Instructions for Firmware Upgrade

Instructions for Upgrading
PACSystems™ RX7i CPU Modules
With New Firmware and Web Files

If You Need Help

Contact GE Fanuc Intelligent Platforms Support online at http://www.gefanuc.com/support/ or by phone at
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Pakistan.

Introduction

PACSystems RX7i CPU modules contain operating firmware and PLC web monitoring files stored in flash
memory. New firmware, new web files, and the **WinLoader** upgrade utility are provided in upgrade kits that are
available in two different forms:

- A physical upgrade kit that contains upgrade files on a CD and a digital copy of this document

- A ZIP file download from http://www.gefanuc.com/support/, containing the upgrade files and a digital
  copy of this document

The **WinLoader** update utility is a Windows application that downloads the new firmware from a Windows PC to
PACSystems RX7i CPU modules.

Before You Begin

1. If OEM Protection in your PACSystems RX7i CPU is **Locked**, uploads and downloads of the application
   logic, hardware configuration, and initial/forced values can be performed only by personnel who have the
   OEM Key. If you are an end user, please contact your OEM to arrange for a firmware upgrade.

2. The revision of the *Important Product Information* (IPI) document that applies to this firmware upgrade is
   included in this upgrade kit. Please read the IPI to understand how the changes in this upgrade will impact
   your application.

3. Your use of this firmware upgrade is subject to the terms and conditions of a Software License Agreement.
   You must agree to these terms and conditions before you can complete the upgrade. The **WinLoader** Utility
   displays the license agreement in Firmware Upgrade Instructions step 9.

What You Will Need

1. This firmware upgrade kit

2. A 9-pin male to female RS-232 serial cable such as catalog number IC200CBL001 or equivalent.

3. A Windows PC running Microsoft® Windows 95/NT 4.0/98/ME/2000/XP/Vista:

   - The upgrade PC must have a 9-pin RS-232 COM port. If you have a PC without a COM port, an external
     USB to RS-232 converter with a 9-pin COM port can be used. Note that some converters, such as the
     Belkin model F5U109, are not compatible with the **WinLoader** Utility.

   - If your upgrade kit is a ZIP file, its contents must be extracted using Windows Explorer in Windows
     XP/Vista, a commercial application such as WinZip® or PKZIP® for Windows, or a freeware application
     such as 7-Zip or FreeZip. Configure your ZIP utility to create folders/directories on extraction.

   - Proficy™ Machine Edition PLC Programming Software is required to back up the PLC application before
     the upgrade and to restore the application afterward.

® *Microsoft* and *Windows* are registered trademarks of Microsoft Corporation.
® *WinZip* and *PKZIP* are registered trademarks of their respective owners.

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CPE to CRE Conversion Instructions

PACSystems RX7i IC698CPE020/030/040 CPU modules may be converted to IC698CRE020/030/040 modules if desired. (The IC698CPE010 CPU module may not be converted to a CRE010.) Use this procedure to convert your CPE CPU module to a CRE CPU module. If you do not wish to convert your CPU module, continue with step 1 of the Firmware Upgrade Instructions below:

1. Use programming software to upload the entire user application from the CPU module to a PC. (This includes but is not limited to logic, hardware configuration, initial/forced values, and controller supplemental files.)

CAUTION

APPLICATION LOGIC, HARDWARE CONFIGURATION, INITIAL/FORCED VALUES, AND CONTROLLER SUPPLEMENTAL FILES IN USER RAM AND FLASH WILL BE LOST DURING THE CPE TO CRE CONVERSION. THEY MUST BE UPLOADED TO A PC BEFORE STARTING THE CONVERSION.

IF YOU ARE UNABLE TO COMPLETE AN UPLOAD OF APPLICATION LOGIC, HARDWARE CONFIGURATION, INITIAL/FORCED VALUES, AND CONTROLLER SUPPLEMENTAL FILES FOR ANY REASON, STOP AT ONCE. <u>DO NOT</u> ATTEMPT TO CONVERT THE CPU MODULE FROM A CPE TO A CRE.

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2. Turn power to the CPU **OFF**.
3. If a battery is connected to the CPU, disconnect it.
4. Remove the CPU module from the rack.
5. Enable ECC on the CPU module:

   IC698CPE020   –   Locate **Jumper E7** at the bottom of the CPU module and move it so both posts are covered.

   IC698CPE030/040   –   Locate **Jumper E10** at the bottom of the CPU module and move it so both the **ECC** and **ON** posts are covered.
6. Reinstall the CPU module in the rack.
7. Turn power to the CPU **ON**.
8. Continue with step 1 of the Firmware Upgrade Instructions below using the IC698CRExxx upgrade kit that corresponds to your CPU model.

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Firmware Upgrade Instructions

1. Configure your ZIP utility to create folders/directories on extraction then, extract the ZIP file contents to any directory on your PC.

2. Use programming software to upload the entire user application from the CPU module to a PC. (This includes but is not limited to logic, hardware configuration, initial/forced values, and controller supplemental files.) Alternately, programming software may be used to write the entire user application to flash in the CPU module. User flash is preserved during a firmware update. Skip this step if you are converting your CPU module from a CPE to a CRE CPU.

CAUTION

APPLICATION LOGIC, HARDWARE CONFIGURATION, INITIAL/FORCED VALUES, AND CONTROLLER SUPPLEMENTAL FILES IN USER RAM WILL BE LOST DURING THE FIRMWARE UPGRADE. THEY MUST BE UPLOADED TO A PC OR WRITTEN TO FLASH BEFORE STARTING THE UPGRADE AND DOWNLOADED TO THE PLC CPU AFTER THE UPGRADE.

IF YOU ARE UNABLE TO COMPLETE AN UPLOAD OR WRITE TO FLASH OF APPLICATION LOGIC, HARDWARE CONFIGURATION, INITIAL/FORCED VALUES, AND CONTROLLER SUPPLEMENTAL FILES FOR ANY REASON, STOP AT ONCE. <u>DO NOT</u> ATTEMPT TO UPGRADE THE PRODUCT'S FIRMWARE.

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3. Use programming software or the **RUN/STOP SWITCH** on the CPU module (See Figure 1) to place the CPU in **Stop Disabled** mode. (If the **RUN/STOP SWITCH** does not change the CPU's mode, it may be disabled in the CPU hardware configuration. In this case, use programming software to place the CPU in **Stop Disabled** mode.)

4. Use programming software to clear the PLC hardware configuration. This will assure that the serial port configuration of the CPU module matches the upgrade default.

5. If a battery is connected to the CPU, disconnect it.

6. Connect the firmware upgrade cable between a serial port on your PC or external USB to RS-232 converter and **COM 1** on the CPU module. (See Figure 1)

7. Close any PC applications (including PLC programming software) that may be using the serial port where the firmware upgrade cable is connected.

8. Start the **WinLoader** application from the directory created in step 1. Use either of these methods:

   - Find the **WinLoader** application by using Windows **Explorer** to view the directory created in step 1. Then double-click the **WinLoader** icon; or

   - Execute **WinLoader** by clicking the Windows **Start** button and then the **Run…** icon. In the **Run** dialog, browse to the directory created in step 1, and click on **WinLoader** or **WinLoader.exe**. Then click **OK** in the **Browse** and **Run** dialogs.

9. Read the **WinLoader** license agreement. If you agree to the terms, click the "**I agree**" radio button on the **License Agreement** dialog box and then click the **Next** button. If you do not agree, you will not be able to proceed with the upgrade.

10. If the upgrade cable is not connected to the COM1 port on your PC, select the correct port in the **WinLoader COM Port** select box.

11. Start the firmware upgrade by clicking the **WinLoader Update** button. While the upgrade is in progress, the **OK**, **RUN**, **ENA**, **EOK**, **LAN**, and **STAT** LEDs on the CPU module (See Figure 1) blink synchronously. A status bar on the **WinLoader** dialog shows upgrade progress.

12. The CPU LEDs remain in the state described in step 11 until the CPU firmware half of the upgrade completes. When this occurs, all LEDs on the CPU module briefly turn off. Then, the **OK** LED turns on and the **EOK**, **LAN**, and **STAT** LEDs begin to blink synchronously again. (See Figure 1) Now, **WinLoader** automatically begins the Ethernet firmware upgrade.

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13. When the firmware upgrade completes successfully, a **Firmware Upgrade Summary** dialog box indicates success. Click **OK** to close the dialog box.

   - If this is the last CPU module you plan to upgrade, click the **Quit** button to close the **WinLoader** utility.

   - You may upgrade additional CPU modules by starting at step 2. Be sure to upload the entire user application to a PC as instructed in step 2.

14. If the upgrade was not successful, a **Firmware Update Status** dialog box indicates that the "Firmware Update Failed". See the **Common Causes of Failure** section to determine how to correct the problem.

15. When you have successfully completed the firmware upgrade:

   - Disconnect the upgrade cable from the CPU.

   - Mark or label your CPU to indicate the new firmware version. Ensure the label does not cover any vents.

   - Turn the CPU rack's power off and on to restart the CPU module and begin operation with the new firmware. If the PLC hardware configuration contains one or more expansion racks, all the racks should be powered on simultaneously.

16. Reconnect the CPU's battery if it was disconnected in step 5.

17. Reconnect the programming software to the CPU and download all user application components that were saved to the PC in step 2. Alternately, if the user application was saved to flash, use programming software to read the application from flash. If the CPU is configured to read logic, configuration, and/or initial values from flash at power up, this step is not necessary.

18. Return the CPU to **Run Enabled** mode using programming software or the **RUN/STOP SWITCH** (See Figure 1) on the CPU module. (If the **RUN/STOP SWITCH** does not change the CPU's mode, it may be disabled in the CPU hardware configuration. In this case, use programming software to place the CPU in **Run Enabled** mode.) Verify that the **OK**, **RUN**, **ENA**, and **EOK** LEDs on the CPU module are **ON**.

Web File Upgrade Instructions

The CPU's web files are upgraded by transferring them via Ethernet to the CPU using FTP. These instructions provide a sample procedure for upgrading the web files using the Windows FTP client however, any FTP client may be used to perform the upgrade. Ensure the CPU's Ethernet interface is operating normally, is configured with a valid IP address, and is accessible by the PC running the FTP client.

1. Open a Command Prompt window on your PC

2. Use the **CD** command to navigate to the `web_files` directory contained within the directory created in step 1 of the **Firmware Upgrade Instructions** above. In this example, the directory is `C:\rx7i_upgrade\web_files`.

   ```
   C:\> cd C:\rx7i_upgrade\web_files
   ```

3. Verify Ethernet communication between the PC and the CPU module using the **PING** command and the CPU's IP address. (In this example, the CPU's IP address is 10.0.0.1.) The **PING** command will timeout if the PC cannot establish Ethernet communication with the CPU. If this occurs, adjust the network settings on your PC and CPU module so they are compatible, check your network connections, and execute the **PING** command again. The web files cannot be upgraded without a working Ethernet connection.

   ```
   C:\rx7i_upgrade\web_files> ping 10.0.0.1
   ```

4. Open an FTP connection between the PC and the CPU module using the **FTP** command and the CPU's IP address. In this example, the CPU's IP address is 10.0.0.1.

   ```
   C:\rx7i_upgrade\web_files> ftp 10.0.0.1
   ```

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5. The FTP client prompts for a user name and password. Login with the user name "**user**" and default password "**system**".

```
Connected to 10.0.0.1.
220 VxWorks (5.4.2) FTP server ready
User (10.0.0.1:(none)): user
331 Password required
Password: system
230 User logged in
ftp>
```

6. Set the FTP file transfer type to binary using the **BINARY** command.

```
ftp> binary
200 Type set to I, binary mode
```

7. Enable hash mark printing in the FTP Client using the **HASH** command. This command shows file transfer progress by displaying zero or more "#" characters during each file transfer.

```
ftp> hash
Hash mark printing On  ftp: (2048 bytes/hash mark) .
```

8. Change to the CPU module's `ffs` directory using the FTP client's **CD** command.

```
ftp> cd /ffs/
250 Changed directory to "/ffs/"
```

9. Transfer the new web files to the CPU module using the FTP client's **MPUT *** command. This command transfers all files from the PC's current working directory to the CPU module's current working directory. The FTP Client prompts for confirmation before transferring each file. Respond to each prompt by pressing the **<Enter>** key. The example below only shows a prompt for two files however, the FTP client prompts for each file in the `web_files` directory specified in step 2.

Before executing this command, verify the FTP client was started from the `web_files` directory specified in step 2. Also verify the CPU module's current directory is set to `ffs` as specified in step 7.

```
ftp> mput *
mput Clrgef25.gif?
200 Port set okay
150 Opening BINARY mode data connection

226 Transfer complete
ftp: 1080 bytes sent in 0.00Seconds 1080000.00Kbytes/sec.
mput common_functions.js?
200 Port set okay
150 Opening BINARY mode data connection
########
226 Transfer complete
ftp: 17761 bytes sent in 0.00Seconds 17761000.00Kbytes/sec.
```

10. Verify all files from the `web_files` directory specified in step 2 are transferred using the FTP client's **DIR** command. This returns a list of the files in the CPU module's `ffs` directory.

```
ftp> dir
```

11. The web file upgrade is complete. Exit the FTP session using the FTP client's **QUIT** or **BYE** commands.

```
ftp> quit
221 Bye...see you later
```

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Common Causes of Failure

1. **PC COM Port Already In Use Or Does Not Exist**

   INDICATION: A **WinLoader Firmware Update Status** dialog box immediately reports that the "Firmware Update Failed" and that the selected COM port is either busy or does not exist.

   REMEDY: If you selected a port that is not present on your PC, select a different one that is present. If the port actually exists, look for other applications (including PLC programming software) that may be using the port, and close them. Verify that the serial cable is connected to the correct COM port on the PC, click the **Cancel Upgrade** button on the **Firmware Update Status** dialog box, click **OK** on the **Firmware Upgrade Summary** box, select a different COM port if necessary, and start the upgrade again from Firmware Upgrade Instructions step 11.

2. **Wrong PC COM Port Selected; CPU COM 1 NOT Configured for SNP Slave, Odd Parity, 1 Stop Bit; Upgrade Cable not Connected to CPU COM 1; PLC CPU Powered Off**

   INDICATION: After multiple attempts to connect to the CPU at various data rates, a **WinLoader Firmware Update Status** dialog box reports that the "Firmware Update Failed" and that **WinLoader** cannot connect to the target device.

   REMEDY: Verify that you selected the COM port where the upgrade cable is connected and that the upgrade cable is connected to CPU **COM 1**. (See Figure 1) Then follow the instructions in the **WinLoader** dialog. Then click the **Cancel Upgrade** button on the **Firmware Update Status** dialog box, click **OK** on the **Firmware Upgrade Summary** box, and start the upgrade again from Firmware Upgrade Instructions step 11.

3. **CPU Not In Stop/Disabled Mode**

   INDICATION: A **WinLoader Error** dialog box reports a "CPU STATE MISMATCH" and prompts the user to place the CPU in STOP/NOIO (that is, I/O disabled) mode. This dialog box may appear in either step 11 or 12 of the Firmware Upgrade Instructions above.

   REMEDY: Click **Yes** to continue.

4. **Upgrading Firmware with Modules in Rack**

   INDICATION: A **WinLoader Error** dialog box reports the "Firmware Update Failed" and lists several reasons why the update failed.

   REMEDY: Move the CPU module to a rack without I/O modules and restart the upgrade again from Firmware Upgrade Instructions step 2.

5. **FTP Password Set to Non-default Value**

   INDICATION: FTP login fails when upgrading web files.

   REMEDY: The FTP password is changed using the `tpassword` parameter located in the Advanced User Parameter file in the CPU module's hardware configuration. Restart the upgrade again from Web File Upgrade Instructions step 5 using the password found in the Advanced User Parameter file.

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Restarting an Interrupted Firmware Upgrade

If the upgrade process is interrupted for any reason (for example, a power failure or accidental cable disconnection), exit the **WinLoader** utility and turn the CPU rack's power off and on. Depending on where the firmware update was interrupted, the CPU module may power on with the **OK**, **RUN**, **ENA**, **EOK**, **LAN**, and **STAT** LEDs on the CPU module blinking synchronously. Alternately, it may power on with the **OK** LED on and the **EOK**, **LAN**, and **STAT** LEDs blinking synchronously. (See Figure 1) If the CPU powers on with either of the LED conditions above, start the upgrade process again from Firmware Upgrade Instructions step 8. If the CPU powers on normally, start the upgrade process again from Firmware Upgrade Instructions step 2.

Figure 1 – Sample RX7i CPU Faceplate