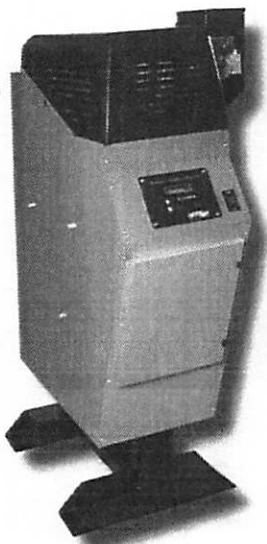
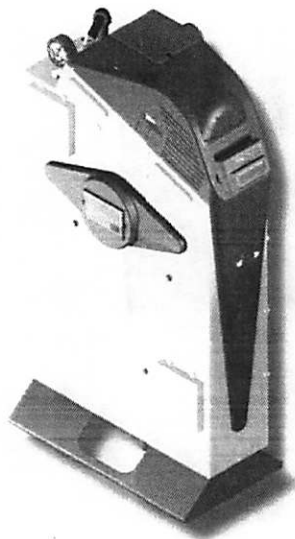


HydroTherm®



HeatNet® OnBoard

KN SERIES

Cast Iron Condensing Boilers

Models **KN-2** and **KN-4**

HeatNet® Manual

Control Adjustment and Operation Instructions
for Hydrotherm Firmware Version 2.8

Also read and follow:

KN Boiler Manual
KN Vent/Air Manual



WARNING This manual is intended only for use by a qualified heating installer/technician. Read and follow this manual, all supplements and related instructional information provided with the boiler. Install, start and service the boiler only in the sequence and methods given in these instructions. Failure to do so can result in severe personal injury, death or substantial property damage.

WARNING **Do not use the boiler during construction.** Construction dust and particulate, particularly drywall dust, will cause contamination of the burner, resulting in possible severe personal injury, death or substantial property damage. The boiler can only be operated with a dust-free air supply. Follow the instruction manual procedures to duct air to the boiler air intake. If the boiler has been contaminated by operation with contaminated air, follow the instruction manual guidelines to clean, repair or replace the boiler if necessary.

CAUTION Affix these instructions near to the boiler/water heater. Instruct the building owner to retain the instructions for future use by a qualified service technician, and to follow all guidelines in the User's Information Manual.

The KN boiler — HeatNet® control

Control overview

The KN HeatNet control monitors boiler temperature and limit circuit inputs, modulating boiler firing rate to meet demand. The control uses microprocessor electronics, watching time-average response from the system to anticipate how much heat the system needs. Coupled with the five-to-one turndown of the KN boiler, this results in maximum possible condensing-mode operation. The KN boiler will provide unmatched seasonal efficiency.

Indoor air reset (IAR)

HydroTherm's unique approach to boiler output regulation is its Indoor Air Reset function. The control monitors the demand from up to 8 different zones. Watching the demand duration and response to supply temperature, averaging over time, the HeatNet control anticipates system needs. It sets boiler maximum firing rate and adjusts supply water temperature to fine-tune boiler heat output. All that is required to enable IAR is to connect thermostat circuit wires to the IAR inputs. The HeatNet control can also be configured for outdoor reset operation, but IAR provides response based on system behavior rather than just looking at outdoor temperature.

The HeatNet platform

HeatNet controls are designed to provide an integrated boiler management system on every boiler. The platform provides multiple levels of selectivity. HeatNet electronics can be operated as a simple single-boiler control, while still providing intelligent regulation of boiler firing rate to match system demand. With a few key strokes on the key pad, the HeatNet control can operate as a sophisticated multiple-boiler controller, using simple RJ45 cable interfacing between units. The control can even accept external control commands from building managements systems (Modbus standard, with optional bridge for BACnet or LonWorks) or 20-milliamp analog input from an external controller.

The control method used by the HeatNet control is based on digital communications, which eliminates the need for analog control signals. Analog signal inputs are supported, but a higher level of control precision, repeatability and feedback is gained with digital communications.

The HeatNet control can be versatile, providing for operation in multiple ways:

- Operation as a stand-alone boiler.
- Operation as a boiler in a boiler network, using the on-board HeatNet protocol.
- Operation as a member boiler in a boiler management system.

- Operation as a member of a remotely-controlled boiler network (20-milliamp regulation).
- Setpoint can be determined by the HeatNet control or by a 20-milliamp input signal.
- Network boilers can be operated by override commands for increased versatility.

PID response

The HeatNet control uses proportional-integral-derivative calculations to determine the response to boiler water temperature changes. This means it not only looks at how far away the water temperature is from the setpoint temperature, but how fast the temperature is changing and how it has responded over time. This ensures the boiler won't make sudden unnecessary changes in firing rate.

Multiple boiler operation

The HeatNet control easily interfaces with other HeatNet controls. Multiple boiler operation using HeatNet protocol only requires RJ45 cables daisy-chained from boiler to boiler and a few key strokes setting up control behavior. The master boiler is automatically selected by connecting a sensor lead to its HEADER sensor terminals. The HeatNet control recognizes the sensor and configures the boiler as the master. Other boilers only need to have an address assigned.

Among the advanced design features of the HeatNet control is the MOD-MAX setting. This limits the firing rate of all boilers to a pre-set maximum (50% by default). This means all of the boilers will be run at a very efficient level until all boilers are on. Only then can firing rate increase above this setting. Boiler rotation can be first-on/first-off, first-on/last-off, or true rotation (the HeatNet control monitors the total on time of all boilers, and rotates their usage so the total on time is the same for all).

Firmware Version 2.5 and greater is now compatible with HeatNet Mixed Boiler Systems. For more information on the operation of HeatNet Mixed Boiler Systems see the KN6-30 HeatNet Control Manual V3.47, which is available at www.HydroThermKN.com.

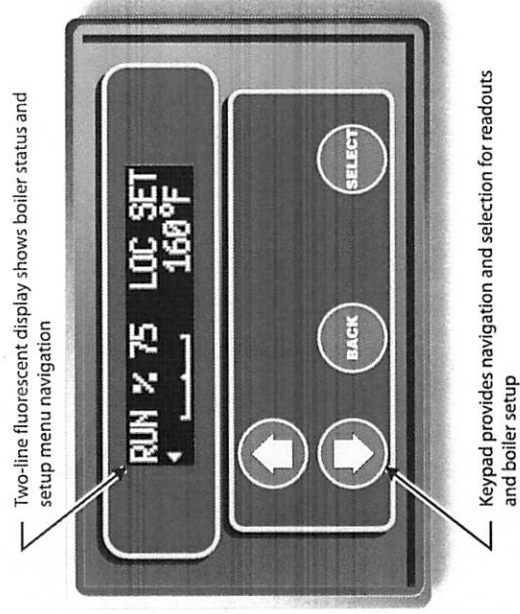
External limit monitoring & annunciation

In addition to controlling the boiler, the HeatNet control monitors external limits wired into the limit circuit connections. The control shuts down the boiler if a limit opens, and the digital display shows which limit failed. Monitored limits include high limit aquastat, flow, ignition control fault, inlet pressure, flue pressure and other optional or user-selectable limits."

The KN boiler — HeatNet® control

KN Control panel

(Located on boiler front — shown with keypad cover removed)

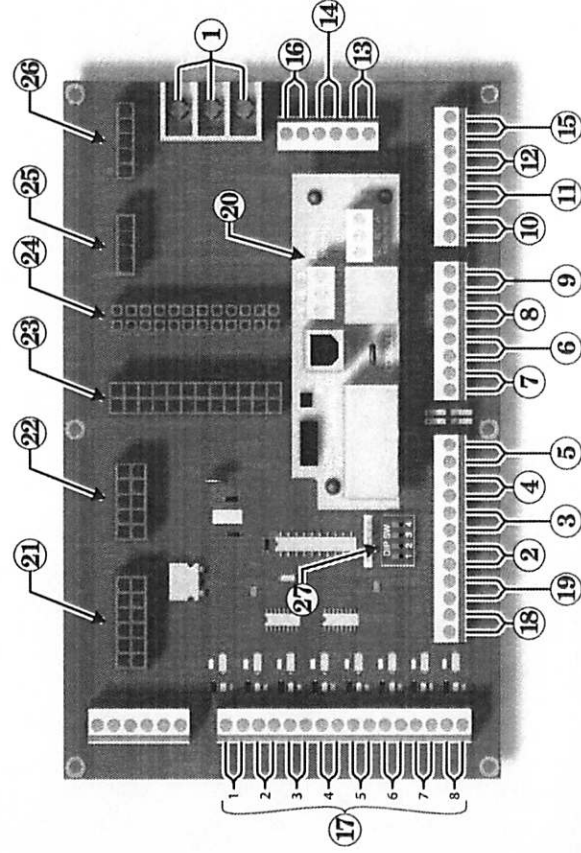


Two-line fluorescent display shows boiler status and setup menu navigation

Keypad provides navigation and selection for readouts and boiler setup

Electrical connection board

(Located in center panel on boiler right side)
(All field and boiler wiring connects here)



(All boiler wiring is made with non-interchangeable plug-in harnesses, connected to this board)

Wiring connections

1. Power wiring, 120 vac
2. Heat demand input
3. DHW demand input
4. Low fire terminals
5. High fire terminals
6. To boiler outlet water temperature sensor
7. To optional outdoor temperature sensor
8. To optional boiler return water temperature sensor
9. To optional header temperature sensor
10. To boiler postpurge pump (factory piped and wired)
11. To boiler circulator
12. Alarm output dry contacts
13. To external high limit and/or low water cutoff if desired
14. To flow switch, when used
15. Used to activate combustion air damper if desired
16. To combustion air damper proving switch, required when controlling combustion air damper
17. Indoor air reset inputs — connect to up to 8 zone thermostats
18. Optional 20 ma control signal input
19. Remote enable to start when operating on 20 ma input
20. Optional HeatNet communications board
21. Boiler wiring socket to blower and gas valve
22. Boiler wiring socket to pressure switches and ignition control
23. Boiler wiring socket to control panel
24. Boiler wiring socket to control panel
25. Boiler wiring socket to power switch
26. Boiler wiring socket to transformer
27. Termination DIP switches

KN
components

1

Method 1: HeatNet modulation – local control

WARNING **Electrical shock hazard** — Disconnect all electrical power sources to the boiler before making any electrical connections.

Label all wires prior to disconnection when servicing controls. Wiring errors can cause improper and dangerous operation! Verify proper operation after servicing.

Failure to comply with the above could result in severe personal injury, death or substantial property damage.

NOTICE The electrical connections to this boiler must be made in accordance with all applicable local codes and the latest revision of the National Electrical Code, ANSI /NFPA-70. Installation should also conform to CSA C22.1 Canadian Electrical Code Part I if installed in Canada. Install a separate 120 volt 15 amp circuit for the boiler. A properly rated shut-off switch should be located at the boiler. The boiler must be grounded in accordance with the authority having jurisdiction, or if none, the latest revision of the National Electrical Code, ANSI/NFPA-70.

Line voltage field wiring of any controls or other devices must use copper conductors with a minimum size of #14 awg. Use appropriate wiring materials for units installed outdoors.

Overview — control setup sequence

CAUTION **Follow the Boiler manual** — Install the boilers according to the KN Boiler manual before attempting to set up the control system.

1. Install all boilers per the Boiler manual.
2. Close the external gas valve on every boiler.
3. Wire all boilers following the guidelines in this section.
4. Attach a header sensor to the master boiler ONLY. The KN-2 control automatically configures the boiler with a header sensor as the master.
5. Set the master boiler control parameters using its display/keypad.
6. Set the master boiler's termination DIP switches.
7. Set the termination DIP switches on the member boilers.
8. Set the member boilers' control parameters using their display/keypads.
9. Follow the instructions in the Boiler manual to start up each boiler before proceeding further.
10. Finish by connecting cables between the communications boards of all of the boilers and verifying network operation.

Add communications modules

1. Insert a RS485 communications module onto each of the boilers' electrical connection panels, as shown in Figure 1.

Power supply (120 VAC)

1. See Figure 1 and Figure 2.
2. Connect minimum 14awg copper wire to the power connection as shown in Figure 2.
3. Install a fused service switch, mounted and installed in accordance with all applicable codes.

Figure 1 Electrical connection board (see item 10, page 3 for location — Also see the wiring summary illustrations on the next pages)

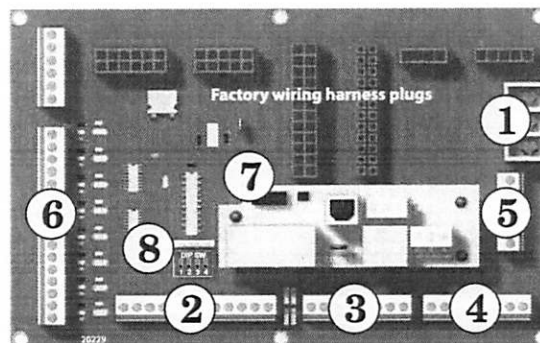
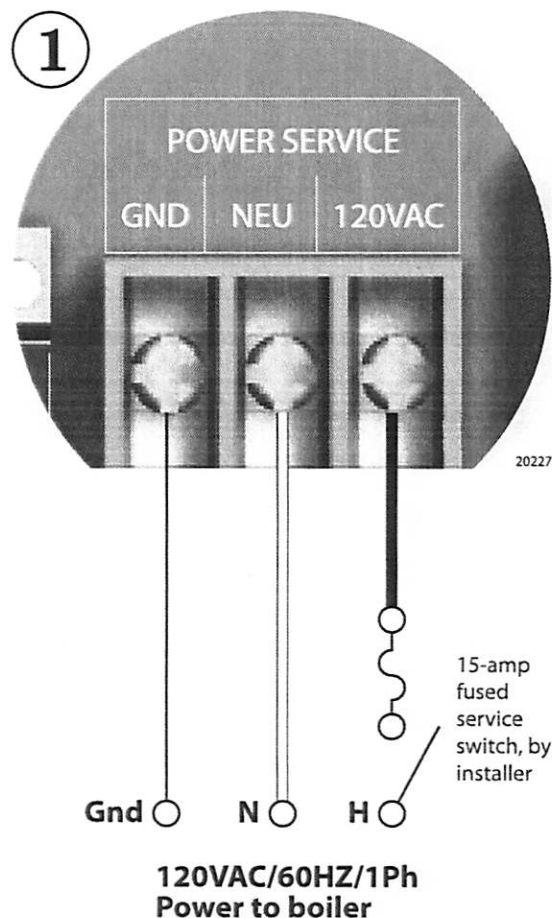


Figure 2 120VAC power service terminals on electrical connection board — See Figure 15 for location of the power terminal strip



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Method 1: HeatNet modulation – local control (cont.)

Circulator wiring

Postpurge circulator (KN-2 only)

- The circulator shipped installed with the boiler cannot be used for system circulation. It must be used as supplied from the factory. It circulates water after the boiler stops firing to prevent potential damage from heat pocketing in the top of the heat exchanger.
- The postpurge circulator is factory-piped and pre-wired. Do not change the usage, the wiring, the location or the piping.

Boiler circulator

- See the Boiler manual for circulator piping.
- Figure 3, Figure 4, and Figure 5 show wiring of the Boiler circulator (or boiler/system circulator) to the terminal strip of the KN-2 electrical connection board.
- DO NOT directly connect a circulator with a motor larger than 1/4 hp. For larger motors, install a circulator relay or motor contactor. Figure 3 and Figure 4 show the correct ways to install the boiler circulator using a relay or motor starter.

Figure 3 Wiring the boiler circulator using a circulator relay (required for motors over 1/4 hp)

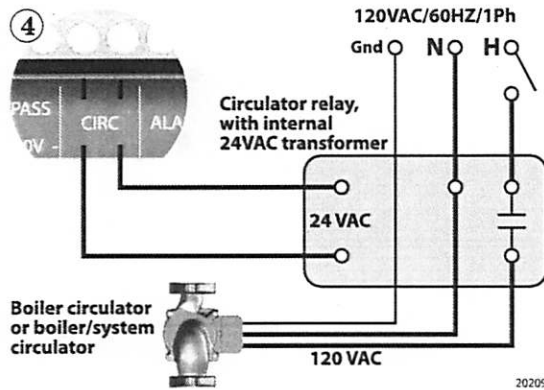


Figure 4 Wiring the boiler circulator using a relay or starter (required for motors over 1/4 hp)

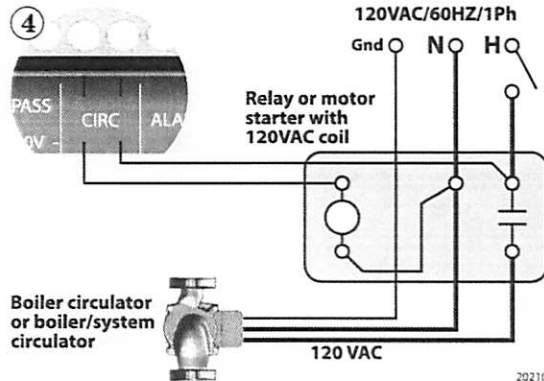
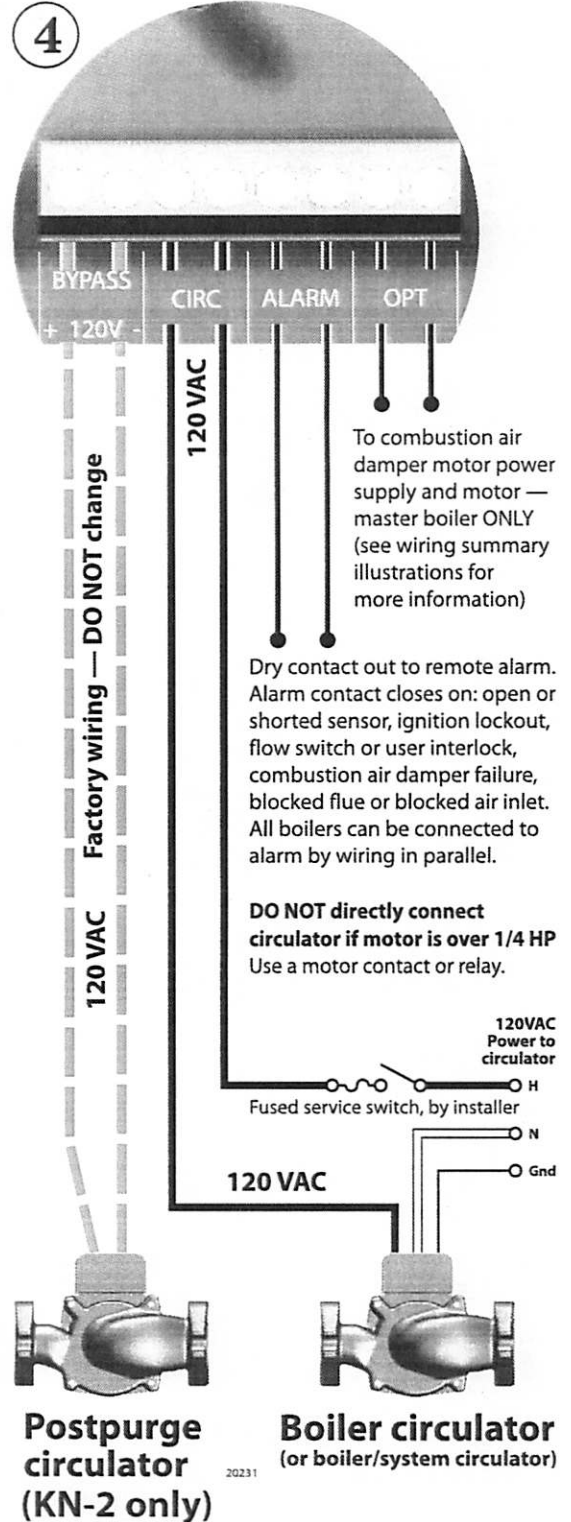


Figure 5 Circulator wiring terminal strip (see Figure 1 for location) — Also see the wiring summary illustrations on the next pages)



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Method 1: HeatNet modulation – local control *(cont.)*

IAR (Indoor Air Reset) wiring, when used

- Heat Demand terminal connections — The end switch leads from the zone valves must connect to the Heat Demand terminals on the electrical connection board as shown in Figure 7.
- See Figure 6 for typical wiring to the IAR inputs when using 4-wire zone valves without a zone controller. For other applications, such as circulator relays or zone controllers, see Appendix A in the Boiler manual.

CAUTION Polarity — The connections to the **IAR** positive terminals (**IAR +**) must be to the same location on the zone valve as the thermostat wire, as shown in Figure A1. The connections to the **IAR** negative terminals (**IAR -**) must be from the zone valve terminal connected to the 24VAC common line, as shown. Connecting the wires incorrectly can cause the transformer to be shorted out and damaged. Verify the wiring with a voltmeter.

CAUTION Always use a voltmeter to check the leads coming from the end switches of the zone valves. With the thermostat calling for heat, connect the voltmeter leads across the wires coming from the end switches. If the meter shows a voltage reading, the zone valve wires are incorrect. Change the wiring and retest. **DO NOT** connect the wires to the boiler until you have tested as described. Incorrect wiring can damage the boiler control or other system components.

- If there is only one transformer feeding all of the zone valves in the system, you can omit the wires to the **IAR** negative terminals (**IAR -**) on all but one of the zone valves. This is because these terminals are jumpered internally on the electrical connection board. If there is more than one transformer, provide one wire from each transformer common side to one of the **IAR** negative terminals (**IAR -**).

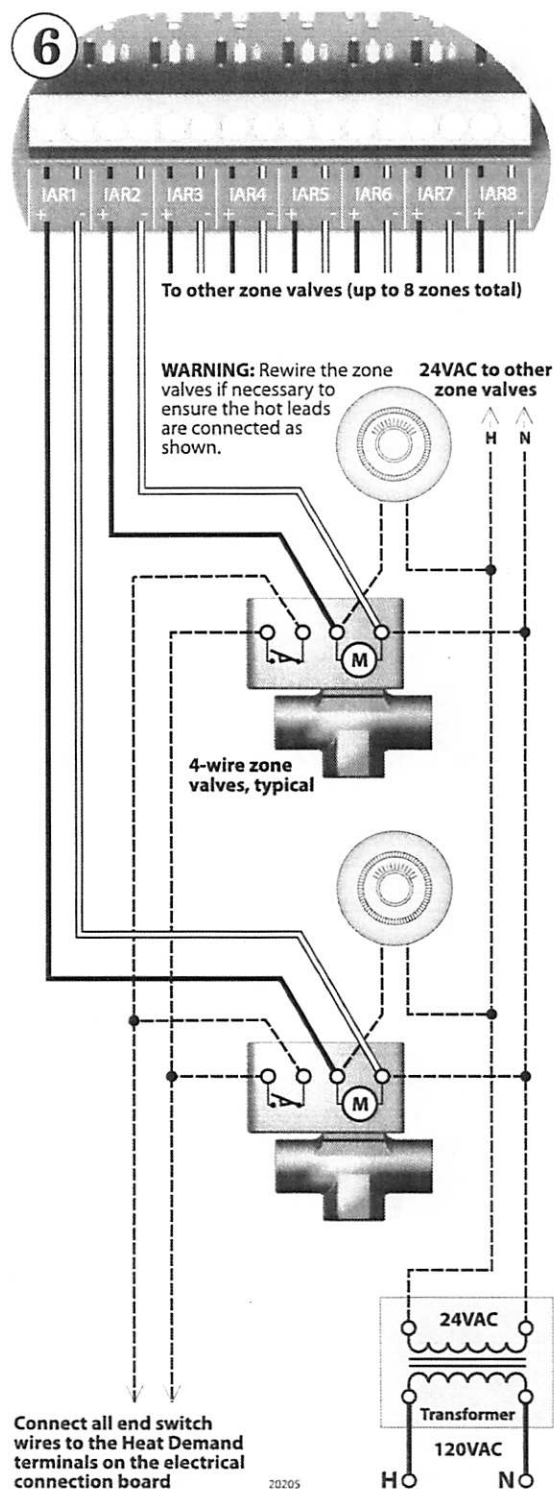
Sensor wiring

- Header sensor is required** — A header sensor must be installed in the system supply piping. **Connect the header sensor ONLY to the master boiler.** Install the header sensor in an immersion well. Locate the sensor where it will accurately sense the system water supply temperature. Connect the sensor leads to the electrical connection board as shown in Figure 8.
- Outdoor reset application** — To operate with outdoor reset, purchase and install an outdoor sensor. Mount the sensor such that it is shielded from direct sunlight if possible and not likely to be covered by snow drifts or debris. Connect the outdoor sensor leads to the master boiler's electrical connection board as shown in Figure 8. (Member boilers could have their own outdoor sensor if they will be operated in override mode by closing the Heat Demand terminals.)
- Return water temperature sensor** — The return water temperature sensor is optional, only needed if you want to automatically control the boiler postpurge pump cycle time. Install the sensor in a well in the boiler return piping. Connect the sensor leads to the electrical connection board as shown in Figure 8. The Return water sensor can **OPTIONALLY** be used as a DHW sensor. The control would then regulate to this sensor for DHW demands. When used in this way the sensor must be moved to a position where it will sense the temperature of the water being supplied to the tank. For more information see the DHW SENSOR description in Table 8.
- Sensor wiring, return water temperature sensor** — Firmware Version 2.5 and greater monitors the temperature differential (Delta T) across the heat exchanger. If the Delta T exceeds the setting, the input to the boiler can be optionally limited.

DHW wiring

- To operate the boiler for domestic water heating with a storage tank, install and pipe the tank according to the tank manufacturer's instructions and the recommended piping diagrams in this manual. Consult the factory for applications not covered.
- The circulator used for DHW must be operated by a circulator relay or zone controller that is activated when the tank aquastat calls for heat, as shown in (Figure 7 - terminal #2).
- Connect the tank enable terminals across the DHW DEMAND terminals on the master boiler's electrical connection board as shown in Figure 7. (Member boilers could be connected to tank aquastats if they are piped appropriately and intended to operate in override mode.)

Figure 6 Indoor Air Reset wiring to IAR terminals with 4-wire zone valves and no zone controller (see Figure 7 for terminal block 6 location)

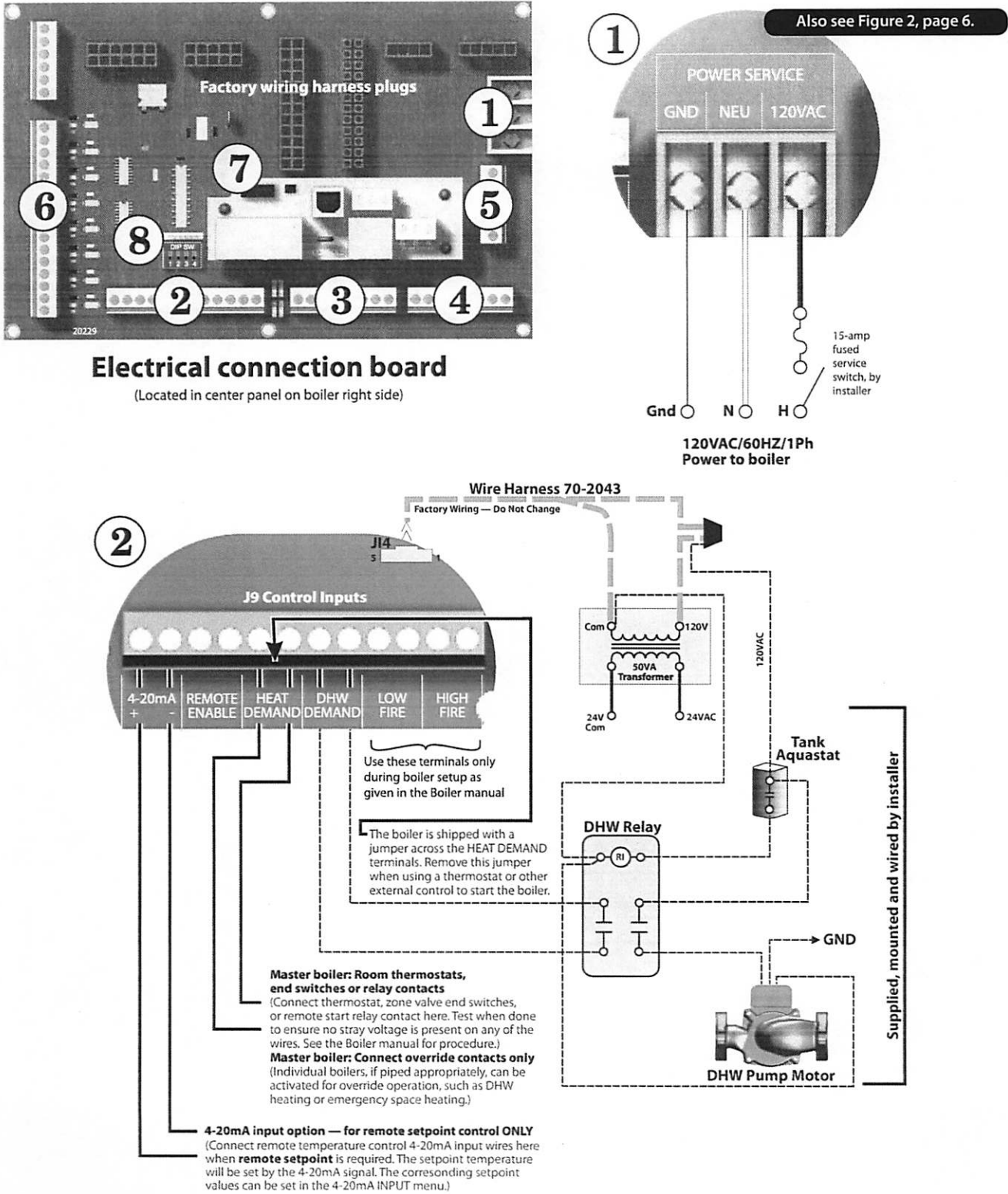


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Method 1: HeatNet modulation – local control *(cont.)*

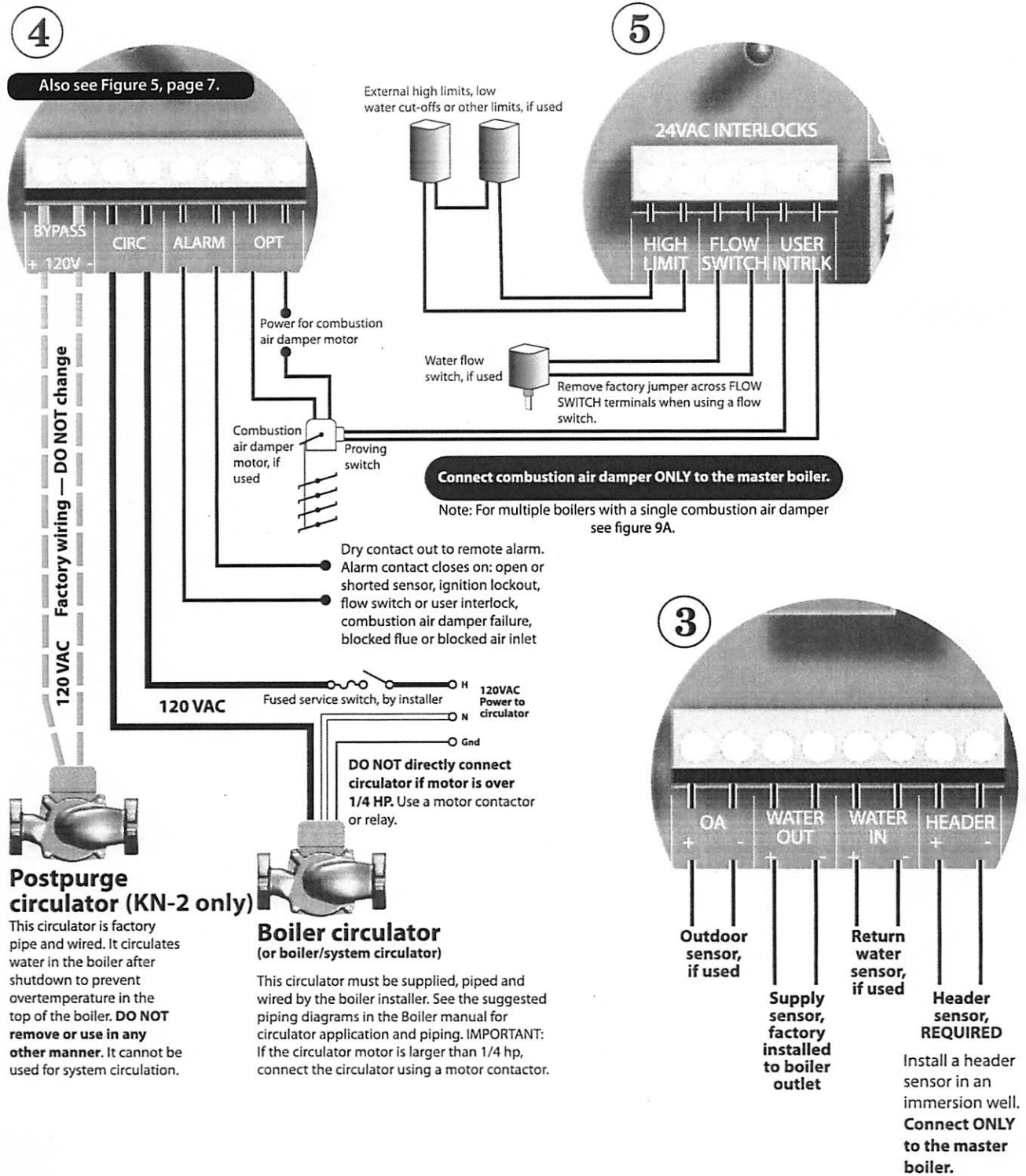
Figure 7 KN wiring summary — wiring to electrical connection board



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Method 1: HeatNet modulation – local control (cont.)

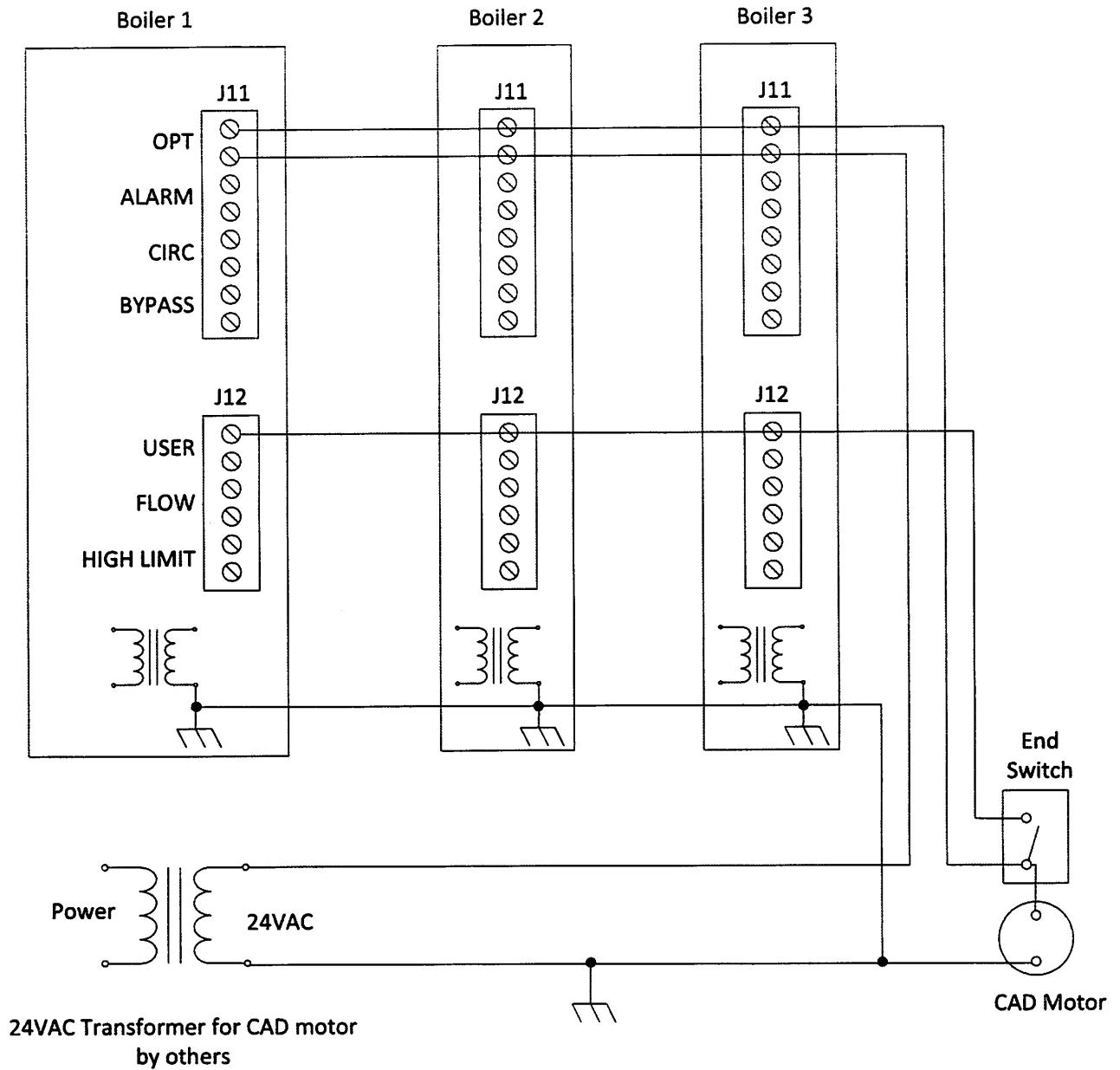
Figure 8 KN wiring summary — wiring to electrical connection board, continued (see Figure 7 for terminal strip locations)



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Method 1: HeatNet modulation – local control *(cont.)*

Figure 9A KN2/KN4 multiple boilers with a single combustion air damper



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Method 1: HeatNet modulation – local control *(cont.)*



Close the external manual gas valve on every boiler before proceeding. DO NOT open any gas valve, or attempt to fire any boiler, until the boilers have been set up and verified following the instructions in the KN Boiler manual.

Failure to comply could cause a boiler failure, leading to possible severe personal injury, death or substantial property damage.

Set control parameters on keypads



Before turning boilers on to set parameters, disconnect all call for heat wiring at the electrical connection boards. This will prevent the boiler for attempting to cycle during the setup process.

1. See "Control menus and adjustments" for a complete list of control parameters and explanations.
2. Carefully read the parameter explanations in Table 8.
3. When adjusting the limit band, operating limit (OP LIMIT), local setpoint (LOC SETPOINT) and DHW setpoint, make sure the operating temperature bands do not overlap or cause potential for nuisance cycling.
4. Indoor air reset — Use this option whenever possible. The indoor air technology monitors space heating demand to help the boiler operate at the highest possible efficiency throughout the season. To operate with IAR, you must wire to the IAR input terminals as described on page 18.
5. System clock — Set the system clock on all boilers to ensure the time stamps will be accurate in the data logs.
6. Turn on the power to each boiler and set the on/off switch to ON as you set its parameters.
7. Use the boiler's keypad to enter the parameters as described on page 23.
8. After setting a boiler's parameters, turn the power off to the boiler until you are ready to start the boiler up following the Boiler manual instructions.
9. Set the master boiler and each member boiler, following the guidelines given in Table 2.

Start up boilers per KN Boiler manual

1. Turn off power to all boilers.
2. Follow all instructions in the KN Boiler manual to start up each boiler and verify operation.

Connect network cables



Electrical shock hazard — Turn off power to each boiler before attempting to connect the network cables.



Before turning boilers on to check network operation, disconnect all call for heat wiring at the electrical connection boards. This will prevent the boiler for attempting to cycle during the setup process.

Master boiler cable

1. Connect an RJ45 cable to the master boiler H-Link OUT block (item 2, Figure 10) or 3-wire shielded cable to the H-Link terminal strip (item 4, Figure 10). The other end of this cable will be attached to the first member boiler in following steps.



Table 2 Control parameters

| Parameter | Master boiler | Member boiler (see notes) |
|----------------|----------------------------------|-------------------------------|
| HEAT BAND | Set on master boiler only | |
| LOC SETPOINT | Set | HD only ¹ |
| SOURCE | Set | HD or DHW only ^{1,2} |
| DHW SETPOINT | Set if DHW will be used | DHW only ² |
| OP LIMIT | Set | Set |
| LIMIT BAND | Set | Set |
| IA RESET | ON if IAR is used, or set to OFF | Do not set |
| OA SHUTDOWN | Set ON if used or set to OFF | HDOA only ³ |
| OA SETPOINT | Set if used | HDOA only ³ |
| OA RESET | Set if used | HDOA only ³ |
| OA SETPTS | Set if used | HDOA only ³ |
| DELTA ENABLE | Set if used | Set if used |
| DELTA TEMP | Set if used | Set if used |
| PURGE TIME | Set if used | Set if used |
| ALWAYS ON | Set if used | Set if used |
| MASTER PUMP | Set if used | Do not set |
| NIGHT SETBACK | Set on master boiler only | |
| OPTIONS (all) | Set | Set |
| AUX FUNCTIONS | Set on master boiler only | |
| SYSTEM CLOCK | Set | Set |
| LOCAL ADD | Automatic | Set (beginning at 2) |
| CONSOLE ADD | Automatic | Set (beginning at 2) |
| MODULAR BOILER | Set on master boiler only | |
| MODULATION PID | Set on master boiler only | |
| FIRING MODE | Set on master boiler only | |
| SENSOR # | Set | HD/HDOA only ^{1,3} |
| TYPE | Set | HD/HDOA only ^{1,3} |
| CALIBRATE? | On any boiler if required | |
| PASSWORD | Set | Set |
| COMMUNICATIONS | Set | Set |
| LOAD DEFAULTS | On any boiler if required | |
| SYSTEM | On any boiler if required | |

Notes:

1 — HD Only means to set the parameter for a member boiler only if it is wired for Heat Demand override.

2 — DHW Only means to set the parameter for a member boiler only if it is wired for DHW Demand override.

3 — HDOA Only means to set these parameters only if the member boiler will be operated with outdoor reset when put in override mode with closure across its Heat Demand terminals (requires outdoor sensor connected to boiler).

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Method 1: HeatNet modulation – local control (cont.)

- Turn on power to the master boiler and set its on/off switch to ON.
- You should hear at least 2 beeps.
- The control's firmware version number will display.
- The control's display will show **STANDBY** and **SYS SET** with a temperature of **180°F**. After the control's timer finishes, the display will show **STANDBY** and **SYS SET**. This verifies that the master boiler is setup correctly as the master. The same display will show on member boilers when there is a call for heat from the master boiler. When there is no call for heat at a member boiler, the display will show **LOC SET** instead.
- If the master is functioning correctly, the yellow LED's on the H-Link jack ports will blink. The blinking indicates that the master is trying to communicate with member boilers.
- If a **FAULT** message is displayed, clear the faults until the **STANDBY** message is displayed. Refer to troubleshooting suggestions at the end of this manual if you cannot resolve the issue.

Member boiler cables

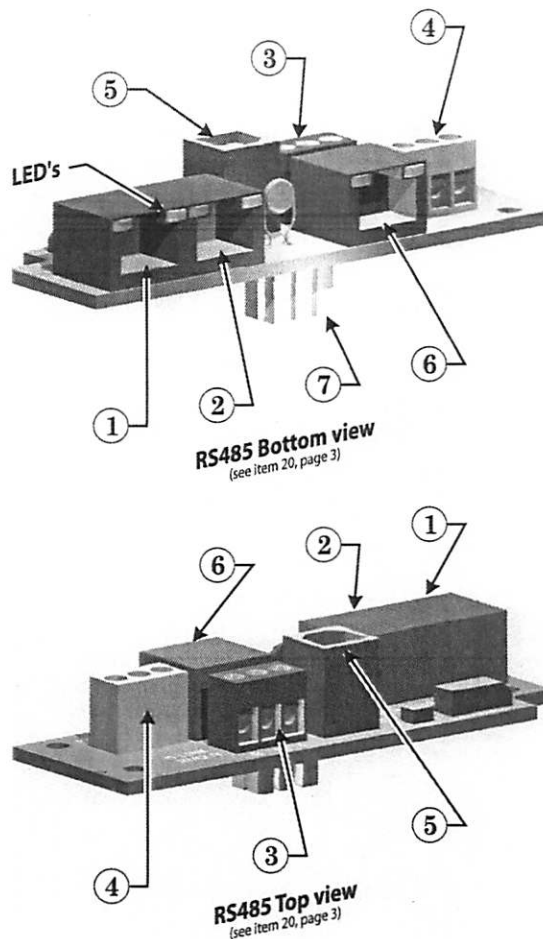
- Begin with the first member boiler.
- Plug the other end of the master boiler's communications cable to the member boiler's input port (Figure 10, item 2 for RJ45 cable or item 4 for 3-wire cable).
- Connect cables to all of the member boilers by cabling from one to the next. Connect incoming cables to item 1 or 4, Figure 10. Connect outgoing cables to item 2 or 4. (Note that shielded cable wires will share terminals when using item 4.)

Check the network

- Turn the power on and the on/off switch to ON for all of the member boilers.
- Allow time for each boiler to initialize.
- After about 30 seconds, the master boiler should recognize the member boilers.
- The control's display will show **HEAT NET BOILERS** with a list of boiler numbers **123456789** and **0'1'2'3'4'5**. Navigate to the **BOILERS** menu, then to **HEAT NET BOILERS** display. The master control will show the boilers it recognizes.
- If the display shows a blank space, such as "123_56789" the control does not detect the missing boiler (boiler 4). Check the yellow LED on the communication port of the missing boiler.
- NORMAL** connection — LED should flash steadily, about twice per second.
- TERMINATION** incorrect — LED will flash rapidly and stay on.
- OPEN** connection — LED does not flash at all.
- If a **FAULT** message is displayed, clear the faults until the **STANDBY** message is displayed. Refer to troubleshooting suggestions at the end of this manual if you cannot resolve the issue.

Start the system

- Turn off power to all boilers.
- Connect all call for heat wiring to the boilers.
- Turn on power to all boilers and turn the on/off switches to ON.
- The boilers should now operate normally, as described in the Boiler manual.
- The master boiler will sequence and modulate boilers as necessary to control the water temperature.
- The master boiler will show the number of boilers firing as well as the temperature and heat band display. Use the UP/DOWN keys to scroll through the displays to watch the process of starting and stopping boilers.

Figure 10 RS485 communications board

- RJ45 HeatNet cable IN from master or previous member
- RJ45 HeatNet cable OUT to next member boiler
- Shielded wire (3-2ire), option to RJ45 cable, HeatNet communications INPUT and connection for additional boilers on the network
- Shielded wire (option to RJ45 cable) Modbus INPUT from building management system
- USB cable port (for USB cable connection to a PC — required when updating control firmware)
- RJ45 cable from building management system, when used
- Plug for insertion into KN control electrical connection panel (see page 3)
- NOT SHOWN — An optional plug-in bridge is required to interface with building management systems that use BACnet or LonWorks protocol. The KN control supports Modbus protocol with no additional components except the RS485 interface board.

2

Method 2: HeatNet modulation – BMS control (Basic)*For Full Register Set see page 40***Overview**

1. This method uses an RS485 digital communications cable with the Modbus protocol to control a boiler or HeatNet network.
2. The boiler or boiler network will operate as in the HeatNet local control method (Section 1 of this manual). But, instead of the HEAT DEMAND input, a software form of the HEAT DEMAND input is used (address 40001 — Boiler / System Enable/Disable).
3. The System Setpoint Timer needs to be loaded periodically to allow the HeatNet system to revert to local control from the master boiler in the event communications is lost.
4. The Modbus protocol allows writing and reading registers using Modbus commands. An optional BACnet or LonWorks bridge module can be used to connect the Modbus network to a BACnet or LonWorks network.
5. This method allows enabling and disabling the boiler or HeatNet system; changing setpoints; and reading boiler status or temperatures remotely, using digital commands from a Building Management System.
6. The master boiler assumes the role of MEMBER, RTU, 192Kb, 8 bits, Even Parity, 1 stop bit, when connected to a BMS.
7. The Member Boilers should not be connected to a BMS system other than to view read-only addresses.

Table 3 Modbus holding (read/write) registers

| Address | Data Type | Description | Valid Values/Range |
|---------|-----------|--|------------------------------------|
| 40001 | Unsigned | Boiler/System Enable/Disable | 0 = Disabled/Off 1 = Enabled/On |
| 40002 | Unsigned | System Setpoint Timer (1) | 0 – 65535 seconds |
| 40003 | Unsigned | System Setpoint (1) | 40°F – 220 °F |
| 40004 | Unsigned | Outdoor Air Reset Enable/Disable | 0 = Disabled/Off 1 = Enabled/On |
| 40005 | Unsigned | Outdoor Air Setpoint | 40°F -100 °F |
| 40006 | Unsigned | Water Temperature at High Outside Air | 60°F -150 °F |
| 40007 | Unsigned | High Outside Air Temperature | 50°F -90 °F |
| 40008 | Unsigned | Water Temperature at Low Outside Air | 70°F -220 °F |
| 40009 | Signed | Low Outside Air Temperature | -35°F -40 °F |
| 40010 | Unsigned | Set Clock – Month (2) | 0 – 11 |
| 40011 | Unsigned | Set Clock – Day of Month (2) | 1 – 31 |
| 40012 | Unsigned | Set Clock – Year (2) | 0 – 99 |
| 40013 | Unsigned | Set Clock – Hours (2) | 0 – 23 |
| 40014 | Unsigned | Set Clock – Minutes (2) | 0 – 59 |
| 40015 | Unsigned | Set Clock – Seconds (2) | 0 – 59 |
| 40016 | Unsigned | Set Clock – Day of Week (2) | 1 – Monday 7 – Sunday |
| 40017 | Unsigned | Set Clock – After the Set Clock Registers listed above have been written, a 1 must be written to this location to set the clock. (2) | 1 |

MODBUS registers

1. See Table 3; Table 4; and Table 5 for register requirements.
2. The system setpoint timer and system setpoint work in tandem to externally control the operating setpoint.
3. The setpoint (countdown) timer should be loaded with a timeout value (in seconds) prior to writing the system setpoint.
4. When the timer reaches zero, the control assumes that the BMS is no longer operating and the local setpoint (saved on the master control) is reloaded.
5. This is a fail-safe feature used to help safeguard the system in case of BMS failure.
6. If the setpoint timer is not written, a default timeout value of 60 seconds is assumed.
7. To write the system clock, registers 40009 – 40015 must first be loaded with the correct date and time. Then, a 1 must be written to register 16 to write the date and time to the system clock.

Table 4 Boiler status flags

| Bit | Description | Bit | Description |
|-----|------------------------------|-----|--------------------------------|
| 0 | Disabled | 16 | Reserved |
| 1 | Local Override | 17 | Blower Running |
| 2 | Alarm | 18 | Ignition Alarm |
| 3 | Failed | 19 | Valve Alarm |
| 4 | Member Error | 20 | High Limit |
| 5 | Boiler Running | 21 | Reserved |
| 6 | Pump Running | 22 | Reserved |
| 7 | Reserved | 23 | Software Operator |
| 8 | Reserved | 24 | Header Sensor not Present |
| 9 | Reserved | 25 | Supply Sensor not Present |
| 10 | Reserved | 26 | Return Sensor not Present |
| 11 | User Interlock | 27 | Outside Air Sensor not Present |
| 12 | Reserved | 28 | — — |
| 13 | Water Prove (Flow) Interlock | 29 | Combination Air Damper |
| 14 | Reserved | 30 | Master Boiler |
| 15 | Main Valve | 31 | Present (Boiler Detected) |