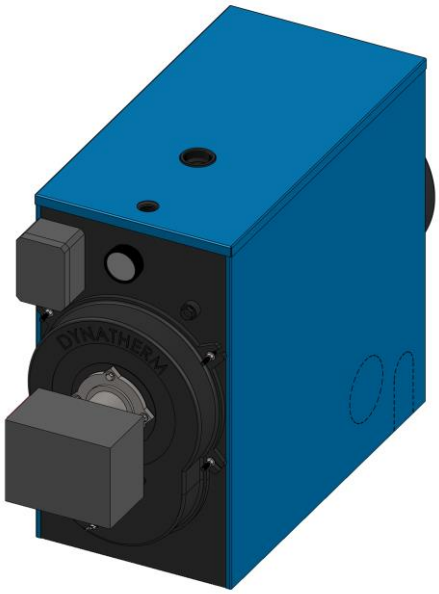
INSTALLATION & OPERATION MANUAL

Dynatherm™

Since 1937

Residential Boilers, Heating & Domestic Hot Water Systems

- *OIL-FIRED*
- *PROPANE-FIRED*
- *NATURAL GAS-FIRED*



Dynatherm™ FP Series Boiler
Models: FP18, FP24, FP36 & FP48

ASME H (Optional) I.B.R DOE

WARRANTY	
This boiler has a limited lifetime warranty. A warranty card is included with your new boiler packet. Please note your serial number, date of installation and contractor's information below.	
SERIAL NUMBER:	DATE:
CONTRACTOR:	PHONE:

43 E. Cherry Rd. | Quakertown, PA 18951 | Ph: 215-536-4078 | Fx: 215-536-8960 | Email: info@dynathermboiler.com

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BEFORE GETTING STARTED

⚠ WARNING
Installation must conform to the following: ▪ Local, state and national codes, laws, regulations and ordinances. ▪ National Fuel Gas Code, ANSI Z223.1 latest version. ▪ National Electric Code, ANSI/NFPA-70 latest revision. ▪ Standard for Controls and Safety Devices for Automatically Fired Boilers, ANSI/ASME CSD-1 latest revision, when required.
Read this manual in its entirety before attempting installation, start-up or service.
Proper operation depends on following all instructions carefully, including those contained within the manufacturers' components that are provided with your boiler.
This boiler contains extremely hot water under pressure and failure to follow all instructions could cause personal injury, property damage or death.
Dynatherm™ boilers must be installed, serviced, maintained, repaired, upgraded and/or modified only by a qualified Dynatherm™ installer/technician.
A qualified Dynatherm™ installer/technician is an individual who has been properly trained on installing and servicing Dynatherm™ boilers and must be a licensed installer.
Homeowners should never attempt to install, service, repair, upgrade or modify the Dynatherm™ boiler.
Dynatherm™ boilers must be installed by a qualified installer/technician in order to validate the warranty.
Verify you have the correct size boiler for your home and/or application. Refer to the DOE & IBR ratings chart found in the *FP Series Boiler Specification* section of this this manual.
This boiler requires regular yearly maintenance and service to operate properly and safely.

GENERAL DESCRIPTION

The Dynatherm™ FP Series Boiler is a high quality fabricated steel & cast iron boiler of the Scotch Marine Design, long recognized as the most efficient boiler design in its size category. It will provide years of economical heat and domestic hot water when properly installed and cared for. Therefore, it is important that these instructions be followed carefully.

The Dynatherm™ boiler comes with an insulated jacket and a burner package. Each burner package includes the following items:

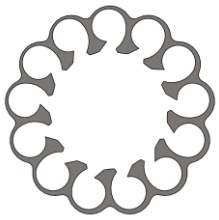
1) Burner
2) Air Tube/Flange/Gasket
3) Nozzle
4) Harness Assembly
5) Temperature/Pressure Gauge
6) Pressure Relief Valve
7) Aquastat
8) Smoke/Flue Cap
9) Bolts/Nuts/Hardware
10) Manufacturer's Warranty Package

Dynatherm™ boilers are shipped skidded or can be picked up directly un-skidded. The burner package and jacket are boxed separately. Upon receiving your items, all packages/items should be inspected for signs of damage. If shipped, any damage should be noted on the carrier's waybill. Keep all damaged packages/items and request an inspection by the carrier. It's the responsibility of the consignee to file any claims with the delivering carrier for any damaged items received. Claims must be submitted within five (5) days after receipt. No claims will be accepted after this five (5) day period.

BOILER DESCRIPTION & OPERATION

Dynatherm™ is America's only residential steel and cast iron belly flue, three pass Scotch Marine boiler. It's designed to force hot gases through the boiler in three passes while maintaining the highest efficiency ratings.

The first pass drives the hot gases of combustion, which are produced by the burner at the front head, through the combustion tube into the end head, which houses our exclusive scroll. As the gases enter the end head, they're separated into the 13 curls of the scroll and spun at a greatly increased velocity into the 13 fire tubes that surround the combustion tube. The scroll is designed to reverse the spin of the whirling gases from clockwise to counterclockwise, which slows the gases down by 2-1/2 – 3 times. This allows the heat to remain inside the boiler much longer.



Scroll

The second pass forces the swirling gases through the 13 fire tubes in a slow counterclockwise motion, causing a scrubbing action. This causes a dual effect. First, the gases travel through the fire tubes in a curling pattern, which causes the heat to be retained inside the fire tubes 2-1/2 – 3 times longer. Due to the longer retention, this gives the gases a longer period of time to transfer the heat (BTU's) through the fire tubes into the surrounding water inside the boiler shell. Second, the action caused by these gases creates a scrubbing effect which greatly enhances the efficiency of heat transfer from the gases into the fire tube walls.

The third pass creates the gases third rotation as they enter the front head. Heat naturally tries to rise, so our boiler is designed to force all the heat downward into the third pass chamber (belly pan). This process allows the most efficient transfer of heated gases into the belly pan.

This three pass Scotch Marine design utilizes all the BTU's that are input through direct contact of gases to the heating surfaces, allowing the maximum available heat to transfer into the boiler water. As a result of this process, the Dynatherm™ boiler has a proven efficiency rating up to 90.9% with low stack temperatures ranging from 240°F to 370°F.

BURNER DESCRIPTION

Riello and Carlin are the only two burner manufacturers recommended by Dynatherm™. Refer to the *Burner Configuration*s section in this manual to identify the most suitable burner and model for your boiler.

Retrofit kits are available for older, compatible burners, such as the original Dynatherm, that are installed on your boiler.

Refer to the manufacturer's *Installation Manual* for proper installation and settings.

CONTROLS DESCRIPTION

Fuel-fired hot water boilers and associated controls have evolved over the years to a point at which they are extremely safe and will operate automatically in your home.

Dynatherm™ boilers are equipped with a Fuel Smart Hydrostat 3200-Plus/3250-Plus aquastat. This unit serves as the boiler water sending unit. The high temperature, low temperature and temperature differential are set digitally on this unit.

Refer to the manufacturer's *Installation Manual* for proper installation and settings.

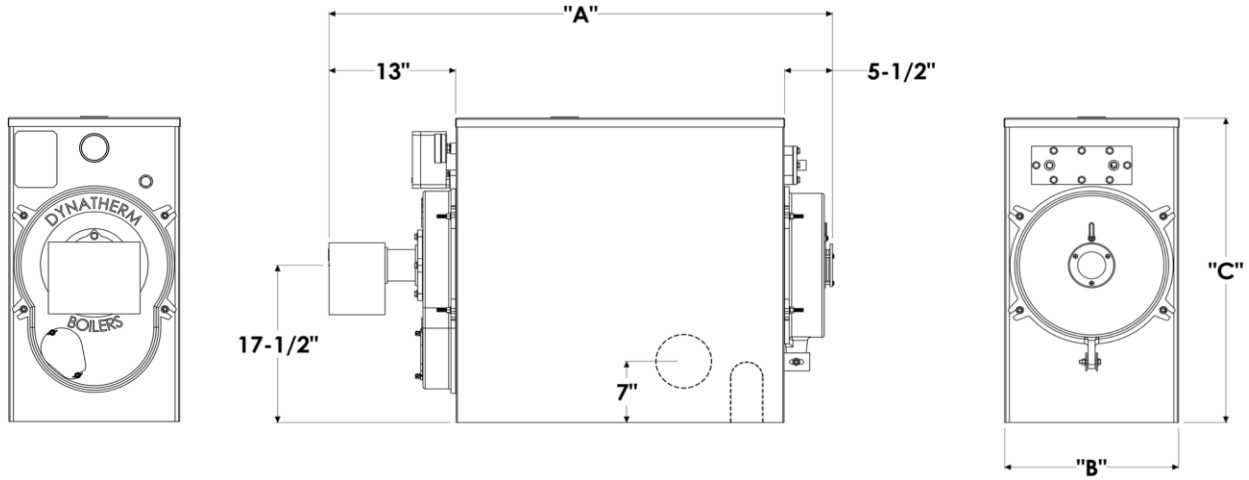
NOTICE

Only a qualified Dynatherm™ installer/technician should install, service, set or adjust these units.

FP SERIES BOILER SPECIFICATIONS

MODEL NO	FIRING RATE GPH	DOE HEATING CAPACITY MBH	NET IBR RATING WATER MBH	SQ FT	EFFICIENCY STEADY STATE COMB	AFUE	HEAT TRANSFER SURFACE SQ FT	WATER CONTENT GAL	DOMESTIC HOT WATER COIL GPM P1	P2	STACK TEMP GR	NET	CO_2
FP18	0.65	81.7	71	484	89.1	87.3	19.0	19	5	1.8	290	230	13%
	0.85	105.4	92	611	88.2	86.1	19.0	19	5	2.3	325	265	
	1.00	121.7	106	706	86.7	84.5	19.0	19	5	2.7	370	310	
FP24	0.85	106.7	93	620	89.2	87.2	23.5	25	5	2.3	240	180	13%
	1.00	123.7	108	720	88.1	85.9	23.5	25	5	2.7	275	215	
	1.25	152.1	132	880	86.5	83.9	23.5	25	5	3.3	350	290	
FP36	1.25	159.3	139	927	90.5	88.5	32.5	38	6	3.4	260	200	13%
	1.35	170.9	149	993	89.9	87.9	32.5	38	6	3.7	285	225	
	1.50	187.9	164	1093	89.0	87.0	32.5	38	6	4.1	325	265	
FP48	1.65	209.0	167	1119	90.9	88.9	41.5	52	6	4.5	250	190	13%
	2.00	253.0	182	1213	90.0	88.0	41.5	52	6	4.9	290	230	
	2.25	285.0	201	1340	88.8	86.8	41.5	52	6	5.3	320	26	

* **P1** is the coil capacity at 180°F, intermittent draw. Use these ratings to compare with boilers.
* **P2** is the ability to heat water from 40°F to 140°F, without interruption, at the intended flow.
* **DOE** is the annual fuel use efficiency.

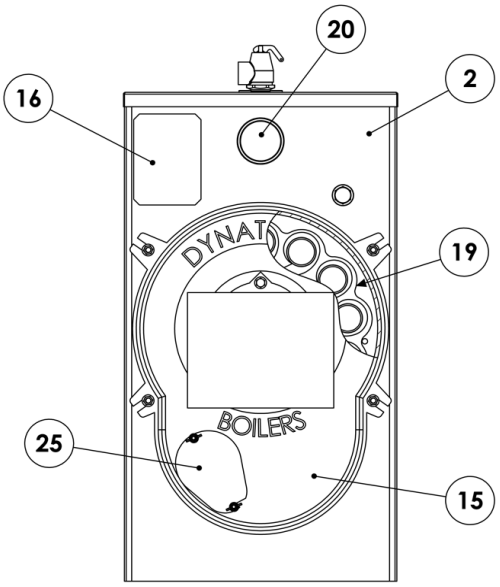


MODEL NO	"A" LENGTH	"B" WIDTH	"C" HEIGHT	WEIGHT LBS	INSTALLATION CLEARNACE TOP	SIDE	FRONT	REAR	FLUE & FITTINGS FLUE (DIA)	CHIMNEY (MIN)	OUTLET RETURN
FP18	36.5"	18.5"	35"	500	6"	12"	24"	20"	5"	6" RD OR 6" SQ	1.25" NPT OR 1.5" NPT OR 2" NPT
FP24	42.5"	18.5"	35"	555	6"	12"	24"	26"	5"		
FP36	54.5"	18.5"	35"	665	6"	12"	24"	38"	5"		
FP48	66.5"	18.5"	35"	775	6"	12"	24"	50"	5"		

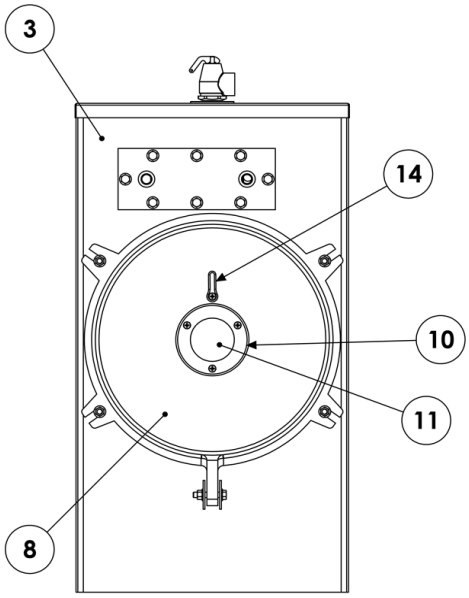
BILL OF MATERIALS

ITEM	DESCRIPTION	PART NO.
1	Boiler Shell	N/A
2	Front Tube Sheet	N/A
3	Rear Tube Sheet	N/A
4	Fire Tubes - FP18	306.000
	FP24	306.010
	FP36	306.020
	FP48	306.040
5	Combustion Tube	N/A
6	Liner, Combustion Tube	503.012
7	Tankless Coil - FP18	500.000
	FP24	500.010
	FP36	500.020
	FP48	500.040
8	End Head, 70L	920.003
9	Refractory Insert, Target	921.000
10	Frame, 3” Peephole	100.315
11	Glass, Peephole	102.316
12	Gasket, Peephole	100.317
13	Slide, Peephole	202.102S
14	Lever, Peephole	202.102L
15	Front Head, 69U	200.101
16	Aquastat	C483250
17	Third Pass Chamber	N/A
18	Flue Connection	N/A
19	Scroll	210.000
20	Temperature/Pressure Gauge	502.001
21	Jacket - FP18	975.000
	FP24	975.010
	FP36	975.020
	FP48	975.030
22	Gasket, Rope 3/8”	100.300B
23	Gasket, Rope 1/2"	100.300A
24	Air Tube Insulator	960.001
25	Inspection Plate	211.000
26	Gasket, Inspection Plate	100.003
27	Gasket, Coil	100.001
28	Burner	N/A
29	Gasket, Burner Adapter	100.202
30	Pressure Relief Valve	422.001

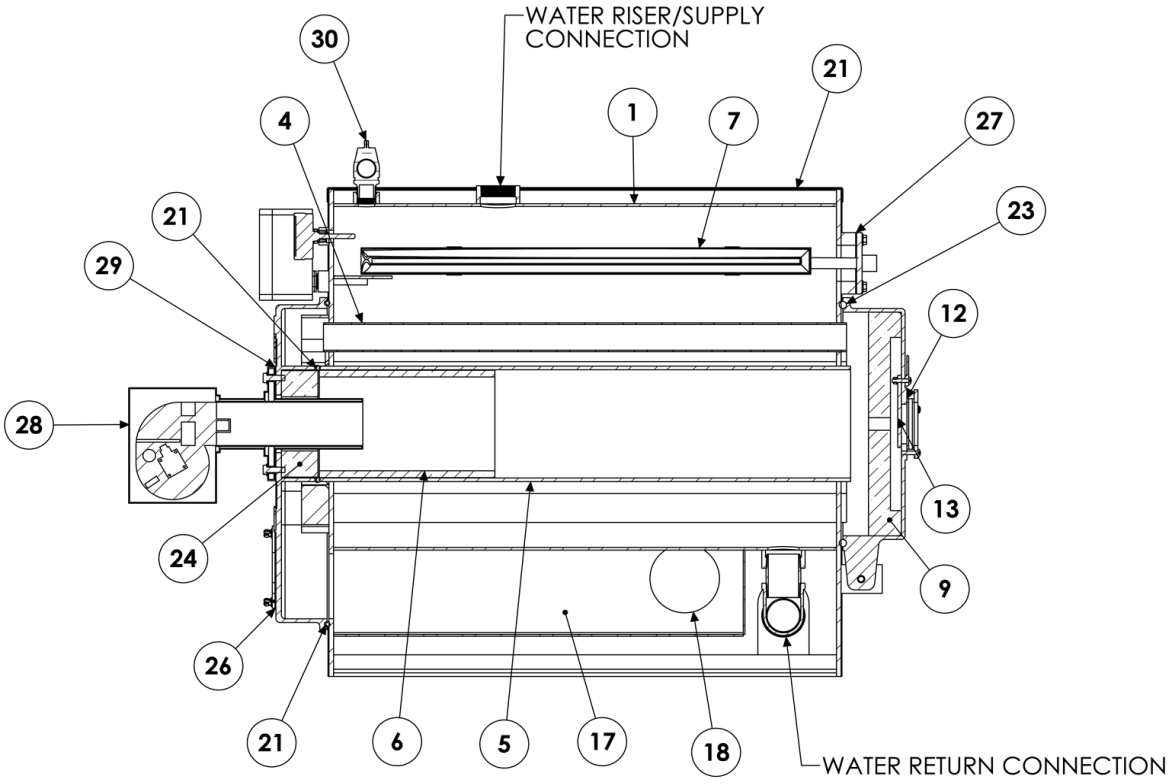
FP SERIES BOILER LAYOUT



FRONT VIEW



BACK VIEW



SIDE VIEW CUTAWAY

BOILER INSTALLATION

⚠ DANGER	
Keep the boiler area clean and free from combustible materials, gasoline and other flammable liquids and vapors.	Avoid installing and operating the boiler in an environment where saw dust, loose insulation fibers, dry wall dust, etc. are present.

⚠ IMPORTANT
Be sure to wear protective clothing and gear when installing this boiler to prevent injury.
All seals must be air tight and all enclosure plates must be in place at all times. The seals consist of the peephole gasket, rope gaskets, inspection plate gasket and the burner gasket. Leaks in these seals will result in the improper operation of the boiler, which can cause smoke and/or poor CO_2 levels. Under no circumstances should you use boiler cement to seal a gasket joint.
This boiler needs fresh air for safe operation and must be installed so there is proper combustion and ventilation.
This boiler must be properly vented, either direct vent or chimney vent.
A pressure relief valve must be installed on this boiler.
The combustion tube liner and the air tube insulator must be installed directly against the front head, prior to starting the burner. The combustion tube liner is used to provide protection for the combustion tube and assists with maintaining smokeless combustion, while the air tube insulator protects the air tube.
The burner operation can be observed through the peephole located on the end head. The cast iron lever can be conveniently rotated to one side of the peephole in order to view the fire/flame. The lever must be returned to cover the glass when not in use.
If your boiler is being used for domestic hot water, a temperature limiting valve/thermostatic mixing valve must be installed to prevent burns or scalding. Selection and installation must comply with the valve manufacturer's recommendations and instructions. Check with the local authority having jurisdiction for regulations. Mixing valves are not included with your boiler package nor are these valves supplied or sold by Dynatherm™.
The tankless domestic hot water coil is positioned in the hottest boiler water inside the boiler shell, just above the fire tubes. This provides an immediate response to domestic hot water requirements.

LOCATION

1. The boiler must be located on a rigid, non-combustible floor or base such as cement, tile, brick etc.
   a. A suitable enclosure, usually a basement, is a desirable location.
2. Check to make sure the area is free and clear from any combustible materials, surfaces or flammable liquids, and make sure there is plenty of room around the boiler for fresh air.
3. The water return and flue can be piped from either side of the boiler.
4. The recommended base size and necessary clearance distances from the edge of the boiler to any combustible surface, chimney or any other obstruction is indicated below.

BOILER SIZE	BASE DIMENSIONS		MINIMUM CLEARNACE			
	WIDTH (A)	LENGTH (B)	BURNER END (C)	COIL END (D)	TOP (E)	SIDE (F)
FP18	28”	50”	24”	20”	6”	12”
FP24	28”	56”	24”	26”	6”	12”
FP36	28”	70”	24”	38”	6”	12”
FP48	28”	92”	24”	50”	6”	12”

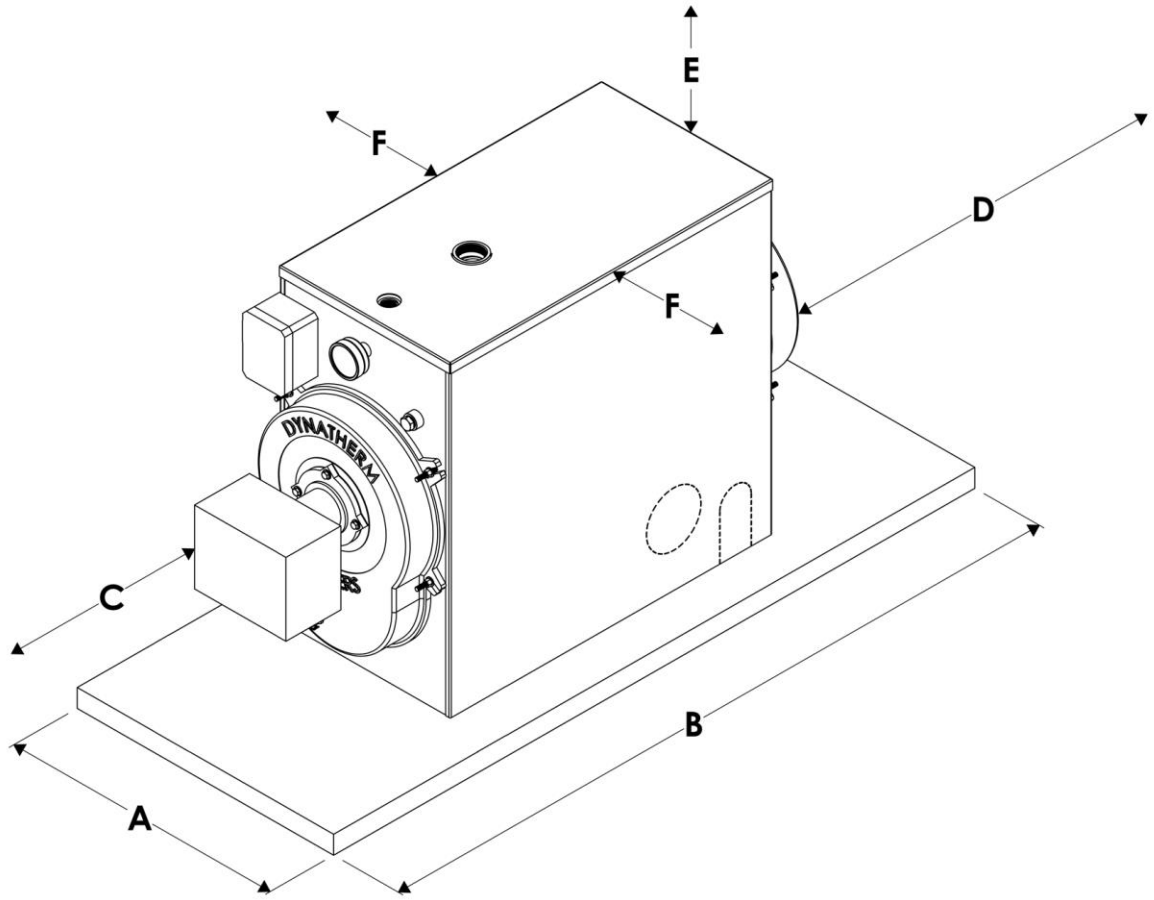


Figure 1

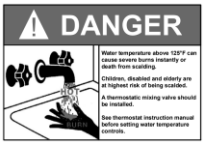
The above chart shows the absolute minimum clearance needed. As an additional safety measure, Dynatherm™ recommends a minimum of 24” at the front end (burner end), 48” at the rear end (coil end), and 12” from the top and sides of the boiler for ideal working access.

LEVELING

1. The boiler should be shimmed level.
2. If the floor is damp, it's recommended that the boiler be supported on blocks or framing with a non-oxidizing material (brick, slate, etc.) above the floor for ease of servicing and to minimize piping and flue connection requirements.

JACKETING

1. Verify that the three jacket panels in the box are the correct size for your boiler. There should be one top, one left and one right side panel.
2. Attach the two side panels first and then the top jacket to overlap the side panels.
   a. Use the bolts, nuts and sheet metal screws provided to fasten the panels to the boiler.
3. Depending on which side of the boiler you're connecting the water return and exhaust to, punch out the perforated openings on the side jacket so you'll have access. Don't forget to cap the flue opening that you aren't using with a flue cap.
4. Once the jacket panels are installed, affix the appropriate safety label(s) to the outside of the jacket and make sure they're located in plain sight.
   a. These safety labels are included with your new boiler packet.



PIPING

1. Make sure the jacket top is installed on the boiler before connecting any piping. If it's not, install the top jacket first.
2. Connect piping to the water riser on top of the boiler and the water return on the bottom of the boiler.
   a. The riser should run a vertical distance of a least 12" above the boiler outlet.
   b. The return must run horizontally and be at least 14" from the center of the boiler to clear the side jacket panels. A 2" NPT X 12" male pipe nipple is recommended.
   c. See *Figure 2*.

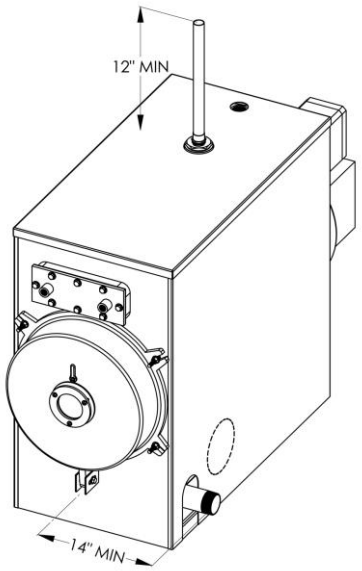


Figure 2

3. The unused water return connection should be plugged and/or used as a boiler drain.
4. Install a pressure relief valve on top of the boiler next to the water riser.
   a. If a domestic hot water coil is installed on the boiler, a separate pressure relief valve should be installed on that line in accordance with local codes.
5. Connect a discharge pipe to the pressure relief valve(s) and direct the piping downward toward the floor.
   a. The pressure relief valve(s) and discharge pipe(s) should be installed in accordance with local codes.
6. A water make-up circuit should be installed with the boiler.
7. Fill the boiler and system with water and check for leaks.
   a. If leaks are detected, drain the water and address the leaks.
   b. If no leaks are detected, add boiler water treatment compounds as recommended

by your local qualified water treatment company.

c. Dynatherm™ recommends the water to be maintained at 85 pH.

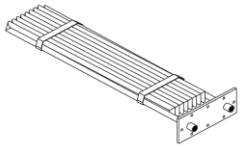
⚠ CAUTION

If the boiler is being fired without being full of water, the tubes can loosen and leak. This is a negligent operation and is not covered under the warranty.

8. All piping should be done in a neat, workmanlike manner to compliment the boiler. The design of the piping is pertinent to each job and is the responsibility of the installer.
9. *See Figures 3, 4 & 5* below for suggested general piping diagrams.

DOMESTIC HOT WATER COIL

1. If a tankless domestic hot water coil is installed on the boiler, make connections to the hot water coil and provide valves to backflush the coil.



Tankless Coil

2. The coil is made of thin, finned copper tubing and should be handled carefully in the event of removing, cleaning or installing.

⚠ IMPORTANT

Do not install a domestic hot water coil without a thermostatic mixing valve. Install the mixing valve at the hot water outlet. Adjust and maintain the mixing valve according to the manufacturer's instructions.

GENERAL PIPING DIAGRAMS

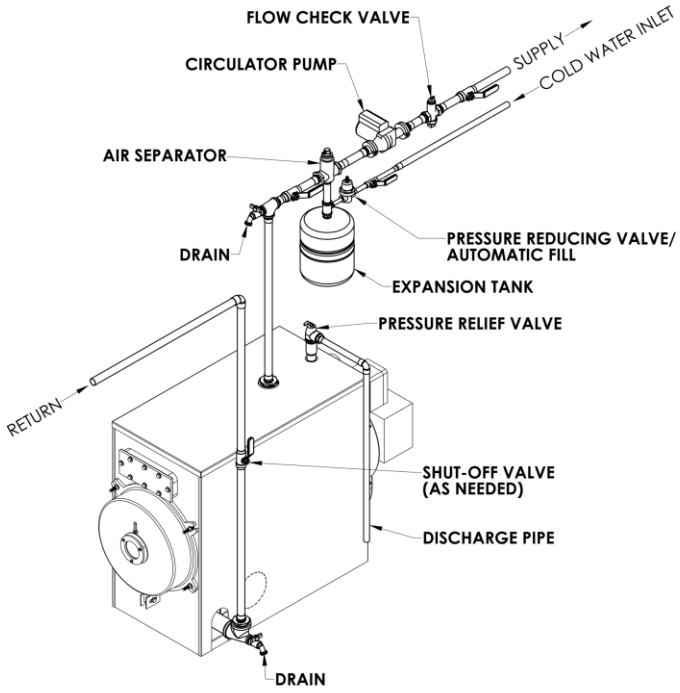


Figure 3 – Hot Water Piping

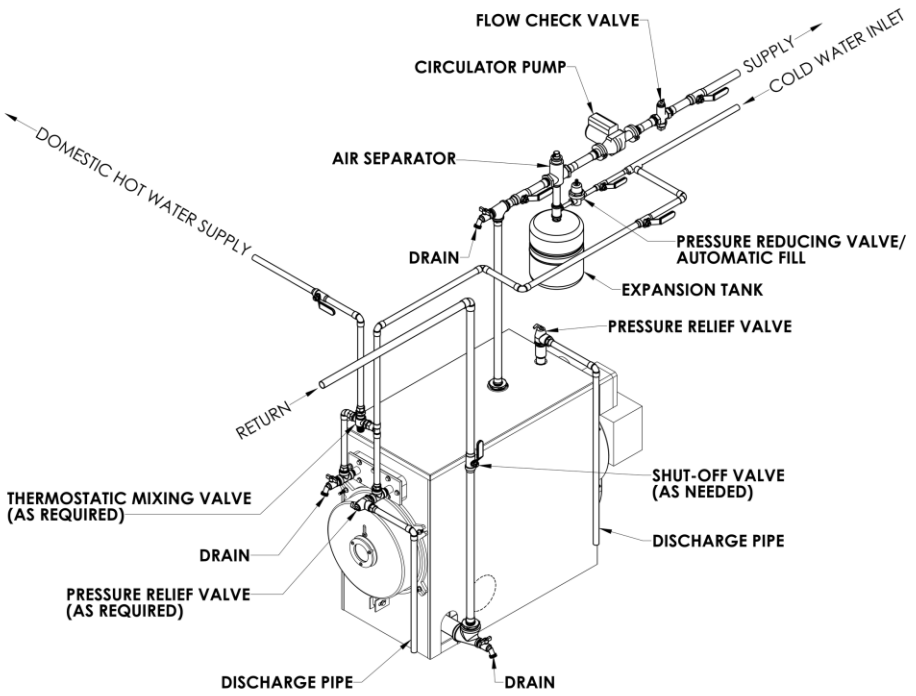


Figure 4 – Hot Water Piping with Domestic Hot Water

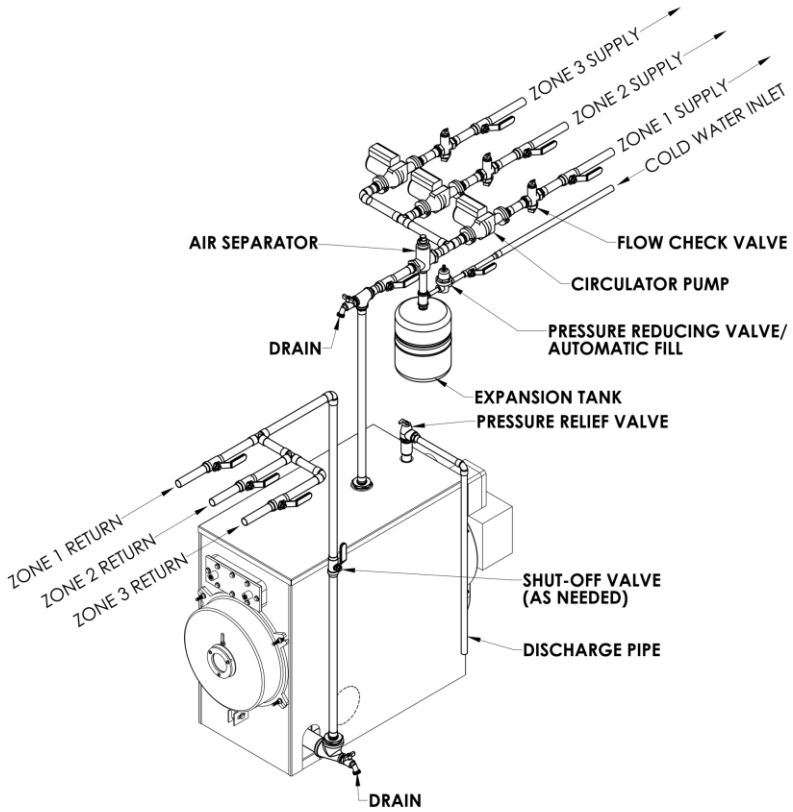


Figure 5 – Hot Water Piping, Multiple Zones

VENTILATION & CHIMNEY CONNECTIONS

1. Vent system installation must be in accordance with National Fuel Gas Code, ANSI Z223.1/NFPA 31/NFPA 54 latest revision and applicable provisions of local building codes.
2. **Direct vent** and **chimney vent** are the two applications that are recommended and approved by Dynatherm™ when installed according to the proper installation instructions.
   a. See *Figures 6 & 7* below for basic diagrams.
3. A power vent is an optional feature that is only approved when installed per the power vent installation instructions.
4. A draft regulator should NOT be installed with the boiler.
5. The Dynatherm™ boiler is a positive pressure boiler in which the flue gases are being forced through the boiler instead of being drawn out by natural drafts.
6. If venting through the chimney, make sure the chimney is clean of fly ash or carbon.
7. If the chimney is in poor condition, unlined or unprotected from precipitation, condensation will flow down the inside of the chimney and in some cases, the outside of the chimney.
   a. This can be eliminated with the installation of an H-stack cap or other stack-capping devices similar to the Wigwam cap.
8. Since the size of the flue connection is 5" round, breaching to the chimney or wall should be a 5" pipe.

⚠ CAUTION

The 5” flue cannot be reduced. Reducing the flue size can cause the boiler to build up condensation, which could result in property damage or serious injury and void the warranty.

9. The flue pipe should be as short as possible and not exceed three 90° elbows in the chimney or wall breaching.
10. The flue side not being used should be capped off with a stainless steel flue cap.
11. Because this is a forced draft system, all joints in the flue pipe must be made gas tight by sealing with thermosetting pressure sensitive tape.
12. Do not install a fireplace duct on the same flue section as the boiler.

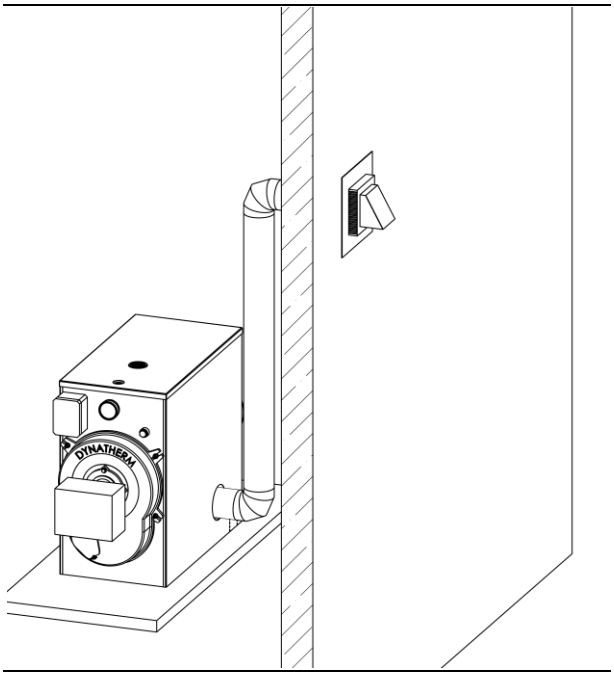


Figure 6 – Direct Vent

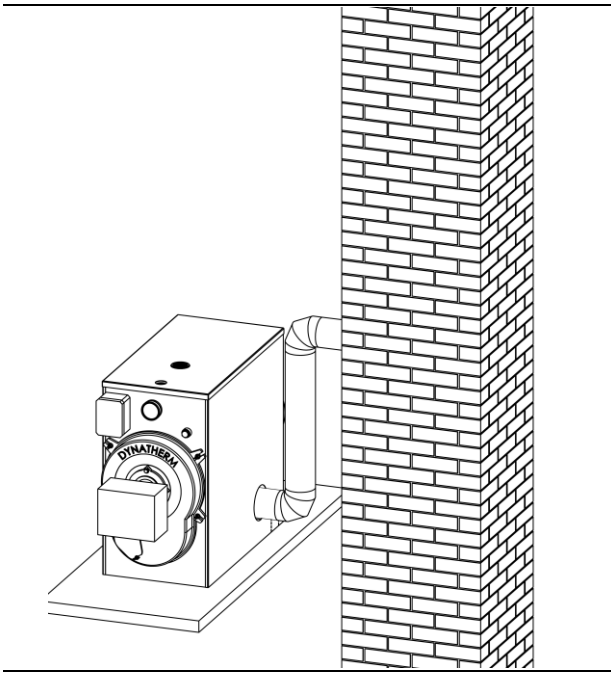


Figure 7 – Chimney Vent

FUEL SUPPLY

1. Fuel gas piping must be in accordance with National Fuel Gas Code, ANSI Z223.1/NFPA 31/NFPA 54 latest revision and applicable provisions of local building codes.
2. The Dynatherm™ boiler is listed by the Underwriters Laboratories to burn the following gases:
   - **Number 2 fuel oil**.
   - **Propane**, in accordance with national regulations, with a content of elementary Sulphur less than 1.5 ppm and volatile Sulphur less than 50 ppm.
   - **Natural gas** from the public gas supply, in accordance with national regulations, with a total Sulphur content less than 15ppm.

NOTICE

Since fuel grades marketed by different distributors may vary, it is advantageous for you to be familiar with the quality of fuels available in your area.

3. Before installing and connecting any fuel lines, turn off the main fuel supply. If there is no shutoff valve, install a valve between the fuel tank and fuel pump in accordance with local codes.
4. Install a ground joint union for servicing, if required.
5. Connect the suction line from the fuel tank to the pump using an unbroken length of copper tubing and flare type fittings as required by the burner manufacturer.
6. In cases where there is an underground or remote fuel tank, it is recommended to use a Suntec Model A1VD-7741 Pump and 1/6 HP motor to maintain proper fuel delivery.
7. If using No. 2 fuel oil, an external, appropriately listed and certified fuel filter must be placed in the fuel line between the fuel tank and the burner pump.
   - A Gar-Ber fuel oil filter is recommended.
8. Ensure that all air is out of the fuel lines. Whenever any line in the system is opened, air must be bled from the high points of the system. The boiler should always be double checked for air.
9. Turn on the main fuel supply/shutoff valve and check for any leaks using an approved combustible gas detector, soap and water, or similar nonflammable solution.

⚠ DANGER

Do not use matches, candles, flames or any ignition source to check for leaks.

ELECTRICAL WIRING

1. All electrical equipment and wiring must be installed in accordance with the National Electric Code, ANSI/NFPA-70 latest revision and applicable provisions of the local building codes.
2. Wiring is to be done inside BX cable or conduit.
3. All connections must be soldered or approved connectors. The minimum wire gauge conductor size should be #14.
4. Since the Dynatherm™ boiler is supported by numerous burners and controls, please refer to the wiring diagrams in those manuals for proper wiring.

INITIAL BURNER SETUP & START-UP

1. Refer to the burner installation manual provided with your burner for proper setup & start-up procedures.
2. Use the proper instruments to adjust the burner settings to achieve 11% - 13% CO_2 readings and a smoke reading of zero.

NOTICE

Variations in flue gas, smoke, CO_2 and temperature readings may be experienced when the burner cover is put in place. Therefore, the burner cover must be in place when making the final combustion instrument readings to ensure proper test results.

BOILER MAINTENANCE

INSPECTION

A Dynatherm™ boiler is operating properly when there is no smoke. A zero smoke reading on the Bacharach scale is an acceptable indication. The CO_2 level should be between 11% and 13%. If either of these two conditions is not obtainable, an inspection of the equipment and the functional parameters is indicated. Only a qualified Dynatherm™ technician should perform the inspection and maintenance on this boiler.

⚠ IMPORTANT

Replace the front head and end head rope gaskets during every maintenance and cleaning.

1. Examine the gaskets on the front head, end head, inspection plate and burner gasket. Small soot deposits forming on the tube sheet may be an indication of a leak.
   a. If a leak is found, tighten the bolts or replace the gaskets as necessary.
2. Check the domestic hot water coil plate and gasket for any water leaks.
   a. If a leak is found, tighten the bolts or replace the gasket.
3. Inspect the 13 fire tube expansion joints at both tube sheets for any signs of water leaks. Water buildup in the front head, end head and third pass chamber may be an indication of a leak.
   a. If a leak is found, contact Dynatherm™ for the proper procedure to repair or replace the leaking tube(s). Do not attempt to repair or replace the leaking tube(s) unless you've been properly trained by a Dynatherm™ employee on tube rolling.
4. Verify the boiler water temperature and pressure on the temperature/pressure gauge (tridicator) are at the recommended settings.
5. If the boiler water is hot enough but the domestic hot water is still not satisfactory, the system could have some oil film which may have insulated the fins on the hot water coil.
   a. This can be corrected by flushing acid through the coil to remove the buildup.

DISASSEMBLY

1) Remove the four (4) brass nuts on the end head.
2) Lower the end head to the horizontal position by the hinge, being careful not to let the scroll drop.
3) Mark an area on top of the scroll with a black marker for reassembly and then remove the scroll. Take note of which side of the scroll goes against tube sheet.
4) Remove the hinge bolt. The end head should now be free from the boiler.
5) Disconnect the electrical wiring from the burner.
6) Disconnect the fuel line(s) from the burner.
7) Remove the four (4) brass nuts from the front head assembly. Carefully remove the assembly from the boiler in order to avoid damaging the gaskets and air tube insulator.

REASSEMBLY

1) Replace the rope gaskets on the front head and end head. Use a high temperature spray adhesive to secure the rope in place.
2) Place the front head in position.
3) Tighten the four (4) brass nuts evenly and across corners to further assure a tight seal.
4) Mount the burner and reconnect the electrical wiring and fuel line(s).
5) Make sure the combustion tube liner is fully seated against air tube insulator.
6) Mount the scroll on the fire tubes. Make sure the black mark you made with the marker is on the top and the scroll is facing the correct way against the tube sheet.
7) Replace the hinge bolt through end head casting and carefully close the end head. Use care so you do not disturb the scroll.
8) Tighten the four (4) brass nuts evenly and across corners until the gasket is tight.
9) Bleed the fuel line(s) to the pump. The boiler is now ready for firing.
10) Proceed with the *Initial Burner Setup & Start-Up* procedure, record CO_2 levels, smoke readings and air adjustments for the homeowner.

CLEANING PROCEDURE

1) Remove the four (4) brass nuts at the end head and hinge the head down to expose the tubes and scroll. Inspect the scroll for cracks and other damage, and replace the scroll if necessary.
2) Clean the fire tubes with a shop vacuum and/or tube brush. If there is any carbon inside the combustion tube, clean it out.
3) Inspect the end head refractory insert and replace if necessary.
4) Clean the inspection sight glass and replace if necessary.
5) Replace the end head rope gasket.
6) Remove the inspection plate at the front head (burner end) and clean the inside thoroughly with a vacuum.
7) Remove the flue cap and clean inside the belly pan. Replace the flue cap once finished.
8) Inspect the exhaust pipe and tape, and clean or repair if necessary.
9) Clean or replace the burner nozzle per the burner manual, making sure to use the proper size and angle.
10) If using No. 2 fuel oil, replace the oil filter element.
11) If there is any indication that any other gaskets are leaking, replace those gaskets immediately.
12) Reinstall the cleanout cover, scroll, end head and stack connections. Make sure that all vent connections are taped and secured with screws.

⚠ WARNING

Do not omit the scroll. The scroll is important to assure the efficient operation of the boiler.

13) Fire up the boiler and double check for any leaks in gaskets or stack joints. Make sure the CO_2, air control setting and smoke test are to the recommended levels. Refer to the *Initial Burner Setup & Start-Up* section of this manual.

TROUBLESHOOTING

⚠ DANGER	
IF YOU SMELL GAS	• Do not attempt any repairs. • Do not turn on any lights or appliances. • Do not use your cell phone or any electronics. • Leave the building immediately and call your gas supplier and the fire department.

Dynatherm™ requires a qualified installer/technician to service the boiler and we prohibit the homeowner from attempting any repairs, upgrades and/or modifications to the boiler. However, before placing a service call, refer to the below chart for basic troubleshooting problems.

PROBLEM	SOLUTION
No power to the boiler	Check to see if there's a blown fuse or a tripped breaker. If so, replace the fuse or turn the breaker back on. If this doesn't fix the problem, contact a Dynatherm™ technician.
Boiler is cold and there is no hot water	Look through the peep hole in the end head to make sure the flame is lit on burner. If there is no flame, refer to the *Troubleshooting* section of your burner manual or contact a Dynatherm™ technician.
Burner is not working properly or will not start	Refer to the *Troubleshooting* section of your burner manual or contact a Dynatherm™ technician.
Controls not working or not adjusted properly	Refer to the *Troubleshooting* section of your controls manual or contact a Dynatherm™ technician.
Water temperature too hot or too cold	Refer to the *Troubleshooting* section of your controls manual or contact a Dynatherm™ technician.
Fuel pump is not pumping fuel	Turn off the breaker and fuel shutoff valve. Check the fuel level in the fuel tank. If there's fuel, check to see if the fuel filter is clogged. If clogged, clean or replace the filter. Reinstall the filter and turn on the breaker and shutoff valve. If this doesn't resolve the problem, contact a Dynatherm™ technician.

For all additional troubleshooting problems not listed above, please contact a qualified Dynatherm™ technician or the contractor who installed your boiler.

BURNER CONFIGURATIONS

Carlin Combustion Technology, Inc.

APPLIANCE VENTING ARRANGEMENT	BOILER MODEL	BURNER MODEL	CONTROL PRE/POST PURGE	NOZZLE SIZE	AIR SETTING	TURBULATOR OR HEAD SETTING	PUMP OR MANIFOLD PRESSURE	FLANGE INSERTION DEPTH
Chimney Vented	FP18 Oil	EZ-1 PRO	6020002 10/10	0.55x45°B	0.60	0.50	150 psig	3" to flange
	FP18 Oil	EZ-1 PRO		0.65x45°B	0.65	0.60/0.65		
	FP18 Oil	EZ-1 PRO		0.75x45°B	0.75	0.75		
Direct Vented	FP18 DV	EZ-1 PRO DV	6020002 15/120	0.55x45°B	0.45	0.60/0.65	150 psig	3" to flange
	FP18 DV	EZ-1 PRO DV		0.65x45°B	0.55	0.75		
	FP18 DV	EZ-1 PRO DV		0.75x45°B	0.65	0.85/1.00		
Chimney Vented	FP24 Oil	EZ-1 PRO	6020002 10/10	0.75x45°B	0.75	0.75	150 psig	3" to flange
	FP24 Oil	EZ-1 PRO		0.85x45°B	0.85	0.85/1.00		
	FP24 Oil	EZ-1 PRO		1.10x45°B	1.10	1.10/1.25		
Direct Vented	FP24 DV	EZ-1 PRO DV	6020002 15/120	0.75x45°B	0.65	0.85/1.00	150 psig	3" to flange
	FP24 DV	EZ-1 PRO DV		0.85x45°B	0.85	1.10/1.25		
	FP24 DV	EZ-1 PRO DV		1.10x45°B	1.15	1.35/1.50		
Chimney Vented	FP36 Oil	EZ-1 PRO	6020002 10/10	1.00x45°B	1.15	0.85/1.00	150 psig	3" to flange
	FP36 Oil	EZ-1 PRO		1.10x45°B	1.15	1.10/1.25		
	FP36 Oil	EZ-1 PRO		1.25x45°B	1.20	1.35/1.50		
Direct Vented	FP36 DV	EZ-1 PRO DV	6020002 15/120	1.00x45°B	1.20	1.10/1.25	150 psig	3" to flange
	FP36 DV	EZ-1 PRO DV		1.10x45°B	1.20	1.35/1.50		
	FP36 DV	EZ-1 PRO DV		1.25x45°B	1.60	1.65		
Chimney Vented	FP48 Oil	EZ-66	6020002 30/30	1.50x30°B	80%	6-8 set at 7	150 psig	3" to flange
	FP48 Oil	EZ-66		1.65x30°B	100%	6-8 set at 7		

NOTES: A) All "B" burner nozzles listed above for EZ-1 oil burners are Hago or Delavan.

B) The air tube for the FP18, FP24 & FP36 are 7" in length.

C) The air tube for the FP48 are 11" in length.

APPLIANCE VENTING ARRANGEMENT	BOILER MODEL	BURNER MODEL	CONTROL PRE/POST PURGE	FIRING RATE	NATURAL GAS ORIFICE	NATURAL GAS AIR SETTING	PROPANE ORIFICE	PROPANE AIR SETTING
Chimney Vented	FP18 Gas	EZ-GAS	6020002FR 30/6/30	91 MBH	13/64”	15%	9/64”	12%
	FP18 Gas	EZ-GAS		105 MBH	.213” (#3)	22%	9/64”	23%
	FP18 Gas	EZ-GAS		119 MBH	15/64”	32%	11/64”	33%
Direct Vented	FP18 DV	EZ-GAS DV	6020002FR 30/6/30	91 MBH DV	13/64”	5%	9/64”	6%
	FP18 DV	EZ-GAS DV		105 MBH DV	.213” (#3)	8%	.159” (#21)	8%
	FP18 DV	EZ-GAS DV		119 MBH DV	15/64”	11%	11/64”	12%
Chimney Vented	FP24 Gas	EZ-GAS	6020002FR 30/6/30	119 MBH	15/64”	41%	11/64”	42%
	FP24 Gas	EZ-GAS		140 MBH	17/64”	60%	13/64”	60%
	FP24 Gas	EZ-GAS		175 MBH	5/16”	90%	.238” (B)	90%
Direct Vented	FP24 DV	EZ-GAS DV	6020002FR 30/6/30	119 MBH DV	15/64”	8%	11/64”	11%
	FP24 DV	EZ-GAS DV		140 MBH DV	17/64”	18%	13/64”	18%
	FP24 DV	EZ-GAS DV		175 MBH DV	5/16”	37%	.238” (B)	28%
Direct Vented	FP36 Gas	EZ-GAS	6020002FR 30/6/30	175 MBH	5/16”	50%	.238” (B)	40%
	FP36 Gas	EZ-GAS		189 MBH	.332” (Q)	60%	.257” (F)	53%
	FP36 Gas	EZ-GAS		210 MBH	3/8”	83%	.277” (J)	67%
Direct Vented	FP36 DV	EZ-GAS DV	6020002FR 30/6/30	175 MBH DV	5/16”	37%	.238” (B)	32%
	FP36 DV	EZ-GAS DV		189 MBH DV	.332” (Q)	43%	.257” (F)	42%
	FP36 DV	EZ-GAS DV		210 MBH DV	3/8”	75%	.277” (J)	85%

NOTES: A) 3-1/2” water column manifold pressure.

B) 4” long orifice nipple is used. The orifice faces toward the gas valve.

RIELLO

APPLIANCE VENTING ARRANGEMENT	BOILER MODEL	BURNER MODEL	FIRING RATE INPUT VALUE US GPH OR BTU/HR	NOZZLE SIZE	AIR SETTING	TURBULATOR OR HEAD SETTING	PUMP OR MANIFOLD PRESSURE	FLANGE INSERTION DEPTH
Chimney Vented	FP24 Oil	40 F5 w/SBT	0.85 GPH	0.75x80°B	2.8	0.0	145 psig	2.5" to flange
	FP24 Oil	40 F5 w/SBT	1.00 GPH	0.85x80°B	3.0	1.0		
	FP24 Oil	40 F5 w/SBT	1.25 GPH	1.10x80°B	3.25	3.0		
Direct Vented	FP24 DV	40 BF5 DV w/SBT	0.85 GPH	0.75x80°B	3.5	0.0	145 psig	2.5" to flange
	FP24 DV	40 BF5 DV w/SBT	1.00 GPH	0.85x80°B	4.0	1.0		
	FP24 DV	40 BF5 DV w/SBT	1.25 GPH	1.10x80°B	5.5	3.0		
Chimney Vented	FP24 Gas	40 G200 w/SBT	119,000 BTU	2.0 mm	2.0	2.0	.85 w.c.	Fixed
	FP24 Gas	40 G200 w/SBT	140,000 BTU	2.0 mm	2.25	3.0	1.0 w.c.	
	FP24 Gas	40 G200 w/SBT	175,000 BTU	2.0 mm	3.0	4.0	1.45 w.c.	
Chimney Vented	FP36 Oil	40 F5 w/SBT	1.00 GPH	1.00x30°W	3.1	2.0	156 psig	2.5" to flange
	FP36 Oil	40 F5 w/SBT	1.10 GPH	1.10x30°W	3.3	3.0	150 psig	
	FP36 Oil	40 F5 w/SBT	1.25 GPH	1.25x30°W	3.9	4.0	144 psig	
Chimney Vented	FP36 Gas	40 G400 w/SBT	175,000 BTU	C1	1.6	0.0	3.90 w.c.	Fixed
	FP36 Gas	40 G400 w/SBT	189,000 BTU	C1	1.9	0.0	4.65 w.c.	
	FP36 Gas	40 G400 w/SBT	210,000 BTU	C14	2.5	0.0	4.35 w.c.	
Chimney Vented	FP48 Oil	40 F10 w/LBT	1.65 GPH	1.50x30°B	3.0	2.0	145 psig	2.5" to flange
	FP48 Oil	40 F10 w/LBT	2.00 GPH	1.75x30°B	4.0	3.0	160 psig	
	FP48 Oil	40 F10 w/LBT	2.25 GPH	2.00x30°B	5.0	4.0	155 psig	
Chimney Vented	FP48 Gas	40 G400 w/SBT	231,000 BTU	C3	2.6	1	4.25 w.c.	Fixed
	FP48 Gas	40 G400 w/SBT	280,000 BTU	C4	3.5	1	4.55 w.c.	
	FP48 Gas	40 G400 w/SBT	315,000 BTU	C5	4.2	1	4.10 w.c.	

NOTES: A) All oil burner nozzles listed above are Delavan.

RATINGS AND APPROVALS

All Dynatherm™ boilers are rated in accordance with I-B-R recommendations. The Dynatherm™ ASME boilers have the "H" constructed stamp as well as a National Board registration number. All burners and electrical components provided by the manufacturer with a Dynatherm™ boiler are UL approved.

DOE 

(Optional)

NOTES