

SG Pro Series Boiler

SG/3 - SG/7

Distributed By:

QHT

QUINCY HYDRONIC TECHNOLOGY, INC.

3560 LAFAYETTE RD

Please Read Instructions Carefully

Save for Future Reference

WARNING

If the information in this manual is not followed exactly, a fire explosion may result causing property damage, personal injury or loss of life.

DANGER

WHAT TO DO IF YOU SMELL GAS

- Do not try to light any appliance
- Do not touch any electric switch; do not use any phone in your building
- Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions.
- If you can not reach your gas supplier call the fire department

Installation and service must be performed by a qualified installer, service agency or the gas supplier.



Dear Customer:

Thank you for buying a BIASI SG boiler.

The BIASI SG Pro is a cast iron, oil or gas fired hot water boiler, using the famous 3-pass design. The boiler is light, compact, simple, rugged and engineered for maximum home heating efficiency.

We realize that it is not possible to answer all questions about the SG Pro-series boiler in this manual. Reading this installation manual does not make the reader an expert in all aspects of installation and operation, and does not replace the need for a qualified, licensed heating contractor. We urge you to contact your installing contractor or distributor if you are in question about any aspect of your boiler's performance. Our main concern is that you are satisfied with your boiler and its performance. **We require that your contractor complete efficiency tests using instruments.**

The controls and accessories listed in this manual are intended to serve as guidelines rather than specific recommendations. We realize that other makes and models of such devices are available and can be used as successfully as those we specify. The installing contractor is the best judge of a system's specific requirements, as well as the local availability of certain makes and models of controls and accessories. The preceding does not apply, however, to the equipment that comes with every boiler, such as the overheat control (Hydrolevel 3250) and pressure relief valve. **The installation of the specific devices supplied with every boiler is absolutely necessary to the safe operation of the boiler and protection of the heating system.**

All SG Pro-series boilers are built in accordance with the ASME boiler and pressure vessel code, and bear the "H" stamp. The BIASI SG Pro boiler has been tested to CSA standard 4.9.

This BIASI SG Pro boiler has a limited lifetime warranty (refer to back of manual), a copy of which is provided with the boiler. Please be sure to return the warranty registration card or register online at www.qhtinc.com/support/online-warranty-registration. The warranty will be void without your boiler's serial numbers (located on the plate on the leg of the boiler), date of installation and the name of your installer being on record in our files.

Thank you for purchasing our BIASI SG Pro series boiler. If you have questions or comments, please don't hesitate to contact us immediately. Our goal is 100% customer satisfaction.

QHT inc.

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This installation manual is for the basic installation of a SG Pro series boiler for atmospheric venting for oil and gas. **If you are installing a direct vent system or please refer to its addendum in conjunction with this manual to insure the proper installation of the boiler.**

IMPORTANT INFORMATION

Please read this page carefully.

- **ALL BOILERS MUST BE INSTALLED IN ACCORDANCE WITH NATIONAL, STATE AND LOCAL PLUMBING, HEATING AND ELECTRICAL CODES AND ORDINANCES, AS WELL AS THE REGULATIONS OF THE SERVING ELECTRICAL, WATER AND GAS UTILITIES.**
- **All systems should be designed by competent contractors, and only persons knowledgeable in the layout and installation of heating systems should attempt the installation of any boiler. It is the responsibility of the installing contractor to see that all controls are correctly installed and operating properly when the installation is completed.**
- **Do not burn volatile garbage, gasoline, naphtha or other flammable liquids other than No. 2 fuel oil. All flammable liquids (especially gasoline), chemicals, rags, paper, wood scraps, debris, etc., should be kept away from the boiler at all times. Keep the boiler area clean and free of all fire hazards.**

Codes and Regulations:

Installation of the boiler, burner, oil tank and related equipment must conform to national, state and local regulating agencies and codes applicable to the installation of the equipment. In the absence of local requirements, the following codes apply:

- A. ANSI/NFPA - #31 Installation of Oil Burning Equipment
- B. ANSI/NFPA - #70 National Electric Code
- C. ANSI/NFPA - #211 Chimneys and Vents
- D. ANSI/NFPA - #Z223.1 National Fuel Gas Code
- E. ANSI/NFPA - Domestic Gas Conversion Burner

National Fire Protection Association (NFPA)

Battery March Park

Quincy, Massachusetts, 02269

<http://www.nfpa.org>

American Gas Association (AGA)

Pleasant Valley Road

Cleveland, OH 44134

<http://www.aga.org>

WARNING

Any appliance that burns natural gas, propane gas, fuel oil, wood or coal is capable of producing carbon monoxide (CO). Carbon Monoxide (CO) is a gas which is odorless, colorless and tasteless but is very toxic. CO is lighter than air and thus may travel throughout the building.

BRIEF EXPOSURE TO HIGH CONCENTRATIONS OF CO, OR PROLONGED EXPOSURE TO LESSER AMOUNTS OF CO MAY RESULT IN CARBON MONOXIDE POISONING. EXPOSURE CAN BE FATAL AND EXPOSURE TO HIGH CONCENTRATIONS MAY RESULT IN THE SUDDEN ONSET OF SYMPTOMS INCLUDING UNCONSCIOUSNESS.

Symptoms of CO poisoning include the following:

dizziness	vision problems	shortness of breath
headache	loss of muscle control	unclear thinking
nausea	weakness	unconsciousness

The symptoms of CO poisoning are often confused with those of influenza, and the highest incidence of poisoning occurs at the onset of cold weather or during flu season. A victim may not experience any symptoms, only one symptom, or a few symptoms. **Suspect the presence of carbon monoxide if symptoms tend to disappear when you leave your home.**

The following signs may indicate the presence of carbon monoxide:

- * Hot gasses from appliance, venting system pipes or chimney, escaping into the living space.
- * Flames coming out around the appliance.
- * Yellow colored flames in the appliance.
- * Stale or smelly air.
- * The presence of soot or carbon in or around the appliance.
- * Very high unexplained humidity inside the building.

If any of the symptoms of CO occur, or if any of the signs of carbon monoxide are present, **VACATE THE PREMISES IMMEDIATELY AND CONTACT A QUALIFIED HEATING SERVICE COMPANY OR THE GAS COMPANY OR THE FIRE DEPARTMENT.**

ONLY QUALIFIED, LICENSED SERVICE CONTRACTORS SHOULD PERFORM WORK ON YOUR BIASI SG PRO SERIES BOILER.

1. General Information

The BIASI SG Pro-series boilers are wet base design, sectional, cast-iron boilers for forced hot water heating systems. The boilers are shipped pre-assembled from the factory in lengths from three to seven sections. They are designed for firing with oil or gas power burners, which are packed separately along with the jacket and controls for shipping purposes.

When the boiler is received, check the contents to ensure that there is no shortage or damage to any part of the boiler system. With every boiler you should receive a boiler block, jacket, trim kit and a burner (oil or gas).

Trim Kit Components-

- | | |
|--|------------------------------------|
| 1 - Control panel with temperature and pressure gauges and Hydrostat touch panel limit control | 1 - 3/4" 90° Elbow |
| 1 - Immersion well | 1 - 12"x12" Cera-fiber Blanket |
| 1 - 30 PSI pressure relief valve | 1- Boiler Rating Label |
| 1 -3/4" Boiler drain | 1- 48" Hydrolevel Sensor |
| 1 - 3/4" X 3" Nipple | 1- Double acting barometric damper |

USE ONLY THE LISTED BOILER SYSTEM COMPONENTS AND SPECIFIED OIL AND GAS BURNER COMPONENTS SUPPLIED WITH THE BIASI SG BOILER.

Boiler Model	Heating Capacity	Gross Input Burner Capacity		Net Output	Efficiency	Water Content	Length (L)		Weight
		GPH	MBH				NET MBH	%	
SG-3	109	.91	125.0	94.6	86.9	7.7	21.8	341	
SG-4	147	1.22	168.0	127.1	86.9	9.6	26.9	418	
SG-5	183	1.52	210.0	158.9	86.8	11.3	32.1	506	
SG-6	220	1.83	252.5	191.0	86.8	13.1	37.2	605	
SG-7	257	2.14	295.0	223.2	86.8	14.9	42.3	704	
Maximum Water Working Pressure 50 psi					Maximum Relief Valve is 50 psi at 500 MBH				

2. Boiler Block Assembly

All SG series boilers are shipped from the factory in assembled boiler blocks. If the block needs to be split into sections for ease of delivery, please read the following:

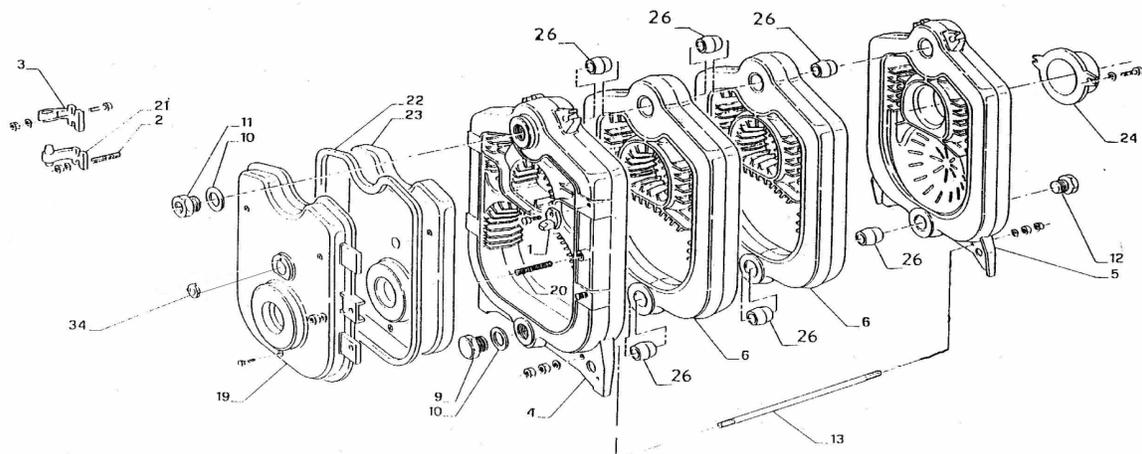
To assemble split blocks, move sections into parallel and facing each other. Sections may be slid along boards placed underneath the sections. Inspect nipple ports for damage or burrs. Remove any burrs by scraping the port very lightly. Wipe the push nipples and nipple ports with a clean cloth. Apply a film of sealing compound to both the nipple and port. Install the nipple in the port and then seat it by hitting with a hammer cushioned with a block of wood. Apply boiler mastic to one section only and slide sections together. Install the four draw rods and draw the sections together evenly (measure with ruler or tape measure). Draw the sections together until sections make iron-to-iron contact at a point around the top and bottom ports of each section.

DO NOT OVER TIGHTEN DRAW RODS

After assembly of boiler block, seal all joints with boiler gasket and remove boards. NOTE: When cutting off excess length of draw rods, allow enough length to install boiler jacket on the draw rods.

BIASI SG-Series Components & Parts

2) Door Alignment Pin	9) Lower Front Bushing
21) Hinge Stud, Nut and Washer	10) Front Tapping Gasket
3) Upper Hinge Element	11) Upper Front Bushing
19) SG Front Block Section	12) Lower Rear Bushing
5) SG Rear Block Section	13) Draw Rod
6) SG Intermediate Block Section	19) SG Door



3. Boiler Location

The following are the minimum clearance to construction or combustible materials:

1. 9" from the top, sides, and rear of the boiler.
2. 18" from the flue pipe in any direction.
3. 24" inches from the front of the boiler.

DANGER

The boiler must be located on a non-combustible floor. A smooth, level concrete floor is recommended. Locate the boiler as close as possible to the chimney. The length of the chimney connector may not exceed a distance of chimney height less ten feet. If boiler is installed on combustible flooring, consult local authorities for proper method of covering floor. The boiler must not be installed on carpeting.

Caution: Do not store or use flammable materials, chemicals or flammable liquids, especially gasoline, in the vicinity of this heating appliance.

If the boiler is to be installed in "direct vent" configuration, please refer to the QHT Direct Vent Addendum supplied with the Direct Vent Kit.

PROVISIONS FOR COMBUSTION AIR AND VENTILATION AIR MUST BE IN ACCORDANCE WITH SECTION 5.3, AIR FOR COMBUSTION AND VENTILATION, OF THE NATIONAL FUEL GAS CODE, ANSIZ223.1, OR APPLICABLE PROVISIONS OF THE LOCAL BUILDING CODES. **DO NOT INSTALL THE BOILER UNTIL PROPER COMBUSTION AIR HAS BEEN ARRANGED.**

WARNING

Boiler is certified as an indoor appliance. Do not install boiler outdoors or locate where it will be exposed to freezing temperatures

WARNING

Biasi SG Pro Boiler is NOT listed for use in Mobile Homes

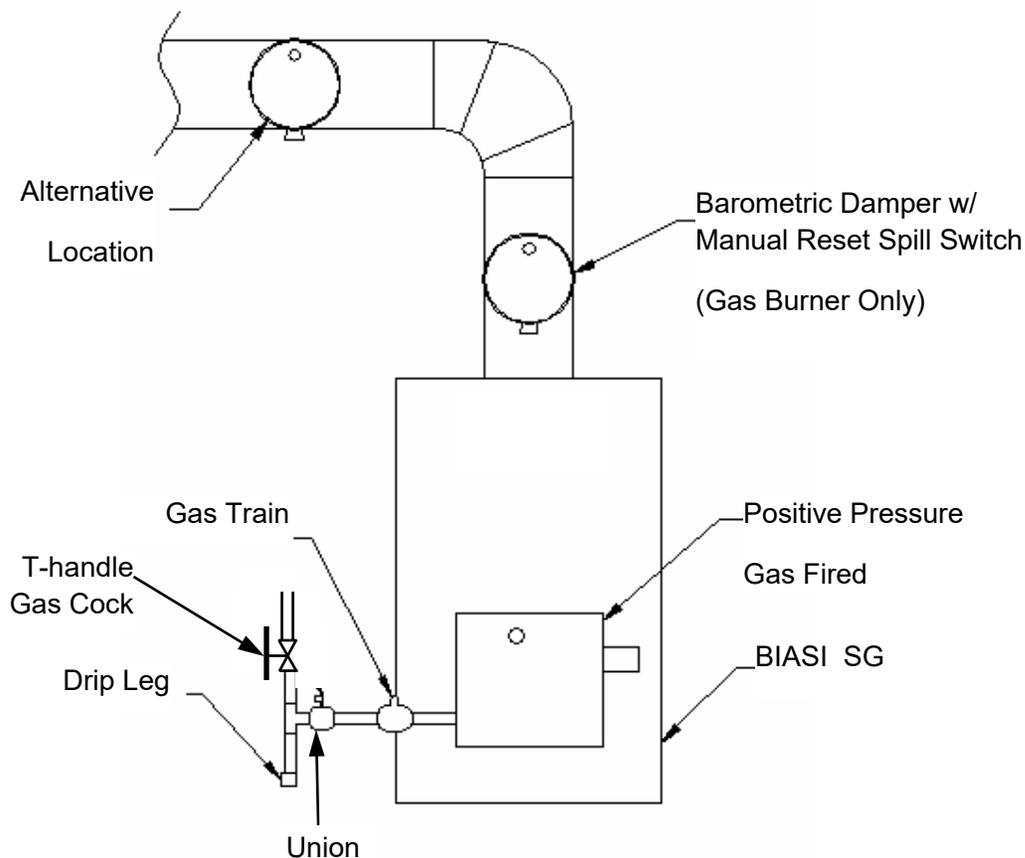
4.1 Installation of Boiler Trim Components

Trim Kit Components:

1 - Control panel with temperature and pressure gauges and Hydrolevel Touch Panel control	1 - $\frac{3}{4}$ " X 3" Nipple
1 - Immersion well	1 - $\frac{3}{4}$ " 90° Elbow
1 - 30 PSI pressure relief valve	1 - 48" Hydrolevel Sensor
1 - $\frac{3}{4}$ " Boiler drain	1 - Boiler Rating Label
1 - 12"x12" Cera-fiber blanket	1 - Double Acting Barometric Damper with Manual Reset Spill Switch (Gas systems only)

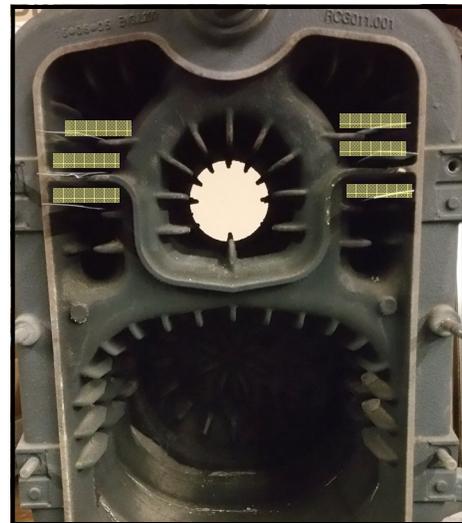
USE ONLY THE LISTED BOILER SYSTEM COMPONENTS AND SPECIFIED OIL AND GAS BURNER COMPONENTS SUPPLIED WITH THE BIASI SG PRO BOILER.

Please refer to figures below for Barometric Damper location (gas burners only) and to the right for the proper location of the trim components.



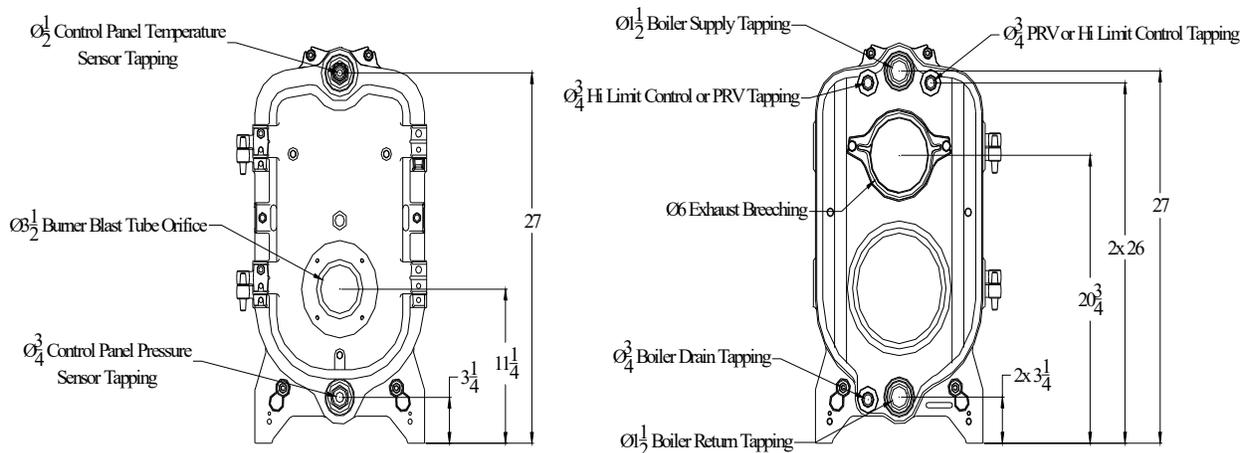
4.1 Installation of Boiler Trim Components Cont.

1. Install the high limit control sensor in upper left or right rear tapping using 3/4" immersion well supplied. All tapings and joints should be sealed with piping compound. The high limit control should be set to the desired temperature by the installer. Install Pressure Relief Valve in opposite upper rear tapping using 3" nipple and 3/4" elbow supplied.
2. Install 3/4" boiler drain in lower rear tapping.
3. Install remote pressure sensor from the control panel in lower front tapping of the boiler.
4. Install remote temperature probe from control panel into immersion well in the upper front tapping.
5. Run Hydrolevel sensor wire from Immersion Well at rear of boiler to control panel.
6. Remove the front door and install the baffles supplied in the SG trim kit. One baffle should be installed in each of the locations highlighted in the picture to the right. Remove hinge bag from chamber. Do not replace the door so that you will be able to install the hinge on the boiler, See (4.2).
7. Place Cera-fiber pad on chamber floor at front of block.



Boiler Tapping Diagram:

All dimensions are in inches:



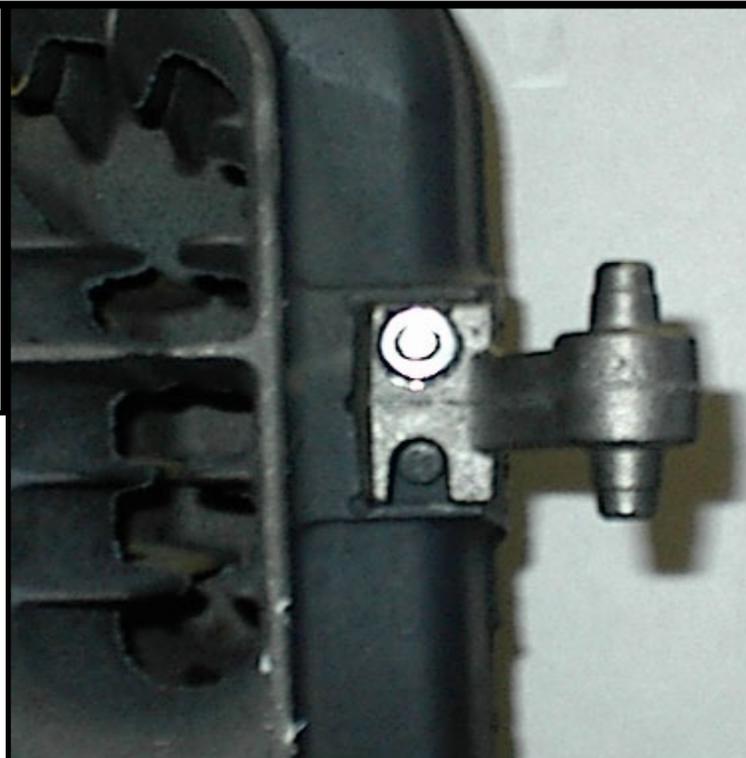
4.2 Installation of Boiler Door Hinge

1. Remove the boiler door by unscrewing the two nuts holding the door onto the boiler
2. Take the boiler hinge elements (it has the pins on the ends) and place them on the upper and lower studs of the side of the boiler that you want the door to swing towards. Install them such that the stud comes through the upper “U”-section and the pin on the boiler block is under the lower “U” section of the hinge. (see Figure 4.1 below) Tighten each with a washer and a nut.
3. Next place the door catch under the top post of the side opposite that on which the hinges are mounted. This is mounted in a similar manner to the hinges. Tighten with a washer and a nut.
4. Place the bolts with a washer on each through the back of the ears on the door in the upper and lower holes on the same side as the hinges are mounted on.
5. Place the upper hinge element onto the bolt and tighten with a washer and a nut.
6. Place the doors hinges onto the pins of the hinge on the boiler.
7. The installation of the hinge is complete. Now, close the door and put the nuts and washers back onto the door to keep shut.

**NOTE: HINGES ARE PACKED IN COMBUSTION CHAMBER.
Remove prior to firing appliance.**

SG Hinge Kit Contents:

- 5—Nuts
- 7—Washers
- 2—Bolts
- 2—Lower hinge elements
- 2—Upper hinge elements
- 1—Door Catch



5. Piping the Boiler

All piping must conform to state and local codes. Page 7 shows the location and size of the boiler tapings. Be sure to allow enough room to clear the casing by installing sufficient sized nipples. It is recommended to install unions and shutoff valves at the inlet and outlet of the boiler, so it may be easily isolated for service.

Install the provided pressure relief valve so the discharge is piped directly to a drain, if possible. If not, the discharge should be piped to the floor. In either case, the discharge pipe should be of the same diameter as the outlet of the relief valve, with no valves or obstructions to impede overflow from the boiler.

For **Canadian** installations, it is required to install a low water cut off if the boiler is installed above the level of radiation. Even if the boiler is installed below the level of radiation it is strongly recommended that a low water cut off be installed.

Install manual and/or automatic air venting devices at the high points in the system to eliminate trapped air. The weight of all piping should be supported by suitable hangars and floor stands, not by the boiler's purging/expansion station. Clearance for hot water pipes are 1 inch to combustibles.

It is recommended that the make-up water line have a backflow preventer and a pressure-reducing valve to reduce line pressure to 10 to 15 psi installed adjacent to the boiler.

In the case of a gas installation, the boiler should be installed such that the gas ignition system components are protected from water (dripping, spraying, etc.) during appliance operation and service (circulator replacement, condensate trap, control replacement, etc.).

If the boiler is to be used in conjunction with a refrigeration system, it must be piped in parallel with refrigeration system with the appropriate valves to ensure the chilled medium does not enter the boiler. Also if the boiler is connected to heating coils in an air handling system, where the coil could be exposed to cold air circulation. The boiler must have flow control valves or other automatic means to prevent gravity circulation of the boiler water during the cooling cycle.

NOTE: If the heating system is to be filled with antifreeze, use only formulations expressly made for hydronic heating systems (such as propylene glycol). **Do not use automotive types of antifreeze (ethylene glycol).** Use of antifreeze will alter system output and characteristics. Consult a factory representative for details or assistance.

SAFETY RELIEF VALVE

1. The safety relief valve should be piped into one of the two upper tapings in the rear of the boiler
2. The relief valve should be piped in with a doping compound using the supplied hardware in the trim kit
3. Pipe the discharge of the safety relief valve to per local codes. Provide piping that is the equal to or larger than the safety relief valve outlet diameter.

6. Intake Venting

1. Be certain adequate air is available for combustion and ventilation.

a.) Boiler located in unconfined space:

Installation in large areas, such as basements can usually be assumed to provide sufficient air. An unconfined space is defined as having an area of greater than 50 square feet for every 1000 Btuh of input.

b.) Boiler located in confined space:

If all air for combustion and ventilation is to come within the building: Two (2) openings shall be provided with one (1) opening commencing within 12 inches of the top and one (1) opening commencing within 12 inches of the bottom of the enclosure. These openings shall not be located closer than 3 inches from either the top or bottom of the enclosure and shall be open to areas connecting freely with the outdoors. The area of each opening shall not be less than one square inch per 1000 BTU/HR. of total input rating of all appliances within the enclosure; with a minimum of 100 square inches for each opening.

If all the air for combustion and ventilation is to come from outside the building; two (2) openings shall be provided with one opening commencing within 12 inches of the top and an opening commencing within 12 inches of the bottom of the enclosure. These openings shall not be located closer than 3 inches from either the top or bottom of the enclosure, and shall connect directly or by ducts with the outdoors. The area of each opening shall be equal to one square inch per 2000 BTU/HR of total input rating. If ducts are used to convey the air, vertical ducts require areas of one square inch per 4000 BTU/hr horizontal ducts require one square inch per 2000 BTU/hr. Ducts shall have the same cross sectional area as the full area of the openings to which they connect.

The upper opening is essential for maintenance of proper circulation of air with the boiler and reasonable ambient temperature in order to maintain proper control temperatures. When a duct is used for ventilation, check for louver free net area and correct for screen resistance to ensure that the ventilation area has been satisfied. **DO NOT INSTALL THE BOILER UNTIL PROPER COMBUSTION AIR HAS BEEN ARRANGED.**

c.) Boiler located in a room under negative pressure:

If the boiler is to be installed within a home where the operation of exhaust fans, attic fans, kitchen ventilation systems, clothes dryers or fireplaces may create severe negative vent pressures causing unsatisfactory combustion and venting, special provisions should be made for additional make-up air to supply the other air requirements. If building is of tight construction, combustion air requirements may not be met and combustion air ducts from outside may be necessary. Please refer to NFPA No. 31.

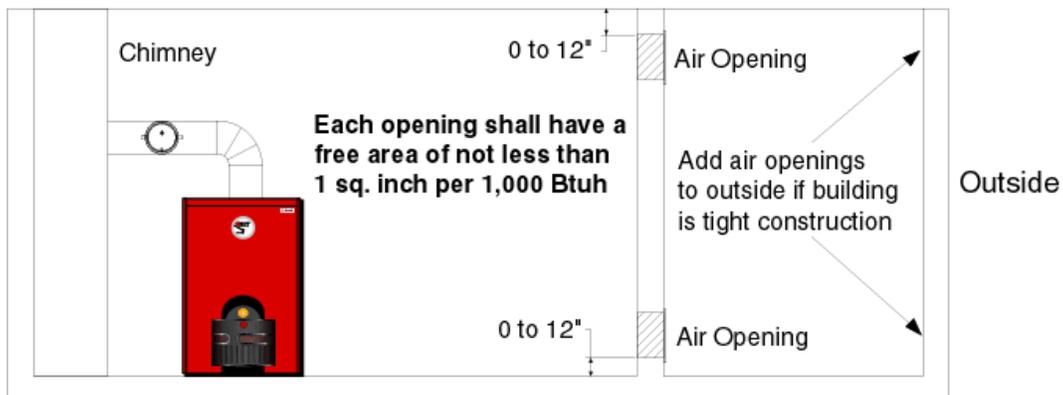
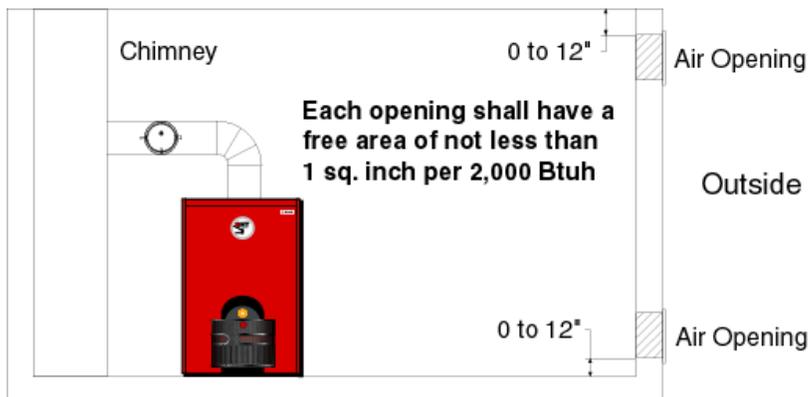
6. Intake Venting Cont.

Tight Construction (as defined by ANSI Z223.1):

1. Walls and ceilings exposed to the outside atmosphere have a continuous water vapor retarder with a rating of 1 perm or less with openings sealed with gaskets, etc..
2. Weather-stripping has been added on open able windows and doors, and...
3. Caulking or sealants are applied to areas such as joints around windows and door frames, between sole plates and floors, between wall-ceiling joints, between wall panels, at penetrations for plumbing, electrical, and gas lines, and in other openings.

If the building is of tight construction, air openings must be provided from the outside, with appropriate sizing depending on amount of Btu/h as shown in pictures.

The area that the boiler is in must never be under a negative pressure, even if the appliance is installed as direct vent. Always provide air openings sized not only to the dimensions required for the firing rate of all appliances, but also to handle the air movement rate of the exhaust fans or air movers using air from the building or space.



7. Exhaust Venting

The SG boiler is a high efficiency unit that requires proper venting. The boiler must be vented to the outdoors by means of a tile lined masonry or an approved pre-fabricated chimney of the size and height recommended by the vent manufacturer or by a listed "power venting" unit which provides draft by mechanical venting. In many installations, particularly older interior and most exterior chimneys, a corrosion resistant liner should be installed. Please consult liner manufacturer for the appropriate chimney liner.

The chimney discharge opening must be located at least 24 inches above any part of the building structure within 4 feet of the chimney. Be sure the chimney and smoke pipe don't become obstructed by squirrels, bird nests, soot buildup, chimney liner deterioration, etc.. If using a "power venter" system, it is suggested that it should be installed on the leeward side of the house. (Please consult with manufacturer of "power venter" for requirements concerning clearances from combustibles and distances from doors and windows.) The "venter" must be installed by a licensed burner mechanic and done in accordance with local codes. This is a very low stack temperature boiler (350F gross temp.) so caution should be used when connecting to an outside built chimney. Should you have concern that the flue gases could condense, then you should consider lining the chimney or using a listed, "power venting" or "direct venting unit". If "power venting" is used to discharge flue gases, then the power vent unit should be equipped with a postpurge control such as a delay-off, timing control to prevent problems with fogging and nozzle post drip.

The determining connection from the boiler to the chimney should be as short as possible, with a minimum number of elbows. The equivalent length of the chimney connector may not exceed a distance of chimney height less ten feet. The vent pipe must have a vertical rise of at least 1/4 inch per foot of horizontal run. The vent pipe must be of the same diameter as the flue outlet on the boiler. The chimney connector should have a minimum thickness of 24 gauge, be corrosion resistant (galvanized) steel, assembled with a minimum of three (3) sheet-metal screws in each joint. It is recommended to install 12-18" of straight breeching prior to the first elbow to reduce turbulence noise caused by combustion. In some houses, a barometric draft control isn't required as the SG is designed to be pressure-fired, however in high draft situations which exceed the flue gas resistance through the boiler, a barometric draft control is recommended. The over fire draft should be between 0 and .06 inches of water column. The draft at the breech should be enough to overcome the over fire

7.1 Common Exhaust Venting

Common vent exhaust:

If this boiler is replacing one that was part of a common venting system, it is likely that the vent is too large to vent the appliances still attached to it. To prevent this, at the time of removal, the following steps shall be followed with each appliance remaining connected to the common venting system. Place each unit in operation, while the other appliances remaining connected to the common venting system are not in operation.

1. Seal any unused openings in the common venting system.
2. Visually inspect the venting system for proper size and horizontal pitch and determine there is no blockage or restriction, leakage, corrosion and other deficiencies which could cause an unsafe condition.

7.1 Common Exhaust Venting Cont.

3. Insofar as practical, close all building doors and windows and all doors between the space in which the appliance remaining connected to the common venting system are located and other spaces of the building . Turn on any appliance not connected to the common vent system. Turn on all exhaust fans except for summer exhaust fans. Close the fireplace damper if applicable.
4. Place in operation the appliance being inspected. Follow the lighting instructions. Adjust thermostat so appliance will operate continuously.
5. Test for spillage at the barometric damper after 5 minutes of main burner operation. Use the flame of a match or candle, or smoke from a cigarette, cigar or pipe.
6. After it has been determined that each appliance remaining connected to the common venting system property vents when tested as outlined above, return doors, windows, exhaust fans, fireplace dampers and any other gas-burning appliance to their previous condition of use.
7. Any improper operation of the common venting system should be corrected so the installation conforms with the National fuel Gas Code, ANSI Z223.1 and/or CAN/CGA B149, Installation Codes. When resizing any portion of the common venting system, the common venting system should be resized to approach the minimum size as determined using the appropriate tables in Part 11 of the National Fuel Gas Code, ANSI Z223.1, and/or CAN/CGA B149, Installation Codes.

7.2 Blocked Flue Switch: (Canada Only)

1. Pierce a 5/8" hole into the vent pipe near the appliance outlet. Remove one of the securing nuts from the pipe of the safety switch. Tighten the other securing nut onto the pipe as far as possible.
2. Insert the threaded pipe end into the pierced hole, then install the securing nut, then install the securing nut, which was removed in step 1, and tighten securely.
3. Please consult the wiring section of this manual for the wiring of the blocked flue switch.

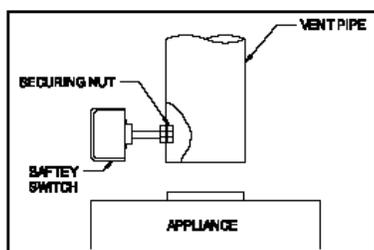


Figure 2

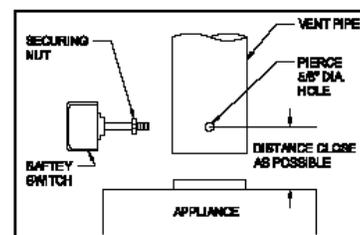


Figure 1

7.2 Gas Venting

For boilers connected to gas vents or chimneys, vent installations shall be in accordance with part 7, Venting of Equipment, of the National Fuel Gas Code, ANSI Z223.1 or Section 7, Venting Systems and Air Supply for Appliances, of the CAN/CGA B149, Installation Codes, or applicable provisions of the local building codes.

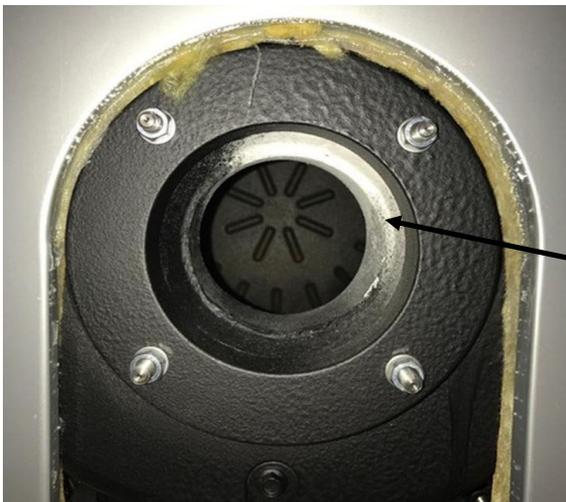
Vent connectors serving appliances vented by natural draft shall not be connected into any portion of mechanical draft systems operating under positive pressure.

8. Oil Burner Setup

Good, reliable operation with a minimum of service, starts with attention to the small details:

1. Setting the nozzle position and electrodes "by the book" using the manufacturer's gauges.
2. Installing a quality micron filter at the burner.
3. Making careful/tight flare connections without couplings on oil suction line.
4. Checking fuel pump pressure.
5. Checking draft at the breeching to insure it is adequate to overcome flue gas resistance.
6. Setting the air band properly with well maintained instruments. A good target is 12% to 12.5%. To achieve the rated efficiency the CO₂ should be set to 12.5% CO₂.
7. Checking for a zero smoke level in the flue pipe.

To ensure proper burner setup, gauges should be used to check things such as the pump pressure, CO₂ levels, etc...



**Refractory must
be trimmed to fit
specific burner**

8.1 Oil Burner Setup

This page is only for boilers using an oil burner. If a gas burner is being used, please refer to page 13 for the proper setup of the burner and gas lines.

BURNER MANUFACTURER Beckett NX		
Boiler Model	SG-3	SG-4
Burner Model	NEC 1202	NEC 1202
Firing Rate	0.91	1.22
Insertion Depth	6"	6"
Nozzle	.75 X 60B	1.00 X 60B
Spray Pattern	B	B
Pump Pressure	145 psi	145 psi
Head Type	9-slot	9-slot
Head Position	2.5	4.5

BURNER MANUFACTURER Carlin					
Boiler Model	SG-3	SG-4	SG-5	SG-6	SG-7
Burner Model	EZ-1	EZ-1	EZ-1	EZ-66	EZ-66
Firing Rate	0.91	1.22	1.52	1.83	2.14
Insertion Depth	3.5"	3.5"	3.5"	3.5"	3.5"
Nozzle	.65 x60	1.00 x 60	1.25 X 60	1.35 x 60	1.50 x 60
Spray Pattern	B	B	B	B	B
Pump Pressure	175 psi	135 psi	140 psi	170 psi	200 psi
Head`	.60/.65	.85/1.00	1.10/1.25	1.5	7
Air Gate	0.9	1.2	1.65	30%	40%

BURNER MANUFACTURER Riello R-40 Series					
Boiler Model	SG-3	SG-4	SG-5	SG-6	SG-7
Burner Model	F-5	F-5	F-5	F-10	F-10
Firing Rate	0.91	1.22	1.52	1.83	2.14
Insertion Depth	5"	5"	5"	4 1/4"	4 1/4"
Nozzle	.75 X 60	1.00 x 60	1.25 X 60	1.50 X 60	1.75 X 45
Spray Pattern	W	W	W	Solid (B)	Solid (B)
Pump Pressure	145 psi				
Turbulator	1	3	4	2	3
Air Gate	2.5	3	4	3.75	4.25

For Carlin and Beckett burners to qualify for Energy Star, it is necessary to install and automated vent damper to prevent off cycle losses.

8.2 Gas Burner Setup

Good, reliable operation with a minimum of service, starts with attention to the small details:

1. Setting electrodes "by the book" using the manufacturer's gauges.
2. Checking gas pressure to the burner and out of the gas valve.
3. Checking draft at the breeching to insure it is adequate to overcome flue gas resistance.
4. Setting the air band properly with well maintained instruments. A good target is 9.0% to 9.5% of (CO₂) for Natural Gas or 10.5% to 11.5% of (CO₂) for Propane.
7. Verify a CO level is less than 200 ppm

This page is only for boilers using a gas burner. If an oil burner is being used, please refer to page 12 for the proper setup of the burner.

Riello		Natural Gas					Propane			
Boiler Model	Burner Model	Input (MBH)	Man. Pres. (W.C.)	Head Setting	Air Gate	Orifice	Man. Pres. (W.C.)	Head Setting	Air Gate	Orifice
SG-3	R200	140	3.5"	2.0	2.25	B5	3.5"	2.0	2.25	B15
SG-4	R200	182	3.5"	3.0	2.75	B6	3.5"	3.0	2.5	B16
SG-5	R400	224	3.5"	1.0	2.0	C3	3.5"	1.0	1.5	C13
SG-6	R400	266	3.5"	2.0	2.5	C4	3.5"	2	2.0	C14
SG-7	R400	315	3.5"	3.0	3.0	C5	3.5"	3	2.4	C15

To determine how much gas is coming into the burner, or to set the gas meter correctly, the following formula can be used.

The chart to the right can be used to determine the flow rate depending upon the time per revolution and the size of the gas meter dial.

Seconds per Revolution	Size of Gas Meter Dial (Cubic Foot)		
	0.5	1	2
20	90	180	360
25	72	144	288
30	60	120	240
35	51	103	206
40	45	90	180
45	40	80	160
50	36	72	144
55	33	65	131
60	30	60	120

$$Ft^3/hr = [3600/(sec. Per rev.)]*(Size of gas meter)$$

9. Gas Line Piping

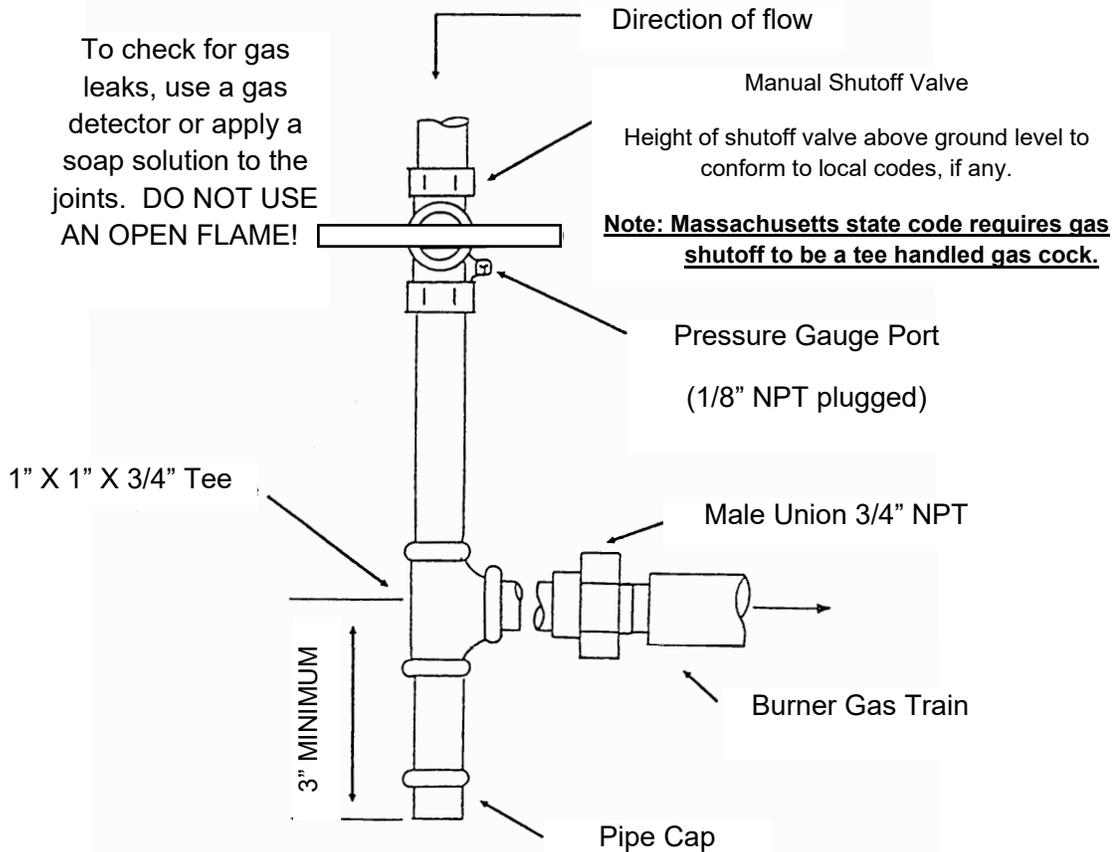
Gas supply piping is to be sized and installed properly in order to provide a supply of gas sufficient to meet the maximum demand without undue loss of pressure between the meter and the boiler. Consult with the **National Fuel Gas Code ANSI Z223.1** for proper sizing of gas piping for various lengths and diameters.

Locate a drop pipe adjacent to, but not in front of the boiler. Locate a tee in the drop pipe at the same elevation as the gas inlet connection to the boiler. Extend the drop line with a nipple towards the floor and cap to form a sediment trap. Install a shut off valve before the tee with sediment trap and a union after the tee before the combination gas valve.

When installing the boiler, make sure a pipe compound resistant to the action of liquefied petroleum is used. Check piping for leaks. Always check leaks with a water and soap solution. **DO NOT USE A FLAME FOR CHECKING GAS LEAKS**

The boiler and its individual shut-off valve must be disconnected from the gas supply piping during any pressure testing of that piping at test pressures in excess of 1/2 psi.

INSTALLATION OF SEDIMENT TRAP AND BURNER SUPPLY LINE



10. Boiler Jacket Assembly

- 1) Install jacket after installing supply and return piping and installing the breech. After hanging the jacket, install the immersion well for the aquastat and the PRV piping.
- 2) Wrap the boiler body (1) with insulation (2) and fasten in place with strap provided. Secure the plastic strap use the white plastic buckles (Fig. 10.1) supplied in the casing box.
- 3) Install the two upper mounting brackets (4) to the upper tie rods using the outer nuts (5) already mounted on tie rods. Make sure the flat surface of the bracket faces out on both brackets fig (Fig. 10.3).
- 4) Attach the two lower mounting brackets (3) to the lower tie rods using the outer nuts (5) already mounted on the tie rods. Make sure the L of the bracket faces away from the boiler legs on the front and back of the boiler (Fig. 10.2).
- 5) Mount side panels (6-7) by sliding slit on bottom of panel onto tab on lower mounting bracket (3) and fasten to top mounting bracket (4) using washers and self-tapping screws (14).
- 6) Insert the control panel (12) between side panels (6-7) open panel to expose wiring and fasten to top mounting bracket (4) through the back of the control panel with the 3/4" screws supplied (13) threading into the mounting bracket (4). Please see page 24 for installation location of sensor fittings and probes.
- 7) Fasten the two rear panels (9-10) to the side panels (6-7) with screws supplied (14).
- 8) Close top of boiler with the cover (8), hooking it to the sides (6-7) in the front and fastening it in the rear with screws (14).
- 9) Attach front panel (11) of the casing by sliding onto tabs located on bottom of the side panels (6-7), and pushing top of front panel till mounting pins engage.

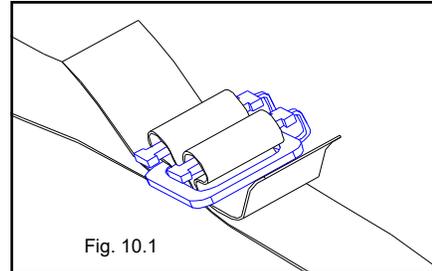
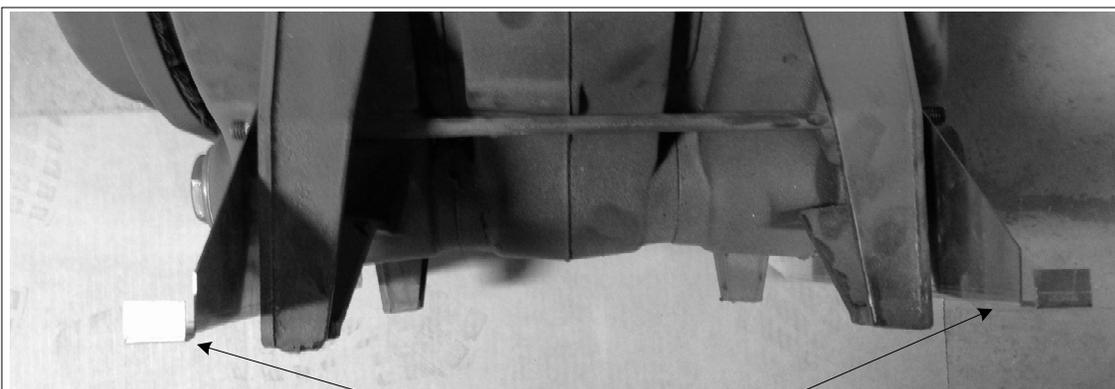


Fig. 10.1

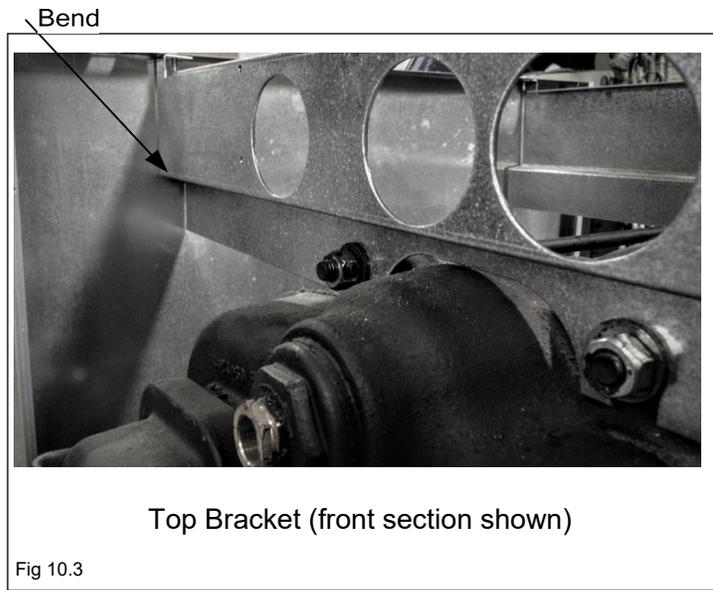


Front Section

Rear Section

Fig 10.2

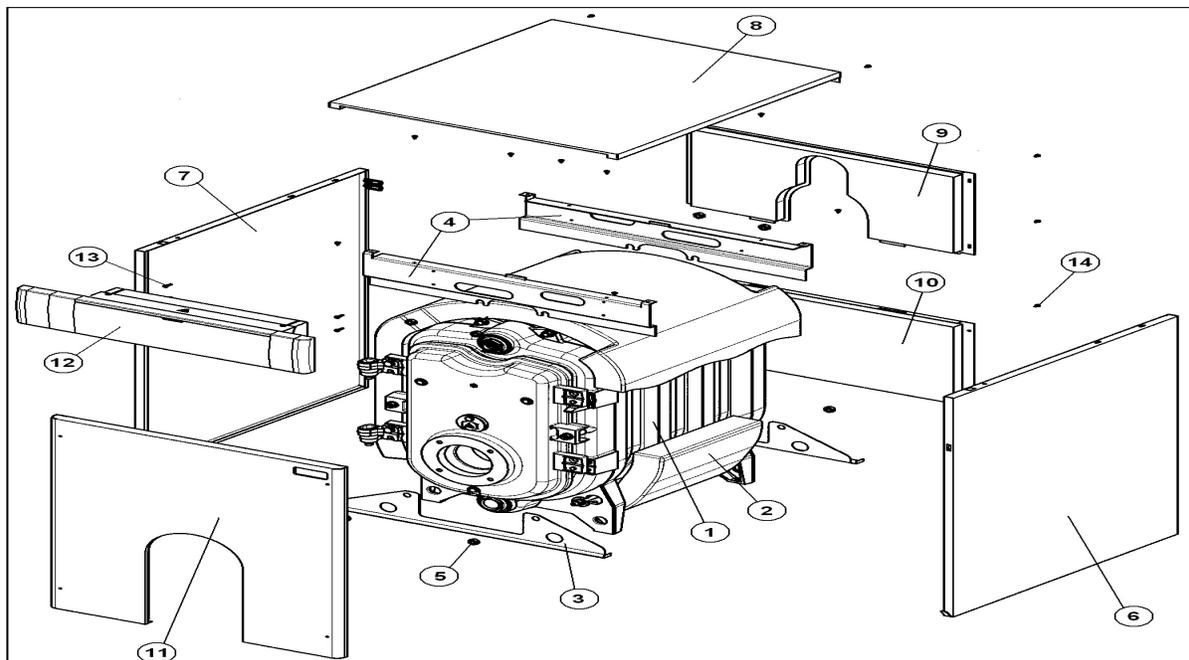
Bracket angle face away from section legs, F and R sections.



Biasi SG — Series Components & Parts

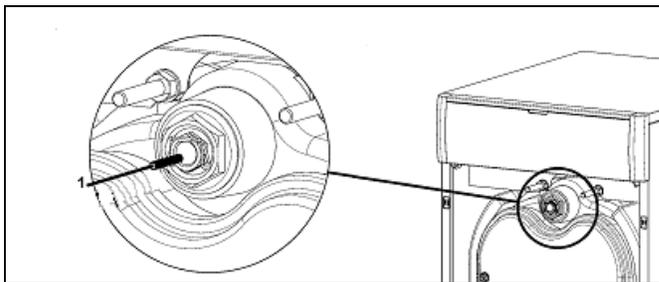
Boiler Jacket Assembly:

- | | |
|----------------------------------|---|
| 1) Boiler Body | 8) Top Jacket Panel |
| 2) Insulation Surrounding Boiler | 9) Top Rear Jacket Panel |
| 3) Lower Mounting Bracket | 10) Bottom Rear Jacket Panel |
| 4) Upper Mounting Bracket | 11) Front Jacket Panel* |
| 5) M10 Nut (mounted on tie rod) | 12) Control Panel |
| 6) RH Side Jacket Panel | 13) Self-tapping screw (min. 3/4" long) |
| 7) LH Side Jacket Panel | 14) Self-tapping screw (min. 1/2" long) |
- * Supplied with attached insulation

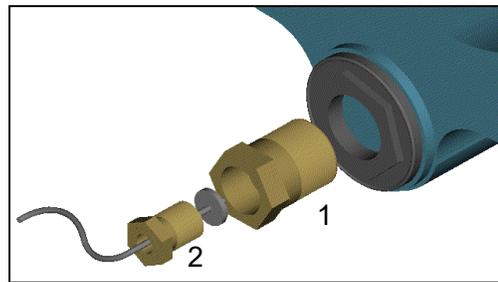


11. Control Panel Sensor installation

1. Install the control panel to the casing bracket as described on the previous page.
2. Insert the temperature gauge probe from the SG control panel into the immersion well all ready installed in the front of the boiler. **Do not install the external high limit probe into the front immersion well.**
3. Remove spring clip from well and reinstall the clip over the capillary lines for the probe.
4. Install pressure adapter (Part #1) into lower tapping on front of boiler. Be sure not to get any sealant on the adapter end of the fitting.
5. Install the capillary fitting (Part #2) into the pressure adapter.



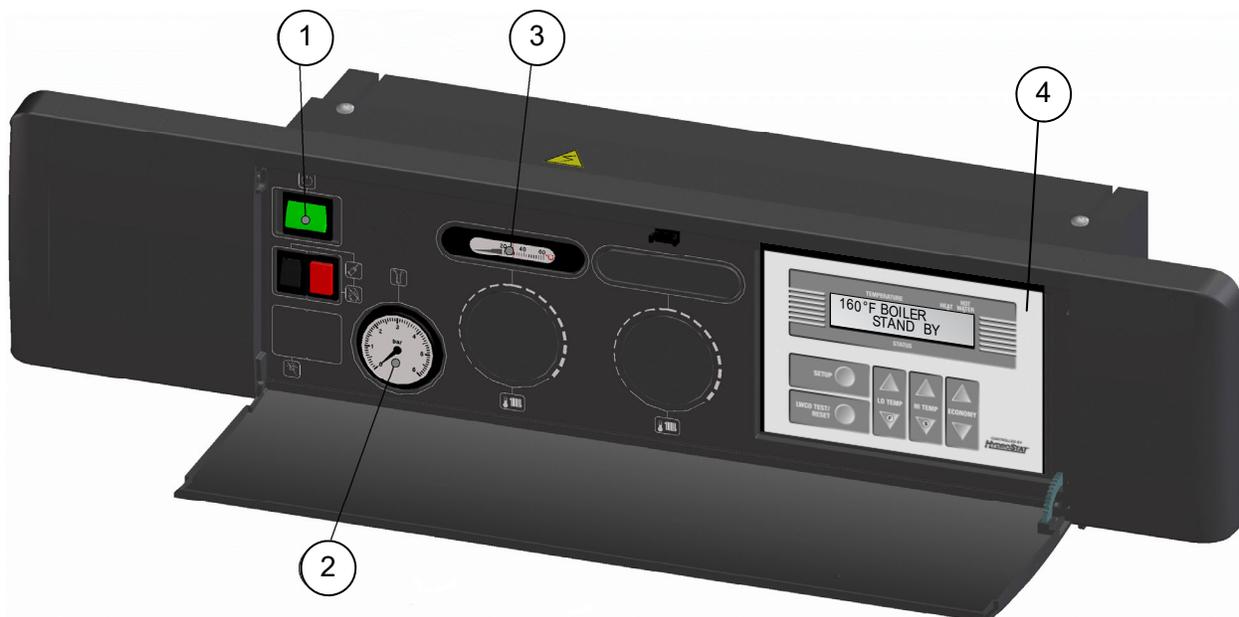
Upper Port of Front Section (temp.)



Lower Port of Front Section (pres.)

11. Control Panel Legend

1. On/Off Switch
2. Pressure Gauge
3. Temperature Gauge
4. Hydrolevel 3250R Limit Control



11.1 Operation of 3250R control

Upon power up, the LCD display shows INITIALIZING, then immediately tests the low water function displaying LOW WATER and flashing. The control then goes into normal operating mode displaying the current status of the boiler.

Setting the HIGH LIMIT

The high limit is factory set at 190°F. To adjust, press the SET UP button. The screen will display **ADJUST SETTINGS**. Then press the **HI TEMP ▲ or ▼** buttons to select the desired high limit. (Setting range: 100°-220°F)

Setting the LOW LIMIT

The low limit is designed to maintain temperature in boilers equipped with tankless coils used for domestic hot water. The low limit is factory set to OFF and should be left that way for the SG boiler. If it is necessary to set a low limit temperature, press the **SET UP** button. The screen will display **ADJUST SETTINGS**. Press the **LO TEMP ▲ or ▼** buttons to select the desired low limit setting. (Setting range: OFF or 110°-200°F). For proper operation, the low temperature limit setting should be at least 10° below the high limit setting.

NOTE: For cold start operation, the low limit must be turned OFF.

ECONOMY FEATURE

The Economy Feature conserves fuel by reducing boiler temperature whenever possible without sacrificing comfort. The Economy Feature is factory set for a 1 zone heating system. To adjust, touch the **SET UP** button. The screen will display **ADJUST SETTINGS**. Referring to the table below, press the **ECONOMY ▲ or ▼** buttons to the number of heating zones in the house. Do not include indirect water heaters in the number of heating zones. If the heating system is unable to supply needed heat to the house, the Economy Feature should be set to a lower number (example: In a three zone house, the Economy Feature should be set at 2 or 1).

SETTING	
OFF	Disables economy function. Will allow boiler to fire until hi-limit temp is reached and re-fire with a 10° subtractive differential.
LO	Provides lowest level of fuel savings. Use this setting only if the house does not stay warm at higher settings.
1	Recommended setting for single zone systems
2	Recommended setting for Two zone systems
3	Recommended setting for Three zone systems
4	Recommended setting for Four zone systems
5	Recommended setting for Five zone systems
HI	Provides highest level of fuel savings

Conversely, if the boiler provides adequate heat, added fuel savings can be achieved by selecting a higher setting (example: 4 or 5). If the heating and indirect water heater signals were not separated when wiring the control, the Economy Feature should be adjusted to OFF to ensure the boiler supplies adequate temperature to heat the indirect tank.

Setting the ZONE/INDIRECT SWITCH

The Zone/Indirect Switch (labeled Z-I) on the control must be set in the I position when the boiler is installed with an indirect water heater. Wiring the indirect water heater properly is important to ensure proper operation of this feature. See WIRING for more information on the Zone/Indirect Switch and wiring.

12.1 Wiring

The electricity to the boiler shall come from a dedicated breaker in the electric service box. A service switch should be mounted on the side of the boiler so the burner technician can service the burner and controls. The electrical wiring should be routed so as not to interfere with normal servicing of the boiler. Wiring done in the field between devices not attached to boiler shall conform with the temperature limitations for type T wire (63F/35C) or other specified wire as applicable when installed in accordance to manufacturer's instructions and wiring diagrams.

If an external electrical source is utilized, the boiler, when installed, must be electrically bonded to ground in accordance with the requirements of the authority having jurisdiction or, in the absence of such requirements, with the National Electrical Code, ANSI/NFPA 70 and/or the Canadian Electrical Code Part 1, CSA C22.1, Electrical Code.

Wiring the control panel

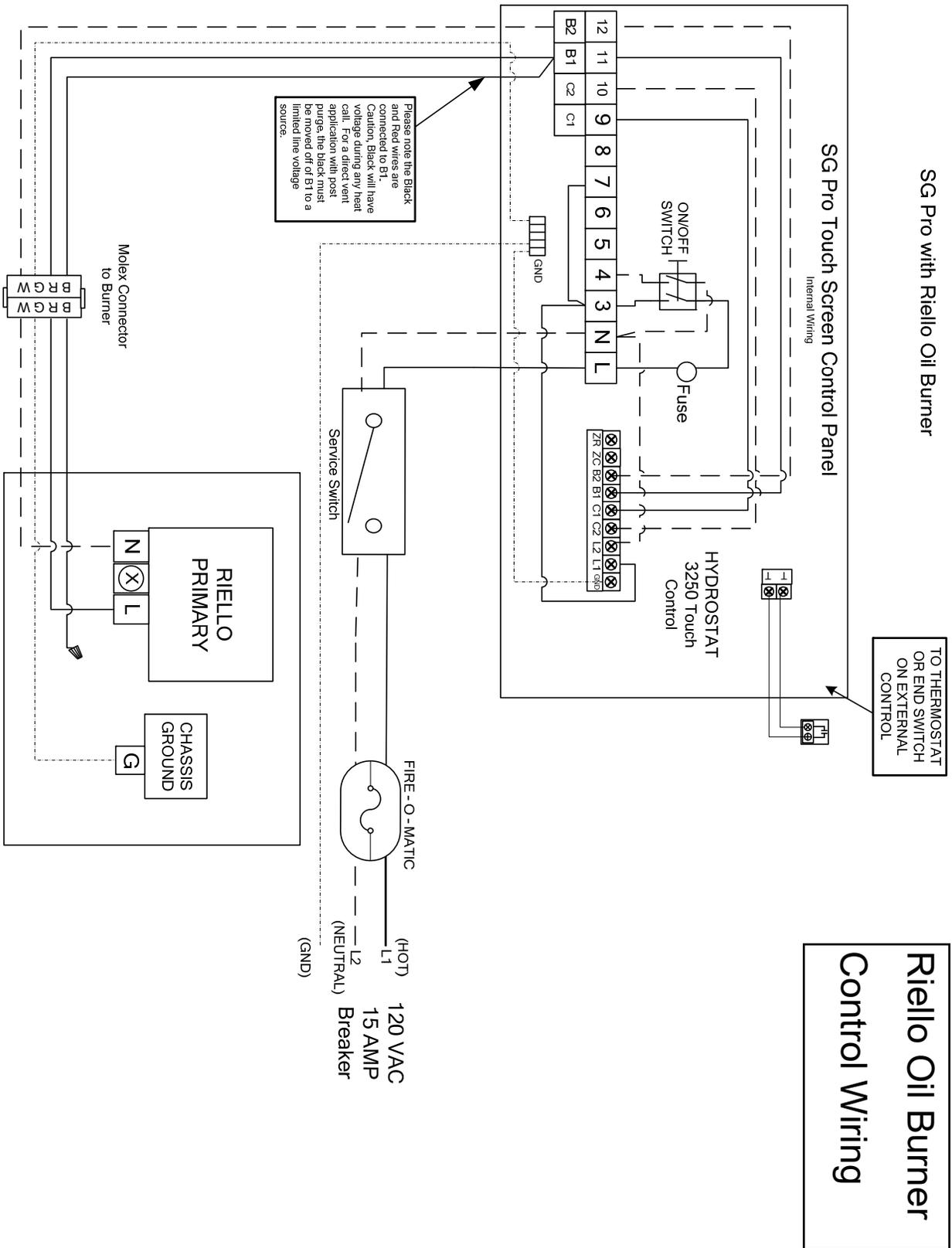
Power for the SG Pro series control panel should be brought through the knock outs in the back of the panel. All that is required is to apply line voltage from the fire-o-matic to L1 and L2 on the terminal strip and to wire ground to the grounding strip in the panel. All other wiring inside the panel for basic operation is done. Once that is completed the panel should be closed. Then connect the 4' wire harness from the bottom of the panel to the short harness that is all ready wired to the burner. Once this is complete, simply give the system power and set the various parameters on the control panel.

Direct Vent Applications

On applications with Direct Vent Burners a **field installed jumper** is required from terminal #3 to terminal #7. The capped off black wire also needs to be terminated to #7. This provides a fused constant 120volt power supply for the post purge of the burner.

Refer to pages 27 to 29 for oil wiring diagrams and page 30 for gas wiring diagrams.

12.2 Oil Burner Wiring



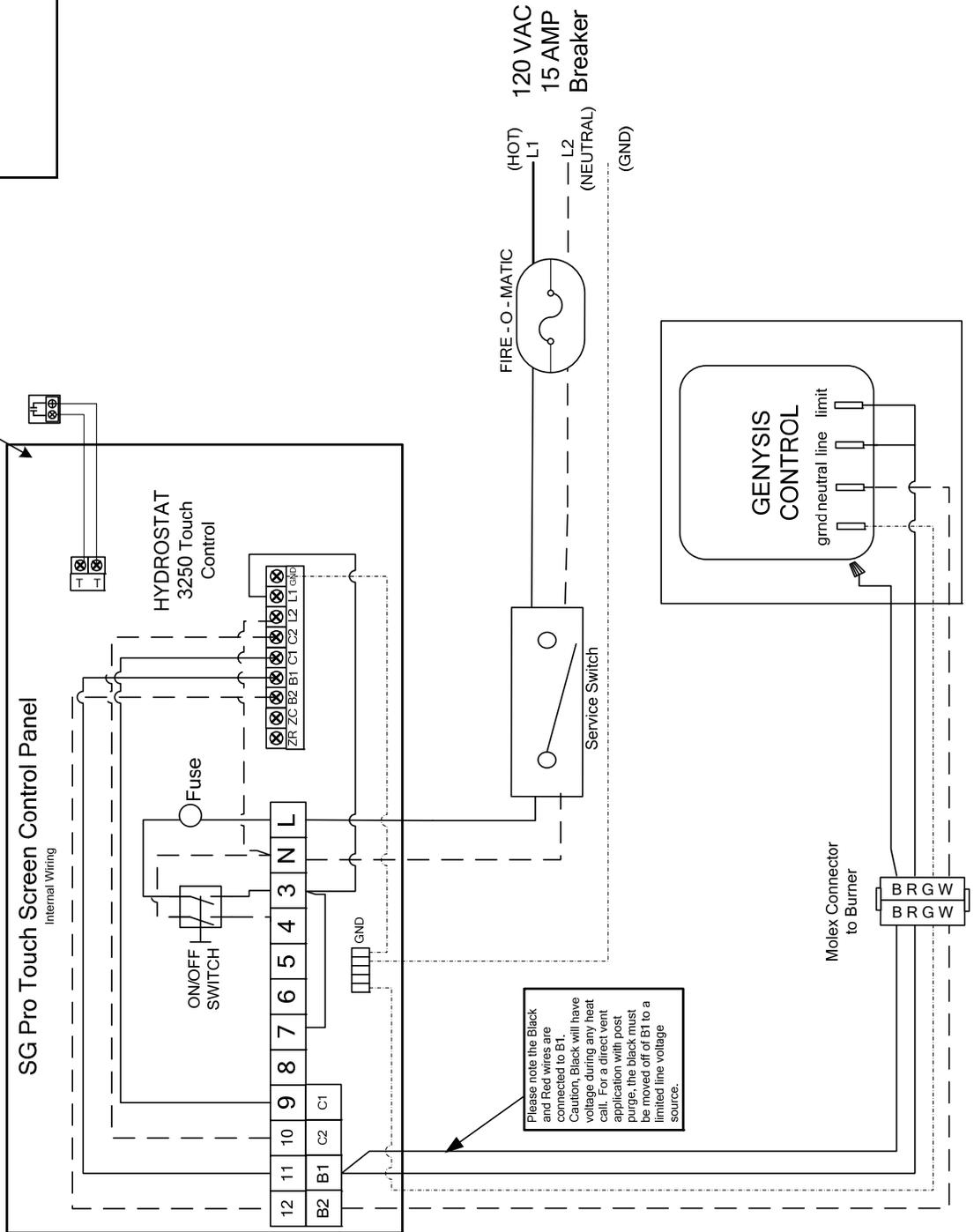
NOTE: All wiring must be done in accordance with applicable state, local and national codes. Use only copper conductors.

12.2 Oil Burner Wiring

Beckett Oil Burner Control Wiring

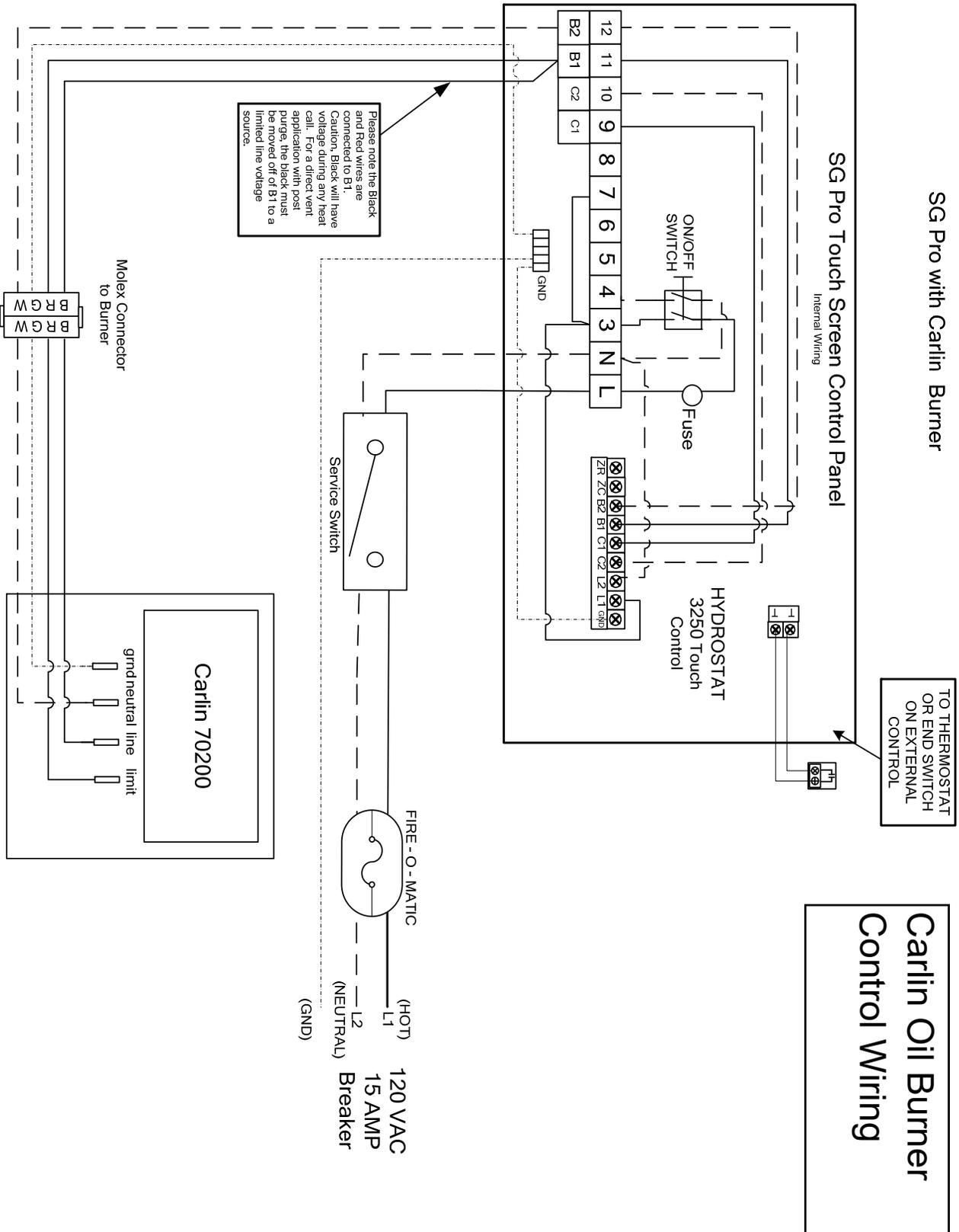
TO THERMOSTAT OR END SWITCH ON EXTERNAL CONTROL

SG Pro with Beckett NX Burner



NOTE: All wiring must be done in accordance with applicable state, local and national codes. Use only copper conductors.

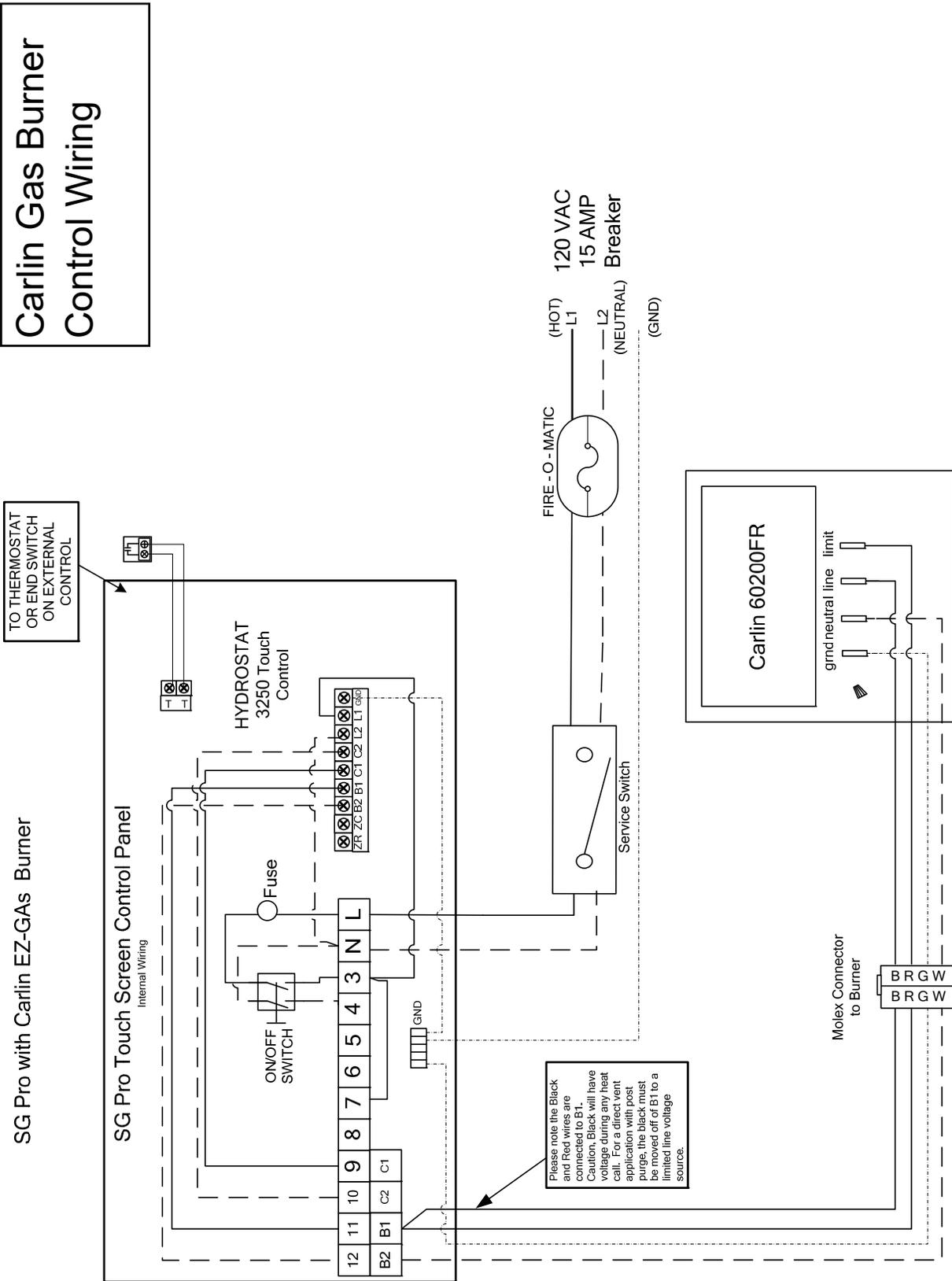
12.2 Oil Burner Wiring



NOTE: All wiring must be done in accordance with applicable state, local and national codes. Use only copper conductors.

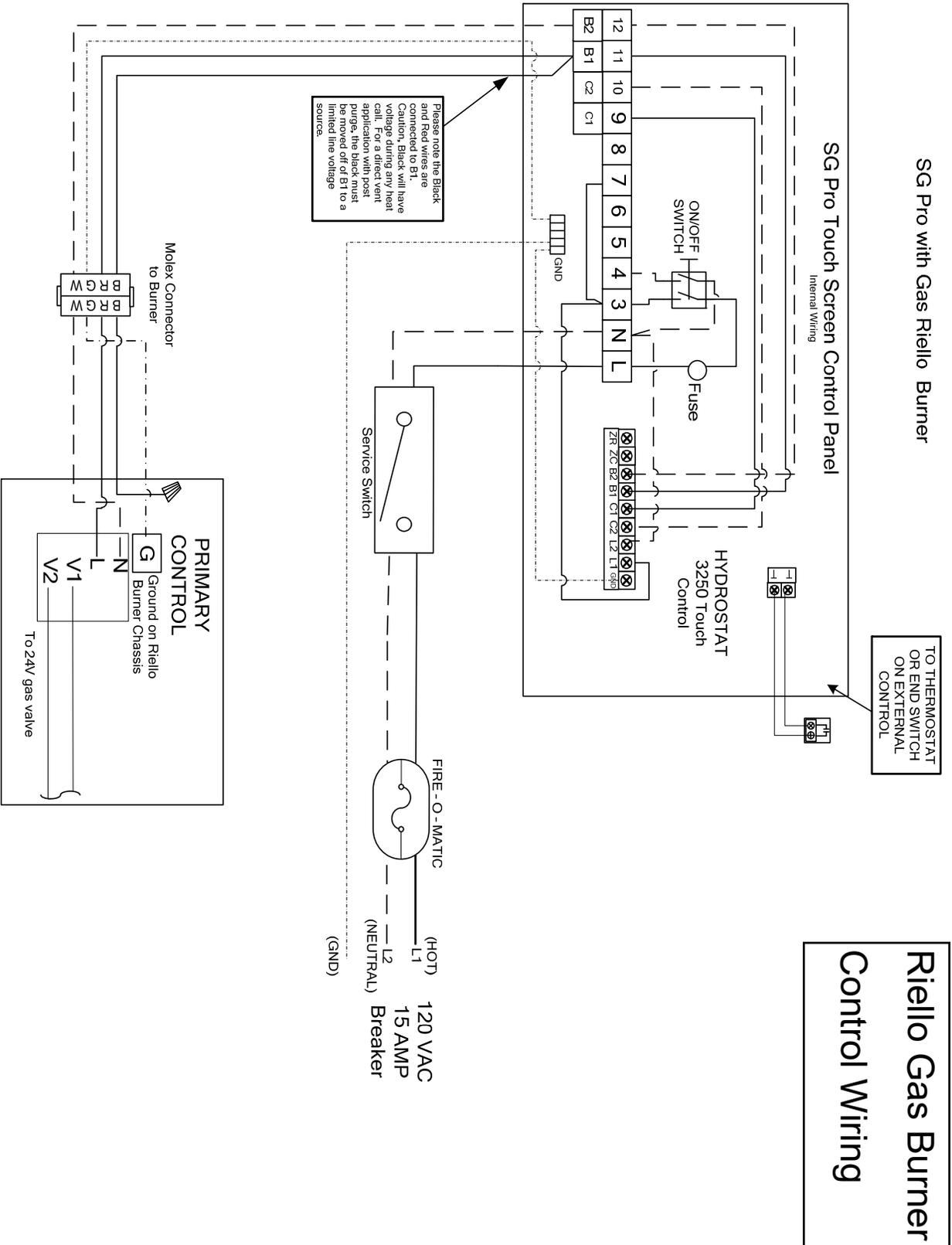
12.3 Gas Burner Wiring

Carlin Gas Burner Control Wiring



NOTE: All wiring must be done in accordance with applicable state, local and national codes. Use only copper conductors.

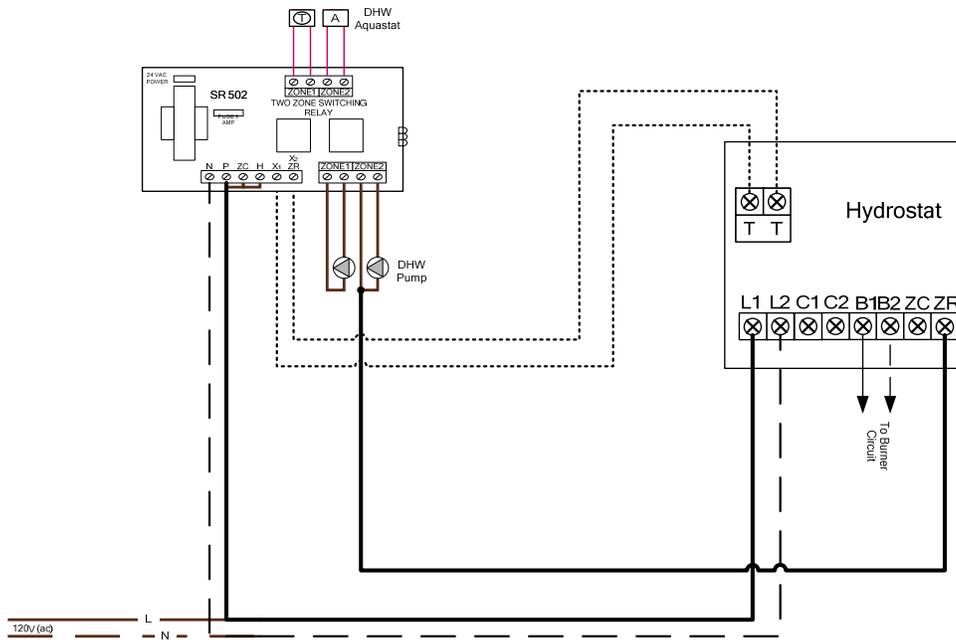
12.3 Gas Burner Wiring



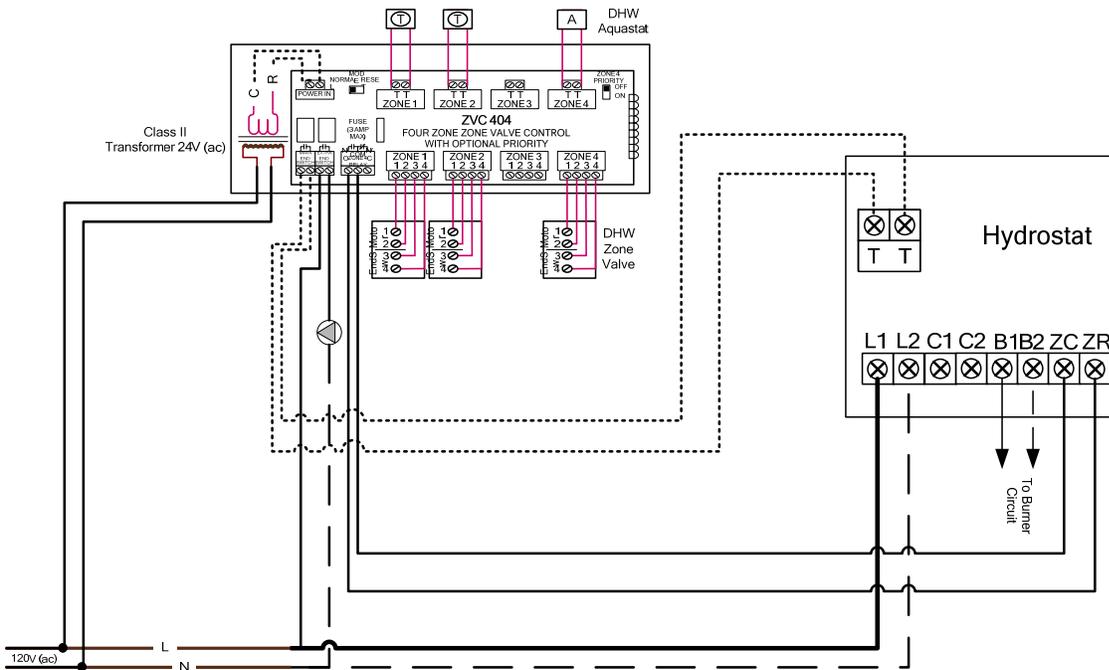
NOTE: All wiring must be done in accordance with applicable state, local and national codes. Use only copper conductors.

12.3 Priority Wiring

Priority Wiring for Hydrostat with circulators



Priority Wiring for Hydrostat with Zone Valve Panel



NOTE: All wiring must be done in accordance with applicable state, local and national codes. Use only copper conductors.

13. Commissioning

Before a gas boiler may be commissioned, it's gas connection must be leak tested before the boiler may be put into operation and tested. After installation of oil/gas-fired boiler, operation and performance tests shall be conducted to make certain that the burner is operating in an acceptable manner and that all safety controls and devices function properly. It is critical that the high limit, low water cutoff and burner "cad cell" relay be checked for normal operation before leaving the job.

CAUTION

Label all wires prior to disconnection when servicing controls. Wiring errors can cause improper and dangerous operation.

14. Maintenance

The Biasi boiler system should be serviced once a year.

1. Inspect the boiler and make sure it is operating normally, I.e. temperature and pressure.
2. Inspect the Pressure Relief Valve and manually set it off three times to ensure it is operating normally and not leaking.
3. If a Low Water Cut-Off is installed follow the manufactures suggested maintenance and test procedures.
4. Adjust room thermostat so there is a call for heat and test boiler high limit for proper operation.
5. Turn boiler safety switch off.
6. Open swing door.
7. Brush upper passages first and then clean combustion camber of any debris with brush and vacuum.
8. Remove smoke pipe and clean out debris from cleaning or soot build up.
9. Inspect smoke pipe for any corrosion before reinstalling. Replace if necessary.

Notice

Verify proper operation after servicing.

15. Installer Notes

System Checkout:

Boiler Model No. _____ Serial No. _____

Original Purchaser:

Installer:

Burner Manufacturer-----

Type of Oil Burner-----

Burner Model No.-----

Burner Serial No.-----

Nozzle Manufacturer-----

Nozzle Spray Angle-----

G.P.H. -----

Type -----

Burner Performance Tests:

GROSS STACK TEMPERATURE -----

ROOM TEMPERATURE (AMBIENT) -----

NET STACK TEMPERATURE -----

CO₂ -----

O₂-----

SMOKE READING -----

COMBUSTION EFFICIENCY-----

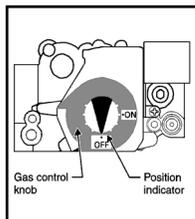
COMMENTS _____

16. Homeowner Information

- 1) STOP! Read the safety information on the side of the boiler. DO NOT START THE BOILER UNLESS ALL CLEANOUT DOORS ARE SECURED AND SEALED.

(Skip to step 9 for oil burning boilers)

- 2) Set thermostat to lowest setting
- 3) Turn off all electric power to the appliance
- 4) Do not attempt to light the burner by hand
- 5) Turn the manual shut off on the combination gas valve clockwise to the off position.



- 6) Wait five minutes to clear out any gas. Then smell for gas, including near the floor. **If you smell gas, STOP!** Follow "B" in the safety information above on this label. If you don't smell gas, go to the next step.
- 7) Return the manual valve on the combination gas valve to the on position by reversing step "5".
- 8) Turn on all electric power to the appliance.
- 9) Set thermostat to the desired setting.
- 10) If the burner fails to light you may press the reset button once. If the appliance will not operate, follow the instructions "To Turn Off Gas To Appliance" and call your service technician or gas supplier. DO NOT ATTEMPT TO START THE BURNER WHEN EXCESS OIL HAS ACCUMULATED, WHEN THE UNIT IS FULL OF VAPOR, OR WHEN THE COMBUSTION CHAMBER IS VERY HOT.

NOTE: ALWAYS KEEP THE MANUAL FUEL SUPPLY VALVE SHUT OFF IF THE BURNER IS SHUT DOWN FOR AN EXTENDED PERIOD OF TIME.

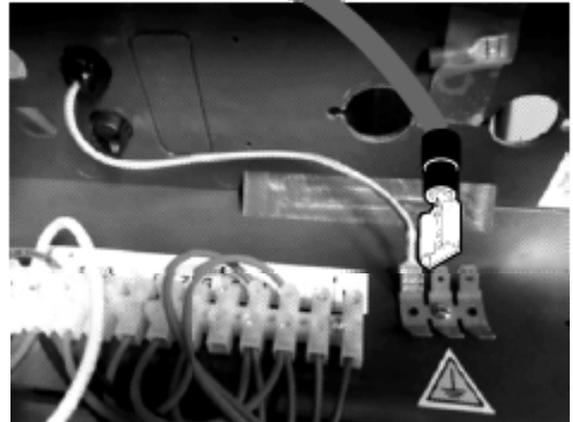
TO TURN OFF GAS APPLIANCE

- 1) Set the thermostat to the lowest setting.
- 2) Turn off electric power to the appliance if service is to be performed.
Turn the gas control valve to the off position.

Hydrolevel Immersion Well Grounding Addendum

**48" 18ga Green
Copper Stranded Wire**

Immersion Well in boiler block



**Ground terminal strip on SG/340
Boiler Control**

**48" 18ga Green
Copper Stranded Wire**

Immersion Well in boiler block



**Ground terminal on bottom
of Hydrolevel Control**

**Warranty
For BIASI SG Pro Series Residential
Cast-Iron Water Boilers**

FIRST YEAR-WARRANTY FOR SG SERIES RESIDENTIAL HOT WATER BOILERS:

QHT warrants that its cast-iron boiler and casing are free from defects in material and workmanship for one year from the date of installation. If the boiler is found to be defective within this period, QHT will replace the boiler block or casing.

LIFETIME WARRANTY-WARRANTY FOR THE CAST IRON BOILER BLOCKS OF THE SG SERIES RESIDENTIAL BOILERS:

Biasi warrants that the cast-iron sections and nipples of the BIASI SG boilers are free from defects in material and workmanship for the lifetime of the original single family home installation. If the SG boiler block is then found to be defective, QHT and Biasi will replace the original cast iron boiler block.

These warranties are subject to the condition that a heating contractor whose principal occupation is the sale and installation of heating equipment must have installed the boiler. PARTS, WHICH ARE COVERED, consists of all materials supplied by Biasi, identified by QHT's part numbers in its literature. Other parts supplied in the casing, trim kit or in the burner pack carry their own warranty and each manufacturer has responsibility for its own products.

NOTE: ANY PART, WHICH IS REPLACED UNDER WARRANTY, CARRIES ONLY THE UNEXPIRED PORTION OF THE ORIGINAL WARRANTY.

OWNER RESPONSIBILITIES:

1. Provide for proper installation, which includes pressure relief and pressure reducing valves and high limit safety controls on closed systems.
2. Provide qualified periodic service to prolong proper operation and service.
3. Insure that boiler is installed with approved burner and that installation conforms to all codes and ordinances.
4. This warranty does not apply to boilers, which are subject to misuse, abuse, neglect, alteration, accident, excessive temperature, excessive pressure, or corrosive water or atmosphere.
5. Owner will be responsible for return of faulty components to Portsmouth, NH, freight pre-paid.

QHT and Biasi will not be responsible for:

1. Components that are part of the heating system, but were not manufactured by Biasi or QHT as part of the boiler.
2. The workmanship of the installers of SG boilers. Furthermore, this warranty does not assume any liability for unsatisfactory performance caused by improper installation.
3. Any costs for labor to remove or replace the faulty component.
4. Improper burner application or adjustments, control settings, care or maintenance.
5. Any damage associated with corrosion or leakage due to the use of "non-barrier", plastic pipe in the heating system.

- THIS WARRANTY DOES NOT EXTEND TO ANYONE EXCEPT THE FIRST PURCHASER AT RETAIL AND ONLY WHEN THE BOILER IS IN THE ORIGINAL INSTALLATION SITE.
- IMPLIED WARRANTIES OF FITNESS FOR A PARTICULAR PURPOSE AND MERCHANTABILITY SHALL BE LIMITED TO THE DURATION OF THE EXPRESSED WARRANTY. BIASI AND QHT EXPRESSLY DISCLAIM AND EXCLUDE ANY LIABILITY FOR CONSEQUENTIAL OR INCIDENTAL DAMAGES FOR BREACH OF ANY EXPRESSED OR IMPLIED WARRANTY.

THIS WARRANTY GIVES YOU SPECIFIC LEGAL RIGHTS, AND YOU MAY HAVE OTHER RIGHTS THAT VARY FROM STATE TO STATE.

For prompt warranty service, notify the installer, who, in turn, will notify the distributor from whom he purchased the boiler. If this does not result in corrective action, contact Biasi through Quincy Hydronic Technology (Address Below) with details in support of the warranty claim. All claims must be processed through proper trade channels. Contact with Biasi directly is not recommended

Quincy Hydronic Technology,
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www.qhtinc.com

Manufactured by:
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Verona, Italy