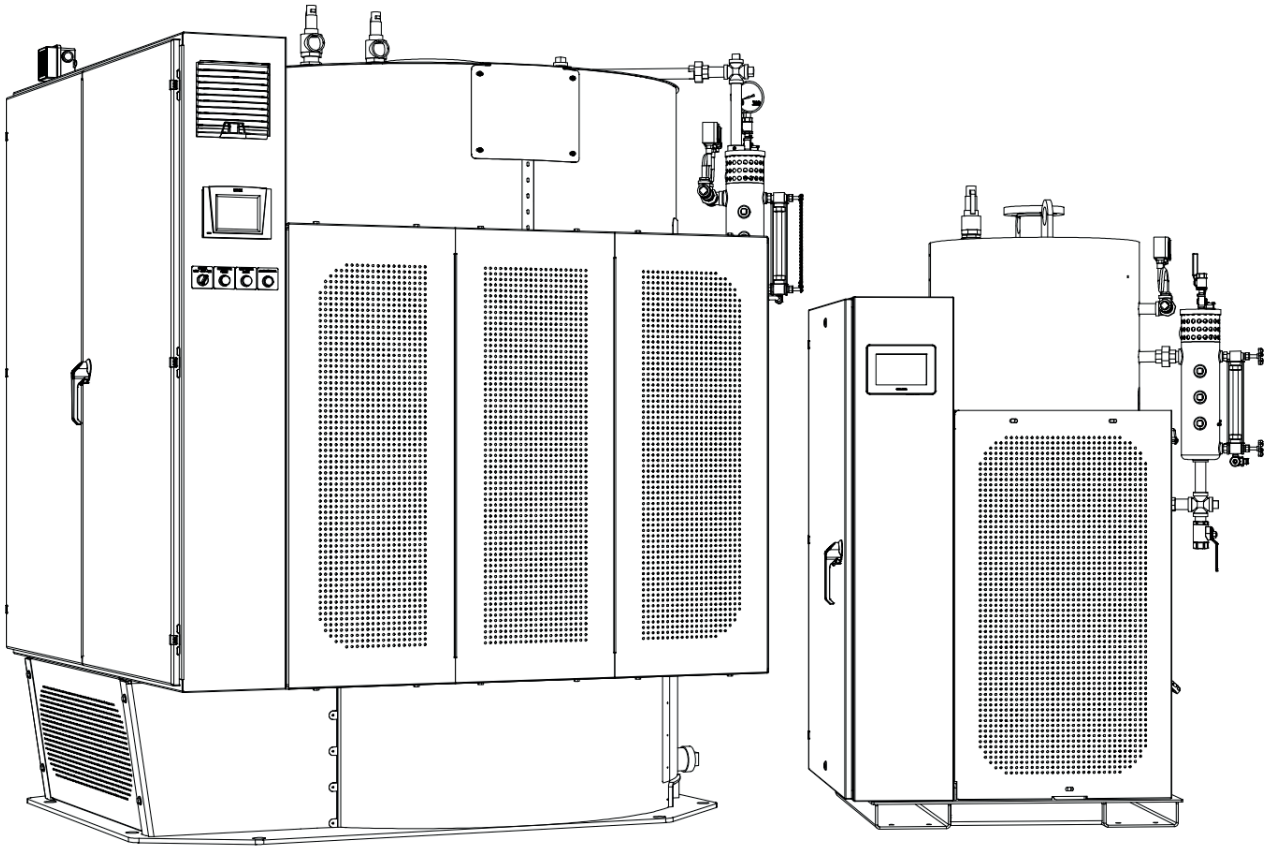
INSTALLATION & OPERATION INSTRUCTIONS

CHSI SERIES
CONTROLS USER MANUAL



CHROMALOX

CHSI-CTRL-2024-0927
January 2025

TABLE OF CONTENTS

⚠WARNING

This user manual is specific to the usage of the SC750 and should be used in conjunction with the current version of the respective boiler's Installation and Operation manual. Both should be read in their entirety and be made permanently available to the staff responsible for equipment operation.

This user manual should not be considered as a complete guide, nor should it replace existing guides or standards which may be applicable. Chromalox reserves the right to change any part of this user manual and the corresponding Installation and Operation manual without notice.

Do not install, operate, service or repair any component of this equipment unless you are qualified and fully understand all requirements and procedures.

All information in this user manual is for reference and guidance purposes, and does not substitute for required professional training, conduct, and strict adherence to applicable jurisdictional/professional codes or regulations.

INTRODUCTION

OVERVIEW

This addendum is specific to the usage of the SC750 and should be used in conjunction with the current version of the CHSI Installation and Operation manual.

Chromalox reserves the right to change any part of this addendum.

When using this addendum, observe all warnings, cautions, and notes in literature, on stickers and labels, and any additional safety precautions that apply. Follow all safety codes and wear appropriate safety protection. Follow all jurisdictional codes and consult any jurisdictional authorities prior to installation.

WARNINGS & CAUTIONS

WARNINGS and CAUTIONS appear in various chapters of this manual. It is critical that all personnel read and adhere to all information contained in WARNINGS and CAUTIONS.

·WARNINGS must be observed to prevent serious injury or death to personnel.
·CAUTIONS must be observed to prevent damage or destruction of equipment or loss of operating effectiveness.

All Warnings and Cautions are for reference and guidance purposes, and do not substitute for required professional training, conduct, and strict adherence to applicable jurisdictional/professional codes or regulations.

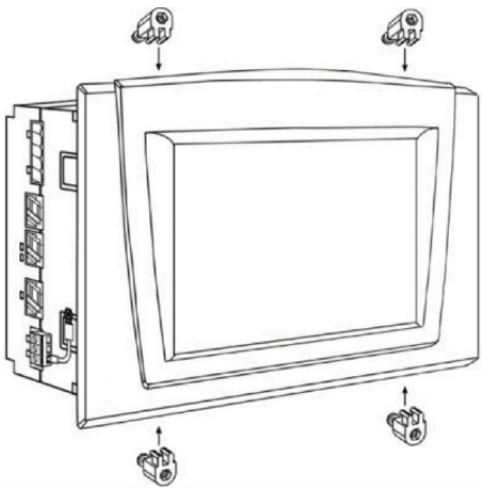
DISCLAIMERS & LOCAL CODES

Installation of the equipment shall conform to all the requirements of all national, state and local codes established by the authorities having jurisdiction or, in the absence of such requirements, in the US to the National Electric Code (NEC)/ National Fire Protection Association (NFPA) 70 latest edition, and the specific instructions in this addendum.

Authorities having jurisdiction should be consulted prior to installation.

INSTALLATION

OVERVIEW



Steam SC750 Control Hardware and screen navigation are explained in the following sections.

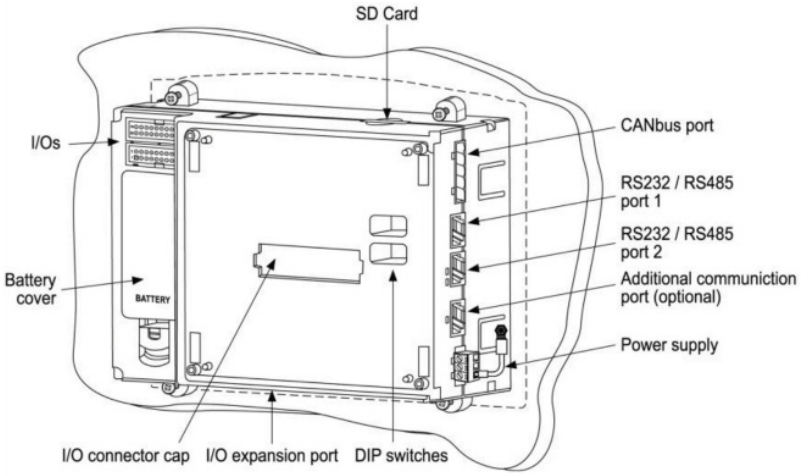
Screenshots are for reference only and will vary by boiler product line and Software Version installed.

Please be aware of which configuration has been supplied for your application.

The customer should examine the equipment for any damage. It is the responsibility of the installer to ensure all parts supplied with the equipment are fitted in a correct and safe manner.

DISPLAY HARDWARE

The SC750 Hardware is shown below.

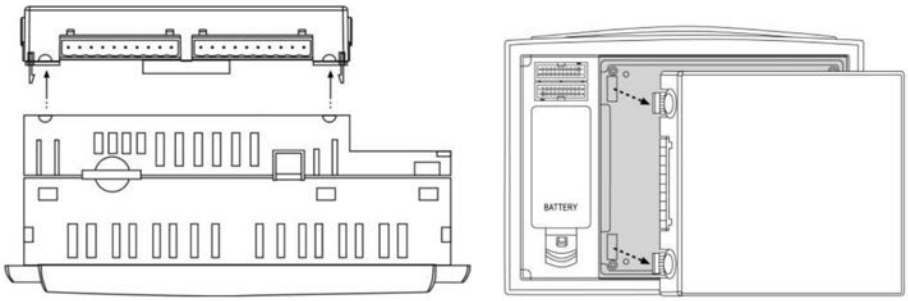


REMOVING SNAP-IN I/O MODULE

1. Locate the four buttons on the sides of the controller, two on either side.

2. Press the buttons and hold them down to open the locking mechanism.

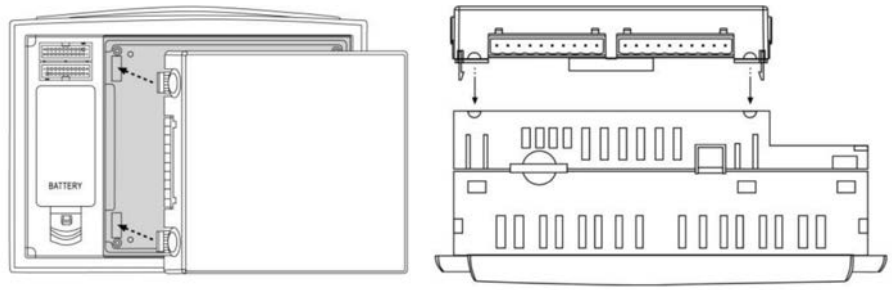
3. Gently rock the module from side to side, easing the module from the controller.



RE-INSTALLING SNAP-IN I/O MODULE

1. Line the circular guidelines on the controller up with the guidelines on the Snap-in I/O Module as shown below.

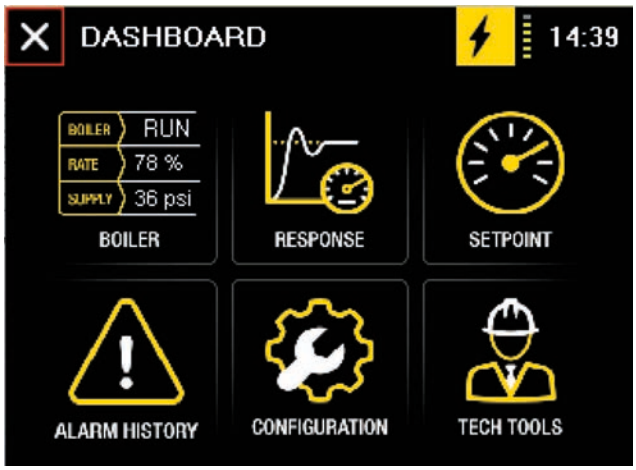
2. Apply even pressure on all 4 corners until you hear a distinct ‘click’. The module is now installed. Check that all sides and corners are correctly aligned



SCREEN NAVIGATION

The boiler control system features and integrate color touchscreen display thought which many commissioning and operation tasks are performed, including steam pressure control, BMS integration, and Electric Element staging. The Graphical interface is navigated by touch using your finger or a stylus.

The screens are grouped into categories, and each serves a unique function for changing parameters and viewing statuses. To navigate, start from the main menu and select the desired category or screen selection.



MAIN MENU PICTURE

⚠WARNING

All information in this user manual is for reference and guidance purposes, and does not substitute for required professional training, conduct, and strict adherence to applicable jurisdictional/professional codes or regulations.

Follow all proper lockout/tagout procedures for service. Before beginning any service, ensure area is free of combustible materials and other dangers.

The information contained in this manual is written to cover a wide range of functions and features, some of which may not be available on every boiler. Human Machine Interface (HMI), algorithms, features and functions will vary depending on program version and boiler model. For detailed information specific to your boiler, please have your boiler Serial Number and software version ready and contact your Chromalox Representative for further support.

⚠WARNING

This user manual is specific to the usage of the SC750 and should be used in conjunction with the current version of the respective boiler's Installation and Operation manual. Both should be read in their entirety and be made permanently available to the staff responsible for equipment operation.

⚠WARNING

This user manual should not be considered as a complete guide, nor should it replace existing guides or standards which may be applicable.

Chromalox reserves the right to change any part of this user manual and the corresponding Installation and Operation manual without notice.

Do not install, operate, service or repair any component of this equipment unless you are qualified and fully understand all requirements and procedures.

All information in this user manual is for reference and guidance purposes, and does not substitute for required professional training, conduct, and strict adherence to applicable jurisdictional/professional codes or regulations.

CONTROLS MENUS

The screenshots and information in this section will guide you through the control menu screens.

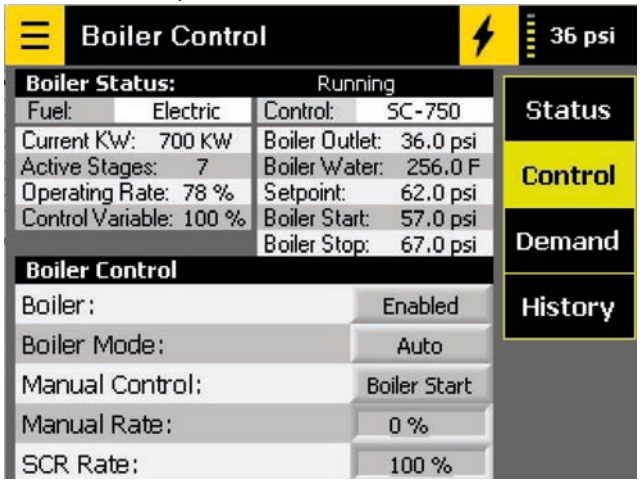
BOILER MENU

Provides information on how the boiler is operating including pressure setpoints, on/off points and operating percentages.

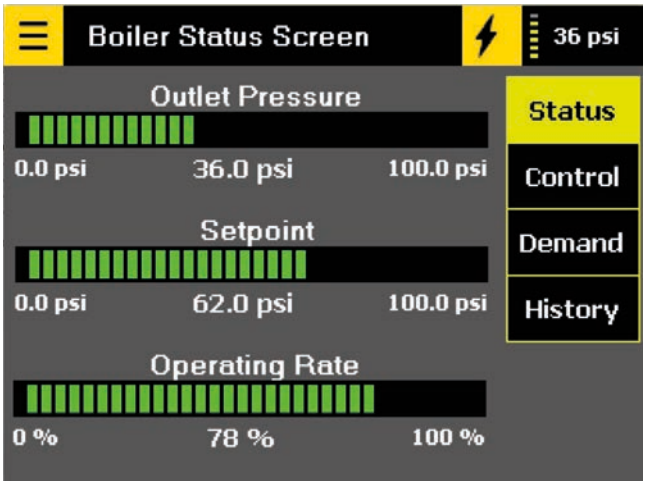
· Boiler Control

This screen is used for multiple functions including operator Enable/Disable, Auto/Manual Control, and Interface selection.

When in Automatic Control the temperature controller will energize and modulate elements to achieve the setpoint. To enter Manual Control, tap the Automatic Control button, and it will change to Manual Control. Enter a Manual Control Rate in the box. The boiler will now operate to the user defined rate. When finished return to this screen and place the boiler back into Automatic.



BOILER CONTROL MENU



BOILER STATUS MENU

Table 1 - Parameters

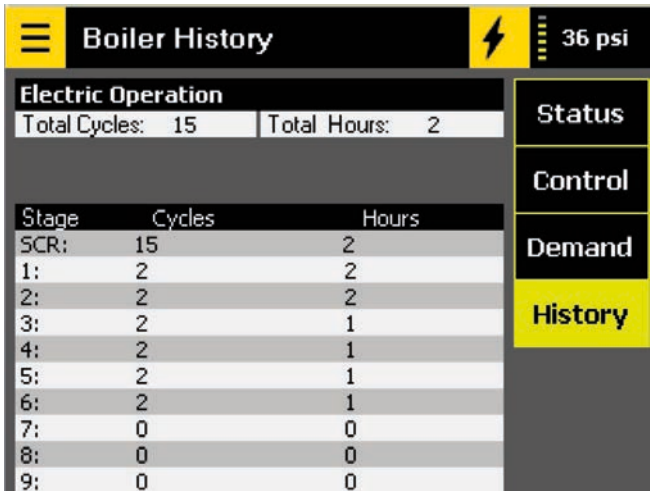
Parameter Name	Range	Unit	Description	Wiring	Modbus Register
Boiler Status	0-1 Reserved 2 - Boiler Off 3 - Reserved 4 – Standby 5-6 – Reserved 7 – Running 8 – Reserved 9 – Disabled 10 – Heat Demand 11-12 Reserved 13 – High Pressure Limit 14 – Reserved 15 – Disabled by BMS 16-17 Reserved 18 - Modsync Communication Error 19 – Reserved 20 – BMS Comm Error 21 – Low Water Level 22 – Reserved 23 – Disabled by Modsync 24 – Boiler Alarm 25 – Cold/Slow Start 26-27 Reserved 28 - Safety String Open	N/A	Current Operating sequence of the boiler.	N/A	N/A
Fuel	1 - Electric	N/A		N/A	(4)1822 INT16 Read
Control	0 – Local / SC750 1 – Modsync 2 – Remote SP 3 – Remote I/O 4 – BMS COM SP	N/A	Determines where the setpoint is coming from.		N/A
Outlet Pressure	0 to 200.0	Psi	Current Operating Pressure		(4)1816 INT16 Read
Setpoint	0 to 200.0	Psi	Pressure Setpoint		(4)1803 INT16 Read/Write
Start Boiler	0 to 200.0	Psi	Pressure at which the boiler will have a call for heat		N/A
Stop Boiler	0 to 200.0	Psi	Pressure at which the boiler will lose the call for heat		N/A
Current kwh	0 to 10,000	kWh	Calculation of the total number or elements energized.		(4)1836 INT16 Read
Active Stages	1 to 10	N/A	Total number stages that are energized		(4)1823 Int16 Read

Table 1 - Parameters (Continued)

Parameter Name	Range	Unit	Description	Wiring	Modbus Register
Operating Rate	0 to 100	%	Calculated percentage of the currently energized elements compared to the total number of elements		(4)1838 INT16 Read
Control Variable	0 to 100	%	PID based variable used to determine staging and boiler operation		N/A
Boiler Mode Auto/Manual	Enabled/Disabled	N/A	Will show current state depending on boiler status. Operators can also toggle between Enabled/Disabled if the boiler could normally operate.	N/A	N/A
Manual Control	Boiler Start / Boiler Stop	N/A	Starts and stops the boiler while in Manual Control	N/A	N/A
Manual Rate	0 to 100	%	Operating rate at which the boiler should run at in Manual.		N/A
SCR Rate	0 to 100	%	Reference signal to the SCR used to modulate the electric ele-ments.	Factory installed SCR 4-20mA Analog Output	N/A

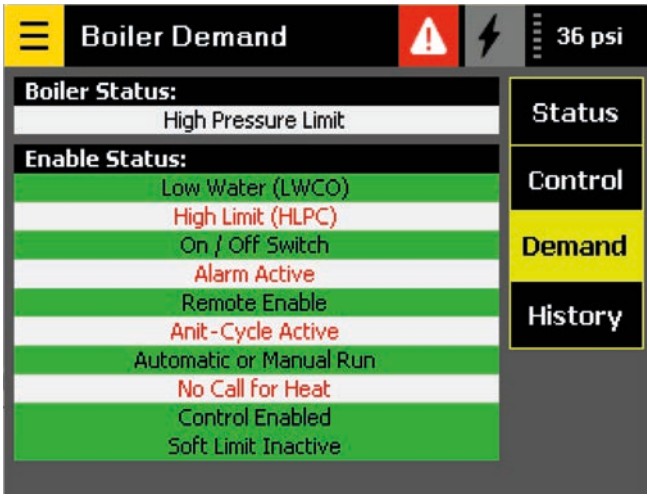
- **Boiler History**

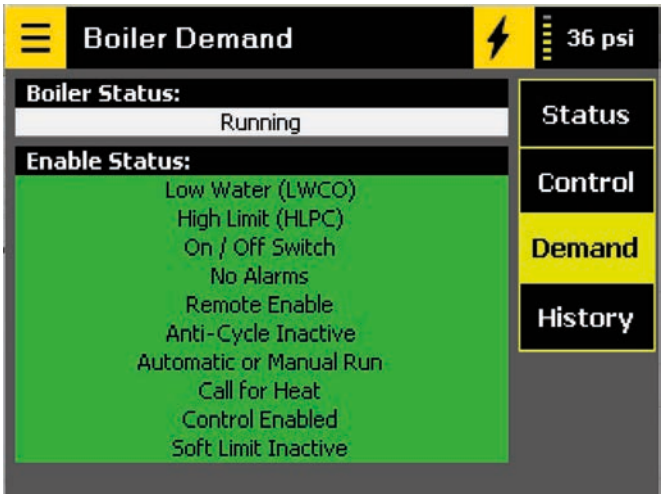
Displays Current Information for the Element/Stages including active stages (green), staging order, individual hours or operation, cycles, and kWh.



- **Boiler Demand**

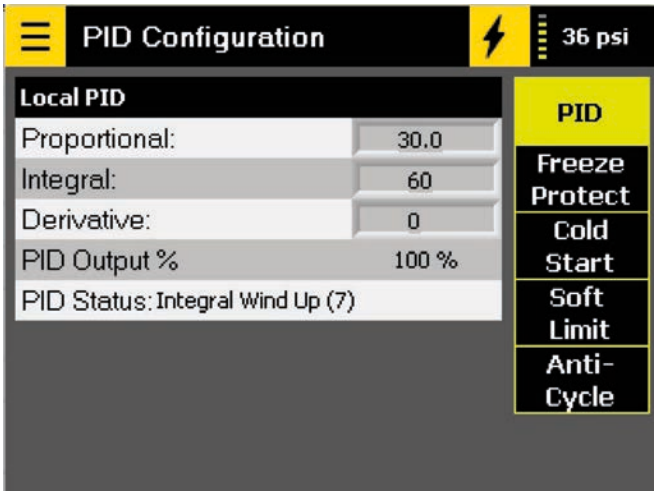
Used as a quick reference to determine the status of items required for the boiler to run. All items should be green during normal operation and call for heat.





- **PID Configuration**

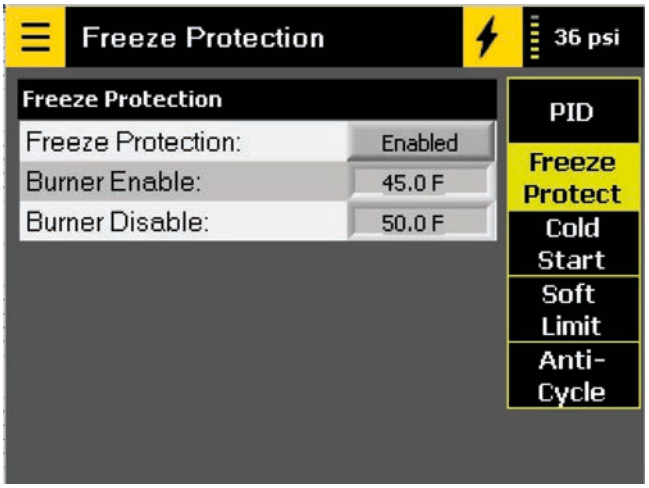
The PID is used to calculate the control variable, which is used to stage contactors as well as reference signal for the SCR used for electric element modulation between stages.



Parameter Name	Range	Unit	Description	Wiring	Modbus Register
Proportional	0 to 100.0	%	Represented as a percentage of the boiler outlet sensor range.	Factory installed and scaled outlet pressure transducer. Analog input 4-20mA	N/A
Integral	0 to 3600	Seconds	Sum of the PID deviation from setpoint over time and will help increase/decrease the PID output slowly. A 0 disables the Integral function	N/A	N/A
Derivative	0 to 20	Psi/s	Based on current rate of change for the PID and Acts as a brake or damper	N/A	N/A
PID Output %	0 to 100	%	Calculated Output for the PID. Used to stage contactor and electric element stages as well as reference signal for the SCR used for electric element modulation.	N/A	N/A
PID Status		N/A	Operating State of the PID	N/A	N/A

- **Freeze Protection**

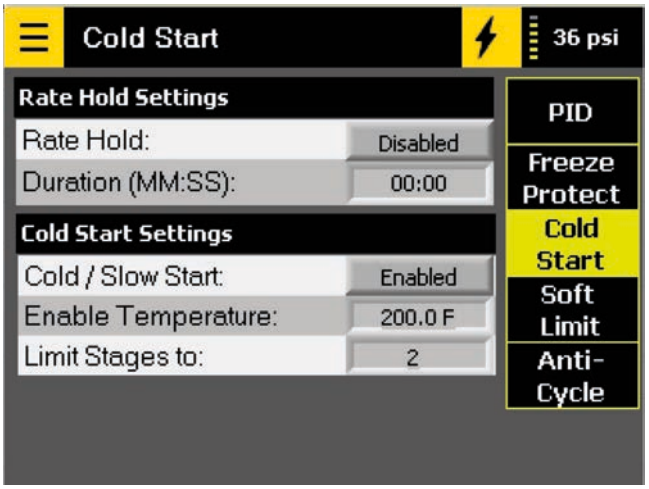
Designed to keep the boiler from damage associated with freezing by running the boiler to a user defined water temperature.



Parameter Name	Range	Unit	Description	Wiring	Modbus Register
Freeze Protection	Enable/Disable	N/A	Turns the Freeze protection feature on or off	Factory installed water Temperature Sensor	N/A
Burner Enable	0.0 – 200.0	Deg F	Temperature below which the boiler will receive a call for heat	Factory installed water Temperature Sensor	N/A
Burner Disable	0.0 – 200.0	Deg F	Temperature at which the freeze protection will stop running the boiler	Factory installed water Temperature Sensor	N/A

- **Cold Start**

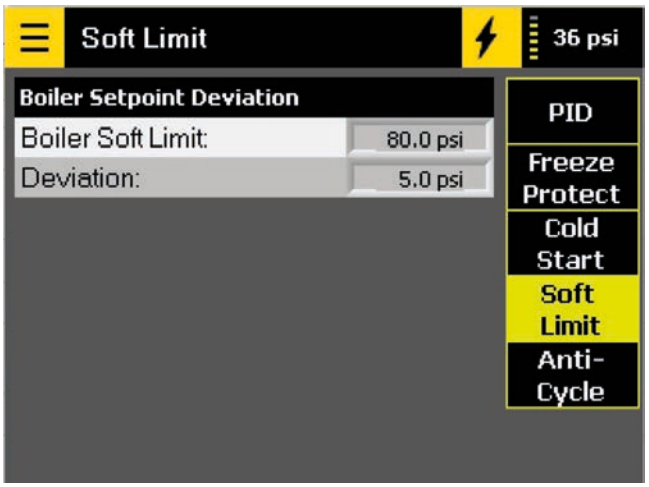
Limits the modulation rate of the boiler until a user defined water temperature is reached.



Parameter Name	Range	Unit	Description	Wiring	Modbus Register
Rate Hold	Enable/Disable	N/A	Turns the Rate Hold feature on or off	N/A	N/A
Duration	00:00 to 59:59	Deg F	Time for which the boiler runs at the low modulation rate after a call for before releasing to modulate normally.	N/A	N/A
Cold / Slow Start	Enable / Disabled	N/A	Turns on or off the Cold/Slow Start Feature	N/A	N/A
Enable Temperature	0 to 200.0	Deg F	Temperature below which the cold start is active. Once the water temperature has increased above the elements will stage normally.	Factory installed water temperature sensor.	N/A
Limit Stages To	1 to 10	N/A	Maximum number of electric stages allowed to turn on while below a customer selected boiler water temperature.	N/A	N/A

- **Soft Limit**

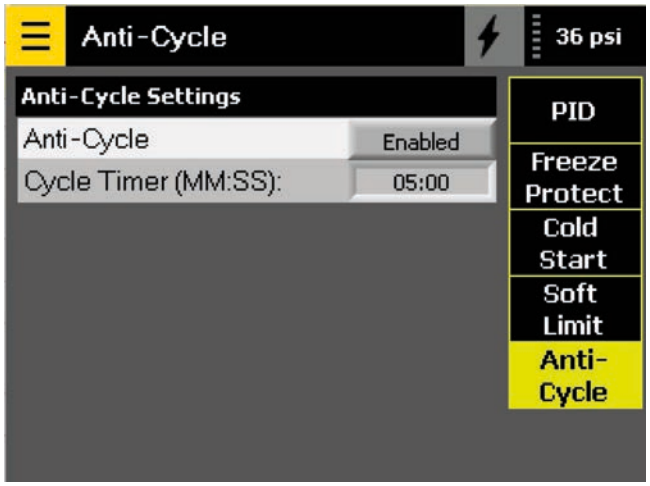
Useful in Lead/Lag setups the Soft Limit will reduce the boiler modulation rate when the outlet pressure becomes excessive. The Soft Limit serves as a buffer for the Manual Reset High Limit and can reduce short cycling based on pressure.



Parameter Name	Range	Unit	Description	Wiring	Modbus Register
Boiler Soft Limit	0.0 to 200.0	Psi	Customer Selected pressure at which the boiler will reduce the modulation rate.	Factory Wired Outlet Pressure	N/A
Deviation	0.0 to 20.0	Psi	How far below the soft limit pressure that the boiler will release to modulate again.	N/A	N/A

- **Anti Cycle**

Minimum amount of time that the boiler will remain OFF in between cycles and before it can receive an new call for heat.

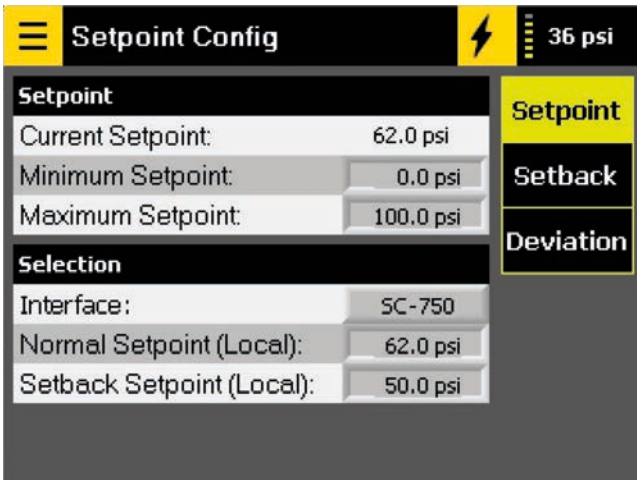


Parameter Name	Range	Unit	Description	Wiring	Modbus Register
Anti-Cycle	Enable/Disable	N/A	Turns the Anti-Cycle option on or off	N/A	N/A
Cycle Timer	00:00 to 59:59	MM:SS	Minimum time off	N/A	N/A

SETPOINT MENU

- **Setpoint Configuration**

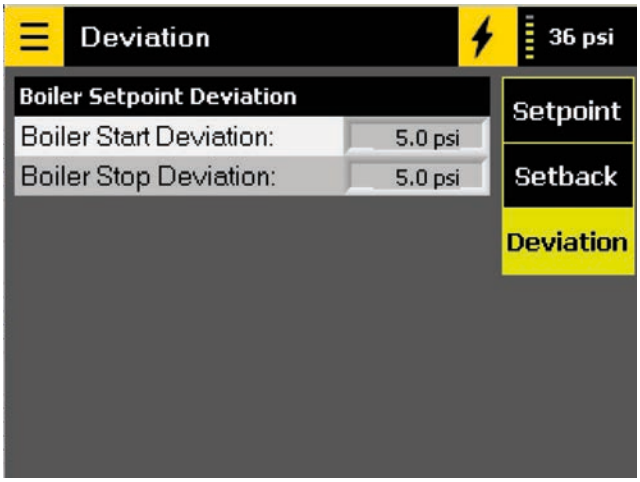
Used to set the local boiler setpoint as well as minimum and maximum setpoint ranges.



Parameter Name	Range	Unit	Description	Wiring	Modbus Register
Current Setpoint	0 to 200.0	Psi	Current setpoint being used by the boiler regardless of source	Modbus RTU or Hardwire connections depending on control type.	(4)1803 INT16 Read
Minimum Setpoint	0 to 200.0	Psi	Absolute minimum setpoint that the boiler will control too. Will override values that are lower from any source.	Modbus RTU or Hardwire connections depending on control type.	N/A
Maximum Setpoint	0 to 200.0	Psi	Absolute maximum setpoint that the boiler will control too. Will override values that are lower from any source.	Modbus RTU or Hardwire connections depending on control type.	N/A
Interface	0 – Local /SC750 1 – Modsync 2 – Remote SP 3 – Remote I/O 4 – BMS COM SP	N/A	Determines where the setpoint is coming from.	Modbus RTU or Hardwire connections depending on control type.	(4)1804 INT16 Read
Normal Setpoint	0 to 200.0	Psi	Local Setpoint entered on HMI and determined by Operator	N/A	N/A
Setback Setpoint	0 to 200.0	Psi	Setback Setpoint entered on the HMI and determined by the Operator	N/A	N/A

• Deviation

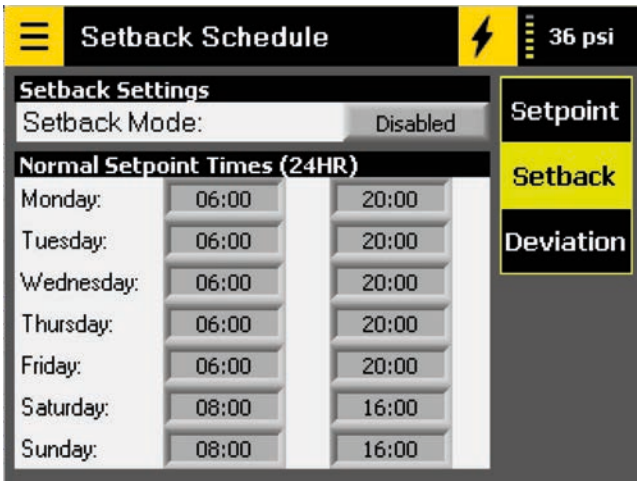
Useful in Lead/Lag setups the Soft Limit will reduce the boiler modulation rate when the outlet pressure becomes excessive. The Soft Limit serves as a buffer for the Manual Reset High Limit and can reduce short cycling based on pressure.



Parameter Name	Range	Unit	Description	Wiring	Modbus Register
Boiler Start Deviation	0 to 20	Psi	Pressure below setpoint when the boiler will receive a call for heat.	N/A	N/A
Boiler Stop Deviation	0 to 20	Psi	Pressure above setpoint when the boiler will be shut off.	N/A	N/A

• Setback Schedule

Used to select timeframes for the normal and setback modes of operation.

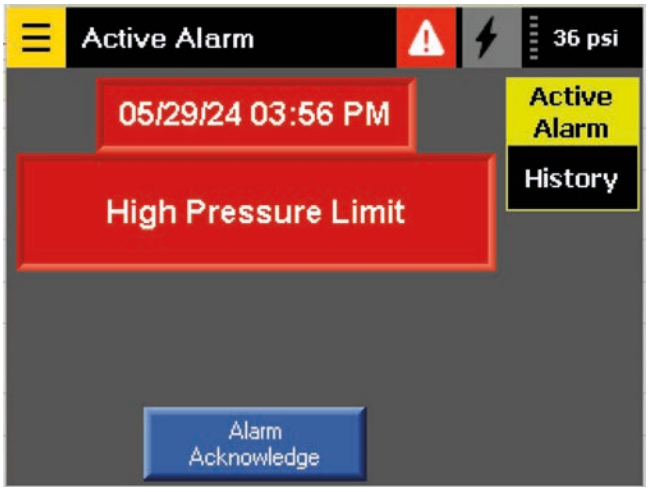


Parameter Name	Range	Unit	Description	Wiring	Modbus Register
Setback Mode	Enable/Disable	N/A	If Disabled the control only uses the Normal Mode Setpoint and settings.	N/A	N/A
Normal Setpoint Times	00:00 to 23:59	HH:MM	Time during which the control uses the Normal setpoint and settings.	N/A	N/A

ALARM HISTORY MENU

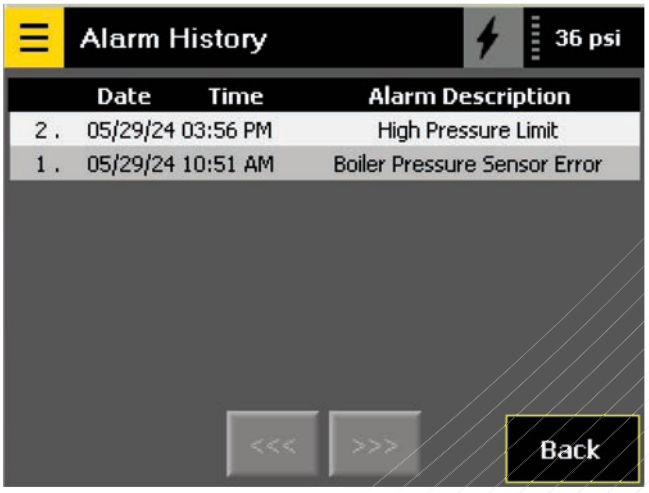
- **Active**

The Active Alarm screen shows the most recent alarm that has occured and would prevent the boiler from operating.



- **Alarm History**

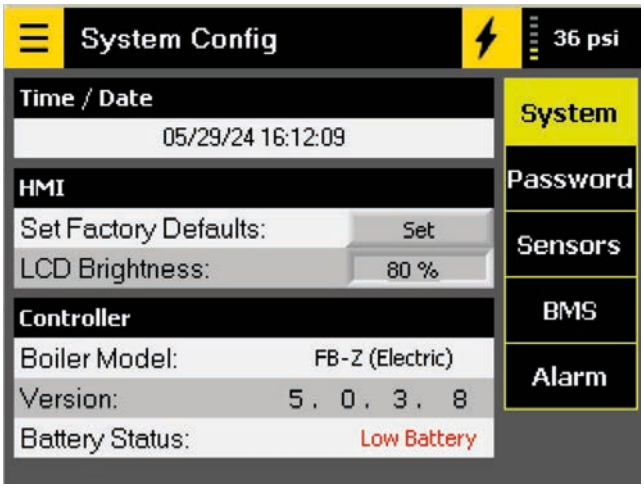
Time and Date stamp for the last 100 alarms.



CONFIGURATION MENU

- **System Configuration**

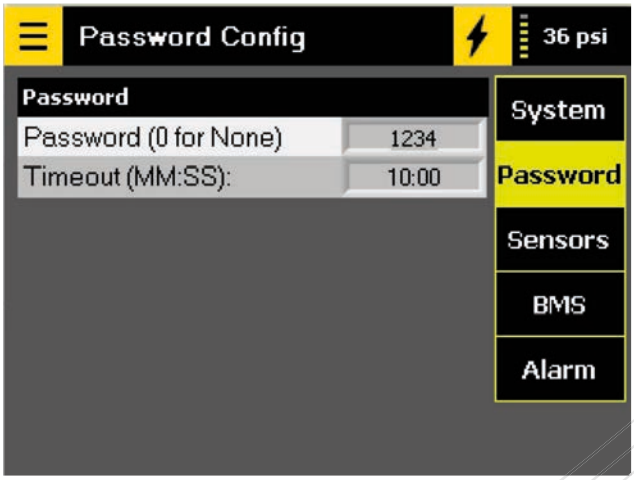
Contains control setup and Programming information



Parameter Name	Range	Unit	Description	Wiring	Modbus Register
Time/Date	N/A	MM/DD/YY	Pressure below setpoint when the boiler will receive a call for heat.	N/A	N/A
Factory Defaults	N/A		Loads the Factory Defaults and will overwrite current user settings	N/A	N/A
Boiler Model	FB-Z (Electric)	N/A	Shows the boiler model that the controller is selected for	N/A	N/A
Version	N/A	N/A	Software Version installed	N/A	N/A
Battery Status	Good / Low Battery	N/A	Indicates that the battery voltage is low, dead, or missing and should be replaced.	N/A	N/A

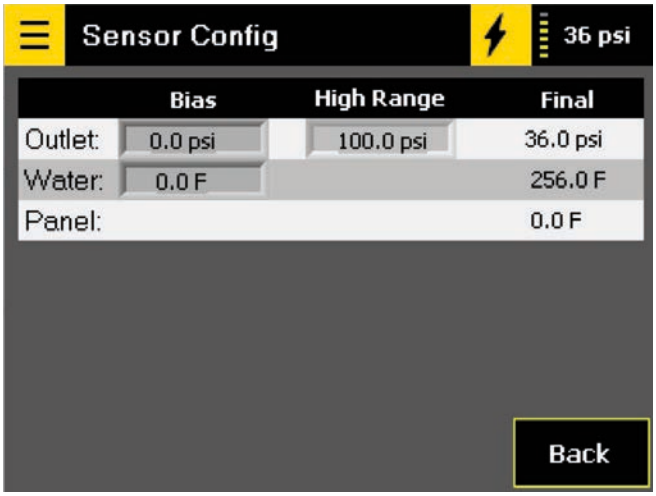
- **Password**

Options to password protect screens based on a user or site defined 4-digit password. Adjustable HMI values will be visible but appear grayed out and not able to be altered until the password is entered.



- **Sensor Configuration**

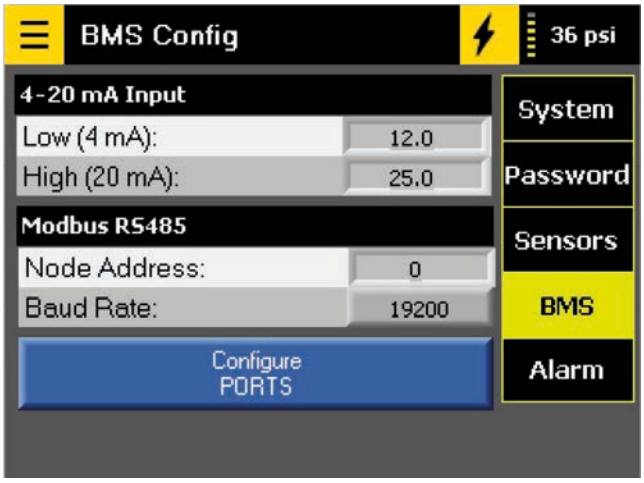
Setup information and adjustments for connected sensors.



Parameter Name	Range	Unit	Description	Wiring	Modbus Register
High Range	0 to 200.0	Psi	Applies to scaling for the outlet pressure transducer only.		N/A
Sensor Bias	0 to 10.0	Psi / Deg F	Adds an offset to the sensor value	N/A	N/A
Final Value (Outlet Pressure)	0 to 200.0	Psi	Realtime value reported to the BMS and used by the pressure controller for controlling the boiler	Factory Installed Pressure Transducer 4-20mA Analog Input	(4)1816 Int16 Read
Final Value (Water Temp)	0 to 450.0	Deg F	Realtime value reported to the BMS and used by the pressure controller for controlling the boiler	Factory installed thermocouple. Analog Input	(4)1801 Int16 Read
Final Value (Panel)	0 to 450.0	Deg F	PLC temperature	Internal to PLC	N/A

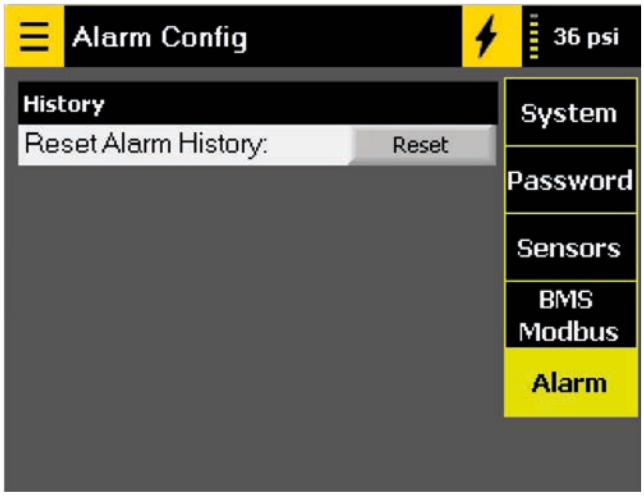
- **BMS Configuration**

Sets the analog scaling for BMS 4-20mA Setpoint or Firing Rate. Configures the BMS communication port for Modbus RTU including Node address and Baud Rate. Anytime a communication settings is changed the ‘Configure Ports’ button should be pressed to refresh the port.



- **Alarm Configuration**

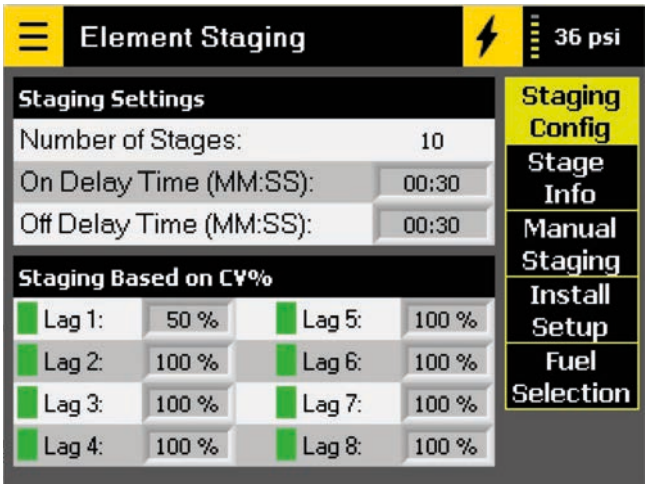
Allows users to clear the alarm history.



TECH TOOLS MENU

- **Staging Configuration**

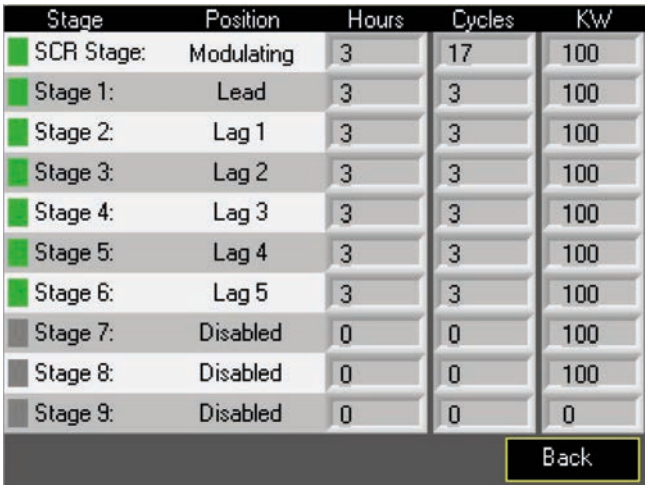
Allows users to customize the staging options.



Parameter Name	Range	Unit	Description	Wiring	Modbus Register
Number of Stages	0 to 10	N/A	Total number of stages that are setup for this specific model and size of boiler	Factory installed contactors and electric elements.	N/A
Stage On Delay	0 to 59:99	MM:SS	Time Delay on between stages	N/A	N/A
Stage Off Delay	0 to 59:99	MM:SS	Time Delay Off between stages	N/A	N/A
Staging Points (Lag1 – Lag9)	0 to 100	%	Sets the point at which the individual stages will be enable/disabled as part of the sequence.	N/A	N/A

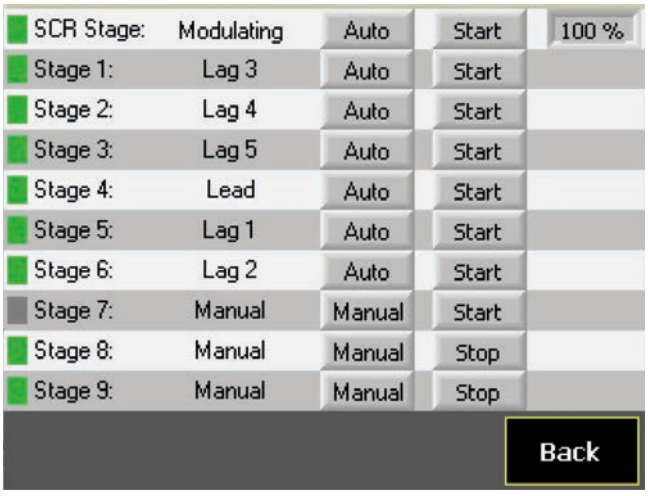
• Staging Information

Displays information on the curent state and setup of the stages.



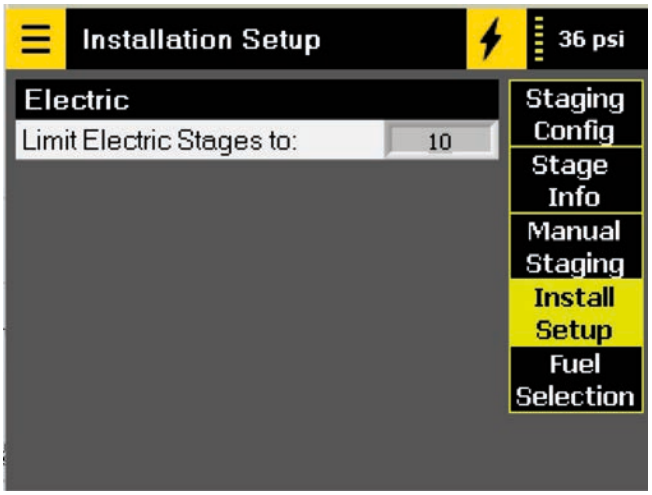
• Manual Staging

Used to manual trigger individual element stages and used for startup or troubleshooting. Stages put in manual will be removed from the normal staging sequence and not be counted towards the total number of element stages that are available.



- **Staging Information**

Displays information on the curent state and setup of the stages.



Parameter Name	Range	Unit	Description	Wiring	Modbus Register
Limit Electric Stages to	1-10	N/A	Limits the total number of elements that can be staged at one time in the normal sequence. All elements and stages will still rotate through for equal cycles and/or run time.	N/A	(4)1834 INT16 Read

CHSI SEQUENCE OF OPERATIONS

1. A Call for Heat reference around a user defined point below setpoint will start the staging of the electric element(s)/ contactor(s).
2. The Modulated SCR stage(s) are always enabled first and disabled last. They will remain enabled and modulate for the entire duration of the call for heat.
3. During the Initial Call for heat the Lead Stage is brought on with the SCR at the minimum modulation rate.
4. If the boiler pressure continues to decrease, the CV will increase, SCR will modulate up.
5. A Lag stage will be enabled after the next CV% stage has been met and the On delay time has expired.
6. The SCR will then drop back to its minimum modulation rate at the beginning of each stage.
7. Additional Lag stages will continue to be brought on based on the selected CV% staging and On Delay times between each stage.
8. The SCR will modulate from its minimum to maximum rate between each stage.
9. Up to 9 stages plus the SCR will be brought on based on user adjustable CV% and delay time between each stage.
10. As the pressure increases the boiler control will modulate the SCR stage down.
11. Lag Stages will be disabled in the opposite order as the CV% rate is reached, and Off delay time expires.
12. The SCR will modulate from its maximum to the minimum modulation rate between each stage before that stage is shut off.
13. The Lead stage will be shut off once the boiler pressure is at or above setpoint.
14. The SCR will continue to modulate down between setpoint and the Off point that is user defined above setpoint.
15. If the pressure drops below the setpoint while the SCR is modulating, then the Lead Stage will enable, and staging will continue until the demand Is met.
16. Element/Contactors will be rotated to maintain equal run time or cycles across all stages. A Rotation of the staging order will only occur when there is not a call for heat at the boiler.

⚠WARNING

This user manual is specific to the usage of the SC750 and should be used in conjunction with the current version of the respective boiler's Installation and Operation manual. Both should be read in their entirety and be made permanently available to the staff responsible for equipment operation.

This user manual should not be considered as a complete guide, nor should it replace existing guides or standards which may be applicable. Chromalox reserves the right to change any part of this user manual and the corresponding Installation and Operation manual without notice.

Do not install, operate, service or repair any component of this equipment unless you are qualified and fully understand all requirements and procedures.

All information in this user manual is for reference and guidance purposes, and does not substitute for required professional training, conduct, and strict adherence to applicable jurisdictional/professional codes or regulations.

⚠WARNING

This user manual is specific to the usage of the SC750 and should be used in conjunction with the current version of the respective boiler's Installation and Operation manual. Both should be read in their entirety and be made permanently available to the staff responsible for equipment operation.

⚠WARNING

This user manual should not be considered as a complete guide, nor should it replace existing guides or standards which may be applicable.

Chromalox reserves the right to change any part of this user manual and the corresponding Installation and Operation manual without notice.

Do not install, operate, service or repair any component of this equipment unless you are qualified and fully understand all requirements and procedures.

All information in this user manual is for reference and guidance purposes, and does not substitute for required professional training, conduct, and strict adherence to applicable jurisdictional/professional codes or regulations.

MAINTENANCE

BEFORE CALLING, PLEASE HAVE THE FOLLOWING INFORMATION AVAILABLE.

Software Version Number: _____

Boiler National Board Numbers: _____, _____, _____, _____

· ModSync Alarms

Message	Explanation / Recommended Action
System Active / No Alarm	The ModSync® is active and no alarms are sensed.
Outdoor RTD Sensor Error	The Outdoor Sensor is providing a value that is outside of the allowable scale. Verify the RTD wiring, replace the sensor if necessary.
Loop RTD Sensor Error	The Hydronic Loop Sensor is providing a value that is outside of the allowable scale. Verify the RTD wiring, replace the sensor if necessary.
Boiler (#) Alarm	The Local boiler controls have indicated that an alarm condition occurred.
Boiler (#) Monitor Alarm	The ModSync® called for the boiler to start and the main gas valve inputs was not received within a customer adjustable 5 minutes. Check the limit string of the boiler to verify which device is preventing the boiler from enabling. Verify the operating limits are set higher than the maximum loop temperature variable on the ModSync®.
Boiler (#) Modbus Error	Issues with the Modbus communication between the ModSync® and the specified boiler. Check wiring and local boiler control settings. See section 4 of this manual for local boiler control setup and addressing.

• Backing up the Program

Backing up the program aids in preventing the program from being lost when replacing the battery or the controller is powered down.
Note: This process does not save customer settings.

1. **Press and hold your finger on the screen for 5-10 seconds.** The 'Info Mode' Screen will be displayed. Select '**Enter Info Mode**'.
2. Enter the password of '**1111**' and then press enter.
3. Select '**Flash Memory**' from the 'Information Mode Main Menu'.
4. Select '**Backup User Application**' from the 'Flash Memory' menu.
5. Select '**Yes'**. The Controller will now cycle and backup the program. This could take several minutes.
6. When complete, the DLU will display '**This app is already backed up'**. Press '**ESC'** three times to exit Info Mode.

• Battery Replacement

A 3V coin style lithium battery with part number CR2450N is installed in every ModSync® screen. The battery is responsible for the backup of the program, system data, and user settings. It is recommended that the battery be replaced annually to prevent issues such as loss of program or customer settings.

• Common Troubleshooting Problems

Issue	Explanation / Recommended Action
The Boiler Outlet temperature displayed at the ModSync® does not match what is shown on the local boiler controls for 4-20mA applications.	This is commonly seen on boilers with the Siemens LMV3 controls. Check that the Outlet temperature scaling in the ModSync® matches the scaling in the local boiler controls. The most common are 0-210F and 0-240F.
The Protonode is not communicating with the ModSync® (Rx and Tx are not flashing)	Check that the Protonode is connected to Port 2 on the ModSync® using the factory supplied cable. The Port 2 settings on the BMS Config page should be set up for a node address of 2 and baud rate of 19200.
The Boiler is tripping on its high limit while under ModSync® control.	Check that the Maximum setpoint plus any deviation is set at least 10F below the high limit of the boilers. Check flow through the boilers including isolation valve and pump operation.
ModSync® displays *** for temperatures instead of a value.	The ModSync® sensor reading is out of range. Check wiring and sensor operation.
Boilers will not Start/Stop while under ModSync® control.	Check the limit string at the boiler, Wiring and/or Modbus communication, ModSync® settings or settings at the local boiler control. If the ModSync® shows a call for heat but the boilers do not fire a Monitor Alarm could be seen at the ModSync®.

DOWNLOADING A PROGRAM

Program Updates for the PLC on the SC-750 will be broken out into several sections.

1. Record Customer Settings (if applicable)
2. Replace the Battery CR2450 (If required)
3. Initial Setup - Preparing the software, drivers, and cables.
4. Connecting to the PLC
5. Performing the Program Update
6. Verifying settings/setup
7. Flash Memory backup.

It is very important to determine what hardware and ports are available on the PLC. Different cable types may need to be used for older PLC panels.

The following instruction is based on the technician utilizing a Windows based computer. Results may vary based on Windows versions and permissions.

The download process could fail if the wrong cables/connections, drivers, or software setup are used.

- **Record the Customer Settings**

A Worksheet for recording the customer settings and values is provided in a later section of the manual. Taking pictures of the screens for reference is also recommended. Existing settings are not guaranteed to carry over during a download or battery replacement and may be forced to revert to factory defaults as a result. Having a record will make setting back of the control easier.

- **Replace the Battery**

The PLC has a battery installed to help preserve the programing and customer settings/setup during power outages. The battery is a 3V lithium coin style (CR2450N) and can be accessed through a compartment door from the back of the display. Replacement of the battery is done with the PLC powered on. Removing the battery while the PLC is powered off can result in loss of settings, setup, and/or programming.

It is recommended that the battery be changed for any of the following:

- Once a year and/or at the same time Preventive Maintenance is performed on the associated boilers or equipment.
- When a download is attempted.
- Anytime the PLC will be powered down for an extended period of time.
- When the Low Battery indicator/warning is active on the HMI.

- **Initial Setup - Preparing the Software, Drivers, and Cables**

In addition to the Windows computer, you will also need the following:

- USB / USB mini download cable. Note that not all cables are the same – Cables used to charge cell phones and other electronic devices may not work. (USB Micro cables are not physically compatible)

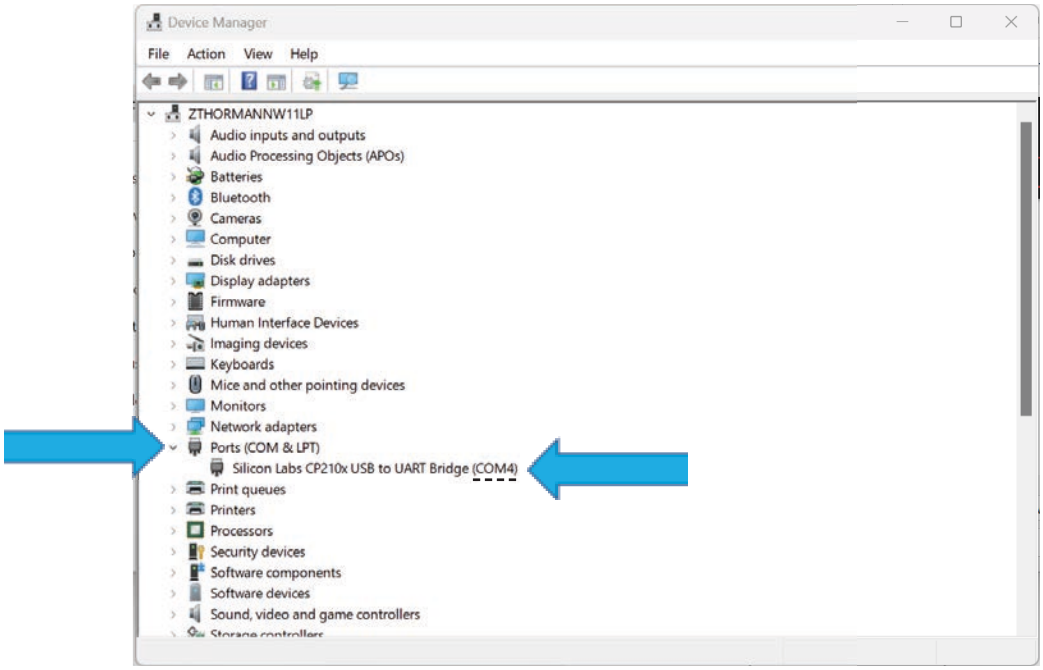
- Silicon Labs CP201x USB to UART Bridge VCP Driver:
  https://www.silabs.com/developers/usb-to-uart-bridge-vcp-drivers

- UniDownloader Software installed on your computer.
  https://downloads.unitronicsplc.com/Sites/plc/Visilogic/Download%20 Software%20Utilities/UnitronicsUniDownloader_5_0_B30.exe

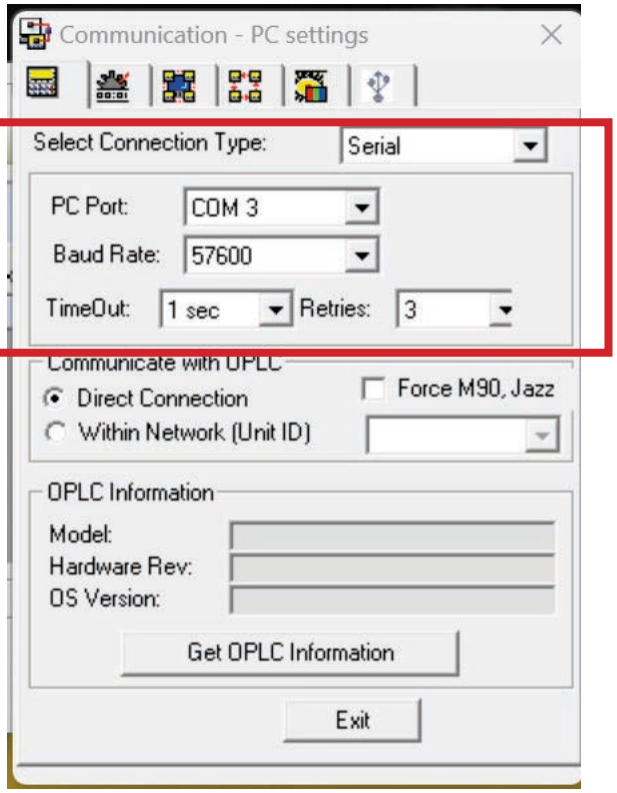
- The compiled program file, provided by Chromalox. The file extension ends in “.udc”

- **Connecting to the PLC**

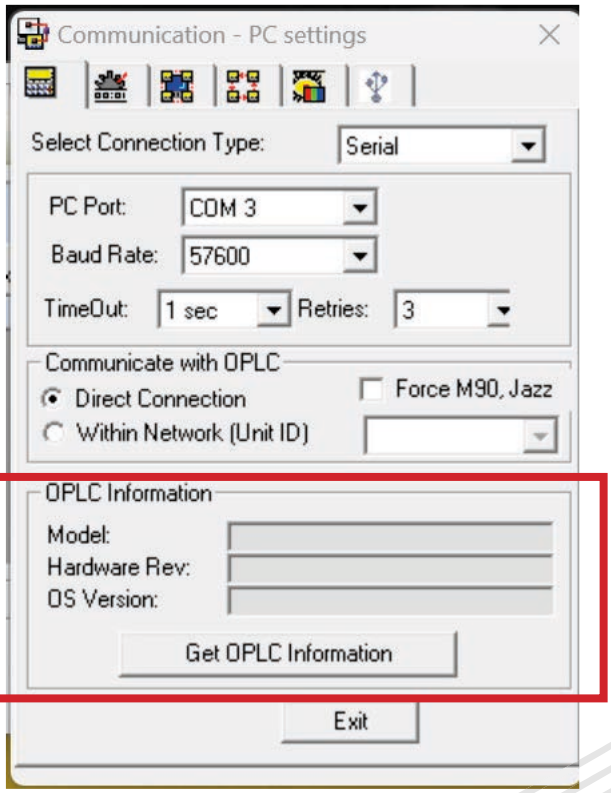
Connect the Cable to both your Computer and the HM. The USB mini port is located on top of the display. Determine your Computer’s serial COM port number. Open Device manager and make sure that the computer recognizes the cable, drivers are installed, and a COM port number is assigned to the connection.



Test PLC Connection. Open the Unidownloader software and navigate to the Connections menu. Select the Com port from the drop down to match what is seen in the device manager and select a baud rate 19200, 38400, and 57600 are all acceptable.

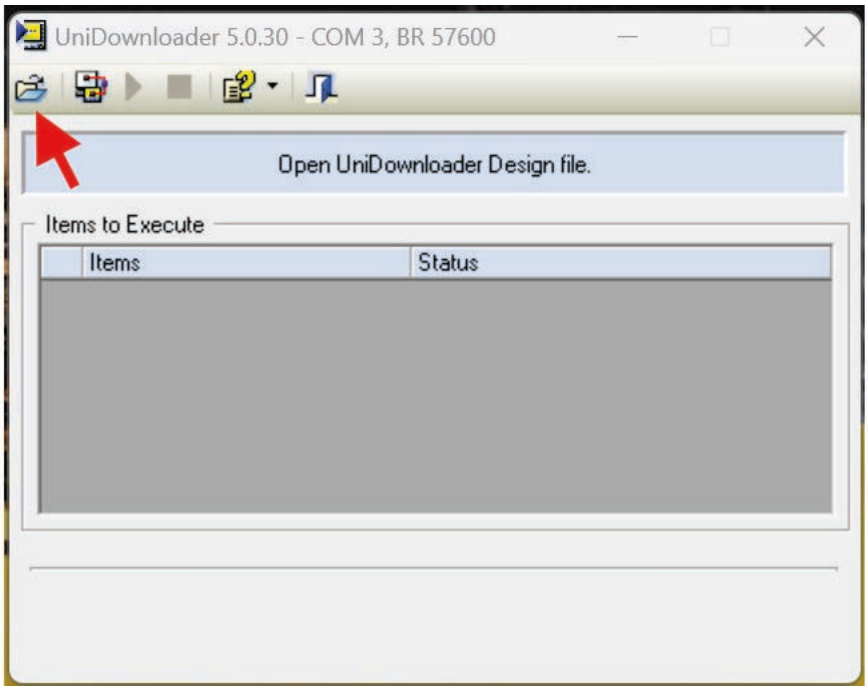


Press Get OPLC information and wait for the three lines above to fill in. If lines do not fill in, then check cable connections, drivers, and settings.

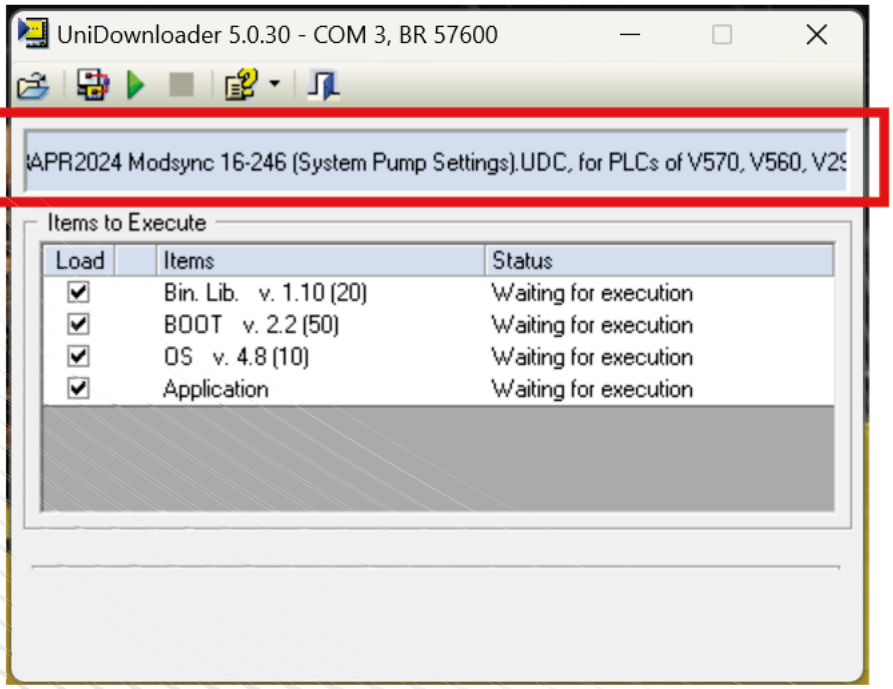


- **Performing the Program Update**

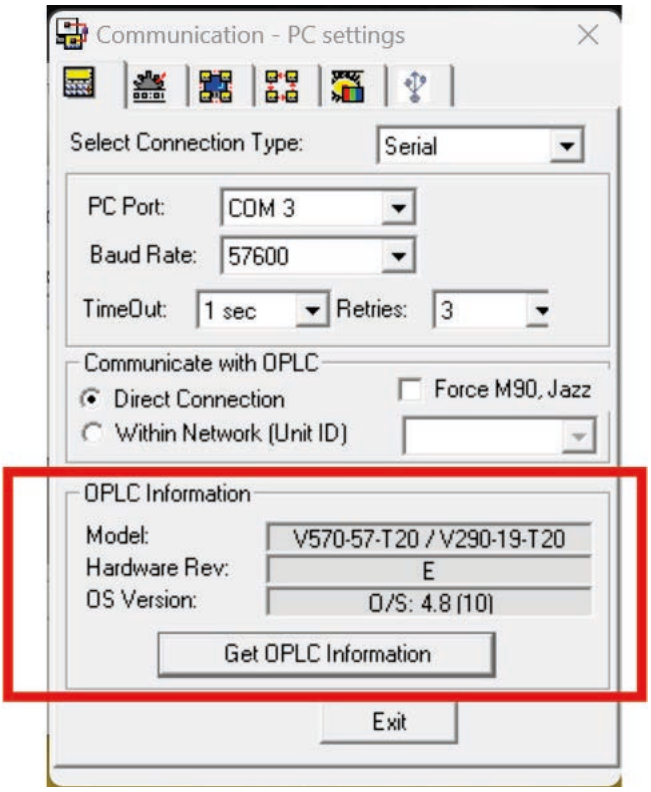
Using the unidownloader program open the file provided by Fulton and ending in ".UDC."



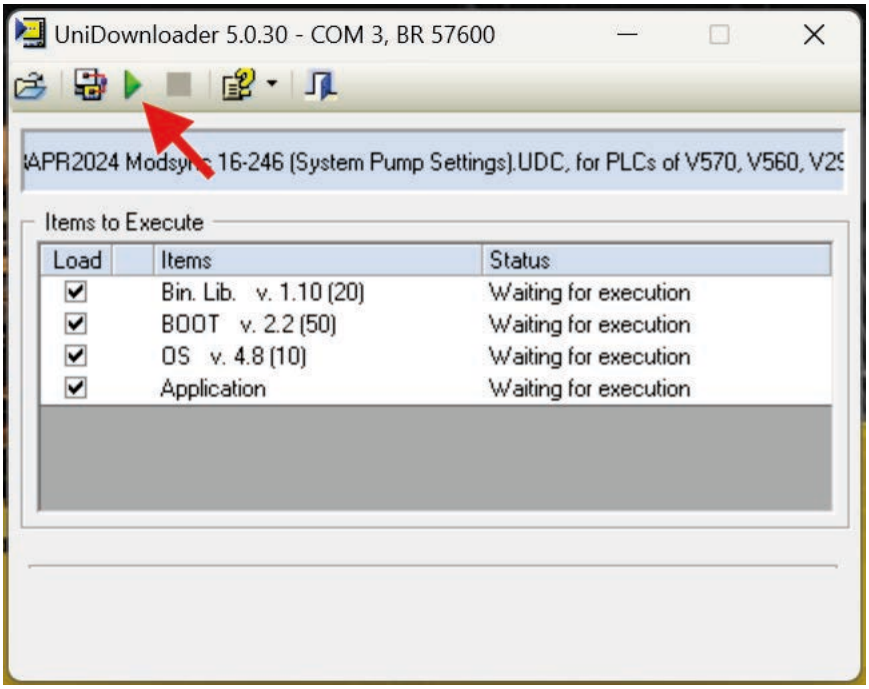
Check that the file name matches the panel that you are downloading to.



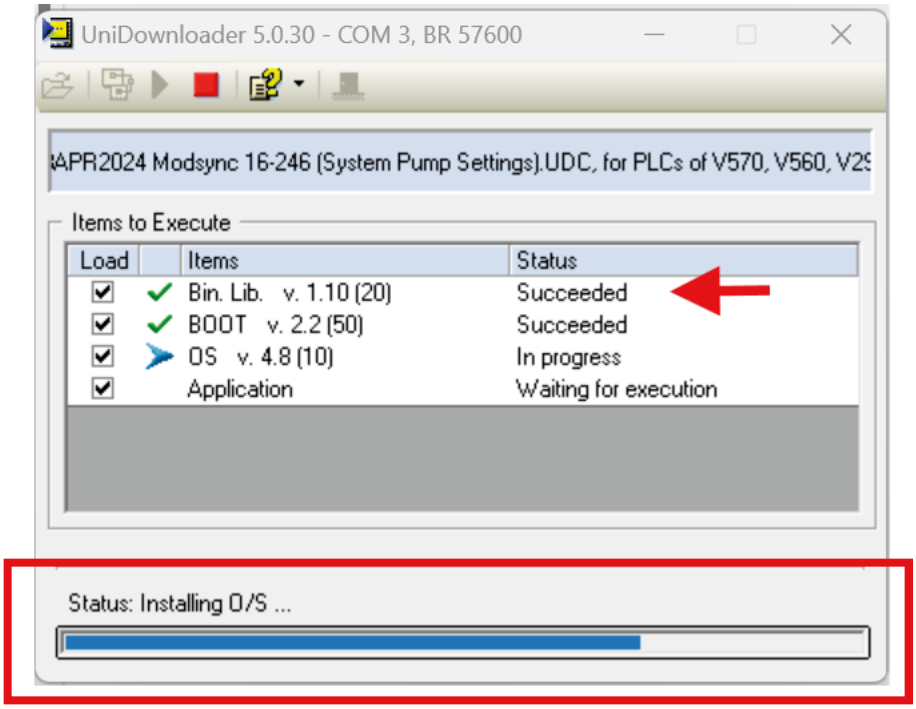
Verify the port settings in the connections menu and press ‘Get OPLC Information’.



Press the green ‘play’ button when ready to start the download.



Each file will load before proceeding to the next and give the status and progress bar. This process can take 15-20 minutes or more.



When complete, acknowledge and prompts and allow the PLC to reboot, if required. Then disconnect the cable.

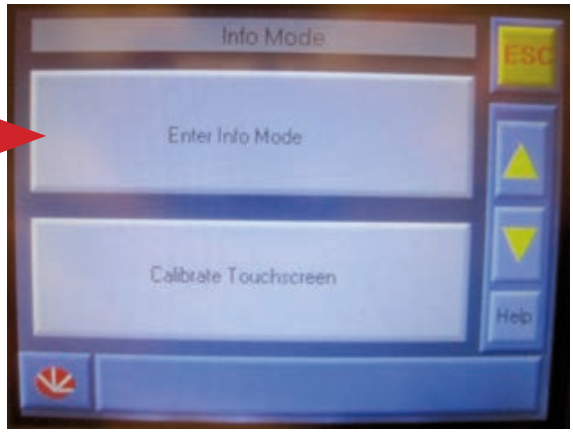
- **Verify the Settings and Setup**

Thoroughly review the screens and settings. Depending on the nature of the update, an number of items could have changed including HMI layout, settings, and/or PLC logic. Reference the Customer settings that were documented and test the features that may have been affected by the update. Allow connected equipment to run in Automatic control and observe proper operation following an update.

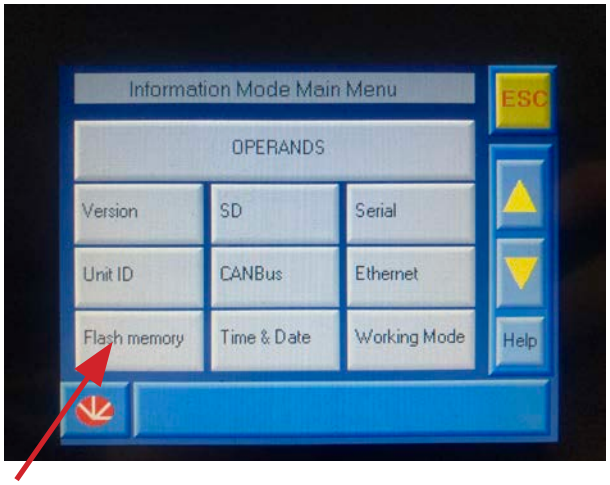
- **Flash Memory Backup**

The flash memory stores the program to the internal (non-volatile) memory to help preserve the program through power outages and battery loss.

Press and hold your finger on the screen for 5-10 seconds until the 'Info Mode' Screen is displayed. Select ***'Enter Info Mode'.***

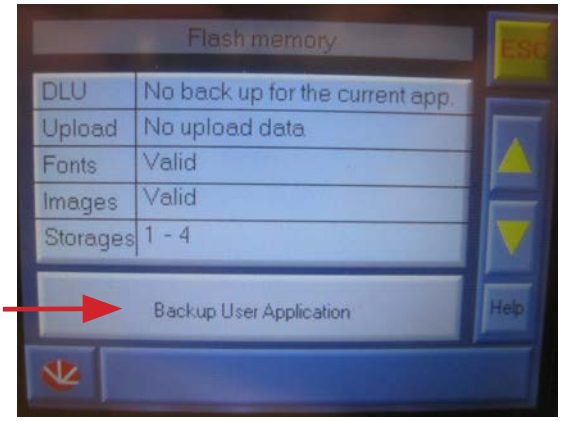


Enter the password of ***‘ 1 1 1 1 ‘*** and then press enter.



Select ***‘Flash Memory’*** from the ‘Information Mode Main Menu’

Select ‘***Backup User Application’*** from the ‘Flash Memory’ menu and the ‘Yes’ at the Prompt



When complete the DLU with display ‘***This app is already backed up***’.
Press ‘***ESC***’ three times to exit Info Mode.

SC750 SETTINGS

Boiler Configuration	Factory Settings	User Settings
Boiler:	Enabled	
Interface:	SC-750	
Boiler Mode:	Auto	
Manual Control:	Boiler Start	
Rate:	0%	

Setpoint Configuration	Factory Settings	User Settings
SC-750 Local Setpoint:	0.0 psi	***psi***
Minimum Setpoint Pressure:	0.0 psi	***psi***
Maximum Setpoint Pressure:	0.0 psi	***psi***

PID Configuration	Factory Settings	User Settings
Proportional	20.0	***%***
Integral	60	***s***
Derivative	0	
Boiler Start Deviation	5.0 psi	***psi***
Boiler Stop Deviation	5.0 psi	***psi***

Sensor Configuration Settings	Factory Settings	User Settings
• **Steam Header Pressure Sensor**		
Sampling Rate	00:10	***(MM:SS)***
High Range	30.0 – 200.0 psi *Model Specific	***psi***
Sensor Bias	0.0 psi	***psi***
• **Water Temperature Sensor**		
Sampling Rate	00:10	
Sensor Bias	0.0 psi	(MM:SS)

Element Staging	Factory Settings	User Settings
Rotation Priority	Hours	(Hours/Cycles)
Stage On Delay (MM:SS)	01:00	***(MM:SS)***
Stage Off Delay (MM:SS)	01:00	***(MM:SS)***
Lag 1	20%	%
Lag 2	30%	%
Lag 3	40%	%
Lag 4	50%	%
Lag 5	60%	%
Lag 6	70%	%
Lag 7	80%	%
Lag 8	90%	%
Lag 9	100%	%

Cold /Slow Start:	Enabled	
For Boiler Water Temp Below:	200.0 °F	***°F***
Cold Start Number of Elements	2	
Max Number of Stages	10	
Maximum Firing Rate (Gas)	100 %	***%***

BMS Configuration	Factory Settings	User Settings
Node Address	2	
Baud Rate (19200/9600)	19200	

Alarm Configuration Settings	Factory Settings	User Settings
Sensor Error Delay	00:01	***(MM:SS)***
Monitor Alarm	Enabled	
Monitor Delay	05:00	***(MM:SS)***
Monitor Alarm Retry	Enabled	
Monitor Retry Delay	10:00	***(MM:SS)***

BMS INTEGRATION

BMS Networking - RS485 Modbus Points List

Modbus Address	Description	Range	Type	Units	R/W
(4)1801	Water Temperature	0 to 400.0 [Note 1]	INT16	Deg. F	R/W
(4)1803	Boiler Setpoint	0 to 200.0 [Note 1]	INT16	PSI	R
(4)1804	Boiler Setpoint Mode	0 – SC-750 1 – Modsync 2 – Remote SP 3 – BMS I/O 4 – BMS Com SP 5 – BMS Com FR	INT16		R
(4)1805	Alarm Code	See Alarm Chart	INT16		R
(4)1806	BMS Remote Start Stop	0 – Stop 1 – Start	INT16		R/W
(4)1807	BMS Boiler Rate	0 to 100	INT16	%	R/W
(4)1808	BMS Boiler Setpoint	0 to 200.0 [Note 1]	INT16	PSI	R/W
(4)1809	BMS Watchdog	1 must be written at least once every 60 seconds to maintain remote operation. If not received the boiler will revert to local control	INT16		R/W
(4)0810	Boiler Auto Manual Mode	0 – Manual 1 – Auto	INT16		R
(4)1811	Boiler Run Status	0 – Off 1 - On	INT16		R
(4)1812	Boiler Local Remote Mode	0 – Local 1 – Remote	INT16		R
(4)1813	Boiler Enable Disable	0 – Disabled 1 – Enabled	INT16		R
(4)1814	Boiler Demand Status	0 – Off 1 – On	INT16		R
(4)1815	Boiler Alarm Status	0 – Off 1 – On	INT16		R
(4)1816	Boiler Outlet Pressure	0 to 200.0 [Note 1]	INT16		R
(4)1817	Boiler Rate	0 to 100	INT16		R
(4)1823	Number of Elements Energized	1 to 10	INT16		R
(4)1824	Stage 1 Operation	0 – Off 1 – On	INT16		R
{4)1825	Stage 2 Operation	0 – Off 1 – On	INT16		R

Modbus Address	Description	Range	Type	Units	R/W
(4)1826	Stage 3 Operation	0 – Off 1 – On	INT16		R
(4)1827	Stage 4 Operation	0 – Off 1 – On	INT16		R
(4)1828	Stage 5 Operation	0 – Off 1 – On	INT16		R
(4)1829	Stage 6 Operation	0 – Off 1 – On	INT16		R
(4)1830	Stage 7 Operation	0 – Off 1 – On	INT16		R
(4)1831	Stage 8 Operation	0 – Off 1 – On	INT16		R
(4)1832	Stage 9 Operation	0 – Off 1 – On	INT16		R
(4)1833	Stage 10 (SCR) Operation	0 – Off 1 – On	INT16		R
(4)1834	Max Elements to Stage (Electric)	1 to 10	INT16		R/W
(4)1836	Current Electric kW	0 to 10,000	INT16	KW	R
(4)1837	Total kW size of Boiler	0 to 10,000	INT16	KW	R
(4)1838	Electric Operating Rate %	0 to 100	INT16	%	R

Notes:

1. The decimal point is fixed to the tenth place, but not transmitted. For example, a value of 1000 equals 100.0

Alarm Chart

Alarm Code	Description
0	No Alarm
2	Boiler Pressure Sensor Error
3	High Pressure Limit
7	Low Water Level
11	BMS Communication Error
13	Monitor Alarm
15	Boiler Alarm
17	Boiler High Pressure
19	High Water Level

Limited Warranty:
Please refer to the Chromalox limited warranty applicable to this product at
http://www.chromalox.com/customer-service/policies/termsofsale.aspx.

Chromalox, Inc.
103 Gamma Drive
Pittsburgh, PA 15238
(412) 967-3800
www.chromalox.com