

Upgrading to a PHYTEC phyCORE CPU Module

This document describes how to replace the PicoCOM-based CPU module of a Furio robotic head with a new CPU module based on PHYTEC phyCORE technology.

This procedure applies to Furio VR-One and VR600 robotics heads only.

Perform this procedure only if instructed to do so by Ross Video Technical Support.

The new CPU module consists of a PHYTEC unit mounted on a slightly larger circuit board that has two data/power cable connectors (4-pin). The CPU module also includes a short data/power cable, as shown in Figure 1.

Ross Robotics installs PHYTEC CPU modules in all new Furio VR-One and VR600 robotic heads. The new module features a significantly faster CPU with hardware floating point acceleration.

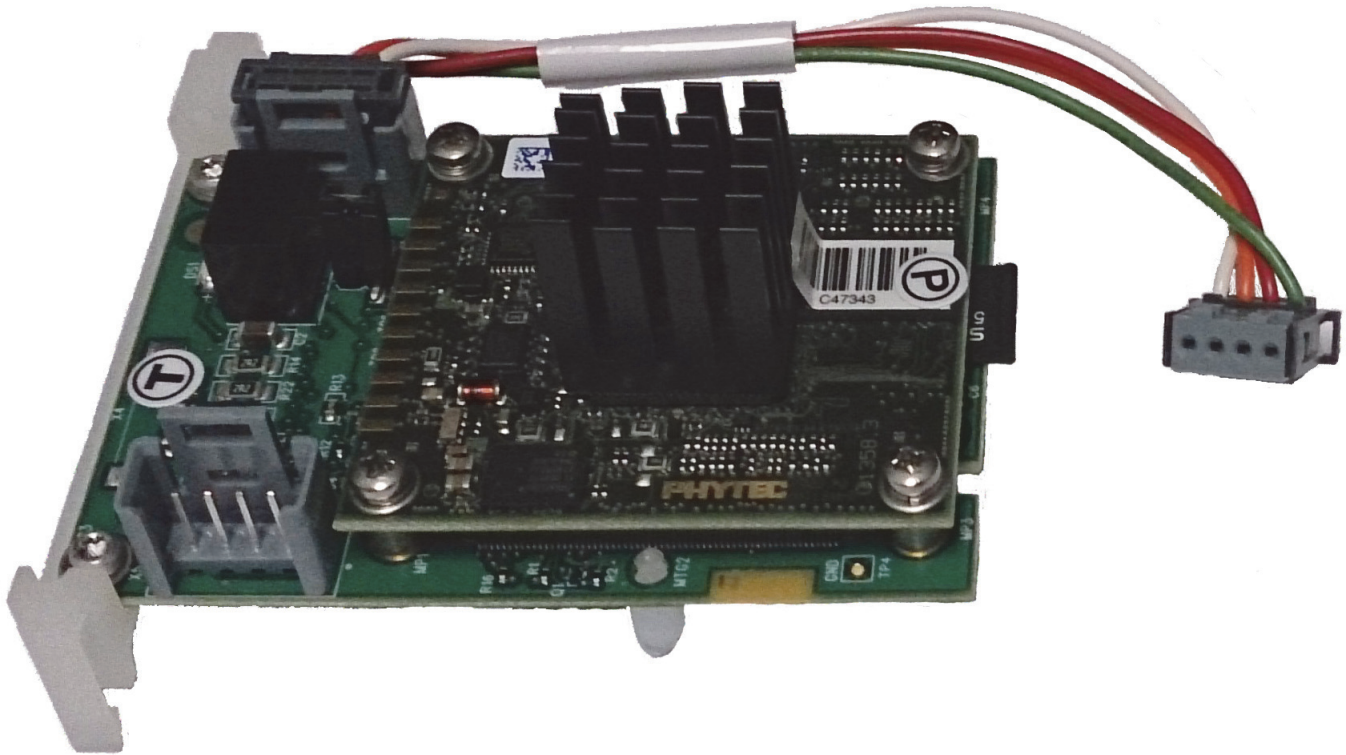


Figure 1 - New CPU Module

IMPORTANT: Advance Preparation Before You Arrive On-Site

This section describes tasks you must perform in advance. Do not schedule an on-site service visit until after you perform these tasks.

Check Collision Module Version

If the system includes Furio dollies, find out whether it also includes a collision avoidance module. If it does, confirm the part number on the bottom of the collision avoidance module:

- If it is **5100AR-750-02** (or higher), the collision module is capable of communicating with upgraded Furio robots.
- If the part number is **5100AR-750-01**, the firmware on the collision avoidance module is outdated. Obtain a new collision avoidance module before you go on site so you are prepared to replace the old one.

Check PicoCOM Firmware Version

The upgrade procedures in this document are intended for Furio robots with PicoCOM-based CPU modules running firmware version 3.3.x (or higher).

Ask someone at the facility to check the firmware version running on each robotic head to be upgraded.

If a robot is running a firmware version lower than 3.3.x, do not upgrade it. Contact the Ross Robotics Research and Development group for guidance.

To check the firmware version:

1. On the SmartShell computer, open a web browser, and then navigate to the IP address of the head.
The Furio configuration interface for the head appears.
2. Note the **Firmware Version**, as shown in the **Information** box.

Obtain Latest Firmware for New CPU Module

After you upgrade the CPU module, you will upgrade its firmware to the latest version.

Obtain the latest firmware version from Ross Video.

Transfer it to a USB stick to bring on-site.

Before You Begin the Upgrade

The instructions in this document are intended for persons who:

- have experience using the Furio configuration interface (also known as the Furio web interface).
- have computer networking skills, including the ability to connect to devices using a SSH application such as PuTTY.
- are capable of performing basic hardware disassembly and reassembly tasks.
- know how to use a digital multimeter (DMM) to test circuit continuity.

IMPORTANT: When handling internal electronic components, take precautions against electrostatic discharge (ESD).

Required Tools and Materials:

- A set of hexagonal wrenches (Imperial sizes)
- A small Phillips screwdriver
- A thin screwdriver or other narrow tool less than 3/32" diameter
- One new CPU module per head being upgraded
- A digital multimeter (DMM)
- One collision avoidance module (optional).

For more information, see "**Check Collision Module Version**" on page 2

Major Steps

The CPU installation procedure consists of several major steps. This document describes each major step in detail. The steps must be performed in the order in which they are presented in this document.

The major steps are as follows:

1. "**Replace the Collision Module (if necessary)**" on page 4
2. "**Back Up Data, and Gather Configuration Information**" on page 4
3. "**Remove and Disassemble the Head**" on page 5
4. "**Remove the PicoCOM CPU Module**" on page 6
5. "**Set the Configuration Switch to the Open Position**" on page 7
6. "**Install the New CPU Module**" on page 8
7. "**Reassemble the Head and Payload**" on page 10
8. "**Configure Network Settings**" on page 10
9. "**Set the Date and Time**" on page 11
10. "**Set the Product Code and Serial Number**" on page 11
11. "**Upgrade Firmware**" on page 12
12. "**Customize the Configuration**" on page 13
13. "**Manually Restore Tracking and Axis Settings**" on page 14
14. "**Restore the User Data Zip File**" on page 15
15. "**Check the Robot Status**" on page 15

Replace the Collision Module (if necessary)

If the system includes a collision avoidance module, check the part number on the bottom of the unit. If the part number is **5100AR-750-01**, replace the collision avoidance module it with a new one (part number **5100AR-750-02** or higher).

To replace the collision avoidance module:

1. Turn off all Furio dollies.
2. Record the position of each cable connected to the collision avoidance module.
3. Disconnect all cables, and then remove the collision avoidance module.
4. Mount the new collision avoidance module.
5. Connect the cables to the new collision avoidance module.

IMPORTANT: Each cable must be reconnected to its original position on the new module! Connecting cables incorrectly may result in dollies colliding!

6. Turn on the robotics system and test that the collision avoidance module is working properly.

For more information about testing the collision avoidance module, see the ***Collision Avoidance Module Installation Guide (5100DR-012)***.

7. Send the old collision avoidance module back to Ross Video to be refurbished.

Back Up Data, and Gather Configuration Information

This section describes how to back up the configuration template file, back up user data, and gather information required to configure the head after the CPU upgrade.

Before you begin, you must know the IP address of the head.

To back up user data and gather configuration information:

1. On the SmartShell computer, open a web browser, and then navigate to the IP address of the head.
The Furio configuration interface for the head appears.
2. Record the **Serial Number** of the head, as shown in the **Information** box.
3. Create a backup of the **Configuration Template** file:

- a. On the **Status and Logging** tab, right-click the **Download Configuration Template** button, and then click **Save Link As**.
- b. Specify a unique file name and location for the backup, and then click **Save**.

Tip: You will later copy portions of this file into a similar file. The file name should reflect the fact that this is the old file.

IMPORTANT: The file name extension must remain as **.tmpl**.

4. Create a backup of the user data zip file:
 - a. On the **Backup** tab, click the **Download Data Backup** button.
 - b. When prompted, save the file.

Tip: The file name is **backup.zip**. The file is saved in your **Downloads** folder.

5. Navigate to the **Axis Settings** tab, and then print the contents of the tab.
6. If your system includes position tracking, navigate to the **Tracking** tab, and then print the contents of the tab.
7. Navigate to the **IP Settings** tab, and then note the **IP Address**, **Netmask**, and **Gateway** values.
8. Close the web browser.

Remove and Disassemble the Head

This section describes how to remove and disassemble the head, so you can access the main circuit board.

IMPORTANT: When handling internal electronic components, take precautions against electrostatic discharge (ESD).

To remove and disassemble the head:

1. Disconnect power to the head.
2. If the head is mounted to a dolly, turn off the dolly.
3. Remove the payload:
 - a. Note where cables connect to payload components, and disconnect them as required.
 - b. Mark the precise position of the payload on the cradle, and then remove the payload.

CAUTION: If the head is mounted to a lift column, the column rises when you remove the weight of the payload.
4. Record the position of each cable connected to the head, and then disconnect the cables.
5. Remove the head and place it on its side, on a solid work surface.
6. Remove the screws and/or bolts that fasten the face plate to the head.

Tips:

- The face plate is the part with the cable connections.
- The bolts and screws are along the perimeter of the face plate, and along its edge.
- If the head is a VR600, the cable bracket attached to the face plate does not need to be removed.

IMPORTANT: On the VR-One, the face plate is hinged to the body of the head. On the VR600 it is not. If the head is a Furio VR600, removing the bolts and screws frees the face plate from the head. Do not let the face plate drop! Cables running between the head and the face plate may become damaged if they are pulled tight.

7. Open the head so that the face plate is on the work surface and the internal electronic components are facing up. Be careful not to pull on any cables.

Remove the PicoCOM CPU Module

This section describes how to remove the old CPU module.

IMPORTANT: When handling internal electronic components, take precautions against electrostatic discharge (ESD).

To remove the PicoCOM CPU module:

1. Find the PicoCOM CPU module (see Figure 2), which is attached to the main circuit board of the face plate.

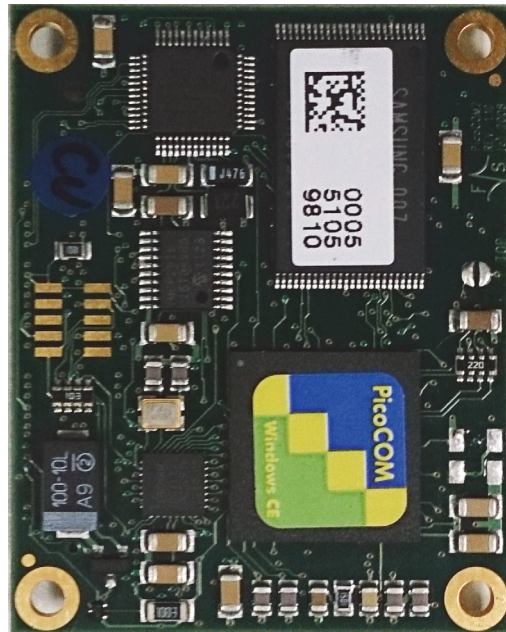


Figure 2 - The PicoCOM CPU module (to be removed)

2. Gently lift the PicoCOM CPU module to detach it from the main circuit board.
Tip: The PicoCOM CPU module is attached to the main circuit board by an 80-pin connector. The new PHYTEC CPU module will attach to the same connector.
3. Wrap the PicoCOM CPU module in ESD protective packaging and store it in a dry location.

Set the Configuration Switch to the Open Position

The main circuit board includes a configuration switch that must be set to the **open** position. This section describes how to check the position of the switch, and how to set it the **open** position.

IMPORTANT: When handling internal electronic components, take precautions against electrostatic discharge (ESD).

IMPORTANT: Never operate the configuration switch while the head is connected to power. Damage may result.

To check the switch and set it to the open position:

1. Prepare your digital multimeter (DMM) to test circuit continuity.
2. On the main circuit board, test continuity across the **CONFIG** switch to determine whether the switch is **open** or **closed** (see Figure 3).

Tip: An **open** switch does **not** conduct electricity. For example, if a light switch is in the **open** position, the lights are **OFF**.

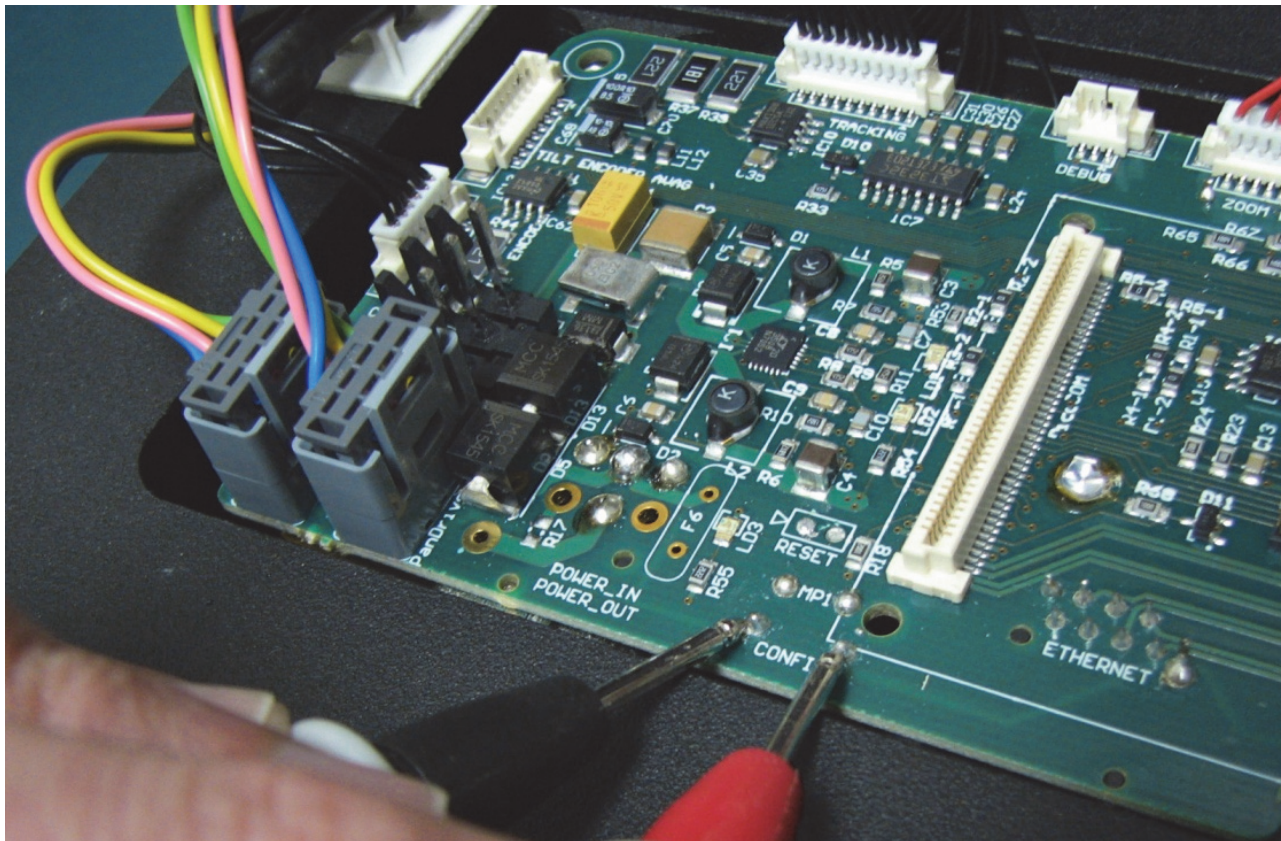


Figure 3 - Testing Continuity Across the CONFIG Switch.

3. If the switch is **open**, skip the remaining steps in this section, and proceed to the section, “**Install the New CPU Module**” on page 8.
4. On the outside of the face plate, between the **Power** connector and the **Ethernet** connector, find a small hole.

5. Slowly insert a thin screwdriver or other narrow tool straight into the hole until it makes contact (see Figure 4).



Figure 4 - Operating the CONFIG switch

6. Gently push the tool further into the hole until you hear the switch click.
7. Remove the tool.
8. Repeat the continuity test (**Step 2**) to ensure that the **CONFIG** switch is in the **open** position.

Install the New CPU Module

This section describes how to install the new PHYTEC CPU module.

IMPORTANT: When handling internal electronic components, take precautions against electrostatic discharge (ESD).

To install the new PHYTEC CPU module:

1. On the main circuit board, locate fuse **F3**, if present (see Figure 5).
The fuse is rectangular, and its mounting position is labeled **F3**. Some Furio heads do not have a fuse installed at the **F3** position.

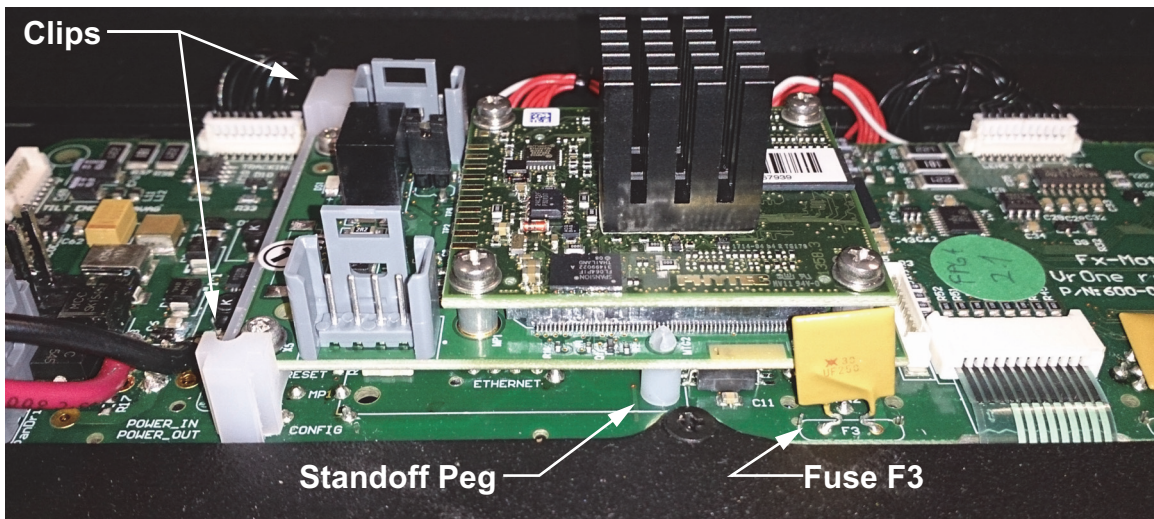


Figure 5 - New CPU Module (installed)

2. If fuse **F3** is present, gently stand it upright to make space for the new CPU module.
3. Beside the **F3** position, ensure the blue jumper is upright. See Figure 6.

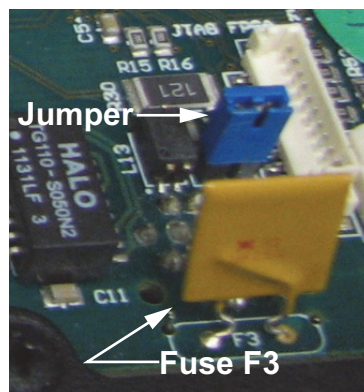


Figure 6 - Blue Jumper on Main Circuit Board, Before New CPU Module Installation (left) and After (right)

4. Carefully align the new CPU module:
 - The new CPU module attaches to the same 80-pin connector that the old CPU module did. Align the connector first, to ensure proper orientation of the new CPU module.
 - The new CPU module fits around the blue jumper on the main circuit board, so that the jumper remains upright. See Figure 6.
 - The new CPU module has two plastic standoff pegs that align with holes on the main circuit board. See Figure 5.
5. Gently push the new CPU module and the main circuit board together until the module is properly installed:
 - The 80-pin connector must be fully seated.
 - The plastic standoff pegs must be locked into their holes on the main circuit board.
 - Two plastic clips on the new CPU module must wrap around the main circuit board and be locked into place.

6. Connect the data/power cable that came with the CPU module so it runs between the module and one of the two connectors on the main circuit board.

Note: If the robot is a VR-One, both connectors on the main circuit board are already occupied. Unplug one of the cables, and then plug it into a vacant connector on the new CPU module. You may need to remove a cable tie to release enough slack to make the connection.

Tip: It does not matter which cable plugs into which connector, as long as one cable runs between the new CPU module and the main circuit board, and all cables are plugged in.

7. Ensure all cables are neatly dressed, to prevent possible snagging. Use cable ties if needed.

Reassemble the Head and Payload

This section describes how to reassemble the head and reattach the payload.

IMPORTANT: When handling internal electronic components, take precautions against electrostatic discharge (ESD).

To reassemble the head:

1. Align the face plate with the head chassis, ensuring that no wires or cables are pinched.
2. Fasten the face plate to the head using the screws and/or bolts you removed earlier.
3. Mount the head.
4. Align the payload with the marks you made earlier, and fasten it to the cradle.

IMPORTANT: The payload must be installed in the exact original position.

5. Reconnect cables to the head and to the payload.
6. Dress all cables properly, to allow slack for the full range of robot motion.

Configure Network Settings

This section describes how to configure network settings.

1. Turn on power to the head and wait a few minutes for it to start up.
2. On the SmartShell computer, open a web browser, and then navigate to the IP address of the head.

The IP address immediately after CPU module upgrade is either **192.168.3.11** or **10.42.3.64**.

The Furio configuration interface for the head appears.

3. On the **IP Settings** tab, specify values for the **IP Address**, **Netmask**, and **Gateway**, using the values you recorded earlier.

IMPORTANT: Due to a known issue in the current software release, a new IP address is not accepted unless a gateway is specified. If you do not have an actual gateway in your network, you can type any unused IP address in the range specified by the netmask. Usually the first address in the range is reserved for the gateway. For example, for an address in the range 191.168.0.x (netmask 255.255.255.0) the gateway address would typically be 192.168.0.1.

4. Click the **Save and Reboot** button.

The **Device is Rebooting** message appears. The message includes a URL link.

5. Wait for two minutes while the head reboots, and then click the URL link provided.
6. If the web browser is unable to connect to the head, unplug the power cable from the head, wait a few seconds, and then plug it back in. Wait two minutes for the head to start, and then refresh the browser.
This step addresses a known issue that sometimes the head does not restart after receiving a reboot request from the web interface. The configuration changes made in the web interface are saved, but the head fails to reboot. Turning it off and then back on resolves this problem.

Set the Date and Time

This section describes how to set the date and time on the head.

To set the date and time:

1. Connect to the head using SecureShell (SSH).
Tip: On Windows, you can use an SSH program such as **PuTTY**.
2. Log in as username `root`, with an empty password.
3. To set the clock, use the command: `date -s "2015-2-24 15:06"`
Tip: In the example above, replace `2015-2-24 15:06` with the current year, month, day, and time.
4. To save the current date and time into the RTC chip, use the command: `hwclock -w -f /dev/rtc0`
5. To check the time on the RTC chip, use the command: `hwclock -r -f /dev/rtc0`
6. Remain logged in to the head for the next procedure.

Set the Product Code and Serial Number

This section describes how to set the product code and serial number on the head.

Note: The steps in this section continue from the previous section.

To set the product code and serial number:

1. Using SSH, execute the following command: `vi /furio_metadata.properties`

The file opens in the vi text editor. The file contents resemble the following:

```
#  
# Furio metadata  
#  
furio.serialnumber=VR1-Z99-999  
furio.product=vrone
```

Tip: If you see an empty file then you mis-typed the file name or forgot the back slash. Try again.

2. Edit the file to contain the correct serial number and product ID code.

You recorded the serial number before you disassembled the head.

Valid product ID codes are `vrone` and `vr600`. These are case-sensitive.

Tip: For help using the vi text editor, find instructions on the Internet. For example, help can be found at <http://www.cs.colostate.edu/helpdocs/vi.html>.

3. Save the file.
4. For the changes to take effect you need to reboot the head. You can do this on the command line with the `reboot` command.
5. Log out of the head, and exit the SSH session.

Upgrade Firmware

This section describes how to upgrade the firmware to the latest version from Ross Video.

To upgrade the firmware:

1. On the SmartShell computer, open a web browser, and then navigate to the IP address of the head.
The Furio configuration interface for the head appears.
2. Insert the USB stick that contains the latest firmware zip file for the new CPU module.
3. In the Furio configuration interface, navigate to the **Upgrade** tab.
4. Click the **Browse** button.
The **File Upload** dialog box appears.
5. Select the firmware zip file, and then click **Open**.
The **File Upload** dialog box closes, and the file name appears beside the **Browse** button.
6. Click the **Upload File and Reboot** button.
The **Device is Rebooting** message appears. The message includes a URL link.
7. Wait for two minutes while the head reboots, and then click the URL link provided.
8. If the web browser is unable to connect to the head, unplug the power cable from the head, wait a few seconds, and then plug it back in. Wait two minutes for the head to start, and then refresh the browser.
This step addresses a known issue that sometimes the head does not restart after receiving a reboot request from the web interface. The configuration changes made in the web interface are saved, but the head fails to reboot. Turning it off and then back on resolves this problem.
9. Leave the Furio configuration interface open for the next procedure.

Customize the Configuration

In an earlier procedure you created a backup of the configuration template file from the old CPU module (step 3 on page 4). This is the old configuration template file.

This section describes how to download a new configuration template file from the head, edit it with information from the old file, and upload the edited file onto the head.

For these steps we recommend you use text editor that enables you to compare files visually, such as Notepad++. The Notepad++ application is available free at www.notepad-plus-plus.org.

IMPORTANT: The steps in this section assume that the old PicoCOM CPU module was running firmware version 3.3.x (or higher) when you created the old template configuration file. If the PicoCOM PCU module was running a lower version of firmware, do not perform the steps in this section. Contact Ross Video Technical Support for guidance.

To customize the configuration:

1. In the Furio configuration interface, navigate to the **Status and Logging** tab.
2. Right-click the **Download Configuration Template** button, and then click **Save Link As**.
3. Specify a unique file name and location for the file, and then click **Save**.

IMPORTANT: The file name extension must remain as **.tmpl**.

Tip: This file is the one you will edit. The remaining steps refer to this as the “new” file.

4. In a text editor that enables you to compare files visually, open and compare the following two files:
 - The new file you saved in the previous step.
 - The old file, which you downloaded from the head before you removed the old CPU module.
5. Wherever the files differ, copy settings from the old file into the new file, with the following exceptions:
 - The following line in the new file must remain as shown below:

```
SmartFX 1.0.2 {
```

- The following line in the new file must remain as shown below:

```
LensDrive /dev/ttyO2 {
```

- The following line in the new file must remain as shown below:

```
Param AllowCutWhileOnAir { Value true; };
```

Tip: Ross Video sometimes creates new parameters to expose features. If the new file contains parameters not present in the old file, keep the parameters in the new file. Keep the default values, or set them to appropriate values. If you are unsure about any settings, contact Ross Video.

6. If you want to disable the robot’s ability to perform **CUT** or **PREPARE (CUE)** actions while the camera is on air, change the value of the **AllowCutWhileOnAir** parameter to **false**.

Note: The option to disable **CUT** and **PREPARE (CUE)** actions for on-air cameras applies only if your system includes tally integration.

7. Save the new file.
8. In the Furio configuration interface, navigate to the **Upgrade** tab, and then click the **Browse** button. The **File Upload** dialog box appears.
9. Select the new file you edited, and then click **Open**.

The **File Upload** dialog box closes, and the file name appears beside the **Browse** button.

10. Click the **Upload File and Reboot** button.

The **Device is Rebooting** message appears. The message includes a URL link.

11. Wait for two minutes while the head reboots, and then click the URL link provided.
12. If the web browser is unable to connect to the head, unplug the power cable from the head, wait a few seconds, and then plug it back in. Wait two minutes for the head to start, and then refresh the browser.

This step addresses a known issue that sometimes the head does not restart after receiving a reboot request from the web interface. The configuration changes made in the web interface are saved, but the head fails to reboot. Turning it off and then back on resolves this problem.

13. Leave the Furio configuration interface open for the next procedure.

Manually Restore Tracking and Axis Settings

This section describes how to manually restore the tracking and axis settings.

To manually restore tracking and axis settings:

1. In the Furio configuration interface, navigate to the **Axis Settings** tab.
2. Click the **Enable Edit** button.
3. Click **Yes**.
4. For each property on the **Axis Settings** tab, restore the values to the ones you printed earlier. Do not press **Enter**.
5. After you have specified all property values, scroll to the bottom and then click the **Save** button.
6. Click the **Tracking** tab, even if your system does not include position tracking.
7. If your system includes position tracking, for each property on the **Tracking** tab, restore the values to the ones you printed earlier. Do not press **Enter**.
8. Click the **Save and Reboot** button.

The **Device is Rebooting** message appears. The message includes a URL link.

9. Wait for two minutes while the head reboots, and then click the URL link provided.
10. If the web browser is unable to connect to the head, unplug the power cable from the head, wait a few seconds, and then plug it back in. Wait two minutes for the head to start, and then refresh the browser.

This step addresses a known issue that sometimes the head does not restart after receiving a reboot request from the web interface. The configuration changes made in the web interface are saved, but the head fails to reboot. Turning it off and then back on resolves this problem.

11. Leave the Furio configuration interface open for the next procedure.

Restore the User Data Zip File

This section describes how to restore the user data zip file you saved earlier.

To restore the user data zip file:

1. In the Furio configuration interface, navigate to the **Backup** tab.
2. Click the **Browse** button.
The **File Upload** dialog box appears.
3. Select the **backup.zip** file, and then click **Open**.
The **File Upload** dialog box closes, and the file name appears beside the **Browse** button.
4. Click the **Restore Data Backup** button.
The **Device is Rebooting** message appears. The message includes a URL link.
5. Wait for two minutes while the head reboots, and then click the URL link provided.
6. If the web browser is unable to connect to the head, unplug the power cable from the head, wait a few seconds, and then plug it back in. Wait two minutes for the head to start, and then refresh the browser.
This step addresses a known issue that sometimes the head does not restart after receiving a reboot request from the web interface. The configuration changes made in the web interface are saved, but the head fails to reboot. Turning it off and then back on resolves this problem.
7. Leave the Furio configuration interface open for the next procedure.

Check the Robot Status

This section describes how to confirm that the changes you made have been applied.

To check the robot status:

1. In the Furio configuration interface, in the **Information** box, confirm the following:
 - The **Serial Number** matches the serial number you recorded earlier (step 2 on page 4).
 - The **Firmware Version** matches the version to which you upgraded the head.
 - The **Device Type** matches the type of head you are using.
2. On the **Status & Logging** tab, scroll to the bottom of the log and confirm that the most recent entry has an accurate time stamp.
3. On the **Axis Settings** tab, verify that the axis settings are correct.
4. If your system includes position tracking, click the **Tracking** tab and verify that the tracking settings are correct.
5. Close the Furio configuration interface.
The upgraded robot should now be fully functional.