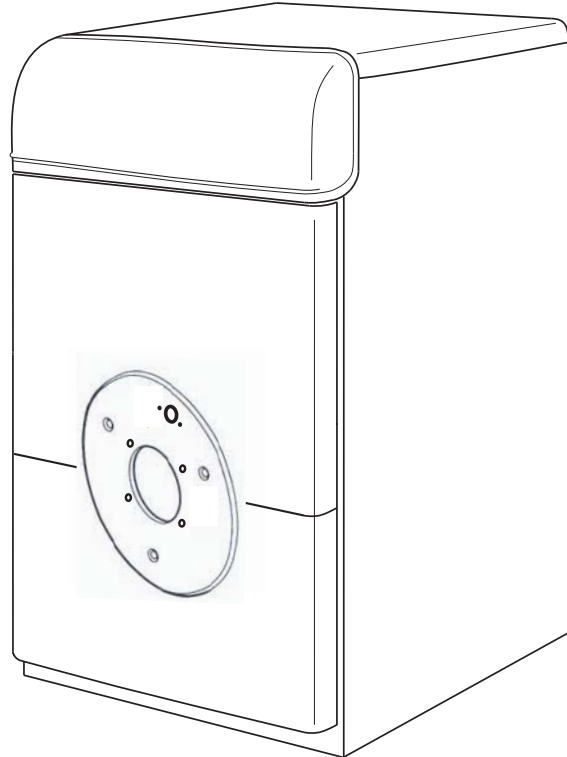




TRANE®

Oil Fired Water Boiler with Three Pass Cast Iron Heat Exchanger

**TPFWF071A93ABA
TPFWF099A94ABA
TPFWF132A95ABA
TPFWF164A96ABA
TPFWF201A97ABA
TPFWF242A98ABA
TPFWF286A99ABA**



PUB. NO. 22-1811-01



Features Summary

OIL BOILER MODLES

Annual Fuel Utilization Efficiencies (AFUE) and I=B=R® performance ratings are certified in accordance with US Department of Energy test procedures. Efficiency and performance ratings are listed in the Consumer Directory of Certified Efficiency Ratings for Heating and Water Heating Equipment and follow Federal Trade Commission labeling regulations. Oil boilers are listed in accordance with CSA B140.7-05 Oil Burning Boilers and UL 726 Oil Fired Boilers. Oil burners are listed in accordance with CSA B140.2.1 Oil Burners – Atomizing and UL 296 Oil Burners.

Boiler heat exchanger assemblies are constructed and hydrostatically tested to three times working pressure in accordance with American Society of Mechanical Engineers (ASME) and Pressure Vessel Code Section IV for cast iron heating boilers. Boilers are marked with an ASME H stamp.

CAST IRON HEAT EXCHANGER ASSEMBLY

Three pass heat exchanger for maximum efficiency. Sections are assembled with steel push nipples. Easily reversible hinged door for application fit – ships with hinges on right side. Swing door provides quick open access for cleaning. Combustion chamber sight glass

CONTROLS

Control panel mounted power disconnect switch with factory installed temperature-pressure gauge and factory installed adjustable supply water thermostat (fixed 18° F differential). A high limit temperature control is factory installed inside the control panel. Circulator and burner operation are field configurable.

OIL BURNER

Completely assembled Riello oil burner with welded flange, installed burner cord, 24 volt relay and matching Trane Polyslate gray acoustically insulated burner cover. Accessory purchased separately from boiler. Boiler and burner electrical cables are pre-wired with seven pin polarized connectors for quick connection. Boiler and burner cord are restrained to limit cord length and heat exchanger swing door opening without first disconnecting polarized plug. Electronic air shutter automatically closes air intake virtually eliminating heat loss through burner when not operating, enhancing burner efficiency. Burner has 5 second safety shutoff and a 10 second pre-purge for smoke free starts. High static pressure combustion head for ideal flame geometry and titanium air tube for long life.

APPLICATIONS

Oil-fired boilers are available in seven sizes with heating inputs of 71,000 to 286,000 BTU/hr and AFUE of up to 86.7%. Boilers may be used in a wide variety of applications including radiant floor heating, baseboard heating, zoned heating systems, snow melt and indirect domestic hot water. Compact size allows easy installation in a basement or utility room. All boilers are factory assembled with all controls installed and wired with in the cabinet (Oil burner is field installed)

STYLING

Jacket constructed of heavy 20 gauge steel. Powder painted polyslate gray matching Trane indoor products color. Tool-less top and front access panels. Easy to disassemble jacket for handling and maintenance



Contents

Feature Summary

Features and Benefits

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Optional Equipment

General Data

TPFWF071A93ABA

TPFWF099A94ABA

TPFWF132A95ABA

TPFWF164A96ABA

TPFWF201A97ABA

TPFWF242A98ABA

TPFWF286A99ABA

Performance Data

Electric Data

Field Wiring Diagrams

Dimensions

Typical System Piping Diagrams



Features and Benefits

OIL FIRED BOILER STANDARD EQUIPMENT

- Power supply 115/1/60
- Exceeds Energy Star® minimum efficiency
- Efficiencies up to 86.7% AFUE
- Convertible left/right swing door
- Rear utilities - easy connections
- Simplified field connections to terminal strip
- Controls and components enclosed in jacket
- Tapered NPT pipe threads
- Powder painted polyslate gray jacket
- Cast iron sections assembled with steel push nipple
- Field configurable circulator/burner operation
- Tool-less top and front access panel removal
- Control panel mounted power disconnect switch
- Factory installed temperature pressure gauge
- Factory installed adjustable water thermostat
- Factory installed automatic resetting high limit
- 30 PSI ASME relief valve and Tee included (installation required)
- 3" heat exchanger insulation
- Optional manual reset high limit accessory (installation required)
- Oil burner with factory installed relay kit and electronic air shutter
- Oil burner sound enclosure matches boiler jacket color
- **5 Year limited parts warranty**
- **Limited lifetime heat exchanger warranty**
- **Optional extended warranties**



Features and Benefits

OIL FIRED BOILER OPTIONAL EQUIPMENT

Thermostat, Mechanical 2-Stage Heating/ 1-Stage Cooling.....	TAYSTAT241 []
Thermostat, Mechanical Heating Only With Fan Switch	BAYSTAT303 []
Thermostat, Mechanical Heating Only.....	BAYSTAT388 []
Thermostat, Heating/Cooling Single Stage (Mounts Horizontally)	AY28X092 []
Thermostat, Electronic Non-programmable 1-Stage Heating/1-Stage Cooling.....	BAYSTAT370 []
Thermostat, Electronic Programmable (5-2) 1-Stage Heating/1-Stage Cooling.....	BAYSTAT340 []
Thermostat, Heating/Cooling Single Stage (Mounts Vertically)	BAYSTAT305 []
Thermostat, Electronic Programmable 2-Stage Heating/2-Stage Cooling	TAYSTAT302C []
Thermostat, Electronic Programmable 1-Stage Heating/1-Stage Cooling	TAYSTAT300C []
Manual Reset High Limit Temperature Control.....	BAYLMT10AMRSTA []
Trim Kit including 4.4 Gallon Expansion Tank, Fill Valve, Backflow Preventer (1"NPT), and Air Eliminator	BAYTRM10AVTVPA []
Trim Kit including 4.4 Gallon Expansion Tank, Fill Valve, Backflow Preventer (1-1/4"NPT), and Air Eliminator	BAYTRM20AVTVPA []
4.4 Gallon Expansion Tank.....	BAYEXP30ATANKA []



General Data

Table 1 - General Specifications			
Model ¹	*PFWF071A93ABA	*PFWF099A94ABA	*PFWF132A95ABA
Input BTU/hr	71,000	99,000	132,000
DOE Output BTU/hr	61,000	86,000	115,000
I=B=R Net Water BTU/hr	53,000	75,000	100,000
Efficiency - AFUE	85.5	85.7	85.9
Electrical Power Supply	115 volts / 1 phase / 60 hertz		
Minimum Circuit Ampacity - amps	less than 12.0		
Maximum Overcurrent Protection - amps	15		
Nominal Flue Outlet Dia. - inches (tapered)	5	5	5
No. of Heat Exchanger Passes	3	3	3
No. of Sections	3	4	5
Water Content - Gallons	3.4	4.5	5.5
Supply Water Connection - NPT	1-1/4"	1-1/4"	1-1/4"
Return Water Connection - NPT	1-1/4"	1-1/4"	1-1/4"
Maximum Working Pressure - PSIG ⁵	60.0	60.0	60.0
Combustion Chamber Pressure Drop - in w.c.	0.02	0.04	0.08
Combustion Chamber Volume - Cubic Feet	0.87	1.12	1.37
Water Pressure Drop 10 ⁰ Td - Ft Head	0.2	0.4	0.7
Water Pressure Drop 20 ⁰ Td - Ft Head	0.1	0.1	0.2
Water Pressure Drop 30 ⁰ Td - Ft Head	-	-	0.1
Riello Non Direct Vent (40 Series) ^{2,3,4}	BAYRAF03ABURNA	BAYRAF03ABURNA	BAYRAF05ABURNA
Riello Direct Vent (40 Series) ^{2,3,4}	BAYRBF03ABURNA	BAYRBF03ABURNA	BAYRBF05ABURNA
Crated Dimensions - inches (H x W x D)	40-3/16 x 24-13/16 x 23-5/8	40-3/16 x 28-3/4 x 23-5/8	40-3/16 x 32-11/16 x 23-5/8
Ship Weight (Lbs) / Net (Lbs)	294 / 262	360 / 326	429 / 390

Notes

1. * May be "A" or "T"

2. Oil burner is purchased separately as an accessory. Ships pre-assembled. Burner cord pre-wired with 7 pin plug that connects to boiler

3. BAYRAF03 & BAYRBF03 burners ship with a factory installed nozzle for use with *PFWF071A. An additional nozzle, which requires field installation, is included for use with *PFWF099A

4. BAYRAF05 and BAYRBF05 burners ship with a factory installed nozzle for use with *PFWF132A. Two additional nozzles are included, which require field installation; one each for use with *PFWF164A and *PFWF201A

5. Boiler is shipped with 30 psi ASME Pressure Relief Valve



Table 1 - General Specifications (Continued)		
Model ¹	*PFWF164A96ABA	*PFWF201A97ABA
Input BTU/hr	164,000	201,000
DOE Output BTU/hr	143,000	176,000
I=B=R Net Water BTU/hr	125,000	153,000
Efficiency - AFUE	86.1	86.3
Electrical Power Supply	115 volts / 1 phase / 60 hertz	
Minimum Circuit Ampacity - amps	less than 12.0	
Maximum Overcurrent Protection	15	
Nominal Flue Outlet Dia. - inches (tapered)	5	5
No. of Heat Exchanger Passes	3	3
No. of Sections	6	7
Water Content - Gallons	6.7	7.9
Supply Water Connection - NPT	1-1/4"	1-1/4"
Return Water Connection - NPT	1-1/4"	1-1/4"
Maximum Working Pressure - PSIG ⁵	60.0	60.0
Combustion Chamber Pressure Drop - in w.c.	0.12	0.14
Combustion Chamber Volume - Cubic Feet	1.62	1.87
Water Pressure Drop 10 ⁰ Td - Ft Head	1.1	1.6
Water Pressure Drop 20 ⁰ Td - Ft Head	0.3	0.5
Water Pressure Drop 30 ⁰ Td - Ft Head	0.2	0.2
Riello Non Direct Vent (40 Series) ^{2,3}	BAYRAF05ABURNA	BAYRAF05ABURNA
Riello Direct Vent (40 Series) ^{2,3}	BAYRBF05ABURNA	BAYRBF05ABURNA
Crated Dimensions - inches (H x W x D)	40-3/16 x 36-5/8 x 23-5/8	40-3/16 x 40-9/16 x 23-5/8
Ship Weight (Lbs) / Net (Lbs)	497 / 454	565 / 518

Notes

1. * May be "A" or "T"
2. Riello burner purchased separately as an accessory. Ships pre-assembled. Burner cord pre-wired with 7 pin plug that connects to boiler
3. BAYRAF05 and BAYRBF05 ship with a factory installed nozzle for use with *PFWF132A. Two additional nozzles are included which require field installation; one each for use with *PFWF164A and *PFWF201A
4. BAYRAF10 ships with a factory installed nozzle for use with *PFWF242A. An additional nozzle, which requires field installation, is included for use with *PFWF286A
5. Boiler is shipped with 30 psi ASME Pressure Relief Valve



Model ¹	*PFWF242A98ABA	*PFWF286A99ABA
Input BTU/hr	242,000	286,000
DOE Output BTU/hr	212,000	252,000
I=B=R Net Water BTU/hr	185,000	219,000
Efficiency - AFUE	86.5	86.7
Electrical Power Supply	115 volts / 1 phase / 60 hertz	
Minimum Circuit Ampacity - amps	less than 12.0	
Maximum Overcurrent Protection	15	
Nominal Flue Outlet Dia. - inches (tapered)	5	5
No. of Heat Exchanger Passes	3	3
No. of Sections	8	9
Water Content - Gallons	9.1	10.3
Supply Water Connection - NPT	1-1/4"	1-1/4"
Return Water Connection - NPT	1-1/4"	1-1/4"
Maximum Working Pressure - PSIG ⁵	60.0	60.0
Combustion Chamber Pressure Drop - in w.c.	0.16	0.20
Combustion Chamber Volume - Cubic Feet	2.12	2.37
Water Pressure Drop 10 ⁰ Td - Ft Head	2.3	3.2
Water Pressure Drop 20 ⁰ Td - Ft Head	0.6	0.9
Water Pressure Drop 30 ⁰ Td - Ft Head	0.3	0.4
Riello Non Direct Vent (40 Series) ^{2,4}	BAYRAF10ABURNA	BAYRAF10ABURNA
Riello Direct Vent (40 Series) ^{2,4}	-	-
Crated Dimensions - inches (H x W x D)	40-3/16 x 44-1/2 x 23-5/8	40-3/16 x 48-7/16 x 23-5/8
Ship Weight (Lbs) / Net (Lbs)	632 / 582	698 / 646

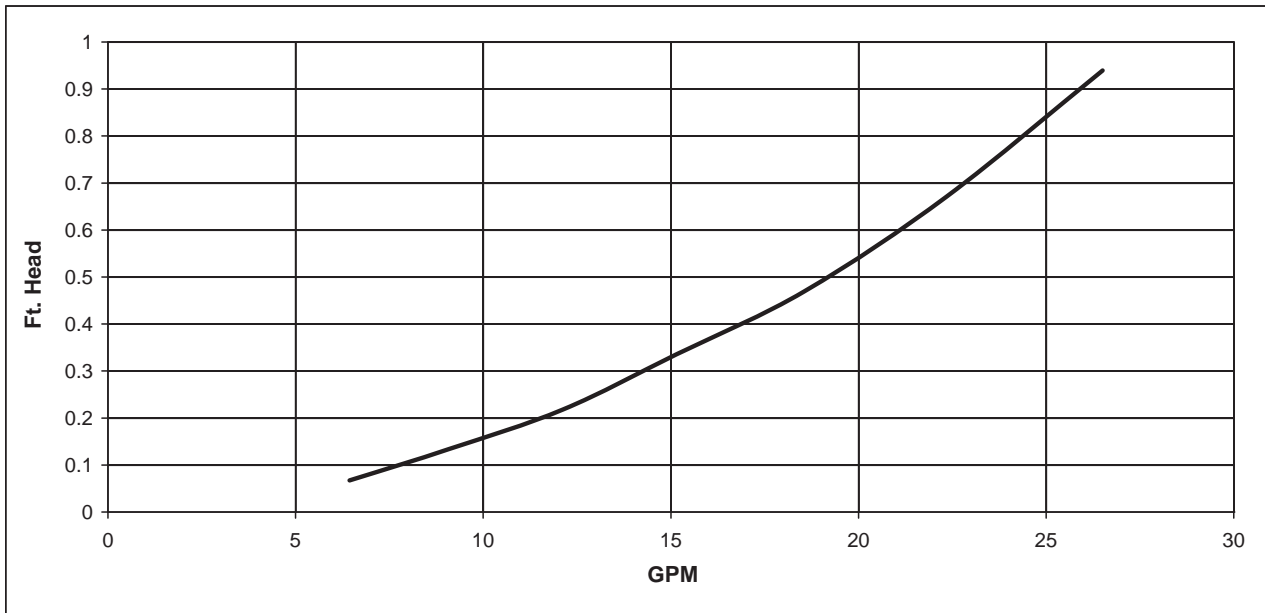
Notes

1. * May be "A" or "T"
2. Riello burner purchased separately as an accessory. Ships pre-assembled. Burner cord pre-wired with 7 pin plug that connects to boiler
3. BAYRAF05 and BAYRBF05 ship with a factory installed nozzle for use with *PFWF132A. Two additional nozzles are included which require field installation; one each for use with *PFWF164A and *PFWF201A
4. BAYRAF10 ships with a factory installed nozzle for use with *PFWF242A. An additional nozzle, which requires field installation, is included for use with *PFWF286A



Performance Data

Head Loss versus Flow for TPFWF Models

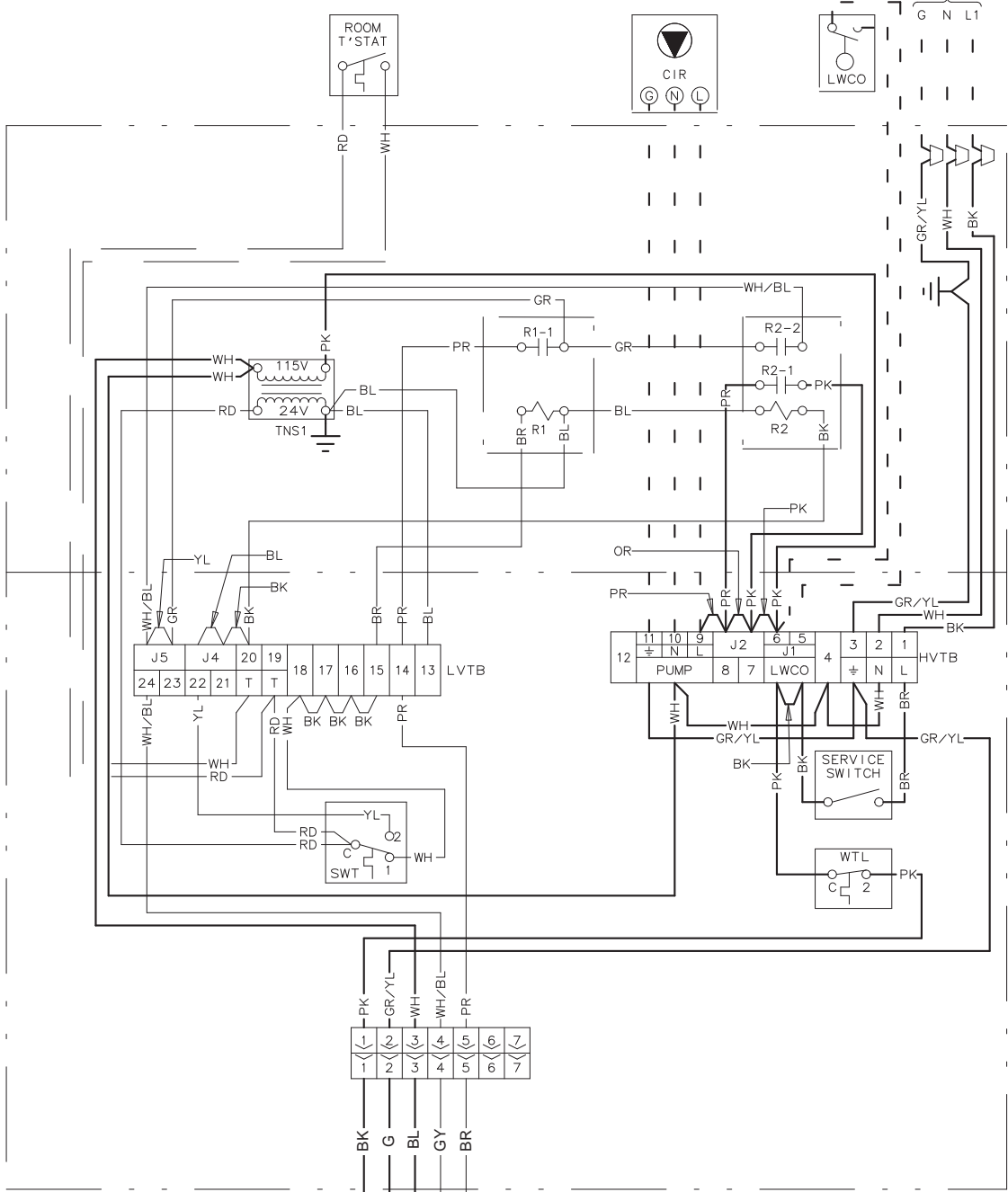




Electrical Wiring Diagram

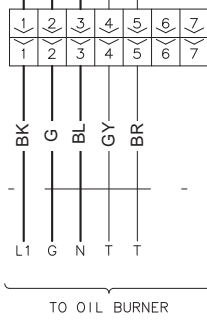
WIRING DIAGRAM OIL FIRED BOILER

115V, 1Ph, 60 Hz
POWER SUPPLY
PER LOCAL CODE



WIRING COLOUR LEGEND

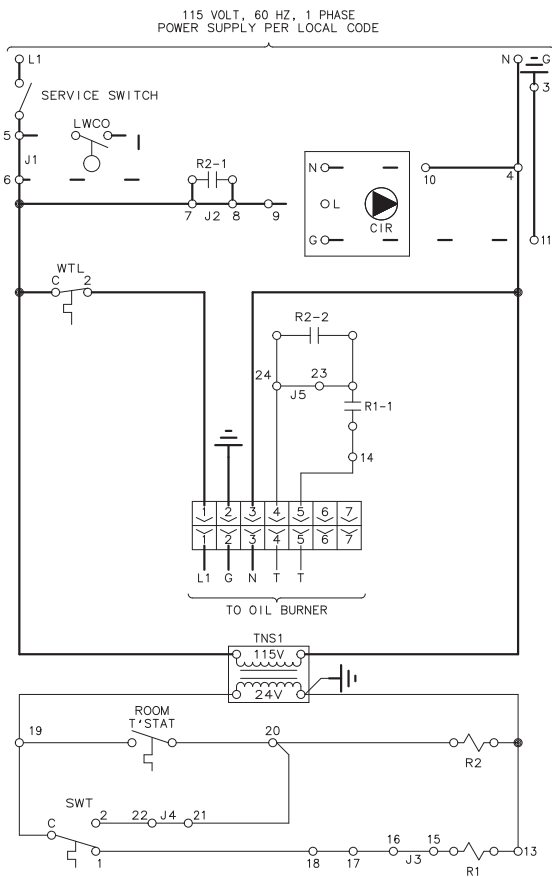
- BK = BLACK
- G = GREEN
- BL = BLUE
- GY = GRAY
- BR = BROWN
- W = WHITE
- R = RED



3540F100

Schematic Diagram

SCHEMATIC DIAGRAMS FOR OIL FIRED BOILER



LEGEND-EQUIPMENT DIAGRAM

— 24 V. } FACTORY WIRING		POL. PLUG FEMALE HOUSING (MALE TERM.)
- - 24 V. } FIELD WIRING		POL. PLUG MALE HOUSING (FEMALE TERM.)
— 24 V. } FACTORY WIRING		RESISTOR OR HEATING ELEMENT
- - 24 V. } FIELD WIRING		MOTOR WINDING
— 24 V. } FACTORY WIRING		TERMINAL
- - 24 V. } FIELD WIRING		COLOR OF WIRE
— 24 V. } FACTORY WIRING		BK/BL BLACK WIRE WITH BLUE MARKER
- - 24 V. } FIELD WIRING		COLOR OF MARKER
— 24 V. } FACTORY WIRING		OR ORANGE
- - 24 V. } FIELD WIRING		YL YELLOW
— 24 V. } FACTORY WIRING		GR GREEN
- - 24 V. } FIELD WIRING		BR BROWN
— 24 V. } FACTORY WIRING		WH WHITE
- - 24 V. } FIELD WIRING		PR PURPLE
— 24 V. } FACTORY WIRING		PK PINK
— 24 V. } FACTORY WIRING		FUSIBLE LINK
- - 24 V. } FIELD WIRING		LIMIT (POSITION) SWITCH
— 24 V. } FACTORY WIRING		LIGHT
- - 24 V. } FIELD WIRING		CIRCULATOR PUMP

BLACK J1 LWCO JUMPER (REMOVE WHEN CONNECTING FIELD SUPPLIED LWCO).
ORANGE J2 PUMP CONTROL JUMPER (SHORT = CONTINUOUS, OPEN = ONLY DURING HEAT DEMAND).
BLUE J4 PUMP OVER RUN JUMPER (SHORT = OVER RUN WITHOUT HEAT DEMAND, OPEN = NO OVER RUN).

YELLOW J5 JUMPER (SHORT = BURNER CYCLED BY SWT ONLY; OPEN = BURNER STARTS ONLY WHEN BOTH SWT AND ROOM THERMOSTAT ARE CLOSED AND BURNER STOPS WHEN EITHER ROOM THERMOSTAT OR SWT OPENS).

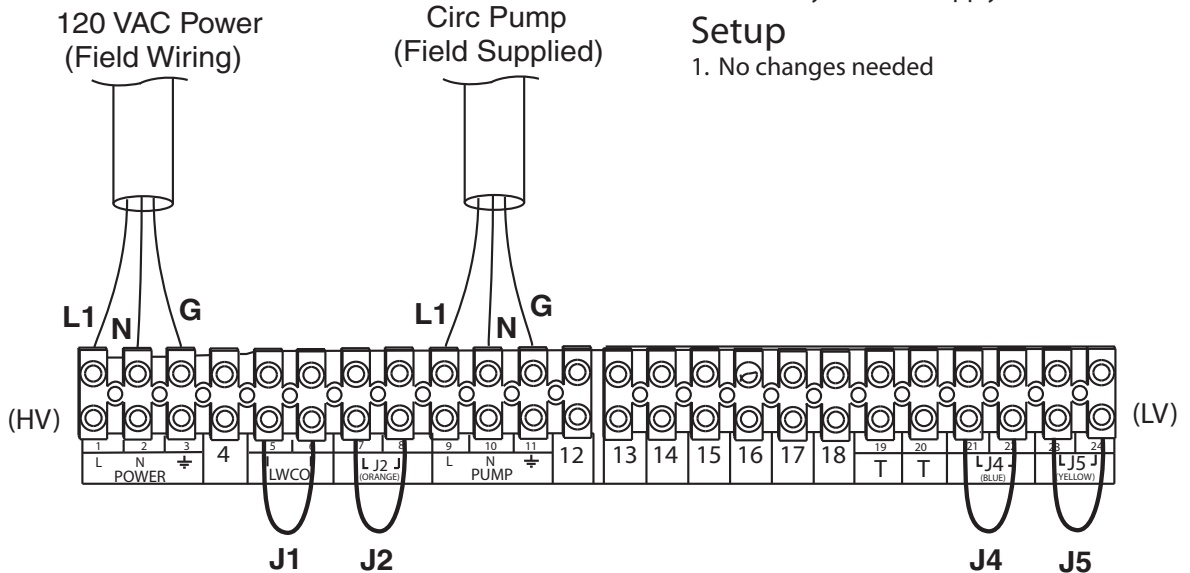
- LWCO - LOW WATER CUT OFF (FIELD SUPPLIED - CONNECT PER MANUFACTURERS INSTRUCTIONS).
- *AVD - AUTOMATIC VENT DAMPER (ATMOSPHERIC MODELS ONLY) - FACTORY PROVIDED, FIELD INSTALLED.
- PS - PRESSURE SWITCH (INDUCED DRAFT ONLY)
- IP - IGNITOR PROBE
- FD - FLAME DETECTOR
- IGN - IGNITION CONTROL MODULE
- SWT - SUPPLY WATER THERMOSTAT
- WTL - WATER TEMPERATURE LIMIT SWITCH
- CIR - CIRCULATOR PUMP (FIELD SUPPLIED)
- CFM - COMBUSTION FAN MOTOR (INDUCED DRAFT ONLY)
- FL - FUSIBLE LINK
- GV - GAS VALVE
- TNS1 - 24V CONTROL POWER TRANSFORMER
- DHSS - DRAFT HOOD SPILLAGE SWITCH (ATMOSPHERIC MODELS ONLY)
- HVTB - HIGH VOLTAGE TERMINAL BLOCK (115V)
- LVTB - LOW VOLTAGE TERMINAL BLOCK

NOTES:

1. IF ANY OF THE ORIGINAL WIRE AS SUPPLIED IN THIS UNIT MUST BE REPLACED, REPLACE IT WITH APPLIANCE WIRING MATERIAL RATED AT 105°C.

Field Wiring

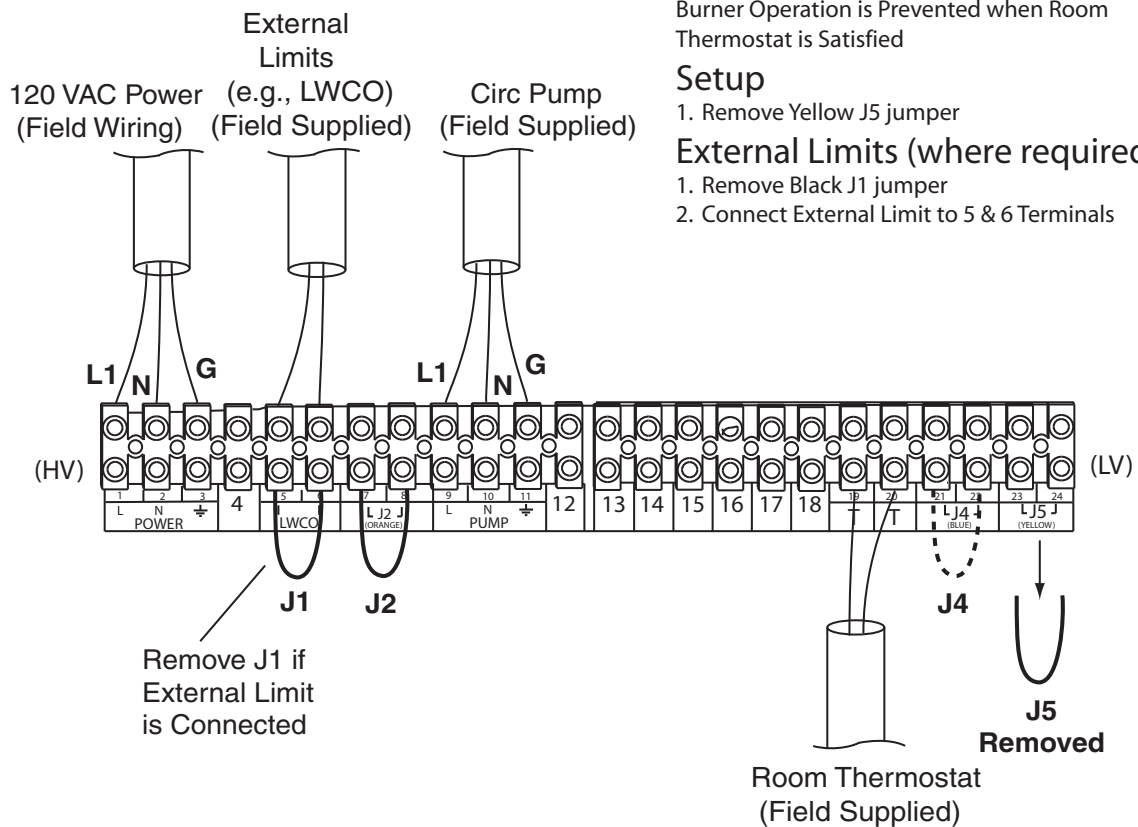
Option 1 - Factory Jumpers in Place



System Configuration

1. Continuous Pump Operation
 2. Burner Cycles With Supply Water Thermostat Setup
- Setup
1. No changes needed

Option 2 - Field Installed Room Thermostat, Yellow J5 jumper removed



System Configuration

1. Continuous Pump Operation
2. Burner Cycles with Supply Water Thermostat when Call from Room Thermostat is present; Burner Operation is Prevented when Room Thermostat is Satisfied

Setup

1. Remove Yellow J5 jumper

External Limits (where required)

1. Remove Black J1 jumper
2. Connect External Limit to 5 & 6 Terminals

Option 3 - Field Installed Room Thermostat, Orange J2 jumper removed

System Configuration

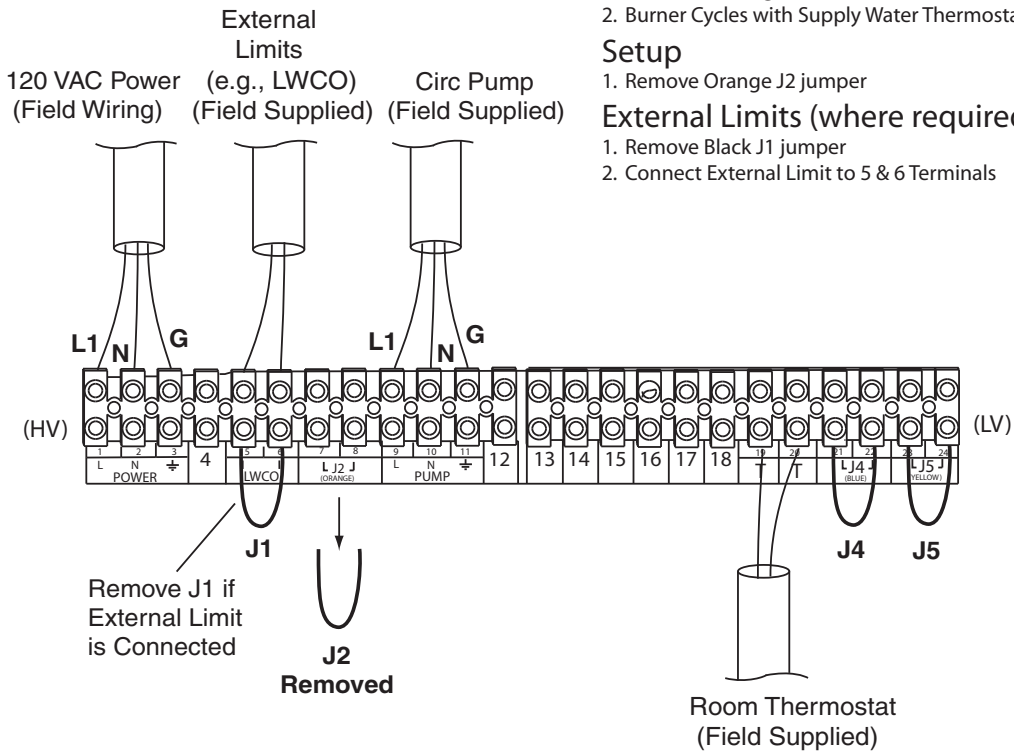
- 1. Pump Runs on Call from Room Thermostat OR if Water Temperature is Above Supply Water Thermostat setting
- 2. Burner Cycles with Supply Water Thermostat

Setup

- 1. Remove Orange J2 jumper

External Limits (where required)

- 1. Remove Black J1 jumper
- 2. Connect External Limit to 5 & 6 Terminals



Option 4 - Field Installed Room Thermostat, Orange J2 jumper removed, Blue J4 jumper removed

System Configuration

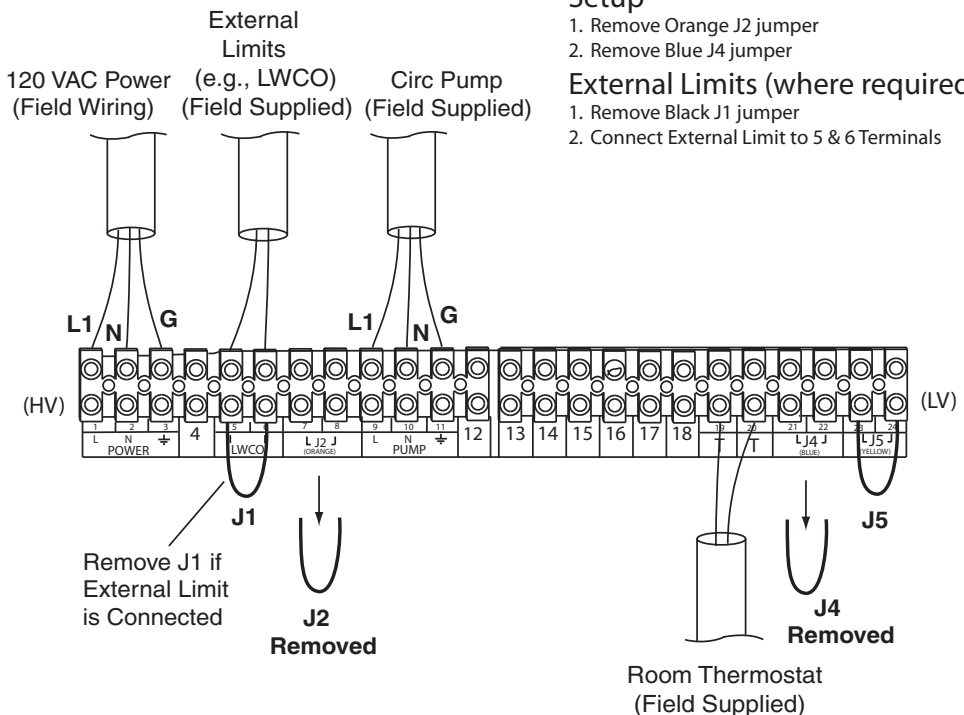
- 1. Pump Controlled by Room Thermostat
- 2. Burner Cycles with Supply Water Thermostat

Setup

- 1. Remove Orange J2 jumper
- 2. Remove Blue J4 jumper

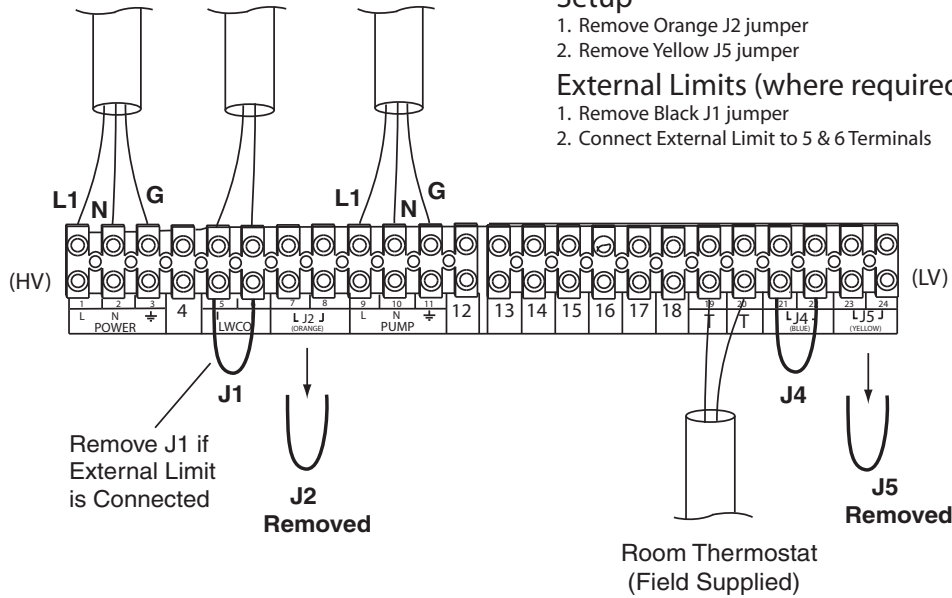
External Limits (where required)

- 1. Remove Black J1 jumper
- 2. Connect External Limit to 5 & 6 Terminals



Option 5 - Field Installed Room Thermostat, Orange J2 jumper removed, Yellow J5 jumper removed

120 VAC Power (Field Wiring) External Limits (e.g., LWCO) (Field Supplied) Circ Pump (Field Supplied)



System Configuration

1. Pump Runs on Call from Room Thermostat OR if Water Temperature is Above Supply Water Thermostat setting
2. Burner Cycles with Supply Water Thermostat during Call from Room Thermostat. Burner Operation is Prevented when Room Thermostat is Satisfied

Setup

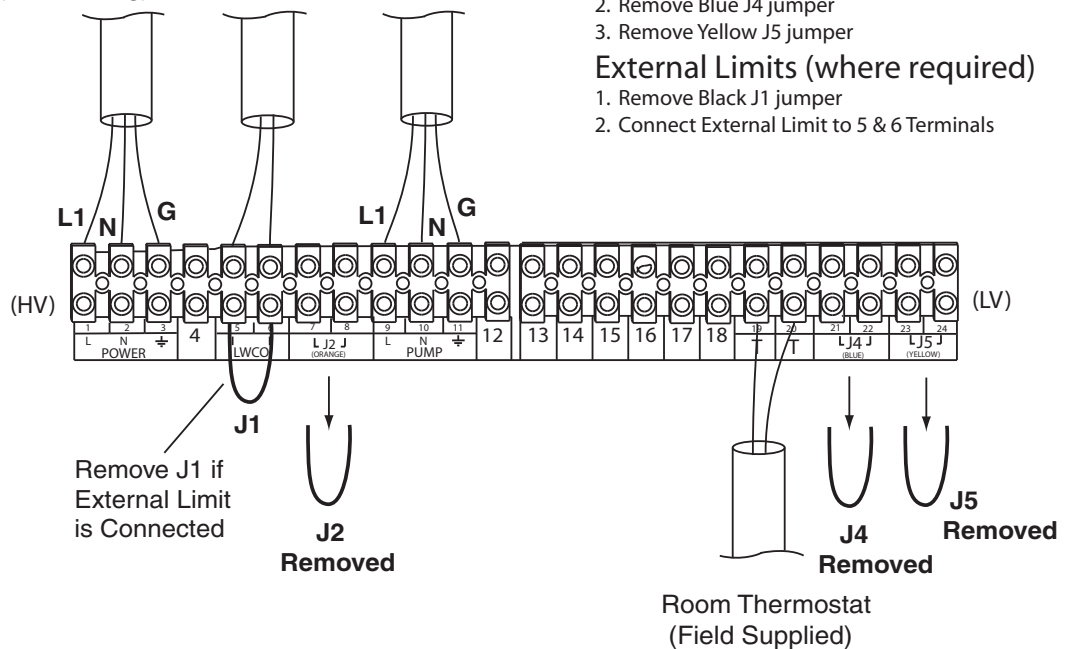
1. Remove Orange J2 jumper
2. Remove Yellow J5 jumper

External Limits (where required)

1. Remove Black J1 jumper
2. Connect External Limit to 5 & 6 Terminals

Option 6 - Field Installed Room Thermostat, Orange J2 jumper removed, Blue J4 jumper removed, Yellow J5 jumper removed

120 VAC Power (Field Wiring) External Limits (e.g., LWCO) (Field Supplied) Circ Pump (Field Supplied)



System Configuration

1. Pump Runs off Room Thermostat
2. Burner Cycles with Supply Water Thermostat during Call from Room Thermostat; Burner Operation is Prevented when Room Thermostat is Satisfied

Setup

1. Remove Orange J2 jumper
2. Remove Blue J4 jumper
3. Remove Yellow J5 jumper

External Limits (where required)

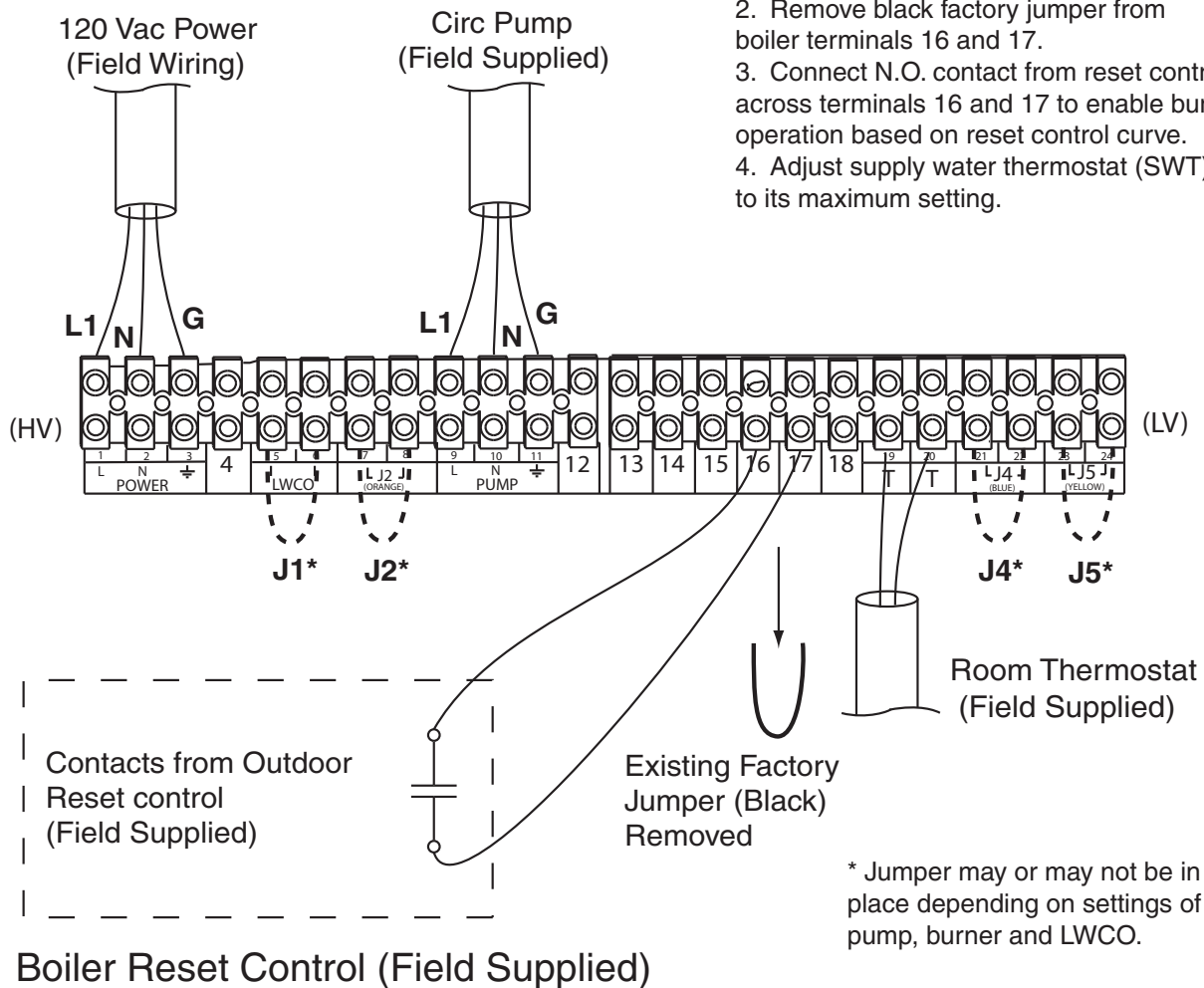
1. Remove Black J1 jumper
2. Connect External Limit to 5 & 6 Terminals

Boiler Reset Option - Field Wiring for Field Supplied Boiler Temperature Reset Controls (to Decrease Boiler Water Temperature with Increasing Outdoor Temperature)

Boiler Reset Configuration

NOTE: This Boiler Reset option may be used in combination with any of the other system configuration options and jumper arrangements shown in this document.

1. Use field supplied boiler reset control with water temperature sensor and outdoor temperature sensor. Install according to manufacturer's instructions.
2. Remove black factory jumper from boiler terminals 16 and 17.
3. Connect N.O. contact from reset control across terminals 16 and 17 to enable burner operation based on reset control curve.
4. Adjust supply water thermostat (SWT) to its maximum setting.





Dimensions

The minimum clearances from boiler casing surfaces to combustible materials are:

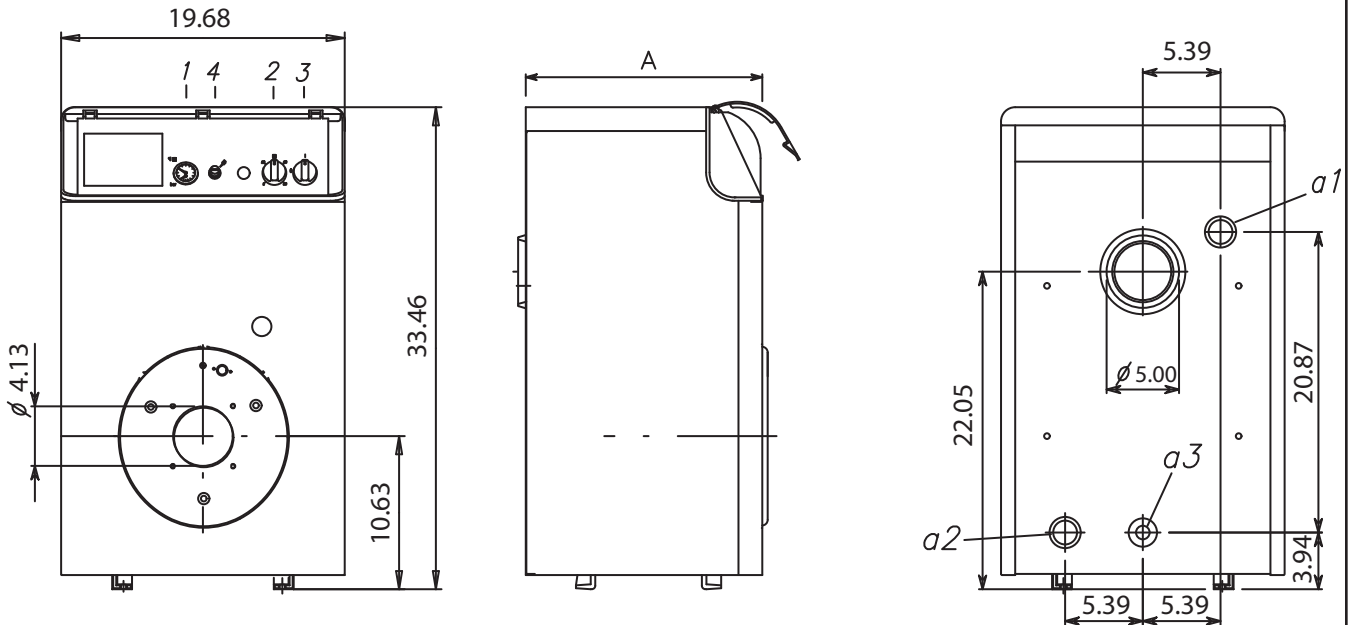
Table 2

	Minimum Clearances for Combustion	Minimum Clearances for Service
Top	6"	36" (2)
Right Side	6"	24" (1)
Left Side	6"	6" (1)
Front	18"	30" (2)
Back	6"	6" (2)

(1) Leave at least 24" on one side of the boiler and 6" on the opposite side

(2) Though these are approved clearances for these boilers, space must be provided at the front (18 inches minimum, 24 inches recommended) and at the rear of the boiler for access, service, and replacement of the oil burner and other hydronic system components.

Outline Drawings Dimensions and Connections



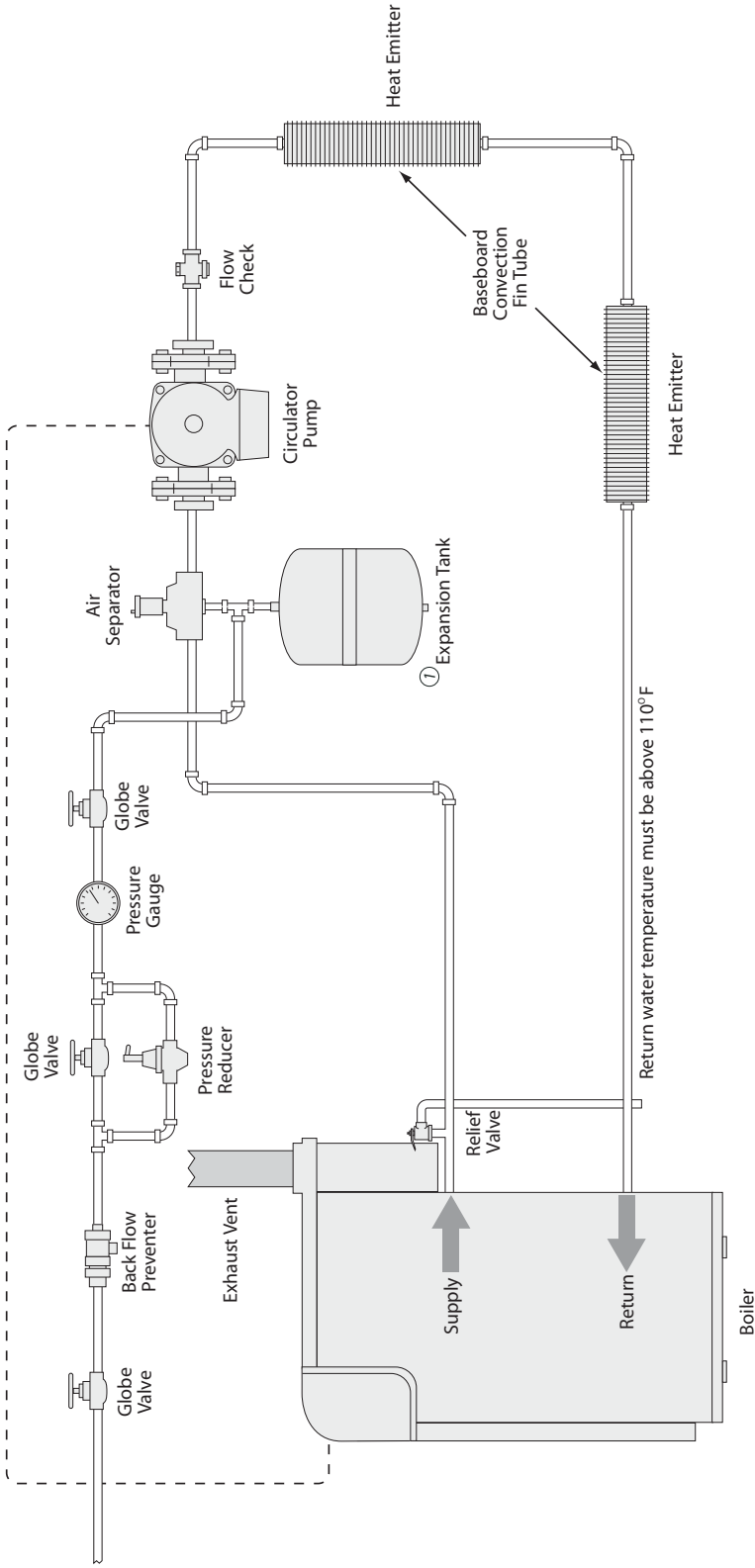
All dimensions are in inches

Table 3

Model	A	a1	a2	a3
	in.	in.	in.	in.
TPFWF071A93ABA	17.0	1 1/4	1 1/4	1/2
TPFWF099A94ABA	20.9	1 1/4	1 1/4	1/2
TPFWF132A95ABA	24.9	1 1/4	1 1/4	1/2
TPFWF164A96ABA	28.8	1 1/4	1 1/4	1/2
TPFWF201A97ABA	32.8	1 1/4	1 1/4	1/2
TPFWF242A98ABA	36.7	1 1/4	1 1/4	1/2
TPFWF286A99ABA	40.6	1 1/4	1 1/4	1/2

Typical System Piping Diagrams

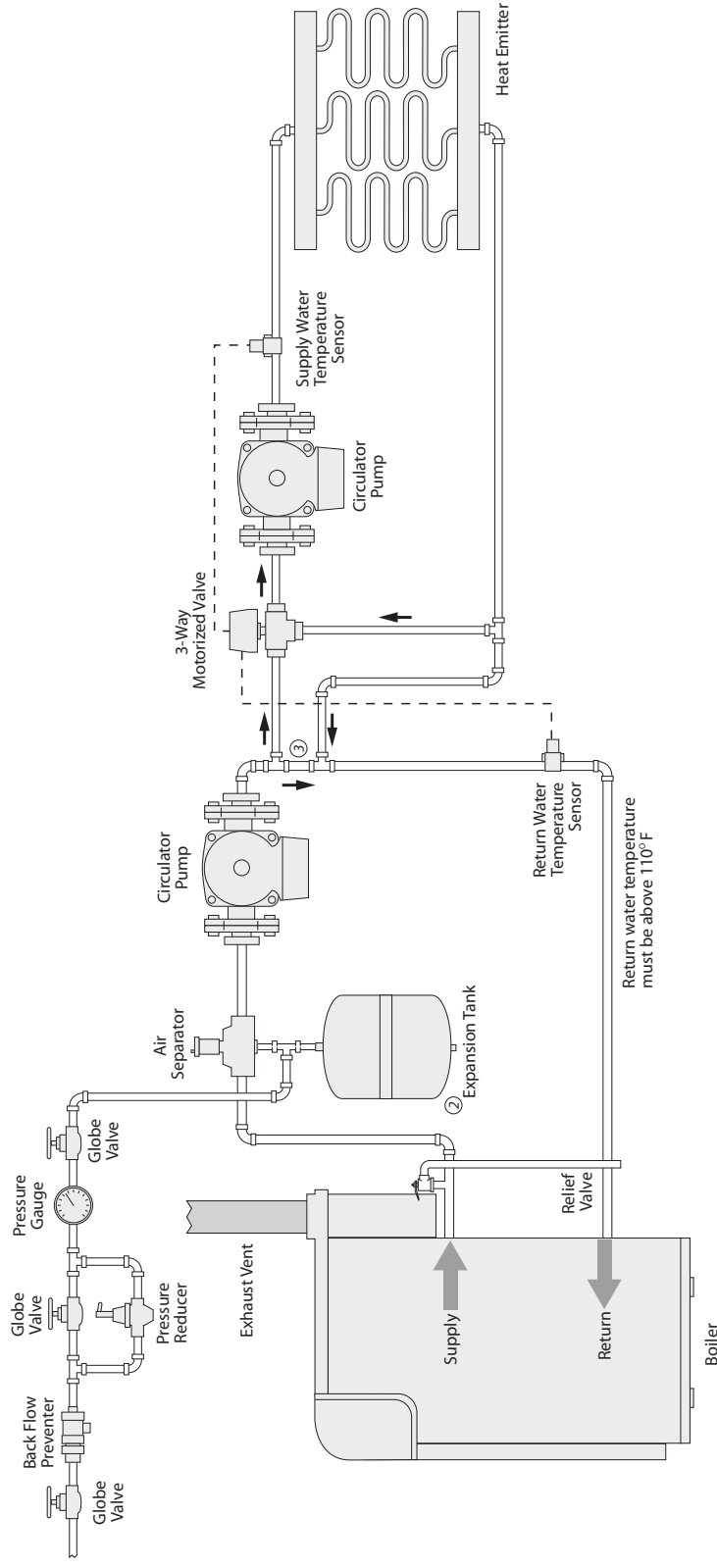
Typical System Piping Diagram
Single Zone System - High Temperature with Low Mass Heat Emitters



NOTES:
① Locate circulator inlet close to connection point of the expansion tank, but allow at least the equivalent of 10 to 12 pipe diameters between the circulator pump and the expansion tank to reduce the possibility of pump noise and facilitate air removal.

Typical System Piping Diagram

- ① Primary Secondary Loop with 3-way Motorized Valve
Low Temperature with Low Mass Heat Emitters
or High Temperature with High or Low Mass Heat Emitters

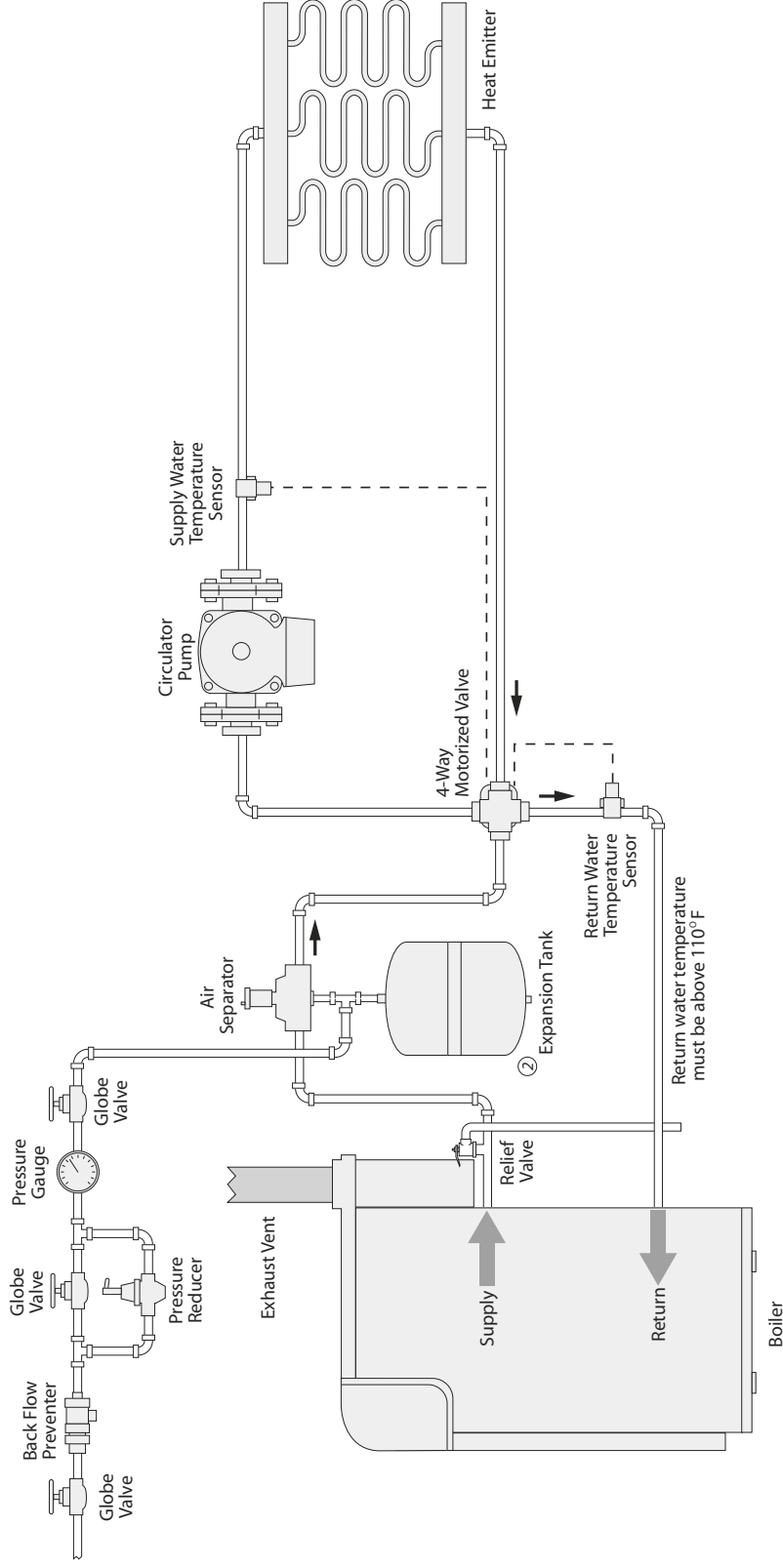


NOTES:

- ① Protects boiler from too low return water temperature and condensation.
- ② Locate circulator inlet close to connection point of the expansion tank, but allow at least the equivalent of 10 to 12 pipe diameters between the circulator pump and the expansion tank to reduce the possibility of pump noise and facilitate air removal.
- ③ Close coupled Tees

Typical System Piping Diagram

- ① Primary Secondary Loop with 4-Way Motorized Valve with Circulator in Secondary Loop
 Low Temperature with Low Mass Heat Emitters
 or High Temperature with High or Low Mass Heat Emitters

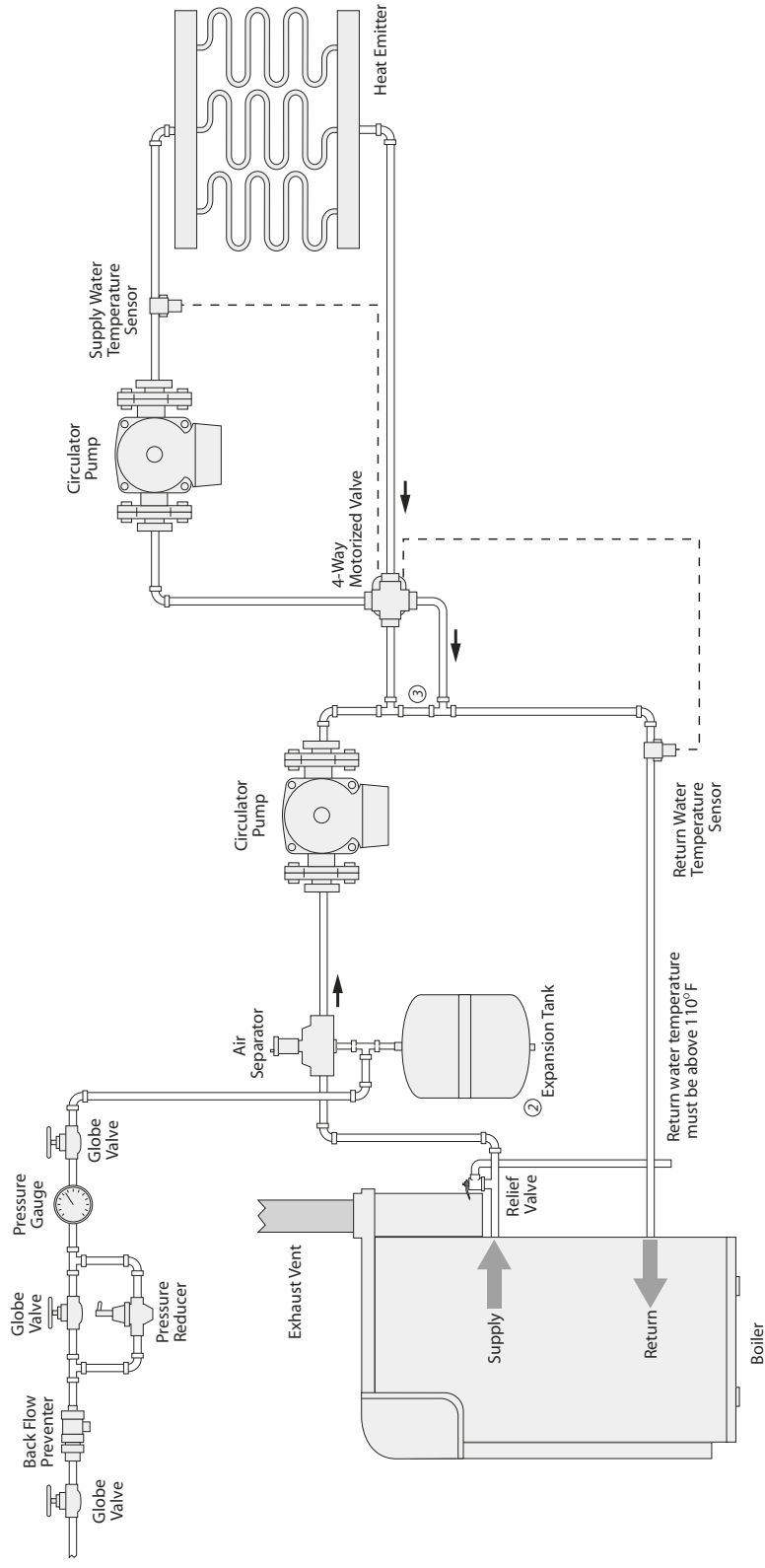


NOTES:

- ① Protects boiler from too low return water temperature and condensation.
- ② Locate circulator inlet close to connection point of the expansion tank, but allow at least the equivalent of 10 to 12 pipe diameters between the circulator pump and the expansion tank to reduce the possibility of pump noise and facilitate air removal.

Typical System Piping Diagram

- ① Primary Secondary Loop with 4-way Motorized Valve
- ② Low Temperature with Low Mass Heat Emitters
- ③ or High Temperature with High or Low Mass Heat Emitters

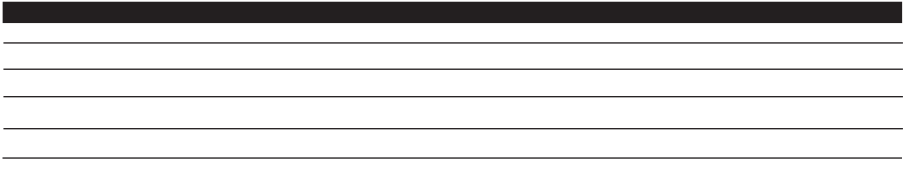


NOTES:

- ① Protects boiler from too low return water temperature and condensation.
- ② Locate circulator inlet close to connection point of the expansion tank, but allow at least the equivalent of 10 to 12 pipe diameters between the circulator pump and the expansion tank to reduce the possibility of pump noise and facilitate air removal.
- ③ Close coupled tees



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*Since **Trane** has a policy of continuous product improvement, **it** reserves the right to change design and specifications without notice.*