

Crown Boiler Company

Phantom[®] Boiler System Combi Kit Instruction Manual

Includes mixing valve and primary secondary piping

Kit P/N 430751

I– Product Description

This kit adds the ability to generate DHW, as well as heat, (“combi” capability) to select Phantom models through the use of a plate heat exchanger. In addition, this kit includes a hydraulic separator, eliminating the need for the installer to provide separate primary-secondary piping.

This kit is only compatible with the models: **PHTM150HNT1SUC** & **PHTM180HNT1SUC**

This kit is not compatible with other size Phantom boilers, nor is it compatible with models ending in “A” or “B”.

II– Basic Operation

The Phantom Boiler Combi Kit provides central heat through an integrated primary/secondary header and DHW through a flat plate heat exchanger. DHW is activated by a flow switch. Water temperatures are regulated by the Phantom boiler controls and a thermostatic mixing valve.

III– Specifications

Compatible Boilers: PHNTM150, PHNTM180

Compatible Boiler Control: Sage2.2 or higher

Dimensions (LxWxH): 21” x 16-5/8” x 12-1/2”
(53.3 x 42.2 x 31.8cm)

Kit Weight (approx.): 30 lbs (13.6 kg)

Thermostatic Mixing Valve:

- Adjustable 70°F - 145°F (21°C - 63°C).
- ASSE 1017 Certified

Minimum Flow to Operate: 0.5 gpm (2 L/min)

Re-circulation Loop: Not recommended

Lead Content: Components comply with SDWA Section 1417, Jan. 4, 2014 version.

Phantom 150 Performance

- DHW Output @ 70°F (39°C) T.rise: 3.7 gpm (14.0 L/min)
- DHW Output @ 77°F (43°C) T.rise: 3.5 gpm (13.2 L/min)
- DHW Output @ 90°F (50°C) T.rise: 3.0 gpm (11.4 L/min)

Phantom 180 Performance

- DHW Output @ 70°F (39°C) T.rise: 4.4 gpm (16.7 L/min)
- DHW Output @ 77°F (43°C) T.rise: 4.1 gpm (15.5 L/min)
- DHW Output @ 90°F (50°C) T.rise: 3.5 gpm (13.2 L/min)



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Specifications (contd):

Approximate Cold Response Time*

Phantom 150 @ 3.4 gpm

- 100°F (37.8°C) Outlet Temp—67 sec
- 120°F (48.9°C) Outlet Temp—100 sec

Phantom 180 @ 4.1 gpm

- 100°F (37.8°C) Outlet Temp—58 sec
- 120°F (48.9°C) Outlet Temp—83 sec

* Time required starting with 60°F (15.6°C) inlet water to reach temperatures shown *at the outlet of the combi unit*. Additional time will be required for hot water to reach fixtures. Additional time will also be required at lower inlet temperatures.

IMPORTANT INFORMATION— READ CAREFULLY

Note: Equipment shall be installed in accordance with those installation regulations enforced in area where installation is to be made. These regulations shall be carefully followed in all cases. Authorities having jurisdiction shall be consulted before installations are made.

All wiring on boilers installed in the USA shall be made in accordance with National Electrical Code and/or local regulations.

The following terms are used throughout this manual to bring attention to the presence of hazards of various risk levels, or important information concerning product life.

 DANGER
Indicates an imminently hazardous situation which, if not avoided, will result in death, serious injury or substantial property damage.

 CAUTION
Indicates a potentially hazardous situation which, if not avoided, may result in moderate or minor injury or property damage.

 WARNING
Indicates a potentially hazardous situation which, if not avoided, could result in death, serious injury or substantial property damage.

NOTICE
Indicates special instructions on installation, operation, or maintenance which are important but not related to personal injury hazards.

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DANGER

- **Electrical Shock Hazard.** Positively assure all electrical connections are unpowered before attempting installation or service of electrical components or connections of the boiler or building. Lock out all electrical boxes with padlock once power is turned off.
- **Water temperature above 120°F (49°C) can cause serious injury.** Mixing valve temperature setting should be done by a licensed contractor per local code requirements. To ensure correct temperature control, use the water thermometer at faucet outlet.

WARNING

- **Improper installation, adjustment, alteration, service or maintenance can cause property damage, personal injury or loss of life.** Read and understand the entire Phantom boiler manual before attempting installation, start-up operation, or service. Installation and service must be performed only by an experienced, skilled, and knowledgeable installer or service agency.
- **Failure to properly install, adjust, service or pipe this Combi Kit may result in improper operation causing damage to the boiler and structure and personal injury.** All work should be done in accordance with current manufacturer instructions and local codes.

NOTICE

- **Hard water conditions may result in scale deposits in Combi components.** Hard water will significantly shorten the life of these parts. Water conditioning is recommended for water hardness greater than 200 ppm.
- **DHW output capacity in gpm changes with varying domestic inlet water temperatures.**
- **With maximum boiler set point at 190°F (87.8°C) the boiler with the Combi Kit will provide a system water temperature varying from 165°F (73.9°C) to 186°F (85.6°C) depending on system flow conditions.**
- **Do not use ethylene glycol or chemicals that are not explicitly permitted by the boiler installation instructions.** See the “Start-Up and Checkout” section of the Phantom Boiler Installation Instructions for important information on water chemistry requirements.

DANGER

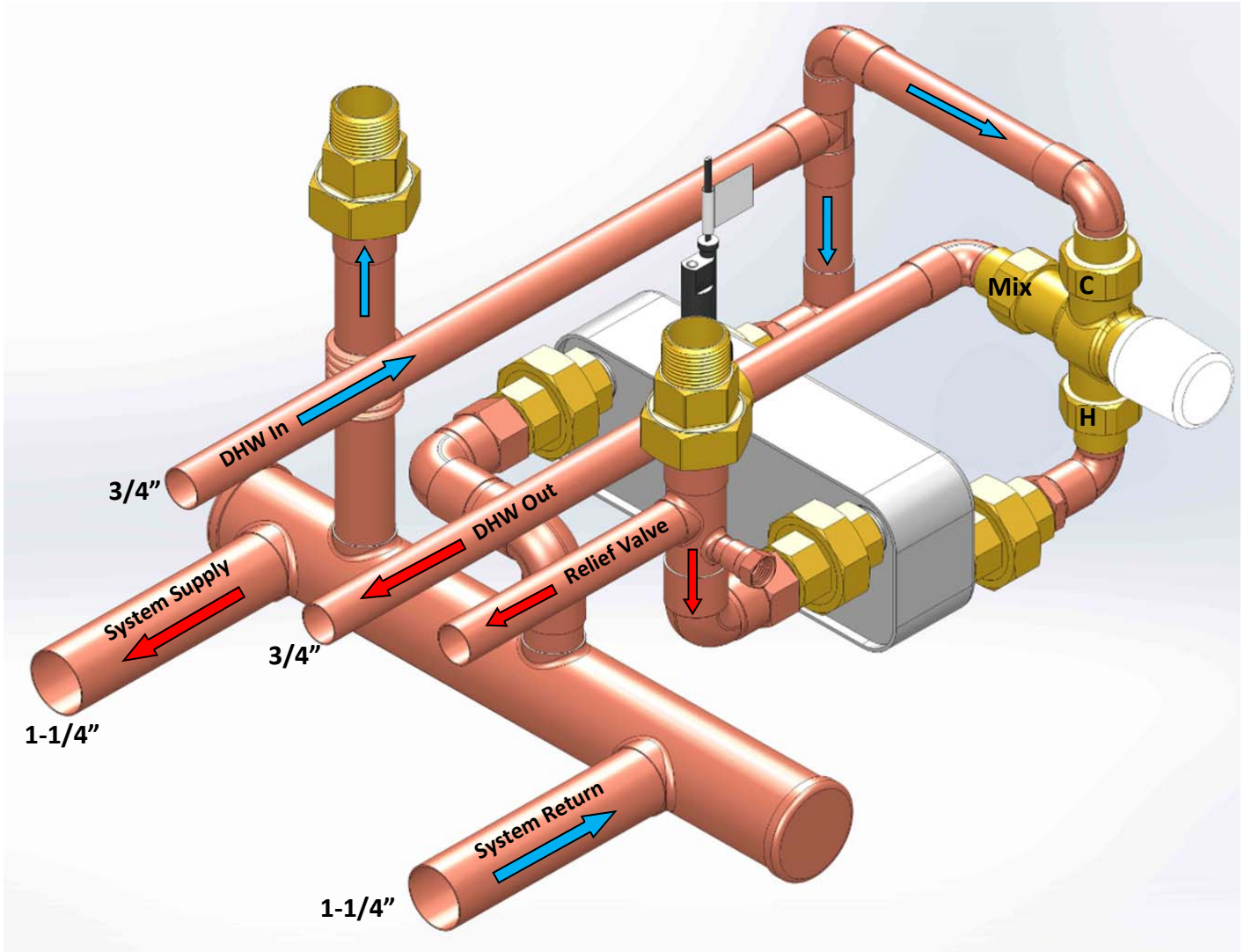
Explosion/Scald Hazard.

- **Pipe boiler relief valve discharge to a location where the potential of severe burns is eliminated.**
- **Do not install boiler relief valve having a setting greater than the MAWP shown on the rating plate.**
- **Do not install a valve in the boiler relief valve discharge line.**
- **Do not install boiler relief valve in a location other than that specified by the factory.**
- **Do not plug the boiler relief valve discharge.**

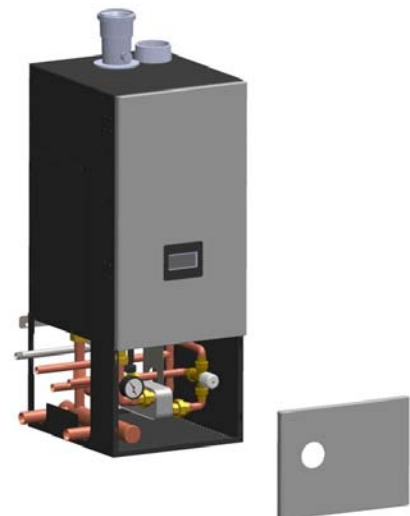
Combi Kit

IV– Introduction

1. Parts Included: 5 copper pipe assemblies, flat plate heat exchanger, thermostatic mixing valve, flow switch, sheet metal (wrapper, door and support bracket) and miscellaneous parts bag.



2. Install central heat piping. See pages 6 and 7.
3. Install DHW piping. See pages 7 and 8.
4. Complete wiring and system connections. See page 9.
5. Select "Combi Module" in boiler control. See page 10.
6. Adjust mixing valve. See page 11.
7. Install jacket. See page 11.

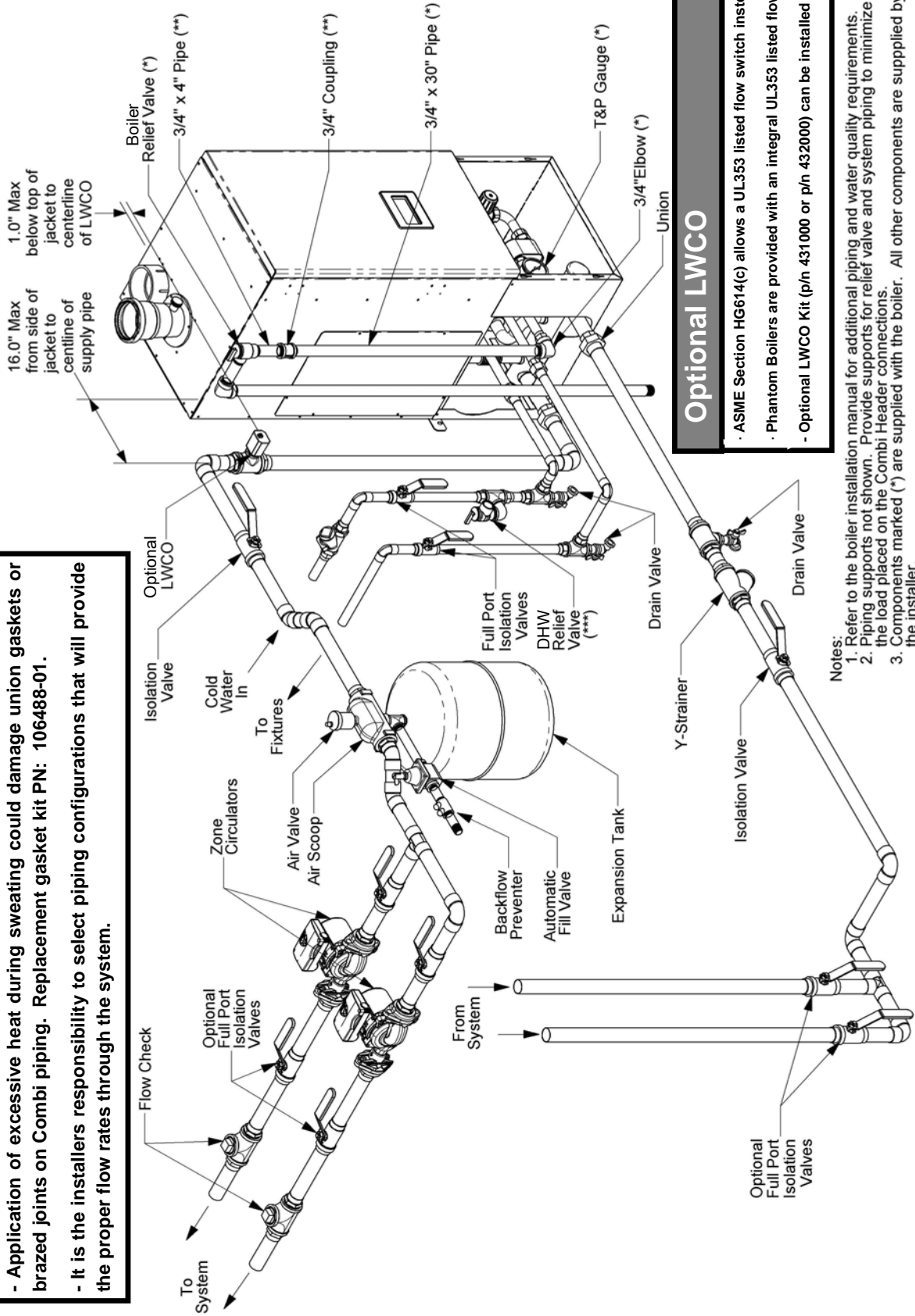


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V- Piping Diagram

! CAUTION

- Application of excessive heat during sweating could damage union gaskets or brazed joints on Combi piping. Replacement gasket kit PN: 106488-01.
- It is the installers responsibility to select piping configurations that will provide the proper flow rates through the system.



Optional LWCO

- ASME Section HG614(c) allows a UL353 listed flow switch instead of a LWCO.
- Phantom Boilers are provided with an integral UL353 listed flow switch.
- Optional LWCO Kit (p/n 431000 or p/n 432000) can be installed as shown.

- Notes:
1. Refer to the boiler installation manual for additional piping and water quality requirements.
 2. Piping supports not shown. Provide supports for relief valve and system piping to minimize the load placed on the Combi Header connections.
 3. Components marked (*) are supplied with the boiler. All other components are supplied by the installer.
 4. 3/4" coupling and 3/4" x 4" nipple marked (**) are supplied by the installer and are required to locate the relief valve above the boiler heat exchanger as required by ASME Section IV.
 5. Relief valve (supplied by installer) in DHW piping marked (****) is to be installed as required by local code.
 6. At least 18" of straight pipe is required on inlet side of conventional air scoop.

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Tools Needed:

- 1/2 inch open-end wrench
- Flat Head screwdriver
- Phillips head screwdriver, Standard and small
- Small flat-head screwdriver
- Pliers
- Adjustable wrench
- Electric drill with extension
- 5/16" nut driver attachment for electric drill

VI– General Installation Instructions

- **All connections in this kit require gaskets (included) and thread sealant (installer supplied).**
- Pipe assemblies are packed with hand-tight, pre-assembled unions. Remove these unions before re-attaching them with gaskets at final connections.

VII- Preparation

- These instructions only cover near-boiler water piping. Connections to gas, electrical power and building heating system water piping should be completed using the instructions and warnings in the Phantom Boiler Installation Instructions.
1. Review all local codes to assure installation compliance.
 2. Confirm that all electrical, water and gas supplies are shut off at sources.
 3. Unpack and identify all parts. Retain all instructions.

VIII– Central Heat Section

- 4.** Attach large manifold assembly to the 1" rear, boiler return connection under the boiler. Hand-tighten.
- 5.** Attach boiler supply pipe assembly to 1" front, boiler supply connection under boiler. Align and hand-tighten.
- 6.** (on bench) Assemble support bracket to two studs on flat plate heat exchanger. Use washers and nuts pre-mounted on studs. Bracket should extend to the opposite side of the flat plate's 3/4" water connections with boiler attachment flange pointed in same direction as studs. Hand-tighten to allow movement.
- 7.** Attach flat plate heat exchanger and bracket, to 3/4 " NPT connections on the manifold assembly and boiler supply pipe.
8. Square up installation and tighten all nuts and unions.



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9. Use drill and 5/16" nut driver attachment with the two self tapping screws to attach bracket to bottom of the boiler jacket.



WARNING

Verify proper alignment and orientation of flat plate and support bracket before drilling. Improper positioning could damage gas line inside boiler jacket.

10. Install Temperature/Pressure gauge (supplied with boiler) into 1/4 inch NPT on boiler supply pipe.



WARNING

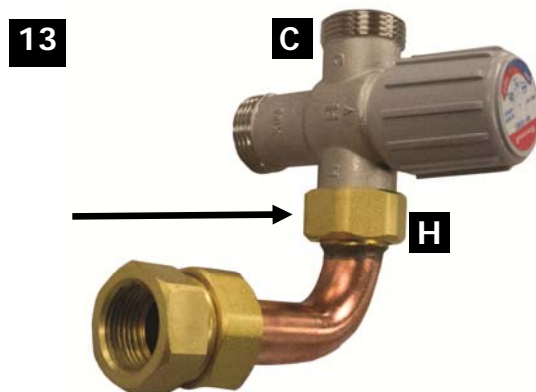
Technicians must install, a boiler safety relief valve (SRV) per the boiler installation manual and the drawing on page 5 of this manual. SRV components are supplied with the boiler.

11. Follow instructions in the Phantom IOM, as well as the drawing on page 5, to install the boiler relief valve. A 3/4" threaded adaptor is supplied with the combi kit for installation as shown in Figure 11. Install the 3/4" black elbow (supplied with the boiler), onto this adaptor and mount the relief valve above the boiler's heat exchanger using the 3/4" x 30" nipple, 3/4" x 4" nipple, and an installer supplied 3/4" black coupling. Support this piping using a split ring clamp as shown in Figure 9.9 in the boiler IOM.



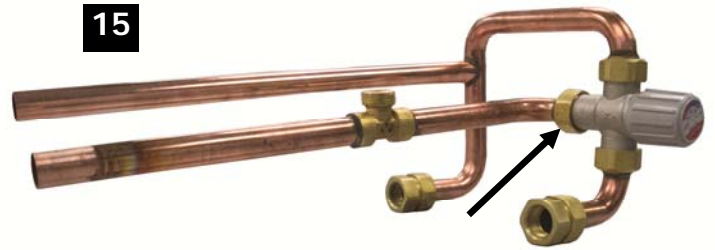
IX– DHW Section (on bench)

12. Unpack mixing valve and gather three remaining pipe assemblies. Identify hot water inlet, (H) cold water inlet (C) and mixed water outlet connections on mixing valve.
13. Install copper elbow hot water inlet pipe (smallest pipe) to mixing valve. Shortest side should attach to side connection marked "H" on mixing valve. Hand-tighten.
14. Attach side branch of cold water inlet pipe to "C" connection on mixing valve. Hand-tighten.



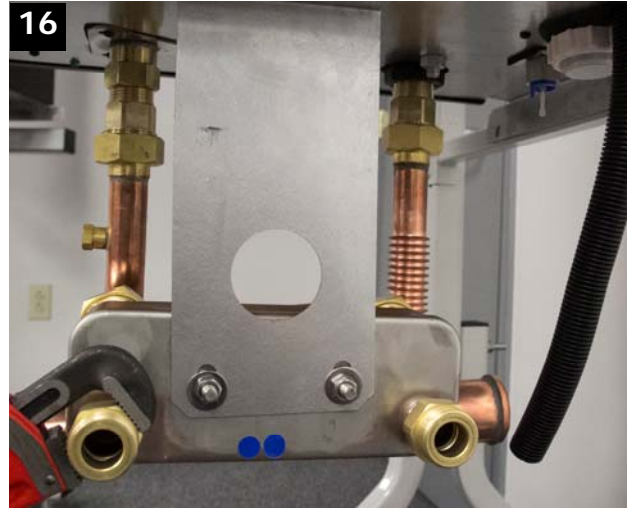
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15. Attach remaining long, L-shaped mixed water outlet pipe to mixed water outlet connection of mixing valve. Hand-tighten.



X- DHW Section (at boiler)

16. Remove two 3/4" unions from DHW pipe section and add thread sealant. Attach and tighten them to flat plate heat exchanger under boiler.



17. Thread DHW pipe assembly through support bracket and attach to flat plate heat exchanger. Hand-tighten.



18. Square up installation and tighten all unions.

19. Install flow switch to mixed water outlet pipe. Ensure that flow direction arrow points away from mixing valve.



NOTICE

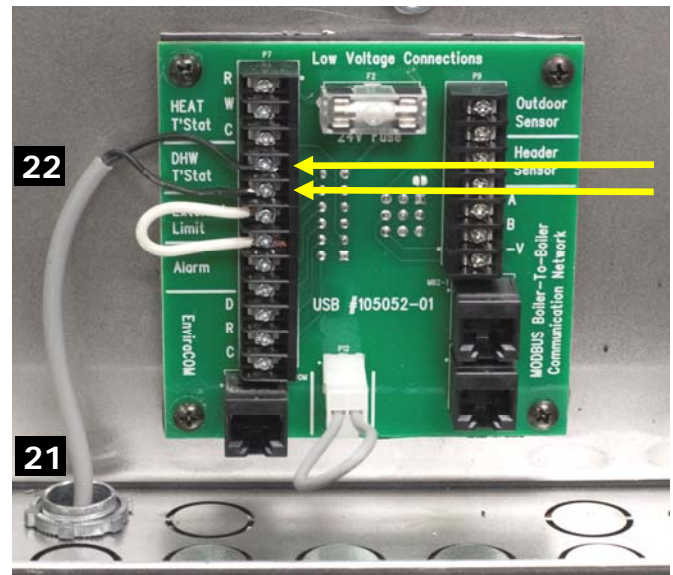
Proper installation of the flow switch is required for the boiler to fire and produce domestic hot water.

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XI– Electrical

DANGER! Turn off all power before proceeding.

20. Remove cover from boiler junction box. Identify low voltage PCB on right side of compartment.
21. Remove a knockout near “DHW T’Stat” connection. Install a knockout strain relief.
22. Thread two wire leads from flow switch through strain relief and connect them to either of the two “DHW T’Stat” terminals. See wiring schematic in Phantom Boiler Installation Instructions.



! CAUTION

Safety relief valve, expansion tank and flow check valves for DHW are not supplied with this Combi Kit. Consult local codes to determine if required.

XII– System Readiness

23. Fill system. Bleed air from main heat exchanger through top, left manual air vent.
24. Connect gas line and condensate line per Phantom Boiler Installation Instructions.
25. Connect near boiler heating system water lines per diagram on page 4 of these instructions. Follow general piping instructions in the Phantom Boiler Installation Instructions.
26. Installing isolation valves and drain valves on DHW inlet and outlet are required to permit flat plate heat exchanger to be flushed periodically.
27. Connect to incoming domestic cold water and building domestic hot water systems. Refer to diagram on page 5.

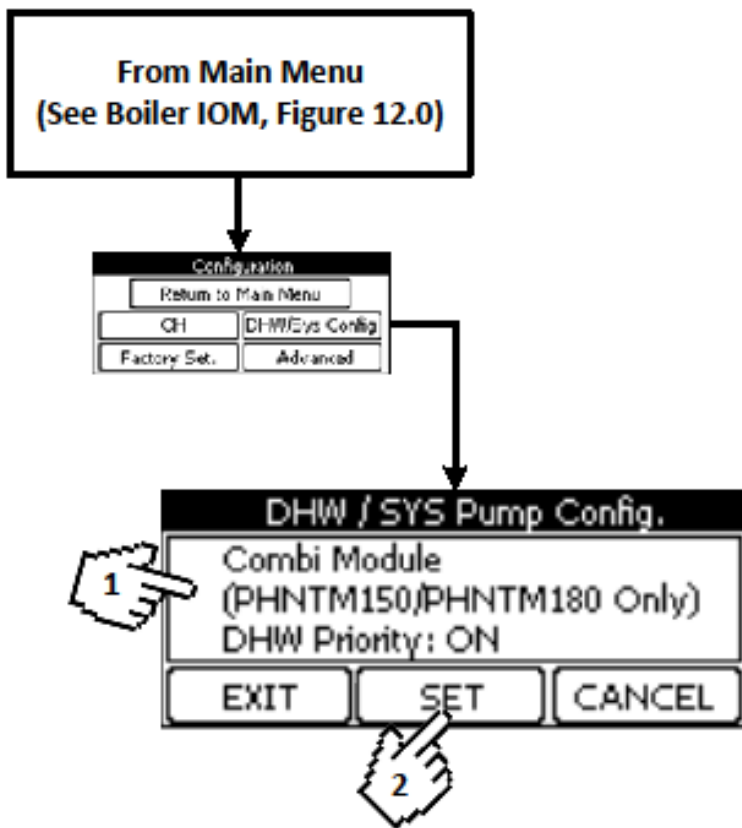
! WARNING

To complete service and place boiler back into operation, follow “Start-up and Checkout” instructions in Phantom Boiler Installation Instructions manual supplied with boiler. A copy is also posted on the manufacturer’s website, www.crownboiler.com.

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XIII– Boiler Control Set-up

28. From the Home Screen (shown in Figure 12.0 of the boiler IOM), press “MENU” to enter the Main Menu:
29. Press “CONFIGURE”
30. When prompted for a password, use the “+1” key to raise the password to “043”. Press SUBMIT, then NEXT (if you accidentally scroll past 043, press EXIT to return to the main menu and start over).
31. Review the Warning and press ACCEPT to continue to the Configuration Menu.
32. Press DHW/Sys Config to enter the DHW/System Pump configuration menu.
33. Touch the screen repeatedly as shown in Figure 29 until, one of the “Combi Module” options is shown.
There are two combi module choices:
DHW Priority: ON - System pump will be forced off during a call for DHW if there is a simultaneous call for heat. This makes all of the boiler output available for DHW production. Target temperature is still that for DHW.
DHW Priority: OFF – System pump is allowed to operate during a call for DHW so that the boiler’s output is divided between the heating and DHW loads. Do not select this option if the heating system requires supply temps lower than 180F.
34. Press SET to select the appropriate combi option.



DHW/System Pump Options:

- Option #1: System pump runs for CH only, DHW priority pumping*
 - Option #2: System pump runs for CH only, No DHW priority pumping
 - Option #3: System pump runs for CH and DHW, No DHW priority pumping.
 - Option #4: Combi Module, DHW Priority ON; System pump forced off during call for DHW.
 - Option #5: Combi Module, DHW Priority OFF; System pump allowed to run during simultaneous call for CH + DHW.
- * Default

- 1) Pressing large button cycles through all available options.
- 2) Press SET to save change

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- 3) To restore original option before SET is pressed, press CANCEL or EXIT.

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Water temperature above 120°F (49°C) can cause serious injury. Mixing valve temperature setting should be done by a licensed contractor per local code requirements. To ensure correct temperature control, use the water thermometer at faucet outlet.

XIV– Mixing Valve Set-up

35. Set and operate mixing valve per manufacturer instructions. If instructions are lost, download a new copy from manufacturer's website (customer.honeywell.com) before proceeding.
36. Measure water temperature using a thermometer or the thermostrip provided with mixing valve.
- 37.** Loosen hand-wheel screw, lift hand-wheel and turn to the desired temperature as indicated on thermostrip.
38. Re-position hand-wheel and re-tighten screw.

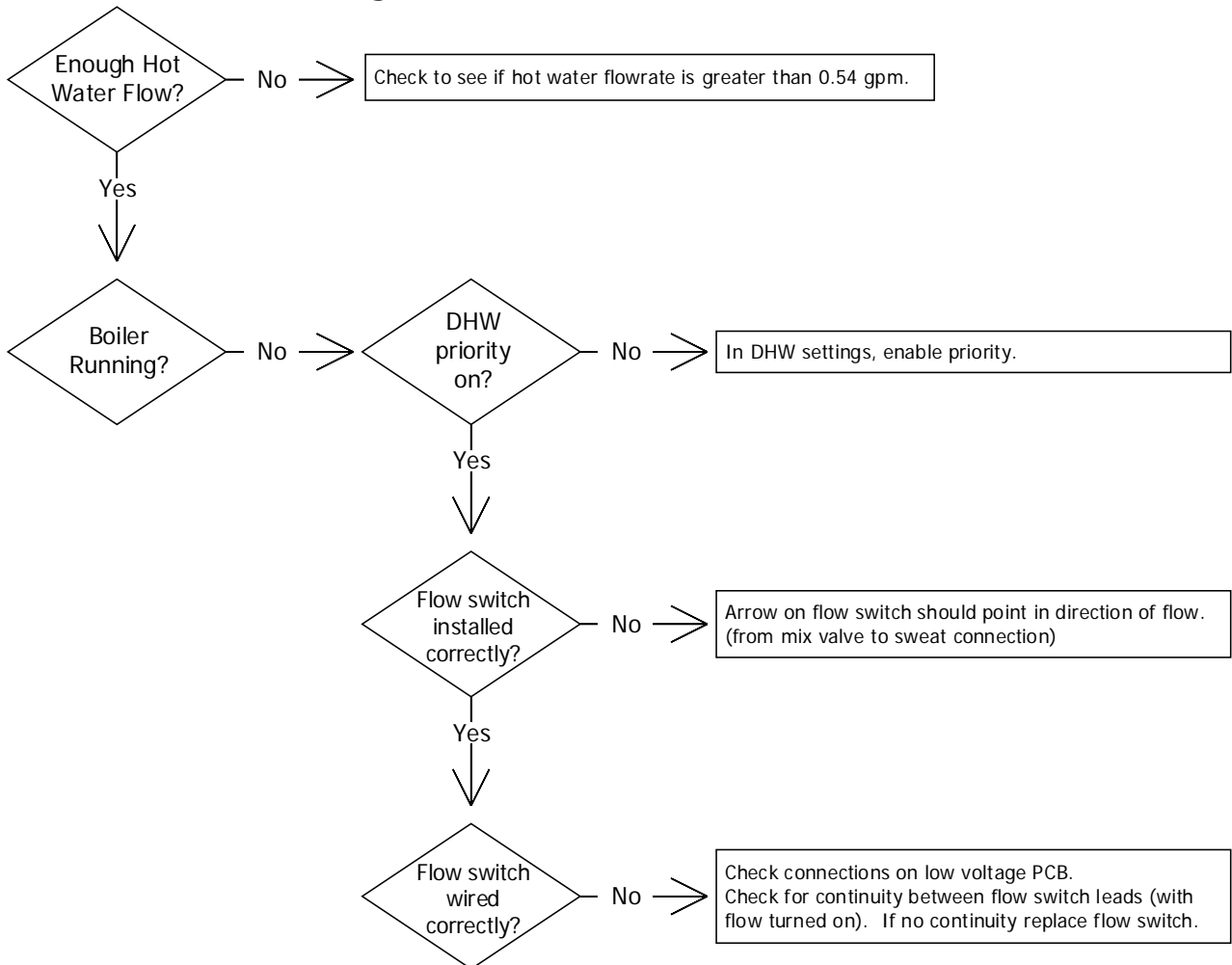


XV– Jacket and Front Panel Assembly

39. Remove five #8 jacket screws from bottom sides of boiler.
40. Align and re-install the five screws to attach the Combi jacket to boiler. If holes are stripped, replace old screws with new #10 screws provided.

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XVI– Troubleshooting



Central Heat System: Systems that have varying flow rates or systems requiring high water temperatures may require additional adjustments.

Method 1: Increase central heat set point. Reference Phantom Boiler Operating Instructions.

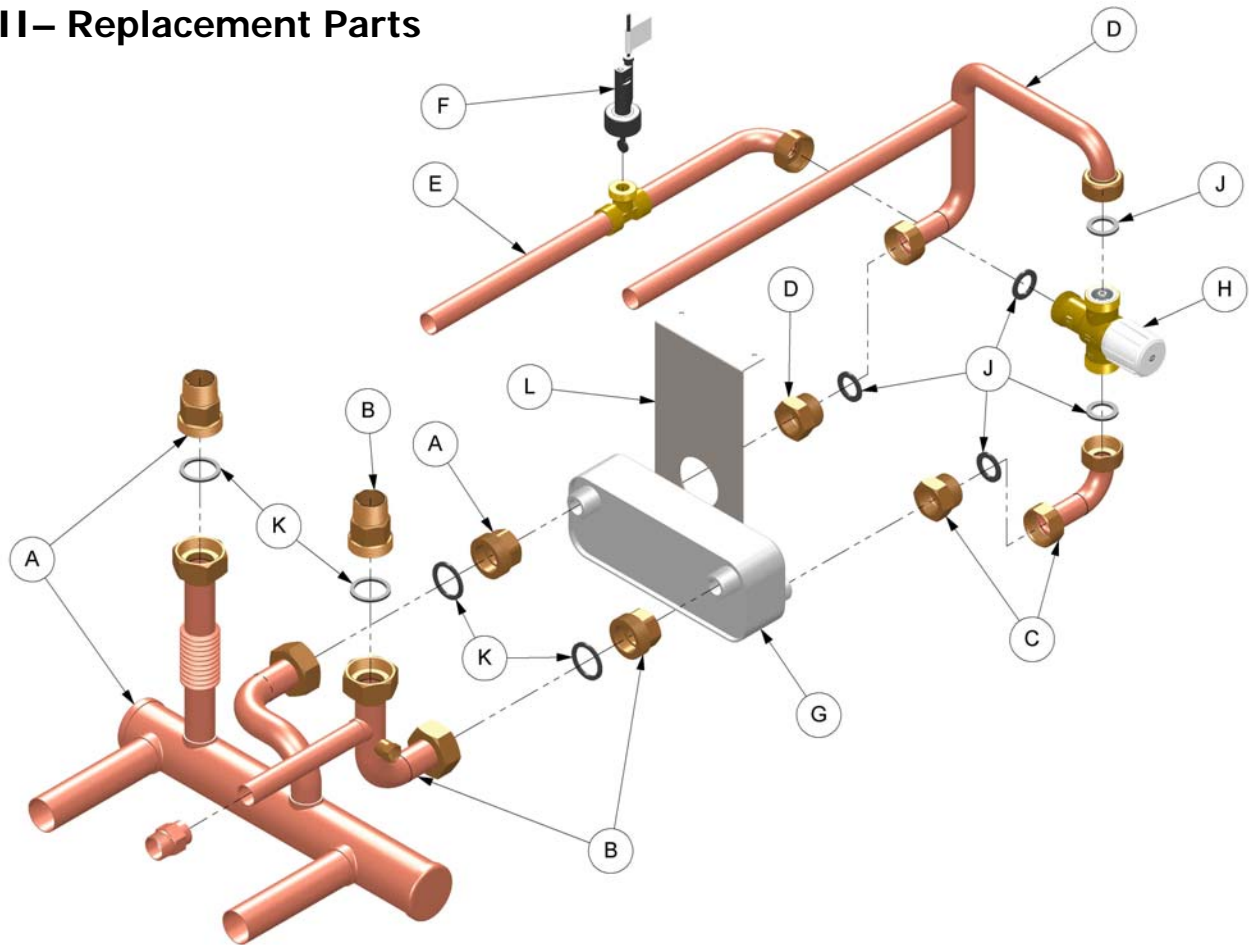
Method 2: Add a header sensor (Honeywell 32003971-003), allowing water temperature being sent to radiation to be more accurately controlled. Header sensor should be located on outlet pipe of primary/secondary header (well mounted as opposed to surface mounting, is highly recommended). Reference Wiring section of Phantom Boiler Installation Instructions.

XVII– Service, Maintenance and Inspection

- Monthly- Inspect all water and gas lines for leaks. Contact technician for service.
- Annual– Use thermometer to verify proper mixing valve operation.
- Annual– **CAUTION! Follow boiler shut down procedure in the Phantom Boiler Installation Instructions before cleaning.** Flush DHW loop to remove scaling. Vinegar can be used to remove scaling.
- Periodic– Consult mixing valve manual for maintenance instructions.

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XVIII– Replacement Parts



Replacement Parts List		Replacement P/N
A	Primary/Secondary Header Kit (includes 1-1/4" gaskets)	106484-01
B	Boiler Supply/SRV Kit (includes 1-1/4" gaskets)	106485-01
C	Hot water inlet pipe Kit (includes 1" gaskets)	106482-01
D	Cold water inlet pipe Kit (includes 1" gaskets)	106483-01
E	DHW outlet pipe Kit (includes 1" gasket)	106486-01
F	Flow switch	106343-01
G	Flat plate heat exchanger	106487-01
H	Thermostatic mixing valve	106342-01
J,K	Gasket Kit (includes 1" gaskets and 1-1/4" gaskets)	106488-01
L	Support Bracket	106489-01
	Front Panel Kit (not shown)	106525-01
	Jacket Wrapper Kit (not shown)	106524-01
	Boiler Safety Relief Valve (supplied w/ boiler)	95-040
	T & P Gauge (supplied w/ boiler)	95-038

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Manufacturer of Hydronic Heating Products
P.O. Box 14818 3633 I. Street
Philadelphia, PA 19134
www.crownboiler.com

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