NXTSD4xx TOUCHSCREEN OPERATORS GUIDE

USED WITH PPC4000
FUEL AIR RATIO
CONTROLLER

DESCRIPTION

This document describes the NXTSD407 and NXTSD413 Graphics Touch Screen displays and their capabilities. The Displays are designed to connect to the PPC4000 ModBus RTU interface provided on the P12 connector that provides the required RS485 interface. The baud rate of the display and the PPC4000 is 57,600 BAUD. The ModBus address needs to be set during installation as described in the **NXTSD-4001** Touch Screen Display Installation document.

Refer to Bulletin PPC-4001 for a complete description of the PPC4000 control system.

DISPLAY SCREENS

The two Displays (NXTSD407 / NXTSD413) have screens that perform separate functions and have different graphic objects based upon the functionality presented specifically for that screen. This section describes each screen with enough detail to provide the general operator the ability to use the Display for the intended purpose of controlling and monitoring of the connected Burner Controls. This document assumes the need for the display operators to have a working knowledge of boiler systems and their operation before attempting to use the displays for that purpose.

The equipment described in this manual is capable of causing property damage, severe injury, or death. It is the responsibility of the owner or user to ensure that the equipment described is installed, operated and commissioned in compliance with the requirements of all national, state and local codes.

1.0 Common Control Elements to all Screens

Some Control elements are available in some form on every screen. This section describes each element and the capabilities of those elements.

1.1 Company Logo

The Fireye Company Logo is located in the top left corner of all display screens. As this is not normally thought of as a control item, the left hand portion of the logo is actually a button that when pressed will provide a password dialog that can be used to gain access to the Display Installation and Configuration screen. This functionality is not intended for the general operator and, should the button be pressed inadvertently, the dialog should be canceled to return to normal Main screen operation. For qualified technical personnel, refer to document NXTSD-4001 "Touch Screen Display Installation Guide"

NOTE: **Proper operation of the NXTSD4xx Touchscreen display requires a PPC4000 with an Engineering code of 9 or greater or a PPC4000 running main firmware revision v3.7 or greater.**

Due to limitations of Modbus RTU, only one master can exist on the Modbus interface. The NXTSD4xx Touchscreen display is considered the master of the bus and the Modbus system should be configured such that the Touchscreen display is the only device speaking to the PPC4000(s) on the bus.

1.2 Time and Date

The Time and Date control item can be seen in the top right corner of all display screens and provides the current time setting as maintained by the displays internal Real Time Clock (RTC). The Time and Date control is also a button that when pressed will cause a dialog window (Figure 1) to be displayed that will allow the operator to change the current time and date.

FIGURE 1.

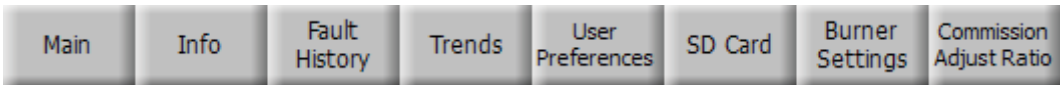
"Time and Date" Change Dialog

On the "HMIce" dialog window, the month, day, year, hours, minutes, and seconds fields can be pressed by the operator to allow for a change in the current values. Each of the fields will have an associated pop-up window that is tailored to the field that was pressed. Entries by the operator for any of these fields will cause an immediate change in the RTC once the pop-up window is dismissed with anything other than a press of the escape (ESC) or cancel button.

1.3 Navigation Buttons

The navigation buttons are positioned in the lower left corner on all screens of the NXTSD407 display and positioned in the top right corner (below the time and date control) on the NXTSD413 display. The buttons provide the operator with the capability to change from one screen to another. Pressing any of the navigation buttons will cause the page to change to the screen associated with the pressed button unless the screen is already visible.

FIGURE 2.



Display Navigation Buttons

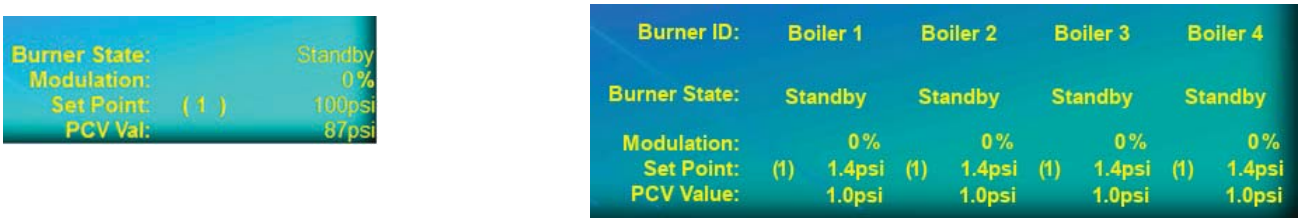
The Screens associated with each button will be discussed later in this document.

The last two buttons on the right are visible and available to the operator in this example but if a display is designated through configuration during installation to be a "Remote" display, then these buttons will not be available to the operator. The reason for this is discussed later in this document.

1.4 Burner Status Data

The Burner Status Data (shown in Figure 3) is displayed on each screen in the bottom right hand corner so that the operator can always view the state of the burner(s) from any screen. The Burner Status Data is similar for both display types with the exception of the Burner ID which is only displayed on the Burner Status Data of the NXTSD413 Display and will be explained in more detail later in this document. The only other difference between the two displays is the ability of the NXTSD413 to display more than one Burner Status Data simultaneously.

FIGURE 3.



Burner Status Data for NXTSD407 (left) and NXTSD413 with 4 Burners (right)

The Information contained in the Burner Status Data is described in detail in the following sections.

1.4.1 Burner ID

The NXTSD407 Display allows a connection to just one display, so unique Burner ID is not provided. With the capability of the NXTSD413 Display to monitor multiple burners at the same time, the need to associate the Burner Status Data to the correct burner is required. The method used to provide this capability is the Burner ID. The ID for each burner is set during the installation process and cannot be modified except by a qualified technician (see the NXTSD-4001 "Touch Screen Display Installation Guide"). The ID is also used on the Boiler Graphic to associate the graphic with the correct burner as described later in this document.

1.4.2 Burner State

The Burner State informs the operator as to what operational state each burner is in. The following sections describe each of the available Burner States that the Burner Control operational sequence can achieve.

1.4.2.1 SYSTEM STARTUP

The System Startup operational sequence state lasts briefly waiting for all internal configuration and communications to complete on the Burner Controller.

1.4.2.2 STANDBY

At this operational sequence state, the Burner Control is in the Boiler Off mode or in the normal off state and is waiting for a call-for-heat to start a burner cycle.

1.4.2.3 WAIT FOR PROFILE

In this operational sequence state, the Burner Control turns on the blower motor and waits a predetermined period for the purpose of stabilization.

1.4.2.4 MOVE TO PURGE

During this state, the actuators specific to the current profile are moved to the p01 purge positions entered during the Burner Control commissioning process.

1.4.2.5 PURGE

This is the high fire purge state designed to purge the burner of all unburnt gasses and fill the burner chamber with fresh air.

1.4.2.6 MOVE TO IGNITION

This state moves all current profile specific actuators to the p02 (low fire purge) positions entered by the operator during the commissioning process.

1.4.2.7 MOVE TO LOW FIRE

This operational sequence state moves all current profile specific actuators to their p03 (low fire) positions entered during the Burner Control commissioning process.

1.4.2.8 AUTO

This operational sequence state allows all current profile specific actuators to move to positions from p03 (low fire) to the highest position entered during the Burner Control commissioning process depending on the demand.

1.4.2.9 POST PURGE

This operational sequence state shuts down any active controls with the exception of the blower motor to purge the combustion chamber of all burned and unburned gasses.

1.4.2.10 LOCKOUT

This operational sequence state indicates that the Burner Control has detected some type or error and needs to proceed to a non volatile lockout state. The operator must initiate a reset to leave this state.

1.4.3 Modulation

The Burner State informs the operator as to what percentage of modulation the Burner Control is maintaining on the Burner. Available range for this value is from 0 to 100% of modulation or firing rate. This information is duplicated on the Boiler Graphic as described in section 1.5.

1.4.4 Setpoint

The Setpoint portion of the Burner Status Data indicates to the operator the current sensor used for the purpose of determining the modulation of the burner and the current setpoint value in the units specified during the setup and commissioning of the Burner Control. In this example shown in Figure 3, the sensor number used by the Burner Control associated with "Boiler 1" is Sensor 1 as represented by the "(1)" and the Setpoint value is 100psi.

1.4.5 PCV Value

The PCV Value portion of the Burner Status Data represents the measurement of the Primary Control Value (PCV) as measured on the Sensor used for that purpose. In the example shown in Figure 3, the PCV sensor for the Burner Control associated with "Boiler 1" is Sensor 1 and its value is 95psi on the NXTSD407 Display and 1.0psi on the NXTSD413 Display.

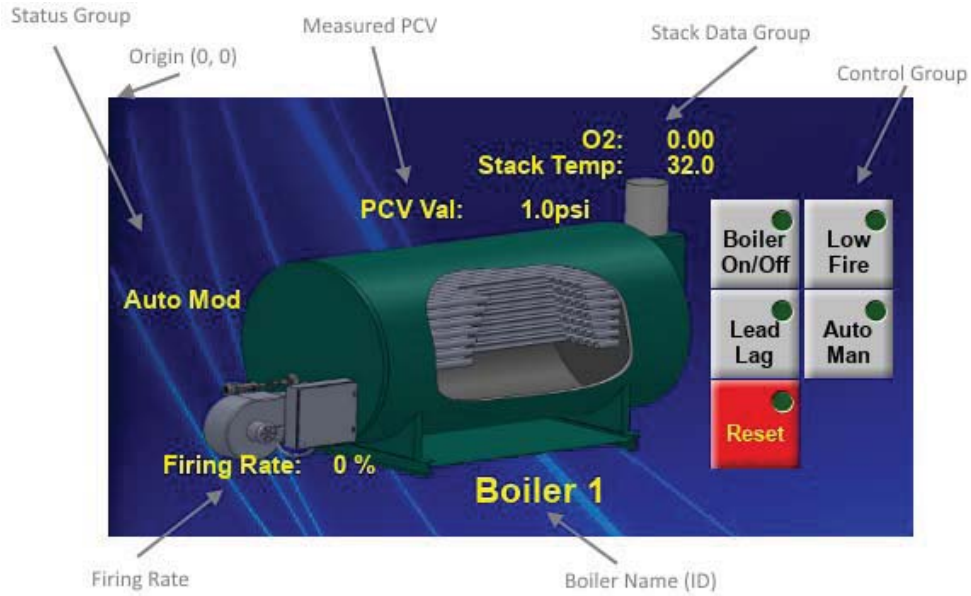
1.5 Boiler Graphic

The Boiler Graphic, as shown in Figure 4, is generally placed in the center area of the Main screen or to the sides of the remaining screens and shows the various conditions of the Burner Control and associated systems. The graphic also provides the operator the ability to change the operation of each connected Burner Control.

The remaining screens available to the operator also contain a single Boiler Graphic that must support all connected Burner Controls. This is a simple matter for the NXTSD407 Display as there is only one connected Burner Control accepted by the display. In the case of the NXTSD413 Display, there can be as many as six Burner Controls connected. When multiple Burner Controls are available, the Burner Control that the operator wishes to view the information can be selected from the Burner Select field or drop down control placed just above the graphic.

The Boiler Graphic is comprised of data (Boiler Name or ID, Stack Data, PCV Value Data, Firing Rate Data, and Burner Status Data) and control (Boiler On/Off, Low Fire Hold, Lead/Lag, Auto/Manual, and Reset Control) elements that are described in detail in the following sections.

FIGURE 4.



1.5.1 Boiler ID / Name

The Boiler ID or Boiler Name identifies the burner system that is associated with the Burner Control and applicable systems that the Boiler Graphic represents. The Boiler Name or ID is set during the installation process by qualified technical personnel (as described in the 105-4709 "CES Graphics Touch Screen Display Configuration" document) so that the operator can immediately know which boiler/burner control the graphic is referring to. This is especially pertinent in environments where there is more than one burner system displayed (NXTSD413).

1.5.2 Stack Data Group

The Stack Data group is shown on Burner Control systems that have a stack probe capable of measuring the Stack Temperature, Oxygen (O2) Saturation, and/or the Carbon Dioxide (CO) Concentration. When a stack probe is present in the Burner Control system, then these elements will be shown on the associ-

ated Boiler Graphic. It should be noted that these items have to be configured during the installation of the Burner Control system and require the setup provided by a qualified technician as described in the NXTSD-4001 "Touch Screen Display Installation Guide" document.

1.5.2.1 Stack Temperature Data

The Stack Temperature or "Stack Temp:" is available when the compatible Probe is present in the Burner Control system and indicates to the operator the current temperature of the flue gasses passing through the probe. The value represents the temperature in degrees Centigrade or in degrees Fahrenheit depending on the selected measurement units set during installation by the qualified technician. During the setup and commissioning process, this information is used to help with the fine tuning of the burner at the various firing positions that the boiler is set to utilize during normal operation. This data is also essential when calculating the efficiency of the system and is present in the Boiler Graphic just as a reference for the purpose of checking the efficiency calculation.

1.5.2.2 O2 Data

The O2 Data or "O2:" is available when the compatible Probe is present in the Burner Control system and indicates to the operator the current O2 saturation percentage of the flue gasses passing through the probe. As with the Stack temperature, the setup and commissioning process uses this information to help with the fine tuning of the burner at the various firing positions that the boiler is set to utilize during normal operation. This data is also used to calculate the efficiency of the system.

1.5.2.3 CO Data

The CO Data or "CO:" is available when the compatible Probe is present in the Burner Control system and indicates to the operator the current CO concentration in Parts Per Million (PPM) of the flue gasses passing through the probe. As with the Stack Temperature, this measurement is available in systems that have been setup to be shown by qualified technical personnel.

1.5.3 Measured PCV Data

The Measured PCV Data represents the value of the sensor used as the PCV device and is shown in the units set by the installing technician.

1.5.4 Firing Rate Data

The Firing Rate Data or "Firing Rate:" represents the percent of modulation currently produced from the Burner.

1.5.5 Status Group

The Status Group contains a set of messages that indicates to the operator the current state of the Burner Control and associated system. These states include indicators for functions like Standby Water, Thermal Shock, Setback, Sequencing Master, Low Fire Hold, Auto or Manual Modulation, Commissioning, Burner Lockout, or not able to be monitored due to a Communications Error.

1.5.5.1 Standby Water

The Standby Water indication is shown in the Boiler Graphic when the boiler is setup to maintain a minimum water pressure or temperature (depending on the boiler system being a steam or hot water system) and the system demand doesn't have a call for heat present (the PCV is above the Cut In setting).

1.5.5.2 Thermal Shock

The Thermal Shock indication is shown in the Boiler Graphic when the boiler has a call for heat present (the PCV is below the Cut In setting) but the current water pressure or temperature (depending on the boiler system being a steam or hot water system) is below a set Thermal Shock limit setting. The Thermal Shock functionality is described in more detail in section 2.6.8 of this document.

1.5.5.3 Setback

The Setback indication is shown on the Boiler Graphic when the boiler system begins firing during the times when the boiler system has been set to operate under Setback levels. Setback allows a boiler system to operate at an alternate pressure or temperature (depending on the boiler system being a steam or hot water system) during off peak times. The Setback functionality is described in more detail in section 2.6.9 of this document.

1.5.5.4 Sequencing Master

The Sequence Master or "Seq Master" indication is shown on the Boiler Graphic when the associated Burner Control has assumed the lead or master boiler in a multi-boiler environment running under boiler sequencing control or "Lead / Lag". When the indicator shows that the boiler is a master in a sequenced system, the master boiler controls the slave or lag boilers as to when they are to turn on due to the demand detected by the master boiler. Sequencing is described in more detail in section 2.6.7 of this document.

1.5.5.5 Low Fire Hold

The Low Fire Hold indication is shown on the Boiler Graphic when the associated burner has been

commanded to be in the Low Fire Hold state. See section 1.5.6.2 for a description of the Low Fire state of the Burner Control.

1.5.5.6 Auto Mod / Manual Mod

The Auto Modulation or "Auto Mod" indication is shown on the Boiler Graphic when the associated Burner Control is set to manage the burner firing rate based on the PCV. The Manual Modulation or "Manual Mod" indication is shown on the Boiler Graphic when the associated Burner Control is set to manage the burner firing rate via a manual input from the operator. See section 1.5.6.4 for more information on the manual modulation control over the burner.

1.5.5.7 Commissioning

The Commissioning indication is shown in the Boiler Graphic when the boiler is in Adjust Ratio or Commissioning mode. The adjust ratio and commissioning functionality is described in more detail in section 2.6.15 of this document.

1.5.5.8 Burner Lockout

The Lockout indication is shown in the Boiler Graphic along with the current Lockout Code when the Burner Control has detected a condition that prevents the Boiler system from operating safely. More detail explaining the Burner Control Lockouts can be found in section 2.2 of this document and in the "Fault History" section of the **PPC-4001** "PPC4000 Series Fuel Air Ratio Controller" bulletin.

1.5.5.9 Communications Error

The Communications Error or "Comm Err" indication is shown in the Boiler Graphic when the Display cannot communicate with the associated Burner Control. The reason for this error is either a hardware connection or Burner Controller setup problem. This error is described in more detail in section 2.2 of this document and in sections 3.6.6 and 3.6.7 of the **NXTSD-4001** "Touch Screen Display Installation Guide" document.

1.5.6 Control Group

The Control Group of the Boiler Graphic provides the operator with the ability to control the operation of the Burner Control and associated Burner. The control contains a series of buttons that allow for turning the burner on and off, setting the burner into a low fire hold state, setting the associated burner control to be the master or slave in a sequenced boiler setup, set the burner to automatically respond to the PCV for burner operation, or to reset the Burner Control in the event of a Lockout.

1.5.6.1 Boiler On/ Off

The Boiler On/Off button is a push to turn on and push to turn off button control. The button has a green status indicator that indicates that the Boiler is "ON" when the indicator is lit or "Off" when the indicator is not lit. When the indicator is lit then a press of the Boiler On/Off button will turn the boiler to the off state and will then be reflected in the green indicator as an unlit state. Pressing the Boiler On/Off button again will turn the boiler on and light the green status indicator. Turning the boiler on may not start a light off cycle in the burner as the Burner Control needs to detect a call for heat before the cycle can start.

1.5.6.2 Low Fire

The Low Fire button operates similarly to the Boiler On/Off button. When the Low Fire button indicator is lit the Burner Control is in the Low Fire Hold state where if there is a call for heat, the modulation rate is held at 0% modulation and the current profile position is held at the P03 position. A press of the button will return the boiler to Low Fire disengaged state and return the green indicator to the unlit condition allowing the Burner Control to modulate the burner firing rate as dictated by the Boiler system demand.

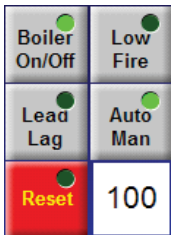
1.5.6.3 Lead Lag

The Lead Lag button operates similarly to the Boiler On/Off button in so far as the push on and push off action is the same. The green indicator has a different meaning though. The Burner Control can assume the role of sequencing master as long as there is no other sequence master on the associated communications bus. If boiler sequencing has been configured and the master select is designated to be a function of the keypad, then the Burner Control assuming the role of sequence master can be toggled on or off by pressing the Lead Lag button. If the green indicator is not lit then the Burner Control is considered to be a sequencing slave. If the green indicator is lit then the Burner Control has become the sequencing master. If the green indicator is blinking, then the Burner Control is in a transitional state waiting for any communication traffic from another master on the bus associated with boiler sequencing to stop communicating with the sequencing slaves.

1.5.6.4 Auto Man

The Auto Man button operates similarly to the Boiler On/Off button. When the Auto Man button indicator is lit the Burner Control is in the Manual Modulation control state where if there is a call for heat, the modulation rate is held at the modulation rate entered by the operator. The numeric Manual Modulation entry field just under the Auto Man button is visible and the green indicator is lit whenever the manual modulation mode is enabled. Any modulation rate (shown in Figure 5) can be entered as an integer from 0% to 100% by pressing the Manual Modulation entry field. Once in Manual Modulation mode a press of the Auto Man button will return the boiler to the Automatic Modulation mode causing the Manual Modulation entry field to vanish and the green indicator to go to the unlit state. This will allow the Burner Control to again modulate the burner firing rate as dictated by the Boiler system demand.

FIGURE 5.



Boiler Graphic Control Group with Manual Modulation Enabled

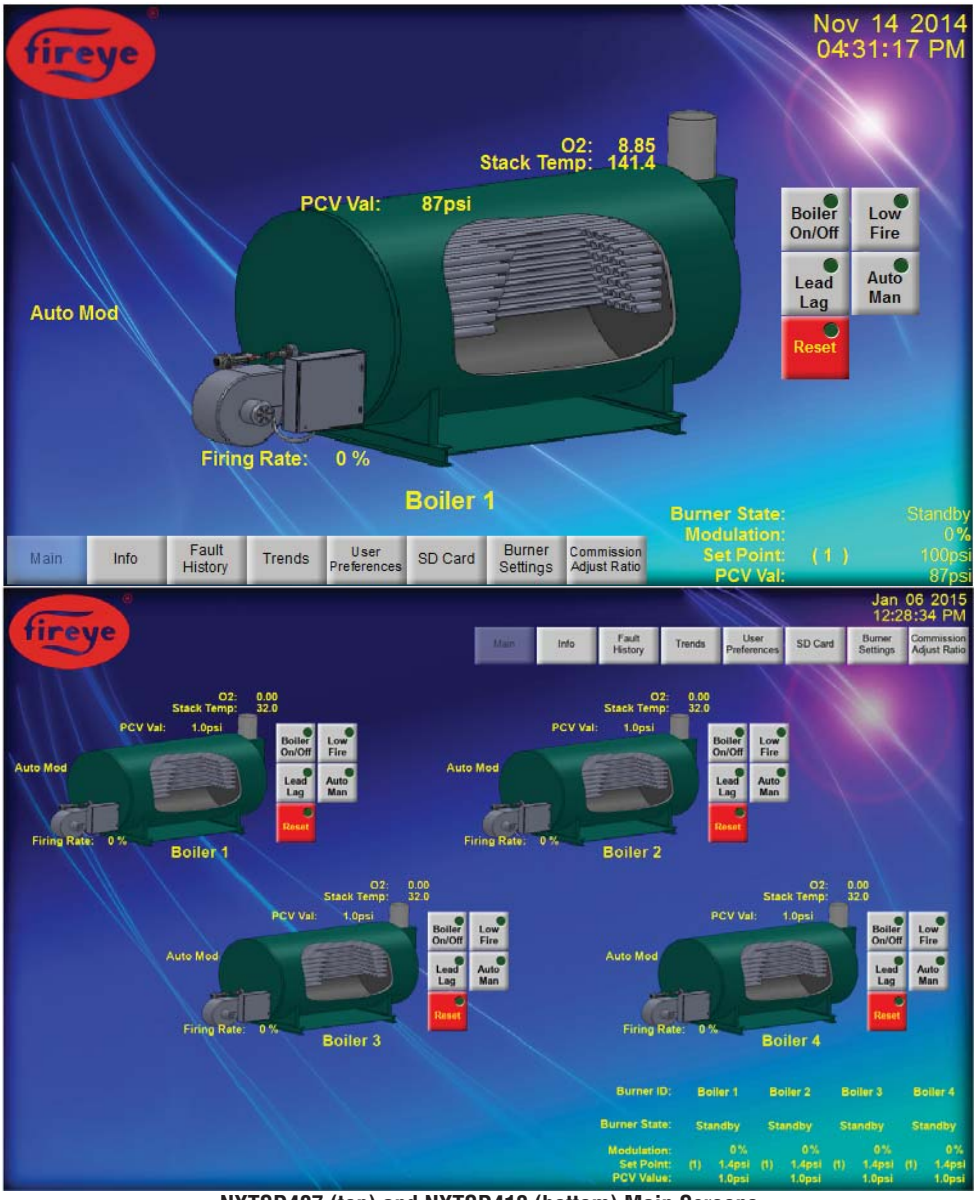
1.5.6.5 Reset

The Reset button operates similarly to the Boiler On/Off button. When the Reset button indicator is lit the Burner Control is in a Lockout state and cannot turn on in response to a call for heat. A press of the button will take the Burner Control out of the Lockout state and return the boiler to an operational state. It should be noted that if the problem that caused the Lockout still exists, the Burner Control will register a new Lockout condition.

2.0 Main Screen

The Main Screen (shown in Figure 6) contains the general operational information needed to operate and monitor the status, condition, and state of the PPC4000 controller and associated equipment. The NXTSD407 Display is capable of displaying the information associated with one PPC4000 controller connected to the display. The NXTSD413 Display has a Main screen that is setup during installation to accommodate one PPC4000 controller to a maximum of six PPC4000 controllers. The operational capability and information provided on the Main screen of the two displays is fundamentally the same with the allowed quantity of monitored boiler systems and placement of the graphical items being the only distinction. Navigation to the main screen can be performed at any time when the Main screen is not displayed by pressing the "Main" button of the navigation button controls.

FIGURE 6.



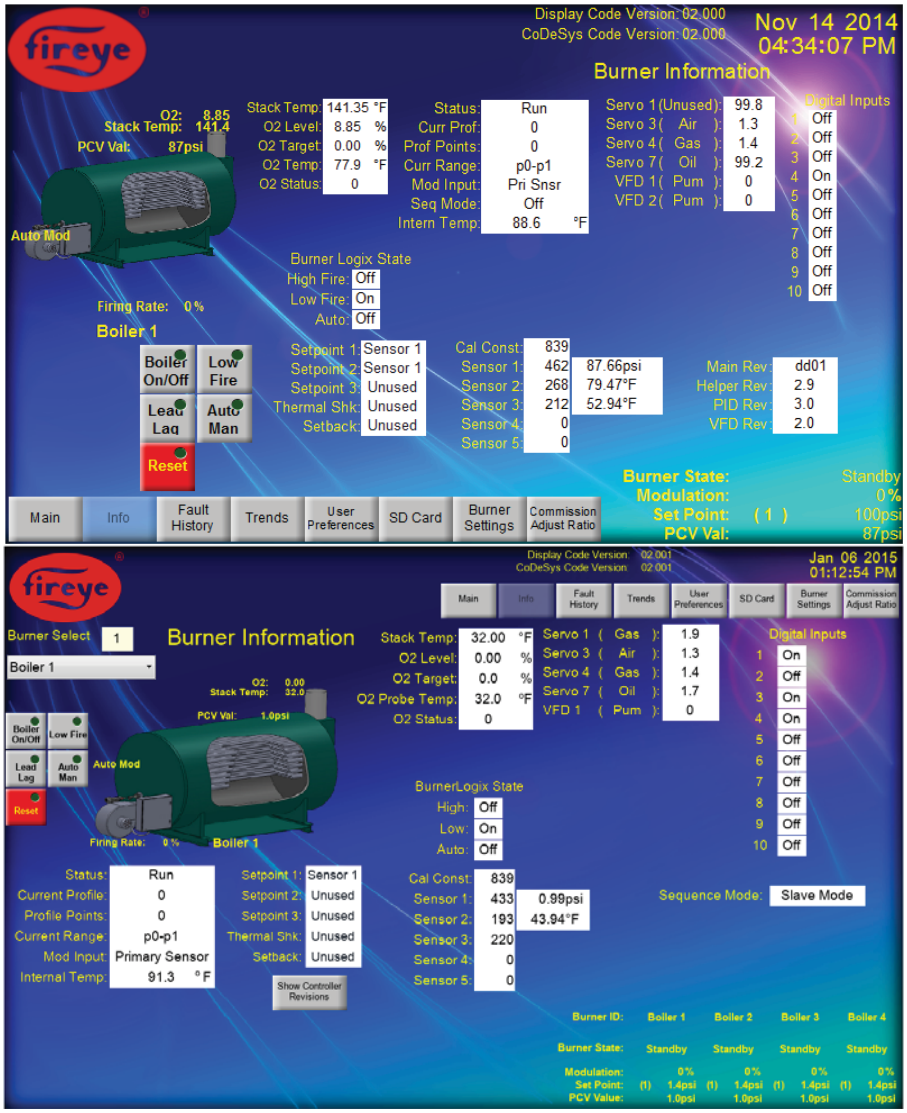
NXTSD407 (top) and NXTSD413 (bottom) Main Screens

The main screen contains the same common control elements as the rest of the screens with the exception of the Boiler Graphic which is larger on the NXTSD407 Display taking up most of the center area of the screen. The NXTSD413 Display also places the Boiler Graphic in the center area of the Main screen but will display a separate graphic for each connected Burner Control and will resize and position the graphic across the center area of the Main screen to provide maximum detail without overlap.

2.1 Info Screen

The Info Screen (shown in Figure 7) provides the installer or operator the ability to quickly check key system values for the purpose of verifying the boiler system settings and performance. The Info screen displays data that is dependent on the setup of the Burner Control done during the installation and setup process. Navigation to the Info screen can be performed at any time when the Info screen is not displayed by pressing the "Info" button of the navigation button controls.

FIGURE 7.



NXTSD407 (top) and NXTSD413 (bottom_ Info Screens

The information on the Info screen is divided into logical areas that are made visible when the Burner Control settings dictate that the data is available. The display also contains elements that are common to all screens (see section 1.0). The different groups are described in more detail in the following sections.

2.1.1 O2 Group

The O2 Group consists of the Stack Temp, O2 Level, O2 Target, O2 Probe Temp, O2 Status, Boiler Efficiency, and Combustion Efficiency. The Stack Temp and O2 Level is the same information shown in the Boiler Graphic Stack Data Group described in section 1.5.2, 1.5.2.1, and 1.5.2.2. If the Burner Control does not have a stack probe then the information in the Boiler Graphic will be missing but the data in the O2 Group will still exist but be invalid. Detailed descriptions of all of the O2 Group items

can be found in section 2.6.6. The Boiler Efficiency field contains the calculated efficiency in percent and is provided by the Burner Control when the O2 data is available from a stack probe. In the case where there is no stack probe available, the field will not be displayed.

2.1.2 Actuator Group

The Actuator Group consists of the servo and VFD elements that are configured to be used on all available profiles. Each visible line in the column shows the usage, position, or encoder counts for each configured actuator. The current example shown in Figure 7 shows only four servos configured to be used with the Burner Control. A maximum of ten servos and two VFDs can be displayed in the column.

2.1.3 Digital Input Group

The Digital Input Group displays the current state of all ten (or sixteen if the burner control is a NXF4000) of the available digital inputs regardless of the assigned usage (see section 2.6.5 for more detail). Each input can have one of two possible states. The "On" state indicates that the digital input has a signal applied to that input and the "Off" state indicates an absence of any signal.

2.1.4 BurnerLogix State Group

The BurnerLogix State Group shows the current logic state of the Burner Control inputs corresponding to the output logic from the BurnerLogix Primary Safety Control. Each logic input has only two states, on or off.

2.1.5 Profile Status Group

The Profile Status Group consists of the Status, Current Profile, Profile Points, Current Range, Mod Input, and Internal Temperature.

The Status field shows the current operational mode that the Burner Control is in. There are two possible modes. The "Run" mode means that the Burner Control is capable of performing normal operations. The "Lockout" mode indicates that the Burner Control is in a Lockout condition and is unable to respond to a call for heat from the system.

The Current Profile field shows either a "0" representing that a burner cycle has not been started or a number from "1" to "4" indicating which profile has been selected by the profile select inputs of the Burner Control.

The Profile Points field displays the number of commissioned profile points available for the selected Current Profile or "0" if the Profile has not been selected (burner cycle has not been initiated). The allowed number of profile points for a valid commissioned profile is four to twenty four points.

The Current Range field displays the current profile position the Burner Control is in when the burner cycle is on and modulating at the firing rate need per the system heating demands. Available range indications are dependent on the number of commissioned profile points but if all twenty four points were commissioned then the available profile items in the field would be "p0-p1", "p1-p2", "p2-p3", "p3-p4", "p4-p5", "p5-p6", "p6-p7", "p7-p8", "p8-p9", "p9-p10", "p10-p11", "p11-p12", "p12-p13", "p13-p14", "p14-p15", "p15-p16", "p16-p17", "p17-p18", "p18-p19", "p19-p20", "p20-p21", "p21-p22", "p22-p23", and "p23-p24".

The Mod Input field displays the sensor that the Burner Control is using to determine the need for the burn cycle modulation rate. The field can also indicate when the burner cycle is running due to the Burner Control set to run due to a Digital Input going to the "On" state (Digital Input), the operator enters manual modulation (Keypad), the Burner Control is set to be a sequencing slave and the master has started the cycle (Sequencing), or the operator has placed the Burner Control in Low Fire Hold (Low Fire Hold).

The Internal Temp field indicates the internal temperature of the Burner Controller. The value may be represented in degrees Centigrade or in degrees Fahrenheit depending on the selected measurement units set during installation by the qualified technician. There is a finite operational range that the Burner Control can operate in so this information can be monitored to verify that the installation (Burner Control position within an enclosure for example) will not cause the device to go beyond the limits which could cause the device to be damaged. The limits for the device are described in the **PPC-4001** "PPC4000 Series Fuel Air Ratio Controller" bulletin.

2.1.6 Setpoint Group

The Setpoint Group consists of the Setpoint 1 to 3, The Thermal Shock Setpoint, and the Setback Setpoint. Each of the fields will display "Unused" if the setpoint has not been setup or the sensor used if the setpoint has been configured.

2.1.7 Sensor Group

The Sensor Group consists of six rows of numeric fields consisting of a cal constant and the readings of each of the five available sensors in their "raw" form. The "Cal Const" or Calibration Constant field is used by the Burner Control to convert the raw Sensor input values of sensor 1 to 3 to their corrected values. As these values are based on the 4-20ma inputs of the Burner Control, the sensor data has to be processed further to get the actual measurement that the sensor input represents. Each sensor has a number of settings that effect the calculations (see section 2.6.2) for more detail as to how this is performed. Fortunately, each row in the Sensor group that is associated with a sensor (Sensor 1 to Sensor 3) has a left column indicating the raw reading of the sensor before it has been corrected and the actual converted value in the right hand column of the group based upon the sensor configuration. In the example shown in Figure 7, sensor one and two are the only sensors that are configured for use providing an actual measured value for those sensors to be calculated and displayed on the same rows next to the raw values..

2.1.8 Sequence Mode

The Sequence Mode field indicates the current sequencing mode the Burner Control is in during the sequencing process. The possible modes are operational modes "Off", "Slave Mode", or "Master Mode" and transitional modes "Off to Slave", "Off to Master", "Slave to Off", "Master to Off", "Slave to Master", or "Master to Slave". The Sequencing capability is described in detail in the **PPC-4001,** "PPC4000 Series Fuel Air Ratio Controller" bulletin.

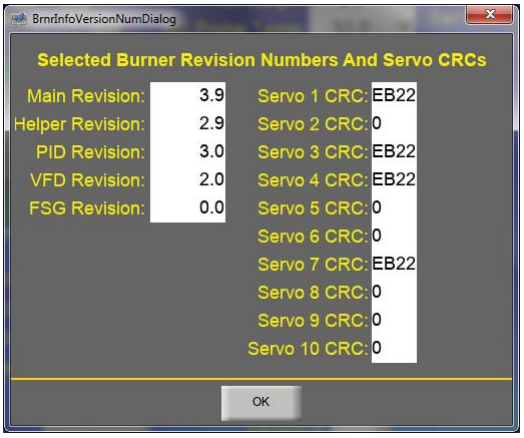
2.1.9 Analog Output Group

The Analog Outputs are visible when any of the available analog outputs are enabled as analog outputs. There are three possible analog outputs that include one analog output available from the standard Burner Control configuration and two Variable Frequency Drives (VFD) outputs. The VFD outputs can be configured as analog outputs when the VFD configuration is available in the Burner Control and the either VFD outputs are not configured as a control for VFDs. In the example shown in Figure 7, the Analog Outputs are not configured and for that reason are not visible.

2.1.10 Show Controller Revisions Button

This button will launch a dialog box that shows the versions of each processor in the Burner Control and the CRCs of each of the connected servos as shown in Figure 8.

FIGURE 8.

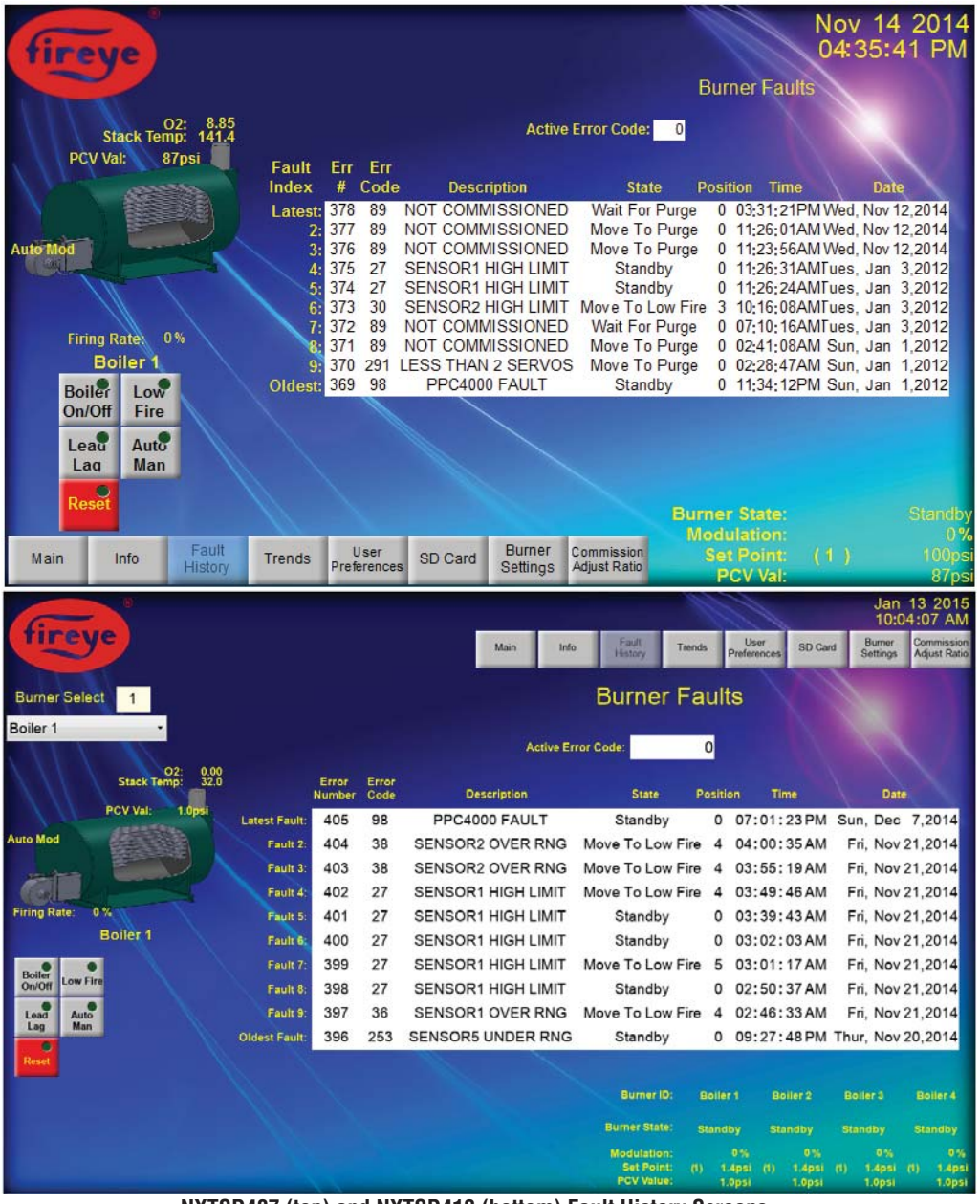


The Version Group consists of the "Main", "Helper", "PID", "VFD", and "FSG" version fields and indicates the current version of the firmware for each of the processors in the Burner Control. If any of the processors is absent in the current configuration of the Burner Control then the version will show "0.0".

2.2 Fault History Screen

The Fault History Screen (shown in Figure 9) provides the installer or operator the ability to view the last ten faults (Lockouts) that have occurred within the Burner Control. The Fault History data is displayed as an active error code entry and Fault data in the form of a table where each row shows a recorded fault. Navigation to the Fault History screen can be performed at any time when the Fault History screen is not displayed by pressing the "Fault History" button of the navigation button controls.

FIGURE 9.



NXTSD407 (top) and NXTSD413 (bottom) Fault History Screens

As with all of the other screens, the Fault History screen contains elements that are common to all screens (see section 1.0). The unique items on the screen include the Active Error Code field and the Fault Code table.

While the Burner Control has an active fault that has not been reset, the Active Error Code contains the error code number associated with the active fault. Once the fault has been reset and there are no more active faults the Active Error Code will be filled with a "0".

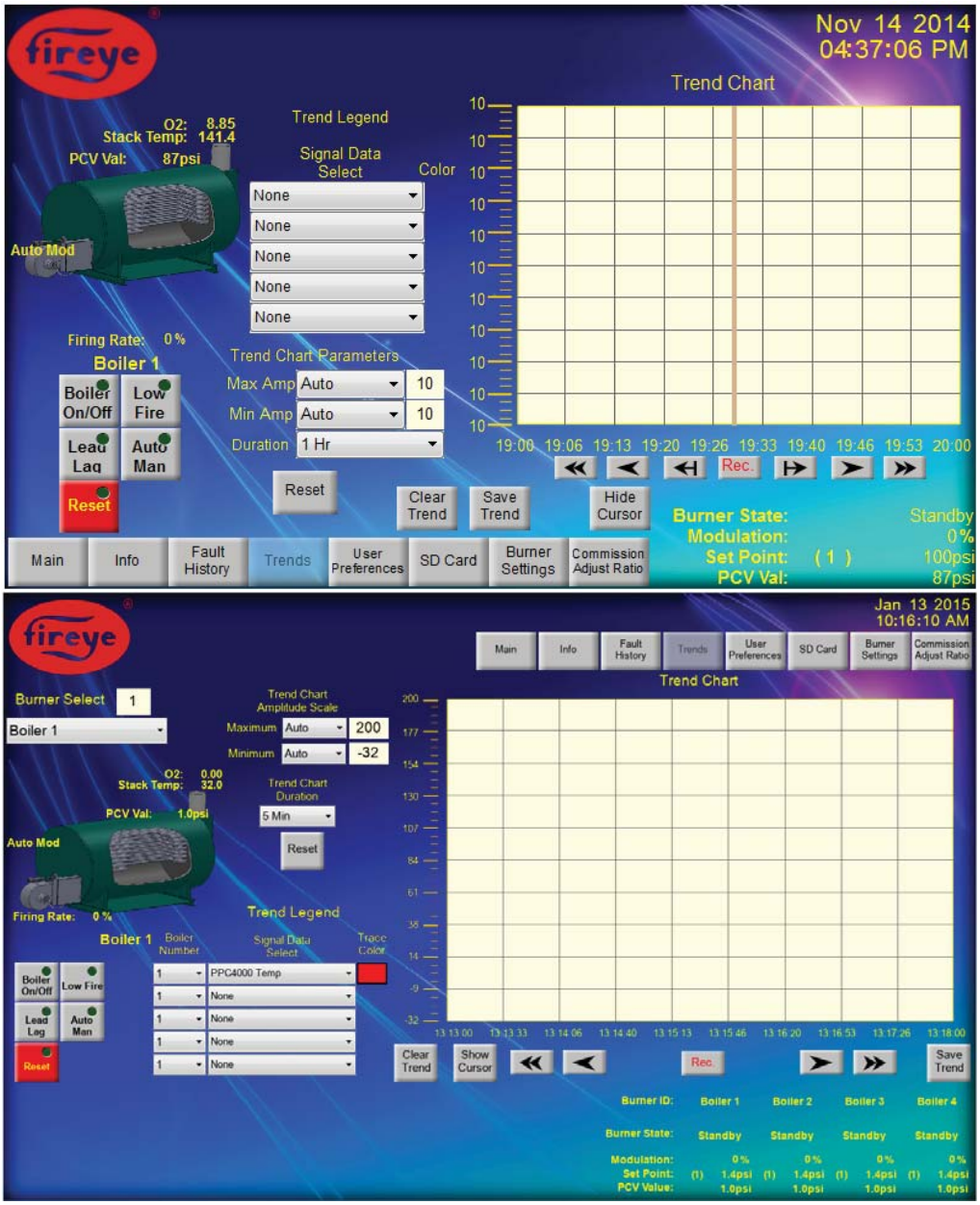
The Fault Table is in descending order displaying the latest fault in the top row of the table. Each row contains the Error Number, Error Code, Fault Description, Burner Control Operational State, and the time and date of the fault (per the real time clock of the Burner Control).

2.3 Trend Screen

The Trend Screen (shown in Figure 10) provides an operator with the ability to view up to five data items from the Burner Control and plots the items as a trend line on the Trend Chart. The operator has the ability to select which data items are to be plotted. Navigation to the Trend screen can be performed at any time when the Trend screen is not displayed by pressing the "Trends" button of the navigation button controls.

As with all of the other screens, the Trend screen contains elements that are common to all screens (see section 1.0). The unique items on the screen include the Trend Chart, Trend Legend selector, Trend Chart Amplitude Scale selections, Trend Chart Duration selection and the Cursor controls.

FIGURE 10.



NXTSD407 (top) and NXTSD413 (bottom) Trend Screen

2.3.1 Trend Chart Display

The Trend Chart is the area that displays the trend lines that are selected by the operator to be displayed. The vertical scale or amplitude scale represents the value of the signal at the displayed point in time as shown on the horizontal scale or time scale. Part of the chart area is used to display the values of the selected data items at any point along the visible trend line. These display fields are only visible when the chart cursor is visible (see section 2.3.5).

2.3.2 Trend Legend Controls

The Trend Legend selector is the area where the operator can select the data item to be charted. The available data item selections include None, Modulation Rate, Burner Control Internal Temperature, Calculated CO2, VFD 1 Position, VFD 2 Position, Efficiency, O2 Target, Stack Temperature, Stack Probe Ambient Temperature, O2 Level, Servo 1 to 10 Positions, Sensor 1 to 5 Values, Setpoint 1 to 5 Value, Cut In, Cut Out, High Margin Alarm, and High Margin Limit. When the trend chart is used on an NXTSD413 display that has more than one Burner Control connected, the Trend Legend selector also includes a Boiler Number selector so that the trend data items from more than one boiler can be displayed at the same time.

2.3.3 Trend Chart Amplitude Scale Controls

The Trend Chart Amplitude Scale controls (part of the Trend Chart Parameters controls on the NXTSD407 Display) are set to automatically adjust the vertical (amplitude) scale of the Trend Chart to a default minimum and maximum value. The default values are based upon the data item selection(s) made by the operator in the Trend Legend Controls. By setting the scale adjustments to be manual, the operator can change the amplitude scale to have the selected minimum to maximum amplitude range effectively expanding the trend line to view with better amplitude resolution.

2.3.4 Trend Chart Duration controls

The Trend Chart Duration controls (part of the Trend Chart Parameters controls on the NXTSD407 Display) set the duration displayed on the horizontal (time) scale of the Trend Chart Display. The selections set the amount of time that is displayed from the scale start time (left side of the horizontal scale) to the scale end time (right side of the horizontal scale). The duration does not provide the ability to set a specific start time or end time but just sets the range of time. To set the portion of the time scale to view, see the cursor position controls in section 2.3.5.

2.3.5 Trend Chart Cursor Controls

The Trend Chart Cursor controls provide the operator with the ability to start and stop the recording of the Trend Chart display (red record button control), change the portion of the horizontal scale to be displayed (scroll left ◄, page left ◄◄, page right ►►, and scroll right ►), turn the cursor on or off, and scroll the cursor left ◄┤ or right ├► (not shown as these are only available while the cursor is visible).

2.3.6 Trend Chart Clear Trend control

The Trend Chart Clear Trend control clears all collected trend data. This will also clear the trend chart and any collected data that was showing.

2.3.7 Trend Chart Save Trend control

The Trend Chart Save Trend control provides the user with the ability to save the trend data to a USB flash drive as long as there is a flash drive connected.

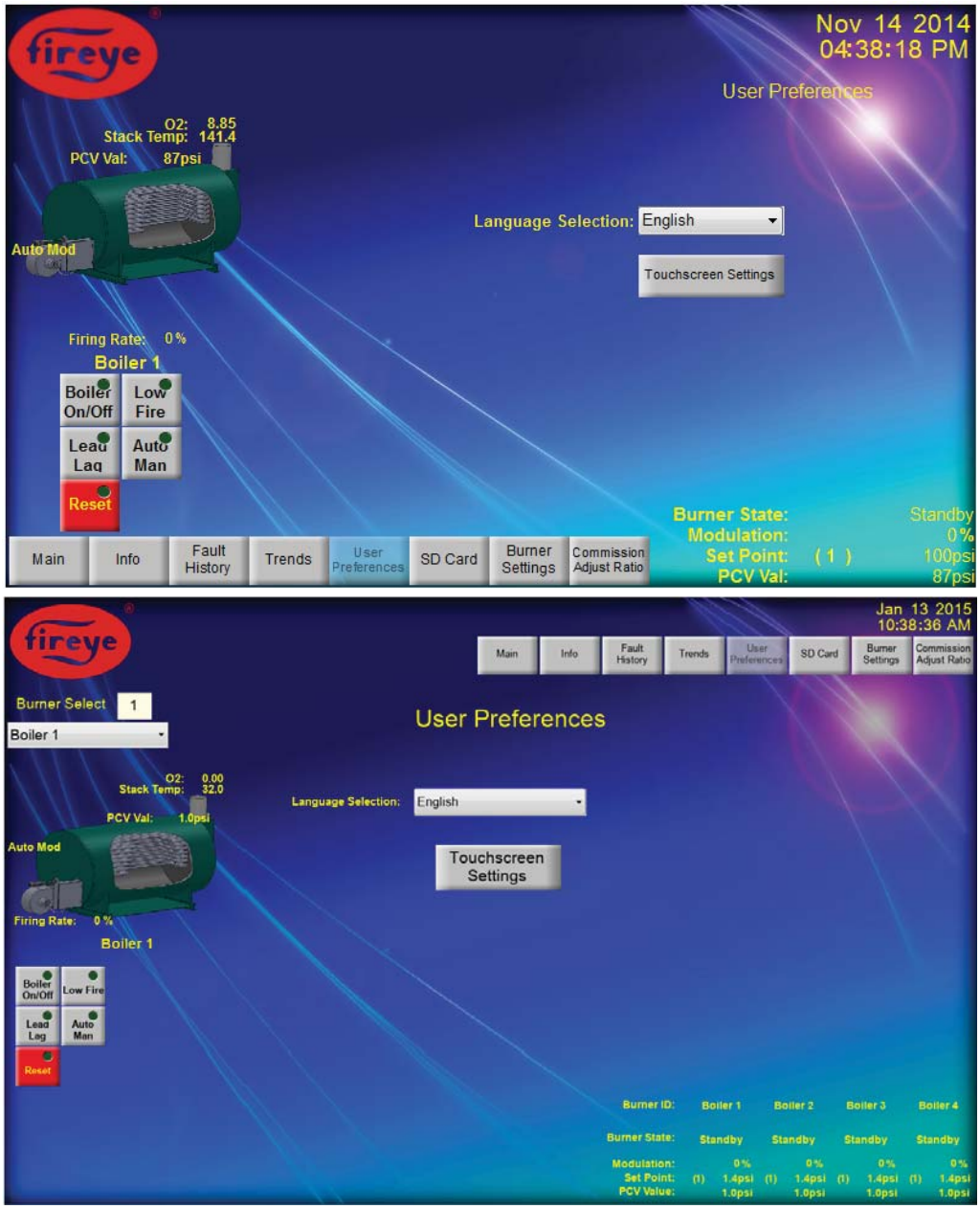
2.4 User Preferences Screen

The User Preferences Screen (shown in Figure 11) provides an operator with the ability to customize the touch screen to the desired settings of the individual operator. There is currently only one item that can be modified and that is the touch screen calibration.

Navigation to the User Preference screen can be performed at any time when the User Preference screen is not displayed by pressing the "User Preferences" button of the navigation button controls.

As with all of the other screens, the User Preferences screen contains elements that are common to all screens (see section 1.0).

FIGURE 11.

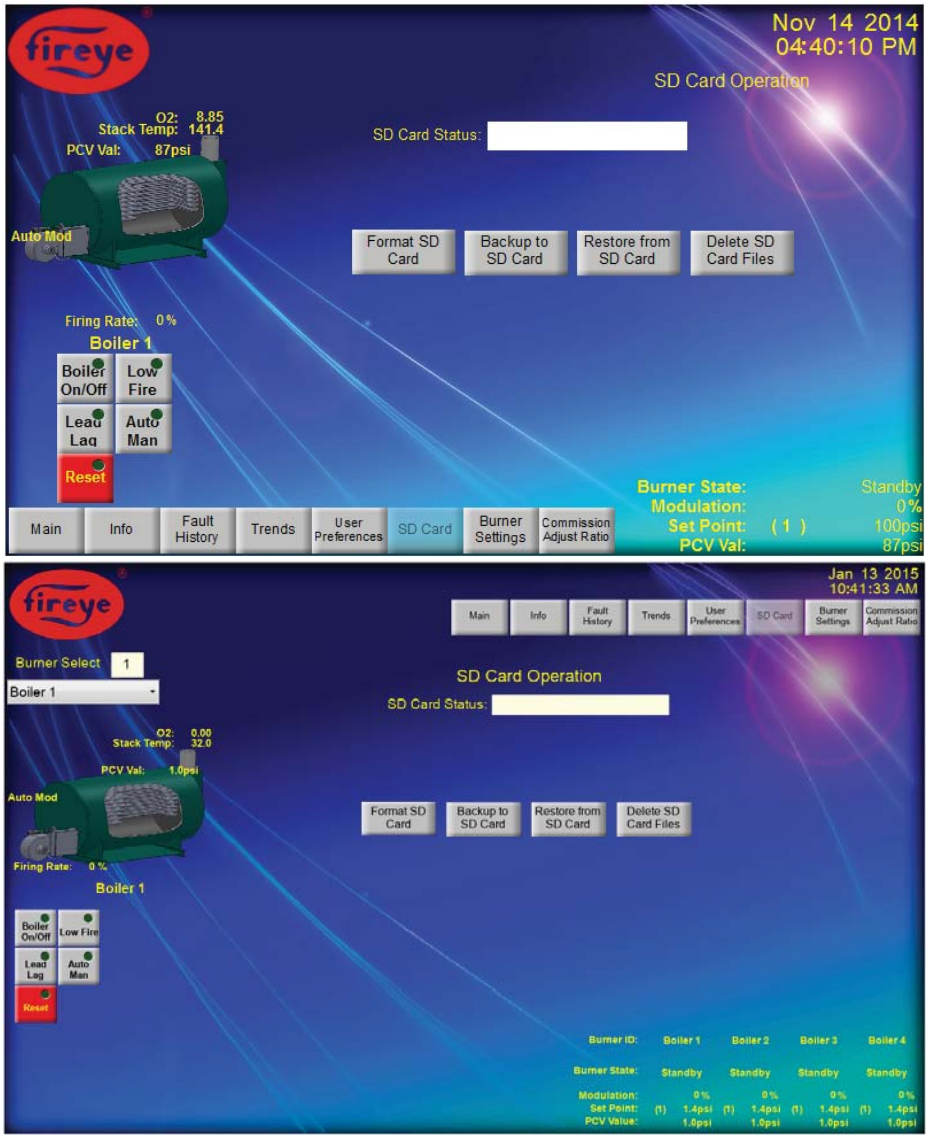


NXTSD407 (top) and NXTSD413 (bottom) User Preference Screen

2.5 SD Card Screen

The SD Card Screen (shown in Figure 12) provides an operator with the ability to store and retrieve the Burner Control settings. Included with this screen is also the ability to format an SD Card or delete individual settings previously stored on the card. Navigation to the SD Card screen can be performed at any time when the SD Card screen is not displayed by pressing the "SD Card" button of the navigation button controls.

FIGURE 12.



NXTSD407 (top) and NXTSD413 (bottom) SD Card Screen

As with all of the other screens, the SD Card screen contains elements that are common to all screens (see section 1.0). The unique items on the screen include the SD Card Status, SD Operation Status (not visible), Format SD Card button, Backup to SD Card button, Restore From SD Card button, Delete SD Card Files button, SD Card File Type selector (not shown), and the SD Card File selector (not shown).

2.5.1 SD Card Status field

The SD Card Status field shows the results messages provided by the Burner Control while the SD Card operation is being performed.

2.5.2 SD Card Operation Status

The SD Card Operation Status is a text message display just below the SD Status field that provides the operator with the state information and operator instructions of the current SD Card operation.

2.5.3 Format SD Card Button

The Format SD Card button provides the operator with the ability to initiate an SD Card format operation.

2.5.4 Backup to SD Card Button

The Backup to SD Card button provides the operator with the ability to initiate a backup of the operator selected file type (see section 2.5.7) to the SD Card.

2.5.5 Restore from SD Card Button

The Restore from SD Card button provides the operator with the ability to initiate a restore of the Burner Control settings from an operator selected SD Card file selected from a file list (see section 2.5.8).

2.5.6 Delete SD Card Files Button

The Delete SD Card Files button provides the operator with the ability to erase the operator selected file from the SD Card.

2.5.7 SD Card File Type selector

The SD Card File Type selector is shown whenever the current selected SD Card operation requires the operator to select the file type used in the operation. The SD Card Backup and Restore operations both require the operator to select the SD Card file type that the operator is to use for the SD Card operation.

2.5.8 SD Card File selector

The SD Card File selector is shown whenever the current selected SD Card operation requires the operator to select a file on the SD Card. The SD Card File selector is provided to the operator when the SD Card Restore or the SD Card Delete files operation is performed.

2.6 Burner Settings Screen

The Burner Settings Screen provides an operator with the ability to perform various Burner Settings by settings type. The Burner Settings are only available to Graphics Displays that are local to the Burner Control(s). The Burner Settings are selected by button presses on the screen and include such setups as setting of the Servos, Sensors, Set Points, Profiles, Digital Inputs, O2, Boiler Sequencing (Seq.), Thermal Shock, Setback, Communications (Comm.), Keypad, Analog Outputs, Pass Code, and Set Time. Navigation to the Burner Settings screen can be performed at any time when the Burner Settings screen is not displayed by pressing the "Burner Settings" button of the navigation button controls.

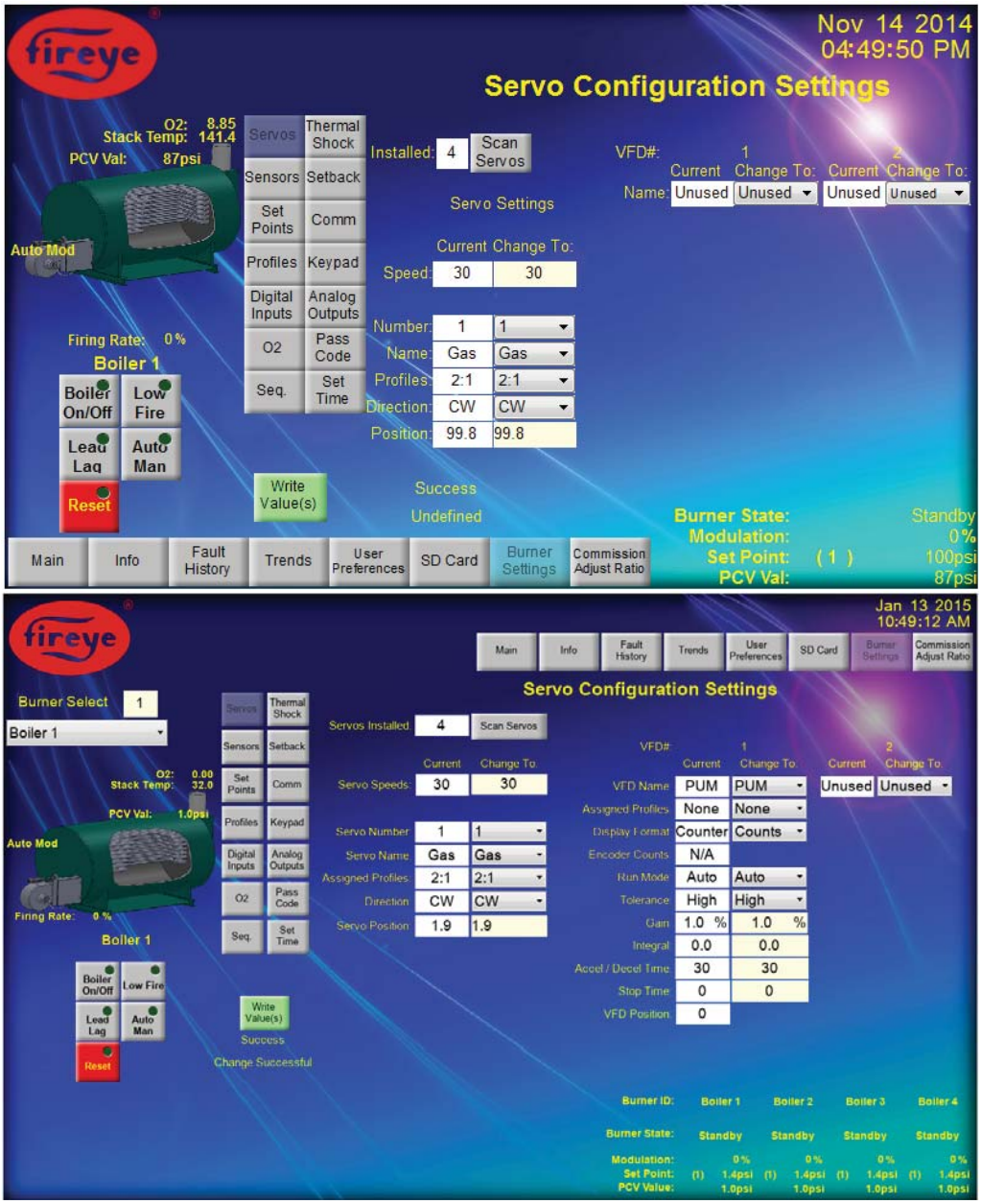
As with all of the other screens, the Burner Settings screen contains elements that are common to all screens (see section 1.0). Each settings selection provides a unique set of controls that are associated with the selected settings as described in the following sections.

Most settings values when changed by the operator are not changed in the Burner Control until a settings write operation is initiated with a press of the Write Value(s) button. In most Burner Control Setup screens, the operator can change any values desired so that when the Write Value(s) button is pressed, all controls that were changed will initiate a change for those items in the Burner Control. Two message displays (to the right of the Write Value(s) button on the NXTSD407 Display and bellow the button on the NXTSD413 Display) provide feedback status to the operator as to the success or failures of the settings write operation. In addition to the message displays, all writeable fields and selections have a corresponding "current settings" field that shows the values set in the Burner Control. If the "current settings" fields corresponding to the operator settable fields are not the same after the write operation then the write operation messages will indicate a failure in the settings write unless there is sequence precedence in the write operation that disallows a setting to occur while another setting is being written. An example of this is in the Commissioning and Adjust Ratio screens that will not allow more than one servo or VFD to be changed at a time. This is discussed further in the Commissioning and Adjust Ratio settings section 2.6.15.

2.6.1 Servo Settings

The Servos settings selection (shown in Figure 13) provides the operator with the ability to setup the servos and VFDs that are part of the Burner Control system. There can be up to ten servo actuators and 2 VFDs installed in each Burner Control. The Servo settings are displayed in a format where the current settings of the Burner Control are positioned in a column on the left of the modifiable fields for each selection. Fields that are able to be modified by the operator are generally shown as a beige color or a drop down selector.

FIGURE 13.



NXTSD407 (top) and NXTSD413 (bottom) Servo Setup Screen

The Servos setups include the ability to scan for servos, change the Servo Speed, set the Servo Name, the Servo Profile Assignment, the direction, and check the servo position. In addition to using a servo to control the air flow into a combustion chamber, the Burner Control can control one or two variable frequency drives (VFD/VSD) that are not used as Analog Outputs (see section 2.6.12) to allow for better air flow control and combustion. The VFD setup items include the VFD Name, Assigned Profiles,

Format, Number of Encoder Counts, Mode, Tolerance, Gain, Integral, Acceleration / Deceleration, Stop Time, and Position. All settings can be changed and applied to the settings in the Burner Control with a single write operation. If the Servo Number is changed while there are changes to the Servo settings then those settings for that Servo will be lost if the write operation has not been performed on the changes (the current settings information should indicate if new values have been written to the Burner Control or not).

2.6.1.1 Scan Servos

The Scan Servos button is used to direct the Burner Control to scan the servo communication port and return the number of servos found. This operation has to be performed whenever a servo is installed or when the system is first installed. By completing this operation, the Burner Control is now aware of all attached servos.

2.6.1.2 Servo Speed

The Servo Speed can be selected within the range of 30 to 120 seconds in steps of 5 seconds. The selection tells the Burner Control the amount of time the servos need to move 90 degrees. The default is 30 seconds and for most applications is an adequate setting.

2.6.1.3 Servo Number

The Servo Number selection provides the operator with a way to select which servo will be viewed or modified. The available servos are the same servos found during the Scan Servo operation described in section 2.6.1.1.

2.6.1.4 Servo Name

Before the servos can be used by the Burner Control they must be named. Naming the Servo indicates to the Burner Control the type of control the servo has on the system. At least one servo of each profile must be named AIR. The table below lists the options for naming the servos.

Table 1: **Servo / VFD Name Selections**

NAME	DESCRIPTION
UNUSED	Servo Not Used
FU1	Fuel 1
FU2	Fuel 2
GAS	Gas
OIL	Oil
CUP	Rotary Cup
PUM	Pump
WAS	Waste Fuel
PRI	Primary Air
FGR	Flue Gas Recirculation
AIR	Main Combustion Air
FAN	Main Combustion Fan
SEC	Secondary Air
SLE	Burner Sleeve

2.6.1.5 Servo Profile Assignment

For a servo to be used by the Burner Control, the servo must be assigned one of the profiles that the Burner Control can use. See table 2 for a description of profiles and settings.

Table 2: **Servo / VFD Profile Assignment Selections**

PROFILE ASSIGNMENT VALUE	
DISPLAY VALUE	**PROFILES**
NONE	None
1	1
2	2
2,1	2 and 1
3	3
3,1	3 and 1
3,2	3 and 2
3,2,1	3, 2, and 1
4	4
4,1	4 and 1
4,2	4 and 2
4,2,1	4, 2, and 1
4,3	4 and 3
4,3,1	4, 3, and 1
4,3,2	4, 3, and 2
4,3,2,1	4, 3, 2, and 1 (ALL)

2.6.1.6 Servo Direction

The Servo Direction indicates to the Burner Control the direction that the servo will turn when travelling from 1.0 to 90.0 degrees. The available selections are Clockwise (CW) and Counter-Clockwise (CCW). See the PPC4000 bulletin **PPC-4001** "PPC4000 Series Fuel Air Ratio Controller".

2.6.1.7 Servo Position

The Servo Position setting provides the operator with the capability of checking the position settings to verify correct servo installation and setup. The Servo Position can be set by the operator to any angular position between 1.0 to 99.9 degrees. The operator must take care as to not drive the servo past the mechanical limits of the linkage attached to the servo drive shaft. When the operator leaves the Servo Settings the Servo Position will return to its default position (1.0 for Burner Controls that have not been commissioned).

2.6.1.8 VFD Name

As with the servos, the VFD must be named in order to be usable. The available Names for the VFD can be found in Table 1.

2.6.1.9 Assigned Profiles

As with the Servo Profile Assignment, the VFD must be assigned to a profile that is able to be used by the Burner Control before the VFD can be used. The available profile selections can be found in Table 2. See section 2.6.1.5 for a description of profiles and settings.

2.6.1.10 Format

The Format is used to select the method of feedback used from the VFD. A 4-20 mA input or an encoder input are the two methods of feedback that can be selected. The encoder “counts” and the % Full Scale are dependent on 4-20 mA from the VFD.

2.6.1.11 Encoder Counts

The Encoder Counts are dependent on the use of an encoder. The Counts selection is the default and has a range of 0 - 1000 and is derived from the 4-20 mA feedback. The % Full Scale translates the 4-20 mA to a scale ranging from 0 - 100.0%. The scale for encoder counts is dependent on the encoder used. Total encoder counts are determined by the encoder's counts per revolution specification and the motor's maximum revolutions per minute (RPM). The allowable range is 300 to 5000 with a default of 1000.

2.6.1.12 Run Mode

The Mode setting is the Run Mode of the VFD and provides the operator with the option of using the Burner Controls PID (Auto) or the VFDs PID (Manual) to control the VFD setpoint.

2.6.1.13 Tolerance

The Tolerance setting is the acceptable error in the VFD feedback signal. A Low Tolerance selection requires the positioning error to be less than 4% of setpoint over a 30 second period. A High Tolerance selection requires the positioning error be less than 6% of setpoint over a 15 second period.

2.6.1.14 Gain

The Gain setting is the amount of amplification of the error signal. This error signal is the deviation between feedback and control. A high gain can result in unstable operation and cause overshoot. The range is 1.0% to 100% with an increment of 0.1% and a default of 1.0%.

2.6.1.15 Integral

The Integral setting is the time between error corrections or updates to the VFD. A high rate of updates (short integral time) to the VFD can result in unstable operation. Conversely too few updates (long integral time) to the VFD can result in large deviations from setpoint. Update time to the VFD output is done at ¼ second intervals. The range of value for the Integral setting is 0 to 100 in increments of 0.1 with a default of 0.0. The lower the setting, the shorter the integration time will be. The default setting of 0.0 will inhibit integration. A setting of 100.0 will have the longest integration time.

2.6.1.16 Acceleration / Deceleration

The Acceleration / Deceleration time is the time required to move from minimum (0 Hz) to maximum (60 Hz) and from maximum to minimum speeds. The default value is 30 seconds and the range is from 0-255 seconds. The rate of change of the 4-20 mA output is based on the Acceleration and Deceleration time setting. During this time period, the VFD is allowed to move to its next position and not be checked for errors until the time has expired.

2.6.1.17 Stop Time

When using flame safeguard controls that require the air flow switch to be proved open before the start of a cycle, the VFD must be nearly stopped before the air flow switch may open. The STOP TIME parameter is the amount of time the Burner Control will wait between cycles to allow the VFDs to come to a complete stop. Operators can adjust the Stop Time between 0 and 100 seconds in 1 second increments. The default value for Stop Time is 0 seconds.

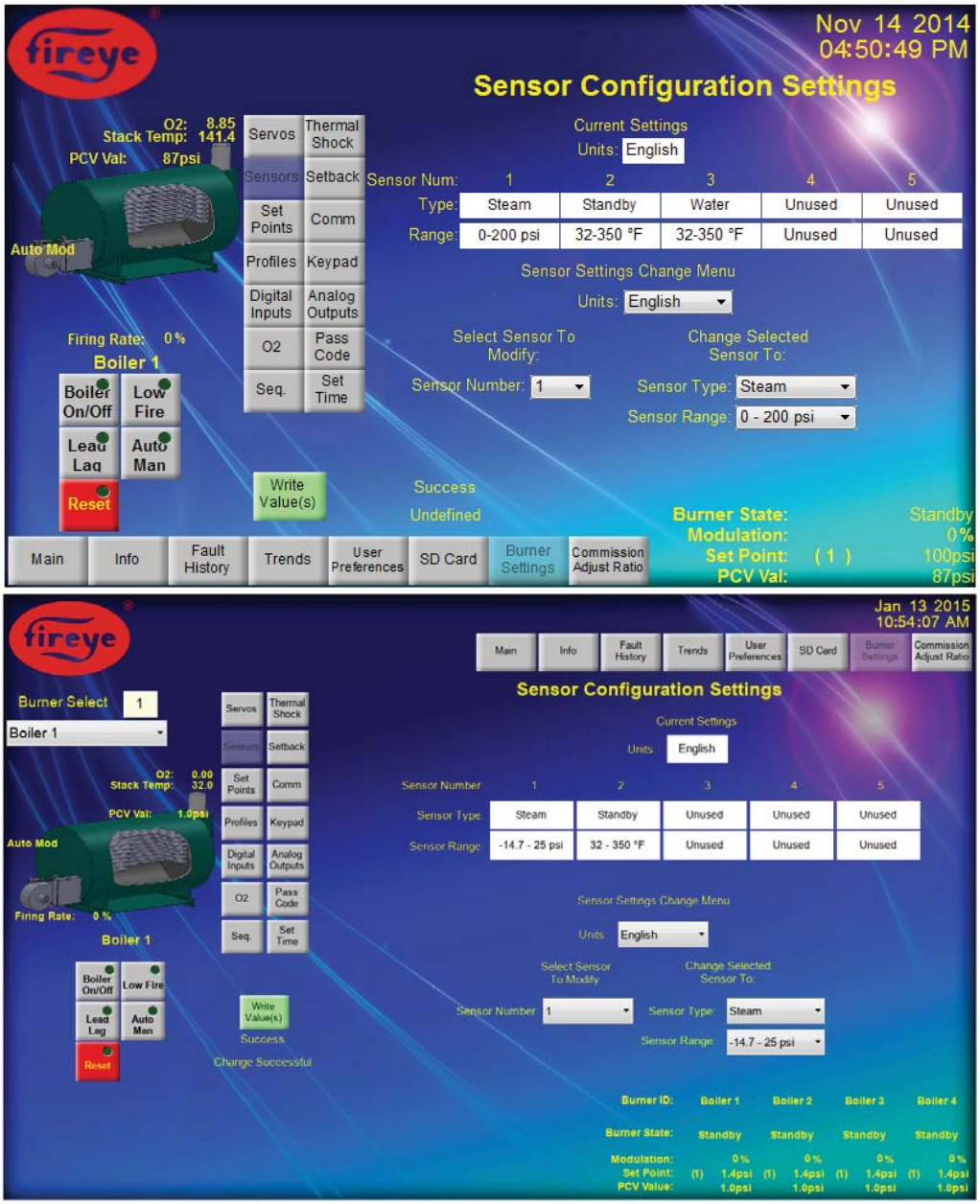
2.6.1.18 Position

This setting is unavailable as it has never been implemented in the Burner Control.

2.6.2 Sensor Settings

The Sensors settings selection (shown in Figure 14) provides the operator with the ability to setup the Sensor inputs to the Burner Control system. The Burner Control has the ability to utilize up to five sensor transducers. The screen is divided into two sections which the upper section is reserved for the current Burner Control settings while the lower section contains the operator settable selectors.

FIGURE 14.



NXTSD407 (top) and NXTSD413 (bottom) Sensor Setup Screen

The Sensor setups include the ability to change the Burner Control Units and set the Sensor Type and Range for each Sensor. All settings can be changed and applied to the settings in the Burner Control with a single write operation. If the Sensor Number is changed while there are changes to the Sensor Type or Range settings then those settings for that sensor will be lost if the write operation has not been performed on the changes (the current settings information should indicate if new values have been written to the Burner Control or not).

2.6.2.1 Sensor Units

The Sensor Units provides the operator with the ability to select the units of measurement for all sensors. The English selection causes all settings in the Burner Control to be in Pounds per Square Inch (PSI) for steam sensors and degrees Fahrenheit for water temperature sensors. The Metric selection causes Burner Control settings to be in BAR or mBar for steam sensors and degrees Centigrade for water temperature sensors. Once the operator has set the units in the Burner Control, the setting are applied to all sensor settings. If there are any sensors already defined (have the sensor type or range values set) then the Sensor Units cannot be changed.

2.6.2.2 Sensor Number

The Sensor Number selection provides the operator with a way to select which sensor will be modified.

2.6.2.3 Sensor Type

The Sensor Type can be set by the operator to a value that is dependent on the sensor number as shown in Table 3.

Table 3: **Sensor Type Selections**

Sensor Number				
1	**2**	**3**	**4**	**5**
Unused	Unused	Unused	Unused	Unused
Water	Water	Water	Inlet	Inlet
Steam	Steam	Steam		
Track	Standby	Inlet		
		Outdoor		
		Stack		

2.6.2.4 Sensor Range

The Sensor Range can be set by the operator to a value that is dependent on the units and sensor type as shown in Table 4.

Table 4: **Sensor Range Selections**

Type	Sensor Units	
	English	**Metric**
Steam	15 psi	1030 mBar
	25 psi	1720 mBar
	30 psi	2070 mBar
	200 psi	13.8 Bar
	300 psi	20.7 Bar
Water, Standby, Ambient, Outdoor, Stack	350ºF	176ºC
	752ºF	400ºC
Inlet	140°F	60°C
	300°F	149°C
	350°F	176°C

2.6.3 Set Point Settings

The Setpoint settings selection (shown in Figure 15) provides the operator with the ability to setup the Setpoint settings of the Burner Control system based upon the Sensor selected for the Setpoint. The Burner Control has the ability to utilize up to five setpoint settings. The screen is divided into two sections which the left section is reserved for the current Burner Control setpoint settings while the right section contains the operator settable selectors.

FIGURE 15.

NXTSD407 (top) and NXTSD413 (bottom) Setpoint Setup Screen

The Setpoint setups include the ability to change the Sensor Used, Limit Type, Setpoint, Cut In, Cut Out, P-Band, High Margin Limit, High Limit, Integral, and Derivative for each Setpoint. All settings can be changed and applied to the settings in the Burner Control with a single write operation. If the Setpoint Number is changed while there are changes to the Setpoint settings then those settings for that setpoint will be lost if the write operation has not been performed on the changes (the current settings information should indicate if new values have been written to the Burner Control or not).

2.6.3.1 Setpoint Number

The Setpoint Number selection provides the operator with a way to select which setpoint will be modified.

2.6.3.2 Sensor Used

For Setpoint 1 the options for Sensor Used are limited to Unused and Sensor 1. Setpoint 2 can use Sensor 1, or Sensor 2. Setpoint 3 can be set to Unused or Sensor 3.

2.6.3.3 Limit Type

The Limit Type is fixed to the "Deviation" selection making the Cut In and Cut Out values an offset or deviation from the Setpoint value.

2.6.3.4 Setpoint

The Setpoint value is the target pressure or temperature that the Burner Control will maintain in the system.

2.6.3.5 Cut In

The Cut In setting determines the point at which the pressure or temperature must reach to start a burner cycle. Because the Limit Type (see section 2.6.3.3) is fixed to the Deviation option, the Cut In is a differential value that is subtracted from the pressure or temperature setpoint.

2.6.3.6 Cut Out

The Cut Out setting determines the point at which the pressure or temperature must reach to end a burner cycle and initiate a normal shutdown. Because the Limit Type (see section 2.6.3.3) is fixed to the Deviation option, the Cut Out is a differential value that is added to the pressure or temperature setpoint.

2.6.3.7 P-Band

The P-Band determines the proportional band and is the range of pressure or temperature in which the firing rate is commanded from its low fire position (0%) to its high fire position (100%). Because the Limit Type (see section 2.6.3.3) is fixed to the Deviation option, the P-Band is a differential value that is subtracted from the pressure or temperature setpoint.

2.6.3.8 High Margin Limit

The High Margin Limit setting is the sensor level that when exceeded for more than four seconds will cause the Burner Control to generate an alarm but the system will not go to lockout. The High Margin Limit cannot be set to a value that exceeds the High Limit (see section 2.6.3.9).

2.6.3.9 High Limit

The High Limit setting is the sensor level that when exceeded will cause the Burner Control to generate an alarm and a system lockout.

2.6.3.10 Integral

The Integral has a range of 0 to 100% and is used by the Burner Control to eliminate steady-state error and reduce overshoot. A value of 0 turns the function off.

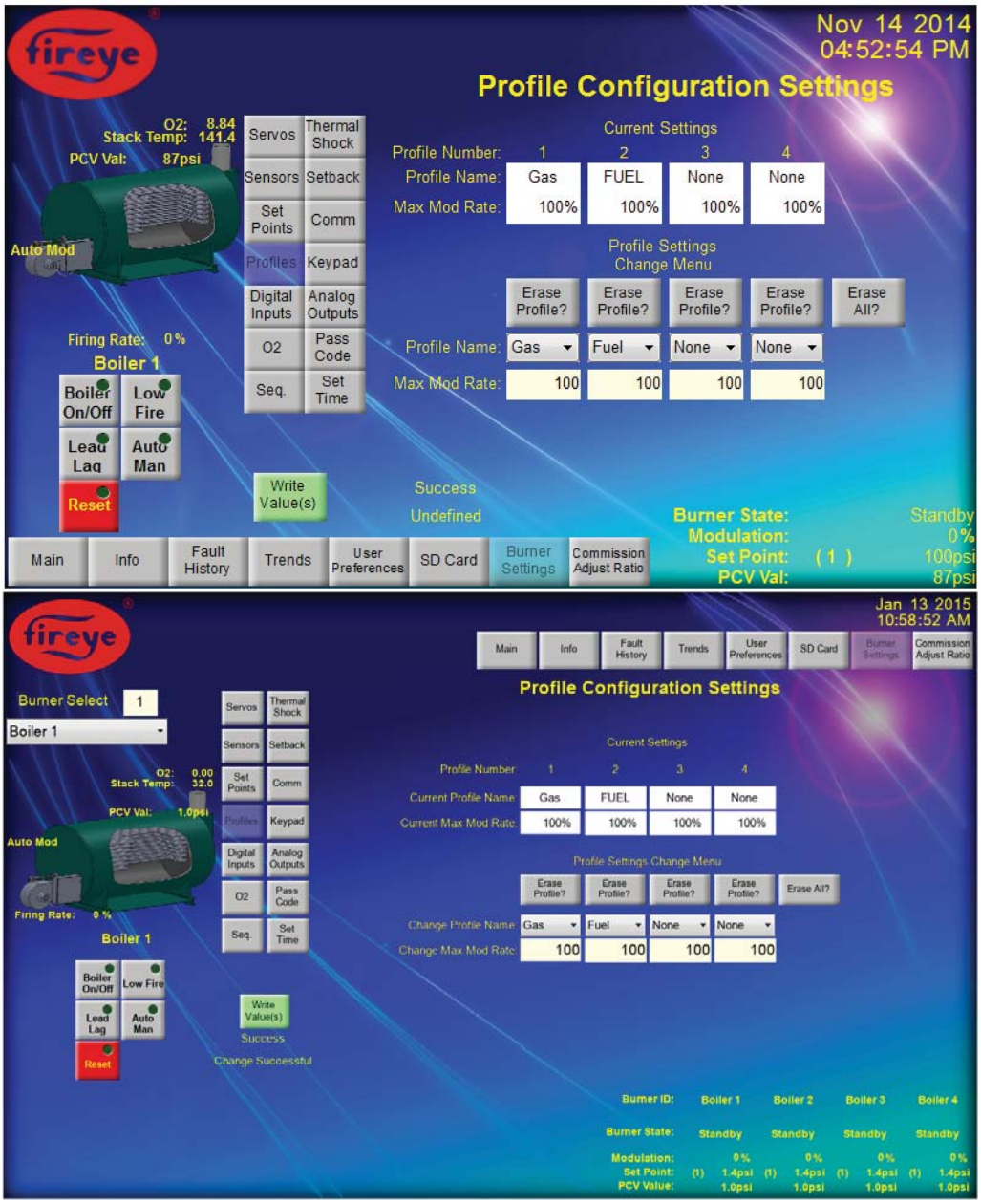
2.6.3.11 Derivative

Like the Integral, the Derivative has a range of 0 to 100% and is used by the Burner Control to eliminate steady-state error and reduce overshoot. A value of 0 turns the function off.

2.6.4 Profiles Settings

The Profile settings selection (shown in Figure 16) provides the operator with the ability to name a profile, set its maximum modulation rate, and when necessary erase the profile setpoints. The Burner Control has the ability to set up to four profile settings. The screen is divided into two sections which the upper section is reserved for the current Burner Control profile settings while the lower section contains the operator settable selectors.

FIGURE 16.



NXTSD407 (top) and NXTSD413 (bottom) Profiles Setup Screen

The Profile setups include the ability to change the Profile Name and Maximum Modulation Rate for each Profile. All settings can be changed and applied to the settings in the Burner Control with a single write operation. The Profile Name provides the Display Boiler Graphic(s) with the data needed to determine which flame animation to show (blue flame for all forms of gas type fuel and orange flame for all forms of oil type fuel).

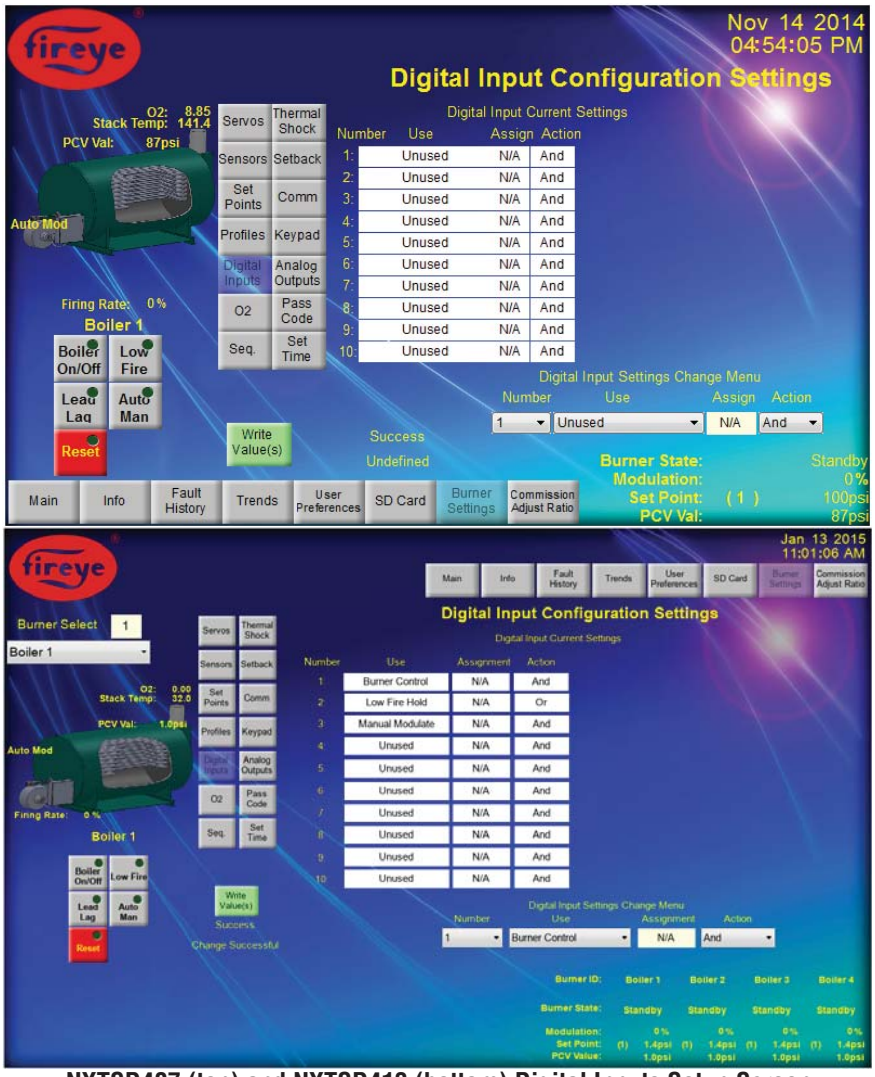
The screen also includes buttons to allow the operator to clear all commission points from the profile associated with the pressed button. The "Erase All?" button clears all profile and Burner Control set-

tings. Extreme care must be exercised when using these buttons as they can make the Burner Control inoperable unless a new Commissioning operation is performed or the Burner Control settings are retrieved from a previously saved setup stored on a SD Card.

2.6.5 Digital Input Settings

The Digital Input settings of the Burner Control provides an operator with the ability to tag any of the ten available digital inputs to be either unused, Burner Control, Setpoint 2 Select, Low Fire Hold, Alarm Reset, Manual Modulation, O2 Trim Disable, Forced Setback, Setback Override, or Sequencing. The input can be logically set to be an "And" or an "Or" function with the keypad or with other digital inputs configured as the same tagged function. When selected as "And", it is required that all inputs be active for the tagged function to be realized. The "Or" function requires either digital input or keypad function to be active for the tagged function to be realized. Each digital input applies to all profiles. The screen is divided into two sections which the upper section is reserved for the current Burner Control Digital Input settings while the lower section contains the operator settable selectors.

FIGURE 17.



NXTSD407 (top) and NXTSD413 (bottom) Digital Inputs Setup Screen

The Digital Input setups include the ability to change the Digital Input Use (the name of the function that the input is tagged to) and the Action (the "And" or "Or" logical operation applied to the input). All settings can be changed and applied to the settings in the Burner Control with a single write operation. If the Digital Input Number is changed while there are changes to the Digital Input settings then those settings for that Digital Input will be lost if the write operation has not been performed on the changes (the current settings information should indicate if new values have been written to the Burner Control or not).

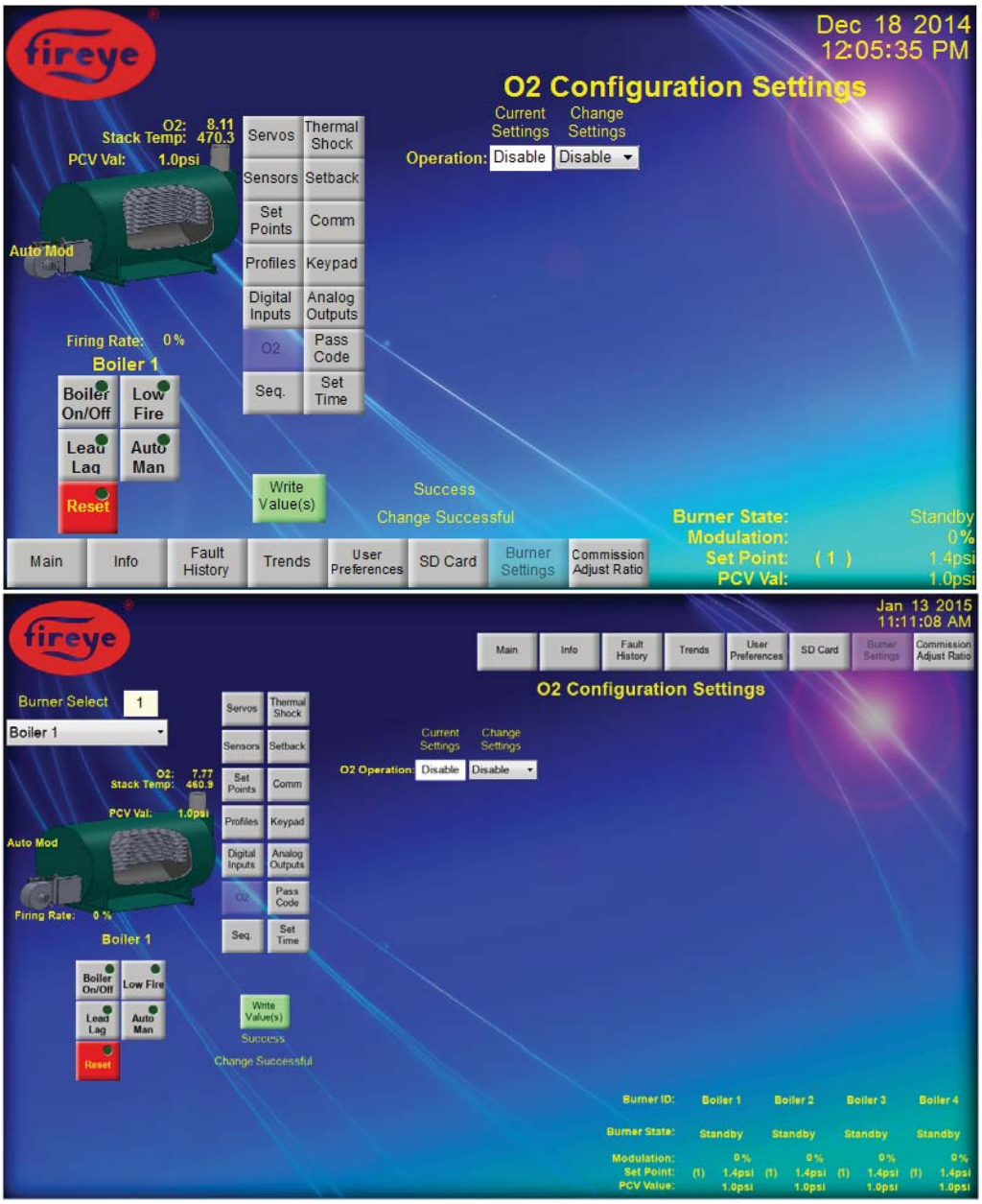
2.6.6 O2 Settings

The O2 settings provide the operator with the ability to set the Burner Control settings to operate with a Stack Probe that provides continuous O2 measurements.

2.6.6.1 O2 Disabled Operation

For systems that have no stack probe or any other device providing continuous O2 measurements, the operator has the ability to disable the O2 capability (see Figure 18)

FIGURE 18.



NXTSD407 (top) and NXTSD413 (bottom) O2 Setup Screen

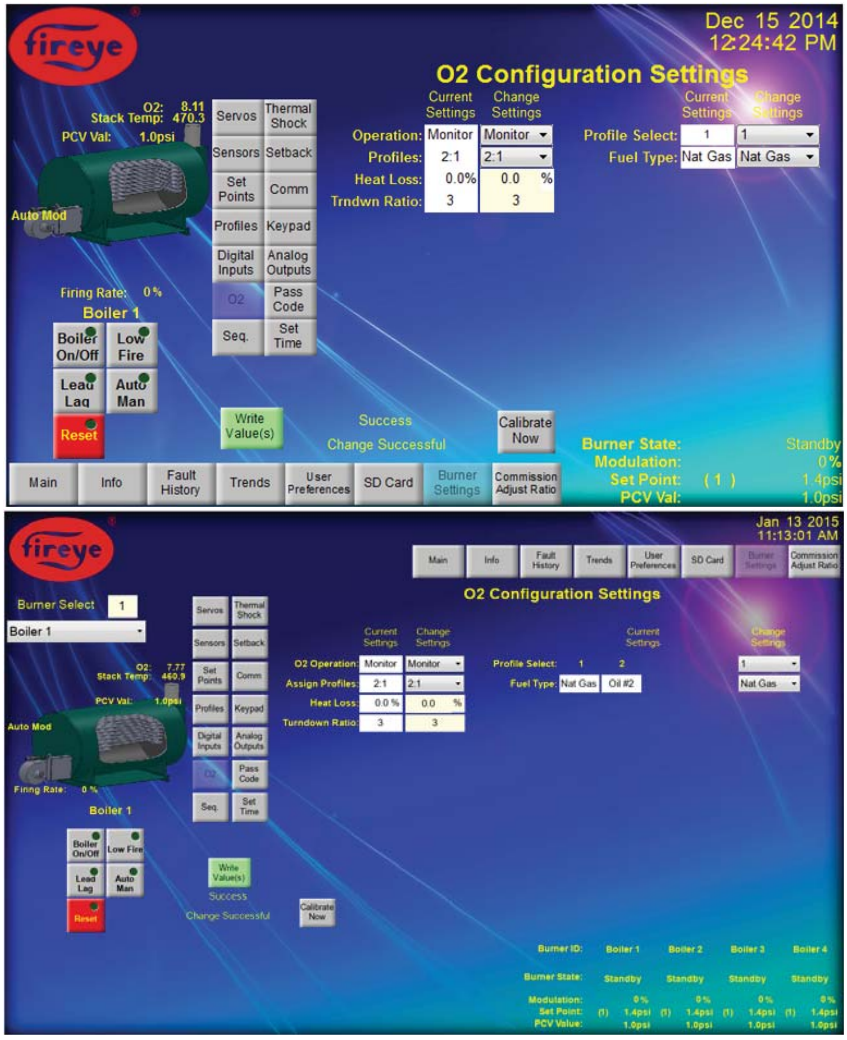
The O2 settings are arranged on the screen in columns where the left portion of the column contains the current Burner Control O2 settings while the right portion of the column contains the operator settable selectors. Some selection fields will enable other fields to appear based on the content of the field. For example, the screen shown in Figure 17 just shows a single row called "O2 Operation". By changing the "Change Settings" item to anything other than "Disabled" will cause the display to show the other rows of configurable settings based upon the selection made by the operator. Figure 18 shows the screen when the operator has changed the operation to "Monitor" whereas the screen shown in Figure

19 shows the screen when the operator has changed the operation to "Control". In this example, the operator has changed the "Change Settings" and written them to the Burner Control as the screens show the same data on both the left and right side of each row. All settings can be changed and applied to the settings in the Burner Control with a single write operation.

2.6.6.2 O2 Monitor Operation

Figure 19 shows a Burner Control that has been setup so that the O2 measurements are for monitoring purposes only disabling the Burner Control O2 Trim control but allowing the Burner Control to calculate the burner efficiency. The left column shows the items needed for O2 monitoring that are not profile specific. The right column shows the O2 measurement items that are specific to a profile. The "Profile Select" field allows the operator to select the profile for the profile specific items that the operator can view or modify. Any changes to the profile specific data must be written to the Burner Control before changing the "Profile Select" as the changes for that profile will be lost.

FIGURE 19.



NXTSD407 (top) and NXTSD413 (bottom) O2 Monitor Setup Screen

The Profile Assignment, Heat Loss, Turndown Ratio, Fuel Type selections, and the "Calibrate Now" button are common to both the Monitor and the Control operations as both operations need to calculate boiler efficiency.

2.6.6.3 Profile Assignment

The settings in the "Assign Profiles" row will only allow the O2 monitor or Control operations to be used for the selected profiles therefore the operator selections in the "Profile Select" row will only allow the available profiles to be in the selection list.

2.6.6.4 Heat Loss

The "Heat Loss" setting is the percentage of boiler output lost through the shell of the boiler when the Burner Control is maintaining high fire. The default is 0% and ranges to 9.9% in 0.1% increments.

2.6.6.5 Turndown Ratio

The "Turndown Ratio" is used to determine the amount of heat loss at all firing rate positions. The calculated value is subtracted from the gross efficiency. The default is 3 with a range of 1 to 10 in increments of 1. A value of 1 will result in a constant heat loss across all firing rate values.

2.6.6.6 Fuel Type

The "Fuel Type" selection determines the constant used for the efficiency calculations.

2.6.6.7 Calibrate Now button

The Calibrate Now button causes the Burner Control to initiate a Calibrate Signal to the Stack Probe when the Burner is in "Standby" or "Purge" and the button is pressed.

2.6.6.8 O2 Control Operation

If the Burner Control installation has to utilize the O2 measurement for the additional purpose of controlling the burner efficiency, the operator needs to select the O2 Operation to be the Control operation as shown in Figure 20.

FIGURE 20.

NXTSD407 (top) and NXTSD413 (bottom) O2 Control Setup Screen

When the O2 Operation is set to Control, the same items available in the Monitor operation are also available for this operation with the addition of the Cal Enable, Trim Type, Transport Delay, Trim

Limit Ratio, Trim Limit Mode, Fault Alarm, Level Alarm, Stack Alarm, and a selection for the Trim P-Gain, Trim I-Gain, Trim Limit Level, Low Level Alarm at Low, Low Level Alarm at High, High Level Alarm at Low, High Level Alarm at High, Stack Temperature Alarm Level at Low, and Stack Temperature Alarm Level at High for each available profile selection.

2.6.6.9 Transport Delay

The Transport Delay setting is the amount of time it takes for a step change in O2 to be realized after a step change in the trim servo is made. The range of the Transport Delay is 0 to 60 seconds. The default delay is 0 seconds.

2.6.6.10 Trim Type

The Trim Type selection tells the Burner Control which servo to use as the trim adjustment servo as the Burner Control adjusts for better efficiency. Because using the Fuel servo as the trim servo is more sensitive than using the Air servo, the operator should be cautious when selecting Fuel trim. The default Trim Type selection is Air trim.

2.6.6.11 Trim Limit Ratio

The Trim Limit Ratio is used by the Burner Control to determine the trim limit. The range of value is 1 to 8 with the default value being 3. See the section titled "SETTING TRIM LIMITS" of bulletin PPC-4001 "PPC4000 Series Fuel Air Ratio Controller".

2.6.6.12 Trim Limit Mode

The Trim Limit Mode setting causes the Burner Control to select the default Trim Limit Amount of 2 degrees of trim at low fire (Default setting) or use the Trim Limit Amount setting (see section 2.6.6.19). See section titled "SETTING TRIM LIMITS" of bulletin PPC-4001 "PPC4000 Series Fuel Air Ratio Controller".

2.6.6.13 Fault Alarm

The Fault Alarm setting is used by the Burner Control to issue a Warning or a Lockout when a stack probe error is detected. If the error is detected with the Fault Alarm set to warning, then the Burner Control operation will default to air and fuel servo settings derived during commissioning otherwise, when the setting is set to the lockout selection the Burner Control goes to shutdown and a lockout message is recorded in the fault history.

2.6.6.14 Level Alarm

The Level Alarm setting is used by the Burner Control to perform no action (Unused), issue a Warning, or issue a Lockout when the O2 level is exceeded (see sections 2.6.6.20 through 2.6.6.23). If the O2 level is exceeded with the Level Alarm set to Unused, then no action is taken by the Burner Control. A Warning setting will cause the Burner Control to issue a warning but take no further action. A Lockout selection will cause the Burner Control to go to shutdown and a lockout message to be recorded in the fault history.

2.6.6.15 Stack Alarm

The Stack Alarm setting is used by the Burner Control to perform no action (Unused), issue a Warning, or issue a Lockout when the Stack Temperature level is exceeded (see sections 2.6.6.24 and 2.6.6.25). If the temperature is exceeded with the Stack Alarm set to Unused, then no action is taken by the Burner Control. A Warning setting will cause the Burner Control to issue a warning but take no further action. A Lockout selection will cause the Burner Control to go to shutdown and a lockout message to be recorded in the fault history.

2.6.6.16 Flue LO Time

The amount of time in minutes that the burner will go to low fire when the flue temp falls below the flue temp LO setting. Valid range is 0-60 min.

2.6.6.17 Trim P-Gain

The Trim P-Gain is used by the Burner Control to amplify the amount of O2 trim applied. The higher the P-Gain term is, the more aggressive the O2 trim. The range of value is 0 to 100% where 100% is the maximum gain. Care should be used when selecting this term.

2.6.6.18 Trim I-Gain

The Trim I-Gain is used by the Burner Control as an integral term in the calculation to determine the amount of error signal being fed back to the trim algorithm. The maximum value is 100% which implements the fastest rate of integration (resets per minute) in the trim calculation. The range for this setting is 0 to 100%.

2.6.6.19 Trim Limit Amount

When the Trim Limit Mode setting is set to Manual, then the Burner Control uses the Trim Limit Amount setting as the number of degrees of trim limit at low fire. The range is for this setting is 0 to 9.9 degrees. See section titled "SETTING TRIM LIMITS" of bulletin PPC-4001 "PPC4000 Series Fuel Air Ratio Controller".

2.6.6.20 Low Level Alarm at Low

The Low Level Alarm at Low setting refers to the lowest O2 level below the Targeted O2 level at the Low Fire rate that when exceeded will generate a Low Level O2 Alarm. The default alarm level for this setting is 0.5% O2 deviation and the range of values is between 0.1 to 5.0% in 0.1% increments. See the section titled "GENERAL RULES FOR ALARM NOTIFICATION" of bulletin PPC-4001 "PPC4000 Series Fuel Air Ratio Controller" for more information.

2.6.6.21 Low Level Alarm at High

The Low Level Alarm at High setting refers to the lowest O2 level below the Targeted O2 level at the High Fire rate that when exceeded will generate a Low Level O2 Alarm. The default alarm level for this setting is 0.5% O2 deviation and the range of values is between 0.1 to 5.0% in 0.1% increments. See the section titled "GENERAL RULES FOR ALARM NOTIFICATION" of bulletin PPC-4001 "PPC4000 Series Fuel Air Ratio Controller" for more information.

2.6.6.22 High Level Alarm at Low

The High Level Alarm at Low setting refers to the highest O2 level above the Targeted O2 level at the Low Fire rate that when exceeded will generate a High Level O2 Alarm. The default alarm level for this setting is 0.5% O2 deviation and the range of values is between 0.1 to 5.0% in 0.1% increments. See the section titled "GENERAL RULES FOR ALARM NOTIFICATION" of bulletin PPC-4001 "PPC4000 Series Fuel Air Ratio Controller" for more information.

2.6.6.23 High Level Alarm at High

The High Level Alarm at High setting refers to the highest O2 level above the Targeted O2 level at the High Fire rate that when exceeded will generate a High Level O2 Alarm. The default alarm level for this setting is 0.5% O2 deviation and the range of values is between 0.1 to 5.0% in 0.1% increments. See the section titled "GENERAL RULES FOR ALARM NOTIFICATION" of bulletin PPC-4001 "PPC4000 Series Fuel Air Ratio Controller" for more information.

2.6.6.24 Stack Temperature Alarm Level at Low

The Stack Temperature Alarm Level at Low refers to the lowest Stack Temperature that should be seen at the Low Firing rate of the burner. If the stack temperature drops below this level while the Burner Control is firing, then the Burner Control will generate the appropriate alarm action as defined in section 2.6.6.16 The valid range for this setting is from 40 ºF (4 ºC) to 800 ºF (426 ºC) and must be lower than the value selected for the Stack Temperature Alarm at High setting (see section 2.6.6.25).

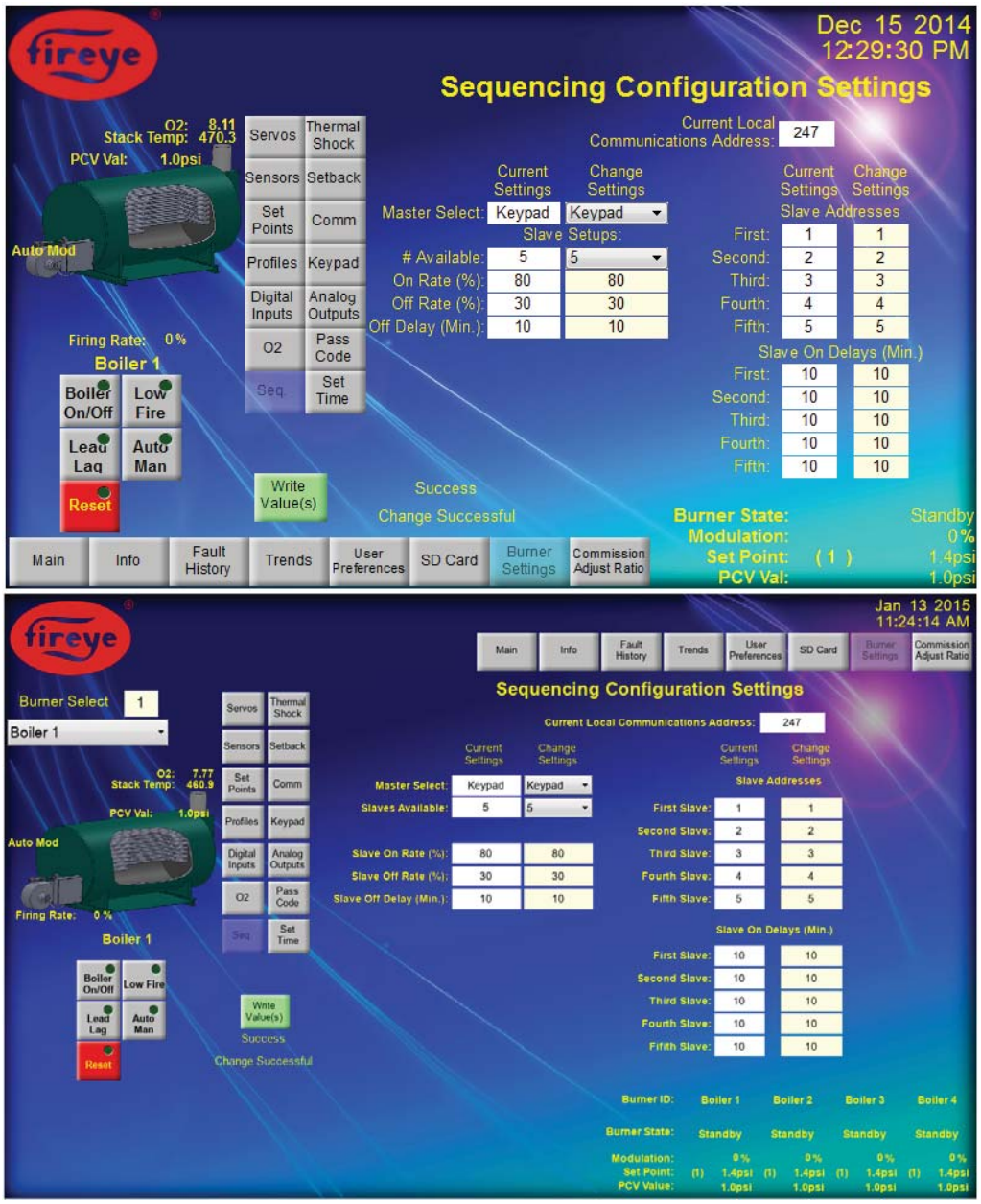
2.6.6.25 Stack Temperature Alarm Level at High

The Stack Temperature Alarm Level at High refers to the highest Stack Temperature that should be seen at the High Firing rate of the burner. If the stack temperature exceeds this level, then the Burner Control will generate the appropriate alarm action as defined in section 2.6.6.16 The valid range for this setting is from 40 ºF (4 ºC) to 800 ºF (426 ºC) and must be higher than the value selected for the Stack Temperature Alarm at Low setting (see section 2.6.6.24).

2.6.7 Sequencing Settings

The Sequencing settings selection (shown in Figure 21) provides the operator with the ability to setup the Sequencing settings of the Burner Control system. The Burner Control has the ability to manage up to five other boilers for the purpose of boiler sequencing.

FIGURE 21.



NXTSD407 (top) and NXTSD413 (bottom) Sequencing Setup Screen

The screen provides two columns having fields to the left of each column containing the current sequencing settings in the Burner Control and the right side of each column providing the fields and selectors that the operator uses for making changes to the associated settings. The settings for sequencing include the Master Select, Number of available slaves, On Rate, Off Rate, Off Delay, and the Slave Address and Slave On Delay for each of the connected slaves (First, Second, Third, Fourth, and Fifth). All settings can be changed and applied to the settings in the Burner Control with a single write operation.

2.6.7.1 Master Select

The Master Select setting is used by the Burner Control to determine which input will be used to start the Burner Control into a state where it will try to become the sequencing master. The available selections are unused (sequencing is disabled), keypad (where the Lead / Lag button provides the Master Select function), digital input (a logical input on one of the Digital Inputs provides the Master Select function), or communication (where a ModBus command will initiate the Master Selection function).

2.6.7.2 Number of Slaves

The Number of Slaves setting tells the Burner Control how many slaves will be connected to and commanded by the Master Burner Control. The Number of Slaves has a minimum of 0 and a maximum of 5. The value of this setting determines the number of rows that are available on the right portion of the screen. If the setting is zero "0" then the right portion of the screen will not contain any settable parameters. A "1" setting will expose the Slave Address and Slave On Delay for the "First" slave row of parameters. A "2" will show the "First" and "Second" rows, and so on.

2.6.7.3 On Rate

The Firing Rate of the Master that will initiate the startup of the next boiler in the sequence once the Slave On Delay has expired (see section 2.6.7.7). The On Rate value range is from 1 to 100% firing rate and must be above the Off Rate.

2.6.7.4 Off Rate

The Firing Rate of the Master that will initiate the shutdown of the last boiler in the sequence once the Slave Off Delay has expired (see section 2.6.7.5). The Off Rate value range is from 1 to 100% firing rate and must be below the On Rate.

2.6.7.5 Off Delay

The Off Delay is used by the Master to set the amount of time in minutes that the master has to have been below the Off Rate (see section 2.6.7.4) before the last boiler in the sequence that is on will be commanded to shutdown. The possible selections for the Off Delay setting are from 0 to 999 minutes.

2.6.7.6 Slave Addresses

The Slave Addresses are used by the Master to signify which boiler will be first, second, or third in the sequence. Because each of the slave boilers require a unique ModBus address, the Master Boiler can use the addresses as to which boiler will be commanded to turn on and got to the firing rate provided by the master, run at the firing rate designated by the slaves own firing rate, or turn off. If the Slave designated as the first slave is off (the second and third slaves should also be off under this condition) then when the Master has exceed the turn on rate for more than the turn on delay, then the Master will command the first slave to start up and go to a modulation rate that is the same as the masters firing rate. The available selections for the Slave addresses are 1 to 247. Because the slaves cannot have the same address as the master, the ModBus address of the Master is provided to the operator in the upper portion of the screen. For a more complete description of the sequencing function see the section titled "SEQUENCING CONFIGURATION" of bulletin PPC-4001 "PPC4000 Series Fuel Air Ratio Controller".

2.6.7.7 Slave On Delay

The Slave On Delay is used by the Master to set the amount of time that the master has to have been above the On Rate (see section 2.6.7.3) before the next boiler in the sequence is commanded to turn on. There is a different Slave On setting for each slave in the sequence denoted by the First, Second, and Third designations signifying the slave assignment in the sequence.

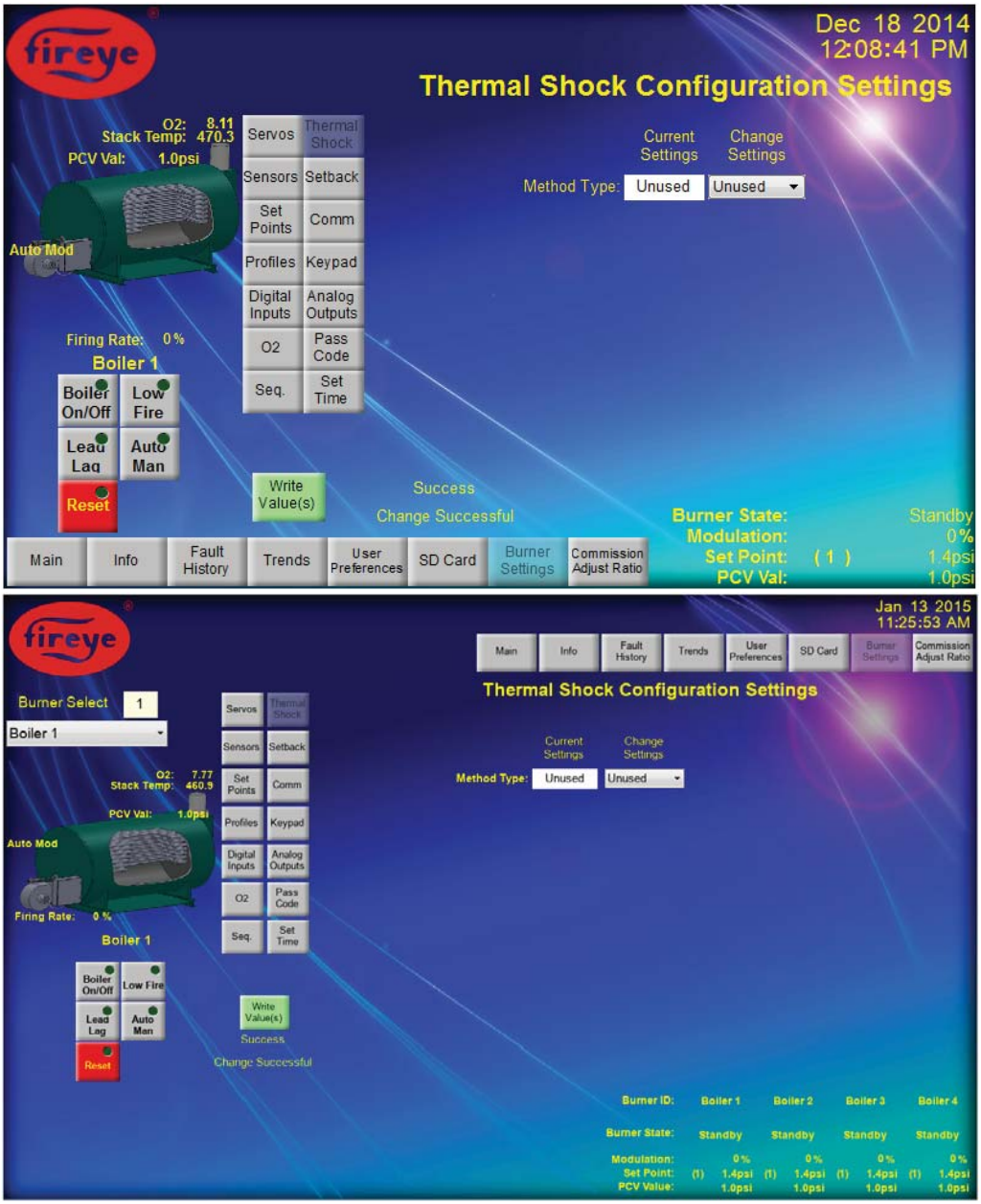
2.6.8 Thermal Shock Settings

The Thermal Shock setting selections (shown in Figure 22, Figure 23 and Figure 24) provides the operator with the ability to configure the settings for the Burner Control Thermal Shock cold start protection. Thermal Shock protection is a method to slowly increase the burner firing rate on a cold start of a boiler to limit mechanical stress due to thermal differences. The Burner Control can be set to disable the Thermal Shock protection or to let the operator select from two methods of protection. The Low Fire method of Thermal Shock causes the Burner Control to go to Low Fire Hold and stay there until the primary control reaches the thermal exit point. The Segment method of Thermal Shock causes the Burner Control to incrementally increase the firing rate to the Thermal Exit point. The Thermal Shock settings are arranged on the screen as a set of parameters arrange in rows where the left portion of each row contains the current Burner Control Thermal Shock settings while the right portion of the row contains the operator settable entries.

2.6.8.1 Thermal Shock Disabled

When the Method Type is set to "Unused", the screen removes all of the Thermal Shock settings and Thermal Shock protection is disabled. By disabling this protection method, the Burner Control will respond normally to a system call for heat.

FIGURE 22.

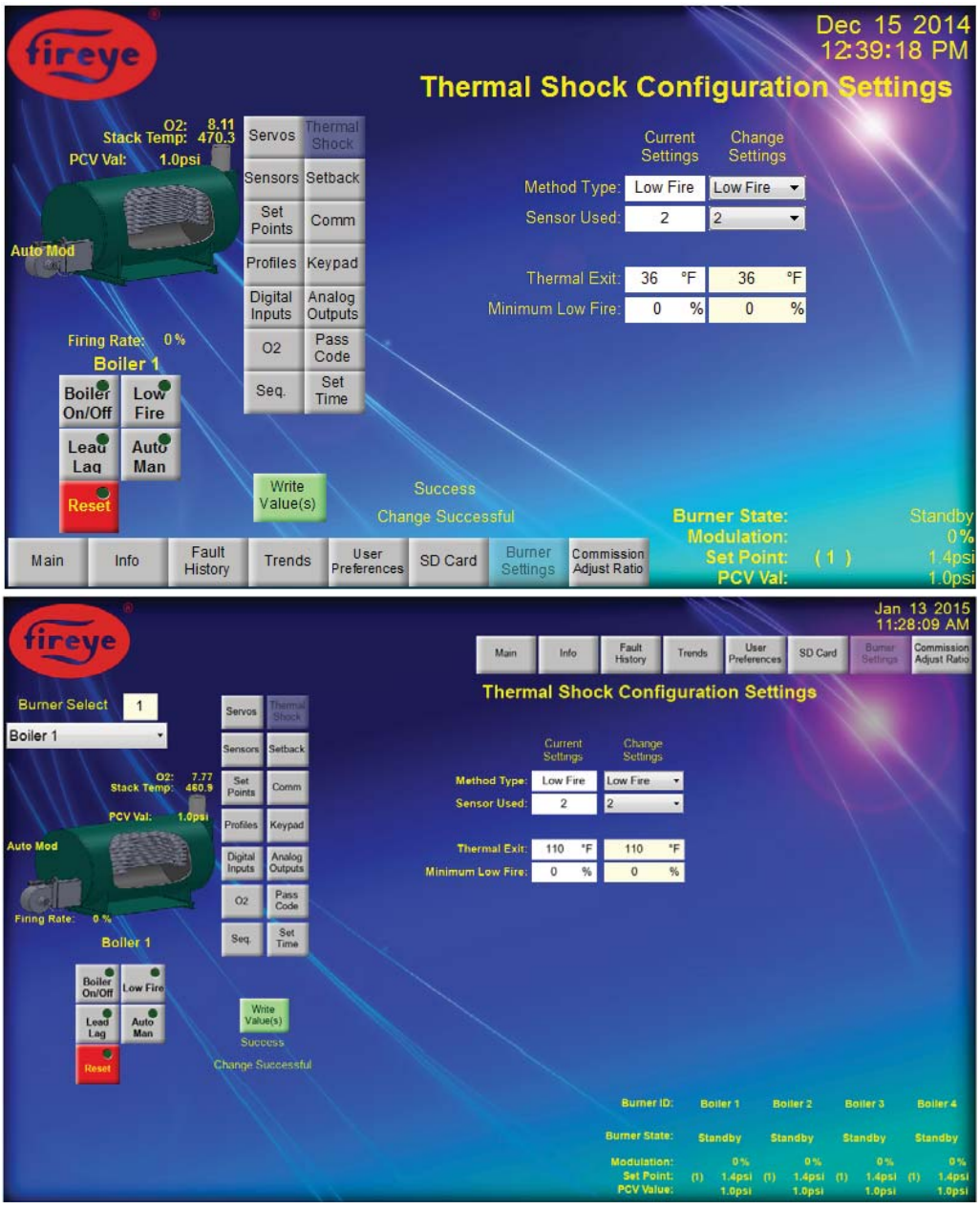


NXTSD407 (top) and NXTSD413 (bottom) Thermal Shock Setup Screen

2.6.8.2 Low Fire Method

When the Low Fire method of thermal shock is selected, the Burner Control uses the "Sensor Used", "Thermal Exit", and "Minimum Low Fire" parameters to perform the Thermal Shock operation upon the detection of a call for heat condition by the system.

FIGURE 23.



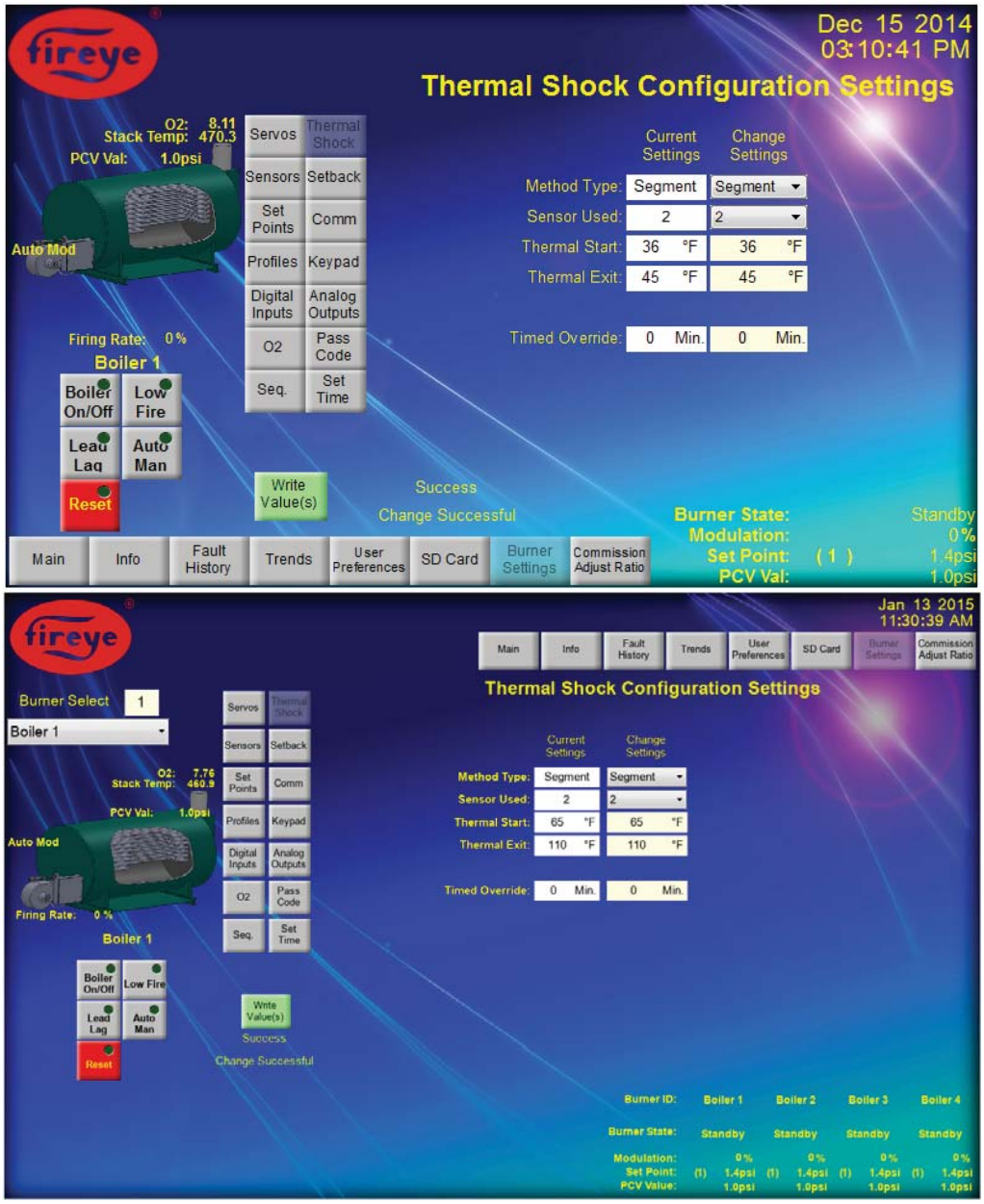
NXTSD407 (top) and NXTSD413 (bottom) Thermal Shock Low Fire Setup Screen

The "Sensor Used" parameter provides the Burner Control with which sensor to use to determine when the Thermal Exit parameter has been reached. The Thermal Exit parameter will be in the same units that are set for the sensor selected in the Sensor Used parameter. The Minimum Low Fire rate is used by the Burner Control to set the firing rate to the value specified as the Low Fire rate (this rate is not the same rate as the Low Fire Hold rate which is usually 0%). During Thermal Shock, the Burner Control will maintain the Minimum Low Fire rate until the selected sensor indicates that the Thermal Exit value has been exceeded. See the section titled "COLD START THERMAL SHOCK PROTECTION" of bulletin PPC-4001 "PPC4000 Series Fuel Air Ratio Controller".

2.6.8.3 Segment Method

When the Segment method of thermal shock is selected, the Burner Control uses the "Sensor Used", "Thermal Start, "Thermal Exit", and "Timed Override" parameters to perform the Thermal Shock operation upon the detection of a call for heat condition by the system.

FIGURE 24.



NXTSD407 (top) and NXTSD413 (bottom) Thermal Shock Segment Setup Screen

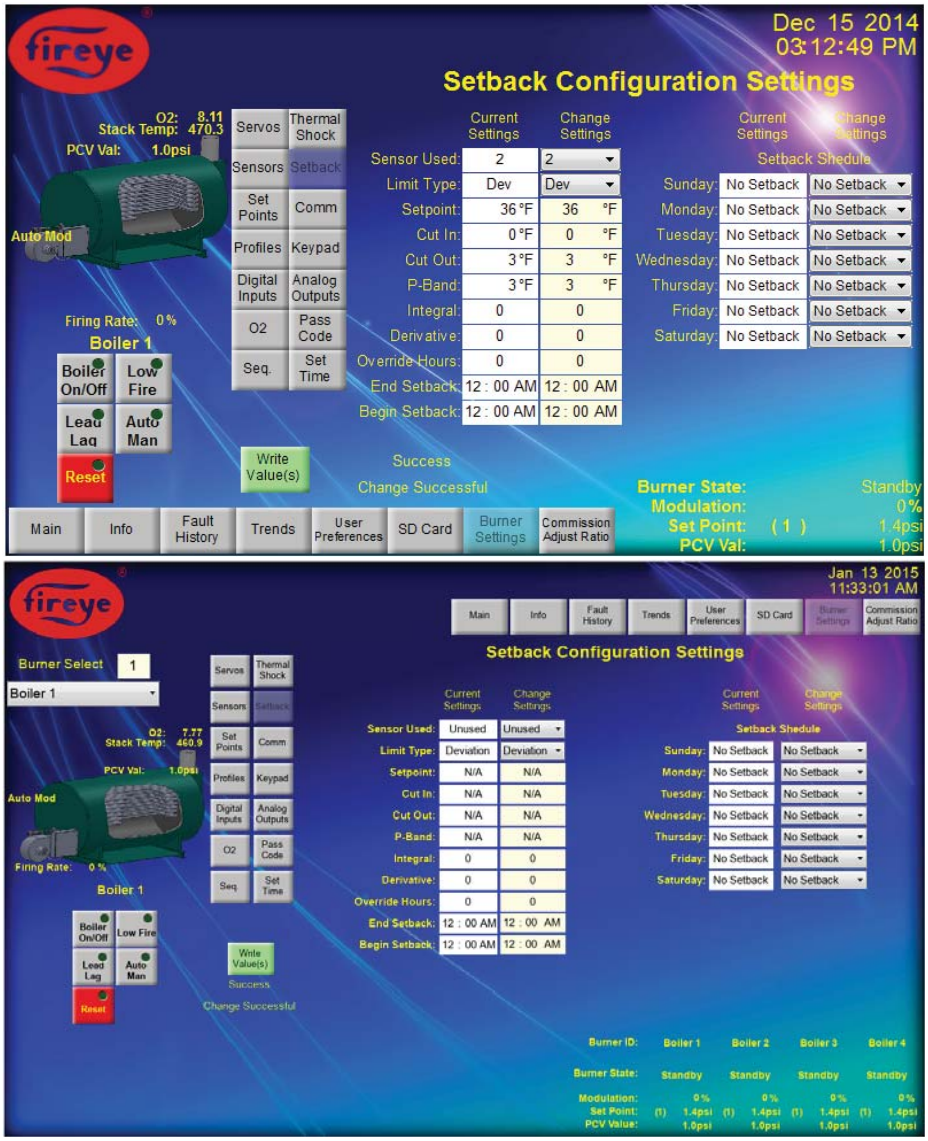
As with the Low Fire method (see section 2.6.8.2), the "Sensor Used" parameter provides the Burner Control with which sensor to use to determine when the Thermal Start and Thermal Exit parameters have been reached. The Thermal Start and Thermal Exit parameters will be in the same units that are set for the sensor selected in the Sensor Used parameter. The Burner Control uses the Thermal Start and Thermal Exit points to calculate 16 segments to range between these points during the Thermal Shock operation. When the Burner Cycle starts, the Burner Control moves to the Low Fire Position and holds that position until the Boiler reaches the Thermal Start position or the Timed Override timeout period has elapsed forcing the Burner Control to advance to the next segment. The Burner Control continues the cycle through each of the calculated segments until the Thermal Exit value has been

exceeded. See the section titled "COLD START THERMAL SHOCK PROTECTION" of bulletin PPC-4001 "PPC4000 Series Fuel Air Ratio Controller".

2.6.9 Setback Settings

The Setback setting selections (shown in Figure 25) provides the operator with the ability to configure the settings for the Burner Control Setback operation. Setback is used by the Burner Control to operate at a different setpoint during selected off peak times.

FIGURE 25.



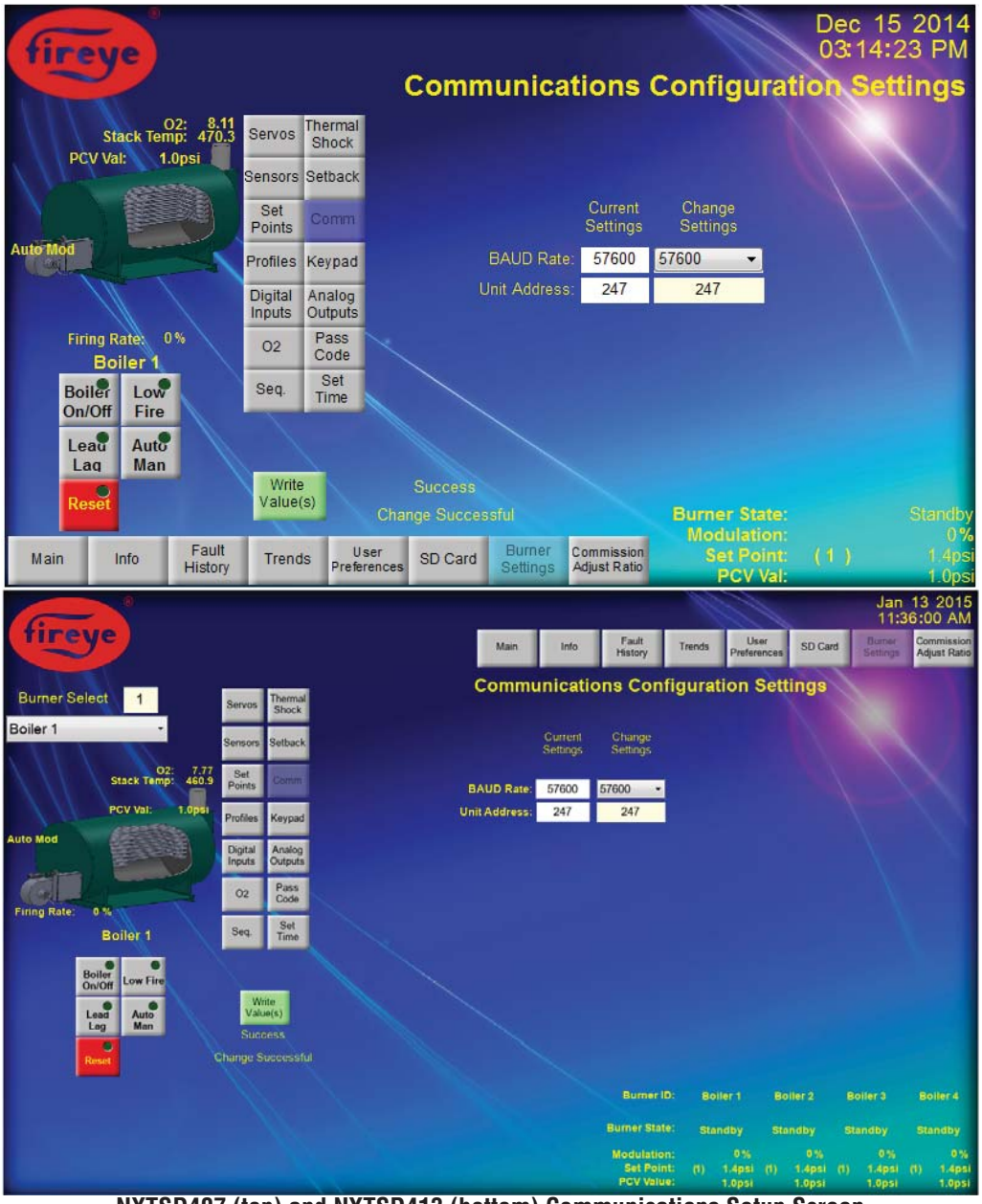
NXTSD407 (top) and NXTSD413 (bottom) Setback Setup Screen

The Setback screen has two columns where the column on the left side of the screen contains the general Setback settings and the column on the right side of the screen is the Setback Schedule. Each row in the columns has a Setback parameter in two fields. The left field of each row contains the current setting in the Burner Control. The right side of each row contains the operator settable selections that can be set then written to the Burner Control. Multiple values can be entered and all parameters that are different from the current Burner Control parameters will be written to the Burner Control. The operator can verify that the new parameters have been successfully written by observing that the changes made to the right side of the column is shown to have caused the same value to be set in the left side of the column. For more detailed information as to setting the Setback parameters, see the section titled "SETBACK OPERATION" of bulletin PPC-4001 "PPC4000 Series Fuel Air Ratio Controller".

2.6.10 Communications Settings

The Communications setting selections (shown in Figure 26) provides the operator with the ability to configure the settings for the Burner Control Serial ModBus (RTU) Communications. The Communications settings are used by the Burner Control to set the RS485 ModBus ports to the configured BAUD rate and ModBus Address.

FIGURE 26.



NXTSD407 (top) and NXTSD413 (bottom) Communications Setup Screen

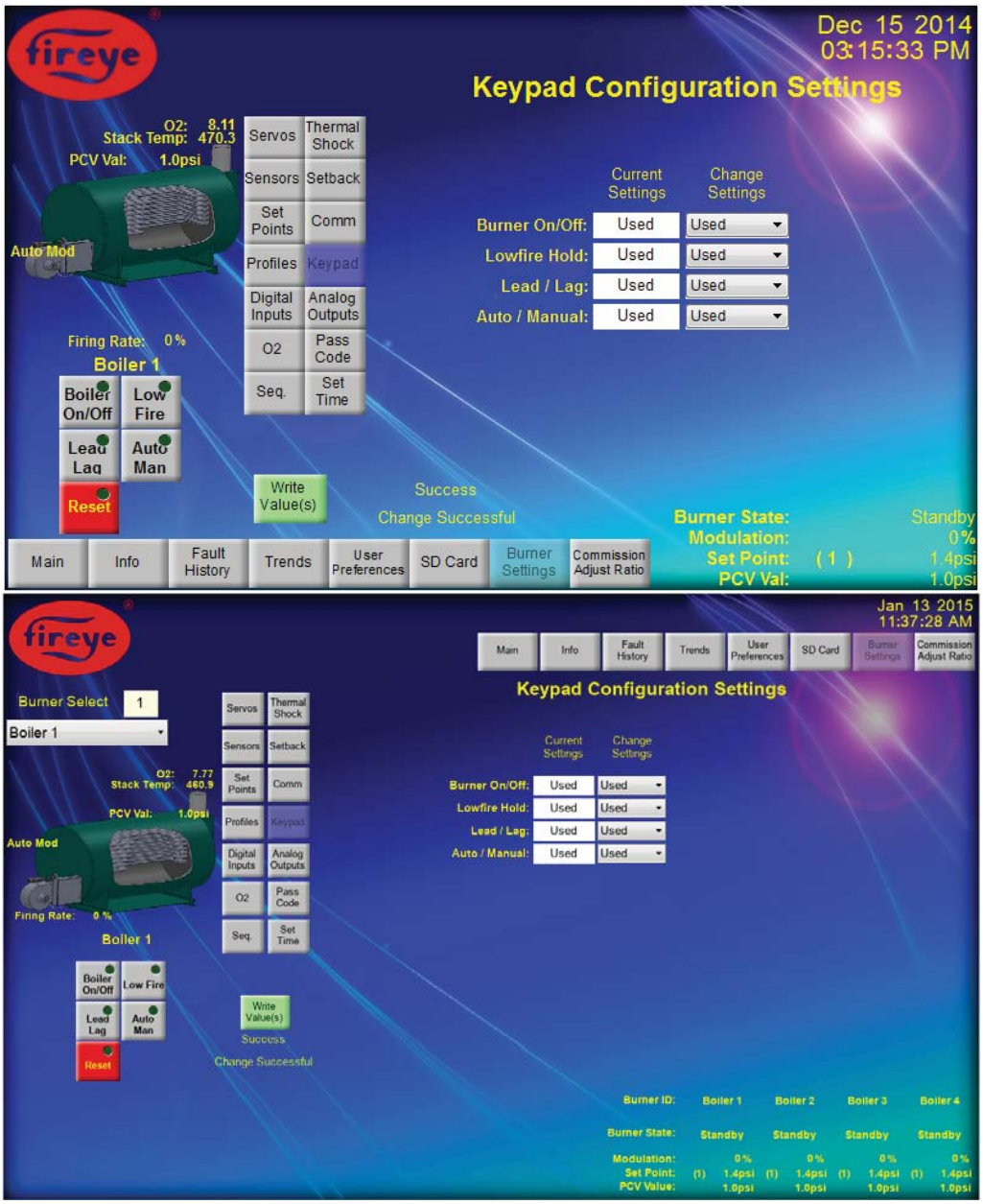
The ModBus protocol is used in various external communications interfaces to support features like inter-burner communications (Sequencing), Actuator (Servo) communications, and Graphic Display communications. The Graphic Display communications port is the port that is used to provide the interface to these displays so any changes to these settings could make the Graphic Display unusable with the Burner Control. The Graphics Displays require that the BAUD rate be set to 57600 BAUD. This rate is fixed in the Graphics Displays so any other setting will cause the Burner Control to not be able to communicate with the display. The Address of the Burner Control has a default of 247. To communications from the Display to the Burner Control, the Display has a configuration that also defaults to an address of 247. If more than one Burner Control is to be used with the Display (NXTSD413 Displays

only), then the address of the Burner Controllers and the associated address configurations within the Display will need to be set to the same address maintaining a unique address for every Burner Control. For more information on how to set up the configuration of the displays, refer to the NXTSD-4001 "Touch Screen Display Installation" document.

2.6.11 Keypad Settings

The Keypad settings are used by the Burner Control to allow associated keypad buttons the ability to perform their designated function. If the value of the setting is "Unused" then the associated keypad button will not perform the associated function (i.e. Burner On/Off, Low Fire Hold, Lead/Lag, or Auto/ Manual).

FIGURE 27.



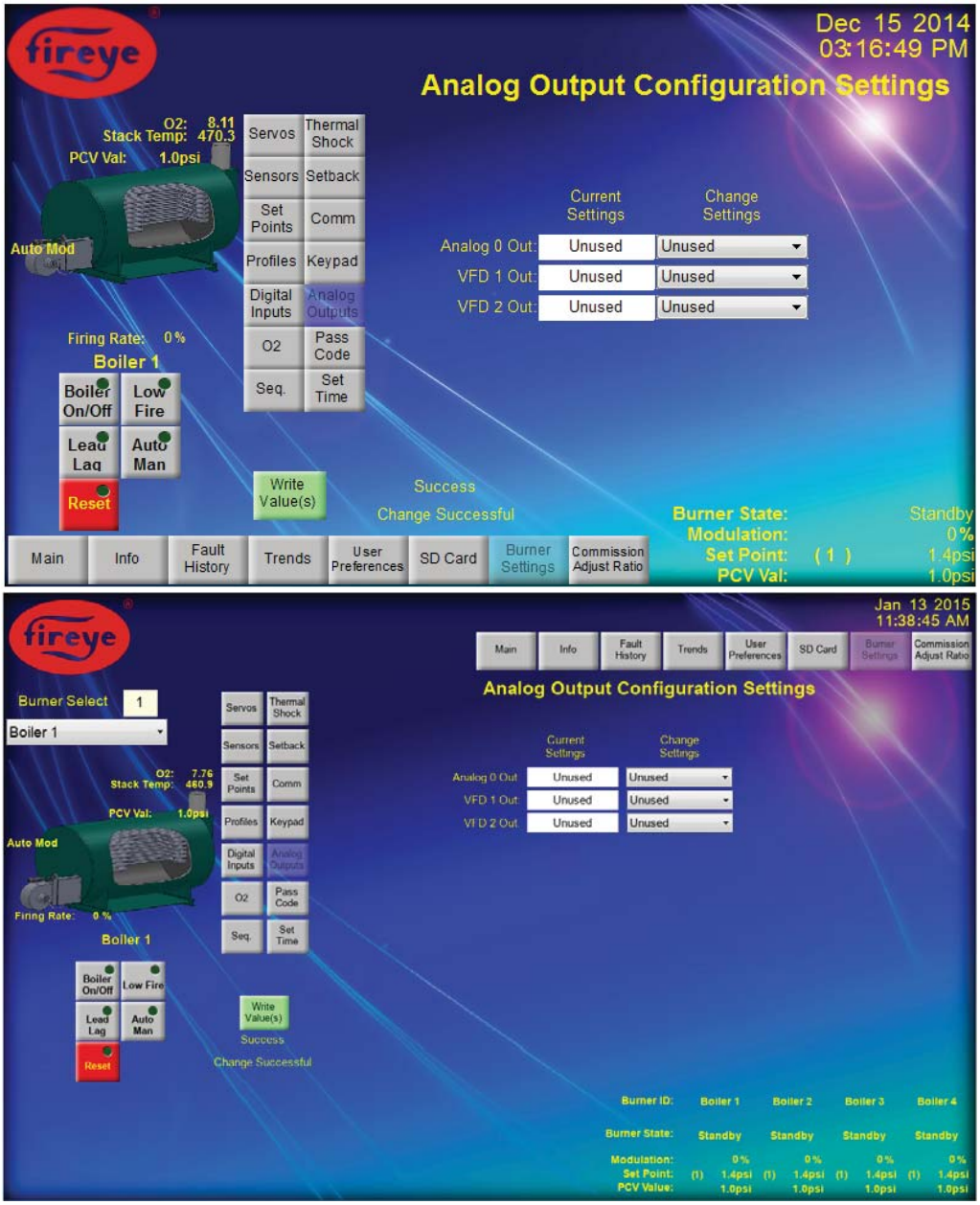
NXTSD407 (top) and NXTSD413 (bottom) Keypad Setup Screen

The Graphics Display buttons are not affected by the settings on these screens. For more detailed information as to setting the Keypad parameters, see the section titled "KEYPAD SETUP" of bulletin PPC-4001 "PPC4000 Series Fuel Air Ratio Controller".

2.6.12 Analog Output Settings

The Analog Output settings (shown in Figure 28) are used by the Burner Control to enable or disable the available analog outputs of the Burner Control. There is one analog output available with the basic PPC 4000 control and three analog outputs if the controller has the VFD option installed. The Operator can enable the associated analog output by selecting which of the available signals will be routed to the output.

FIGURE 28.



NXTSD407 (top) and NXTSD413 (bottom) Analog Output Setup Screen

The Available selections for the analog outputs are shown in Table 5. If either of the VFDs are set to be outputs, the VFD that has been designated as an analog output can no longer be used as VFD controllers.

Table 5: **Analog Output Signal Selections**

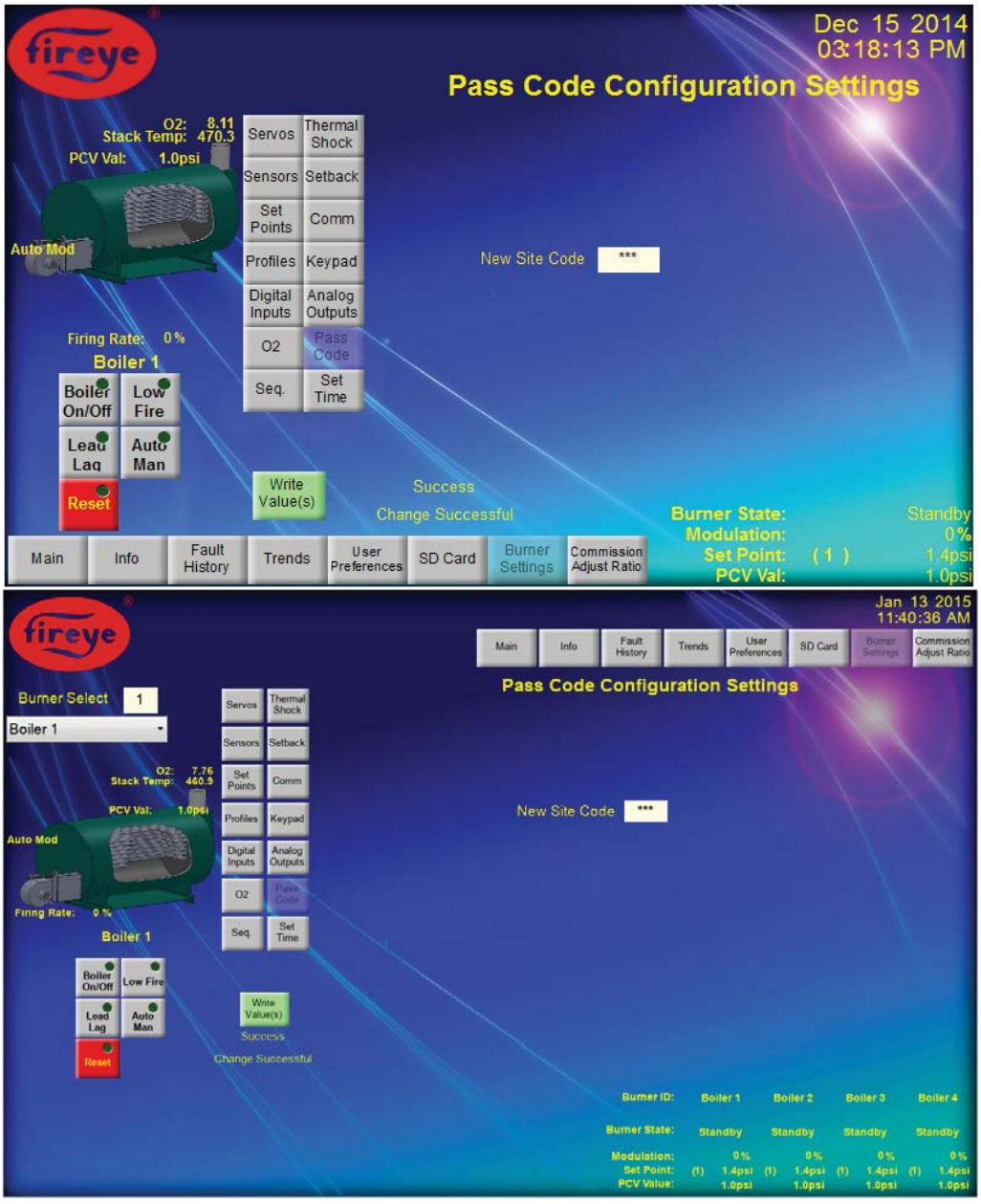
UNUSED	SERVO 1	STACK
CMD RATE	SERVO 2	O2
SETPOINT	SERVO 3	CO
STBK STPT	SERVO 4	
SENSOR 1	SERVO 5	
SENSOR 2	SERVO 6	
SENSOR 3	SERVO 7	
SENSOR 4	SERVO 8	
SENSOR 5	SERVO 9	
	SERVO 10	

For more detailed information as to setting the Analog Output parameters, see the section titled " COMMISSIONING WITH VFD" of bulletin PPC-4001 "PPC4000 Series Fuel Air Ratio Controller".

2.6.13 Pass Code Settings

The Burner Control has 3 levels of pass codes and a user level that requires no pass code. The Burner Control allows the Level 1 pass code (referred to as the Site Code) to be modified by the operator. The Pass Code Settings screen (shown in Figure 29) allows the operator to set the pass code level to a setting of the desired code which can range from 0 to 999.

FIGURE 29.



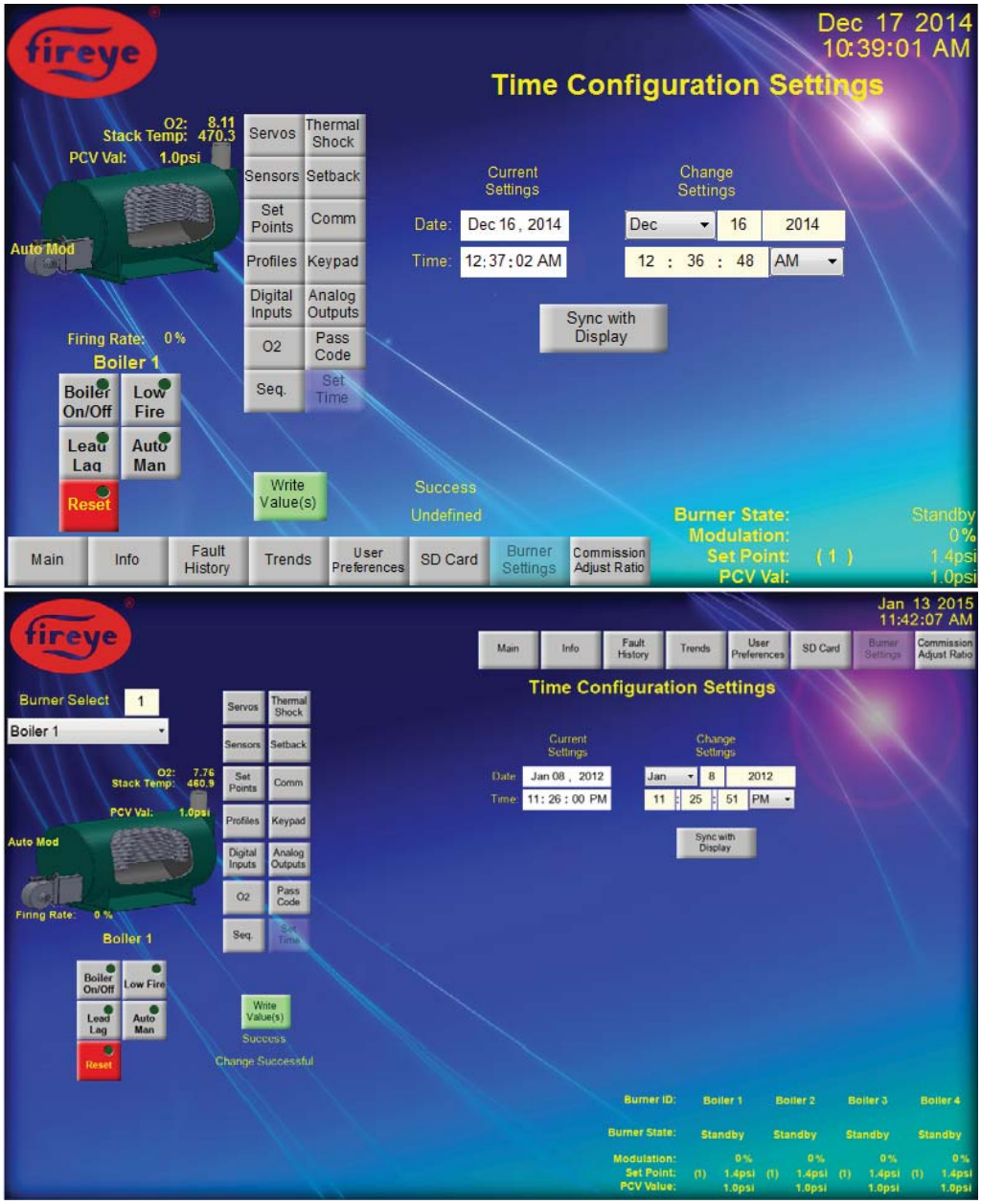
NXTSD407 (top) and NXTSD413 (bottom) Pass Code Setup Screen

The pass code change will require that the operator provide a level 3 pass code "log in" before the site code can be changed. For more detailed information as to setting the Site Code parameter and pass code levels in general, see the section titled "PASS CODE" of bulletin PPC-4001 "PPC4000 Series Fuel Air Ratio Controller".

2.6.14 Time Settings

The Burner Control contains a real time clock that is used to record fault history and implement the set-back schedule. To operate properly, the real time clock should be checked and set correctly. The real time clock information from the Burner Control is not the same information that is displayed in the top right hand corner of the Graphics Displays. Because the Burner Control has to be set correctly for proper operation, the Time Setting screen (shown in Figure 30) is provided to the operator.

FIGURE 30.



NXTSD407 (top) and NXTSD413 (bottom) Set Time Setup Screen

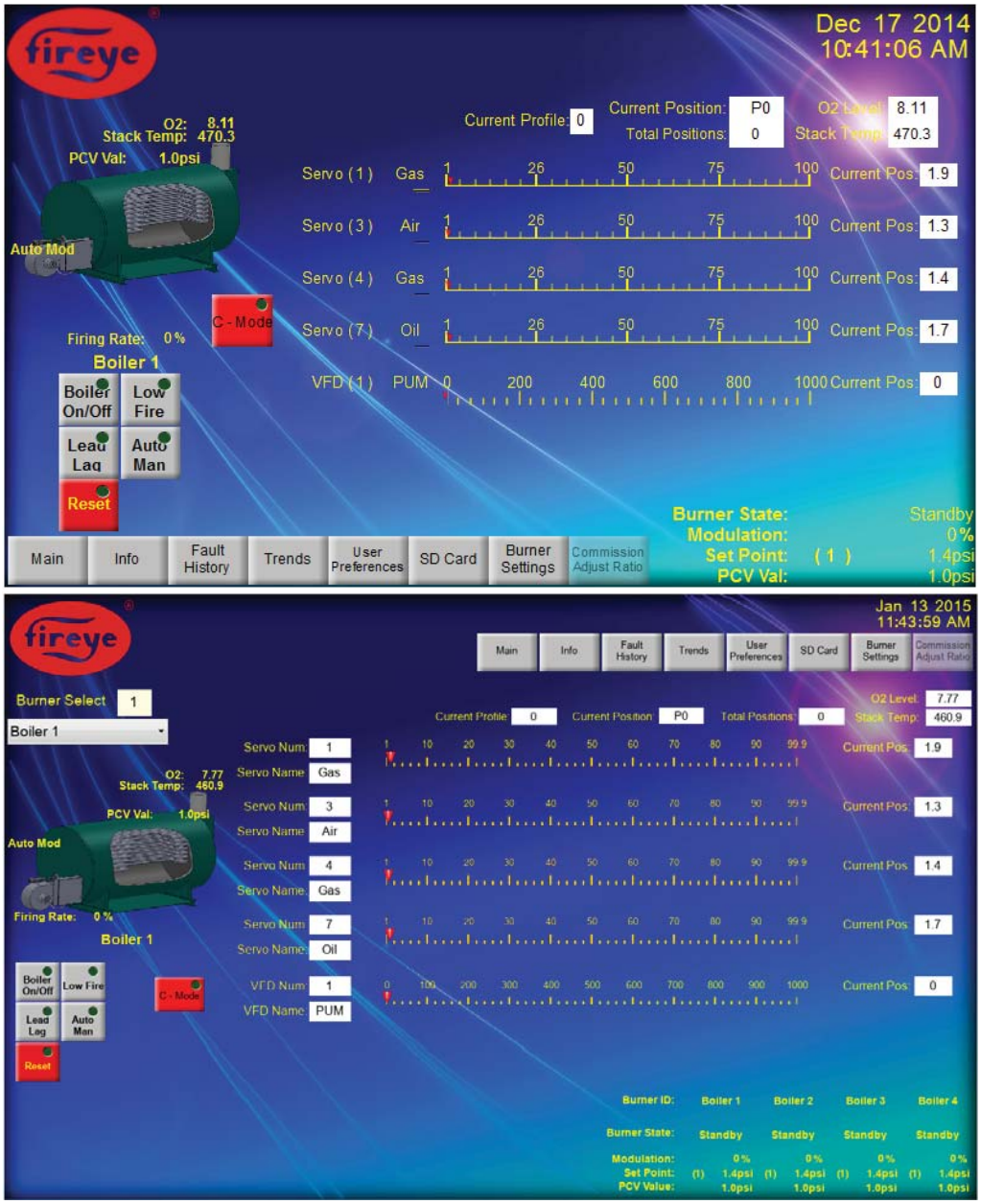
The Display time is independent of the Burner Control time so the user can set these independently. Section 1.2 of this document describes the Display Time and Date and the method for changing these settings in the display. The Burner Control time and date settings can be set individually so that they can have a different time and date (usually used in the situation where the display is not in the same time zone of one or more of the Burner Controls). If the Display and the Burner Controls are to be set to the same time, the operator can press the "Sync with Display" button which causes the Change Settings selections to be set to the Display time, then immediately press the "Write Value(s)" button causing the

values to be written to the Burner Control. Once the Current Settings fields match the Change Settings, the next burner (NXTSD413) can selected and the process repeated.

2.6.15 Commissioning / Adjust Ratio Screen

The Commissioning / Adjust Ratio Screen (shown in Figure 31, Figure 32, and Figure 33) provide an operator with the ability to set or modify the profile commission points for the connected Burner Control(s). The Commissioning / Adjust Ratio Settings are only available to Graphics Displays that are local to the Burner Control(s). Navigation to the Commissioning / Adjust Ratio Screen can be performed at any time when the screen is not displayed by pressing the "Commission Adjust Ratio" button of the navigation button controls.

FIGURE 31.



NXTSD407 (top) and NXTSD413 (bottom) Commissioning / Adjust Ratio Setup Screen

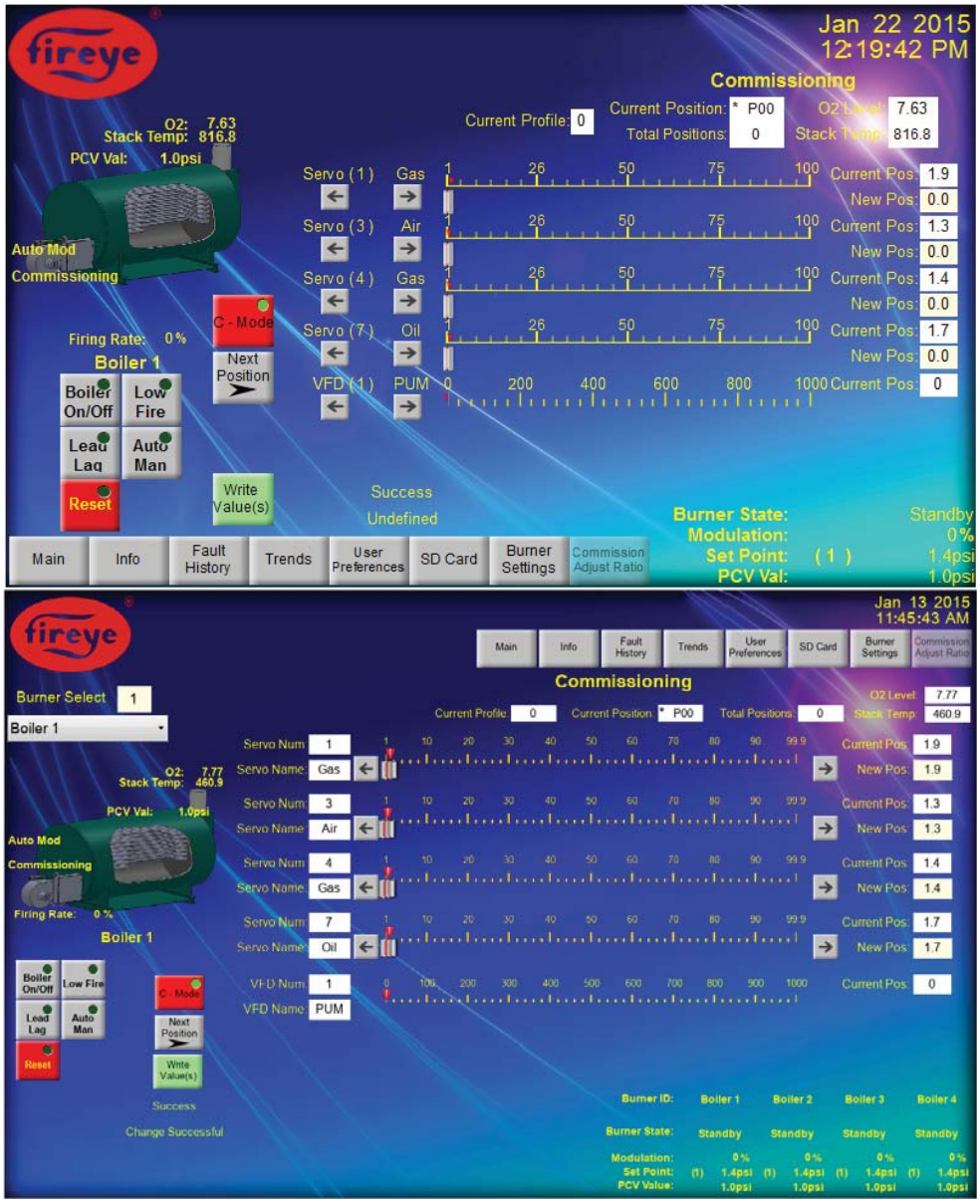
If the Burner Control is in standby, the screen will appear with the heading of "Commissioning or Adjust Ratio". The screen will show a series of fields that show the Current Profile, Current Position, Total Positions, O2 Level, and Stack Temp (with the Burner Control in "standby", the Current profile

selection will be "0", the Current Position will be "P0", and the Total Positions will be "0" as the profile is not available until the Burner Control starts a burner cycle). Below these fields are the actuator (servo and VFD) positions for the current profile commission point. The Graphics Displays use a Servo Number field, Servo Name field, slider scale with a red pointer, and a Current Position Field to show the current servo or VFD position. These items constitute the data for a single actuator and while the Burner Control cannot determine the Profile selection, the display will show all connected actuators regardless of the profile that the actuator is assigned (once the Burner Control has begun a burner cycle, the selected profile will be known and the screen will change to only show the actuators for the current profile. The Servo Number and Name fields are used to identify which actuator the slider represents. The Current Position field shows the actual angle (in degrees) of the actuator (this field is updated approximately every second with the live actuator position). While in this mode (commissioning or adjust ratio not started), the screen will continue to show the actuators but the operator will be unable to modify any of the positions.

2.6.15.1 Commissioning Mode

To start the Commissioning or Adjust Ratio process, the red C-Mode button needs to be pressed. If the Burner Control has not started the burner cycle (Burner Control is in "Standby") then once the C-Mode button request has completed (pass code entered and accepted) the Burner Control will enter the Commissioning mode (see Figure 32). In this mode, the screen now has changed each actuator slider to include a left arrow button, right arrow button, slider control, and a New Position field.

FIGURE 32.



NXTSD407 (top) and NXTSD413 (bottom Commissioning Setup Screen

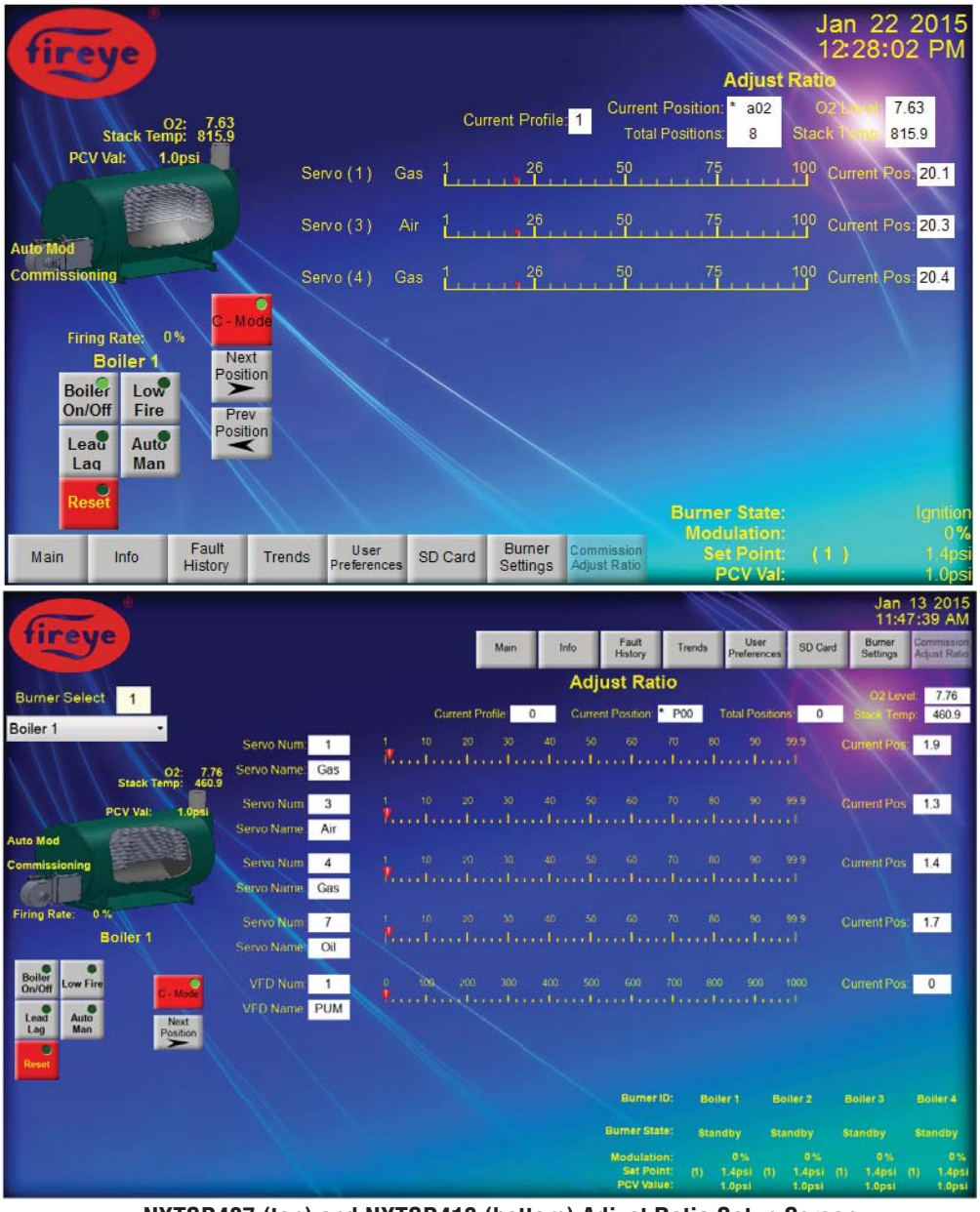
The actuator positions can now be modified with the new items in that the left arrow and right arrow can decrement and increment the new position by 0.1 degrees, or the New Position field can be pressed to allow the operator to enter the new position with a numeric key pad, or (for coarse changes) the slider bar can be slid left or right until the new value is reached. Once the desired value is set, the "Write Value(s)" button can be pressed to set the position in the Burner Control. If the operator makes changes to more than one slider control, the new value change on the actuator above any other changed actuators will be the only change sent to the Burner Control as only one actuator can be changed for every press of the "Write Value(s)" button. When the operator is satisfied with the changes made for the current

profile position, the "Next Position" button can be pressed to advance the commissioning process to the next profile position. For more detailed information regarding the commissioning of the Burner Control, see the section titled "COMMISSIONING PROCEDURE" of bulletin PPC-4001 "PPC4000 Series Fuel Air Ratio Controller".

2.6.15.2 Adjust Ratio Mode

Unlike the Commissioning mode, if the Burner Control has started the burner cycle (Burner Control is not in "Standby") then once the C-Mode button request has completed (pass code entered and accepted) the Burner Control will enter the Adjust Ratio mode (see Figure 33). In this mode, the screen is similar to the Commissioning mode screen but now the Current Position has an "a" as a prefix to the position number and a "Prev Position" button is now available. The operator can adjust the actuator position for any profile position from position "a03" to the last profile commission position.

FIGURE 33.



NXTSD407 (top) and NXTSD413 (bottom) Adjust Ratio Setup Screen

For more detailed information regarding the Adjust ratio mode of the Burner Control, see the section titled "ADJUST RATIO PROCEDURE" of bulletin PPC-4001 "PPC4000 Series Fuel Air Ratio Controller".

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NOTICE

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