GRAND CONTROLS Inc.
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HEATVIEW

CONTROLLER

MANUAL

Grand Controls inc.

Product number: A002

Revision: 1.0

Creation Date: 15 August 2019

Revision Log

Revision	Description	Initial	Date
1.0	Initial Release	JB	15 Aug 2019

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1. Introduction

This document is intended to help you get your HEATVIEW controller setup and running correctly. It will guide you through the process of electrically installing it into your heating console(s), setting it up and then running it.

The HEATVIEW controller can be setup and run from the built-in touchscreen, as well as through the computer software.

Please see the website: http://www.HeatView.ca for the latest software and products.

2. Electrical Specs

Control Power Only	
Input Voltage	120 Vac +/- 10%
Input Current (at 120Vac)	1 Amp

3. HeatView Controller Overview

The HeatView controller is a stand alone or interconnected controller that allows you to easily setup and control multiple heating consoles.

Each HeatView controller has the ability to independently control up to 24 console channels. Each HeatView controller has built-in networking architecture to allow them to be connected in a network and controlled from a single computer or controller. There are two Ethernet connector ports on each controller to allow for this. Connecting and controlling more than 1 controller is explained later in this document.

Each HeatView controller can be controlled by a complementary computer software application. This computer software will allow you to program and run the controller as desired, AS WELL AS record the heat cycle results and put these results in a printable report format.

There is backup on board storage to record the heat cycle results too. This on-board storage is meant as a backup system to the computer application and is not as full featured as the computer software. You can extract a heat cycle from the backups through the computer application and generate a report from it.

a. Modes of operation

Each controller can control all of its channels independently in 3 different modes of operation. Each mode of operation is described here.

Automatic Mode

The HeatView controller has the ability to create and store temperature profiles or Recipes. These temperature profiles can be created either locally on the internal controller or through the computer application.

When a channel started in Automatic Mode, it will heat the work piece according to the temperature profile selected. When the temperature profile has been completed it will stop the channel. While in this mode you will have the ability to pause the cycle or skip forwards and backwards in the recipe.

Manual Mode

When a channel is placed into manual mode and started, it will heat the work piece to a specified temperature at a specified rate, then will hold that temperature until the channel is stopped manually.

Percentage Timer Mode

If the channel is placed into percentage timer mode and started, the output will be pulsed on and off, with the ratio between the on and off time determined by the percentage entered by the operator.

b. Slave and Master channels

Any channel in a controller can be a slave to any other channel in the SAME controller. This feature does not work across multiple controllers.

If a channel is setup to be the slave of another channel, it will match its master's channel set point and running state (started or stopped). If a channel is a slave channel and is running, its

output is still independently controlled with its own thermocouple providing feedback for its control algorithm. Only the set point from the master channel is used.

4. Introduction to HeatView case

The HeatView controller is assembled in a rugged plastic case. There are connectors around the outside of the case for you to connect it to your console. If you open the case you will see a 7" touch screen interface module. You can use this touch screen module to setup and run the controller. This section of the document describes all the connectors on the sides of the controller.

WARNING: Do not run this unit with the lid closed! The controller will overheat and cause damages to the unit. Always have the lid open when powered.

In the figure below you can see an image of a HeatView controller.

Figure 1: Picture od a HeatView controller

If you are looking at the HeatView controller with the handle facing you, then the **Power Plate** will be on the Left-Hand Side of the case. On this plate you will find connection points for the control power, Ethernet jacks and connections to the first 12 channels. At the back of the unit you will find the **Connector Plate**. On the connector plate, you will find connectors for the remaining 12 channels as well as the stand alone enable switch. On the Right-Hand Side of the case you will find the **Thermocouple Plate**. This plate has connection points for all 24 thermocouples.

c. The Power Plate

On the Left-Hand Side of the controller you will find the power plate. The figure below is an image of the power plate. The power plate has a North American Standard 3 prong power connector. Please use the provided power cord to connect this to your power outlet.

ONLY CONNECT A GROUNDED POWER CORD TO THIS UNIT. NEVER POWER FROM AN UNGROUNDED SOURCE.

Next to the power connector is an illuminated power switch. This switch enables control power to the unit. This does not disconnect any power that might be applied to the unit through the console connection points. To turn the unit on, simply connect the power cord supplied with the unit and then turn this switch to the '1' position.

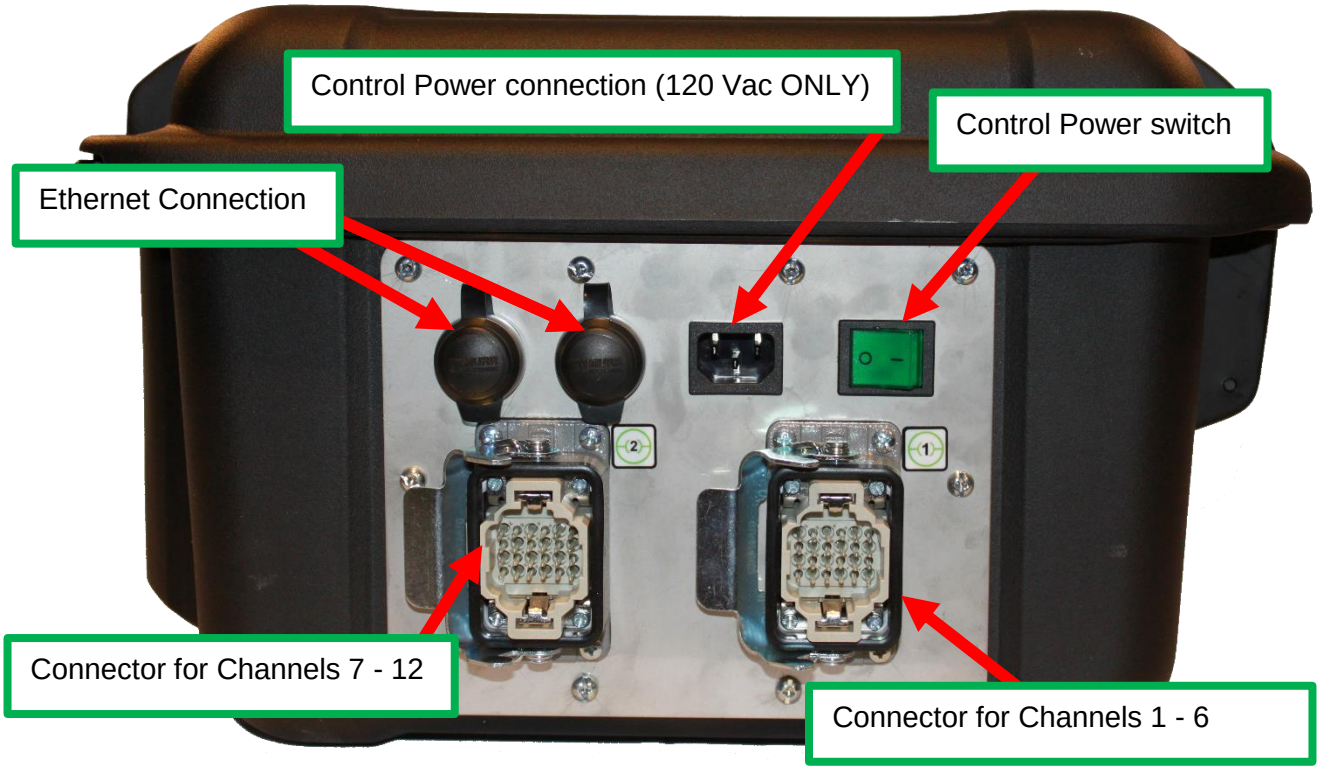

Figure 2: Power Plate image

This plate also has console connection points. There are two connection points on this plate. If you are looking at the plate, then the connector on the right of the plate is for Channels 1 to 6 (This is the connector next to the sticker with the number 1 on it), the connector on the left is for Channels 7 to 12 (This is the connector next to the sticker with the number 2 on it).

The Ethernet connectors on the top of the plate are for computer control of the module and for connecting controllers together. The connectors go to an internal switch, so it does not matter which Ethernet port you plug into.

PLEASE NOTE: If you are connecting more than 1 HEATVIEW controllers together, there is a small 'Stand alone enable' switch on the rear Connector Plate. This needs to be turned off on all of the connected controllers except for one of them.

d. Connector Plate

On the rear of the controller is another set of 2 console connection points. If you are looking at the plate, then the connector on the right is for Channels 13 to 18 (This is the connector next to the sticker with the number 3 on it) and the connector on the left is for Channels 19 to 24. (This is the connector next to the sticker with the number 4 on it). See figure below for an image of the Connector Plate.

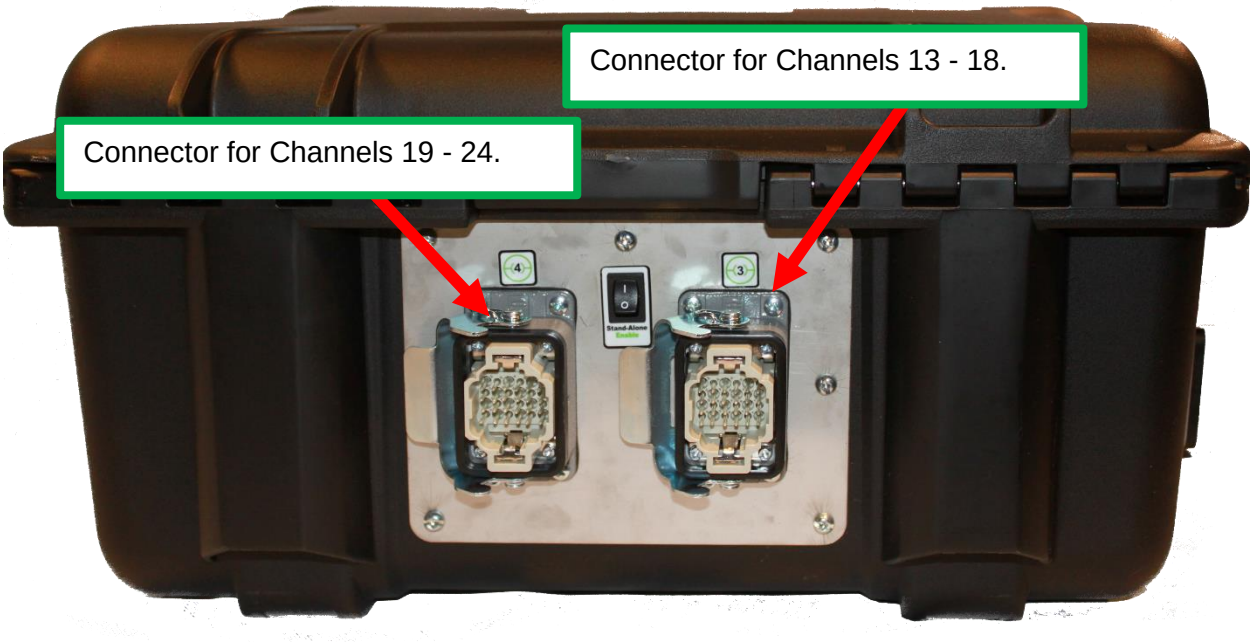

Figure 3: Connector Plate

e. Thermocouple Plate

On the Right-Hand side of the case is the thermocouple plate. This plate has panel jack connectors for you to connect the process temperature measurement thermocouples for each channel. Each channel has the allowance for the connection of a single thermocouple. Each channel uses the feedback from this thermocouple in its control loop.

The figure below shows an image of the thermocouple plate. If you are looking at the plate, the top left connector is for Channel 1 and then numbers them from Left to Right and Top to Bottom.

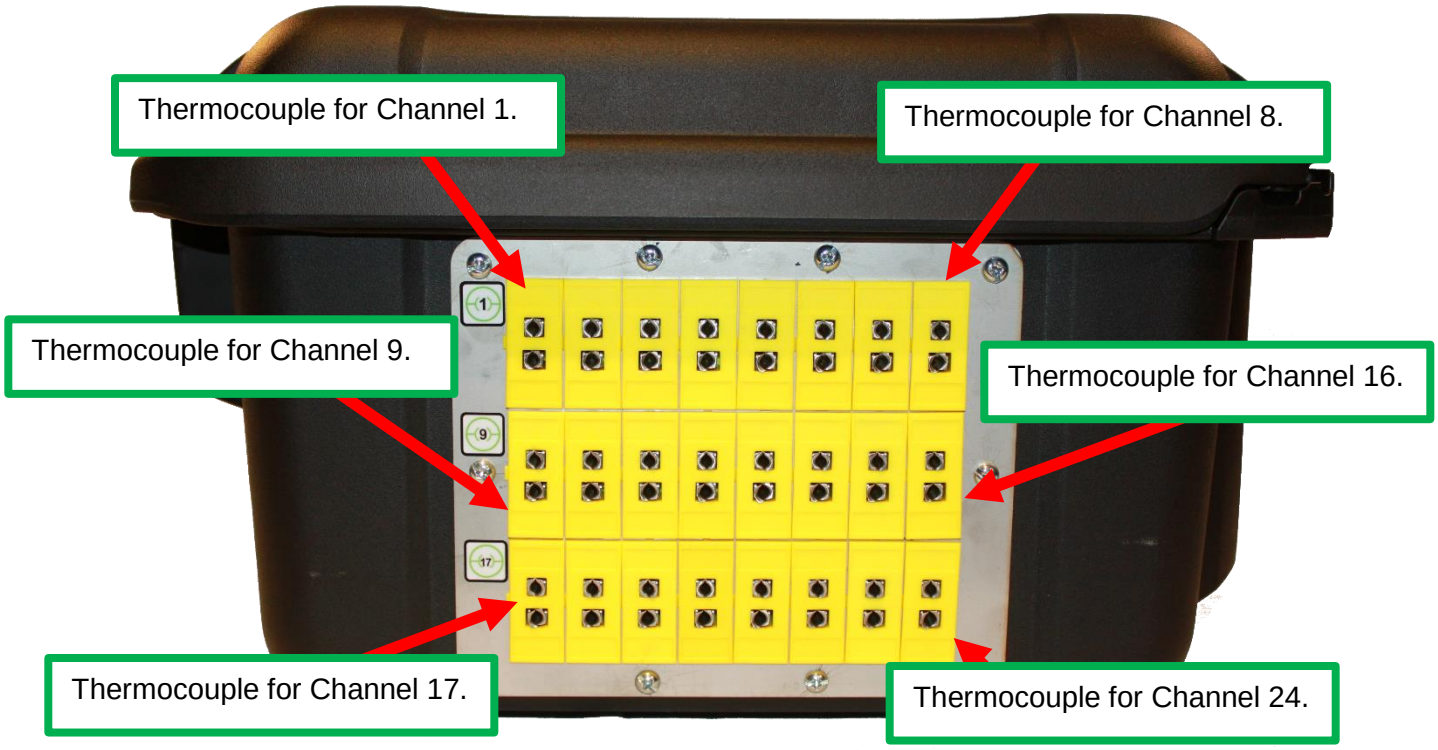

Figure 4: Thermocouple Plate

If a thermocouple becomes disconnected, then the Channel will stop if running and not allow you to restart it until the thermocouple is reconnected.

f. The 7” Touch Screen Interface

If you open the HEATVIEW controller case, you will see a 7” touch screen interface. This interface will allow you to setup and run the controller as desired. A detailed explanation on how to do this is covered further on in this document. The figure below is an image of the interface.

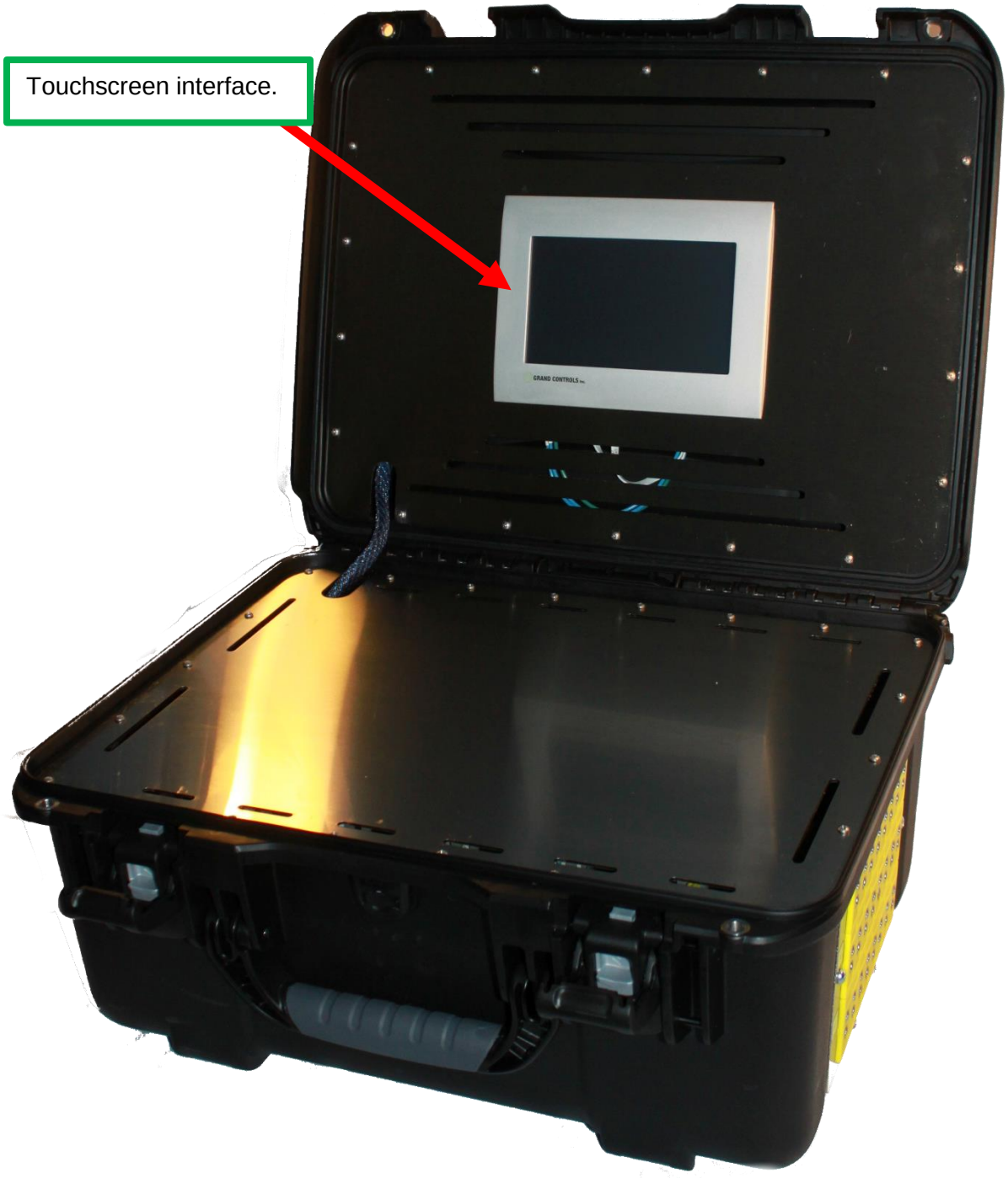

Figure 5: The 7" touch screen interface

g. The stand alone enable switch

On the rear of the HEATVIEW controller case you will see a switch on the Connector Plate. This switch will turn on/off the stand-alone feature of the controller. Once you turn the switch to ON you will notice that the wireless network will be enabled for the controller and you will be able to connect to the controller with the computer application.

If you are connecting more than 1 HEATVIEW controller together, you will need to turn this switch to '0' on all the controllers except for 1 of them, to prevent any networking errors.

If you are only working with a single controller, make sure this switch is turned to '1' to ensure easy connection to the controller.

5. HeatView controller interface

The touchscreen interface for the temperature controller can be found inside the lid of the controller case.

WARNING: Do not run this unit with the lid closed! The controller will overheat and cause damages to the unit. Always have the lid open when powered.

Once the unit has been powered on the controller will boot up and automatically load the interface software. Once unit has booted up you can start controlling the system.

a. The MAIN screen of the interface

The unit will automatically boot up and load the MAIN screen. An image of the MAIN screen can be seen in the figure below. This screen gives a brief overview of 6 channels at a time. To cycle through all the channels, press the 'Next >>' and '<< Prev' buttons at the bottom of the screen. (These buttons will be hidden if there are no more channels in the specific direction.)

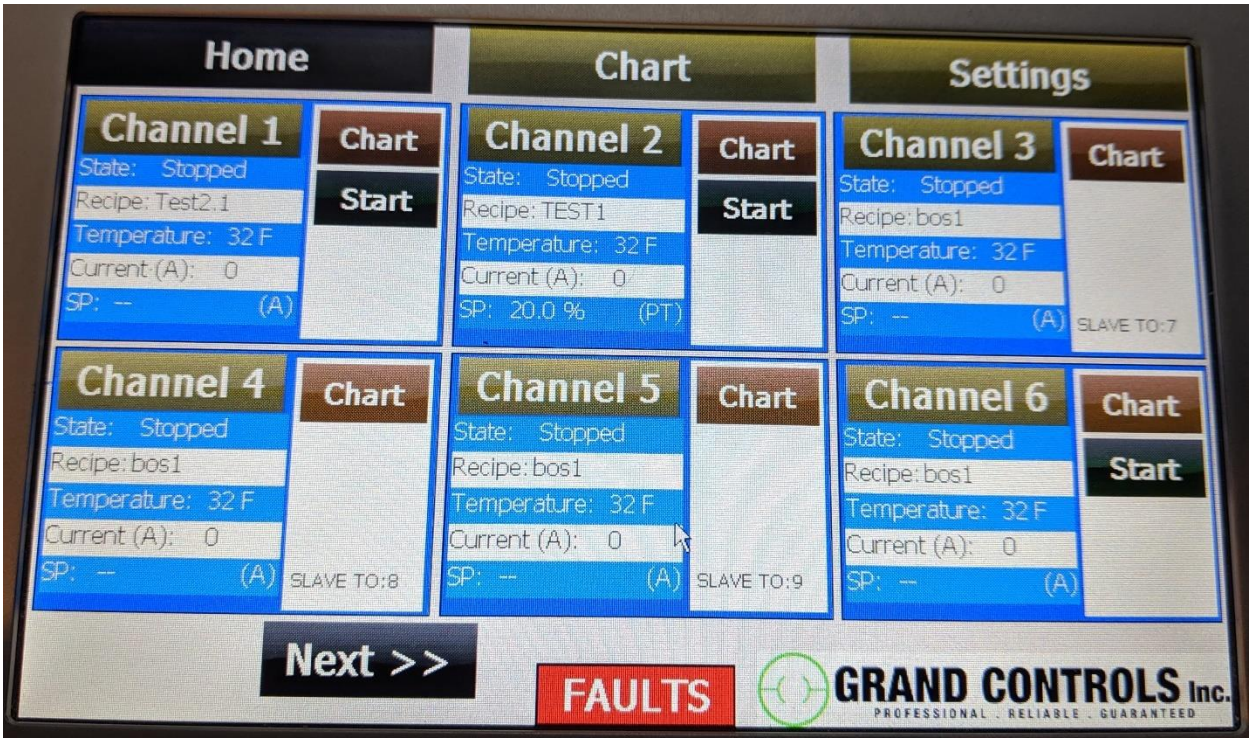

Figure 6: Touchscreen - MAIN display

Channel interface on the MAIN screen

The channel overview box on the main screen is explained in more detail here.

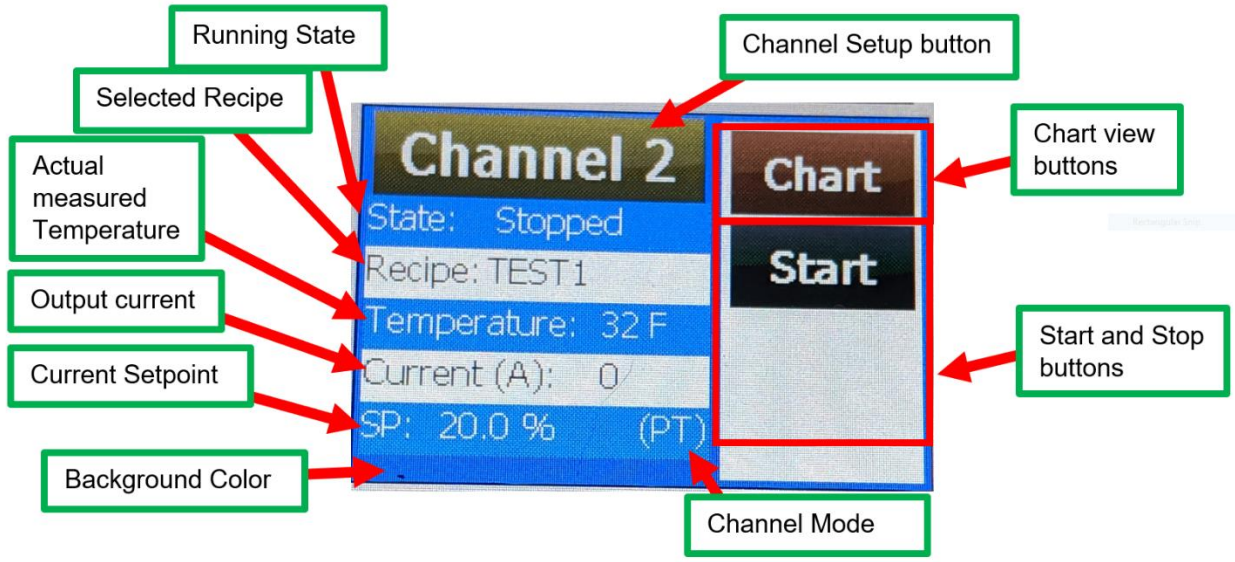

Figure 7: Detailed view of a channel on the MAIN screen

As can be seen in the above figure, there is a lot of information on each channel on the MAIN screen.

The 'Running State' is either "Stopped", "Monitoring" or Heating". If the channel is not running, this will say "Stopped". If the channel is running but the output is off, this will say "Monitoring". If it is running and the output is on, this will say "Heating".

The 'SP' is the current temperature Set Point the controller is trying to heat the work piece to. If the mode is Percentage Timer, this will show the output percentage.

The Start and Stop buttons will start and stop the channel if it is not a slave. The buttons will appear and disappear if the channel is running or not. There is also a Restart button to restart the channel from its previous position in its heat cycle.

The 'Chart' button will change the display to bring up the heating chart for the specific channel. This chart will show the measured temperatures of the channel since it was last started, along with the temperatures of all the slave channels too.

The 'Channel Setup' button will load a new screen that will allow you to change the channels settings. This includes creating/loading a recipe, changing modes and so on. This covered in more detail in the next section.

b. Channel setup screen

This screen is accessed by pressing on the channel setup button on the MAIN screen for the channel you want to setup. An image of the of the setup screen can be seen in the figure below.

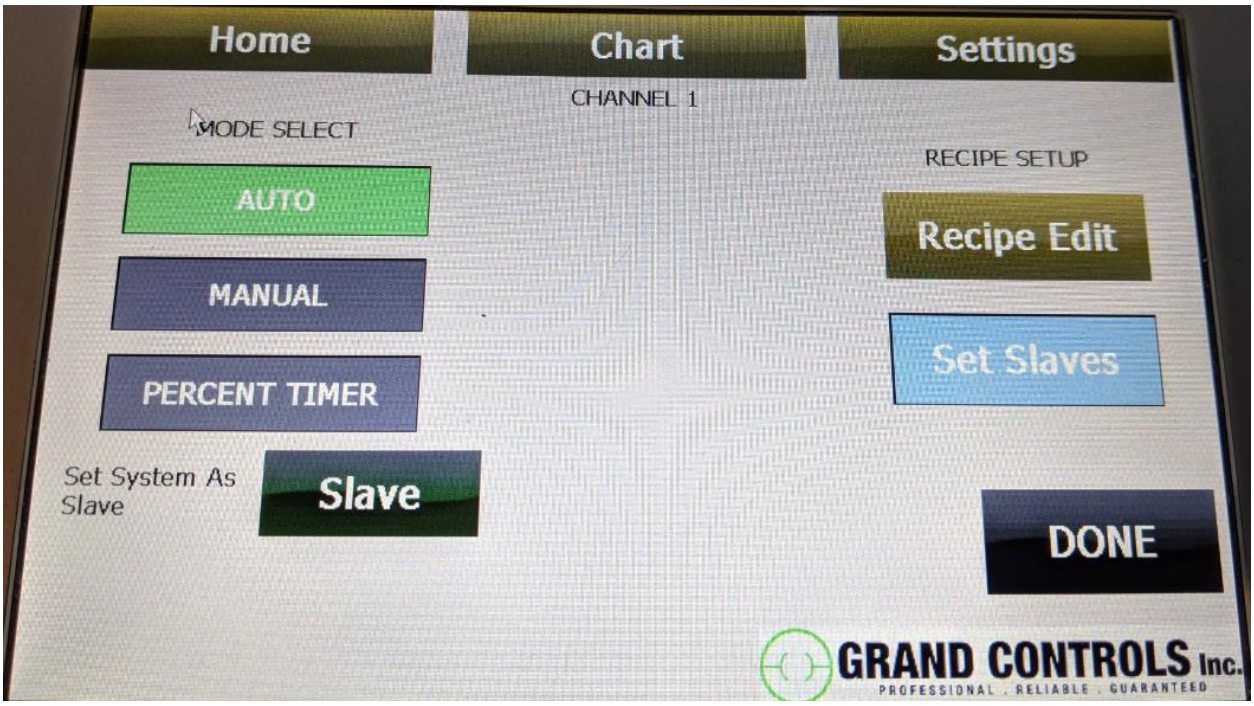

Figure 8: Picture of the Channel setup screen (Auto Mode)

If you press on the Channel setup screen, you will get a screen that resembles the figure above. If the channel is not running, you can switch the mode for the channel by pressing one of the buttons under the title ‘MODE SELECT’. Pressing these buttons will request the controller to change the mode. If it is not ‘safe’ to change the mode, these buttons will have no effect.

If you want to make the channel a slave to another you can press on the ‘Slave’ button. This will bring up a screen similar to the one in the figure below. Press on the button to select the channel you want as its master. After you push the button, the channel will be made as a slave and you will be returned to the channel settings screen. Then a button will appear on the screen titled ‘Master’. Pressing this, will set the channel back as a normal channel again. This button is shown in Figure 10 below.

A channel cannot be set as a slave if it is a master to any other channel.

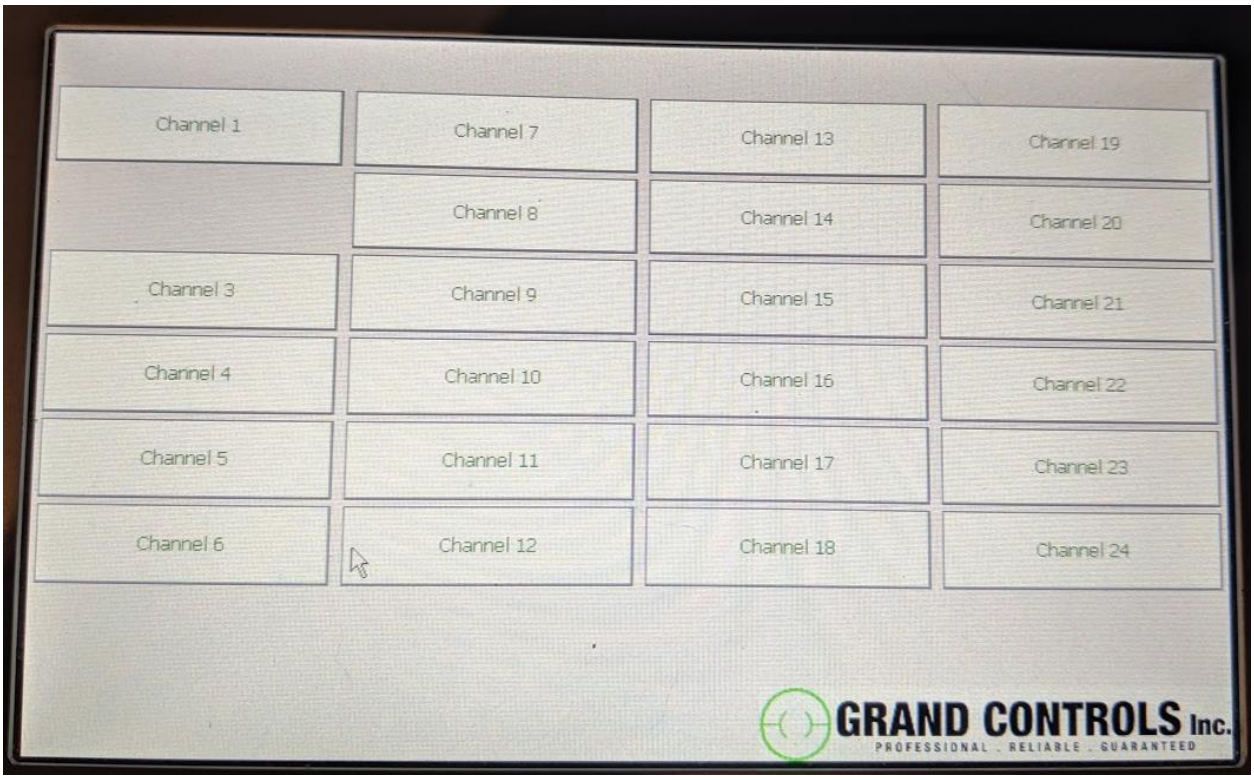

Figure 9: Master channel select screen

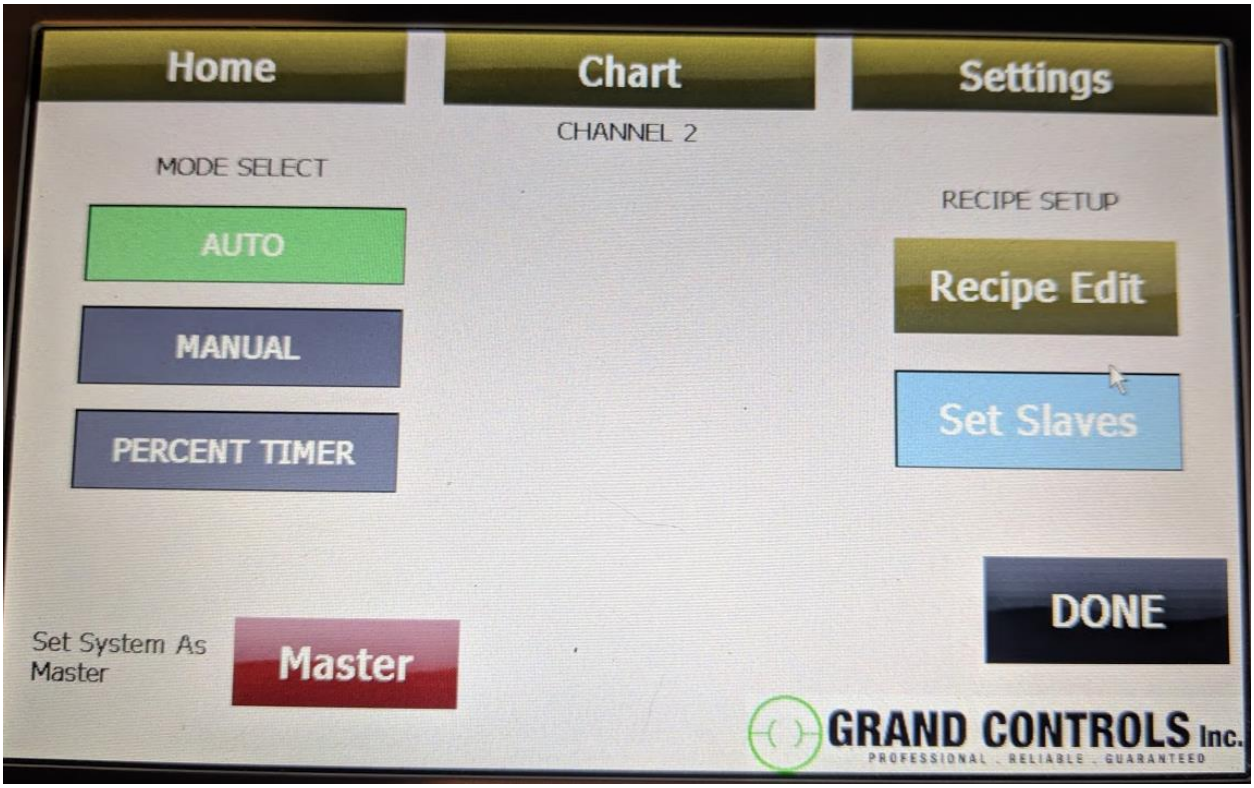

Figure 10: Channel settings with channel set as a slave

On the Right-Hand side of this screen, there are different settings available, depending on what mode the channel is in. The figure below shows the different settings available based on the mode.

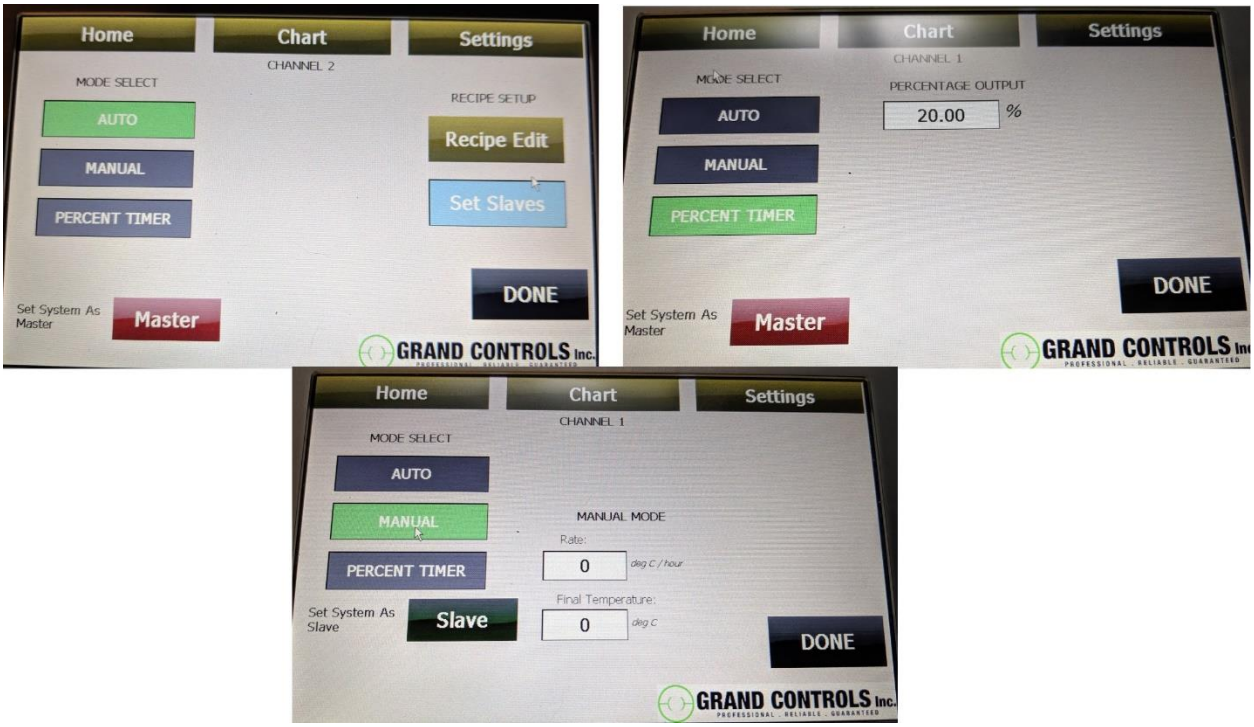

Figure 11: The different settings available based on the different modes the channel is set in

Settings available in Auto mode

When in Auto mode, there are 2 buttons available. The first button is 'Recipe Edit' button. This button brings up the recipe edit screen. This is covered in more detail further on in this section.

Settings available in Manual mode

In manual mode the system will bring the work piece up to a specified temperature at a specified rate. The first number entry field is the rate the system will try to heat the work piece at. The second number entry field will be the temperature the system will heat the work piece to and will hold it at until the channel is stopped. To change the values, press on the number entry fields to bring up the number keypad. Type in the desired value and press '

Settings available in Percentage Timer mode

If the channel is in percentage timer mode, you can only enter the desired output percentage. To change the value, press on the number entry field and type in the desired value.

When you are done setting up the channel, press on the 'DONE' button to return to the MAIN screen.

c. Recipe Edit screen

The recipe edit screen allows you to edit the current recipe in the channel. To get to this screen press on one of the channel settings buttons, make sure it is not a slave to another channel as well as that it is in Auto mode and press on the ‘Recipe Edit’ button. An image of the first recipe edit screen is shown below.

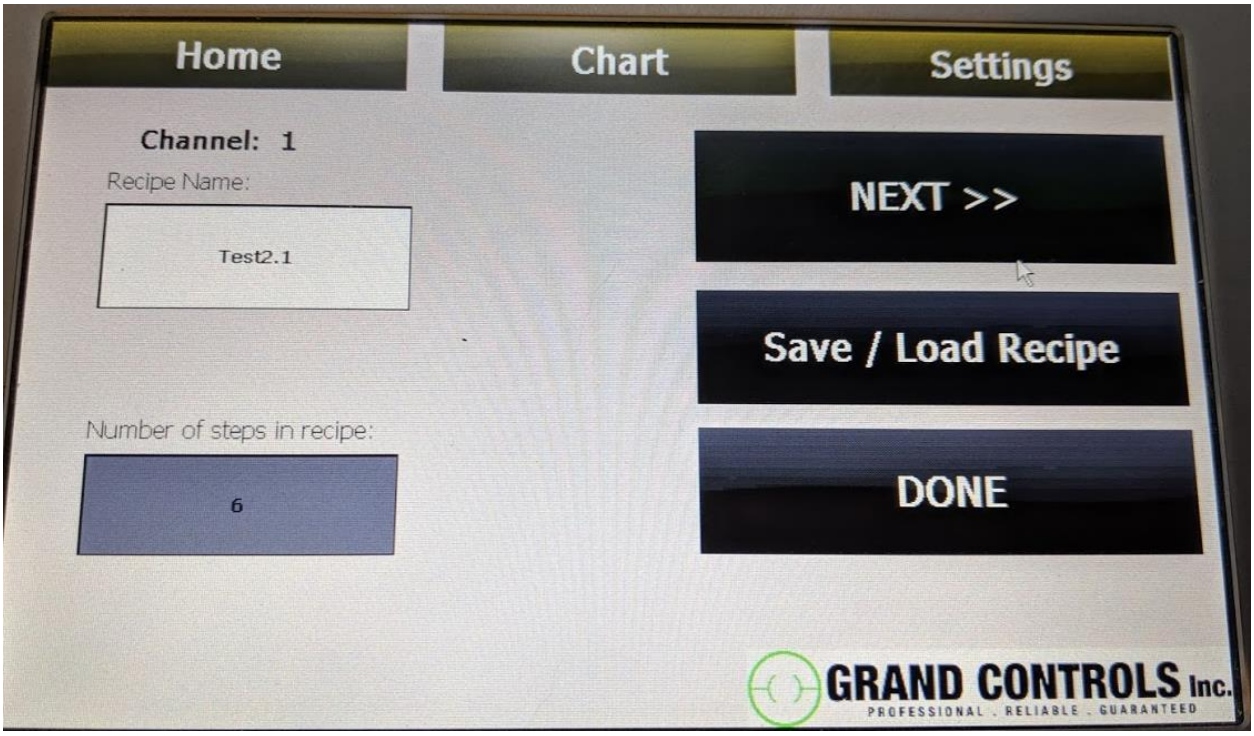

Figure 12: Recipe Edit main screen.

In the Recipe Edit main screen you can start editing the recipe in the channel. On this screen you can press on the text entry field below the title ‘Recipe name:’ to bring up a keyboard to type in a new name. When you have typed in a new name, press the ‘Done’ button on the keyboard. This will pass the new name to the controller immediately.

The value below the title ‘Number of steps in recipe:’ displays the current number of steps in the recipe. This value is not directly editable, but is a calculated number. As you modify the recipe for the channel it will be modified.

Once you have entered the recipe name, you can press on the ‘NEXT >>’ button to start editing the steps in the recipe. This will bring you to a new screen to allow you to edit the steps the heat cycle will need to follow. Once on this screen, you will need to set the step as either ‘RATE’ or ‘HOLD’ by pressing on one of the buttons at the top of the screen. Once the type of step has been set, the options for the step will appear for you to modify. The two different options are shown in the two figures below.

You can keep adding steps by pressing the ‘NEXT >>’ button at the bottom of the screen. You can go back and edit previous steps by pressing on the ‘<< PREV’ button. When you have entered all the steps for the recipe, you can press on the ‘End Recipe Here’ button to let the

system know that you have just edited the final step. This will bring you back to the channel setup screen.

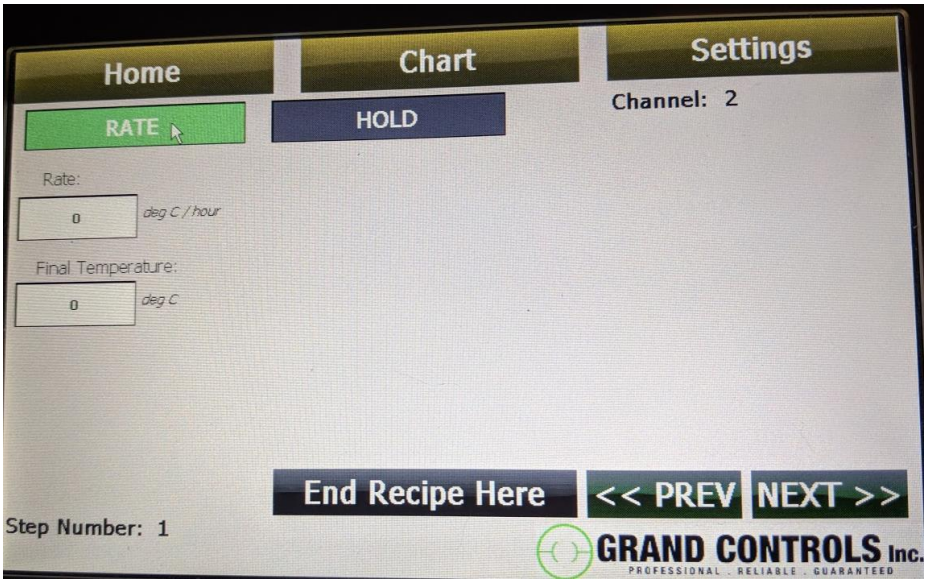

Figure 13: Recipe step editor – Rate step

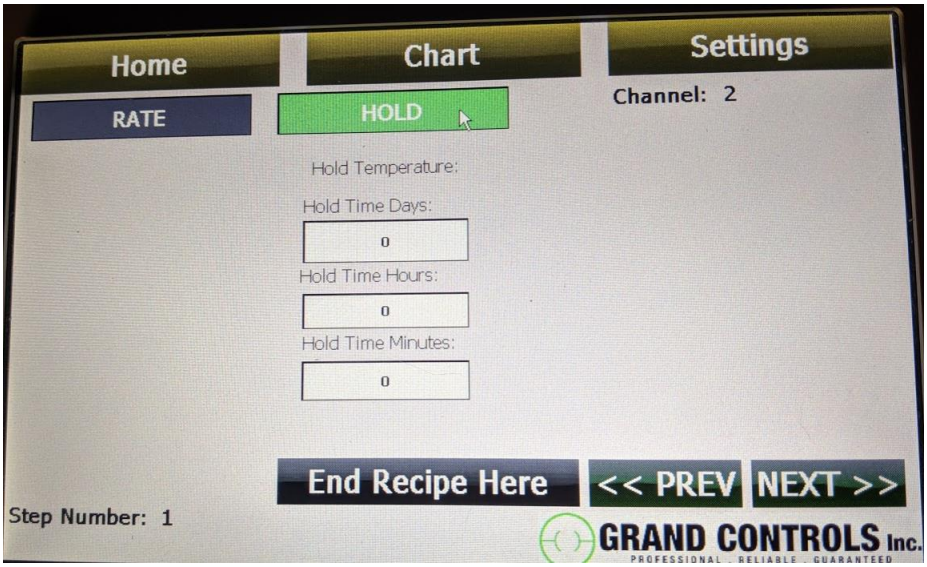

Figure 14: Recipe step editor - Hold step

PLEASE NOTE: The recipe you just entered is not saved to the permanent storage of the device. It is stored in the channels memory until it is edited or over written. You need to SAVE the recipe to store it to permanent storage.

d. Saving a recipe

If you edit a recipe in the channel, it will remain in the channel until changed. Once changed the recipe will be lost and the new one stored in the channel memory again. If you want to store the recipe locally and be able to recall it to other channels, you need to save it.

PLEASE NOTE: If a recipe is saved through this process, it will be available locally only. It is not the same as being saved by the computer application. To save it to the computer application it needs to be read by the computer application and saved through it.

To save a recipe, you need to go to the Channel's settings screen. From there, press on the 'Recipe Edit' button to edit the recipe. This screen will have a button on it titled 'Save /Load Recipe'. Press this button to go to the Save / Load screen. It will bring up a screen similar to the one shown in the figure below.

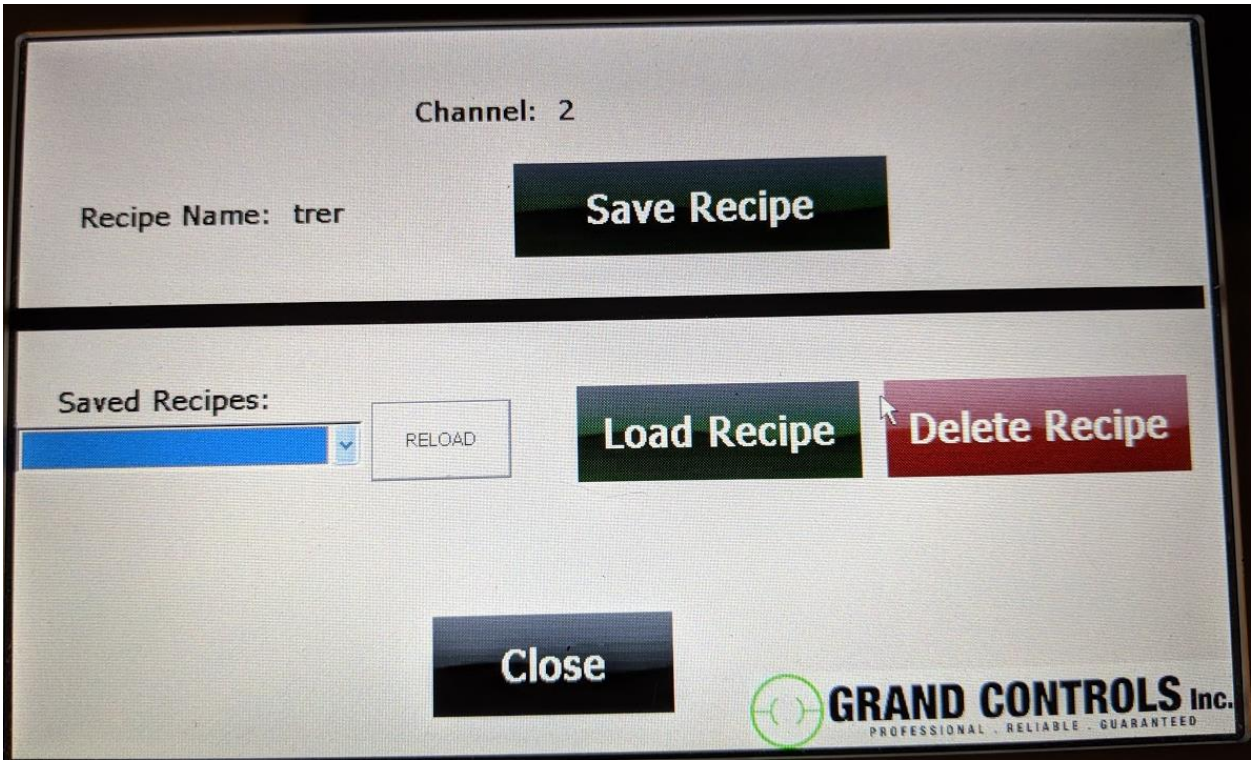

Figure 15: Recipe save/load screen

Once on the recipe Save/Load screen you can save the recipe currently setup in the channel to the local Hard Disk Drive.

Saving the recipe

Once on the Save/Load screen, you save the recipe by pressing on the 'Save Recipe' button once. The screen will not change. You will be able to check to make sure it is saved by pressing the 'Reload' button then pressing on the drop-down menu. This menu will show you a list of the

currently saved recipes on the system. If the new recipe name is on the list, it has been successfully saved.

Loading a recipe

Rather than re-creating a recipe in the channel, you can load a saved recipe. To do this follow these steps:

1) On the MAIN screen press the channel setup button for the channel you want to load the recipe to.
2) Set it to Auto Mode.
3) Press on the 'Recipe Edit' button.
4) Press on the 'Save / Load Recipe' button on the recipe edit screen.
5) On the Save/Load screen, press the 'Reload' button.
6) Press on the drop-down menu next to the reload button.
7) Scroll down to the recipe you have saved and want to use on this channel. Press on this recipe's name. this will highlight the recipe name and show it in the drop-down menu's window.
8) Press the 'Load Recipe' button. This will change the screen back to the recipe settings screen and the recipe will have been loaded.

Deleting a recipe

You can delete any recipe saved on the local Hard Disk Drive. To do this, follow these steps:

1) On the MAIN screen press any channel setup button that is not running.
2) Set the channel to Auto mode.
3) Press on the 'Recipe Edit' button.
4) Press on the 'Save / Load Recipe' button on the recipe edit screen.
5) On the Save/Load screen, press the 'Reload' button.
6) Press on the drop-down menu next to the reload button.
7) Scroll down to the recipe you have saved and want to delete. Press on this recipes name. this will highlight the recipe name and show it in the drop-down menu's window.
8) Press the 'Delete Recipe' button. This will delete the recipe.
9) Press the 'Reload' button again.
10) Press the drop-down menu next to the reload button again and scroll through to make sure your recipe is no longer there.

e. Step skipping in Auto Mode

When you are running a channel in Auto Mode, you will have the ability to pause the controller or skip steps in the recipe. Once a channel is running in Auto Mode, you press in the Channel Settings button on the MAIN screen to bring up a screen similar to the one in the image below.

If you press on the 'Pause' button, the Set Point will be held constant until you press the 'Resume' button that will appear under the 'Pause' button.

If you press the 'Next >' button the controller will jump to the next step in the recipe.

If you press the '< Prev' button the controller will jump to the previous step in the recipe.

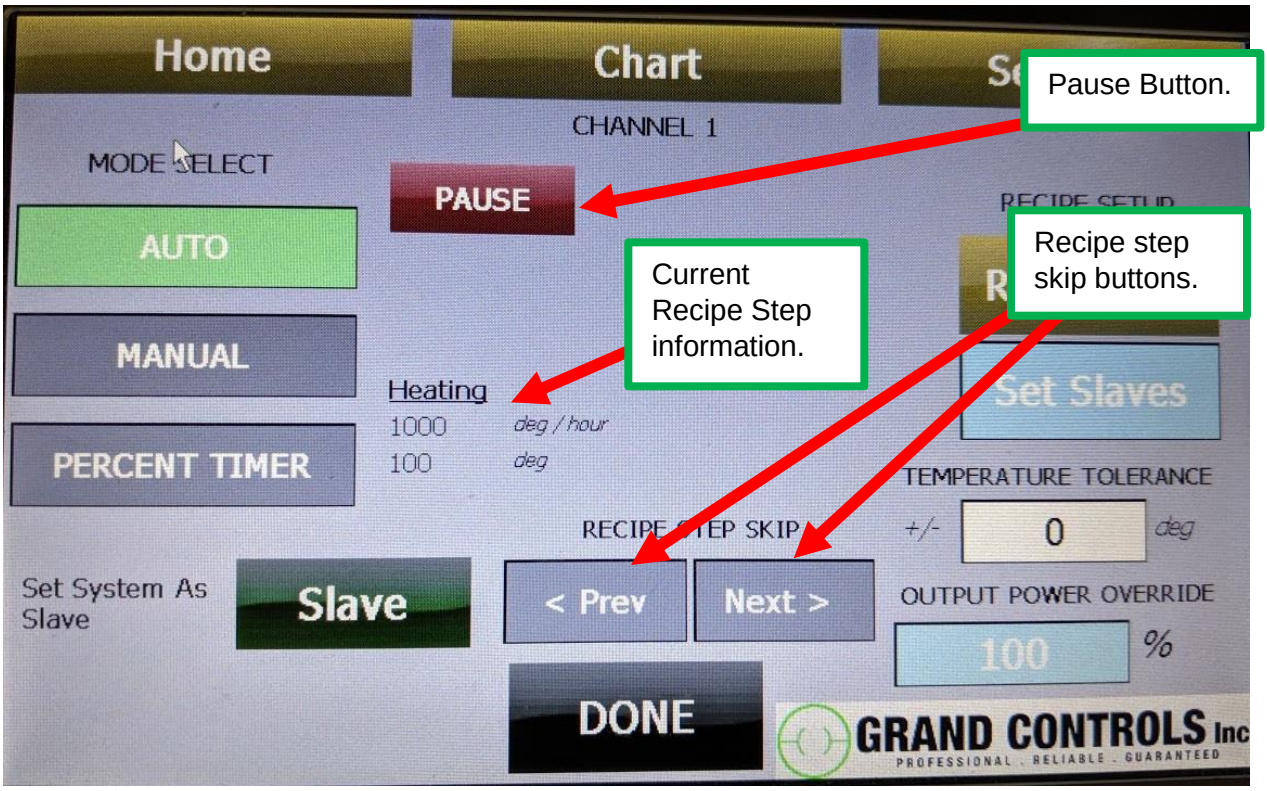

Figure 16: Channel - Auto Mode step manipulations

PLEASE NOTE: These buttons will only be available if the channel is not a slave channel.

f. Chart screen

Each channel will record the temperature from its thermocouple. The temperature progress can be seen on the screen. To access the chart screen to see the temperature progress, press on the 'Chart' button for the corresponding channel on the MAIN screen. This will bring up the chart for the specific channel. If the channel is running and it has slave channels, then the slave channel charts will be displayed on this chart too. There is a maximum of 9 different charts allowed on a single chart screen at a time. So, if the channel has more than 8 slave channels, only the first 8 slaves will be displayed. This is not a limitation on the computer application.

The figure below shows an example of the charting screen. The chart screen has 4 buttons on it. They are described here:

1) **Close button**: This button will close the chart and return you to the MAIN screen.
2) **Reset Button**: If the current chart has more than 1 chart on it, pressing this button will remove all the charts added to this chart, unless they are slave channels.

3) **Add button**: If you want to add another chart to the current chart, you can press the Add button. This will bring up a screen with a button for every channel that is currently running.
4) **Remove button**: This button will bring up screen with a list of buttons. Press on the button for the channel number you want to remove from the chart and it will remove it.

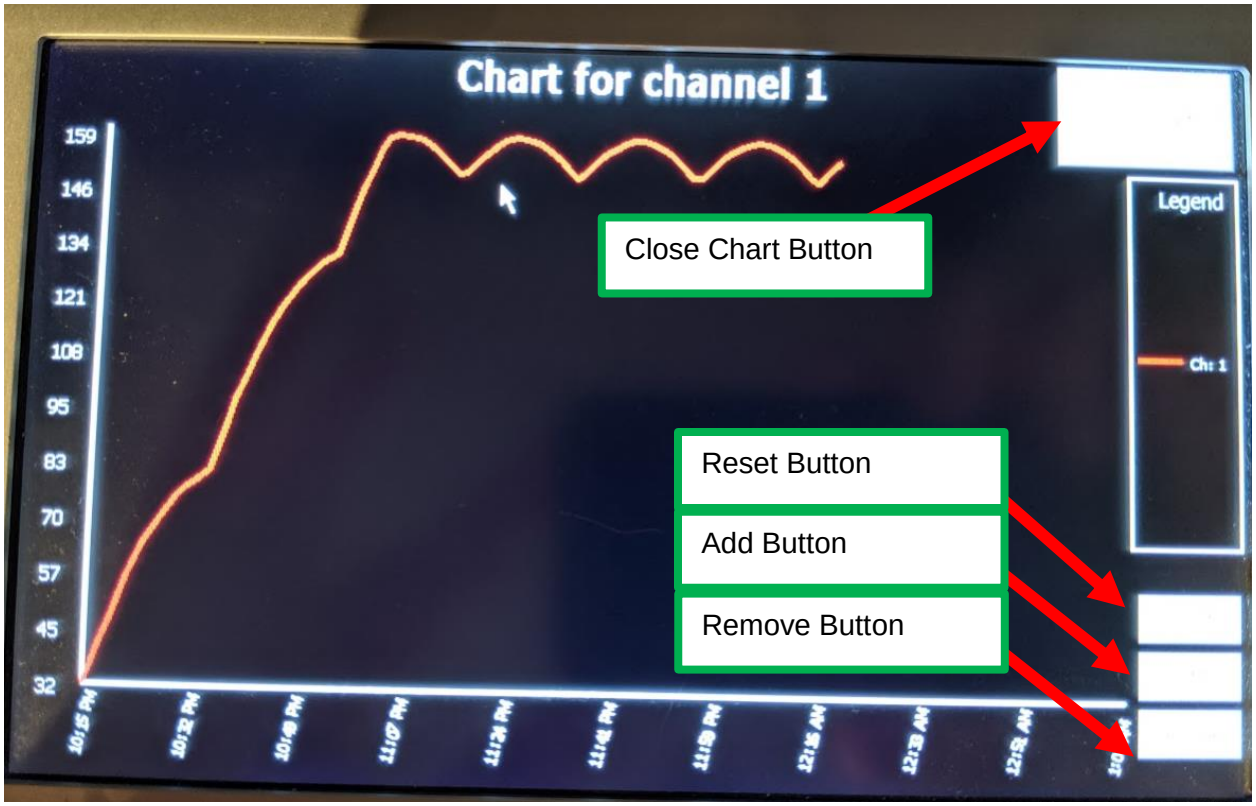

Figure 17: Chart screen

PLEASE NOTE: Pressing on the 'Chart' button in the navigation bar at the top of a screen will bring up the last chart selected from the MAIN screen.

g. Settings screen

The Settings screen will enable you to set the parameters for each channel as well as show the local system information and allow you to connect to a remote HEATVIEW controller. This is all described here.

System settings

Currently, the only system settings available for the HEATVIEW controller is the C.T. ratios. These values are used by the system to calculate the current output for each channel. To modify a value, press on the value and enter the new number on the keypad that shows up.

The other available setting is the temperature settings for the controller. To switch between Celsius and Fahrenheit, press on the button. The text on the button will let you know what the system is set to run in.

System information and remote connection

If you press on the 'Remote Connection' button at the bottom of the Settings screen, it will bring up the system information screen. This screen will look similar to the picture in the figure below.

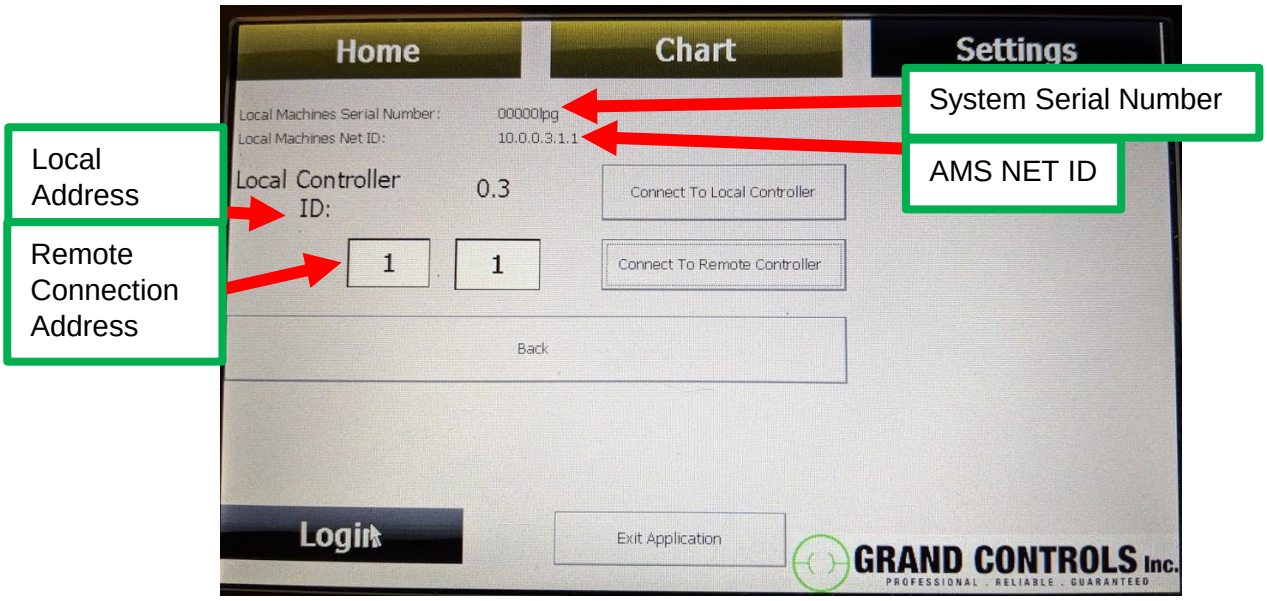

Figure 18: System info / remote connection screen.

Once on this screen, you can see your system's serial number, it's AMS NET ID and the local controllers ID.

PLEASE NOTE: If you are connecting to this controller via the computer application, the 'Local Controller ID:' is the address you need to type into the computer application to establish a connection.

Controlling a remote controller

You have the ability to connect to another controller through this controller. To do this, you need to:

1) Connect them together with an Ethernet cable.
2) Turn off one of their 'Stand Alone Switches' on the rear of the control box.
3) Take note of the other controllers 'Local Address'.

4) Type the ‘local address’ of the other controller into the ‘Remote Connection Address’ boxes.
5) Press the button ‘Connect to Remote Controller’. If this is the first time these controllers are connecting to each other, please continue on to the next step, otherwise jump to step 10.
6) Once you press the ‘Connect to Remote Controller’ button a red message will appear on the screen stating “New Connection Created – Repeat this process on the remote controller, then REBOOT CONTROLLER FOR CONNECTION TO WORK!”. (Similar to the image below)

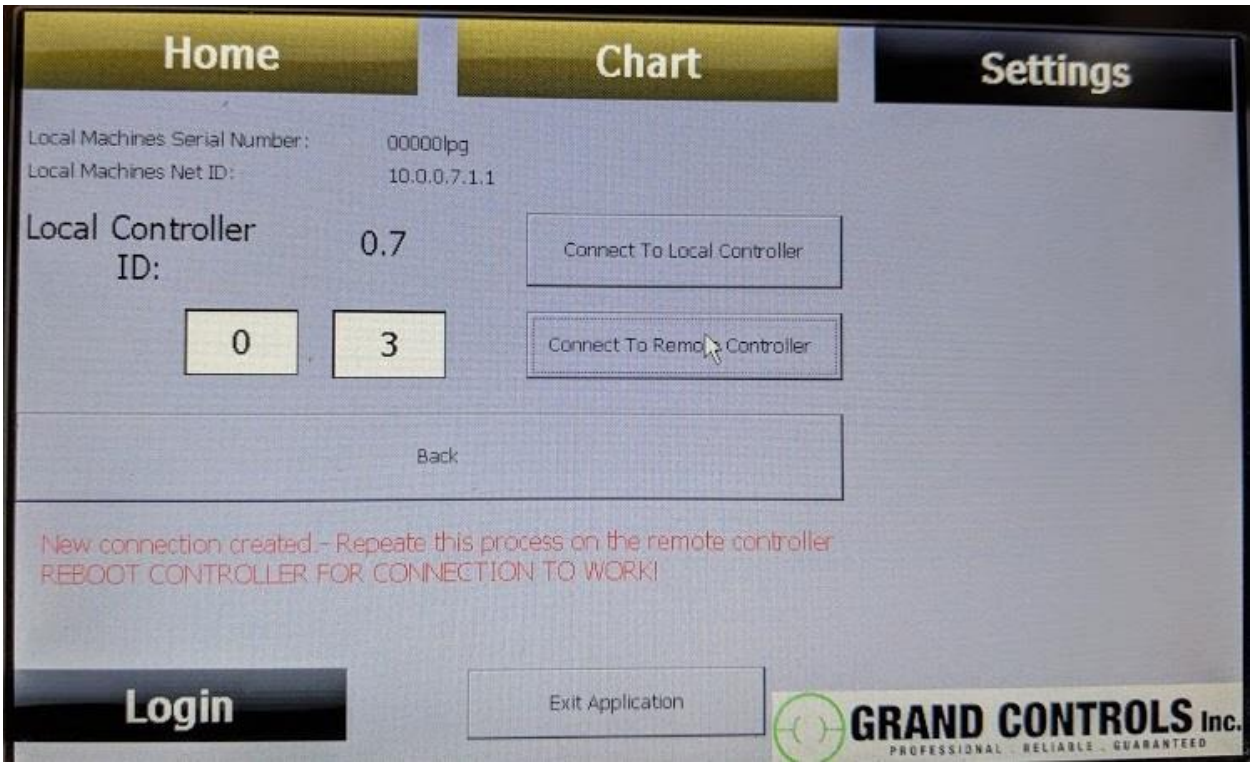

Figure 19: Remote connection warning label.

7) Go to the remote controller and type in the address of the controller you were just working on and press the ‘Connect to Remote Controller’ button.
8) Reboot both controllers. (Wait more than 10 seconds for the controller to power down completely before restarting)
9) Go back to the main controller and re-enter the address of the remote controller and press the ‘Connect to Remote Controller’ button.
10) Once connected a red warning block will appear on the screen showing that it is controlling a remote controller. Anything you do on the touch screen will only affect the remote controller. The images below show the REMOTE warning connection.

Figure 20: Remote connection warning

Changing back to control local controller

Once you are done setting up the remote controller, press on the ‘Connect to Local Controller’ button on the “System info / remote connection screen”, as shown in Figure 18. This will remove the ‘REMOTE’ message from the front screen and will make the screen control the local controller again.

h. Faults screen

The controller will list the current faults on the system if there are any. As new a fault occurs on the controller, a faults window will pop-up on the touch screen with a message letting you know what is wrong. To hide the screen so you can continue working, you can press the 'ACK' button on the faults screen.

PLEASE NOTE: Pressing the 'ACK' button on the faults screen will hide the faults screen and will also try to reset all the current faults. If the fault cannot be reset at this time, it will remain active, but the fault screen will be hidden.

PLEASE NOTE: If the fault screen is present for a critical fault that cannot be reset, you can ignore the fault screen by pressing on the display next to the Fault screen. Pressing the 'ACK' button will try and reset the fault, which will generate a new warning and bring the fault screen back.

If there is an active fault present the 'FAULTS' button on the HMI will be colored red, otherwise it will be grey. The figure below highlights the fault screen and the different fault button colors.

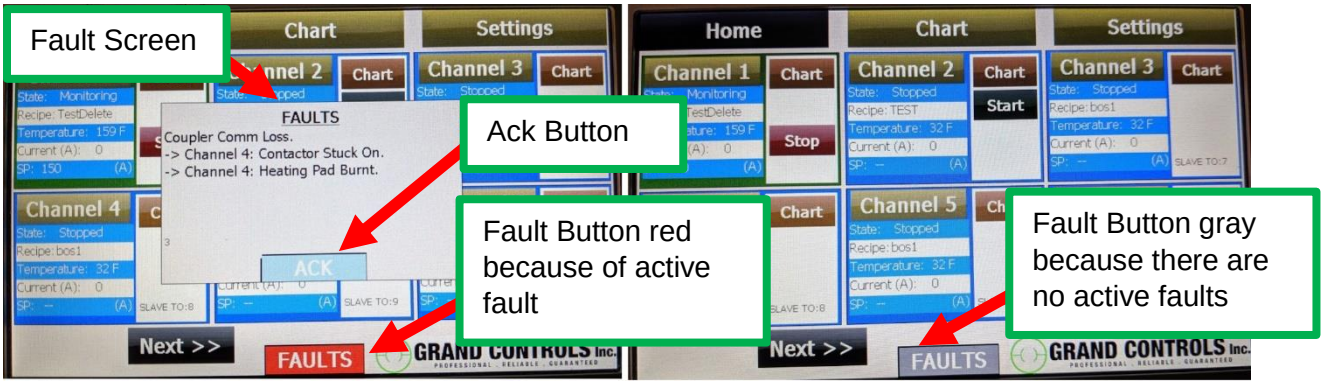

Figure 21: Faults screen and fault button colors

If the fault screen is not visible and the fault button is red, you can press on the 'FAULTS' button to show the faults screen.

There are two types of faults:

1. Channel Faults: These are faults specific to a channel.
2. System Faults: These are system level faults, that are not exclusive to a channel.

A table listing all the faults and their possible causes are shown in the table below.

6. Faults

Channel Faults	
Fault	**Explanation**
Thermocouple unplugged	This fault occurs if a thermocouple becomes disconnected from the controller. If this fault occurs, the channel will be stopped and cannot be re-started until a thermocouple is plugged into the channel.
Thermocouple Loose	This warning occurs if the system sees a rise in the required output power of a channel while it is in a long hold period. It assumes that the thermocouple has come loose from the workpiece. **It does not stop the channel and is merely a warning.**
Contactor Stuck On	If the system turns off a contactor for the specific channel and it sees output current, this fault will appear. Check your contactor to make sure it is cycling correctly. **It does not stop the channel and is merely a warning.**
Heating Pad Burnt	If the output current of a channel suddenly drops, the system will throw this fault. It does not stop the channel from running, but merely marks a fault for you to check your heating pads. **It does not stop the channel and is merely a warning.**
System Faults	
Fault	**Explanation**
Coupler Comm Loss	This fault arises when the system can no longer see the internal coupler. The cause of this error can be either a faulty cable or a damaged module. This fault is typically followed by a few other faults. If this fault is present, you can ignore all other faults and focus on this one. To remedy the situation, please contact your service technician or distributor.
I/O module X Comm Loss	This fault occurs if you have a faulty/defective module in the IO system. To remedy the situation, please contact your service technician or distributor.
Internal Storage Write Fault.	This fault occurs if the system is unable to store heat cycle data to the internal storage card. Your system will continue to run with this fault active.

	To remedy the situation, please contact your service technician or distributor.