



# Firmware Upgrade Procedure for the L90 Line Differential Relay

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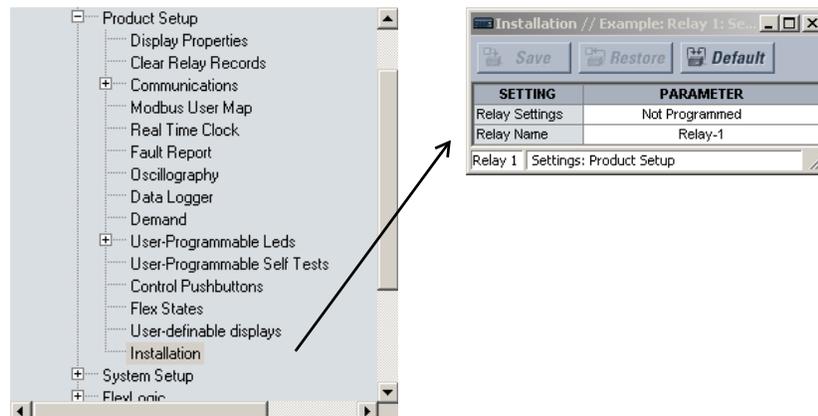


**L90 relays should not be placed in-service with differing firmware versions at any terminal. Therefore all terminals on a protected line must be upgraded to the same firmware version prior to placing the protection in service.**

## PROCEDURE

The recommended sequence for upgrading firmware on in-service relays is as follows:

1. Change the Online Relay Settings from “Programmed” to “Not Programmed”. This will simultaneously disable the line differential at all terminals.

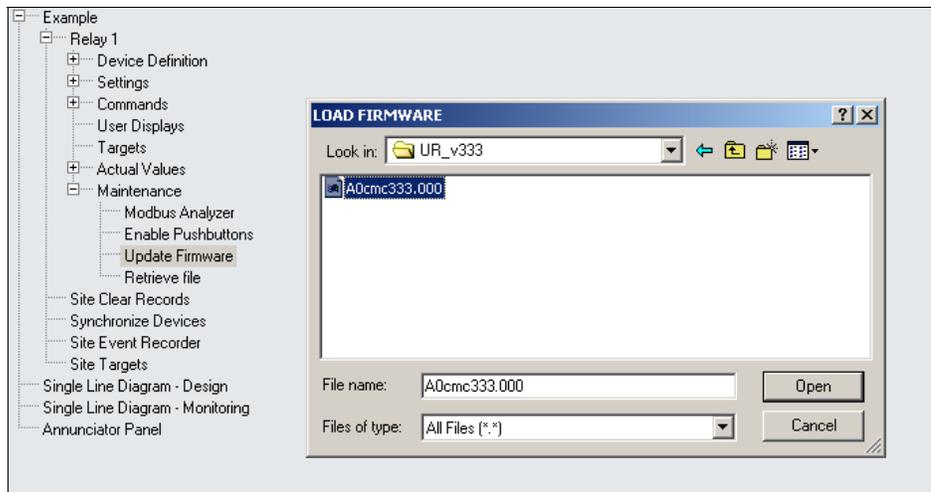


2. Isolate outgoing relay trip contacts from the external DC circuits.
3. Isolate voltage and current outputs from the CT/PT circuits.
4. Repeat steps 1, 2, and 3 for the remote terminal relay(s).
5. Enable communications to the relay using the enerVista UR Setup software.

6. Upload existing relay settings from the relay by right-clicking on the device in the **Online Settings Window** as shown below.

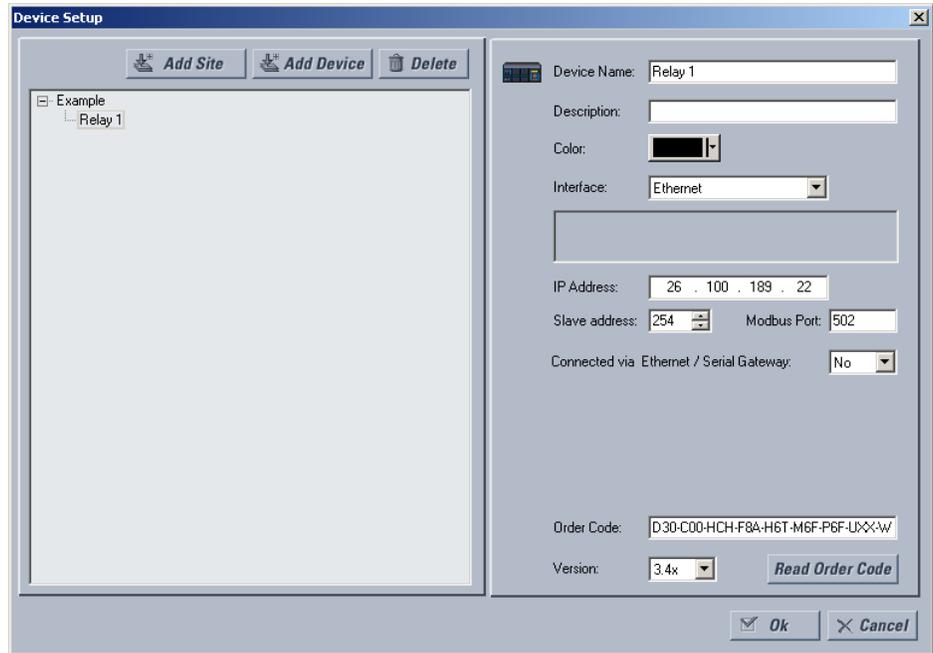


7. Select Update Firmware from the Maintenance menu. Choose the desired firmware file for upload to the relay.



8. Once the firmware upgrade is completed the relay will reboot automatically.

- From the **Device Setup** screen click the Read Order Code button. This will update the enerVista UR Setup device definition.



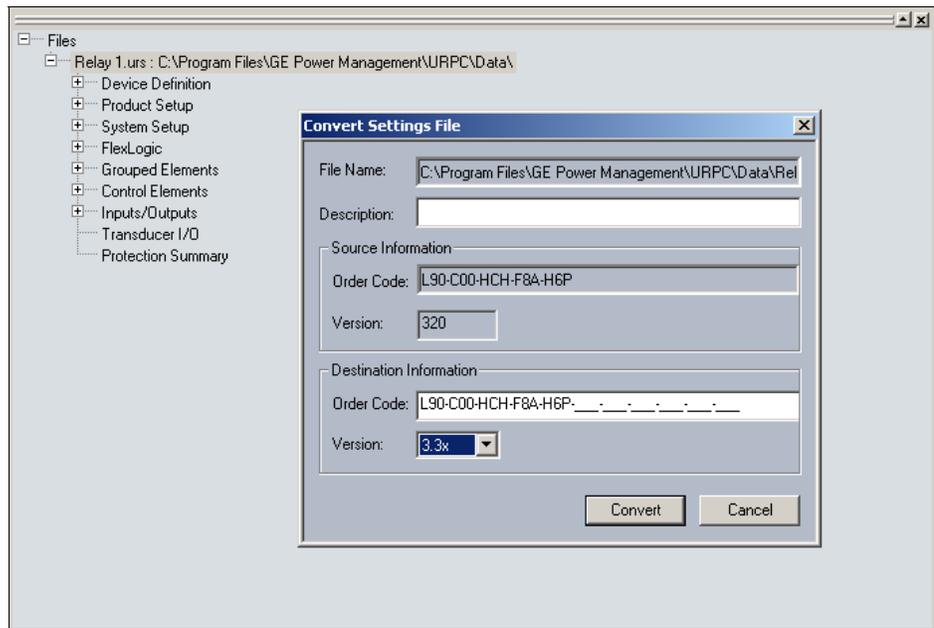
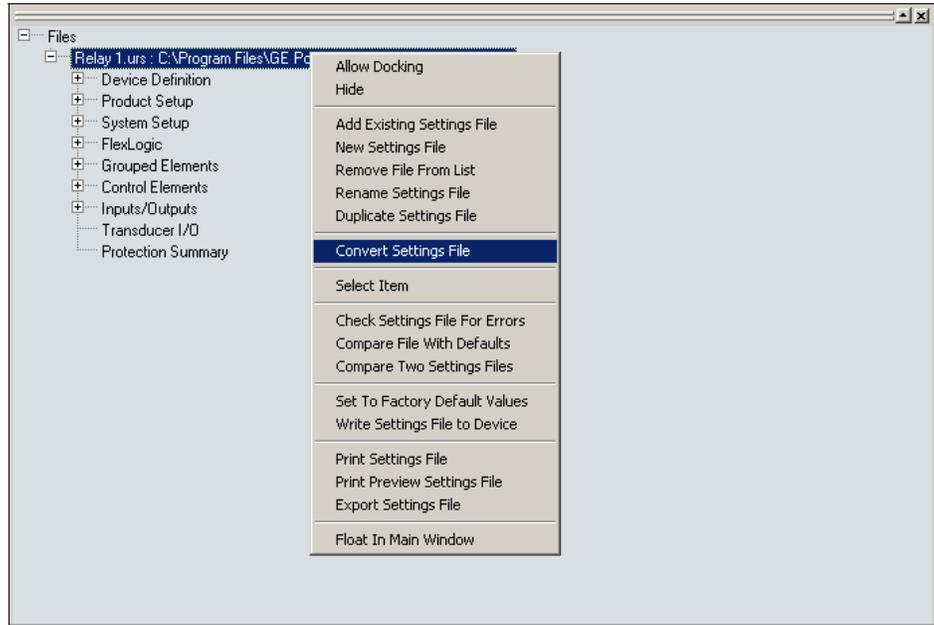
- If a minor firmware revision is being upgraded (second decimal place), the original setting file should be downloaded to the relay. If a major firmware revision is being upgraded (first decimal place), the setting file shall be converted to reflect the new firmware version and checked before downloading to the relay. To convert the setting file right-click on the offline setting file (this is the file created in step 5).



NOTE

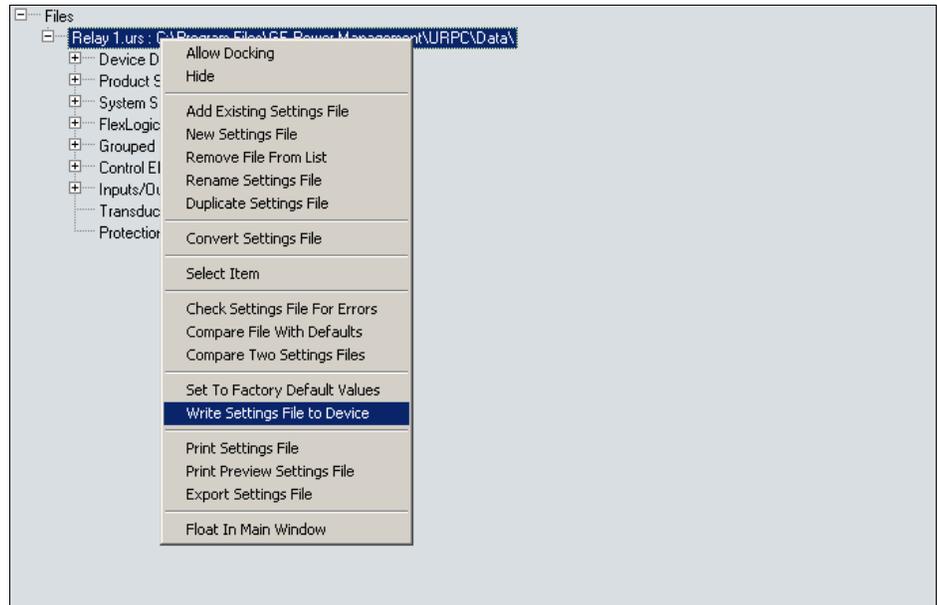
If the Convert Setting File item is displayed in grey then the required rights are not enabled in enerVista UR Setup. Go to User Management under the Security tab at the top menu bar and click on Enable Security. Next, go to Login User under the Security tab. Login as Administrator (default password URPC). Now, when right-clicking on the device, the Convert Setting File selection should be black.

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11. When the setting file has been converted, a file conversion report will be created. This report will contain details on setting additions or deletions. The user should review the conversion report in order to confirm the file conversion has no adverse impact for the specific application. It is strongly recommended to review firmware release notes prior to reviewing the converted setting file. The file conversion feature does not automatically guarantee that a given application will work unaffected. The existing relay features may be enhanced or modified; new settings may be added; backward com-

patibility may require changing new settings from their default to application-specific data; memory maps may be relocated, etc. After the converted setting file is reviewed and/or modified it should be uploaded into the relay. This can be done by right-clicking on the setting file and selecting Write Settings File to Device.



12. Select the device for upload and click **Send**.



13. Note that there are a number of communication settings that are not sent to the enerVista UR Setup as part of the setting file. This prevents loss of communication when storing a setting file. The following settings will not be changed during this process:

In the **SETTINGS** ⇒ **PRODUCT SETUP** ⇒ **COMMUNICATION** ⇒ **SERIAL PORTS** menu:

**RS485 COM2 BAUD RATE**  
**RS485 COM2 PARITY**  
**RS485 RESPONSE MIN TIME**

In the **SETTINGS** ⇒ **PRODUCT SETUP** ⇒ **COMMUNICATION** ⇒ **NETWORK** menu:

**IP ADDRESS**  
**IP SUBNET MASK**  
**GATEWAY IP ADDRESS**  
**ETHERNET OPERATION MODE**  
**OSI NETWORK ADDRESS (NSAP)**

In the **SETTINGS** ⇒ **PRODUCT SETUP** ⇒ **COMMUNICATION** ⇒ **MODBUS PROTOCOL** menu:

**MODBUS SLAVE ADDRESS**  
**MODBUS TCP PORT NUMBER**

In the **SETTINGS** ⇒ **PRODUCT SETUP** ⇒ **INSTALLATION** menu

**RELAY SETTINGS**

Also note that when certain settings related to SCADA protocol points lists are changed, the relay should be restarted (i.e. control power should be removed and then reapplied). The relay should be restarted when any of the following settings are changed:

In the **SETTINGS** ⇒ **PRODUCT SETUP** ⇒ **COMMUNICATION** ⇒ **DNP PROTOCOL** menu:

**USER MAP FOR DNP ANALOGS**  
**NUMBER OF SOURCES IN ANALOG LIST**  
**DNP SCALE FACTORS**  
**DNP DEFAULT DEADBANDS**  
**DNP BINARY INPUTS USER MAP**

In the **SETTINGS** ⇒ **PRODUCT SETUP** ⇒ **MODBUS USER MAP** menu, any entry when used for DNP points.

In the **SETTINGS** ⇒ **PRODUCT SETUP** ⇒ **COMMUNICATION** ⇒ **IEC 60870-5-104 PROTOCOL** menu:

**IEC 60870-5-104 FUNCTION**  
**NUMBER OF SOURCES IN MMENC1 LIST**  
**IEC DEFAULT THRESHOLDS**

14. Change the Online Relay Settings from “Not Programmed” to “Programmed”.
15. Repeat steps 5 through 13 for the remote terminal relay(s). This will re-enable the differential element at all terminals.

16. Confirm that the Channel Status, Channel Configuration, and PFL are all OK. These statistics can be found in the **ACTUAL VALUES** ⇒ **STATUS** ⇒ **CHANNEL TESTS** menu.

The screenshot shows a software window titled "Channel Tests // Example: Relay 1: Actual Values: Status". It contains a table with the following data:

Channel 1	Value
Channel 1 Status	OK
Channel 1 Lost Packets	69
Channel 1 Local Loopback Status	n/a
Channel 1 Remote Loopback Status	n/a
Channel 1 Loop Delay	15.2 ms
Channel 1 Asymmetry	3.968 ms
Channel 2	Value
Channel 2 Status	n/a
Channel 2 Lost Packets	9
Channel 2 Local Loopback Status	n/a
Channel 2 Remote Loopback Status	n/a
Channel 2 Loop Delay	9.3 ms
Channel 2 Asymmetry	0.000 ms
Validity of Ch Config	OK
PFL Status	OK

The window also includes "Save", "Restore", and "Default" buttons and a status bar at the bottom showing "Relay 1 | Actual Values: Status".

17. If required, carry out secondary injection tests at each terminal to confirm the relay operates as expected (see the L90 manual for details).
18. Restore the CT and VT connections for all relays.
19. Confirm that the voltages and currents measured by the relay are as expected. Confirm also that the differential current for each phase is virtually zero. These values can be found in the **ACTUAL VALUES** ⇒ **METERING** ⇒ **87L DIFFERENTIAL CURRENT** menu.

The screenshot shows a software window titled "87L Differential Current // New Site 1: Relay1: Actual Val...". It contains a table with the following data:

PHASORS	View
Local IA	1.205 A -0.8 °
Local IB	1.201 A -119.8 °
Local IC	1.197 A -240.2 °
Terminal 1 IA	1.209 A -180.1 °
Terminal 1 IB	1.201 A -299.2 °
Terminal 1 IC	1.201 A -59.4 °
IA Differential Current	0.000 A 0.0 °
IB Differential Current	0.000 A 0.0 °
IC Differential Current	0.000 A 0.0 °

The window also includes "Save", "Restore", and "Default" buttons and a status bar at the bottom showing "Relay1 | Actual Values: Metering".

20. Confirm that none of the relays have operated (by inspection of the LEDs and front panel display).
21. Restore the outgoing tripping contacts to the DC circuits for all relays.