RBI Futera III Series Firmware Revision Sheet

Revision 3.51- 3.52   4-24-2015   Release

1. Removed the running restriction when calling a Base Load boiler from a Member boiler. The Member boiler does not need to be firing in order to call a Base Load boiler. **Provisions on the Base Load boiler should be checked to allow a system pump to run and any dampers to open.**

   Failsafe using the Base Load boiler from the Member is automatic. Whenever the Member fails, the Base Load boiler will be enabled as long as the Member can do so.

   The Master boiler still requires a heat demand input in order to control a Base Load boiler connected to it. Though, the Master boiler does not need to be running. This is to ensure that the system pump and damper will be enabled for the system. The System pump and Damper control are the main reasons to connect the Base Load boiler to the Master.

   Failsafe on the Master boiler will occur if there is a Heat Demand input present, there are no available boilers to fire, and the Master has failed.

2. The Spare 4 interlock (USER) is now used to facilitate a condensate switch.

Revision 3.50   11-12-2014   Release

1. Fixed an issue when using the HeatNet control on a stand-alone boiler. The local pump could remain on after the heating cycle has completed. The local pump will now always shut off when the heating cycle completes.

Revision 3.48-3.49   9-July – 2014   Release

1. The ADVANCED SETUP:MODULAR BOILER SET:ADD BOILER DELAY setting showed 120 seconds instead of 30 seconds. This was a display issue, the 120 seconds displayed is actually 30 seconds. The setting now shows 30 seconds for intervals.

Revision 3.47 2– April – 2014   Pre-Release

2. Limited the SETUP:AUX FUNCTIONS:HEAT EXCHANGER:TEMP < 140F setting to go no lower than 135F.

3. Fixed an issue with saving the MIN OFF TIME. Values larger than 4 minutes were not saved.

Revision 3.46 7 – March – 2014   Pre-Release

1. Added the fault error codes to the upper byte of the BOILER STAGECONTROL bits. This is to allow HeatNet online to properly decode a fault.

2. Increased the maximum ADD BOILER delay time from 15 minutes to 1 hour due to requests.

3. Added the ability for a boiler to take itself offline from HeatNet when the return water temperature is below a threshold. This feature would primarily be used to keep non condensing boilers from firing in a condensing situation. It may be used with the priority 1 & 2 modes to keep only condensing boilers running when return temperatures are low.

If the boiler is isolated by a pump/valve, a HeatNet V3 board can be used as a Master boiler to supply the return temperature. The V3 board has the ability to measure the system return temp and send it to each boiler via the HeatNet network. The version 2 board (this firmware) can then use it to view the system return temperature and make itself, **not available** to fire by HeatNet. While the boiler is in this "not available" state, it can still be fired locally and failsafe is still available.

If the Master boiler is a version 2 board the Master will always transmit its return temperature to all boilers. If the Master is set to Priority 1 and all other non-condensing boilers are set to Priority 2 the Master should always remain on if there is a call for heat. This requires that the Priority 1 boiler be set up to start first and stop last. This method should always send a valid return temperature to the Member boilers. This method can also be used with a version 3 board, but a system return sensor is preferred if available.

When this condition is in effect, the STATUS screen will indicate "blr offline".

SETUP:AUX FUNCTIONS:HEAT EXCHANGER:LOW TEMP:

OFF	No check is made to the return temperature – boiler remains online
RETURN	Uses the boilers own return sensor (No pump /valve present)
SYS RETURN	Uses the System Return temp received from the Master Boiler.

SETUP:AUX FUNCTIONS:HEAT EXCHANGER:TEMP < 140F

Adjustable threshold temperature below which the boiler will take itself offline.
1 degree F of hysteresis is provided so as to not toggle offline-online at threshold temp.

Revision 3.45 20 – August – 2013   Pre-Release

1. Fixed an issue with taking the Member boiler offline. If a Member boiler is running in Lowfire or being directly Modulated using a 4-20mA or 0-10V signal, the Master would still see the boiler as available to fire. This has been corrected.

Revision 3.44 29 – July – 2013   Pre-Release

1. The previous version had an issue when the extended post purge of the blower would not keep combustion damper open long enough. The **Combustion Air Damper** now closes immediately after the extended post purge ends.

Revision 3.42 24 – June – 2013   Release

1. Minimized a Calibration display error when switching to running mode from calibration mode. Also fixed a display error when switching from Heat Demand to Low Fire. The Low Fire value will now be displayed.

2. Reduced code size to allow for PVC, and Spanish/Russian version builds.

Revision 3.41 6 – November – 2012   Release

1. The previous version introduced a timing issue that caused USB drive firmware updates to fail on some boards. In order to update the firmware, it is necessary to use a USB cable and the HeatNet Firmware Update PC software. This issue is fixed with this release.

Revision 3.401 24 – January – 2012   Release

1. When using a single boiler with a base load boiler the Linked/Common damper did not operate properly. This issue is fixed with this release.

2. When using a base load boiler and there is no Member or Master boiler available to fire, the Modulation % setting to start the base load boiler will not work. This is due to the Modulation value going to 0 when all boilers are in a failed condition. With this release, the Master's base load boiler will automatically fire if the Master boiler sees this condition. This new feature will not work if a stand-alone/ Member boiler (no header sensor) is used with a base load boiler.

3. During a UV sensor 24 Hour shutdown test, the Fail bit would be temporarily set in the Modbus status register. This has been corrected with this release.

Revision 3.39 18 – AUGUST – 2011   Release

1. Extended the adjustment range of MIN RUNTIME to 750 hours (31 days) in ADVANCED SETUP:FIRING MODE:MIN RUNTIME. The old setting was limited to 10 days when TRUE ROTATION MODE is used.

2. Added the 0-10Vdc control signal output J4.3 (signal) and J4.7 (ground). This signal is output by the Master boiler as a percent function of the number of boilers running and can be used to set the speed of a System Pump using a Variable Frequency Drive. Two wires are required and need to be inserted into the J4.3 and J4.7 positions to access this signal.

   Note: This signal has a step response and is not linear to the system or boiler's input firing rate.

   The output signal is proportionally mapped to % using the equation:
   $$\%VFD = (boilers\ running/total\ boilers)$$

   The %VFD represents the stepped percentage of boilers running where:
   $$0Vdc = 0\%\ \ to\ 10Vdc = 100\%$$

   If there are (6) boilers in a system and (2) are running, the control signal = 33% or 3.3Vdc. This signal could then be applied to a system pump's VFD to control the speed of the pump relative to how many boilers are firing. The VFD would need to be set appropriately to allow the correct flow through each boiler.

   In low volume systems sudden temperature changes may occur when the flow is stepped up or down by a large percentage. In these situations the ADAPTIVE MOD may need to be disabled and the ORIGINAL KN method used. Other adjustments may also be required (see manual).

   Currently, no failsafe mode is available in the event the Master boiler's control fails. If this method is employed, a failsafe boiler could be used to override the control signal and enable the system pump's VFD using some external wiring.

Revision 3.38 10 - JUNE– 2010 Release

1. Allow Spanish language build.

2. Changed the minimum temperature setting from 150F to 190F on the SETUP:OUTDOOR AIR RESET:SET OA SETPOINTS:WATER TEMP at HIGH OA TEMP. This change was done to allow greater range.

3. Added the ability to change the DHW water setpoint along with viewing other variables via Modbus, BACnet, and LonWorks.

    1) Added Read/Write DHW Setpoint. The DHW setpoint is located address 40018.
    2) Updated description of Setpoint Timer (a write to any read/write variable now reloads).
    3) Updated description of System Modulation
    4) Added Boiler## Status4 Flags
    5) Added Boiler## DHW Temperatures
    6) Added Boiler## Modulations
    7) Added Operating Setpoint

    See online Modbus register documentation.

4. Added a Modulation Maximum hold off when using the AA terminal for High Fire and when using the 4-20 mA input for direct modulation. When these demands for heat are used, the maximum modulation the boiler can obtain when first starting is equal to the; ADVANCED SETUP: MODULAR BOILER SET: MOD MAX – LAST FIRE:. The timer value ADVANCED SETUP: MODULAR BOILER SET:ADD BOILER DELAY is used in conjunction to limit the modulation for this amount of time. Once the boiler has fired and the ADD BOILER DELAY time expires, the full modulation is available. This change is a protective means for extending the life of the heat exchanger which may consistently be exposed to thermal stress.

Revision 3.37 P 19 - Nov– 2010 Release

1. This firmware version is only available for Fusion boilers, and allows the use of an approved PVC vent pipe. It requires a flue temperature sensor and high limit mounted to a vent pipe adaptor which is available from the factory. The flue temperature sensor must be wired to J10B, pins 3 and 4 marked "Spare 2". The boiler will not operate if the flue temperature sensor is not connected.

    The control monitors the flue temperature and attempts to keep it below an operating limit by reducing the boiler's input. The control will limit the boiler's input starting at a flue temperature of 179°F. If the flue temperature continues to rise, the input will be further reduced to a maximum of the MIN FIRE until the control limit of 184°F is reached and the boiler shuts down. Once the flue temperature falls below 174°F the boiler will recycle. If the high limit of 195°F (+0, -5%) is reached the boiler will shut down and a manual reset will be required.

Revision 3.37 9 - Jun– 2010   Release

1. An issue exists when using a Flash Drive to update the firmware. Due to an end of life component in positions U20 and U2, a substitute was used. This firmware version applies to version 2.x control boards manufactured between 3/8/10 to 6/7/10. If the U20 component is

    manufactured by Microchip (part number and symbol on chip: 25LC256,   ), this firmware release needs to be downloaded via USB cable and a PC/laptop. The Flash Drive

loader may not work with earlier firmware versions if this chip is present. This release corrects this issue.

Revision 3.36 29 - Mar– 2010   Release

1. Corrected an issue when writing the setpoint using Modbus, LonWorks, or BACnet. If the setpoint is written repeatably within a few minutes, a condition may arise where the real time clock will not increment the time. This has been corrected with this release.

Revision 3.35 19 - MAR – 2010   Release

1. Added the ability to control a local pump using a Variable Frequency Drive. To enable this feature: SETUP:PUMP OPTIONS:LOCAL PUMP PUMP/VALVE OPTION:LOCAL PUMP VFD: ON. Setting this Option to ON will map the control signal on J4 pins 1+ and 5- to the modulation rate. (2) wires need to be run from J4.1+ and J4.5- to the VFD's input connection. Ensure that the J18 shunt jumper on the control board is in position PWM/0-10. This will allow the local pump to run at speeds relative to the firing rate of the boiler

2. Added a failsafe mechanism for Base Loading using the J4 relay. If there are no boilers available to fire and there are no boilers in local override, and there is a call for heat, The J4 Base Load relay will close. If a boiler becomes available and needs to fire, the Base Load boiler will remain firing until the temperature exceeds the band.

3. Added the 'E' suffix after the file name to indicate that the version is English menus. The 'R' version will indicate Russian.

Revision 3.34 25 - JAN – 2010   Release

1. Corrected a display issue caused in Version 3.43 when there is no call for heat and the System Flow switch is open. The message "HEAT:OPL*" would be displayed. This has been corrected to display "STANDBY". Also: When a delayed open interlock was in process of timing out "HEAT:OPL" was displayed until the delay expired. This was corrected to display "HEAT:INTLK" until the interlock fault delay time completed.

2. Corrected a display issue during Warm Weather shutdown. "HEAT:OPL" would be displayed if the operating limit was tripped and Warm Weather Shutdown was entered. The "HEAT:OPLM" would be displayed until WWS exited. This has been corrected.

3. A condition exists where the Heat Net control will close the last interlock to start the ignition control and the START interlock relay K3 or K1's contact would stick open. While this is rare, the boiler will lock out and require a manual power cycle. This failure mechanism would be displayed as "HEAT:WAIT" forever or until power cycled.

    In order to minimize this impact and downtime, a retry algorithm of (5) attempts has been added. If this condition occurs, an '*' will be displayed and the status screen will display "retry strt" indicating it has attempted a restart to "un-stick by electrically tapping" on the K3 and K1 relays. During this restart period, the restart timer is loaded with the local pump post purge time + 3 seconds. This is to ensure the water flow through the boiler has ceased and the flow switch is open, thus removing the power to the K3 interlock relay. If this does not work, the control will attempt up to (4) more retries before locking out. This method to electrically tap the K3 relay may not work completely in systems without local valves/pumps since a way of opening the interlock circuit needs to occur. The K1 relay will always get "tapped".

If this condition occurs on Member boilers the Run Screen will display STANDBY * and the Status Screen will display "rtry start" each time the retry occurs and will lockout with the "**CALL SERVICE**" message displayed.

A log entry of "START FAILED, RETRY " will also be entered for each attempt.

4. Identified an issue where the Outdoor Air sensor and other sensors failed as OPEN or SHORTED when they were not present (**version 1** control boards, BLUE). Fast AC line power cycling/brownout resets may cause the control to erroneously detect a phantom chip on a **version 1** board that is only present on version 2 boards. Detection of **version 1** and version 2 boards has been adjusted to account for this condition. This issue does not exist on version 2 boards.

5. Corrected a **display issue** while in the Run Screen with DELTA TEMP. Base temperature calculations are always performed in degrees F and then converted to degrees C. If the temperature scale is set to C, the difference F temperature was being converted to C. Now the DELTA TEMP is calculated as the difference temperature in degrees C rounded to the nearest degree.

This display issue was also present in the HEAT EXCHANGER:EXCHGR DELTA menu and the fault message when the delta T was exceeded.

6.   Fixed a display issue when erasing the temperature pointer in the main screen.

7. Added the MIN RUNTIME to the ADVANCED SETUP:FIRING MODE. This setting replaces the USE LEAD BOILER menu item. Prior to this change, when using TRUE Runtime or MIXED fire rotation, the boilers were rotated based on how many seconds elapsed between boilers (typically a 3 minute difference). This was determined to cause boilers to rotate too quickly. This change will allow a boiler to rotate only once it has exceeded the time in hours set in MIN RUNTIME. This change allows a boiler that has already fired and warmed up to fire again when it's minimum runtime has not been met. Some limitations may be in effect and the most optimal boiler to fire next with the least runtime may not occur.

The "USE LEAD BOILER" menu is replaced by setting the SETUP:BOILERS:LEAD BOILER to a 0 (equivalent to NO) and will disable the use of the LEAD BOILER. Setting it to a boiler number will enable that Lead Boiler. If the heating application uses the Lead boiler, the lead boiler may need to be set, since the default value after loading this revision is SETUP:BOILERS:LEAD BOILER 0.

Revision 3.33 16 - JAN – 2010   Release

This revision brings (2) major features to the Heat Net control.

A. The first feature uses Heat Net to allow mixing of *CONDENSING, NON-CONDENSING, BASE LOAD,* or other combination of (2) functional boiler types. This feature provides conditional firing based on a "priority set" of boilers utilizing (2) priority levels.

B. The second feature allows *BASE LOADING* of boilers without Heat Net. This feature provides the ability to control (1) base load boiler using an OPTION relay (version 2.x controls only). It can also be used with 'A' above for more control configurations.

The Heat Net method of *BASE LOADING* also provides for TRUE RUNTIME rotation, fault detection/reporting, conditional firing of multiple non-condensing boilers with multiple condensing boilers, and modulating of non-condensing base load boilers.

1. The first feature: A MIXED boiler priority method may be used to control condensing and non-condensing, base load, or other boiler **sets** in a system for optimal performance and economy. A boiler set can be constructed by simply setting the FIRING PRIORITY on each boiler (to be in the set) at the same priority. Setting all (example)condensing boilers to the highest priority of 1, and then setting all (example)non-condensing boilers to a priority of 2, will create (2) sets of boilers, one condensing and the other non-condensing. Once this is done, the set of condensing boilers will have a firing order that has a higher priority and is independent of the other non-condensing set with the lower priority. The boiler set with the highest priority can then be fired based on the conditional settings menu. The lower priority set will follow.
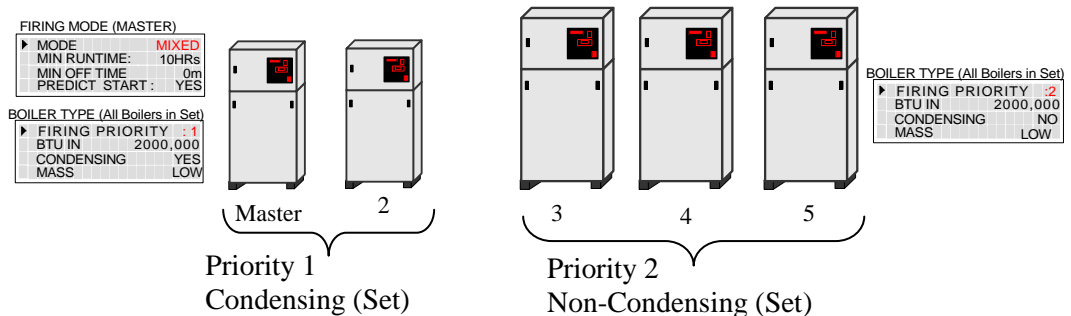
A boiler's firing priority can be designated as such in: "ADVANCED SETUP:SYSTEM:BOILER TYPE:FIRING PRIORITY : 1" menu on each boiler. A priority of '1' is the highest priority, a '2' the lowest (default is always 2).

In the above example condensing boilers and non-condensing boilers are used, but other combinations may also be used. Another example could use (2) small boilers and set them to Priority 1 and then use (3) large boilers and set them to Priority 2. Using these priority settings (with the conditions menu), the small boilers can run first during the shoulder months and the larger boilers can fire last during the colder season (base loading set).

Before the MIXED method can be used, the firing mode on the Master boiler must be set to MIXED. ADVANCED SETUP:FIRING MODE: MODE: MIXED. Pressing the SELECT key when the cursor is pointing to MIXED will enter the conditions menu. The Start and Stop conditions for starting and stopping priority boiler sets may be configured here. Temperatures are adjustable.

Once the conditions menu has been entered, the firing order and stop order of the priority 1 boiler set can be selected based on up to (3) conditions each in the conditional settings menu. All conditional settings apply to the priority 1 boiler set. When the conditional settings do not apply to the priority 1 set, the conditional settings will apply to the priority 2 boiler set. **The following is an example using mixed condensing and non condensing boilers:**

Condensing boilers may be configured to **fire first** (set to PRIORITY 1) when:

A. The Return water temperature is below 130F and condensing occurs.
B. The Outside Air Temperature is above a setpoint determined by the system configuration. This setpoint ensures that the more efficient condensing boilers run during shoulder months (Spring and Fall) when minimal heating is required. Below this setpoint, larger boilers should be brought on first to "base load" the system.
C. Greater efficiency is required.

Condensing boilers may be configured to **stop first** (set to PRIORITY 1) when:

A. The Return water temperature is above 130F and condensing is minimized, thus leaving the larger lower cost boilers running to carry the load.
B. The Outside Air Temperature is below a setpoint determined by the system configuration. This setpoint ensures that the larger non-condensing boilers run during the coldest months when maximum heating is required. Above this setpoint smaller condensing boilers should be brought on first to run the system as efficiently as possible.
C. Maximum heating is required

```
 START  PRIORITY 1
▸SET  :  FIRST
 STOP   PRIORITY 1
 SET  :  OA  T  <      15°F
```
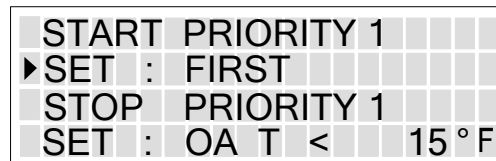
START PRIORITY 1 SET: Selections (always the lowest runtime first):

FIRST: The condensing boilers (Priority 1) are always started FIRST
OA T > 15F: The condensing boilers (Priority 1) are started when the OA temperature is greater than the Mixed Boiler Outdoor Air Temperature setting.
RET < 140F: The condensing boilers (Priority 1) are started when the Return water temperature is less than the Mixed Boiler Return temperature setting.

                Note: The *condensing boiler set* (Priority 1) has a higher priority to *fire* when one of these conditions is met.

STOP PRIORITY 1 SET: Selections (always the highest runtime first):

LAST: The condensing boilers (Priority 1) are always stopped LAST.
OA T < 15F: The condensing boilers (Priority 1) are stopped first when the OA temperature is less than Mixed Boiler Outdoor Air Temperature.
RET > 140F: The condensing boilers (Priority 1) are stopped first when the Return water temperature is greater than the Mixed Boiler Return temperature.

                Note: The *condensing boiler set* (Priority 1) has a higher priority to *stop* when one of these conditions are met.

Any combination of Start Conditions and Stop Conditions can be used to optimize the mixing of condensing (Priority 1) and non-condensing boilers (Priority 2) for best performance/economy.

The default settings for the start and stop conditions of the condensing set are:

```
 START  PRIORITY 1
▸SET  :  FIRST
 STOP   PRIORITY 1
 SET  :  LAST
```

The default start setting always starts the condensing boilers (Priority 1 example) first, except for the lead boiler setting. The lead boiler will always start first if enabled, unless there is a boiler already running (this includes a Member boiler in LOCAL). The default stop condition setting always stops the condensing boilers (Priority 1) last.

Base load boilers can be mixed in the same way as condensing and non-condensing boilers. The base load boiler(s) can be prioritized in one set (say, priority 2) and non-base load boilers (priority 1) the other set. The non-base load boilers can then be set to fire first and once they are all firing, the base load boiler would fire.

To minimize the cycling of a large base load boiler, consider using the **stop** condition. Change it to the OA T < 15F (Outside Air Temperature) condition. This setting may be used to stop the priority 1 boiler set when the OA T drops below the OA T setpoint, thus leaving the large base loaded boiler on and shutting off the condensing boilers first. This is also true when using the OA T setting to start the priority 1 boiler set when the OA T is above the start setpoint. To use temperatures as start and stop conditions the system design temperatures must be known.

Starting Boilers:
When a boiler is to be fired (water temp is below the heating band), the Master checks the Heat Net boilers it has available. The Master boiler then looks at which boilers are returning priority firing status (set on a boiler in: (ADVANCED SETUP:SYSTEM:BOILER TYPE:PRIORITY : *1*). If the Start condition is met (ADVANCED SETUP:FIRING MODE: MODE: MIXED:SET *FIRS T*(*example*), the Master or Member boiler that is configured as PRIORITY 1, with the lowest runtime, will be fired *FIRST*(*example*).. As long as the start condition is met, all PRIORITY 1 set of boilers will fire based on runtime. Once all PRIORITY 1 set of boilers have fired, the PRIORITY 2 set of boilers will fire based on runtime. If the Start condition changes and/or is not met (such as with: OA T or RET temp), the PRIORITY 2 set of boilers will fire first/next based on runtime.
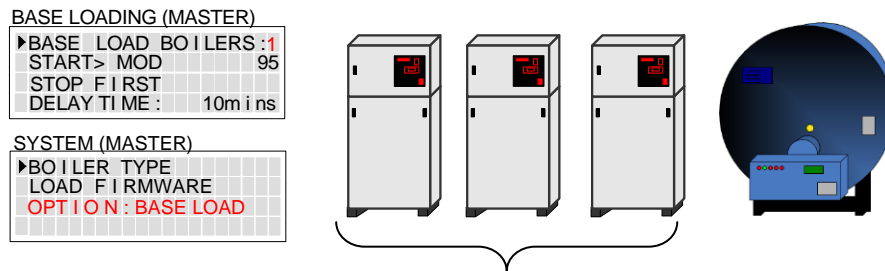
Stopping Boilers:
When a boiler is to be stopped (water temp is above the heating band), the Master checks the Heat Net boilers it has available. The Master boiler then looks at which boilers are returning priority firing status (set on a boiler in: (ADVANCED SETUP:FIRING MODE: MODE: MIXED:SET *LAST*(*example*) If the Stop condition is met, the Master or Member boiler that is configured as PRIORITY 1 with the highest runtime will be stopped *LAST* (*example*). As long as the stop condition is met, all remaining PRIORITY 1 set of boilers will stop based on runtime. If the Stop condition changes and/or is not met (such as with: OA T or RET temp), the PRIORITY 2 set of boilers will stop first/next based on their highest runtime.

2. Added the ability to control (1) base load boiler using the K8 Relay contacts on J4 pins 2 & 6. In order to connect to this plug, (2) wires with pins are required and inserted in J4. This ability

requires these (2) flying leads (loose wires available from the factory) to be inserted into J4, pins 2 & 6. These (2) wires then make up the Normally Open contacts. . This feature also requires a rev 2.x control board and can be used on Master or Member boilers. It is not applicable in version 1.x control boards (no relay). The relay K8, with contact connections on J4.2 & J4.6 has a rating of**: 0.1 to 1 Amp**.

If the base load boiler is of the modulating type, a 4-20mA signal is also provided on J4 pins 1 and 5. J18 will then need to be set to 4-20mA. Two additional wires (available from the factory) will need to be added to the J4 pins at 1 & 5. Pin 1 is the + output of the 4-20mA transmitter, and pin 5 is the – output. This modulating control signal is used to modulate the base load boiler along with the Heat Net boilers in parallel. The ADAPTIVE MOD does not function when the base load boiler is added to lower the modulation rate of all boilers. The PID will adapt to the newly fired base load boiler and lower its modulation rate with the increase in water temperature.

```
BASE LOADING (MASTER)
▶BASE  LOAD  BOILERS :1
 START>  MOD              95
 STOP  FIRST
 DELAY TIME :      10mins

SYSTEM (MASTER)
▶BOILER  TYPE
 LOAD  FIRMWARE
 OPTION : BASE LOAD
```

Enable the base load feature by setting:

2. ADVANCED SETUP:SYSTEM:OPTION to BASE LOAD. This setting instructs the OPTION Relay to be used as control for a Base Load Boiler.
3. The ADVANCED SETUP:BASE LOAD BOILERS: BASE LOAD BOILERS: to 1. Currently allows (1) base load boiler.
4. The START & STOP qualifier condition to the method discussed below.
5. The DELAY TIME to the amount of time required after the start qualifier condition has been met to start the boiler.

If a MINIMUM OFF time of the Base Load boiler is needed, the Base Load boiler will share the MIN OFF TIME of this boiler. If the base load boiler was running and shuts off, the MIN OFF TIME will need to expire before the boiler can start again. Once this time expires, the DELAY TIME also needs to expire to start the boiler. This will help in minimizing short cycle conditions and can be set at: ADVANCED SETUP:FIRING MODE: MODE:MIN OFF TIME.

Preferred:
A modulating base load boiler that can accept a 4-20mA control signal is preferred. A 135 ohm input for the base load boiler will need a converter from 4-20mA to 135 ohm.

Stopping the Base Load boiler will require that the size of the Base Load boiler (ex:Hi/Lo) in BTUs is known relative to the Heat Net boilers if the base load boiler is not of the modulating type. Boiler selection is ideally; having more total BTUs in the Heat Net boilers than total BTUs of the Base Load boiler. This will prevent short cycling. Example: (4) 2 million BTU Heat Net boilers = 8 million BTUs and (1) 6 million BTU Base Load boiler. When all (4) Heat Net boilers are running @ 99%, the Base Load boiler is called on (demand is approx. 8

million BTUs). As the Base load boiler comes on it introduces 6 million BTUs and the Heat Net boilers modulate down to 25% for a total output of 2 million BTUs and running at high efficiency. The Heat Net boilers can now trim additionally to the load from 1.6 million BTUs (20% mod) to another 8 million BTUs.

Not Preferred:

Example of having a larger Base Load boiler that is not of the modulating type: If there is a 6 Million BTU Base Load boiler running with (3) 2 million BTU Heat Net boilers, a short cycling situation will arise when the (3) 2 million BTU boilers are running @ 99% and the Base Load boiler is called on. At this point there is a need for approximately 6 million BTUs. The (3) smaller boilers will then modulate down to low fire. At this point, the (3) smaller boilers need to shut off or the Base load boiler needs to shut off. There is no overlap. A selection for stopping the boiler now needs to be determined. Setting the Stop qualifier; Modulation to 40% or a low fire rate will shut the Base Load boiler off and allow the (3) smaller boilers to modulate up again (short cycle of the Base Load boiler; Use the Delay Timer and Min OFF timer). Or, the Stop qualifier; OA T > xxF may also be used if the system design temperature is known, and then let the Base Load boiler cycle off its limits, whether a 2 stage, Hi/Lo, or modulating boiler. The default setting is for the Base Load boiler to stop first once the water temperature exceeds the top of the heating band.

The base load boiler is controlled using a set of contacts to enable it (location J4). Enabling/Disabling this relay contact can be done using any combination of (3) qualifiers to start the boiler and (4) to stop the boiler. These qualifiers are:

A.   Modulation %:
   1.   START menu item: The relay contact will close when the MOD % from the Master boiler exceeds this value. ADVANCE SETUP:BASE LOADING: START>MOD
   2.   STOP menu item: The relay contact will open when the MOD % from the Master boiler falls below this value. ADVANCE SETUP:BASE LOADING: STOP<MOD

   NOTE: If the MOD value is set to a value higher than the ADVANCED SETUP:MOD-MAX - LAST FIRE: STOP MOD MAX % **all boilers** will be firing before this modulation rate is reached.
    Setting the Modulation % to a start value greater than STOP MOD MAX % will ensure that all available boilers are firing before the base load boiler relay is enabled.

   Setting the Modulation % to a stop value slightly above the min fire rate % of the system will ensure that the base load boiler will stop before the first condensing boiler stops. This is due to the Modulation rate being close to the min modulation rate before the water temperature exceeds the top of the heating band.

B.   Outside Air Temperature:
   1.   START menu item: The relay contact will close when the OA T read from the Outside Air Temperature sensor (if Equipped) falls below this temperature. ADVANCE SETUP:BASE LOADING: START< OA T
   2.   STOP menu item: The relay contact will open when the OA T read from the Outside Air Temperature sensor (if equipped) rises above this value. ADVANCE SETUP:BASE LOADING: STOP> OA T

> **NOTE:** If the OA T qualifier is used as the Start and Stop qualifier, ensure that there is at least a few degrees difference for hysteresis.

C. Return Water Temperature:
  1. START menu item: The relay contact will close when the RET read from the Return Water Temperature sensor (if Equipped) falls below this temperature. ADVANCE SETUP:BASE LOADING: START> RET
  2. STOP menu item: The relay contact will open when the RET temperature read from the Return Water Temperature sensor (if Equipped) rises above this temperature. ADVANCE SETUP:BASE LOADING: STOP< RET

D. FIRST:
  1. STOP menu item: The relay contact will open when the temperature exceeds the heating band. This gives the result of stopping the Base Load boiler First. Default setting

The DELAY TIME is also included to hold off starting the boiler until this delay time is met. Once the start condition qualifier term is met, the DELAY TIME will start counting down. When the time expires, the base load relay contacts will close. ADVANCE SETUP:BASE LOADING:DELAY TIME. It is adjustable in a range of: 0 to 60 minutes.

8. An issue exists with displaying an operating limit condition on a Member boiler when the Member boiler is in STANDBY. A tripped operator on a Member will report back to the Master boiler that it cannot fire and display the HEAT:OPL on the Member. This will cause the Master to remove the Call-For-Heat to this boiler. The Member boiler will then display STANDBY with no indication of the tripped operator since the Master removed the Call-For-Heat to this boiler. With this release a tripped operator will be displayed as HEAT:OPL* instead of STANDBY if the Hardware Operating Limit interlock opens and STANDBY * if the Software Operating Limit trips. The STATUS SCREEN will interpret the '*' and display the condition there.

Revision 3.32D 11 - NOV – 2009   Pre-Release for review

1. Fixed an issue with the adaptive modulation mode when a newly started member boiler does not respond in *mixed* boiler systems; ADAPTIVE MOD:DROP DOWN:ONCALL selected. This condition could hold the modulation percentage at the drop down percentage when the newly started member boiler was the last boiler and **did not respond** with a **running** *or* **fault** condition. A timeout period of the ADD BOILER DELAY time is used to release the drop down fixed modulation percent and allow normal modulation if this situation occurs. The boiler that did not respond has an operational issue and should be corrected, but will not be as apparent now.

Ensure that the ADD BOILER DELAY TIME is at least long enough to allow a boiler to start and allow modulation. This is typically greater than (1) minute. The release of the drop down modulation % is contingent on the newly fired boiler returning its running status. The running status will be sent once the newly fired boiler completes it's main flame proving period.

2. Added a non volatile flag for enabling/disabling the SETPOINT TIMER. The prior versions only allowed the timer to be disabled when the power was applied to the boiler or did not allow disabling of the timer. The prior version would allow disabling the timer though, once the boiler was power cycled, the SETPOINT TIMER would be re-enabled.

This version allows permanently setting the SETPOINT TIMER to OFF and would be used when MODBUS/BACnet/LonWorks communications are implemented.

The feature is located in: ADVANCED SETUP:COMMUNICATIONS:SETPOINT TIMER. If this value is set to OFF, the setpoint timer will be disabled and any changes to the setpoint value through the Modbus communications port will be semi-permanent. When this value set to OFF, the Setpoint Timer will not need to be written when the setpoint register is written. If power to the boiler is lost, the setpoint will still revert back to the Local/System setpoint.

3. In the ADVANCED SETUP:COMMUNICATIONS menu, the PARITY name was changed to DATA FORMAT with the selections of:

    A.   8N1   8 bits, No Parity, 1 Stop bit
    B.   8N2   8 bits, No Parity, 2 Stop bits
    C.   8O1   8 bits, Odd Parity, 1 Stop bit
    D.   8E1   8 bits, Even Parity, 1 Stop bit

4.   Corrected a minor display issue in the BLRS FIRING screen. When the Master boiler is firing, it displays an 'M' indicating this. Prior to this release, if the Master boiler faults, it would display a 'M' and blink a '1'. This has been corrected to always display the 'M' and blink.

5.   Time qualified the User, Gas Pressure, VFD, Low Water Cutoff, Ignition Control, High Limit, and Gas Valve Interlock/Alarm(s) for (2) seconds before they are reported. This change was incorporated to minimize falsely reported fault conditions due to electrical noise, either radiated or carried on the AC Line. When an interlock has been seen by the control inputs as tripped, HEATING:INTLK will displayed until the interlock is qualified as tripped.

6.   Narrowed the threshold for auto detection of the temperature sensors. During an AC LINE brownout/power cycle condition, a residual voltage may remain on the open ended inputs where the sensors are attached. This may cause the Heat Net Control to detect a sensor when no sensor at that position was connected. A sensor which is not connected would then report a fault. To work around this condition, a jumper wire would be connected across the sensor input that does not have a sensor attached. Narrowing the threshold range for auto detection will help minimize this condition when a jumper has not been installed.

Revision 3.32C   21 – OCT – 2009 Pre-Release

1. Corrected a bug when using the FIRING MODE:MIN OFF time and with the PUMP OPTIONS:PUMP/VALVE OPTION set to ON. The Member Boiler reported to the Master that the Member was in Local Override mode rather than Unavailable when the MIN OFF timer was active. The result of this was that the local pump/valve would shut off on the Master even though no valve was open on a Member.

This has been corrected with this release.

Revision 3.32B   8 – OCT – 2009 Pre-Release

1. A condition exists using Failsafe Mode and local valves. This condition may cause deadheading. The conditions:

    A.   The SETUP:PUMP/VALVE OPTION is used and REMAINS ON: is set to ON.
    B.   A Member boiler is set to Failsafe mode (H-NET COMM LOST:ON).

    C.   Master boiler is shut down or it's control fails.

When the Master boiler fails/shuts off, it will take 10 minutes for the Member boiler that is operating in Failsafe Mode to enable it's local valve. At this time no flow will take place through the member boiler as the Master boiler's valve closes. Deadheading will occur without a bypass valve.

With this revision, when this condition occurs, the Member boiler that is operating in Failsafe mode (H-NET COMM LOST:ON) will open the local valve after 30 seconds in anticipation of entering Failsafe mode. It will remain open until the boiler is ready to fire in Failsafe Mode (10 minutes). A normal post purge time on the pump will remain in effect.

2.   The pre-release version 3.41 did not allow setting of the clock through the menu system . This issue was caused by a code efficiency change. The ability to write to the clock has been corrected with this release.

Revision 3.32A   7 – OCT – 2009 Pre-Release

1.   Include build support for Russian text.

2.   Added the MIN OFF TIME in menu ADVANCED SETUP:FIRE BOILERS:MIN OFF TIME. The minimum off time is used to prevent short cycling of the boiler when a call-for-heat is made and then removed within a short period of time. Its purpose is to provide a minimum time the boiler remains OFF after a heating cycle completes. By setting the MINIMUM OFF TIME to a value of (0 – 10) minutes, short cycling can be minimized.

Once a boiler cycle ends (Post Purge completes), the minimum off time begins counting down. During this time, a call-for-heat if present, is held off.

Master: HEAT:WAIT will be displayed if a call is present, otherwise STANDBY *
    until the timer expires. Then STANDBY will be displayed.
Member: The boiler will first indicate HEAT:WAIT until the master boiler detects that the member is offline and unavailable to fire. Once the master sees the member boiler is unavailable the master will remove its call-for-heat and the member will indicate STANDBY *. The " * STATUS " screen will show "Min off. Once the timer expires the member boiler will post its status as available and STANDBY will be displayed.

3.   Due to the addition of the MIN OFF TIME the FIRE BOILERS menu was rewritten. The menu item MODE is the Fire mode and the selections have been abbreviated. FIRST ON FIRST OFF is now FOFO, LAST ON FIRST OFF is now LOFO, TRUE RUNTIME is now TRUE.

4.   Fixed the default DHW DIFF value in SETUP:DOMESTIC HOT WATER:DHW DIFF when using the centigrade temperature scale.

5.   The ADVANCED SETUP:SYSTEM menu now contains a BOILER TYPE menu that will allow a boiler to be classified by its input BTU size in increments of 10,000. It also allows selecting whether it is CONDENSING, and what its relative MASS is. Currently these values do need to be set at the field/jobsite, but will be used in future releases.

6.   Internal: firmware program efficiency rewrite.

Revision 3.32   25- SEP – 2009 Pre-Release

1. Fixed a bug using a USB Flash Drive to update firmware when 1200 or 2400 BAUD is selected in communication settings.

2. Allow shutting off the Predictive Start Algorithm. ADVANCED SETUP:FIRING MODE: PREDICT START: YES will allow the boiler to start in or above the heating band when:

    A. There are no boilers firing.
    B. The water temperature is falling so fast that it will fall below the band before the main valve opens.

The predictive start algorithm is used to try and keep the water temperature within the heating band, but in some applications (parallel piping), the water temperature may drop suddenly and then stabilize. If this occurs, the boiler can short cycle. Starting too soon and then exiting the top of the band too soon causes the short cycle. If this menu item is set to "NO", the predictive algorithm is not executed and falling below the band is the only way a boiler may start.

Revision 3.31   1- SEPT – 2009 Pre-Release

1. Added the MIN OFF TIME in menu ADVANCED SETUP:FIRE BOILERS:MIN OFF TIME. The minimum off time is used to prevent short cycling of the boiler when a call-for-heat is made and then removed within a short period of time. Its purpose is to provide a minimum time the boiler remains OFF after a heating cycle completes. By setting the MINIMUM OFF TIME to a value of (0 – 10) minutes, short cycling can be minimized.

    Once a boiler cycle ends (Post Purge completes), the minimum off time begins counting down. During this time, a call-for-heat if present, is held off.

    Master: HEAT:WAIT will be displayed if a call is present, otherwise STANDBY *
    until the timer expires. Then STANDBY will be displayed.
    Member: The boiler will first indicate HEAT:WAIT until the master boiler detects that
    the member is offline and unavailable to fire. Once the master sees the member boiler is unavailable the master will remove its call-for-heat and the member will indicate STANDBY *. The " * STATUS " screen will show "Min off. Once the timer expires the member boiler will post its status as available and STANDBY will be displayed.

2. Due to the addition of the MIN OFF TIME the FIRE BOILERS menu was rewritten. The menu item MODE is the Fire mode and the selections have been abbreviated. FIRST ON FIRST OFF is now FOFO, LAST ON FIRST OFF is now LOFO, TRUE RUNTIME is now TRUE.

3. Fixed the default DHW DIFF value in SETUP:DOMESTIC HOT WATER:DHW DIFF when using the centigrade temperature scale.

4. Allow 38k baud rate for Modbus communications. Previous releases only allowed 19.2k.

5. The ADVANCED SETUP:SYSTEM menu now contains a BOILER TYPE menu that will allow a boiler to be classified by its input BTU size in increments of 10,000. It also allows selecting whether it is CONDENSING, and what its relative MASS is. Currently these values do need to be set at the field/jobsite, but will be used in future releases.

6. Internal: firmware program efficiency rewrite.

Revision 3.30   12- JULY – 2009 Pre-Release

1. When the HNET control is controlled by a building management system the Modbus Setpoint timer implements a Fail Safe mechanism. If communications from the Management system is lost, the boiler/system runs in Local mode. This timer always requires a value to be written to it to keep from timing out and reverting to Local mode. Now, writing a 0 to the Setpoint Timer will disable this Fail Safe mechanism.

2.   Added the ability to enable the System Pump while in Warm Weather Shutdown. Prior to this release, when the boiler/system entered Warm Weather Shutdown, the system pump was disabled. The system pump did not have a priority mode. When the OA OVR input (override) was closed (WWS active), the override would only allow the local pump to run. The system pump is now allowed to run in WWS when the OR OVR override input is closed by setting the following new feature to "ON". This feature is located in the "SETUP: PUMP OPTIONS: SYSTEM PUMP: OVR ENAB IN WWS?" ON. When set to OFF, the system pump will not come on while in WWS with the OR OVR override input closed. This method allows a priority mode with the system pump while in WWS.

Revision 3.29   24- MAR - 2009

1. Corrected a damper issue which would leave the Master boiler's damper ON when Member boilers have all stopped and the Master was the last to shut OFF (damper INDEPENDENT mode).

2. Corrected a FLOW WAIT display issue when the Local Pump has stopped. The FLOW WAIT message was displayed when there is no flow and the pump is off.

Revision 3.28   20 - MAR – 2009 Internal Release for Testing

1. Corrected a field reported bug when the Operating Limit Band overlaps the Heating band. The Operating Limit Band should always be set higher than the Heat Band, but if a building management system is in direct control of the setpoint, this situation can not be avoided. The bug occurs when the Operating Limit Band reduces the modulation rate to avoid tripping the Operating Limit, but at the same time, the PID may also be trying to reduce the modulation rate while in the Heat Band. During this conflict, the modulation rate could fall below the minimum set modulation and would cause "Air Flow Switch" faults on the Ignition Control. This conflict is now handled.
    On earlier releases, a temporary solution to this bug was to set the Operating Limit Band to '1' and the Operating limit higher than the top of the Heat Band. Though, this could not handle the externally controlled setpoint (4-20mA/0-10VDC).

2. Corrected the low fire hold to work as defined in the manual. Prior to this release, the first 10 seconds of the Modulate Delay Time overlapped the Main Flame proving time of 10 seconds. This would result in the boiler never going to Low Fire after the flame proving time with the Modulate Delay Time set to the default time of 10 seconds. Now the Boiler will hold at the ignition rate (as before) for 10 seconds, and then drop to the Minimum rate for 10 seconds. The Modulate Delay Time is adjustable and set in the ADVANCED:MODULAR BOILER SET menu.

3. Corrected a damper issue when operating as a stand-alone boiler. During a fault condition the damper may remain open rather than closing. The damper will now close when a fault condition occurs, with only one boiler present.

4. Added log entries to the log when the failsafe mode is entered. Prior versions made no entries when a boiler entered failsafe.

Revision 3.27   10 - MAR – 2009

1. Corrected a software protection bug with version 1.x controls and prior firmware releases. If the FIII boiler has severe ignition problems (i.e. damaged insulator, HV cable, or sparking to chassis) the ignition noise could cause the executed code to jump to the flash drive loader code which is still resident on version 1.x controls. Once there, it would erase the existing bootloader and program since none of the hardware was there to support it.

Revision 3.26   2 - MAR – 2009

****** NOT TO BE USED WITH VERSION 1.x CONTROLS *****

1. Corrected flow prove issue with pre-release Version 3.25. Version 3.25 was only released for testing.

Revision 3.25   19- JAN – 2009 INTERNAL RELEASE

****** NOT TO BE USED WITH VERSION 1.x CONTROLS *****

1. Merged the FIII and the FIII XLF firmware so that the same firmware (V3.25) will run on both boilers. Previously, separate firmware files were required for the FIII XLF and the FIII. This includes the ability of the factory to set the turndown.

Revision 3.24   19- JAN – 2009

****** NOT TO BE USED WITH VERSION 1.x CONTROLS *****

1. There is no Post Purge on the System and Local pumps if a loss of flow occurs. With this revision, if the flow switch was to trip due to a loss of flow the Post Purge cycle of the pumps will occur.

   The Post Purge was not done in all prior versions, and the pump would shut off within 3 seconds and wait 10 minutes to retry the pump. This was to allow some time for the pump to cool down (with no power applied and assuming the pump failed) if the pump motor tripped its breaker, and then attempt a restart. In the event that the flow switch failed, shutting off the pump could cause the boiler to trip the High Limit and lockout. So, now the boiler will shut down and complete a pump post purge, then shut the pumps off and wait the remainder of the 10 minute retry before trying to start again.

2. Renamed the MIN, IGN, and MAX OUT text in calibration mode to avoid confusion. The text now states: MIN VFD, IGN VFD, MAX VFD. These values represent the percentage of signal sent to the VFD.

Revision 3.23   1- DEC – 2008

1. Qualified the System and Local flow sensors so that they must prove flow for 2 seconds. This was due to the sensitivity of the flow switch detection inputs. Some flow switches would flutter and cause nuisance trips. Also, some environments that produce strong electrical noise would cause nuisance trips.

2. Improved the way Domestic Hot Water is used with a dedicated DHW sensor and thermostat input. There are now (5) DHW modes of operation. See: Control I&M manual.

Revision 3.2   8 – OCT – 2008 INTERNAL RELEASE

1. Added continuous daily runtime restart. This feature monitors the runtime of a boiler and if it has exceeded 24 hours of continuous runtime, the boiler is restarted. A log entry "UV SHUTDOWN TEST" will be made to indicate this.

2. Added the selection of a Lead Boiler in **SETUP:BOILERS**, allow the lead boiler to start first in **ADVANCED SETUP:FIRING MODE,** and then rotate boilers based on runtime. This provides a way to assign a designated lead boiler that will create a draft for common vented systems.

3. During failsafe operation the Local Pump relay contact is enabled on the failsafe boiler as: always ON. This is used to ensure a flow of water over the outlet sensor.

4. Added the Adaptive Modulation mode. ADAPTIVE MODULATION method is used for bringing on new boilers by the MASTER. This menu is accessed in: **ADVANCED SETUP:ADAPTIVE MOD.** This method helps prevent over firing of the system when boilers are added.

   When a new boiler is added, the Master boiler adjusts the system modulation rate lower to compensate for the BTUs that will be introduced by the newly added boiler. Once the newly added boiler fires and an adjustable timer expires, the Master resumes control of the modulation in order to maintain setpoint temperature.

Revision 3.0-3.1   1 – JULY – 2008

1. This release includes support for Version 2.0 control board and its added features.

Revision 2.55   15 – APR – 2008

1. Fixed a display bug.
   Condition:
   > The Master boiler's inlet temperature is less than 130F,
   > The Master boiler's warning message is displayed,
   > The master is in the heating band,
   > No boilers are firing,
   > Then the top running status line would display the minimum modulation RUN %

   Correction: The Display will now display "HEATING"

   Also, When the Master Boiler's inlet temperature is less than 130F the warning message will not be displayed until the boiler is firing. Before this release, the warning message was always displayed.

2. Provided additional support for dampers that are individual or have a linked/common system damper. Added a continuous retry time of 10 minutes and removed the lockout on a damper failure. In the SETUP:AUX FUNCTIONS:COMBUST AIR DAMPER: you can now select the damper TYPE:. There are two types of dampers that are supported now.
   1. TYPE: LINKED/COMMON setting is used if only one damper is present. If the damper fails to prove when using this setting, the boiler system will be shut down. Every 10 minutes a retry of the damper will be attempted until it successfully opens.

2. TYPE:INDEPENDENT setting supports separate independent dampers controlled by each boiler. If any damper fails to open, the other boilers in the system can still function as long as their dampers open and prove. A damper retry of 10 minutes will also be in effect if any damper fails to open and prove.

3. Factory diagnostic enhanced to exercise relays.

4. Added a new feature to the 4-20ma input. This feature allows the 4-20mA input to function at the highest priority level (same as AA input). The feature gives an external control the ability to interrupt heating that is being enabled by a HEAT DEMAND or HEAT NET. When this mode is active the external control can set modulation directly using the 4-20mA input. Use the ADVANCED SETUP:4-20mA INPUT:PRIORITY and set the 4-20mA input to HIGHEST priority. This can only be set to HIGHEST if the SETPOINTS:SETPOINT SOURCE is set to AUTO. Be aware that the control cannot be placed in LOCAL mode if this PRIORITY mode is enabled and active.

Revision 2.54   20 – MAR – 2008

1. Provided additional support for dampers that are individual or have a linked/common system damper. In the SETUP:AUX FUNCTIONS:COMBUST AIR DAMPER: you can now select the damper TYPE:. There are two types of dampers that are supported now.
    1. TYPE: LINKED/COMMON setting is used if only one damper is present. If the damper fails to prove when using this setting the boiler system will be shut down. Every 10 minutes a retry of the damper will be attempted until it successfully opens.
    2. TYPE:INDEPENDENT setting supports separate independent dampers controlled by each boiler. If any damper fails to open, the other boilers in the system can still function as long as their dampers open and prove. A damper retry of 10 minutes will also be in effect if any damper fails to open and prove.

Revision 2.53   13 – FEB – 2008

1. If the IRI gas valve proving package is installed, there may be not enough time to allow the IRI circuit to prove gas before the "CALL FACTORY" message is displayed and the system locks out (IRI circuit needs 15 to 25 secs to prove). The time now allowed for the IRI gas proving circuit to prove has been extended to **one minute**.

2. Fixed an annoying audible alarm problem. When a fault occurs, an Alarm is started. If a call-for-heat is still present and the fault clears, the audible alarm will also clear. But when the boiler restarts and the main valve opens an audible alarm may sound for approx 1 minute with no indication of a fault before clearing. This is intermittent and is a result of the prior alarm fault being latched.

Revision 2.52 Pre-release   28 – JAN - 2008

1. When setting the Variable Flow Proving time to greater than 10 seconds (added in Version 2.5 pre-release) the CALL FACTORY message is displayed and the boiler locks out. This has been corrected.

Revision 2.5   12-18-07

This revision incorporates field requests to improve serviceability and function.

1. Two special FAILSAFE MODES have been added to help protect systems from loss of heat conditions. When using one of these modes **ensure that you connect any DAMPER control, or system pump control to safely allow operation** with the assumption that the MASTER boiler is DOWN. Be aware that the boiler may start without a call-for-heat in the FAILSAFE MODES. These FAILSAFE MODES can be accessed through the SETUP:AUX FUNCTIONS:FAILSAFE MODES.

     1. H-NET COMM LOST: OFF   ON
        This mode allows a member boiler to run in LOCAL if the communications link via the H-NET cable is lost. This includes the MASTER boiler losing it's Control/Communications board or the power on the MASTER is switched OFF. If this MODE is set to ON, when the member boiler loses it's link (heartbeat packet over the H-NET cable) to the MASTER Boiler, this MEMBER will fire to the LOCAL setpoint.
                        NOTE: The heartbeat packet over the H-NET
                            cable needs to be lost for 10 minutes.
        The MEMBER boiler will continue to run at the LOCAL setpoint until communications from the MASTER boiler is re-established.

     2. LOW TEMP: OFF SUPPLY HEADER DHW RETURN
        This mode may be used by the MASTER or MEMBER boiler and can be used as a type of freeze protection. In this mode you may select which Sensor you wish to monitor, or you may opt to turn this mode OFF. If you select a sensor, you may then associate it with a temperature at which the boiler will turn ON and fire to setpoint when this LOW TEMP temperature is reached. Once the setpoint is reached the boiler will turn OFF.

2. Due to delays in proving flow when opening valves a new menu item has been added. This menu is the FLOW PROVE. It may be accessed in SETUP:PUMP OPTIONS: and allows for an adjustable flow proving time before the boiler can start. It is adjustable from 10 –240 seconds and should allow most valves to fully open while attempting to prove flow while they are opening.

3. Air Switch (BLOWER) fault added. In the event that the blower is stuck in PRE PURGE for more that 2 minutes, the message AIR SWITCH (BLOWER) will be displayed and the Boiler will alarm and lockout. This has been added to prevent freeze-ups if the air switch were to fail.

4. The message CALL FACTORY will be displayed in the event the Ignition Control does not complete a handshaking sequence with the H-NET control. The boiler will alarm and lockout.

5. The 4-20ma input mode has been expanded to allow more control by BMS systems. The current method did not allow any flexibility and was not standard practice. This has been corrected in this release. A new menu item has been added: ADVANCED SETUP:4-20ma INPUT. Also, when selecting; SETUP:SETPOINTS:SETPOINT SOURCE and selecting 4-20ma, the 4-20ma INPUT menu will be automatically entered.

   You may now select the current at which the boiler will start. It is adjustable from 3.7ma to 5ma. A bit of hysteresis (differential) of .1ma is always in effect. So, if the starting ma = 4.10ma the boiler will start when the control current applied achieves this value of 4.10ma. The boiler must drop .1ma below this to turn OFF, in this example 4.00ma. This hysteresis value is not adjustable.

   When using the 4-20ma setpoint control, a band may now be set at which the 4-20ma signal will operate over to establish a remote setpoint. The lower setpoint is defined as 4ma SETPOINT and the upper setpoint is defined as 20ma SETPOINT. The 4ma SETPOINT is linked to the BOILER START x.xxma where this starting current is the lower setpoint. So if we

set the 4ma SETPOINT to 130F and the 20ma SETPOINT at 180F we will have established the band. Once a starting control current of BOILER START 4.1ma is applied, the boiler will start (4-20 REMOTE ENABLE INPUT CLOSED) and the setpoint will be set to 130F. If a control current of 10ma is applied the boiler will track on a linear slope towards the 20ma SETPOINT settling at a SETPOINT of ~149F. As the current increases to 20ma, the SETPOINT will indicate 180F. The Default setting is 4ma SETPOINT: 50F and 20ma SETPOINT 220F for backwards compatibility with the older version. NOTE: anytime a new firmware version is uploaded to the control, these values return these defaults.

If using the direct modulation mode by applying a 4-20ma current only the BOILER START x.xx setting applies.

Revision 2.4   Internal Release

Revision 2.3   7 – Nov- 2007

1. Changed the way in which the Heat Exchanger Delta T works when the ALARM TYPE is set to FAULT. Previously if you set the HEAT EXCHANGER:ALARM TYPE to FAULT, the Boiler would shut down when the Heat Exchanger Delta T increased beyond 40F. This would act like a lockout and would require manual intervention to re-fire the boiler. The new method is to shut down the boiler when this occurs, but when the Delta T drops by 10F, the boiler is allowed to re-start if there is still a call-for-heat.

2. Separated the Outdoor Reset from the Warm Weather shutdown. They are now independent. A menu item was added in the OUTDOOR AIR RESET menu to allow this. See the Manuals for more information.

Revision 2.2   29 – OCT- 2007

1. Combustion Air Damper issue: If the Combustion Air Damper function is used with a **common system damper** (not individual dampers assigned to each boiler) and the proving switch for the damper is only brought to the Master boiler, a deficiency exists with proving the damper on member boilers set to LOCAL. If a boiler is manually set to LOCAL, a proof of damper on that boiler will not occur unless a relay is supplied that would supply a proof of damper and the "COMBUSTION AIR IN USE?" is set to ON. Currently, any time that a member boiler is placed to the LOCAL position while operating using H-NET, the master boiler will see this, open the damper and prove the damper, but if the damper fails, the **manually overridden boiler** will be unaware of the damper's failure and continue to fire (unless it has been wired to receive the prove switch from the damper, and "COMBUSTION AIR IN USE?" = ON).

In order to provide a means without adding an external relay to use a common damper, the input designated as T4 on J12B is now used for this purpose. The inputs T3 and T4 and the methods associated with them will be discontinued. T1 and T2 inputs will be used to fire the boiler as if it were a 2 stage (Low fire and High fire). The in-between stage firing of 50% and 75% will not be supported.

J12B pin 7 can now accept a low voltage 24vac signal. This signal can be daisy chained to each member boiler's J12B pin 7 input using 1 wire. Each member boiler must have the Damper enabled in the AUX FUNCTIONS menu so they can each prove the damper before firing while in LOCAL or REMOTE.

Wiring is done beginning with the Master boiler. J12B Pins 7,8 are connected to the prove switch of the combustion damper. Pin 8 is supplying 24 VAC and pin 7 is the sense input. A second wire is connected to J12B pin 7 of the Master and the other end connected to the first

member boilers J12B pin 7. If another member boiler is present, connect another wire to the J12B Pin 7 terminal of the first member and the other end to the second member boiler J12B pin 7. Continue this method for each additional boiler.

2. If using Outdoor reset, and during summer shutdown, the System Pump will come on if the OA RESET OVERRIDE input is enabled. This release **does not** enable the System Pump during this condition.

3. Modified the H-NET boiler lost and found communications to be more tolerant. Some systems exhibit randomly dropped boilers in electrically noisy environments when all boilers are still present. This version attempts to correct this.

4. Adjusted the retry method for pump flow failures in order limit the amount of time the Master can call a member boiler that is exhibiting flow failures with it's flow prove switch. This event would occur mainly when using the TRUE RUNTIME rotation.

5. Menu changes:
    A. Removed the menu items PID and made it a factory adjustment only.
    B. Renamed the **LOCAL ADDRESS** to **H-NET ADDRESS** and **the CONSOLE ADDRESS** to **MODBUS ADDRESS** for clarity.
    C. Removed the BOILER START TIME menu under MODULAR BOILER SET. This menu was used for informational purposes and has been deemed, not needed.
    D. Removed the EARLY STOP DEGREES menu under MODULAR BOILER SET. This menu was used for informational purposes and has been deemed, not needed.

6. Fixed a bug with the silence switch. If the silence switch was pressed while the Beeper was cycling between ON and OFF. A narrow window existed that could cause the beeper to stick ON if the silence switch was pressed while in this window.

7. OA RESET sensor failure backup. Prior to this release, if the Outside Air sensor went bad (opened or shorted) the Master boiler would shut down the system. With this release, if the Outdoor Air sensor fails the Master boiler reverts to the System Setpoint setting and the system will continue to run. The sensor error is displayed, audible alarm, and the Alarm relay contact are closed.

Revision 2.1   18- AUG - 2007

1. Fixed Pump Post Purge time saved. When the Post Purge Time is set to other than default, after a power cycle the default values were restored and the saved settings lost. The time can now be changed and retained after a power cycle.

Revision 2.00   19 – JUNE – 2007   First Release

1. True Runtime Boiler Rotation added. This feature allows boiler rotation based on runtime. Each boiler stores it's own runtime. The Master polls this runtime from each boiler and fires the boiler with the lowest runtime. The boiler with the most runtime is stopped first.

2. Allows the Master boiler to always be the first to fire. This is used in a common vent system when a draft needs to be established first before firing other boilers.

3. 4-20mA remote setpoint control. A 4-20mA signal can be converted to a setpoint by a building management system. This feature is primarily used when a BMS is controlling the Outdoor Reset function.

4. Last pump/valve remains on. This feature is used to prevent deadheading in variable flow systems by leaving the Master boiler's pump/valve open if no boilers are firing.

5. Added the System Pump control. Along with the Local pump/valve (circ) a system pump control relay was added along with a summer shutdown jog feature.