



Better Boilers

V-10 TOUCH SCREEN BOILER CONTROLLER

OPERATING INSTRUCTIONS



This Manual is also available in French - contact IBC or visit our web site www.ibcboiler.com

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1.0 IBC MODEL V-10 TOUCH SCREEN BOILER CONTROLLER

1.0 GENERAL



The IBC V-10 Boiler Controller is available for all VFC and SL series condensing boilers. The touch screen controller is engineered to be backward compatible with previous IBC 5 button boiler controllers.

The controller is equipped to provide:

- Control of up to 5 pumps – 1 boiler pump + 4 separate load pumps
- Outdoor Reset control
- Set Point temperature regulation
- Domestic Hot Water (DHW)
- External control via 0-10VDC or 4-20mA signaling
- Alarm dry contacts
- Load Combining – simultaneous operation of 2 similar water temperature loads
- The control can manage and/or operate in a network of up to 24 IBC VFC or SL boilers

Some of the new features available in the touch screen control include:

- Express Setup Menu for simple, quick programming
- Software updatable in the field with a SD card or a USB stick
- Setup configuration back-up and cloning using SD card or USB stick
- Superior warning messages while setting up the control
- Advanced Error messages with visual display on the Home Screen
- Internet/LAN connectivity
- BACnet (with activation)

NOTE

To view the software version on the controller go to Main Menu, Diagnostics, Boiler Information.

1.2 CONTROL

When the boiler is first energized, the controller will go through a power up sequence that will take approximately 90 seconds. During this time the controller is completing a self-diagnostic and loading all previous settings. In the event of a power interruption the boiler will automatically resume operation when power is restored with all the previously stored values.

The controller provides overall management of the boiler operations including;

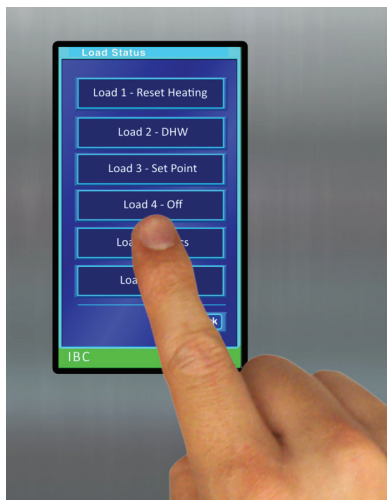
- Power-up, self-diagnostics, easy load parameter adjustments
- Burner operation, safety management systems, call for heat management and load priority
- Real time boiler data
- Temperature and throttle operation
- Maintenance of operational and error service logs
- 2-way communication between other IBC boilers and controls

Operational and historical data may be accessed at any time using the System Status and Load Profiles sections of the control. Error logs are available in the Diagnostics section and the controller is capable of recording any or all errors since original power-up complete with the date and time of the error.

1.3 CONTROL INTERFACE

⚠ CAUTION

No sharp or metallic object should be used on the touch screen as this will cause damage. Use only a Stylus or your clean finger



This section explains the general structure of the control interface and,

- how to navigate through the screens
- how to display information
- how to enter settings

The specific purpose and effect on boiler operation of the various parameters that can be displayed and adjusted will be explained later in this manual.

The control interface is provided through a 2-1/4 x 4 inch, colour Touch Screen display. The Touch Screen responds to a light finger touch on the screen. You can also use a stylus or similar device to operate the touch controls. Do not use a sharp or metallic object such as a screw driver to operate the control as it could damage the touch screen.

The controller display is divided into two areas, the screen active area and the boiler status bar. All screens have an active area consisting of the screen title bar at the top and a boarder surrounding the active area. At the bottom of the display there is space reserved for the boiler status bar.

Prior to any interaction with the touch screen the display will be showing the Home screen that includes details of the current boiler status. If the controller has been left on the Home screen long enough (user adjustable, 10 minutes by default) the display with be dimmed to save power.

The control will automatically return to the home screen if left unattended. The screens will step back one screen at a time in 10 minute increments if the touch screen has not been touched. The pop-up windows will also step back automatically in 2 minute intervals.

IBC 04:01

Inlet / Outlet Sensor

Ignition Failure

Status Bar Graphics

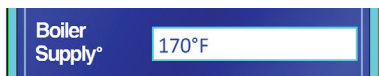
1.3.1 Boiler Status Bar

The boiler status bar indicates if the boiler is in a normal, warning or alarm state. When no warning or alarm state is present, the bar will be green and the time will be displayed inside the green area. The bar can also be yellow or red corresponding a warning or alarm state. Text inside the bar will indicate the specific warning or alarm present. If more than one alarm is present the text display will slowly change, rotating though whatever alarms that are present.

1.3.2 Navigation Overview

Navigating through the controller touch screen interface is designed to be simple, consistent and intuitive.

There are three screen types; Menu Screens, Status Display Screens and Setting Screens. The display can be split in some cases to show a Menu Screen and a Setting Screen at the same time.



Entry Box

1.3.2.1 MENU SCREENS

Menu screens are a list of choices that lead to other screens. The screen is divided into evenly spaced button icons each labeled with a choice to be selected. At the bottom of the active screen will be a **Back** button to return to the previous page.



Entry Button

1.3.2.2 STATUS DISPLAY SCREENS

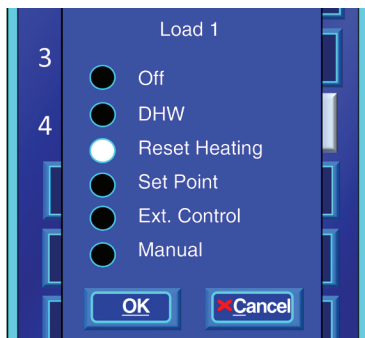
These screens are self-explanatory. Text describing various parameters is listed along with the current value for each. Data cannot be entered or values changed on these screens. If there are no buttons on the screen, touching the screen anywhere in the active area will exit the screen.

1.3.2.3 SETTING SCREENS

A Setting Screen presents various parameters and setting options to allow new values to be entered and saved as necessary.

There are four ways new settings are entered;

- an Entry Box
- an Entry Button
- a Radio Button
- a Check Box



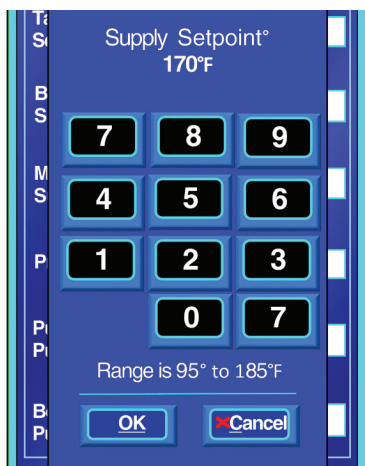
Radio Buttons

An entry box is used in most cases to adjust parameter settings. Entry buttons are used to set the load type. Radio buttons are used to select a setting from a list of options and can be used in conjunction with entry boxes. A check box is used to select whether a specific function or capability is turned on or off, enabled or disabled.



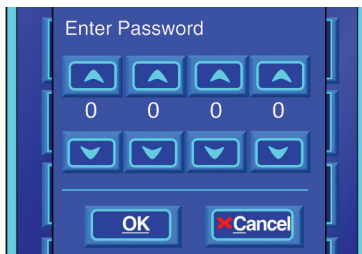
Check Box

To change the value in an Entry Box or Entry Button, touch the current entry and a pop up window will appear. If the entry type is a number, the pop-up window will show a numeric keypad with the current entry value displayed above it. Touching the numbers on the keypad will change the value displayed. The back arrow button will delete the last digit entered. If the value is not numeric the popup window will show a list of options to choose from with a radio button adjacent to each choice. Select the option required by touching it and the radio button will light indicating the selection. At the bottom of the pop-up window will be an **OK** button and a **Cancel** button. Pressing the **OK** button accepts the value or selection displayed and closes the pop-up window displaying the new value in the entry box. The **Cancel** button disregards any value changed and closes the pop-up window, making no adjustments.



Numeric Key Pad

Any changes entered will be displayed on the settings screen for review. The **Save** button at the bottom of the settings screen must be pressed for the changes to implemented. **NOTE: Any changes entered will not be saved unless the Save button is pressed.**



1.3.2.4 PASSWORD POP-UP WINDOW

Access to setup areas that allow operational parameters to be changed can be restricted by requiring a password to be entered. If the Security mode is on then the password pop-up window will appear as soon as a button is pressed that provides access to a restricted area. The password is factory set and cannot be changed.

The password window shows 4 digits with an up arrow and down arrow button above and below the digit. The password graphic looks similar to some combinations locks. Touching the arrow button above or below the digit will cause the digit to increment up or down respectively. Tap the appropriate buttons until the desired password is displayed. Pressing **OK** will close the popup and then grant access. Access to secure areas will remain available for 15 minutes without having to reenter the password.

1.3.2.5 SLIDE BAR

The Slide Bar (left side) allows the viewing of a list that is longer than will fit inside the active display area. For example, while editing a load in the installer menu, the list of items is longer than can fit on one screen. Simply touch and hold the Slide Bar until it turns blue and slowly drag it down. As you do the list of items viewable will scroll with the side bar. You can also tap the arrows at either end of the Slide Bar to move the bar up or down.

1.3.2.6 COMMON BUTTON ICONS



Save will save the displayed settings and return you to the previous screen. This button is found at the bottom left on all Setting Screens.



Back will return you to the previous screen without saving any changes. This button is found at the bottom right on all Setting Screens and all menu screens.



OK will accept the settings displayed in a pop-up window and close the window. This button is only found at the bottom left of a pop up window.



Cancel will ignore the settings displayed in a pop-up window and close the window. This button is only found at the bottom right of a pop-up window.



Edit is only available in the **Installer Settings** menu and only active on loads that have been defined. Pressing **Edit** will enter the settings screen for the corresponding load or setting.



Close appears at the bottom of a Warning pop-up window.



View is only available in the Error Log to display the particular Minor errors, Major errors or System faults associated with the logged error event.



The single **Up** and **Down** arrow is available in the Error Log menu and enables you to scroll through the list of event records one at a time.



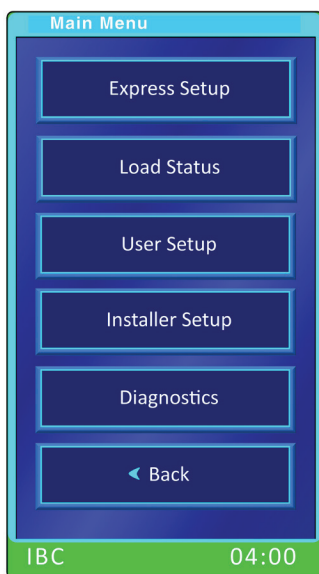
The single **Left** and **Right** arrow is available in the **Load Profiles** screen to scroll through the 4 separate loads plus the remote load if the boiler is operating as part of a multi boiler network.

1.4 HOME SCREEN



The Home Screen displays basic boiler status information. The title bar shows the boiler model number and boiler ID number if set higher than zero. Just below the title bar a line of bold text indicates the current operating state and immediately below that the load currently being serviced, if any, is displayed. Up to 8 of the current operating values are listed on the balance of the active screen. If there is no current value for a given parameter, for example when no corresponding temperature sensor is connected, then there is no line of text for that value.

1.5 MAIN MENU



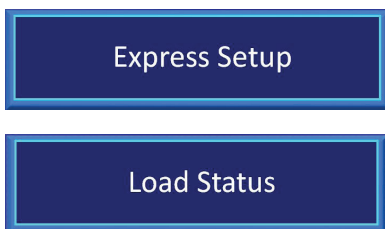
To enter the Main Menu screen simply press anywhere on the Home screen. If the display has been dimmed you will need to touch the screen twice.

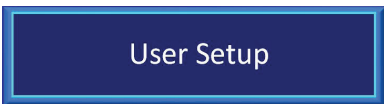
The Main Menu displays 5 possible selections allowing quick and easy access to all areas of the controller interface. The selections support the display of extensive operational and diagnostic information and provide a structured interface for the adjustment of control settings. The **User Setup** selection provides a relatively simple interface allowing for the adjustment of settings relevant to the user while **Installer Setup** gives field access to the full functionality of the system for the appropriately trained heating professional. The split access also allows a layer of security against “finger trouble”, including accidental adjustment to settings that could lead to inefficient operation (e.g. excessive cycling) or dangerous conditions.

1.5.1 Main Menu Selections

Express Setup gives the installer a simplified and fast way to setup and enable any or all of the 4 Loads. This easy to use feature walks the installer through the basic settings of the controller and sets parameters to default (typical) values that will work for the selected load type and can be adjusted if required. Error messages are displayed if the installer sets the values incorrectly. All Loads are factory set to OFF allowing the installer to easily choose a type for each load when the controller is first powered on.

Touching **Load Status** will bring up a menu screen with six possible selections to display the current status details for the 4 individual loads, operating **Load Statistics** and the operational **Load Profiles** (graphs) for each load.





User Setup leads to the User Settings screen where the installer or end user can set the time and date, overrides, screen brightness, hot water tank temperature, occupied status and choose Imperial or Metric units.

The **Installer Setup** selection gives access to all configurable settings for the advanced installer. If security is turned on, an Enter Password window will appear requiring the correct password to be entered before access is granted. All 4 Loads can be set to any of the available types with all possible parameters for each load available for editing. Menu buttons provide further access to settings for **Load Combining** and **Multi-Boiler** operation. The **System Settings** selection leads to the Systems Settings menu screen where **Site Settings, Network Settings, Security, Licensing, Backup & Restore** and **Boiler Information** are available.

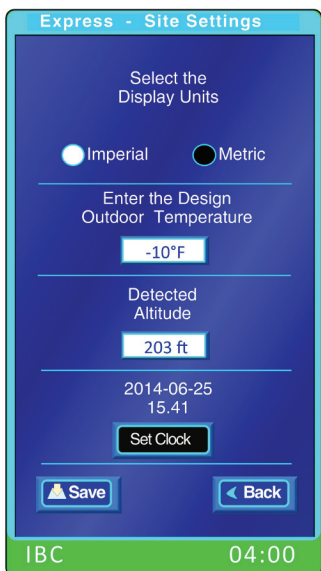
The **Diagnostics** menu screen includes **Error Log, Temperature Sensors, Pressure Sensors, Fan Operation, Network Information, Clean the Screen,** and **Advanced Diagnostics** selections. Most selections provided information only. The **Clean the Screen** section allows the touch screen to be de-activated for 60 seconds while the screen is being cleaned. **Advanced Diagnostics** is where the installer can view advanced diagnostic information, do a **Software Update, Clear Error** messages, **Restart the boiler, Reset Factory Defaults** and calibrate the touch screen.

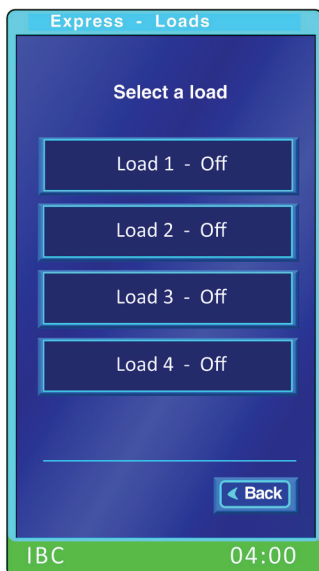
1.5.2 Express Setup

Express Setup is a quick and simple method to set all the necessary parameters for most single boiler installations. Express Setup sets parameters to default values including all the appropriate values to operate each load type under most operating conditions. A Settings Screen will present the default values for review and if necessary the settings can be adjusted. The controller checks entries for compatibility and displays an error prompt to advise the installer to correct a mistake.

Begin Express Setup by touching the **Express Setup** button. If the boiler has never had any programming done previously. or if all loads are set to **Off**, this will display **the Express - Site Settings** screen. This screen allows you to choose Imperial or Metric units, enter the Design Outdoor Temperature, view your altitude and set the clock. The Design Outdoor Air Temperature must be set correctly for your geographic location if Reset Heating is to be used for any of the loads. This temperature is available from a number of sources including the local IBC wholesaler. The Design Outdoor Air Temperature can also be found in the heat loss calculation documentation used in the design of the heating system. The boiler controller is equipped to automatically detect altitude so this value will be set for you.

The Time and Date settings can be changed by touching the **Set Clock** button and entering desired settings. If the boiler is connected to the Internet then selecting **NTP Server** will automatically set the time. Once the desired entries have been made press the **Save** button and the display will change to the Express – Loads menu screen.



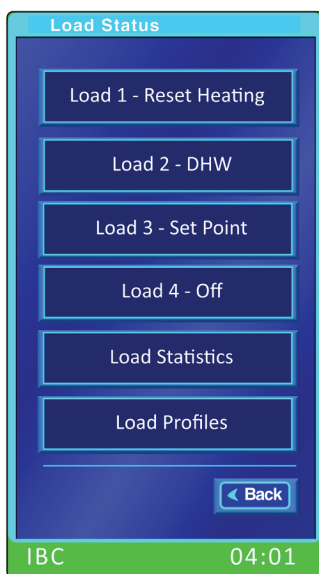


The **Express – Loads** screen displays a selection button for each of the 4 possible loads. All loads are set to OFF from the factory allowing the system to be programmed to correspond to the installation’s specific wiring connections. If Load 1 has been piped and wired - (Load 1 = P/V1 & Therm.1) to heat something press the **Load 1** button. Next, select the type of load being heated with Load 1; **Reset Heating, Setpoint, DHW** (Domestic Hot Water), or **External control**. If Setpoint, DHW or External Control is selected a settings screen will be shown with the values pre-programmed appropriately for typical residential applications. If Reset Heating is selected then the emitter type must be selected and then the settings screen will be displayed. The pre-programmed values should be carefully reviewed to be sure they will work for the intended application. The values can be changed if necessary by following the methods described in section 1.3.2.2 Setting Screens in this manual. When all the values are set as required, press **Save** at the bottom of the screen to save the changes and the **Select a Load** Screen will return. Pressing the **Back** button will return to select a **Load Screen** with no load type being assigned.

These steps can be repeated for all loads connected to the boiler.

Express Setup can be used at any time after the controller has been programmed to reset or alter the current settings of a load or to add settings for a programmed load. Outdoor design temperature can be adjusted in the Installer Menu.

1.5.3 Load Status



Touching one of the Load 1 to 4 buttons will bring up a status display screen listing specific operational information about that load in real time. If a sensor is not connected to the controller, for example a DHW sensor or the Outdoor sensor then the display will show n/c for Not Connected. Cycles/Day is a running tally of the number of calls for heat that load has received in the last 24 hours. In general, fewer cycles per day = better efficiency and usually better comfort.

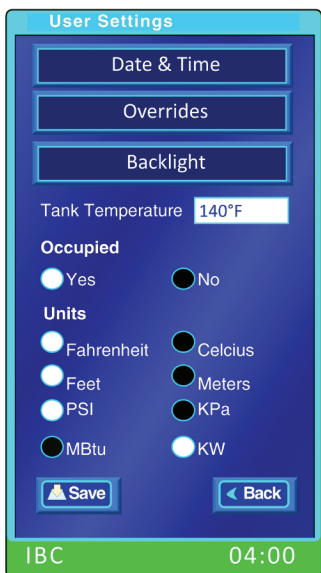
Touching the **Load Statistics** button will access a status screen that will list run time statistics for the boiler including specifics for each load.

Load Profiles will give access to screens for each load that show a bar graph profile of the time the boiler is firing at various throttle levels.

1.5.4 User Setup

The **User Settings** screen is a combination menu and settings screen. **Date & Time, Overrides** and **Backlight** are the three available menu buttons. The water **Tank Temperature** can be changed by touching the entry box. Radio buttons are used to select the **Occupied** status and **Units**.

On the Time and Date settings screen **NTP Server** or **Internal** can be chosen. The controller must be connected to the Internet for the **NTP Server** selection to work properly. Choosing **NTP Server** will make the controller, when connected to the Internet; automatically update its internal clock from an Internet time service. If Internal is selected then the time must be set manually. The **Time Zone and Auto DST** should be set appropriately in either case.



The **Overrides** screen allows the override programming for each load to be enabled or disabled and by touching the **Edit** button the override temperatures with corresponding start and end times can be set for each load by day of the week. There are two override programs for each day of the week. (Refer to section: 1.7.5)

The **Backlight Settings** screen provides a slide bar to set the screen backlight level (brightness) and a **Dim Time** setting to control the length of time, with no touch screen interaction, the controller waits before dimming the screen to save power.

1.5.5 Installer Settings

The **Installer Settings** screen gives access to all configurable settings for the advanced installer.

There is an Entry Button for each of the 4 available loads used to assign the load types. Once a type is assigned all the load's parameters can be edited independently. Setting the load type to **Off** means that load is disabled and will not be used.



The **Multi-Boiler, Load Combining** and **System Settings** menu buttons complete the selections available on the **Installer Settings** screen.

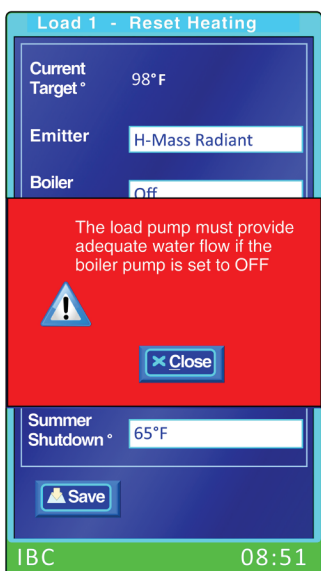
- **Multi-Boiler** provides access to settings required for the boiler to operate as part of a multi-boiler system. (Refer to section: 1.7.10)
- **Load Combining** provides access to settings for required to enable the boiler's Load Combining (previously known as Load Pairing) feature. (Refer to section: 1.7.2)
- **System Settings** leads to a menu screen where the **Site Settings, Network Settings, Security, Licensing** and **Backup & Restore** selections are available.

1.5.5.1 LOAD SETTINGS

Most load settings available to adjust are self-explanatory to the experienced installer but listed below are ones that may be new to some installers:

Boiler Pump – This feature is available for all load types and allows the installer to have the Boiler Pump (primary loop pump) off while this load is running. The load pump must be piped in such a way (series piping) as to ensure adequate flow through the boiler without needing the Boiler Pump to provide flow through the heat exchanger. When you set the Boiler Pump to **Off** a warning message will appear as a reminder. If the load is a radiant floor then it is strongly recommended to use primary/secondary piping and leave the Boiler Pump set **On**.

Ramp Speed – Ramp Speed allows the installer to adjust how fast the boiler tries to raise the water temperature flowing through the heat emitters. With a fin tube baseboard radiator you may want the water temperature to rise quickly to provide heat as quickly as possible. This type of heat emitter has very little mass so it can heat up quickly and when the call for heat is removed, cools down quickly. A radiant floor, on the other hand, has significant mass therefore takes a long time to heat up. When the call for heat is removed, the floor is still warm and will continue to add heat to the space for a significant period of time.



Depending on the settings it's possible for the indoor temperature to overshoot the desired indoor temperature. Reducing the **Ramp Speed** Value will help reduce this overshooting issue.

The factory **Ramp Speed** setting is Auto. While set to **Auto** the controller uses the selected heat emitter type to automatically determine an appropriate ramp speed. The installer can manually set the **Ramp Speed** by choosing a value from 1 to 10. A setting of 1 will raise the water temperature very slowly and 10 will raise the water temperature very quickly. **Auto**, the factory setting, is generally the best setting to choose.

Priority – Each load has a priority value between 20 and 90, the Priority Value has to be different for each load. A higher numerical value means a higher priority. Consider these values as minutes. The difference between 2 load priority values is the number of minutes the higher priority load will be allowed to operate before switching back to the lower priority load. For example, if DHW has a priority of 80 and the Set Point load has a priority of 50, the DHW load will operate for (80-50) 30 minutes while the Set Point load is temporarily turned off. *Also see section 1.7.1.*

Pump Post Purge (sec) – Each load pump can be operated for a period of time after the call for heat has ended. This feature takes the heat left-over in the heat exchanger and nearby boiler piping after the burner has turned off and pumps it into the load. A good example of this is the indirect water heater DHW load. After the tank has reached its target temperature, the boiler shuts down but allows the load pump to operate for a period of time to transfer heat that is stored in the boiler's heat exchanger into the hot water tank. This feature is adjustable in seconds from 0 to 900 (15 min). If the load has zone valves that close off the flow to the load as the boiler shuts down then this can be set to 0 sec. Each load can be set independently of each other to provide maximum flexibility.

Boiler Pump Purge Time (Site Settings) is adjustable independently of the 4 load pumps. Many installations will use a primary (boiler) loop and it is recommended that the boiler pump operate for 3 – 5 minutes after all calls for heat have been satisfied.

Indoor ° From – The default setting is **Indoor**. If an indoor temperature sensor is being used the sensor will normally be connected to the TB2 Indoor Sensor terminals on the controller board. Alternatively the TB2 2nd Loop Sensor input terminals can be wired to the indoor temperature sensor. To support this alternate connection the **Indoor ° From** setting must be **Sec. Loop**.

Outdoor ° From – The Default setting is **Outdoor**. If an outdoor temperature sensor is being used the sensor will normally be connected to the TB2 Outdoor Sensor terminals on the controller board. Alternatively the TB2 2nd Loop Sensor or the DHW Sensor input terminals can be wired to the outdoor temperature sensor. To support these alternate wiring options the **Outdoor ° From** setting must be set to **Sec. Loop** or **DHW** to correspond with the wiring.

Water ° From - The Default setting is **Outlet**. When set to Outlet the controller will determine the supply water temperature from the outlet temperature sensor on the boiler. Alternatively the 2nd Loop Sensor or the DHW Sensor input terminals can be wired to a water temperature sensor. To support these alternate wiring options the **Water ° From** setting must be set to **Sec. Loop** on **DHW** to correspond with the wiring.

Burner On From – This feature is found on a load set to **External Control**. The setting can be **Therm.** or **Ext. Control** so that the load will respond to a call for heat from either the Thermostat or External Control. If set as **Therm.** then the boiler will wait for a call for heat on the Thermostat terminal associated with the load and then look at the Ext. Cont. terminals for the target water temperature signal. If set to **Ext.Cont.**, the controller only uses the Ext. Cont. terminals to determine a call for heat. If the voltage at the Ext. Cont. terminals is below 2.1VDC there is no call for heat. If the voltage is at or above 2.1VDC, then there is a call for heat.

Fail Safe Enable – Fail Safe Enable is only available in External Control and only if the **Burner On From** is set to **External Control**. If this feature is active and the External Control voltage drops below 0.25Vdc, the boiler will automatically turn on the Boiler Pump (if selected “ON”), the load pump, and operate the boiler to the Fail Safe Set Point temperature. This temperature set point is adjustable.

1.5.5.2 SYSTEM SETTINGS

Site Settings gives the installer access to boiler operating parameters that are not specific to any load. Included are the load control type, primary pump purge time, manual pump purge, and the variable speed output control settings.

The **Network Settings** screen is used to assign the boiler its ID, address and network configuration to support multi-boiler operation and connection to internet data networks.

The **Security** control setting allows the Security mode to be set **On** or **Off**. When On is selected the **User Password** and **Installer Password** are displayed until **OK** or **Back** are pressed.

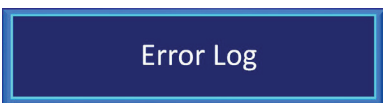
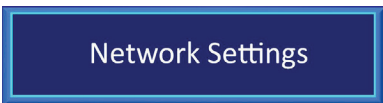
Licensing is used to activate special add-on software packages.

Backup & Restore is used to backup or restore the boiler’s complete controller configuration and settings to/from a USB memory stick or SD-Card inserted into the controller. The **Backup/Restore Type** can be **This Boiler** or **Boiler Model**. “This Boiler” creates or loads a copy of the configuration for the specific single boiler. “Boiler Model” creates or loads a copy/clone of the configuration. This feature facilitates the creation of a standard boiler configuration that can quickly be loaded into another boiler of the same model.

1.5.6 - Diagnostics

The **Diagnostics** menu is a valuable tool for the installer and service provider. Access to the following Diagnostics tools is available;

Each time an error condition happens a record for the error(s) is created and stored in the controller memory. An error record includes the date, time, classification, type(s) and the state of key boiler operating parameters at the time the error event occurred. The controller can store a practically unlimited number of error records.





The **Error Log** screen title bar shows “**Error Log**: (record no) (total no. of error records)”. If there are no error records logged the title bar will show “**Error Log**: 1/0” and the **Date** will be shown as **End of Log**. An error record screen for an actual error event will have a **View** button beside the type of error. Press the **VIEW** button and the error or errors present at the time of the error event will be displayed in a pop-up window. Errors are classified as Minor, Major and System Faults. An Error record will include all the errors present at the time of the error event.



The **Clear** button can be used to delete all entries in the error log. There is a **Yes** or **No** check prompt to avoid accidental deletion



The **Save** button is used to save the error log to an SD card or USB flash memory is inserted into the controller.



The **Temperature Sensors** status screen displays the current active value for each of the temperature sensors. If a sensor is not connected to the controller it will display **n/c**.



The **Pressure Sensors** status screen displays the current active value for each of the pressure sensors, the water **Flow Rate**, **VS Load Duty Cycle** and the **Altitude**. If a sensor is not connected to the controller it will display **0**.



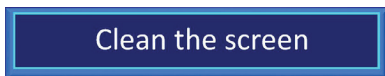
The **Fan Operation** screen displays specific information related to the current fan operation and venting system. For testing purposes the **Fan Test Heat Out** Entry Box allows the fan to be activated independently and set to speeds corresponding to the entered Heat Out value. This test can be used to verify proper fan operation and check venting for blocks or leakage. The test will stop as soon as the screen is exited.



Boiler Information lists basic boiler information like the controller software version and boiler model.



The **Network Information** screen displays information related to the web interface and BACnet settings of the boiler. Also available here is the Multi Boiler network information.



Clean the Screen - When activated the touch screen will not respond to touches for a period of 60 seconds. Care must be taken not to scratch the screen while cleaning. Use a damp soft cloth and do not spray cleaner directly onto the screen.



The **Advanced Diagnostics** menu screen includes the following advanced level selections for the experienced installer.

Display Parameters

The Advanced Display status screen lists 17 key operational parameters and their current readings.

Edit Parameters

Password protected, for use by IBC personnel.

Software Update

Allows the Controller software to be updated via an SD memory card or USB memory stick.

ATD Channels

Displays the raw, unfiltered input values from the analog inputs.

Clear Errors

Clears any currently latched error states and forces the controller to reassess the boiler's error status and determine if any error state is still present. This method to clear errors is preferred and much faster than a power cycle.

Restart Boiler

Used to initiate a full boiler controller restart. A restart will take approximately 2 minutes to complete.

Reset Factory Defaults

Used to return all boiler operating parameters to their factory default settings. This includes all settings configurable in **Installer Setup** and **User Setup** except for the Network and Date & Time settings. The error log and operating history is not cleared. Reset Factory Defaults will take approximately 2 minutes to complete.

Touch Pad Calibration

Over time the touch pad calibration can drift slightly resulting in the touch locations being out of line with the displayed touch points such as buttons or entry boxes. The Touch Pad Calibration procedure will resolve any such alignment issues.

1.6 SEQUENCE OF OPERATION

The control module has 5 states during normal operation, as well as an error mode for problem detection:

1. Standby
2. Purging
3. Ignition
4. Heating
5. Circulating
6. Error mode

Each state is explained below. A flow chart for the sequence of operation can be found in the back of the manual.

GLOSSARY OF TERMS

This glossary briefly defines some terms used in the Sequence discussion.

Call for Heat: the thermostat indicates that room temperature is below the thermostat setting.

Heat Required: temperature sensors on the boiler indicate that water temperature is below the water temperature target or setpoint.

Heating Enabled: the boiler is powered and there is a Call for Heat, Heat is Required. The boiler will start and enter the Heating Cycle unless it is in an error mode.



1.6.1 Standby

Waiting for a Heating Enabled signal (as defined in the above glossary), the burner and boiler pump are off during this time.



1.6.2 Purging

PREPURGE

On a Heating Enabled signal, the boiler automatically enters a prepurge cycle. The fan starts and automatically adjusts to a level suitable for ignition. Ten seconds later, the pump starts. After a total of 15 seconds, the ignition cycle begins.

INTERPURGE

The boiler enters an interpurge cycle if ignition is unsuccessful. The fan and pump continue to run, and ignition is delayed by an additional 15 seconds.

POSTPURGE

When the boiler exits a heating cycle the fan remains on for 20 seconds and then reduces airflow to an ultra-low flow mode for 90 minutes unless preempted.

The boiler pump and the last load pump remain on for 5 minutes (adjustable) after the Heating cycle ends.

If the heating cycle ends as a result of water temperature exceeding the postpurge will continue as normal but the boiler will enter the circulating mode. (Current boiler target water temperature + 1/2 the Supply Differential.)

The cut off temperature levels are specific for each load; for space heating they are determined using the preset target plus 1/2 of the Supply Differential setting. Default values for such differentials are 20°F (+/- 10°F) for space heating with outdoor reset and 20°F (+/- 10°F) for DHW.

If there is a Heating Enabled signal any time during this cycle, the postpurge ends and a prepurge begins, otherwise the boiler will enter Standby mode.



1.6.3 Ignition

After the prepurge, the gas ignitor starts sparking and the valve opens for a 4.0 second ignition trial.

If no flame is detected at the end of the trial, the interpurge cycle is entered. If 3 trial for ignition sequences fails, the boiler locks out for a 1 hour long interval, after which the ignition cycle is refreshed (e.g. For 3 further attempts). Alternately, the Clear Errors diagnostic button can be used to accelerate the retry sequence. The homeowner should follow up persistent recurrence of the 1 hour reset routine by contacting a qualified service technician, to evaluate the cause of such ignition irregularity.

With a successful ignition, the output of the boiler decreases to a low level after 7-10 second burner warmup period and the heating cycle begins.

1.6.4 - Heating

The heating cycle lasts until the Heating Enabled state ends (for all loads) or until water temperature exceeds the target temperature by 1/2 of the supply differential for the last served load and the throttle has fallen to the minimum output. At the end of the heating cycle the boiler enters a postpurge.

During the heating cycle, the boiler addresses the multiple defined loads in accordance with its Prioritization algorithm. See Section 1.7.1. Boiler output changes to meet heating demands as indicated by the temperature characteristics of the boiler supply and return water. Boiler supply water temperature targets vary according to the set up parameters entered and are subject to further variation for loads where outdoor reset has been selected. Where thermal loads are within the boiler’s minimum to maximum MBH throttle range, the control algorithm seeks to regulate the boiler supply temperature within $\pm 3^{\circ}\text{F}$ of the target temperature. On/off differentials apply to loads below the minimum MBH input rating.

VFC 15-150 ID:2	
Circulating	
Heating: 1-Baseboard	
Supply Temperature	145°F
Return Temperature	131°F
Target Temperature	134°F
DHW Temperature	139°F
Outdoor Temperature	26°F
Inlet Pressure	12.5 psi
Heat Output	0 MBtu
IBC	12.17

1.6.5 Circulating

This cycle operates when water temperature exceeds target by 1/2 of the supply differential for that load at minimum output, and call for heat is still present. After entering a postpurge, the system pump remains on until water temperature is 1/2 of the supply differential below setpoint temperature.

The boiler can also enter the Circulating mode during transition from any high temperature load (e.g. DHW at 180°F) to the cooler target (e.g. radiant floor on outdoor reset, at perhaps 90°F). In the case where the boiler loop temperature is outside the applicable differentials, the burner will shut off while the pump remains on until the loop drops 1/2 the differential below the new load target temperature. **NOTE:** if there is no place to sink heat during this type of Circulating Mode, this phase will continue indefinitely, affecting heat delivery.

Thermal shock avoidance is key. Wherever two or more loads are used and settings could permit supply temperature differences greater than 20°F, external 3-way motorized mixing valve, thermostatic mixing valve, or injection mixing is recommended.

A thermal shock avoidance routine is employed to avoid undesirable effects of large temperature swings: the hot load pump remains on until the boiler’s return water sensor detects temperature stability - to sink excess heat. For example, upon satisfaction of a DHW call the DHW load pump will remain running until the boiler return water temperature falls to the DHW tank target temperature. This deposits legacy heat from the primary loop into the water tank before activation of a cooler load.

Always ensure that loads sensitive to high temperatures are protected using appropriate means - e.g. a three way mixing valve set to restrict entering water temperature to 130°F.

VFC 15-150 ID:2	
Heating	
Heating: 1-Baseboard	
Supply Temperature	101°F
Return Temperature	81°F
Target Temperature	134°F
DHW Temperature	139°F
Outdoor Temperature	26°F
Inlet Pressure	12.5 psi
Heat Output	150 MBtu
IBC	12.17

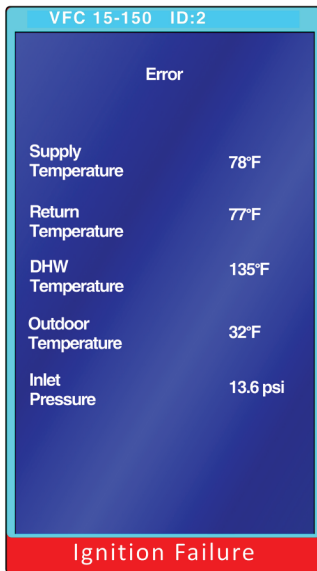
1.6.6 Error Code

The controller continually checks sensors to see that they are operating within normal parameters. If sensors indicate the boiler is operating outside its limits, it will declare an error condition.

Two types of error conditions can occur:

- **Minor Errors:** result when an abnormal condition exists which does not present an immediate safety hazard. The boiler shuts off the fuel and enters an extended purge, followed by the error cycle of 5 minutes for all conditions other than maximum ignition trials (a modified Major error which locks out for 1 hour after 3 unsuccessful ignition attempts). Following the purge, the fan and pump are stopped until the end of the error cycle. Normal operation then resumes.
- **Major Errors:** result when a condition exists that may be a safety hazard. The boiler enters an extended purge then the fan and pump are stopped. The boiler is in a lockout, and must be checked and restarted by a service technician.

See the Troubleshooting section 5.3.1 of the boiler’s Installation and Operating Instructions for a list of errors and their likely causes. Note that other problems such as disconnected wires or defective sensors may be the cause of the error. Always check connections and wiring first.



1.7 OTHER OPERATING FEATURES

1.7.1 Priority

The control module hosts a scheduling routine to manage the boiler’s operation when more than one load has been defined. Typically, loads declared as DHW receive significant - but not absolute - priority. Multiple heating loads - with varying temperature targets - are run sequentially as opposed to simultaneously (with a mixing valve). The objective is to serve each load at the minimum possible temperature, as opposed to running hot then mixing down – with hardware, saving the related hardware and fuel cost. The approach optimizes the low temperature combustion benefits of direct cool running of a radiant floor. The large throttle turndown range coupled with outdoor reset means that several loads can receive heat in-turn, with less on/ off duty cycling than would occur with other heat sources.

The boiler is shipped with default values for each type of declarable load (e.g. DHW, radiant floor). The preset variables for DHW (a value of 85-87 on a 20-90 scale) give it substantial priority, which declines over time if another load is calling. Spacing heating loads (with Outdoor Reset) are given default values starting at a low of 28, while other Set Point loads start with 62. Over time, such points are transferred between the loads in accordance with the system rules.

The boiler will automatically shift between loads once the points totals reach an upset value. Upon a load transfer, the burner will modulate down to its base level and will then throttle up as required for the new load. If competing loads have not been satisfied at the load switch stage, the control will register the firing rate and will return rapidly to such rate on the next rotation.

Heat-apportioning can be altered in the Installer Settings input section. For instance if Baseboards (set up with Outdoor Reset as Load 3) are not providing the desired heat, the on-time of the baseboards can be increased by increasing the Priority value relative to the other declared channels (e.g. moving the Load 3 preset value from 43 to 50 or reducing another load's value). Temperature targets for the under-served load could also be raised in this example. The basic function is that the difference between settings equals the run time (in minutes, for the initial cycle) of the higher load setting before switch-over to the simultaneously calling load, e.g. DHW with priority set to 80 will run for approx. 35 min. before switching to a clashing load set with priority 45. Following such initial cycle, the competing loads will switch back and forth after further 10 min. intervals pending satisfaction of one or both loads.

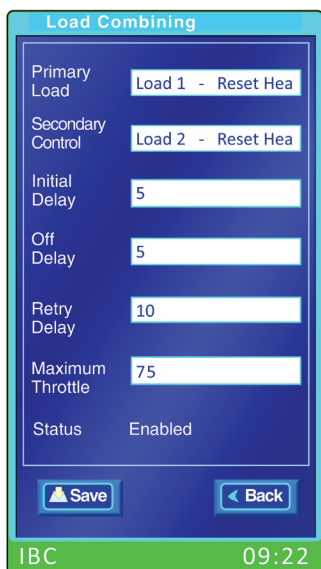
To cause repeated unequal run times (for example, constant 35 vs 5 min. runs) it is necessary to integrate an external load removing relay or timer on one of the heat calls (contact the Factory for details). Do not set each load to the top value, and it is generally better to avoid equal ratings. **NOTE:** the priority scale values do not need to add up to 100 – they are relative only to each other.

1.7.2 Load Combining

The controller allows two loads of compatible temperature settings to be run together.

Access to enable the feature and enter the required settings is done by selecting **Load Combining** on the **Installer Settings** screen.

There are 5 parameter settings associated with Load Combining:



PARAMETER	DEFAULT	MINIMUM	MAXIMUM
Primary Load	Disabled	Load1	Load 4
Secondary Load	Disabled	Load1	Load 4
Initial Delay	5	2	15
Off Delay	5	2	15
Retry Delay	10	5	60
Maximum Throttle %	75	50	90

- 1. Primary Load:** Set to the load that will control the boiler operation while Load Combining is active. This load must have a higher initial priority than the **Secondary Load** and should have a higher water temperature requirement. The Load Combining feature is disabled when this parameter is set to **Disabled**.
- 2. Secondary Load:** Set to the load that will be serviced simultaneously, in combination with the Primary Load, if the conditions for Load Combining are met. Load Combining conditions are met;
 - if the supply temperature requirements for the Primary Load are being met,
 - if the supply temperature is within the temperature range requirements of the Secondary Load and,
 - if the boiler has the capacity to service the Secondary Load as determined by the Maximum Throttle % setting.

The Load Combining feature is disabled when this parameter is set to **Disabled**.

3. **Initial Delay:** The number of minutes after the Primary load must initially be serviced before the boiler can add a Secondary load. A sufficient amount of time should be allowed for the Primary load to stabilize before the boiler adds the Secondary load.
4. **Off Delay:** When the secondary load is added into combination service it is expected that the supply temperature could briefly go below the normally allowed temperature range for the Primary load. The **Off Delay** is the number of minutes after the loads have been initially combined that the loads will continue to be combined regardless of an under-temperature condition. The **Off Delay** setting should be reasonably long enough to allow the boiler to drive the supply temperature up within the Primary load's target supply temperature range. The loads will be uncombined if the under temperature condition persists after the **Off Delay** time. If the supply temperature exceeds the requirements for either the Primary or Secondary load the loads will be uncombined immediately.
5. **Retry Delay:** If the boiler has to remove the Secondary load from combined service because Load Combining conditions have been violated the Retry Delay is the number of minutes the boiler will wait before attempting to add the Secondary load back into combination service.
6. **Maximum Throttle:** Maximum Throttle % is the percentage of the boiler's maximum heat output for which Load Combining will be allowed to begin. The Secondary Load will not be added into combined service if the boiler's output is higher than this value. The **Maximum Throttle** % has no effect once the loads have been combined.

1.7.2.1 CONSIDERATIONS FOR COMBINING LOADS

The Primary and Secondary loads must have compatible temperature parameter settings, or the Secondary load cannot be combined for service. The type of load generally doesn't matter, as long as the target temperature requirements for the loads to be combined are similar.

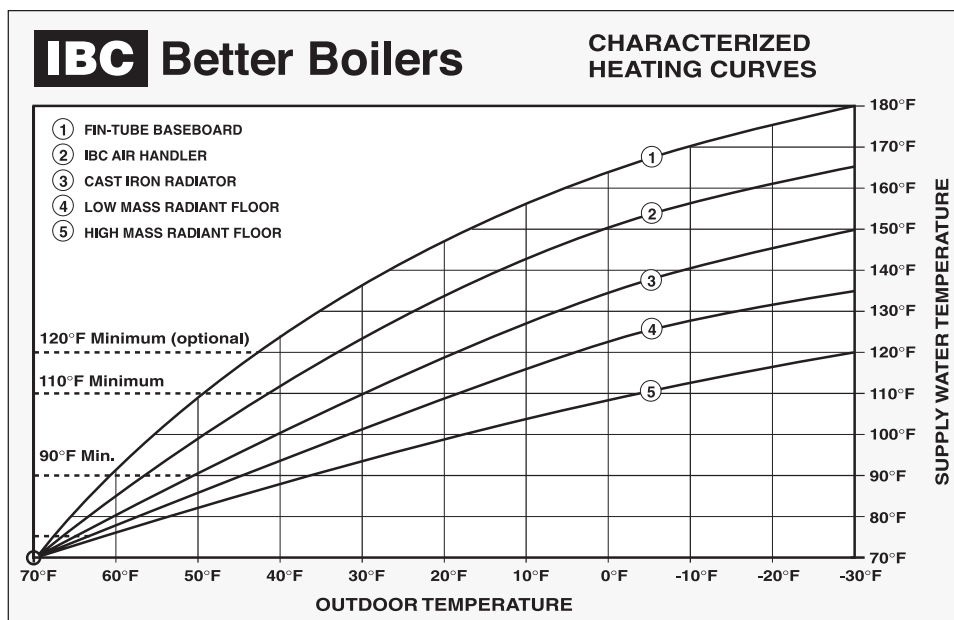
Load Combining does not interfere with the normal Load Priority scheme implemented by the boiler. Therefore, the Secondary load must be configured with a lower initial priority than the Primary load (a priority difference of at least 15 is recommended). If the Secondary load's running priority becomes higher than the Primary load, then it will be serviced in the normal priority rotation, just as if the load were not combined. The Primary load will be dropped, and the Secondary load will be serviced in the normal priority rotation. The priority scheme also means that the Load Combining will only occur while the Primary Load is the active load. The same would apply if an uncombined load's priority became higher than the Primary's. The Primary load, and therefore the Secondary load if in combination service at the time, would be dropped and the uncombined load serviced in the normal priority rotation.

Compatibility temperature ranges are the load's target temperature, +/- the differential temperature (the load's minimum and maximum supply temperatures). Note that any system or load temperature limits will still be in effect.

It should be noted that in the case of Reset Heating or External Control loads, the target temperature is dynamic. So it is possible that as outdoor and/or indoor temperatures change, reset and external control heating loads could drift in and out of compatibility for Load Combining. See *IBC Technical Note: Load Combining for further details*.

1.7.3 - Reset Heating

The boiler offers Reset Heating or outdoor reset control as standard equipment; this feature coordinates the control of boiler supply/outlet water temperature for space heating with the outdoor temperature. Reset Heating offers enhanced comfort and efficiency by using variable supply water temperatures to compensate for the differing rates of heat loss that a building experiences as the outdoor temperature changes. At any outdoor temperature above the coldest day expected, it automatically uses lower heating temperatures than would otherwise be used. This saves energy without sacrificing comfort.



When applied within a condensing boiler, outdoor reset control offers direct and significant combustion efficiency benefits by allowing generally lower circulating water temperature. This provides cooler return water to the boiler, promoting more condensation (= energy capture).

NOTE

If there is no outdoor temperature sensor the controller assumes 32°F/0°C to determine the heating curve.

Contacts are provided for connection of an outdoor sensor (shipped with each boiler) to be placed in an appropriate outdoor position (typically on the north face of the building away from any heat source). The temperature management algorithm flexes the boiler supply temperature according to characterized heating curves that are automatically called up through the load declaration process. Curves are provided for each of the radiation terminal types offered - e.g. High or low mass radiant floor, air handler, finned tube baseboards etc.

In an “open loop” reset system, a room or zone thermostat is used to send a call for heat over a 24VAC lead; this opens the respective zone valve, and signals the boiler to fire using onward leads to the boiler’s dry contacts (use one of the connections marked “Therm 1, 2, 3 or 4” on the TB2 terminal strip). Gang such leads in parallel from multiple zone valves for single connection to the boiler. Note that typical room thermostats simply provide a call for heat, they do not control the circulating water temperature from the boiler in an open loop reset system. Adjustment of a room thermostat from 72°F/22°C to 86°F/30°C will make no further difference to the delivered temperature if the floor slab has stabilized at the boiler temperature determined by the reset curve.

Where outdoor reset is applied without the indoor sensor feedback option, some manual adjustment may be required to achieve the desired comfort level. Fine adjustment can be made by editing the Indoor Setpoint ° variable, on the Reset

NOTE

Location of the indoor temperature sensor is very important. Typically the sensor needs to be installed in the coolest area of the space being heated.

Heating settings screen. To increase heat (e.g. From 72°F/22°C to 74°F/23°C) - move the Indoor Setpoint ° value upward (warmer) from the level otherwise chosen. This shifts the position of the reset curve, will amend the boiler water temperature by a similar amount. Do not adjust the Design Indoor ° value - a movement upward in concert with the Indoor Setpoint ° adjustment will have the effect of neutralizing the intended effect.

An optional indoor temperature feedback routine can be activated with the installation of an indoor sensor, connected to the designated TB2 contacts to automate adjustment of the outdoor reset routine.

The key inputs on initial set up are (1) **Design Outdoor** ° – the coldest expected outdoor temperature typically experienced at the installation site; (2) the **Design Supply** ° – the desired boiler outlet temperature to occur at that coldest day; and (3) the **Design Indoor** ° - this is the temperature value that anchors the reset curve. The **Indoor Setpoint** ° setting is the primary means for the user to “bias” the outdoor reset routine to add or reduce heat.

If Reset Heating is selected and there is no signal received from the Outdoor Sensor, the controller assigns a provisional 32°F/0°C value and will adopt the appropriate temperature target from the relevant reset curve.

Use the **Minimum Supply** ° entry to optimize boiler run times on low mass loads. Finned tube baseboards sink very little heat when operated below 90° F/32°C; application of a “full reset curve” (e.g. 160°F/71°C right down to a 70° F/21°C room target) would cause boiler cycling in light-to-moderate heating conditions. Set baseboard minimums at 90-120°F (32-49°C) and aim for 4 or less cycles/hr. A minimum setting can also be used to enhance home comfort with single or excessive speed air handlers to avoid the cool blast effect. Set to the lowest possible level for combustion efficiency.

1.7.4 Temperature Differential Settings

For all loads, the **Maximum Supply** ° and the on/ off **Supply Diff'I** ° temperature settings should be reviewed to ensure the Maximum takes account of the construction and safety requirements of each application – e.g., 140°F/60°C maximum for typical in-slab radiant floor, for avoidance of thermal stress. The **Supply Diff'I** ° shall be set to offer a reasonable temperature control range (suggested values: 20°F/11°C for high mass radiant // 10°F/6°C for DHW). Ensure that the spread between the target and maximum temperatures is greater than one half of the Supply Differential temperature. For example, for a radiant floor a Design Supply temperature of 125°F and a High Limit or Maximum Supply of 140°F, and a differential (**Supply Diff'I** °) setting of 20°F (half of which is 10°F) fits nicely.

1.7.5 Daily Temperature Overrides

This feature provides the ability to override set point temperatures for each Load for specific programmable time periods for each day of the week. Normally this feature is used to reduce temperatures during night-or-away hours to achieve fuel savings. The feature can also increase temperatures for defined time periods in a day; this may be of use for certain commercial applications where short-term high temperature DHW service is desired.

For Reset Heating loads the **Indoor Setpoint** temperature setting will be overridden for the programmed time periods. For Set Point loads the **Boiler Supply** temperature setting will be overridden and for DHW loads the **DHW Tank Setpoint** will be overridden. The DHW Boiler Supply temperature is also overridden to keep the difference between the Boiler Supply and the **DHW Tank Setpoint** temperature the same when the override is in effect.

The automated override feature will not work for DHW with simple aquastat control where the DHW Tank Setpoint temperature has no effect.

Each load can have two automated programs per day of the week, Prog 1 and Prog 2. Each program includes one override temperature that can be applied during two separate programmable time periods; each period defined by a start and a stop time in 24 hour clock format. If the programmed times overlap then Prog 1 will supersede Prog 2.

The complete Temperature Override programming can be enabled or disabled for each load independently without affecting the temperature and time settings for each day of the week.

Temperature Override settings are accessed via the User Settings screen.

1.7.6 - Unoccupied Mode

Users can reduce energy consumption by switching the boiler to the unoccupied mode during holidays or other away periods.

While in the **Unoccupied** mode, the DHW load is turned off, while a Reset Heating load will have its circulating water temperature lowered by reducing the Indoor Setpoint° to 50°F / 10°C. Set Point controlled loads are not adjusted through this process, to avoid the potential for boiler cycling as there is no linkage with the relevant thermostat.

On the User Settings screen the **Occupied** status is removed and Unoccupied mode enabled by removing the check mark from the **Occupied** check box. For changes to the **Occupied** status to be activated remember to press the **Save** button to exit the User settings screen.

NOTE

If the outdoor sensor is not connected the control assigns 32°C / 0°F as the current outdoor temperature.

1.7.7 Summer Shutdown

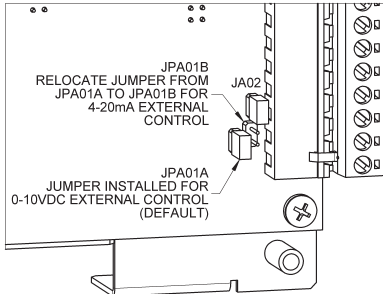
Each space heating load except DHW has a **Summer Shutdown**° setting that is used as a cut-off level for outdoor temperature to curtail any further space heating. This is typically used to turn off Reset Heating loads once the outdoor temperature exceeds a threshold level e.g. 65°F/18°C. The load will be automatically reactivated once the weather returns to levels at/or below the selected threshold. Use of this feature with a value 5°- 10°F/3°-6°C below the **Indoor Setpoint** ° is strongly recommended to avoid short cycling of the boiler during very marginal heating conditions.

The **Summer Shutdown** ° setting is available via the Installer Settings screen by selecting **Edit** for the desired load. It is also available through Express Setup.

The controller must receive a valid signal from the outdoor sensor, supplied with the boiler, for **Summer Shutdown** to operate correctly.

NOTE

Disconnect electrical power to the boiler before removing the circuit board cover.

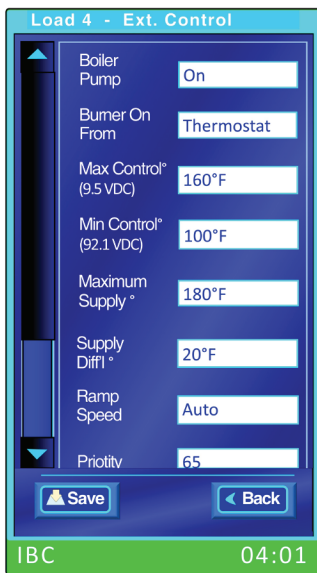


1.7.8 External Control

Installers have the option of placing the control of a load under an external electronic controller (such as a tekmarNET © control). Connections are provided (TB2 Ext. Cont.) to receive a 0-10VDC or 4-20 mA signal for throttle management. The default configuration is 0-10VDC (JPA01A installed); to switch over to 4-20 mA (JPA01B installed), disconnect electrical power to the boiler, remove the electrical box corner cover and the circuit board cover to provide access to jumpers on the lower right corner of the control circuit board; use needle-nose pliers to place the plastic jumper tabs as pictured in the adjacent drawing. Reinstall cover then restore power to the boiler.

When the IBC controller senses a signal on the remote connections, it automatically subordinates its internal throttle logic, and adopts the external signal. The burner on/off, or the call for heat, can be set to the thermostat input or the Ext. Control input. In remote mode, temperature management is also surrendered to the external controller’s sensors. The installer enters maximum boiler supply and on/off differential temperatures; the boiler will respond to these as high limit switches.

From the Installer Settings screen, touch the Entry Button corresponding to the desired load and select Ext. Control, then configure the load with the maximum and differential temperature values. Externally controlled loads work with other loads with the same priority, logic and sequencing.



1.7.9 Alarm Contacts

The controller provides a relay dry contact connection to indicate the boiler’s alarm state externally. This can be used, for example, to connect to an external alarm panel or indicator light. The terminals on TB3 supply the wiring connection. Disconnect electrical power to the boiler, remove the controller front cover to access the TB3 connection. Refer to the diagrams in Section 2 for more details.

The alarm contacts will normally be open indicating no alarm present. The contacts will be closed any time an alarm state is present and boiler operation has been disabled. This corresponds to when the boiler status bar on the display is red. The error that was detected creating the alarm state will be recorded in the Error Log and will be displayed in the boiler status bar.

NOTE

Consult IBC’s latest technical memorandum on multi-boiler operation prior to implementing any multiboiler, multi-load application

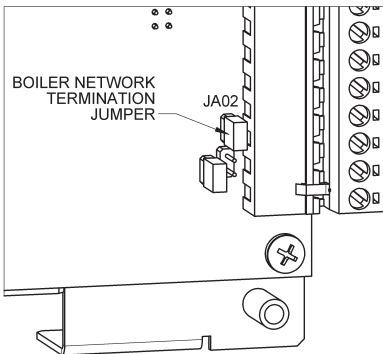
1.7.10 Multi-Boiler Operation

The **Multi-Boiler** capability allows a group of up to 24 IBC boilers to be connected and networked together to operate as a single heating plant. The boilers are networked for communication and control via a proprietary network called BoilerNet.

Boilers can be configured for Multi-Boiler operation using the **Multi-Boiler Settings** screen available by selecting **Multi-Boiler** from the **Installer Settings** menu. Please refer to the latest IBC Technical document on Multiple Boiler Systems for detailed information on how to set the parameters involved for proper Multi-Boiler operation.

⚠ WARNING

Disconnect electrical power to the boiler before removing the circuit board cover.



The BoilerNet Interface utilizes a 2-wire CAN-bus communications interface between the boilers. BoilerNet wiring must be installed in compliance with the published standards, ISO 11898 or SAE J2284. A suitable cable, compliant with the same standards must be used.

The general specifications for this cable are:

- 24 AWG shielded twisted pair
- 9 twists / ft
- Capacitance 12.5pF/ft (cond./cond.)
- Resistance 25.5 ohms/1000 ft

Network wiring tips:

- The “Boiler Net +” and “Boiler Net –“ are polarity sensitive and must not be crossed.
- The Boiler Network wiring must only be installed in a “Daisy Chain” format where the network wiring goes from the first boiler to the second to the third to the fourth and so on.
- When using shielded pair wire ensure the shielding is only grounded at one end of the “Daisy Chain”. If the shielding is grounded in multiple locations (i.e. at each boiler or at the first and last boiler,) the shielding becomes ineffective and in some cases increases the electromagnetic interference affecting the communication signal.

The termination jumper (JA02) needs to be removed from the boiler controller boards that are NOT the first or last boiler of the BoilerNet chain. For example, in a two boiler network JA02 must be left installed in both controllers and in a three boiler network the JA02 must be removed on the middle boiler only.

Please contact IBC if any additional information is required.

1.7.11 Internet Networking

Internet Protocol (IP) networking based features are supported via the standard RJ 45 Ethernet jack on the back of the controller board. Web Browser access for set up, monitoring and control of the boiler and BACnet capabilities are examples of features enabled by connecting the controller to an IP network via the Ethernet jack.

The IP network settings are available via the **Network Settings** selection on the **System Settings** screen (see section 1.5.5.2). On the Network Settings screen the **TCP/IP** group of parameters includes the basic settings required to connect to an IP network. By default **DHCP** is selected. When **DHCP** is activated the other four entries are not required and their entry boxes are disabled. When the particular installation requires that the boiler be assigned a fixed IP address then **Manual** must be selected and the boiler’s **IP Address**, the **Net Mask**, **DNS Server** address and **Gateway** address must be entered manually.

The controller supports standard 100 Base T data rates over typical CAT5 or CAT6 wiring. Connection to wireless networks can be supported using an inexpensive wireless access point device connected to the Ethernet jack. The wireless access point device must be configurable to operate in client mode. Contact IBC for currently available access point device suggestions.

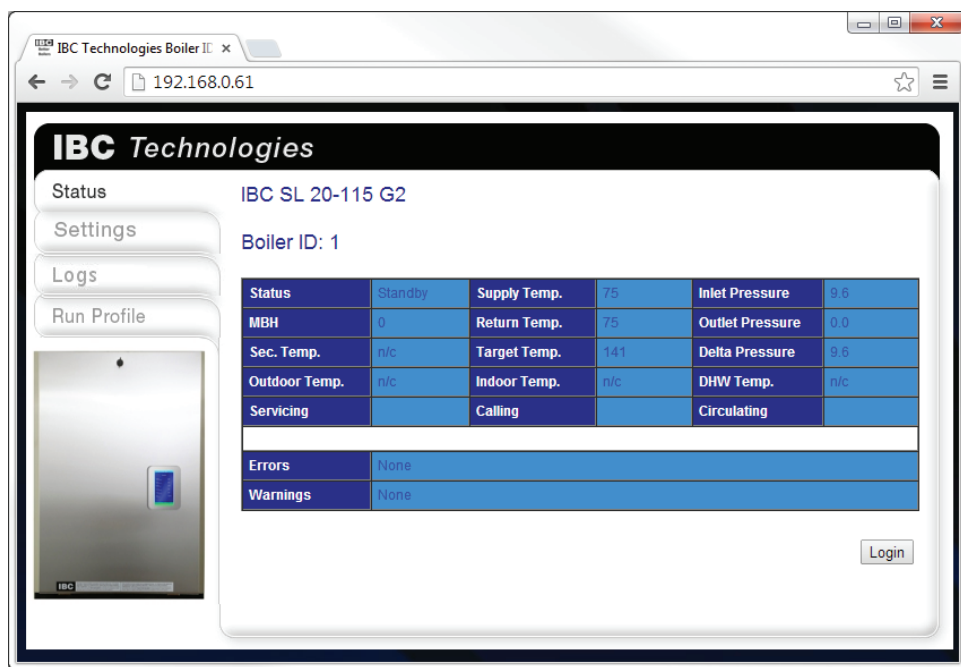


1.7.12 Web Browser Interface

The IBC V-10 controller includes built in web pages to support a complete user interface via a standard web browser. All the settings, status information and control capabilities available on the touch screen are also available via the web browser interface.

The boiler must be properly connected to an IP network for this feature to be used. Access to the boiler web pages is accomplished by entering the boiler's IP address into the web browser's address field. When connecting to the boiler within the local area network the boiler's IP address will be the same as listed on the controller's **Network Information** screen. Remote access via the Internet will typically require that the router, connecting the boiler's local area network to the Internet, have its port forwarding settings configured to forward port 80 to the boiler's local IP address. In this case the remote browser will access the boiler's web pages via the real Internet address of the router.

Please refer to the separate Web Browser Interface manual for complete capabilities and instructions on how to use the web browser interface.

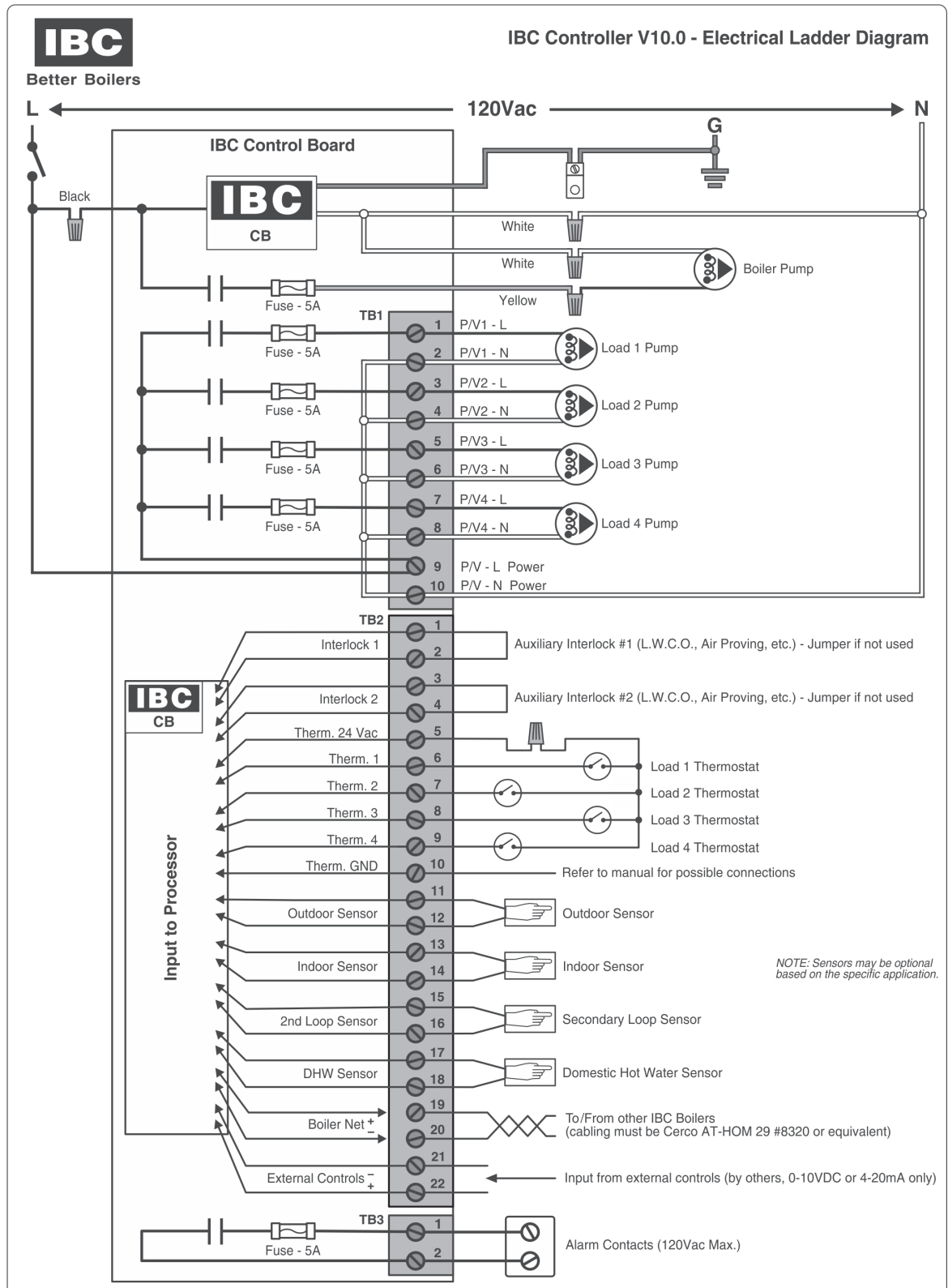


1.7.13 - BACnet Support

The V-10 controller can include complete BACnet/IP functionality including all the features supported by IBC's BIC II module without needing the BIC II device. A separate license must be purchased to enable this capability. The License can be obtained and activated using the capabilities available by selecting Licensing on the System Settings menu screen. Contact IBC Technologies for information on how to obtain the BACnet licenses. Refer to separate BACnet documentation for complete details on BACnet capabilities and how to use them.

2.0 DIAGRAMS

2.1 ELECTRICAL WIRING DIAGRAM



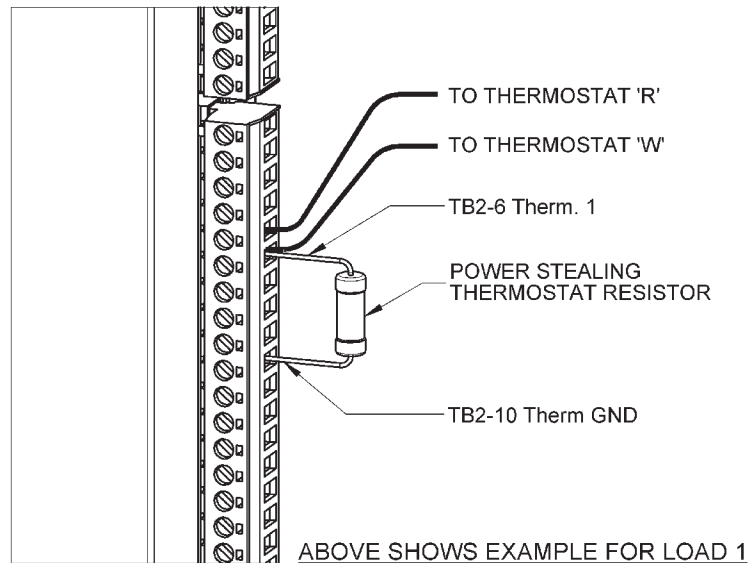
2.1.1 Thermostat Connections

The controller is designed to be compatible with most common thermostats including simple single contact (mercury switch) types as well as most power stealing type thermostats.

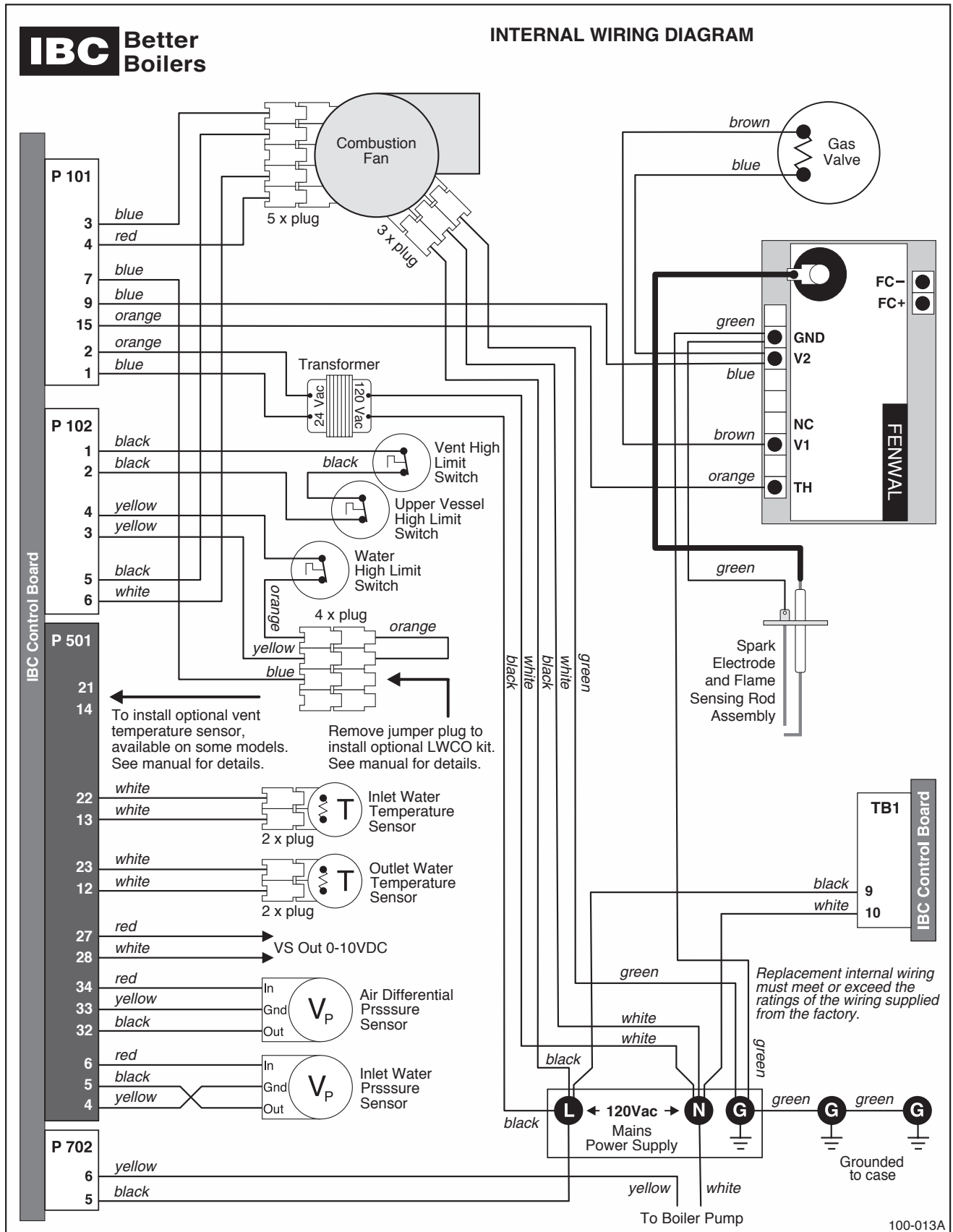
The standard connection for common thermostats that provide a simple contact closer for the boiler is shown in the Electrical Ladder Diagram on the previous page.

The Therm. 24Vac (TB2 terminal 5) provides 24 volts AC to all thermostats (up to four). This will connect to the “R” terminal on the thermostat. Each individual thermostat’s “W” terminal connects separately to one of the controller input terminals Therm. 1 (TB2-6), Therm. 2 (TB2-7), Therm. 3 (TB2-8) or Therm. 4 (TB2-9) depending on the load it is intended to control.

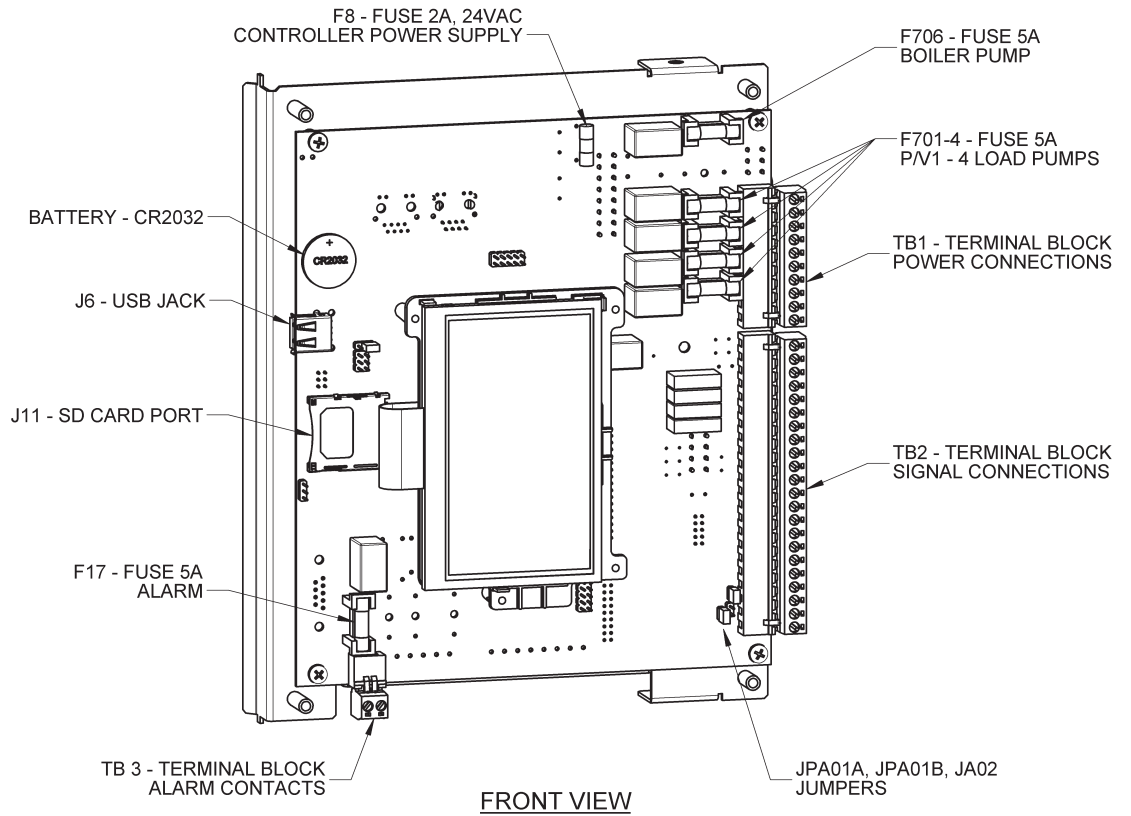
Power stealing thermostats take a small amount of current from the 24 VAC to operate their internal electronics. To complete the 24 VAC circuit required to operate power stealing thermostats the controller includes an internal 2740 ohm resistor from the thermostat input to ground. This internal resistor limits the power available to the thermostat and for some models additional power is required for proper operation. Thermostats that require this extra amount of power (for example the Honeywell T8775) will have a resistor available from the manufacturer capable of supplying the required power. The controller’s Therm GND terminal (TB2-10) is provided to allow simple installation of the power resistor. Connect the resistor from the thermostat’s input terminal to the Therm. GND (TB2-10) terminal.



2.2 INTERNAL WIRING DIAGRAM

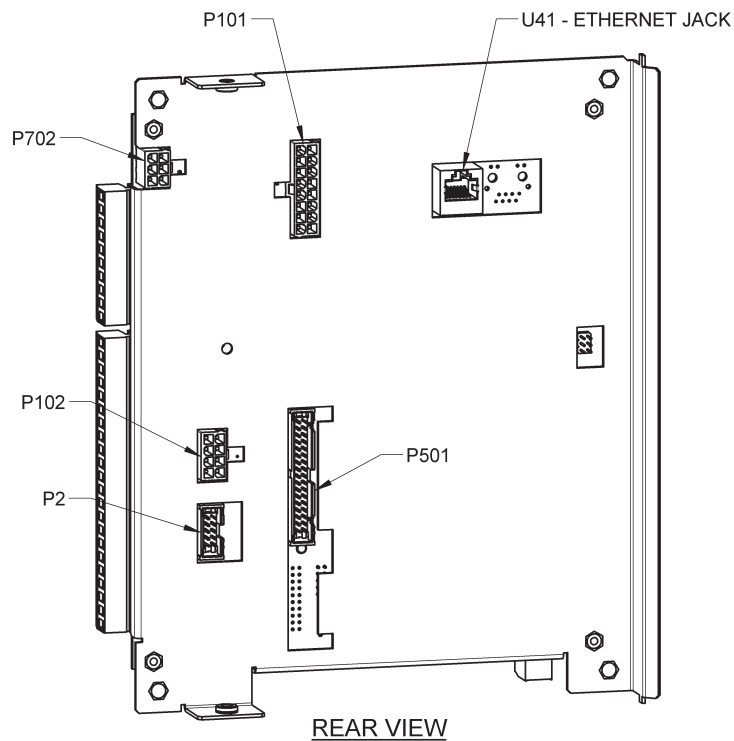


2.3 CONTROLLER BOARD LAYOUT

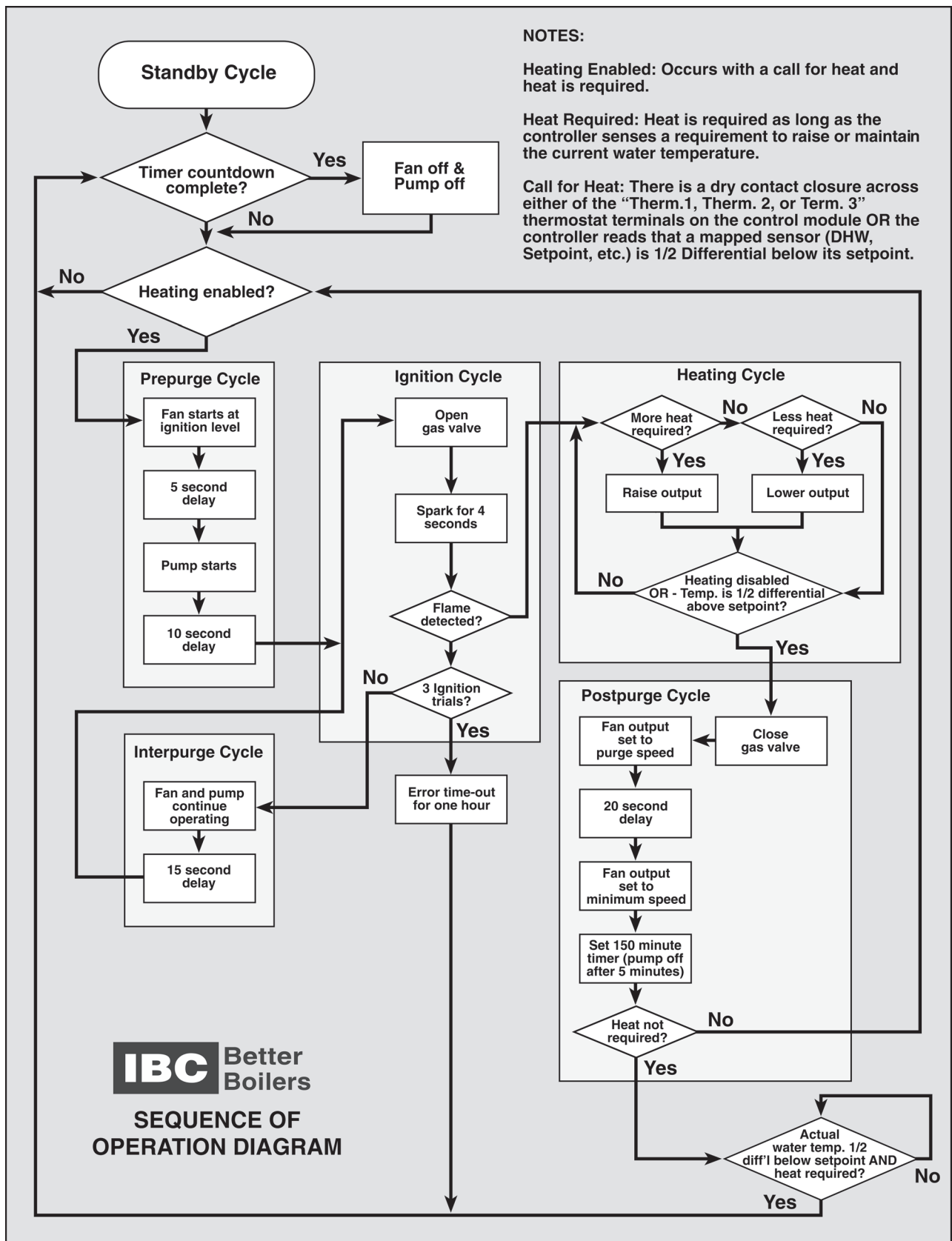


NOTE

See Instruction Sheet # for instructions on installing a V-10 Touch Screen Boiler Controller. Re-Order Part #500-044.



2.4 SEQUENCE OF OPERATION



NOTES:

Heating Enabled: Occurs with a call for heat and heat is required.

Heat Required: Heat is required as long as the controller senses a requirement to raise or maintain the current water temperature.

Call for Heat: There is a dry contact closure across either of the "Therm.1, Therm. 2, or Term. 3" thermostat terminals on the control module OR the controller reads that a mapped sensor (DHW, Setpoint, etc.) is 1/2 Differential below its setpoint.



SEQUENCE OF OPERATION DIAGRAM

REVISION HISTORY

R1 (JULY 2014) Initial release

R2 (JULY 2015) Address update

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