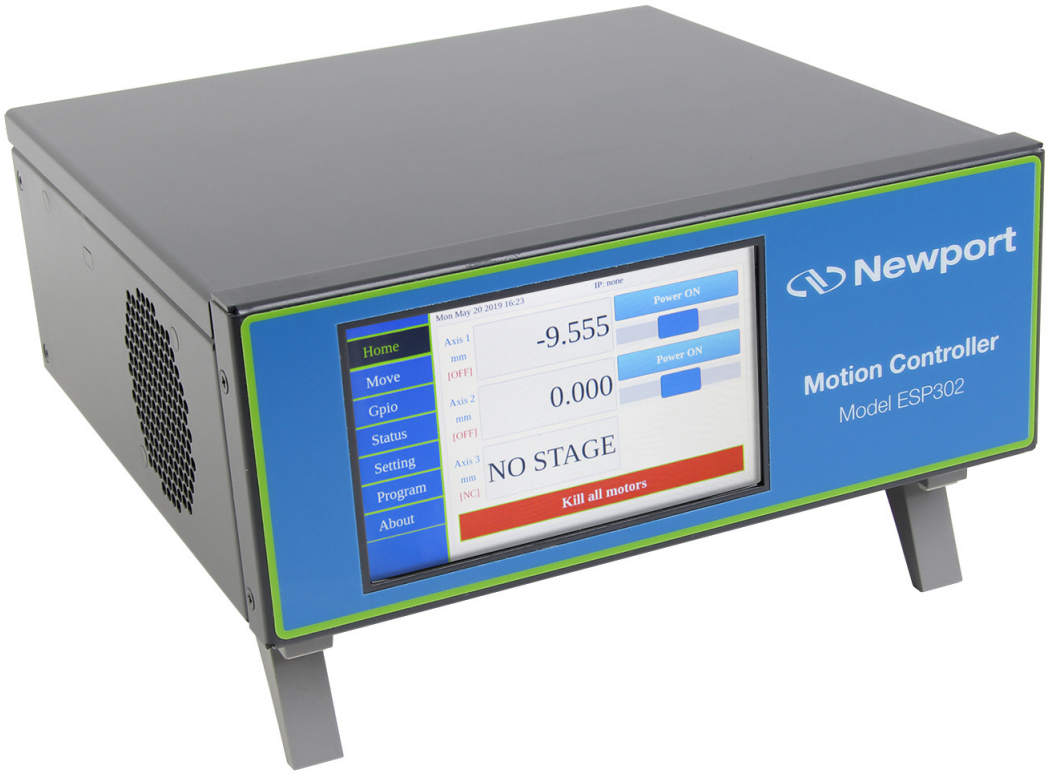
ESP302

Friendly Motion Controller/Driver



ESP COMPATIBLE

Newport®

User Interface Manual

Table of Contents

Friendly Motion Controller/Driver ESP 302 Controller

1.0 Introduction

1.1 Scope of the Manual

The ESP302 is an advanced stand-alone, easy to use, motion controller with up to 3 integrated motor drivers, outstanding powerful programming functionality.

It offers different operating modes through its user-friendly touchscreen front panel, command remote port, and web interface offering high-speed communication through 10/100/1000 Base-T Ethernet.

The ESP302 provides advanced trajectory and synchronization features to precisely control from the most basic to the most complex motion sequences. Multiple digital triggers provide users with additional data acquisition, synchronization and control features that can improve the most demanding motion applications.

The Enhanced System Performance (ESP) architecture consists of ESP-compatible controllers and stages. When used with ESP-compatible stages, the ESP302 plug-and-play concept significantly increases user friendliness and improves overall motion performance.

To maximize the value of the ESP302 Controller/Driver system, it is important that users become thoroughly familiar with available documentation.

The present manual describes:

- The controller **Front panel interface** (used in LOCAL mode)
- The controller **Website interface** (used in WEB INTERFACE mode).

1.2 Prerequisite

It is mandatory that **ESP302 Start-Up Manual** be thoroughly read and understood before going through these interfaces.

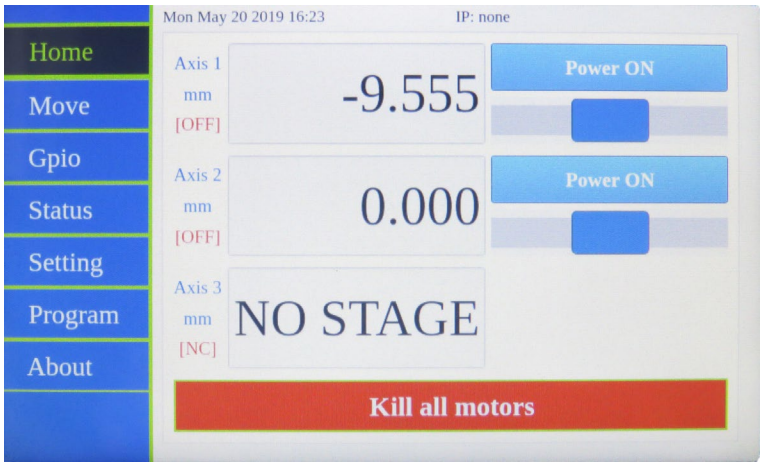
Particularly, for Web interface mode, a connection must be established between the computer and the controller either directly or through a network.

2.0 Front panel interface

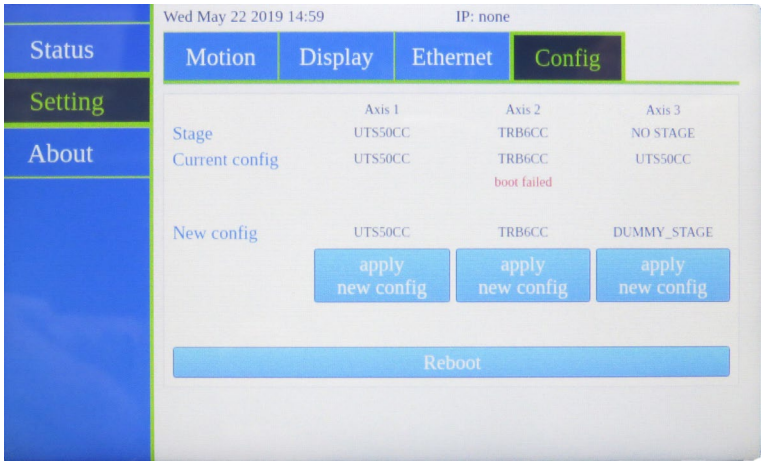
This section provides a detailed explanation of the controller front panel menus and fonctions.

2.1 Start-up

Upon start-up, the controller begins booting and analyses the connected hardware. If new ESP compatible stages have been connected, configuration is automatically modified and the "Home" page is displayed. Example with 2 stages connected on axis 1 and axis 2:



If a configuration problem occurs, the "Setting/Config" tab is displayed:



The "boot failed" mention appears on the faulty axis (Axis 2 in the example above).

- Note the faulty axis and connect another stage on it.

2.2 Home Menu

This page appears by default after power-up but it can be displayed from another page by pressing the "Home" button on the screen top left. Pressing the other buttons located below ("Move", "GPIO" …) will change the display to the other available pages described further.

Home page displays for each axis its present status (**[OFF] or [NC]** if no stage).

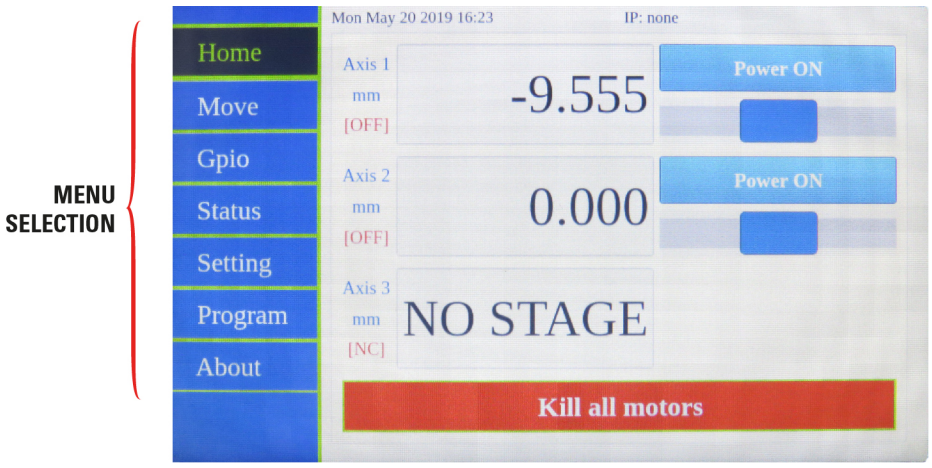
- First press "Power ON". The status changes to **[ON]** and the button to "Home".
- Press “Home”. The stage starts moving to find its reference position. When done, the status changes to **[REF]** and the button to “Power OFF”.
- If the homing sequence fails, the status turns back to **[OFF]** and the button to “Power ON”.
- Do this for each present axis.

Jog slider buttons can then be pressed, maintained and shifted right or left like a joystick to manually move the stage. If slightly moved, the speed will be low and if moved totally, it will be high.

Each axis can be turned off by pressing "Power OFF" and turned on again by pressing "Power ON" without losing position information.

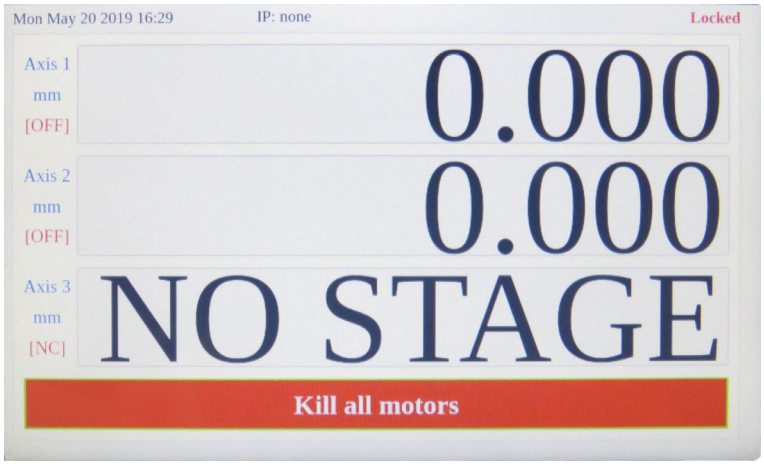
Pressing "Kill all motors" kills all axes. Position information is lost and axes must be homed again to be operated.

The axes current positions are normally displayed. It is possible to have a bigger display by swiping the display to the right with the finger (swipe to the left to return).

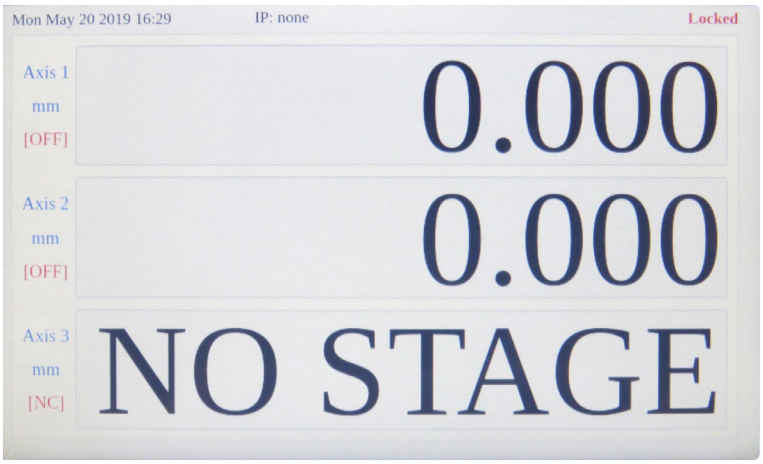


It is also possible to lock the screen to have a bigger display by using the LC command in remote mode. See ESP302 Programmer's Manual for details.

Screen locked with LC1:



Screen locked with LC2:



Note that current Date and HOST IP address are displayed on the top of all screens.

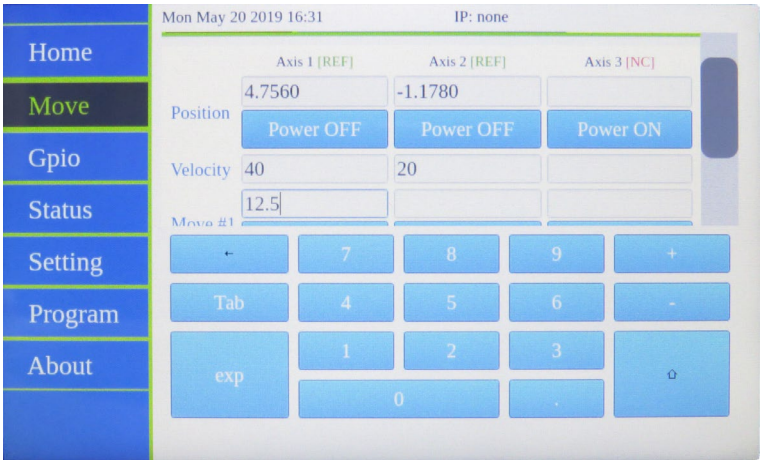
2.3 Move Menu

2.3.1 Absolute Tab

Absolute tab allows making absolute moves.

- Positions are displayed under the axis name.
- If not already done, press "Power ON" and then "Home" to initialize each axis.

- Modify the axis velocity if necessary.
- Set "Move #1" and/or "Move #2" expected position.
- To set a value, press on the value area, a virtual keyboard appears.
- Type the desired number (erase with "←") and valid by pressing "⇑".

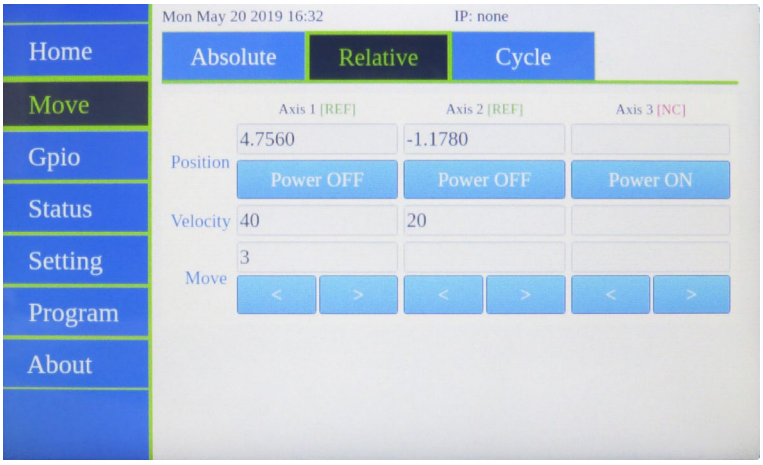


- Launch displacement by pressing the appropriate "Go" button.

2.3.2 Relative Tab

Relative tab allows making relative moves.

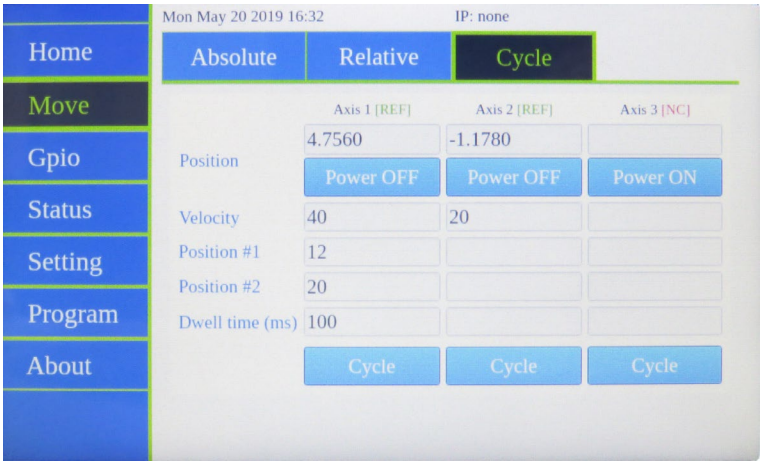
- Positions are displayed under the axis name.
- Set the desired velocity and displacement value.
- Press forward ">" or backward "<" button to execute the displacement step in the expected direction.



2.3.3 Cycle Tab

Cycle tab allows making continuous cycle moves between two positions.

- Positions are displayed under the axis name.
- Set the desired velocity, limit positions #1 and #2 and Dwell time (duration at each limit position).
- Press "Cycle" button to launch cycling. The button turns to "Stop".
- Press "Stop" to stop cycling.



2.4 GPIO Menu

This page allows controlling and monitoring the 16 digital I/Os (2 groups of 8).

- Tick GPIO1 or GPIO2 "OE" button if you want to set the group in output mode (green) instead of input (white).
- When set as output, each bit can be set to "1" (green) or reset to "0" (white).
- When set as input, each bit state is displayed ("1": green, "0": white).

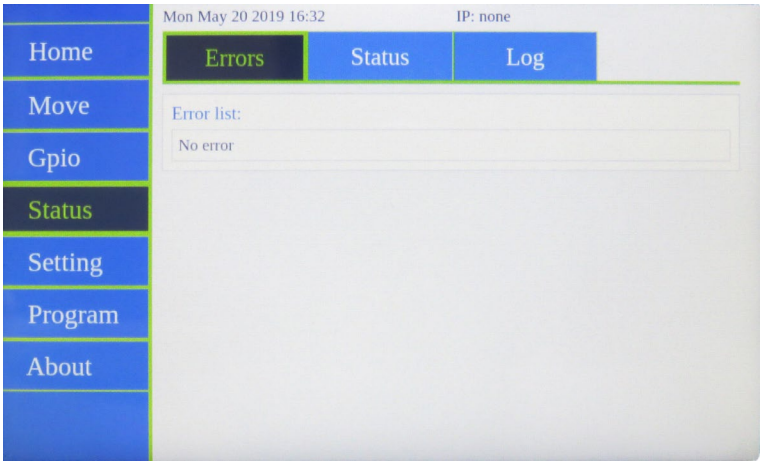
Note that open inputs are reporting level "1" by default.

2.5 Status Menu

2.5.1 Errors Tab

This tab shows pending errors. Its content is erased after it is displayed.

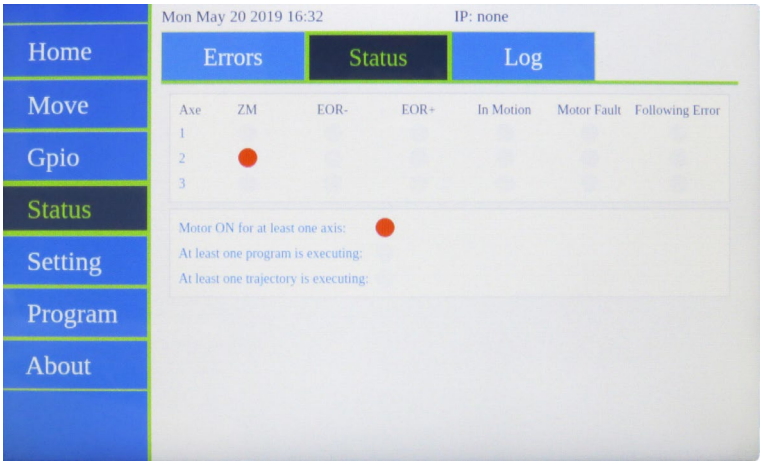
Note that if they are unread errors, the "Status" menu button is blinking red/green until visiting this menu.



2.5.2 Status Tab

This tab displays axes hardware flag status (ZM, EOR- and EOR+), and if they are in motion, have a motor fault or a following error.

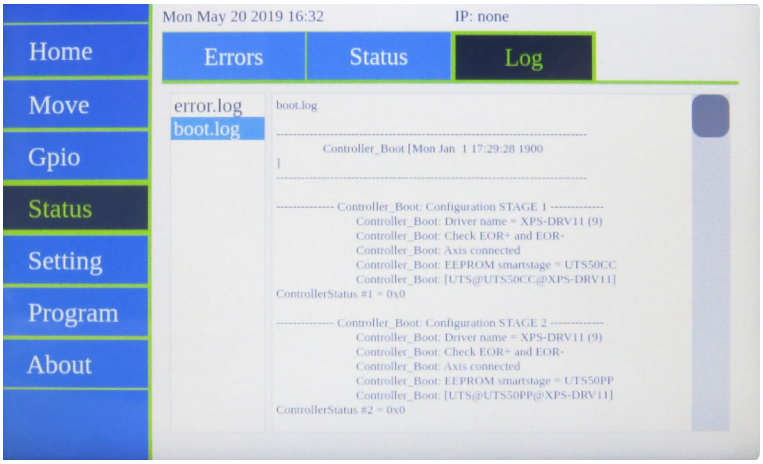
It also reports if at least one motor is ON, one program or one trajectory is executing.



2.5.3 Log Tab

This page displays the content of the firmware log files. The front panel is locked in this page in case of boot failure.

- Press error.log or boot.log to display the content of the file.



2.6 Setting Menu

2.6.1 Motion Tab

This tab allows setting motion parameters:

- OH (home search high speed)
- JW (jog low speed)
- JH (jog high speed)
- VA (velocity)
- AC (acceleration)

Modifying a value changes its color from green to red.

"Apply parameters" applies modified parameters to the stages (modified values in red turn to green).

"Read parameters" button displays the currently applied parameters (values in green) and erases red pending modifications.

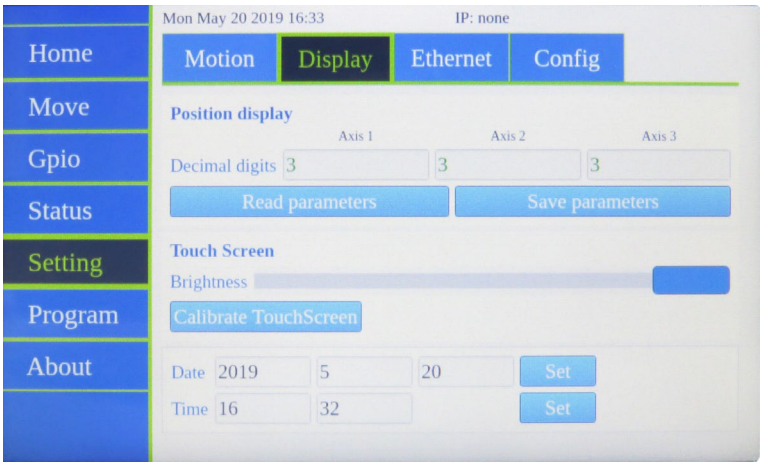
2.6.2 Display Tab

Display page can be used to configure the number of digits for axes position display.

"Apply parameters" applies modified parameters (modified values in red turn to green).

"Read parameters" button displays the current parameters (values in green).

Moreover, date and time can be adjusted in the bottom of the screen. (Do not forget to press "Set" to apply your changes).



This tab also allows to set the brightness, or to calibrate the touchscreen as follows:

- After pressing the "Calibrate Touchscreen" button and the "yes" button to confirm, the controller reboots and the user must touch the 3 crosses poping up on the screen.

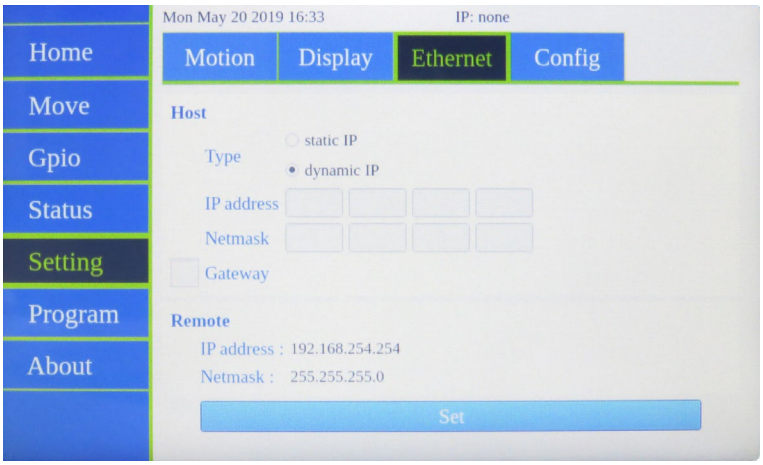
Opun completion the touchscreen is calibrated.

2.6.3 Ethernet Tab

This page allows configuring the IP setting of the "Host" Ethernet port.

Static IP:

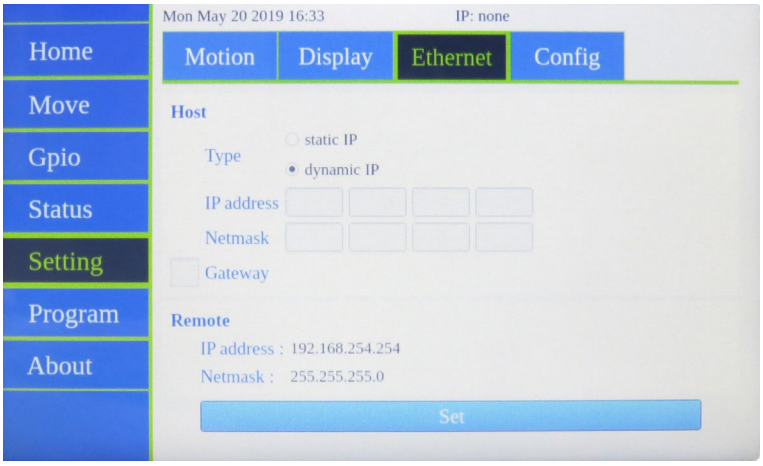
- Tick "static IP" if you want to set your own IP address parameters.
- Type your settings and press "Set". The new address is displayed on the top.



Dynamic IP:

- Tick "dynamic IP" to let the network choose an address automatically.
- Press "Set". The button turns to "Cancel (Searching.)" while the network tries to negociate an IP address. Press again to stop searching.

Once an address is allocated, it is displayed on the top of the screen.



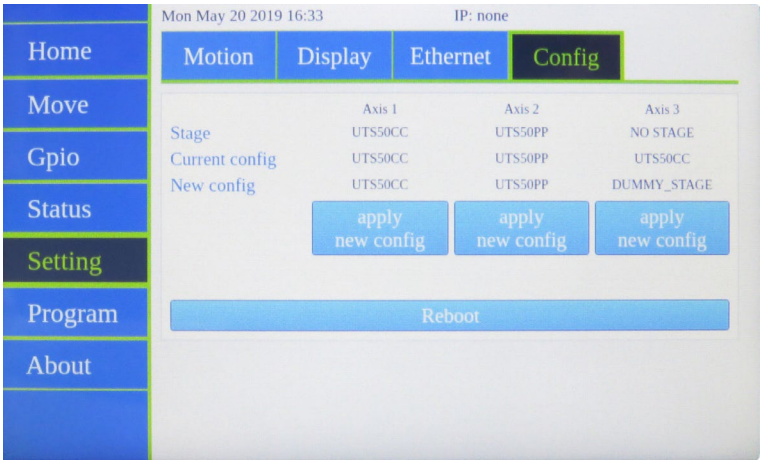
2.6.4 Config Tab

This page allows reviewing axes configuration.

It is automatically dispayed when the power-up automatic configuration fails (non ESP compatible stage or stage not recognized).

This tab can also be used to configure a Dummy stage for simulation on axes with no physical stage connected. In the example below, axis 3 reports "NO STAGE", Current config is "UTS50CC" (stage previously connected) and proposed New config is "DUMMY_STAGE".

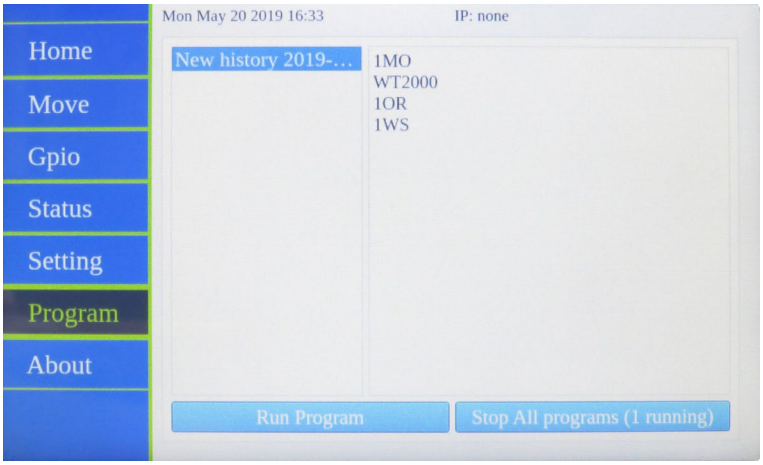
- Press "apply new config" and then "Reboot" if you want to simulate a stage on this axis.



2.7 Program Menu

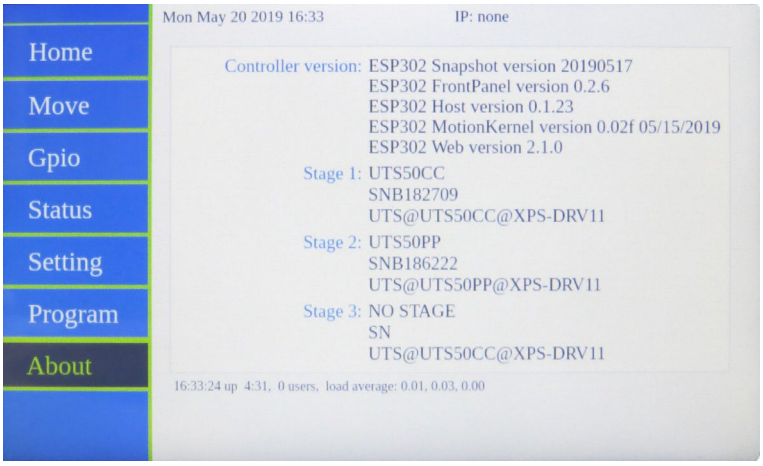
The page allows running programs stored in the controller. Writing a new program is not possible from front panel, it shall be done with a remote connection (with commands or sftp files upload).

- Select the program you want to execute and press "Run Program". Several programs can be launched simultaneously.
- Press "Stop All programs (X running)" to stop all programs execution. "X" reports the number of programs currently running.



2.8 About Menu

This page gives information about software versions and connected stages.



3.0 Website interface

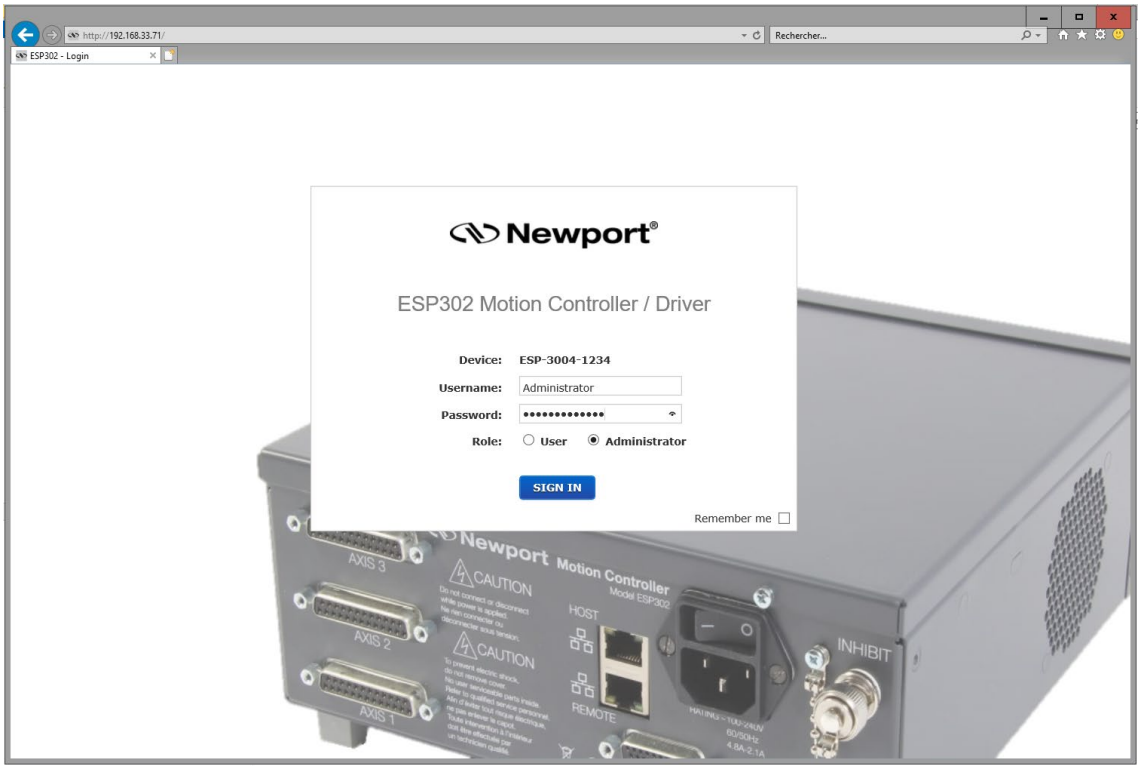
3.1 Interface Overview

ESP302 web interface is compatible with Windows 7 and above.

The ESP302 software tools provide users a convenient access to the most common features and functions of the ESP302 controller. All software tools are implemented as a web interface. The advantage of a web interface is that it is independent from the user's operating system and doesn't require any specific software on the host PC.

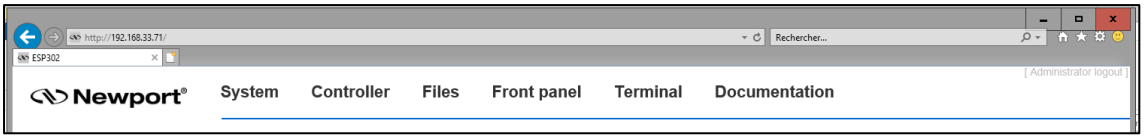
When connected to the controller, a log-in menu pops up. There are two options to log-in to the ESP302 controller: as “User” or as “Administrator”. Users can log-in only with User rights. Administrators can log-in with User or with Administrator rights by selecting the respective Role in the login page. When logged-in with Administrator rights, you have an extended set of tools available.

The predefined user has the log-in name **Anonymous**, Password **Anonymous**. The predefined Administrator has the log-in name **Administrator**, Password **Administrator**. Both the log-in name and the password are case sensitive. Select **"Remember me"** to save the login credentials.

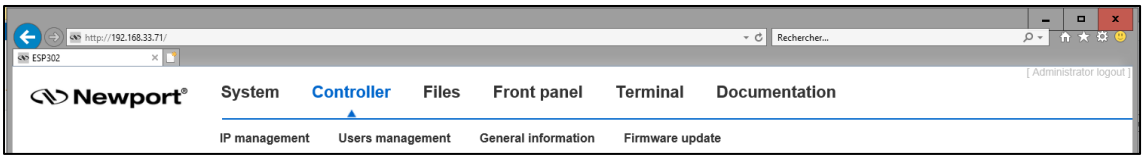


Once logged, the main tab is displayed across the top of the ESP302 Motion Controller/Driver main program window, and lists each primary interface option. Each interface option has its own pull-down menu that allows the user to select various options by clicking the mouse's left button.

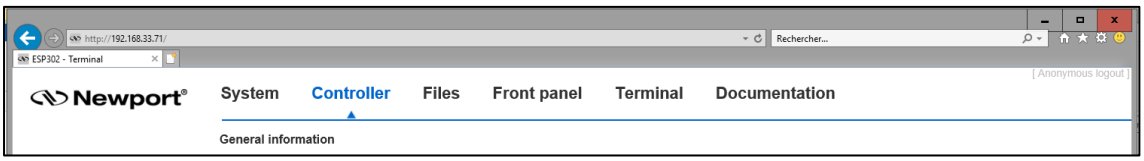
Main menus (with User or Administrator Rights)



Sub-menus for CONTROLLER (with Administrator Rights)



Restricted set of sub-menus for CONTROLLER (with User Rights)

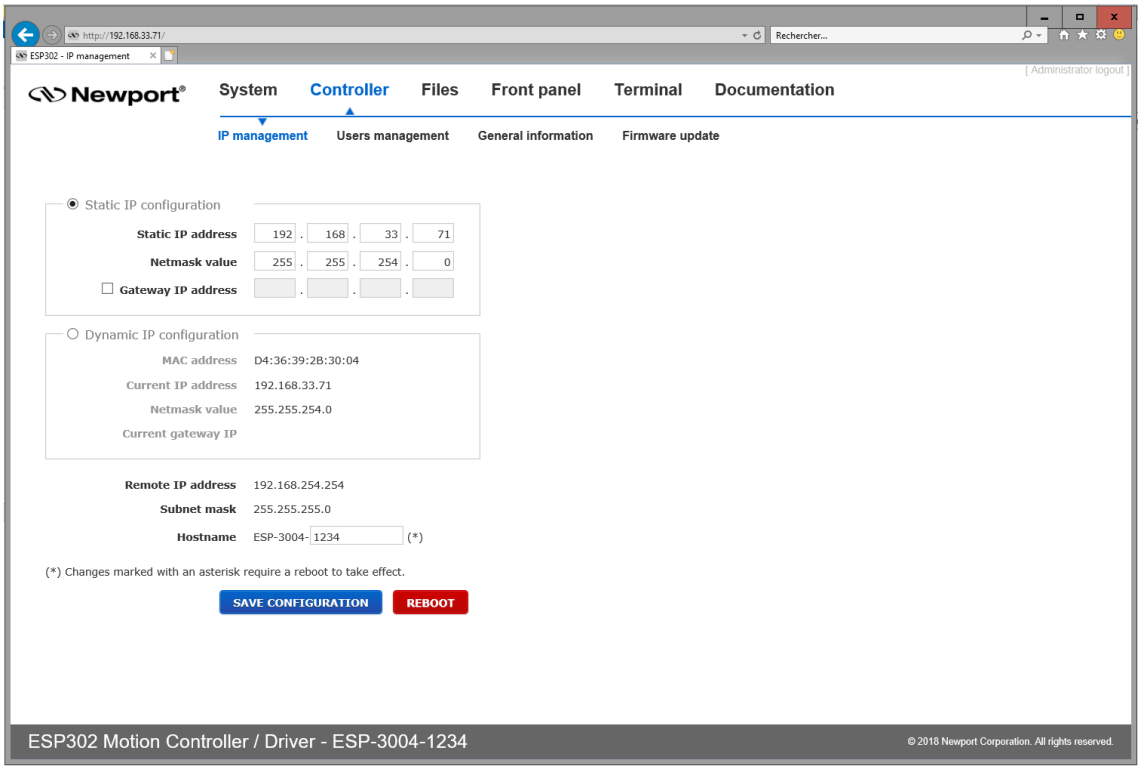


On the following pages, a brief description of each available tool is provided.

3.2 Controller – IP Management

To access this Web Tool, users must be logged in with Administrator rights. This screen allows HOST Ethernet plug IP address management and setting. Host name termination can also be modified.

ATTENTION: the IP address visible on the following screenshots probably does not correspond to the one of your device! See Start-Up Manual for further details.

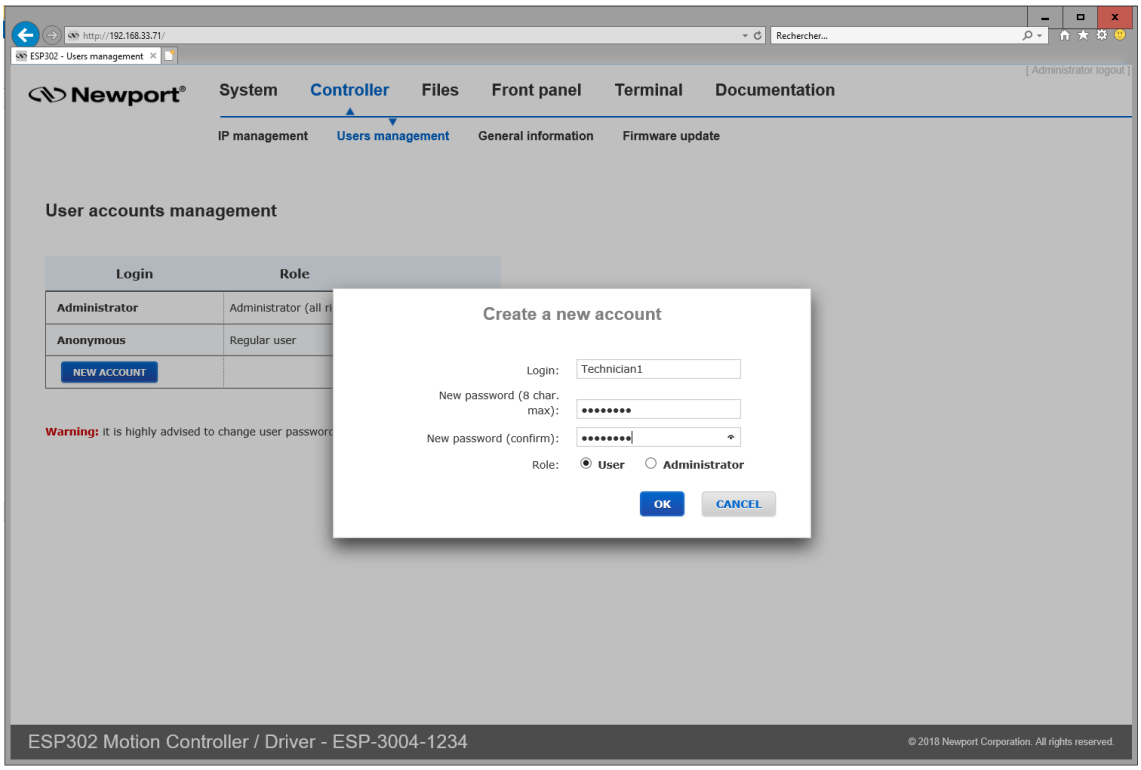


3.3 Controller – Users Management

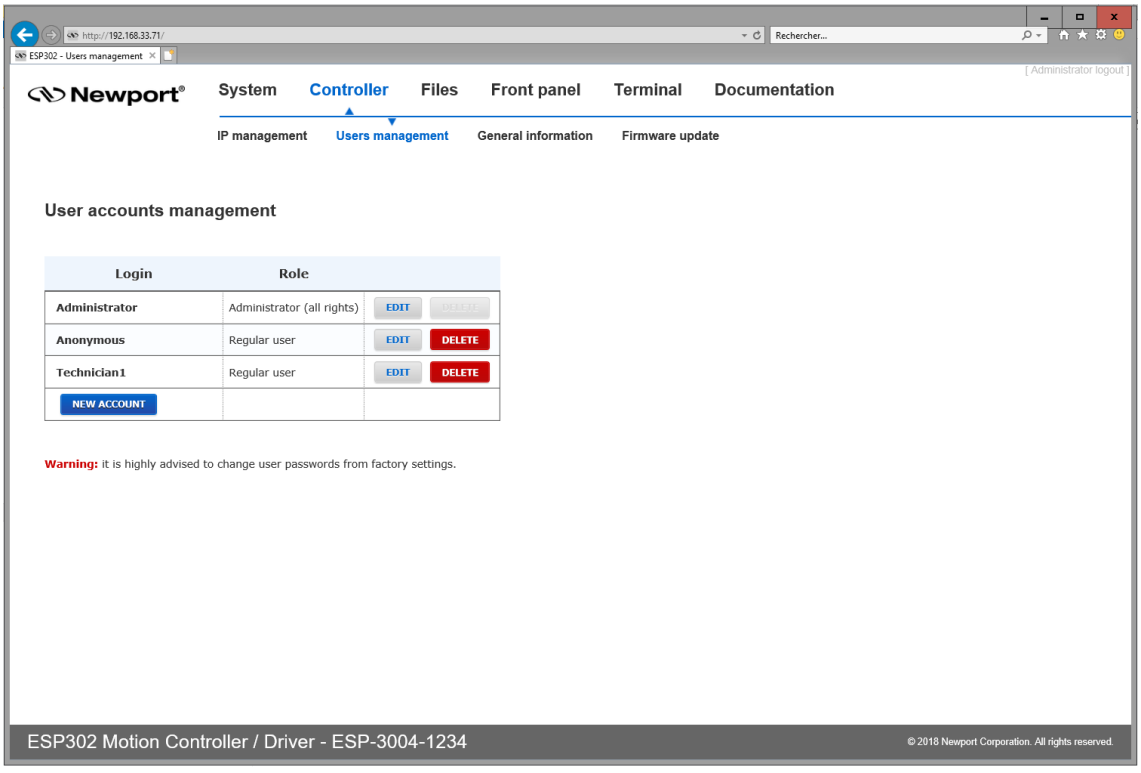
This tool allows managing User accounts. There are two types of users: Administrators and Users. Administrators have configurations rights. Users have restricted rights to use the system.

The following steps are needed to create a new user:

- Click on "New Account" and the following window appears:

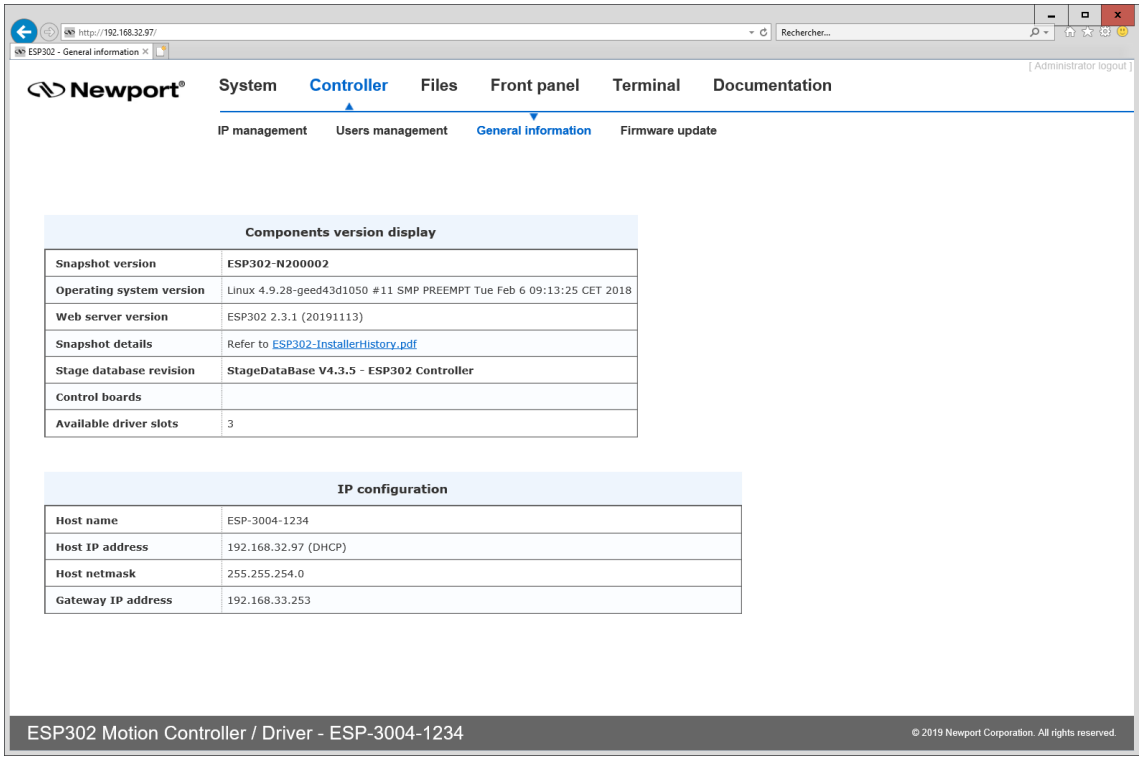


- Type in a Login name (without blank), password, and role (User or Administrator).
- Click “OK” to add the new access account.



3.4 Controller – General Information

This screen provides valuable information about the firmware and the hardware of the controller. It is an important screen for troubleshooting the controller. This screen also displays information about the IP configuration.



3.5 Controller – Firmware Update

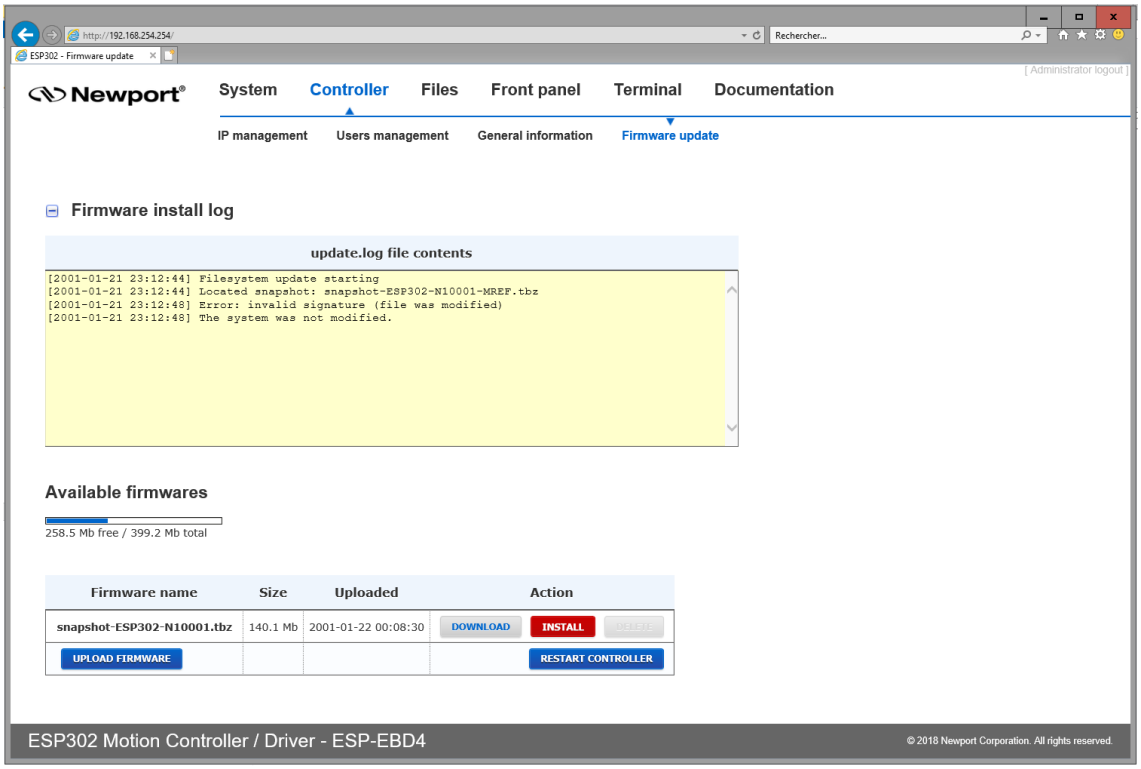
Users can regularly update the controller with new firmware releases. Updating the firmware does overwrite the stageX.ini files if changes are required. Since configuration will be reset when upgrading the firmware, these files should be backed up prior to the firmware upgrade.

NOTE

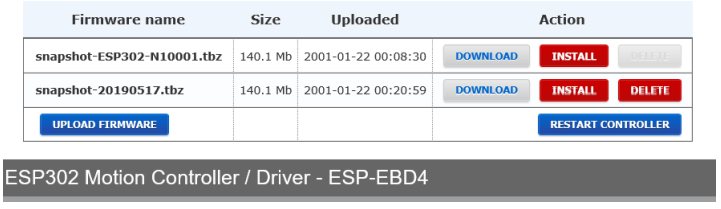
Controller configuration files including stage1.ini, stage2.ini and stage3.ini files can be downloaded and saved from the "Config" folder of the controller using SFTP connection. See Start-Up Manual for more information.

Updating the ESP302 Firmware

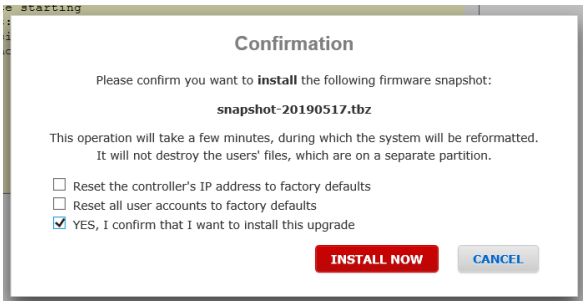
- Download the firmware installer pack from the ESP302 webpage at www.newport.com.
- Connect to the ESP302 controller. For more information see Start-Up Manual.
- Login on to the ESP302 with Administrator rights.
- Go to Controller → Firmware update.



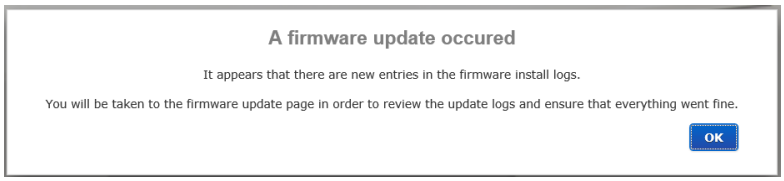
- Click on UPLOAD FIRMWARE and select the installer pack file saved on the PC. The snapshot installer is uploaded, verified, and then appears in the firmware list:



- Click INSTALL in the snapshot line and the following Confirmation window appears:



- Select “Yes, I confirm that I want to install this upgrade”. Resetting the controller IP address or user accounts is optional.
- Click INSTALL NOW. The controller reboots and the following window appears:



- Click OK.

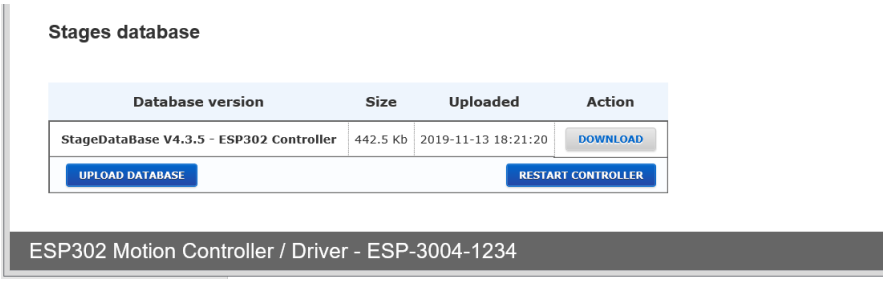
NOTE

This will reboot the controller and reset the controller configuration.

Updating the stages Database

- Scroll down the Firmware Update page.

The present StageDataBase version is displayed. It can be saved on your computer by clicking DOWNLOAD.

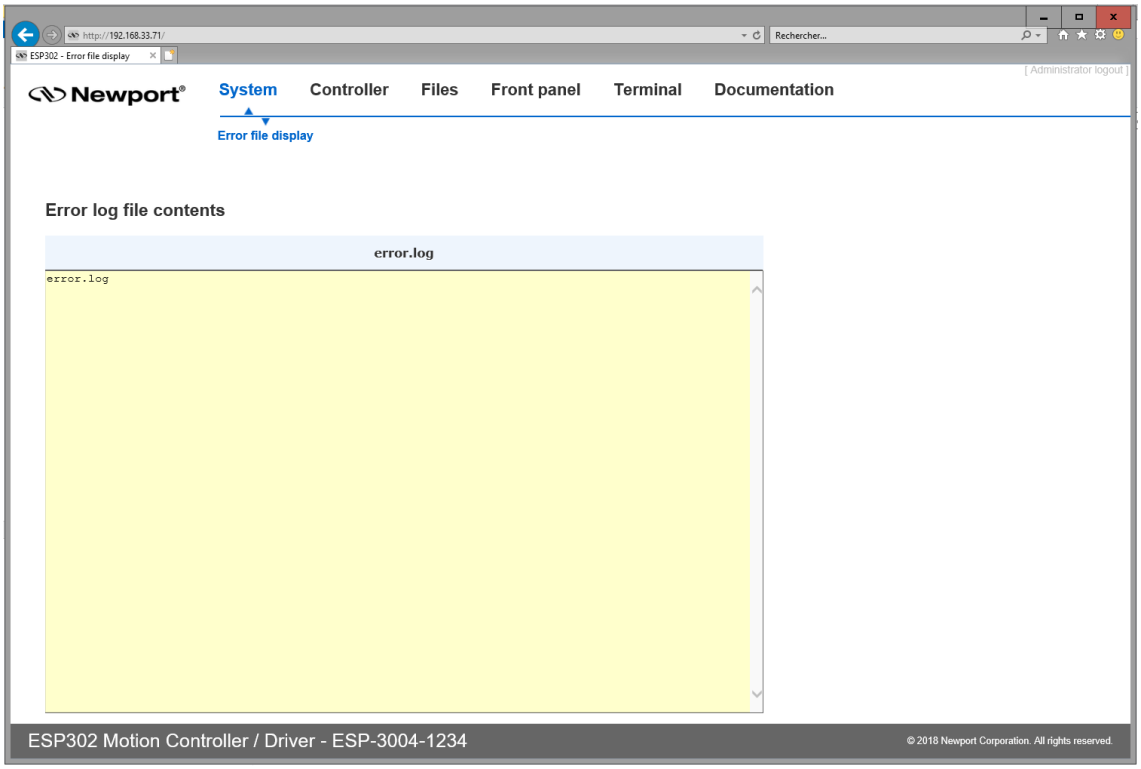


- Click UPLOAD DATABASE and browse to select the new "database.txt" on your computer.
- Once uploaded, click RESTART CONTROLLER to apply changes.

3.6 System – Error file Display

The Error File Display is an important screen for troubleshooting the ESP302 controller. When the ESP302 encounters any error during booting, for instance due to an error in the configuration files or because the configuration is not compatible with the connected hardware, there are entries in the error log file that guides you to correct the error. If several consecutive boot sequences contain errors, they are all reported.

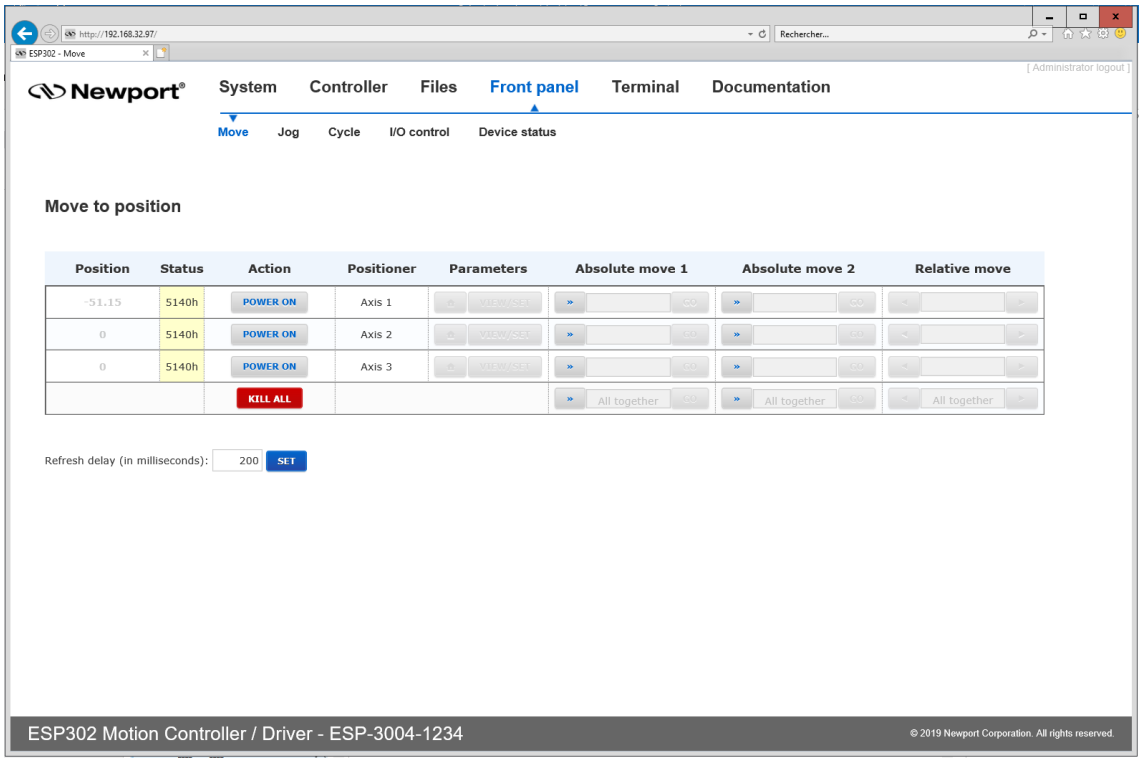
When no error is detected during the last system boot, this file becomes blank.



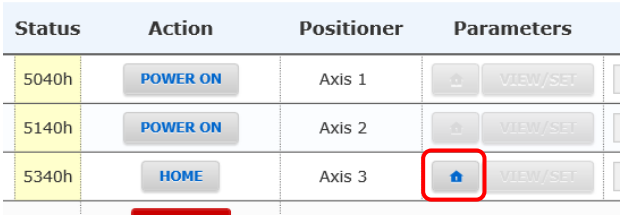
3.7 Front Panel – Move

The Move page provides access to basic group functions like POWER ON, HOME, or POWER OFF, and executes relative and absolute moves.

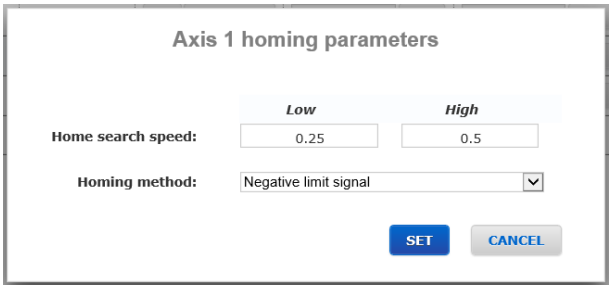
The Move page also provides a convenient review of all important axes information like axes names, status and positions. All axes are listed in the Move page.



- Click “POWER ON”. The Status changes and the Action button changes from “POWER ON” to “HOME”. The homing parameters button becomes active. See example with axis 3 below:



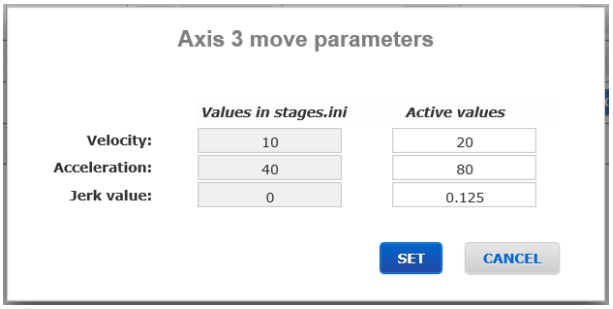
- When clicking on this button, homing parameters can be modified.



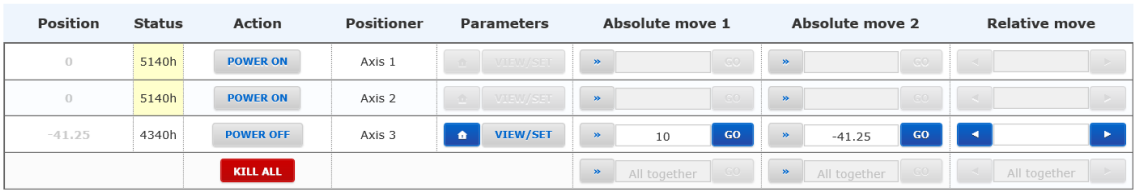
- Modify if necessary and click "SET" or "CANCEL" to abort.

- Click “HOME” button. The stage starts moving to find its reference position. When done, the Action button changes to “POWER OFF” and the grey controls become active. If the homing sequence fails, the Action button turns back to “POWER ON”.

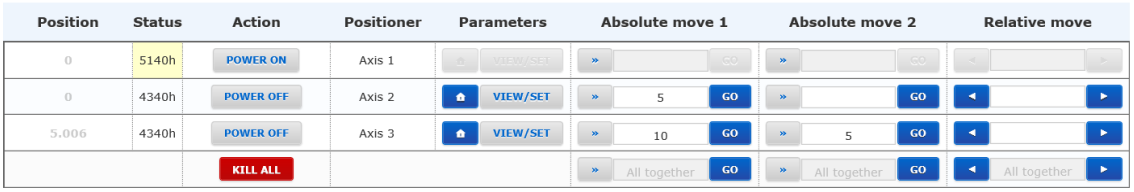
- When clicking “VIEW/SET”, move parameters can be modified.



- Modify if necessary and click "SET" or "CANCEL" to abort.
- Enter an allowed absolute position value in the “Absolute move 1” or“Absolute move 2” field and click “Go”, or enter a relative move value in the “Relative move” field and click forward or backward arrow. The stage moves to the new position.
- You can also click on ">>" button to fill an absolute move area with the current axis position (see example "in Absolute move 2").



- If more than one axis is enabled, a move value can be entered for each, and simultaneous motions can be executed by pressing the "GO" button next to the "All together" label.

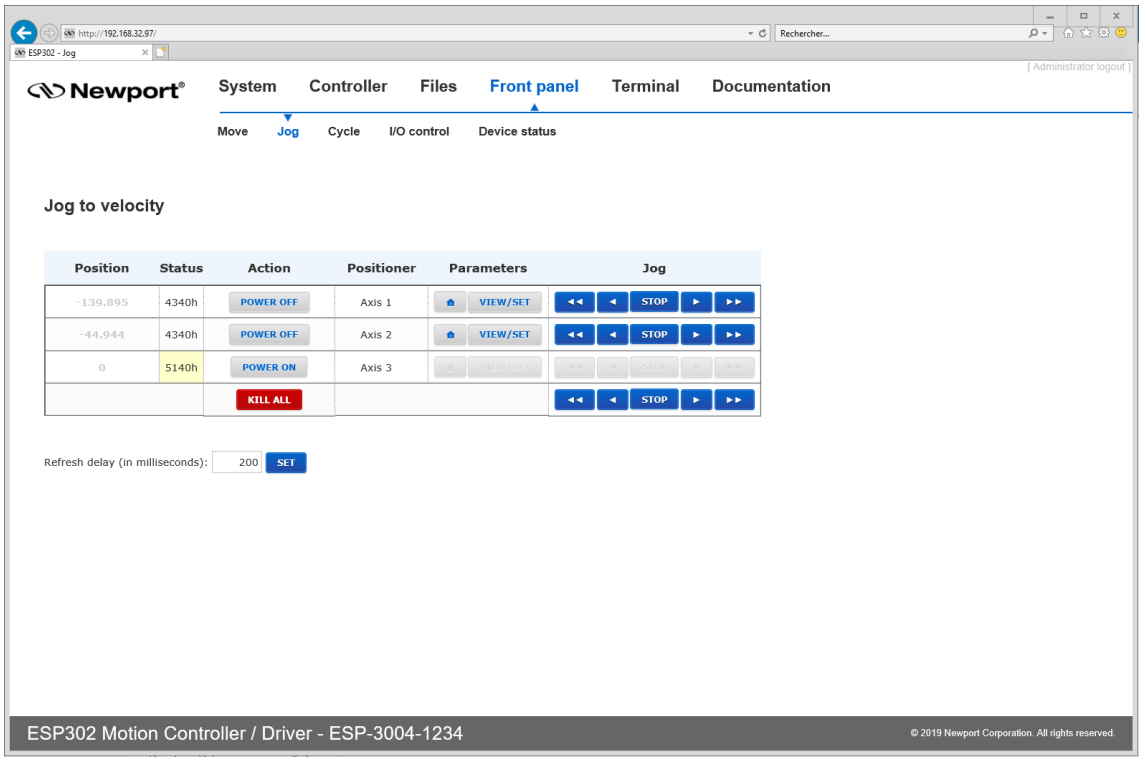


- Anytime, you can click on “POWER OFF” to disable a stage. The Action button changes to “POWER ON”.
- Click on “POWER ON” to enable the stage again without loosing encoder position.
- When clicking “KILL ALL”, all axes are killed and the encoder positions are lost. They have to be powered on and homed again.

3.8 Front Panel – Jog

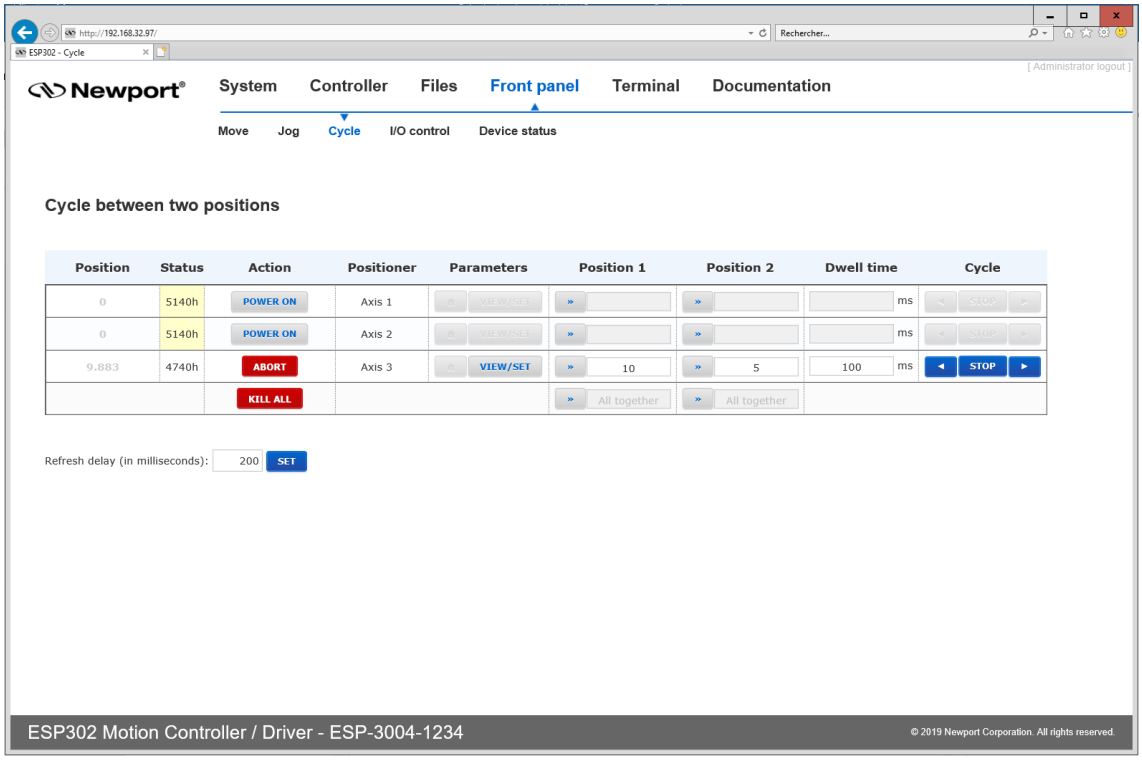
The Jog page allows executing a jog motion. A jog motion is a continuous motion, where only the speed and acceleration are defined, but no target position. Speed and acceleration can be changed during the motion (but not during the acceleration period).

- Click on the “Action” button to Power ON and Home the axis.
- Then start Jog by pressing forward or backward arrow (simple for Jog low speed or double for Jog high speed).
- Click on "STOP" to stop Jog.
- Move parameters can be modified, even during Jog, with the “VIEW/SET” button.



3.9 Front Panel – Cycle

The cycle page allows cycling of a stage. A cycle motion moves back and forth between two defined positions where speed, acceleration and jerk time can be modified during motion (but not during the acceleration period).



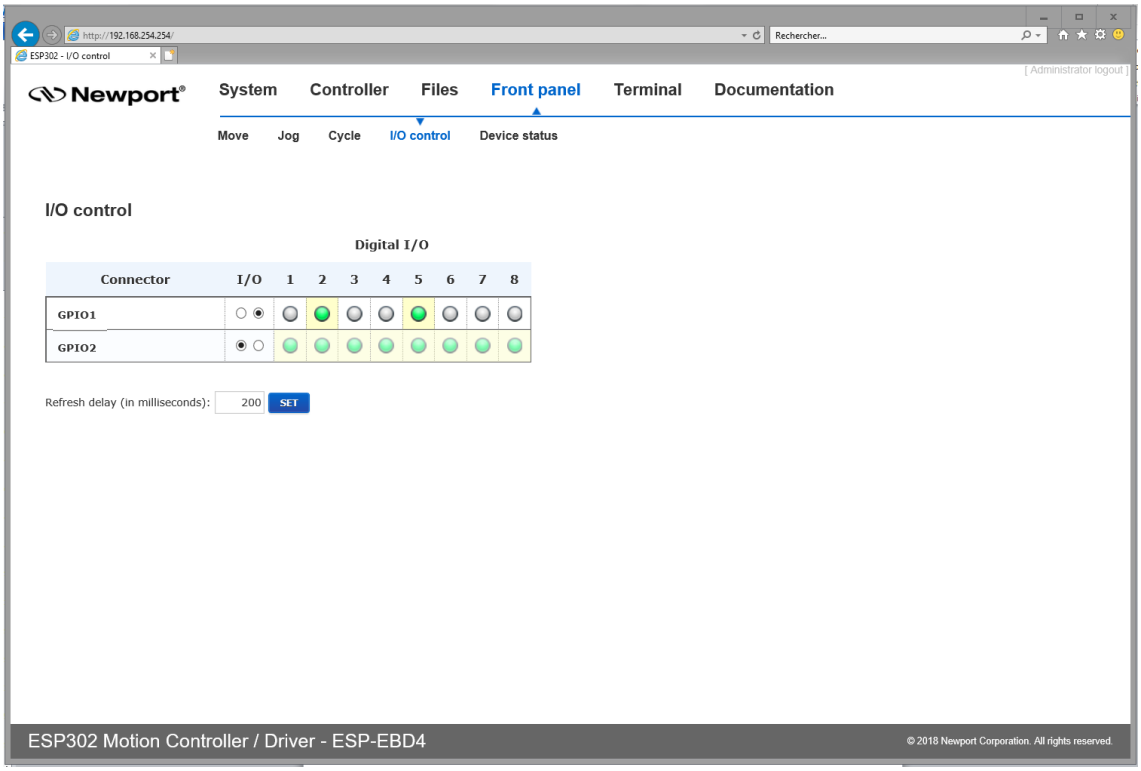
- Enter Position 1, Position 2 and Dwell time (time the stage remains in each position).
- Click on one of the arrows to start cycling.
- Click on “STOP” to stop motion.
- Move parameters can be modified, even during cycling, with the “VIEW/SET” button.

3.10 Front Panel – I/O Control

This page allows controlling and monitoring the 16 digital I/Os (2 groups of 8).

- Tick GPIO1 or GPIO2 "O" button if you want to set the group in output mode instead of input ("I").
- When set as output, each bit can be set to "1" (green) or reset to "0" (white).
- When set as input, each bit state is displayed ("1": green, "0": white).

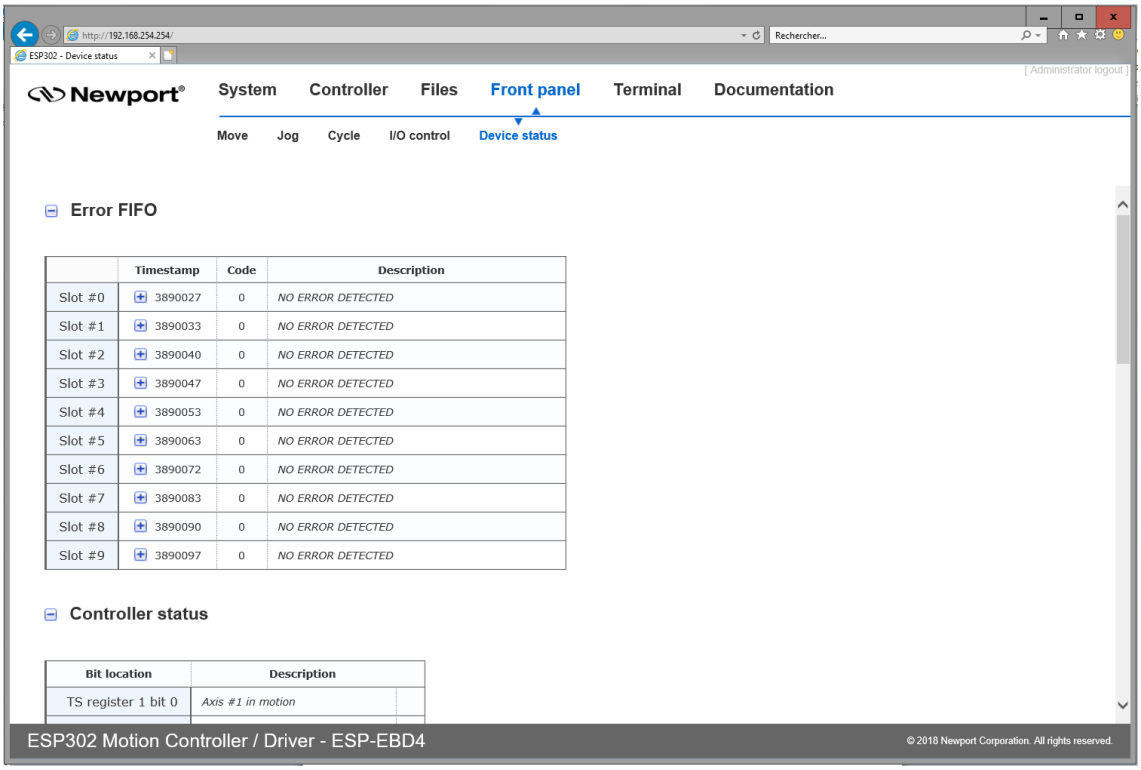
Note that open inputs are reporting level "1" by default.



3.11 Front Panel – Device Status

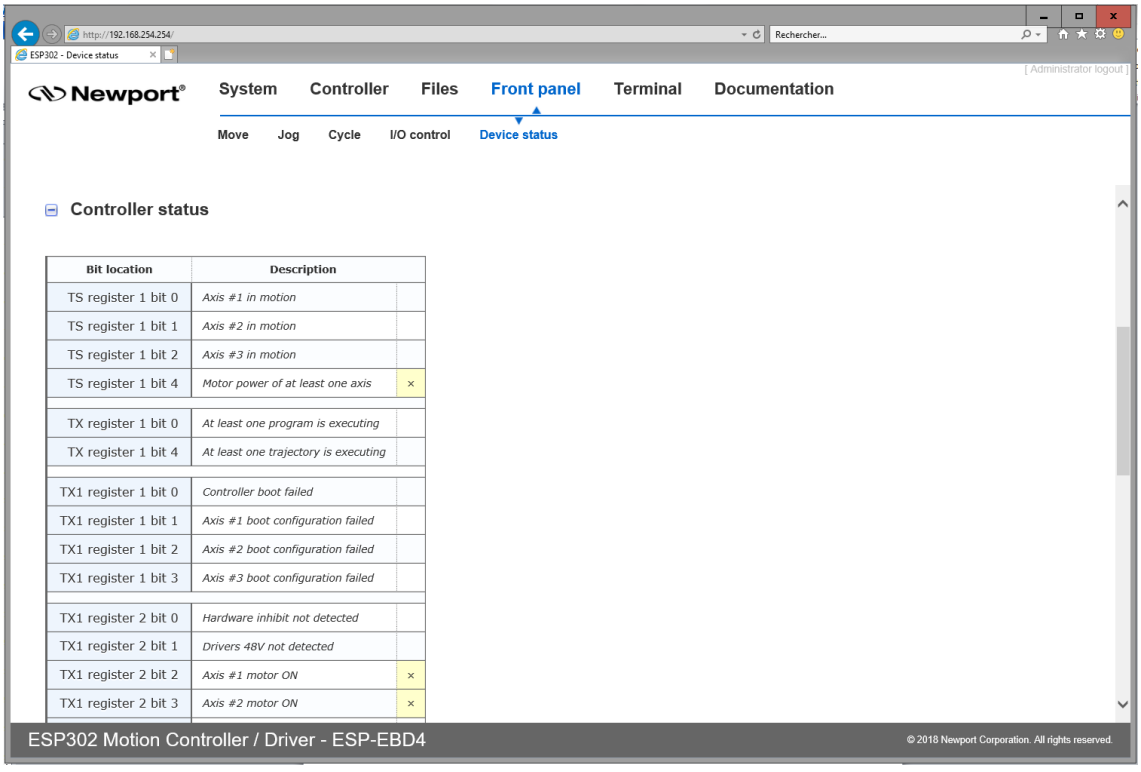
3.11.1 Device Status – Error FIFO

The Error FIFO section is an important page for trouble-shooting. When encountering any problem during the use of the system, information about the errors related to the commands are found in this page.



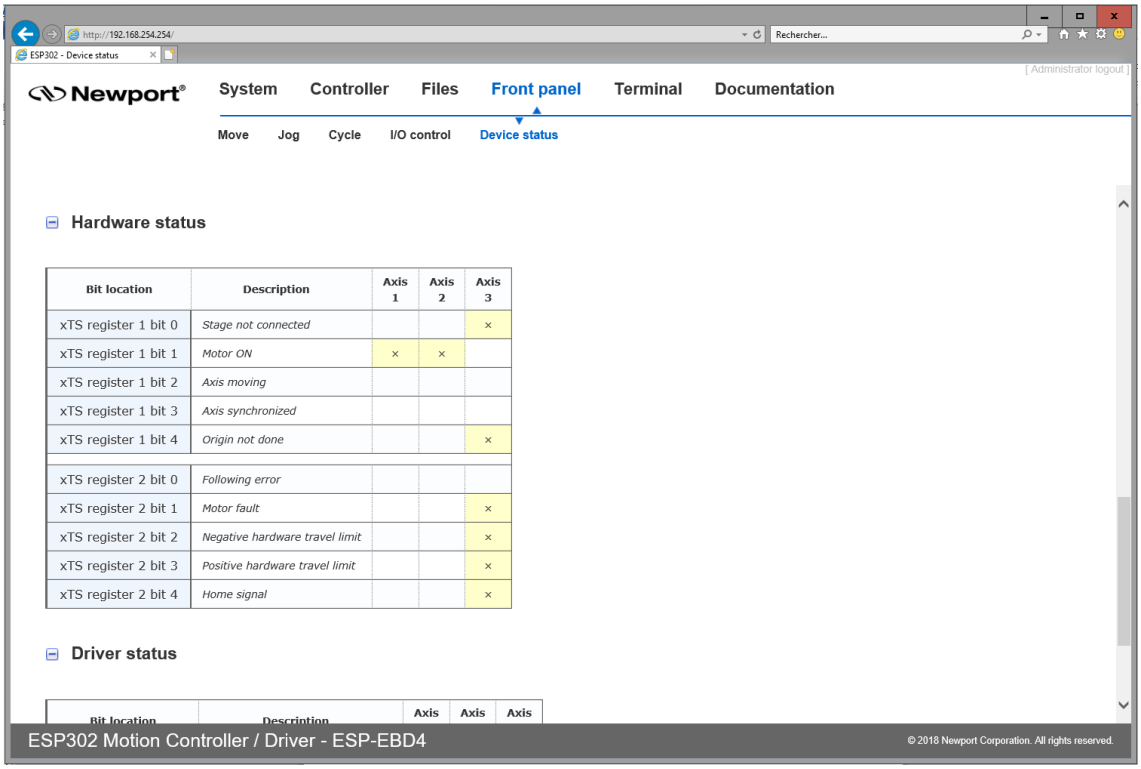
3.11.2 Device Status – Controller Status

The Controller Status section reports different information about axes or controller.



3.11.3 Device Status – Hardware Status

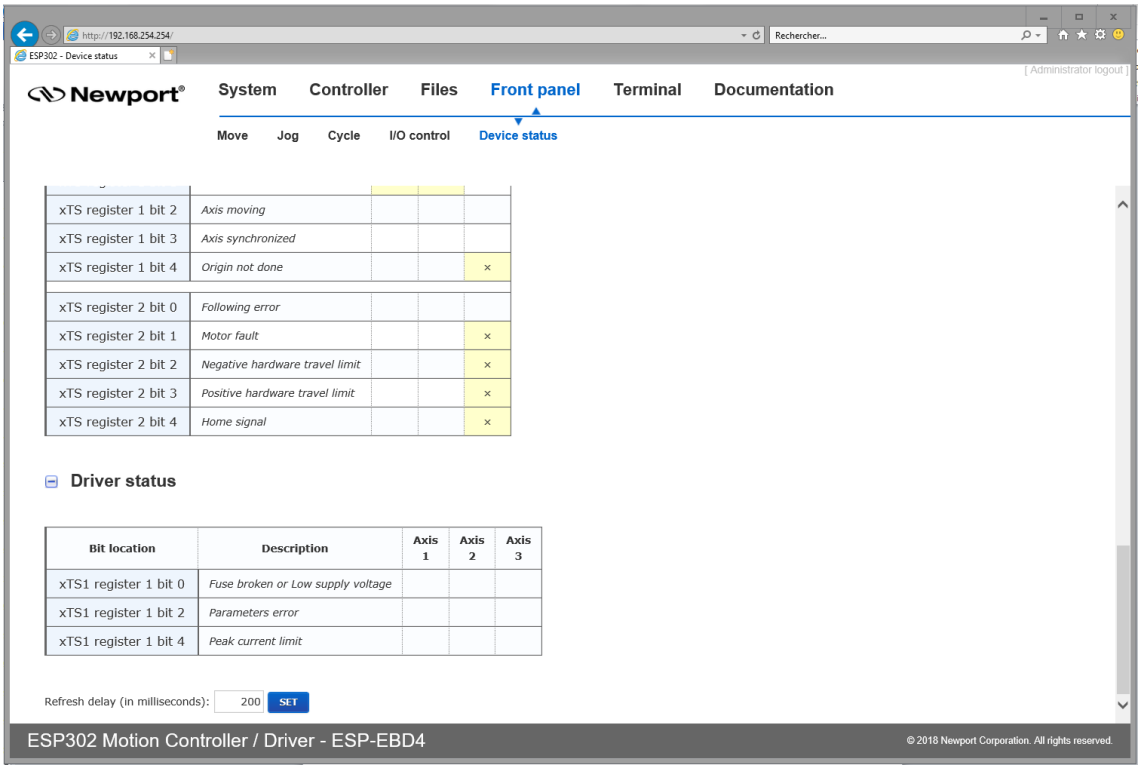
The Hardware Status section is another important page for trouble-shooting, but not all information is related to an error.



Bit location	Description	Axis 1	Axis 2	Axis 3
xTS register 1 bit 0	*Stage not connected*			×
xTS register 1 bit 1	*Motor ON*	×	×	
xTS register 1 bit 2	*Axis moving*			
xTS register 1 bit 3	*Axis synchronized*			
xTS register 1 bit 4	*Origin not done*			×
xTS register 2 bit 0	*Following error*			
xTS register 2 bit 1	*Motor fault*			×
xTS register 2 bit 2	*Negative hardware travel limit*			×
xTS register 2 bit 3	*Positive hardware travel limit*			×
xTS register 2 bit 4	*Home signal*			×

3.11.4 Device Status – Driver Status

The Driver Status section reports some potential driver defaults.



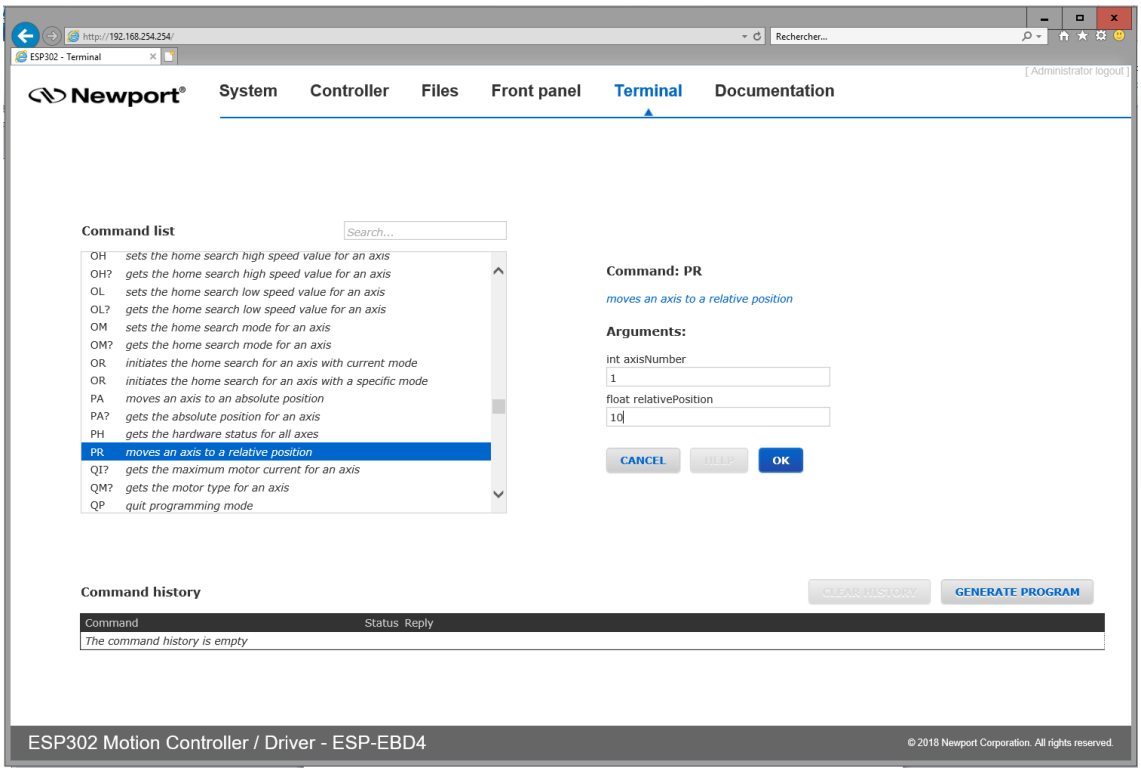
Bit location	Description	Axis 1	Axis 2	Axis 3
xTS1 register 1 bit 0	*Fuse broken or Low supply voltage*			
xTS1 register 1 bit 2	*Parameters error*			
xTS1 register 1 bit 4	*Peak current limit*			

3.12 Terminal

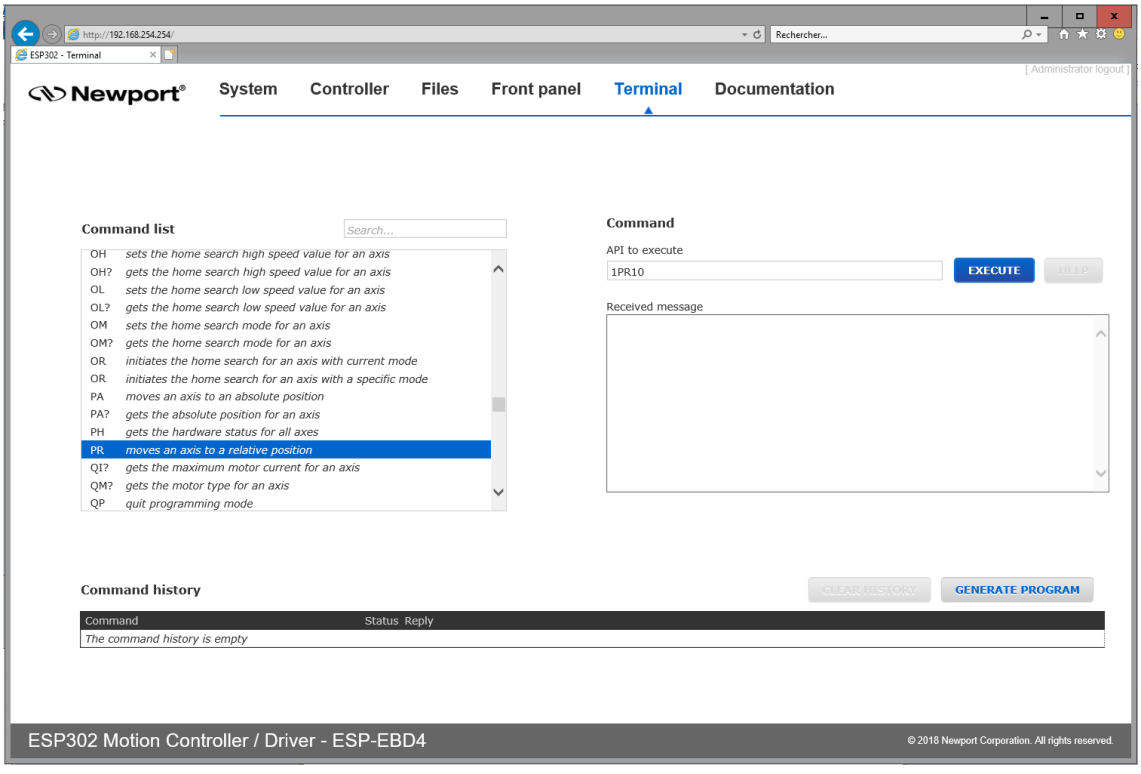
The Terminal screen allows the execution of all ESP302 controller commands. Refer to ESP302 Programmer's manual for command descriptions.

To execute a command from the Terminal, do the following:

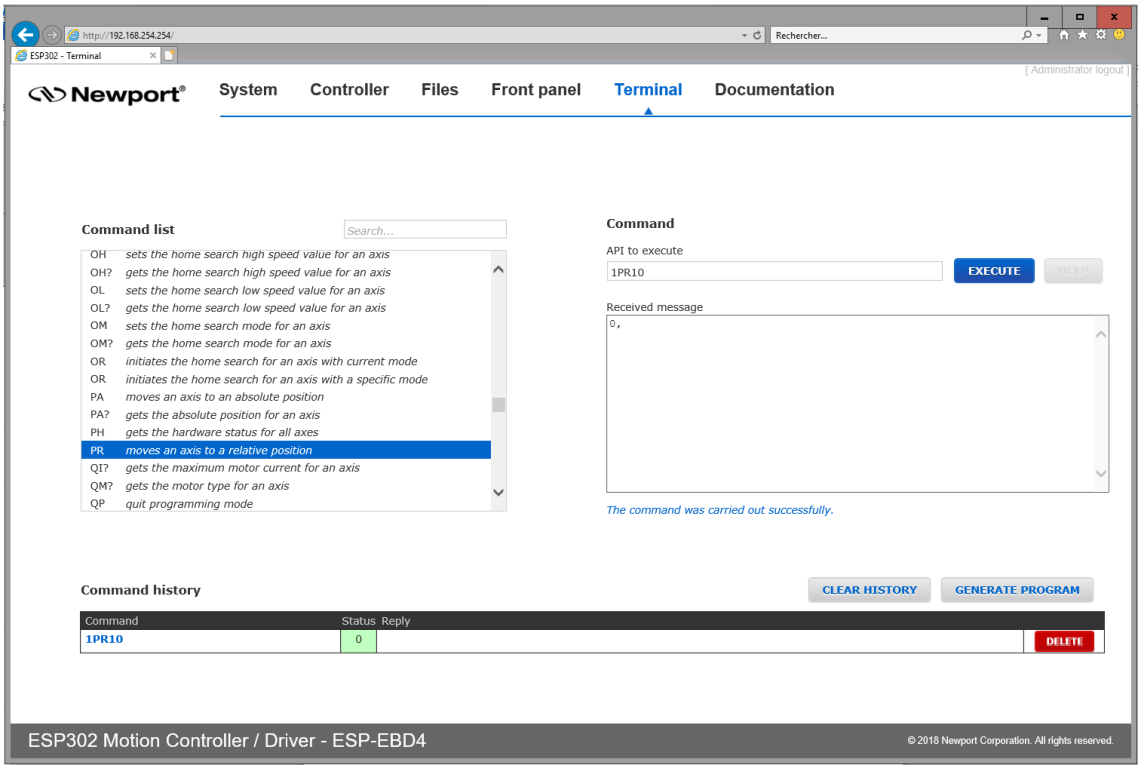
- Click to select a function, which then appears in the "Command" area.
- Define the arguments for the function.



- When all arguments are defined, click “OK”. Now review the final syntax of the function and make final text changes, as needed. When done, click “Execute”.



- When the function is executed, the controller's response code will appear in the "Received message" window and a description will appear beneath. If the command was carried out successfully, 0 is returned. In all other cases, there will be an error code. The error code description is also provided.



The functions are listed in alphabetical order and can be searched for using the search bar at the top of the Function list.

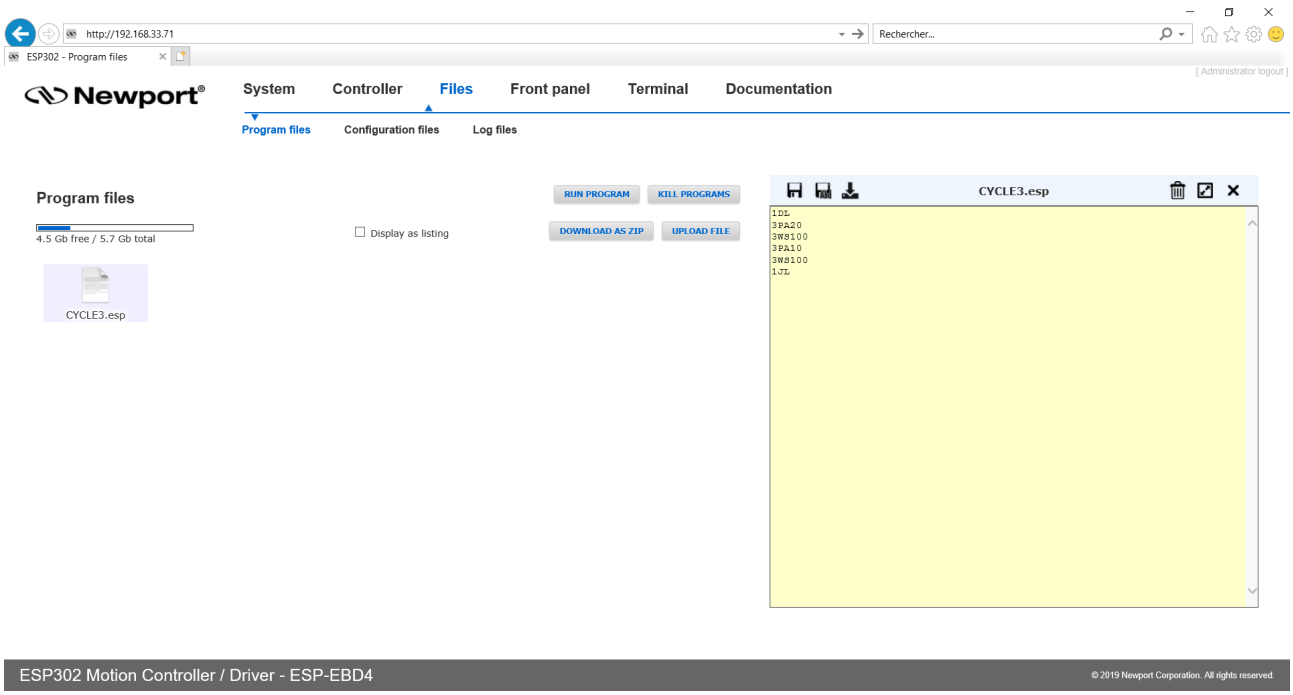
All the executed commands are listed in the "Command history" list.

- Click "DELETE" on the line you wish to remove.
- Click on "GENERATE PROGRAM" to save a program containing the commands of the history list in the controller.
- Click "CLEAR HISTORY" to reset the list.

3.13 Files – Program files

The Program files section allows programs management in the controller.

- Click on a program file to open the file in the text editor. In the text editor the user can edit, save, save as, view, delete the program file or download again the original file.
- Click on "RUN PROGRAM" to execute. Several programs can be selected and executed simultaneously.
- Click on "KILL PROGRAMS" to stop all programs execution.
- Use "DOWLOAD AS ZIP" to copy all programs at once in a zip folder to the user's PC
- Use "UPLOAD FILE" to transfer a text file program from the user's PC to the controller.



3.14 Files – Configuration files

In this webpage Configuration files stored on the controller can be downloaded, uploaded, viewed, edited or deleted. Note: Users must be logged in with Administrator rights in order to access this webpage. **Only experimented users (or Newport support personnel) should be allowed to make changes in these files.**

Download/Edit/View/Delete

Click on the configuration name to open the file in the text editor. In the text editor the user can view, edit, save, save as or delete the configuration file (in the controller) and download it to the user's PC.

UPLOAD FILE

Click UPLOAD FILE to upload a configuration file from the user's PC to the controller. When uploading a file, take note of the file extension.

LOAD CONFIG

Click LOAD CONFIG to upload all configuration files as a zip file from the user's PC to the controller.

SAVE CONFIG

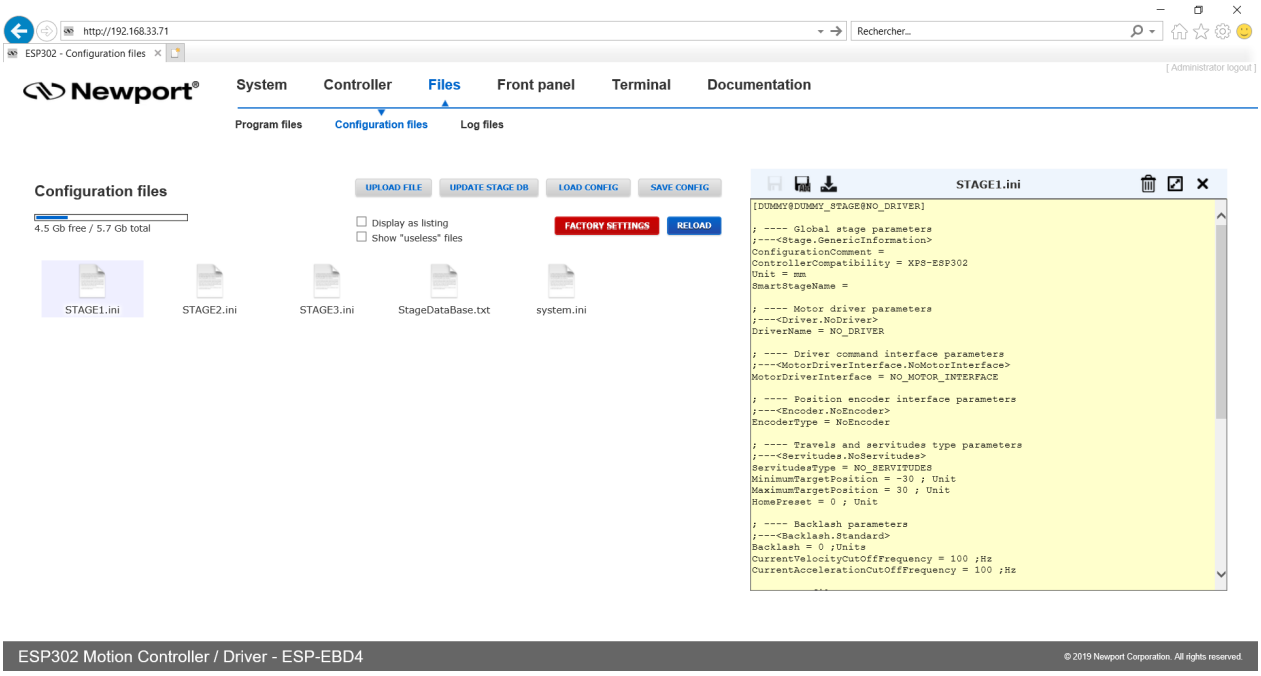
Click SAVE CONFIG to download all configuration files as a zip file from the controller to the user's PC.

UPDATE STAGE DB

Click UPDATE STAGE DB to upload a new StageDataBase.txt file from the user's PC to the controller.

RELOAD

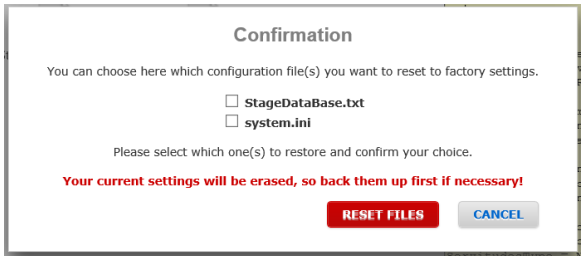
Click RELOAD to reboot or restart controller to apply configuration changes.



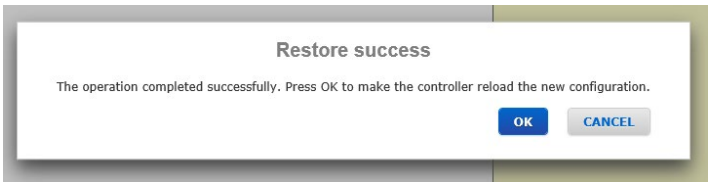
FACTORY SETTINGS

This button allows retrieving all the original configuration files.

After pressing this button, the following window appears. Tick the files you want to restore and click "RESET FILES".



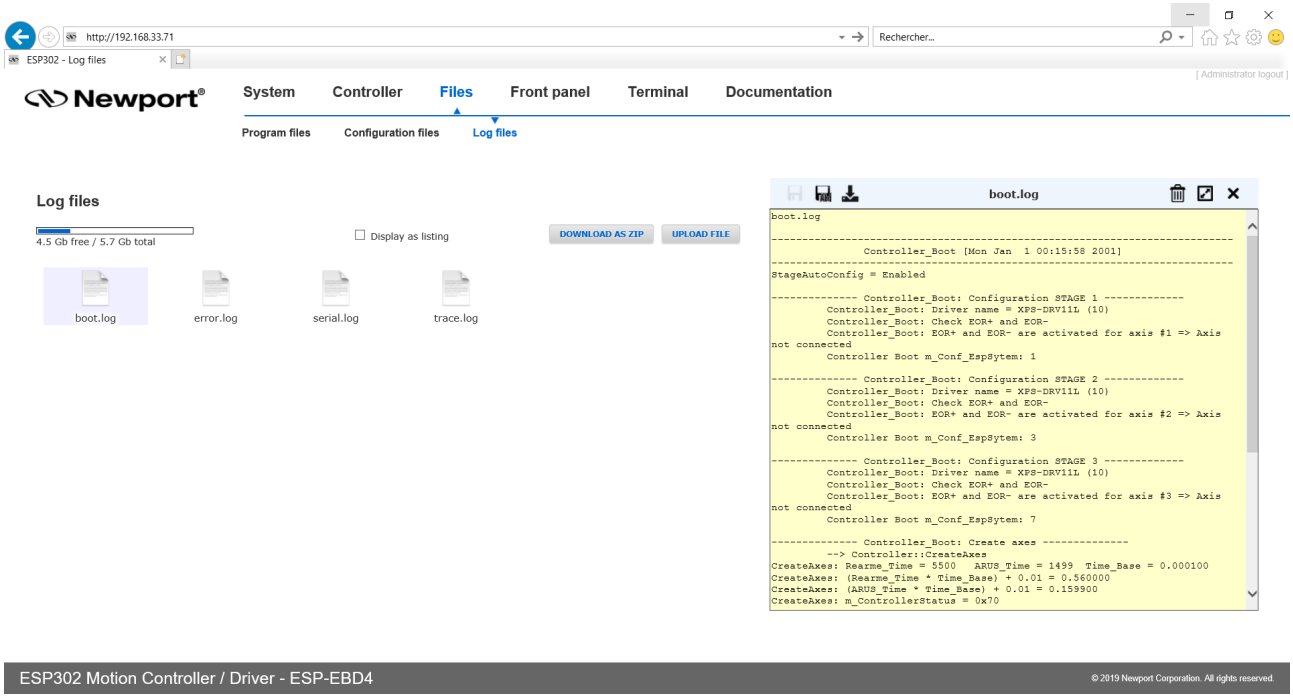
A message pops up to inform restore success. Click OK to restart the controller and reload the new configuration.



3.15 Files – Log Files

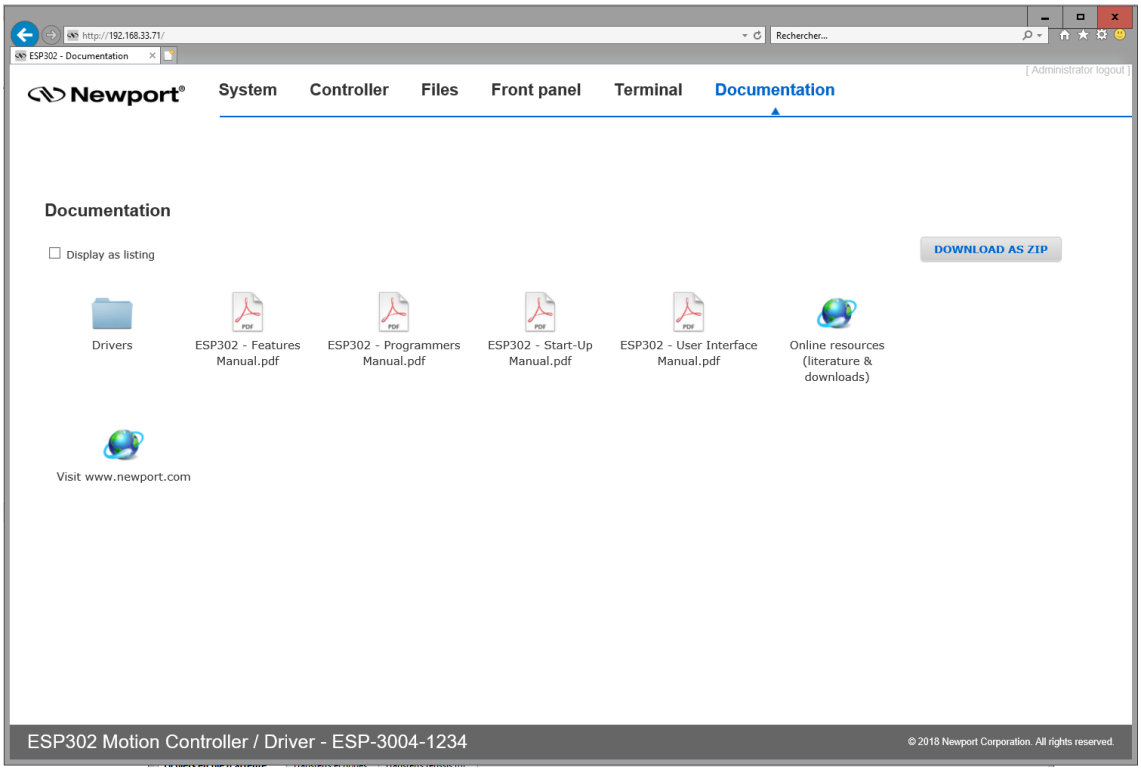
In this webpage log files stored on the ESP302 controller can be downloaded, uploaded, viewed, edited or deleted.

- Click on the log file name to open the file in the text editor. In the text editor the user can edit, save, save as, view, delete the log file or download again the original file.
- Click "UPLOAD FILE" to upload a log file from the user's PC to the ESP302 controller. When uploading a file, take note of the file extension.
- Click "DOWNLOAD AS ZIP" to download all log files at once in a zip folder to the user's PC.



3.16 Documentation

Under the webpage Documentation users can open and download ESP302 manuals, drivers and example code.



Service Form

Your Local Representative

Tel.: _____

Fax: _____

Name: _____

Company: _____

Address: _____

Country: _____

P.O. Number: _____

Item(s) Being Returned: _____

Model#: _____

Return authorization #: _____
(Please obtain prior to return of item)

Date: _____

Phone Number: _____

Fax Number: _____

Serial #: _____

Description: _____

Reasons of return of goods (please list any specific problems): _____

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