

CLOSED LOOP WATER SOURCE HEAT PUMP SYSTEM

- Ideal for Low-temperature Systems
- High Recovery, High Efficiency
- Thermal Shock Proof
- Outdoor / Indoor
- Lightweight

Why use Raypak® for heat pump applications?

Water source heat pump applications utilize low system return temperatures, and most boiler designs, such as cast iron and smooth tube, cannot operate with system temperatures below 140°F without condensing. When a non-condensing boiler condenses, soot is formed which builds up on the heat exchanger and burners and reduces its thermal efficiency. This results in a noticeable loss of performance, higher service and maintenance costs, and shortened boiler life.

Raypak non-condensing boilers use copper finned tubes that can operate at temperatures as low as 105°F (Raytherm® and Hi Delta®) or 120°F (MVB®) without condensing. Most other boilers must operate above 140°F to avoid condensation. This means that a Raypak boiler can provide added years of reliable service with less maintenance in a much wider range of applications.

FAST RESPONSE

Raypak copper finned tube boilers are much smaller and lighter than any other boiler design. The operating weight can be up to 35 times lighter due to water content alone! Typical water content in a 624 MBH boiler is:

Raypak	1.4 gallons
Smooth tube	50.0 gallons
Cast Iron	55.0 gallons

As you can see, a Raypak boiler has minimal water content thus requiring no pick-up load factors. A hydronic system with a responsive Raypak boiler will operate more efficiently and under better control at all times.



THERMAL SHOCK PROOF

Another prime concern of low-temperature hydronic systems is thermal shock. Thermal shock takes place when the system temperature undergoes a rapid temperature change. Both cast iron and multi-row, smooth tube boilers are not designed to withstand thermal shock, and thermal shock damage is not covered under warranty. Raypak's single-row heat exchanger and floating return header design is guaranteed against thermal shock for 20 to 25* years from the date of installation. (For complete warranty information see Catalog No. 1900.10.)

COMPLETE PRODUCT LINE

Raypak has five models of boilers for Heat Pump applications: the atmospheric Raytherm; the sealed combustion Hi Delta and MVB; high efficiency XTherm® and XFyre® condensing boiler.

With over 65 years of industry experience and a proven reputation for high quality, reliable products, Raypak is truly your "Hot Water Management Expert!"

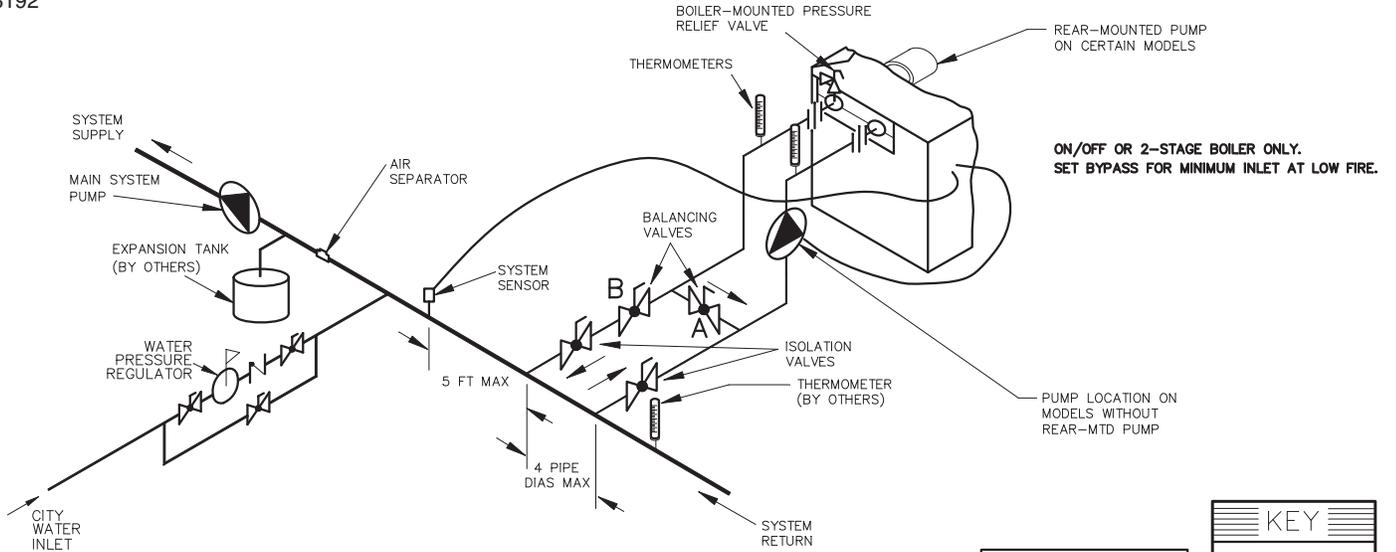
*25 years on XTherm models.



Raypak
A Rheem® Company

Closed Loop Water Source Heat Pump – Non-Condensing Boiler

Fig# 8192



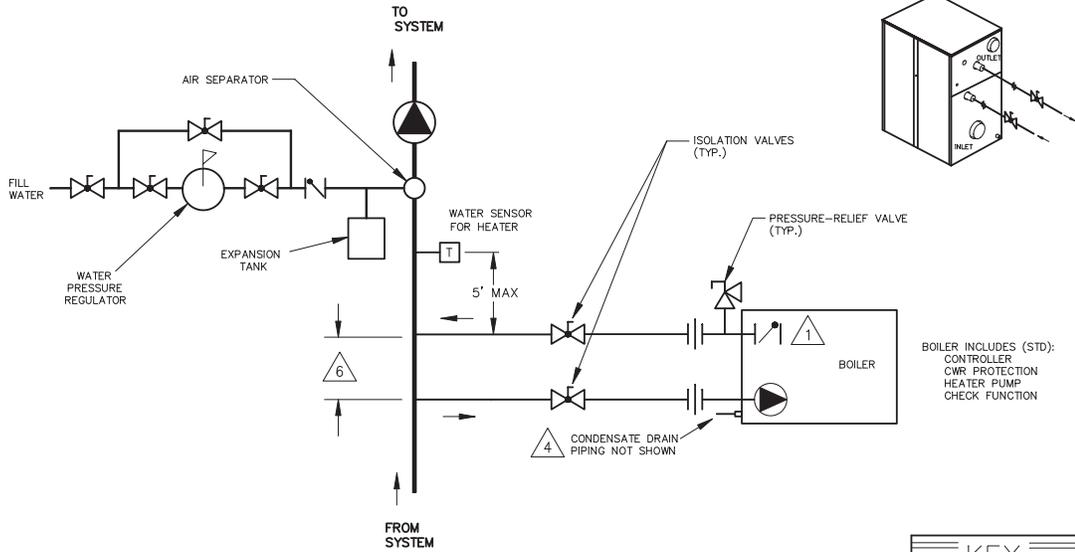
- NOTES:
1. PLUMB SWING CHECK VALVE IN GRAVITY-CLOSED POSITION.
 2. PIPE ALL RELIEF VALVES TO DRAIN, OR AS LOCAL CODES REQUIRE.
 3. PROVIDE FOR THERMAL EXPANSION OF HOT WATER IF A BACKFLOW PREVENTER, CHECK VALVE, WATER METER OR PRESSURE-REDUCING VALVE IS INSTALLED IN THE COLD WATER LINE.
 4. SEE CHART "PIPE SIZES" FOR PIPE SIZES, CALCULATED AT MAXIMUM FLOW, NOT TO EXCEED 7.5 FT/SEC.
 5. STANDARD PUMP SIZING BASED ON 75 EQUIVALENT FEET OF PIPING. IF DISTANCE IS GREATER, THE PUMP MUST BE SIZED TO ACCOMMODATE INCREASE IN PIPING-RELATED LOSSES.

PIPE SIZES		
	UNIT	MAIN
RAYTHERM		
181-401	1-1/2"	2"
514-824	2"	3"
926-1826	2-1/2"	3"
2100-4001	3"	4"
MVB		
504-754	2"	3"
1004-2004	2-1/2"	4"
HI DELTA		
HD101-HD401	1-1/2"	2"
302-902	2"	3"
992-2342	2-1/2"	4"

KEY	
	PRESSURE RELIEF VALVE
	PUMP
	UNION
	CHECK VALVE
	BALL VALVE
	THERMOMETER

Closed Loop Hydronic Single Boiler System – Condensing Boiler

Fig# 8651 (XTherm)



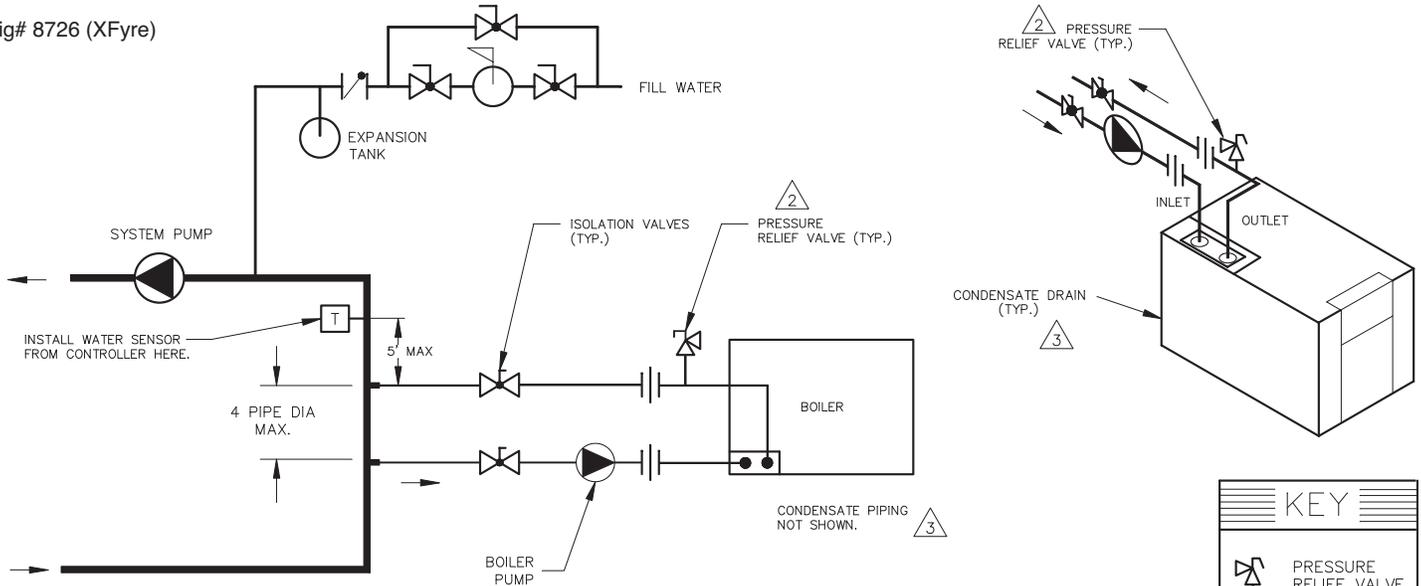
NOTES:

- 1. CHECK VALVE INTEGRAL TO XTHERM MODELS 1005A–2005A. MODELS 2505–4005 REQUIRE CHECK VALVE INSTALLED IN EXTERNAL PLUMBING BY OTHERS.
- 2. PIPE ALL RELIEF VALVES TO DRAIN, OR AS LOCAL CODES REQUIRE.
- 3. PIPE SIZE MUST BE EQUAL TO THE BOILER INLET / OUTLET SIZE. SEE "PIPE SIZES" CHART ABOVE.
- 4. CONDENSATE MUST BE PIPED TO AN APPROVED DRAIN. LOCAL CODE MAY REQUIRE NEUTRALIZATION PRIOR TO DRAIN.
- 5. PROVIDE FOR THERMAL EXPANSION OF HOT WATER IF A BACKFLOW PREVENTER, CHECK VALVE, WATER METER OR PRESSURE-REDUCING VALVE IS INSTALLED IN THE COLD WATER LINE.
- 6. DECOUPLER SPAN MUST NOT EXCEED 4 PIPE DIAMETERS OR 12", WHICHEVER IS LESS.

PIPE SIZES	
	BOILER
1005A–2005A	2–1/2"
2505	3"
3005–4005	4"

KEY	
	PRESSURE RELIEF VALVE
	PUMP
	UNION
	CHECK VALVE
	BALL VALVE
	THERMOMETER

Fig# 8726 (XFyre)



NOTES:

- 1. MINIMUM PIPE SIZE MUST BE EQUAL TO THE BOILER INLET / OUTLET SYSTEM FLOW MUST EXCEED BOILER FLOW BY AT LEAST 20%.
- 2. PIPE ALL RELIEF VALVES TO DRAIN, OR AS LOCAL CODES REQUIRE.
- 3. PIPE CONDENSATE DRAIN TO DISCHARGE PER LOCAL CODE, OR NEUTRALIZE AND DRAIN TO DISCHARGE PER LOCAL CODE. CONDENSATE MUST NOT BE ALLOWED TO FREEZE.

PIPE SIZES	
	BOILER
300	1–1/2"
400	2"
500	2"
700	2"
850	2"

KEY	
	PRESSURE RELIEF VALVE
	PUMP
	UNION
	CHECK VALVE
	BALL VALVE
	THERMOMETER

MODELS	RECOMMENDED PUMP TACO (or equivalent)	
	NON-CONDENSING	CONDENSING
RAYTHERM®		
182-400	0012-1/7 HP	
181-401	0012-1/7 HP	
514-624	120-1/6 HP	
724-824	1600-1/4 HP	
926-1125	1630-1/2 HP	
1178-1826	1632-3/4 HP	
2100-4001	1638-2 HP	
HI DELTA®		
302B-502B	120-1/6 HP	
652B-752B	1600-1/4 HP	
902B-992B	1630-1/2 HP	
1262B	1632-3/4 HP	
1532B-1802B	1634-1 HP	
2002-2342B	1634-1 HP	
HI DELTA® ss		
HD101	0010-1/8 HP	
HD151	0010-1/8 HP	
HD201	0010-1/8 HP	
HD251	0010-1/8 HP	
HD301	0010-1/8 HP	
HD401	0010-1/8 HP	
MVB®		
503A* /504A	1611-1/4 HP	1611-1/4 HP
753A* /754A	1611-1/4 HP	1611-1/4 HP
1003A* /1104A	1611-1/4 HP	1611-1/4 HP
1253A*		1630-1/2 HP
1503A* /1504A	1632-3/4 HP	1632-3/4 HP
1753A*		1634-1 HP
2003A* /2004A	1634-1 HP	1634-1 HP
XTHERM®		
1005A		Integral Pump Standard
1505A		
2005A		
XFYRE®		
300A		0012-1/8 HP
400A		0012-1/8 HP
500A		1611-1/4 HP
700A		1630-1/2 HP
850A		1630-1/2 HP

To properly adjust boiler temperatures for non-condensing boilers in this application:

- 1 Select the proper size of boiler based on the BTU requirement to meet the maximum boiler load of the water loop system.
- 2 Use boiler Type H4 (on/off). For Hi Delta 502 and larger, convert the stage firing to on/off by connecting a single-stage aquastat to stage 1 and connecting jumpers to stages 2 and up.
- 3 For the pipe connecting the boiler and the system loop main, select a size that is at least equal to the inlet/outlet header connections of the boiler.
- 4 Install recommended boiler pump (from chart).
- 5 Check that both isolation valves are open.
- 6 Adjust Balancing Valve **A** 1/2 open and Balancing Valve **B** fully open.
- 7 Fire the boiler and adjust Balancing Valve **A** to obtain a boiler inlet temperature approximately 50°F greater than the system loop return temperature. (Turning Valve **A** in the open direction will raise the boiler inlet temperature and closing Valve **A** will lower the boiler inlet temperature.) Note: Boiler inlet should never be less than 105°F.
- 8 If the boiler inlet temperature remains less than 50°F higher than system loop return temperature and Valve **A** is fully open, leave Valve **A** fully open and throttle Valve **B** until the boiler inlet temperature rises to be 50°F higher than system loop return temperature.
- 9 Main loop and boiler temperatures should be checked regularly throughout the heating season to prevent boiler condensation. If balancing valves are adjusted at the coldest loop temperature (typically 50°F) and the boiler inlet temperature adjusted to 105°F (Raytherm and Hi Delta) or 120°F (MVB), then the entire heating season should have proper boiler operation. The boiler inlet temperature can be higher than 105°F without boiler damage, but operating at less than 105°F (Raytherm and Hi Delta) or 120°F (MVB) inlet can cause damage from condensation.

*CAT IV MVB® models.

This chart provides a pump with sufficient head to work with approximately 50 equivalent feet of piping from the boiler, to the system, and back to the boiler. For example, the boiler may be 5 feet from the main system piping and have four elbows. (Assuming an elbow has 10 equivalent feet, this would be 40 feet + 5 + 5 = 50 feet).

Raypak, Inc. reserves the right to make product changes or improvements at any time without notification.