WEIL-McLAIN

EG/PEG

Series 7
Natural Gas-Fired Boilers

Boiler Manual

- **Installation**
- **Startup**
- **Maintenance**
- **Parts**

Now featuring Unity-CI Control with Built-In Low Water Cut Off Functionality (EG Water Only)

⚠ WARNING

Installation and service of the boiler must be performed by a qualified installer or service technician. Read all instructions, including this manual and all other information shipped with the boiler, before installation or operation. Perform steps in the order given. Failure to comply could result in severe personal injury, death or substantial property damage.

Part Number 550-100-225/0425

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Abbreviations

Table 1 Common abbreviations

Abbreviation	Description
AHD	Additional Heat Demand
AMP	Ampere or Amperage
ANSI	American National Standards Institute
BMS	Building Management System
BTUH	British Thermal Unit per Hour
CAD	Combustion Air Damper
CH	Comfort Heat
CP	Consumer Protection
CSA	Canadian Standards Association
DHW	Domestic Hot Water
LWCO	Low Water Cut-Off
MBH	Thousands of Btuh
NFPA	National Fire and Protection Agency
ODR	Outdoor Reset
ODT	Outdoor Temperature
P/T	Pressure and Temperature
VAC	Volts Alternating Current
VDC	Volts Direct Current
WWSD	Warm Weather Shut Down

Tools

Table 2 Tools

Tools Needed	Purpose
1/16" flat blade screwdriver	Wiring on terminal blocks
Flat blade screwdriver	Adjusting gas valve
5/16" socket	Burner access shield screws
Phillips head screwdriver	Jacket screws
Pipe wrenches	Gas train installation
Manometer (inclined or digital)	Measuring the gas pressure coming to the boiler

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Section 1
Safety

Hazard Definitions

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

DANGER

Indicates presence of hazards that **will result in severe** personal injury, death or substantial property damage.

WARNING

Indicates presence of hazards that **can result in severe** personal injury, death or substantial property damage.

CAUTION

Indicates presence of hazards that **will or can result in minor** personal injury or property damage.

NOTICE

Indicates special instructions on installation, operation or maintenance that are important but not related to personal injury or property damage.

Glycol — potential fire hazard —

All glycol is flammable when exposed to high temperatures. If glycol is allowed to accumulate in or around the boiler or any other potential ignition source, a fire can develop. In order to prevent potential severe personal injury, death or substantial property damage from fire and/or structural damage:

- **Never store glycol of any kind near the boiler or any potential ignition source.**
- **Monitor and inspect the system and boiler regularly for leakage. Repair any leaks immediately to prevent possible accumulation of glycol.**
- **Never use automotive antifreeze or ethylene glycol in the system. Using these glycols can lead to hazardous leakage of glycol in the boiler system.**

1

Please Read Before Proceeding

⚠ WARNING

Installer— Read all instructions, including this manual and all other information shipped with the boiler, before installing. Perform steps in the order given to prevent personal injury or death.

User — This manual is for use only by a qualified heating installer/service technician. Refer to User's Information Manual for your reference.

User — Have this boiler serviced/inspected by a qualified service technician, at least annually.

Failure to comply with the above could result in severe personal injury, death or substantial property damage.

NOTICE

Write in the Consumer Protection (CP) number in the space provided on the Installation certificate on **page 65** if not already shown.

When calling or writing about the boiler— Please have the boiler model number from the boiler rating label and the CP number from the boiler jacket.

Consider piping and installation when determining boiler location.

⚠ DANGER

If any part of a boiler, burner or its controls has been sprayed with or submerged under water, either partially or fully, DO NOT attempt to operate the boiler until the boiler has been either replaced or completely repaired, inspected, and you are sure that the boiler and all components are in good condition and fully reliable.

Otherwise, by operating this boiler, you will cause a fire or explosion hazard, and an electrical shock hazard, leading to serious injury, death, or substantial property damage.

Saltwater Damage — The exposure of boiler components to saltwater can have both immediate and long-term effects. While the immediate effects of saltwater damage are similar to those of freshwater (shorting out of electrical components, washing out of critical lubricants, etc.), the salt and other contaminants left behind can lead to longer term issues after the water is gone due to the conductive and corrosive nature of the salt residue. Therefore, Weil-McLain equipment contaminated with saltwater or polluted water will no longer be covered under warranty and should be replaced.

Electrical Damage — If any **electrical component** or **wiring** came into contact with water, or was suspected to have come into contact with water, replace the boiler with a new Weil-McLain boiler.

⚠ WARNING

Failure to adhere to the guidelines below can result in severe personal injury, death or substantial property damage.

When Servicing Boiler —

- To avoid electric shock, disconnect all electrical supplies to the boiler before performing maintenance.
- To avoid severe burns, allow boiler to cool before performing maintenance.
- This boiler contains ceramic fiber and fiberglass materials. Refer to the WARNING and instructions on **page 91**.

Carbon Monoxide Detector —

- The installer must verify that at least one carbon monoxide alarm has been installed and is operational within a residential living space or home following the alarm manufacturer's instructions and applicable local codes before putting the appliance into operation.

Combustion Air —

- DO NOT install combustion air intake where there is a risk of combustion air contamination.

Boiler Water —

Before connecting the boiler, thoroughly flush the system to remove sediment. Install a strainer or other sediment removal equipment if necessary. The cast iron heat exchanger can be damamged by build-up or corrosion due to sediment.

- Do not use petroleum-based cleaning or sealing compounds in boiler system. Gaskets and seals in the system may be damaged. This can result in substantial property damage.
- Do not use "homemade cures" or "boiler patent medicines". Serious damage to boiler, personnel and/or property may result.
- Continual fresh makeup water will reduce boiler life. Mineral buildup in sections reduces heat transfer, overheats cast iron, and causes section failure. Addition of oxygen and other gases can cause internal corrosion. Leaks in boiler or piping must be repaired at once to prevent makeup water.
- Do not add cold water to a hot boiler. Thermal shock can cause heat exchanger to crack.

Freeze Protection Fluids —

- NEVER use automotive or standard glycol antifreeze. Use only freeze-protection fluids made for hydronic systems. Follow all guidelines given by the antifreeze manufacturer. Thoroughly clean and flush any replacement boiler system that has used glycol before installing the new boiler

⚠ CAUTION

Frozen Water Damage Hazard

Residences or buildings that are unattended in severely cold weather, boiler system components failures, power outages, or other electrical system failures could result in frozen plumbing and water damage in a matter of hours. For your protection, take preventative actions such as having a security system installed that operates during power outages, senses low temperature, and initiates an effective action. Consult with your boiler contractor or a home security agency.

Section 2
Installation

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Preparation

Boiler Location — Codes & Checklist

Installations must follow these codes:

2

- Local, state, provincial, and national codes, laws, regulations and ordinances.
- National Fuel Gas Code, ANSI Z223.1/NFPA 54 – latest edition.
- Where required by the authority having jurisdiction, the installation must conform to the Standard for Controls and Safety Devices for Automatically Fired Boilers, ANSI/ASME CSD-1 — latest edition.
- National Electrical Code, ANSI /NFPA 70 – latest edition.
- Canadian installations must comply with the Natural Gas and Propane Installation Code, CAN/CSA B149.1 or B149.2 Installation Codes.

Certification:

Commonwealth of Massachusetts

When the boiler is installed within the Commonwealth of Massachusetts:

- This product must be installed by a licensed plumber.
- If antifreeze is used, a reduced pressure back-flow preventer device shall be used.

NOTICE

Safe operating and other performance criteria were met with the gas manifold and control assembly provided on boiler when boiler underwent tests specified in ANSI Z21.13 – latest edition.

Before Locating the Boiler, Check the Following:

- Check for nearby connection to:
  - System water piping
  - Venting connections
  - Gas supply piping
  - Electrical power
- Check area around boiler. **Remove any combustible materials, gasoline and other flammable liquids, or other contaminants.**

⚠WARNING

Failure to keep boiler area clear and free of **combustible materials, gasoline and other flammable liquids and vapors** can result in severe personal injury, death or substantial property damage.

- Boiler must be installed so that gas control system components are protected from dripping or spraying water or rain during operation or service.
- If new boiler will replace existing boiler, check for and correct system problems, such as:
  1. System leaks causing oxygen corrosion or section cracks from hard water deposits.
  2. Incorrectly-sized expansion tank.
  3. Lack of antifreeze in boiler water causing system and boiler to freeze and leak.

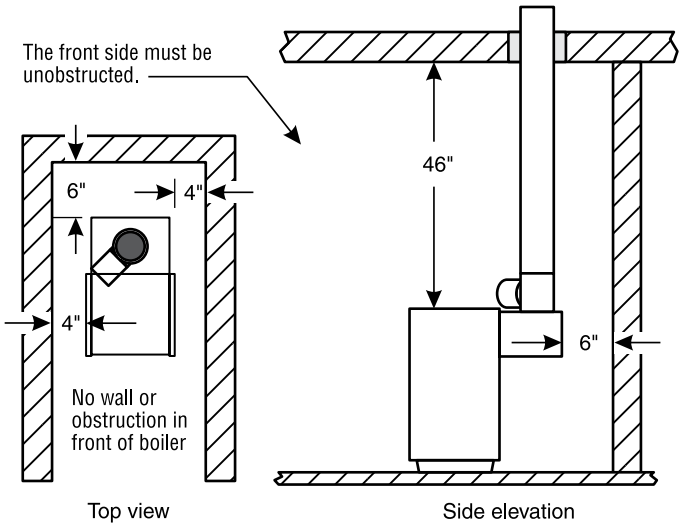
Preparation (continued)

Boiler Location — Clearances

Recommended Service Clearances

1. Provide minimum clearances for cleaning and servicing the boiler and for access to controls and components as listed in the table at right.
2. Provide at least screwdriver clearance to jacket front panel screws for removal of front panel for inspection and minor service. If unable to provide at least screwdriver clearance, install unions and shutoff valves in system so boiler can be moved for servicing.

Figure 1 Alcove installation (EG & PEG only)



Combustible Material Clearances

General

1. See **Table 1** for clearances to boiler and system components.
2. Clearances to Type B vent materials are as specified by the vent manufacturer.

Alcove (not closet) installations only

⚠ WARNING

EG and PEG boilers are not approved for closet installation.

EG and PEG boilers are approved for alcove installation, with minimum clearances to combustible surfaces as shown in **Table 1**. See **Figure 1**. The front side must be completely open — that is, a three-walled room.

Table 1 **EG**, **PEG** - Service and combustible materials clearances

EG, PEG - Clearance for service	**Minimum**
Clearance to boiler jacket	
Top (for cleaning flue ways)	46”
Front (for access to controls and components)	18”
Back	6”
Left side (for cleaning and servicing)	24”
Right side	6”

Clearance to combustible materials	**Minimum EG & PEG**
Clearance to boiler jacket	
Top	46”
Front (provides means of access)	3”
Back	6”
Left side (provides means of access)	4”
Right side	4”
Clearance to piping and vent components	
Water and steam pipes	1/2”
Vent pipe (other than Type B vent)	6”
Type B vent piping	Per B vent manufacturer
Vent damper	6”

Residential Garage Installations

Take the following special precautions when installing the boiler in a residential garage. If the boiler is located in a residential garage, per ANSI Z223.1, – latest edition:

- Mount the boiler a minimum of **18 inches above the floor** of the garage to assure the burner and ignition devices will be no less than 18 inches above the floor.
- Locate or **protect the boiler** so it cannot be damaged by a moving vehicle.

Preparation (continued)

Flooring and Foundation

⚠ WARNING

Do not install boiler on combustible flooring or carpeting even if a concrete or aerated foundation is used. Fire can result, causing severe personal injury, death or substantial property damage.

1. See **Figure 2**. A level concrete or solid brick pad is required if:
   - There is a possibility of the floor becoming flooded.
   - Non-level conditions exist.
2. An aerated boiler foundation is recommended if any of the following conditions exist:
   a. Electrical wiring or telephone cables buried in the concrete floor of the boiler room.
   b. Concrete floor is “green.”
   c. There is a history of the floor becoming flooded.
   d. Water is channeled under the concrete.

Figure 2 Boiler foundation

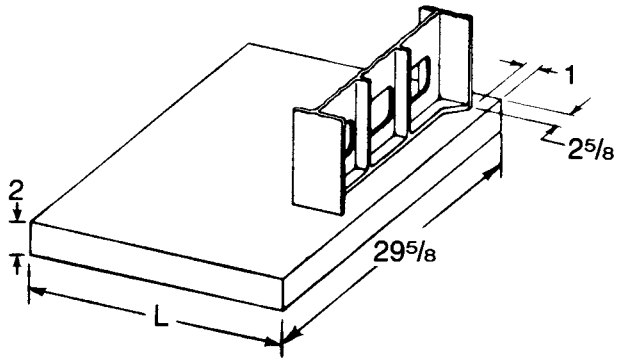


Table 2 Minimum foundation size

Boiler Foundation Size - Inches	
Boiler No.	**“L”**
EG 30-35	19”
EG 40-45	23 1/4”
EG 50-55	27 1/2”
EG 65	31 3/4”
EG 75	36”

Boiler Location — Vent System

⚠ WARNING

Failure to follow all instructions can result in flue gas spillage and carbon monoxide emissions, causing severe personal injury or death.

⚠ DANGER

- **Inspect existing chimney before installing boiler. Failure to clean or replace perforated pipe or tile lining will cause severe personal injury or death.**
- **Do not alter boiler draft diverter or place any obstruction or non-certified vent damper in breeching or vent system. CSA certification will become void. Flue gas spillage and carbon monoxide emissions will occur causing severe personal injury or death.**

NOTICE

The following requirements apply when you remove an existing boiler from a vent system shared with other appliances. If the new boiler will not use the common vent, you must test (as described below) each remaining appliance — operating by itself — to verify that the vent system operates adequately.

When Removing Boiler from an Existing Common Vent System:

At the time of removal of an existing boiler, the following steps shall be followed with each appliance remaining connected to the common venting system placed in operation, while the other appliances remaining connected to the common venting system are not in operation.

a. **Seal any unused openings** in the common venting system.

b. **Visually inspect the venting system** for proper size and horizontal pitch and determine there is no blockage or restriction, leakage, corrosion or other deficiencies which could cause an unsafe condition.

c. **Test vent system —** Insofar as is practical, close all building doors and windows and all doors between the space in which the appliances remaining connected to the common venting system are located and other spaces of the building. Turn on clothes dryers and any appliance not connected to the common venting system. Turn on any exhaust fans, such as range hoods and bathroom exhausts, so they will operate at maximum speed. Do not operate a summer exhaust fan. Close fireplace dampers.

d. **Place in operation** the appliance being inspected. Follow the operating instructions. Adjust thermostat so appliance will operate continuously.

Preparation (continued)

e. Test for spillage at draft diverter relief opening after 5 minutes of main burner operation. Use the flame of a match or candle.

f. After it has been determined that **each appliance** remaining connected to the common venting system properly vents when tested as outlined above, return doors, windows, exhaust fans, fireplace dampers, and any other gas-burning appliance to their previous conditions of use.

Any improper operation of the common venting system should be corrected so the installation conforms with the National Fuel Gas Code, ANSI Z223.1/NFPA 54 – latest edition and/or Natural Gas Installation Code, CAN/CGA B149 or B149.2, 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 the National Fuel Gas Code, ANSI Z223.1/NFPA 54 – latest edition and/or Natural Gas Installation Code, CAN/CSA B149.1 or B149.2, Installation Codes.

Chimney or Vent Requirements

1. Venting must be installed according to the National Fuel Gas Code, ANSI Z223.1/NFPA 54 – latest edition and applicable building codes. Canadian installations must comply with Natural Gas Installation Code, B149.1 or B149.2 Installation Codes.

2. See Ratings table on **page 89** for minimum chimney or vent sizes.

- Chimney or vent termination. A chimney, or any vent other than a Type B vent with listed vent cap, must extend at least 3 feet above the highest point where it passes through a roof of a building, and at least 2 feet higher than any portion of a building within a horizontal distance of 10 feet.
- Type B vents with listed caps may terminate as in **Figure 3** if no closer than 8 feet from a vertical wall or similar obstruction.
- Otherwise, Type B vents must terminate at least 2 feet above the roof penetration and at least 2 feet higher than any portion of a building within 10 feet.
- Ensure proper clearance above grade or snow line. Keep vents/air intake area clear of accumulating snow.

3. A lined chimney is preferred and must be used when required by local, state, provincial and national codes, laws, regulations and ordinances. Vitreous tile linings with joints that prevent retention of moisture and linings made of noncorrosive materials are best. Advice for flue connections and chimney linings can be obtained from local gas utility. **Type B** double-wall metal vent pipe or single-wall vent pipe may be used as a liner.

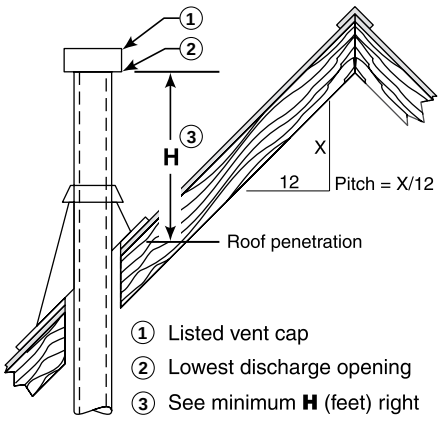
4. Cold masonry chimneys, also known as outside chimneys, typically have one or more walls exposed to outside air. When any atmospheric gas-fired boiler with automatic vent damper is vented through this type of chimney, the potential exists for condensation to occur. Condensation can damage a masonry chimney. The following are recommended to prevent possible damage.

a. Line chimney with corrosion-resistant metal liner such as AL29-4C® single-wall stainless steel or B-vent. Size liner per National Fuel Gas Code ANSI Z223.1/NFPA 54 – latest edition.

b. Provide drain trap to remove any condensate.

5. Where two or more gas appliances vent into a common chimney or vent, equivalent area should be **at least equal** to area of vent outlet on largest appliance **plus 50 percent** of vent outlet area on additional appliance.

Figure 3 Terminations with Type B vent fitted with listed cap, provided vent is at least 8 feet from any vertical wall or similar obstruction



Pitch	H (min) (feet)
Flat to 6/12	1.0
6/12 to 7/12	1.25
over 7/12 to 8/12	1.5
over 8/12 to 9/12	2.0
over 9/12 to 10/12	2.5
over 10/12 to 11/12	3.25
over 11/12 to 12/12	4.0
over 12/12 to 14/12	5.0
over 14/12 to 16/12	6.0
over 16/12 to 18/12	7.0
over 18/12 to 20/12	7.5
over 20/12 to 21/12	8.0

Preparation (continued)

Boiler Location — Air Contamination

Please review the following information on potential combustion air contamination problems. Refer to **Table 3** for products and areas which may cause contaminated combustion air.

⚠ WARNING

To prevent potential of severe personal injury or death, check for products or areas listed below before installing boiler. If any of these contaminants are found:

- remove contaminants permanently

  — OR —

- isolate boiler and provide outside combustion air. See national, provincial or local codes for further information.

Table 3 Corrosive contaminants and likely locations

Products to avoid	Areas likely to have contaminants
Spray cans containing chloro/fluorocarbons	Dry cleaning/laundry areas and establishments
Permanent wave solutions	Swimming pools
Chlorinated waxes/cleaners	Metal fabrication plants
Chlorine-based swimming pool chemicals	Beauty shops
Calcium chloride used for thawing	Refrigeration repair shops
Sodium chloride used for water softening	Photo processing plants
Refrigerant leaks	Auto body shops
Paint or varnish removers	Plastic manufacturing plants
Hydrochloric acid/muriatic acid	Furniture refinishing areas and establishments
Cements and glues	New building construction
Antistatic fabric softeners used in clothes dryers	Remodeling areas
Chlorine-type bleaches, detergents, and cleaning solvents found in household laundry rooms	Garages with workshops
Adhesives used to fasten building products and other similar products	Buildings under construction (where air is contaminated with particulates)
Airborne particulates (drywall dust, fiberglass particles, road or gravel dust, lint, etc.)	

Preparation (continued)

Boiler Location — Air Openings

⚠ WARNING

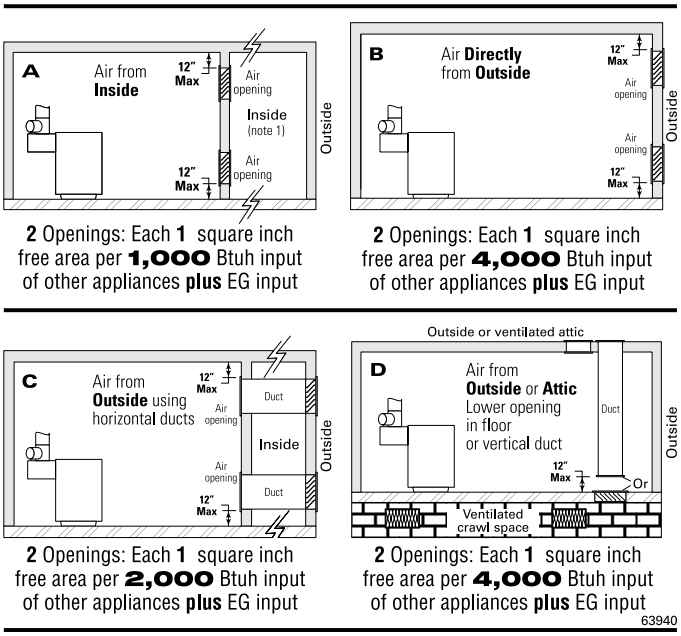
Provide adequate combustion and ventilation air to assure proper combustion and reduce the risk of severe personal injury, death or substantial property damage caused by flue gas spillage and carbon monoxide emissions.

Combustion air and ventilation openings must comply with the National Fuel Gas Code, ANSI Z223.1/NFPA 54 – latest edition, or applicable local building codes. Canadian installations must comply with Natural Gas Installation Code, B149.1 or B149.2 Installation Codes.

Air opening sizes in the following are given in free area (after correction for louver obstruction).

Air Opening Options

Option 1 — Provide (2) Openings:



2 Openings: Each **1** square inch free area per **1,000** Btuh input of other appliances **plus** EG input

2 Openings: Each **1** square inch free area per **4,000** Btuh input of other appliances **plus** EG input

2 Openings: Each **1** square inch free area per **2,000** Btuh input of other appliances **plus** EG input

2 Openings: Each **1** square inch free area per **4,000** Btuh input of other appliances **plus** EG input

Option 2 — Provide (1) Opening:

A single combustion air opening can be used, provided:

- The opening must commence within 12 inches of the ceiling.
- The boiler must have clearances of at least 1 inch from both sides and back, and 6 inches from the front.
- The opening must connect directly to the outdoors or to a space that communicates directly to the outdoors.
- The air can be provided through a direct opening or through a horizontal or vertical duct.
- The free area of the opening must be at least equal to the sum of all vent connectors in the space.
- The free area of the opening must be at least 1 square inch per 3000 Btu/hr input rating of all equipment located in the space.

Tight Construction — Definition:

Tight construction means (per ANSI Z223.1/NFPA 54 – latest edition):

- Walls and ceilings exposed to the outside atmosphere have a continuous water vapor retarder with a rating of 1 perm or less with openings gasketed AND
- Weather-stripping has been added on openable windows and doors AND
- 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.

Tight Construction Requirements

If building is of tight construction and air is taken from inside the building, provide two openings in building outside wall, one within 12 inches of ceiling, the other within 12 inches of the floor. Each opening must have a minimum free area of 1 square inch per 1,000 Btuh of all appliances in the building.

Exception

NO combustion air openings are needed when the boiler (and other appliances) are installed in a space with a volume NO LESS than 50 cubic feet per 1,000 Btuh of all installed appliances. Sum the total input of all appliances in MBH (1,000's of Btuh) and multiply this number times 50. Building must not be of Tight construction (see above).

Example: For total input of 100 MBH (100,000 Btuh), minimum volume is 50 x 100 = 5,000 cubic feet. At a ceiling height of 8 feet, space must have at least 5,000 ÷ 8 = 625 square feet (25 feet x 25 feet, for instance).

Exhaust Fans and Air Movers

The appliance space must never be under a negative pressure. 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.

Motorized Air Dampers

If the air openings are fitted with motorized dampers, electrically interlock the damper to:

Preparation

Boiler Location — Air Openings (continued)

- Prevent the boiler from firing if the damper is not fully open.
- Shut the boiler down should the damper close during boiler operation.

To accomplish this interlock, wire an isolated contact (proving the damper open) in series with the thermostat input to the boiler. The boiler will not start if this damper is closed, and will shut down should damper close during operation.

Placement and Setup

Place Boiler/Carton Near Position

1. **Leave boiler in carton and on pallet** until installation site is ready.
2. Move entire carton and pallet next to selected location.
3. Remove carton. **Leave boiler on pallet.**
4. Unbolt boiler from pallet.
5. Remove boiler from pallet.

Placing the Boiler

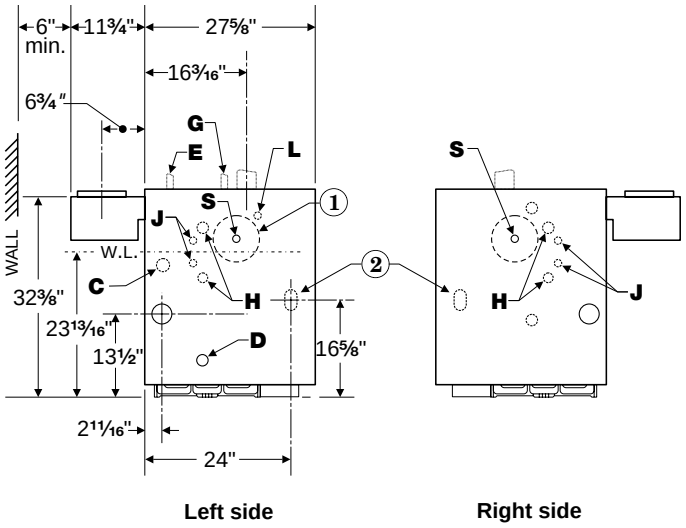
⚠ WARNING

Block assembly is extremely heavy. Handle with caution to avoid personal injury.

Installation of Optional Indirect Water Heater

1. For a boiler ordered with internal type indirect water heater, remove heater opening cover plate (water boilers – round plate on left side; steam boilers – rectangular plate on front).
2. Install heater(s) as shown on **page 28**. Do not over tighten studs and nuts - damage to the gasket can occur.

Figure 4 Boiler tappings (see **Table 4**)



① Optional heater for water boiler

② Gas supply entrance — enter on either side of boiler

Preparation (continued)

Table 4 Control tapping (see **Figure 4**)

Tapping	Size	EG, PEG Steam Boilers	EG Water Boilers only
C	¾"	Probe-type low water cutoff	Probe-type LWCO (when used)
D	¾"	Drain	Drain
E	¾"	Safety valve	Safety relief valve
G	¾"	Plugged	Piping to compression tank or auto air vent
H	½"	Gauge glass and /or optional low water cutoff	Combination pressure temperature gauge
J	⅜"	Tri cock tappings	Plugged on (Float type LWCO)
L	½"	Siphon, pressure gauge, high limit (Probe type LWCO)	Combination pressure temperature gauge
S	1 ½" ¾" (note 1)	Skim tapping —	Limit control Limit control

Notes: 1. Available on special request only, when tankless heater is specified.
3. When an internal type water heater is installed, use the tapping in the heater for an additional operating control.

Hydrostatic Pressure Test

Pressure test before attaching gas piping or electrical supply.

1. Plug any necessary boiler tappings or openings.
2. Do not use gauge supplied with boiler for pressure testing. Install gauge with appropriate range.
3. Fill boiler with water. Vent all air. Test steam boilers between 45 - 55 psi. Test water boilers at 1-1/2 times maximum working pressure.

⚠ WARNING

Do not leave boiler unattended. A cold water fill could expand and cause excessive pressure, resulting in severe personal injury, death or substantial property damage.

4. Verify gauge pressure is maintained. Check for leaks. Repair if found.

⚠ WARNING

Leaks must be repaired at once. Failure to do so can cause boiler damage, resulting in substantial property damage.

⚠ DANGER

Do not use petroleum-based sealing compounds in boiler system. Severe damage to boiler will result, causing substantial property damage.

5. Drain boiler and repair leaks if found.
6. Retest boiler after repairing leaks.
7. Remove plugs from any tappings that will be used for controls and accessories. Refer to **Table 4** and **Figure 4**.
8. On initial start-up check for leaks in the system piping. If found, repair at once.

Installation of Flue Baffles (EG water only)

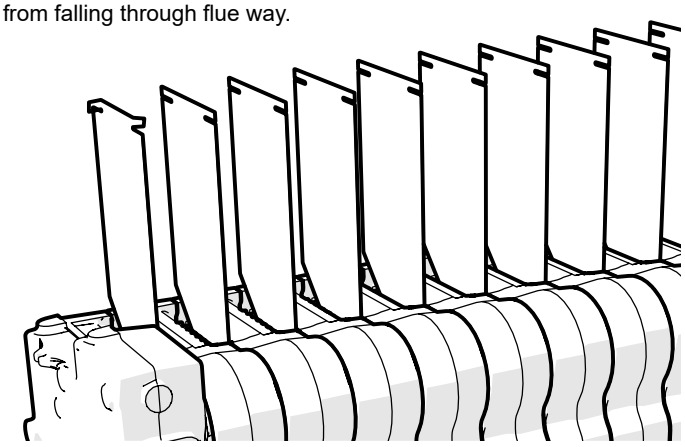
1. Bend the two (2) tabs on the flue baffle approx. 90 degrees in opposite directions.
2. Slide flue baffles (notch down and to the back) in between each section.

⚠ WARNING

The installer must install all flue baffles for proper boiler operation.

Figure 5 EG water - Flue baffles

Bend tabs on each plate to keep from falling through flue way.



Preparation (continued)

Installation of Flue Collector Hood

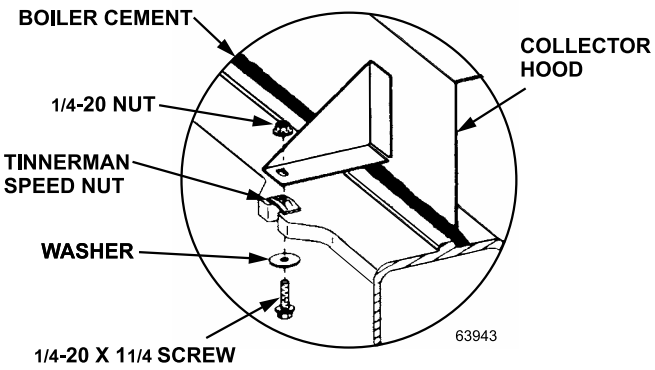
(Factory installed on PEG boilers)

Set flue collector hood on boiler as shown in **Figure 6**. Use boiler cement furnished to provide gas-tight seal.

⚠ WARNING

Failure to maintain gas-tight seal can cause flue gas spillage and carbon monoxide emissions, resulting in severe personal injury or death.

Figure 6 Flue collector hood



Installation of Rear Base Panels

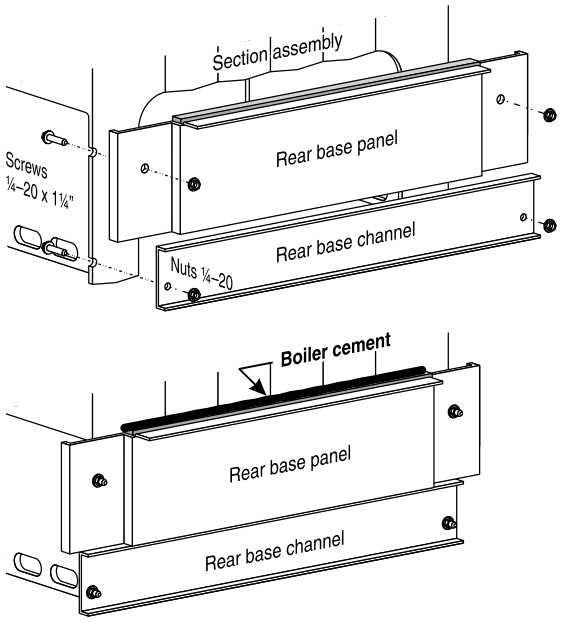
(Factory installed on PEG boilers)

For EG-30 through 75, see **Figure 7**. Fasten rear base panel (7 5/16 inch high - EG/PEG - 2 pieces) channel to section assembly. Seal with boiler cement along top of insulation panels.

⚠ WARNING

Failure to maintain gas-tight seal can cause flue gas spillage and carbon monoxide emissions, resulting in severe personal injury or death.

Figure 7 EG/PEG - Rear base panel and base channel



Installation of Drawer Assembly, Front Base Panels – EG

(Factory installed on PEG boilers)

1. See **Figure 8, page 17**. Fasten front base panel (6 ⅛ inch high) and rear base channel to section assembly. Seal with boiler cement along top of insulation panels.
2. The burner drawer assembly consists of the burner drawer, main burners, gas manifold, pilot burner, etc.
3. Check for proper orifice sizing from **Table 5, page 17**.

⚠ DANGER

Proper orifices must be used. Failure to do so will cause severe personal injury, death or substantial property damage.

4. Place burners in the drawer assembly as shown in **Figure 10** and **Figure 11, page 17**.
5. Slide the drawer assembly under the front base panel and attach to the section assembly as shown in **Figure 9, page 17**.
6. Level and straighten burners.

⚠ DANGER

Burners must be properly seated in slots in back burner support with openings facing up. Gas orifices must inject down center of burner. Failure to properly seat burners will result in severe personal injury, death or substantial property damage.

Preparation (continued)

7. EG 30 – EG-75 only: Install rollout thermal fuse element with wire terminals facing up on front access panel as shown in **Figure 40, page 49**. Wire per the appropriate Wiring Diagram.

Figure 8 EG - Front base panel
(Factory installed on PEG boilers)

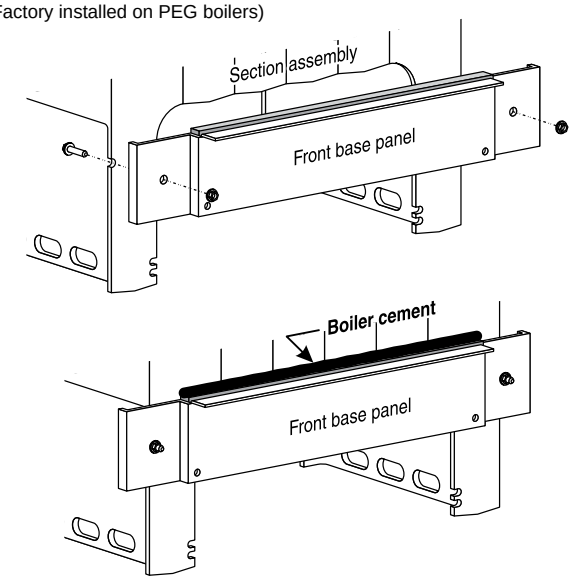


Figure 9 Burner drawer installation

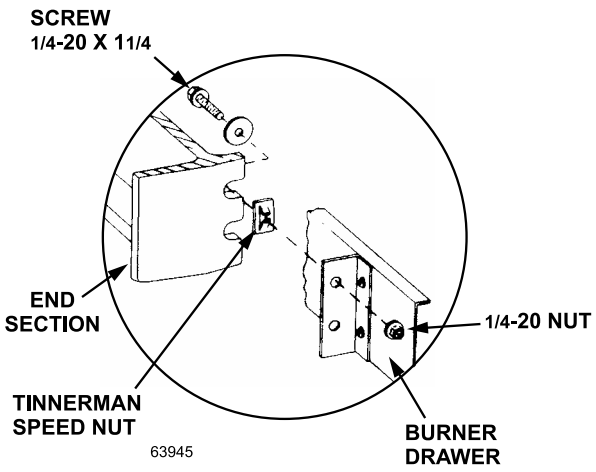


Figure 10 EG Burner drawer assembly

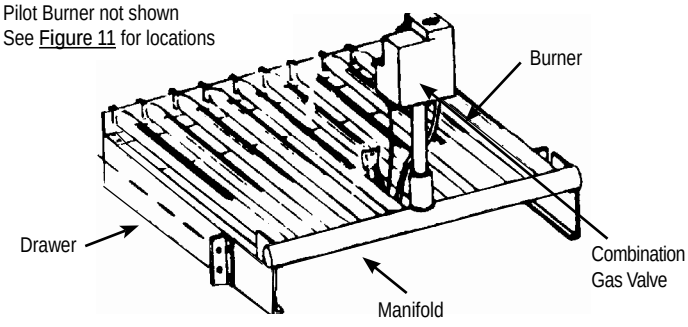
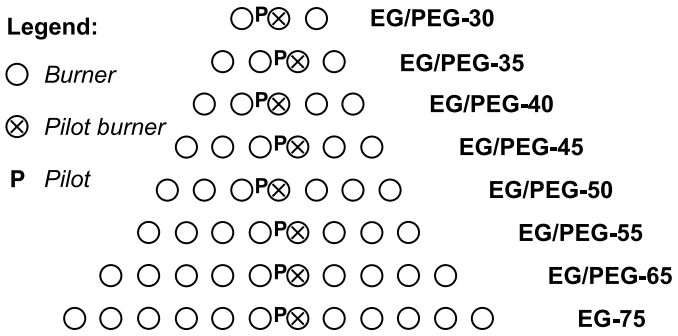


Figure 11 Burner and pilot burner locations



Inspect Burners – PEG Boilers

PEG boiler are factory-assembled, but the burners and base panels should be inspected to ensure they are in good condition.

Remove the access panel (**Figure 12**) and inspect the burners per step 6 on **page 16**. Replace the access panel.

Figure 12 EG - Access panel
(Factory installed on PEG boilers)

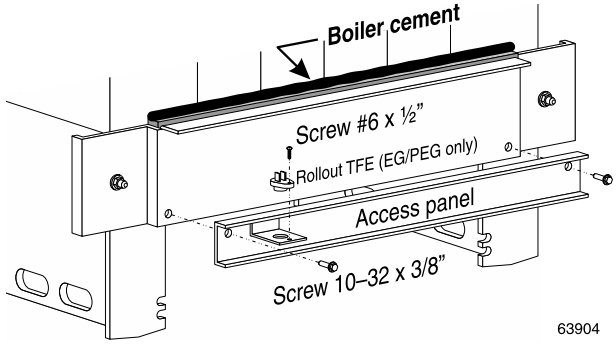


Table 5 Orifice drill sizes

Orifice Drill Sizes	
Boiler Model	**Natural Gas**
EG 30-65	2.35mm
EG 75	2.30mm

Orifice Drill Sizes EG/PEG Canada Only	
Elevation	**Natural Gas**
0-2,000 ft.	2.45mm
2,000-4,500 ft.	2.30mm

Preparation (continued)

Jacket Installation (Factory installed on PEG)

1. Remove the proper knockout discs from panels as shown in **Table 4, page 15**.

NOTICE

Tankless and storage heater knockouts must be removed for EG boilers with optional tankless heaters prior to jacket installation.

2. Follow Jacket Instructions in jacket carton.

Draft Hood Installation

Attach draft hood to flue collector hood using #10 x 1/2" sheet metal screws provided. Use boiler cement furnished to provide gas tight seal.

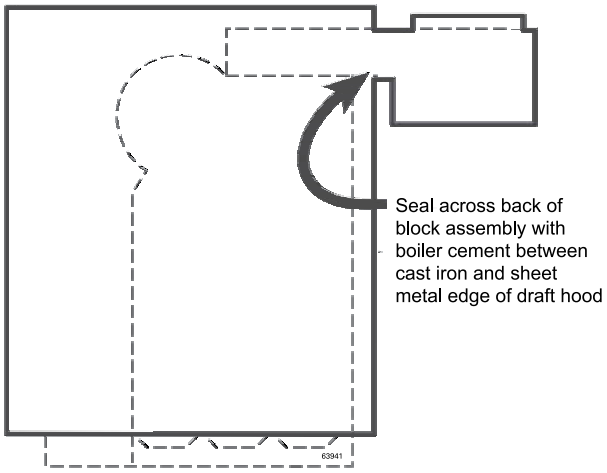
⚠ WARNING

Failure to maintain gas-tight seal can cause flue gas spillage and carbon monoxide emissions, resulting in severe personal injury or death.

⚠ DANGER

Do not alter boiler draft hood or place any obstruction or non-approved damper in the breeching or vent system. CSA certification will become void. Flue gas spillage and carbon monoxide emissions will occur causing severe personal injury or death.

Figure 13 Draft hood



Spill Switch Installation

EG-30 – EG-75 and **PEG-30 – PEG-65** boilers only, fasten spill switch to draft hood as shown on **page 83**, Drawing Ref. Letter "K". Connect wires as shown in the appropriate wiring diagram for your boiler EG water on **page 36** and EG Steam on **page 53**.

Damper Installation

NOTICE

Once damper is installed, boiler will not operate without a damper installed.

⚠ WARNING

Only dampers listed in the Replacement parts **Table 19, page 85** are approved for use on EG-30 through EG-75 Series 7 and PEG-30 through PEG-65 Series 7, using Universal Control Systems. Any other vent damper installed could result in severe personal injury or death.

The following boiler models must have damper installed:

- EG-30 through EG-65, natural gas.
- PEG-30 through PEG-65, steam, natural gas.

The following boiler models may have damper installed:

- EG-75, natural gas.

Minimum Clearances to Combustibles

Provide a minimum of 6" between the vent damper and any combustible material. (Provide a minimum of 46" between jacket top and combustible ceiling for EG/PEG). See **page 9** for complete clearance requirements.

Installation

⚠ DANGER

Damper must be installed directly on top of draft hood so that it serves only that boiler. Do not modify draft hood or damper, or make another connection between draft hood and damper or boiler except as noted below. This will void CSA certification and will not be covered by Weil-McLain warranty. Any changes will result in severe personal injury, death, or substantial property damage.

1. Install plug (packed in damper carton of 4" through 8" dampers) in hole in damper blade.

Preparation (continued)

2. Install vent damper horizontally or vertically as shown in vent damper manufacturer's instructions. Vent damper must be installed so that it serves only one boiler and so damper blade indicator is visible to the user. See **Figure 14**.
3. Screws or rivets used to secure the vent damper to the draft hood must not interfere with rotation of the damper blade.
4. Install damper harness between damper actuator and knockout in jacket top panel. Use strain relief connectors and locknuts to secure both ends of the damper harness.

⚠CAUTION

Keep wiring harness clear of all hot surfaces.

Figure 14 Vent damper assemblies

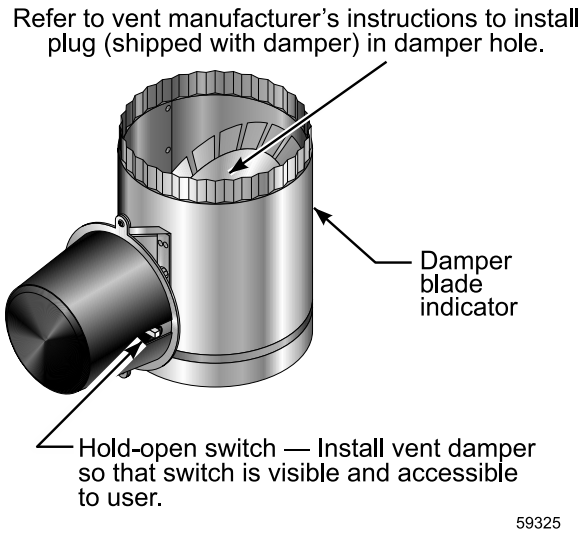
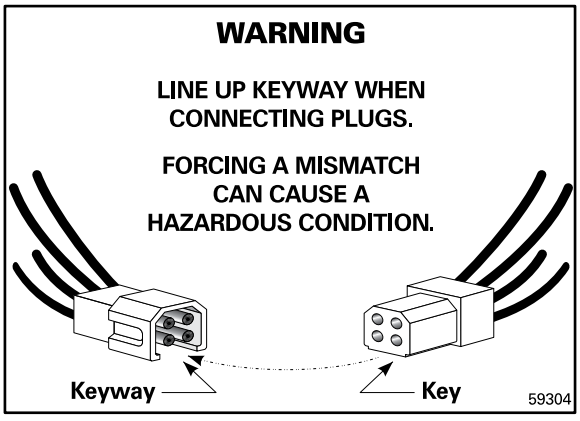


Figure 15 Vent damper harness plug warning label



5. Read and apply the harness plug warning label (**Figure 15**) so that it is visible after installation.
6. Plug damper harness receptacle into damper harness plug.

⚠DANGER

Bypassing (jumpering) vent damper will result in flue products such as carbon monoxide to escape into the house. This will result in severe personal injury or death.

⚠CAUTION

After boiler has operated once, if either end of the harness is disconnected, the system safety shutdown will occur. The boiler will not operate until harness is reconnected.

NOTICE

Damper setting — Damper hold open switch must be in "Automatic Operation" position for system to operate properly.

Breeching Erection

Connect from draft hood or damper outlet to chimney or vent with same size breeching. Where possible, vertical venting to the outside from draft hood or damper outlet will offer best performance. Where horizontal breeching is used, slope upward at least 1/4 inch per lineal foot toward chimney or vent and support with hangers to prevent sagging.

Breeching must not be connected to any portion of a mechanical draft system operating under positive pressure.

Connect Piping – Water Boilers – EG only

General Piping Information

Install the boiler jacket before connecting return piping. (Supply piping can be connected before or after jacket installation.) Connect controls after all piping is connected.

If installation is to comply with ASME or Canadian requirements, a high temperature limit is needed. Install control in supply piping between boiler and isolation valve. Set external high limit to minimum 20°F above setpoint of operating set point. The maximum allowable setpoint of 240°F is for the external high temperature limit. The maximum operating limit is 210°F. See **page 31** for wiring.

A low water cutoff device is required when boiler is installed above radiation level or by certain state or local codes or insurance companies. The boiler has a pre-installed water temperature sensor. EG water boilers are equipped with a water temperature and low water sensor and the control modules includes functionality for low water monitoring. An additional external low water cutoff device may be used simultaneously if necessary.

Use backflow check valve in cold water supply if required by local codes.

Isolation Valves

Isolation valves are required to enable servicing of the boiler's temperature sensor. Install as shown in appropriate piping diagram.

Near-Boiler Piping

Boiler connections

1. EG — Connect supply and return to left end.
2. Plug all unused connections.

Systems Operating at or Above 130°F

(Return water temperature)

See **Table 6** and **Figure 17, page 21** (diaphragm-type or bladder-type expansion tank) or **Figure 16** (closed-type expansion tank) on **page 21** for near-boiler piping for systems designed for return water at least 130 °F.

Low-Temperature Systems

1. See **Figure 19, page 22** and **Figure 20, page 23** for near-boiler piping for low-temperature or high-volume systems.
2. See **Figure 18, page 22** for boilers used with refrigeration systems.

Relief Valve

Install relief valve vertically in ¾" tapping on side of boiler. See the tag attached to the relief valve for manufacturer's instructions.

⚠WARNING

To avoid water damage or scalding due to valve operation, discharge line must be connected to relief valve outlet and run to a safe place of disposal. Terminate the discharge line to eliminate possibility of severe burns should the valve discharge.

- Discharge line must be as short as possible and be the same size as the valve discharge connection throughout its entire length.
- Discharge line must pitch downward from the valve and terminate at least 6" above the floor drain where any discharge will be clearly visible.
- The discharge line shall terminate plain, not threaded, with a material serviceable for temperatures of 375 °F or greater.
- Do not pipe the discharge to any place where freezing could occur.
- No shutoff valve shall be installed between the relief valve and boiler, or in the discharge line. Do not plug or place any obstruction in the discharge line.
- Failure to comply with the above guidelines could result in failure of the relief valve to operate, resulting in possibility of severe personal injury, death or substantial property damage.
- Test the operation of the valve after filling and pressurizing system by lifting the lever. Make sure the valve discharges freely. If the valve fails to operate correctly, replace it with a new relief valve.

Table 6 Minimum recommended pipe sizes

Minimum Recommended Pipe Sizes (for 20°F rise)				
	Forced-flow systems		Gravity-flow systems	
Boiler model	Supply "A"	Return "B"	Supply "A"	Return "B"
EG-30, 35	1"	1"	1 ½"	1 ½"
EG-40, 45, 50	1 ¼"	1 ¼"	2"	2"
EG-55, 65	1 ½"	1 ½"	2 ½"	2 ½"
EG-75	2"	2"	2 ½"	2 ½"

Note: * All supply and return pipe sizes are based upon a 2° F temperature rise through the boiler.

Circulator

The circulator is not provided, but wiring is supplied with boiler to allow you to locate it either in the return or supply piping, as desired. See **Figure 16 or Figure 17, page 21** for a typical installation. Pipe the expansion tank to the suction side of the circulator whenever possible. Install an air separator in the supply piping. Connect the expansion tank to the air separator only if the separator is on the suction side of the circulator. Always install the system fill connection at the same point as the expansion tank connection to the system. **Figure 16** and **Figure 17, page 21** show typical near-boiler piping connections.

Connect Piping – Water Boilers – EG only (continued)

Expansion Tank

Diaphragm-type or bladder-type tank — **Figure 17**

1. Ensure expansion tank size will handle boiler and system water volume and temperature. Tank must be located in boiler return piping as close to boiler as possible, before inlet side of circulator. See tank manufacturer's instructions for details.
2. Install an automatic air vent as shown.

Closed-type tank — **Figure 16**

1. Ensure expansion tank size will handle boiler and system water volume and temperature. See tank manufacturer's instructions for details.
2. Connect tank to ½" NPT tapping located behind supply outlet, using ½" NPT piping. Pitch any horizontal piping up towards tank 1 inch per 5 feet of piping.

⚠CAUTION

Undersized expansion tanks cause system water to be lost from relief valve and makeup water to be added through fill valve. Eventual section failure can result.

Water Piping — Multiple Zone Systems

Install system piping using either circulator zoning or zone valve zoning. Install expansion tank on suction side of system circulator. Always connect fill line only at the expansion tank — never at another point in the system.

⚠CAUTION

DO NOT connect directly from 3-wire zone valves to the T-T terminals on the boiler. When using 3-wire zone valves, install an isolation relay. Connect the zone valve end switch wires to the isolation relay coil. Connect the isolation relay contact across the boiler T-T terminals. Failure to comply can result in damage to boiler components or cause unreliable operation, resulting in severe property damage.

⚠WARNING

Use **Figure 16** or **Figure 17** only for systems designed for return water at least 130 °F. For systems with low return water temperature possible, such as converted gravity systems and radiant heating systems, install bypass piping (see **page 22**) to protect boiler against condensation. Failure to prevent low return water temperature to the boiler could cause corrosion of the boiler sections or burners, resulting in severe personal injury, death or substantial property damage.

Figure 16 Recommended piping – forced hot water boilers with closed type expansion tanks

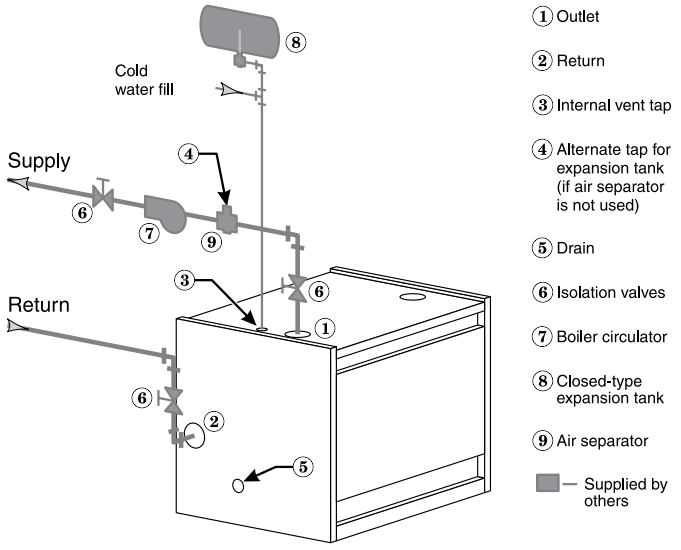
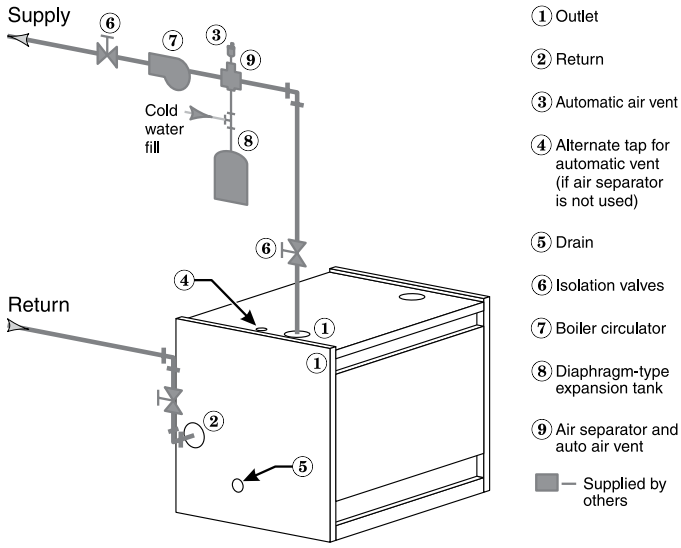


Figure 17 Recommended piping – forced hot water boilers with diaphragm type expansion tanks



⚠WARNING

If system includes radiant heating circuits, provide piping and controls to regulate the temperature supplying the radiant circuits. Failure to comply could result in substantial property damage.

Connect Piping – Water Boilers – EG only (continued)

Water Piping — Refrigeration Systems

Prevent chilled water from entering boiler

Install boiler so that chilled medium is piped in parallel with the heating boiler. Use appropriate valves to prevent chilled medium from entering boiler. See **Figure 18** for typical installation of balancing valve and check valve.

⚠WARNING

Install boiler so that chilled medium is piped in parallel with heating boiler (**Figure 18**). Use appropriate valves to prevent chilled medium from entering boiler. Consult AHRI Installation and Piping Guides.

If boiler is connected to heating coils located in air handling units where they can be exposed to refrigerated air, use flow control valves or other automatic means to prevent gravity circulation during cooling cycle. Circulation of cold water through the boiler could result in damage to the heat exchanger, causing possible severe personal injury, death or substantial property damage.

Figure 18 Recommended piping – refrigeration systems

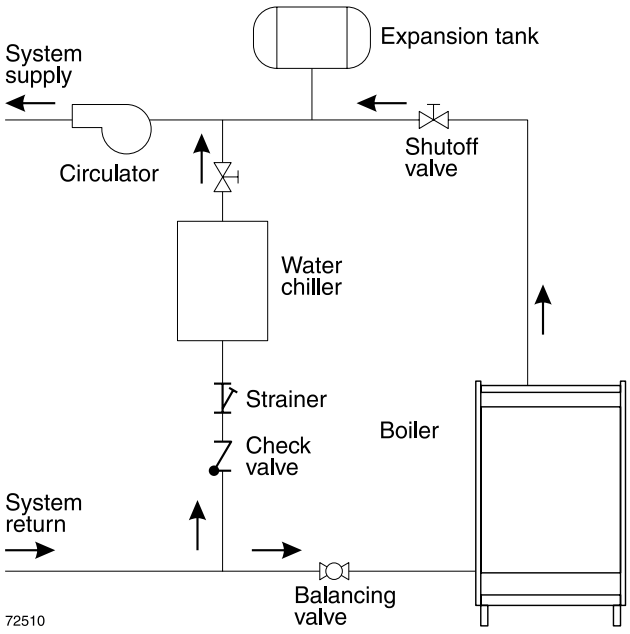
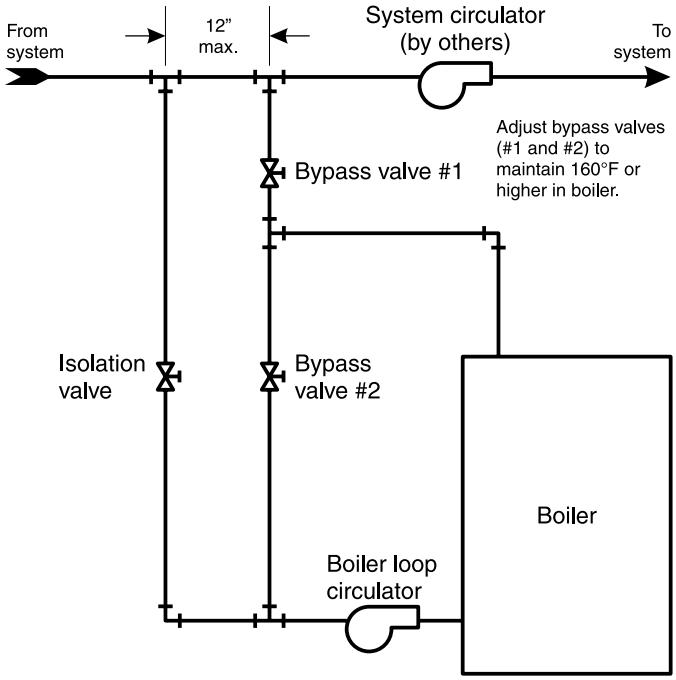


Figure 19 System bypass piping in boiler loop with separate system circulator, using primary/secondary piping.



System Bypass Method

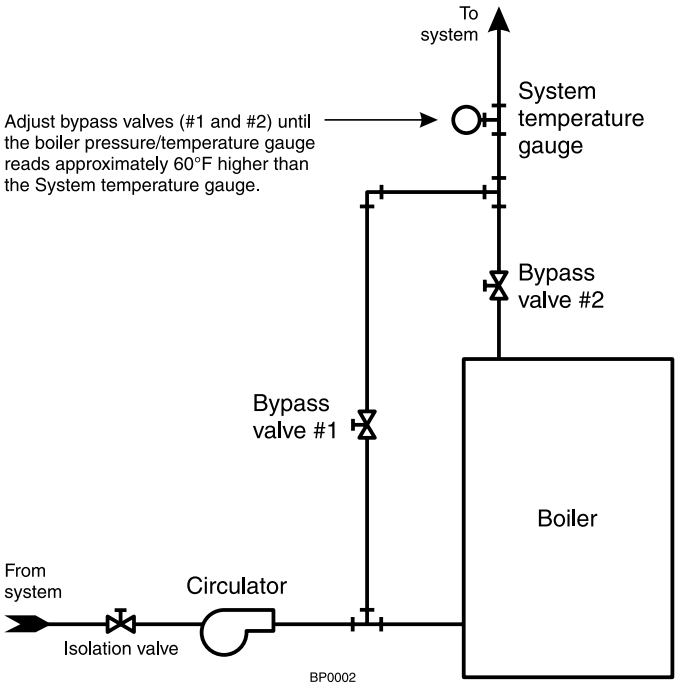
1. Apply bypass piping of **Figure 19** to high water content systems, radiant panel systems or any system that is likely to operate with low return water temperature for extended periods.
2. The bypass arrangement shown protects the boiler from damage caused by condensate corrosion due to low return water temperature and protects low temperature systems from too high a supply temperature.
3. Adjust the bypass valves as indicated below.

Adjust Bypass Valves 1 and 2 as Follows:

1. Start with valve 2 fully closed, valve 1 fully open.
2. Slowly open valve 2 while closing valve 1. Adjust the valves until the boiler pressure/temperature gauge reads 160 °F or higher. As you open the valves, pause long enough to allow temperatures to level off. It takes a while for the boiler water temperature to rise as the flow changes.
3. Bypass valve 2 allows hot boiler outlet water to blend with colder return water, raising the supply temperature to the boiler. Bypass valve 1 balances the pressure drop through valve 2.
4. The purpose of this piping is to raise the return water temperature to the boiler enough to prevent condensation of flue gases.

Connect Piping – Water Boilers – EG only (continued)

Figure 20 Boiler bypass piping — use only for high water content systems —DO NOT use for radiant panel systems.



Boiler Bypass Method

1. Apply bypass piping of **Figure 20** to high water content systems, such as converted gravity systems.
2. The bypass arrangement shown protects the boiler from damage caused by condensate corrosion due to low return water temperature. This method does not provide protection from high temperature water being supplied to the system.
3. DO NOT apply this piping to radiant panel systems.
4. Adjust the bypass valves as indicated below.

Adjust Bypass Valves 1 and 2 as Follows:

1. Start with valve 1 fully closed, valve 2 fully open.
2. Slowly open valve 1 while closing valve 2. Adjust the valves until the boiler pressure/temperature gauge reads approximately 60 °F higher than the system temperature gauge. As you open the valves, pause long enough to allow temperatures to level off. It takes a while for the boiler water temperature to rise as the flow changes.
3. Bypass valve 1 controls system flow rate. Bypass valve 2 controls flow through the boiler.
4. The purpose of this piping is to cause a high enough temperature rise in the boiler that the average temperature will be warm enough to prevent condensation of flue gases.

⚠ WARNING

Install all components specified above and adjust valves as described to prevent low temperature in the boiler. Failure to prevent low water temperature in the boiler could cause corrosion of the boiler sections or burners, resulting in severe personal injury, death or substantial property damage.

Connect Piping – Steam Boilers

General

⚠CAUTION

Failure to properly pipe the boiler may result in improper operation and damage to the boiler or building.

NOTICE

Steam supply must be on same end as controls. Return may be from either end.

1. Install the boiler jacket before connecting return piping. (Supply piping can be connected before or after jacket installation.) Connect controls after all piping is connected.
2. See **Table 7** for recommended pipe sizing.
3. See **Figure 4, page 14**, for tapping locations.

NOTICE

Condensate return —

- Satisfactory operation of a steam heating system depends on adequate condensate return to boiler to maintain a steady water level.
- Avoid adding raw makeup water.
- Where condensate return is not adequate, install low water cutoff/pump control, condensate receiver and condensate boiler feed pump. Refer to Table 7, for sizing.

Connecting to Parallel-Flow Piping

See **Figure 21, page 24** for parallel-flow steam systems.

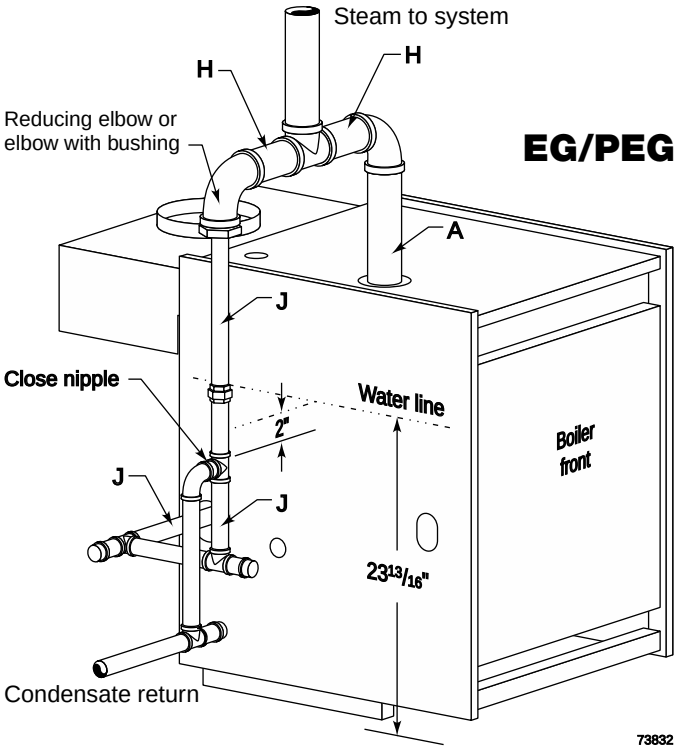
Connecting to Counterflow Piping

When connecting to a counterflow system, the boiler steam supply must connect into the top of the counterflow system header, as shown in **Figure 22, page 25**.

Table 7 Recommended steam boiler pipe sizing

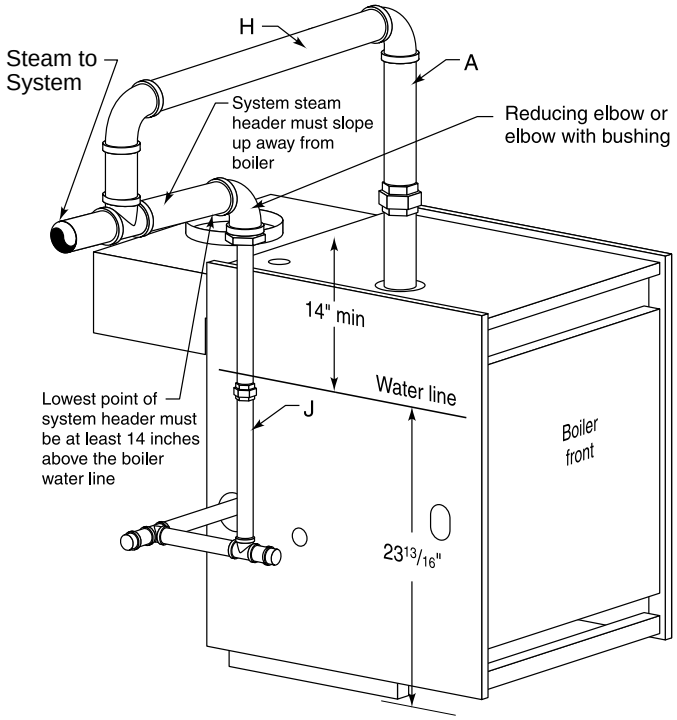
Steam Boiler Piping Minimum Recommended Pipe Sizes				
Boiler Model	Riser Pipe Size		Header *	Equalizer
	A	B	H	J
EG-30, 35 PEG-30, 35	2”	—	2”	1 ½”
EG-40, 45, 50 PEG-40, 45, 50	2 ½”	—	2 ½”	1 ½”
	2”	2”	2 ½”	
EG-55, 65, 75 PEG-55, 65	2”	2”	3”	1 ½”
	3”	—		
* 24” minimum from waterline to bottom of header.				

Figure 21 Recommended piping for parallel-flow systems



Connect Piping – Steam Boilers (continued)

Figure 22 Connection to counter flow steam piping



Installing the Relief Valve

Install relief valve in tapping on top of boiler. See **Table 4, page 15**, for control tapping locations. See the tag attached to the relief valve for manufacturer's instructions.

⚠ WARNING

Follow the steps below to avoid potential severe personal injury, death or substantial property damage.

- When installing the relief valve, ensure that all connections, including the valve inlet, are clean and free from any foreign matter.
- Mount the relief valve only in the vertical position, directly connected to the tapping designated in the manual on top of the boiler.
- Use pipe compound sparingly, or tape, on external threads only.
- Do not use a pipe wrench! Use proper type and size wrench on wrench pads only.

⚠ DANGER

During operation, this valve may discharge large amounts of steam and/or hot water. Therefore, to reduce the potential for bodily injury and property damage, a discharge line MUST be installed that:

- Is connected from the outlet to a safe point of discharge with no intervening valve.
- Allows complete drainage of both the valve and the discharge line.
- Is independently supported and securely anchored so as to avoid applied stress as possible.
- Terminates freely to atmosphere where any discharge will be clearly visible and is at no risk of freezing.
- Is, over its entire length, of a pipe size equal to or greater than that of the valve outlet.

  Use only schedule 40 metal pipe for discharge. (Do not use schedule 80, extra strong or double strong pipe or connections.) DO NOT CAP, PLUG OR OTHERWISE OBSTRUCT DISCHARGE PIPE OUTLET! If discharge is piped upward, a condensate drain must be provided in the elbow below the vertical pipe to prevent condensate from returning into the valve. Failure to comply with these instructions will cause a dangerous spray of hot water and steam that would cause severe personal injury or death.

Connect Piping – Steam Boilers (continued)

Condensate Return

Modern steam boilers are designed to steam for less time than older, larger boilers. When replacing an older steam boiler the system condensate return time may be longer than the steaming time. This could cause the following problems:

1. Boilers fitted with an automatic water feed could overfill.
2. Units fitted with only a low water cutoff would shut down and cycle while waiting for condensate to return.

Following is a simple method for determining whether or not a reservoir pipe is required to lengthen steaming time for a residential installation:

1. Disconnect condensate return line at existing boiler.
2. Heat boiler and allow to steam for 10 minutes. Turn off boiler.
3. Measure length of time from when boiler started to steam to when condensate begins to return through condensate line.
4. Measure length of time from when condensate begins to return to when it stops returning. Divide this time by 2.
5. Add time measured in step 3 to time calculated in step 4. This sum is the average time required for condensate to return to the boiler.
6. If this total time is 10 minutes or less, no reservoir pipe is needed.

If total time for condensate to return to boiler (from step 5) is more than 10 minutes, a reservoir pipe (or boiler feed system) is recommended. See **Table 8** and **Figure 23** for suggested reservoir pipe size. Install as shown in **Figure 23**.

For larger systems (as noted in Table 8), use a boiler feed system with a condensate tank and feed pump. You will have to install a low water cutoff/pump control on the boiler to operate the pump. Use **Table 9** to size boiler feed systems. See **Figure 4, page 14**, for tapping locations. (The use of a combination condensate tank and float-controlled condensate return pump is not recommended.)

For most residential installations a reservoir pipe may be all that is necessary to ensure proper operation.

Table 8 Reservoir pipe sizing

Boiler model number	Max. boiler gross output	Time from initial steaming to average condensate return (boiler steaming capacity based on 970 Btu per pound of steam)					
		15 minutes		20 minutes		30 minutes	
	MBH	gallons	pipe length (feet)	gallons	pipe length (feet)	gallons	pipe length (feet)
EG/PEG-30	64	¾	¾	1 ½	1 ½	3	2 ½
EG/PEG-35	85						
EG/PEG-40	106	1 ¼	1 ¼	2 ½	2 ¼	Use boiler feed system	
EG/PEG-45	127						
EG/PEG-50	148	1 ½	1 ½	3	2 ½		
EG/PEG-55	169	1 ¾	1 ¾	Use boiler feed system			
EG/PEG-65	201	2 ¼	2 ¼				
EG-75	237	2 ½	2 ½				

Designed full capacity steaming time of modern boilers is 10 minutes.

Figure 23 Recommended piping for parallel-flow systems with optional reservoir pipe

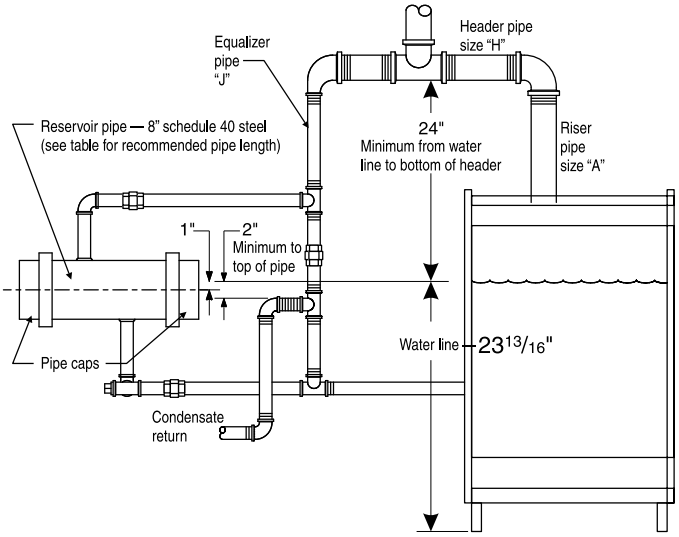


Table 9 Boiler feed system sizing

Boiler Model	Gross Output Pounds Steam Per Hour	Gallons Condensate Per Hour	Minimum Condensate Receiver Capacity (Gal.) Minutes of boiler operation: 15	30	45	60	Recommended Maximum Feed Pump Capacity GPM *
EG/PEG-30	62	7 ½	2	5	7	10	0.3
EG/PEG-35	82	10	3	7	10	13	0.3
EG/PEG-40	103	12 ½	4	8	12	17	0.4
EG/PEG-45	124	15	5	10	15	20	0.5
EG/PEG-50	145	17 ½	6	12	17	23	0.6
EG/PEG-55	166	20	7	13	20	27	0.7
EG/PEG-65	198	25	8	17	25	33	0.8
EG-75	234	29 ½	10	20	29	39	1.0
*	If pump capacity exceeds capacity shown, pump can be throttled with globe or ball valve.						

Install Boiler Controls

⚠WARNING

Failure to properly install, pipe and wire boiler controls may result in severe damage to the boiler, building and personnel.

Water Boiler - EG only

1. Install controls as shown on Control Tapping Table and **Figure 4, page 14**.
2. Low water cutoff is integral to this control when using the 381-356-589 sensor.
3. If system is to be ASME inspected and approved, an additional high temperature limit is needed. Purchase and install in supply line above boiler.

Steam Boiler - EG, PEG

NOTICE

Water line dimension are measured from bottom of boiler section leg where it rests on the boiler room floor or boiler foundation.

1. For steam boilers furnished with probe-type low water cut-offs, install as shown in **Figure 24**.
2. For steam boilers furnished with float type low water cut-off, install controls as illustrated in **Figure 25**.

   Install blowdown line in bottom of cutoff. See **Figure 25** and control manufacturer's instructions for details.

⚠WARNING

Pipe blowdown line near floor close to floor drain to eliminate potential of severe burns. Do not plug, valve or place any obstruction in blowdown line.

Water feeders are not recommended for primary control. A low-water cut-off with pump controller is recommended with a condensate receiver and feed pump.

3. Install remaining controls as shown in **Table 4, page 15**. and **Figure 4, page 14**.

Figure 24 Probe-type low water cut-off - (Left side view)

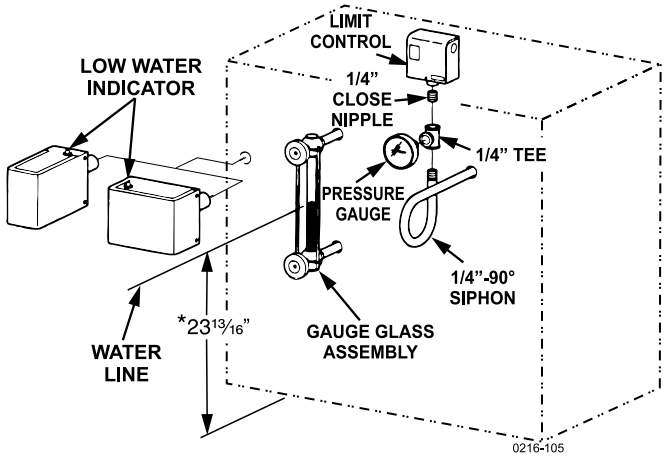
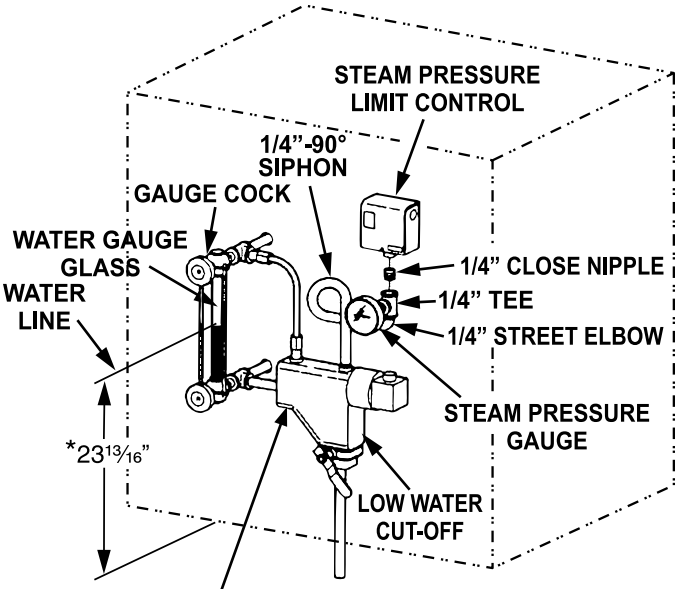


Figure 25 Float-type low water cut-off - (Left side view)



Primary float LWCO or secondary manual reset LWCO with primary probe LWCO

Connect Piping – Tankless Heater (optional)

NOTICE

EG boilers for tankless heater application are available only on special order as factory-installed optional equipment. Standard boilers cannot be adapted for heater use. Install a tankless heater only in a steam boiler or forced hot water.

For correct operation, install as shown in **Figure 26** (water boilers) or **Figure 27** (steam boilers).

1. Automatic mixing valve must be installed per mixing valve manufacturer's instructions.
2. Flow regulating valve must be installed. Size according to intermittent draw of heater as shown in following table.
3. Operating control with a small differential scale is recommended. Install in temperature control tapping in heater plate.
4. In hard water areas, it is advisable to soften cold domestic supply water to the tankless heater to prevent lime buildup.

Table 10 Minimum recommended pipe sizes

Boiler Model	Heating Number (Note 3)	Intermittent Draw GPM 100°F Av. Temp. Rise (Note 1)	Continuous Draw GPM 100°F Av. Temp. Rise (Note 2)	Inlet and Outlet Tappings	Temp. Control Tapping
Water					
EG-35	E-624	3.00	1.60	½"	¾"
EG-40	E-624	3.00	2.00	½"	¾"
EG-45	E-624	3.25	2.40	½"	¾"
EG-50	E-626	4.00	2.80	½"	¾"
EG-55	E-626	4.25	3.20	½"	¾"
EG-65	E-632	4.50	4.00	½"	¾"
EG-75	E-632	4.50	4.80	½"	¾"
Steam					
EG/PEG-35	35-S-29	3.00	1.60	¾"	¾"
EG/PEG-40	35-S-29	3.00	2.00	¾"	¾"
EG/PEG-45	35-S-29	3.25	2.40	¾"	¾"
EG/PEG-50	35-S-29	3.25	2.80	¾"	¾"
EG/PEG-55	35-S-29	3.50	3.20	¾"	¾"
EG/PEG-65	35-S-29	3.75	4.00	¾"	¾"
EG-75	35-S-29	4.00	4.80	¾"	¾"

Weil-McLain ratings based on 60 PSIG domestic water pressure at heater.

Notes:

1. Gallons of water per minute heated from 40°F to 140°F with 200°F boiler water temperature.
2. Continuous draw – no recovery period.
3. These single wall heat exchangers comply with National Standard Plumbing Code provided that:
   - Boiler water (including additives is practically non toxic, having a toxicity range or class of 1, as listed in Clinical Toxicology of Commercial Products, and
   - Boiler water pressure is limited to max. 30 PSIG by approved water or steam relief valve.

Figure 26 Tankless heater piping EG (water boiler)

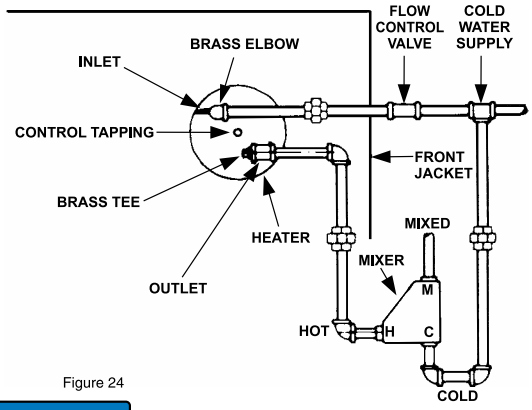


Figure 24

NOTICE

Piping connections not furnished. Use brass plugs in tees and crosses to facilitate cleaning in hard water areas.

Figure 27 Tankless heater piping EG (steam boiler)

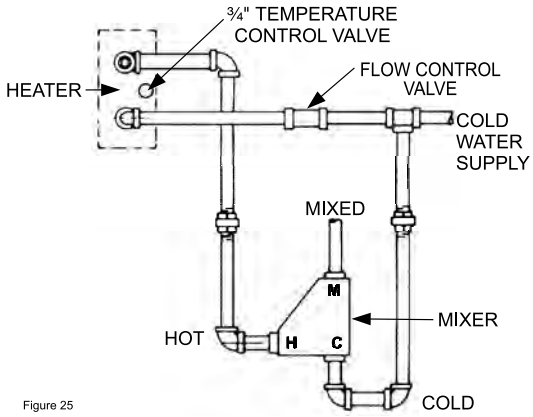


Figure 25

Tankless water heaters for EG boilers have been tested and certified by CSA Group (certificate # 2552127).

C US

NSF/ANSI 372

WARNING

Studies have indicated that dangerous bacteria can form in potable water distribution system if certain minimum water temperatures are not maintained. Contact local health department for more information.

NOTICE

These single wall heat exchangers comply with National Standard Plumbing Code provided that:

- Boiler water (including additives) is practically non-toxic, having a toxicity rating or class of 1, as listed in Clinical Toxicology of Commercial Products.
- Boiler water pressure is limited to maximum 30 psig by approved water relief valve.

See Automatic mixing valve and scald warnings, **page 64**.

Connect Gas Supply Piping

Connecting gas supply piping

1. Size gas piping considering:
   a. Diameter and length of gas supplying piping.
   b. Number of fittings.
   c. Maximum gas consumption (including any possible future expansion).
   d. Allowable loss in gas pressure from gas meter outlet to boiler. For pressure drops, see ANSI Z223.1/NFPA 54 – latest edition. Canadian installations must comply with Natural Gas and Propane Installation Code, CAN/CSA B149.1 or B149.2 Installation Codes.
2. For natural gas:
   a. Refer to **Table 11** or the National Fuel Gas Code. To obtain cubic feet per hour, divide the input by 1000.
   b. Size for rated boiler input.
   c. Inlet gas pressure: 5” w.c. minimum
      13” w.c. maximum
   d. Manifold gas pressure: 3½" w.c.
   e. Install 100% lock-up gas pressure regulator in supply line if inlet pressure exceeds 13" w.c., then adjust for 13" w.c. maximum.
3. Remove knock-out disc from jacket panel which gas supply is to be piped.
4. Follow good piping practices.
5. Apply pipe joint compound (pipe dope) sparingly only to the threads of pipe joints.
6. Install drip leg at inlet of gas connection to boiler. Where local utility requires, extend drip leg to floor.
7. Install ground joint union when required for servicing. See **Figure 28, page 30**.
8. Install manual shut-off valve outside boiler jacket as shown in **Figure 28, page 30** when required by local codes.
9. Support piping by hangers, not by boiler or its accessories.
10. Canada only, the manual main shut off valve (when used) must be identified by the installer.
11. Purge all air from piping.
12. Before placing boiler in operation, check boiler and its gas connection for leaks.

⚠ WARNING

Do not check for gas leaks with an open flame – use bubble test. Failure to do so can cause severe personal injury, death or substantial property damage.

a. Close manual main shut-off valve during any pressure testing at less than 13 inches water column.
b. Disconnect boiler and gas valve from gas supply piping during any pressure test greater than 13 inches water column.

Gas Piping (continued)

Table 11 Pipe capacity for 0.60 specific gravity natural gas, pressure loss 0.30" w.c.

Gas pipe length (feet)*	Capacity of pipe for pipe size of: (Capacity in cubic feet gas per hour)**				
	½"	¾"	1"	1¼"	1½"
10	132	278	520	1050	1600
20	92	190	350	730	1100
30	73	152	285	590	860
40	63	130	245	500	760
50	56	115	215	440	670
75	45	93	175	360	545
100	38	79	150	305	460
150	31	64	120	250	380

Notes:
*Include measured length of gas supply piping and allowance in feet for number and size of fittings.
** Specific Gravity - 0.60; Pressure loss - 0.30" w.c.

Figure 28 Gas supply piping

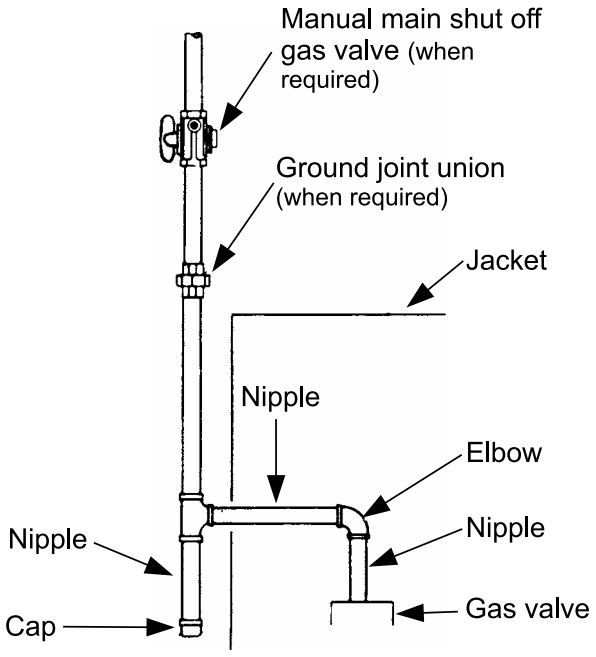


Figure 26

Section 3 Electrical

Field Wiring

⚠WARNING

For your safety, turn off electrical power supply at service entrance panel before making any electrical connections to avoid possible electric shock hazard. Failure to do so can cause severe personal injury or death.

NOTICE

Wiring must be N.E.C. Class 1.

If rollout thermal fuse element wire as supplied with boiler must be replaced, type 200°C wire or equivalent must be used. If other original wiring as supplied with boiler must be replaced, use only type 105°C wire or equivalent. Boiler must be **electrically grounded** as required by National Electrical Code ANSI/NFPA 70 – latest edition.

Installation Must Comply With:

- National Electrical Code ANSI /NFPA 70 – latest edition, and any other national, state, provincial or local codes or regulations.

Wiring Connections

Boiler is shipped with controls completely wired, except spill switch, circulator, and vent damper. Refer to wiring diagrams shown on **pages 36** and **37** for spark-ignited pilot boiler.

Thermostat

1. Connect thermostat as shown on wiring diagram on boiler.
2. Install on inside wall away from influences of drafts, hot or cold water pipes, lighting fixtures, television, sunrays or fireplaces.
3. If using an AcuTemp Control, wire to the boiler control as shown in the diagram below.

Domestic Hot Water (DHW)

- Connect DHW aquastat as shown in wiring below. Economy function isn't utilized with DHW input.

Figure 29 Wiring Indirect Tank Control

Junction box (existing)

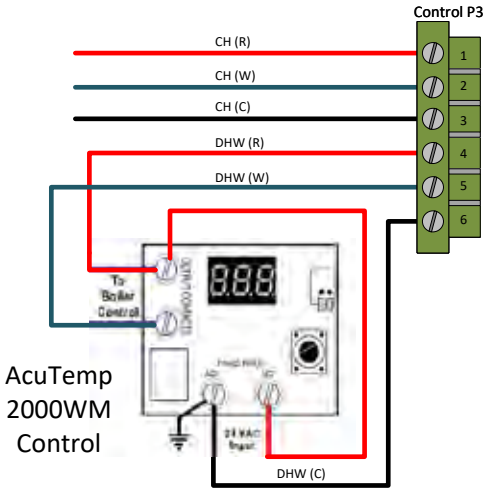
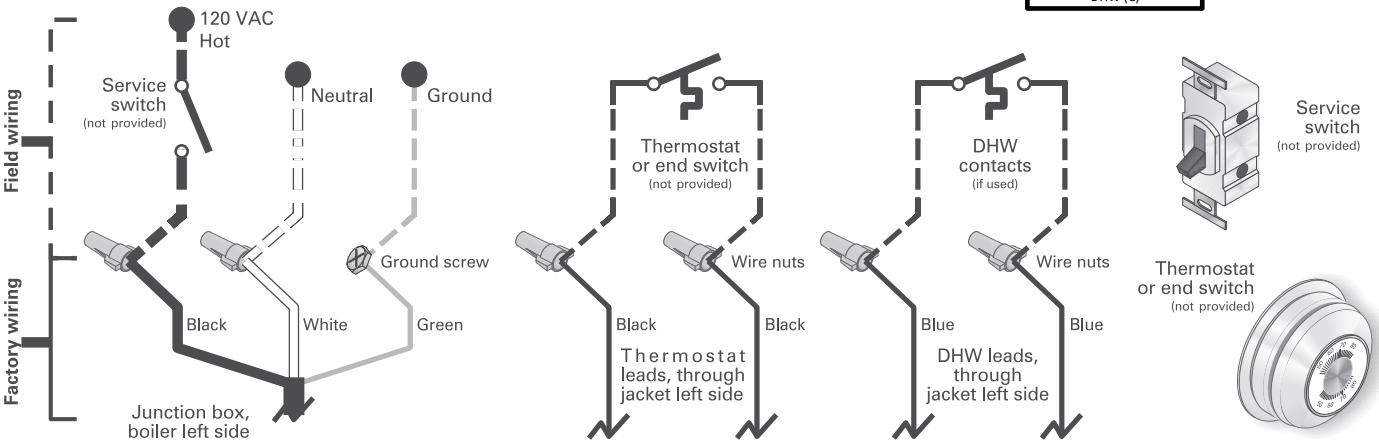


Figure 30 Field wiring connections —service switch, DHW (if used) and thermostat (or end switch) provided by installer



Field wiring (continued)

1. Connect 120 VAC power wiring (**Figure 30, page 31**).
2. Fused disconnect or service switch (15 amp recommended) may be mounted on this box. For those installations with local codes which prohibit installation of fused disconnect or service switch on boiler, install a 2 x 4 cover plate on the boiler junction box and mount the service switch remotely as required by the code.

Wiring Multiple Zones

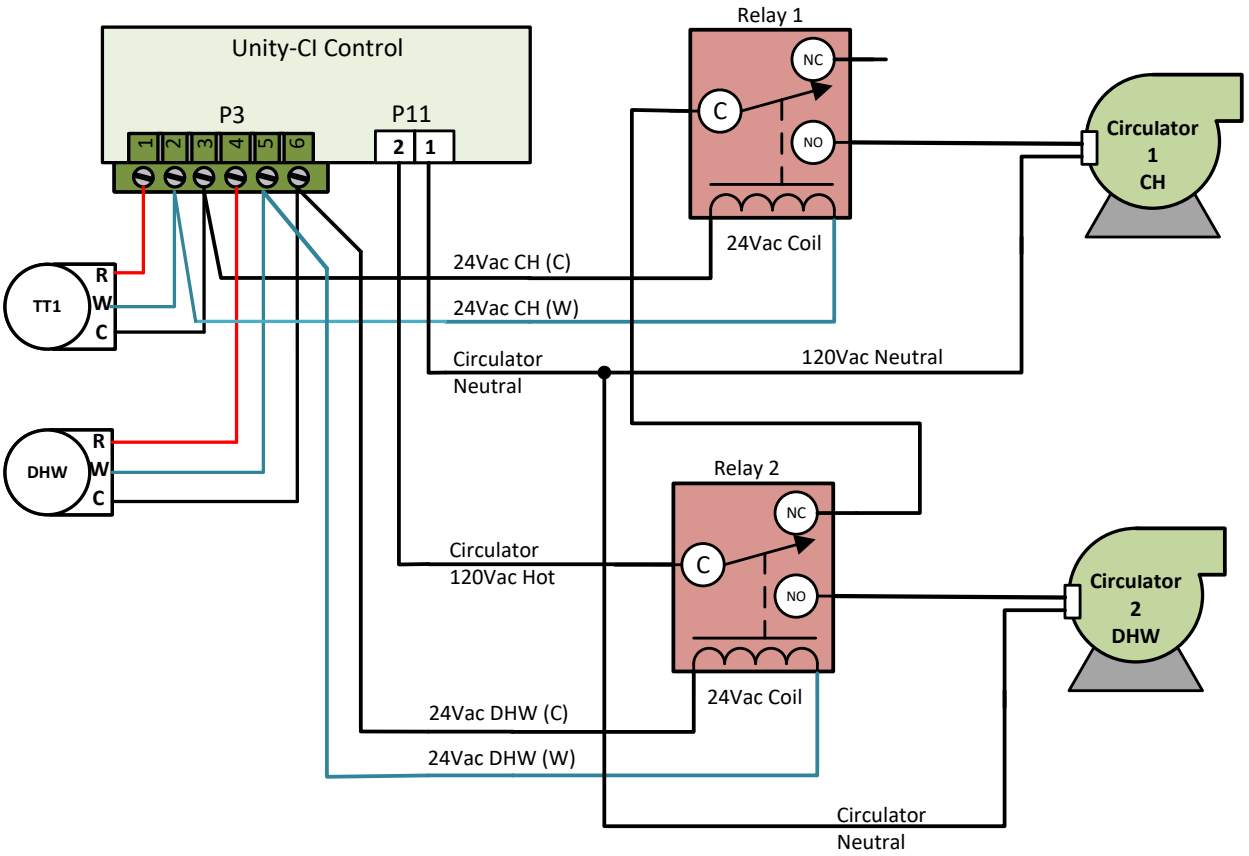
Refer to zone valve manufacturer's literature for wiring and application. A separate transformer is required to power zone valves. Zoning with circulators requires a relay for each circulator as shown in the diagram labeled Wiring Multiple Zones.

⚠CAUTION

DO NOT connect directly from 3-wire zone valves to the T-T terminals on the boiler. When using 3-wire zone valves, install an isolation relay. Connect the zone valve end switch wires to the isolation relay coil. Connect the isolation relay contact across the boiler T-T terminals. Failure to comply can result in damage to boiler components or cause unreliable operation, resulting in severe property damage.

3

Figure 31 Wiring Multiple Zones (EG water boilers)



Field wiring (continued)

Additional Limit Controls

Following standard industry practices, if installation is to comply with ASME requirements, a high temperature limit may be needed. Consult local requirements for other codes/standards to determine if needed.

1. Install a manual reset high temperature limit constructed to prevent a temperature setting above 240°F in system supply piping between boiler and isolation valve. (Note that the Unity CI-Control module operating limit function shuts the boiler down at 210°F, or lower if set to a lower value.)

⚠ WARNING

Multi-temperature systems — If the heating system includes circuits that require lower temperature water (radiant slab circuits, for example) as well as higher temperature circuits, it is recommended to protect low temperature circuits with limit controls that are wired to a Unity CI-Control external limit circuit (P4 terminals 1 and 2 for manual reset, or P4 terminals 2 and 3 for automatic reset).

2. See instructions below for wiring information.

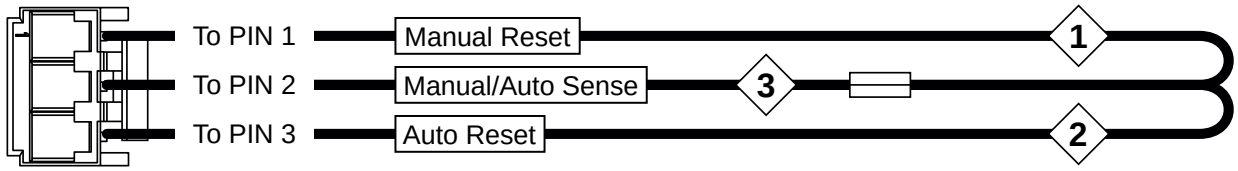
   a. Manual reset operation: If external limit controls are to cause manual reset of the Unity CI-Control module, connect series-wired isolated contacts to P4 terminal 1 by cutting and splicing in the external limit wires at the ‹1› mark (see **Figure 32** for wiring information).

   b. Automatic reset operation: If external limit controls are to cause automatic reset of the Unity CI-Control module, connect series-wired isolated contacts to P4 terminal 3 by cutting and splicing in the external limit wires at the ‹2› mark (see **Figure 32** for wiring information).

   c. If using a manual reset limit control or wiring in the manual reset circuit, set Unity CI-Control boiler limit at least 20°F less than the external manual reset limit (i.e., set Unity CI-Control no higher than 180°F for a 200°F external limit, for example).

3

Figure 32 External limit controls P4 terminals



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Section 4
Operation

Operation (EG Water Boilers)

Spark-Ignited Pilot System

NOTICE

Follow all procedures given in this manual and operating instructions when operating the boiler. Failure to do so could result in severe personal injury, death or substantial property damage.

1. **Standby:** With no call for heat, the vent damper and circulator are de-energized. No gas flows to pilot or main gas valve.
2. **Call for heat (thermostat circuit closes):**
   a. While attempting to satisfy the heat demand, the control module monitors the boiler temperature changes via the temperature sensor and determines whether or not the available hot water will satisfy the demand, only running the circulator. If additional heat is needed, the sequence continues. When DHW (if used) calls for heat, sequence above is bypassed.
   b. Vent damper and circulator energized if pilot status acceptable. Vent damper drives open. When vent damper end switch makes circuit, ignition control begins pilot ignition attempt.

Manual Reset Procedure for Lockout —

⚠ DANGER

If there is an ignition fault, the following fault reset procedure should be performed. While on the fault indication screen, press and release the enter button. A confirmation screen appears.

If the answer to the question is Yes, and the enter button pressed and released, the current fault shall be cleared if the underlying fault condition is clear.

3. **Pilot ignition:** Control module sparks the pilot and opens pilot valve in main gas valve.
   a. If pilot does light and control module senses flame current, spark generator is turned off and main valve opens.
   b. **Natural Gas -** If pilot does not light within 15 seconds, pilot valve is closed and spark generator is turned off. Control module waits 5 minutes, then attempts to ignite pilot again. This cycle will continue indefinitely if pilot ignition control does not sense pilot flame.
4. **Main burner operation:**
   a. Control module monitors pilot flame current. If signal is lost, main valve closes, spark generator activates and sequence returns to step 2.
   b. If power is interrupted, control system shuts off pilot and main gas valves and restarts at step 1 when power is restored.
   c. In the event the limit control shuts down the boiler — the control module closes the main gas valve, but keeps the circulator operating and the vent damper open.
5. **Thermostat satisfied (thermostat circuit opens)** — Pilot and main gas valves are closed — Vent damper is de-energized, and cycles to closed position. Circulator is shut off.
6. Boiler is now in the standby mode.

⚠ WARNING

Electrical shock hazard - can cause severe injury or death. Disconnect power before installing or servicing.

⚠ CAUTION

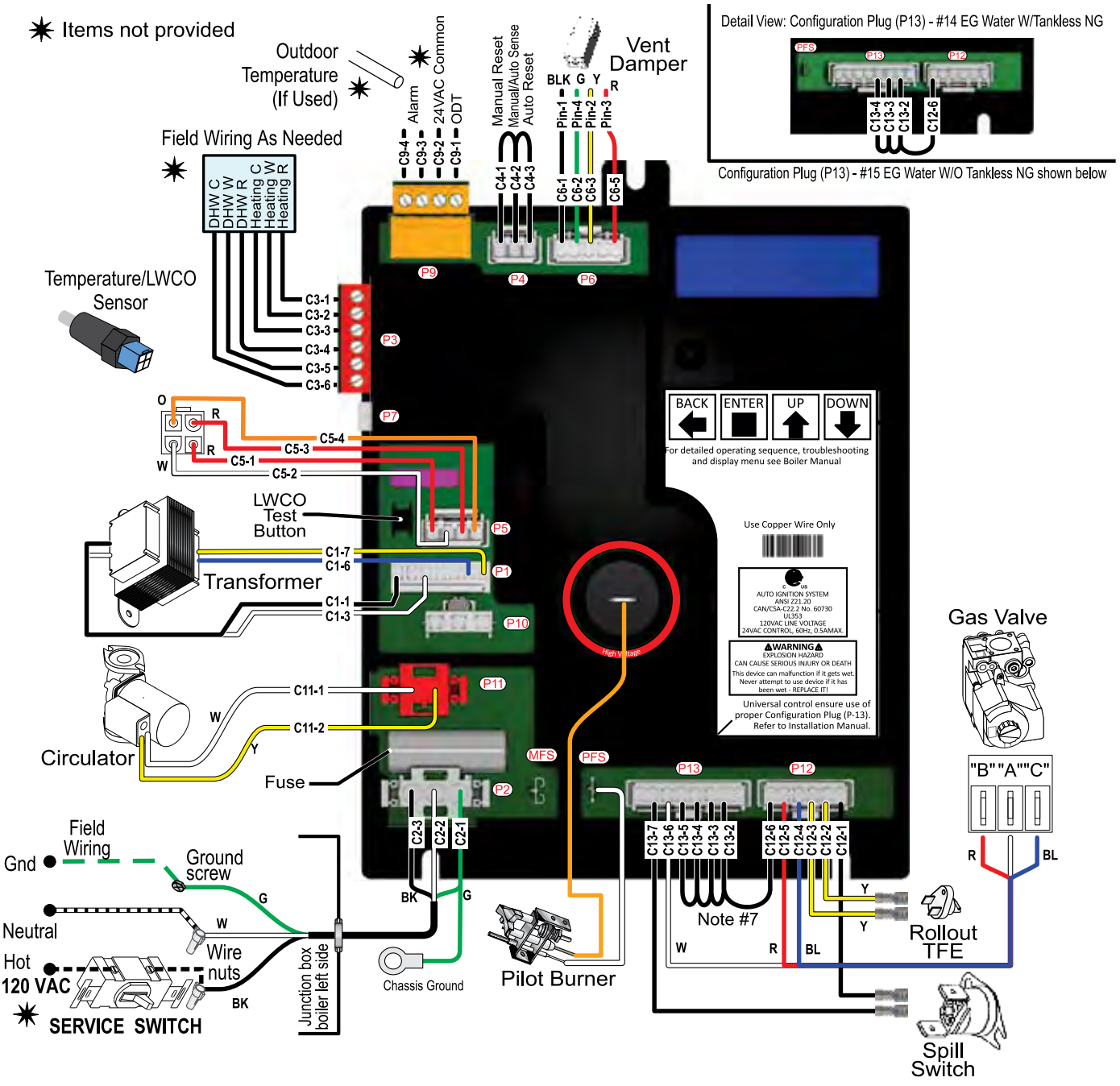
DO NOT connect directly from 3-wire zone valves to the T-T terminals on the boiler. When using 3-wire zone valves, install an isolation relay. Connect the zone valve end switch wires to the isolation relay coil. Connect the isolation relay contact across the boiler T-T terminals. Failure to comply can result in damage to boiler components or cause unreliable operation, resulting in possible severe property damage.

NOTICE

- The control module is polarity-sensitive to the incoming 120 VAC power. If polarity is reversed, the control will display FAULT L1 POLARITY and will not cycle boiler.
- All contacts shown without power applied.

Operation (EG Water Boilers) (continued)

Figure 33 Schematic wiring diagram — Spark-ignited pilot system



Operation (EG Water Boilers) (continued)

Figure 34 Ladder wiring diagram — Spark-ignited pilot system

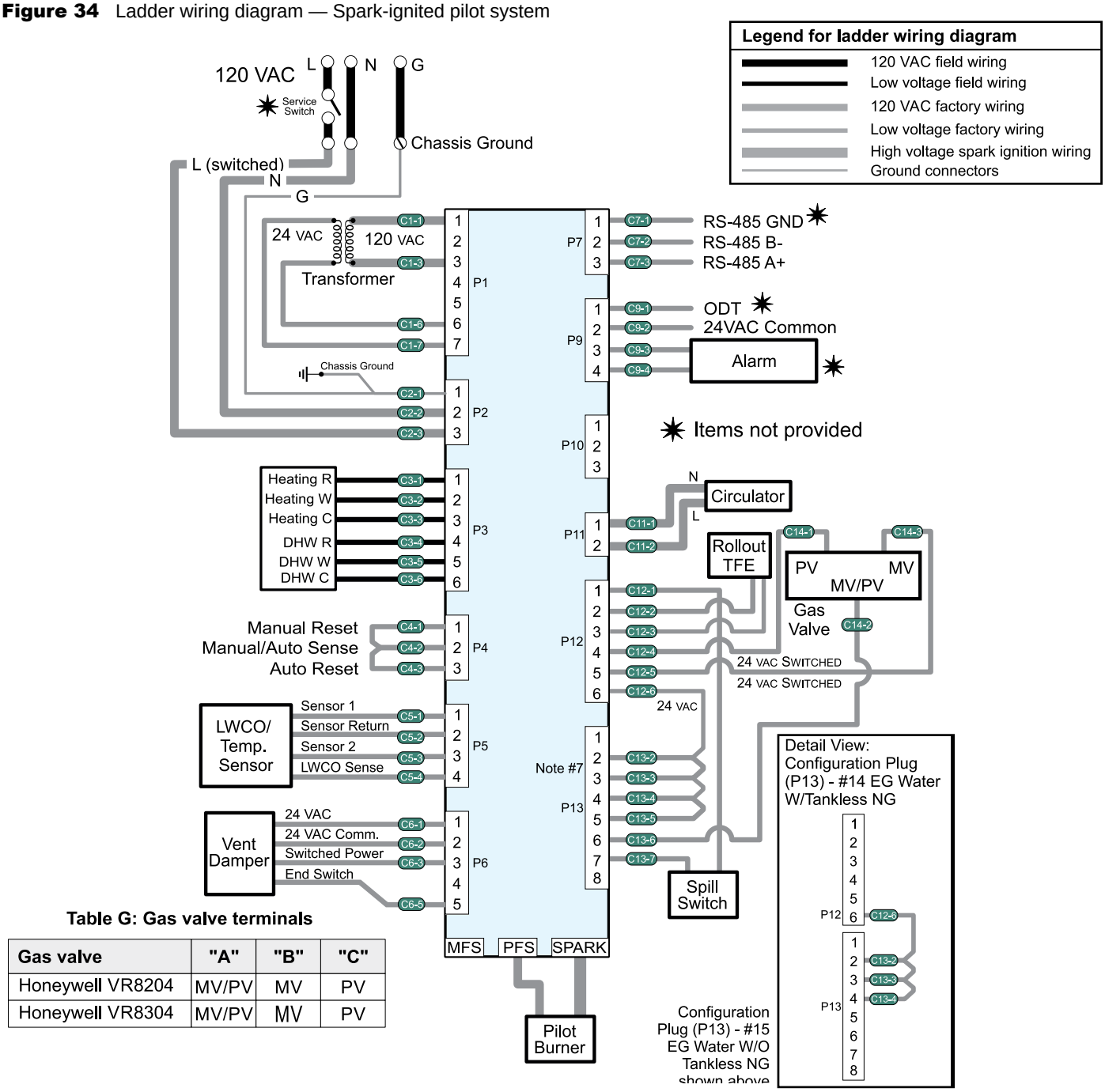


Table G: Gas valve terminals

Gas valve	"A"	"B"	"C"
Honeywell VR8204	MV/PV	MV	PV
Honeywell VR8304	MV/PV	MV	PV

1. All wiring must be installed in accordance with:
   A. U.S.A. -N.E.C. And any other national, state, or local code requirements.
2. Pilot lead wires are not field replaceable. Replace pilot assembly if necessary.
3. If any of the original wire as supplied with the appliance must be replaced, use minimum 105'C wire or equivalent. Exception - wires to a rollout TFE must be 200'C or equivalent.
4. For multiple zoning, use either zone valves or circulators. Refer to the component manufacture's instructions and this manual for application and wiring suggestions.
5. Refer to control component instructions packed with the boiler for application information.
6. Wire any additional limit controls (low water cut-off, high temperature limit, etc.) to P4 on Control.
7. C13-2 through C13-5 used to set model configuration. Configuration Plug (P13) - #15 EG Water W/O Tankless NG shown in the main view; Configuration Plug (P13) - #14 - EG Water W/Tankless NG shown in detail view

Operation (EG Water Boilers) (continued)

Operating instructions EG and PEG

- **Gas valve: Resideo VR8204/VR8304**

FOR YOUR SAFETY READ BEFORE OPERATING

WARNING If you do not follow these instructions exactly, a fire or explosion may result causing property damage, personal injury or loss of life.

A. This appliance is equipped with an ignition device which automatically lights the pilot. Do not try to light the pilot by hand.

B. BEFORE OPERATING, smell all around the appliance area for gas. Be sure to smell next to the floor because some gas is heavier than air and will settle on the floor. See below.

C. Use only your hand to turn the gas control knob. Never use tools. If the knob will not turn by hand, don't try to repair it, call a qualified service technician. Force or attempted repair may result in a fire or explosion.

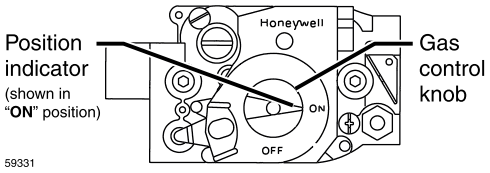
D. Do not use this appliance if any part has been under water. Immediately call a qualified service technician to inspect the appliance and to replace any part of the control system and any gas control, which has been under water.

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 phone outside the structure. Follow the gas supplier's instructions.
- If you cannot reach your gas supplier, call the fire department.

OPERATING INSTRUCTIONS

1. STOP! Read the safety information above on this label.
2. Set the "thermostats" to lowest setting.
3. Turn off all electrical power to the appliance.
4. Remove front panel.
5. This appliance is equipped with an ignition device which automatically lights the pilot. Do not try to light the pilot by hand.
6. The gas control knob clockwise ↷ to "OFF".



7. Wait five (5) minutes to clear out any gas. Then smell for gas, including near the floor. If you smell gas, STOP! Follow "WHAT TO DO IF YOU SMELL GAS" in the safety information above. If you don't smell gas, go to the next step.
8. Turn gas control knob counterclockwise ↶ to "ON."
9. Turn on all electric power to the appliance.
10. Set "thermostats" to desired setting.
11. If the appliance will not operate when there is a call for heat and the piping is not hot , follow the instructions "To Turn Off Gas To The Appliance" and call your service technician or gas supplier.
12. Reinstall front panel.

TO TURN OFF GAS TO THE APPLIANCE

1. Set the thermostat to lowest setting.
2. Turn off all electric power to the appliance if service is to be performed.
3. Remove front panel.
4. Turn gas control knob clockwise ↷ to "OFF." Do not force.
5. Reinstall front panel.

550-223-041(0724)

Operation (EG Water Boilers) (continued)

Department of Energy – Compliance

EG Water Boilers Only

This boiler is equipped with a control system that automatically adjusts a time delay period to turn on the boiler during a call for heat. This is accomplished by circulating available hot water in the system while measuring water boiler water temperature changes. The control calculates a suitable delay based on temperature measurements and turns the boiler on only after it determines that the demand for heat cannot be satisfied with the available hot water.

Due to the wide variety of controls used in boiler installations, this control is also equipped with an adjustment for the calculated time delay period (ECONOMY ADJUST). This feature is not used when ODR is enabled. When ECONOMY ADJUST is set to 10%, the time delay is the minimum possible time between energizing the circulator and ignition. The IMPORTANT notice below must then be observed:

IMPORTANT

In accordance with Section 325 (f) (3) of the Energy Policy and Conservation Act, 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 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.

Operating - Controls

This section is intended to provide instructions for control operation and boiler startup procedures.

Control Operation

User Interface

The control has a two-line by sixteen-character display and four push buttons. The buttons are immediately below the display. These buttons allow the user to navigate a list of menu items and edit the associated parameter.

Display and Keypad

The displays shown in **Figure 35 on page 40** show the default display color and arrangement for the five different modes of operation.

Standby

Operating the user interface

Active Central Heat (CH) Call

Active Domestic Hot Water (DHW) Call

Fault

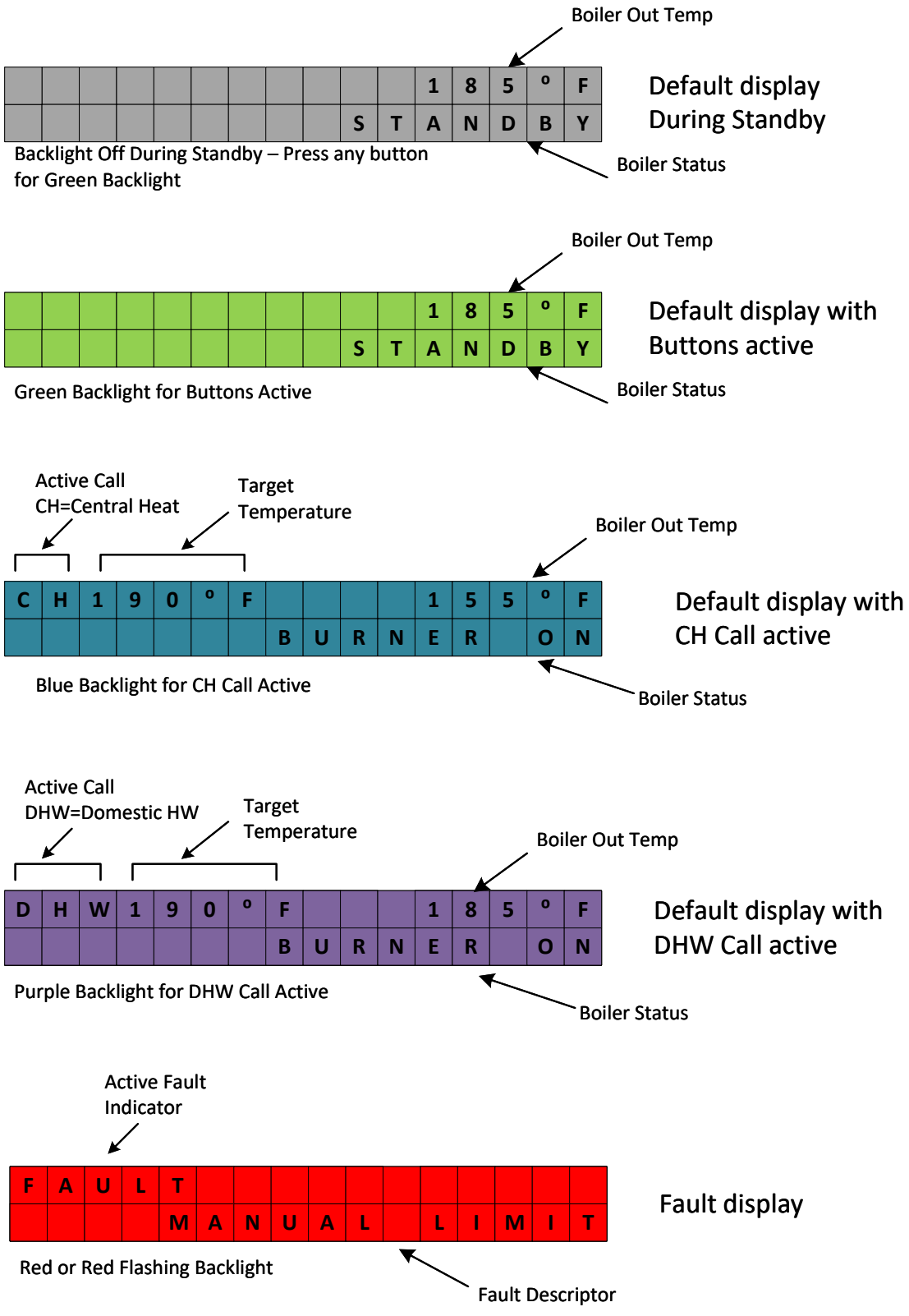
The control display indicates operational status through its use of backlight colors.

1. No backlight indicates that the control is in standby mode.
2. A green backlight is displayed on a configured control when initially powered on. Also when there are no active calls for heat but the control buttons are being used. The backlight will turn off after 20 minutes of no push-button activity.
3. Blue backlight indicates that either initialization is taking place or that a CH call for heat is active.
4. Purple backlight indicates that a DHW call for heat is active.
5. Red backlight is displayed when an unconfigured control is initially powered on or when a fault has occurred. Although a fault must be cleared before normal operation can proceed, the Advanced Menu can be used while in fault mode to identify the current state of parameters which may be involved in this fault condition.

Operation (EG Water Boilers) (continued)

Operating - Controls (continued)

Figure 35 User interface



Operation (EG Water Boilers) (continued)

Operating - Controls (continued)

Control Operation (continued)

Menu Structure

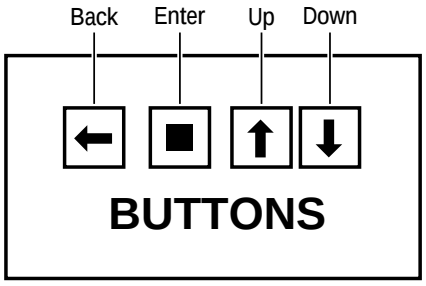
Figure 37 shows the functional flow and operation of the control menu structure. The default Basic Menu is shown on the left, and the Advanced Menu is on the right.

The default menu is the "Basic Menu" which allows display and adjustment of the Central Heating (CH) and Backlight Intensity settings. **Figure 37** shows the sequence of settings while navigating through the menu structure.

Installers use the Advanced Menu to set parameters that are only necessary for installing a new boiler. The Advanced Menu also contains the DIAGNOSTICS menu, allowing near real-time display of important system parameters; this feature is useful when attempting to quickly diagnose system problems.

The default display will be active after control initialization. See **Figure 35 on page 40**. The top, left end of the display shows the target setting when a CH or DHW call is active. The current outlet temperature of the boiler is displayed in the top, right line. The bottom line of the control displays the current state of operation, which is STANDBY in the image.

Figure 36 User interface buttons

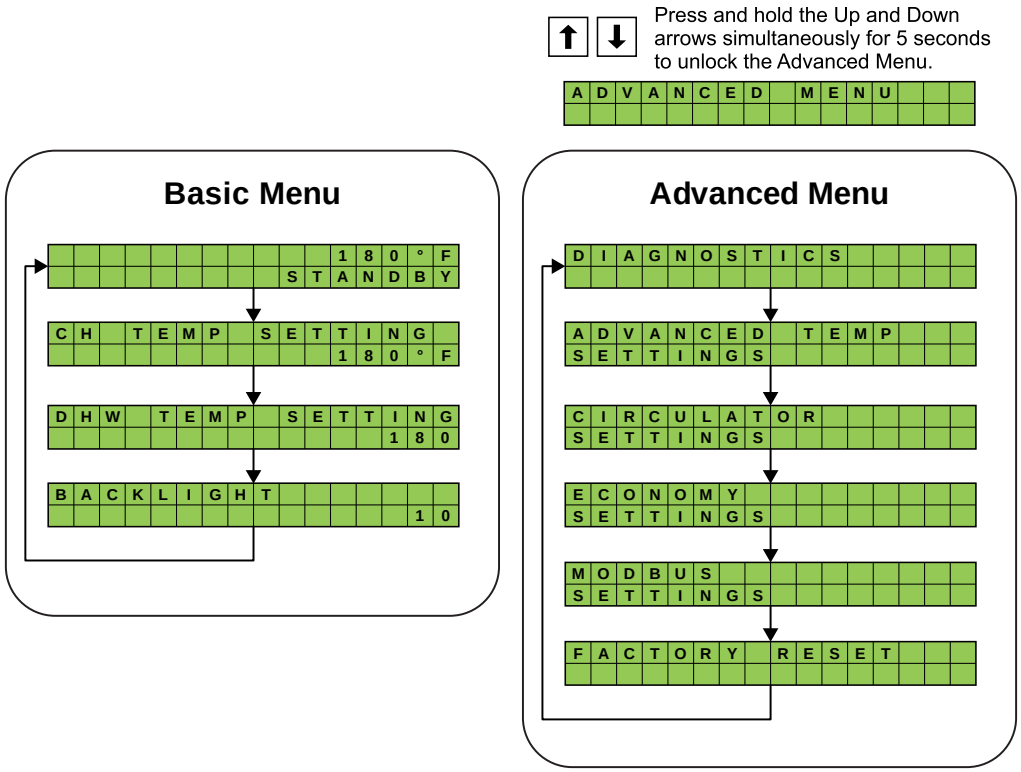


Basic Menu

By default, the control will start in the Basic Menu displaying the default temperature/status display.

1. Pressing any button will turn on the backlight, which will turn off again after 20 minutes of no button activity.
2. The next press will advance you to a parameter item. For example, pressing the Down button will take you to the Central Heat setting item. The top line will say CH TEMP SETTING, while the bottom line will display a temperature.
3. Pressing the Enter button will edit the parameter. The control will indicate edit mode by displaying an asterisk (*) on the left of the bottom line.

Figure 37 Boiler control menu structure



Operation (EG Water Boilers) (continued)

Operating - Controls (continued)

Control Operation (continued)

4. The Up and Down buttons will now affect the parameter value displayed to the right on the bottom line. Pressing and releasing these buttons will change the value shown.
5. Press the Enter button to save the new value you have chosen. The asterisk will disappear from the bottom line, and the new value will be saved.
6. If the Left button is pressed before the Enter button, the edit function ends, the asterisk will disappear, and the display will return to showing the original parameter value and return you to the parameter selection mode.

When in a parameter display, pressing the Down button will move the display to the next parameter in the menu. Pressing the UP button will move the display back to the previous parameter item. Editing and saving parameter values will operate the same as before.

When displaying the last item in a menu, the Down button will wrap around to the top of the menu and display the Default Temperature/Status screen item. User Menu operation will continue as before.

Advanced Menu

The Advanced Menu can be accessed when the Basic Menu is not in edit mode.

To access the Advanced Menu, press and hold the Up and Down buttons simultaneously for 5 seconds. The display will change to read “Advanced Menu.” After a few seconds, the display will proceed to the first menu item, “Diagnostics.”

The Advanced Menu provides access to submenus, which allow for setup, control, and diagnosis of advanced boiler functions: Diagnostics, Advanced Temp Settings, Circulator Settings, Economy Settings, MODBUS Settings as well as Factory Reset.

1. **Diagnostics –** This submenu provides access to further submenus, which show the states and values of sensors and various operating parameters.
   a. Inputs and Outputs
   b. Temperature
   c. LWCO
   d. Status & Faults
2. **Advanced Temperature Setting**

   WWSD stands for “warm weather shutdown.” It means the boiler will not be allowed to fire if the outside temperature is greater than the WWSD setting. When the boiler is kept off because the outside temperature is above WWSD, the graphic display will show “WWSD ACTIVE,” and the boiler will remain in standby until the outside temperature drops below WWSD temperature. WWSD does not apply to DHW systems. The optional outdoor sensor must be installed to use this function.

ODR stands for outdoor reset. The ODR function adjusts the CH target temperature linearly dependent on the following 5 Advanced User settings:

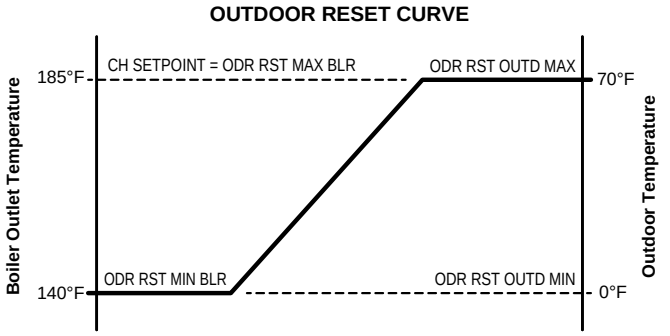
- ODT - Outdoor Temperature as measured by Outdoor Sensor
- ODR RST OUTD MIN – Outdoor Temperature to begin setpoint adjustments.
- ODR RST OUTD MAX - Outdoor Temperature to end setpoint adjustments.
- ODR RST MAX BLR – adjusted CH Setpoint when the outdoor temp is equal to or less then ODR RST OUTD MIN
- ODR RST MIN BLR – adjusted CH Setpoint when the outdoor temp is equal to or greater then ODR RST OUTD MAX

ODR CONFIG – Advanced setting where the ODR feature is Enabled or Disabled

ODR Rules

When the outdoor temperature is greater than the ODR RST MAX BLR the control uses the ODR RST MIN BLR as the operating setpoint. When the outdoor temperature is less than the ODR RST MIN BLR the control uses the ODR RST MAX BLR as the operating setpoint. See **Figure 38** below.

Figure 38 Reset curve

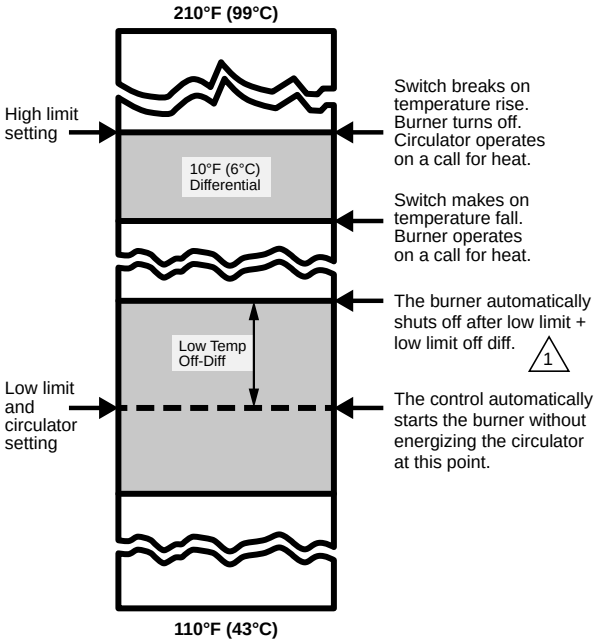


On EG boilers equipped with a Tankless Heater Coil, the DHW settings: Low Temp Limit and Low Tmp Off-Diff can be adjusted in the Advanced Temp Settings Menu. Low Temp Limit and Low Tmp Off-Diff are described in **Table 13, page 46**. **Figure 39** shows a graphical representation of these settings

Operation (EG Water Boilers) (continued)

Operating - Controls (continued)

Figure 39 EG Setpoint Relationships



1 When water reaches proper temperature, the burner shuts off and the circulator continues to run. The circulator shuts off when the thermostat is satisfied.

Setpoint adjustments can be made based on one of three available **Methods (M)**.

M1. ODR when an outdoor temperature sensor is installed.

a. Outdoor Reset (ODR Config) - This configuration parameter will Enable/Disable the ODR feature. Enabling this parameter also requires an Outdoor Temperature Sensor to be installed.

b. Outdoor Reset Max Boiler - (ODR RST MAX BLR) - Boiler output temperature where the minimum amount of adjustment is made.

c. Outdoor Reset Min Boiler - (ODR RST MIN BLR) - Boiler output temperature where the maximum amount of adjustment is made.

d. Outdoor Reset Outdoor Max - (ODR RST OUTD MAX) - Outdoor Temperature to end setpoint adjustments.

e. Outdoor Reset Outdoor Min - (ODR RST OUTD MIN) - Outdoor Temperature to begin setpoint adjustments.

M2. Residual Heat Recovery Algorithm when no outdoor temperature sensor is used.

M3. In addition to these, when an outdoor sensor is used, a maximum outdoor temperature (WWSD) can be set to cause the control to ignore the CH/TT1 input. (WWSD is the outdoor temperature setting in degrees.)

a. Warm Weather Shut Down (WWSD Config) - If warm weather shutdown is enabled, and an outdoor sensor is installed, when the outdoor temperature is greater than the Warm Weather Shut Down (WWSD) setting, an active CH/TT1 demand is ignored. In this case, while the CH/TT1 demand is active, the display will show status as “WWSD ACTIVE”.

3. Circulator Settings - This menu is used to enable or disable the Circulator Freeze Protection and Exercising functions.

a. Freeze Protect - The control energizes the circulator any time the temperature sensor is below 40°F. The circulator will stay energized until the temperature rises above 45°F. The control de-energizes the circulator when the temperature rises above 45°F. Freeze protection does not interfere with a call for heat. A call for heat will proceed normally if the circulator is energized from freeze protect.

b. Circulator Exercising (Thirty Day (+/- 1) Pump Cycle) - At thirty +/- one day intervals after the last call for heat, the circulator pump is to be energized for 30 seconds. Short operations after long-term idle periods prevent damage of the pump rotor from sedimentation.

4. Economy Settings - This menu allows the parameter entry for economy adjustment of the CH Set point.

a. Economy Setting (%) - The Economy setting linearly scales the maximum time to attempt to satisfy the load from residual heat. When set to the minimum (10%), gas heat is immediately enabled when the thermostat demand starts. When set all the way to the “economy” side (100%), gas heat enable may be delayed up to 120 seconds based on how the load satisfy time decreases as water temperature falls. This feature is not enabled if Outdoor Reset is enabled.

5. Modbus Settings – This submenu allows you to set communications parameters for Modbus communications such as:

a. Modbus Address - Default "249"

b. Baud Rate – Default “38400”

c. Parity – Defaults “NONE”

d. Stop Bits – Defaults “2”

e. Communications status (Active/Inactive)

6. Factory Reset - Resets all User Interface (UI) parameters to factory default values.

All of these Advanced Menus are navigated in exactly the same manner as is done in the default Basic menu. To go back to the Default Basic Menu, repeatedly press the Back arrow until you see the Default Temperature/Status screen item or press and hold until the Basic Menu is displayed.

Operation (EG Water Boilers) (continued)

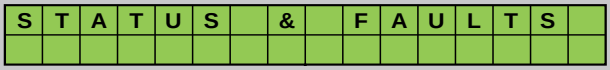
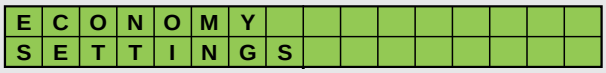
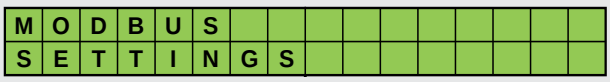
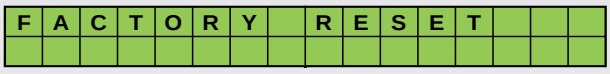
Operating - Controls (continued)

Display Screens (Ordered as advancing with "DOWN" arrow button)

1		This is the main (default) screen on the control. This shows the current boiler water temperature and the current state of the boiler.
1		This screen allows you to adjust the central heat (CH) setpoint.
1		This screen allows you to adjust the domestic hot water (DHW) setpoint.
1		This screen allows the user to adjust the backlight intensity in steps from 1 to 10, with 1 being Off and 10 being maximum brightness.
1		To access the following screens See **Figure 37, page 41**. This screen will only be displayed momentarily, indicating that you have entered the Advanced Menus.
2		This is the 1st sub menu under the Advanced Menus heading. Pressing ENTER when on this screen advances into Diagnostics status screens as listed below: 1. Inputs & Outputs 2. Temperature 3. LWCO 4. STATUS & FAULTS
3		This is the 1st sub-menu under the Diagnostics sub-menu. Pressing ENTER when on this screen advances into the Inputs & Outputs status screens as listed below: 1. Alarm Status 2. Circulator Status 3. Flame Sense-Pilot 4. Damper Output 5. End Switch 6. Inducer Status 7. Pilot (Gas) status 8. Main (Gas) status 9. Air Pressure Switch 10. Auto Limit Status 11. Manual Limit Status
3		This is the 2nd sub menu under the Diagnostic sub-menu. Pressing ENTER when on this screen advances into Temperature sensor status screens as listed below: 12. Boiler Out 1 13. Boiler Out 2 14. OUTDOOR 15. DHW OUT

Operation (EG Water Boilers) (continued)

Operating - Controls (continued)

	3 	This is the 3rd sub menu under the Diagnostic sub-menu. Pressing ENTER when on this screen advances into LWCO status screens as listed below: 1. INTEGRATED LWCO (Enabled) 2. LWCO STATUS (Water Present/No Water) 3. LWCO READING (Measured Resistance)
	3 	This is the 4th sub menu under the Diagnostic sub-menu. Pressing ENTER when on this screen advances into Status & Faults screens as listed below: 1. Boiler Status 2. DHW INPUT STATUS 3. CH input Status 4. CURRENT FAULT 5. Previous Fault 6. BOILER MODEL (Configuration #) & Software Version
	2 	This is the 2nd sub menu under the Advanced Menus heading. Pressing ENTER when on this screen advances into Advanced Temperature Setting screens as listed below: 1. Start-Up On Differential 2. ODR CONFIG (Enable/disable) 3. ODR RST MAX BLR (Temp) 4. ODR RST MIN BLR (Temp) 5. ODR RST OUTD MAX (Temp) 6. ODR RST OUTD MIN (Temp) 7. WWSD Config (Enable/disable) 8. WWSD (Temp) 9. LOW TEMP LIMIT (Temp) 10. LOW TMP OFF DIFF (Temp)
	2 	This 3rd sub-menu is used to enable or disable the Circulator Freeze Protection and Exercising functions. 1. Freeze Protect 2. Circulator Exercising
	2 	This is the 4th sub-menu heading under the Advanced Menus heading. Pressing enter when on this screen advances into the economy setting screen as listed below: 1. ECONOMY SETTING (10% - 100%)
	2 	This is the 5th sub menu under the Advanced Menus heading. Pressing ENTER when on this screen advances into Modbus configuration screens as listed below: 1. Modbus Status 2. Modbus Address 3. Modbus Baud Rate 4. Modbus Parity 5. Modbus Stop Bits 6. Modbus Activity
	2 	This is the 6th sub menu under the Advanced Menus heading. Pressing ENTER when on this screen causes the control to set all adjustable parameters back to factory defaults.

Operation (EG Water Boilers) (continued)

Operating - Controls (continued)

Control Settings

Table 13 Control menus and settings information

Basic Menu			
Item	**Description**	**Default**	**Setting Range**
Setpoint & Boiler Out Temp *–Water Boiler Only–*	This shows the current Boiler Out Temperature and current boiler status.	NA	NA
CH Setting *–Water Boiler Only–*	CH setting is the Operating Limit for the control when thermostat input is active. The boiler will shut down when reaching this temperature.	180°F	140 - 210°F
DHW Setting	DHW setting is the Operating limit for the control when the DHW input is active.	180°F	140 - 210°F
Backlight	This will change the brightness of the backlight on the LCD display.	10	1 - 10
Advanced Menu			
Advanced Temp Settings	**Description**	**Default**	**Setting Range**
Start-Up On Diff	This differential controls when the burner will be turned back on after cycling off after achieving the CH Setpoint.	20°F	1 - 50°F
ODR Config	Enables or Disable Outdoor reset function.	Disable	Enable/Disable
ODR RST MAX BLR	Adjusted CH Setpoint when the outdoor temp is equal to or less than ODR RST OUTD MIN.	180	140 - 210ºF
ODR RST MIN BLR	Adjusted CH Setpoint when the outdoor temp is equal to or greater than ODR RST OUTD MAX.	140	140 - 180ºF
ODR RST OUTD MAX	Outdoor Temperature to end setpoint adjustments.	70	50 - 100ºF
ODR RST OUTD MIN	Outdoor Temperature to begin setpoint adjustments.	0	-29ºF - +49ºF
WWSD Config	Enables the Warm Weather Shut Down.	Disable	Enable/Disable
WWSD	Sets the temperature for WWSD shutdown.	70ºF	50ºF - 100ºF
Low Temp Limit	This is the setting for the keep warm temperature on EG Water with Tankless when no DHW call active.	140°F	110 - 170°F
Low Tmp Off-Diff	Low Temp Limit + Off-Diff is the temperature at which the boiler will shut down when maintaining the low temp setting.	10°F	10-30°F
Economy Settings	**Description**	**Default**	**Setting Range**
Economy Setting	CH Setpoint adjustment percent.	10%	10% -100%
Diagnostics			
Inputs & Outputs	**Description**	**Default**	**Range**
Alarm Status	Shows the status of the alarm.	—	ACTIVE / INACTIVE
Circulator Status	Shows the status of the circulator output.	—	ON / OFF
Flame Sense Pilot	This shows the value of the flame sense. 0 = Strongest; 60 - None.	—	0 - 60
Damper Output	This parameter defines whether the damper motor is enabled.	OFF	ON / OFF
End Switch	This parameter defines the damper position.	CLOSED	OPEN / CLOSED
Pilot Valve	Shows the status of the Pilot Valve output.	—	ON / OFF
Main Valve	Shows the status of the Main Valve output.	—	ON / OFF
Auto Limit	Shows the status of the Auto Limit Switch.	—	OPEN / CLOSED
Manual Limit	Shows the status of the Manual Limit Switch.	—	OPEN / CLOSED

Operation (EG Water Boilers) (continued)

Operating - Controls (continued)

Control Settings (continued)

Temperature	Description	Default	Range
Boiler Out 1	Shows the value of temperature sensor 1 at the boiler out sensor.	—	—
Boiler Out 2	Shows the value of temperature sensor 2 at the boiler out sensor.	—	—
Outdoor	Shows the value of the outdoor Temperature sensor if used.	—	—
DHW Out	Shows the temperature of the boiler water outlet port when servicing the DHW call.	—	—
LWCO	**Description**	**Default**	**Range**
Integrated LWCO	Integrated LWCO cannot be turned Off.	ENABLED	ENABLED ONLY
LWCO Status	Shows status of LWCO sensor.	—	WATER PRESENT / NO WATER
LWCO Reading	This is a value representing the resistance reading of the conductivity between the LWCO sensor and the boiler indicating the presence of water as the conducting medium.	—	0 - 60
Status & Faults	**Description**	**Default**	**Range**
Boiler Status	This shows the status of the boiler.	—	—
DHW Input Status	Shows the status of the Domestic Hot Water call for heat input.	—	ACTIVE / INACTIVE
CH Input Status	Shows the status of the Central Heating call for heat input.	—	ACTIVE / INACTIVE
Lockout/Fault	Two menu items showing current and previous fault.	—	—
Current Fault	Displays name of currently active fault.	—	—
Previous Fault	Displays name of previously active fault.	—	—
Model	Shows the control board model and firmware version.	—	—
Modbus Settings	**Description**	**Default**	**Setting Range**
Modbus Status	Shows the status of modbus system.	Enable	Enable / Disable
Modbus Address	Change the modbus address of this control.	249	0 - 255
Modbus Baud Rate	Speed of communication channel.	38400	4800 / 9600 / 19200 / 38400
Modbus Parity	Change the modbus parity setting of this control.	None	None,1,2
Modbus Stop Bits	Allow time for the reception and processing of current byte and preparation for next byte.	2	1 / 2
Modbus Activity	An indication of communication activity.	Blank Character	Blank / Black Character
Factory Reset	Reset the firmware on the control to factory condition.	—	—

Operation (EG Water Boilers) (continued)

Operating - Controls (continued)

Sequence of Operations

⚠ WARNING

If any manual reset limit device trips, DO NOT reset without determining and correcting the cause. Never attempt to bypass a safety limit device. Attempting to operate a boiler without diagnosing the cause of failure can cause unsafe operation, which can result in personal injury, death, or substantial property damage.

Ignition Process

EG Water 30-75

1. When receiving a call-for-heat from either the CH or DHW inputs, the display will change to OPENING DAMPER. When the control detects the damper end switch closed for 2 seconds, indicating the damper is open, the display will transition to PILOT IGNITION. If the end switch remains open (damper closed) after 45 seconds, the control will display DAMPER FAULT, activate the alarm, and enter a 6-minute hold while keeping the damper activated. If after the 6-minute hold the control detects the end switch closed, it will immediately transition to PILOT IGNITION.
2. The control energizes the spark and pilot valve and looks for flame. If flame is detected, the spark is shut off and the pilot flame is monitored for stability for 2 seconds. If flame remains present after 2 seconds, the control proceeds to steady heat. If flame is lost, the control re-energizes spark output and continues with the ignition trial.
   a. In the Advanced Menu under Diagnostics > Inputs & Outputs > Flame Sense, one can read the flame sense status of the Pilot burner as measured by the control.
   b. A value of 60 is considered to be the "No Flame" threshold.
   c. A good quality flame is expected to show a value of less than 60, with higher quality flames showing lower values.
3. If the control's 15 second pilot flame sense timer expires without seeing an acceptable flame sense value for at least 2 seconds, it will remove power, close the damper, and wait 6 minutes and retry the ignition sequence. There is no limit to the number of pilot ignition trials on Natural Gas units. If the control successfully completes its pilot ignition process, it will energize the Main Gas Valve.

Control Installation

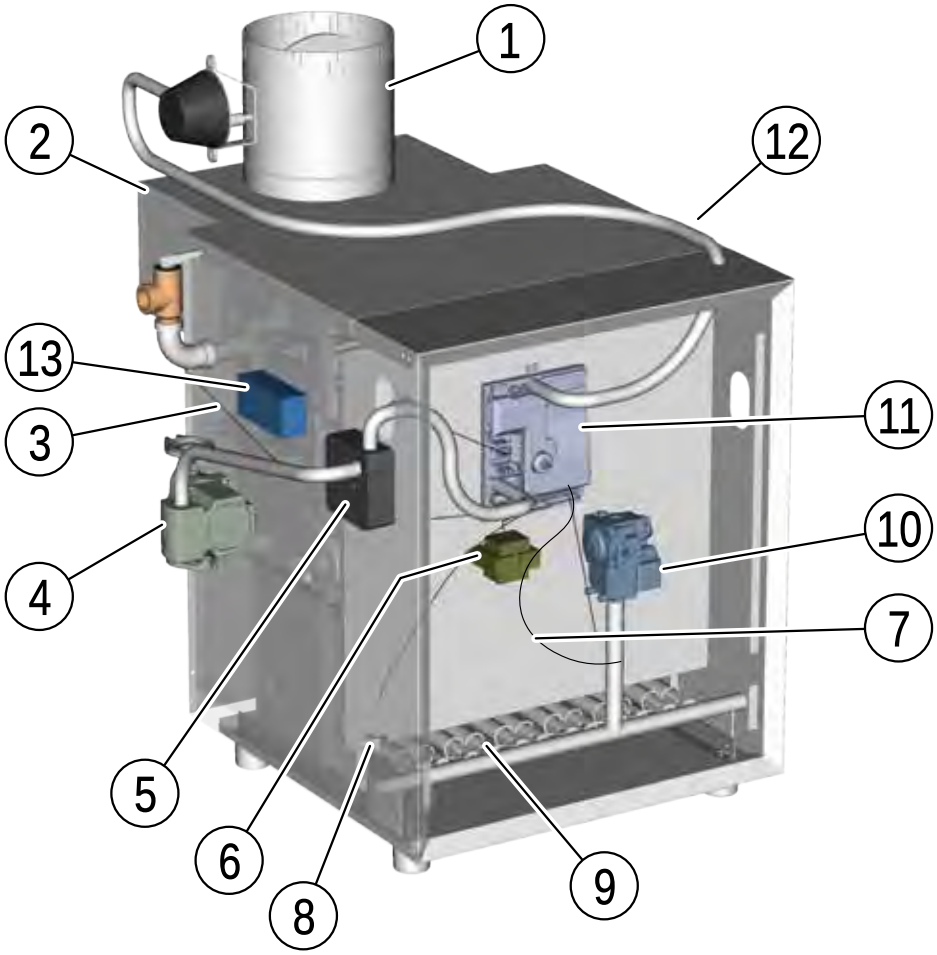
EG-30 Through EG-75 Water Boilers Without Tankless Heaters

⚠ WARNING

For your safety, turn off electrical power supply and turn off external gas supply valve before attempting to work on the boiler. Failure to comply can result in severe personal injury, death or substantial property damage.

1. Mount and wire controls per wiring diagram, **page 36**, and **Figure 40**.
   a. Attach junction box inside left jacket panel with #8-32 x ½" machine screws provided.
   b. Mount the 24VAC transformer to the interior jacket panel with #10 x 1/2" screws and lock washers provided (use mounting holes below the boiler control).
   c. For the 120VAC Power Supply Harness, secure the ring terminal of the chassis ground splice to the interior jacket panel using the #8 x 3/8" screw (use mounting hole to right of the transformer).
2. Bring 120 VAC supply wiring to boiler, must be 14 gauge or heavier.
3. Operating and limit circuit wiring must be 18 gauge or heavier.

Figure 40 EG-30 through EG-75 water boilers without tankless heaters



1) Damper
2) Draft Hood
3) Spill Switch Wires
4) Circulator (by others)
5) Junction Box
6) Transformer
7) Wiring Harness
8) Rollout TFE
9) Pilot
10) Gas Valve
11) Ignition Control
12) Damper Harness
13) Low Water Cut Off

Control Installation (continued)

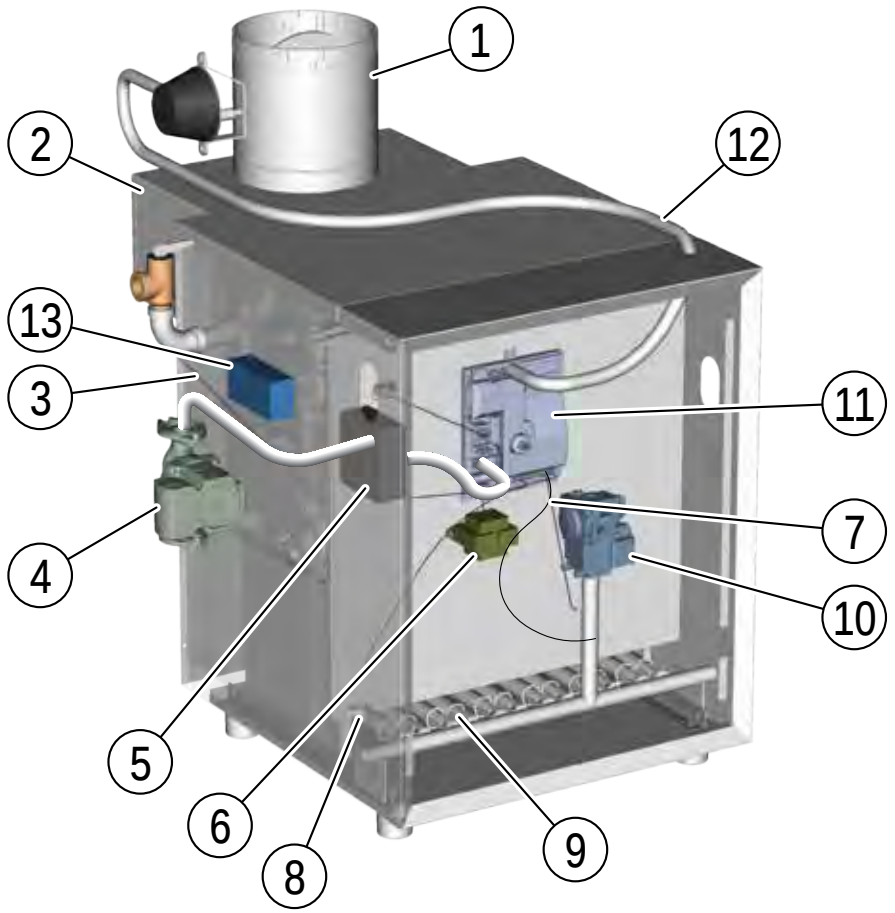
EG-30 Through EG-75 Water Boilers With Tankless Heaters

⚠ WARNING

For your safety, turn off electrical power supply and turn off external gas supply valve before attempting to work on the boiler. Failure to comply can cause severe personal injury, death or substantial property damage.

1. Mount and wire controls per wiring diagram, **page 36**, and **Figure 40**.
   a. Attach junction box inside left jacket panel with #8-32 x ½" machine screws provided.
   b. Mount the 24VAC transformer to the interior jacket panel with #10 x 1/2" screws and lock washers provided (use mounting holes below the boiler control).
   c. For the 120VAC Power Supply Harness, secure the ring terminal of the chassis ground splice to the interior jacket panel using the #8 x 3/8" screw (use mounting hole to right of the transformer).
2. Bring 120 VAC supply wiring to boiler, must be 14 gauge or heavier.
3. Operating and limit circuit wiring must be 18 gauge or heavier.

Figure 41 EG-30 through EG-75 water boilers with tankless heaters



1) Damper
2) Draft Hood
3) Spill Switch Wires
4) Circulator (by others)
5) Junction Box
6) Transformer
7) Wiring Harness
8) Rollout TFE
9) Pilot
10) Gas Valve
11) Ignition Control
12) Damper Harness
13) Low Water Cut Off

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Control Installation (continued)

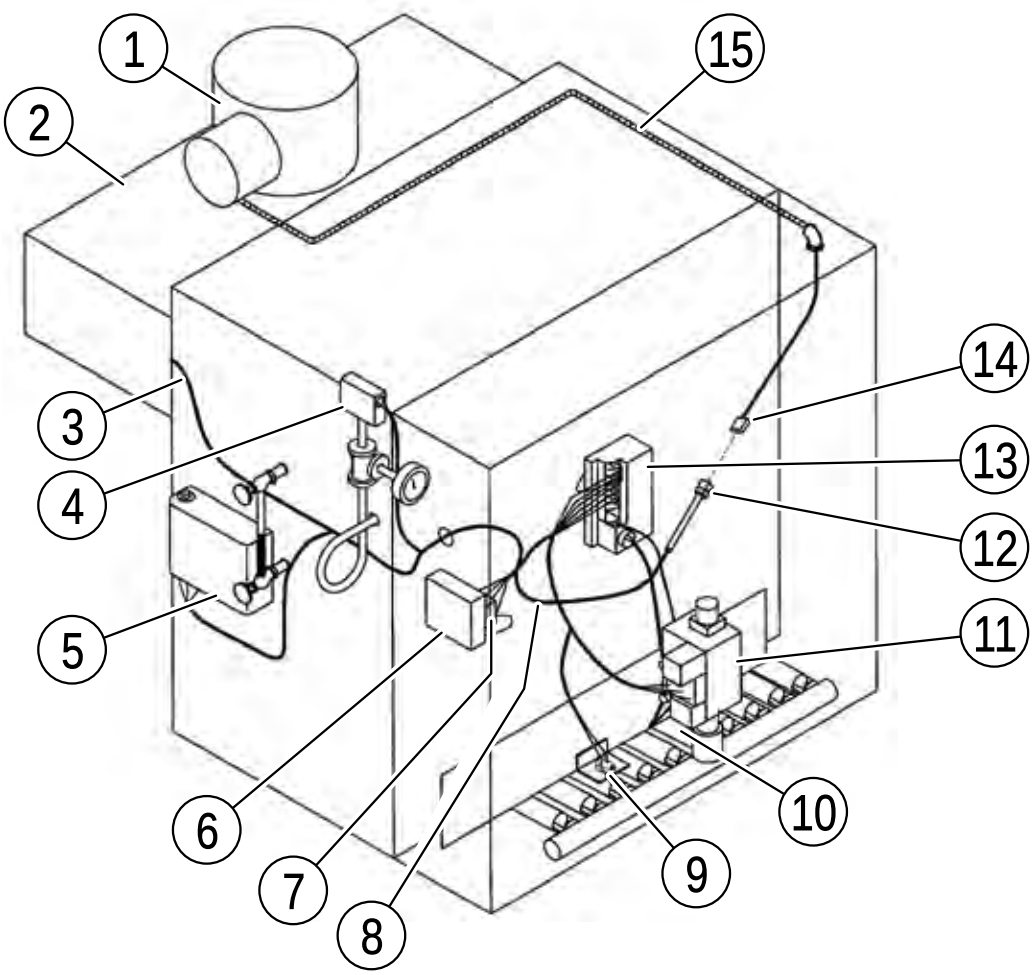
EG steam boilers with probe-type low water cut-off

⚠ WARNING

For your safety, turn off electrical power supply and turn off external gas supply valve before attempting to work on the boiler. Failure to comply can cause severe personal injury, death or substantial property damage.

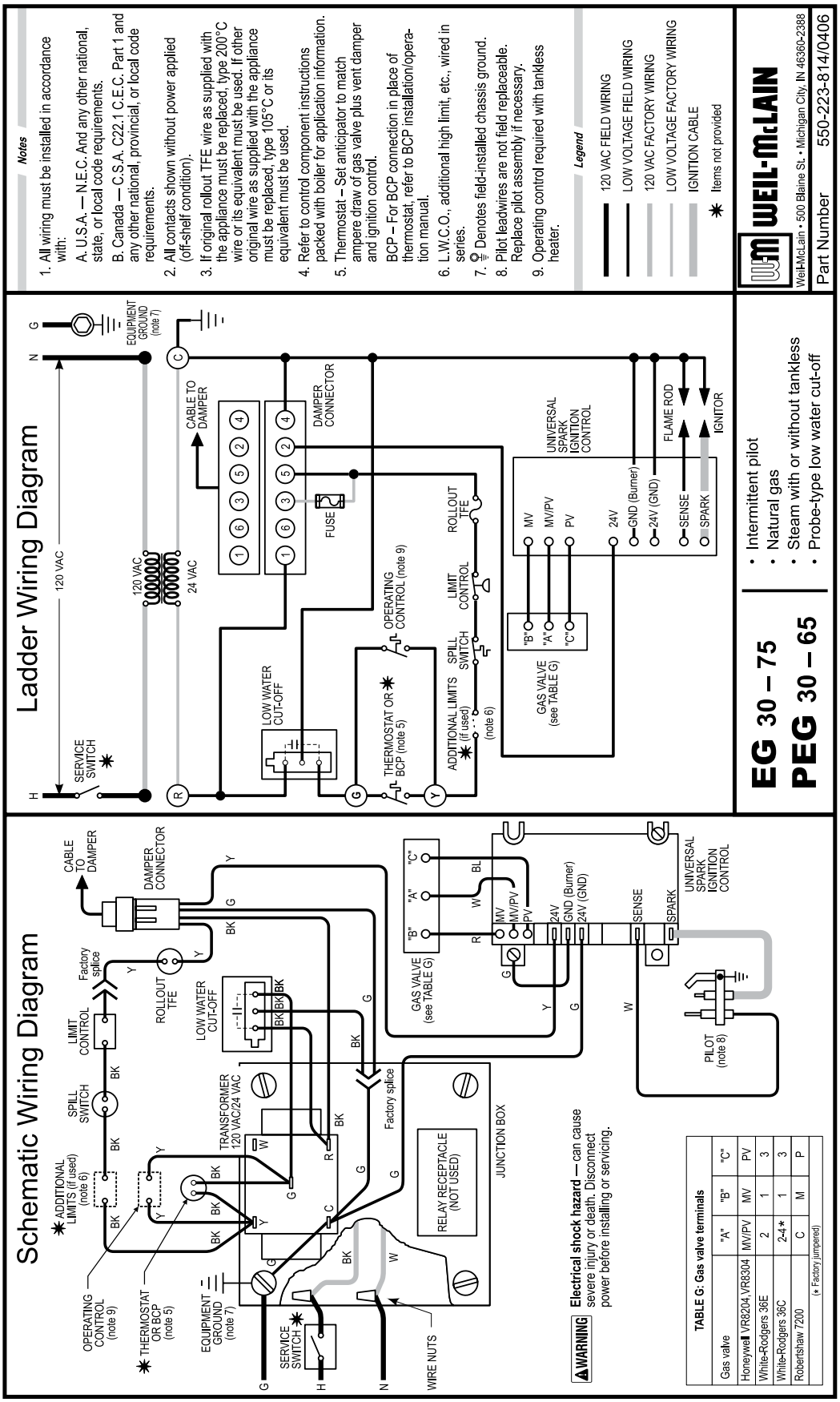
1. Mount and wire controls per wiring diagram, **page 53**, and **Figure 42**.
   a. Attach junction box inside left jacket panel with #8-32 x ½" machine screws provided.
   b. Install transformer with plug-in relay receptacle and relay.
   c. Operating and limit circuit wiring must be 18 gauge or heavier.
2. Bring supply wiring to boiler. Must be 14 gauge or heavier.

Figure 42 EG and PEG steam boilers with probe-type low water cut-off



1) Damper
2) Draft Hood
3) Spill Switch Wires
4) Pressure Limit Switch
5) Probe-Type Low Water Cut-Off
6) Junction Box
7) Transformer
8) Wiring Harness
9) Rollout TFE
10) Pilot
11) Gas Valve
12) Damper Harness Plug
13) Ignition Control
14) Damper Harness Receptacle
15) Damper Harness

Control Installation (continued)



Control Installation (continued)

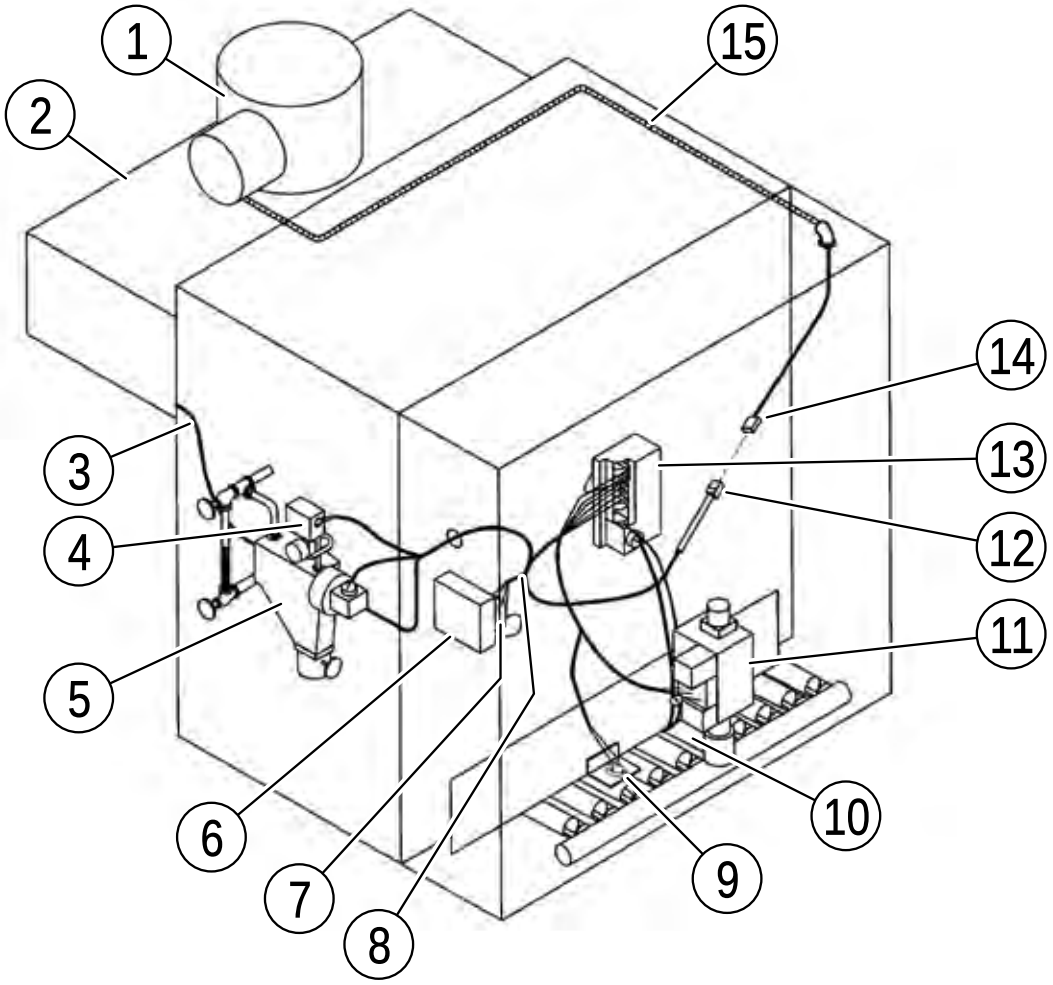
EG steam boilers with float-type low water cut-off

⚠ WARNING

For your safety, turn off electrical power supply and turn off external gas supply valve before attempting to work on the boiler. Failure to comply can cause severe personal injury, death or substantial property damage.

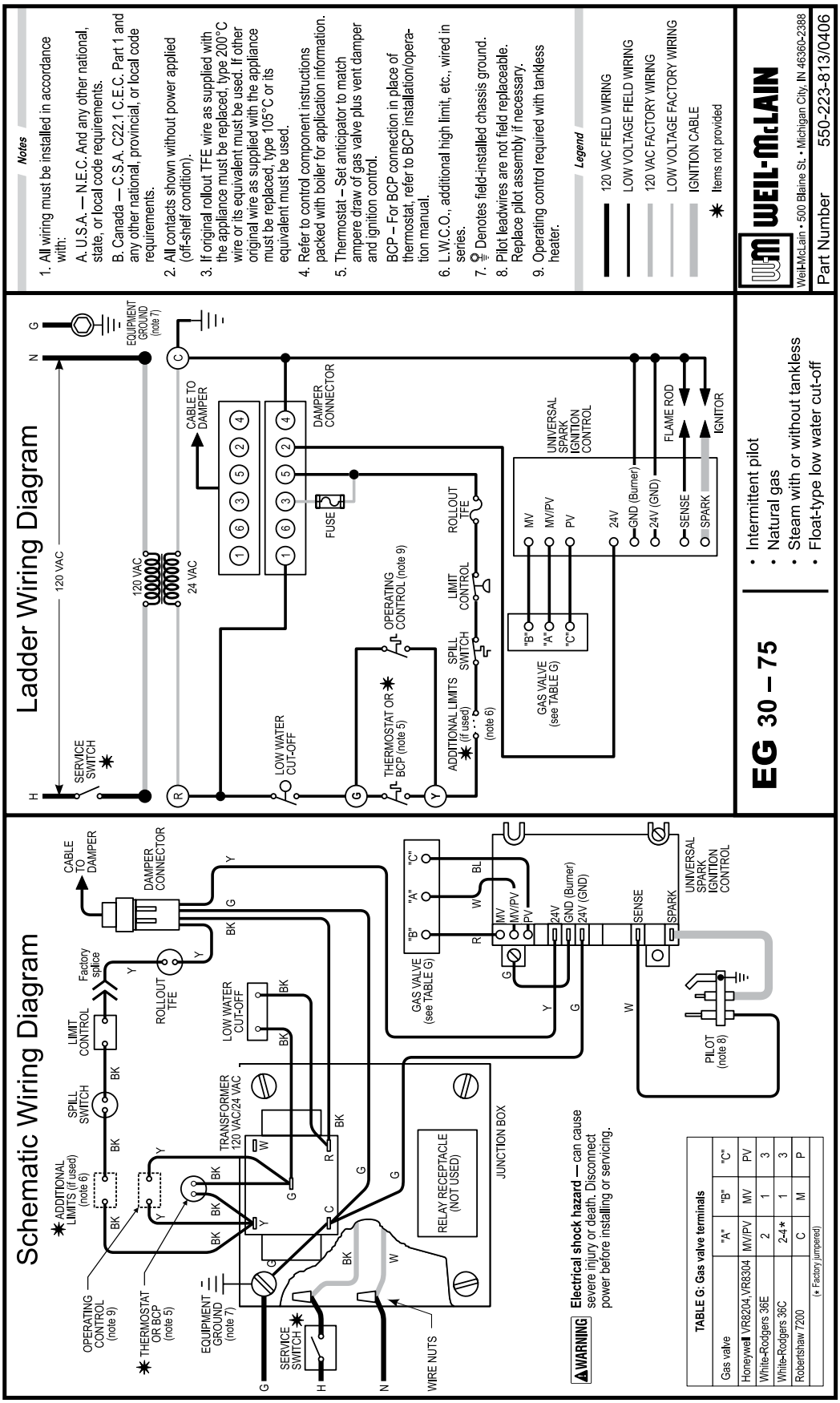
1. Mount and wire controls per wiring diagram, **page 55**, and **Figure 43**.
   a. Attach junction box inside left jacket panel with #8-32 x ½" machine screws provided.
   b. Install transformer with plug-in relay receptacle and relay.
   c. Operating and limit circuit wiring must be 18 gauge or heavier.
2. Bring supply wiring to boiler. Must be 14 gauge or heavier.

Figure 43 EG and PEG steam boilers with float-type low water cut-off



1) Damper
2) Draft Hood
3) Spill Switch Wires
4) Pressure Limit Switch
5) Probe-Type Low Water Cut-Off
6) Junction Box
7) Transformer
8) Wiring Harness
9) Rollout TFE
10) Pilot
11) Gas Valve
12) Damper Harness Plug
13) Ignition Control
14) Damper Harness Receptacle
15) Damper Harness

Control Installation (continued)



Start-Up - Water Boilers

Preparation

Check for Gas Leaks

⚠ WARNING

- Before starting the boiler, and during initial operation, smell near the floor and around the boiler for gas odorant or any unusual odor. Do not proceed with start-up if there is any indication of a gas leak. Repair any leak at once.

Determine if Water Treatment is Needed

⚠ DANGER

Do not use petroleum-based cleaning or sealing compounds in boiler system. Severe damage to boiler will occur, resulting in substantial property damage.

⚠ WARNING

Eliminate all system leaks. Continual fresh makeup water will reduce boiler life. Minerals can build up in sections, reducing heat transfer, overheating cast iron, and causing section failure.

NOTICE

Clean system to remove sediment.

1. You must thoroughly flush the system (without boiler connected) to remove sediment. Sediment can affect chemical treatment of the system and can damage system components.
2. For zoned systems, flush each zone separately through a purge valve. (If purge valves and isolation valves are not already installed, install them to properly clean the system.)
3. Flush system until water runs clean and you are sure piping is free of sediment.

4. Verify Water Chemistry

Consult local water treatment companies for unusually hard water areas (above 7 grains hardness) or low pH water conditions (below 7.0). Boiler water pH of 7.0 to 8.5 is recommended.

Freeze Protection (when used)

Use antifreeze made especially for hydronic systems. Inhibited propylene glycol is recommended.

⚠ WARNING

Do not use **ethylene glycol, automotive or undiluted antifreeze**. Severe personal injury or death can result.

1. Determine **antifreeze quantity** according to system water content. Boiler water content is listed on **page 89**. Remember to include expansion tank water content.
2. Follow antifreeze manufacturer's instructions.
3. A 50% solution of propylene glycol/water provides maximum protection to about -30°F.
4. Local codes may require **back flow preventer** or actual disconnect from city water supply.
5. When using antifreeze in a system with automatic fill, install a water meter to monitor water makeup. Glycol will leak before the water begins to leak, causing glycol level to drop. Added water will dilute the antifreeze, reducing the freeze protection level.
6. If for any reason freeze protection or circulator excercising are not used. Ensure that "FREEZE PROTECT" is disabled in the ADVANCED MENU under CIRCULATOR settings.

Start-Up - Water Boilers (continued)

Preparation (continued)

Fill the System with Water

1. Close manual and automatic air vents and boiler drain cock.
2. **Fill to correct system pressure.** Correct pressure will vary with each application. Typical cold water fill pressure for a residential system is 12 psi.
3. **Purge air** from system:
   a. Connect a hose to the drain valve valves, item **5**, in suggested piping diagrams on **pages 21** through **23**, **Figure 16** through **Figure 20**. Route hose to an area where water can drain and be seen.
   b. Close the boiler or system isolation valve between the purge valve and fill connection to the system.
   c. Close zone isolation valves.
   d. Open quick-fill valve on cold water makeup line.
   e. Open purge valve.
   f. One zone at a time, open the isolation valves. Allow water to run through the zone, pushing out the air. Run until no noticeable air flow is present. Close the zone isolation valves and proceed with the next zone. Follow this procedure until all zones are purged.
   g. Close the quick-fill water valve and purge valve and remove the hose. Open all isolation valves. Watch that system pressure rises to correct cold-fill pressure.
   h. After the system has operated for a while, eliminate any residual air by using the manual air vents located throughout the system.
   i. If purge valves are not installed in system, open manual air vents in system one at a time, beginning with lowest floor. Close vent when water squirts out. Repeat with remaining vents.
4. Open **automatic air vent** (diaphragm-type or bladder-type expansion tank systems only) one turn.
5. Open other vents:
   a. Starting on the lowest floor, open air vents one at a time until water squirts out.
   b. Repeat with remaining vents.
6. Refill to correct pressure.

Inspect System Water Piping

After filling the boiler and system with water, **inspect all piping** throughout the system for leaks. If found, repair immediately. Repeat this inspection after the boiler has been started and the system has heated up.

⚠ WARNING

Leaks must be repaired at once. Failure to do so can damage the boiler, resulting in substantial property damage.

⚠ DANGER

Do not use petroleum-based cleaning or sealing compounds in boiler system. Severe damage to boiler will occur, resulting in substantial property damage.

Inspect Base Insulation

⚠ WARNING

- The boiler contains ceramic fiber and fiberglass materials. Use care when handling these materials per instructions on **page 91** of this manual. Failure to comply could result in severe personal injury.
- Failure to replace damaged insulation or reposition insulation can result in a fire hazard, causing severe personal injury, death or substantial property damage.

Check to make sure **base insulation is secure** against all four sides of the base. If insulation is damaged or displaced, **DO NOT** operate boiler. Replace or reposition insulation.

Start-Up - Water Boilers (continued)

Boiler Operation

⚠ WARNING

DO NOT proceed with boiler operation unless boiler and system have been filled with water and all instructions and procedures of previous manual sections have been completed. Failure to do so could result in severe personal injury, death or substantial property damage. Before starting the boiler, do the following:

- Read manual **"Operation (EG Water Boilers)" on page 35** and the Operating instruction procedure.
- Verify the boiler and system are **full of water**.
- Verify the Start-up preparation procedures of **page 56** have been completed.

Table 14 Operating instruction location guide

Models	Spark-ignited pilot	Gas	Page
EG/PEG-30 to EG/PEG-50	Resideo VR8204/VR8304	Natural	**38**
EG/PEG-55 to EG/PEG-75	Resideo VR8204/VR8304	Natural	**38**

4

Adjust Boiler Control Settings

BOILER OPERATING TEMPERATURE

With power turned on, control module receives a signal from the temperature/LWCO sensor and displays boiler temperature. The control screen labeled CH TEMP SETTING is used to adjust the operating temperature setpoint, refer to **"Control Operation" on page 39**.

- **ADJUST BOILER OPERATING TEMPERATURE TO DESIRED SETPOINT.**

BOILER ECONOMY SETTING

To comply with Department of Energy regulations, the control module circulates available hot water before turning on the boiler to attempt to satisfy a call for heat. While attempting to satisfy the heat demand, the control module also monitors the boiler temperature changes via the temperature/LWCO sensor and determines whether or not the available hot water will satisfy the demand, adjusting the time delay to turn on the boiler until it determines that additional heat will be needed. The menu item ECONONY SETTING in the ECONOMY SETTINGS menu of the Advanced settings section, provides adjustment between Maximum (100%) and Minimum (10%) of the standard time delay used for starting the ignition process. The maximum (100%) adjustment setting should be used to maximize energy savings. Reducing the setting decreases the delay time and should be used in the event that the heated space becomes uncomfortable.

- **ADJUST ECONOMY TO DESIRED POSITION (100% IS THE PREFERRED SETTING).**

IMPORTANT

In accordance with Section 325 (f) (3) of the Energy Policy and Conservation Act, 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 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

Start-Up - Water Boilers (continued)

Boiler Operation (continued)

Start the Boiler

Follow the **Operating Instructions** from **page 35** to start the boiler. Remove boiler jacket door and note the gas valve manufacturer and model number. Use only the operating instruction which applies to this gas valve (see **Table 14, page 58**). (The operating instruction label on the boiler provides the same information.)

See below **If boiler doesn't start . . .**.

Check System and Boiler

1. **Check system piping for leaks.** If found, shut down boiler and repair immediately.
2. **Vent air from system** using manual vents. Air in the system will interfere with circulation and cause heat distribution problems and noise.
3. **Inspect vent system** thoroughly for signs of deterioration from corrosion, physical damage or sagging. Verify that masonry chimney liners are in good condition, with no obstructions, and there are no openings into the chimney.
4. **Check around the boiler** for gas odor following the procedure to check for gas leaks on **page 56**.
5. **Verify operation** per **"Operation Verification" on page 60**. Perform check-out procedure in **"Final Verification Checklist" on page 65** and fill in the **Installation and service certificate** on the same page.

⚠ WARNING

If you discover evidence of any gas leak, shut down the boiler at once. Find the leak source with bubble test and repair immediately. Do not start boiler again until corrected. Failure to comply could result in severe personal injury, death or substantial property damage.

Eliminate all system leaks. Continual fresh makeup water will reduce boiler life. Minerals can build up in sections, reducing heat transfer, overheating cast iron, and causing section failure.

⚠ DANGER

Do not use petroleum-based cleaning or sealing compounds in boiler system. Severe damage to boiler will occur, resulting in substantial property damage.

Glycol or antifreeze leaks around the boiler may result in fire, causing severe personal injury, death or substantial property damage

4

If boiler doesn't start . . .

Check for:

1. Loose connections, blown fuse or service switch off?
2. Boiler temperature adjustment set below boiler water temperature?
3. Thermostat set below room temperature?
4. Gas not turned on at meter or boiler?
5. Incoming gas pressure less than:
   - 5" w.c. for natural gas?
6. If none of the above corrects the problem, refer to **"Troubleshooting 1" on page 73** of this manual.

Start-Up - Water Boilers (continued)

Operation Verification

NOTICE

See operation and operating information earlier in this section.

Check Burner Flames

Pilot Burner Flame (Figure 44)

PROPER pilot flame

1. Blue flame.
2. Inner cone engulfing pilot flame sensor (spark-ignited pilot).
3. Pilot flame sensor glowing cherry red.

IMPROPER pilot flame

1. Overfired — Large flame lifting or blowing past pilot flame sensor.
2. Underfired — Small flame. Inner cone not engulfing pilot flame sensor.
3. Lack of primary air — Yellow flame tip.

Main Burner Flame (Figure 45)

PROPER main burner flame

1. Yellow-orange streaks may appear (caused by dust).

IMPROPER main burner flame:

1. Overfired — Large flames.
2. Underfired — Small flames.
3. Lack of primary air — Yellow tipping on flames (sooting will occur).

Check Vent Damper Operation

1. **Raise room thermostat to call for heat —** Vent damper actuator will slowly open vent damper. The display will show "OPENING DAMPER"
2. **When vent damper is fully open —** Pilot will light, then allow main burners to ignite. The display will advance to "PILOT IGNITION"

DANGER

Vent damper must be fully open before main burners light. If vent damper does not fully open, flue products such as carbon monoxide will escape into house, causing severe personal injury or death.

3. **Lower thermostat setting —** Main burner flames will go out, then vent damper will close. The display will show "POST PURGE" until it recognizes the damper end switch indicates damper closed. If the damper remains open, the Post Purge display will advance to STANDBY after about 15 seconds to allow operation when using the damper hold open switch.

Figure 44 Typical pilot burner flame

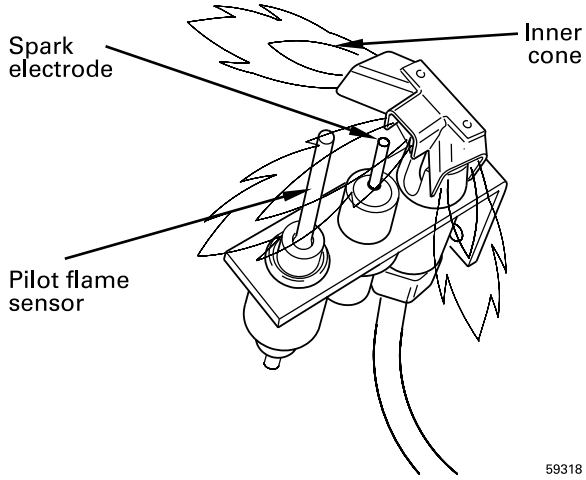
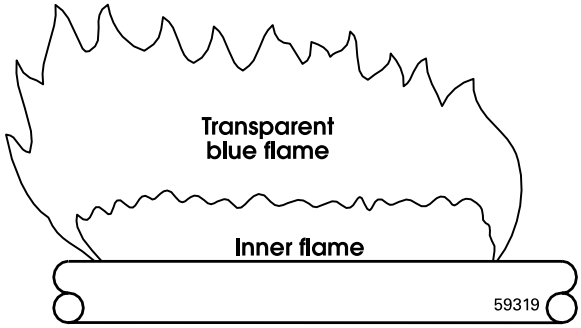


Figure 45 Typical main burner flame



4. **Repeat Steps 1 through 4** several times to verify operation.
5. Return thermostat to normal setting.
6. Set thermostat heat anticipator setting indicated on wiring diagram.

Check Vent System Operation

1. Check vent system at least once a month during heating season. With boiler firing, hold candle or match below lower edge of draft hood “skirt”. If flame does not blow out, but burns undisturbed, vent system is functioning properly. If flame blows out or flickers drastically, inspect vent system for obstructions or other causes of improper venting (such as exhaust fans in boiler room).

Start-Up - Steam Boilers

Steam Boiler Water Treatment

Steam Heating Installation Considerations

Closed steam heating systems should not have high amounts of make-up water. Make-up water only occurs when the system is leaking or when make-up water is incorrectly administered. And, even with chemical treatment, make-up water will reduce boiler life due to corrosion. And chemical treatment may be difficult to execute if the system make-up volume is unpredictable.

Troubleshoot the system BEFORE considering water treatment. If the system is using make-up water, then the following may be likely:

- Leaking return lines, underground pipes, faulty steam traps, faulty air vents
- Automatic water feed is installed incorrectly or incorrectly adjusted
- If the system utilizes a condensate receiver, the feeder may be flooding due to long system time lag

If the piping is NOT leaking, consider installing a boiler feed system (NOT a condensate return system). The boiler feed system provides condensate storage and allows the boiler to directly control water level. This is not the case with gravity return systems or condensate return systems — these only provide water to the boiler when the condensate returns from the system. If the system time lag is longer than boiler can provide steam, and the boiler is equipped with an automatic feeder, water will feed to the boiler before the condensate can return from the system. This will cause overfill and flooding when the condensate does return. Also, pumping cold make-up water directly into the boiler collapses the water level, causing false indications of need for make-up. With a boiler feed system, the float control on the boiler turns the feed pump on and off as needed. Make-up water is added at the boiler feed system tank. And the storage volume of the tank makes it unlikely that make-up will be needed UNLESS there is a system leak.

Chlorides

Over the last several decades, the level of chlorides in some ground water and city water supplies have increased due to use of salt during the removal of snow and ice from roads and highways, and the increased use of water softeners. Elevated levels of chlorides (over 200 ppm) in the water of steam boilers will accelerate water side corrosion and shorten the operating life of the boiler.

Chlorides and other dissolved solids are present in boiler make-up water and are not removed from the boiler when the boiler is producing steam. The level of chlorides and dissolved solids in the boiler water increase when make-up water is added to the boiler because of normal maintenance to low water cut-offs and system leaks. If there are high chloride and dissolved solid levels in boiler make-up water, boiler water treatment should be considered.

In general, cast iron steam boilers do not require water treatment for protection. However, some boiler water treatment chemicals can promote water level instability. Surging and priming in steam boilers can result even though the boiler was thoroughly cleaned before the treatment was added.

Systems where Treatment Should be Considered are:

- Process applications
- Contaminated condensate
- Large make-up water requirements
- System components requiring corrosion inhibitor
- Extremely hard water
- Make-up water supply with higher than 30 ppm of chloride

Beware the Foam

Water treatment chemicals should be thoroughly reviewed before they are introduced into the boiler and heating system. Of particular concern are foaming agents that will interfere with the disengagement of the steam at the boiler waterline. For this reason, foaming agents cannot be tolerated in steam boilers.

Testing & Treatments

To test the boiler water treatment chemicals, prepare a small amount of the chemical intended for the boiler with water. In a ventilated area, put this mixture into a pan and bring to a “rolling boil” on the stove. If the mixture foams, it is not suitable for the boiler.

Recognized treatment compounds used for oxygen scavenging and corrosion protection should not affect the life of the elastomer sealing rings. Asking the treatment supplier to test a sealing ring in the proposed compound can eliminate any doubt. In any case, a compound containing petroleum should not be used.

Without Chemical Treatment

- When the chloride level is above 400 ppm, or the total dissolved solids (TDS) are above 1000 ppm, drain and refill the boiler with fresh water and bring the boiler to pressure for 15 minutes per the boiler manual to drive off excess oxygen.

Start-Up - Steam Boilers (continued)

- If chemical treatment is not used and chloride level and TDS levels are not monitored, drain and refill the boiler when the chloride level is above 400 ppm, or the total dissolved solids (TDS) are above 1000 ppm. After refilling the boiler, bring the boiler to pressure for 15 minutes per the boiler manual to drive off excess oxygen.

These steps will help prevent corrosion caused by high conductivity, but may not prevent under-deposit corrosion.

In general, cast iron steam boilers do not require water treatment for protection. However, some water conditions may require the boiler be drained and refilled, or in more aggressive areas, chemically treated.

Follow the Boiler Manual, for all steam options.

Skim the Steam Boiler

NOTICE

Clean all newly installed steam boilers to remove oil and grease. Failure to properly clean can result in violent fluctuations of water level, water passing into steam mains or high maintenance costs on strainers, traps and vents.

DANGER

Do not use petroleum-based cleaning or sealing compounds in boiler system. Severe damage to boiler will occur, resulting in substantial property damage.

1. Provide 1½" piping from skim tapping to floor drain.
2. Adjust waterline to midpoint of skim tapping. See **Figure 4, page 14**.
3. Follow "Lighting or Operating Instructions" to fire boiler to maintain temperature below steaming rate.
4. Feed in water to maintain water level. Cycle burners to prevent rise in steam pressure.
5. Continue skimming until discharge is clear. May take several hours.
6. Drain boiler. While boiler is warm, but not hot, flush all interior surfaces under full pressure until drain water runs clear.
7. Remove skim piping. Plug tapping.
8. Close drain cock. Fill with fresh water to waterline. Start burners and steam for 15 minutes to remove dissolved gases. Stop burners.
9. Check traps and air vents for proper operation.
10. Process may need to be repeated after several weeks of operation.

Inspect Base Insulation

WARNING

- The boiler contains ceramic fiber and fiberglass materials. Use care when handling these materials per instructions on page 91 of this manual. Failure to comply could result in severe personal injury.
- Failure to replace damaged insulation or reposition insulation can result in a fire hazard, causing severe personal injury, death or substantial property damage.

Check to make sure insulation is secure against all four sides of the base. If insulation is damaged or displaced, do not operate boiler. Replace or reposition insulation.

Operate Boiler

Check System and Boiler

WARNING

DO NOT proceed with boiler operation unless boiler and system have been filled with water and all instructions and procedures of previous manual sections have been completed. Failure to do so could result in severe personal injury, death or substantial property damage.

Before starting the boiler . . .

- Read the Start-Up and Operating Instruction information provided in the boiler manual.
- Verify the boiler and system water level is correct (Steam — no more than ½ of gauge glass or less than ¼" above bottom of gauge glass).
- Verify the "Preparation" procedures on the previous pages have been completed.

Start the Boiler

1. Steam boilers — Check boiler water level — Should be approximately ½ way up gauge glass.
2. Remove boiler jacket door and note the gas valve manufacturer and model number. Use only the operating instruction which applies to this gas valve (see **Table 14, page 58**). (The operating instruction label on the boiler provides the same information).
3. Follow the Operating Instructions to start the boiler.
4. If boiler fails to start, see **"If boiler doesn't start . . . Check for:"** on **page 63**.

Start-Up - Steam Boilers (continued)

Check System and Boiler

⚠ WARNING

- If you discover evidence of any gas leak, shut down the boiler at once. Find the leak source with bubble test and repair immediately. Do not start boiler again until corrected. Failure to comply could result in severe personal injury, death or substantial property damage.
- Eliminate all system leaks. Continual fresh makeup water will reduce boiler life. Minerals can build up in sections, reducing heat transfer, overheating cast iron, and causing section failure.

⚠ DANGER

Do not use petroleum-based cleaning or sealing compounds in boiler system. Severe damage to boiler will occur, resulting in substantial property damage.

1. Check system piping for leaks. If found, shut down boiler and repair immediately.
2. Inspect vent system thoroughly for signs of deterioration from corrosion, physical damage or sagging. Verify that masonry chimney liners are in good condition, with no obstructions, and there are no openings into the chimney.
3. Check around the boiler for gas leaks following the procedure of step 12, **page 29**.
4. Verify operation using procedures below. Perform "Checkout procedure", **page 65** and fill in the "Installation and Service Certificate".

If boiler doesn't start . . . Check for:

1. Loose connections, blown fuse or service switch off?
2. High limit switch set below boiler pressure?
3. Thermostat set below room temperature?
4. Gas not turned on at meter or boiler?
5. Incoming gas pressure less than:

   5" w.c. for natural gas?
6. If none of the above corrects the problem, see "Trouble-shooting" section of this manual.

Operation Verification

Check Burner Flame — Pilot Burner

1. Proper pilot flame (see **Figure 46, page 64**):
   a. Blue flame.
   b. Inner cone engulfing thermocouple.
   c. Thermocouple glowing cherry red.
2. Proper pilot flame:
   a. Overfired — Large flame lifting or blowing past thermocouple.
   b. Underfired — Small flame. Inner cone not engulfing thermocouple.
   c. Lack of primary air — Yellow flame tip.
   d. Incorrectly heated thermocouple.

Check Burner Flame — Main Burner

1. Proper main burner flame (see **Figure 47, page 64**):
   a. Yellow-orange streaks may appear (caused by dust).
2. Improper main burner flame:
   a. Overfired — Large flames.
   b. Underfired — Small flames.
   c. Lack of primary air — Yellow tipping on flames (sooting will occur).

Check Vent Damper Operation

1. Raise room thermostat to call for heat — Vent damper actuator will slowly open vent damper.
2. When vent damper is fully open — Pilot will light, then allow main burners to ignite.

Start-Up - Steam Boilers (continued)

DANGER

Vent damper must be fully open before main burners light. If vent damper does not fully open, flue products such as carbon monoxide will escape into house, causing severe personal injury or death.

3. Lower thermostat setting — Main burner flames will go out, then vent damper will close.
4. Repeat Steps 1 through 4 several times to verify operation.
5. Return thermostat to normal setting.
6. Set thermostat heat anticipator setting indicated on wiring diagram.

Check Venting System Operation

Check vent system at least once a month during heating season. With boiler firing, hold candle or match below lower edge of draft hood “skirt”. If flame does not blow out, but burns undisturbed, vent system is functioning properly. If flame blows out or flickers drastically, inspect vent system for obstructions or other causes of improper venting (such as exhaust fans in boiler room).

Figure 46 Typical pilot burner flame

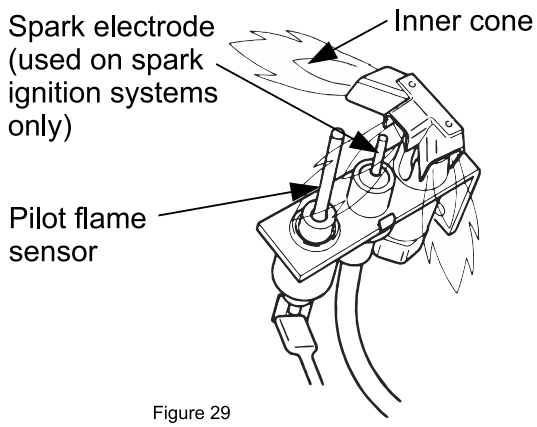
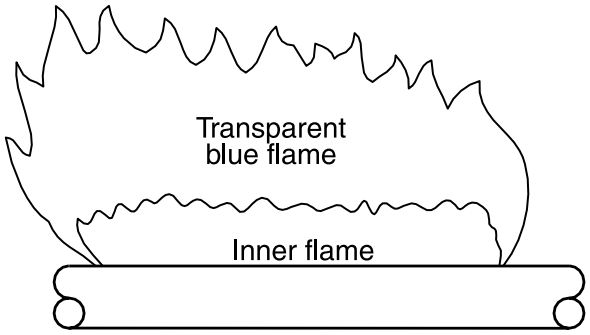


Figure 29

Figure 47 Typical main burner flame



Hot Water Can Scald!

- Consumer Product Safety Commission and some states recommend domestic hot water temperature of 130°F or less.
- When installing an automatic mixing valve, selection and installation must comply with valve manufacturer’s recommendations and instructions.
- Water heated to a temperature suitable for clothes washing, dish washing and other sanitizing needs will scaled and cause injury.
- Children, elderly, infirm or physically handicapped persons are more likely to be injured by hot water. Never leave them unattended in or near a bathtub, shower or sink. Never allow small children to use a hot water faucet or draw their own bath. If anyone using hot water in the building fits this description, or if state laws or local codes require certain water temperatures at hot water faucets, take special precautions:
- Install automatic mixing valve set according to those standards.
- Use lowest practical temperature setting.
- Check water temperature immediately after first heating cycle and after any adjustment.

Protection Must Be Taken Against Excessive Temperature and Pressure! — Installation of a Temperature & Pressure (T&P) relief valve is required.

Final Verification Checklist

- ☐ Boiler and heat distribution units filled with water?
- ☐ Automatic air vent, if used, open one full turn?
- ☐ Air purged from system?
- ☐ Air purged from gas piping? Piping checked for leaks?
- ☐ Correctly sized manifold orifices installed? Refer to **Table 5 on page 17** to check size and fuel type.

⚠ DANGER

Correctly sized manifold orifices must be used. Failure to do so will cause severe personal injury, death or substantial property damage.

- ☐ Followed operating instructions on boiler or in manual **"Operation" on page 35** for proper start-up?
- ☐ Proper burner flame observed? Refer to **"Check Burner Flames"**, manual **"Operation Verification" on page 60**.
- ☐ Test temperature limit — When burners are operating, adjust Boiler Temperature setting until display reading is below actual boiler water temperature. Burners should go off while circulator continues to operate. Adjust Boiler Temperature setting until display reading is above boiler water temperature and ignition sequence should resume.
- ☐ Test low water cut off - While burners are operating, press and hold "LWCO TEST" button on control. Burners should go off while circulator continues to operate and LWCO should be displayed. Release "LWCO TEST" button and ignition sequence should resume.
- ☐ Test field-installed controls — If the boiler has an additional low water cutoff, high limit or other controls, test for operation as outlined by manufacturer. Burners should be operating and should go off when controls are tested. When controls are restored, burners should reignite.
- ☐ Test ignition system safety device.
- ☐ Connect manometer to outlet side of gas valve. Start boiler, allowing for normal start-up cycle to occur and main burners to ignite. With main burners on, manually shut off gas supply at manual main shutoff gas valve. Burners should go off. Open manual main shutoff gas valve. Manometer should confirm there is no gas flow. Pilot will relight, flame sensing element will sense pilot flame and main burners reignite.
- ☐ Set Boiler Temp adjustment to system temperature requirements. Adjust balancing valves and controls to provide design temperature to system.
- ☐ Set Economy mode.
- ☐ For multiple zones, adjust flow so it is about the same in each zone.
- ☐ Cycle boiler with thermostat — Raise to highest setting and verify boiler goes through normal start-up cycle. Lower to lowest setting and verify boiler goes off.
- ☐ Cycle DHW Aquastat if used.
- ☐ Measure natural gas input:
  - a. Operate boiler 10 minutes.
  - b. Turn off other appliances.
  - c. At natural gas meter, measure time (in seconds) required to use one cubic foot of gas.
  - d. Calculate gas input:

$$\frac{3600 \times 1000}{\text{number of seconds from step } \mathbf{c}} = \text{Btuh}$$

  - e. Btuh calculated should approximate input rating on boiler rating label.
- ☐ Check manifold gas pressure by connecting manometer to downstream test tapping on main gas valve. Manifold pressure for natural gas should be 3.5" w.c.
- ☐ Observe several operating cycles for proper operation.
- ☐ Set room thermostat to desired room temperature.
- ☐ Fill in Installation and service certificate below?
- ☐ Review all instructions shipped with this boiler with owner or maintenance person. Return instructions to envelope and give to owner.

Installation and Service Certificate

Boiler model _____ Series _____ Consumer Protection number _____ Date installed _____

Measured Btuh input _____

- ☐ Installation instructions have been followed.
- ☐ Check out sequence has been performed.
- ☐ Above information is certified to be correct.
- ☐ Information received and left with owner/maintenance person.

Installer _____ (company) _____ (address) _____ (phone)

Installer's signature: _____

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Section 5
Service and Maintenance

Service and Maintenance

VERIFY PROPER OPERATION AFTER SERVICING

Table 15 Service and maintenance schedules (service technician and user)

	Service technician (see following pages for instructions)	Owner maintenance (see User's Information Manual for instructions)	
ANNUAL START-UP	**Inspect:** • Reported problems • Boiler area • Air openings • Flue gas vent system • Pilot and main burner flames • Piping • Boiler heating surfaces • Burners and base **Service:** • Gauge glass • Temperature/LWCO sensor **Start-up:** • Perform start-up per manual **Check/test:** • Gas piping • Boiler waterline • Limit controls and cutoffs • Boiler relief valve **Review:** • Review with owner	Daily	• Check boiler area • Check air openings • Check boiler pressure/ temperature gauge
		Monthly	• Check boiler interior piping • Check venting system • Check air vents • Check boiler relief valve • Check pilot and main burner flames
		Periodically	• Test low water cutoff
		Every 6 months	• Operate relief valve
		End of season	• Shut down procedure

WARNING

Follow the "Service and maintenance" procedures given throughout this manual, and in component literature shipped with the boiler. See **"Please Read Before Proceeding" on page 6**. Failure to perform the service and maintenance could result in damage to the boiler or system. Failure to follow the directions in this manual and component literature could result in severe personal injury, death or substantial property damage.

Service and Maintenance (continued)

⚠CAUTION

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

⚠WARNING

- To avoid personal injury, death or property damage, keep boiler area clear and free from combustible materials, gasoline and other flammable vapors and liquids.
- Do not block flow of air to boiler. Incomplete combustion and flue gas spillage can occur.
- Do not store sources of hydrocarbons (i.e., bleaches, cleaners, chemicals, sprays, paint removers, fabric softeners, etc.) in boiler area. This can contribute to shortened boiler/vent system life.

⚠WARNING

- The boiler should be **inspected and started annually**, at the beginning of the heating season, only by a **qualified service technician**. In addition, the maintenance and care of the boiler designated in **Table 15 on page 67**, and explained on the following pages must be performed to assure maximum boiler efficiency and reliability. Failure to service and maintain the boiler and system could result in equipment failure.
- **Electrical shock hazard — Turn off power to the boiler before any service operation** on the boiler except as noted otherwise in this instruction manual. Failure to turn off electrical power could result in electrical shock, causing severe personal injury or death.

☐ Inspect . . .

Reported Problems

Inspect any problems reported by owner and correct before proceeding.

Boiler Area

1. Verify that boiler area is free of any combustible materials, gasoline and other flammable vapors and liquids.
2. Verify that boiler area is free of any of the contaminants listed on **page 12** of this manual. If any of these are present in the boiler intake air vicinity, they must be removed. If they cannot be removed, install combustion air piping to the boiler in accordance with national, provincial or local codes.

Air Openings

1. Verify that combustion and ventilation air openings to the boiler room and/or building are open and unobstructed. Check operation and wiring of automatic combustion air dampers, if used.
2. Verify that boiler vent discharge and air intake are clean and free of obstructions.

Flue Gas Vent System

1. Visually inspect entire flue gas venting system for blockage, deterioration or leakage. Repair any joints that show signs of leakage in accordance with vent manufacturer's instructions.
2. Verify that masonry chimneys are lined, lining is in good condition, and there are not openings into the chimney.

⚠WARNING

Failure to inspect for the above conditions and have them repaired can result in severe personal injury or death.

Pilot and Main Burner Flames

Visually inspect pilot burner and main burner flames as directed on **page 63** of this manual.

Piping

Check the boiler interior piping and all system piping for signs of leaks. Repair any leaks before proceeding.

⚠DANGER

Do not use petroleum-based cleaning or sealing compounds in boiler system. Severe damage to boiler will occur, resulting in substantial property damage.

⚠WARNING

Eliminate all system or boiler leaks. Continual fresh makeup water will reduce boiler life. Minerals can build up in sections, reducing heat transfer, overheating cast iron, and causing section failure. Leaking water may also cause severe property damage.

Boiler Heating Surfaces

⚠WARNING

The boiler contains ceramic fiber and fiberglass materials. Use care when handling these materials per instructions on **page 91** of this manual. Failure to comply could result in severe personal injury.

1. Disconnect the vent pipe at the boiler draft diverter and remove draft diverter after turning off power to the boiler.

Service and Maintenance (continued)

2. Use a bright light to inspect the boiler flue collector and heating surfaces.
3. If the vent pipe or boiler interior surfaces show evidence of soot, follow **"Cleaning Boiler Heating Surfaces" on page 71**. Remove the flue collector and clean the boiler if necessary after closer inspection of boiler heating surfaces.
4. If there is evidence of rusty scale deposits on boiler surfaces, check the water piping and control system to make sure the boiler return water temperature is properly maintained (per this manual).
5. Reconnect vent and draft diverter. Replace all boiler components before returning to service.
6. Check inside and around boiler for evidence of any leaks from the boiler. If found, locate source of leaks and repair.

Burners and Base

1. After turning off power to the boiler, remove the jacket door and base access panel.
2. Inspect burners and all other components in the boiler base.
3. If burners must be cleaned, raise rear of each burner to release from support slot, slide forward and remove. Then brush and vacuum the burners thoroughly, making sure all ports are free of debris. Carefully replace all burners, making sure burner with pilot bracket is replaced in its original position and all burners are upright (ports up).
4. Inspect the base insulation.
   a. Verify that the insulation is intact and secure against all four sides of the base and attachment clips are still in place.

⚠ WARNING

If insulation is damaged or displaced, do not operate the boiler. Replace or reposition insulation as necessary. Failure to replace damaged insulation can result in a fire hazard, causing severe personal injury, death or substantial property damage.

☐ Service . . .

Gauge Glass (Steam Boilers)

NOTICE

Normal waterline is halfway up gauge glass. Clean when needed.

1. Close lower gauge cock.
2. Open pet cock.
3. Open lower gauge cock and allow a small amount of water to flush out through open pet cock.
4. Close pet cock.

⚠ DANGER

Boiler pressure must be low to eliminate potential of severe burns.

⚠ WARNING

If gauge glass breaks, close both gauge cocks. Replace gauge glass. Do not replace with thin glass tubing. Failure to comply could cause severe personal injury, death or substantial property damage.

Temperature / LWCO Sensor

The temperature/LWCO sensor may accumulate deposits on the probe surface. Annual inspection and cleaning of the probe will improve boiler performance.

Disconnect power, unplug harness from sensor.

a. Drain boiler water to a level below the sensor.
b. Remove sensor from boiler.
c. Wipe any built up contaminates from probe and insulator surfaces.
d. Reinstall sensor into boiler.
e. Refill boiler to correct waterline.

5

Service and Maintenance (continued)

☐ Start-up . . .

1. Perform “Start-up” procedures in this manual, pages **56**–**64**, including **"Operation Verification"** of burners and vent damper on **page 63**.
2. Check gas piping, per pages **29** and **30**, verifying no indications of leakage and all piping and connections are in good condition.
3. Read the "**Operating instructions"** starting on page **38**.
4. Start the boiler following the “**Operating instructions**.”

☐ Check/test . . .

Gas Piping

1. Sniff near floor and around boiler area for any indication of a gas leak.
2. Test gas piping using bubble test, per **page 29** of this manual, if there is any indication of a leak.

Boiler Waterline

Normal waterline is halfway up gauge glass.

Limit Controls

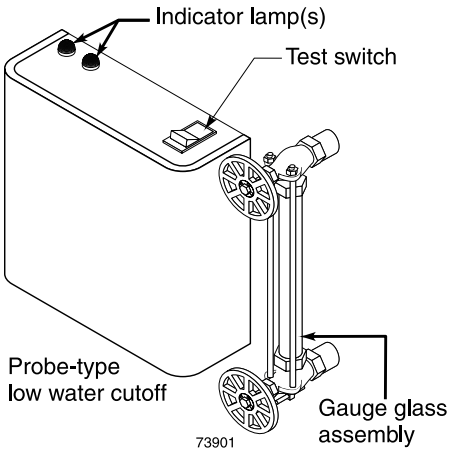
Inspect and test the boiler limit control. Verify operation by turning control set point below boiler pressure. Boiler should cycle off. Return dial to original setting.

Probe-Type Low Water Cutoff (when used)

⚠ WARNING

Clean probe-type low water cutoff (when used) for proper operation.

1. Turn off power to boiler and wait 5 minutes.
2. Drain water to bottom of gauge glass.
3. Turn on power.
4. Set thermostat to call for heat. Red neon lamp on lower water cutoff should light.
5. Wait 5 minutes. Boiler should not fire.
6. Refill boiler to correct waterline. Red lamp should go off.
7. Wait 5 minutes. Boiler should fire.
8. Return thermostat to normal setting.



Float-Type Low Water Cutoff (when used)

⚠ WARNING

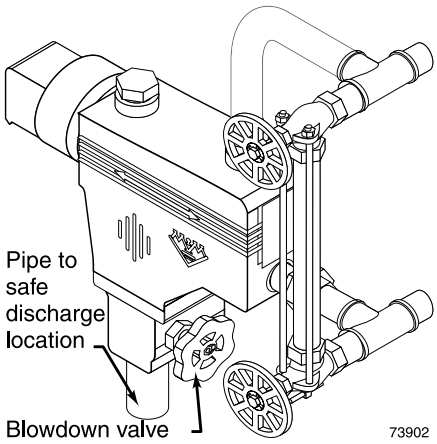
Clean float-type low water cutoff to clear float chamber of sediment.

1. Open blowdown valve on the bottom control.
2. Drain water into a bucket.

⚠ DANGER

Scald potential. Boiler pressure must be low to avoid the potential of severe burns from steam.

3. Check float-type low water cutoff for proper operation:
   a. Turn operating control to call for heat.
   b. Before water gets hot, drain to bottom of gauge glass. Boiler should shut off after water level lowers a few inches.
   c. Refill boiler to correct waterline. Boiler should come back on.



Service and Maintenance (continued)

Boiler Relief Valve

After following the warning directions below, if the relief valve weeps or will not seat properly, replace the relief valve.

⚠ DANGER

Before testing, make certain discharge pipe is properly connected to valve outlet and arranged to contain and safely dispose of boiler discharge. Wear gloves to protect your hands from hot surfaces. Verify that discharge piping is installed in accordance with this manual and the instructions on the relief valve tag. Failure to comply will expose operator and others to severe personal injury or death.

⚠ WARNING

Safety relief valves should be reinspected AT LEAST ONCE EVERY THREE YEARS, by a licensed plumbing contractor or authorized inspection agency, to ensure that the product has not been affected by corrosive water conditions and to ensure that the valve and discharge line have not been altered or tampered with illegally. Certain naturally occurring conditions may corrode the valve or its components over time, rendering the valve inoperative. Such conditions are not detectable unless the valve and its components are physically removed and inspected. This inspection must only be conducted by a plumbing contractor or authorized inspection agency — not by the owner. Failure to reinspect the boiler relief valve as directed could result in unsafe pressure buildup, which can result in severe personal injury, death or substantial property damage.

⚠ WARNING

Check the setting of the boiler limit control. The control should never be set with a pressure above 10 PSIG. Operating at a higher pressure can cause damage to the boiler relief valve.

⚠ WARNING

The boiler relief valve must be tested at least monthly during the heating season to verify the valve and discharge piping flow freely. If corrosion and/or deposits are noticed within the valve body, testing must be performed more often. A “try lever test” must also be performed at the end of any non-service period. Follow the instructions below for a “try lever test”:

With the system at operating pressure, lift and hold the test lever fully open for at least 5 seconds to flush the valve seat free of sediment and debris. Then release lever and permit the valve to snap shut.

☐ Review with Owner

1. Review the User’s Information Manual with the owner.
2. Emphasize the need to perform the maintenance schedule specified in the User’s Information Manual (and in this manual as well).
3. Remind the owner of the need to call in a licensed contractor should the boiler or system exhibit any unusual behavior.
4. Remind the owner to follow the proper shutdown procedure and to schedule an annual start-up at the beginning of the next heating season.

☐ Cleaning Boiler Heating Surfaces

⚠ WARNING

The boiler contains ceramic fiber and fiberglass materials. Use care when handling these materials per instructions on **page 91** of this manual. Failure to comply could result in severe personal injury.

1. Follow shut-down procedure
2. Disconnect breeching and remove damper (if used) and draft hood.
3. Remove upper rear jacket panel. Turn back jacket insulation to expose collector hood.
4. Remove collector hood. Clean excess boiler cement from collector hood and cast iron sections.
5. Remove burners from base of boiler. Follow “Cleaning main burners” to thoroughly clean burners. Place newspaper in base of boiler to collect soot that will fall.
6. With a wire flue brush, clean between the sections.
7. Remove paper and soot. Vacuum or brush base and surrounding area.
8. Replace collector hood. Seal with boiler cement.
9. Replace draft hood, damper (if used) and breeching.
10. Replace insulation and jacket panel.
11. Replace main burners.

Service and Maintenance (continued)

Cleaning Main Burners

Vacuum or brush burners to remove dust and lint.

DANGER

When replacing, burner tubes must be seated in slots in the back with openings face up. Gas orifices must inject down center of burner. Failure to properly seat burners will result in severe personal injury, death or substantial property damage.

Annual Shut-Down Procedure

1. Follow correct operating instructions on boiler.
2. Do not drain system unless exposure to freezing temperatures will occur. If antifreeze is used with system, do not drain.
   a. Test antifreeze.
3. If complete boiler and piping system must be drained to avoid freezing, provide method to drain water from both ends of boiler at or below return tapping level.

Section 6 Troubleshooting

Troubleshooting

General

⚠ WARNING

- Turn off all power to the boiler when servicing. Failure to comply can cause electrical surges or electrical shock, which can result in severe personal injury, death, or substantial property damage.
- Wiring errors can cause improper and dangerous operation. Label all wires to ensure proper connection. Never jumper (bypass) any device except for momentary testing. Failure to comply can result in severe personal injury, death, or substantial property damage.

Always turn power off to the boiler before servicing and making connections. If assistance is required, please complete the **Installation and Service Certificate** in the boiler manual before calling Tech Services. The CP number can be found on the boiler jacket.

Checking Boiler Out Sensor

1. The boiler out temperature sensor is a resistance –type device.
2. The correct value for the sensor at various temperatures is shown in **Table 16**.
3. Use the resistance values at 32°F, 60°F. 70°F, and 212°F to measure the sensor resistance at known temperatures (freezing point, room temperature, and sea level boiling point). For freezing and boiling point, insert the sensor in water at that temperature. Use an ohmmeter to read the resistance value.
4. To check whether the control module is correctly sensing temperature, use a resistance decade box. Temporarily connect the decade box in place of a sensor and read the corresponding temperature on the control display.

Table 16 Sensor resistance values

Water Temperature		Expected Range	
Temp(°C)	Temp(°F)	Min R(Ω)	Max R(Ω)
0	32	293920	374080
5	41	227480	289520
10	50	177461	225859
15	59	139480	177520
20	68	110414	140526
25	77	88000	112000
30	86	70605	89861
35	95	56988	72530
40	104	46278	58900
45	113	37797	48105
50	122	31039	39505
60	140	21262	27060
70	158	14849	18899
80	176	10558	13438
90	194	7633	9715
100	212	5605	7133
110	230	4175	5313
120	248	3151	4011

The temperature should be close to the value corresponding to the input resistance.

Troubleshooting (EG Water Boilers) (continued)

Errors and Lockouts

Control Display

There are two types of lockouts.

1. Manual reset lockouts. The operator must physically enter the reset screen and answer the reset question by changing the answer on line 2 to "YES".
2. Automatic reset lockouts. This lockout resolves with a self-reset when the error condition clears.

Loss of Power

In the event of a power failure, the entire boiler will de-energize. The signal relays used to command auxiliary devices connected to the boiler will also lose power and deactivate.

Fault and Action Items

Manual Reset Procedure for Lockout —

DANGER

If there is an ignition fault, the following fault reset procedure should be performed. While on the fault indication screen, press and release the enter button.

A confirmation screen appears.

Initially the reset question will display an answer of NO on line 2. To change the answer on line 2, press the enter button. Next press the up or down arrow to change the answer to "YES" and press enter once more. The display background will change to green and revert back to the main screen.

Table 17 Control fault information and troubleshooting

Fault Name	Fault Description	Troubleshooting	Action
CONFIRM CONFIGU-RATION	Board not configured.	Does the configuration number displayed match the boiler model? See EG Water with Tankless = Configuration # 14 EG Water without Tankless = Configuration #15	If No, Verify that for EG Tankless there is 24Vac present on P13 pins 2,3 & 4. For EG-NG 24Vac should be present on P13 pins 2,3,4 & 5. If Yes, press enter to configure the control. **WARNING** Ensure boiler control is configured correctly per the boiler manual before operation. Failure to comply can result in severe personal injury, death, or substantial property damage.
CONFIG MISMATCH	Configuration number stored in the board does not match the configuration number the control reads from the harness.	Is the Configuration number shown for the board, on line 2 correct for the boiler model? EG Water with Tankless = Configuration # 14 EG Water without Tankless = Configuration #15	If No, but the number shown for the boiler is correct, press enter. If No, and the number shown for the boiler is also incorrect, verify that for EG-Without Tankless there is 24Vac present on P13 pins 2,3,4 & 5. Press enter when the boiler number is correct. If Yes, verify that for EG- Without Tankless there is 24Vac present on P13 pins 2,3,4 & 5. If the voltages are correct on P13 and the boiler model still shows as other than listed above, replace the control. Press enter when the boiler number is correct. **WARNING** Ensure boiler control is configured correctly per the boiler manual before operation. Failure to comply can result in severe personal injury, death, or substantial property damage.
AUTO LIMIT	Auto Limit chain / electrical circuit is open.	Is the Factory Jumper installed in the Auto Limit terminal block?	If Yes, verify continuity of jumper and factory wiring back to the control. If No, replace the jumper, unless there are devices that are intended to be wired to the Auto Limit chain.
		Are there devices installed / wired to the Auto Limit terminal?	If Yes, verify continuity of the Auto Limit chain P4 connector pins 2 & 3. • If there is continuity, verify factory wiring back to the control and verify the P4 connrctor is fully seated. If still showing "Auto Limit Open" replace the control. If Yes, and there is no continuity on the Auto Limit chain, verify all devices are in an operational state with closed contacts: Ensure there is electrical continuity with a multi-meter at the Auto Limit wiring connections on the device. • If a device will not close its electrical contact when normal operating conditions would indicate it should be closed, replace that device.

Troubleshooting (EG Water Boilers) (continued)

Errors and Lockouts (continued)

Fault Name	Fault Description	Troubleshooting	Action
MANUAL LIMIT	Manual Limit chain / electrical circuit is open.	Is the Factory Jumper installed in the Manual Limit terminal block?	If Yes, verify continuity of jumper and factory wiring back to the control. If No, replace the jumper, unless there are devices that are intended to be wired to the Manual Limit chain.
		Are there devices installed / wired to the Manual Limit terminal?	If Yes, verify continuity of the Manual Limit chain at the field wiring terminal blocks. • If there is continuity, verify factory wiring back to the control.
			If Yes, and there is no continuity on the Manual Limit chain, verify all devices are in an operational state with closed contacts: Ensure there is electrical continuity with a multi-meter at the Manual Limit wiring connections on the device. • If a device will not close its electrical contact when normal operating conditions would indicate it should be closed, replace that device.
		Is the Rollout thermal switch closed?	A failed Rollout switch cannot be individually detected but will present itself to the control as a manual Fault. Replace the switch.
FALSE FLAME	Flame detected when the gas valve is not powered.	Verify flame is present at Pilot or Main Burners.	If Yes, close manual ball gas valves and verify flame has been extinguished.
		Verify wiring of Pilot valve and both Main gas valves are per the boiler manual.	If incorrect wiring is found, correct wiring and follow boiler manual for startup procedure to verify normal operation.
			If wiring is correct, verify that the pilot valve and both main gas valves are actually closing and stopping gas flow. If not, replace the valve that is faulty.
IGNITION FAULT	Maximum number of failed ignitions has been reached.	Is the Pilot sparking?	If not, verify wiring from control to pilot assembly. If in question, remove spark wire from control and check the continuity from the spade connection to the spark rod. If there is no continuity, replace pilot assembly. If pilot has continuity and there is still no spark, replace control.
		Is Gas present?	Check to verify that gas is present and all air has been safely bled from the gas piping. As the boiler goes through an ignition attempt proving pilot, verify gas pressures remain within the stated operating pressures of the boiler manual.
		Pilot is sparking but no pilot flame.	• Verify that the Pilot valve is being energized with 24 Vac. • Is the Pilot gas line piped and routed properly per this boiler manual with no kinks or lose connections? • Verify gas is flowing to the pilot. If not, replace the Pilot valve.
		Pilot is lighting, but not energizing the Main Gas Valve(s).	• Check Pilot Flame Signal in the Control Diagnostics: a flame signal < 60 is required for proven flame. If the flame signal does not register, check the Pilot Flame Sense wiring and Flame Rod for continuity and corrosion on the rod. Replace if necessary. • If a pilot gas pressure regulator is used with lower gas inlet pressures, increase the pilot gas pressure regulator to provide additional gas to the pilot.
		Pilot is lighting, but Main Flame is not.	• Verify that the Main Gas valve(s) are being energized with 24 Vac. • Verify all Manual gas valves are in the open position. • Verify Manifold pressure during Main Flame ignition.
		Main Flame is lighting, but not staying lit.	• Verify inlet gas pressure is within range specified in the boiler manual.
			• Verify the Manifold pressure is set per the boiler manual.

Troubleshooting (EG Water Boilers) (continued)

Errors and Lockouts (continued)

Fault Name	Fault Description	Troubleshooting	Action
FLAME LOST	Flame has been lost during operation.	All boilers	• Check Pilot Flame Signal in the Control Diagnostics: a flame signal < 60 is required for proven flame. If the flame signal does not register, check the Pilot Flame Sense wiring and Flame Rod for continuity and corrosion on the rod. Replace if necessary. • Verify Inlet Gas pressure and Manifold pressure through both high fire and reduced firing rates: Ensure pressures are within ranges specified in the boiler manual.
BOILER OUT OPEN	Boiler Control measures an open circuit.	Inspect Boiler Out Sensor and wiring.	• Verify that wiring has no breaks, cuts, or damage that could short or provide an open circuit for the sensor reading back to the control. • Measure the individual resistance values of Boiler Out and compare to **Table 16, page 73.** • Replace Boiler Out Sensor if values are outside the range of the table for the given temperature.
BOILER OUT SHORT	Boiler Control measures a closed circuit with no resistance.		
HARDWARE FAULT 1	Control Board Hardware faults – A/D converter fault, flame circuit fault, RAM fault, ROM fault, sequence fault, RAM disagrees fault.	Possible Control Board failure.	Cycle power on control. If fault reoccurs when transitioning from Steady Heat to Standby, replace the control.
HARDWARE FAULT 2	Control Board K3 Relay Open Fault.	Possible Control Board failure.	Cycle power on control. If fault reoccurs when transitioning from Steady Heat to Standby, replace the control.
HARDWARE FAULT 3	Control Board K3 Relay Closed Fault.	Possible Control Board failure.	Cycle power on control. If fault reoccurs when ending the next heat cycle, replace the control.
HARDWARE FAULT 4	Control Board K4 Relay Open Fault.	Possible Control Board failure.	Cycle power on control. If fault reoccurs when ending the next heat cycle, replace the control.
HARDWARE FAULT 5	Possible Control board failure or Pilot valve harness short to 24 Vac.	All boilers	• Disconnect Pilot valve harness at control P12. Check for voltage on the harness C12 pin 4. If voltage is detected, inspect harness for short. • If no voltage is detected at C12 pin 4, reconnect all harness connectors and cycle power on the control. If fault reoccurs when ending the next heat cycle, replace the control.
HARDWARE FAULT 6	Control Board K5 Relay Open Fault.	Possible Control Board failure.	Cycle power on control. If fault reoccurs when ending the next heat cycle, replace the control.
HARDWARE FAULT 7	Possible Control board failure or Main valve harness short to 24 Vac.	All boilers	Disconnect Main Gas valve harness at control P12. Check for voltage on the harness C12 pin 5. If voltage detected inspect harness for short.
HARDWARE FAULT 8	Control Board K6 Relay Open Fault.	Possible Control Board failure.	Cycle power on control. If fault reoccurs when ending the next heat cycle, replace the control.

Troubleshooting (EG Water Boilers) (continued)

Errors and Lockouts (continued)

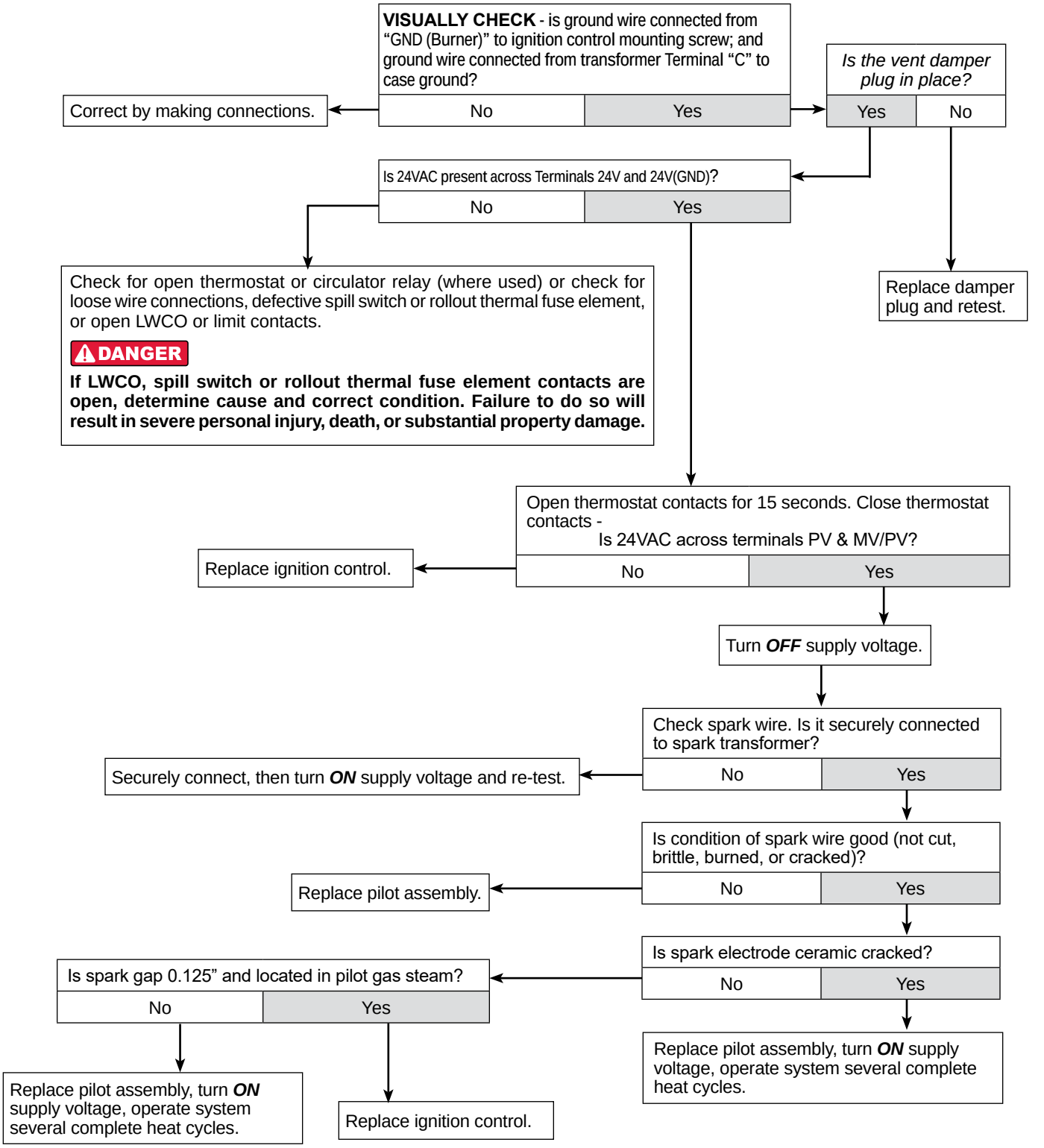
Fault Name	Fault Description	Troubleshooting	Action
CH VOLTAGE HIGH	CH / Thermostat1 input excessive voltage.	Measure CH / Thermostat1 supply voltage.	Unplug the control P3 connector. Measure the voltage between the control connector's Pins 1 & 3. Is the measured voltage in excess of 24 Vac nominal? • If No, inspect the harness for a short. • If Yes, measure the voltage of the 24 Vac transformer output connector P1, between P1 pins 6 & 7, without unplugging it from the control. Is the measured voltage in excess of 24 Vac nominal? • If Yes, replace the transformer. • If No, inspect 120 Vac supply power.
DHW VOLTAGE HIGH	DHW / Thermostat2 input excessive voltage.	Measure HDW / Thermostat 2 supply voltage.	Unplug the control P3 connector. Measure the voltage between the control connector's Pins 4 & 6. Is the measured voltage in excess of 24 Vac nominal? • If No, inspect the harness for a short. • If Yes, measure the voltage of the 24 Vac transformer output connector P1, between P1 pins 6 & 7, without unplugging it from the control. Is the measured voltage in excess of 24 Vac nominal? • If Yes, replace the transformer. • If No, inspect 120 Vac supply power.
SPILL SWITCH	Burner spill caused by possible vent blockage or wind.	Check Spill Switch for continuity.	Press reset button if open circuit detected. If this fails to restore continuity replace sensor.

Troubleshooting – (EG & PEG Steam Boilers)

CHART 1 **NO SPARK – System does not work – without vent damper**

⚠ WARNING

Electrical shock hazard — Wherever you see ▲ **TURN OFF POWER** ▲, follow the instructions. Failure to follow instructions can result in severe personal injury, death or substantial property damage.



Troubleshooting – (EG & PEG Steam Boilers) (continued)

CHART 2 | **NO SPARK** – System does not work – With vent damper

⚠WARNING

Electrical shock hazard — Wherever you see ▲ **TURN OFF POWER** ▲, follow the instructions. Failure to follow instructions can result in severe personal injury, death or substantial property damage.

Is damper harness securely plugged in at both ends?
- No → Secure connections.
- Yes → Is 24VAC present across terminals C and Y on transformer?
  - No → Check for loose wire connections or bad relay on transformer.
  - Yes → Is 24VAC present across terminals C and yellow wire between damper connector and rollout thermal fuse element?
    - No → Check for open thermostat or circ. relay (where used) or check for loose wire connections, defective spill switch or rollout thermal fuse element, or open LWCO or high limit contacts.

      ⚠DANGER

      If LWCO, spill switch or rollout thermal fuse element contacts are open, determine cause and correct condition. Failure to do so will result in severe personal injury, death, or substantial property damage.
    - Yes → Is damper rotated open?
      - No → Check for out of round stack section. Does motor rotate open?
        - No → Replace actuator.
        - Yes → Is 24VAC across terminals PV & MV/PV?
          - No → Open thermostat contacts for 30 seconds. Damper will rotate to closed position. Close thermostat contacts. Damper will rotate to open position.
            - Is 24VAC across terminals PV & MV/PV?
              - No → Check continuity of each wire in wiring harness to damper. Does continuity exist for each wire?
                - No → Replace damper wiring harness.
                - Yes → Remove damper harness from boiler wiring harness. TEMPORARILY install jumper between terminal 2 and terminal 5 on damper plug in boiler wiring harness. See Figure 14. Does boiler fire?
                  - No → Replace ignition control.
                  - Yes → Replace actuator.
              - Yes → Is spark present now?
                - Yes → Re-test.
                - No → Turn ***OFF*** supply voltage. Check spark wire. Is it securely connected to ignition control?
                  - No → Securely connect and turn ***ON*** supply voltage. Re-test.
                  - Yes → Is condition of spark wire good (not brittle, burned, or cracked?
                    - No → Replace pilot assembly.
                    - Yes → Is the spark electrode ceramic cracked?
                      - No → Is spark gap 0.125” and located in pilot gas stream?
                        - No → Replace pilot assembly.
                        - Yes → Replace ignition control.
                      - Yes → Replace pilot assembly.

Turn ***ON*** supply voltage and operate system several complete cycles.

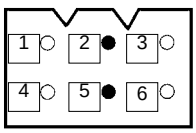


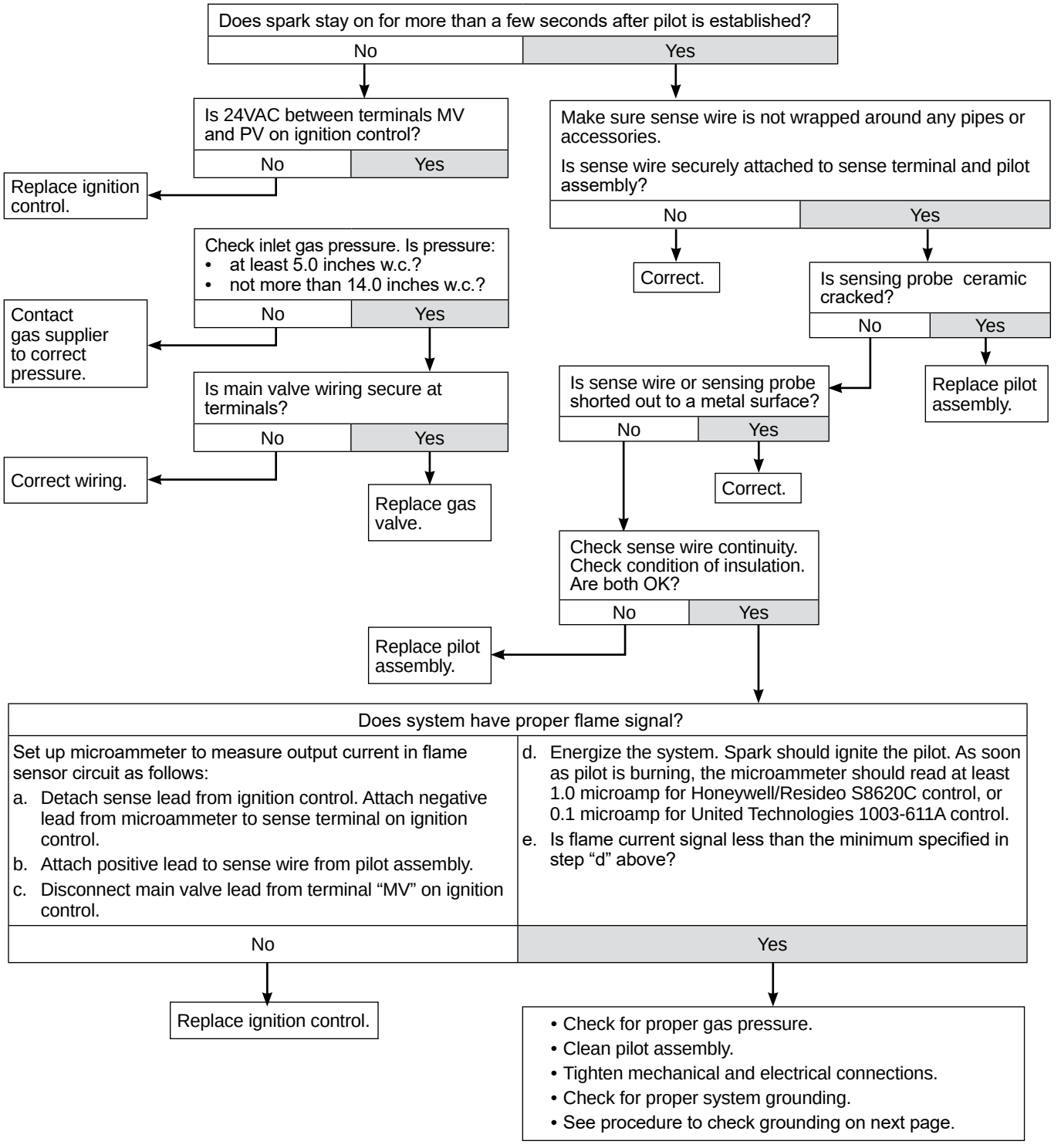
Figure 48

Troubleshooting – (EG & PEG Steam Boilers) (continued)

CHART 3 **PILOT LIGHTS – Main valve will not come on – With or without vent damper**

⚠WARNING

Electrical shock hazard — Wherever you see ▲ **TURN OFF POWER** ▲, follow the instructions. Failure to follow instructions can result in severe personal injury, death or substantial property damage.



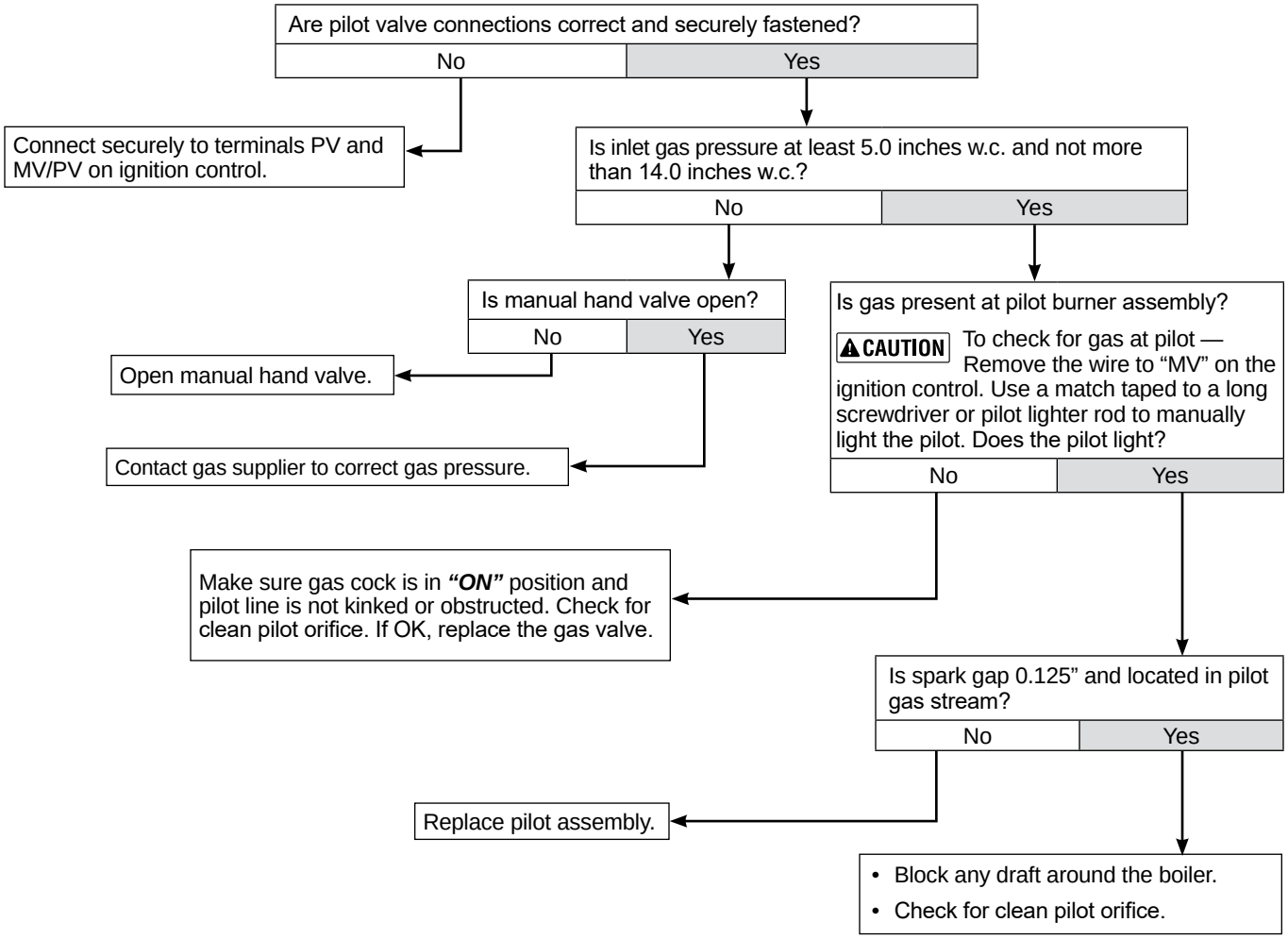
Troubleshooting – (EG & PEG Steam Boilers) (continued)

CHART 4 Procedure to check system grounding

Pilot assembly and ignition control must share common ground with main burner. Nuisance shutdowns are often caused by poor or erratic ground.

- Check for good metal-to-metal contact between pilot burner bracket and main burner, and between main burner and burner rest.
- Check ground lead from “GND (Burner)” terminal on ignition control to ignition control mounting screw, and from “C” on transformer to transformer case ground. Make sure connections are clean and tight. If wire is damaged or deteriorated, replace with No. 18 gauge moisture-resistant, thermoplastic-insulated wire with 105°C minimum rating.

CHART 5 PILOT LIGHTS — Main valve will not come on — With or without vent damper



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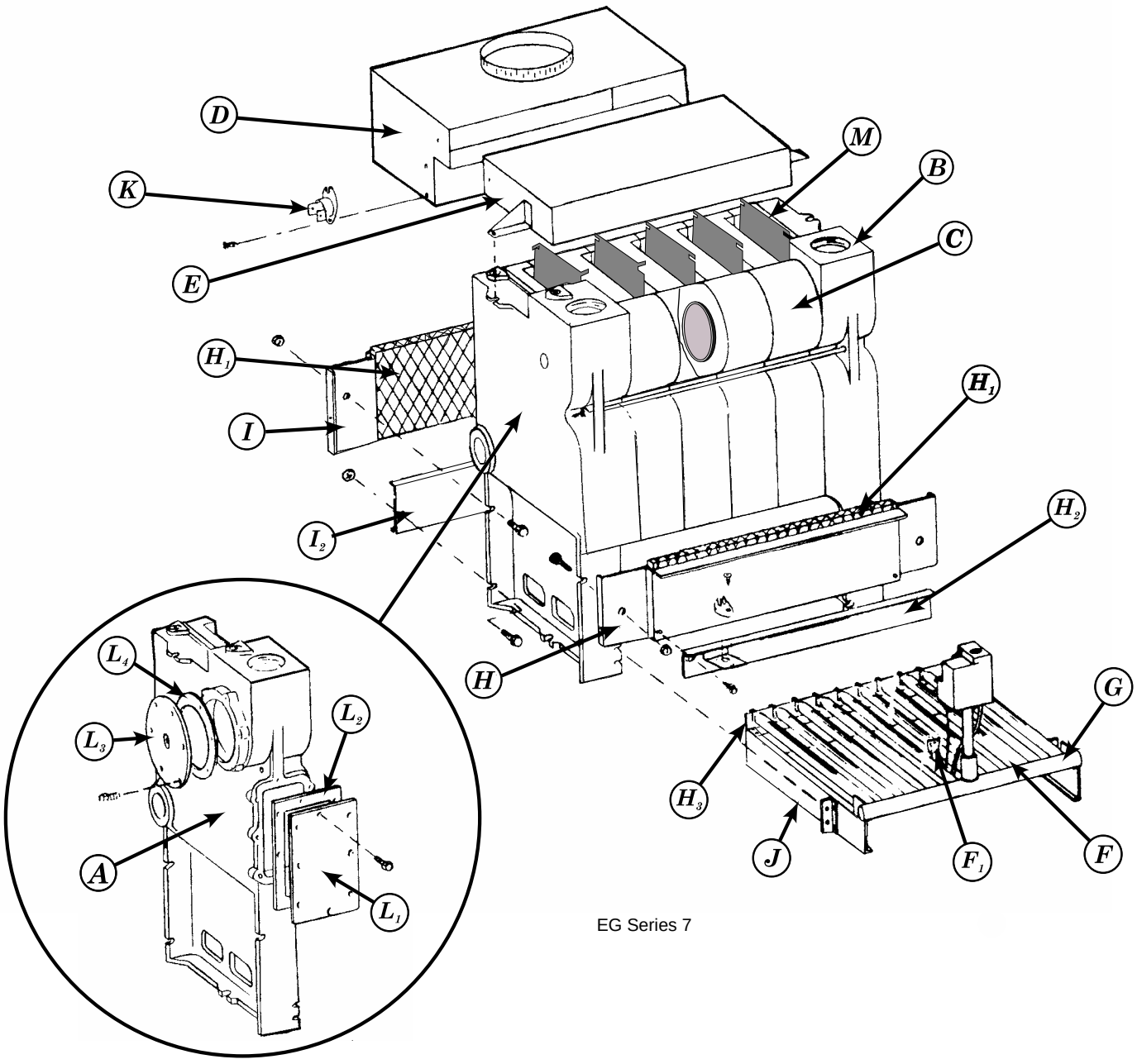
Section 7
Parts

Replacement Parts

⚠ WARNING

The boiler contains ceramic fiber and fiberglass materials. Use care when handling these materials per instructions on **page 91** of this manual. Failure to comply could result in severe personal injury.



EG Series 7

Replacement Parts (continued)

Table 18 EG/PEG replacement parts

Item	Description	Boiler Models	Part Number
A	Left hand end section with heater opening (Pattern No. 1814)	—	311-800-014
	Left hand end section without heater opening (Pattern No. 1813)	—	311-800-007
B	Right hand end section without heater opening (Pattern No. 18128)	—	311-800-029
C	Intermediate section (Pattern No. 1815)	—	311-800-010
D	Draft hood	**EG 30-35**	450-021-292
		EG 40-45	450-021-258
		EG 50-55	450-021-293
		EG-65	450-021-261
		EG-75	450-021-262
E	Collector hood	**EG-30, 35**	450-014-733
		EG-40, 45	450-014-734
		EG-50, 55	450-014-735
		EG-65	450-014-736
		EG-75	450-014-737
F	Burner, stainless tube, regular	—	512-200-000
F_1	Burner, stainless tube, with pilot bracket	—	512-200-001
G	Manifold	**EG-30**	591-125-533
		EG-35	591-125-538
		EG-40	591-125-534
		EG-45	591-125-539
		EG-50	591-125-535
		EG-55	591-125-540
		EG-65	591-125-541
		EG-75	591-125-542
	Main burner orifice, natural gas, 2.35mm	**EG 30-65**	560-529-991
	Main burner orifice, natural gas, 2.30mm	**EG-75**	560-528-975
	Section assembly complete without heater opening (not shown)	**EG 30-35**	321-811-095
	Section assembly complete with heater opening (not shown)	**EG-35**	321-811-100
	Section assembly complete with heater opening (not shown)	**EG 40-45**	321-811-110
	Section assembly complete without heater opening (not shown)	**EG 40-45**	321-811-115
	Section assembly complete with heater opening (not shown)	**EG 50-55**	321-811-120
	Section assembly complete without heater opening (not shown)	**EG-50-55**	321-811-125
	Section assembly complete with heater opening (not shown)	**EG-65**	321-811-130
	Section assembly complete without heater opening (not shown)	**EG-65**	321-811-135
	Section assembly complete with heater opening (not shown)	**EG-75**	321-811-140
	Section assembly complete without heater opening (not shown)	**EG-75**	321-811-145
	Retort cement (1 quart) (not shown)	—	591-602-913
	Flue brush (not shown)	—	591-706-214

Item	Description	Boiler Models	Part Number
H	Front base panel	**EG-30, 35**	451-800-000
		EG-40, 45	451-800-001
		EG-50, 55	451-800-002
		EG-65	451-800-003
		EG-75	451-800-004
H_1	Base insulation kit (includes front and rear base panel insulation, water glass, and boiler cement)	—	510-811-660
H_2	Base front access panel with flame rollout switch bracket	**EG-30, 35**	451-800-040
		EG-40, 45	451-800-041
		EG-50	451-800-039
		EG-55	451-800-042
		EG-65	451-800-043
		EG-75	451-800-044
H_3	Back burner support	**EG-30**	451-800-085
		EG-34	451-800-086
		EG-40	451-800-087
		EG-45	451-800-088
		EG-50	451-800-089
		EG-55	451-800-090
		EG-65	451-800-092
		EG-75	451-800-094
I	Back base panel	**EG-30, 35**	451-800-010
		EG-40, 45	451-800-011
		EG-50, 55	451-800-012
		EG-65	451-800-013
		EG-75	451-800-014
I_2	Back base channel	**EG-30, 35**	451-800-020
		EG-40, 45	451-800-021
		EG-50, 55	451-800-022
		EG-65	451-800-023
		EG-75	451-800-024
J	Base side rail (2 required)	—	451-800-070
K	Spill switch	—	510-300-013
L	Cover plate for heater opening (rectangular)	—	389-900-103
L_2	Gasket for cover plate (rectangular)	—	590-317-579
L_3	Cover plate for heater opening (round)	—	389-900-101
L_4	Gasket for cover plate (round)	—	590-317-495
M	Flue baffle (1 per joint)	—	460-003-790
	Section replacement kit (includes 3" and 6" elastomer seal, 2 pieces of rope, tube of silicone, order 1 per joint between sections) (not shown)	—	381-800-667
	3" Diameter bottom elastomer seal (1 per joint)	—	592-800-010
	6" Diameter top elastomer seal (1 per joint)	—	592-800-007
	Sealer for sections (2 pieces of rope, tube of silicone per joint between sections) (not shown)	—	591-641-865
	½" x 14" Tie rod w/o nut (2 per boiler) (not shown)	**EG-30, 35**	560-234-470
	½" x 18½" Tie rod w/o nut (2 per boiler)(not shown)	**EG-40, 45**	560-234-475
	½" x 22¾" Tie rod w/o nut (2 per boiler)(not shown)	**EG-50, 55**	560-234-480
	½" x 27" Tie rod w/o nut (2 per boiler)(not shown)	**EG-65**	560-234-485
	½" x 31¼" Tie rod w/o nut (2 per boiler)(not shown)	**EG-75**	560-234-490
	½" Nut (2 per tie rod) (not shown)	—	561-928-221
	½" Lock washer (1 per tie rod) (not shown)	—	562-248-668

Note 1: Order sufficient quantities to replace all orifices within a base.

Replacement Controls, Dampers, Gas Valves and Wire Harness

⚠ WARNING

Only dampers listed below are approved for use on EG, PEG Series 7 boilers.
Any other damper installed can cause severe personal injury or death.

Table 19 Replacement controls, dampers, gas valves and wire harness

Description		Part number
EG 30 thru 75 –– Vent Damper Components for both Steam and Water		
Damper assembly	5” — EG-30, EG-35 (Water boiler)	381-800-864
	5” — EG-30, EG-35 (Steam boiler)	381-800-475
	6” — EG-40, EG-45 (Water boiler)	381-800-865
	6” — EG-40, EG-45 (Steam boiler)	381-800-476
	7” — EG-50, EG-55 (Water boiler)	381-800-866
	7” — EG-50, EG-55 (Steam boiler)	381-800-477
	8” — EG-65, EG-75 (Water boiler)	381-800-869
	8” — EG-65, EG-75 (Steam boiler)	381-800-478
Damper actuator		510-512-337
Wire harness - Damper (EG Water)		381-359-436
Wire harness - Damper (EG Steam)		591-391-795
EG 30 thru 75 ONLY — Common Components for both Steam and Water		
Pilot burner assembly		511-330-218
Gas valve, natural gas	½” x ½”, sizes EG 30 thru 50	511-044-381
	¾” x ¾”, sizes EG 55 thru 75	511-044-382
Pilot tubing with fittings 1/8” X 22-3/4” long		560-742-860
Rollout thermal fuse – 228° C		512-050-230
EG 30 thru 75 ONLY — Natural Gas (Water boilers only) No tankless heater		
Control Module - Natural Gas		383-301-211
Supply Temperature Sensor LWCO		381-356-589
Wire harness - Sensor EG 30 thru 75 Water		591-392-106
Wire harness - Power J-Box to Module		381-359-447
Wire harness - Circulator (with molex)		381-356-528
Wire Harness - EG 30 thru 75 water without tankless heater		381-800-893
Control transformer 24VAC 50 VA		383-500-628
Terminal Block, Thermostat Wiring		381-359-430

Replacement Controls, Dampers, Gas Valves and Wire Harness
(continued)

Description	Part number
EG 30 thru 75 ONLY — Natural Gas (Steam boilers only) With or without tankless heater	
UCS Ignition Control EG - Natural Gas	511-330-097
Control Limit with 1/2 NPT Well	510-312-250
Float Type LWCO	511-114-494
Wire harness EG-30 thru 75 steam, float LWCO	540-130-961
Probe Type LWCO	510-811-403
Wire harness EG-30 thru 75, PEG-30 thru 65 steam, probe LWCO	540-130-962
Wire harness - Thermostat	591-391-994
Transformer - relay 120/24VAC 40 VA	510-312-166
EG 30 thru 75 ONLY — Natural Gas (Water boilers only) With tankless heater	
Control Module - Natural Gas	383-301-211
Supply Temperature Sensor LWCO	381-356-589
Wire harness - Sensor EG 30 thru 75 Water	591-392-106
Wire harness - Power J-Box to Module	381-359-447
Wire harness - Circulator (with molex)	381-356-528
Wire harness EG-35 thru 75 water with tankless heater	381-800-884
Control Transformer 120/24V 50VA	383-500-628
Terminal Block, Thermostat Wiring	381-359-430
Miscellaneous Optional Kits	
Outdoor Temperature Sensor - Wired	381-356-586
Outdoor Temperature Sensor - Wireless	384-000-325
Antifreeze, Sentinel X500, 1 Gallon	592-900-029
Antifreeze, Sentinel X500, 5 Gallon	592-900-006
Corrosion Inhibitor, Sentinel X100	592-900-002
Sentinel X100 Quick Test Kit	592-900-005
Conversion Kits - High Altitude	
EG 30-75 2,000 to 6,999 Feet	510-811-996
EG 30-75 7,000 to 10,000 Feet	510-811-997

Section 8
Product Information

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Product Information

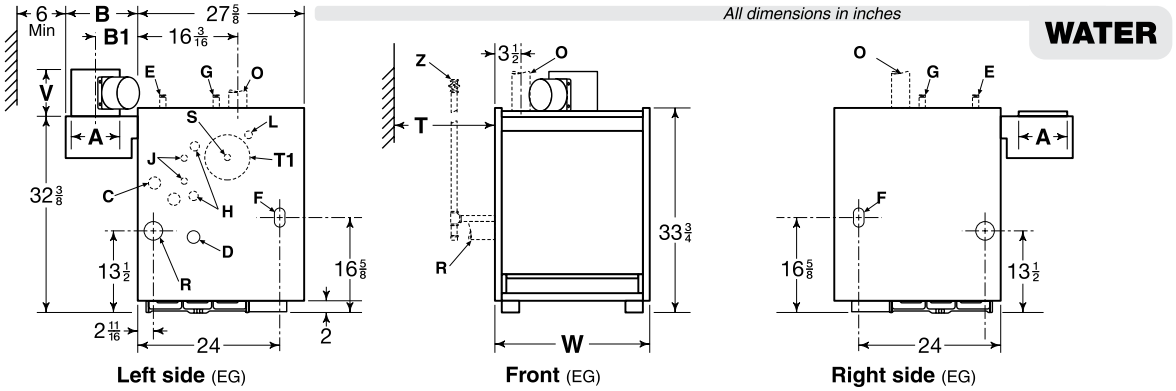
Dimensions

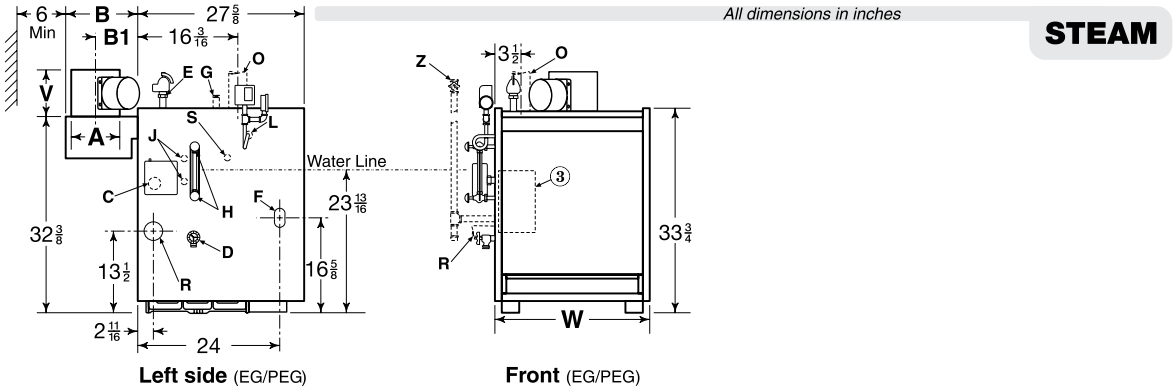
Figure 49 Dimensional data

Model Number	Supply EG O	Return EG P	Dimensions (See note 3 for PEG-30 to PEG-55 carton dimensions) W	A	B	B1	V (note 2)	T	Gas Connection "F" (note 1)	Draft hood outlet size	Approx. ship wt. (lbs)
EG & PEG-30 & -35	1 - 3"	1 - 2 ½"	17"	5"	11 ¾"	6 ¾"	6"	Water boiler tankless coil removal clearance: E-624: 14" E-626: 18" E-632: 22"	½"	5"	430
EG & PEG-40 & -45	1 - 3"	1 - 2 ½"	21 ¼"	6"	11 ¾"	6 ¾"	6 ½"		½"	6"	505
EG & PEG-50 & -55	1 - 3"	1 - 2 ½"	25 ½"	7"	11 ¾"	6 ¾"	9"		½"	7"	585
EG & PEG-65	1 - 3"	1 - 2 ½"	29 ¾"	8"	11 ¾"	6 ¾"	9 ½"		¾"	8"	660
EG-75	1 - 3"	1 - 2 ½"	34"	8"	15 ¾"	8 ¾"	—		¾"	8"	735

Notes:

1. Sizes shown are gas connection sizes for natural gas. Gas piping from meter to boiler to be sized according to local utility requirements. Gas line can enter on either the right or left end of the boiler.
2. Damper dimension for EG-30 through EG-75 ONLY.
3. PEG cartons are 32" wide x 39" high. Cartons lengths are 32" for PEG-30, -35, -40; 37" for PEG-45, -50, and -55; 39" for EG-65.





Tapping	Size	Steam Boilers	Water Boilers - EG only	Tapping	Size	Steam Boilers	Water Boilers - EG only
C	¾"	Probe type low water cut-off	Probe type LWCO (when used)	S	1 ½"	Skim tapping	Limit control
D	¾"	Drain	Drain		¾"	— (note 1)	Limit control
E	¾"	Safety valve	Safety relief valve	T1	—	—	Optional tankless heater for water boilers
G	¾"	Plugged	Piping to compression tank or auto air vent	—	—	—	—
H	½"	Gauge glass and/or optional LWCO	Combination pressure temperature gauge	T3	—	Optional steam boiler tankless heater	—
J	⅜"	Tri cock tappings	Plugged	Z	—	Manual shut-off gas valve (supplied by installer)	
L	½"	Syphon, pressure gauge, high limit (probe type LWCO)	Combination pressure temperature gauge				

Notes: 1. Available on special request only, when tankless heater is specified.

Notes: 2. When a tankless water heater coil is installed, use the tapping in the heater for an additional operating control.

Product Information (continued)

Ratings

Table 20 Ratings

Boiler Model Number	0–2,000 feet altitude			2,000–4,500 feet altitude (Canada)		Net AHRI Ratings			Chimney Size	Boiler Water Content (Gallons)	
	Input Rating, (MBH)	Water Heating Capacity, (MBH)	Steam Heating Capacity, (MBH)	Input (Btuh)	(Output) (Btuh)	Sq. Ft. Steam	Steam (MBH)	Water (MBH)		Water	Steam (to Waterline)
(Note 1)		(Note 2)		(Note 3)		(Note 4)					
***EG-30-**	75	64	62	67,500	57,600	196	47	56	5" I.D. x 20'	12.3	8.4
***EG-35-**	100	85	82	90,000	76,500	258	62	74	5" I.D. x 20'	12.3	8.4
***EG-40-**	125	106	103	112,500	95,400	321	77	92	6" I.D. x 20'	14.8	9.8
***EG-45-**	150	127	124	135,000	114,300	388	93	110	6" I.D. x 20'	14.8	9.8
***EG-50-**	175	148	145	157,500	133,200	454	109	128	7" I.D. x 20'	17.3	11.2
***EG-55-**	200	169	166	180,000	151,200	521	125	147	7" I.D. x 20'	17.3	11.2
***EG-65-**	238	201	198	214,000	180,000	621	149	175	8" I.D. x 20'	19.8	12.6
EG-75-	282	237	234	253,000	213,300	733	176	206	8" I.D. x 20'	22.3	14.0

Notes: (**Table 20**)

* Add prefix "P" for package boiler completely assembled and wired with jacket and controls (PEG-30-S through PEG-65-S only).

1. **EG-30 thru 75:** Add suffix "PID" or "PI" for electronic ignition (30-65 — damper required in U.S.; optional in Canada); add "N" for natural; add "W" for water; add "S" for steam; add "T" for tankless heater; add "P" for provisional tankless heater.
2. Based on standard test procedures prescribed by the United States Department of Energy.
3. Net AHRI ratings are based on net installed radiation of sufficient quantity for the requirements of the building and nothing need be added for normal piping and pick-up. Water ratings are based on a piping and pick-up allowance of 1.15; steam ratings on an allowance of 1.333. An additional allowance should be made for unusual piping and pick-up loads. Consult local Weil-McLain representative.

Table 21 AFUE values

Boiler Model Number	AFUE	
	Water	Steam
	PIDN	PIDN
EG-30 PEG-30	84.0	82.0
EG-35 PEG-35	84.0	82.0
EG-40 PEG-40	84.0	82.0
EG-45 PEG-45	84.0	82.0
EG-50 PEG-50	84.0	82.0
EG-55 PEG-55	84.0	82.0
EG-65 PEG-65	84.0	82.0
EG-75	84.0	82.0

Product Information (continued)

Standard and Optional Equipment

Standard Equipment

- Factory-Assembled Section Block
- Insulated Extended Jacket
- Draft Hood
- Aluminized Steel Burners
- Non-Linting Pilot Burner
- Heater Cover Plates (for boilers with tankless heater openings)
- Control Wire
- Electrical Junction Box

EG/PEG Boilers Add:

- Combination Gas Valve for 24 volt
- Rollout Thermal Fuse Element
- Spill Switch
- Highest Efficiency Models, PID Intermittent Electronic Ignition System and Automatic Vent Damper

For EG Water Boilers

- Unity-CI Ignition Module
- Temperature / LWCO sensor
- Built-In Air Eliminator
- 30 PSI Relief Valve
- Combination Pressure Temperature Gauge
- 50 VA Transformer

For EG/PEG Steam Boilers

- Relief Valve, 15 PSI
- Steam Pressure Gauge
- High-Limit Pressure Control
- Syphon
- Gauge Cocks
- Gauge Glass
- Low-Water Cutoff, Probe Type
- 40 VA Transformer

EG Additional Equipment

- Water Tankless Heater Kits (EG35-EG75)
- Steam Tankless Heater Kit (EG35-EG75)

Product Information (continued)

Handling Fiberglass and Ceramic Fiber Materials

REMOVAL OF COMBUSTION CHAMBER LINING OR BASE PANELS

⚠ WARNING

The combustion chamber lining or base insulation panels in this product contains ceramic fiber materials that have been identified as carcinogenic, or possibly carcinogenic, to humans. Ceramic fibers can be converted to cristobalite in very high temperature applications. The International Agency for Research on Cancer (IARC) has concluded, “Crystalline silica inhaled in the form of quartz or cristobalite from occupational sources is carcinogenic to humans (Group 1).”:

- Avoid breathing dust and contact with skin and eyes.
  - Use NIOSH certified dust respirator (N95). This type of respirator is based on the OSHA requirements for cristobalite at the time this document was written. Other types of respirators may be needed depending on the job site conditions. Current NIOSH recommendations can be found on the NIOSH web site at http://www.cdc.gov/niosh/homepage.html. NIOSH approved respirators, manufacturers, and phone numbers are also listed on this web site.
  - Wear long-sleeved, loose fitting clothing, gloves, and eye protection.
- Apply enough water to the combustion chamber lining or base insulation to prevent airborne dust.
- Remove combustion chamber lining or base insulation from the boiler and place it in a plastic bag for disposal.
- Wash potentially contaminated clothes separately from other clothing. Rinse clothes washer thoroughly.

NIOSH Stated First Aid.

- Eye: Irrigate immediately.
- Breathing: Fresh air.

REMOVAL OF FIBERGLASS WOOL — OR — INSTALLATION OF FIBERGLASS WOOL, COMBUSTION CHAMBER LINING OR BASE PANELS:

⚠ WARNING

This product contains fiberglass jacket insulation and ceramic fiber materials in combustion chamber lining or base panels in gas fired products. Airborne fibers from these materials have been listed by the State of California as a possible cause of cancer through inhalation.

- Avoid breathing dust and contact with skin and eyes.
  - Use NIOSH certified dust respirator (N95). This type of respirator is based on the OSHA requirements for fiberglass wool at the time this document was written. Other types of respirators may be needed depending on the job site conditions. Current NIOSH recommendations can be found on the NIOSH web site at http://www.cdc.gov/niosh/homepage.html. NIOSH approved respirators, manufacturers, and phone numbers are also listed on this web site.
  - Wear long-sleeved, loose fitting clothing, gloves, and eye protection.
- Operations such as sawing, blowing, tear out, and spraying may generate airborne fiber concentration requiring additional protection.
- Wash potentially contaminated clothes separately from other clothing. Rinse clothes washer thoroughly.

NIOSH Stated First Aid.

- Eye: Irrigate immediately.
- Breathing: Fresh air.

WEIL-McLAIN

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