WEB CONTROLLER
FOR SOFTWARE VERSION 2.2
USER MANUAL

⚠
- Read this manual carefully before using the equipment.
- Familiarize yourself with all safety precautions before using the equipment.
- Keep this manual handy for future reference.

ESPEC NORTH AMERICA, INC.

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1.0 Introduction

This document describes the various features of Espec North America's web controller version 2.

1.1 User Accounts

The web controller supports various user access types. These types and the pages they may access are listed in the following table. The 'Guest' account type is used when the user is not logged into the web controller.

User Account Access Table.						
Account Type	**Pages**					
	Home	**Monitor**	**Constant Setup**	**Program Setup**	**Run/Stop**	**Setup**
Guest	Yes	Yes	No	No	No	No
User	Yes	Yes	Yes	No	Yes	No
Technician	Yes	Yes	Yes	Yes	Yes	No
Administrator	Yes	Yes	Yes	Yes	Yes	Yes

The Server comes configured with an Administrator account: username: 'admin', password: 'admin'.

1.2 Requirements

Browser Compatibility:

- Internet Explorer: version 9+
- Google Chrome
- Mozilla Firefox
- Apple's Safari
- Opera

Site requirements:

- IPv6 is not supported at this time.
- DHCP is used by default; if no DHCP server is reachable a static IP address of 192.168.0.83 will be used. A static IP address may also be used if DHCP is not desirable, this is configured on the setup screen.

1.3 Terminology

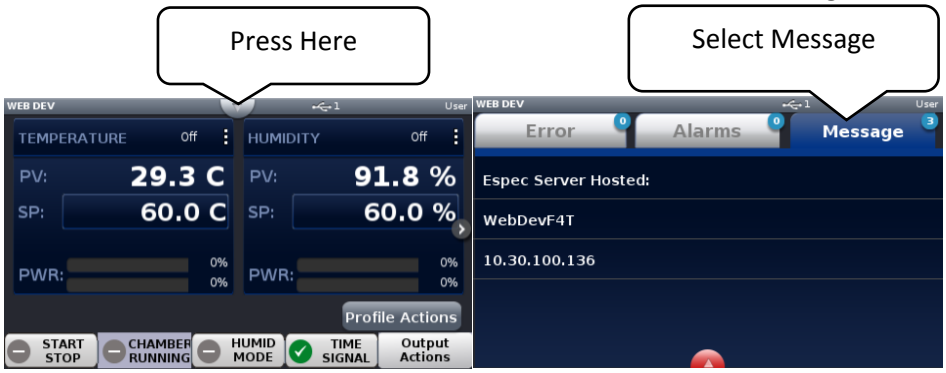
Since this web controller is intended for use with several different process controllers this section covers the various terminology used on the web controller and the corresponding terminology of the supported controller(s).

Web Controller	**P300 SCP-220**	**Watlow F4T**	**Description**
Program	Program	Profile	A series of set points for the chamber to run.
Time Signal	Time Signal	Profile Event	A signal that can be used to turn features on or off manually or at a programmed time.
		Event Output	

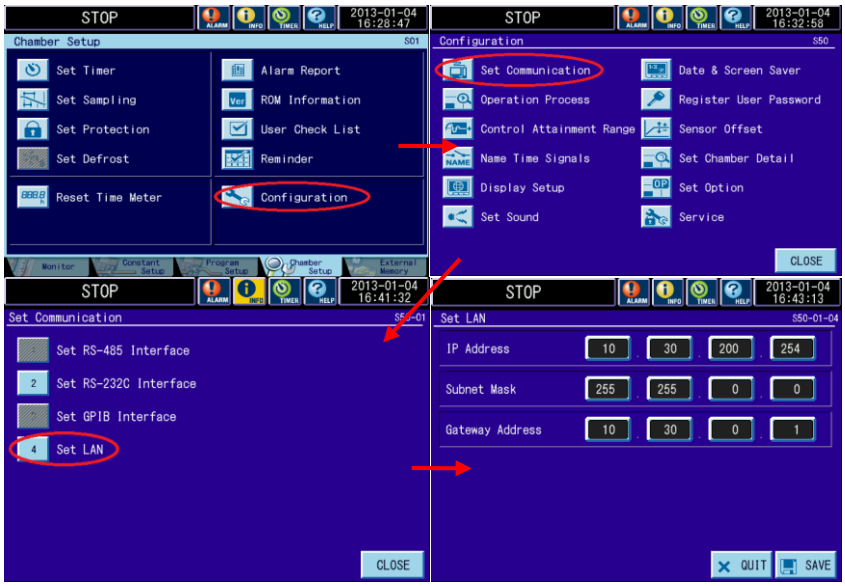
2.0 Accessing the Web Controller

There are two ways to access the web controller.

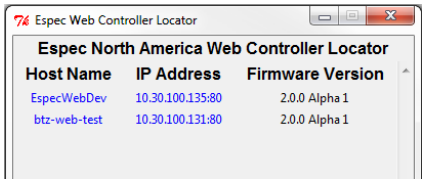
1. Directly via the IP address http://ipaddress/ , the IP address can be found two different ways:
    a. Each time the web controller boots up it will post the IP address to the chamber controller:
        i. On a Watlow F4T the IP address is shown on the 3rd line of the message screen:



        ii. On a P300 the IP address is shown (and settable) on the “Set Lan” Screen:



    b. The IP address can be found via the “Espec Web Controller Locator” utility included on the web controller and or chambers manual CD. The utility will scan look for web controllers version 2.0.0 and higher immediately after opening it, the IP Addresses are listed in the second column. Clicking on the IP address will open that controller via its IP address, the host name will be clickable if the computer can resolve it.



2. Additionally the web controller can be accessed via its hostname: http://HOSTNAME/ on windows, http://HOSTNAME.local on Apple devices, windows computers with Apple's bonjour, and Linux Computers. There are several ways to access the hostname:
    a. The default hostname that the chamber ships with is "espec-serial#" where "serial#" is the serial number of the chamber. If the web controller did not ship with the chamber then the hostname is "espec-default".

For the serial tag shown to the left the web controller would be accessible at: http://espec-06ic515/ on windows and http://espec-06ic515.local on apple devices or Linux computers.

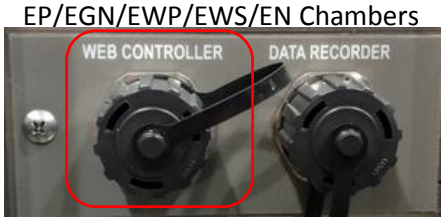
    b. The hostname can also be found on a chamber with a Watlow F4T in the same manner the IP address except the hostname is on line two not three (see 1.a.i of this section).
    c. The hostname can also be found using the "Espec Web Controller Locator" just like the IP address (see 1.b. of this section); the hostnames are listed in the first column.

3.0 First Time Use

Connecting to the device and configuring it for use on your network. The web controller is setup initially to use DHCP, however it will default to an IP address of 192.168.0.83 if a DHCP server is not found.

1. Ensure that the web controller is not powered up.
    a. When the web controller is installed inside a chambers electrical box, turn power off by the disconnecting means (unplug it or switch of the chambers main breaker).
    b. If the web controller is the external type then simply disconnect the power cord.
2. Connect the web controller to the network via a straight through Ethernet cable, or directly to a computer via a cross over Ethernet cable. Ensure that the correct Ethernet port is used:

EP/EGN/EWP/EWS/EN Chambers

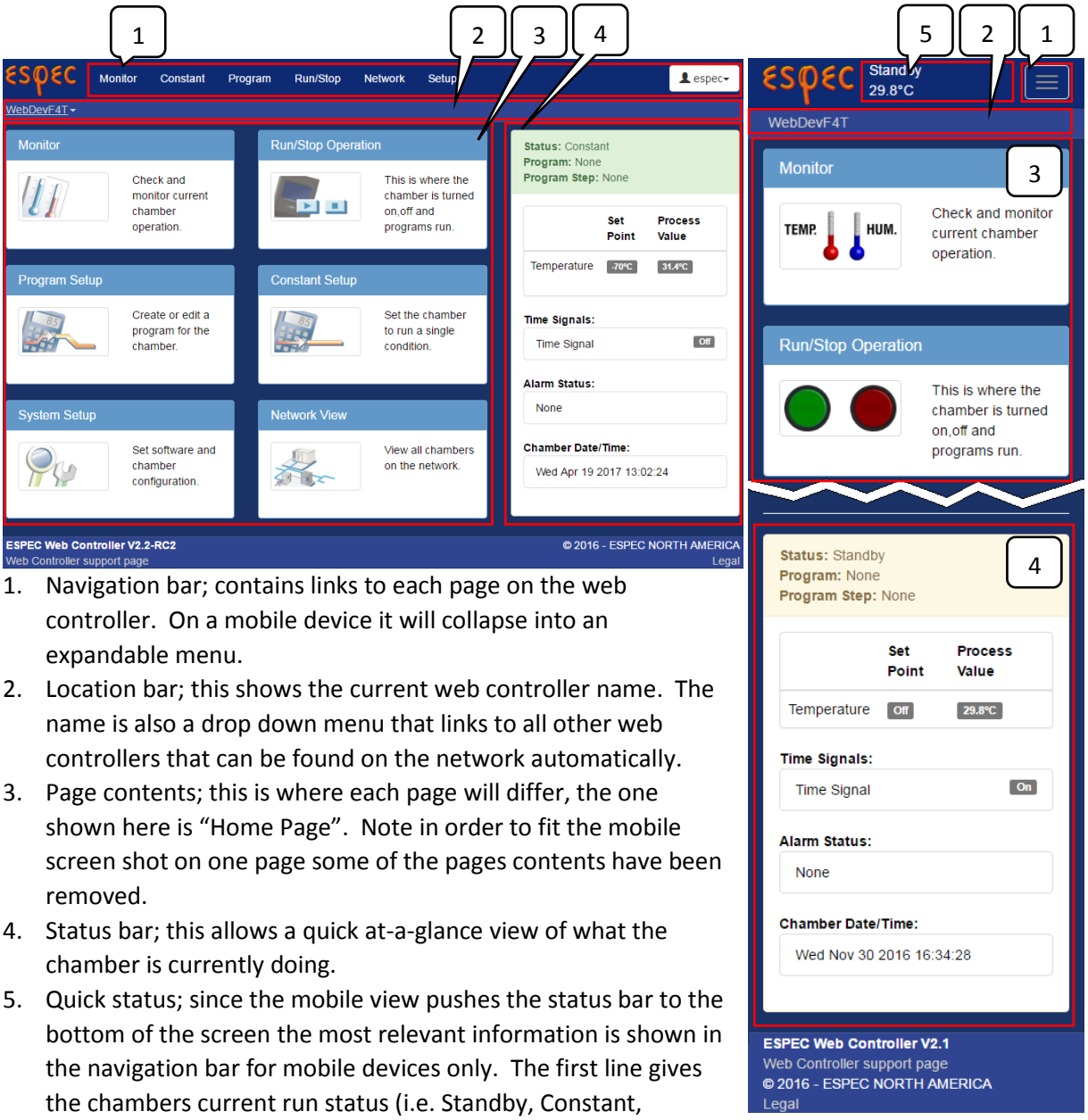


BT Chambers

3. Apply power to the web controller and chamber (if the web controller is installed into the chamber turning on the chamber's disconnect or plugging the power cord back in is sufficient).
4. Give the web controller (and chamber if applicable) time to boot up, five minutes should be sufficient.
5. Access the web controller's home page, which will redirect to the initial setup wizard when accessed the first time.
    a. Refer to section 2.0 of this manual for further details when connected to a network.
    b. If connected directly via a cross over cable the web controller interface is available at (no quotes): "http://192.168.0.83/".
6. The web controller will prompt for a username and password in order to run the setup wizard; use the following (no quotes):
   Username: "admin"
   Password: "admin"
7. Follow the directions given by the web controller.
    a. If the web controller was installed into the chamber at the factory the setup wizard will skip the first step for the controller.
    b. It is highly recommended that the "admin" accounts password is changed when prompted.
    c. The wizard can be exited at any time by pressing the "Exit Wizard" button located at the bottom of all pages. This is not recommended as all settings will need to be configured manually and a manual reboot may be required.
8. Once the setup is complete, and the web controller has finished rebooting the web controller is ready for use. If the IP address or hostname was changed during setup it may be required to navigate to the new hostname or IP address after the reboot.

4.0 Common Page Elements

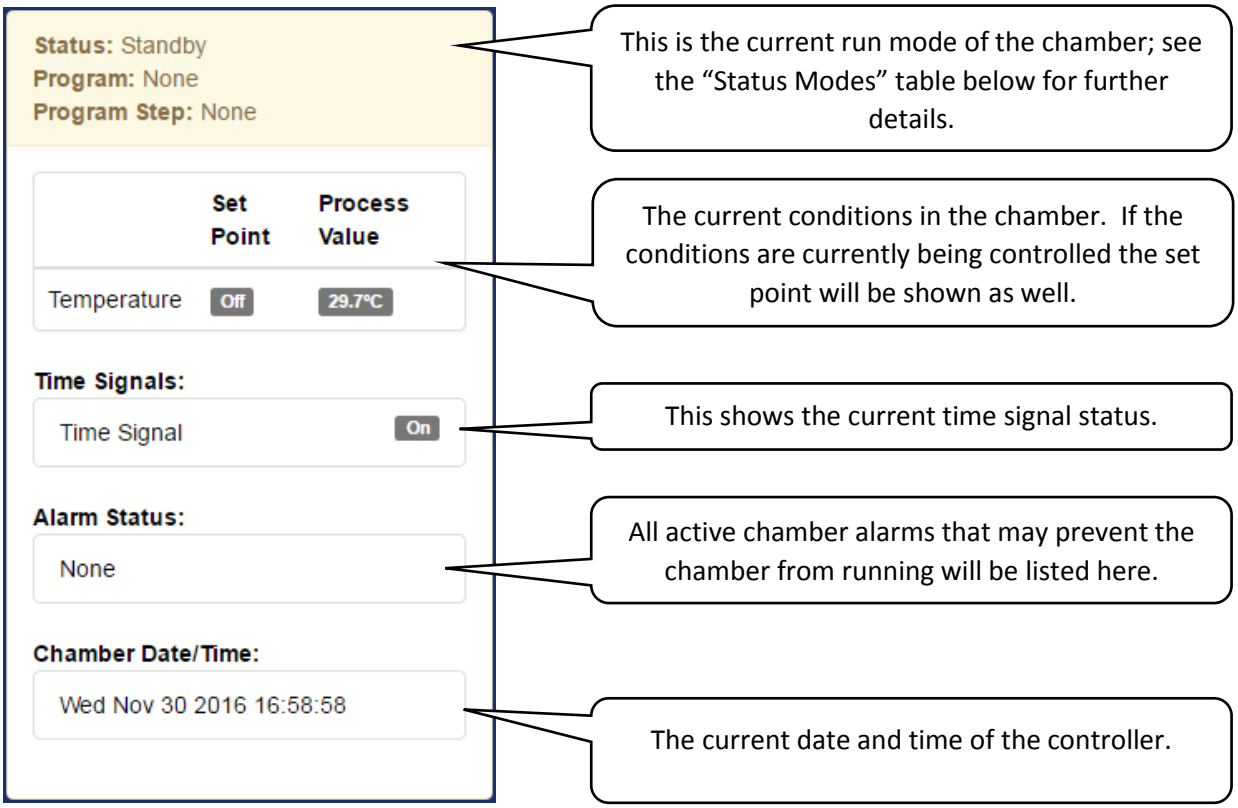
A Description of elements common to all pages for both desktop (left) and mobile (right) view.



1. Navigation bar; contains links to each page on the web controller. On a mobile device it will collapse into an expandable menu.
2. Location bar; this shows the current web controller name. The name is also a drop down menu that links to all other web controllers that can be found on the network automatically.
3. Page contents; this is where each page will differ, the one shown here is “Home Page”. Note in order to fit the mobile screen shot on one page some of the pages contents have been removed.
4. Status bar; this allows a quick at-a-glance view of what the chamber is currently doing.
5. Quick status; since the mobile view pushes the status bar to the bottom of the screen the most relevant information is shown in the navigation bar for mobile devices only. The first line gives the chambers current run status (i.e. Standby, Constant, Program, Alarm) and the second line the conditions inside the chamber i.e. temperature and humidity (if the chamber has humidity).

5.0 Status Bar

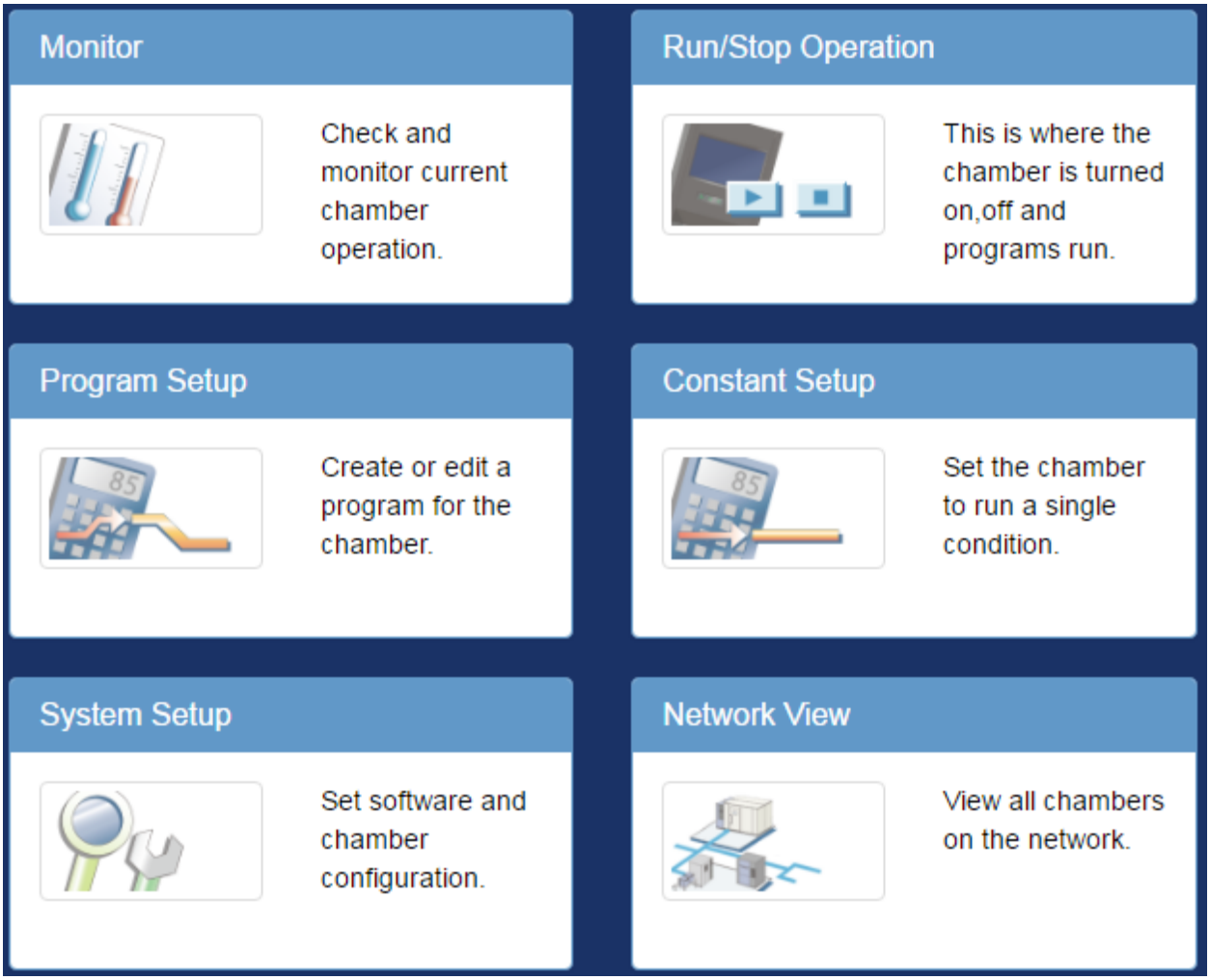
The status bar gives the chamber status at a glance. A brief description of each section of the side bar is shown here:



Status Modes	
Status	**Description**
Status: Standby **Program:** NONE **Program Step:** NONE	The chamber is currently not running.
Status: Constant **Program:** NONE **Program Step:** NONE	The chamber is currently running a constant set point.
Status: Program Running **Program:** Humidity **Program Step:** 1	The chamber is currently running a program. The current program is shown, clicking on it will open it in for editing. The current program step is shown.
Status: Alarm **Program:** NONE **Program Step:** NONE	The chamber is currently alarmed, this state must be cleared before operation may resume.

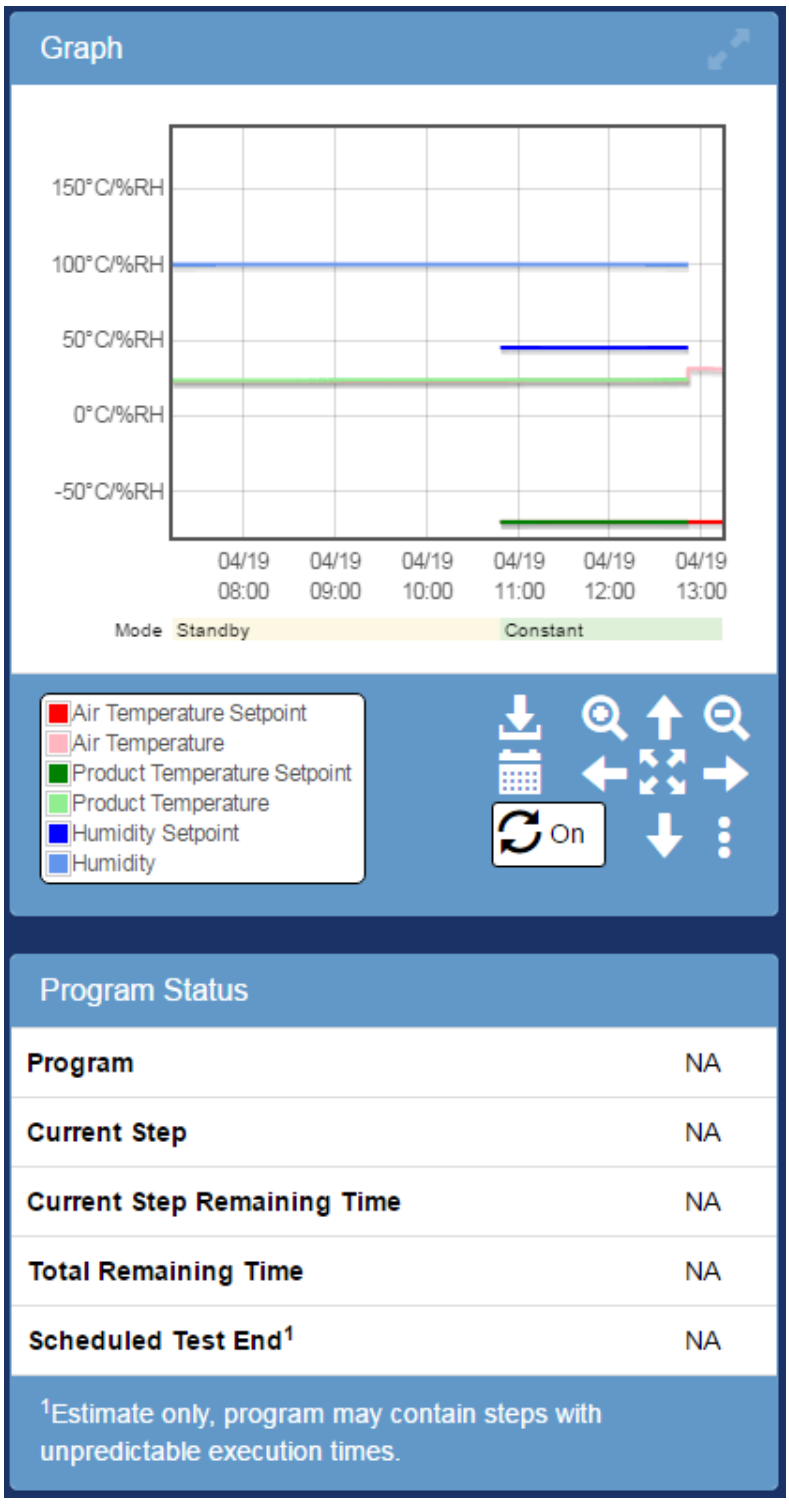
6.0 Home Page

This page provides shortcuts to all other pages that contain the actual functionality. Any user type, as well as guests may access this page.



7.0 Monitor Page

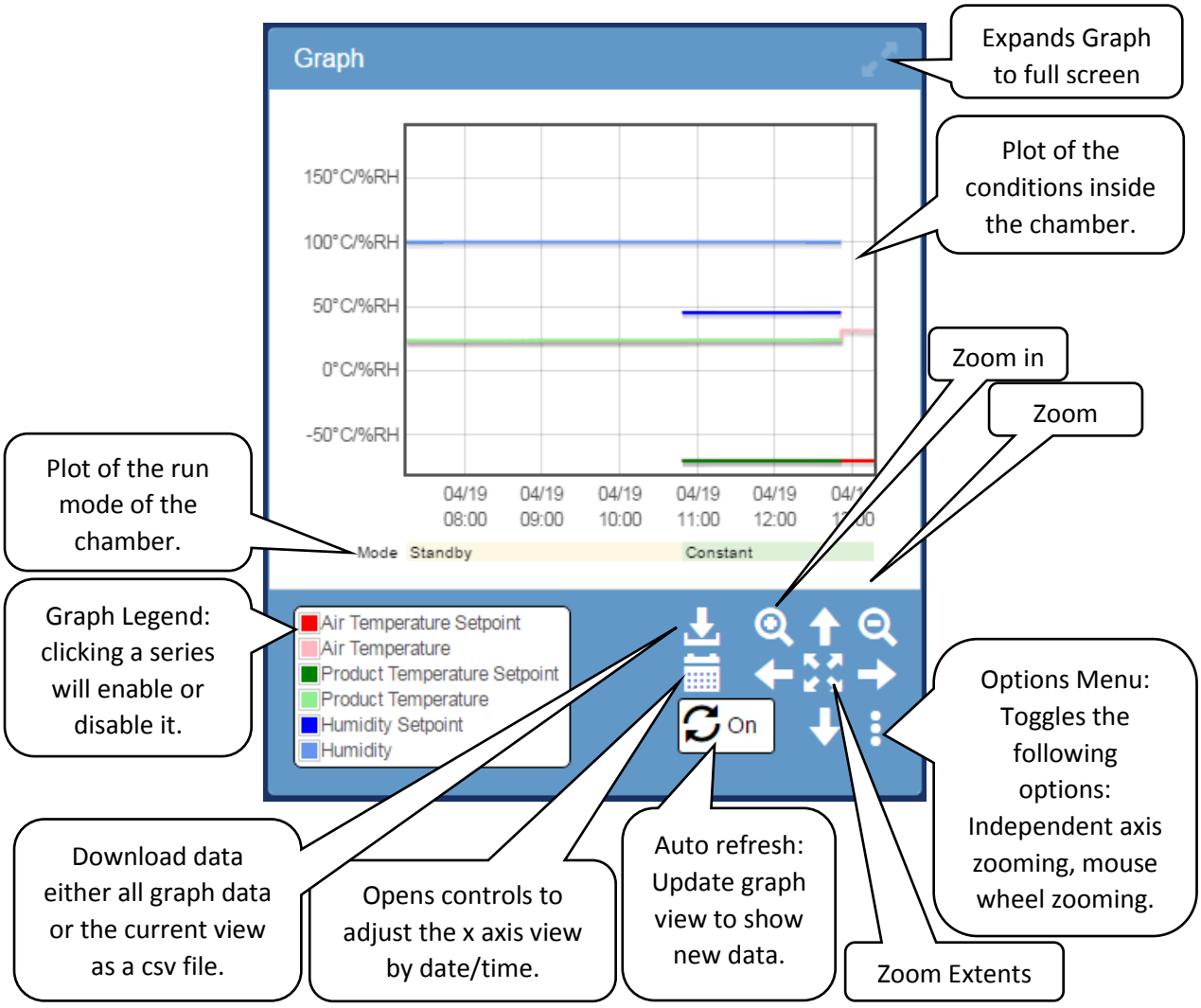
The Monitor page contains two sections of information about the chamber. The top section is a trend graph of the conditions inside chamber and its control mode. The bottom section details the currently running program when the chamber is program mode. Any user type may access this page.



7.1 Graph

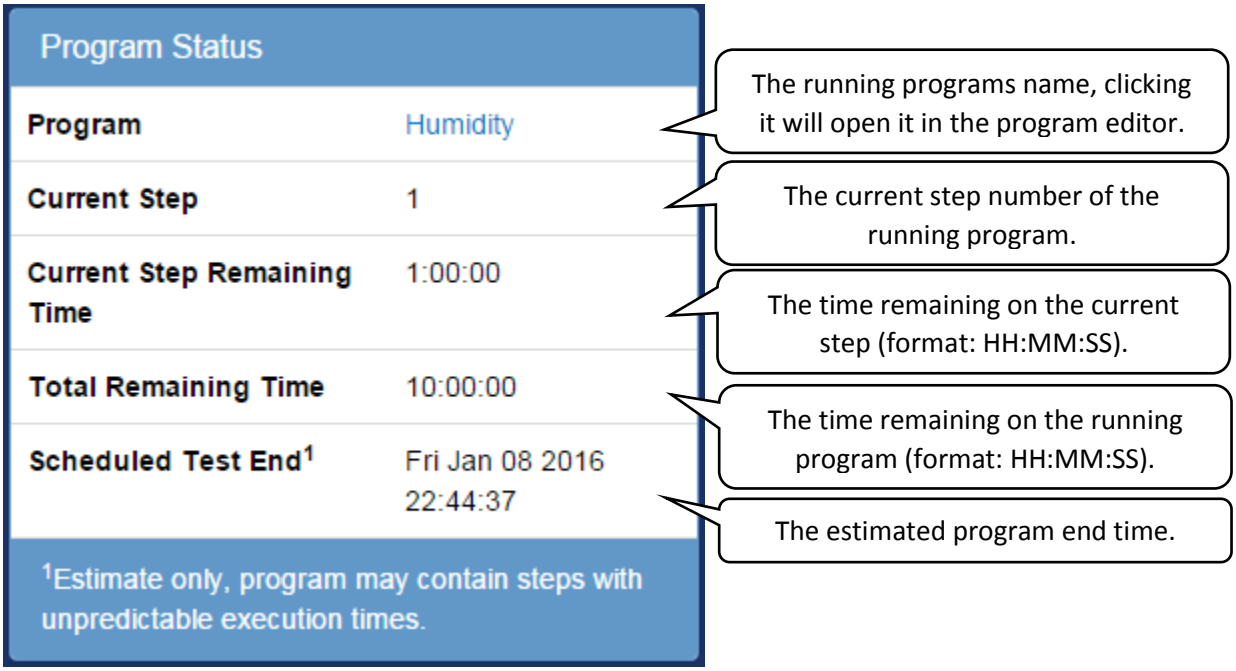
The trend graph has two sets of controls; buttons shown on in the graph panel shown below, and controls that can be accessed when using a mouse:

- Left clicking will select the nearest point in time as well as show the value of each series at that time.
- Left clicking and dragging will zoom into the selected area.
- Clicking and dragging the mouse wheel will pan around the view around and load in data as required.
- Scrolling the mouse wheel up/down will zoom in/out centered at the cursor.



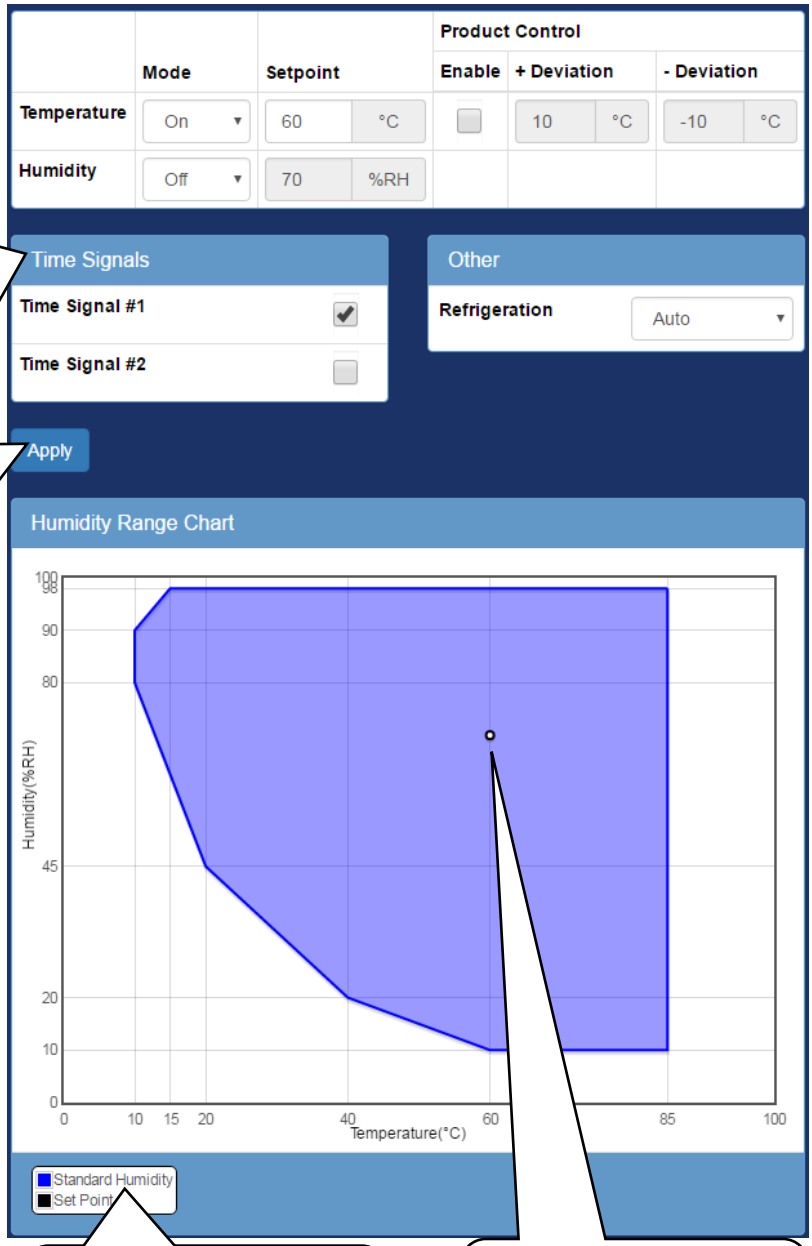
7.2 Program Status

The program status contains the details about the current program when the chamber is in program mode.



8.0 Constant Setup Page

This page allows setting of the constant set point and time signals, and refrigeration power (SCP-220/P300 only) for constant mode operation. To change the constant set point; enter the temperature, humidity (if equipped), product control settings (if equipped) and time signal settings then press “Apply”. Further details on each element and its functionality is shown below. Only users of type ‘User’, ’Technician’, or ‘Administrator’ may access this page.



On the Watlow F4T changing the time signals will effect a running program.

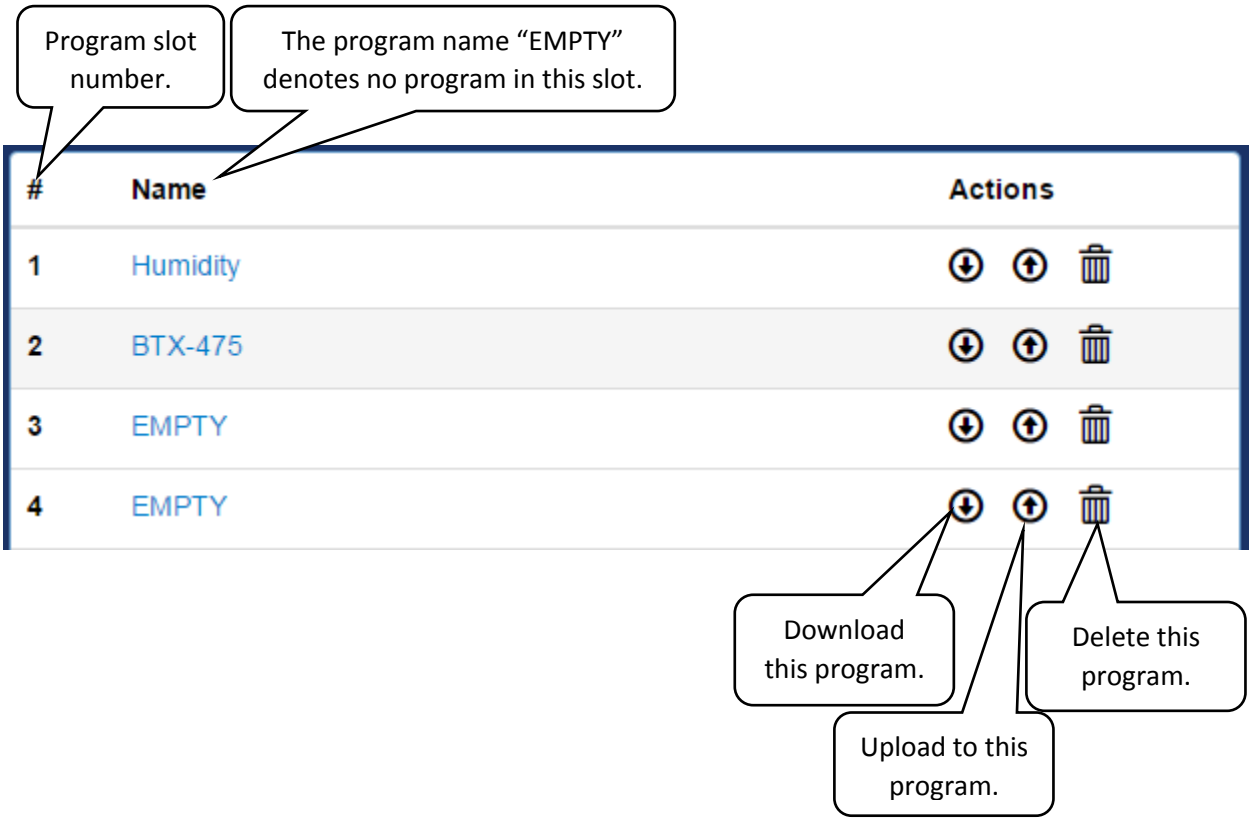
Send settings to the chamber controller.

Humidity Range Chart will only be visible on a chamber with humidity.

Constant point, only visible if Temperature is 0-100°C (32-212°F).

9.0 Program Setup Page

This page displays all programs currently on the chamber as well as all available slots shown as “EMPTY” (each chamber has 40 program slots). Each slot lists the program name which can be clicked to edit it; as well as controls to download, upload, or delete the program. Only users of type ’Technician’, or ‘Administrator’ may access this page.



10.0 Program Edit Page Watlow F4T

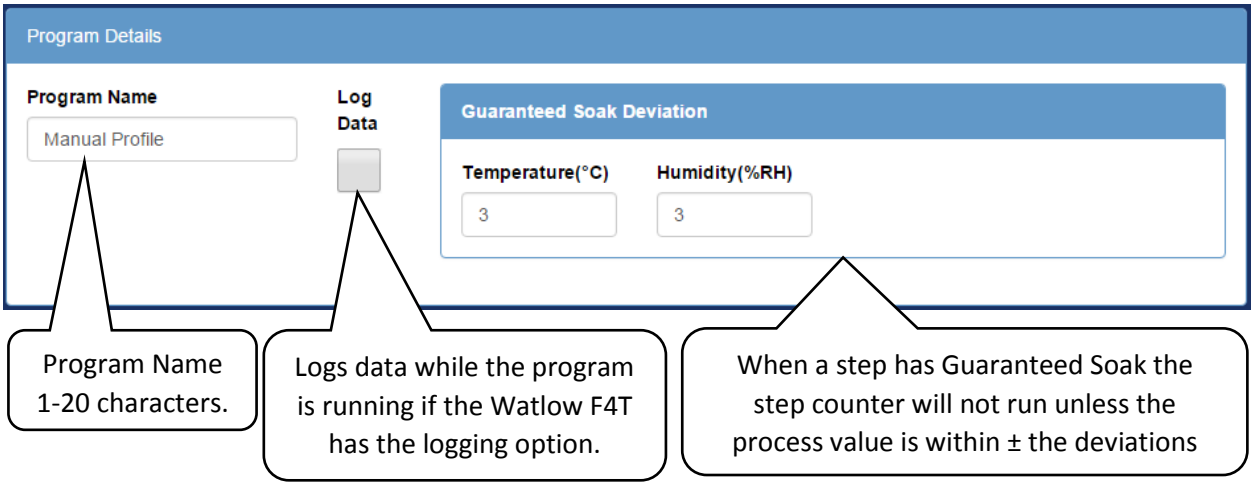
This page is where Watlow F4T programs can be viewed and edited. This page is only accessible if the web controller is configured for a Watlow F4T and for users of type 'Technician', or 'Administrator' may access this page.

To Edit the current program:

1. Enter the program name, guaranteed soak deviation, and data logging settings per section 10.1.
2. Fill in the each program step.
    a. Select a step mode (if an instant set point change is not desired).
    b. Enter step duration (not applicable for Jump, Ramp:Rate, or End mode steps).
    c. Enter the loop details, enabled guarentied soak, set point, etc.
    d. Enter the time signal settings.
3. Repeate 2 for each step
4. Once the program is compelete there are several options:
    a. Download: Download the program to the computer as a JSON file.
    b. Save To: Save the program to a slot any of the slots the chamber has.
    c. Save #(slot): Save the program to the active slot.

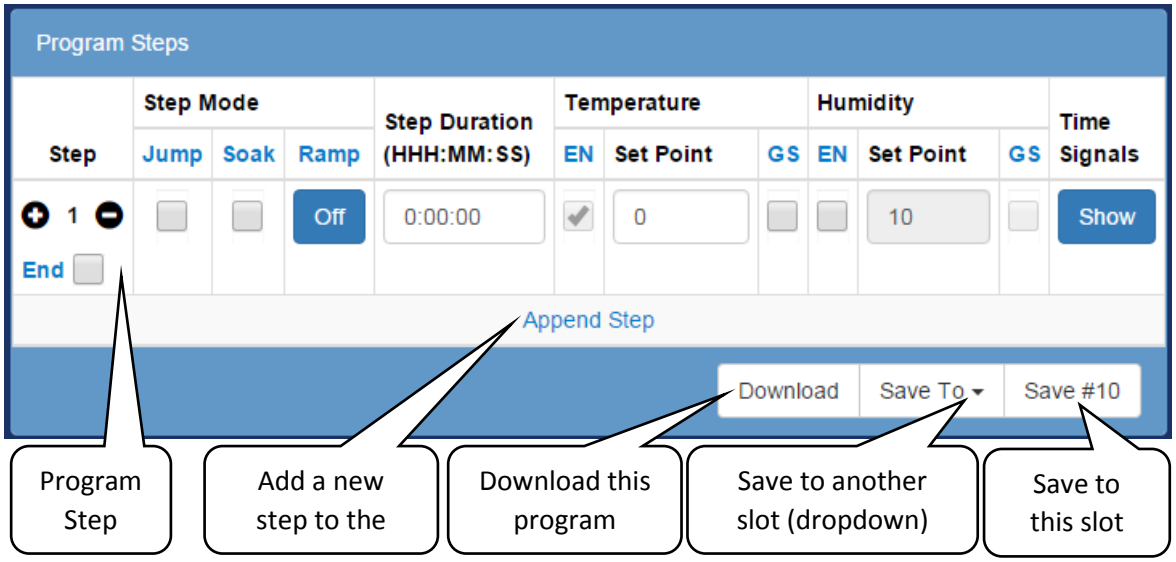
10.1 Program Details

Overall settings for the entire program are set in the first section; element details are shown below.



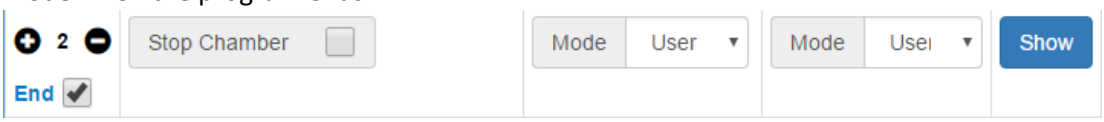
10.2 Program Steps

The program steps are edited in the second section; element details are shown below.



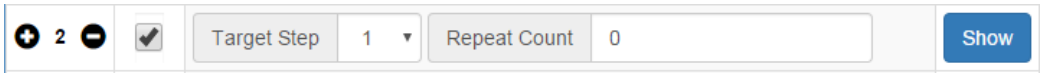
Column Description:

- **Step**: The rows step number in addition to buttons that will insert a step before the selected step (⊕), or delete the selected step (⊖). On the last step only the option to set the end conditions is available, selecting this will replace the standard parameters with the option to stop the chamber when the program ends as well as set each loops (Temperature/Humidity) mode when the program ends:



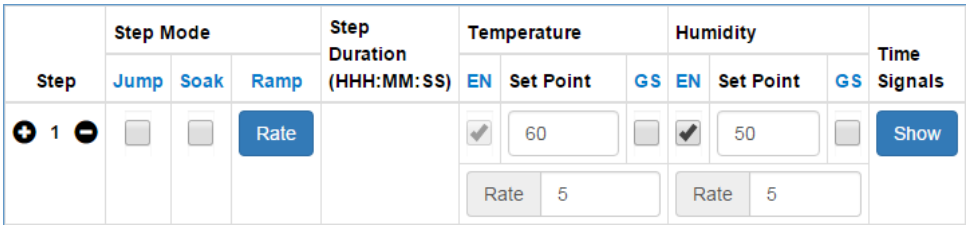
- **Step Mode**:

- **Jump**: Instead of changing the set point the program will jump to a specified step a specified number of times; selecting this will change the view as shown:



- **Soak**: Instead of changing the set point the program will maintain the previous set point for a specified "Step Duration"; selecting this will change the view as shown:

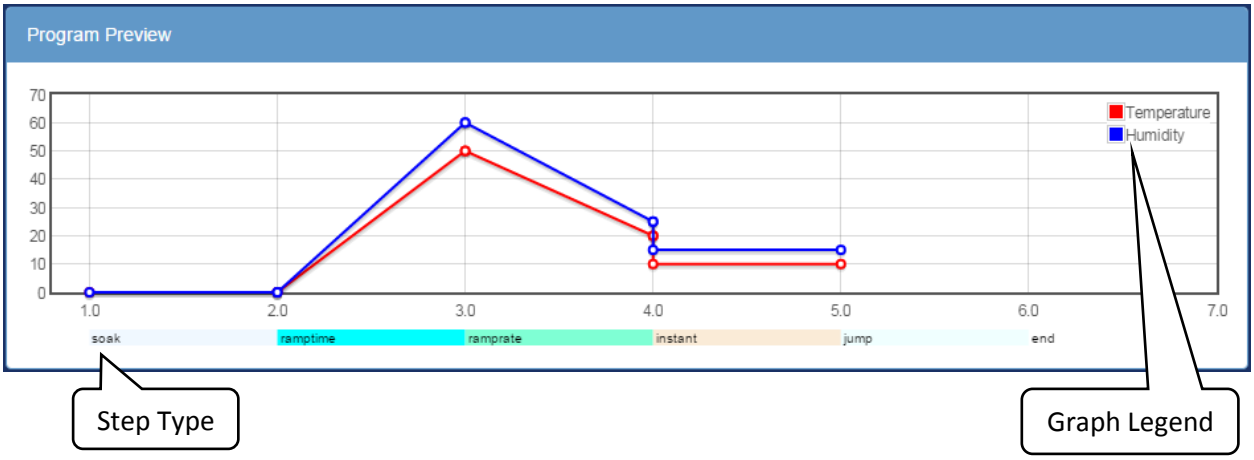
- **Ramp**:
  - Off: The set point will be changed instantly.
  - Time: The set point will be ramped to the new set point over the given duration.
  - Rate: The set point will be ramped at a given rate; selecting this will change the view as shown:



- **Step Duration**: The duration of the step in Hours: Minutes: seconds. If an entered time has greater than 60 seconds or minutes the time will be converted to the correct format ie: "90" becomes "0:01:30", and "90:00" becomes "1:30:00" etc.
- **Temperature, Humidity (or any control loop)**: This is a control loop, the following parameters can be set:
  - **EN**: Enable the loop for this step.
  - **Set Point**: The temperature/humidity to go to during this step.
  - **GS**: Enable Guaranteed soak for this step; this prevents the duration timer from counting down until the process value is within +/- the deviation set in the program details section.
  - **Rate**: This parameter is only visible if the step is set to have a Ramp:Rate; it specifies the rate at which the working set point will change in order to achieve the specified set point.
  - **Mode**: This parameter is only visible if the final steps end checkbox is selected; it specifies what each loop (Temperature, Humidity) will do when a program ends.
    - User: Run the constant set point.
    - Hold: Hold the last set point that the program was at.
    - Off: Disable the loop. This should not be used as the loop will need to be manually re-enabled.
- **Time Signals**: This button will show the settings for each available time signal.
  - NC: No change; do not change the state of this time signal.
  - On: Turn the time signal on.
  - Off: Turn the time signal off.

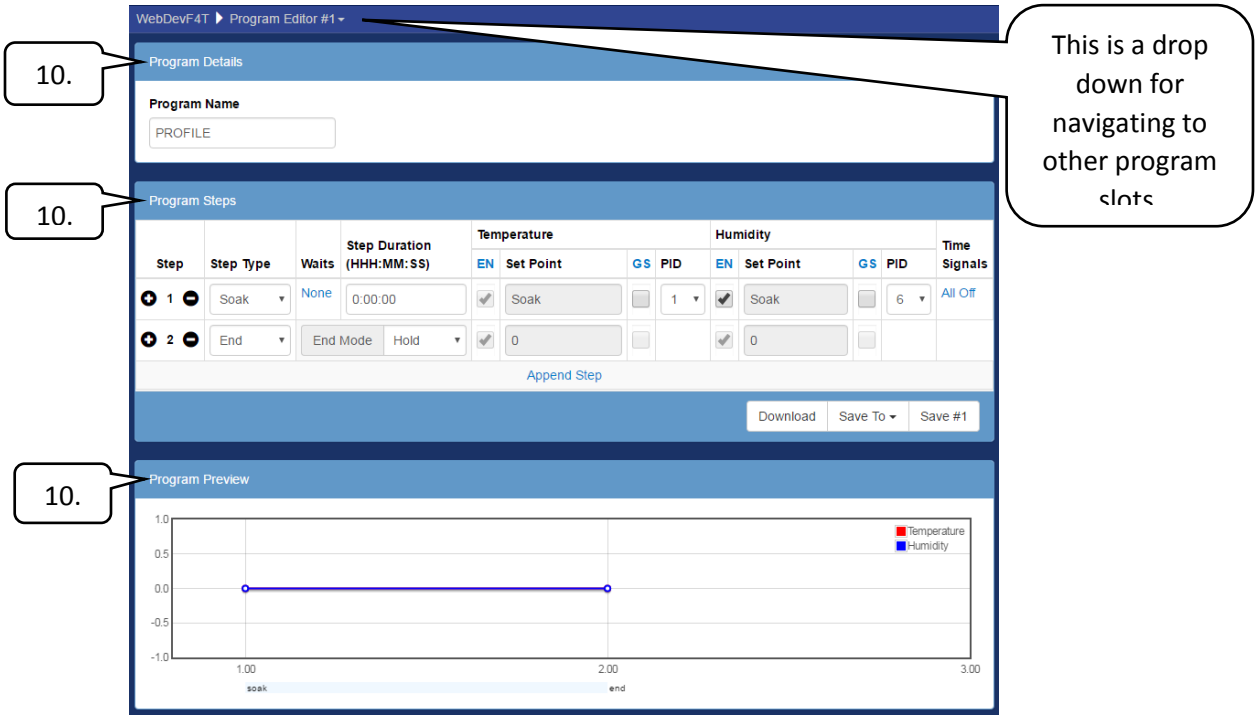
10.3 Program Preview

The current program is plotted at the bottom of the page. Note that the conditions prior to starting a program are assumed to be 0 degrees and 0%RH when rendering this graph.



11.0 Program Edit Page Watlow F4

This page is where Watlow F4 programs can be viewed and edited. This page is only accessible if the web controller is configured for a Watlow F4 and for users of type 'Technician', or 'Administrator' may access this page.

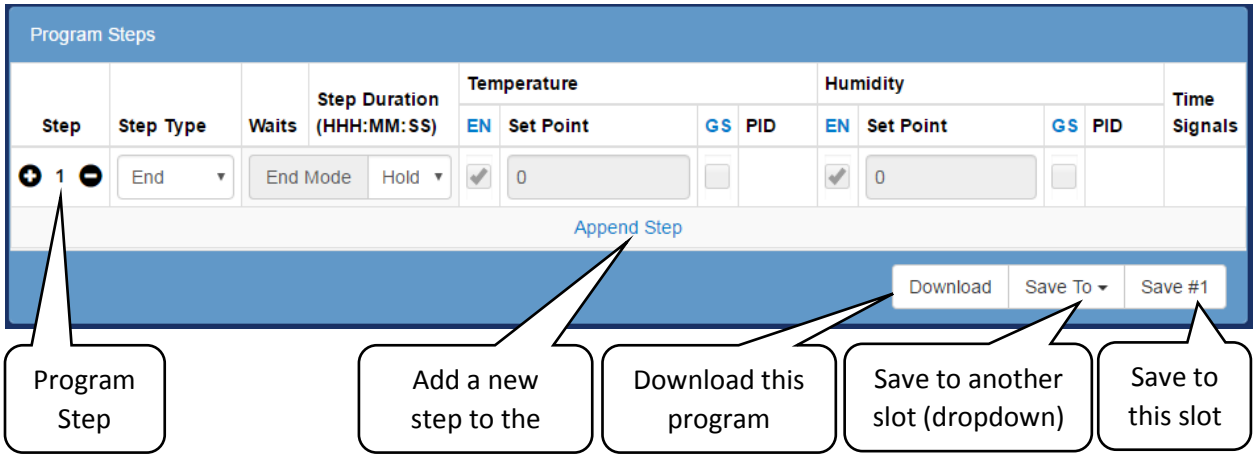


11.1 Program Details

This section is where the program name may be entered.

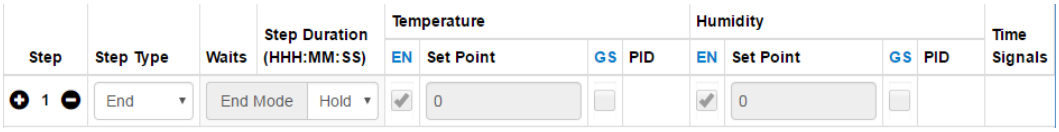
11.2 Porgram Steps

The program steps are edited in the second section; element details are shown below.

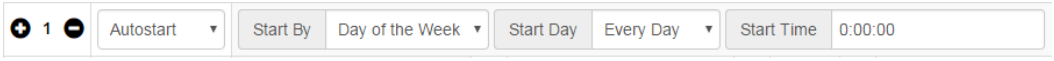


Column Descriptions

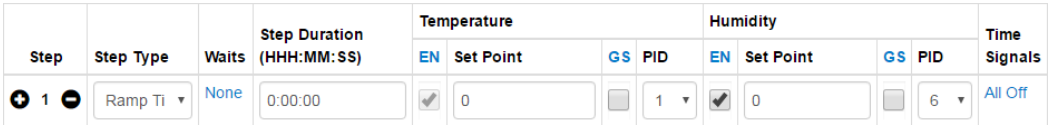
- **Step**: The rows step number in addition to buttons that will insert a step before the selected step (⊕), or delete the selected step (⊖).
- **Step Mode**:
  - **End**: All programs must have an end step, this tells the controller what to do when the program ends. There are four options.



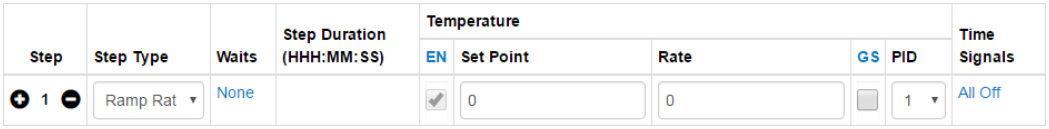
    - **Hold**: Continue to operate with the current control parameters.
    - **Control Off**: Disable the control loops.
    - **All Off**: Disable all outputs (control loops and time signals)
    - **Constant**: Run the constant control loop set points.
  - **Autostart**: Set this program to wait until a specified time to run.



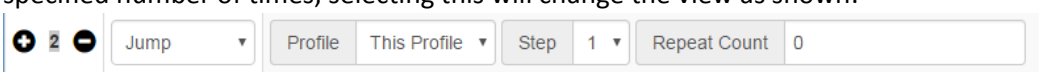
  - **Ramp Time**: Change the control loops set points gradually over a specified time interval.



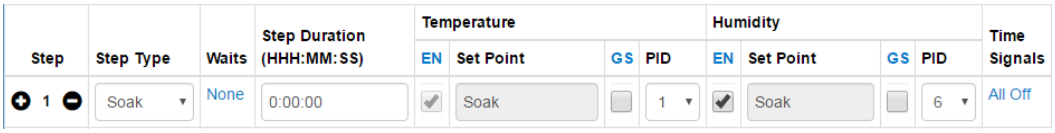
  - **Ramp Rate**: Change the control loop set point at a specified rate. This is only available with single loop controllers such as temperature only chambers.



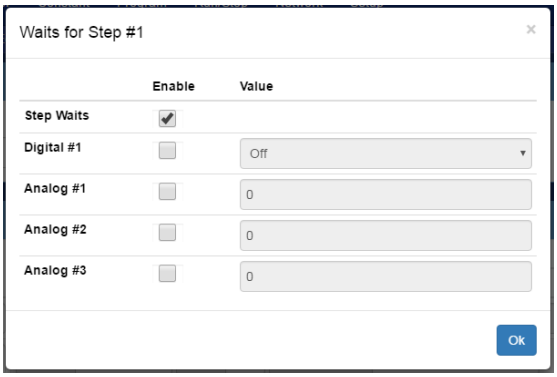
  - **Jump**: Instead of changing the set point the program will jump to a specified step a specified number of times; selecting this will change the view as shown:



- **Soak**: Instead of changing the set point the program will maintain the previous set point for a specified “Step Duration”; selecting this will change the view as shown:



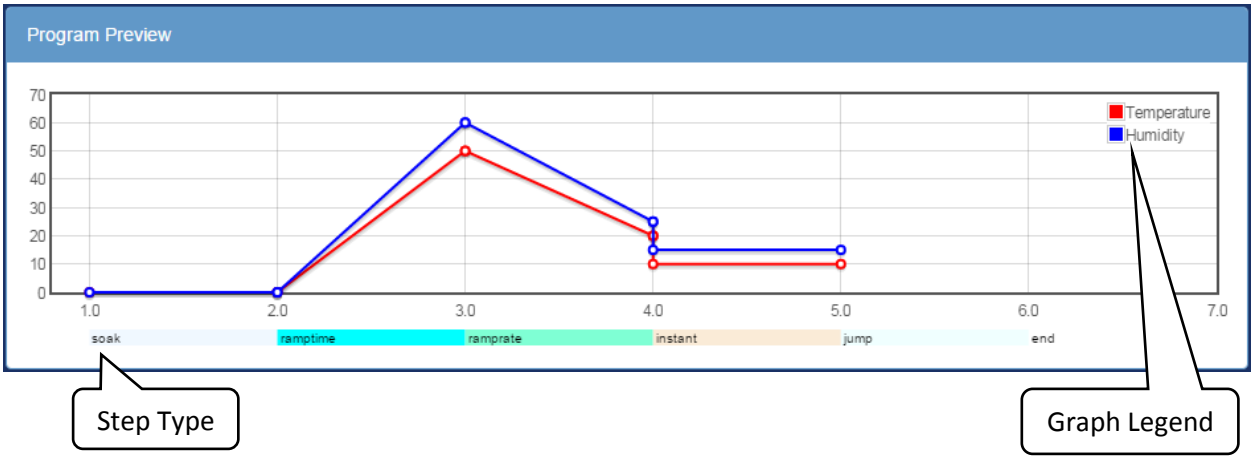
- **Waits**: If set this step will wait until a specified condition is met before executing. These conditions may be a specific analog value or a specific state on one of the digital inputs (when they are configured as wait events).



- **Step Duration**: The duration of the step in Hours: Minutes: seconds. If an entered time has greater than 60 seconds or minutes the time will be converted to the correct format ie: “90” becomes “0:01:30”, and “90:00” becomes “1:30:00” etc.
- **Temperature, Humidity (or any control loop)**: This is a control loop, the following parameters can be set:
  - **EN**: Enable the loop for this step.
  - **Set Point**: The temperature/humidity to go to during this step.
  - **GS**: Enable Guaranteed soak for this step; this prevents the duration timer from counting down until the process value is within +/- the deviation set on the controller.
  - **Rate**: The rate at which the working set point will change in order to achieve the specified set point. This is only available with single loop controllers such as temperature only chambers.
  - **PID**: This is the PID set that will be used to achieve the desired set point.
- **Time Signals**: This button will show the settings for each available time signal.

11.3 Porgram Preview

The current program is plotted at the bottom of the page. Note that the conditions prior to starting a program are assumed to be 0 degrees and 0%RH when rendering this graph.

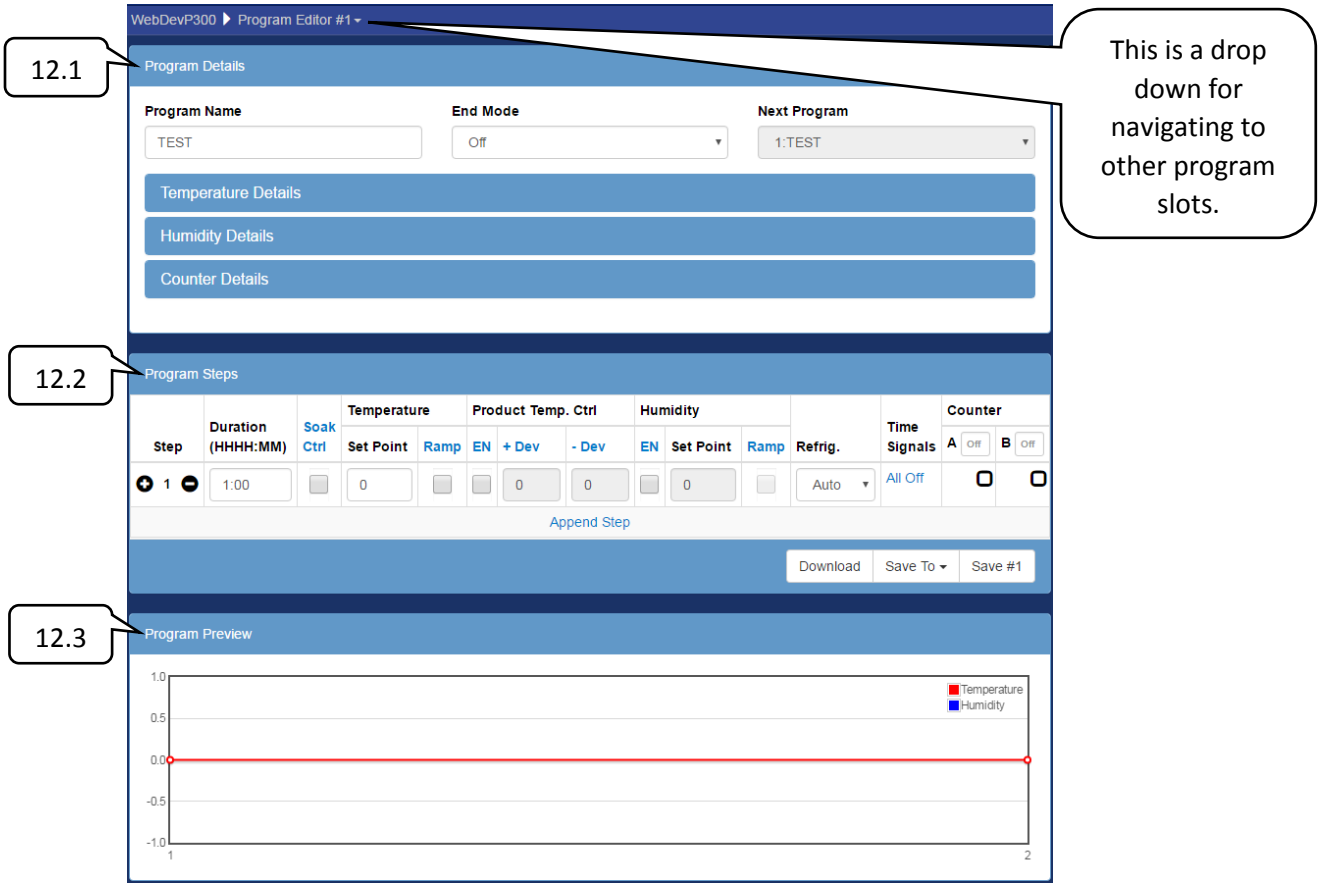


Step Type

Graph Legend

12.0 Program Edit Page P300/SCP-220

This page is where P300/SCP-220 programs can be viewed and edited. This page is only accessible if the web controller is configured for a P300/SCP-220 and for users of type 'Technician', or 'Administrator' may access this page.



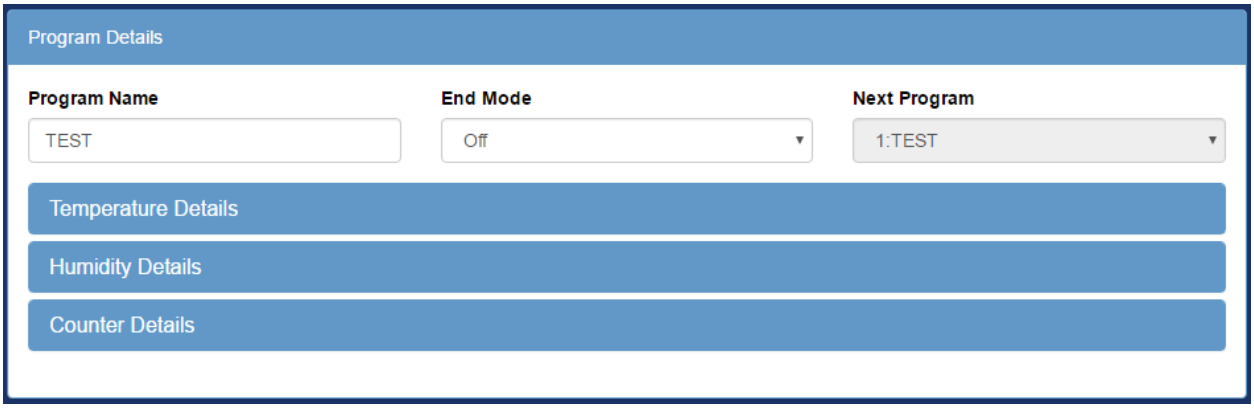
To Edit the current program:

1. Enter the program name, guaranteed soak deviation, and data logging settings per section 10.1.
2. Fill in the each program step.
    a. Select a step mode (if an instant set point change is not desired).
    b. Enter step duration (not applicable for Jump, Ramp:Rate, or End mode steps).
    c. Enter the loop details, enabled guarentied soak, set point, etc.
    d. Enter the time signal settings.
3. Repeate 2 for each step
4. Once the program is compelete there are several options:
    a. Download: Download the program to the computer as a JSON file.
    b. Save To: Save the program to a slot any of the slots the chamber has.
    c. Save #(slot): Save the program to the active slot.

12.1 Program Details

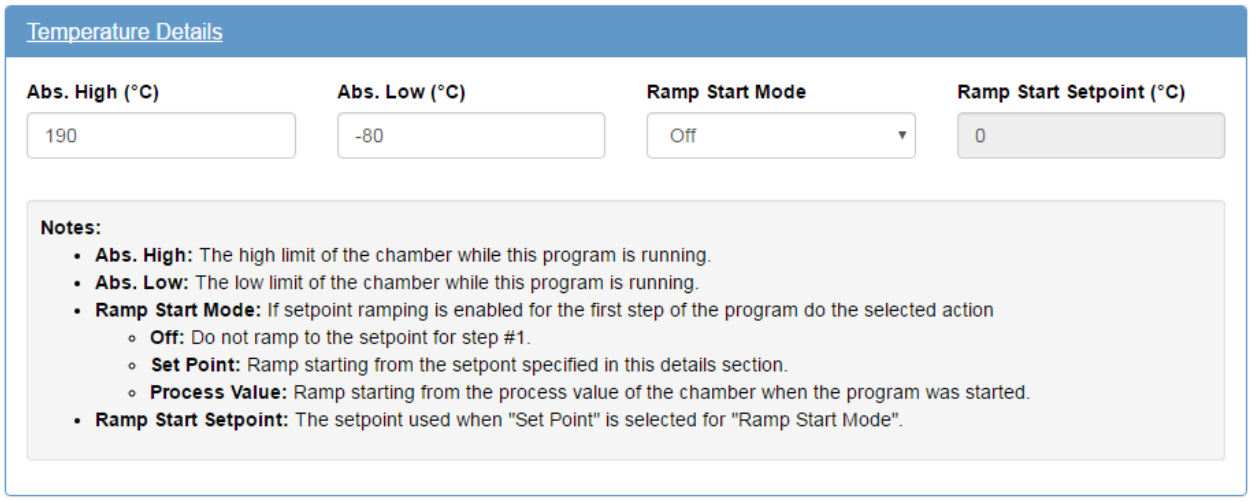
This section allows the user to setup a program name, as well as specify what the chamber will do when the program has finished execution. The following execution modes are available:

- **Off**: Turn the chamber off.
- **Start constant mode**: Run the first constant mode.
- **Hold last step**: Hold the set point(s), time signal(s) and refrigeration settings from the last step executed.
- **Start Next Program**: Start the next program that is specified by the Next program drop down menu.
- **Standby** (P300 only): Stop operation but leave the chamber display on.



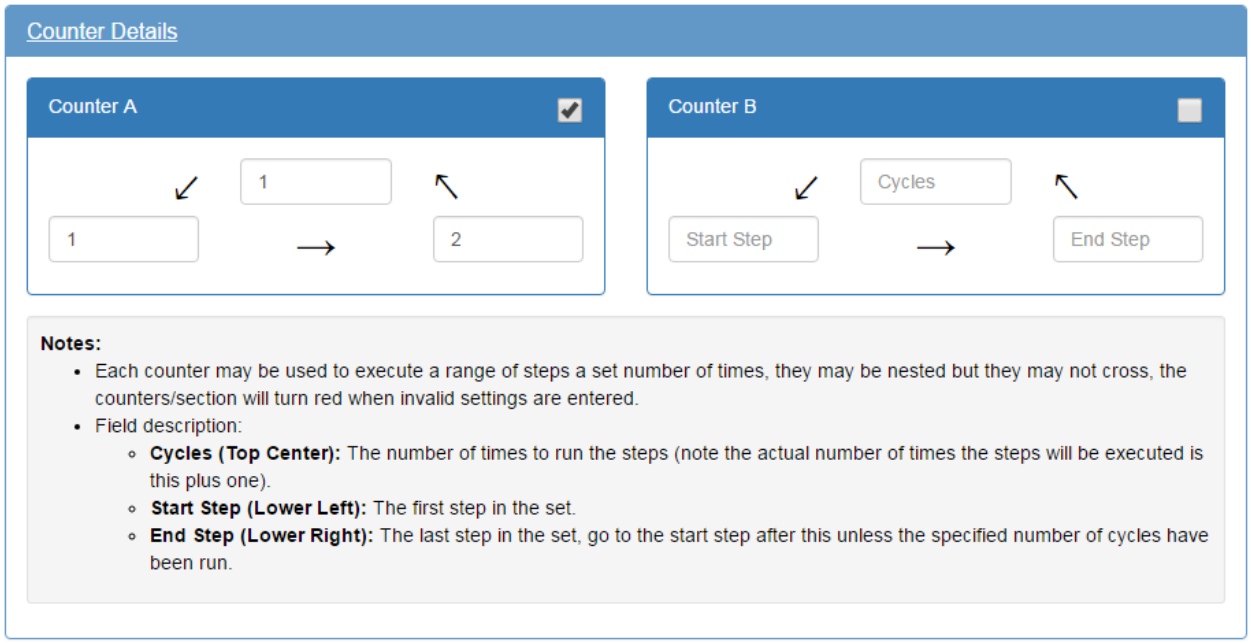
12.1.1 Temperature/Humidity Details

Only present on P300 controllers. This section provides settings for the allowable range of operation of this program as well as how the controller will behave when the first program step contains a ramp.



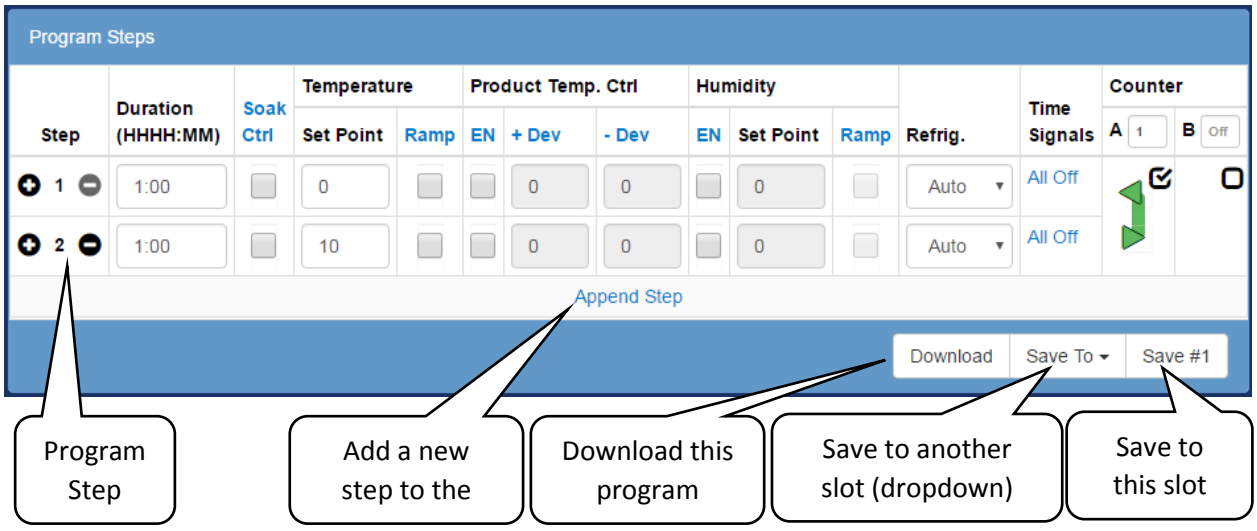
12.1.2 Counter Details

This section sets up the counters A & B which can be used to make a set number of steps repeat a set number of times. To use it enter the start step (bottom left) end step (bottom right) and desired number of cycles (top center). These settings may alos be configured in the program steps section as draggable arrows.



12.2 Program Steps

The program steps are edited in the second section; element details are shown below.



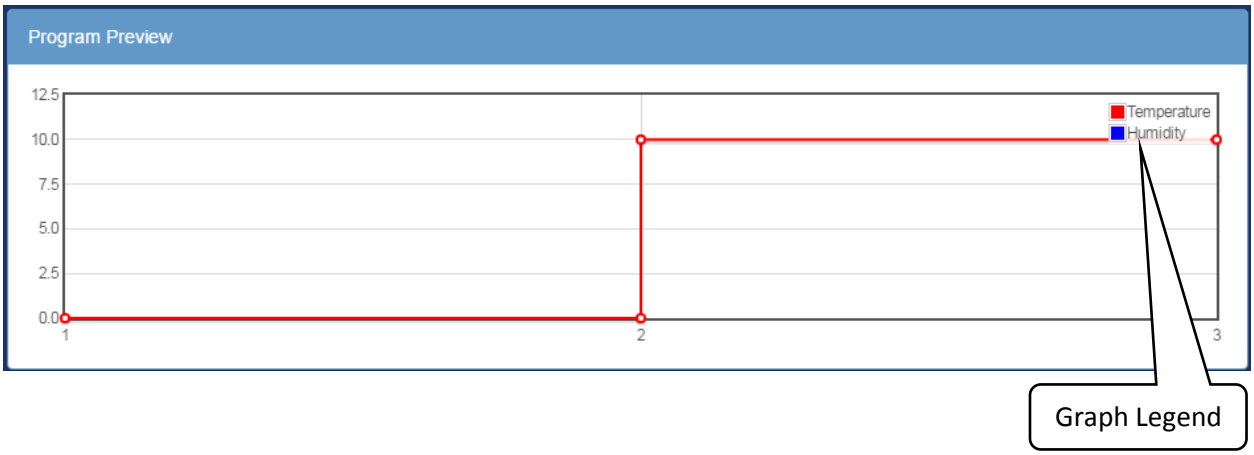
Columns Description:

- **Step**: The rows step number in addition to buttons that will insert a step before the selected step (⊕), or delete the selected step (⊖).
- **Duration**: The duration of the step in Hours: Minutes. If an entered time has greater than 60 minutes the time will be converted to the correct format ie: “90” becomes “01:30” etc.

- **Soak Ctrl**: When soak control is enabled the step will wait until the setpoint(s) have been attained before the duration counter starts to count down.
- **Temperature**: The temperature control loop settings.
    - **Set Point**: The temperature to go to during this step
    - **Ramp**: When enabled the set point will be gradually changed from the previous steps set point to this steps set point over the duration of the step. When disabled the set point will be set immediately go to this steps set point when the step begins.
- **Product Temp. Ctrl** (Optional): Control the product temperature not the air temperature.
    - **EN**: Enable or disable product temperature control.
    - **+ Dev**: The allowable positive deviation between the product and air temperatures (must be positive).
    - **– Dev**: The allowable negative deviation between the product and air temperatures (must be negative).
- **Humidity** (Optional): The humidity control loop settings.
    - **EN**: Enable or disable humidity control for this program step.
    - **Set Point**: The humidity set point for this step.
    - **Ramp**: When enabled the set point will be gradually changed from the previous steps set point to this steps set point over the duration of the step. When disabled the set point will be set immediately go to this steps set point when the step begins.
- **Refrig**: Configure how the refrigeration system will behave during this step. It can be setup for automatic cooling power, a manual cooling power percentage, or completely disabled.
- **Time Signals**: Turn each time signal on or off for each step.
- **Counter**: The counter is used to repeat a specified number of steps. Both counter A and counter B can be set by enabling the check box in their respective column then dragging the start(◀) and end(▶) arrows to the desired step. The counter (number of times to repeat the steps can be adjusted in the text box in each column.

12.3 Program Preview

The current program is plotted at the bottom of the page. Note that the conditions prior to starting a program are assumed to be 0 degrees and 0%RH when rendering this graph.

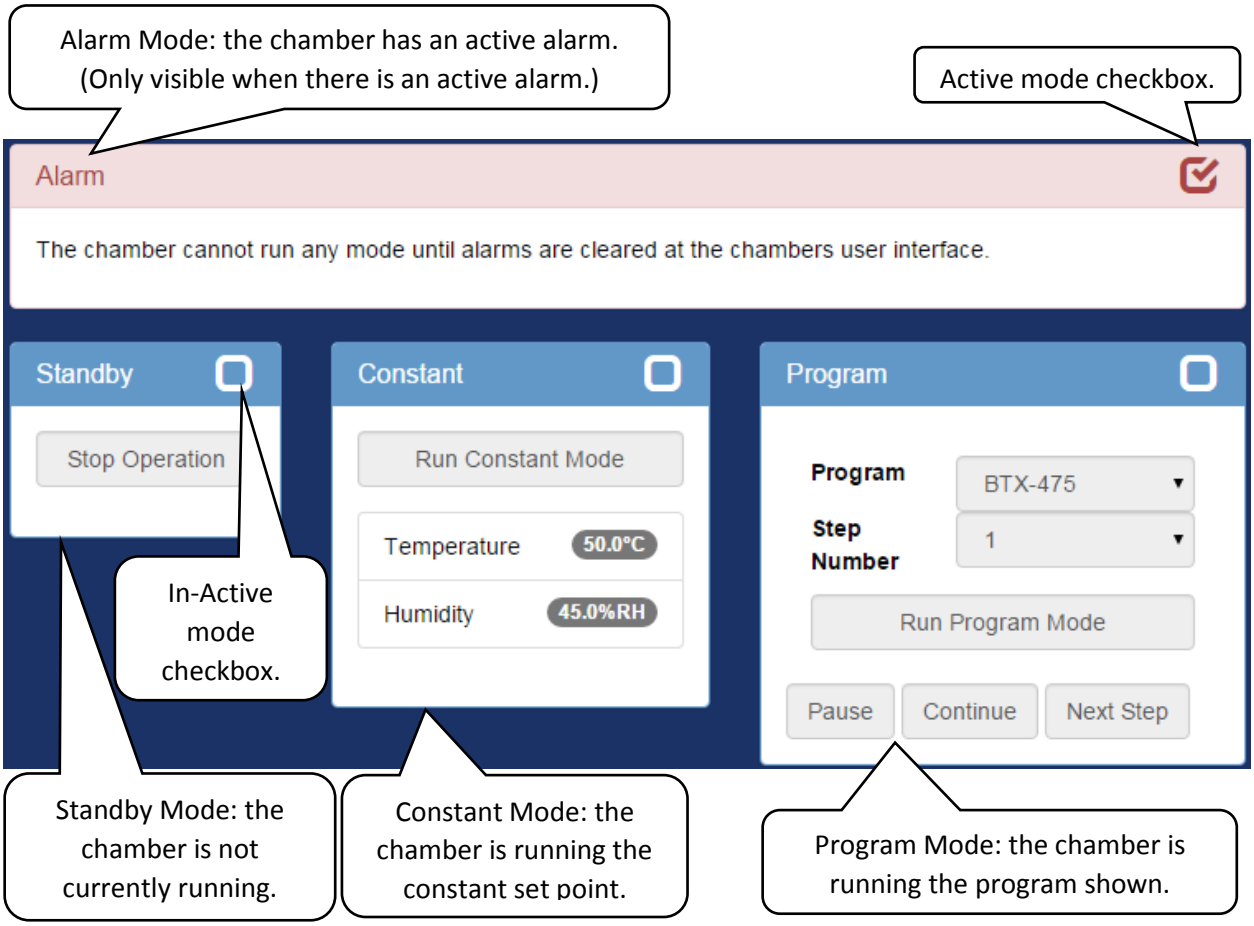


13.0 Run/Stop Page

The chamber may be started, stopped, and programs run from this page. Only users of type 'User', 'Technician', or 'Administrator' may access this page.

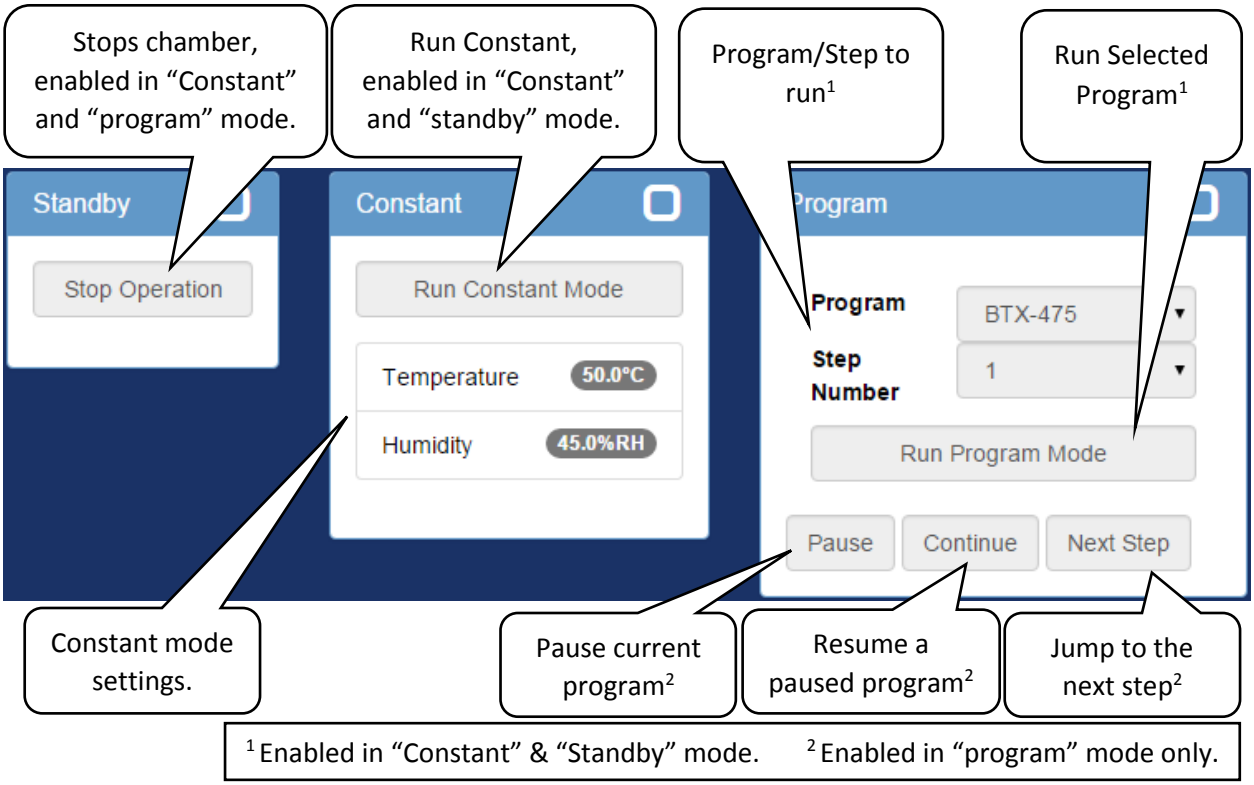
13.1 Section Description

A description of what each section means, and how to tell if it is active or not is given below.



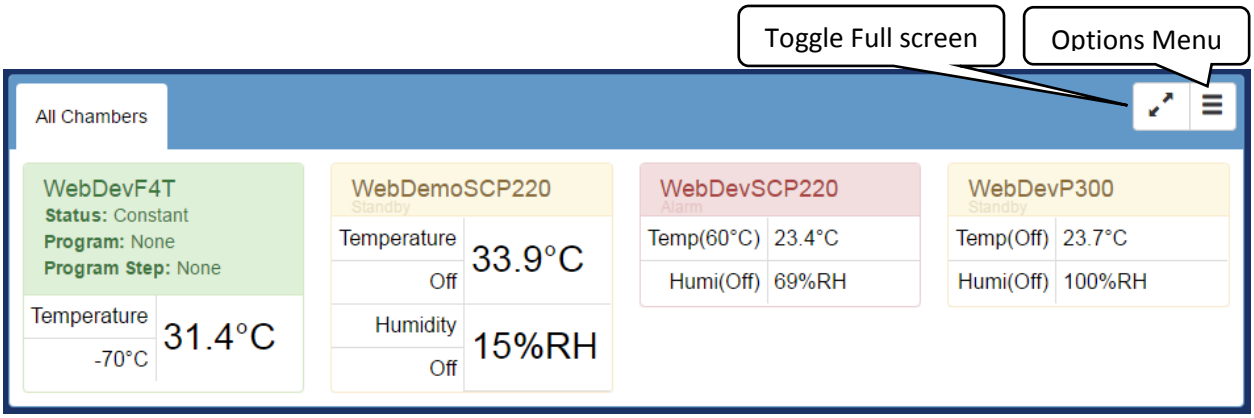
13.2 Mode Controls

An overview of the controls functions and when they are enabled or disabled is given below.



14.0 Network Page

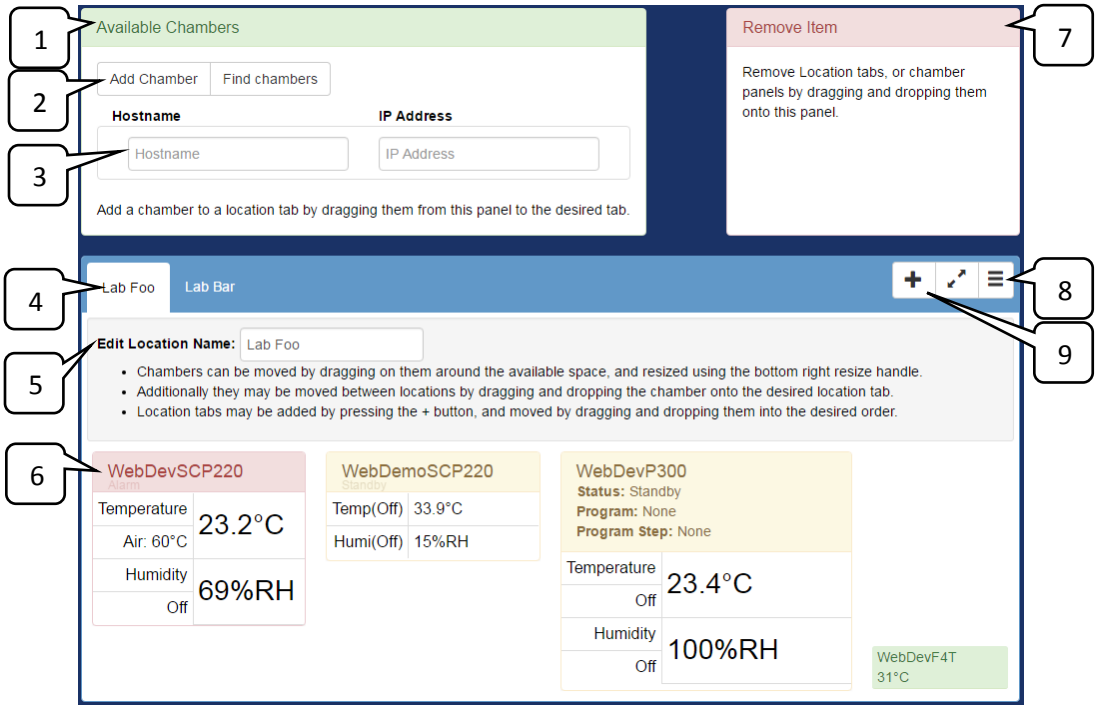
This page shows the status of available chambers on the local network.



This screen defaults to showing all chambers that it can find that have a web controller with firmware version 2.1.X and newer. If any change are made to the layout and saved then the page will load the saved configuration instead.

14.1 Modify Layout

By selecting “Enable Layout Editing” the page will change to allow the various elements to be edited; the functions of each element are as follows.

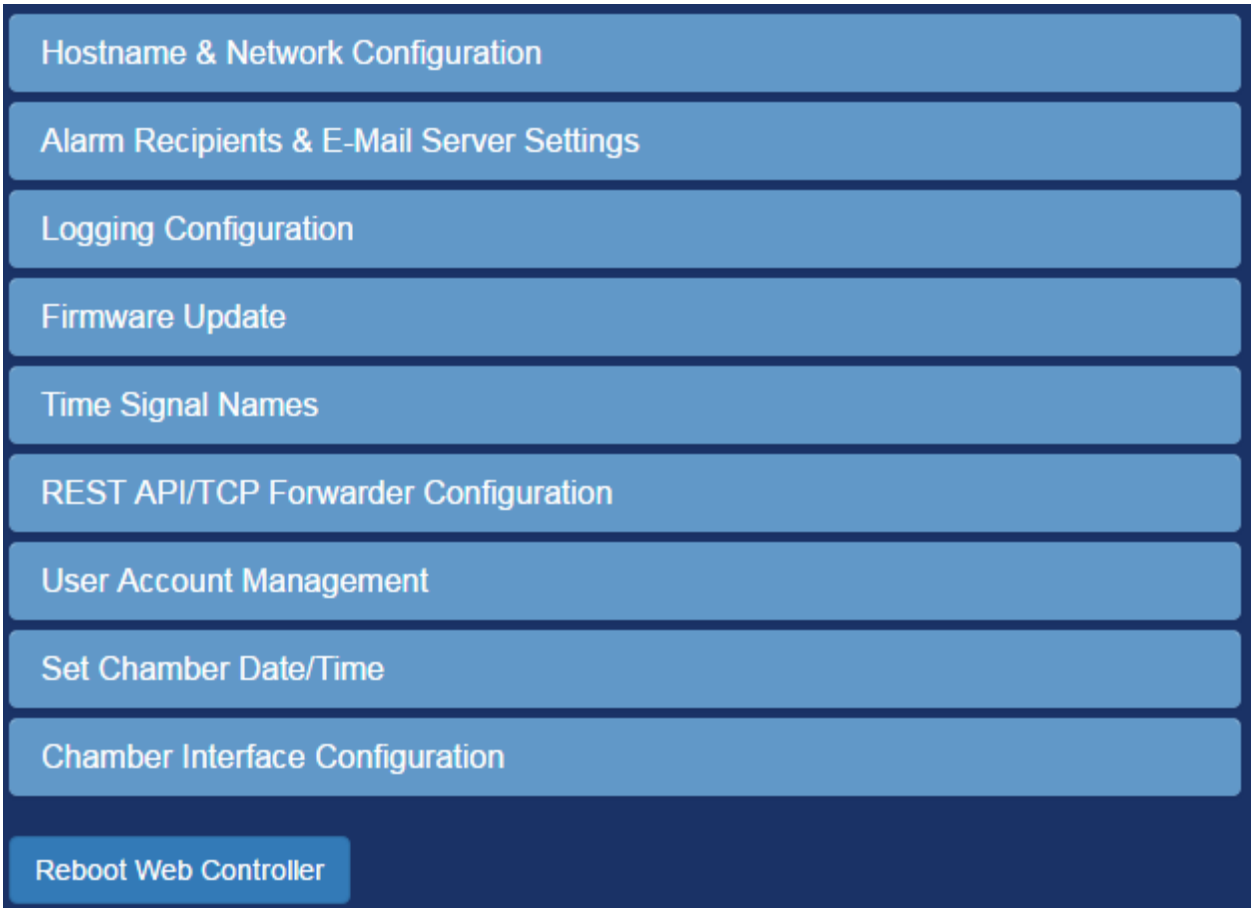


1. Available Chambers: This is a list of chambers that may be added to the interface.
2. “Add Chamber” & “Find Chambers” buttons:
    a. “Add Chamber”: This will add a new entry to the list of available chambers; this is used for adding a chamber manually by Hostname & IP Address
    b. “Find chambers”: This will try and find all chambers on the local network using MDNS (multicast domain name servers).

3. This is the list of available chambers to add to the interface. To add them to the interface drag the desired chamber (row) to the desired location tab (item #4) or remove it by dragging it to the remove Item panel (item #7).
4. This is a list of available locations; chambers (items #3&6) may be sorted by dragging it onto the desired location. The locations may be reordered by dragging them into the desired order, or removed by dragging them onto the remove item panel (item #7).
5. “Edit Location Name”: This field allows a location tabs name to be changed.
6. These are the chamber status displays, they can be interacted with the following ways:
    a. Resizing: When the mouse is hovered over a chamber display a resize icon will be displayed in the bottom right of the panel; by clicking and dragging this icon the panel may be resized. The size of the panel affects what information is displayed for each chamber.
    b. Dragging: When the chamber status display is clicked and dragged it may be moved around within its location tab, dragged between location tabs (item #4) and deleted by dragging it into the remove item panel (item #7).
7. This is where draggable items may be dragged to remove them from the page.
8. Options menu:
    a. “Save Layout Changes” will save the current layout to the server so that the next time a user visits this page the current view is shown.
    b. “Revert Layout Changes” will discard the changes made by reloading the page.
9. This will add a new location tab (item #4).

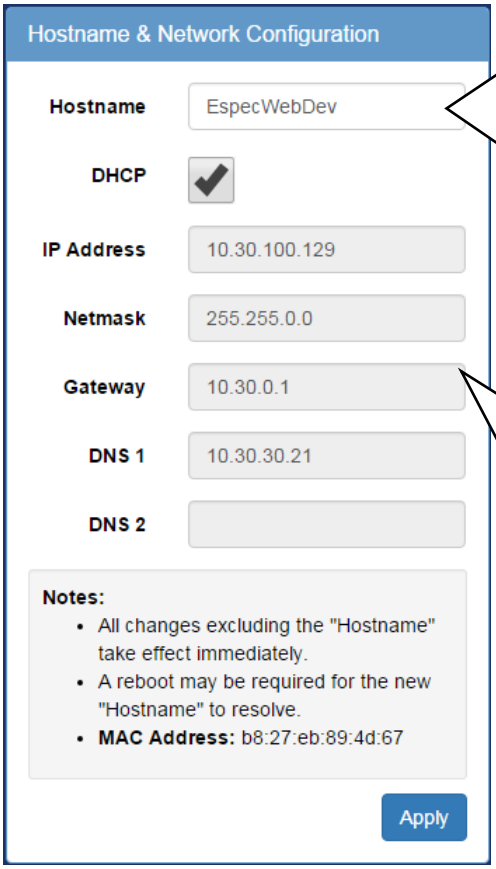
15.0 Setup Page

An administrator account can update various web controller settings on this page. This section is divided into a subsection for each section on the web controller itself.



15.1 Hostname & Network Configuration

View and configure the web controller's network connection and host name.



Hostname: The hostname is used for windows networks when it is 15 characters or less. A windows computer may then access the web controller via http://"hostname"/

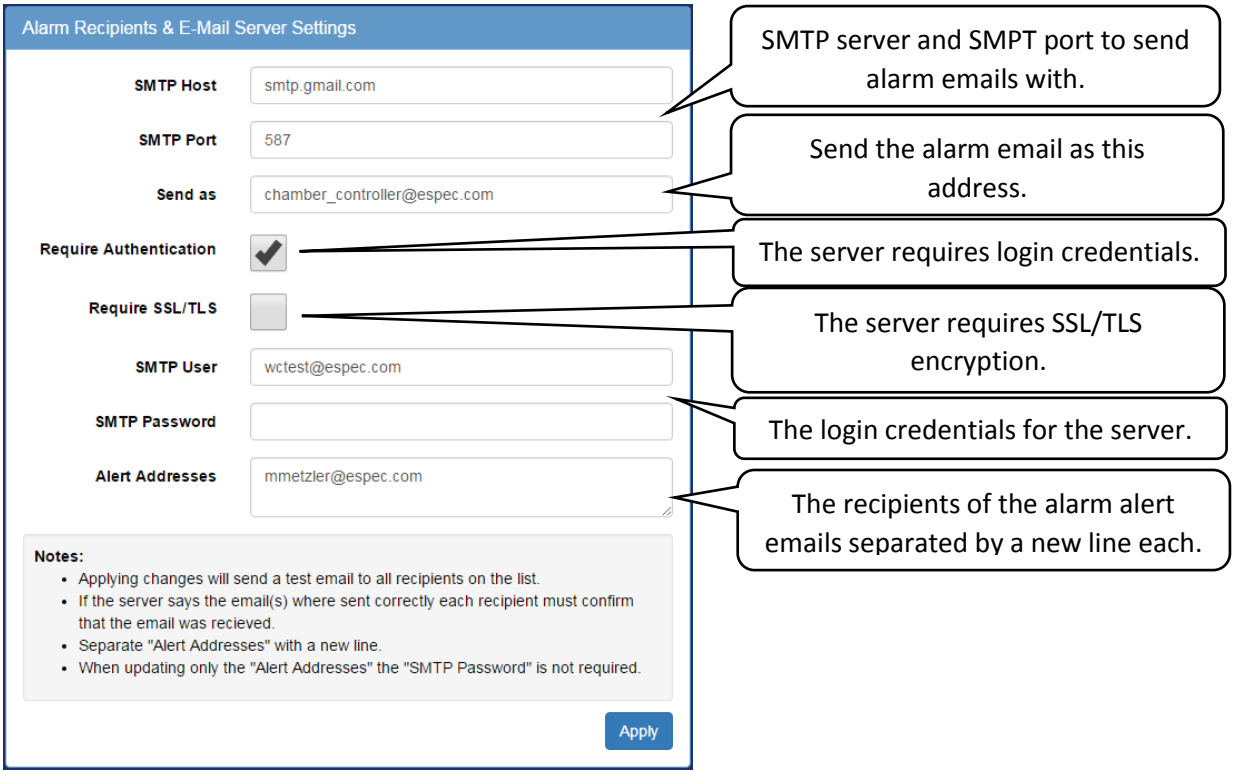
Linux computers, Apple devices and windows computers with bonjour may access the web controller via http://"hostname".local

Network: DHCP is used by default, when enabled the current IP address, netmask, gateway, and DNS servers is shown here.

If DHCP is not enabled these fields will set up the static IP, netmask, gateway, and DNS servers.

15.2 Alarm Recipients & E-Mail Server Settings

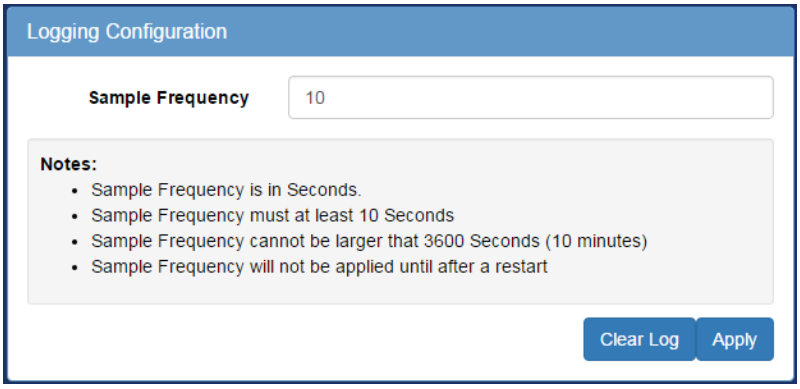
Setup the email server, and email addresses to send alarm emails to. Note that when updating the alert addresses only; the SMPT password is not required.



15.3 Logging Configuration

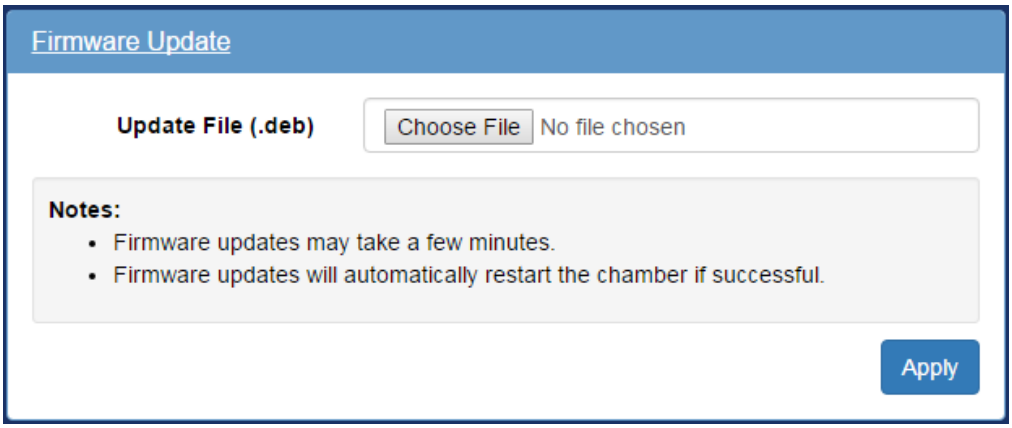
In this section manages the web controller's data logging.

1. To update the sample frequency enter a new value between 10-3600 seconds and press apply. After receiving the green success response restart the web controller via the "Reboot Web Controller" button at the bottom of the page.
2. To clear the data log press the "Clear Log" button.



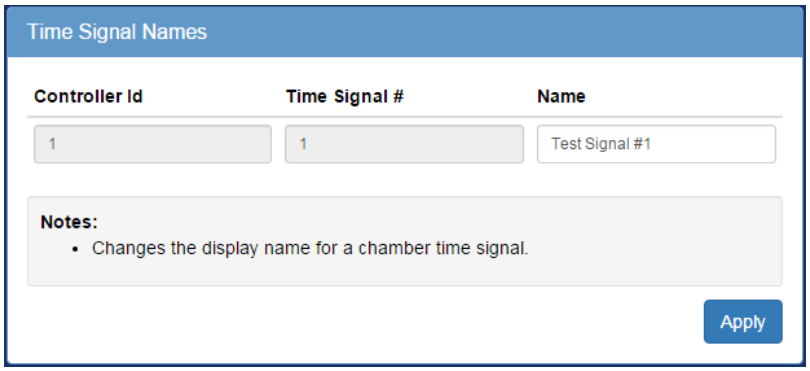
15.4 Firmware Update

Upload a firmware update to the web controller. The web controller will reject all packages not signed by Espec North America.



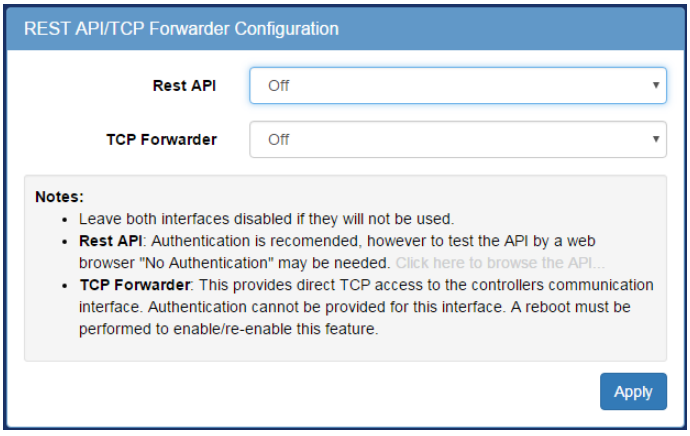
15.5 Time Signal Names

This section will allow custom names to be applied to each time signal.



15.6 REST API/TCP Forwarder Configuration

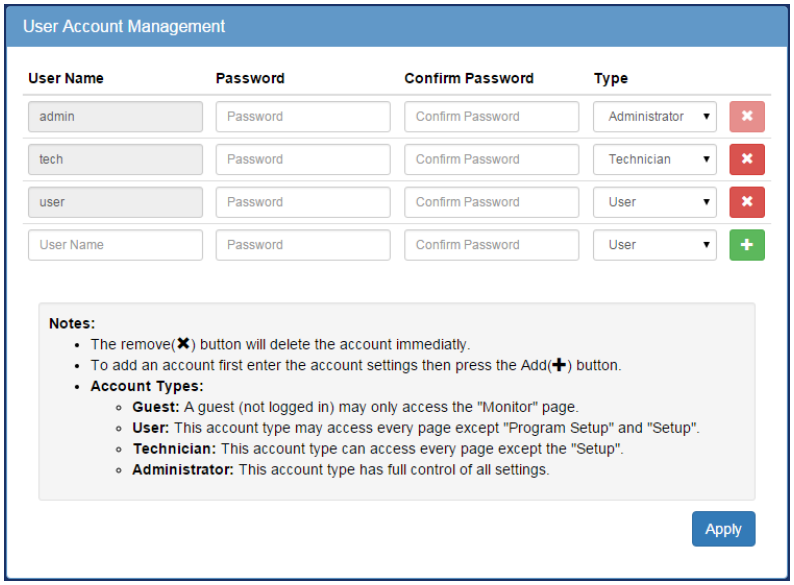
This section will allow the security of the REST API to be adjusted as well as enabling/disabling the TCP Forwarder.



- REST API: This allows for a standard universal way to interact with the web controller & chamber, see section 16.1 for documentation. It supports three security modes:
    - Off: Do not allow any access.
    - No Authentication: Allow all access.
    - HTTP Basic Authentication: Use HTTPs built in basic authentication.
- TCP Forwarder: This allows direct access to the chamber controller through the web controller. See section 16.2 for documentation.

15.6 User Account Management

This section will allow an administrator to add, remove, or modify the password of the web controller's login credentials. The apply button is only used to update passwords.



1. Adding or removing a user takes effect as soon as the add/remove button is clicked:
    1.1. To add an account enter the username, password, confirmation password, use type on the last line and press the add (+) button.
    1.2. To remove a user simply click the remove (✖) button.
2. To update a user's password enter the new password/confirmation password for that user and press the apply button. More than one user password may be updated at a time.

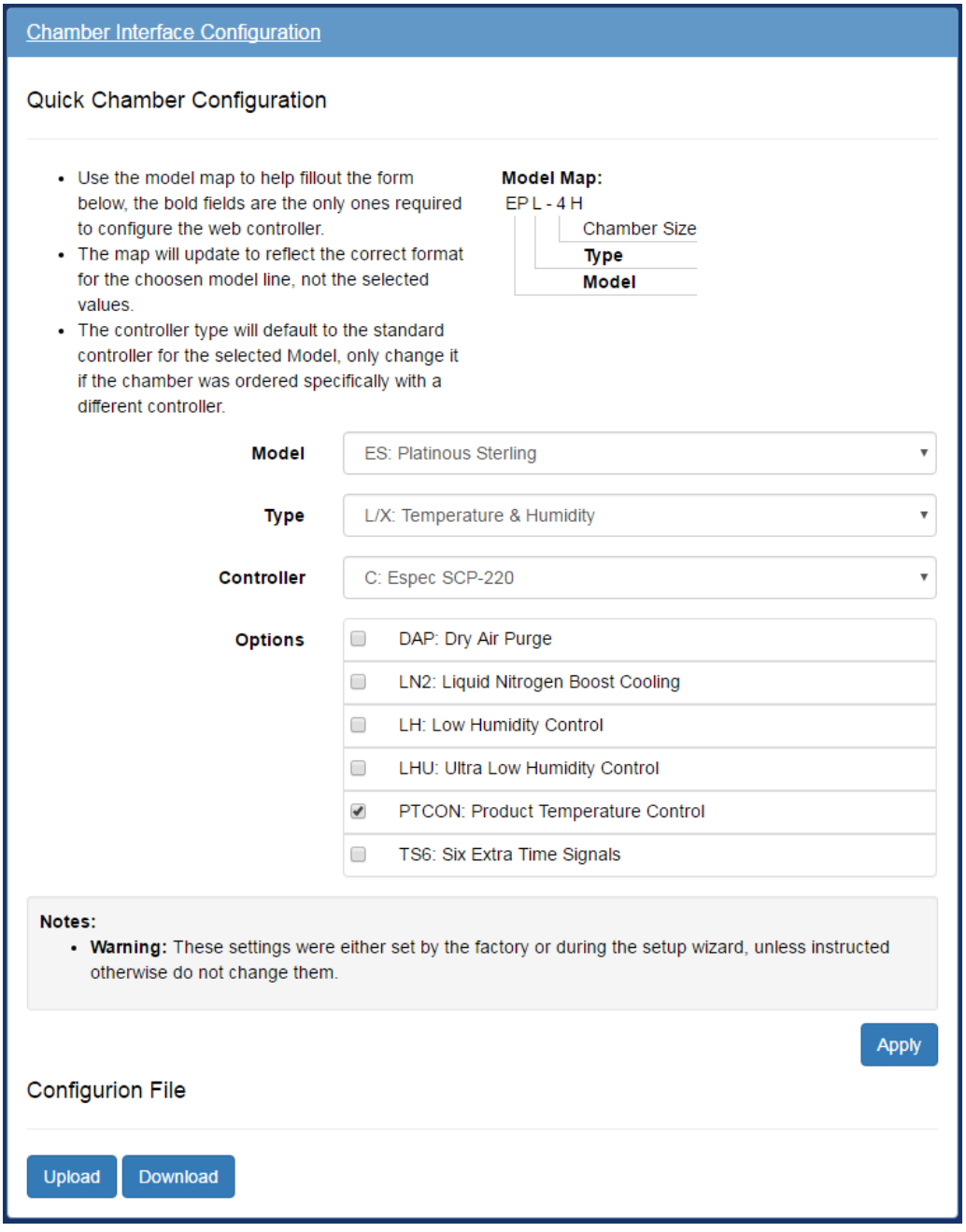
15.7 Set Chamber Date/Time

The date and time can be set by pressing the "Set to current date and time" button. Note that doing so may cause gaps or overlaps in the data being logged by the web controller.

15.8 Chamber Interface Configuration

This is where the web controller is setup to communicate with the attached chamber.

- The “Quick Chamber Configuration” allows the configuration to be selected by entering specific parts of the model number as well as the included options.
- The “Configuration File” is used to upload and download custom configurations that cannot be made using the “Quick Chamber Configuration.”



16.0 Programming Interfaces

The web controller provides several interfaces for other software to read/write the parameters of the chamber, these are documented here.

16.1 REST API

The REST API may be browsed by disabling authentication and navigating to “/api/v1.0/” and following the various uri’s given at each address.

16.2 TCP Forwarder

This feature allows a user to connect directly to the controller through the web server. As each controller has its own interface they must be described separately.

16.2.1 Watlow F4T, F4S, and F4D

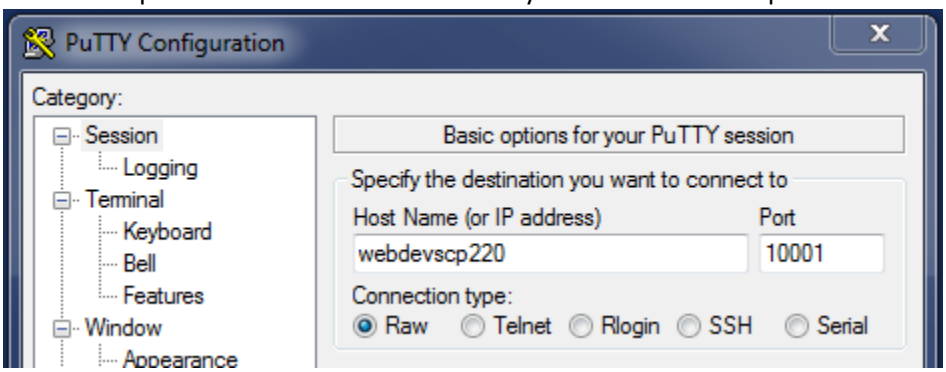
The interfaces protocol provided for the Watlow F4T is MODBUS TCP on port 502. Due to slow performance it is not advised to use the Modbus TCP interface on the web controller but to use the Watlow F4T’s own MODBUS TCP interface.

16.2.2 P300/SCP-220

The TCP forwarder listens for a raw TCP stream on port 10001, and expects the protocol described below: (Note: This is a brief overview, see "P300 or SCP-220 Controller Communications Option Manual" for full details.)

1. The Command data format will be as follows: [command data][delimiter]
    a. Where [command data] is any command found in the "P300 or SCP-220 Controller Communications Option Manual".
    b. Where [delimiter] is "CRLF" ie: a carriage return character followed by a line feed character.
2. Each command will return a Response in the following format: [response data][delimiter]
    a. Where [response data] is one of the following:
        i. If the issued command queried for data it will return the data in the format described in the "P300 or SCP-220 Controller Communications Option Manual".
        ii. If the issued command set a parameter in the controller it will return "OK: [command data]" where [command data] is the command that prompted the response.
        iii. If there was an error executing the command the controller will return "NA: [error message]". Error messages and there meanings are listed in the "P300 or SCP-220 Controller Communications Option Manual". In addition to the error messages listed in the manual this interface also adds the error message "NA: SERIAL TIMEOUT" when the chamber Controller takes too long to respond to the command sent
    b. Where [delimiter] is "CRLF" ie: a carriage return character followed by a line feed character.
3. The interface will timeout after one hour of no activity.

As an example of communication PuTTY may be used when setup for a raw connection on port 10001:



Web Controller for Software v2.2
Instruction Manual:

Orig: 1.00: January 7, 2016
Rev: 1.01: November 30, 2016
Rev: 1.02: February 27, 2017
Rev: 1.03: April 20, 2017

Edited and Published by:

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