Dunkirk Helix VLT Training

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Ratings & Capacities

Capacities BTUH	50,000	75,000	100,000	150,000	200,000	299,000
Modulation with 5 to 1 turndown	50,000 ------- 10,000	75,000 -------- 15,000	100,000 -------- 20,000	150,000 -------- 30,000	200,000 -------- 40,000	299,000 -------- 60,000
Nat or LP	LP conversion kits are shipped with every boiler					
AFUE	95	95	95	95	95	95
Water Connections	1-1/4”	1-1/4”	1-1/4”	1-1/4”	1-1/4”	1-1/4”

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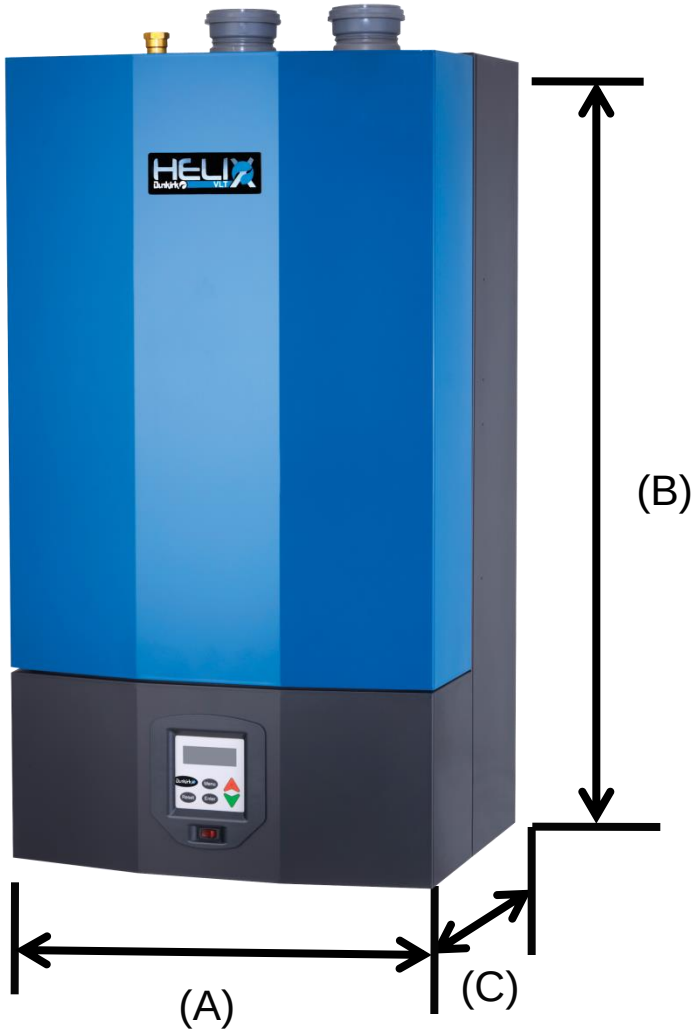
C US

Dimensions/Weights



Model Size	50,000 75,000 100,000	150,000 200,000	299,000
Width (A)	20”	23”	23”
Height (B)	30”	40”	40”
Depth (C)	14”	16” →	18.3”
Boiler Weights	**91 lb**	**157 lb**	**195 lb**

Features-All Sizes

- **Vertical Stainless Steel Coil Heat Exchanger**
- **Probe-type low water cut-off**
- **Specialized flue collector designs**
- **Argus vision control**
- **Built-in Primary/Secondary Piping**

Stainless Steel Coil Heat Exchanger

- Vertical Helix Coil – Self Cleaning

- Stainless Steel Coil 316L with 444 fins that are laser welded to the coil.

- ASME "H" stamp with 150 MAWP

- Exclusive to ECR. Developed in our research facility located in Utica, NY

Benefits

Waterways are wide and smooth with a helix coil that expands and contracts to inhibit hard water scaling. The vertical design coil prevents debris from settling in the heat exchanger. Condensate flowing over the fins continually "washes" the combustion side

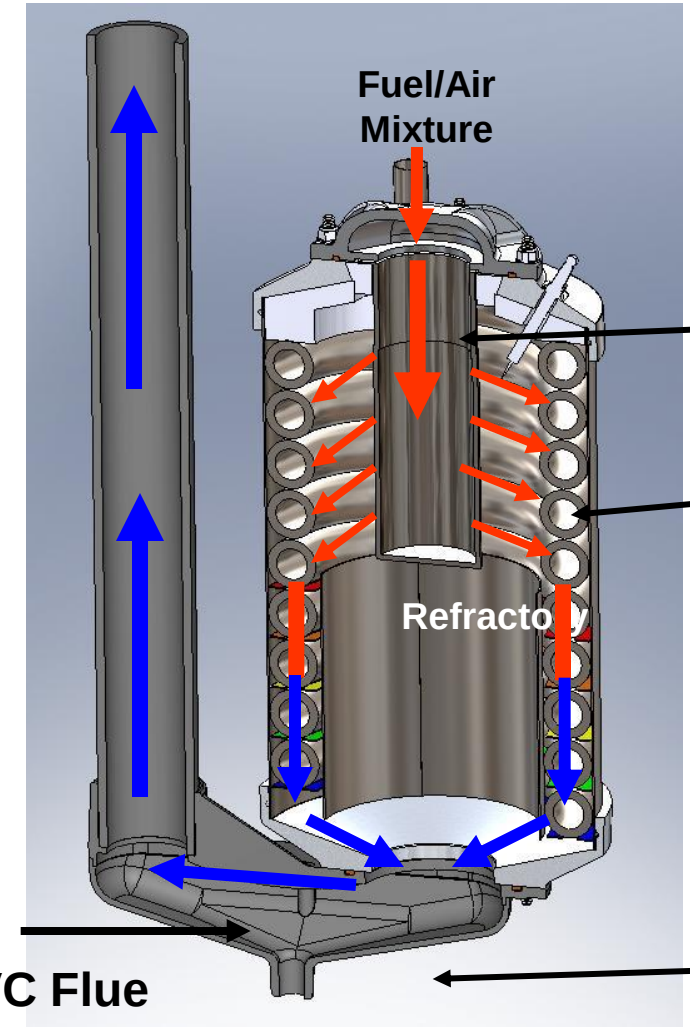
The stainless steel is resistant to the effects of acidic condensate. The laser welding process ensures the highest level of heat transfer and efficiency

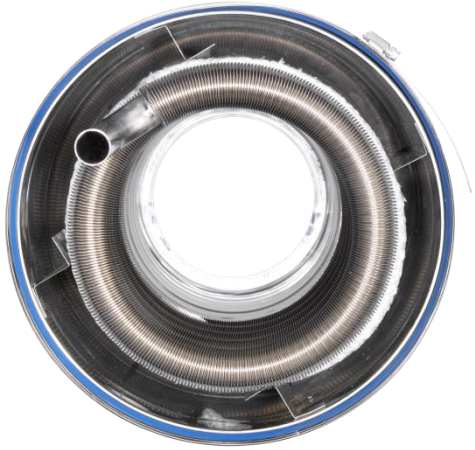
Competitive advantages over other brands which do not have this heat exchanger technology.

H Stamped, ASME heat exchanger designed, assembled and independently audited in our Utica NY facility; unlike competitors who source their heat exchangers.

Stainless Steel Coil Heat Exchanger

299 Series





Stainless Steel Coil Heat Exchanger

The VLT – Vertical mounted, Laser welded fin Tube

316L stainless steel tubing has 444 fins laser welded onto the tubing. 444 fins are used due to their high heat transfer and high corrosion resistance in the combustion area.

Tubing Diameter

The larger diameter tubing and round shape optimize water flow through the heat exchanger. *Less restriction compared to other designs*

Positioning / Self Cleaning

The vertical positioning of the coil heat exchanger and open fin spacing allows the heat exchanger to drain off any combustion particles. The natural flexing of the coil during operation reduces scale buildup

Self cleaning – both water and flue gas sides

Heat Exchanger Comparisons

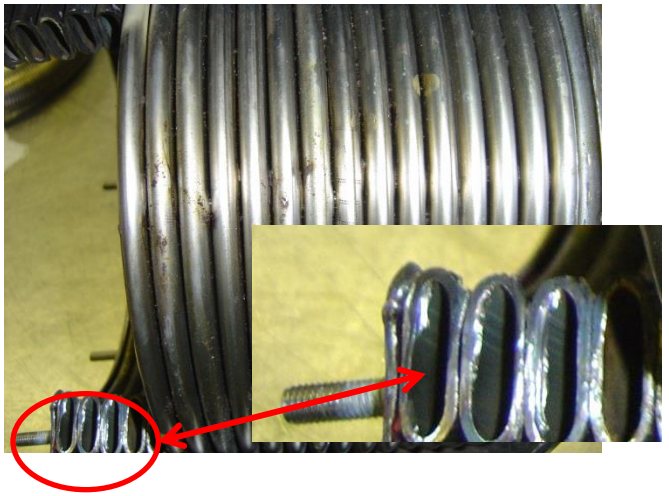
Competition **VLT Coil**

VLT round shape with a larger diameter coil for better water flow and reduced scaling

VLT Coil

Vertically positioned to drain away any debris and scale - self cleaning. Open flueways between the coils.

Competition

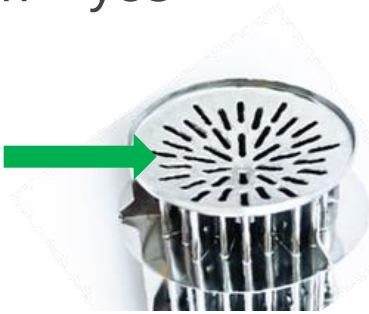


Horizontal positioning - low spots where debris may settle. Close flueways between the coils. Oval shaped small diameter tubes restrict water flow

Heat Exchanger Comparisons

Vertically Positioned - yes
Self Cleaning – (see below)
Stainless Construction – yes

Multiple Welds



VLT Coil

Water Tube – Single piece coil
Self Cleaning
Flue Gas Side – **Yes**
Water Side – **Yes** - water flow velocity is maintained preventing debris from settling. The natural flexing of the coil (during operation) reduces scale buildup
15 year HX warranty
5:1 turndown
95% AFUE

Competition

Fire Tube – multiple tubes with welded connections potential stress and leak points

Self Cleaning
Flue Gas Side – **Yes**
Water Side – Water flow velocity is reduced allowing debris to settle inside the heat exchanger
10 year HX warranty
3.7:1 or 5:1 turndown – depending on manufacture
95% AFUE

Probe-Type Low Water Cutoff

Low Water Cutoff – UL Listed

- Protects the boiler.
- Factory installed.
- Probe style.
- Test button feature with indicator lights.

Benefits

Prevents boiler operation without the proper water level.

Saves the installer material and labor. Most States now require a boiler to have a low water cutoff.

Reliably operates off of the water level in the boiler and not a pressure or flow sensing device. This is not a surface mounted sensor.

Easy to test and verify the LWCO is operating properly.

Condensate Collector 50-200 models

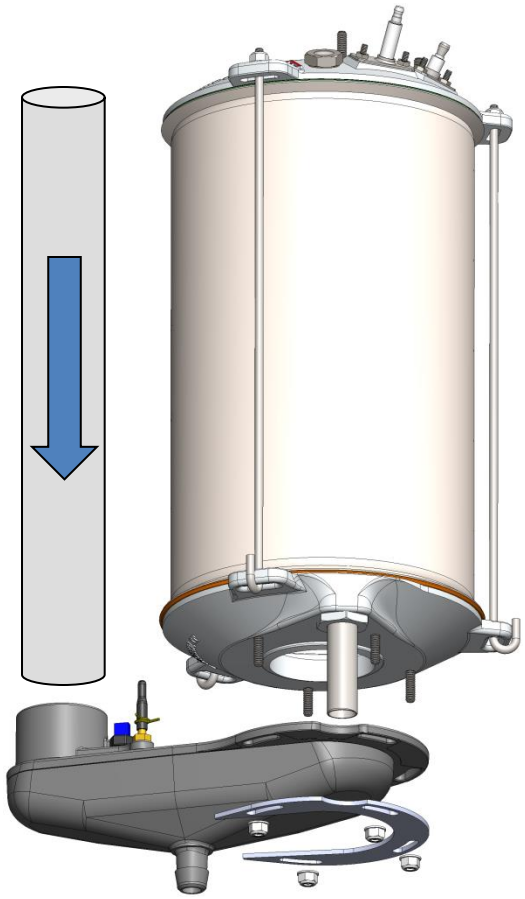
Specialized Flue Collector

Schedule 40 CPVC (Changing to Polypropylene)

Exceptional resistance to the effects of acidic condensate chlorides.

Will not corrode over the life of the boiler.

Saves the installer material and labor.



Condensate Collector 299 Model

Benefits

Polypropylene – High temperature rating.

Exceptional resistance to the effects of acidic condensate.

Will not corrode over the life of the boiler.

Flue Gas sample port built in.

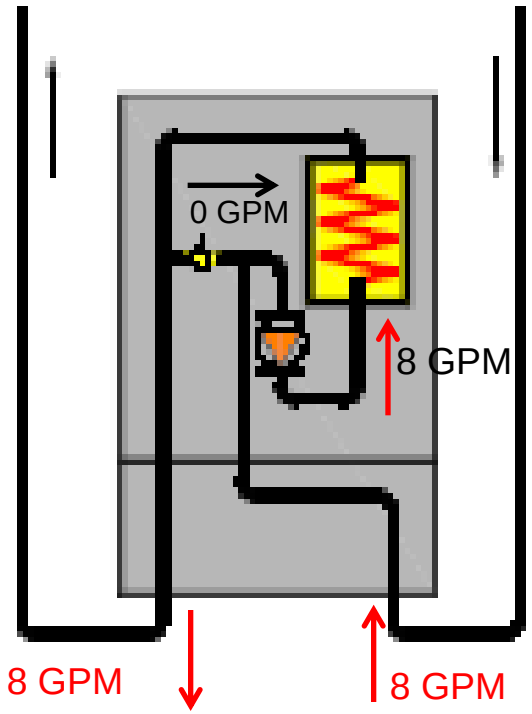
Control Package
ARGUS™ Vision

ARGUS™ Control
EASY TO PROGRAM
EASY TO UNDERSTAND

Same Control on 50-299 models!

Water Flow

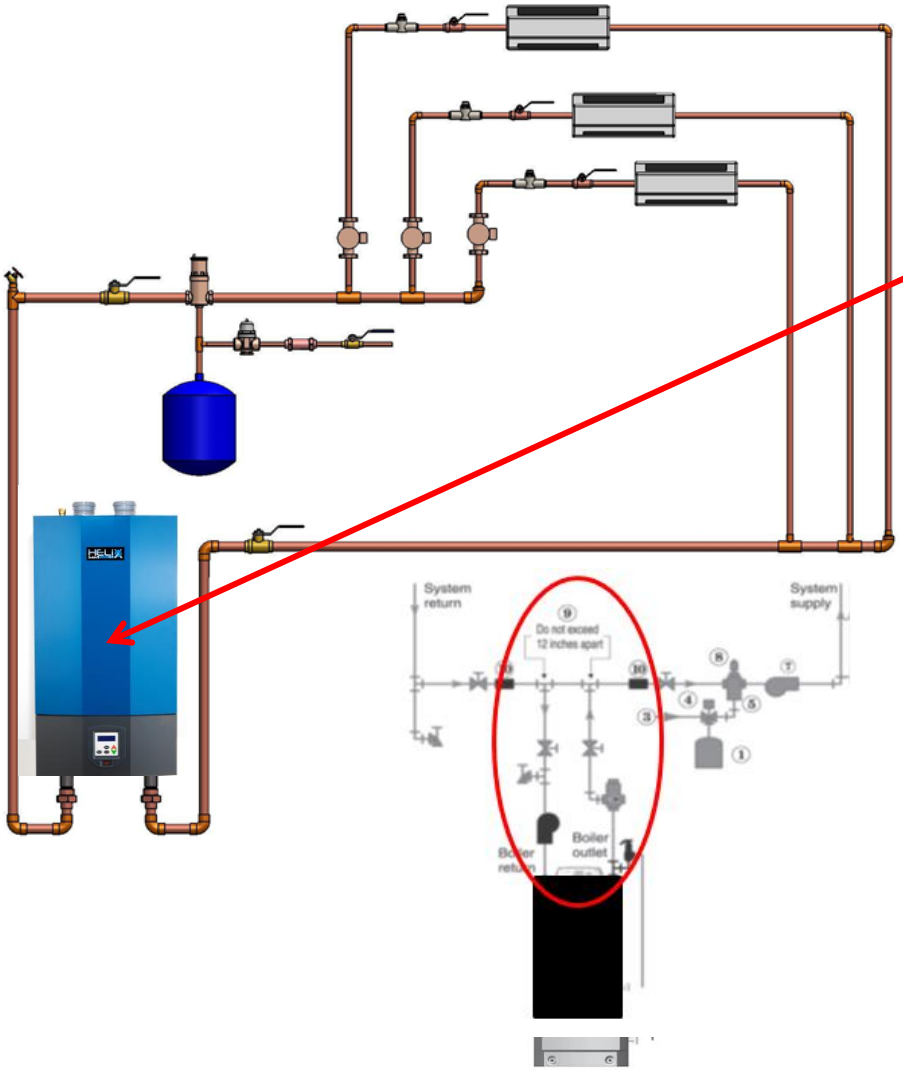
Primary & Secondary Flow Balanced



Placeholder built in primary secondry piping

4 GPM

Built-In Features



Note – internal vs external

Primary/Secondary Piping and Pump

Factory installed inside the boiler.

The internal pump provides the correct amount of water flow through the heat exchanger.

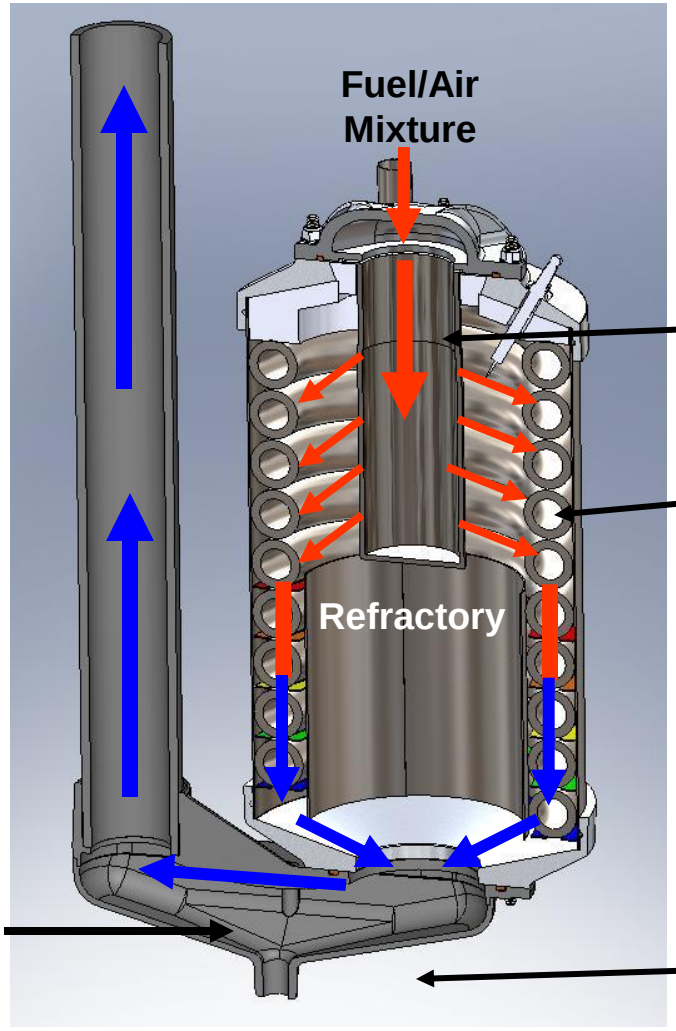
The pressure drop across the boiler's supply and return line is negligible - the boiler is not adding resistance to the system piping.

Gas Burner

- Worgas™ designed gas burner for the unit
- Natural / propane
- Easy removal for field inspection
- Easy removal for maintenance to heat exchanger

Note: Burner is keyed to heat exchanger. Line up notch in heat exchanger casting.

Combustion Path



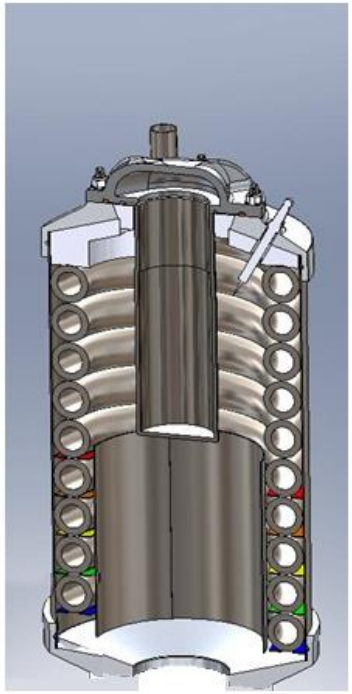
Burner

Heat
Exchanger

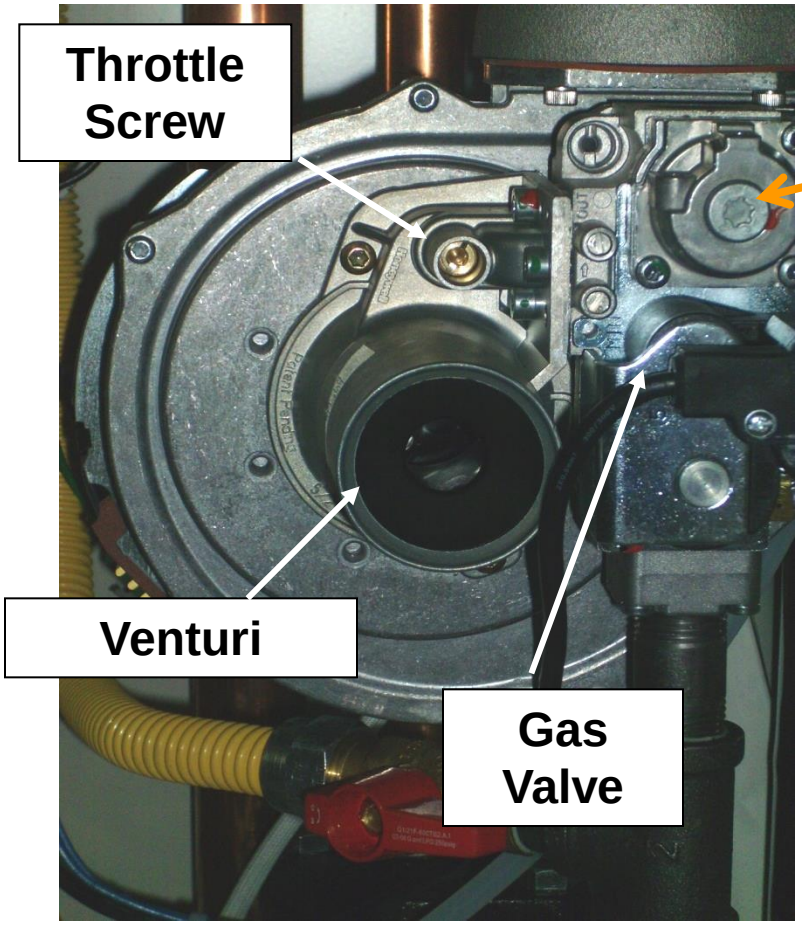
CPVC Flue
Collector

Condensate
Drain

- Add slide – view of 299



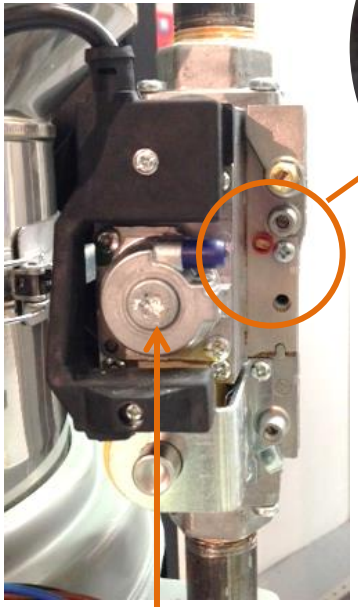
Gas Valve 50-200 Models

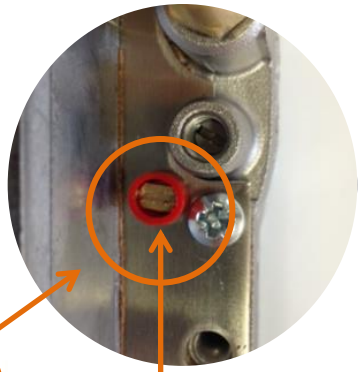


Don’t touch offset screw
Will void valve’s calibration

- 120 volt gas valve system
- Venturi system takes air from within the sealed cabinet
- Adjust throttle screw for proper gas / air CO^2 setting

Gas Valve-299 model



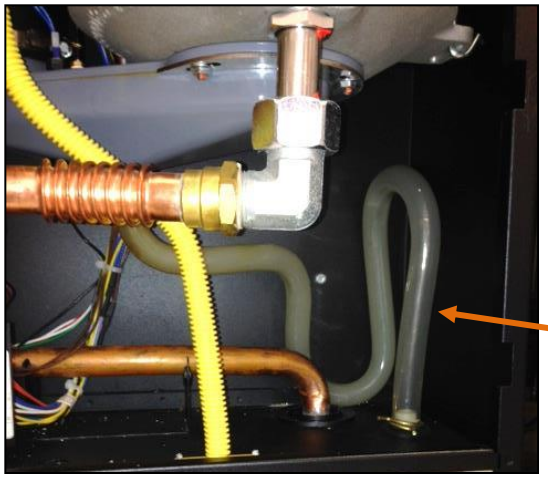


Throttle Screw (red)

Don’t touch offset screw – will void gas valve calibration.

Condensate Drain

- Drain is ¾” PVC NPT.
- Internal trap built into boiler drain.
- Fill trap with water prior to start of boiler.
- Contractor is required to run a drain off boiler.



Built-in Trap

Installation

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Combustible Clearances

Boiler Clearances		
Dimension	Combustible Materials (1)	Service (1) (2)
Model	050/075/100/ 150/200/299	050/075/100/ 150/200/299
Top	**0” (0 cm)**	**14” (36 cm)**
Left Side	**0” (0 cm)**	**0” (0 cm)**
Right Side	**0” (0 cm)**	**0” (0 cm)**
Front	**0” (0 cm)**	**6” (16 cm)**
Back	**0” (0 cm)**	**0” (0 cm)**
Bottom	**0” (0 cm)**	**12” (32 cm)**
Combustion Air/Vent Piping	**0” (0 cm)**	**6” (16 cm)**
Hot Water Piping	**1/2” (1.3 cm)**	**6” (16 cm)**
(1) Required distances measured from boiler.		
(2) Service, proper operation clearance recommendation.		

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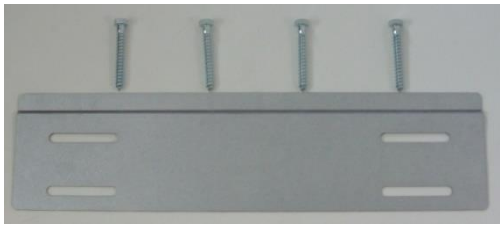
Locating The Boiler

- Access to outdoors to meet minimum and maximum pipe lengths
- Disposal of condensate
- Drainage of water or anti-freeze during service or from safety relief valve piping
- Access to system water, gas piping and electrical service
- Ambient room location above 32°F
- Approved for installation in a closet
- Protect boiler from any external water or moisture that could damage the electrical or combustion controls

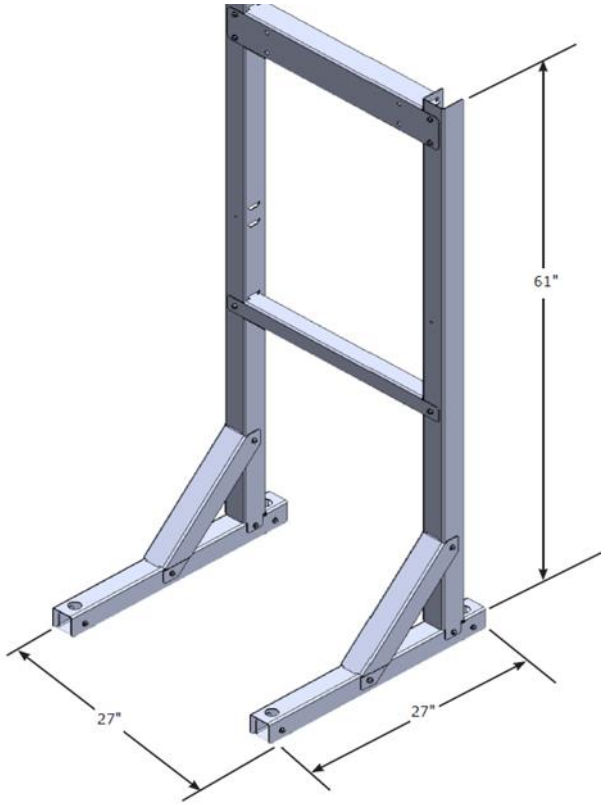
Hanging the Boiler

Rear of Boiler

Wall Mounting Bracket & Hardware



Optional Floor Stand



Wall Mount Bracket and Hardware Included

Note: For Multiple Boiler Applications - Boilers can be placed side by side or back to back

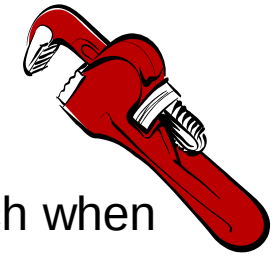
Floor Stand Option

Floor Stand Features Include:

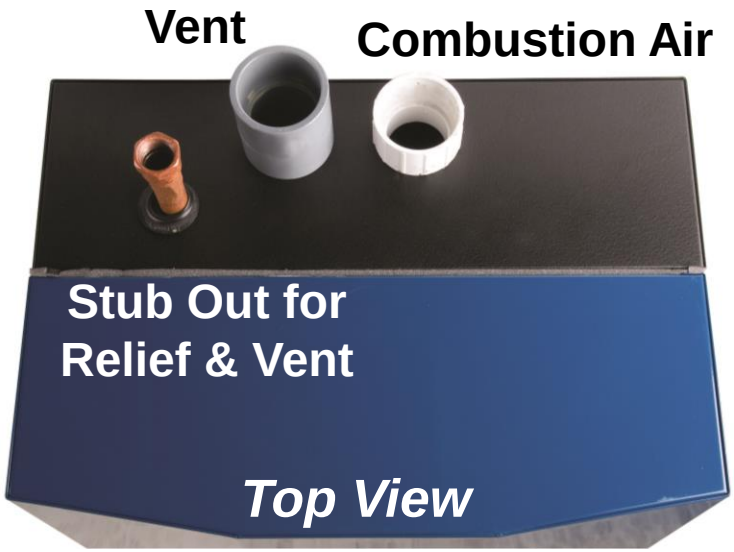
- Powder Coated Black Paint with a textured finish to match the boiler back panel. The paint process provides a durable rust resistant finish.
- One size floor stand fits the entire VLT condensing family from 50 through 299 mbh.
- The stand is shipped in a knockdown configuration for ease of handling and transport. The stand can be quickly assembled at the jobsite in just a few minutes.

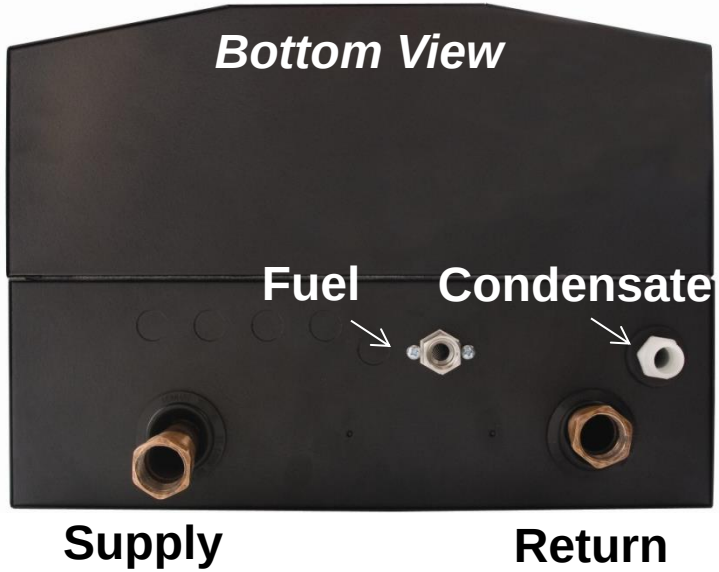
Boiler Connections

- Bottom Supply and Return - 1-1/4” NPT
- Fuel Inlet – ½” NPT
- Condensate Drain – ¾” NPT
- Combustion Air & Vent – 2” PVC
- ¾” NPT Stub out on top for field installation of Safety Relief & Air Vent (included with Boiler)



Backup wrench when tightening fittings





Trimming the Boiler

Included with the boiler is a trim kit!

Top Trim-Relief Valve / Air Vent

Rated up to 150 MAWP

- Factory supplied 30 psig relief valve
- Install safety relief valve and air vent using pipe fittings provided with the boiler
- Install ¾” or larger discharge pipe to floor
- Install relief valve with spindle in vertical position only
- Do not install shutoff valve between boiler and safety relief valve
- Field Installed - pipe relief valve to within 6” of floor

Bottom Trim-T\P Gauge & Drain

On the water side, the only thing left to connect is your Supply & Return

- Insert slide – “If you can do this… you can do this”

Gas Piping

- Gas piping needs to be in accordance with all national and local codes
- Flexible gas line piping and gas shut off inside of boiler
- Always check gas piping and connections for leaks

½" NPT Gas Connection 50/75/100

¾" NPT Gas Connection 150/200/299

Use a backup wrench when tightening

Gas Piping

- Service shut off valve inside boiler
- Shut off valve still required external of the boiler

Gas Pressures

Gas Supply Pressure				
Capacities BTUH	**Natural Gas**		**Propane**	
	Min.	**Max.**	**Min.**	**Max.**
50,000 - 299,000	***3.0" w.c.** (0.7kPa)	**13.5" w.c.** (3.3 kPa)	**5.0" w.c.** (1.2 kPa)	**13.5" w.c.** (3.4 kPa)

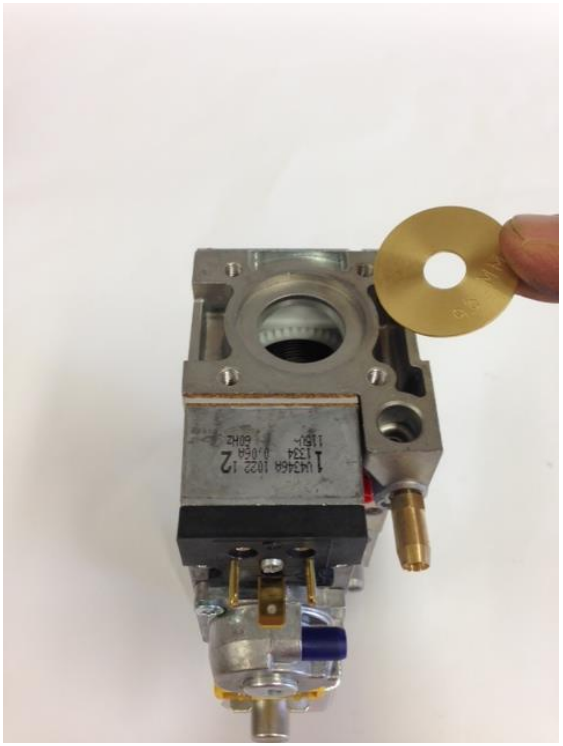
*Minimum gas pressure requirement of 3" w.c. – excellent for metropolitan areas with low gas pressure from the utility.

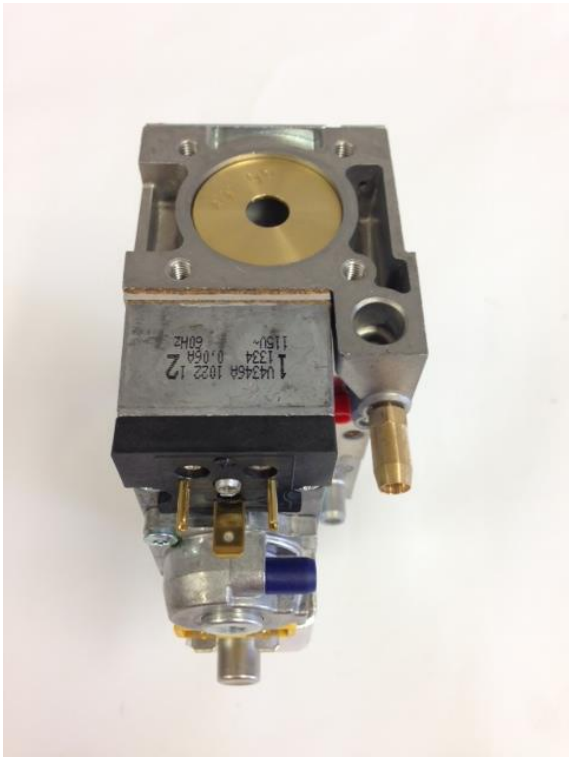
LP Gas Conversion

- All boilers shipped as Nat Gas. LP Kit included.
- Propane orifice conversion from natural gas in less than 5 minutes.
- Orifice to be installed for propane gas fired units
- Propane gas supply inlet pressures: 5” w.c. minimum, 13.5” w.c. maximum

Propane orifice location 50-200

LP Gas Conversion





Propane orifice - 299

Venting/Combustion Air

Combustion Air and Vent Pipe Equivalent Length

Model	2” Pipe		3” Pipe			4” Pipe
	050	075/100	075/100	150/200	299	299
Min.	**6 ft.** (1.8 m)	**6 ft.** (1.8 m)	**6 ft.** (1.8 m)	**6 ft.** (1.8 m)	**6 ft.** (1.8 m)	**6 ft.** (1.8 m)
Max.	**100 ft.** (30.5 m)	**50 ft.** (15.2 m)	**100 ft.** (30.5 m)	**100 ft.** (30.5 m)	**25 ft.** (7.7 m)	**100 ft.** (30.5 m)

1 - 90° elbow = 5 ft. (1.6 m)
1 - 45° elbow = 3.5 ft. (1.1 m)
1 – 2” x 3” adapter = 0 ft. (0 m)
Note: Concentric Vent Kit = 5 ft. (1.6 m) **equivalent length**
i.e.: Boiler can be installed on outside wall and vented with 1 - 90° elbow and 1 ft. (0.30m) of vent pipe.

Venting / Combustion Air

- Venting to ANSI 223.1 / NFPA 54 standards
- Material - PVC / CPVC / Polypropylene, refer to IOM for additional approved vent materials and pipe schedules
- No cellular (foam core) pipe
- Utilize proper cleaner and glue
- Termination - two (2) pipe or concentric venting system

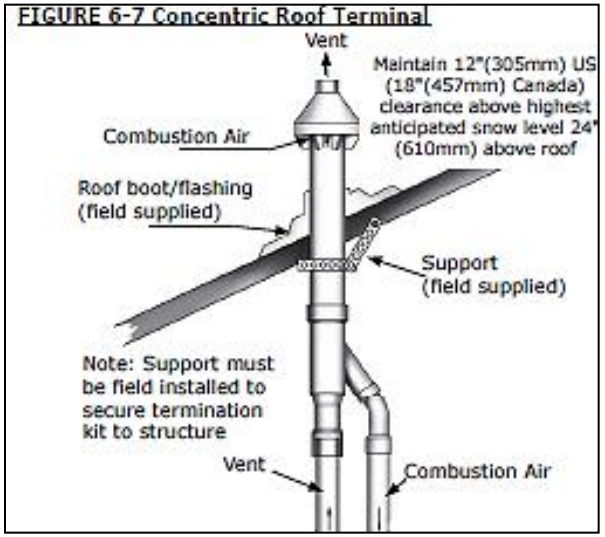
Venting/Combustion Air

- PVC
- CPVC
- ABS
- Polypropylene

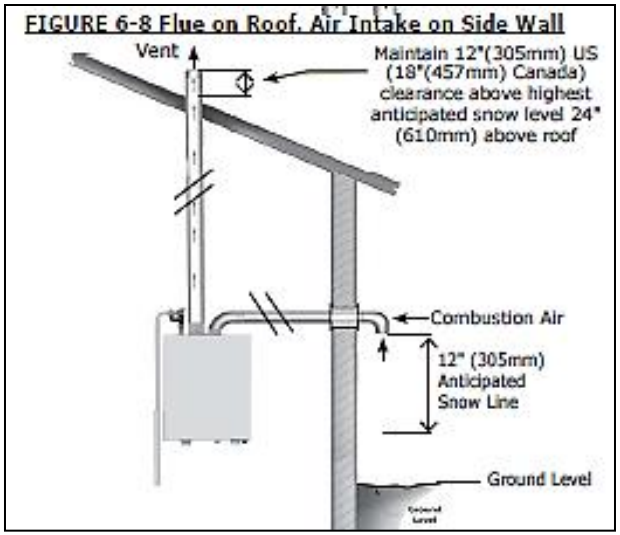
*** Make sure to use appropriate glue for proper vent pipe*

Table 4 – Combustion air and vent pipe fittings must conform with the following:		
Item	Material	Standards
Vent Pipe and Fittings	PVC schedule 40	ANSI/ASTM D1785
	PVC – DWV	ANSI/ASTM D2665
	CPVC schedule 40	ANSI/ASTM D1784/F441
	SDR-21 & SDR-26 PVC	ANSI/ASTM D2241
	ABS-DWV	ANSI/ASTM D2661
	Schedule 40ABS	ANSI/ASTM F627
	PP (Polypropylene) Pipe and Components	UL 1738 ULC S636-08
Pipe Cement / Primer	PVC	ANSI/ASTM D2564
	CPVC	ANSI/ASTM F493
	Schedule 40 ABS	ANSI/ASTM D2235
• IPEX is approved vent manufacturer in Canada listed to ULC-S636. • IPEX System 636 Cements and Primers are approved in Canada listed to ULC-S636		
Use of cellular core PVC (ASTM F891), cellular core CPVC, or Radel®, (Polyphenolsulfone) in venting systems shall be prohibited.		

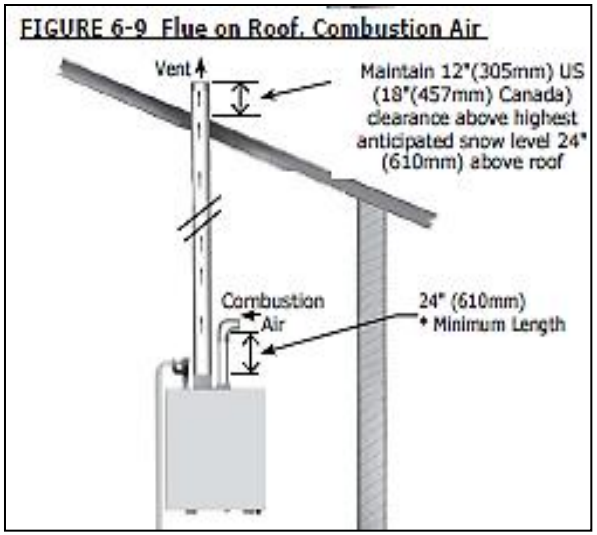
Venting Configurations



Roof w/ Concentric combustion air

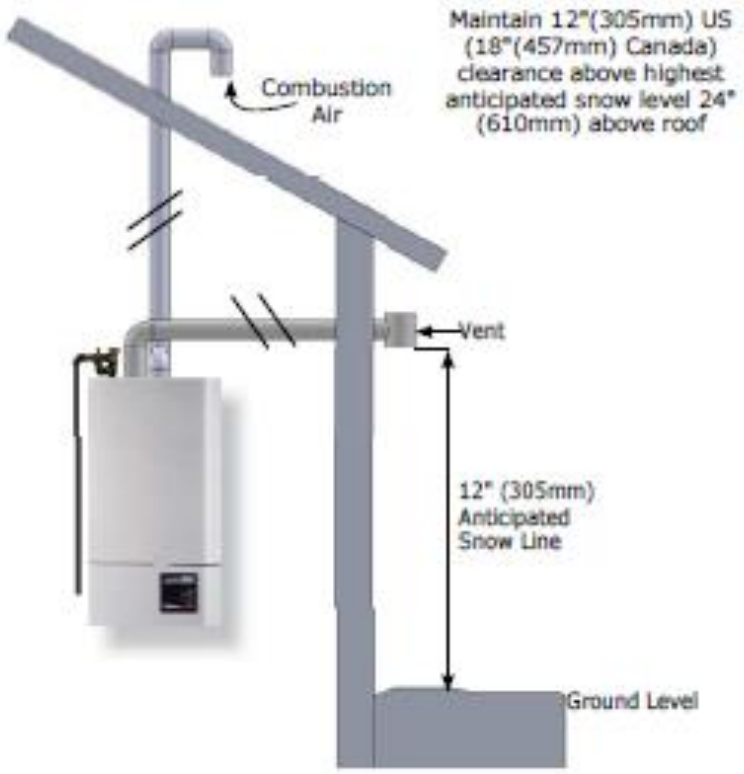


Roof w/ sidewall combustion air

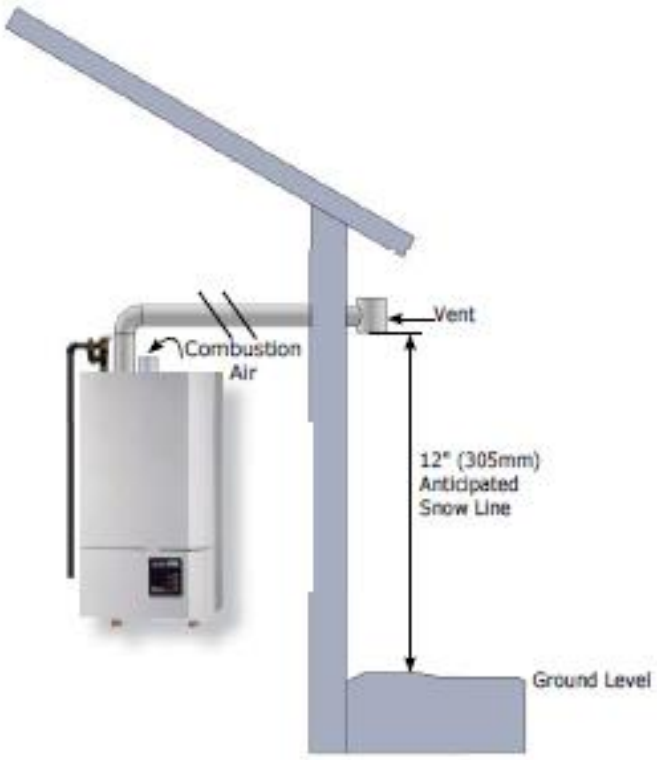


Roof w/ inside combustion air

Venting Configurations

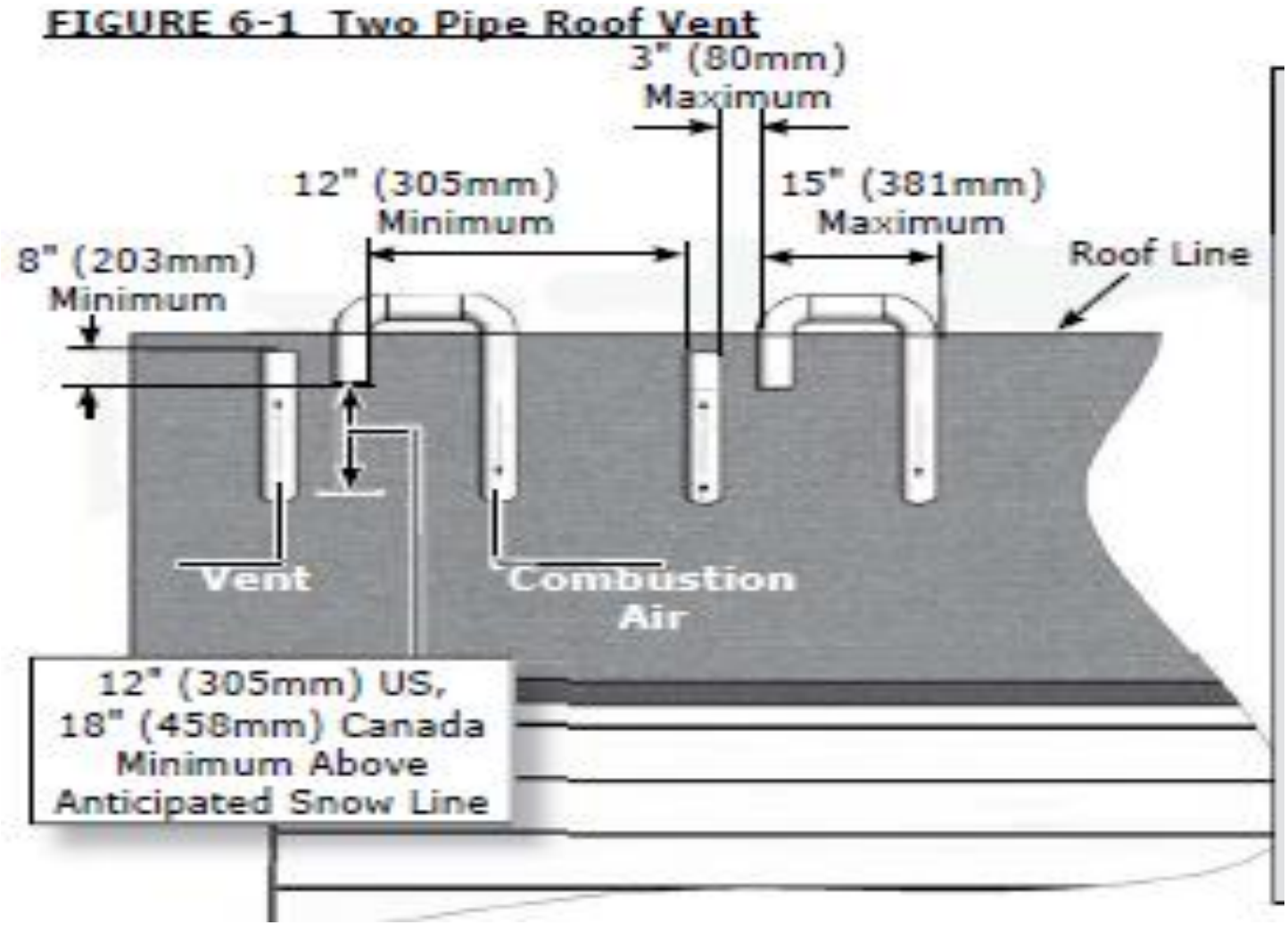


Sidewall vent w/
combustion air on roof



Sidewall vent w/
inside combustion air

Venting Configurations



Venting Configurations

FIGURE 6-2 Two Pipe Side Wall Vent

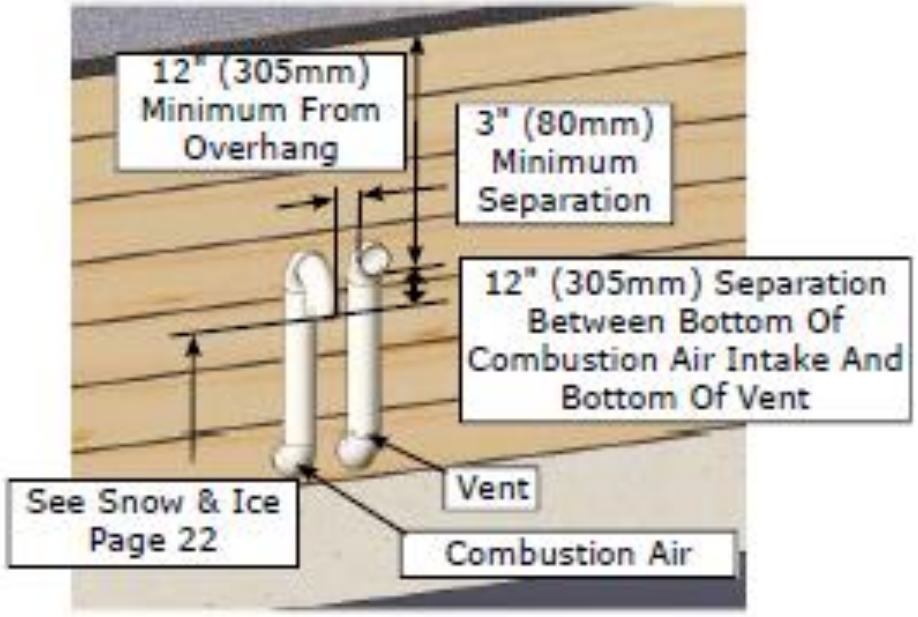
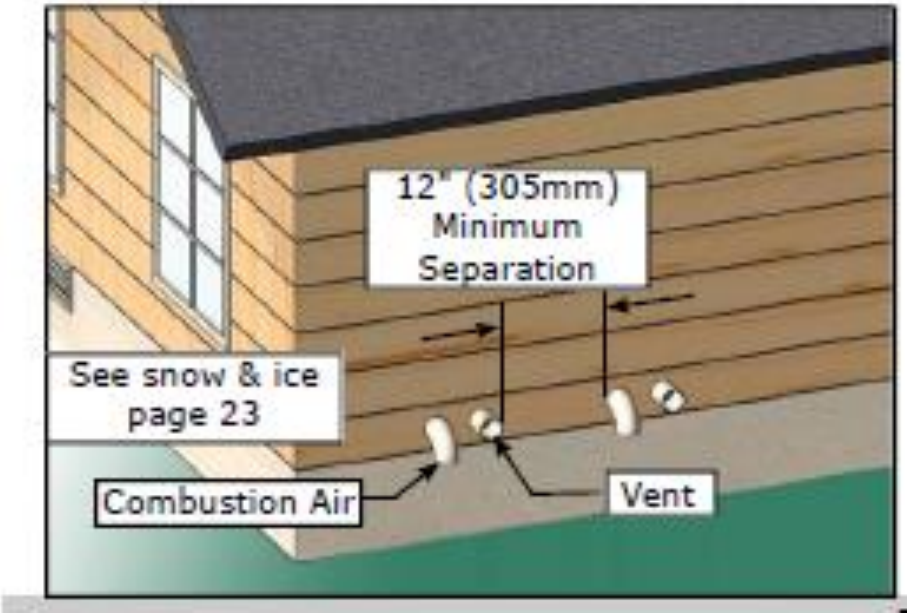


FIGURE 6-3 Two Pipe Side Wall Vent (Multiple Appliances.



Common Venting

Note: Flow Check Valve accessory required – kit number 240010299

FIGURE 6-17 Mulitple Boilers With Common Venting Pipe

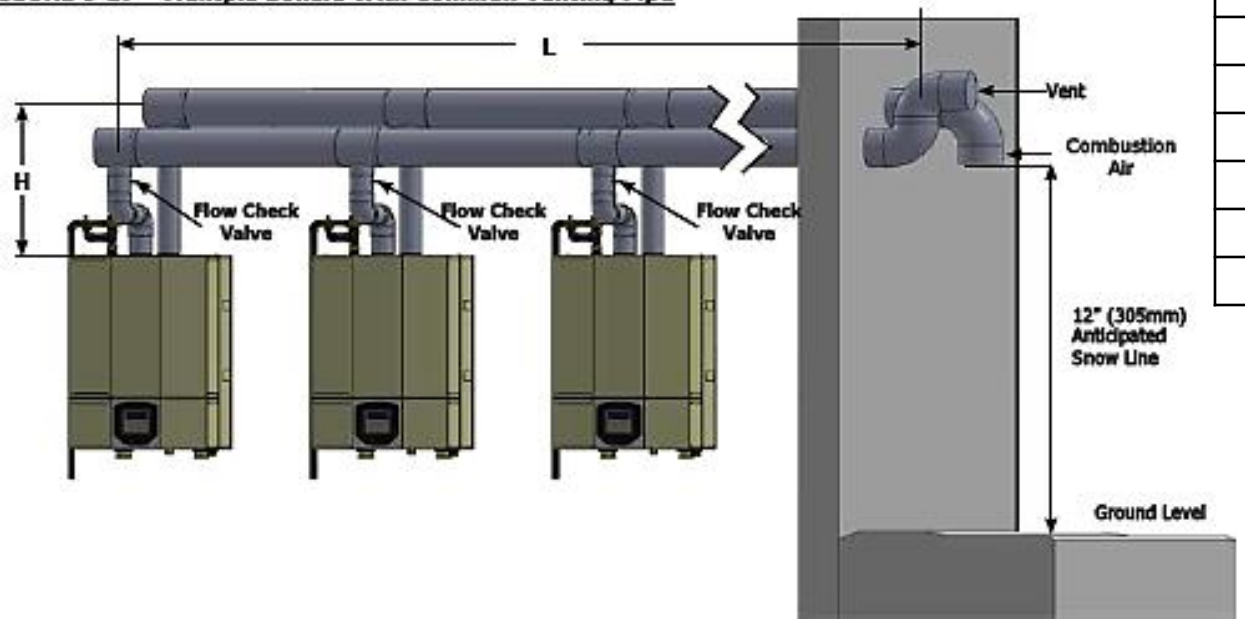


Table 9 – Common Venting Pipe Diameters

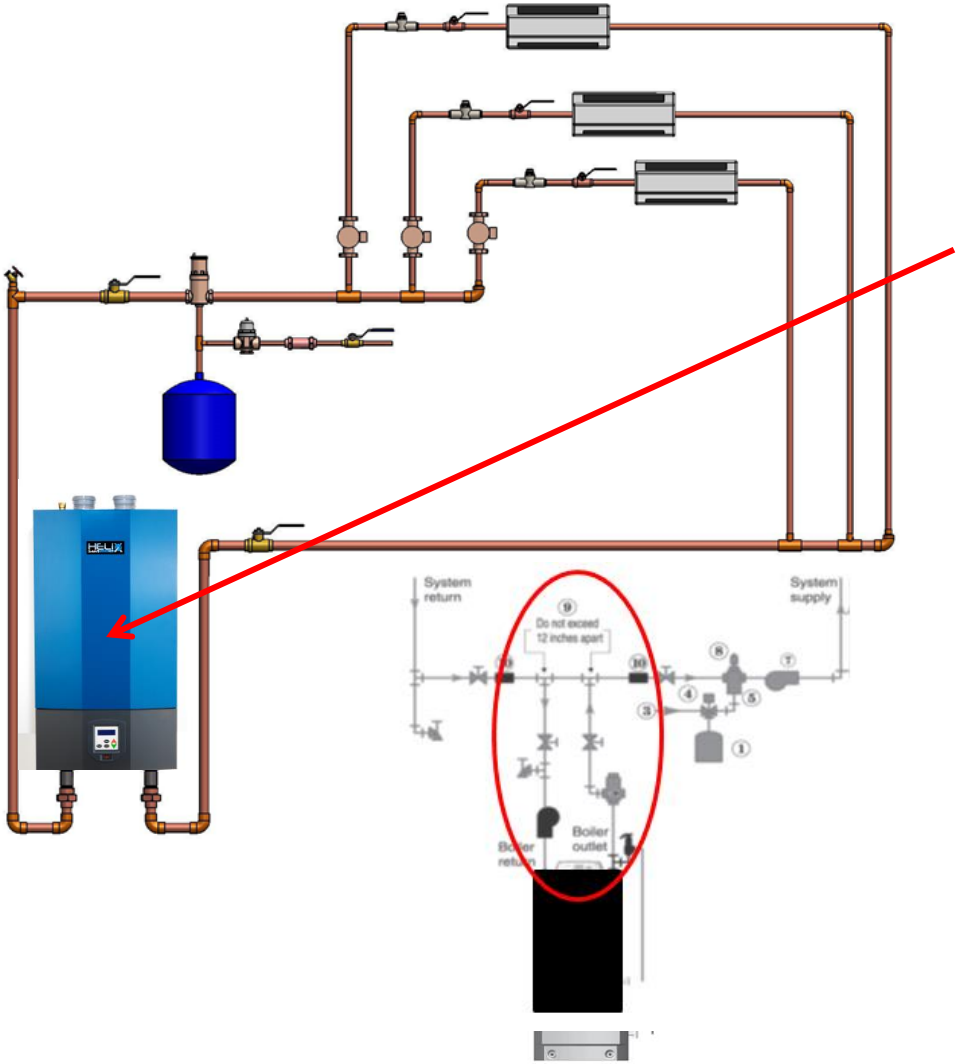
Total Firing Rate	Minimum Diameter of Common vent pipes if L <50 ft (16m)	Minimum Diameter of Common vent pipes if L >50 ft (16m)
400	4" (101mm)	5"(127mm)
600	5"(127mm)	6"(152mm)
800		
1000	6"(152mm)	7"(177mm)
1200		
1400		
1600	7"(177mm)	8"(203mm)
1800		
2000		

Venting / Combustion Air

- Side wall or roof venting systems allowed
- 1’ from or below doors, windows / gravity inlets ***except*** when using indoor air for combustion. 4’ clearance required for single pipe installations. Direct vent on common wall only
- 3’ above and 10’ from any forced air inlet
- Above expected Snow grade (12”)
- 3’ from a inside “L” corner
- 4’ horizontally from, no case above or below electrical, gas meter / regulators or relief equipment
- Cannot be vented under a deck or porch

Piping

Built-In Features



Primary/Secondary Piping and Pump

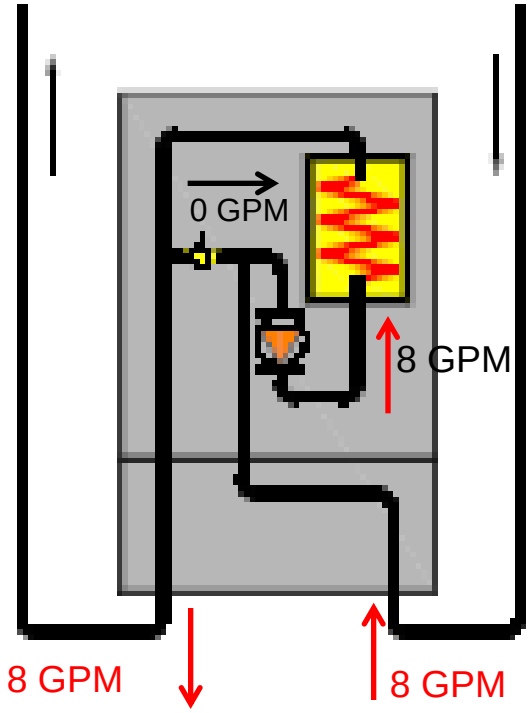
Factory installed inside the boiler.

The internal pump provides the correct amount of water flow through the heat exchanger.

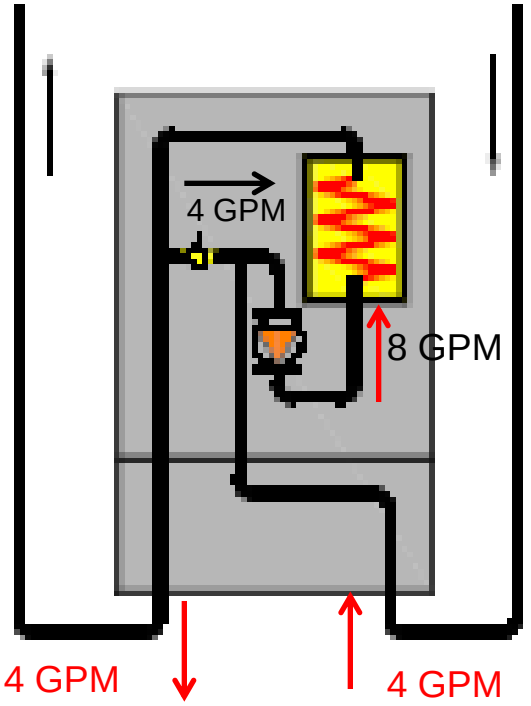
The pressure drop across the boiler's supply and return line is negligible - the boiler is not adding resistance to the system piping.

Water Flow

Primary & Secondary Flow Balanced

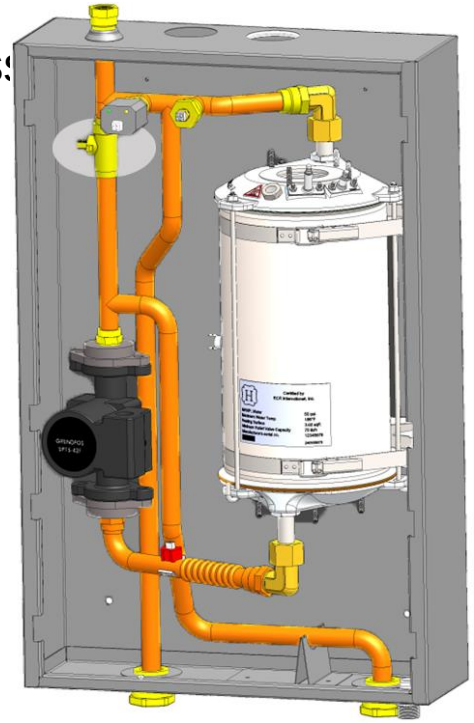


Reduced Flow in Secondary
(One Zone Calling)



Built In Pump & Piping

- Factory installed
- Low pressure drop (less than ½ psi) across the boiler's supply and return connections
- Hydraulically Separates boiler from the system
- A ball valve is located between the internal tees.



Benefits

Saves the installer material and labor.

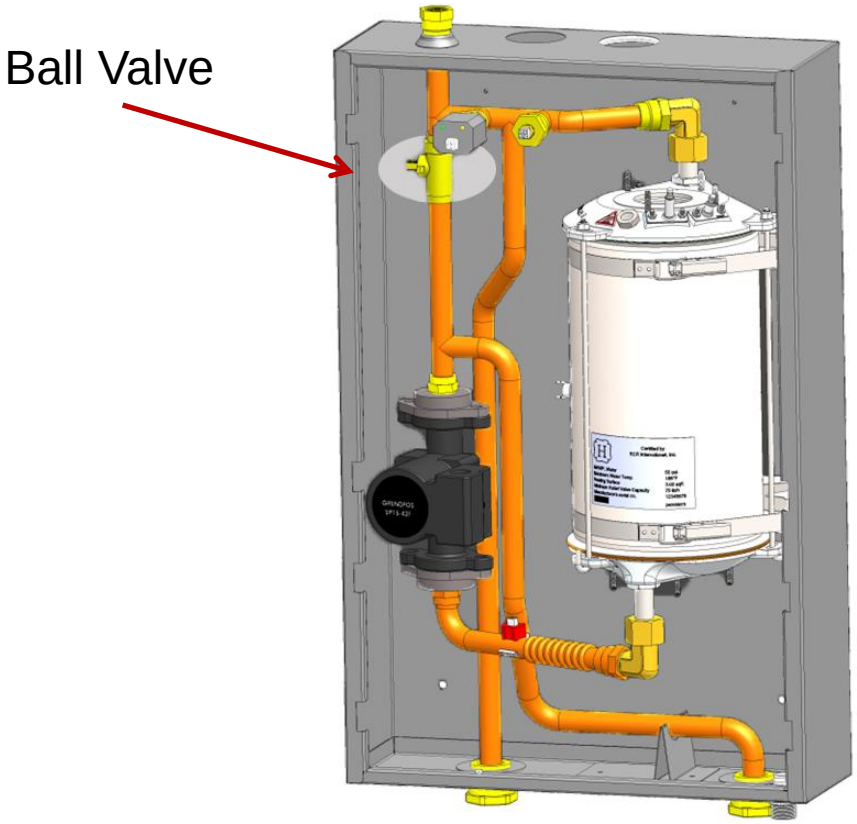
No need to purchase a costly high head pump. Easy to connect to existing systems without extensive re-piping.

Ensures proper flow through the boiler's heat exchanger regardless of how many system zones are open or closed.

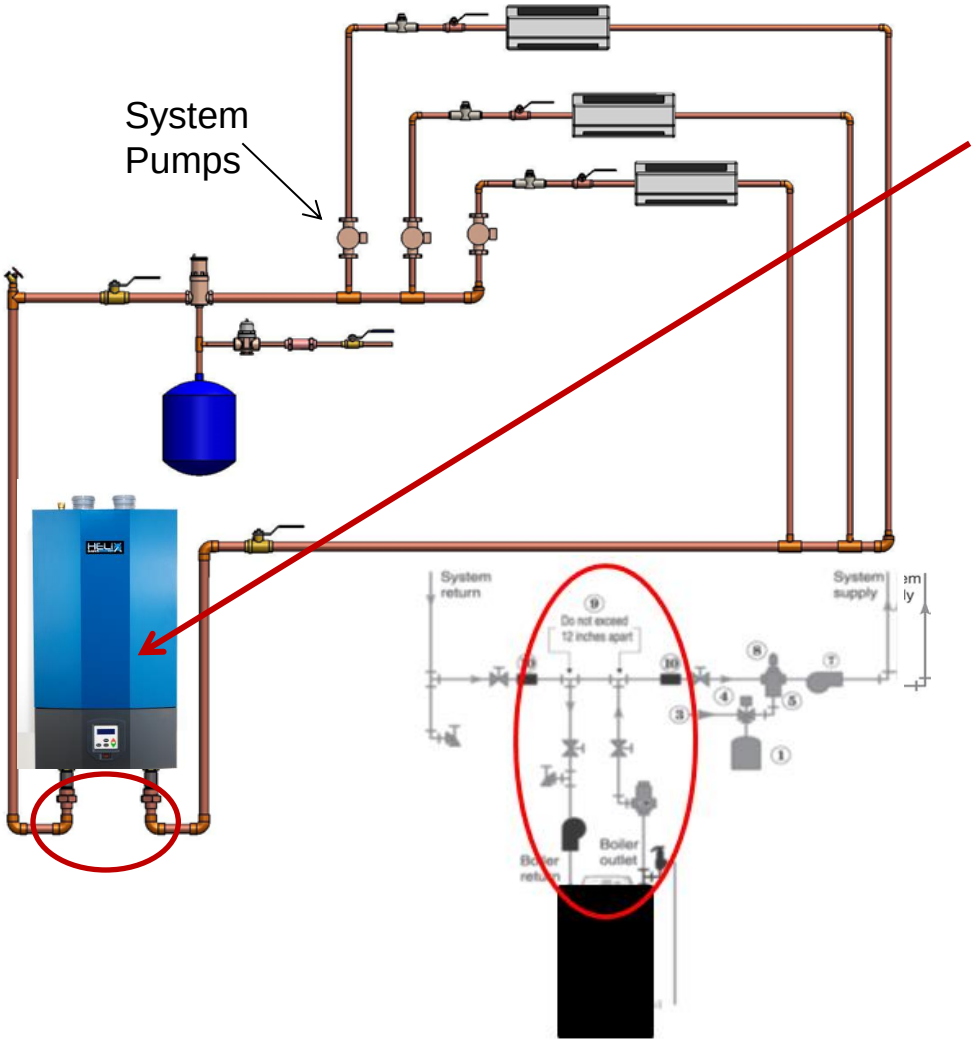
Increases the boiler's piping options when the existing system already has a set of closely spaced tees or when installing a new multiple boiler system.

Internal Piping

- Primary Secondary can be either internal to boiler or external to already existing closely spaced tee's!
- Saves both time and money on install
- Note: System requires at least one secondary circulator.



Built In Pump & Piping



Primary/Secondary Piping and Pump

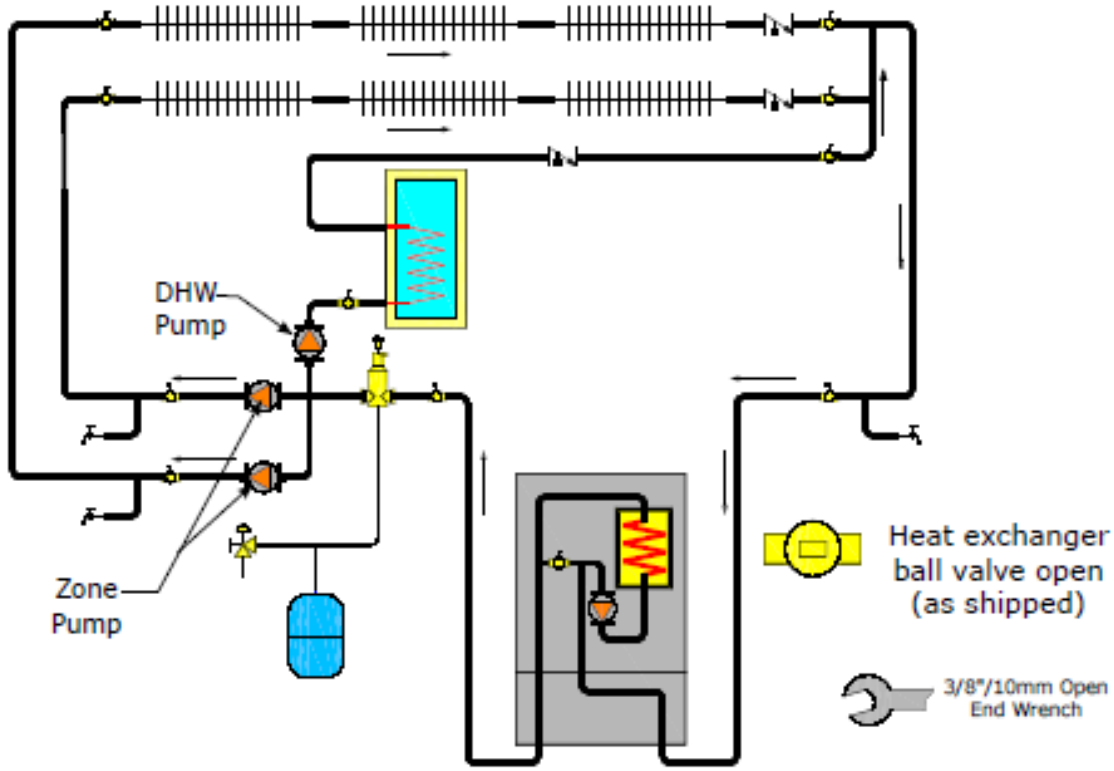
Factory installed inside the boiler.

The internal pump provides the correct amount of water flow through the heat exchanger.

The pressure drop across the boiler's supply and return line is negligible - the boiler is not adding resistance to the system piping.

Built-In Primary/Secondary Piping

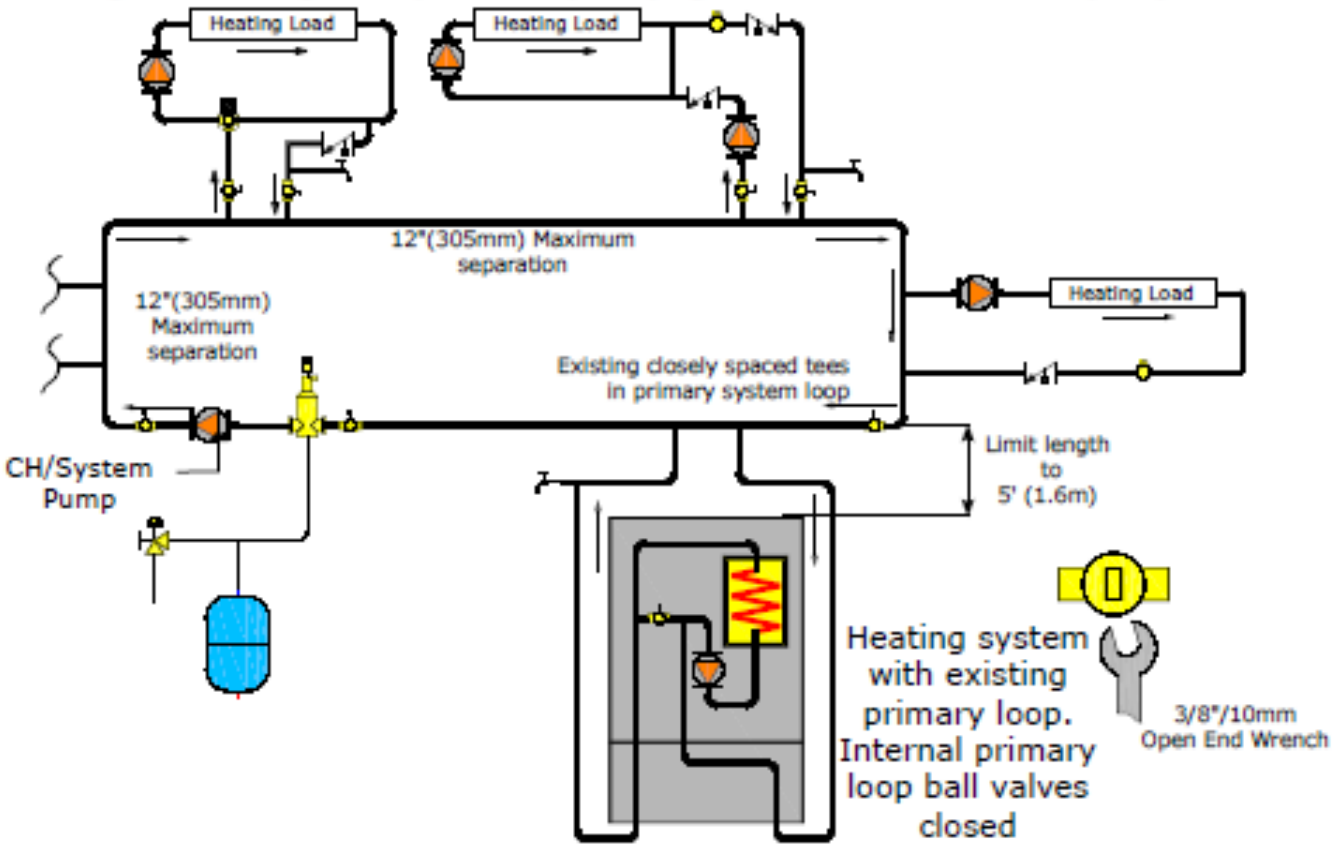
FIGURE 5-6 Single Boiler Two-Pipe Zoned System With Zone Pumps



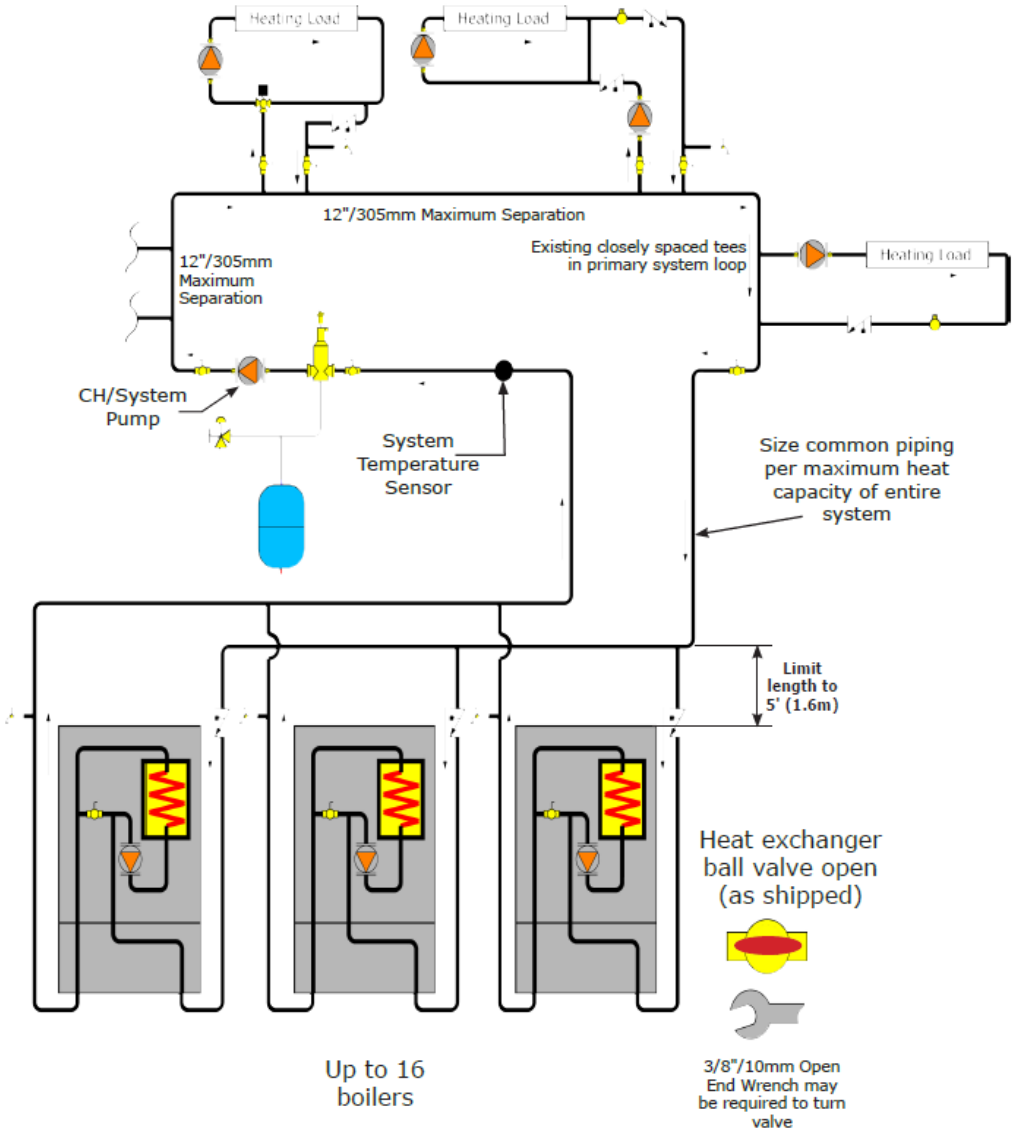
Boiler is shipped with the heat exchanger ball valve open. Connect to existing systems without extensive re-piping or the need to purchase a high head pump.

Dunkirk External Primary/Secondary Piping

FIGURE 5-7A Single Boiler Using Primary/Secondary Pumping With Closed External Primary Loop

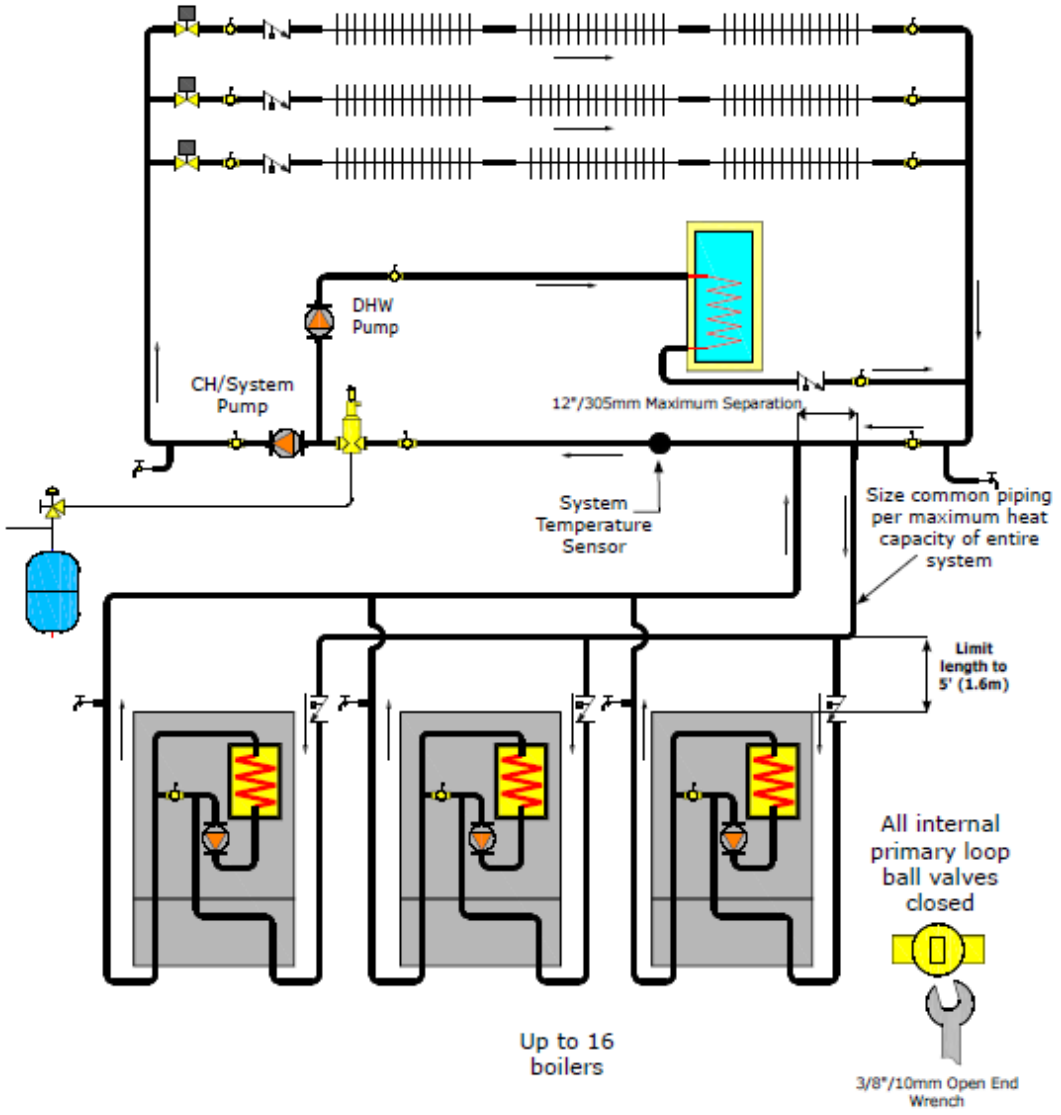


Multiple Boiler Piping



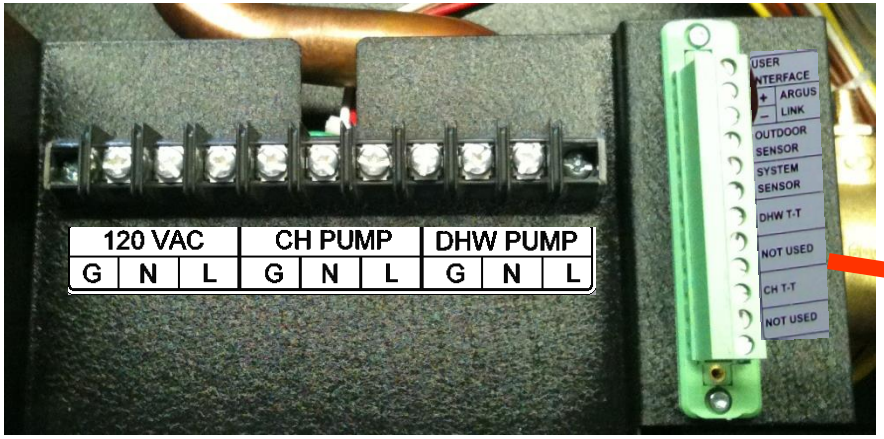
Multiple Boiler Piping

FIGURE 5-8A Multiple Boiler Two Pipe Zoned System With Zone Valves - (See Multiple Boiler Guide)



Electrical Connections
Line Voltage

- Wiring connections located inside, bottom left
- Incoming 120 volt
- Central heating circulator pump
- Domestic hot water circulator pump



Electrical Connections
Line Voltage

Table 11 – Maximum Allowable Current Draw

MBH	CH PUMP	DHW PUMP	NOTE
50 75 100 150 200	1 A	1 A	Powered by Control Board
299	10 A	10 A	Powered by installed 10 Amp relay
If CH or DHW pump current is more than the maximum allowable current draw install proper field sourced relays as shown in figure 8-3.			

Joe – check relay situation

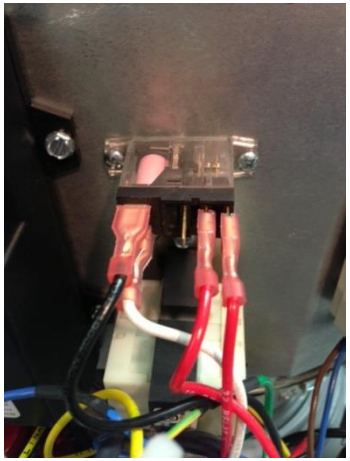
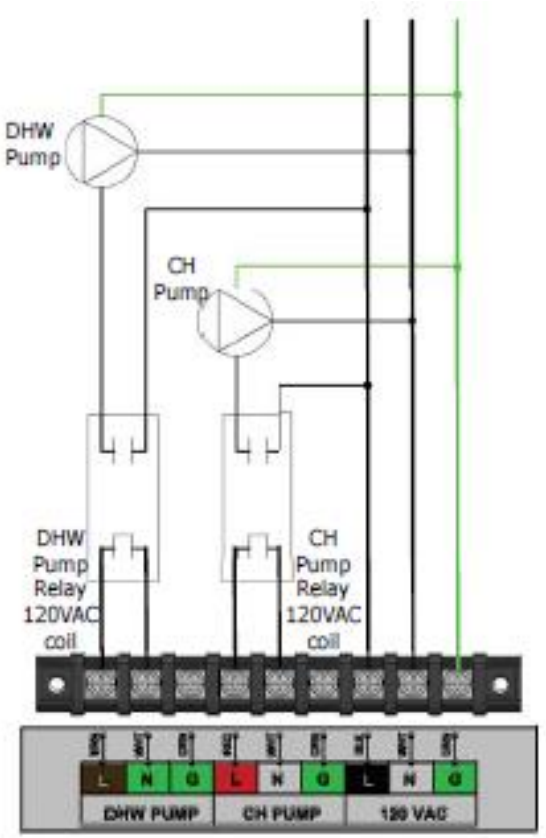
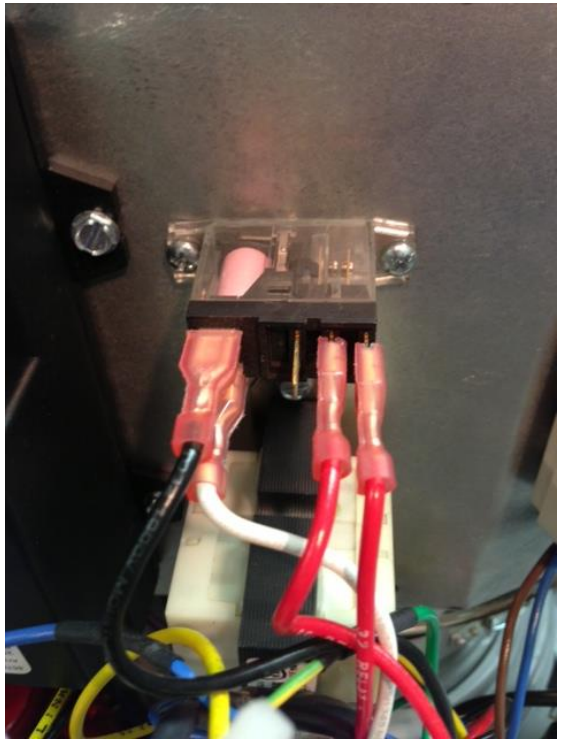


Figure 8-3 Isolation Relays for CH System Pump and DHW Pump



Pump Relay



Built-in Pump Relay is provided on the 299 model.

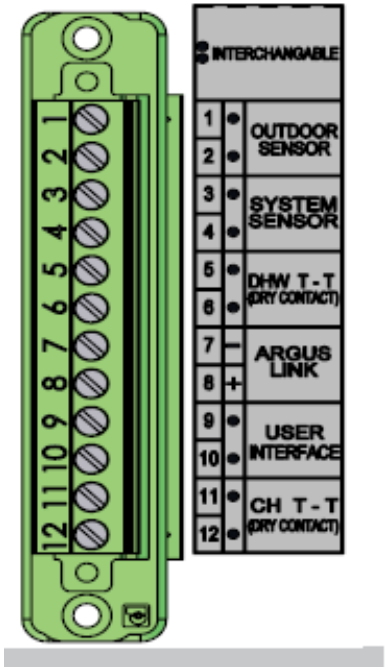
Pending Change - 150 & 200 models will also incorporate the pump relay.

Electrical Connections
Low Voltage

Low voltage terminal strip located inside boiler

Connections

- User Interface
- ARGUS™ Link
- Sensors
- TT – DHW / CH
- Removable for easy wiring

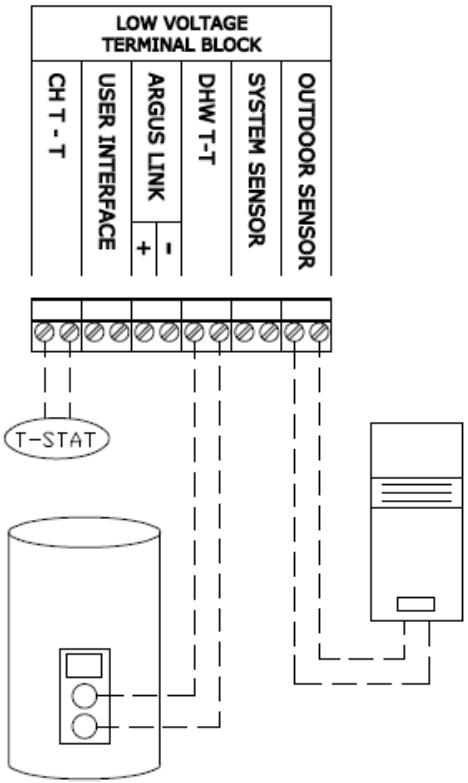


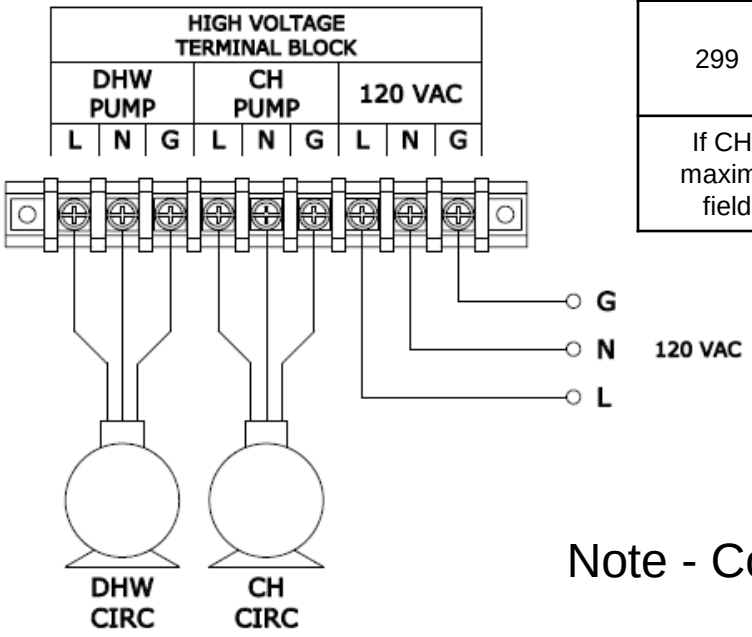
299

50-200

One Zone Heat or One Zone Heat & Indirect

All the Wiring Will Be On Boiler





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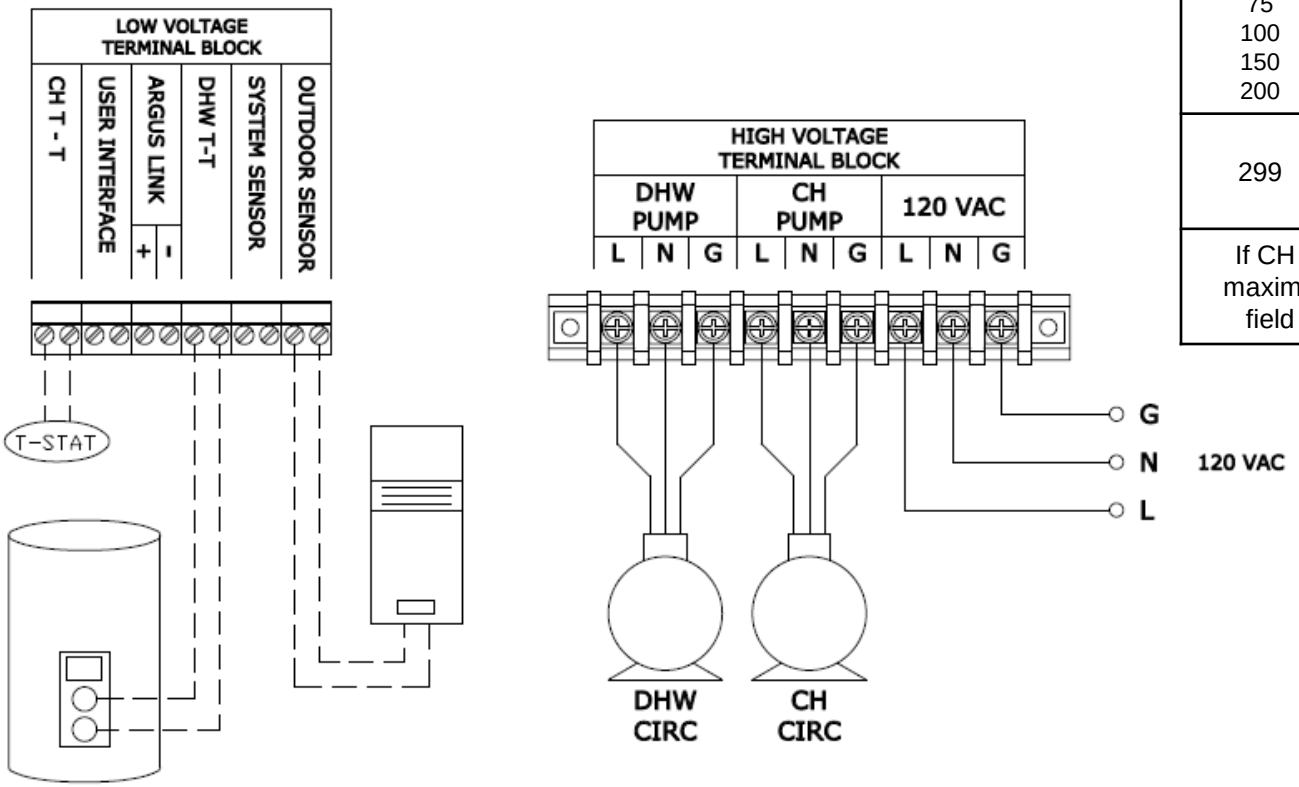
50 75 100 150 200	1 A	1 A	Powered by Control Board
299	10 A	10 A	Powered by installed 10 Amp relay
If CH or DHW pump current is more than the maximum allowable current draw install proper field sourced relays as shown in figure 8-3.			

Note - Corresponding pioe

One Zone Heat or One Zone Heat & Indirect

All the Wiring Will Be On Boiler



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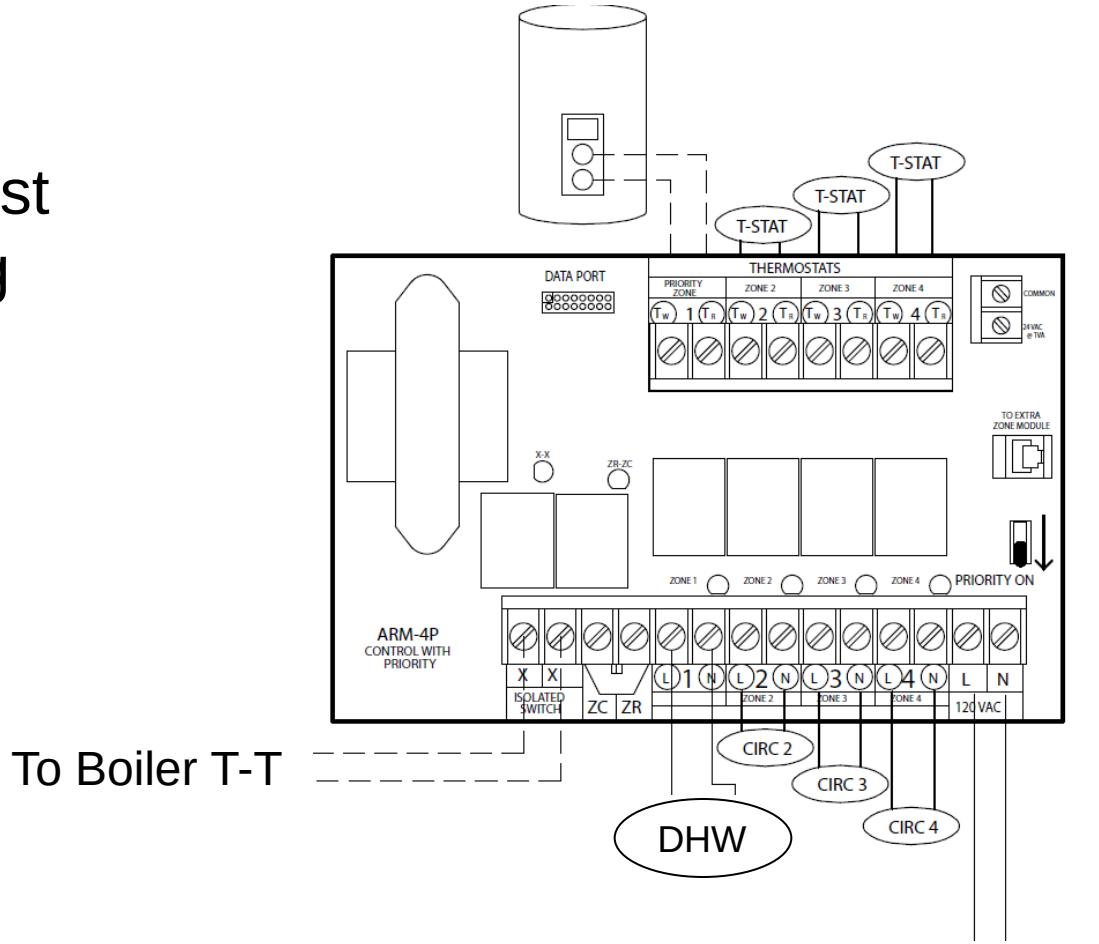
299	10 A	10 A	Powered by installed 10 Amp relay
If CH or DHW pump current is more than the maximum allowable current draw install proper field sourced relays as shown in figure 8-3.			

Priority DHW with Zone Control

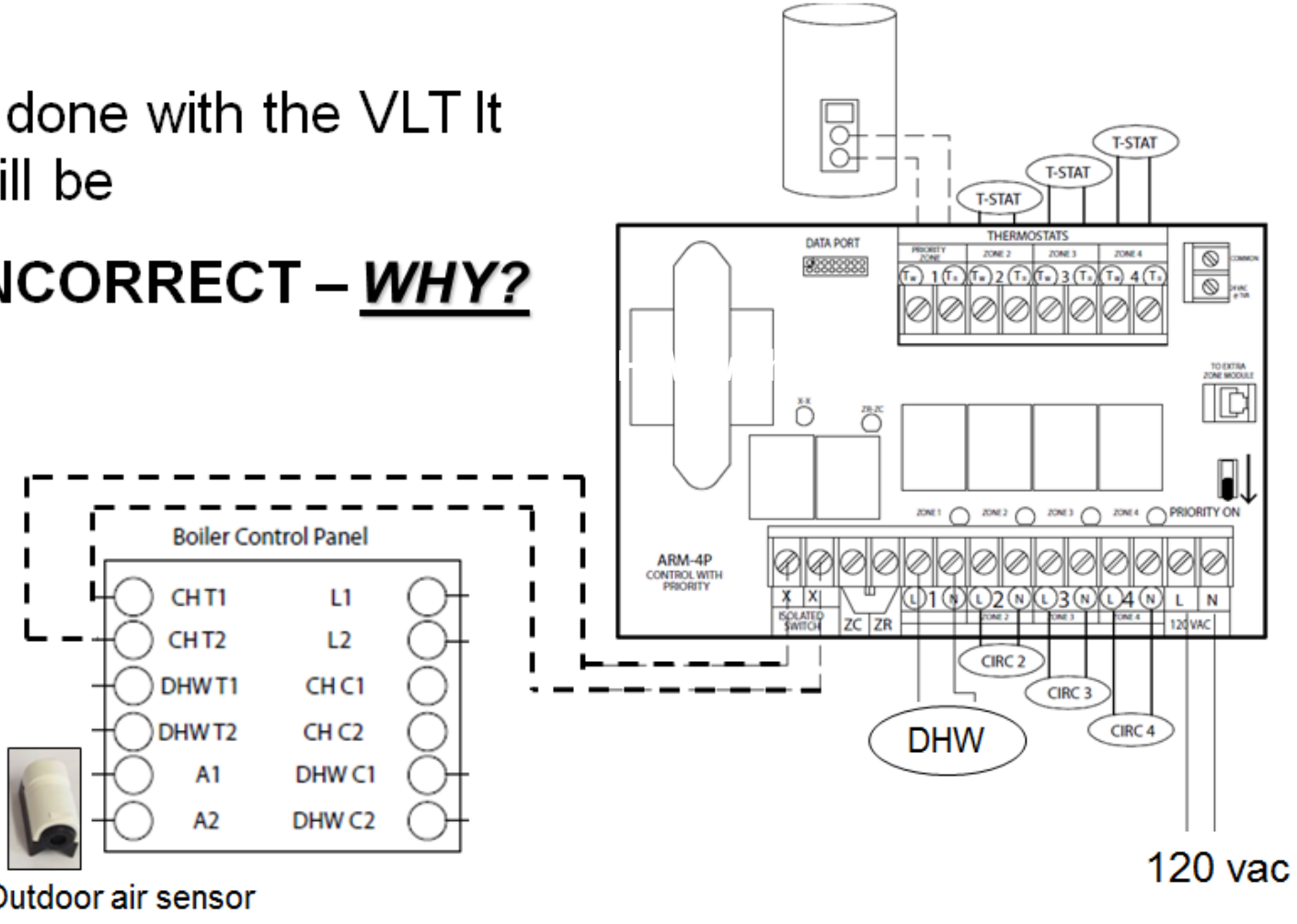
Typical Cast Iron Wiring



Priority DHW with Zone Control

If done with the VLT It will be

INCORRECT – *WHY?*



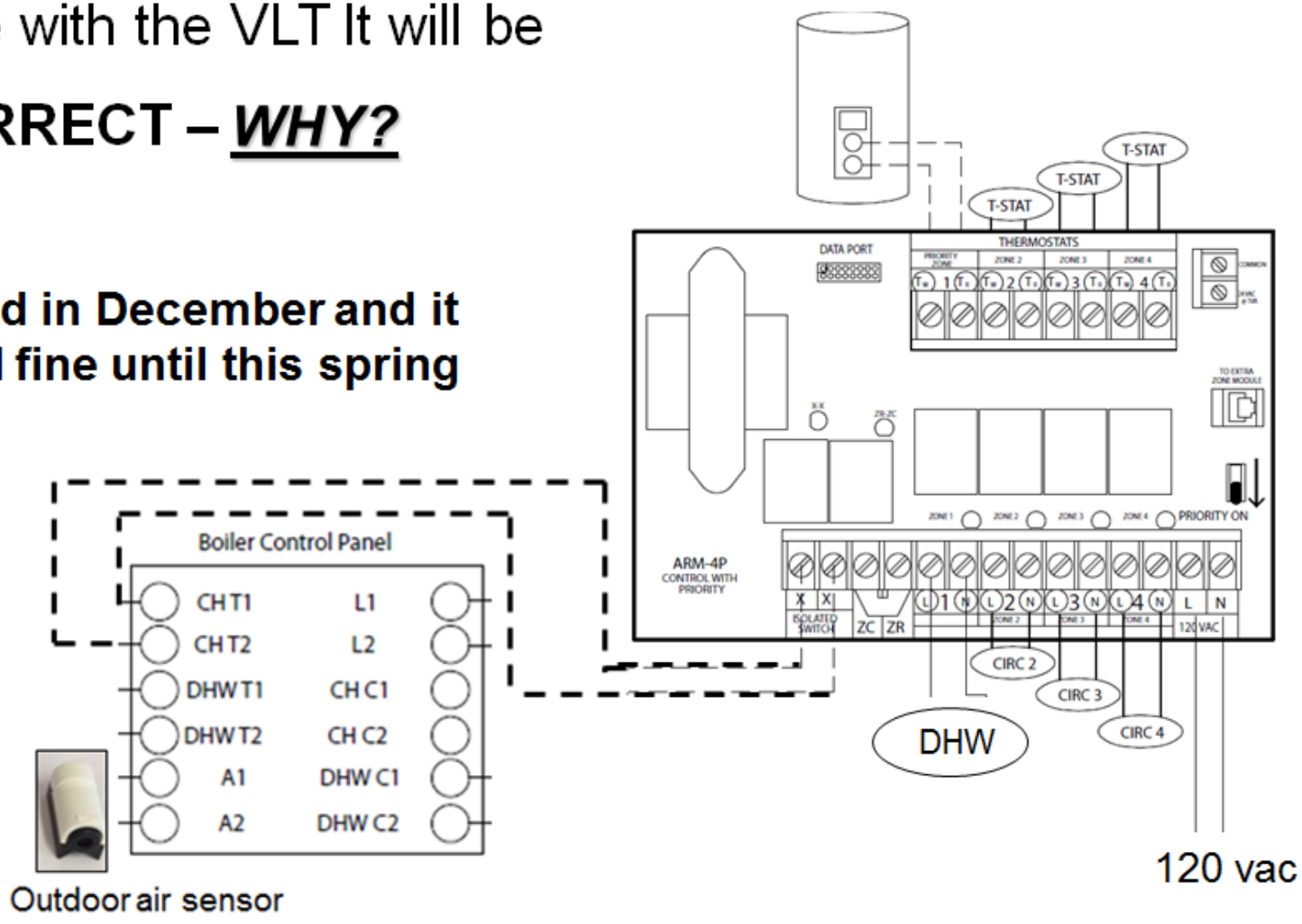
Priority DHW with Zone Control

If done with the VLT It will be

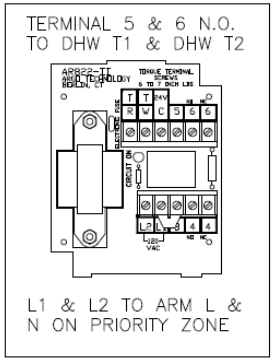
INCORRECT – *WHY?*

HINT:

Installed in December and it worked fine until this spring

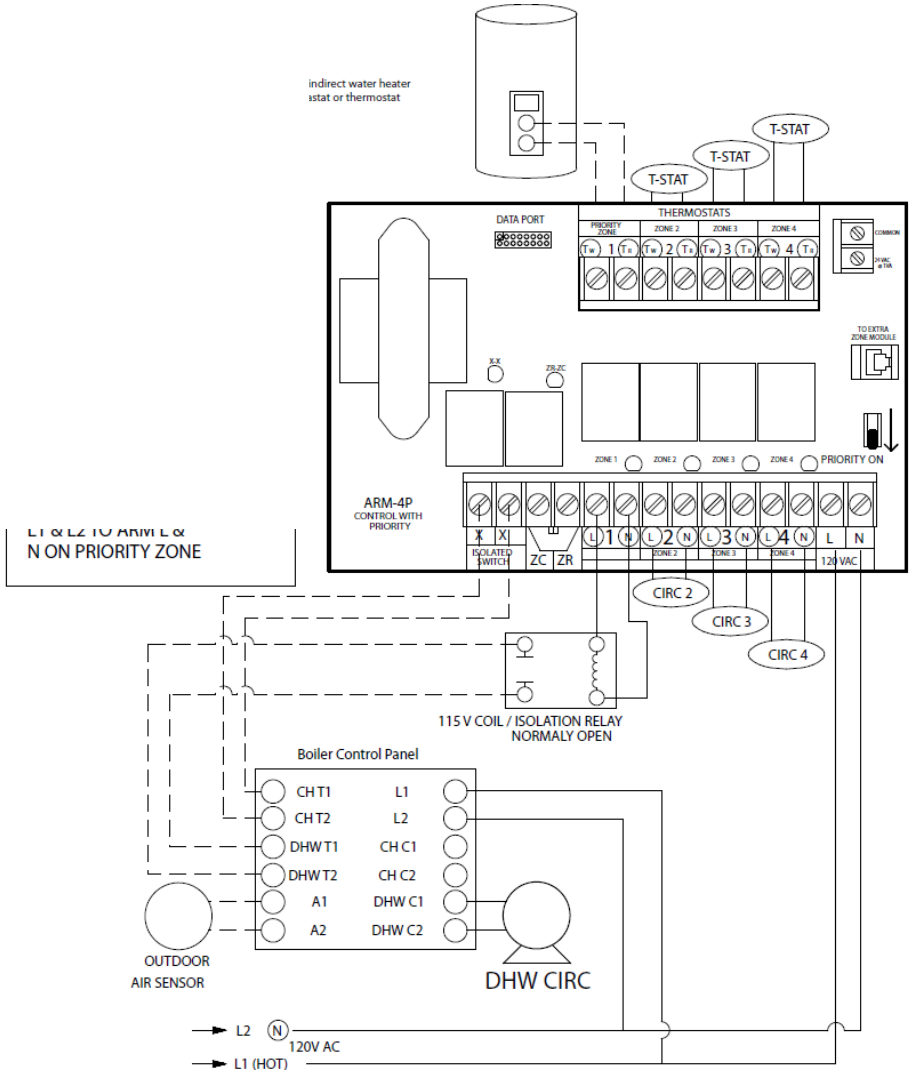


Priority DHW with Zone Control



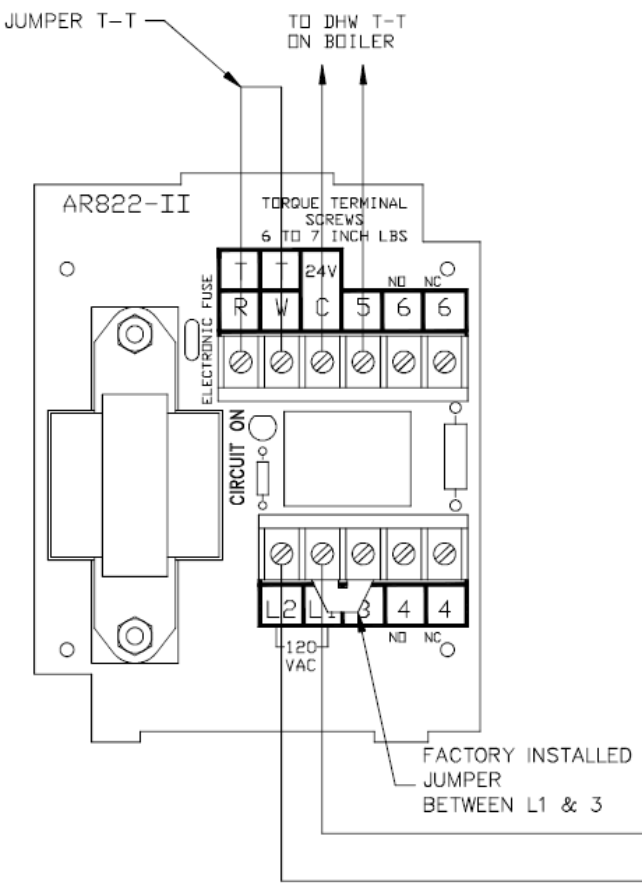
Argo AR822II can be used as isolation relay.

CORRECT

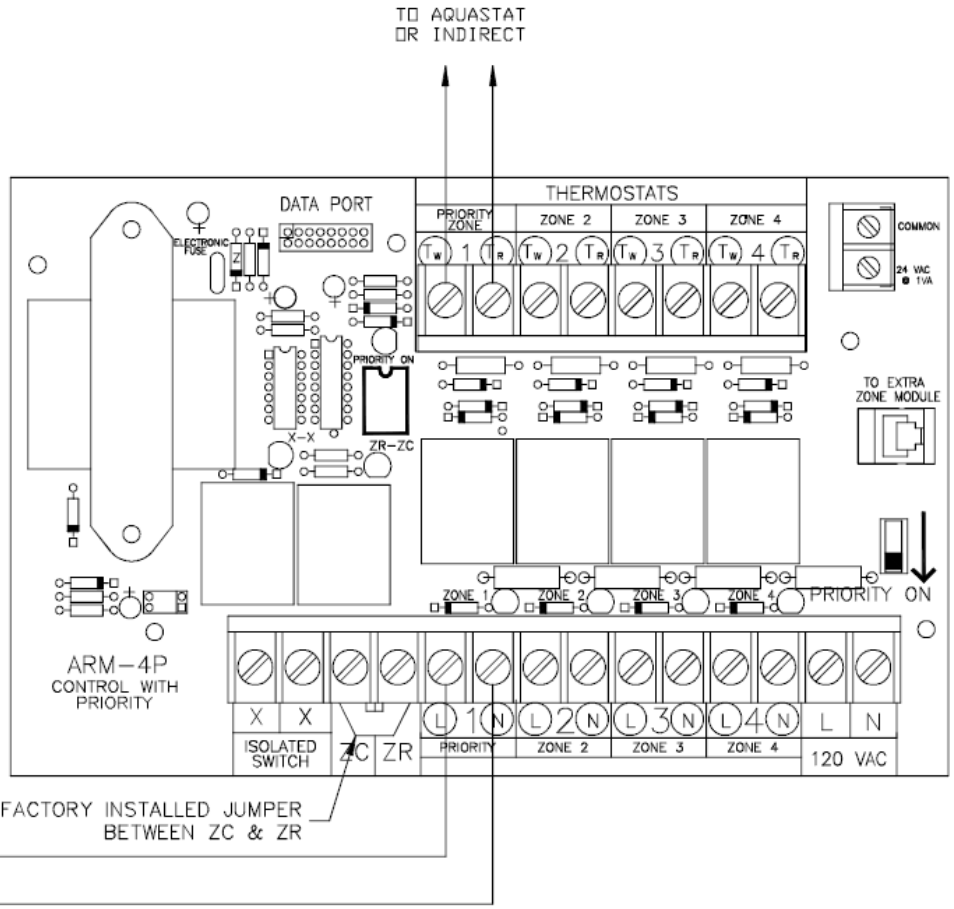


Using AR822 with ARM Control

AR822-II

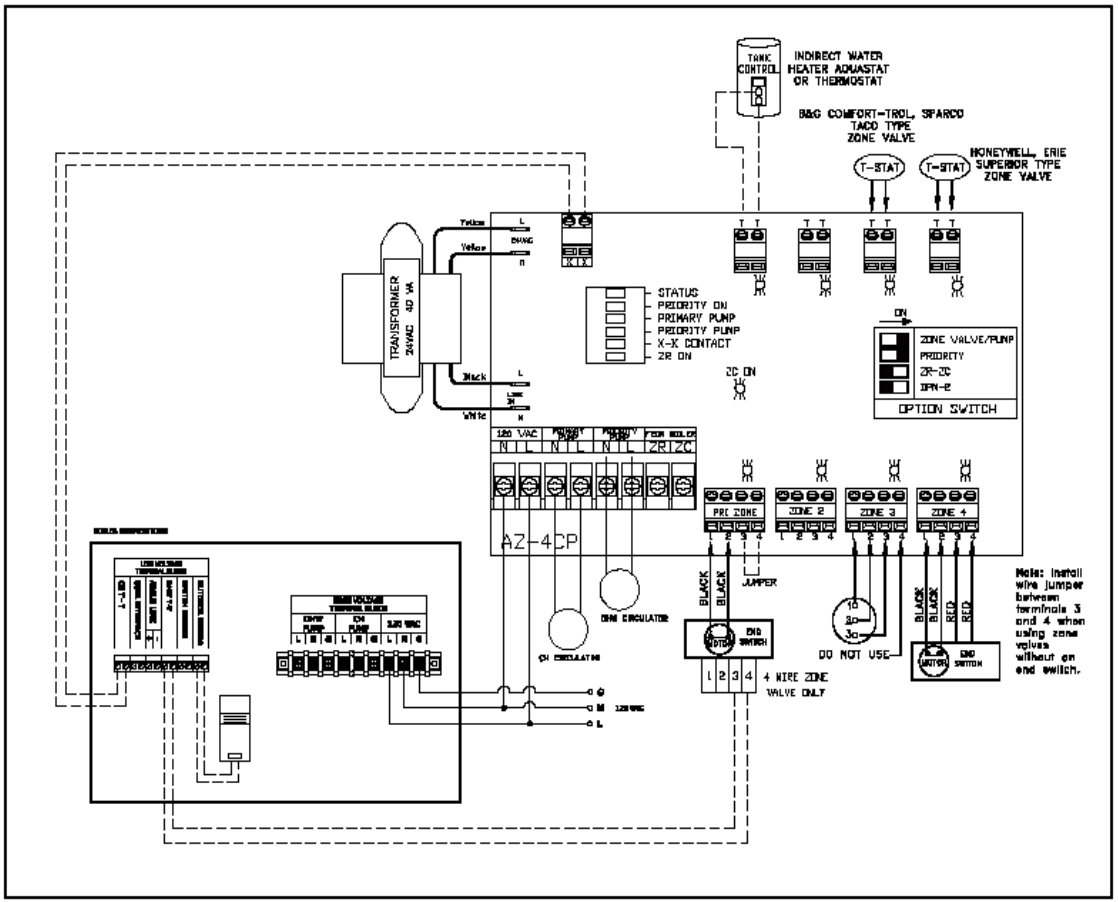


ARGO ARM-4P



System Wiring
Zone Valves

ARGO
AZ-4CP



End Switch of DHW Zone Valve acts as DHW Signal

Wiring Multiple Boilers

- **Multiple Boiler System**

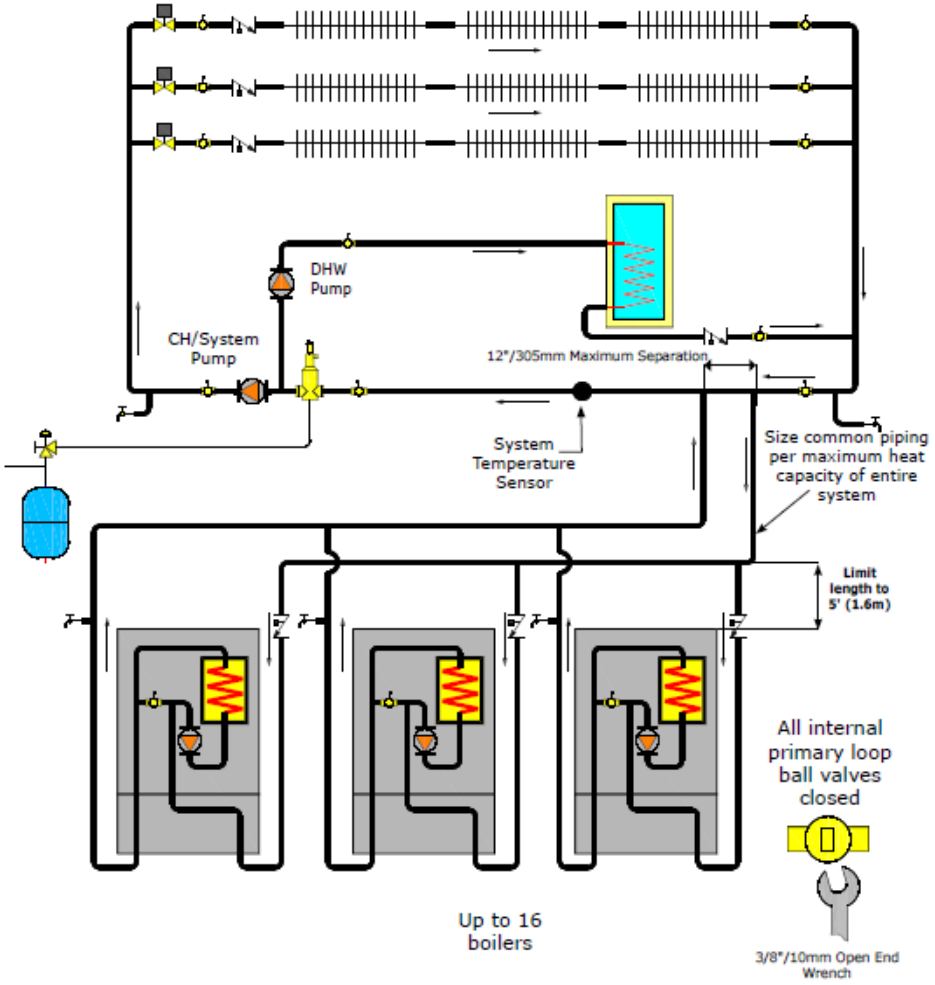
  ARGUS ™ control on first boiler will act as the master control. Requires a Multiple Boiler Install Kit p/n 550002186
- No need for expensive MBS control

- **Wiring**

  Daisy chain wiring from the master to additional boilers with low voltage wiring from the ARGUS link terminals (2-conductor low voltage wire)

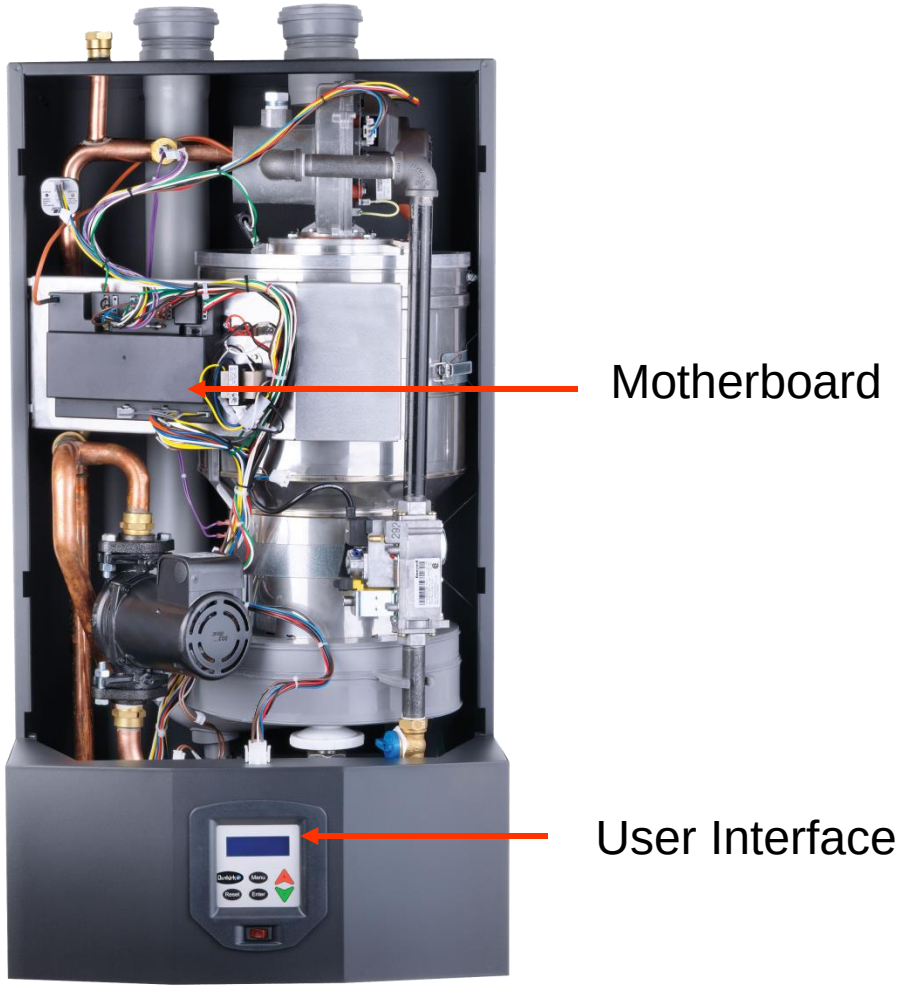
Multiple Boiler Piping

FIGURE 5-8A Multiple Boiler Two Pipe Zoned System With Zone Valves - (See Multiple Boiler Guide)



Control Package
ARGUS™ Vision

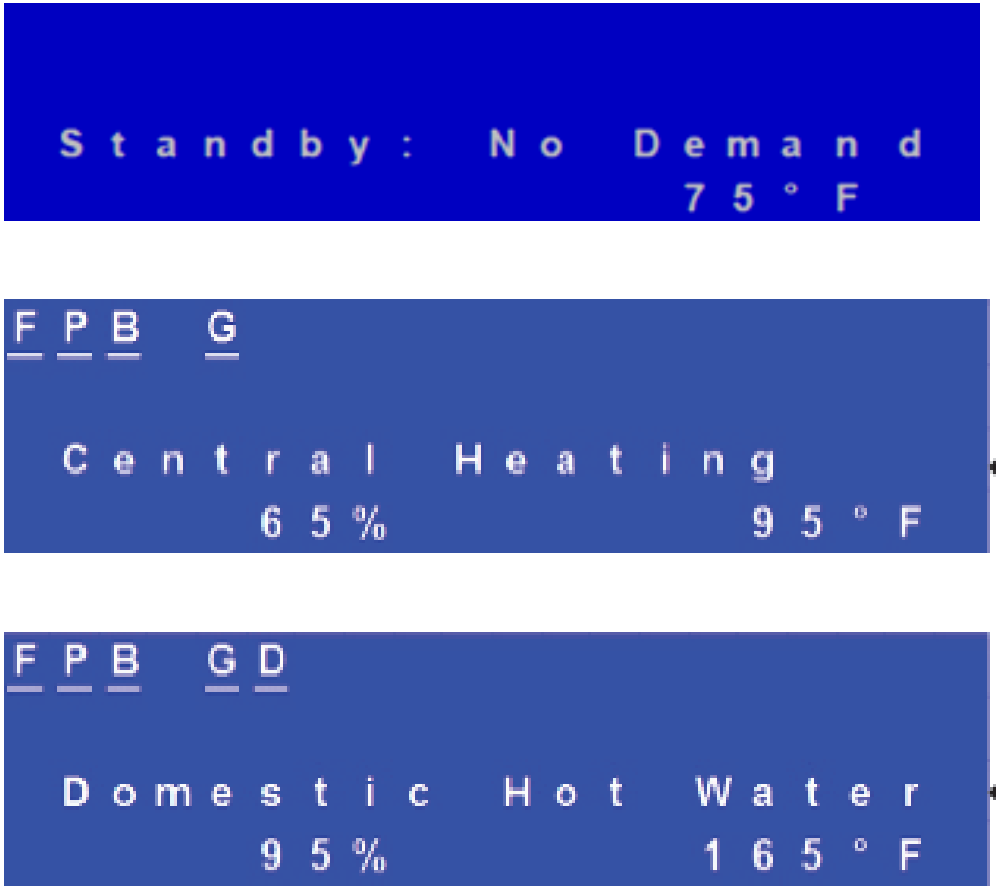
- **ARGUS™**
- **Display / mother board**
- **Fuse protected**



Control Package
ARGUS™ Vision

- Key Features:
  - User Interface with full text readout of error codes + diagnostics.
  - Integrated Multiple boiler control w/ simplified physical connection.

Control Display



Boiler operates in standby mode until demand for Central Heat (CH) or Domestic Hot Water (DHW) is detected.

Control Display

Boiler Status Indicator

F = Flame Detected

P = Boiler Pump On

B = Combustion Air Blower

S = Spark Ignition On

G = Gas Valve Open

D = DHW Pump On

Service Reminder Indicator

Boiler in Standby Mode

Boiler Supply Water

Temperature Indicator

Control Program

ARGUS™ Control

Key	Description
RESET	Reset Control / System
MENU	Enter / Exit user menu
ENTER	Select Menu item Confirm new parameter value
▲ PLUS	Scroll up to next menu item Go to next screen Increase value
▼ MINUS	Scroll down to next menu item Go to previous screen Decrease value

EASY TO PROGRAM
EASY TO UNDERSTAND

TWO MENU'S: MAIN MENU & INSTALLERS MENU

Menu Navigation

Main Menu

- Boiler Status
- Settings

Key	Description
RESET	Reset Control / System
MENU	Enter / Exit user menu
ENTER	Select Menu item Confirm new parameter value
▲ PLUS	Scroll up to next menu item Go to next screen Increase value
▼ MINUS	Scroll down to next menu item Go to previous screen Decrease value

Boiler Status

- Supply Temperature Setpoint
- Supply Temperature
- Return Temperature
- DHW Status
- System (Sensor) N.C. (Not Connected)
- Flue Temperature
- Outside Air Temperature
- Boiler Pump
- CH/System Pump
- DHW Pump

Menu Navigation

Main Menu

- **Boiler Status**
- **Settings**

No Outdoor Sensor

Settings

- **CH Setpoint**
- **DHW Setpoint**
- **Change Units ºF/ºC**

OR

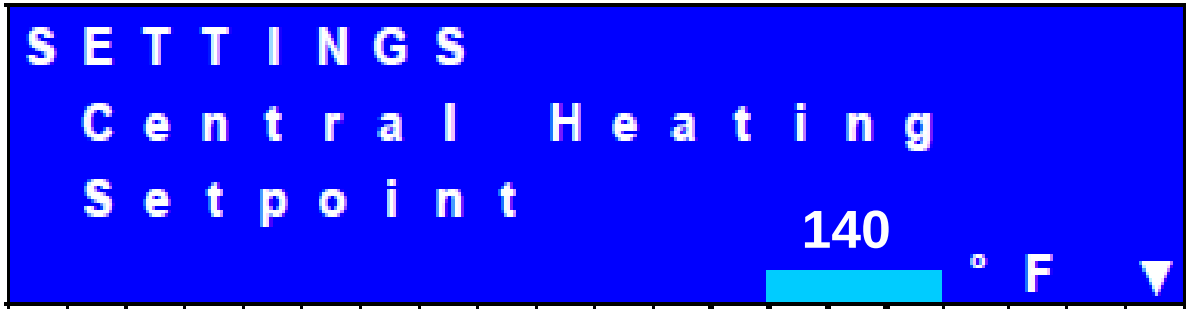
Outdoor Sensor

Settings

- **OD Reset (Not Adjustable)**
- **DHW Setpoint**
- **Change Units ºF/ºC**

Key	Description
RESET	Reset Control / System
MENU	Enter / Exit user menu
ENTER	Select Menu item Confirm new parameter value
▲ PLUS	Scroll up to next menu item Go to next screen Increase value
▼ MINUS	Scroll down to next menu item Go to previous screen Decrease value

Sample Screen Display



Menu Navigation

(Menu & Enter Buttons – 4 seconds)

Installer Menu

- Boiler Status
- Boiler Config
- CH Settings
- DHW Settings
- Cascade Settings
- System Test

Key	Description
RESET	Reset Control / System
MENU	Enter / Exit user menu
ENTER	Select Menu item Confirm new parameter value
▲ PLUS	Scroll up to next menu item Go to next screen Increase value
▼ MINUS	Scroll down to next menu item Go to previous screen Decrease value

Boiler Status

- Fan Speed – Actual, Low, IGN, High
- Flame
  - Signal
  - Failures
- Ignition Attempts
  - Successful
  - Failed
- Boiler Run Time
  - CH – hours
  - DHW – hours
- Blocking Errors (non-volatile memory for 16)
- Locking Errors (non-volatile memory for 16)

Menu Navigation

(Menu & Enter Buttons – 4 seconds)

Installer Menu

- **Boiler Status**
- **Boiler Config**
- **CH Settings**
- **DHW Settings**
- **Cascade Settings**
- **System Test**

Boiler Config

- **Address Selection**
- **LWCO – enable/disable**
- **Pump Mode**
  - **CH or Ch & DHW - 0**
  - **System Pump - 4**
- **Service Reminder**
  - **On/Off**
  - **Duration**

Key	Description
RESET	Reset Control / System
MENU	Enter / Exit user menu
ENTER	Select Menu item Confirm new parameter value
▲ PLUS	Scroll up to next menu item Go to next screen Increase value
▼ MINUS	Scroll down to next menu item Go to previous screen Decrease value

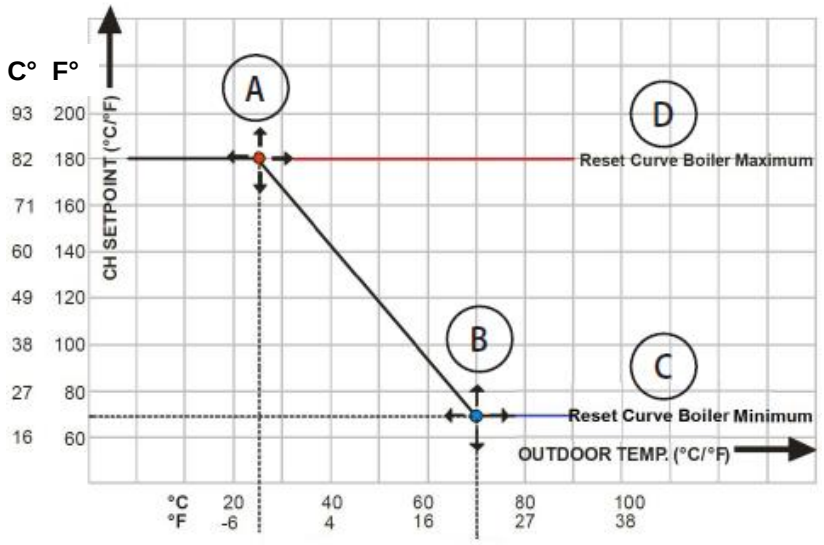
Menu Navigation

(Menu & Enter Buttons – 4 seconds)

Installer Menu

- **Boiler Status**
- **Boiler Config**
- **CH Settings**
- **DHW Settings**
- **Cascade Settings**
- **System Test**

Key	Description
RESET	Reset Control / System
MENU	Enter / Exit user menu
ENTER	Select Menu item Confirm new parameter value
▲ PLUS	Scroll up to next menu item Go to next screen Increase value
▼ MINUS	Scroll down to next menu item Go to previous screen Decrease value



CH Settings

CH Mode

- **0-** **CH with Tstat**
- **1-** **CH: Tstat & Outdoor Sensor**
- **2-** **CH: No Tstat, Full setback by OAS**
- **3-** **CH: Permanent Demand**

Warm Weather Shutdown

Reset Curve Design – High end

Reset Curve Design – Low end

Reset Curve Min/Max Temperatures

Boost Function

Max Power

Menu Navigation

(Menu & Enter Buttons – 4 seconds)

Installer Menu

- **Boiler Status**
- **Boiler Config**
- **CH Settings**
- **DHW Settings**
- **Cascade Settings**
- **System Test**

DHW Settings

- **DHW Mode**
- **DHW Priority**

Key	Description
RESET	Reset Control / System
MENU	Enter / Exit user menu
ENTER	Select Menu item Confirm new parameter value
▲ PLUS	Scroll up to next menu item Go to next screen Increase value
▼ MINUS	Scroll down to next menu item Go to previous screen Decrease value

Menu Navigation

(Menu & Enter Buttons – 4 seconds)

Installer Menu

- Boiler Status
- Boiler Config
- CH Settings
- DHW Settings
- Cascade Settings
- System Test

Key	Description
RESET	Reset Control / System
MENU	Enter / Exit user menu
ENTER	Select Menu item Confirm new parameter value
▲ PLUS	Scroll up to next menu item Go to next screen Increase value
▼ MINUS	Scroll down to next menu item Go to previous screen Decrease value

Cascade Settings

- Emergency Setpoint
- Start Delay Time
- Stop Delay Time
- Start Boiler Differential
- Stop Boiler Differential
- Calculated Setpoint: Max Offset Up
- Calculated Setpoint: Max Offset Down
- Next Boiler Start Rate
- Next Boiler Stop Rate
- Rotation Interval
- Boilers for DHW
- Start Modulation Delay Factor
- System Test – Post Pump Time

Menu Navigation

(Menu & Enter Buttons – 4 seconds)

Installer Menu

- Boiler Status
- Boiler Config
- CH Settings
- DHW Settings
- Cascade Settings
- System Test

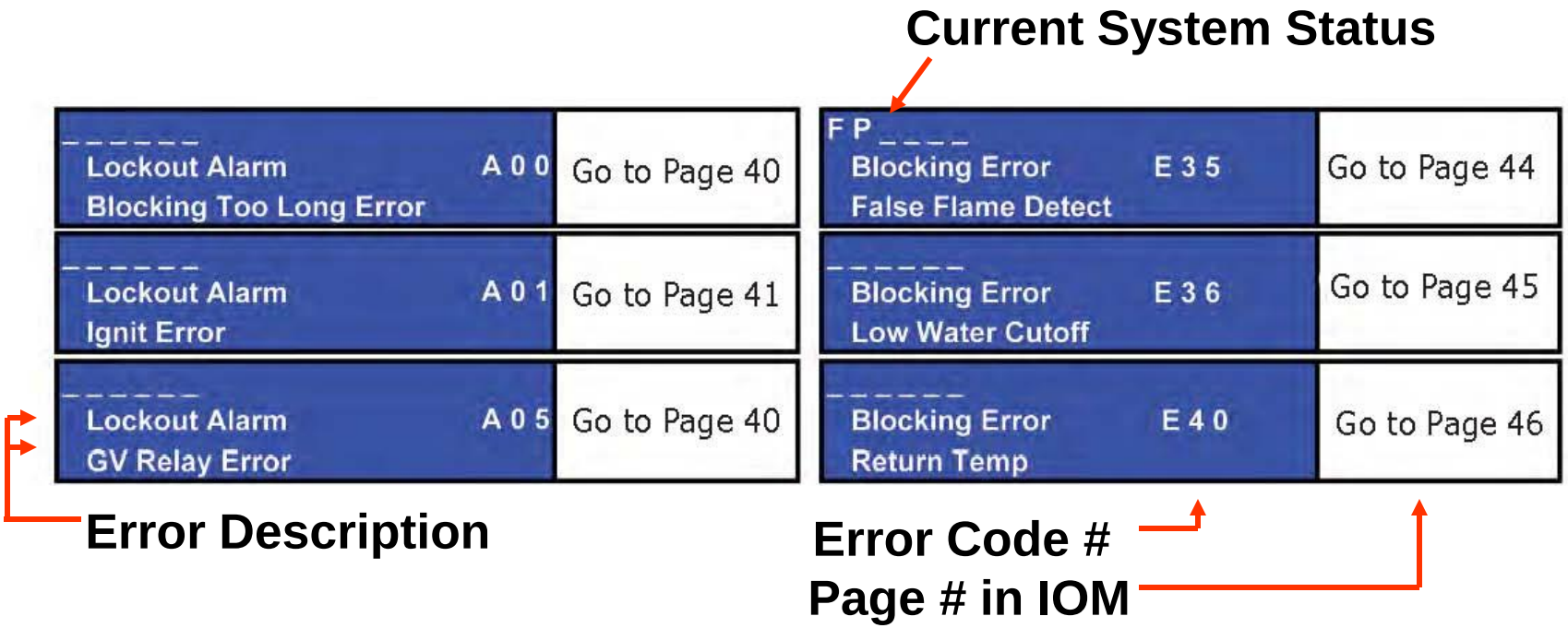
System Test Settings

- System test power: (Low, IGN, High)
- Boiler Pump (On / Off)
- CH Pump (On / Off)
- DHW Pump (On / Off)

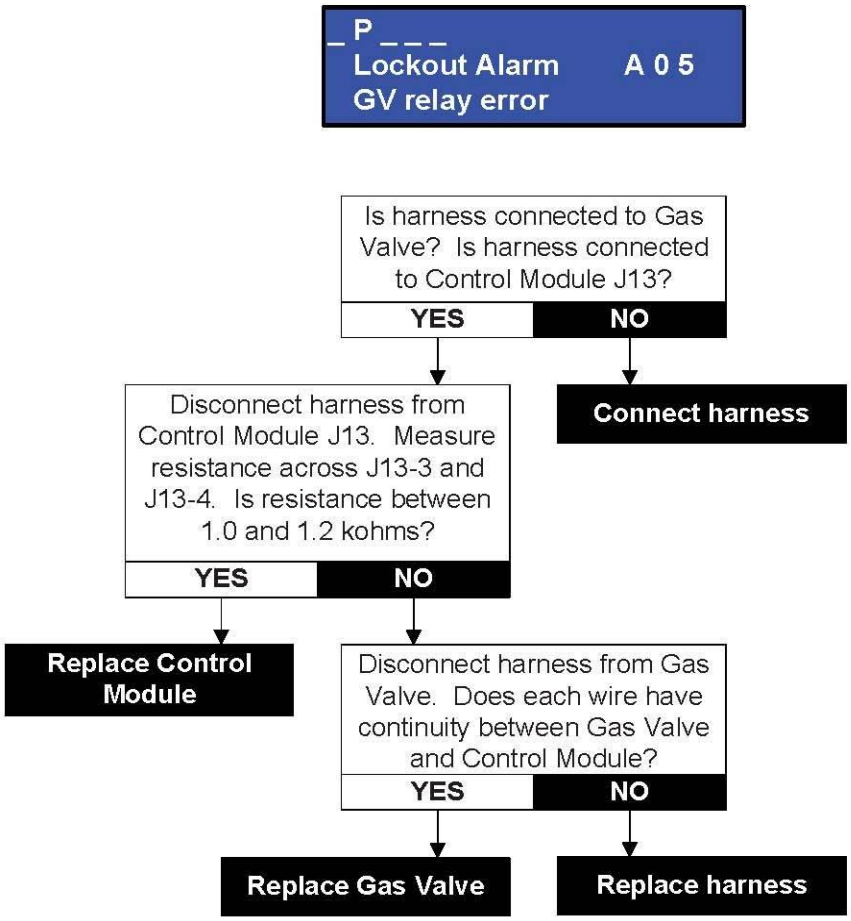
Key	Description
RESET	Reset Control / System
MENU	Enter / Exit user menu
ENTER	Select Menu item Confirm new parameter value
▲ PLUS	Scroll up to next menu item Go to next screen Increase value
▼ MINUS	Scroll down to next menu item Go to previous screen Decrease value

Error Code Troubleshooting

Error Code Troubleshooting



Error Code Troubleshooting



- Flow chart design
- Easy to follow and understand
- Step by step procedure
- Error code listed in blue box

Combustion Requirements

LEARN MORE AT
energystar.gov

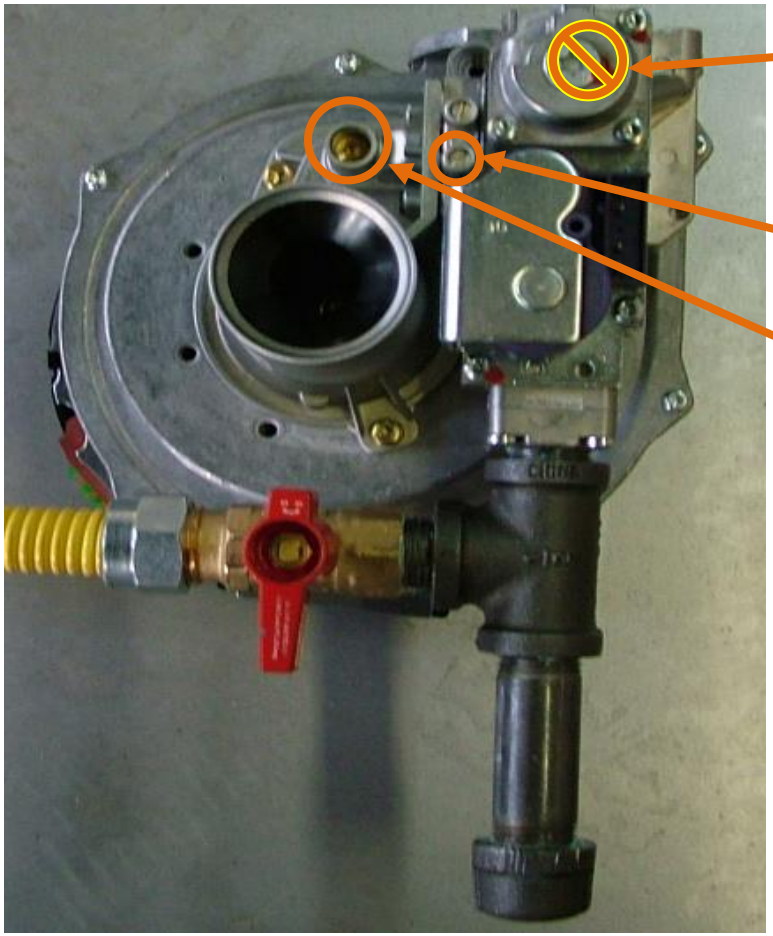
Combustion

- Combustion and proper installation set up required for all high efficiency models
- **Combustion Analyzer -** Properly check CO^2 level of exhaust
- **Gas Meter –** U-tube manometer or gauge set to check inlet gas pressure
- To change gas inlet pressure adjust at system regulator **NOT** THE GAS VALVE REGULATOR
- **Sampling port located on Flue Collector**

No need to drill sample port in flue pipe!!

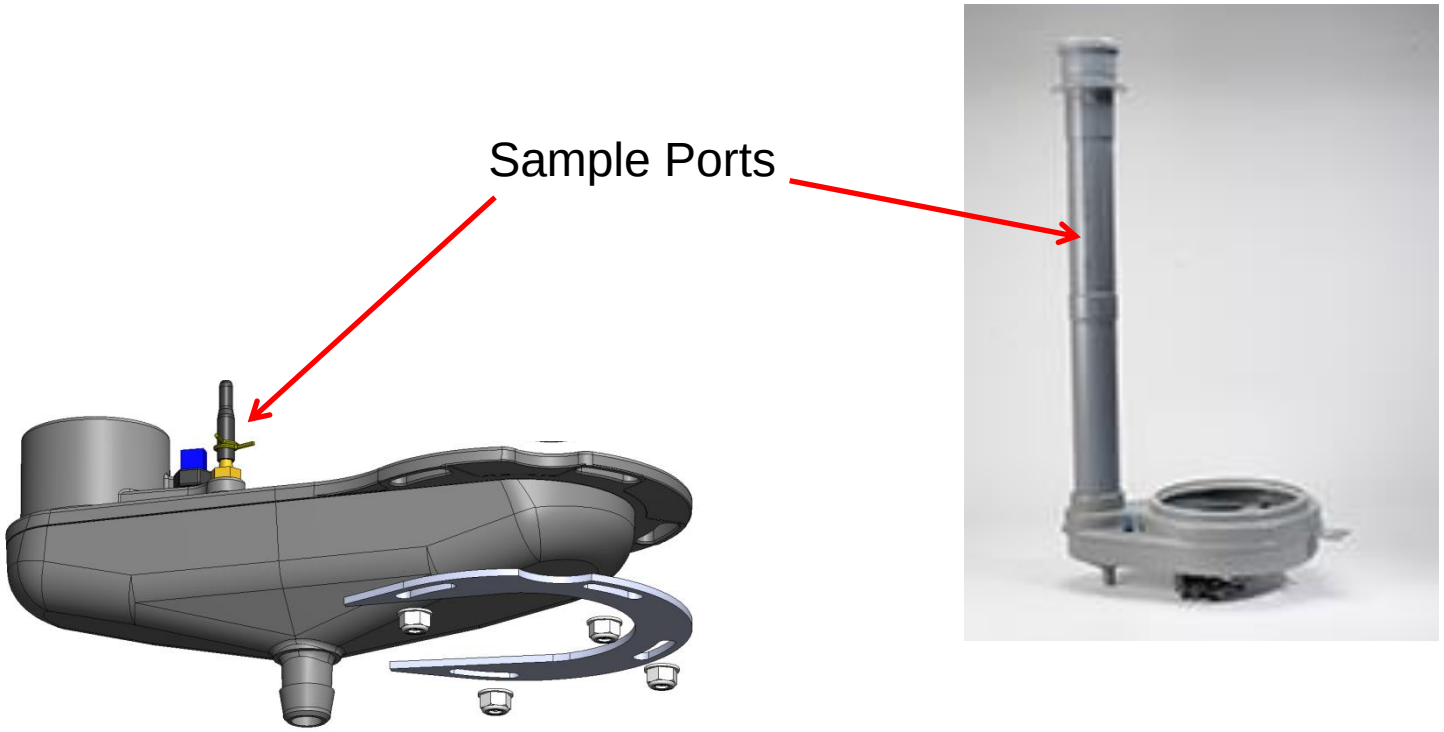
Combustion
Gas Valve on 50-200 Models

Gas	CO2		CO
	Min	Max	
Natural Gas	9.0	9.5	<200ppm
Propane	10.0	11.0	<200ppm



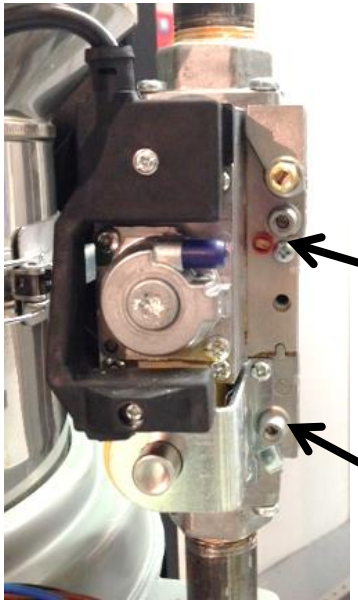
- Do not adjust the gas regulator on the gas valve
- Gas inlet pressure tap
  - Natural: 3” – 13.5” w.c.
  - LP: 5” – 13.5” w.c.
- Throttle screw – to adjust the air / gas mixture on the venturi assembly
- All gas pressure changes are done at the utility regulator external of the equipment

Combustion: Built-in Sample Ports



Combustion
Gas Valve on 299 Model

Gas	CO2		CO
	Min	Max	
Natural Gas	9.0	9.5	<200ppm
Propane	10.0	11.0	<200ppm



Throttle Screw (red)

Gas Inlet Pressure Tap

Maintenance/Cleaning

Most Efficient 2014
ENERGY STAR
www.energystar.gov

Maintenance/Cleaning

- Turn off gas and electrical
- Remove blower / burner assembly and examine flue passageways
- Remove igniter and sensor off top of heat exchanger
- Burner may be cleaned by inserting an air hose into blower opening of casting and blowing air thru heat exchanger side

Maintenance/Cleaning

- Clean heat exchanger with nylon brush if required
- Any remaining sediment can be removed with a shop vacuum snorkel
- Re-install refractory and burner / gas valve
- Visually inspect condensate trap – re-fill trap (If required)

Critical Installation Points

Most Efficient 2014
ENERGY STAR
www.energystar.gov

- Add Slide – Pictures of cleaning?

Getting The Air Out

- Air in the system affects Low Mass Boilers differently than cast iron boilers
- Heat Exchanger Water Volume is much lower
- Air removal methods different
- Water Flow rates are important
- How does Antifreeze affect the System?
- Clean Water

Getting The Air Out

- Cast Iron Boilers are more tolerant of system air issues.
- Gravity works with us

Getting The Air Out

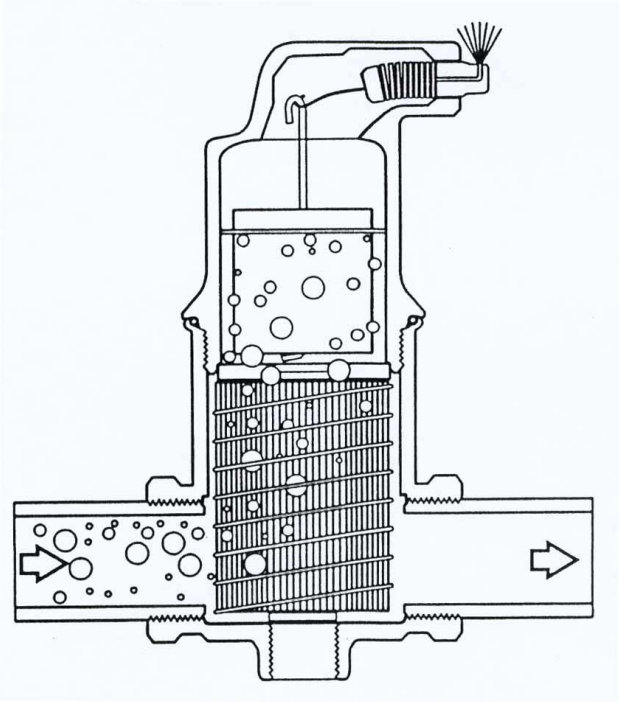
Cast Iron Air Scoop

- Based on venturi principal; accelerated flow yields reduced pressure, causing dissolved gases to separate
- Slow Process – Less Effective
- Proper location Critical for air scoop to remove air

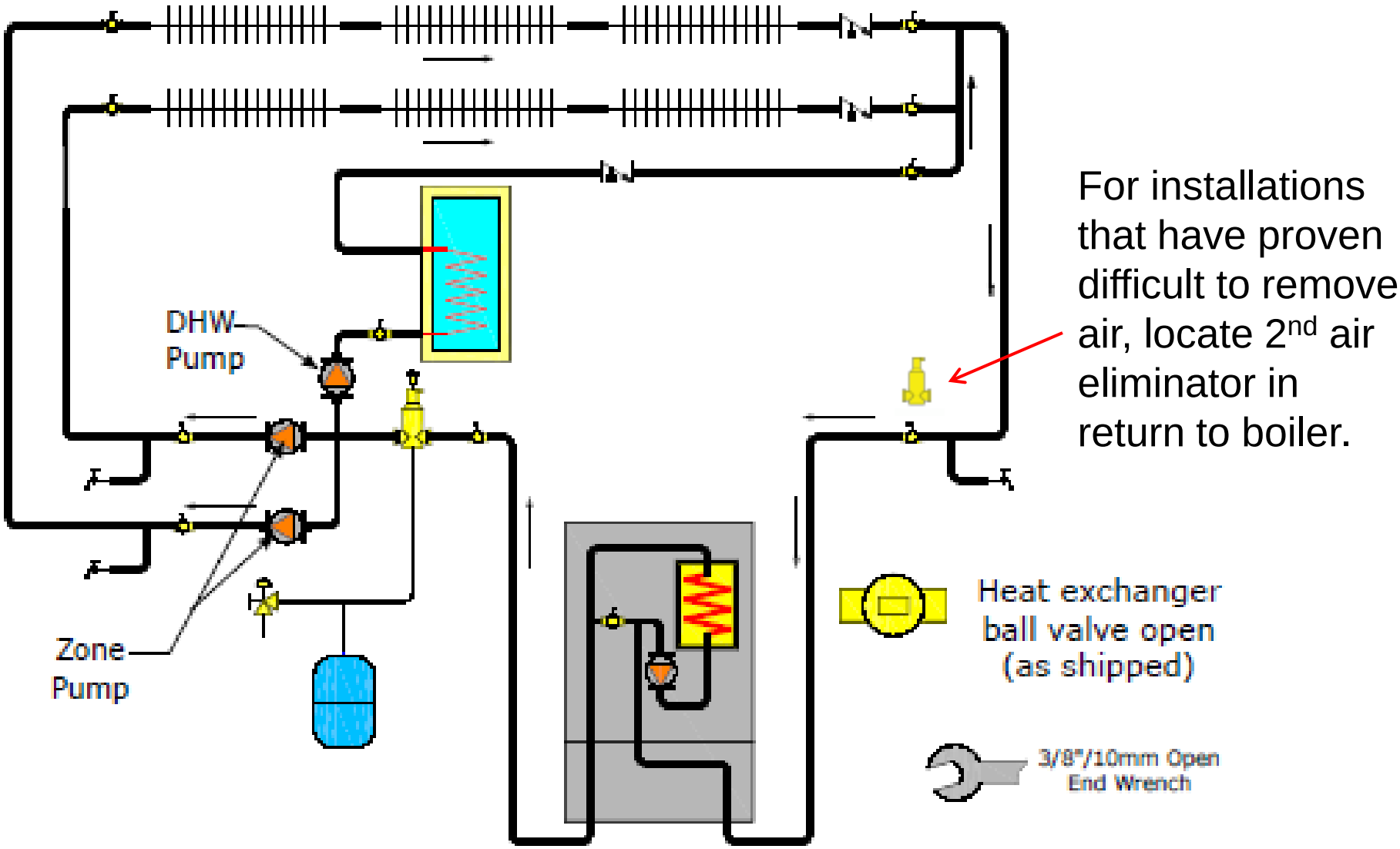
Getting The Air Out

Micro-Bubble Separator

- Based on the principal that reduced velocity plus multiple impact sites allow air bubbles to separate easily
- Faster process, much more effective
- Location Not Critical for Separator to function



Getting The Air Out

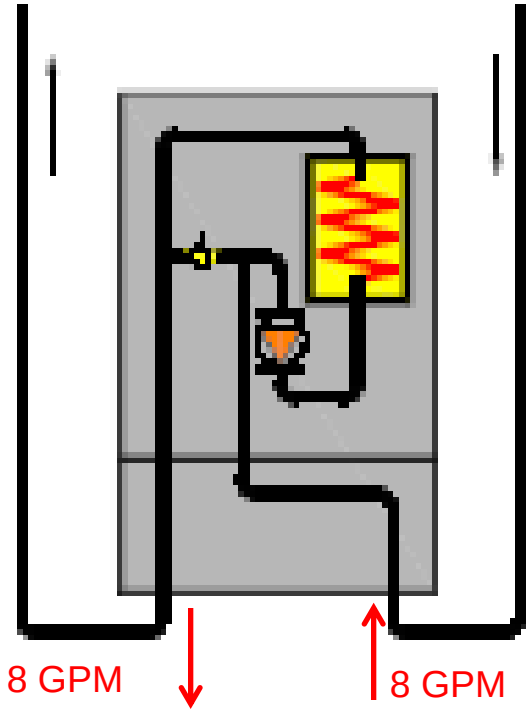


For installations that have proven difficult to remove air, locate 2nd air eliminator in return to boiler.

- Section: How to properly purge a system

Getting The Air Out

VLT Power Purge

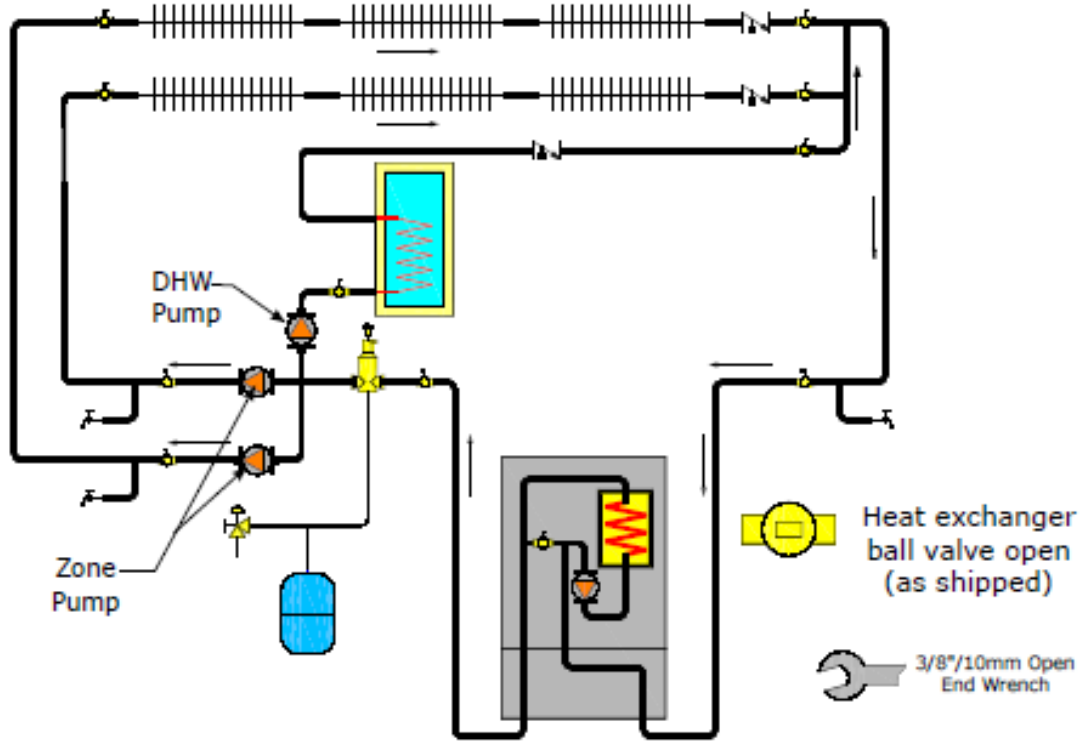


- Prior to Firing, close Ball Valve to help move ALL water out of Boiler to purge air.
- Open Ball Valve before Firing

Water Flow

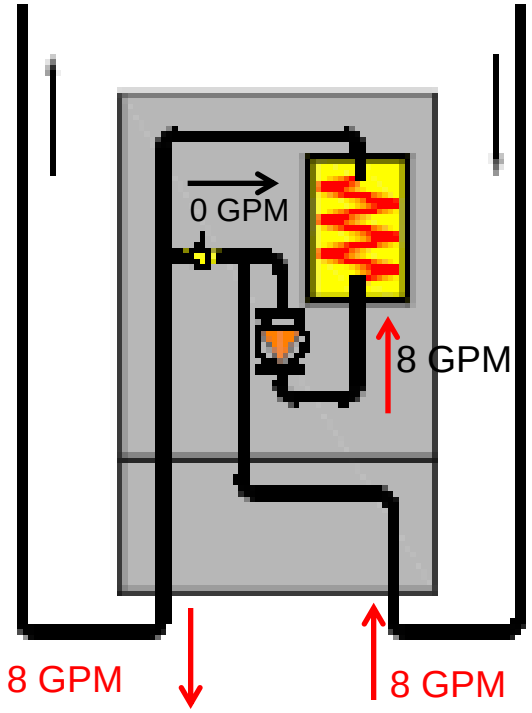
- Low System Flow Rates will cause Boiler to heat quickly
- Cycles frequently on High Limit-Less Efficient
- Harder to get air out of boiler

FIGURE 5-6 Single Boiler Two-Pipe Zoned System With Zone Pumps

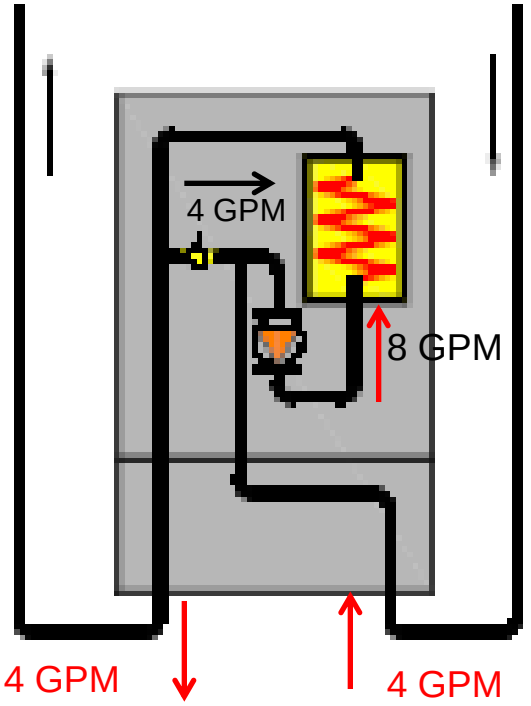


Water Flow

Primary & Secondary Flow Balanced



Reduced Flow in Secondary
(One Zone Calling)

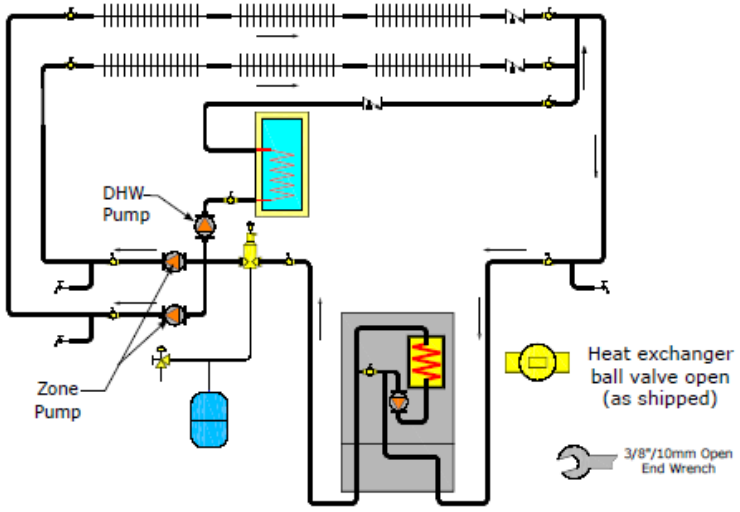


Water Source

- Treated (Softened) water can reduce circulator capacity by 10-15% !!

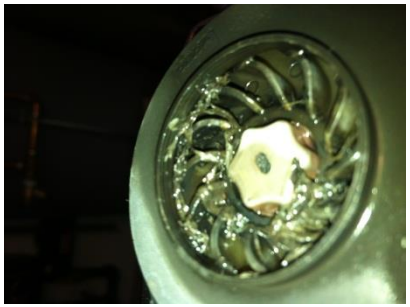
- If reduced flow rate is causing noise issues a higher head pump may resolve the problem.

FIGURE 5-6 Single Boiler Two-Pipe Zoned System With Zone Pumps



Flush & Clean

- Water quality can affect system performance
- Dirty brackish water can lower boiling point
- Also makes air removal more difficult



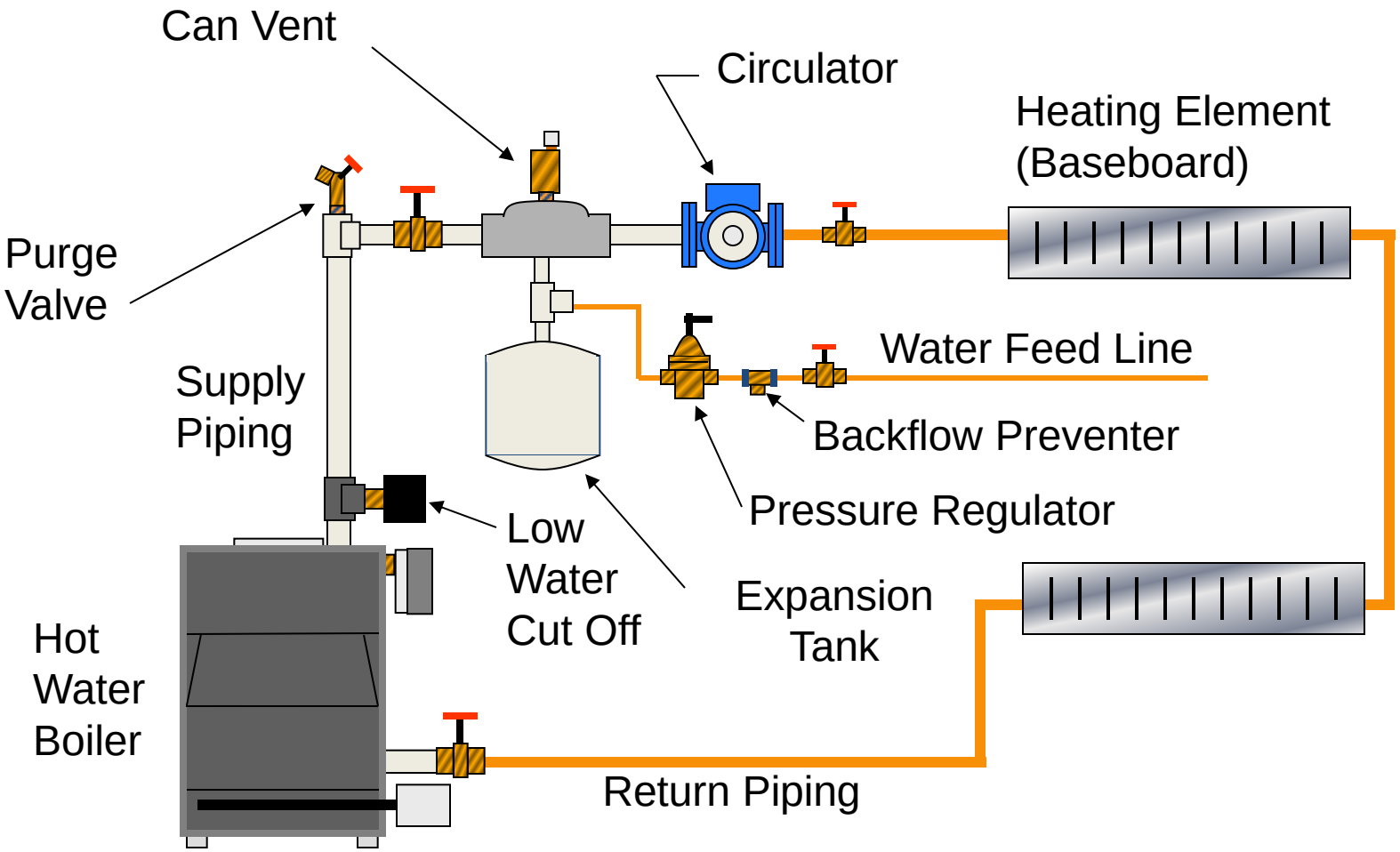
Impela from circulator

Air Elimination device

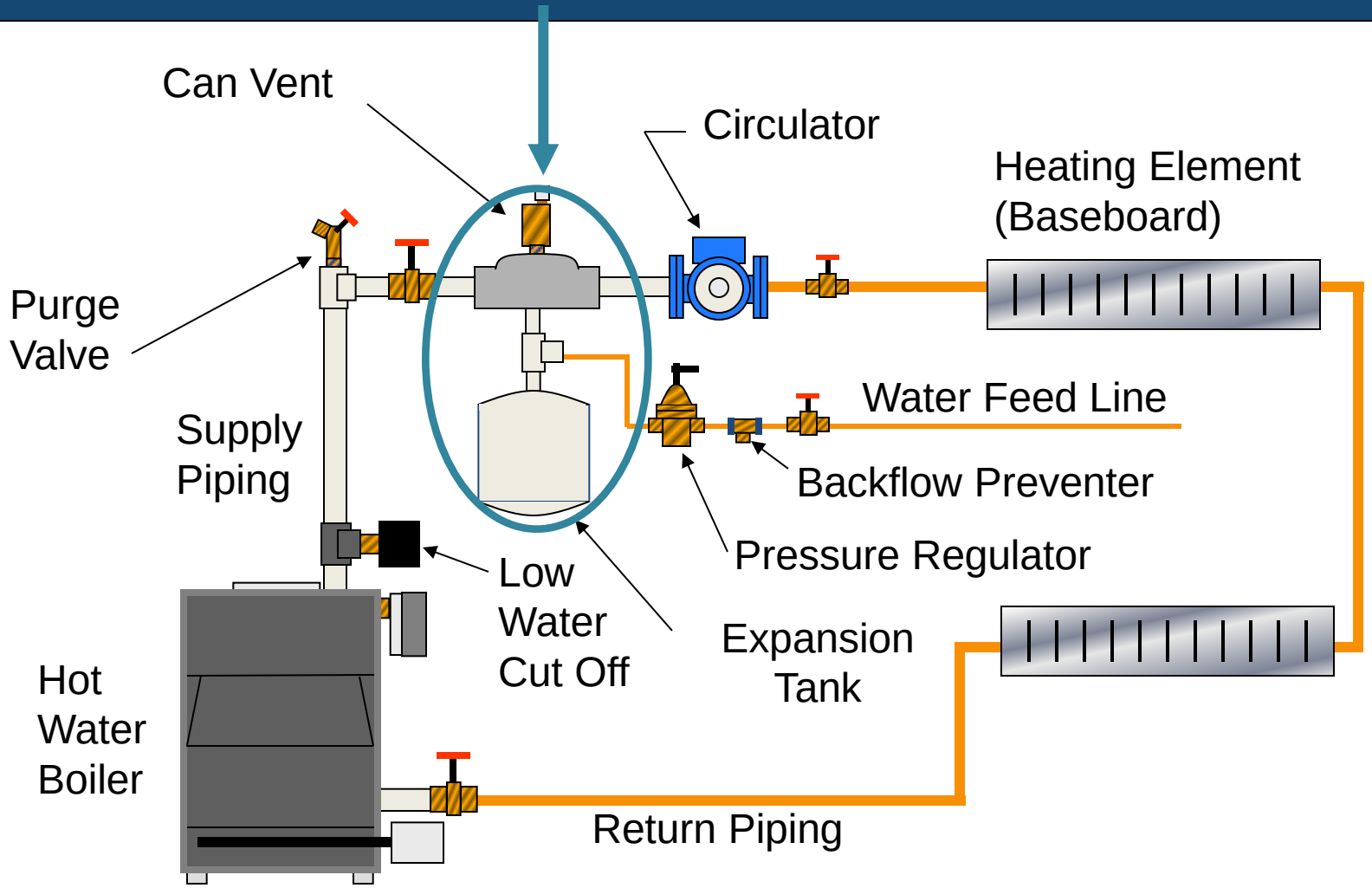
The Point of no Pressure Change

- The Point of no Pressure Change is the one place in the system where the pump cannot affect the overall system pressure.

The Point of no Pressure Change



The Point of no Pressure Change



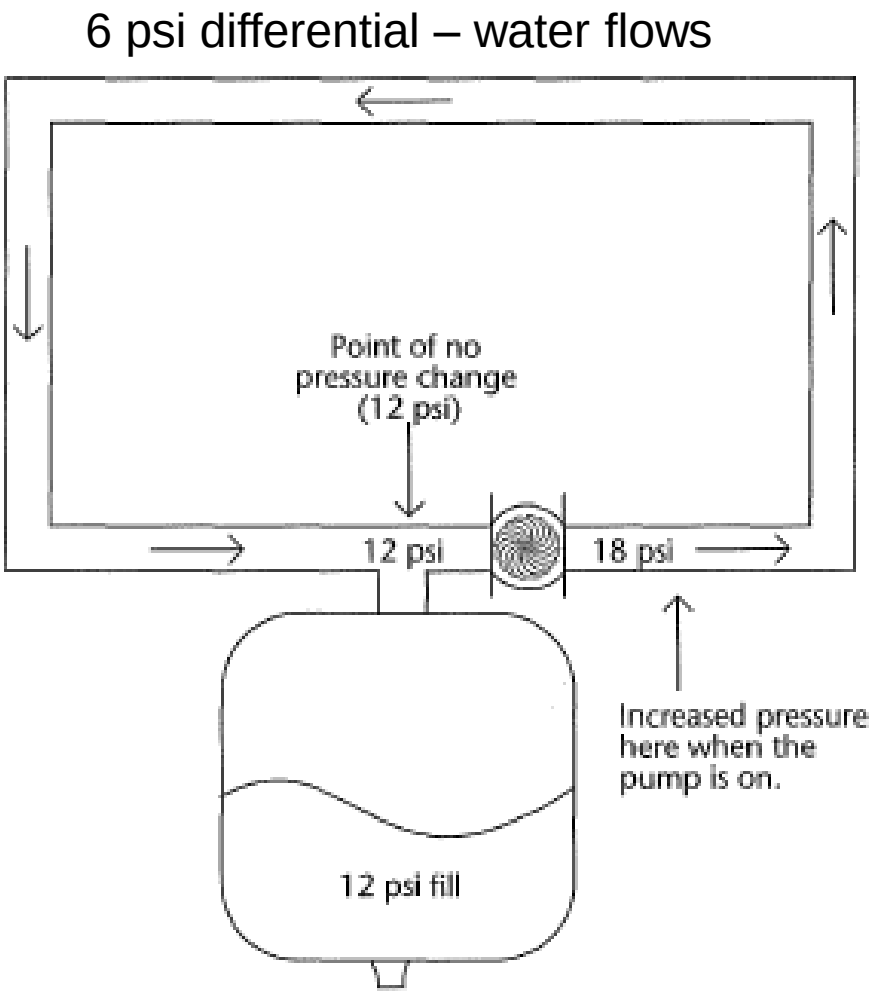
Getting the Air Out

How can pump placement affect system performance?

Supply vs. Return side Pumping

The Point of no Pressure Change

A typical residential circulator will develop about 6psi. In this diagram, all of the pump's differential pressure is on the outlet side.

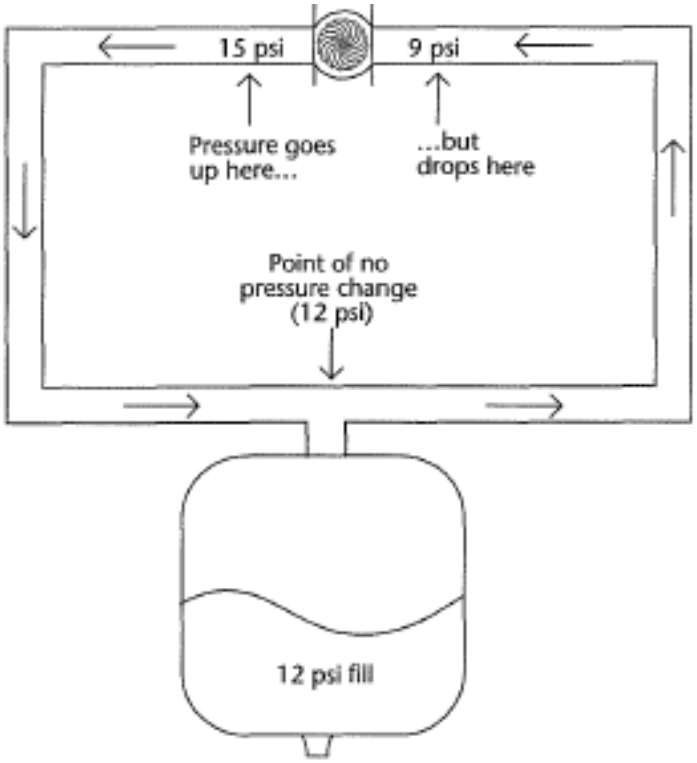


The Point of no Pressure Change

Because the point of no pressure change (the place that must remain at the 12 psi static fill pressure) is now halfway around the system, the pump is showing half of its pressure differential as an increase and the other half as a decrease. You now have a drop of 3 psi at its discharge.

Water flows exactly as it did in the last example because there's still a 6 psi pressure differential across the pump (15 psi – 9 psi = 6 psi differential).

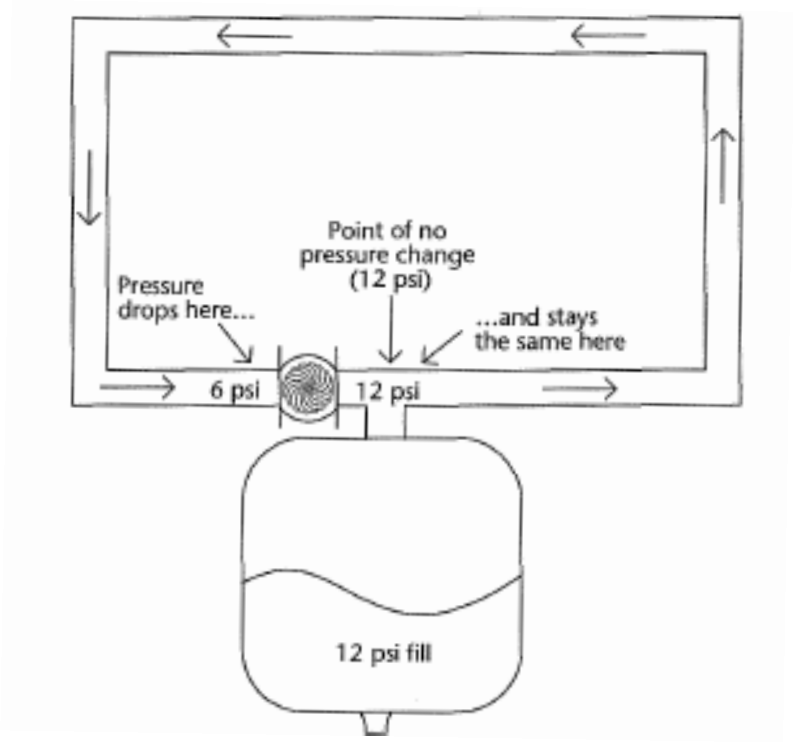
6 psi differential – water flows



The Point of no Pressure Change

Because the outlet of the pump is right at the point of no pressure change, ALL of the pumps difference is on the inlet side. We still have a 6 psi difference and water flows as before.

6 psi differential – water flows



The Point of no Pressure Change

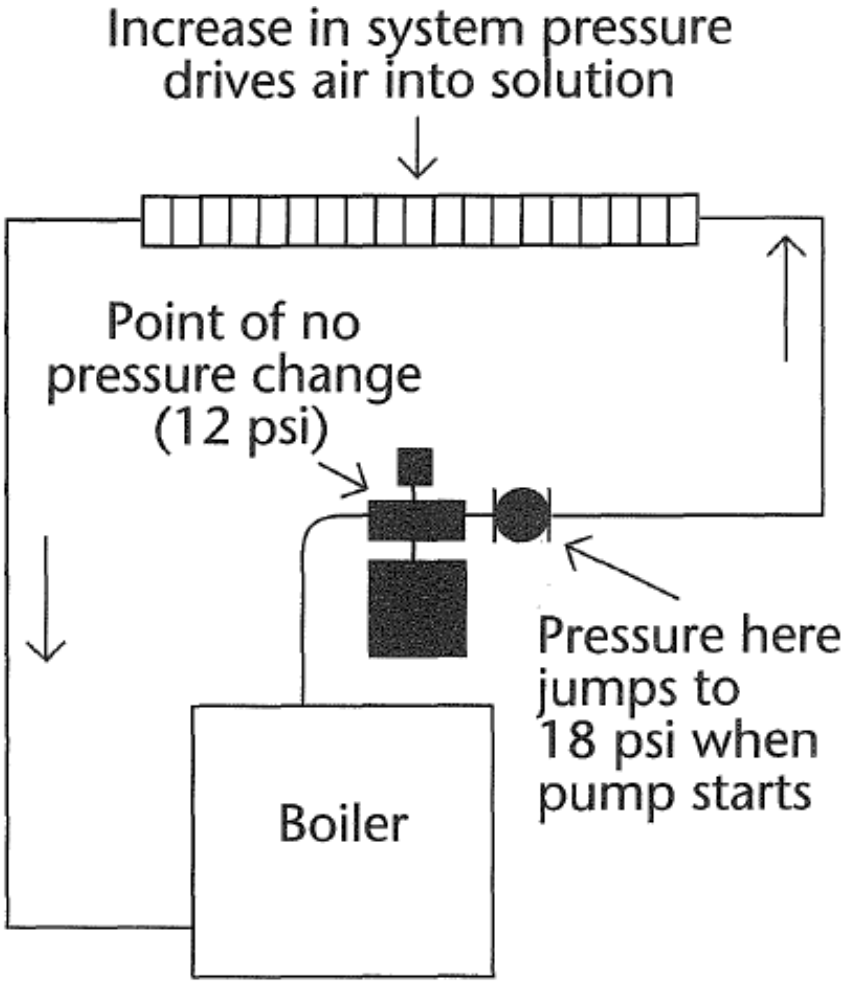
- The Water flowed in all 3 examples
- So why does pump placement matter?

The Point of no Pressure Change

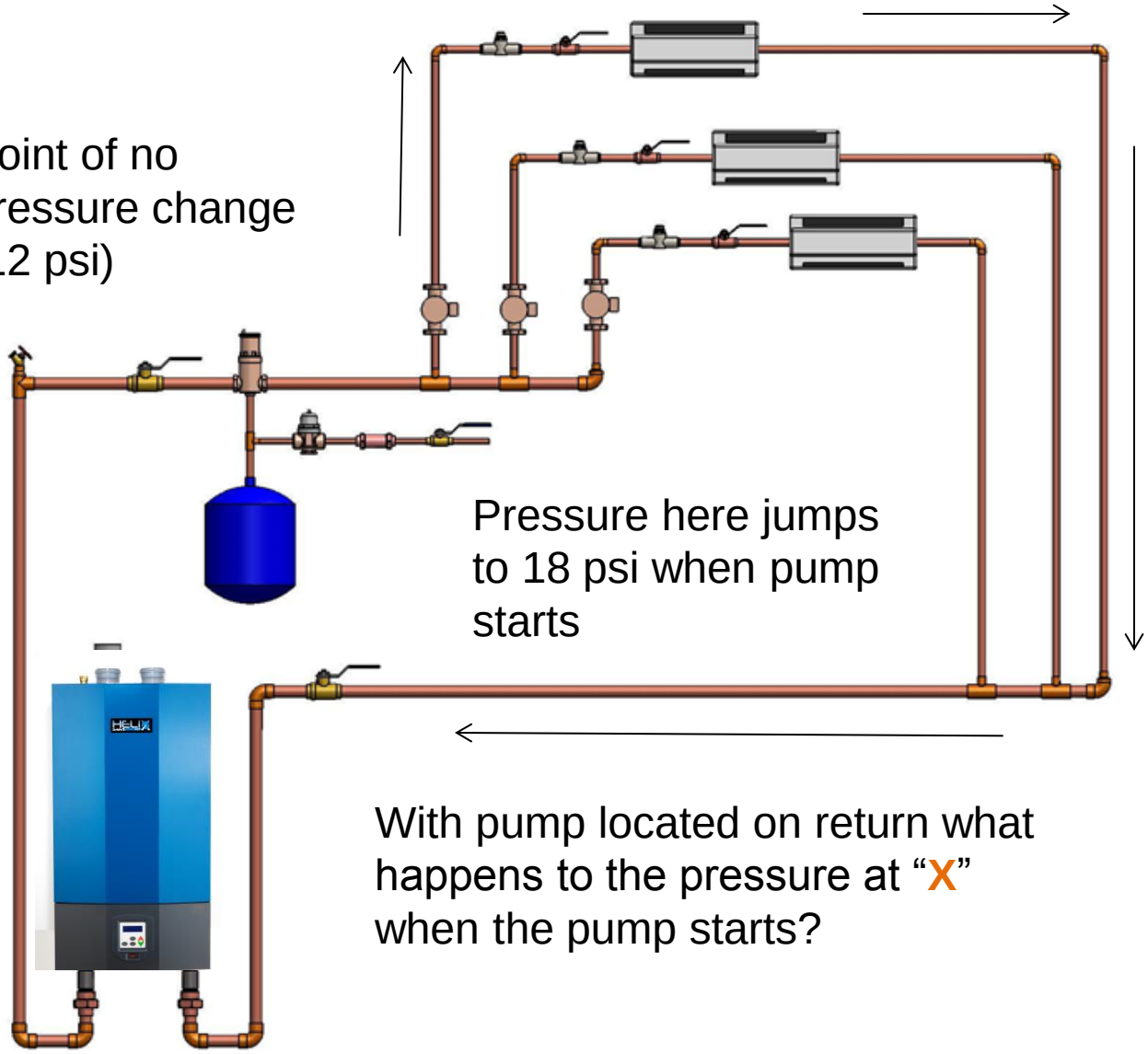
Built-up gas pops the cap a bit

Why do the bubbles explode out of the soda?

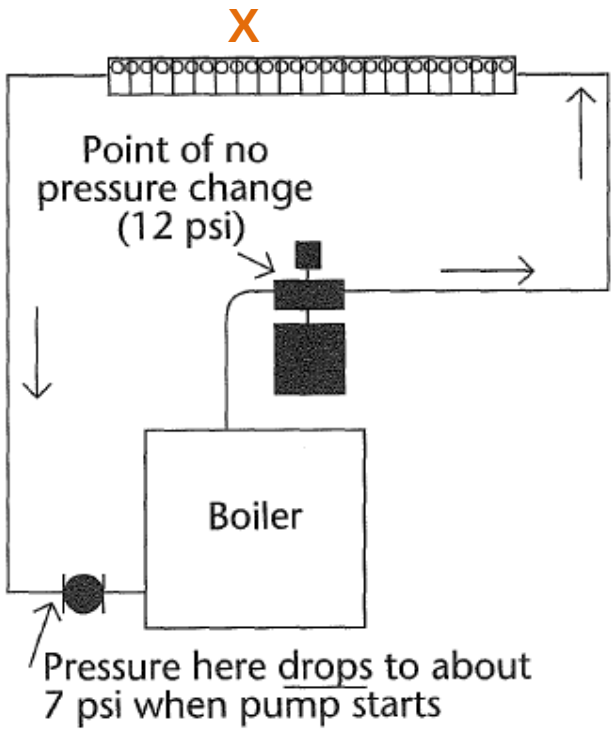
The Point of no Pressure Change



Increase in system pressure drives air into solution

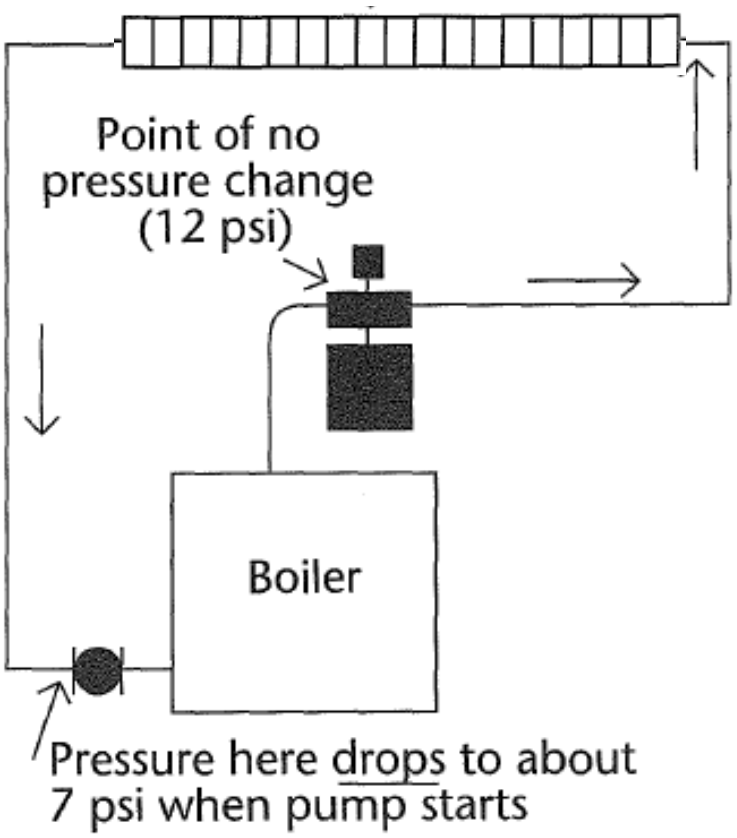


The Point of no Pressure Change

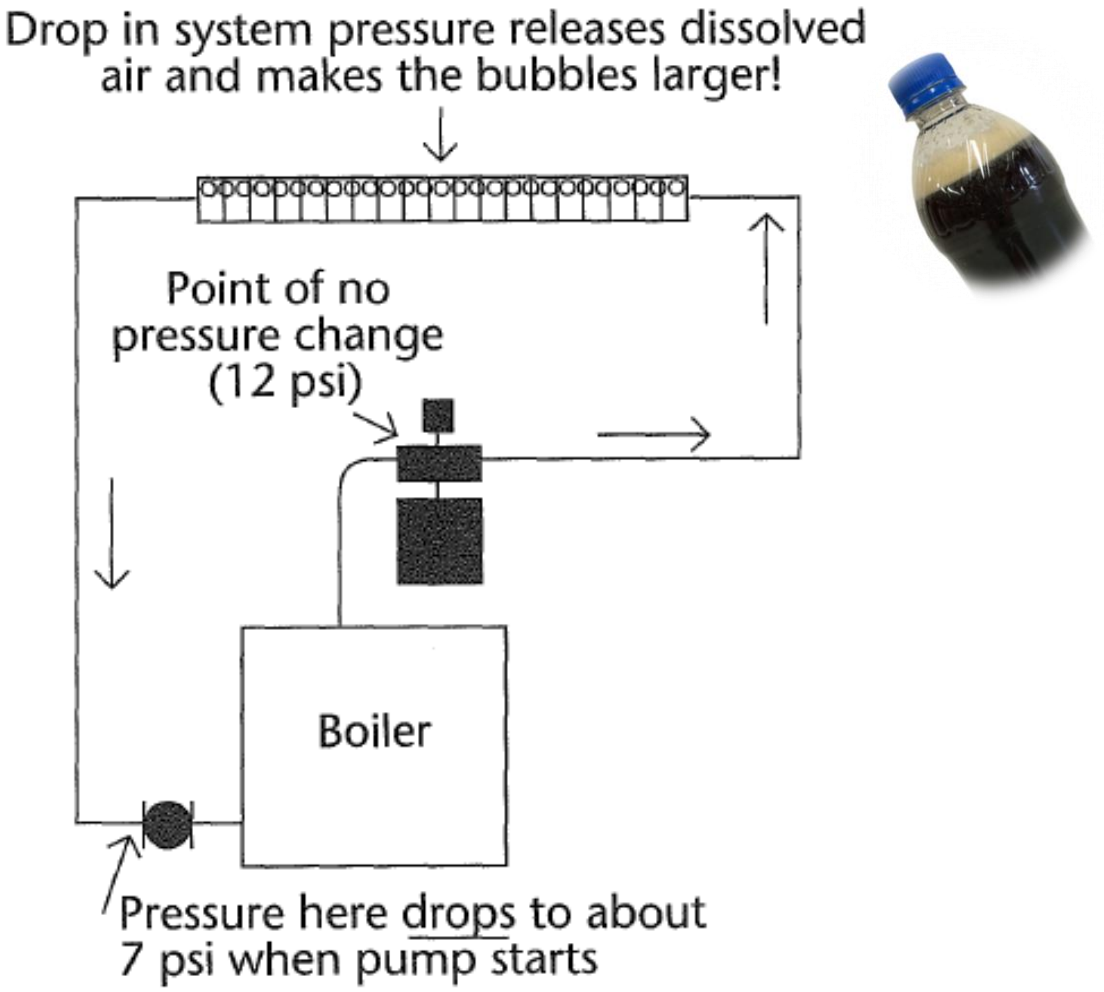


With pump located on return what happens to the pressure at "X" when the pump starts?

The Point of no Pressure Change



The Point of no Pressure Change

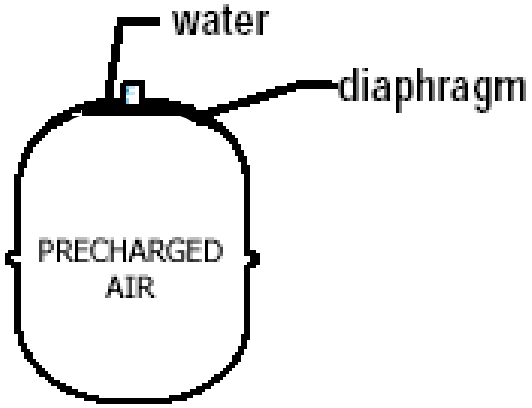


Increase the Boiling Point

- If existing system is contributing to air removal difficulties raise the boiling point.
- Increase system pressure to 20 psi.
- Remember to pump Expansion tank!
- If higher pressure needed change Boiler relief to 50 psi and increase system pressure further.
- Remember to pump Expansion tank!

Adjust Expansion Tank Pressure

Normal Tank Operation



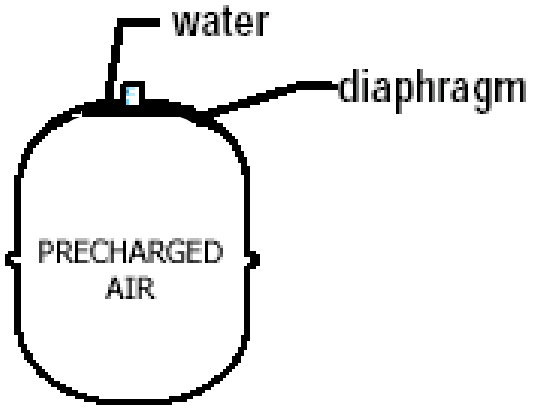
System Off

System Pressure=12

Tank Pressure=12

Adjust Expansion Tank Pressure

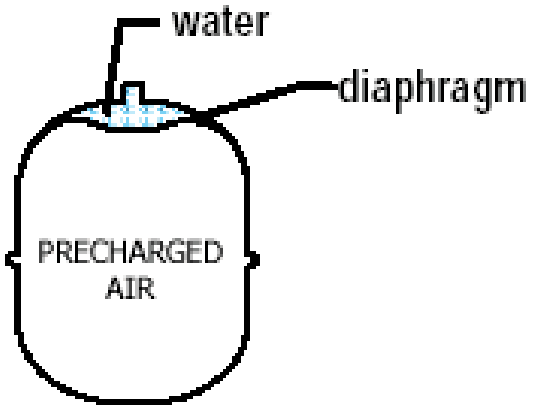
Normal Tank Operation



System Off

System Pressure=12

Tank Pressure=12



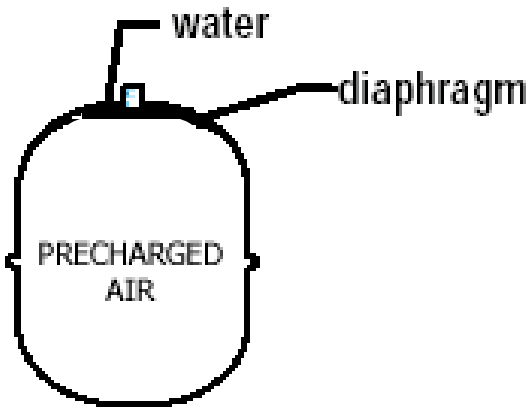
System **On**

System Pressure=14

Tank Pressure=14

Adjust Expansion Tank Pressure

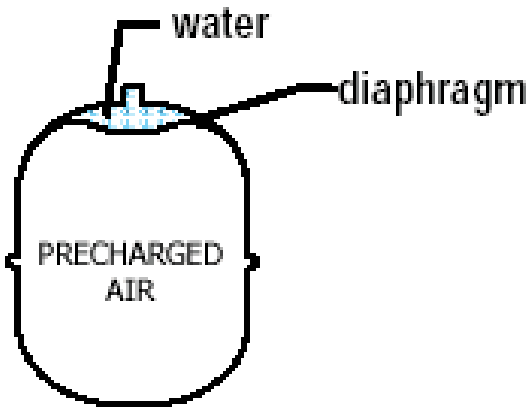
Normal Tank Operation



System Off

System Pressure=12

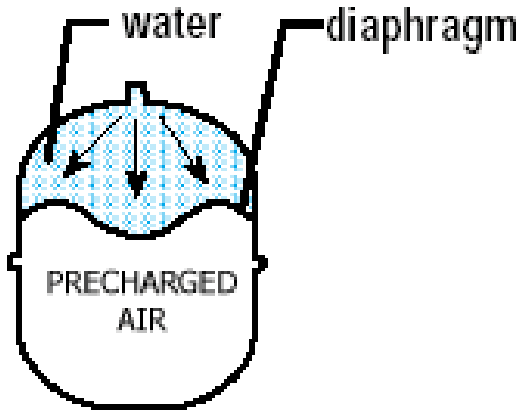
Tank Pressure=12



System On

System Pressure=14

Tank Pressure=14



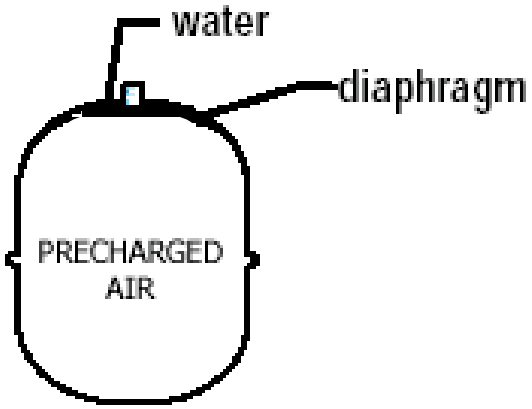
System On

System Pressure=18

Tank Pressure=18

Adjust Expansion Tank Pressure

What happens if I don't Pump Up my Tank?



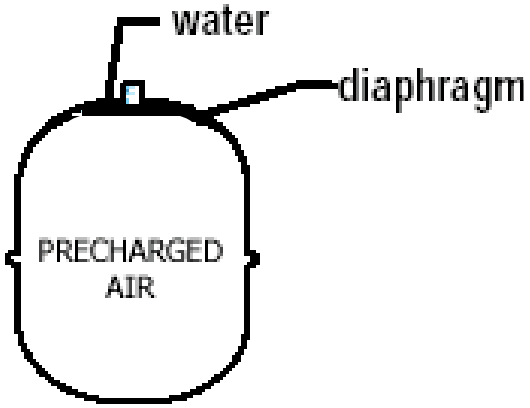
System Off

System Pressure=12

Tank Pressure=12

Adjust Expansion Tank Pressure

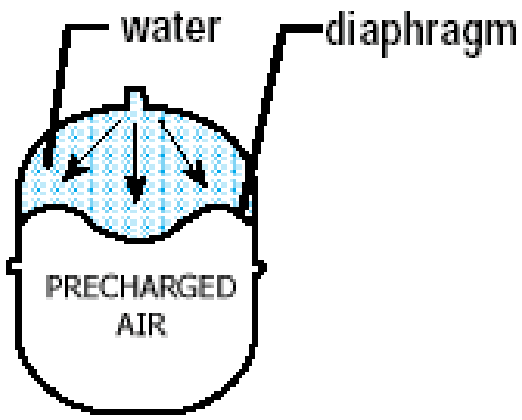
What happens if I don't Pump Up my Tank?



System Off

System Pressure=12

Tank Pressure=12



System Off

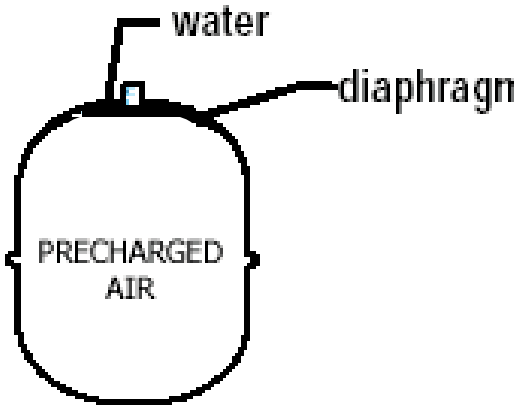
System Pressure Increased to 20

(Tank Fills until air is Compressed to match)

Tank Pressure=20

Adjust Expansion Tank Pressure

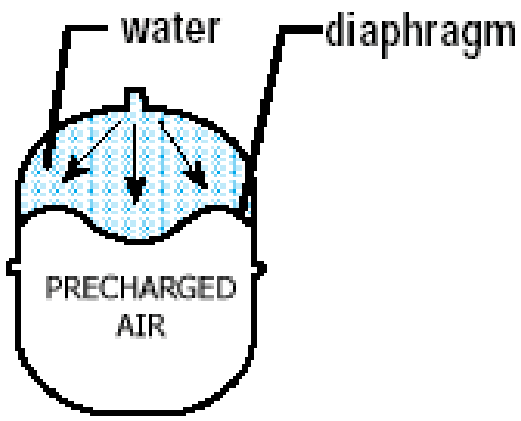
What happens if I don't Pump Up my Tank?



System Off

System Pressure=12

Tank Pressure=12

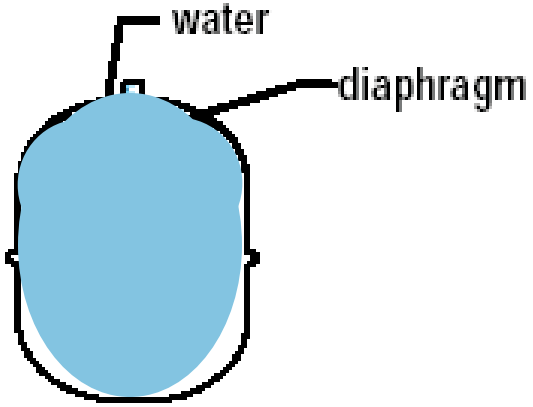


System Off

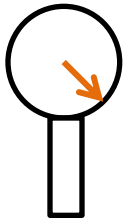
System Pressure=20

(Tank Fills until air is Compressed to match)

Tank Pressure=20

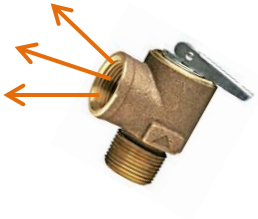


System **On**- Pressure Increases due to Expansion

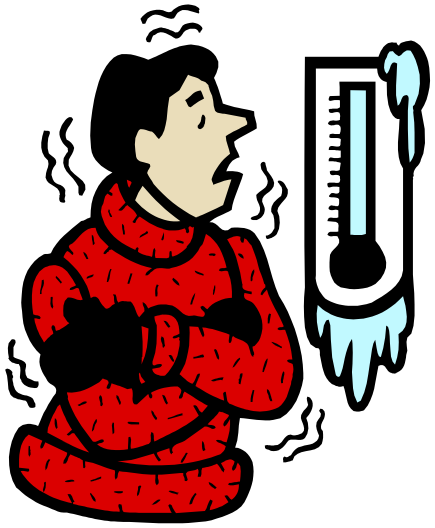


System Pressure=

Tank =FULL!



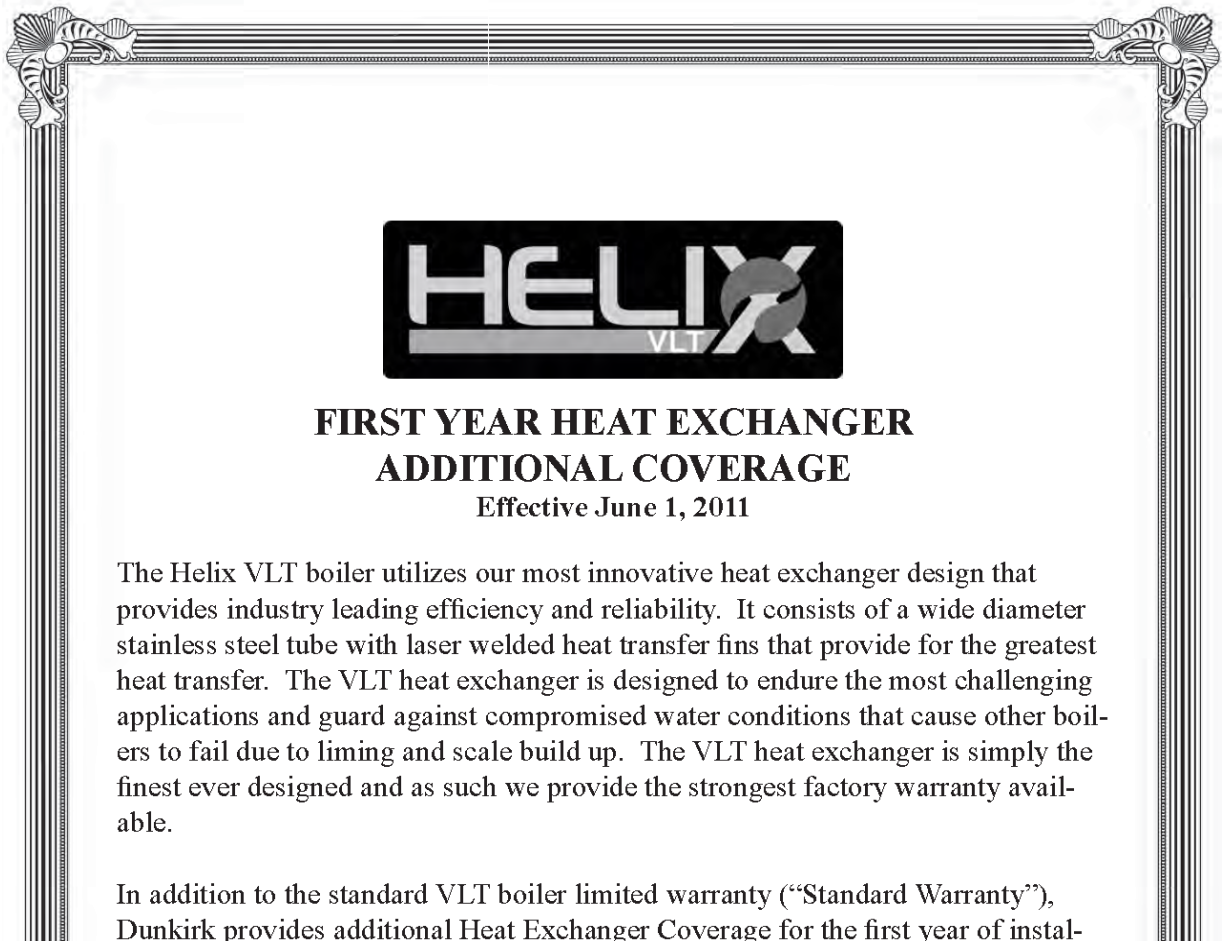
Antifreeze



- Antifreeze is more viscous. Pump capacity reduced.
- Thermal transfer capability reduced 17% at 50-50 strength.
- Only use what's necessary.
- Use tester to determine proper level.
- Don't mix & match
- Future Service / Acidic

Dunkirk VLT Warranty

- 15 Year ECR Limited Warranty
- One Year all other parts



HELIX VLT

FIRST YEAR HEAT EXCHANGER ADDITIONAL COVERAGE

Effective June 1, 2011

The Helix VLT boiler utilizes our most innovative heat exchanger design that provides industry leading efficiency and reliability. It consists of a wide diameter stainless steel tube with laser welded heat transfer fins that provide for the greatest heat transfer. The VLT heat exchanger is designed to endure the most challenging applications and guard against compromised water conditions that cause other boilers to fail due to liming and scale build up. The VLT heat exchanger is simply the finest ever designed and as such we provide the strongest factory warranty available.

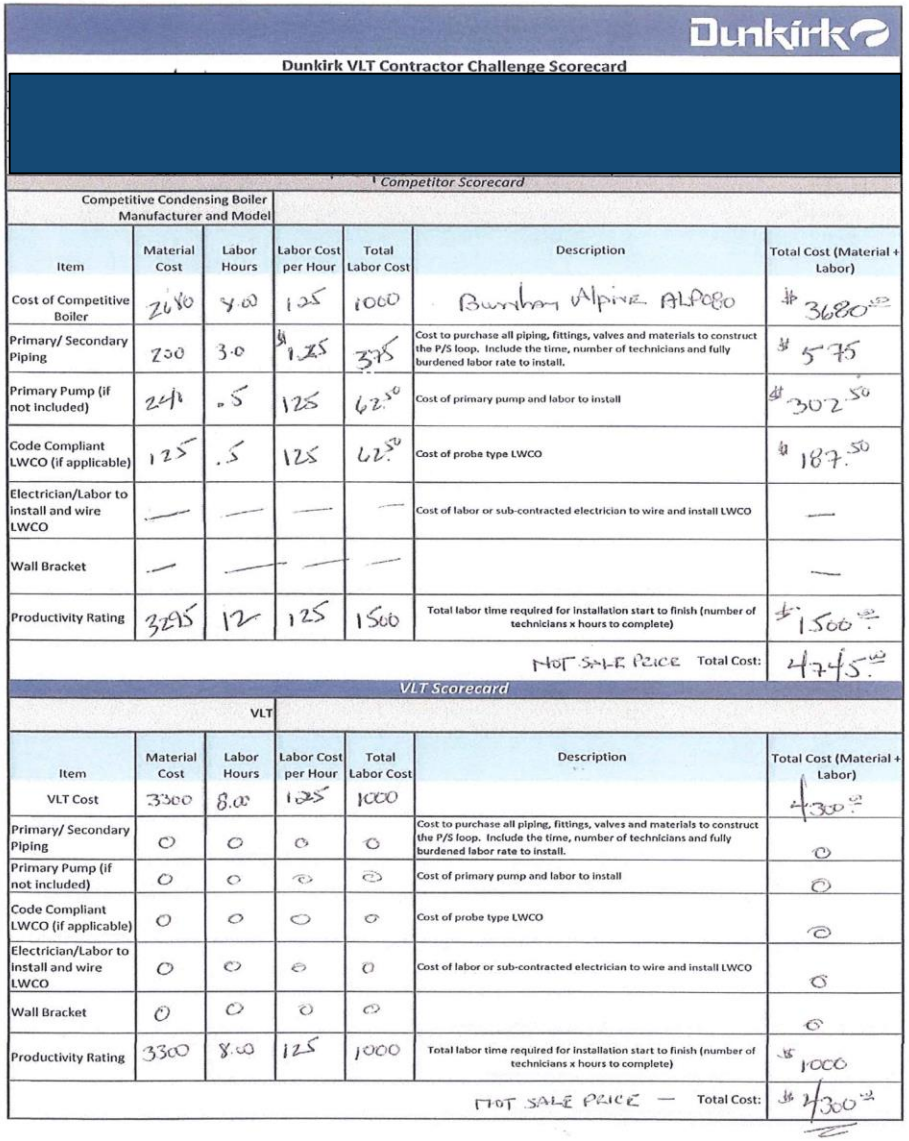
In addition to the standard VLT boiler limited warranty ("Standard Warranty"), Dunkirk provides additional Heat Exchanger Coverage for the first year of instal-

Selling Installed Value

VLT Contractor Challenge

- Targeted Contractors who sell competitors MODCONs.
- When we compare price to price we are often equal, sometimes higher.
- When the filled out the Scorecard we found to be from $343 to $1700 LESS!!

Contractor Testimonials



Dunkirk

Dunkirk VLT Contractor Challenge Scorecard

[redacted]

Competitor Scorecard

Competitive Condensing Boiler Manufacturer and Model

Item	Material Cost	Labor Hours	Labor Cost per Hour	Total Labor Cost	Description	Total Cost (Material + Labor)
Cost of Competitive Boiler	2680	8.00	125	1000	Burnham Alpine ALP080	$ 3680.00
Primary/ Secondary Piping	200	3.0	$ 1.25	375	Cost to purchase all piping, fittings, valves and materials to construct the P/S loop. Include the time, number of technicians and fully burdened labor rate to install.	$ 575
Primary Pump (if not included)	240	.5	125	62.50	Cost of primary pump and labor to install	$ 302.50
Code Compliant LWCO (if applicable)	125	.5	125	62.50	Cost of probe type LWCO	$ 187.50
Electrician/Labor to install and wire LWCO	—	—	—	—	Cost of labor or sub-contracted electrician to wire and install LWCO	—
Wall Bracket	—	—	—	—		—
Productivity Rating	3295	12	125	1500	Total labor time required for installation start to finish (number of technicians x hours to complete)	$ 1500.00
					NOT SALE PRICE Total Cost:	4745.00

VLT Scorecard

VLT

Item	Material Cost	Labor Hours	Labor Cost per Hour	Total Labor Cost	Description	Total Cost (Material + Labor)
VLT Cost	3300	8.00	125	1000		4300.00
Primary/ Secondary Piping	0	0	0	0	Cost to purchase all piping, fittings, valves and materials to construct the P/S loop. Include the time, number of technicians and fully burdened labor rate to install.	0
Primary Pump (if not included)	0	0	0	0	Cost of primary pump and labor to install	0
Code Compliant LWCO (if applicable)	0	0	0	0	Cost of probe type LWCO	0
Electrician/Labor to install and wire LWCO	0	0	0	0	Cost of labor or sub-contracted electrician to wire and install LWCO	0
Wall Bracket	0	0	0	0		0
Productivity Rating	3300	8.00	125	1000	Total labor time required for installation start to finish (number of technicians x hours to complete)	$ 1000
					NOT SALE PRICE — Total Cost:	$ 4300.00

VLT vs Burnham

$ 345.00

Contractor Testimonials

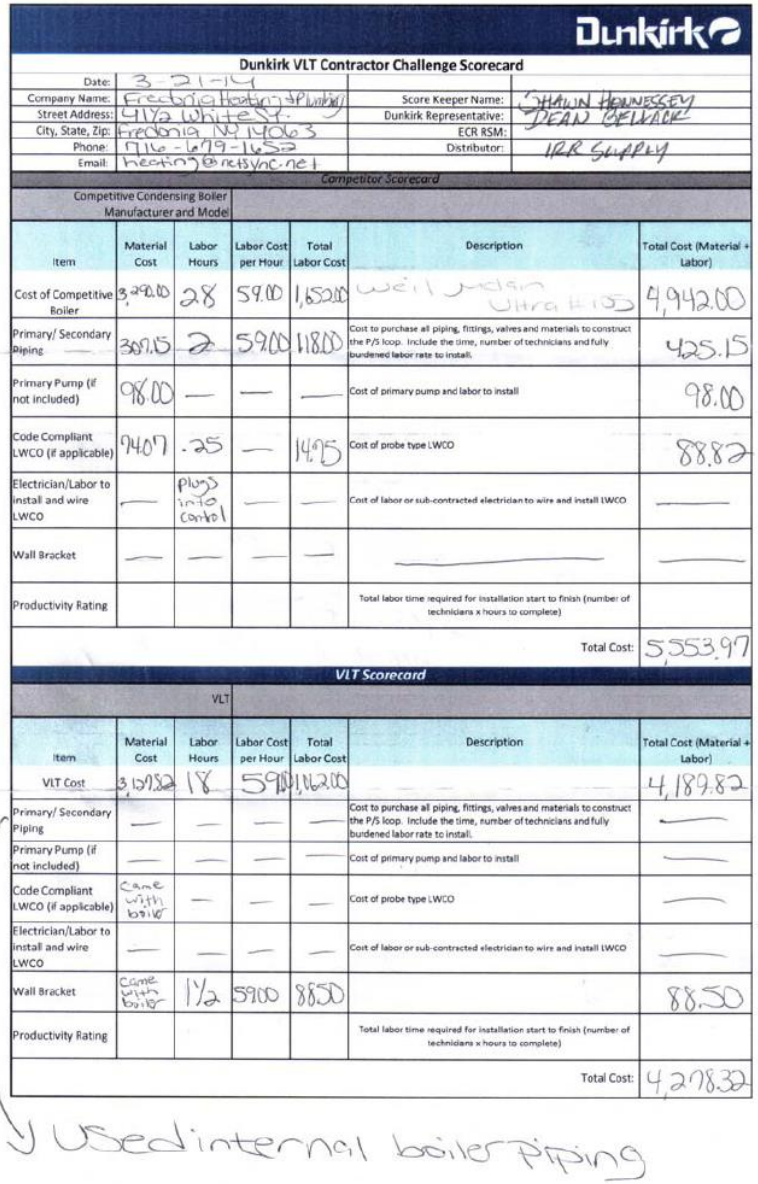
Competitor Scorecard						
Competitive Condensing Boiler Manufacturer and Model	Vitodens 200					
Item	Material Cost	Labor Hours	Labor Cost per Hour	Total Labor Cost	Description	Total Cost (Material + Labor)
Cost of Competitive Boiler	4929					4,929
Primary/ Secondary Piping	200	4	$100	$600	Cost to purchase all piping, fittings, valves and materials to construct the P/S loop. Include the time, number of technicians and fully burdened labor rate to install.	600
Primary Pump (if not included)	150	1		150	Cost of primary pump and labor to install	150
Code Compliant LWCO (if applicable)					Cost of probe type LWCO	
Electrician/Labor to install and wire LWCO					Cost of labor or sub-contracted electrician to wire and install LWCO	
Wall Bracket						
Productivity Rating		2 @ 15	100	1500	Total labor time required for installation start to finish (number of technicians x hours to complete)	3,000
					Total Cost:	8,679

VLT Scorecard						
VLT	VLT 200					
Item	Material Cost	Labor Hours	Labor Cost per Hour	Total Labor Cost	Description	Total Cost (Material + Labor)
VLT Cost	4,270					4,270
Primary/ Secondary Piping				$0	Cost to purchase all piping, fittings, valves and materials to construct the P/S loop. Include the time, number of technicians and fully burdened labor rate to install.	
Primary Pump (if not included)				0	Cost of primary pump and labor to install	
Code Compliant LWCO (if applicable)				0	Cost of probe type LWCO	
Electrician/Labor to install and wire LWCO				0	Cost of labor or sub-contracted electrician to wire and install LWCO	
Wall Bracket				0		
Productivity Rating		2 @ 10	100	2,000	Total labor time required for installation start to finish (number of technicians x hours to complete)	2,000
					Total Cost:	6,270

VLT vs. Viessman

$ 2,409.00

Contractor Testimonials



Dunkirk VLT Contractor Challenge Scorecard

Date:	3-21-14		
Company Name:	Fredonia Heating & Plumbing	Score Keeper Name:	SHAWN HENNESSEY DEAN CELVACK
Street Address:	41½ White St.	Dunkirk Representative:	
City, State, Zip:	Fredonia, NY 14063	ECR RSM:	
Phone:	716-679-1652	Distributor:	IRR SUPPLY
Email:	heating@netsync.net		

Competitor Scorecard

Competitive Condensing Boiler Manufacturer and Model:

Item	Material Cost	Labor Hours	Labor Cost per Hour	Total Labor Cost	Description	Total Cost (Material + Labor)
Cost of Competitive Boiler	3,290.00	2.8	59.00	1,652.00	Weil Mclain Ultra # 105	4,942.00
Primary/ Secondary Piping	307.15	2	59.00	118.00	Cost to purchase all piping, fittings, valves and materials to construct the P/S loop. Include the time, number of technicians and fully burdened labor rate to install.	425.15
Primary Pump (if not included)	98.00	—	—	—	Cost of primary pump and labor to install	98.00
Code Compliant LWCO (if applicable)	74.07	.25	—	14.75	Cost of probe type LWCO	88.82
Electrician/Labor to install and wire LWCO	—	Plugs into control	—	—	Cost of labor or sub-contracted electrician to wire and install LWCO	—
Wall Bracket	—	—	—	—	—	—
Productivity Rating					Total labor time required for installation start to finish (number of technicians x hours to complete)	
					Total Cost:	5,553.97

VLT Scorecard

VLT

Item	Material Cost	Labor Hours	Labor Cost per Hour	Total Labor Cost	Description	Total Cost (Material + Labor)
VLT Cost	3,107.82	18	59.00	1,062.00		4,189.82
Primary/ Secondary Piping	—	—	—	—	Cost to purchase all piping, fittings, valves and materials to construct the P/S loop. Include the time, number of technicians and fully burdened labor rate to install.	—
Primary Pump (if not included)	—	—	—	—	Cost of primary pump and labor to install	—
Code Compliant LWCO (if applicable)	Came with boiler	—	—	—	Cost of probe type LWCO	—
Electrician/Labor to install and wire LWCO	—	—	—	—	Cost of labor or sub-contracted electrician to wire and install LWCO	—
Wall Bracket	Came with boiler	1½	59.00	88.50		88.50
Productivity Rating					Total labor time required for installation start to finish (number of technicians x hours to complete)	
					Total Cost:	4,278.32

Used internal boiler piping

VLT vs. Weil Mclain

$1275.65

Contractor Testimonials

Contractor Testimonial

"We went form two men, two days to two men one day!"
"We are still quoting and getting jobs with 2 men/2 days but are much more profitable, and competitive with the VLT and H2O"

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