal Unit, or Ethernet Switch. These connections need to be disconnected, and after the upgrade reconnected to the new CPU. Except for the CPU terminal block, the terminal blocks can be removed from the case, and reattached to a new case without disturbing the wiring. The following figures show differences in CPU wiring.



WARNING Perform work only when control power has been removed from the unit, else personal injury, damage to the unit or connected equipment, or undesired operation can result.

There are no wiring changes required for DSP modules. For the communications module, compare the wiring diagrams in the old and new instruction manuals for the product (available online) to determine if wiring changes are required. Examples follow.



A CPU module with dual RS485 connections is no longer available in version 7.x.

Example: Wiring differences type C CPU to type U CPU

Figure 13: Back of type U CPU module



Figure 14: For Ethernet connections

10MB Ethernet Fiber
Optic port is no
longer available

Tx	10BaseF	NORMAL	COM 1	CPU
Rx	10BaseT			
D3b	+	RS485 COM 2		
D4b	-			
D5b	COM	IRIG-B		
D5a	+			
D6a	-	SURGE		
D7b	⊥			

10/100MB port
(auto-detect)
compatible with
10BaseT

100Base-TX	Port 1	U
100Base-FX	Port 2	
100Base-FX	Port 3	
D1a	+	RS485 COM2
D2a	-	
D3a	COMMON	IRIG-B input
D4b	+	
D4a	-	
BNC		CPU

Figure 15: For RS485 connections

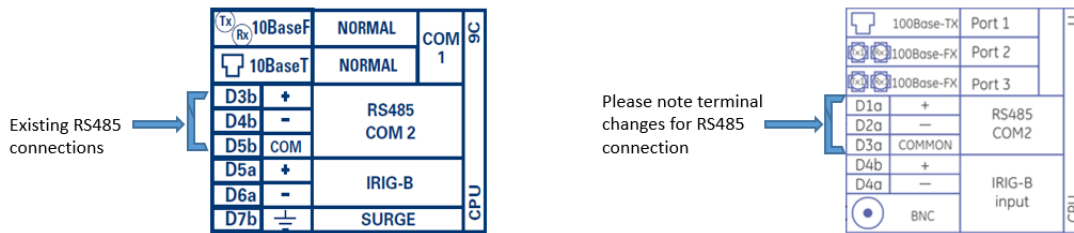
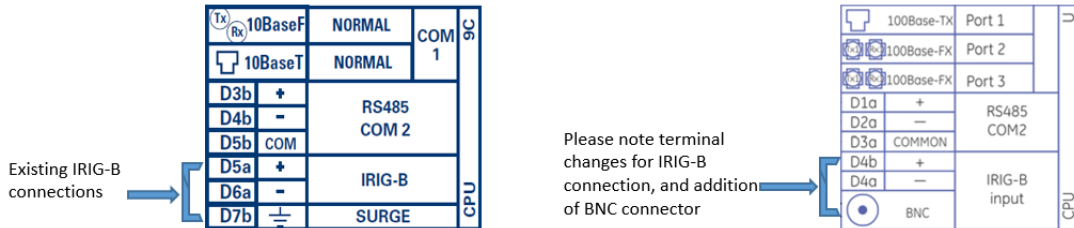


Figure 16: For IRIG-B connections



Module replacement

Figure 17: Replacement Kit label

UR Replacement Kit Label Update.pdf - Adobe Reader

File Edit View Document Tools Window Help

1 / 1 100% Find

GE Digital Energy

CUSTOMER: GE Multilin

SERIAL #: MAZT13000058

OLD SERIAL#: MAZT13000044

P.O. #: 0000

SALES ORDER LINE: ReplaceTestOrder

TAG #:

DUE DATE: October 3 2012

FIRMWARE: A09MA710.000

MOD #:

MODEL: L9RU00HCHF8LH6LL6LNXXSXXUXW77

ORACLE JOB NUM: ReplaceTestOrder

18 of 25

WARNING: Module withdrawal and insertion may only be performed when control power has been removed from the unit. Inserting an incorrect module type into a slot may result in personal injury, damage to the unit or connected equipment or undesired operation!

WARNING!

INSERTING THE MODULES IMPROPERLY CAN DAMAGE THE UNIT. Insert the module by sliding it along the tracks and gently pushing the center of the module until the card-pull tabs begin to cross (1) and (2). Insert the module the remainder of the way by pushing both ends (3) and (4) towards the center of the module simultaneously (4).

1. Insert the module by sliding it along the tracks and gently pushing the center of the module until the card-pull tabs begin to cross (1) and (2).
2. Insert the module the remainder of the way by pushing both ends (3) and (4) towards the center of the module simultaneously (4).

3. Do not push the module in the center.
4. Push the module in the center.

Re-install battery tab if Relay is powered down for a prolonged time

MOD004 FIRMWARE 7.01 MAZT13000044

THE FOLLOWING LABEL Varies

L90

CURRENT DIFFERENTIAL RELAY

1303-0074-A3



Withdraw or insert a module only when control power has been removed from the unit, and be sure to insert only the correct module type into a slot, else personal injury, damage to the unit or connected equipment, or undesired operation can result.

The following three procedures are outlined here, performed in sequence:

1. Replace modules
2. Check order codes
3. Upload settings file and attach labels

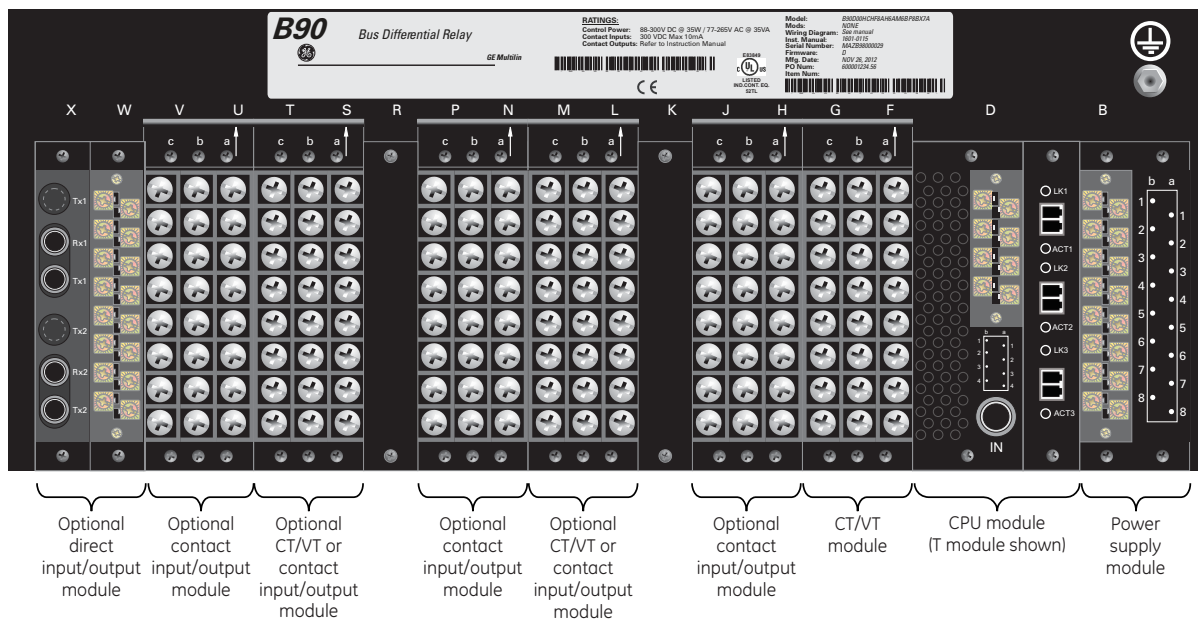
The CPU module contains the firmware specified during the order placement, so no separate upgrade of firmware is required.

To replace the modules:

1. Ensure that the correct UR is being upgraded; verify that the old relay serial number listed on the Replacement Kit corresponds to relay serial number on front display of the UR. If the serial number was not specified when the Replacement Kit was ordered, the serial number is blank.
2. Ensure that the correct quantity and type of modules are present, for example one power supply, one CPU, same quantity DSP (CT/VT) modules. The power supply shown in the figure is RH, while the latest is SH.

Compare the locations of existing modules with locations outlined on the Replacement Kit label and ensure that they are similar, for example CT/VT UR-8A in slot F is to be replaced by CT/VT UR-8L in slot F. If any difference in quantity or location is observed, do not commence with the UR upgrade; the correct Replacement Kit needs to be obtained.

Figure 18: Example of module placement (B90 shown)



836790A1.CDR

3. Open the front panel of the UR and disconnect the RJ45 cable from the front panel to the front of CPU module. The basic front panel is opened to the left, once the black plastic sliding latch on the right side has been pushed up.

Figure 19: Basic front panel; latch shown



4. To remove a module, pull simultaneously the ejector/inserter clips located at the top and bottom of the module.
5. Replace existing UR modules with Replacement Kit modules one by one. Each module has a matching terminal block for the rear of the case. Ensure that the correct module is used in the appropriate slot. Push the top and bottom inserter clips simultaneously when inserting a module. If you are keeping the existing wiring on the CT/VT terminal blocks, pay attention to the module key code that prevents incorrect module insertion. This key code needs to be modified. See the Module Change Process section later for detailed instructions.
On older UR devices, insert the replacement modules with caution, ensuring that the backplane connector pins do not get bent or damaged.
6. Reconnect the cable from the front panel to the front of CPU module. Reconnect any other cables disconnected at the back of the unit. The connection slot for type W CPU modules is black and difficult to see; it is above the chrome connector slot.

Label application

1. Compare the Order Code from the front panel/EnerVista UR Setup with the UR label Order Codes. Notify your GE sales office if they do not match; the kit may need to be verified and corrected. If the order codes match, apply one of the Replacement Kit UR labels to the inside front panel, then close the front panel. Apply the second UR label to the rear of the UR over the existing label.

Power-up

1. Power up the UR.
2. Verify that the UR does not display an EQUIPMENT MISMATCH error. The error means that the modules do not match the order code stored in the UR. If this is the case, power down and check all replaced modules, for example that all modules are in the correct slots.
If modules need to be changed, with the power off, change the modules, and then power up the UR.
3. If an EQUIPMENT MISMATCH error is still present after it was confirmed that the correct Replacement Kit was used with correct modules inserted in the appropriate UR slots of the intended UR, use the **Update Order Code** command under **Commands > Relay Maintenance** to allow the CPU to read all modules and update the order code.

Connect to UR with software

1. Reconnect the CPU connection (RS485, Ethernet, IRIG-B, and so on).
2. Access the UR in the EnerVista UR Setup software and check that the converted settings file matches the new UR order code.

If it does not match, check that the correct kit was ordered and that the settings file was converted to the correct expected order code. If there are discrepancies, either update the settings file if possible, or have the Replacement Kit corrected through your GE sales office.

Load converted settings file

To upload settings:

1. With all order codes matching, upload the converted settings file from the Offline Window area to the device in the Online Window area by dragging-and-dropping or by right-clicking and selecting the **Write Settings to Device** option.
2. Before putting the UR in service, complete some out-of-service and in-service maintenance testing as outlined in the next section.

Relay testing

A detailed test plan with test results template is recommended for the specific UR model, to ensure that all testing is executed in a controlled manner. To get started, this section outlines out-of-service and in-service maintenance steps before putting the UR in service.

In-service maintenance tests:

- Visual verification of analog value integrity, such as voltage and current. Compare metered values of the UR with that of a corresponding system or device.
- Visual verification of active alarms, relay display messages, self-test alarm messages, and LED indications
- Perform LED test. Ensure that all LEDs are operational.
- Visual inspection of UR's physical condition, noting any damage, corrosion, excessive dust, loose wires, and so on
- Compare as-is relay settings with as-left settings file. This can be done by comparing uploaded UR settings with the converted settings file.

Out-of-service maintenance tests:

- Check the integrity of wiring connections, for example that they are secure
- Check analog values (current magnitude and angle, voltage magnitude and angle, RTDs, analog inputs) through injection test and metering accuracy verification. Calibrated test equipment is required.
- Perform secondary injection testing of AC quantities and DC signals. Check enabled protection functions.
- Verify contact inputs and outputs. This can be done by direct change of state through forcing the output into a state or as part of functional testing.
- Perform pushbutton functional test

If these tests show that any element of the UR is defective, contact our Technical Support team.

Upon completion of testing, put the upgraded unit in service.

To put the UR in service:

1. Close all blocking and control switches.

Frequently asked questions

Questions

1. What new software options are available that I should consider?
2. I'm using GSSE feature on my device, how can I migrate it to my version 7 relay?
3. Why do I need to change my Backplane (Busboard)?
4. Can the terminal blocks be connected to a new chassis without disturbing the wiring?
5. I'm using both RS485 ports, how can I maintain my existing connections?
6. What is the minimum upgrade that I should consider on my device?
7. What will be the warranty on my device once I proceed with the upgrade?
8. What are new hardware options that I should consider?
9. My Ethernet equipment does not support 100 Mbps fiber. What are my options?
10. My existing URs include an IRIG-B repeater feature. Is this feature available in version 7?
11. Do I need to change the basic front panel to an enhanced front panel to use version 7?
12. My relay has a redundant power supply. If I am upgrading the power supply, do I need to replace the CPU?
13. Can I add software options to my relay after it has been delivered?
14. What do I do if I forget the password on my version 7 relay?
15. What is the baud rate of my front panel RS232 port?

Answers

1. What new software options are available that I should consider?

Recent releases of the UR have added multiple software options with new features that are of interest to customers, including the following:

- Parallel Redundancy Protocol (PRP)
- IEC 61850
- Phasor Measurement Unit (PMU)
- CyberSentry security Level 1
- IEEE 1588
- IEC 60870-5-103
- Application-based software options, such as Breaker and a Half, In Zone TX protection, and Six Windings Transformer Differential

These options can be added to the Replacement Kit by specifying software options.

2. I'm using GSSE feature on my device, how can I migrate it to my version 7 relay?

GSSE (UCA 2.0) protocol has been expanded to include more advanced aspects of that concept and became part of the IEC 61850 standard. The standard consists of two editions, which differ significantly. To continue using GSSE functionality for peer-to-peer communications, Edition 1 of the software option must be used. Firmware versions 7.1x and 7.2x meet the Edition 1 requirement, while higher firmware versions comply with Edition 2 of the IEC 61850 standard.

The IEC 61850 option needs to be purchased to use GSSE on a version 7 relay.

3. Why do I need to change my Backplane (Busboard)?

The backplane of the UR has been modified since its initial release. Firstly, we have added plastic guides for all modules, so that insertion of modules slightly misaligned does not cause the connector pins to bend and possibly short together. Secondly, the backplane is conformally coated to ensure maximum resistance to harmful corrosion and unfavorable environmental conditions.

4. Can the terminal blocks be connected to a new chassis without disturbing the wiring?

Except for the CPU terminal block, the terminal blocks can be removed from the case, and reattached to a new case without disturbing the wiring. The terminal block is held by six screws of two different types — longer for the bottom and shorter for the top of the terminal block. You do not want to use the longer screws on the top to ensure separation from the backplane, and to prevent damage. The CPU terminal block needs to be replaced with the one included in the upgrade kit, and CPU wiring reconfigured. CPU module types T and U use LC fiber connectors.

5. I'm using both RS485 ports, how can I maintain my existing connections?

If your current installation uses two RS485 ports and these connections must be maintained, then upgrade to firmware 6.0x is the only option. The CPU type 9E has two RS485 ports. None of the version 7.x products support two RS485 ports.

6. What is the minimum upgrade that I should consider on my device?

A minimum relay upgrade includes a power supply. The initial power supply design (UR-1H or UR-1L) had a design life of 10 years, and GE released a Product Advisory GER-4477 to inform customers of potential misoperation risk due to certain failures of the power supply that can impact metering functions on the relay.

7. What will be the warranty on my device once I proceed with the upgrade?

Each module that is upgraded carries a 10-year warranty. Each module is serialized, and the label on the module indicates its manufacturing date for quick identification of warranty status.

8. What are new hardware options that I should consider?

There are several hardware options that may interest customers, such as

- Active Impedance contact inputs (Mod 014)
- CPU with multiple independent Ethernet ports
- High Density Inputs or Outputs
- Graphical Front Panel display
- Auto-burnishing contact inputs

Contact GE Technical Support or your nearest Sales Office to find out more about these features.

9. My Ethernet equipment does not support 100 Mbps fiber. What are my options?

Current CPU modules having fiber ports (types J, K, T, and U) support only 100 Mbps. Interfacing with existing 10 Mbps fiber Ethernet equipment requires a converter between the existing network equipment and the UR CPU module. Else, the existing equipment requires upgrade to support 100 Mbps. CPUs having RJ45 copper Ethernet ports (types J, K, N, U, V, and W) support 10/100Mbps.

10. My existing URs include an IRIG-B repeater feature. Is this feature available in version 7?

The IRIG-B repeater feature is not available in version 7 CPUs (types T, U, V, W). If signal boosting is required, this needs to be accounted for externally. Version 7 CPUs do not include the IRIG-B OUT BNC connector. This can impact coaxial cabling.

11. Do I need to change the basic front panel to an enhanced front panel to use version 7?

No. Version 7 firmware can be used with a basic front panel. If you want to upgrade the front panel, we offer a retrofit kit for the chassis that allows you to install the enhanced style front panel. This retrofit mounting kit is included with the purchase of an enhanced front panel. Basic front panels that are not riveted to the chassis can also be changed to a graphical front panel using a replacement kit.

12. My relay has a redundant power supply. If I am upgrading the power supply, do I need to replace the CPU?

If you are upgrading to UR SHA or UR SLA power supplies, the CPU can remain the same.

13. Can I add software options to my relay after it has been delivered?

Yes, software options can be purchased through Technical Support and installed in the field with an executable file. If a new label is required, it can be purchased for \$25 USD per label.

14. What do I do if I forget the password on my version 7 relay?

Passcodes on a version 7 relay are controlled by the user. If you have forgotten the password, the relay needs to be set to factory default values, which can be done only on the front panel keypad using a factory numeric code. Contact GE Technical Support.

15. What is the baud rate of my front panel RS232 port?

For firmware lower than 7.3, the baud rate is fixed at 19200. For firmware 7.3 and higher, the user can select the baud rate of 19200 or 115200.

Module change process



Withdraw or insert a module only when control power has been removed from the unit, and be sure to insert only the correct module type into a slot, else personal injury, damage to the unit or connected equipment, or undesired operation can result.

To replace a CT/VT module:

1. Open the front panel by unscrewing the knob on the right side or by lifting the lever on the right side, then by pulling the panel out until it forms a 90 degree angle to the chassis.

Figure 20: Open the front panel (enhanced front panel shown)



2. On the CT/VT module, pull the top and bottom levers concurrently so that the module begins to slide out.
3. Remove the CT/VT module by pulling the levers, then gripping the module to slide the module out.

Figure 21: Pull module levers out



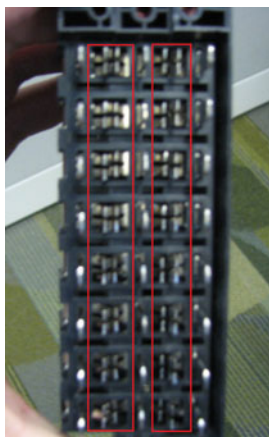
4. Next is to adjust the terminal block for the replacement CT/VT module. Before you insert a new CT/VT module, must make sure that you have the correct terminal block to match the features of the module. The 8F, 8L, and 8M modules are the 4CT/4VT modules and require a terminal block with eight shorting clips at the top half. The following figure shows these eight shorting clips at the top half.

Figure 22: Terminal block with eight shorting clips



The 8N and 8R modules are the 8CT modules and require a terminal block with 16 shorting clips. The next figure shows the 16 shorting clips.

Figure 23: Terminal block with 16 shorting clips



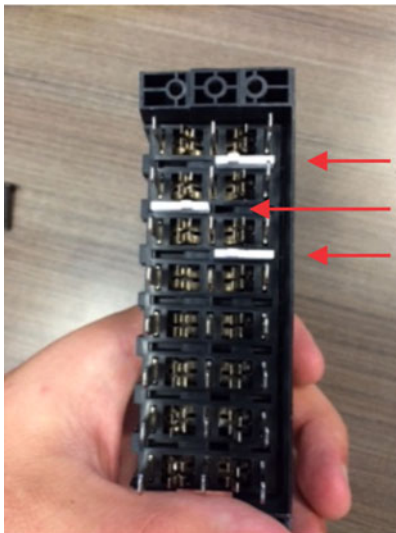
Also ensure that your terminal block matches the white plastic "keys" on your module. For instance, an 8H CT/VT module has the key configuration shown as follows.

Figure 24: CT/VT module with white keys



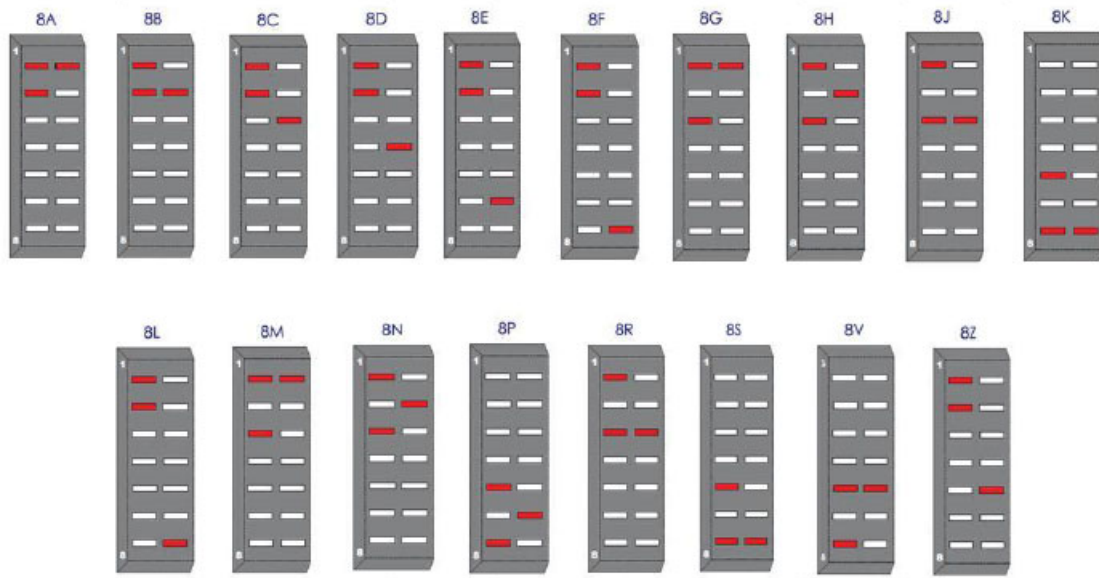
The inside of a terminal block that corresponds to this key configuration looks like the following.

Figure 25: Corresponding terminal block



The following figure shows the module key codes.

Figure 26: Module key codes



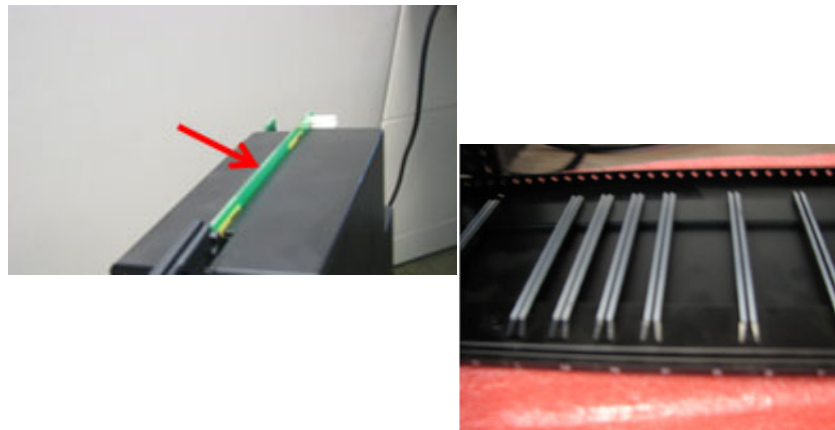
Once you have the correct terminal block and key code combination, remove the six screws attaching the old terminal block to the back of the UR chassis and remove the block. Attach the new one the same way as the old one.

NOTICE

A terminal block's module must be removed from the UR before removing the terminal block. Failing to do this results in damage to the terminal block.

5. Insert the new CT/VT module as follows. Ensure that the levers attached to the module are extended so that they are 180° with the top and bottom surfaces of the module. Insert the new module into the correct DSP slot of the UR chassis, ensuring that the module's protruding printed circuit board (PCB) lines up with the grooves on the chassis.

Figure 27: Line up PCB with grooves on chassis



When the module becomes flush with the chassis, push the module levers in towards the module so that the module slides into the slot. The module is inserted fully when the arms click into the plastic holsters on the front of the module.

Figure 28: Push levers in to insert module fully



For further assistance

For product support, contact the information and call center as follows:

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