Slant/Fin®

EUTECTIC EC-10

OIL-FIRED WATER BOILERS/NO. 2 OIL

INSTALLATION AND OPERATING INSTRUCTIONS

SAFETY WARNING:

KEEP BOILER AREA CLEAR AND FREE FROM COMBUSTIBLE MATERIALS, GASOLINE AND OTHER FLAMMABLE VAPORS AND LIQUIDS. FAILURE TO ADHERE TO ABOVE SAFETY WARNING, MAY RESULT IN PERSONAL INJURY OR DEATH AND PROPERTY DAMAGE.

CONTENTS . . . . . .PAGE

SERVICE COMPANY

Name _____

Address _____

_____

Telephone _____

Model # _____

Serial # _____

IMPORTANT: The installation of this equipment must conform to the requirements of the authority having jurisdiction or, in the absence of such requirements, to the Installation of Oil Burning Equipment, ANSI/NFPA 31, latest edition, and to the National Electrical Code ANSI/NFPA 70, latest edition. The installation must also conform to the additional requirements in this Slant/Fin Instruction Manual. Where there is any difference, the more stringent requirement shall govern.

In addition, where required by the authority having jurisdiction, the installation must conform to American Society of Mechanical Engineers Safety Code for Controls and Safety Devices for Automatically Fired Boilers, No. CSD-1, latest edition.

THIS MANUAL MUST BE LEFT WITH OWNER AND SHOULD BE HUNG ON OR ADJACENT TO THE BOILER FOR REFERENCE.

IMPORTANT: This boiler must be installed, serviced and repaired by a trained, experienced, service technician, licensed for the installation and servicing of oil burning hot water heating system equipment or otherwise qualified by the authorities having jurisdiction over the installation.

Printed in U.S.A. 1116 Publication No. EC-10-40 Rev.E
Part No. 470900000

Figure 1: Dimensions

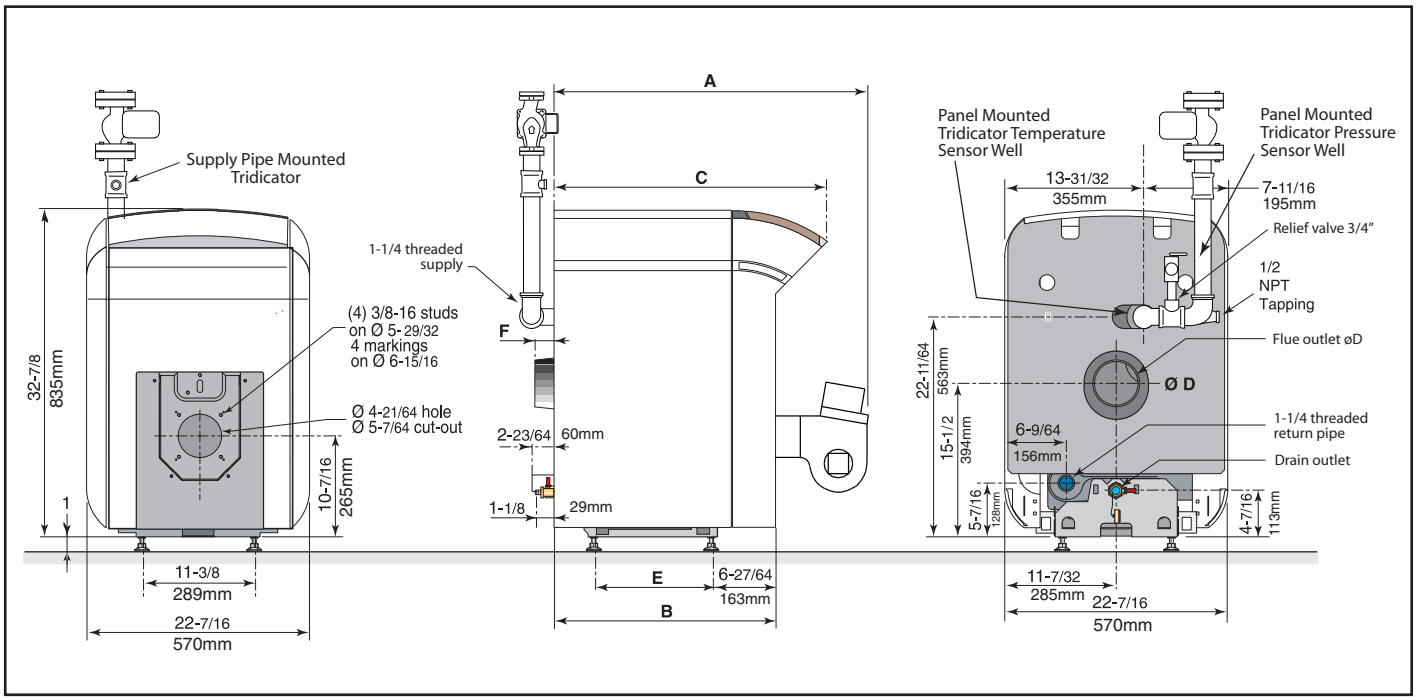


TABLE 1: Ratings and Dimensions

BOILER MODEL NO.	OIL INPUT † §				GROSS OUTPUT*		NET OUTPUT*		CHIMNEY SIZE I.D. ROUND I.D. ROUND X HEIGHT		AFUE %	DIMENSIONS											
												APPROX. OVERALL LENGTH "A"		BOILER LENGTH "B"		BOILER LENGTH "C"		FLUE DIA "D"		DISTANCE BETWEEN LEGS "E"		FLUE OUTLET LENGTH "F"	
	GPH	mL/s	BTU/H	Watts	MBH	kW	MBH	kW	(in x ft.)	mm x m		in	mm	in	mm	in	mm	in	mm	in	mm	in	mm
EC-13P	0.65	0.68	91,000	26,672	79	23	69	20	6 x 15	152 x 4.6	87	36	914	22-1/4	25	27	686	5	127	11-13/16	300	2	51
EC-13-0.7	0.70	0.74	98,000	28,724	85	25	74	22	6 x 15	152 x 4.6	87.0	36	914	22-1/4	25	27	686	5	127	11-13/16	300	2	51
EC-14P	0.80	0.84	112,000	32,827	98	29	85	25	6 x 15	152 x 4.6	87	41	1041	27	686	32	813	5	127	16-13/16	427	2	51
EC-14-0.9	0.90	0.95	126,000	36,931	109	32	95	28	6 x 15	152 x 4.6	87.0	41	1041	27	686	32	813	5	127	16-13/16	427	2	51
EC-15P	1.00	1.05	140,000	41,034	123	36	107	31	6 x 15	152 x 4.6	87	46	1168	32-1/4	819	37	940	5	127	21-13/16	554	2	51
EC-15-1.1	1.10	1.16	154,000	45,137	134	39	117	34	6 x 15	152 x 4.6	87.0	46	1168	32-1/4	819	37	940	5	127	21-13/16	554	2	51
EC-16P	1.15	1.21	161,000	47,189	141	41	123	36	6 x 15	152 x 4.6	87	51	1295	37-1/4	946	42	1067	5	127	26-13/16	681	4	102
EC-16-1.25	1.25	1.32	175,000	51,293	152	45	132	39	6 x 15	152 x 4.6	87.0	51	1295	37-1/4	946	42	1067	5	127	26-13/16	681	4	102

Maximum operating pressure 60 psi (414 kPa)
All boilers hydrostatically tested — A.S.M.E.

* For forced hot water heating systems where the boiler and all piping are located within the area to be heated, the boiler may be selected on the basis of D.O.E. capacity output. The net AHRI output ratings shown are based on an allowance for piping and pickup of 1.15 (water). D.O.E. capacity output is divided by the allowance to obtain net rating. The Slant/Fin Technical Service department should be consulted before selecting a boiler for unusual piping and pickup requirements such as intermittent system operation, extensive piping, etc.

† Ratings apply to the use of light oil at 140,000 Btu per gallon and apply only when burner models listed on pages 13 and 17 of this manual are used, and are properly adjusted to produce 13% CO_2.

§ Boiler models have two firing rates. The boiler is factory shipped at the lower firing rate. To obtain the higher firing rate, refer to the boiler installation instructions for the appropriate field adjustments.

\# All dimensions subject to normal manufacturing tolerance.

NOTE: All boilers under 300,000 Btuh (87.9 kw) input are tested and rated for capacity under the U.S. Department of Energy (D.O.E.) Test Procedures for Boilers.

THE INSTALLATION INSTRUCTIONS IN THIS MANUAL ARE ABBREVIATED. SEE THE FRONT COVER OF THIS MANUAL FOR REFERENCES TO CODES AND STANDARDS.

BOILER LOCATION

CAUTION: NEVER BURN GARBAGE OR PAPER IN THE UNIT, AND NEVER LEAVE COMBUSTIBLE MATERIAL AROUND IT.

Provide a level, solid foundation for the boiler. Location should be near the chimney so that the Flue Pipe Connector or Breeching to the chimney is short and direct.

A. The foundation must be capable of supporting the weight of the boiler when filled with water:

Boiler Size	Approximate Total Weight of Boiler Assembly*, filled with water	
	lbs	kg
EC-13	353	160
EC-14	426	193
EC-15	501	227
EC-16	575	261

* Includes burner, circulator and controls

B. The EC-10 Boiler has full wet base sections which surround fire-box for maximum heat absorption of burning fuel, and low floor temperature.
C. The boiler can be installed on both combustible and non-combustible floors, but must NOT be installed on or above carpeting.
D. If boiler is to be located over buried conduit containing electric wires or telephone cables, consult local codes or the National Board of Fire Underwriters for specific requirements.

MINIMUM CLEARANCE
Provide accessibility clearance of 24" from surfaces requiring servicing (top and front) and 20" on any side requiring passage. The boiler shall be installed with the following MINIMUM clearances from combustible materials:
A. CHIMNEY CONNECTOR-18"
B. BACK- 6" EXCEPT as limited by 18" clearance from chimney connector
C. SIDES- 2" EXCEPT as limited by 18" clearance from chimney connector

NOTE: Except in closets and alcoves, clearances above in (A) and (B) may be reduced by providing forms of protection as specified in NFPA 31, latest edition.

See bottom of page 4 for clearance diagrams.

CHIMNEY REQUIREMENTS (see NFPA 211, latest edition)
A. The chimney must be constructed in accordance with all local applicable codes and the National Board of Fire Underwriters. See boiler models and rating table shown on page 2 for chimney sizes.
B. Check chimney condition.
Existing chimneys and stacks may have deteriorated; without repairs their use would be hazardous. Before connecting to an old chimney or stack:
1. Clean it.
2. Inspect it thoroughly.
3. Remove obstructions.
4. Replace worn sections of metal stacks.
5. Seal bad masonry joints.
6. Repair damaged lining.

C. Breeching area must not be reduced at connection into chimney. Breeching must be inserted into, but not beyond, inside of chimney liner.
D. Chimney height shall extend at least 3 feet (.914m) above where it passes through the roof of the building, and at least 2 feet (.61m) above any ridge within 10 feet (3.05m) of the chimney.
E. The use of a vent cap, where permitted by code, gives additional protection against adverse wind conditions and precipitation.
F. Flue Connection: Connect flue pipe between top of boiler and chimney. Horizontal sections of flue pipe must be pitched upward to the chimney at least 1/4" per foot (20mm/m). Flue must be inserted into, but not extend beyond, the inside wall of the chimney flue. Draft regulator is not required but may be installed if conditions warrant it. Install draft regulator in flue pipe, as shown in figure 2.

CAUTION: AN OIL-FIRED UNIT SHALL BE CONNECTED TO A VENT HAVING SUFFICIENT DRAFT AT ALL TIMES TO ENSURE SAFE AND PROPER OPERATION OF THE UNIT.

EC-10 SERIES BAFFLE PLACEMENT:

EC-13	(3) Baffle Plates
EC-14 & 15	(2) Baffle Plates center & right side when viewing from front
EC-16	(0)

AIR SUPPLY AND VENTILATION (see NFPA 31, latest edition)
Sufficient air for combustion and ventilation in the boiler room must be provided. Failure to do this will result in poor combustion, heavy sooting and health hazards. Any oil-fired boiler must have a steady draft* and an ample supply of combustion air at all times during firing. If air supply or chimney draft* is

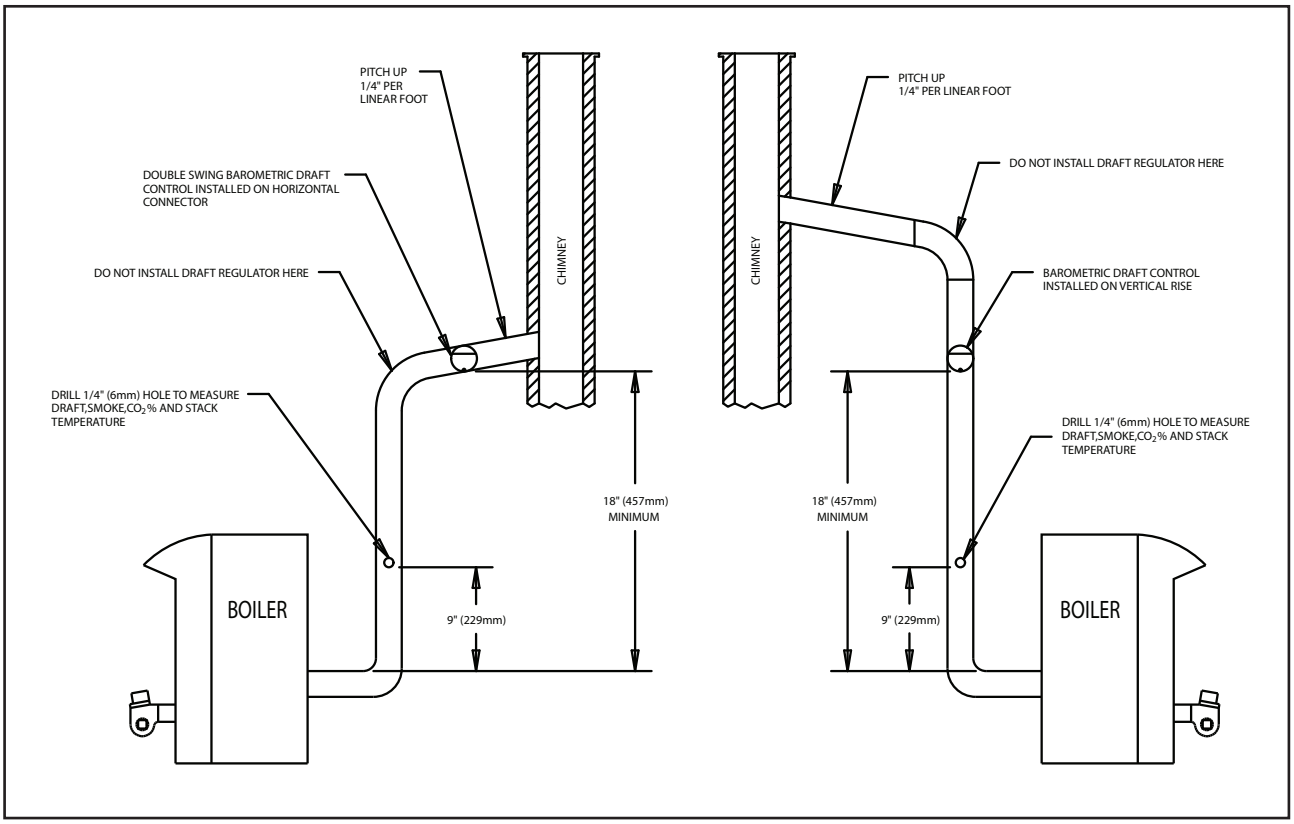
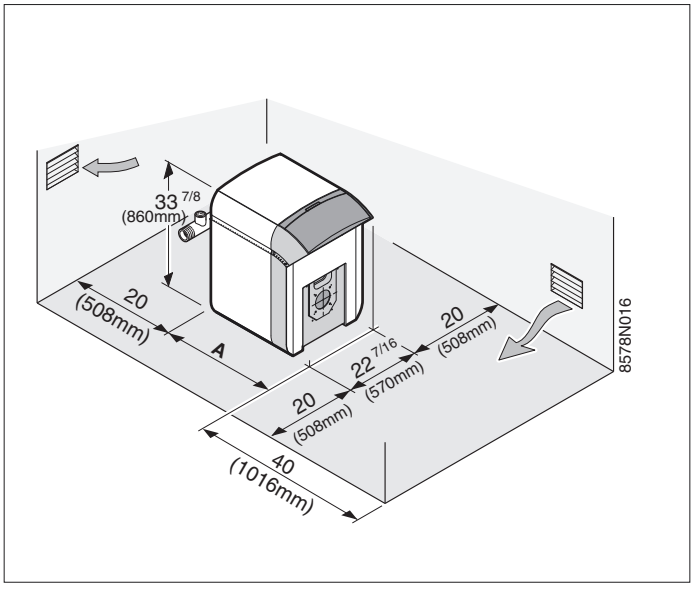


Figure 2. *Barometric Draft Regulator Location*

Sufficient space shall be left clear around the boiler. Do not stack items on or box in the appliance within the required clearances to combustibles.

The figures stated in inches in the drawing below are the minimum recommended dimensions for providing easy access around the boiler.

● **EC-10**



Boiler	A (in)	A (mm)
EC-13	22 1/4	565
EC-14	27 1/4	692
EC-15	32 1/4	819
EC-16	37 1/4	946

For boilers installed in Canada

A BLOCKED VENT SAFETY SWITCH MUST BE INSTALLED

All EC-10 Series boilers must be installed with a Blocked Vent Safety Switch. The Blocked Vent Safety Switch will detect spillage of flue gases due to a blocked vent or inadequate draft.

The Blocked Vent Safety Switch supplied with all EC-10 Series boilers must be installed on the barometric damper. Refer to the manufacturers instructions provided with the Blocked Vent Safety Switch for installation, location instructions.

CAUTION: DISCONNECT ELECTRICAL POWER WHEN WIRING.

The Blocked Vent Safety Switch is to be FIELD wired, see wiring diagrams, into the line voltage connection being wired into the junction box, so the Blocked Vent Safety Switch breaks power supply to the boiler shutting it down in the event of a spillage.

IMPORTANT: The Blocked Vent Safety Switch must be wired in accordance with The National Electrical Code, the Installation of Oil Burning Equipment, CSA B139. The installation must also conform to any applicable local codes, the manufacturer's instructions, the requirements of this Slant/Fin manual, and any authority having jurisdiction. Where there is any difference the more stringent requirement shall govern.

Check the operation of the Blocked Vent Safety Switch:

A: Block chimney or vent pipe.

B: Adjust thermostat to call for heat.

C: Allow approximately two minutes for the system to back up and the burner to shut down.

D: Perform steps B and C again.

unreliable, CO_2 and overfire draft* will change unpredictably.

DO NOT vent this boiler to the same chimney flue used by a fireplace or coal or wood burning furnace or boiler. The draft* produced by solid fueled devices varies tremendously between high fire and low fire:

In modern, weather stripped, energy-saving buildings or older buildings which have been modified similarly, natural infiltration may not supply enough air for combustion, particularly if other fuel burning appliances, exhaust fans or draft inducers are competing for the same air supply. Fireplaces, other solid fuel burning appliances and exhaust fans consume great quantities of air; if air supply is not ample, such an appliance will create a downdraft in the oil-fired boiler flue. This can create a hazardous condition. Flue gases can be sucked out of the chimney through the vent regulator into the living space. DO NOT operate this boiler and a solid fuel burning appliance at the same time, unless the solid fuel burner is provided with its own outside air supply.

See Table 2, "Provisions for Combustion and Ventilation Air Supply" for determining need and method of providing air for combustion and ventilation.

If fly screen must be used over air supply openings, areas calculated should be doubled; the screen should be inspected and cleaned frequently to maintain free air flow.

Protect air openings against closure by snow, debris, etc. Openings such as doors or windows, if used, must be locked open.

* Draft is negative or suction pressure

TABLE 2: Provisions for Combustion and Ventilation Air Supply. See NFPA 31, latest edition for more detailed information. For Canada: See CSA B139, latest edition, section 7, for more detailed information.

	Boiler Location	Air Supply	Action Required
2.1	Unconfined space	Is there sufficient air for combustion by natural infiltration (see NOTE (1), "Test..." below)?	NONE
2.2	Unconfined space	If there is NOT sufficient air for combustion by natural infiltration due to tight construction or other conditions, then it REQUIRES AIR FROM OUTDOORS. SEE "ACTION REQUIRED" column at right. See Notes (1) and (2) below.	Provide air from outdoors directly through a permanent outside wall opening or openings with a free open area of not less than 1 sq. in. per 4000 Btu/hr. (645mm^2/1172 W) of TOTAL input of ALL fuel burning appliances in the building. See Note (1) and (3).
2.3	Confined space	If there is sufficient air for combustion from within building but it comes from outside of the confined space, see "ACTION REQUIRED" column at right. See Note (1) below.	The confined space shall be provided with two permanent air openings, one near the top of the enclosure and one near the bottom. EACH opening shall have a free air opening of not less than 1 sq. in. per 1000 Btu/hr. (645mm^2/293 W) of TOTAL input of ALL fuel burning appliances within the enclosure. The two openings shall freely communicate with the interior areas of the building which in turn would have to have adequate infiltration of air from outdoors. See Notes (1, 3) and Figure 3a.
2.4	Confined space	If there is NOT sufficient air for combustion due to tight construction or other conditions it REQUIRES AIR FROM OUTDOORS. SEE "ACTION REQUIRED" column at right. See NOTE (2) below.	(a) Air from the outdoors shall be provided to the confined space by two permanent openings, one in or near the top of the enclosure space and one in or near the bottom. The openings shall communicate directly, or by means of ducts, with outdoors or to such spaces (crawl or attic) that freely communicate with outdoors (See figures 3b, 3c and 3d). (b) Where directly communicating with outdoors or by means of vertical ducts, each opening shall have a free area of not less than 1 sq. in. per 4,000 Btu/hr. (645mm^2/1172 W) 35 sq. in. per gal. per hr. (5964mm^2/litre/hr) of total input rating of all appliances in the enclosure. If horizontal ducts are used, each opening shall have a free area of not less than 1 sq. in. per 2,000 Btu/hr. (70 sq. in. per gal. per hr.) of total input of all appliances in the confined space. See Figures 3b, 3c and 3d.

(1) Test for sufficient air for combustion by infiltration by running this boiler for 30 minutes under all of the following conditions and at the same time: a) all doors, windows and other like openings must be closed, b) all fuel burning appliances should be FIRING, c) all exhaust fans and clothes dryers turned ON. At the above conditions the CO_2, smoke and draft readings must be normal. (CO_2 between 11% and 13%, smoke between ZERO and a TRACE, draft between .02" W.C. (.05mm) and .04" W.C. (1.0mm) negative pressure in the breeching.)

(2) Aside from tight construction, some of the conditions that steal air for combustion from a boiler are other fuel burning appliances, exhaust fans and clothes dryers.

(3) Generally, louvers made of wood have a free open area of 20% and those made of metal have a 60% to 70% free open area. Screens also reduce the open area of the louvers. Fly screen can reduce air opening by 50%.

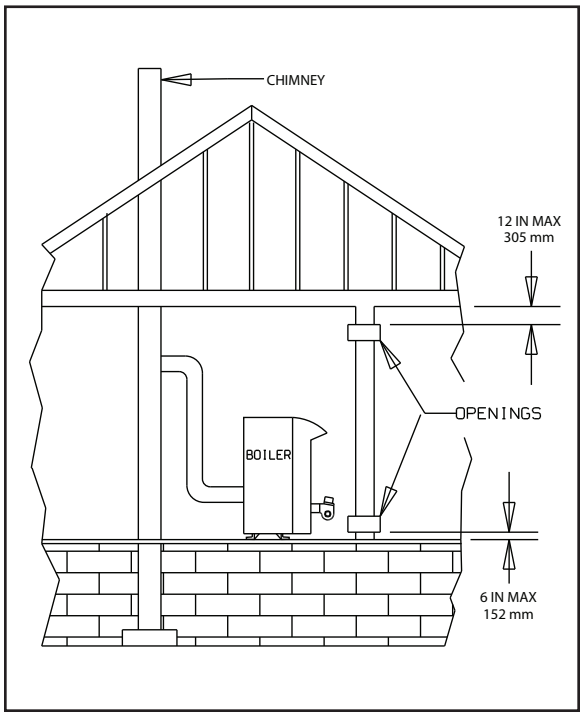


Figure 3a.
Appliances located in confined spaces. Air from inside the building. See Table 2 (2.3).

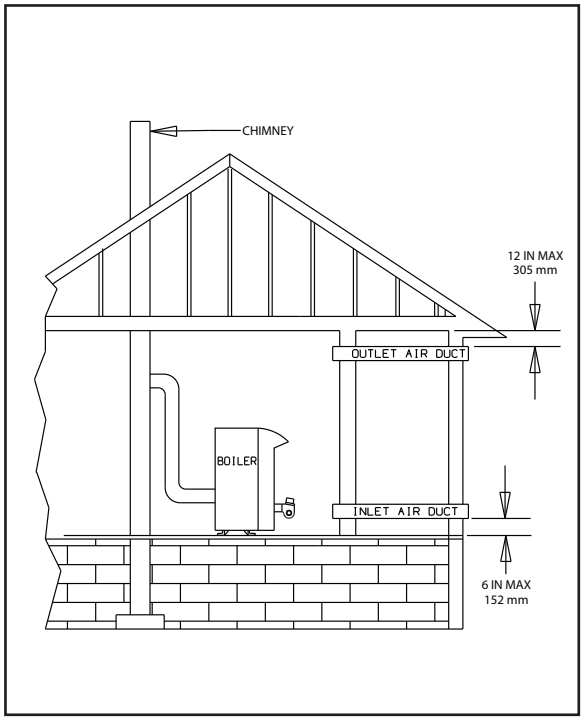


Figure 3b.
Appliances located in confined spaces. Air from outdoors. See Table 2 (2.4).

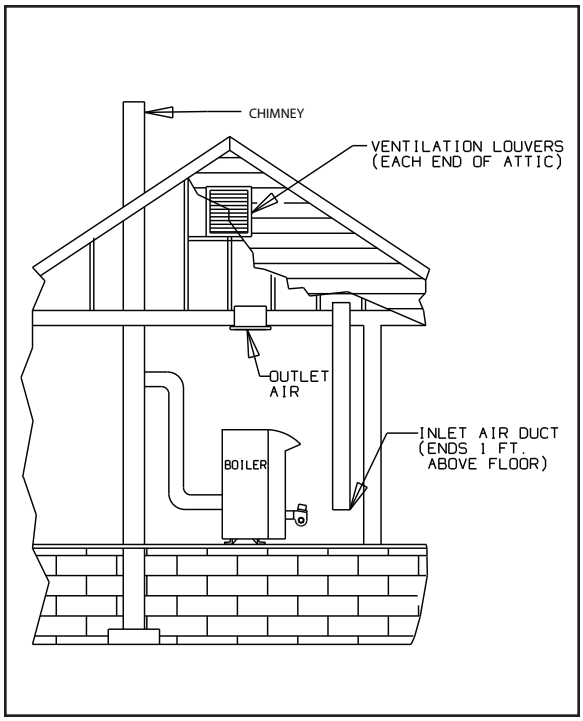


Figure 3c.
Appliances located in confined spaces. Air from outdoors through ventilated attic. See Table 2 (2.4).

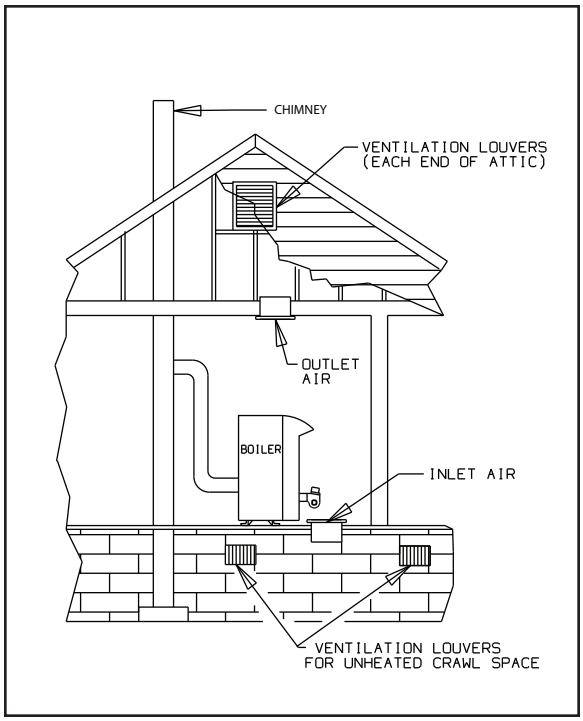


Figure 3d.
Appliances located in confined spaces. All air from outdoors through ventilated crawl space and outlet air to ventilated attic. See Table 2 (2.4).

The opening size recommendation just given is for guidance only. It is the installer's responsibility to provide air for combustion and ventilation to all appliances, under all operating conditions, for each installation. See NFPA 31, latest edition for more specific details.

INSTALLING CONTROLS AND ACCESSORIES ON BOILER UNITS

Notes:Jacket must be installed on boiler units prior to installation of trim.

WATER BOILER TRIM, see page 2, figures 1 and 2 for tapping locations.

WATER PIPING FOR HOT WATER HEATING BOILERS

NOTE: On knocked-down boiler only, jacket may be installed after return piping connection, but must be installed prior to adding trim, supply piping and drain valve.

I. CIRCULATING SYSTEM
   A. FORCED CIRCULATION hot water heating system: Use the top tapping as supply tapping, and use the rear bottom tapping for the return.
   B. A FLOW CONTROL VALVE will prevent gravity circulation and is required when an external tankless heater, an indirect water heater or multiple circulators are installed.

II. AIR CONTROL SYSTEMS
   A. DIAPHRAGM-TYPE COMPRESSION TANKS are used to control system pressure in an AIR ELIMINATING SYSTEM: an automatic air vent is used to REMOVE air from the system water. (See figure 4)
      If system pressure needs further control, add an additional tank or install a larger capacity tank.
      The automatic air vent should be installed in the top of the boiler, as in figure 4 and at radiation high points.
   B. CONVENTIONAL COMPRESSION TANKS (non-diaphragm type) are used to control system pressure in an AIR COLLECTING SYSTEM. Within the system, after initial start-up and venting, air is collected in the tank and acts in contact with the water to control pressure. Air is not vented from this system except at radiation high points.
      If system pressure needs further control, add another tank in parallel with the original tank or install a large capacity tank. Locate the tank at the inlet end of the pump near the boiler.
   C. HOT WATER RADIATION VENTING - Manual air vents should be installed at the top of all "drops" (where piping goes downward). Air must be vented or purged from all zone lines to permit proper system heating.
   D. PUMP LOCATION - Locating low-head pump(s) on return to boiler is only acceptable in residences of one or two stories. The pump location shown in figure 4 is required in large, multi-story building installations, especially when high-head pumps are used and is also recommended for all applications.

IMPORTANT: Hot water heating systems containing high water volume, such as would occur with cast iron radiation, require special care with air elimination.

The circulator pump should be located on the boiler supply pipe and the expansion tank and air scoop should be located near the pump suction. For alternate circulator pump location on return for low-head pumps and one or two story buildings ONLY.

DOMESTIC HOT WATER

For Indirect-fired storage water heater application, see Slant/Fin publication WH-10, Sizing Guide WH-SG and Installation manual WH-40. The installation manual includes several control systems and relay centers for space and domestic water heating in addition to plumbing.

INSTALLING THE BURNER

See Burner Data, pages 13-17, and Burner Manual supplied with burner. If burner is not mounted as received, mount to boiler, placing flange over mounting studs. Use gasket between flange and boiler. Distance between flange and nose of burner must be as shown on pages 13-17. Check to see that nozzle and settings are as given in burner data tables, pages 13-17.

CAUTION: Do Not use gasoline, crankcase drainings, or any oil containing gasoline.

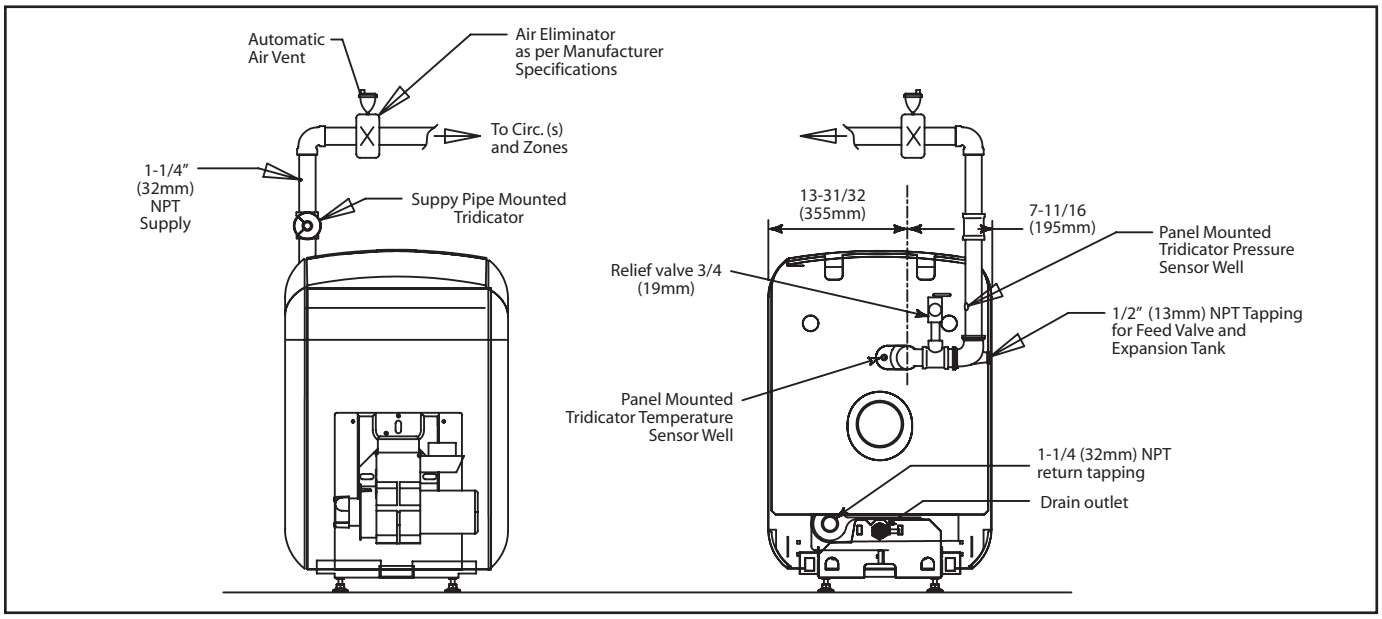


Figure 4. *Air Eliminating System or Alternating Collecting System. Pipe off to a safe place the relief valve and drain outlet.*

OIL SUPPLY PIPING

Install the oil tank or tanks and piping from tank to burner. Follow local codes and practices, INSTALLATION OF OIL BURNING EQUIPMENT, NFPA 31, latest edition, and the instruction sheet attached to the oil burner pump. A one-pipe system should be used for gravity-fed fuel systems and for lift systems, where the total lift is less than 8 feet. Where the total lift is greater than 8 feet, a two-pipe system must be used. In some instances, local codes may require a two-pipe system for below grade fuel oil tanks. Be sure to set up the fuel oil pump for the piping system used; follow the instructions attached to the pump. Be sure to include a good quality, low pressure drop fuel oil filter in the supply line from the tank. This is necessary, especially at low fuel oil flow rates (small nozzle sizes), to prevent nozzle plugging. Fuel oil shutoff valves should be installed at the burner on the supply (and return if two-pipe) to facilitate servicing. See Slant/Fin publication on one-pipe and two-pipe fuel oil systems. (For Canada, see Canadian Electric Code CSA-C22.1, Part 1–latest edition)

WIRING THE BOILER

(see National Electric Code ANSI/NFPA 70-latest edition)

A. The wiring diagrams for the burner and boiler may be found on pages 11 through 15.
B. 24 volt control wiring should be approved Safety Circuit wire, protected as needed.
C. Power supply wiring to the burner must be 14 gauge, as required, and should have a properly fused disconnect switch. 120 volt wiring to pumps and safety controls must also be 14 gauge. Wire must be enclosed in approved conduit.
D. The wires supplying power to the burner MUST go through the quick disconnect plugs provided with the boiler.
E. All wiring must be installed in compliance with the National Electric Code, or any local or insurance codes having jurisdiction.

Wiring to the boiler must come through an emergency power isolation switch with a clearly marked red switch plate. This switch should be located so that it is apparent to the homeowner when entering the basement or other boiler area. The homeowner should be made familiar with operating the toggle to provide or stop the power to the boiler.

VENT PIPING AND DRAFT REGULATOR

(see NFPA 31, latest edition)

A. Vent connectors must be the same diameter as the boiler flue collar. (See page 2)
B. Vent pipes and breeching must be pitched upward a minimum of 1/4" per foot (20mm/m).
C. Connect vent pipe to the chimney using as few elbows as possible and as short as possible within NFPA 31 or authority. (Canada: CSA B139)
D. Horizontal vent connector into the chimney should not be inserted beyond the inside wall of the chimney.
E. Install barometric draft regulator on horizontal breeching, near chimney, with hinge horizontal and face vertical conditions permitting as in Figure 3a. See Figure 3b as a second choice. See manufacturer's instructions packed in carton with barometric draft regulator.
F. If two or more appliances are used on the same chimney, see CHIMNEY, page 3.
G. Make up all joints with minimum air leaks, secure with sheet metal screws.

PRECAUTIONS BEFORE STARTING OIL BURNER

Make a positive check of A through F before starting burner:

A. Boiler and system are full of water. All air is vented from system. See below.
B. All wiring is completed. See page 11 through 15.
C. Oil supply is connected to the burner; nozzle is installed correctly; oil valve is open at tank.
D. Main cast iron door on which burner is mounted is bolted shut and fiberglass rope seal is making good contact.
E. Smokepipe is connected to chimney.
F. All combustible materials are cleared away.
G. Combustion air supply is provided. See page 3.
H. Burner settings are adjusted as per pages 8, 9, 17-21 and as shown on boiler jacket.

START-UP (COMBUSTION TEST INSTRUMENTS MUST BE USED) THIS BOILER IS A POSITIVE PRESSURE BOILER.

A. Make sure the boiler is installed and wired properly and is full of water.
B. The observation port cover is mounted on the hinged burner mounting door (see figure 2 on page 2). NEVER touch the port cover or any surrounding surfaces with hands. They may be HOT. Use tools. Loosen the 2 screws and swing cover until window is directly below pivot (and tighten 2 screws) to observe through window. Loosen the 2 screws and swing cover until slot is directly below pivot (and tighten 2 screws) to be able to insert probe through slot. See the burner instructions for bleeding air, etc. Step away from the boiler and start the oil burner.
C. IMMEDIATELY, set burner air bands to obtain a bright fire without smoke or oil stain. Set the DRAFT REGULATOR to obtain .02" – .04" (0.51 – 1.02mm) draft at the breeching.
D. Tighten the observation door screw. Allow the burner to fire for at least one hour total firing time, to bake out the volatile binders in the combustion chamber before taking final combustion readings.
E. By alternate adjustment of the barometric draft regulator, the burner air regulation and head regulation devices (whichever apply), set for a zero to a trace of smoke and 12% CO_2. Then open the air bands or shutter (whichever apply) an additional 1/8" (3.2mm). This should result in zero smoke with NO raw oil on the smoke paper and a smooth light-off. DO NOT ATTEMPT TO SET FIRE BY EYE. Flame retention burners may appear efficient and smoke free from an inefficient 7% up to an overly high 14% CO_2. However, a very low CO_2 can also result in poor ignition and raw (unburned) oil entering the fire box. At very high CO_2, any slight decrease in air flow for any reason will cause incomplete combustion, with high smoke and dry soot formation in the fire box.
F. Once burner and draft have been set up, then smoke, CO_2 and stack temperature should be checked and recorded. If smoke is greater than trace, review the burner instructions and replace the nozzle if necessary. Normal smoke to be expected is zero to a trace.
G. Make sure that the observation port cover is closed and the screw is tightened.

CLEANING AND FILLING A NEW WATER BOILER

I. There are a number of commercial preparations available from your distributor for cleaning and for corrosion protection conditioning the internal (waterside) surfaces of boilers. Follow the preparation manufacturer's instructions.
DANGER: Use CAUTION when handling chemicals and draining hot water from a boiler. Scalding water and/or chemicals can cause permanent injury to the skin, eyes and respiratory system.

II. Filling and venting the water boiler after cleaning
   A. Refill the system with fresh water.
   B. Bring water temperature to at least 180° F (82˚C) promptly.
   C. Circulate water through entire system.
   D. Vent the system, including the radiation.
   E. The boiler is now ready to be put into service or on standby.
   F. If brand name air-control devices are used, venting instructions furnished with the devices should be followed.

III. Safety check for control system
   High limit control test: Set thermostat high enough for boiler water temperature to reach high limit control setting. When this temperature is reached, the high limit switch should open, and the burner should shut off automatically. If the high limit does not operate to shut off the burner, the high limit or the wiring is faulty. Repair or replace immediately.

CARE AND MAINTENANCE

I. EXTENDED SHUTDOWN, CLEANING OR REMOVAL OF BOILER FROM SERVICE.
   DANGER: Use CAUTION when handling chemicals and draining hot water from a boiler. Scalding water and/or chemicals can cause permanent injury to the skin, eyes and respiratory system.
   A. Shut down burner by disconnecting all electrical power to the burner by turning OFF the BURNER EMERGENCY SWITCH of this boiler. After shutting down burner, while the boiler is still hot (180°F to 200°F), drain water from the bottom of the boiler until it runs clear.
   B. Provide corrosion protection conditioning to the boiler water in the heating system. There are a number of commercial heating system preparations available from your distributor. Follow the preparation manufacturer's instructions.
   C. To clean the fireside boiler surfaces, first shut down burner by disconnecting all electrical power to the burner by turning OFF the OIL BURNER EMERGENCY SWITCH of this boiler in order to perform the following work in (1) through (10) below.

WATER CONTENT OF BOILER (GALLONS / L)			
EC-13	EC-14	EC-15	EC-16
5 18.9	6.5 24.6	8 30.3	5 36.1

1. Remove the flue pipe from the boiler flue collar and clean thoroughly.
2. Inspect the entire vent connector back to the chimney and clean if necessary.
3. Inspect the chimney for soot, debris and other unsafe conditions of the chimney and take the necessary action.
4. The burner mounting door must be fully open to clean the flue passages and the combustion chamber. If the oil line is not flexible enough it should be disconnected from the burner during the cleaning process. The flexible electric conduit connected from the junction box on the boiler to the burner via a plastic connector must be disconnected from the burner by grasping the plastic half of the connector closest to the flexible conduit and gently pulling it in the direction of the conduit until it is disconnected. Remove both13 mm hex head screws on the sides of the swinging door. You will need a 13 mm open end or box wrench. Open the door to completely expose the combustion chamber for thorough cleaning and for inspection of main cast iron burner door insulation and burner door fiberglass sealing rope. If combustion chamber parts above are badly deteriorated then replace with original factory parts available at your distributor.
5. Use the flue brush to clean the flueways. Remove cast iron baffle plates for cleaning [(3) baffle plates in EC-13, (2) baffle plates in EC-14 & 15, (0) baffle plates in EC-16.]† A wire brush may be used to remove any carbon accumulation that may have developed in the combustion chamber. Vacuum the loose soot and debris from the boiler. Replace baffle plates.
6. Inspect the burner combustion head. Clean if necessary and make sure all the adjustments are correct. (See burner data pages for the burner installed.) Replace oil nozzle with new one and readjust electrodes. To insure proper burner operation ONLY THE NOZZLES SPECIFIED IN THIS MANUAL OR ON THE BURNER LABEL SHOULD BE USED FOR REPLACEMENT.

† A flue brush (triangular shape) is supplied with boiler.

VOLUME OF WATER IN STANDARD PIPE OR TUBE

Nominal Pipe Size		Standard Steel Pipe					Type L Copper Tube			
		Schedule No.	Inside Diameter		Volume per linear unit.		Inside Diameter		Volume per linear unit.	
in.	mm		in.	mm	U.S.G/ft.	L/m	in.	mm	U.S.G/ft.	L/m
3/8	10	–	–	–	–	–	0.430	11	0.0075	0.093
1/2	13	40	0.622	16	0.0157	0.195	0.545	14	0.0121	.0150
5/8	16	–	–	–	–	–	0.666	17	0.0181	0.225
3/4	19	40	0.824	21	0.0277	0.344	0.785	20	0.0251	0.311
1	25	40	1.049	27	0.0449	0.557	1.025	26	0.0429	0.532
1-1/4	32	40	1.380	35	0.0779	0.967	1.265	32	0.0653	0.810
1-1/2	38	40	1.610	41	0.106	1.315	1.505	38	0.0924	1.147
2	51	40	2.067	53	0.174	2.159	1.985	50	0.161	1.998
2-1/2	64	40	2.469	63	0.249	3.090	2.465	63	0.248	3.078
3	76	40	3.068	78	0.384	4.765	2.945	75	0.354	4.393

Replacements are available from dealer or hardware stores.

7. Protect all of the fireside surfaces by swabbing with neutral mineral oil.
8. Close main cast iron burner door (door on which burner is mounted). Make sure that the entire seal (fiberglass rope) is making good contact with the boiler casting when replacing both 13 mm hex head screws and tightening.

D. If boiler room is damp, provide ventilation.

CAUTION: ALWAYS KEEP THE OIL SUPPLY VALVE SHUT OFF IF THE BURNER IS SHUT DOWN FOR AN EXTENDED PERIOD OF TIME.

II. PROVIDING PROTECTION FOR FREEZING

Anti-freeze is sometimes used in hydronic heating systems to protect against freeze-up in the event of power failure, or safety control shutdown when the building is unoccupied. It should be recognized that unless the building is kept above freezing temperature by some means, the plumbing system is not protected.

PROPYLENE GLYCOL is used in the quick-freeze food industry; it is practically non-toxic. Its use may be permitted when indirect water heaters are used. When anti-freeze must be used, inhibited propylene glycol is recommended. Useful information on the characteristics, mixing proportions, etc. of glycol in heating systems is given in Technical Topics No. 2A, available from the Slant/Fin website, go to http://slantfin.com. Go to library, select current literature, select boiler model. See related topics and select antifreeze and hydronic systems. Consult glycol manufacturers for sources of propylene glycol.

DO NOT USE ETHYLENE GLYCOL BECAUSE IT IS TOXIC.

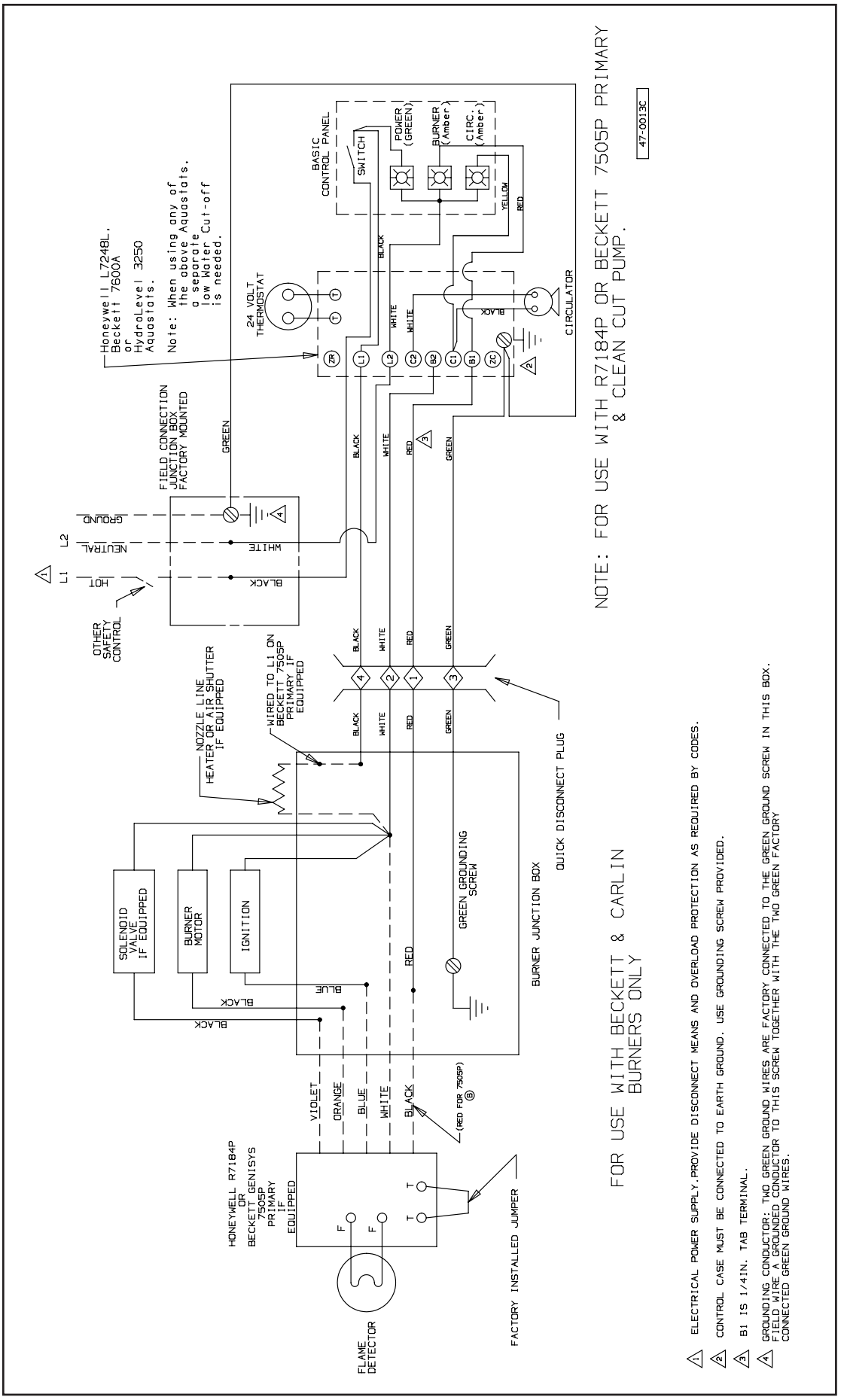
III. OIL BURNER

All service to the oil burner, oil filter, oil strainer, etc., should be performed by a professionally trained service person. Inspect and clean annually and following any period of improper operation. Recheck and adjust settings as specified for burner model and nozzle size. Set burner air and draft regulator, using test instruments to obtain recommended CO_2 and draft without smoke. See the Burner Data page in this manual that corresponds to the burner installed.

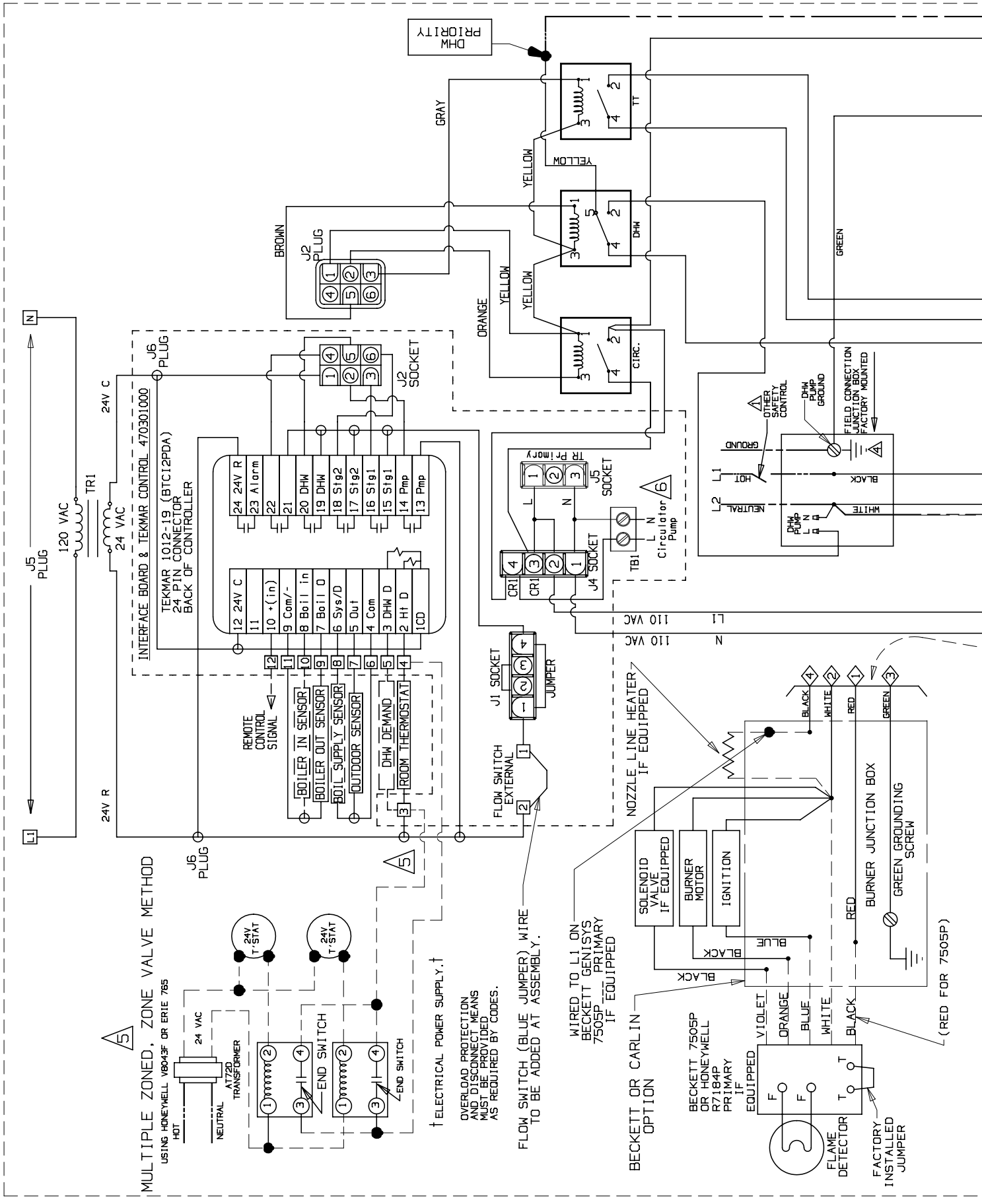
IV. GENERAL MAINTENANCE

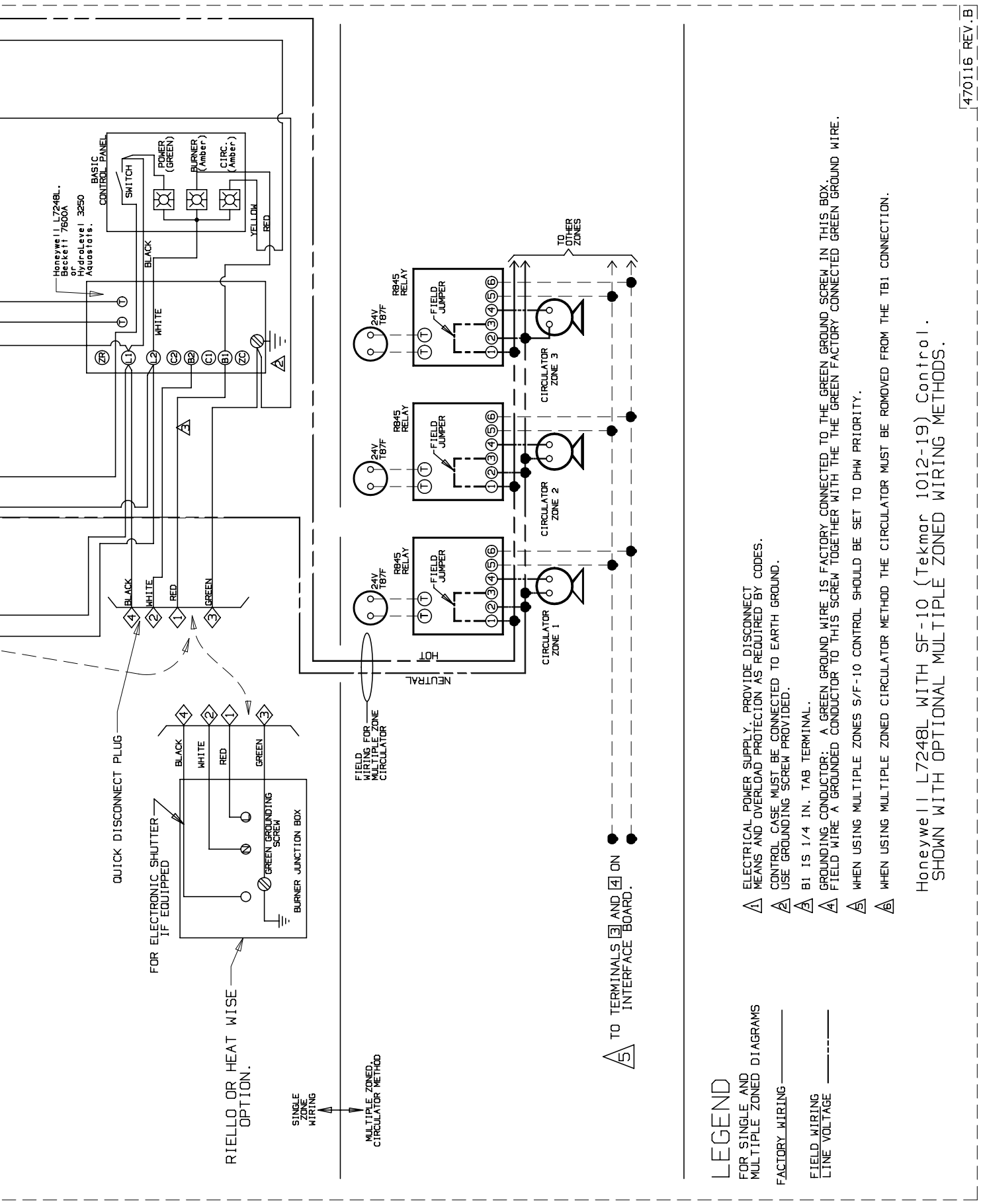
These operations are recommended to be performed at regular intervals:

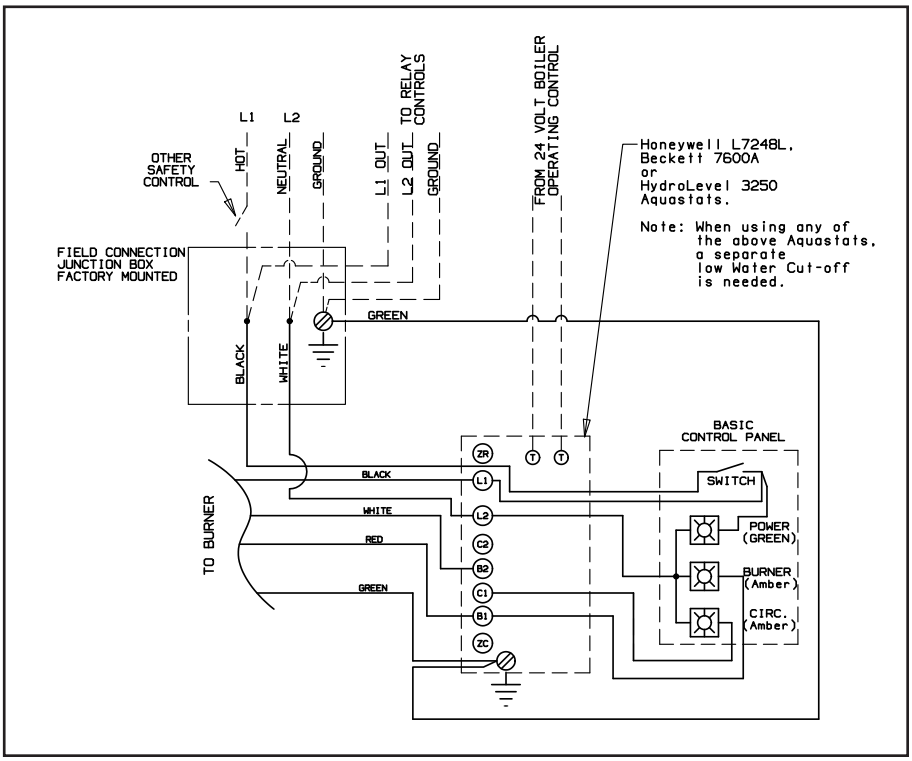
A. BOILER HEATING SURFACES: clean off all coatings found. Reseal covers.
B. BOILER CONTROLS: check contacts, settings, correct functioning.
C. PIPING: check piping and accessories for leaks.
D. CHIMNEY or STUB VENT and BREECHING: check for obstructions and leaks.
E. COMBUSTION AIR TO BURNER: check for continued POSITIVE supply of air as required. Air needs are greatest in coldest weather. Refer to AIR SUPPLY, page 3.
F. WATER SYSTEM: check
   1. System to be full of water and pressure to remain stable (between 12 psi and 25 psi).
   2. Air-control system: noise and air binding in radiation should not occur.
   3. Water lines: slightest leaks should be corrected.
G. BOILER ROOM AIR SUPPLY: air vents should be open and free of obstruction. See page 3.



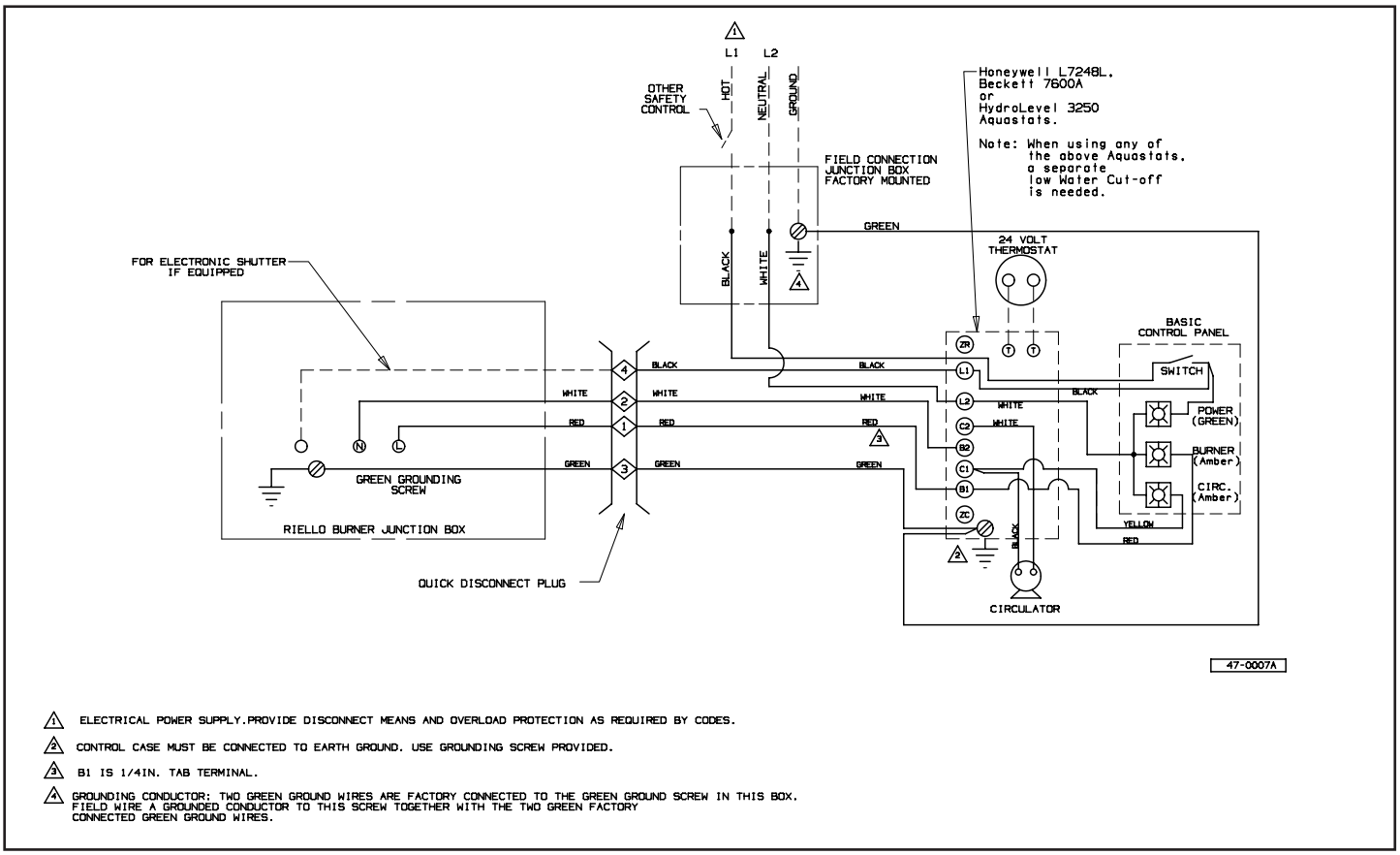
Electronic Aquastat Control and Honeywell R7184P Primary Single Zone Wiring for Beckett & Carlin Burners Only.


DHW PRIORITY
GRAY
YELLOW
BROWN
ORANGE
GREEN
TT
DHW
CIRC.
J2 PLUG
J2 SOCKET
J6 PLUG
J5 PLUG
120 VAC
24 VAC
TR1
24V C
24V R
INTERFACE BOARD & TEKMAR CONTROL 470301000
TEKMAR 1012-19 (BTC12PDA)
24 PIN CONNECTOR
BACK OF CONTROLLER
12 24V C
11
10 +(in)
9 Com/-
8 Boil in
7 Boil O
6 Sys/D
5 Out
4 Com
3 DHW D
2 Ht D
1CD
24 24V R
23 Alarm
22
21
20 DHW
19 DHW
18 Stg2
17 Stg2
16 Stg1
15 Stg1
14 Pmp
13 Pmp
REMOTE CONTROL SIGNAL
BOILER IN SENSOR
BOILER OUT SENSOR
BOIL SUPPLY SENSOR
OUTDOOR SENSOR
DHW DEMAND
ROOM THERMOSTAT
J1 SOCKET
JUMPER
FLOW SWITCH EXTERNAL
TR Primary
J5 SOCKET
J4 SOCKET
CR1
CR1
TB1
Circulator Pump
OTHER SAFETY CONTROL
DHW PUMP GROUND
FIELD CONNECTION JUNCTION BOX FACTORY MOUNTED
GROUND
L1 HOT
L2 NEUTRAL
BLACK
WHITE
DHW PUMP L N
110 VAC L1
110 VAC N
NOZZLE LINE HEATER IF EQUIPPED
BLACK
WHITE
RED
GREEN
BURNER JUNCTION BOX
GREEN GROUNDING SCREW
SOLENOID VALVE IF EQUIPPED
BURNER MOTOR
IGNITION
BLUE
BLACK
RED
(RED FOR 7505P)
WIRED TO L1 ON BECKETT GENISYS 7505P PRIMARY IF EQUIPPED
BECKETT OR CARLIN OPTION
BECKETT 7505P OR HONEYWELL R7184P PRIMARY IF EQUIPPED
VIOLET
ORANGE
BLUE
WHITE
BLACK
F
F
T
T
FLAME DETECTOR
FACTORY INSTALLED JUMPER
5
MULTIPLE ZONED, ZONE VALVE METHOD
USING HONEYWELL V8043F OR ERIE 765
HOT
NEUTRAL
24 VAC
AT72D TRANSFORMER
24V T'STAT
24V T'STAT
END SWITCH
END SWITCH
†ELECTRICAL POWER SUPPLY.†
OVERLOAD PROTECTION AND DISCONNECT MEANS MUST BE PROVIDED AS REQUIRED BY CODES.
FLOW SWITCH (BLUE JUMPER) WIRE TO BE ADDED AT ASSEMBLY.


Honeywell L7248L.
Beckett 7800A
or
HydroLevel 3250
Aquastats.
BASIC CONTROL PANEL
SWITCH
POWER (GREEN)
BURNER (Amber)
CIRC. (Amber)
YELLOW
RED
BLACK
WHITE
ZR
L1
L2
C2
B2
C1
B1
ZC
BLACK
WHITE
RED
GREEN
QUICK DISCONNECT PLUG
FOR ELECTRONIC SHUTTER IF EQUIPPED
GREEN GROUNDING SCREW
BURNER JUNCTION BOX
RIELLO OR HEAT WISE OPTION.
SINGLE ZONE WIRING
MULTIPLE ZONED CIRCULATOR METHOD
FIELD WIRING FOR MULTIPLE ZONE CIRCULATOR
HOT
NEUTRAL
24V T87F
R845 RELAY
FIELD JUMPER
CIRCULATOR ZONE 1
CIRCULATOR ZONE 2
CIRCULATOR ZONE 3
TO OTHER ZONES
5 TO TERMINALS 3 AND 4 ON INTERFACE BOARD.
LEGEND
FOR SINGLE AND MULTIPLE ZONED DIAGRAMS
FACTORY WIRING
FIELD WIRING LINE VOLTAGE
1 ELECTRICAL POWER SUPPLY. PROVIDE DISCONNECT MEANS AND OVERLOAD PROTECION AS REQUIRED BY CODES.
2 CONTROL CASE MUST BE CONNECTED TO EARTH GROUND. USE GROUNDING SCREW PROVIDED.
3 B1 IS 1/4 IN. TAB TERMINAL.
4 GROUNDING CONDUCTOR: A GREEN GROUND WIRE IS FACTORY CONNECTED TO THE GREEN GROUND SCREW IN THIS BOX. FIELD WIRE A GROUNDED CONDUCTOR TO THIS SCREW TOGETHER WITH THE THE GREEN FACTORY CONNECTED GREEN GROUND WIRE.
5 WHEN USING MULTIPLE ZONES S/F-10 CONTROL SHOULD BE SET TO DHW PRIORITY.
6 WHEN USING MULTIPLE ZONED CIRCULATOR METHOD THE CIRCULATOR MUST BE ROMOVED FROM THE TB1 CONNECTION.
Honeywell L7248L WITH SF-10 (Tekmar 1012-19) Control.
SHOWN WITH OPTIONAL MULTIPLE ZONED WIRING METHODS.
470116 REV.B



Honeywell L 7248C–1030 Aquastat Control Multiple Zoned (Circulator or Zone Valve)

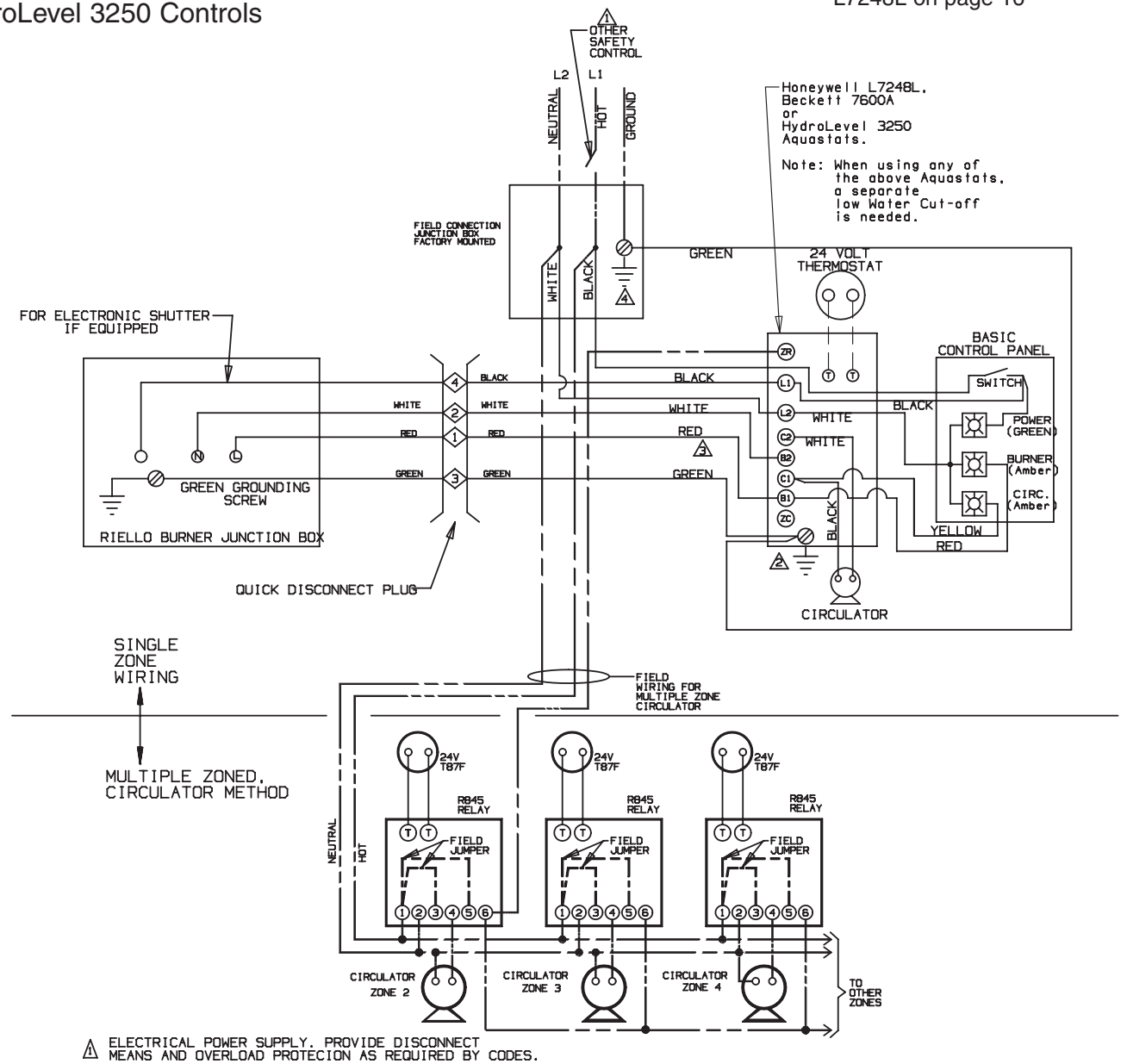


1. ELECTRICAL POWER SUPPLY. PROVIDE DISCONNECT MEANS AND OVERLOAD PROTECTION AS REQUIRED BY CODES.
2. CONTROL CASE MUST BE CONNECTED TO EARTH GROUND. USE GROUNDING SCREW PROVIDED.
3. B1 IS 1/4IN. TAB TERMINAL.
4. GROUNDING CONDUCTOR: TWO GREEN GROUND WIRES ARE FACTORY CONNECTED TO THE GREEN GROUND SCREW IN THIS BOX. FIELD WIRE A GROUNDED CONDUCTOR TO THIS SCREW TOGETHER WITH THE TWO GREEN FACTORY CONNECTED GREEN GROUND WIRES.

Single Zone, Heat Wise or Riello Burner

Honeywell L7248L, Beckett 7600A and HydroLevel 3250 Controls

See “Adjusting Settings” & “error Codes” for L7248L on page 16



1. ELECTRICAL POWER SUPPLY. PROVIDE DISCONNECT MEANS AND OVERLOAD PROTECION AS REQUIRED BY CODES.
2. CONTROL CASE MUST BE CONNECTED TO EARTH GROUND. USE GROUNDING SCREW PROVIDED.
3. B1 IS 1/4 IN. TAB TERMINAL.
4. GROUNDING CONDUCTOR: A GREEN GROUND WIRE IS FACTORY CONNECTED TO THE GREEN GROUND SCREW IN THIS BOX. FIELD WIRE A GROUNDED CONDUCTOR TO THIS SCREW TOGETHER WITH THE THE GREEN FACTORY CONNECTED GREEN GROUND WIRE.

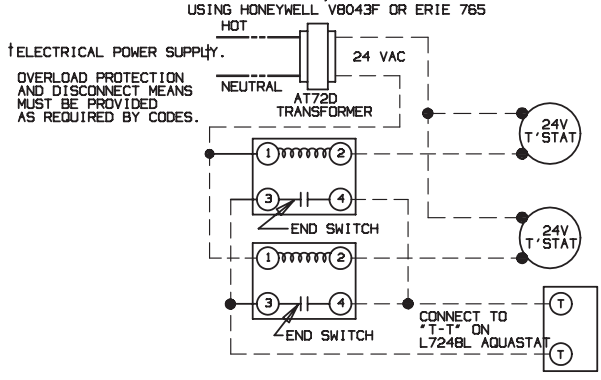
LEGEND
FOR SINGLE AND MULTIPLE ZONED DIAGRAMS

FACTORY WIRING ————

FIELD WIRING LINE VOLTAGE ——--——

24 VOLTS — — — —

MULTIPLE ZONED, ZONE VALVE METHOD
USING HONEYWELL V8043F OR ERIE 765



47-0108

FOR L7248L

ADJUSTING SETTINGS

To discourage unauthorized changing of Aquastat settings, a procedure to enter the ADJUSTMENT mode is required. To enter the ADJUSTMENT mode, press the UP, DOWN, and I buttons simultaneously for three seconds. Press the I button until the feature requiring adjustment is displayed:

. HL_ . High Limit.
. LL_ . Low Limit. (L7224 only)
. Ldf . Low Limit Differential. (L7224 only)
. °F . °C.
.ELL_ External Low Limit (L7248L only)

Then press the UP and/or DOWN buttons to move the set point to the desired value, to change between ˚F and C˚, or to enable (On) or disable (Off) the External Low Limit. After 60 seconds without any button inputs, the control will automatically return to the RUN mode.

DISPLAY

In the RUN mode, the Aquastat will flash .bt. (boiler temp) followed by the temperature (i.e., 220), followed by °F or °C.

To read boiler settings, press the I key to read the parameter of interest. For example, press I High Limit
(HL) is displayed, followed by a three-digit number, i.e., 220, followed by °F or °C. Pressing the I button again (on L7224 models) will display the Low Limit (LL) followed by a three-digit number and the corresponding degree designator.

After approximately 60 seconds without any key presses, the display will enter a dim display mode. To return to the bright display mode, simply press any key.

DESCRIPTION

Boiler Temperature – bt
High Limit – HL
Low Limit – LL
Low Limit Differential – LdF
Local Thermostat Status – tt
Enviracom Thermostat Status – ttE
Error Code – Err
Degrees Fahrenheit – oF
Degrees Celsius – oC

Error Code	Cause/Action
Err1	Sensor fault; check sensor.
Err2	ECOM fault; check EnviraCOM™ wiring
Err3	Hardware fault; replace control.
Err4	B1 fault; check B1 wiring/voltage.
Err5	Low Line; Check L1-L2, 110 Vac.
Err6	Fuse; Check ECOM wires, replace fuse.
Err7	EEPROM, HL, LL, Hdf, Ldf: reset to deault values. Restore desired settings.
Err8	Repeated B1 fault (no voltage present at B1 when output is turned on water temperature above 260F when voltage present at B1); check B1 wiring/voltage.

IMPORTANT

This boiler is equipped with a feature that saves energy by reducing the boiler water temperature as the heating load decreases. This feature is equipped with an override which is provided primarily to permit the use of an external energy management system that serves the same function. THIS OVERRIDE MUST NOT BE USED UNLESS AT LEAST ONE OF THE FOLLOWING CONDITIONS IS TRUE:

- An external energy management system is installed that reduces the boiler water temperature as the heating load decreases.
- This boiler is not used for any space heating
- This boiler is part of a modular or multiple boiler system having a total input of 300,000 BTU/hr or greater.
- This boiler is equipped with a tankless coil.

AQUASMART QUICK REFERENCE GUIDE

To ensure smooth appliance operation, the AquaSmart requires a separation between the High and Low limits no less than the greater differential plus 5°F.

For example: If the High Limit is set to 180°F, the High Diff to 20°F, and the Low Diff to 10°F, the control will not allow a Low Limit above 155°F (180°F - 20°F [the greater of the two differentials] - 5°F = 155°F).

A. Temperature High Limit

1. In any mode or screen other than an OPTION sub-menu, press the "HIGH LIMIT" key.
2. The temperature displayed is the current setting. Use the ▲ and ▼ keys to select the desired setting. Tap the button to increase or decrease the temperature by 1°, or hold it to increase or decrease the temperature by 5° at a time.
3. Press the "ENTER (RESET)" key. Confirm the setting by pressing "ENTER (RESET)" again if the value is correct, or "CANCEL (BACK)" if it is not.

B. Temperature Low Limit

1. In any mode or screen other than an OPTION sub-menu, press the "LOW LIMIT" key.
2. The temperature displayed is the current setting. Use the "▲" and "▼" keys to select the desired setting. Tap the button to increase or decrease the temperature by 1°, or hold it to increase or decrease the temperature by 5° at a time. For cold-start operation, turn the low limit off by pressing the down arrow key repeatedly until OFF is displayed. IMPORTANT: To prevent flue gas condensation and reduce fatigue caused by thermal cycling on conventional (non-condensing) boilers, the LOW LIMIT set point should be 150° F or above.

   NOTE: Boiler manufacturer's temperature requirements supersede this recommendation.
3. Press the "ENTER (RESET)" key. Confirm the setting by pressing "ENTER (RESET)" again if the value is correct, or "CANCEL (BACK)" if it is not.

C. Temperature High Limit Differential

1. In any mode or screen other than an OPTION sub-menu, press the "HIGH DIFF" key.
2. The temperature displayed is the current setting. Use the "▲" and "▼" keys to select the desired setting. Tap the button to increase or decrease the temperature by 1°, or hold it to increase or decrease the temperature by 5° at a time.
3. Press the "ENTER (RESET)" key. Confirm the setting by pressing "ENTER (RESET)" again if the value is correct, or "CANCEL (BACK)" if it is not.

D. Temperature Low Limit Differential

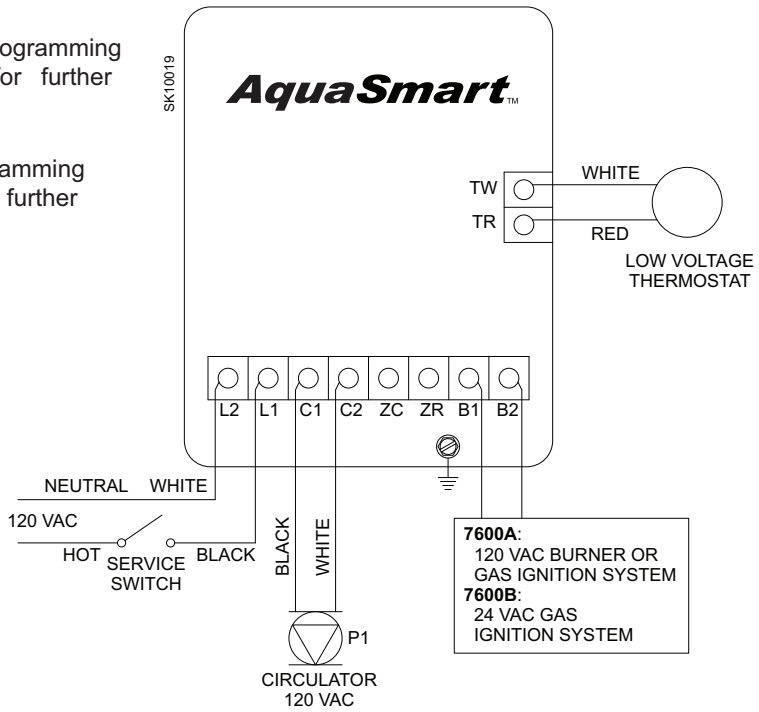
1. In any mode or screen other than an OPTION sub-menu, press the "LOW DIFF" key.
2. The temperature displayed is the current setting. Use the "▲" and "▼" keys to select the desired setting. Tap the button to increase or decrease the temperature by 1°, or hold it to increase or decrease the temperature by 5° at a time.
3. Press the "ENTER (RESET)" key. Confirm the setting by pressing "ENTER (RESET)" again if the value is correct, or "CANCEL (BACK)" if it is not.

7600A single-zone connections without a tankless coil

Control Wiring:

1. Set "DHWP OFF" (default, see programming section of the ***Owner's Manual*** for further instructions)

2. Set "C1 on TT" (default, see programming section of the ***Owner's Manual*** for further instructions)



BURNER DATA—CARLIN BURNERS FOR PACKAGED BOILERS ONLY

Boiler Model	Burner Model	Blast Tube	Firing Rate GPH	Nozzles			Oil Pump (PSIG)	Head Adjusting Plate †	Approx. Air Band Setting	Shutter Non-Adjustable
				Size GPH	Angle & Type	MFR.				
EC-13	EZ-1HP	7" Long	0.65	0.5	45˚A	Delavan	170	.60/.65	0.53	Blank
			0.7	0.5	45˚A	Delavan	195	.60/.65	0.55	Blank
EC-14	EZ-1HP	7" Long	0.8	0.65	60˚B	Delavan	150	.60/.65	0.6	Blank
			0.9	0.75	60˚B	Delavan	145	0.75	0.65	Blank
EC-15	EZ-1HP	7" Long	1	0.85	60˚B	Delavan	138	.85/1.00	0.75	Blank
			1.1	0.85	60˚B	Delavan	168	.85/1.00	0.85	Blank
EC-16	EZ-1HP	7" Long	1.15	0.85	60˚B	Delavan	185	.85/1.00	0.9	Blank
			1.25	1	60˚B	Delavan	155	1.10/1.25	0.9	Blank

† Head settings shown are approximate ONLY. See “START-UP” on page 8.

NOTES:
(1) Insertion depth is 4.5".
(2) See “PRECAUTIONS BEFORE STARTING OIL BURNERS” and “START-UP” on page 8 and burner figures on this page.
(3) All burner models shown are single stage.

It is suggested that due to the positive pressure observed in the chamber that the air tube hole and any other passages of the flue gas leakages be sealed to avoid combustion gas fumes from leaking into the boiler room.

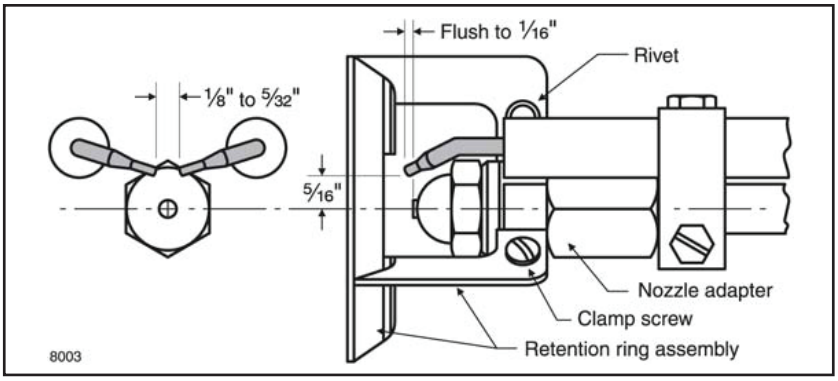


Figure 5. *Electrode placement, retention ring assembly and nozzle adapter.*

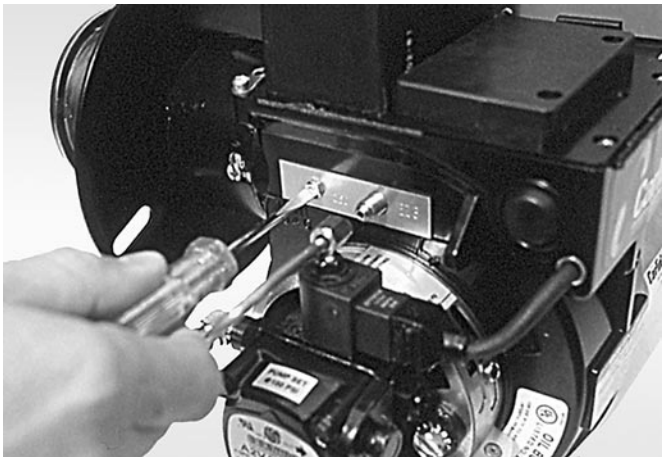


Figure 6. *Installing head positioning bar.*

BURNER DATA—BECKETT BURNERS FOR PACKAGED BOILERS ONLY

Boiler Model	Burner Model	Blast Tube	Firing Rate		Nozzles				Oil Pump		Approx. Head Setting †	Approx. Air Shutter Setting †	Approx. Air Band Setting
					Size		Angle & Type	MFR.					
			GPH	L/hr.	GPH	L/hr.			(PSIG)	kPa.			
EC-13	AFG(MB)	L2	0.65	2.46	0.5	1.89	60˚AS	Danfoss	170	1172	n/a	# 9	Closed
			0.7	2.65	0.5	1.89	60˚AS	Danfoss	195	1345	n/a	# 10	Closed
			0.65	2.46	0.5	1.89	60˚ W	Delavan	170	1172	n/a	# 9	Closed
			0.7	2.65	0.5	1.89	60˚ W	Delavan	195	1345	n/a	# 10	Closed
EC-14	AFG(MB)	L2	0.8	302	0.65	2.46	60˚ W	Delavan	150	1034	n/a	# 10	# 3
			0.9	3.40	0.75	2.84	60˚ W	Delavan	145	1000	n/a	# 8.5	Closed
EC-15	AFG(MB)	L1	1	3.78	0.75	2.84	60˚ B	Delavan	178	1227	n/a	# 10	# 1
			1.1	4.16	0.85	3.21	60˚ B	Delavan	168	1158	n/a	# 10	# 3
EC-16	AFG(MB)	V1	1.15	4.35	0.85	3.21	60˚ W	Delavan	185	1276	# 0	# 9	Closed
			1.15	4.35	0.85	3.21	60˚ B	Hago	185	1276	# 0	# 9	Closed

† Air shutter and head settings shown are approximate ONLY. See “START-UP” on page 8.

NOTES:
(1) Use 2 Slot air band for all models.
(2) See “PRECAUTIONS BEFORE STARTING OIL BURNERS” and “START-UP” on page 8 and burner figures on this page.
(3) All burner models shown are single stage.
(4) EC-13 and EC-14 are supplied with low fire baffle (Beckett # 5880) installed. Remove it when using .90 GPH.
(5) Use 3-3/8" U static disc for EC-13 and EC-14. Use 2-3/4" U for EC-15 an EC-16.

It is suggested that due to the positive pressure observed in the chamber that the air tube hole and any other passages of the flue gas leakages be sealed to avoid combustion gas fumes from leaking into the boiler room.

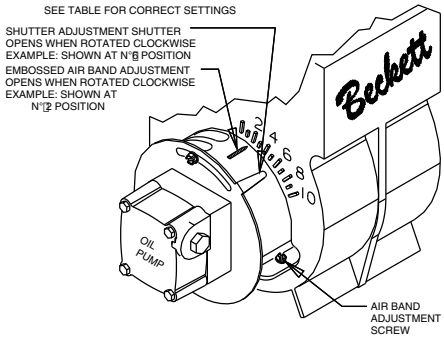


Figure 7.

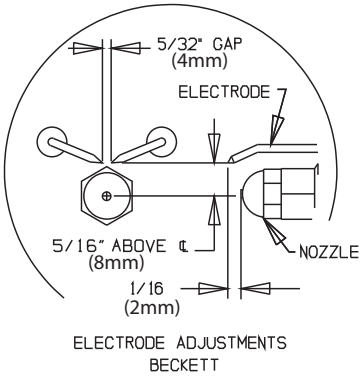
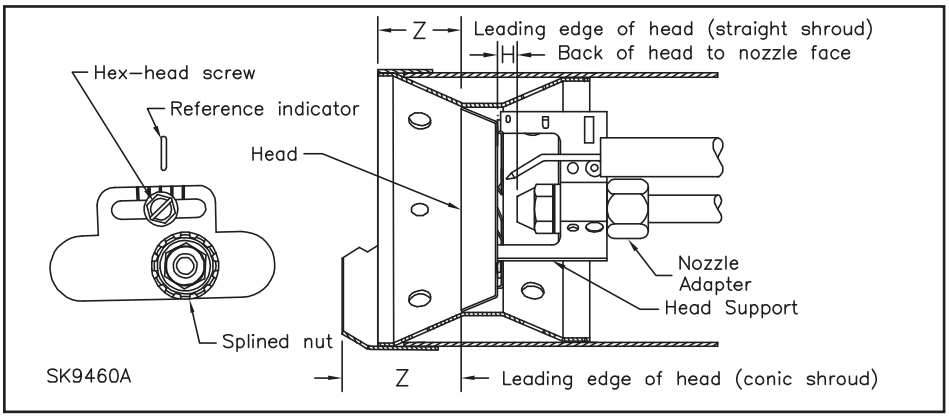


Figure 8.

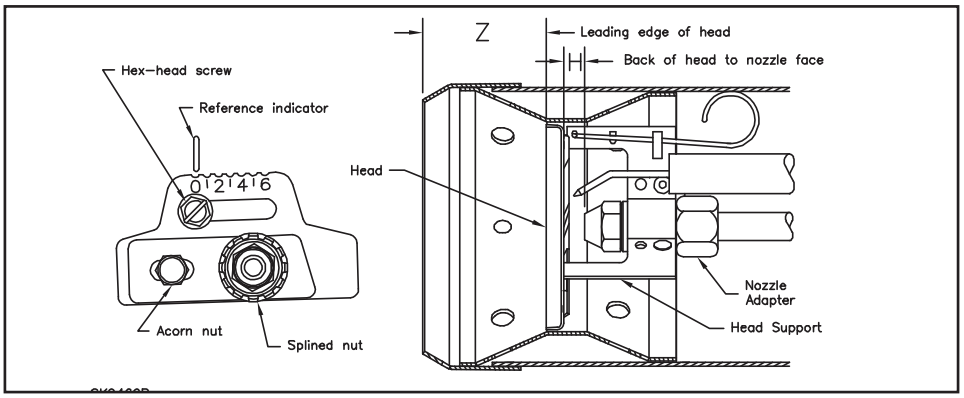
Check/Adjust "Z" Dimension – L1 & L2 Heads



Head Adjustment L1 & L2 Beckett Head ***Figure 9.***

1. See figure above. The important "Z" dimension is the distance from the leading edge of the head to the end of the air tube. This distance for L1 and L2 heads is 1-3/8" (35mm) if the tube has a straight shroud or 1-3/4" (44mm) if the air tube has a conic shroud. The "Z" dimension is factory set for burners shipped with the air tube installed. Even if factory set, verify that the "Z" dimension has not been changed.
2. Use the following procedure to adjust the "Z" dimension, if it is not correct:
   - Turn off power to the burner
   - Disconnect the oil connector tube from the nozzle line.
   - Refer to figure. Loosen the splined nut from the nozzle line. Loosen the hex head screw securing the escutcheon plate to the burner housing.
   - Place the end of a ruler at the leading edge of the head and, using a straight edge across the end of the air tube, measure the distance to the end of the tube. A Beckett T501 gauge may also be used.
   - Slide the nozzle line forward or back until this dimension is 1-3/8" (35mm) for L1 & L2 heads if the tube has a straight shroud, or 1-3/4" (44mm) if the air tube has a conic shroud.
   - Tighten the hex head screw to secure the escutcheon plate to the burner chassis. Then tighten the splined nut and attach the oil connector tube.
3. Recheck the "Z" dimension periodically when servicing to ensure the escutcheon plate has not been moved. You will need to reset the "Z" dimension if you replace the air tube or nozzle line assembly.

Check/Adjust "Z" Dimension – V1 Heads



Head Adjustment V1 Beckett Head ***Figure 10.***

1. See figure above. The important "Z" dimension is the distance from the leading edge of the head to the end of the air tube. This distance for V1 heads is 1-3/4". The "Z" dimension is factory set for burners shipped with the air tube installed. Even if factory set, verify that the "Z" dimension has not been changed.
2. Use the following procedure to adjust the "Z" dimension, if it is not correct:
   - Turn off power to the burner.
   - Disconnect the oil connector tube from the nozzle line.
   - See figure above. Loosen the splined nut from the nozzle line. Loosen the hex head screw securing the head adjusting plate to the burner housing.
   - Loosen the acorn nut. Move the head adjusting plate until the "O" lines up with the reference indicator on the housing, and retighten the hex head screw. Place the end of a ruler at the leading edge of the head and, using a straight edge across the end of the air tube, measure the distance to the end of the tube. A Beckett T501 gauge may also be used.
   - Slide the nozzle line forward or back until this dimension is 1-3/4" (44mm) for V1 heads. Tighten the acorn nut.
   - Tighten the hex head screw to secure the head adjusting plate to the burner chassis. Then tighten the splined nut and attach the oil connector tube.
3. Recheck the "Z" dimension periodically when servicing to ensure the escutcheon plate has not been moved. You will need to reset the "Z" dimension if you replace the air tube or nozzle line assembly.

BURNER DATA - RIELLO BURNERS FOR PACKAGED BOILERS ONLY
(RIELLO R-40 SERIES W/SHORT TUBE)

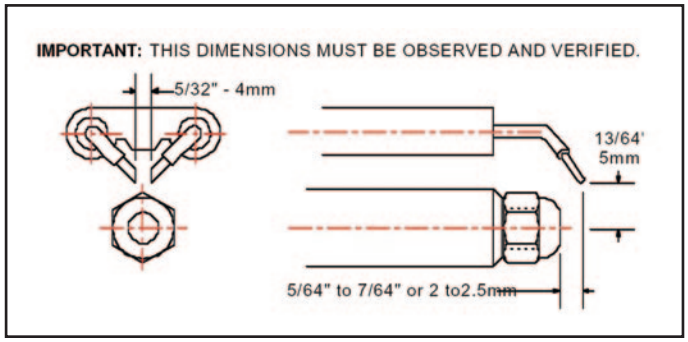
Boiler Model	Burner Model	Blast Tube	Firing Rate		Nozzles				Oil Pump (PSIG)		Approx. Head Setting †	Approx. Air Setting †
					Size		Angle & Type	MFR.				
			GPH	L/hr	GPH	L/hr			(PSIG)	kPa		
EC-13	F-3	#271T1 6" Tube	0.65	2.46	0.55	2.08	80˚A	Delavan	140	965	1	3.75
			0.7	2.65	0.55	2.08	80˚A	Delavan	162	1117	1	4.1
EC-14	F-5	#271T1 6" Tube	0.8	3.02	0.65	2.46	60˚B	Delavan	150	1034	0	2.3
			0.9	3.40	0.75	2.84	60˚B	Delavan	145	1000	1	2.5
EC-15	F-5	#271T1 6" Tube	1.00	3.78	0.85	3.21	60˚W	Delavan	138	952	1	2.6
			1.1	4.16	0.85	3.21	60˚W	Delavan	168	1158	1	3
EC-16	F-5	#271T1 6" Tube	1.15	4.35	0.85	3.21	60˚B	Delavan	185	1276	2	2.8
			1.25	4.73	1.00	3.78	60˚B	Delavan	155	1069	2	3.2

† Air shutter and head settings shown are approximate ONLY. See START-UP page 8. Seal joint between flange and air tube with a suitable high temperature sealant.

NOTE: Insertion depth is 5" (127mm)+.

It is suggested that due to the positive pressure observed in the chamber that the air tube hole and any other passages of the flue gas leakages be sealed to avoid combustion gas fumes from leaking into the boiler room.

***Figure 11A. Riello 40 Series**. Model F-3 & F-5 Electrode Setting*



BURNER DATA - RIELLO (continued)

REGULATION OF THE TURBULATOR AND AIR SHUTTER FOR PROPER COMBUSTION

Turbulator Setting

1. Loosen nut, 1, then turn the screw, 2, until the index marker, 3, is aligned with the correct index number.
2. Retighten the retaining nut, 1.

TURBULATOR SETTINGS - RIELLO 40 SERIES

The numbers on the casting are there to denote the high and low end of the scale - in all cases the first mark is “Zero”.

The air/oil ratio depends on accurate setting of the turbulator disc. Be careful when making this adjustment as an incorrect setting will result in an unsatisfactory installation. See figure 12A and 12B.

1. Regulation of the combustion air flow is made by adjustment of the manual AIR ADJUSTMENT PLATE (4) after loosening the FIXING SCREWS (3&5). The initial setting of the air adjustment plate should be made according to figure 13.
2. The proper number on the manual AIR ADJUSTMENT PLATE (4) should line up with the SETTING INDICATOR (2) on the fan housing cover. Once set, the air adjustment plate should be secured in place by tightening SCREWS 3 and 5.
3. The final position of the air adjustment plate will vary on each installation. Use instruments to establish the proper settings for maximum CO_2 and a smoke reading of zero.

NOTE: 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.

Figure 12A. *Model F-5*

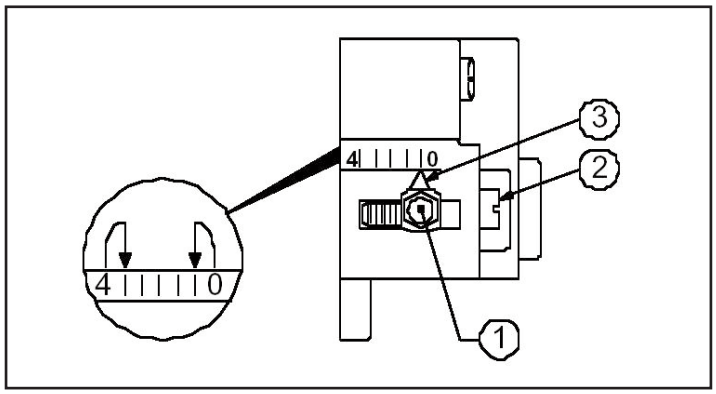


Figure 12B. *Model F-3*

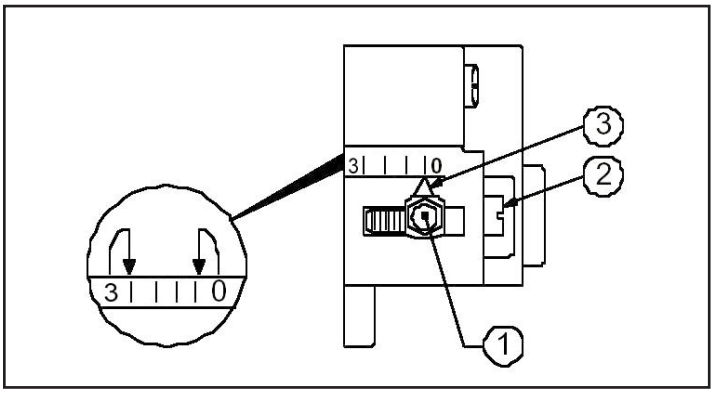
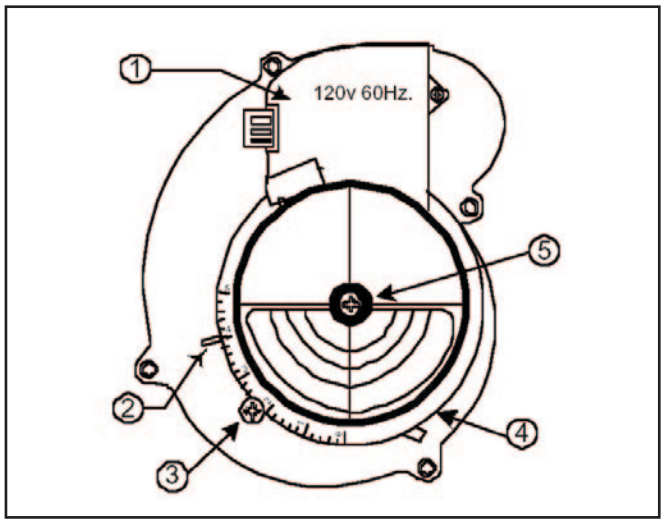


Figure 13. *Model F-3, F-5 Air Adjustment*



SETTING THE AIR ADJUSTMENT PLATE

Note: For F-3 and F-5 models, the air shutter is operated on a 120V 60 Hz. motor, the burner will not operate until the air shutter is in its fully open position.

Notes:

SLANT/FIN CORPORATION, Greenvale, N.Y. 11548 • Phone: (516) 484-2600
FAX: (516) 484-5921 • *Canada: Slant/Fin LTD/LTEE, Mississauga, Ontario*
www.slantfin.com