

The 14 updated pages of document 1295A. The Brute LX (Series 1, wall only) Installation and Operating Manual.

## 1.11 Unpacking and the Installation Kit

All Brute LX's are shipped in a single box with an Installation Kit. See Figure 4. Unpack the unit and check that all components shown are included with your unit. The Installation Kit contains the following items.

1. Flow Restrictor
2. Outdoor Sensor
3. Ball Valve
4. Exhaust Terminal Assembly
5. Air intake terminal Assembly
6. Condensate Trap Assembly (1)
7. Wall Mount Bracket
8. Safety Wall Brackets (2)
9. Washer, Copper
10. Pipe, PRV
11. Pressure Relief Valve (PRV), 30 psi
12. Washer, Sealing (not shown)

## 1.12 The Condensate Trap

The Brute LX is a high efficiency condensating unit. It requires that the included condensate trap be installed along with a proper drain.

We recommend that the condensate trap for the *wall mounted* Brute LX be installed before mounting it the wall. For instructions on how to do this, see Figure 10, Figure 11 and Figure 12 in Section 6 in this manual.

**NOTE:** It is easier to install the Condensate Trap to the Wall Mounted Brute LX before it is mounted to the wall.

## 1.13 The Pressure Relief Valve (PRV)

The Pressure Relief Valve on the wall mounted unit must be installed as the first piping component. See Section 6.9 'Piping Schematics'

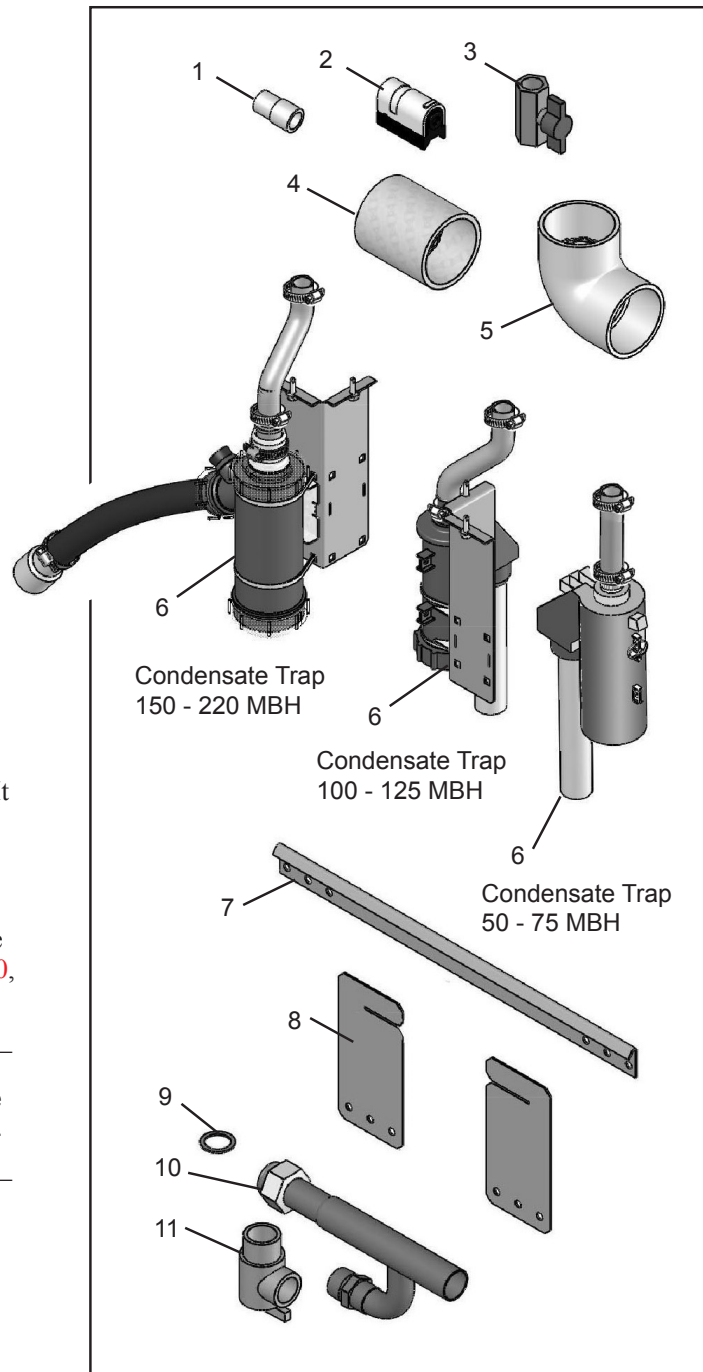


Figure 4. Contents of Installation Kit

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**SECTION 3 -  
VENTING AND COMBUSTION AIR**

**3.1 General Venting**

This product requires a special venting system. Refer to venting supplier’s instructions for complete parts list and method of installation. The manufacturers and product lines listed on the following tables have been tested and authorized to safely operate with Bradford White equipment. Suppliers of stainless steel and polypropylene venting that are not listed on these tables are not permitted for use with Bradford White vent category III/ IV products.

Bradford White Brute LX includes a standard CPVC vent/ combustion air adapter. If field connections require use of PVC/CPVC vent materials, the installer must use proper adhesive to join CPVC and/or PVC pipe and fittings.

Do not mix venting suppliers and models in venting systems. Failure to comply could result in personal injury, property damage, or death.

Installations must comply with applicable national, state and local codes.

MFR MODEL NUMBER (ABBREVIATED)

Example Components	Selkirk	DuraVent	NovaFlex
	Trade Name / Model		
	Safe-T Vent EZ Seal	FasNSeal	Z Flex
90° Elbow	9x14	FSELB90xx	2SVEExx90
Pipe	9x07	FSVLxxxx	2SVEPxxxx
Boiler Adapter	5x01BOI	FSAAUx	2SVSAxx (OD) 2SVSTTAXx (ID)
Horizontal Termination (bird screen)	9x92	FSBSx	2SVSTPXxx
Vertical Termination (rain cap)	5X00CI	FSRCx	2SVSRCxx
Inlet Air Termination	9xTERM	FSAIHXX*	2SVSTEXxx90
Adapter, SS to CPVC		FSA-xxFNMSM-xPVCF	
Adapter SS to PP		FSAAUx-xPP	2ZDCPVCx**

\*4", 6" & 7" only

\*\*up to 6"

**Table 4. - Allowable Single Wall Stainless Steel Vent Suppliers and Part Numbers.**

MFR MODEL NUMBER (ABBREVIATED)

Example Components	CentroTherm	DuraVent	Selkirk	NovaFlex
	Trade Name / Model			
	InnoFlue	PolyPro	PolyFlue	Z-Dens
Single Wall Pipe	ISVLxxxx	xPPS-x	83x002	ZDPx
Elbow	ISELxxxx	xPPS-E90L	83x08	2ZDEx87
PVC Adapter	ISAGLxxxx	xPPS-ADL (to 4") xPPS-xxPVCM-xPPF (>4")	83x040	2ZDCPVCx
Horizontal Termination (bird screen)	IASPPxx (2" - 4") IASSSxx (5" - 12")	xPPS-BG (2" - 6")	83x050	2ZDESx
Vertical Termination	IASPPxx (2" - 4") IASSSxx (5" - 12")	xPPS-VKL (<5") xPPS-VTML (5"-8")	83x050	2ZDESx
Air Inlet				2ZDESx

**Table 5. - Allowable Polypropylene Vent Manufacturers / Trade Names**

NOTE: 1. “x”, “xx”, and “xxxx” refer to variations in nominal size. See manufacturer’s catalog for a particular application.

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MATERIAL	INSTALLATION STANDARDS	
	UNITED STATES	CANADA
ABS	ANSI/ASTM D1527	Air pipe material must be chosen CPVC, sch 40, ANSI/ASTM, Polypropylene based upon the intended application of the boiler.
PVC, sch 40	ANSI/ASTM D1785 or D2665	
CPVC, sch 40	ANSI/ASTM F441	
Polypropylene	UL1738, ULC S636.	
Single wall galv. steel	26 gauge	

**Table 8. Required Combustion Air Pipe Material.**

or, in absence of such requirements, follow CAN/CGA B149.

**3.2.2 Ducted Combustion Air**

The combustion air can be taken through the wall, or through the roof. When taken from the wall, it must be taken from out-of-doors by means of the Bradford White horizontal wall terminal, indicated in Table 7.

See Table 6 to select the appropriate diameter air pipe. When taken from the roof, a field-supplied rain cap or an elbow arrangement must be used to prevent entry of rain water (see Figure 7).

Use ABS, PVC, CPVC, polypropylene, or galvanized pipe for the combustion air intake requirements (see Table 8), sized per Table 6. Route the intake to the boiler as directly as possible. Seal all joints. Provide adequate hangers. The unit must not support the weight of the combustion air intake pipe. Maximum linear pipe length allowed is shown in Table 6. 5 linear ft. (1.5m) = (1) one elbow.

The connection for the intake air pipe is at the top of the unit. In addition to air needed for combustion, air shall also be supplied for ventilation, including air required for comfort and proper working conditions for personnel.

**3.3 Venting (Exhaust)**

The flue temperature of the Brute LX changes dramatically with changes in operating water temperature. Therefore, it is necessary to assess the application of the boiler to determine the required certified vent class. If the Brute LX is installed in an application where the ambient temperature is elevated, and/or installed in a closet/alcove, CPVC,

polypropylene, or stainless steel material is required. If the system temperatures are unknown at the time of installation, stainless, polypropylene or CPVC material is recommended.

The Brute LX is a Category IV appliance and may be installed with PVC, CPVC or polypropylene that complies with ULC-S636, ANSI/ASTM D1785 F441 (see Table 6) or a stainless steel venting system that complies with UL 1738 Standard (see Table 9).

**⚠ WARNING**

All vent piping just be properly supported with suitable hangers at minimum 4 ft intervals.

**⚠ WARNING**

Use of cellular core PVC (ASTM F891), cellular core CPVC, or Radel® (polyphenolsulfone) in venting systems shall be prohibited.

**⚠ WARNING**

Failure to use the appropriate vent material, installation techniques, glues/sealants could lead to vent failure causing property damage, personal injury or death.

**⚠ WARNING**

Use of cellular core PVC (ASTM F891), cellular core CPVC, or Radel® (polyphenolsulfone) in non-metallic venting systems is prohibited and that covering non-metallic vent pipe and fittings with thermal insulation is prohibited.

Part Number	Size	Description
239-44069-02	2"	PVC Concentric Vent Terminal
239-44069-01	3"	PVC Concentric Vent Terminal
CA010101	2"	Flush Vent Terminal PVC
CA010100	3"	Flush Vent Terminal PVC
CA007100	3" to 5"	Stainless Steel Concentric Vent Terminal

**Table 7. Vent Termination Options**

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and anti-foamants that are suitable for use in the Brute LX. Please refer to the manufacturers' instructions for proper selection and application.

1. Sentinel Performance Solutions Group
2. Hercules Chemical Company
3. Dow Chemical Company

**6.5 Domestic Hot Water Piping (BMLXC)**

Connect domestic hot and cold water piping to the boiler at locations noted in **Figure 13 through Figure 19** starting on Page 22. Expected DHW performance is indicated in **Table 14**. A **flow switch** is pre-installed on most combination models and **is required**.

Use of flow restrictor is optional to prevent colder water at excessive flow rates. Contact Bradford White for alternate configurations.

**6.6 Indirect Water Heater Piping**

The BMLXH model can control an indirect water heater zone. Pipe to the locations shown in **Figure 13**. Setpoint is made via aqua-stat or sensor in a well located on the indirect water heater, or can be controlled at the boiler via a remote sensor. **See Section 9 for control details.**

Sensor, Bradford White PN RE2337501

**6.7 Condensate Trap Installation**

The condensate kit for your unit is part of the installation kit. **See Section 1.11.**

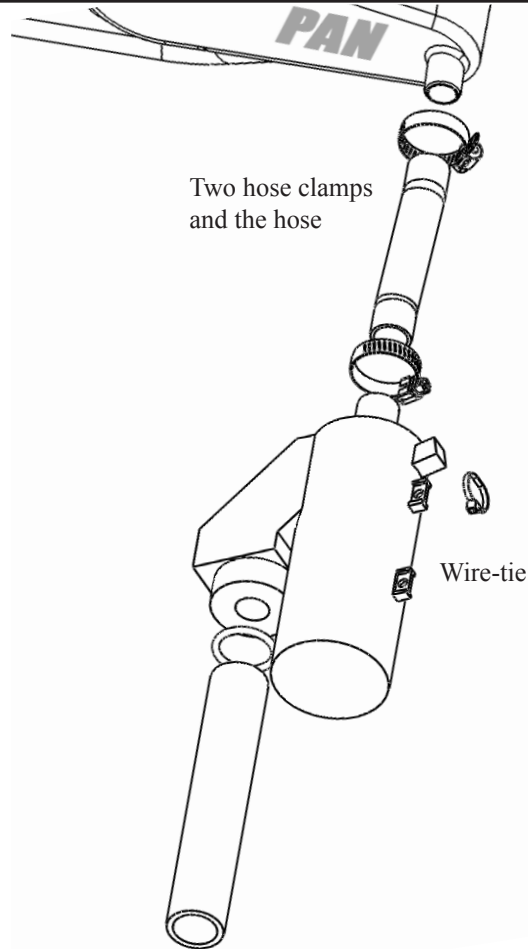
**For wall mounted models sized 50 and 75 MBH,** fasten the condensate trap to the condensate tray using the two hose clamps and the hose. **See Figure 10.** Then secure the condensate trap to the unit using the wire-tie.

A condensate drain must be installed to prevent accumulation of condensate. When a condensate pump is not used, the tubing must continuously slope downward toward the drain with no spiraling.

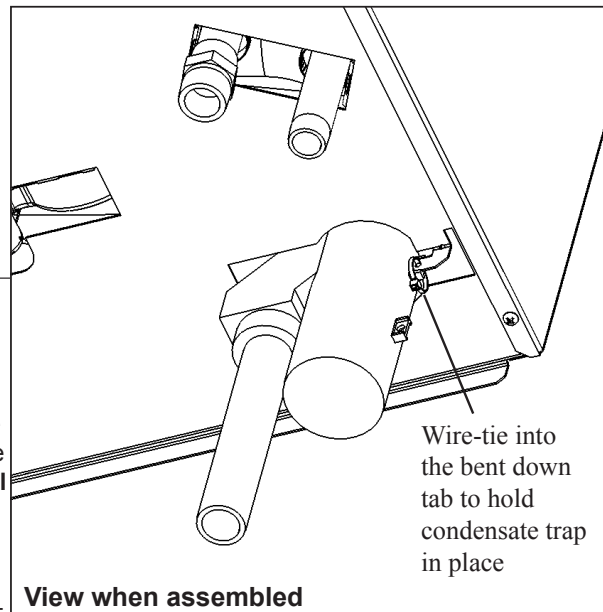
**Consult local codes for the proper disposal method for the condensate.**

**CAUTION**

Condensate is mildly acidic (pH=5), and may harm some floor drains and/or pipes, particularly those that are metal. Ensure that the drain, drainpipe, and anything that will come in contact with the condensate can withstand the acidity, or neutralize the condensate before disposal. **Damage caused by failure to install a neutralizer kit or to adequately treat condensate will not be the manufacturer's responsibility.**  
**Contact Bradford White to order Kit# A2123601**



**Figure 10. Condensate Trap for 50 - 75 MBH Brute LX Wall**



**View when assembled**

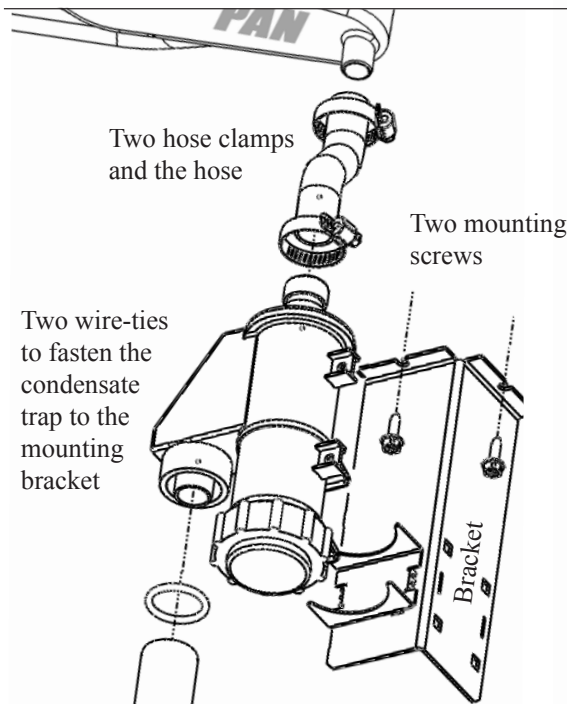
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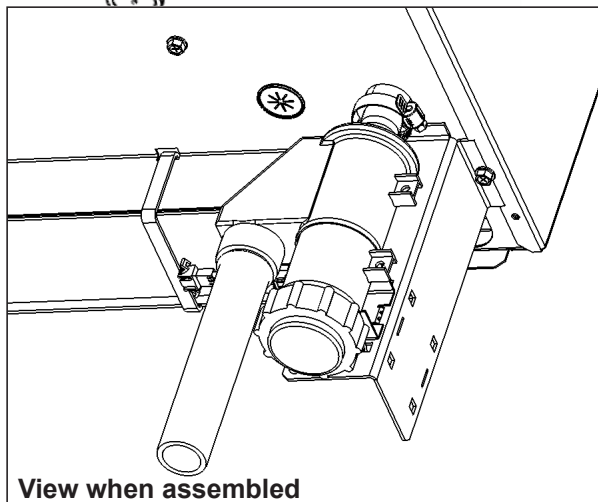
**Brute LX**

For wall mounted models sized 100 to 220 MBH, fasten the condensate trap to the condensate pan using the two hose clamps and the hose. See Figure 11 and Figure 12

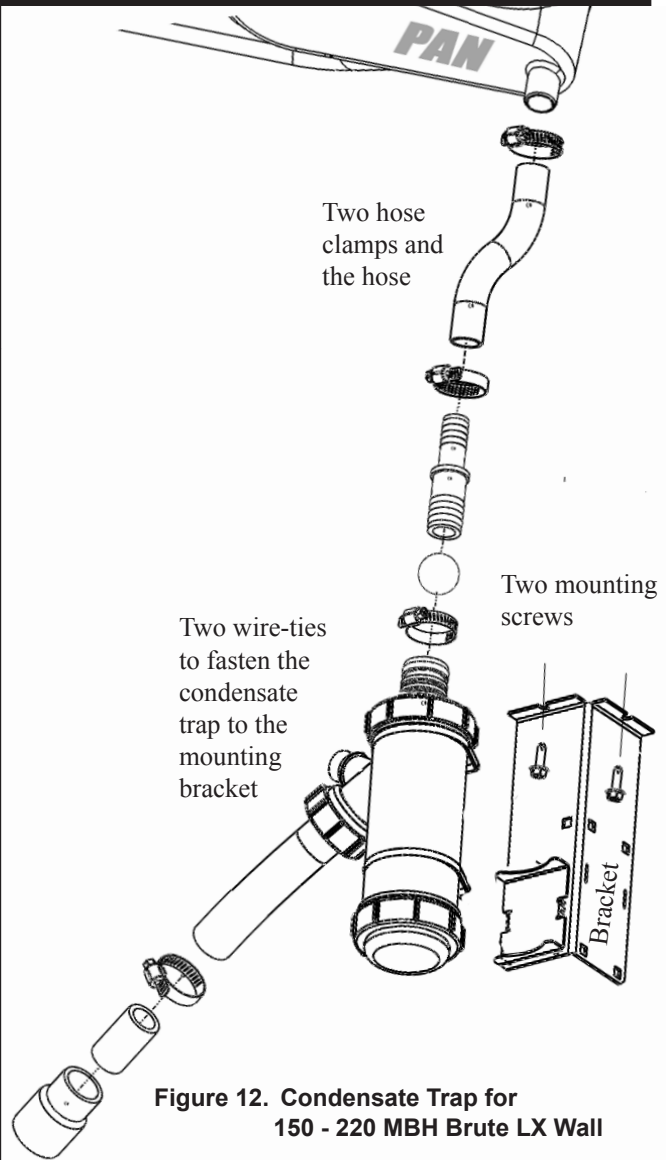
Fasten the bracket to the bottom of the unit using the included two mounting screws. Then secure the condensate trap to the bracket using the two wire-ties.



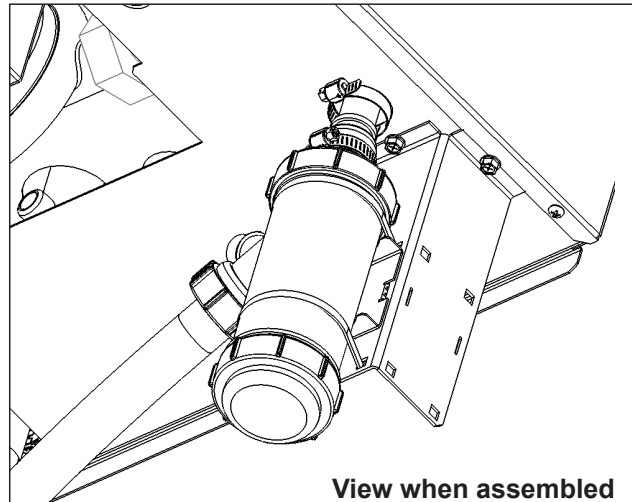
**Figure 11. Condensate Trap for 100 - 125 MBH Brute LX Wall**



**View when assembled**



**Figure 12. Condensate Trap for 150 - 220 MBH Brute LX Wall**



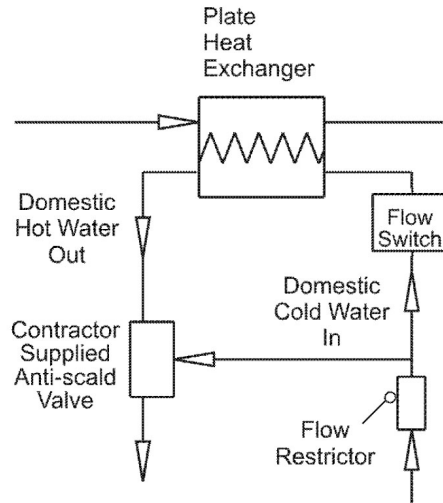
**View when assembled**

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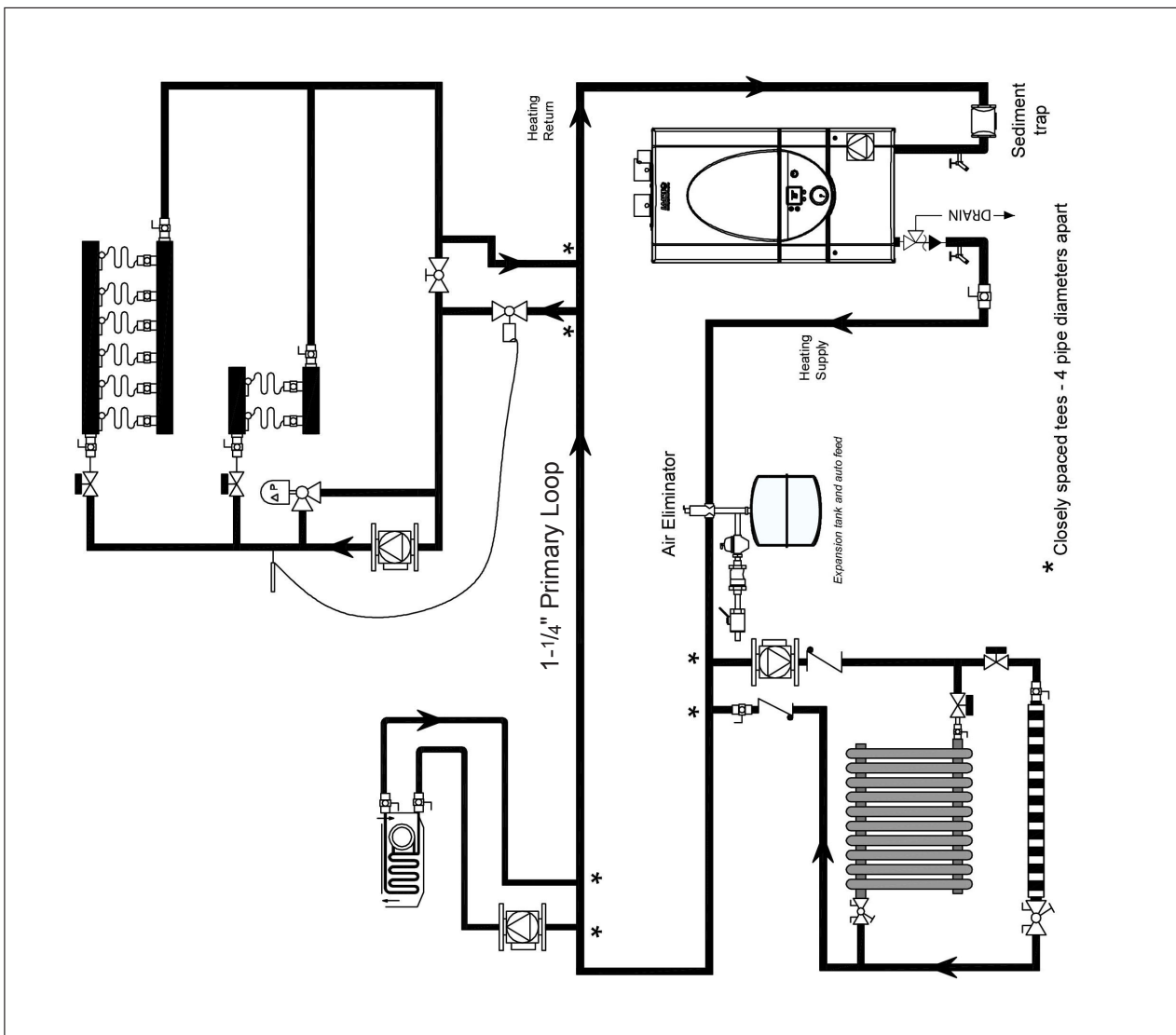
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**6.9 Piping Schematics**

Figure 13 through Figure 19 illustrates typical piping configurations for Brute LX boilers. Although these illustrations show a wall mounted model or models, they are appropriate for floorstanding models as well and are only intended as a guide. All components or piping required by local codes must be installed in their appropriate locations.



**Figure 14. DHW Connections with Flow Switch, Anti-Scald Valve and Flow Restrictor.**



**Figure 13. Hydronic Piping — High and low temp zones.**

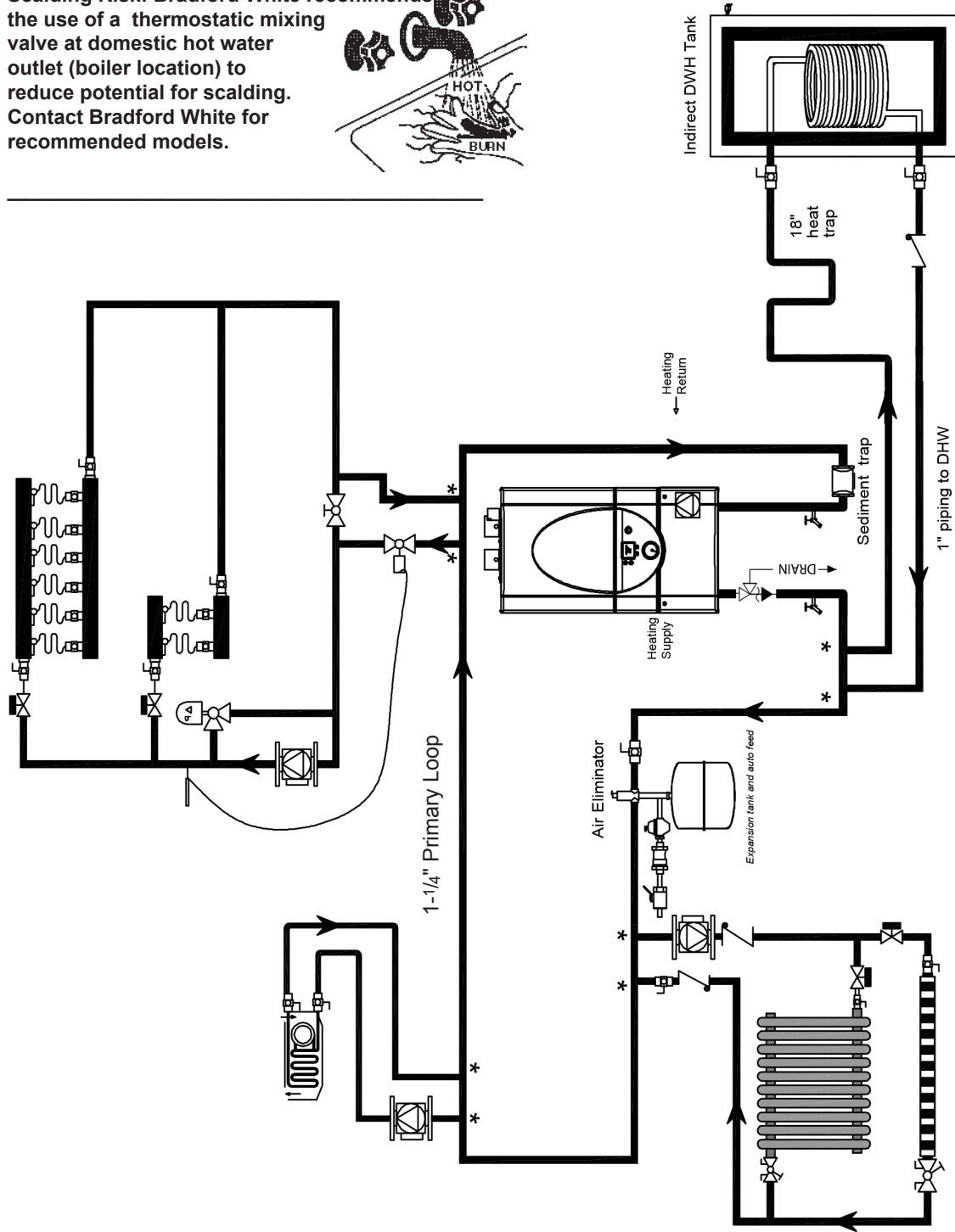
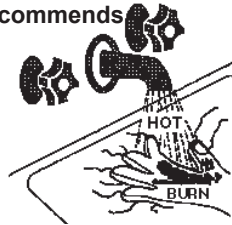
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**CAUTION**

Scalding Risk: Bradford White recommends the use of a thermostatic mixing valve at domestic hot water outlet (boiler location) to reduce potential for scalding. Contact Bradford White for recommended models.

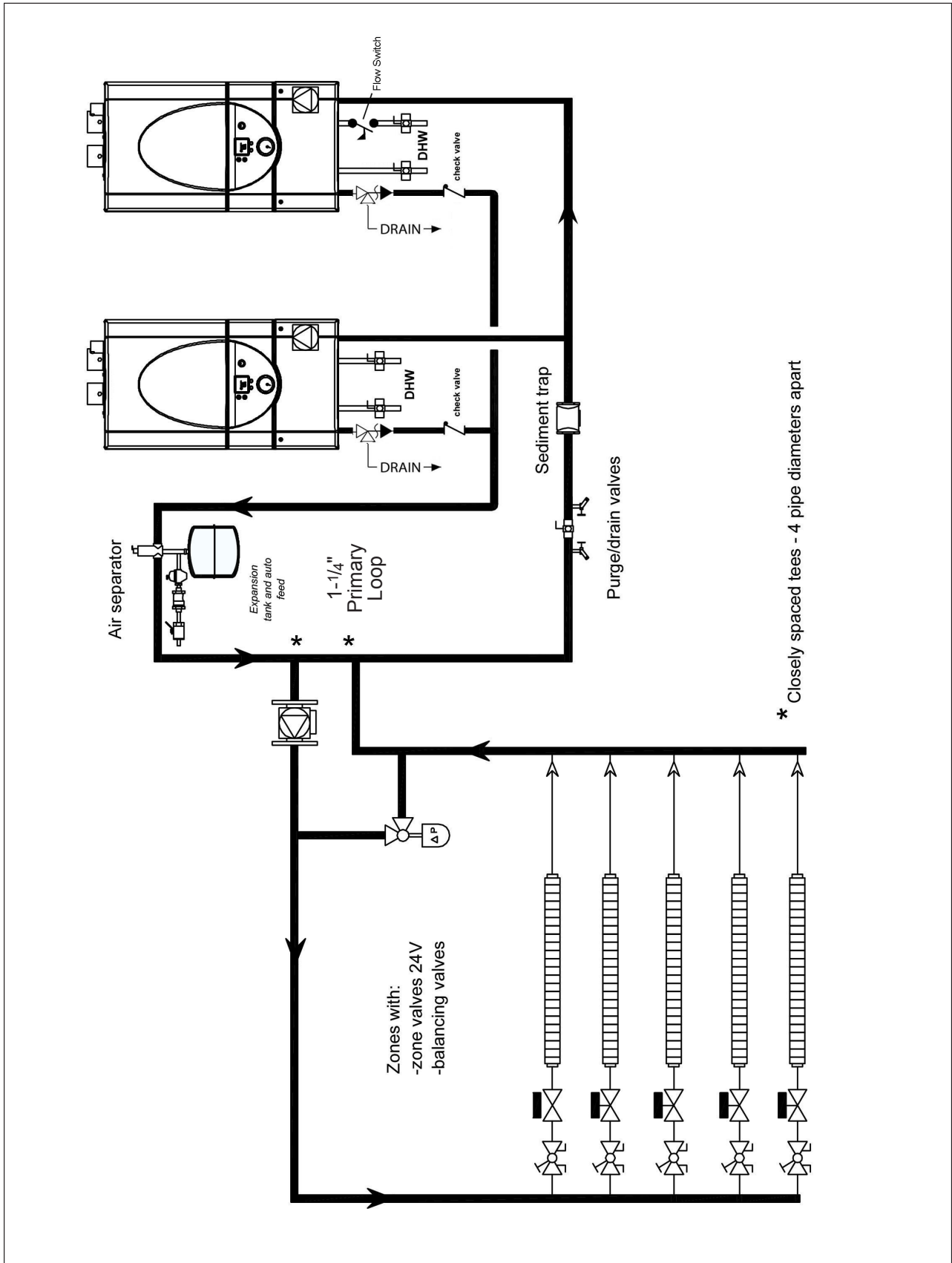


\* Closely spaced tees - 4 pipe diameters apart

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Figure 15. Hydronic Piping (only) — with an indirect tank as a zone.

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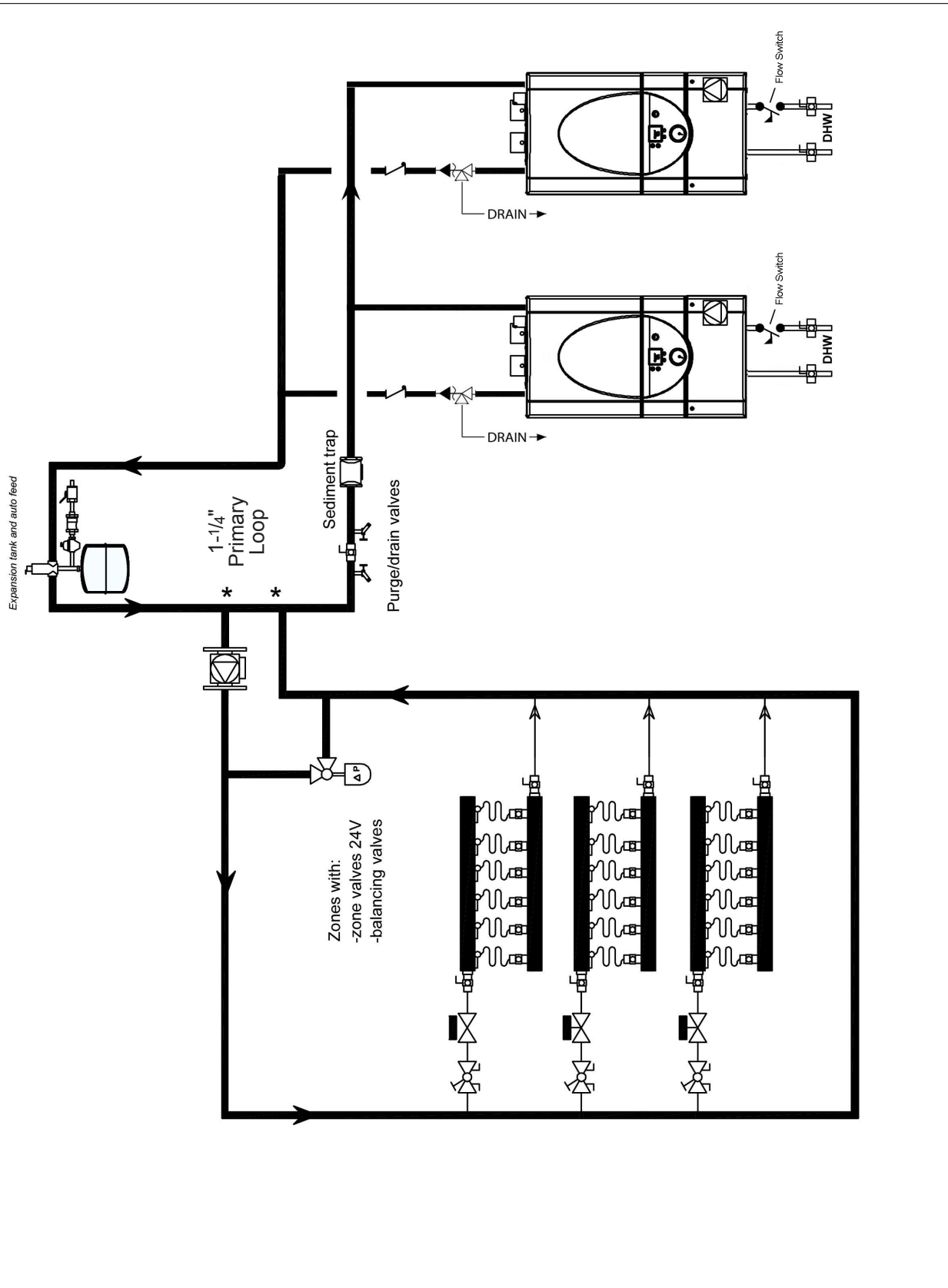
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Figure 16. Hydronic Piping — Multi boilers for large homes with long / multiple baseboard zones.



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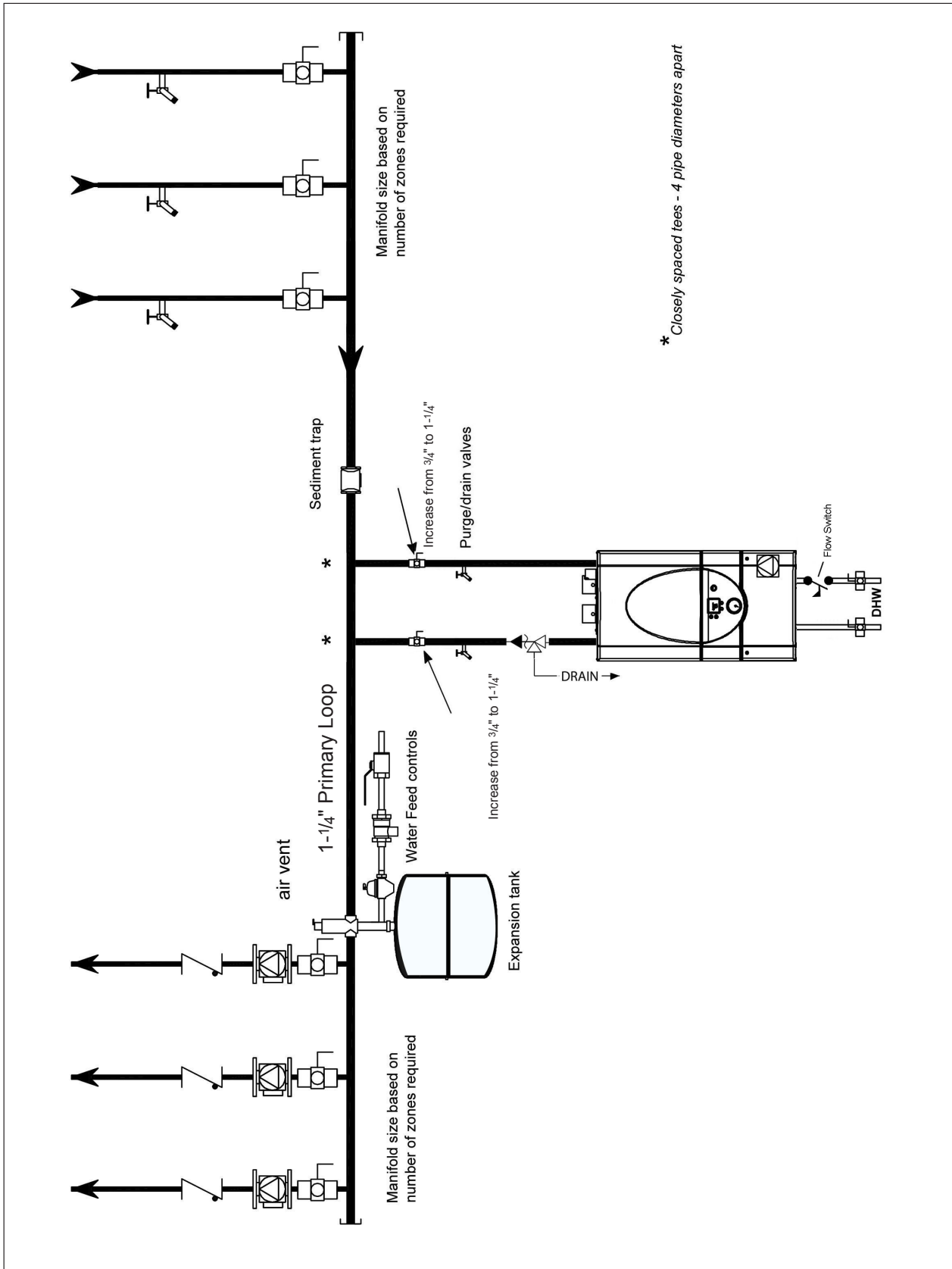
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Figure 17. Hydronic Piping — Multi boilers for large homes with long / multiple radiant zones.

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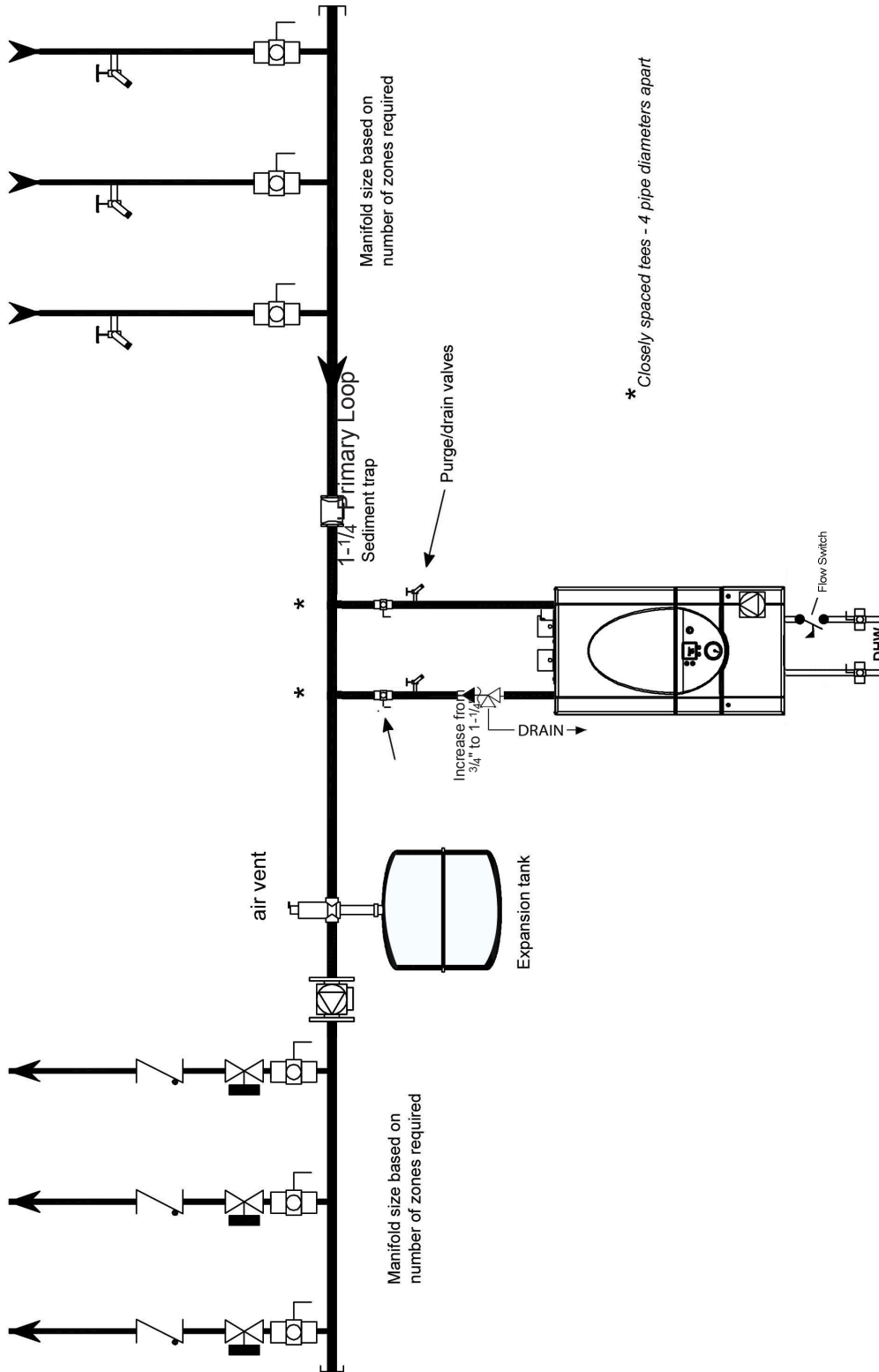
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Figure 18. Hydronic Piping — Heating zones piped with zone pumps.

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NOTE: Wall mount installation shown. Make appropriate connections for floorstanding installations.



\* Closely spaced tees - 4 pipe diameters apart

Manifold size based on number of zones required

Manifold size based on number of zones required

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Figure 19. Hydronic Piping — Heating zones piped with zone valves.

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**8.6 Modulation Control**

The control uses a PID algorithm to adjust the firing rate of the boiler as the control point is approached. The goal of the control is to operate at a minimum firing rate to match the load on the appliance.

**8.7 Pump Control**

The boiler pump is active anytime there is a call for heat applied to the control. When there is a central heat call the system pump relay is active. If there is a DHW call while the central heat call is active the system pump turns off. This happens because of domestic hot water priority, which forces the control to satisfy the domestic water demand prior to the hydronic demand. When the last heat demand is satisfied the boiler pump enters an overrun time.

**8.8 High Limit**

The control uses a dual thermistor sensor to monitor the Brute LX's maximum temperature. The high limit sensor is installed in the outlet water. A dual thermistor sensor is used, so that the two temperatures can be monitored and compared to confirm accuracy. The control will automatically reduce the firing of the Brute LX to prevent the high limit from tripping. The high limit setpoint is not adjustable.

**8.9 Stack Temperature**

The stack temperature is a dual thermistor sensor and is limit rated. The control compares each of the temperature readings to determine accuracy. The stack sensor is used as a limiting feature to avoid excessive temperatures in the venting.

**8.10 Domestic Hot Water Temperature**

The domestic hot water temperature sensor is used to control the DHW temperature. The DHW setpoint can be adjusted through the Base / Home state and the User Mode. On LX 'C' or Combi models, the DHW sensor is pre-installed in the DHW exchanger. On LX 'H' or Heat models the DHW can be controlled by an aquastat or optional DHW sensor installed in an indirect tank.

**SECTION 9.  
OPERATION Modes**

To access the setup parameters for configuring different Operation Modes, the installer level password must be used according to section 8.4.

**9.1 Hydronic Heating Demand**

When using the Brute LX for hydronic heating a call for heat must be supplied to the "T-T or Interlock" terminals. Once the call is supplied the control energizes the boiler pump, the system pump relay, shifts the 3-way valve position and begins the ignition process. The ignition process consists of a prepurge, trial for ignition, and run period. The prepurge period starts once the fan RPM reaches a preset level. The trial for ignition period follows. The trial for ignition period

lasts 4 seconds during which the direct spark ignition system and gas valve are energized. At the end of the trial for ignition period the flame signal is compared with the preset flame threshold value. If the flame signal is higher than the flame threshold the Brute LX enters "run". If the flame signal is below the threshold the Brute LX returns to prepurge and starts the ignition process over. In "run" the Brute LX monitors the flame signal, call for heat, safeties, and water temperatures and modulates as needed between 100% and 20% of rate to satisfy the call for heat.

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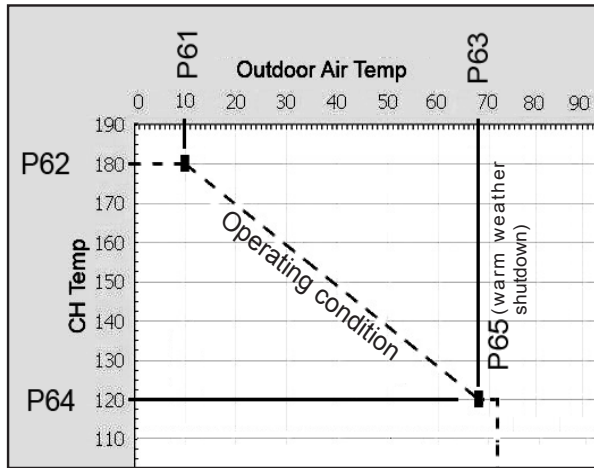


Figure 24. Outdoor Reset Setpoint Temperatures.

**9.2 Hydronic Heating with Outdoor Reset**

Outdoor reset varies the control setpoint based on the outdoor temperature. The reset function works as shown in Figure 24.

When the outdoor air temperature is a low as P61 “low outdoor temperature setpoint” (10°F in this example), the control setpoint is adjusted upward to P62 “high boiler temperature” (180°F in this example). When the outdoor air temperature rises to P63 “high outdoor temperature setpoint” (68°F in this example), the control point setting is lowered to P64 “low boiler temperature setpoint” (120°F in this example).

P65 “Warm Weather Shutdown” is shown in Figure 24 as being set at approximately 72°F.

**9.3 Hydronic Heating Using External Modulation Control (BMS)**

The Brute LX can accept a 0-10 VDC input to integrate with a building management system or external modulating control. Utilizing Installer Parameters P31 “BMS Voltage at minimum” and P32 “BMS voltage at maximum” the installer can set the minimum and maximum input voltages. By default this input is enabled but can be disabled using Installer Parameter P30 “0-10v Input Enable / Disable”.

The Brute LX can use an external 0-10VDC signal to control its fan speed (modulation rate), or to control its outlet setpoint. The 0-10V signal may also be used to create a heat demand eliminating the need to supply a separate “TT call”.

**9.3.a External Signal to Control Modulation.**

Installer Parameter P25 “0-10V to Power (fan speed)” – This is the default 0-10VDC configuration in which the external signal directly corresponds to fan speed or ‘boiler power’ In this mode, the call is initiated by

the 0-10v input based on Installer Parameters P33 “On threshold voltage” and P34 “Off hysteresis voltage”. The modulation power can also be scaled with P35 “BMS rate at minimum voltage” and P36 “BMS rate at maximum voltage”.

**9.3.b External Signal to Control Setpoint.**

Installer Parameter P25 “0-10v BMS modulation control” must be disabled – In this mode the 0-10VDC input directly controls the boiler's outlet temperature. Set the parameters using the Installer Parameters P37 “ BMS Temperature setpoint at minimum voltage” and P38 “BMS temperature setpoint at maximum voltage”

**9.3.c External Signal Initiates Heat Demand**

In this mode P26 “0-10V BMS Thermostat Demand Required” must be disabled to eliminate the need for a separate “TT Call”. This allows a heat demand to be created every time the 0-10V signal exceeds P33 “BMS On Volts”. The heat demand will remain until the 0-10V signal drops below P33 “BMS On Volts” – P34 “BMS Demand Off Differential Voltage”

**9.4 Warm Weather Shutdown**

Warm weather shutdown overrides a central heat call when the outdoor air temperature is greater than the warm weather shutdown setpoint. Warm weather shutdown is always active when there is an outdoor sensor attached to the control. The warm weather shutdown setpoint can be adjusted in Installer mode, using P65 “CH outdoor Air Shutdown Temperature” and P66 “CH Outdoor Air Shutdown Differential”.

**9.5 Domestic Hot Water Demand**

**9.5.a Combi Boiler DHW**

For Combi units (BMLXC), DHW demand is triggered by a flow sensor located near the DHW cold water inlet. When water begins to flow (open faucet, shower, etc.), the boiler will fire, based on the water temperature requirements. It may cycle on and off under very low flow rates. Minimum flow is 0.5 gpm.

**9.5.b Boiler only DHW aquastat demand**

For Boiler only units (BMLXH), an indirect water heater can be piped-in. An aquastat in the indirect water heater connected to terminals 7 and 8 will signal demand for DHW. In this demand mode the boiler will modulate on the outlet water temperature sensor and use P51 “DHW setpoint (S1 – Tank) as the setpoint.

**9.5.c Boiler only DHW sensor demand**

An optional DHW sensor (Bradford White PN E2337501) can also be installed in an indirect water

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**Make adjustments in 1/16 of a revolution increments until the CO<sub>2</sub> is within range.**

Adjustment Screws on Gas Valve.  
Close door first, before measuring CO<sub>2</sub> Range

**High-fire Adjustment (2.5 mm Hex)** +

**Low-fire Adjustment (4 mm Hex)** +  
(under slotted cap)

Manifold Pressure Screw (under cap)

**Figure 25. Adjustment Screws and Settings for CO<sub>2</sub> (Wall Mounted Brute LX)**

GAS TYPE	CO <sub>2</sub> (%) RANGE
Natural	8.9 — 9.9
Propane	9.9 — 10.9

Note: High and Low Fire CO<sub>2</sub> settings should be approximately equal.

**Table 18. CO<sub>2</sub> Range and Pressure Settings.**

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