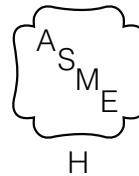
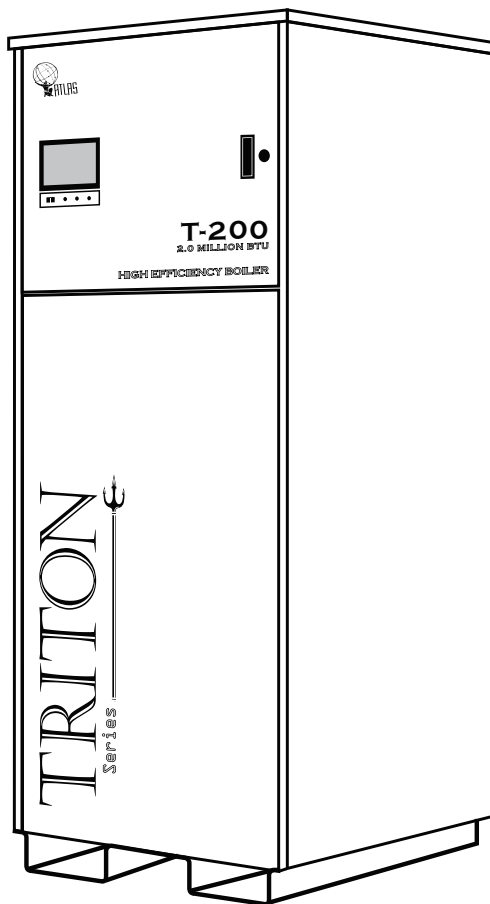


Triton Series™ High Efficiency Boiler

Models: T80 - T200

Installation, Operating & Maintenance Manual



- Designed and Manufactured in Accordance with ASME Code Section IV
- ETL Tested and Listed:
ANSI Z21.13-2010 / CSA 4.9-2010
- AHRI IBR Listing per BTS 2000
- ASME Section IV H-Stamped
- SCAQMD 1146.2
- CRN



Ace Heating
Solutions, LLC

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A. INTRODUCTION

Congratulations on choosing the Atlas™ Triton Series™ high efficiency boiler! The Triton Series™ combines solid engineering and innovative design with all the quality and features you would expect from a company with a proud 100 year tradition of building safe, reliable, high quality products in the USA.

Your Triton boiler is E.T.L. tested, certified and listed and is constructed and stamped in accordance with Section IV of the ASME Code. The boiler is also AHRI IBR Listed per BTS 2000.

A.1. STANDARD FEATURES & BENEFITS

A.1.a. Compact Water Tube Design

The Triton is a compact, vertically fired water tube boiler utilizing a double row, high finned copper tube design to maximize efficiency while minimizing the boiler footprint. The gasketless cast iron headers are a 4-pass configuration.

A.1.b. Quality Construction Built in the USA.

Triton Series™ boilers are 100% designed and manufactured in the USA in accordance with ASME Code Section IV. The finest quality components are used for many years of trouble free service.

A.1.c. Advanced Pre-mix Gas Delivery and Combustion System

Triton Series™ boilers provide clean, efficient combustion with very low emission levels. The gas delivery system is powered by a combustion blower which forces air and gas into the venturi which pre-mixes the gas before entering the combustion chamber. The Triton burner is a knit metal alloy fiber design which optimizes heat transfer, minimizes surface temperatures, and is resistant to clogging.

A.1.d. Controls

The Triton Series™ uses the advanced Honeywell SOLA control system and high-resolution color LCD touch screen Operator Interface display. This system provides the user clear, quick and easy access to all of the system's features and capabilities from a single, user-friendly interface. Up to 8 Triton Series™ boilers can be operated in a lead-lag installation using standard controls.

A.1.e. Heavy Duty, Solid Steel Cabinet

Triton Series™ boilers include a solid, 18 gauge steel cabinet. The cabinet is finished inside and out with a tough UV rated, outdoor quality powder coat paint.

A.1.f. Ease of Installation and Maintenance

Triton Series™ boilers include a heavy steel base with pallet jack access for ease of installation and movement. Routine maintenance and service are made simple with easy access to all components front and rear. The entire heat exchanger is easily removable and replaceable using hand tools only, without performing welding or cutting operations and without the use of gaskets.

A.1.g. Smart Boiler Control System

Triton Series™ boilers are factory equipped to accept the accessory Smart Boiler Control System™. The Ace Heating Solution, LLC proprietary Smart Boiler Control is a web-based system providing 24/7 access to the boilers operational performance from any computer or smart phone with an internet connection. The system allows personnel to conveniently monitor critical boiler information including inlet/ outlet temperatures, stack temperatures, firing rates, cycle counts and much more can be easily accessed and analyzed, to maximize boiler performance and safety

A.2. MISCELLANEOUS

This manual covers installation, maintenance, and operating instructions for Atlas™ Triton Series™ High Efficiency hot water boilers. Please review the entire manual carefully before installation or operation, and keep it in legible condition with the boiler at all times for reference. If this manual is misplaced or lost, check the Ace Heating Solutions, LLC. website, www.aceheatingllc.com to print an electronic copy or contact your local Ace Heating Solutions, LLC. representative. The following terms and signs are used throughout this manual to bring attention to the presence of hazards of various risk levels, or to important information concerning product life.



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



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

CAUTION:

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

NOTE:

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

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

- Do not use or store gasoline or other flammable vapors and liquids in the vicinity of this or any other appliance.
- **WHAT TO DO IF YOU SMELL GAS**
 - Do not try to light any appliance
 - Do not touch any electrical switch; do not use any phone in your building.
 - Immediately call your gas supplier from a neighbors phone. Follow the gas suppliers instructions.
 - If you cannot reach your gas supplier, call the fire department.
- Installation and service must be performed by a qualified installer, service agency or the gas supplier.

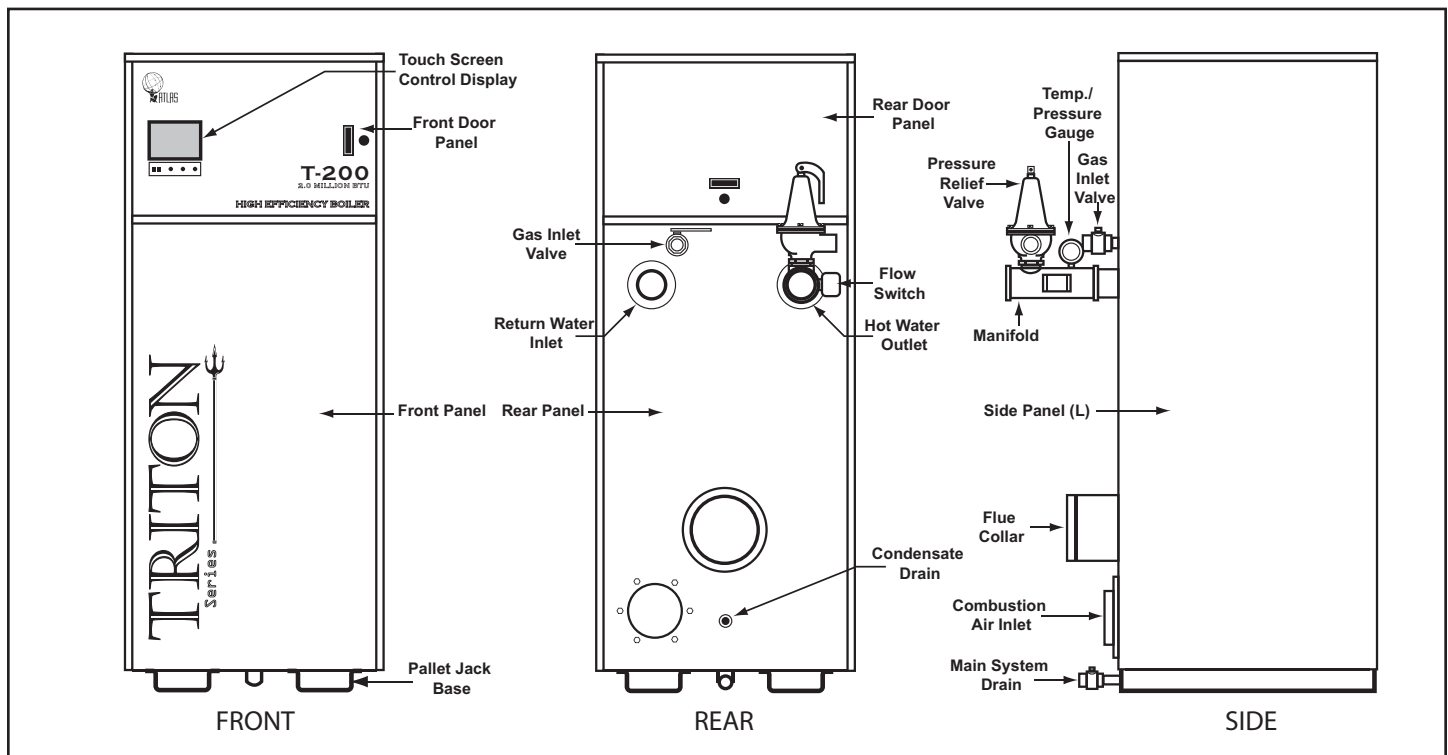


Figure A.1.1. Features and Components

B. PRE-INSTALLATION

Ace Heating Solutions, LLC. strongly recommends that this manual be reviewed thoroughly before installing your Triton Series™ high efficiency boiler. The factory warranty does not apply to boilers that have been improperly installed or operated (Refer to the warranty in chapter 8). If, after reviewing this manual, you still have questions not covered in this manual, please contact the manufacturer or your local Ace Heating Solutions, LLC representative. This section is intended to provide guidance in planning, design, construction and preparing the space prior to physical installation of the boiler, its venting, and the necessary electrical and plumbing connections.



The installation must conform to the requirements of the authority having jurisdiction or, in the absence of such requirements, to the National Fuel Gas Code, ANSI Z223.1/NFPA 54, and/or Natural Gas and Propane Installation Code, CAN/CSA B149.1.

The boiler must not be installed on carpeting.

Local and state codes requiring greater clearances supersede these minimum clearances.

- Multiple appliances may be installed side by side with 6" clearance between adjacent appliances to allow sufficient air for the pilot blower. It is recommended to maintain 16" clearance between adjacent boilers to allow access for service to the rear of the unit.
- The minimum clearance between a Triton Series™ boiler and a storage tank is 6". For alcove installations, the minimum clearance to combustible construction is 6" to side, 24" to rear walls and 22" from top of the unit to the ceiling. The front alcove shall remain open. This will allow boiler to be serviced in its location without movement or removal of the unit.

B.1. DETERMINING UNIT LOCATION

The boiler should be mounted on a level, structurally sound surface. The boiler is not approved for mounting on a combustible surface and Gas fueled equipment installed in enclosed parking garages must be located at least 18" above the floor.

The optimal location for the boiler is as close to an exterior wall as possible to reduce vent loss and to minimize costly stainless steel flue venting. Maintain minimum specified clearances for adequate operation. All installations must allow sufficient space behind the boiler to service vent connections, water pipe connections, piping and other auxiliary equipment, as well as the appliance.

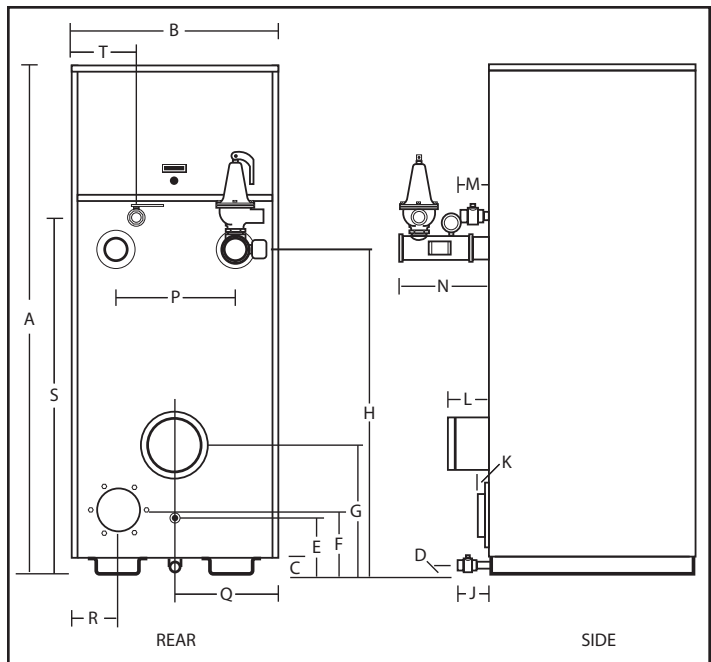


Figure A.2. Dimensions

MODEL	T-80	T-100	T-150	T-200
A: Total Height	60 11/16	60 11/16	68 11/16	76 11/16
B: Total Width	31 1/2	31 1/2	31 1/2	31 1/2
C: Base Height	3 3/8	3 3/8	3 3/8	3 3/8
D: System Drain Height	2 1/4	2 1/4	2 1/4	2 1/4
E: Condensate Drain Ht.	10 11/16	10 11/16	10 11/16	10 11/16
F: Air Intake Height	15 11/16	15 11/16	16 3/4	16 3/4
G: Flue Collar Height	20 7/16	20 7/16	22	23 15/16
H: Inlet/ Outlet Height	32 13/16	32 13/16	40 13/16	48 13/16
J: Syst. Drain Clearance	4 5/8	4 5/8	4 5/8	4 5/8
K: Air Intake Clearance	1	1	1	1
L: Flue Collar Clearance	7 1/8	7 1/8	7 1/8	7 1/8
M: Gas Valve Clearance	6 3/8	6 3/8	6 3/8	6 3/8
N: Manifold Clearance	12 3/4	12 3/4	12 3/4	12 3/4
P: Inlet/ Outlet Clearance	16	16	16	16
Q: Drain/ Flue Center	15 3/4	15 3/4	15 3/4	15 3/4
R: Air Intake Center	6 11/16	6 11/16	6 11/16	6 11/16
S: Gas Valve Height	39 7/8	39 7/8	47 7/8	55 7/8
T: Gas Valve Center	9 15/16	9 15/16	9 15/16	9 15/16

Table A.2. Triton Dimensions (inches). All measurements are approximate and subject to change.

MODEL	T-80	T-100	T-150	T-200
Top Clearance:	18"	18"	18"	18"
Front Clearance:	36"	36"	36"	36"
Side Clearance:	6"	6"	6"	6"
Bottom Clearance:	0"	0"	0"	0"

Figure B.1.1. Triton Minimum Clearances Chart.

CAUTION:

- Locate the unit so that the condensate can be treated and piped to meet city and local code requirements.
- The boiler shall be installed such that the gas ignition system components are protected from water (dripping, spraying, rain, etc.) during boiler operation or service (circulator replacement, control replacement, etc.)
- Keep the area around the unit(s) free from combustibles and flammable liquids.
- It is highly recommended that you allow sufficient space in front and the rear of the unit for replacement and adjustment of all parts requiring such attention.

B.1.a. Outdoor Installations (Optional)

CAUTION:

Triton Series™ boilers are available for certified outdoor installations.

- Boilers must not be installed under an overhang that is less than 3' from the top of the vent terminal.
- Three sides must be open in the area under the overhang.
- Roof water drainage must be diverted away from boiler(s) installed under overhangs.

B.1.b. Installations at Elevation.

Rated inputs are suitable for up to 2,000 ft.. elevation without de-rating. Consult the factory for installations over 2,000 ft.. above sea level. No hardware changes are required to the unit. (Adjustments may be required).

B.2. CONNECTION INFORMATION

NOTE:

The boiler, when used in connection with a refrigeration system, must be installed so the chilled medium is piped in parallel with the boiler with appropriate valves to prevent the chilled medium from entering the boiler.

The boiler piping system of a hot water boiler connected to heating coils located in air handling units where they may be exposed to refrigerated air circulation must be equipped with flow control valves or other automatic means to prevent gravity circulation of the boiler water during the cooling cycle.

All plumbing and electrical connections are conveniently made at the rear of the boiler without the need to remove any panels or components.

MODEL	T-80	T-100	T-150	T-200
Inlet Temp.				
Outlet Temp.				
Rec. Flow Rate (gpm)	34-69	43-85	65-129	85-172
Pressure Drop For Rec. Flow				
Min. Flow Rate (gpm)				
Max. Flow Rate (gpm)				

Table A.1. Triton Recommended Flow Rates.

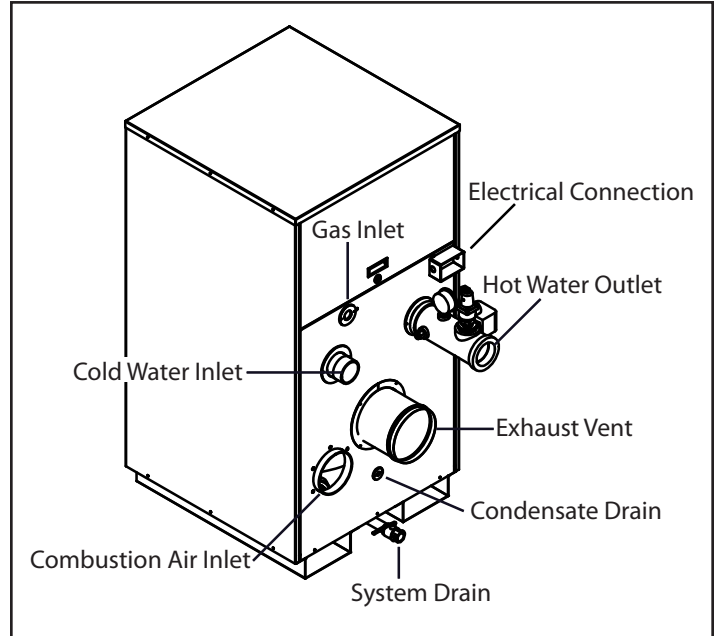


Figure B.2.1. Connection Locations

MODEL	T-80	T-100	T-150	T-200
Gas Connection:	1"	1"	1"	1 1/4"
Water Connection (In):	3" MPT	3" MPT	3" MPT	3" MPT
Water Connection (Out):	3" FPT	3" FPT	3" FPT	3" FPT
Vent Intake:	8"	8"	8"	8"
Exhaust Vent:	6"	6"	8"	8"
System Drain	1 1/4"	1 1/4"	1 1/4"	1 1/4"
Condensate Drain	1/2"	1/2"	1/2"	1/2"

Figure B.2.1. Piping Connection Sizing Chart.

B.3. COMBUSTION AND VENTILATION AIR

WARNING:

- The lack of adequate combustion air is the single biggest operating problem encountered with gas fired water boilers.

- Use of the boiler in construction areas where fine particulate matter, such as concrete dust or drywall dust, is present may result in damage to the boiler that is not covered by the warranty. If operated in a construction environment, a clean source of combustion air must be provided directly to the boiler.
- Your Triton Series™ boiler is equipped with a filter to help prevent such an occurrence above and must be checked at least every month. A single replacement filter is located inside the control box.

B.3.a. Indoor Units (Standard)

The boiler must be supplied with sufficient quantities of non-contaminated air to support proper combustion and equipment ventilation. Triton Series™ boiler combustion air can be taken using the boiler room air or may be vented directly outside.

It is generally recommended to take combustion air from a well ventilated boiler room whenever possible. However when using direct combustion air venting, the boiler is capable of up to 30 ft. of equivalent venting. If more than 30 ft. of equivalent venting is required, an enlarged vent diameter may be used to extend maximum vent lengths, but must be properly sized to allow for sufficient combustion air to be supplied to the boiler.

All installations must comply with the requirements of the National Fuel Gas Code, NFPA 54, Canada B149, and all local codes.

NOTE:

- In calculating free area, the required size of the opening for combustion, ventilation, and dilution air shall be based on net free area of each opening. If free area through a design of louver or grill is known, it shall be used in calculating the size opening required to provide the free area specified. For additional information, refer to the latest NFGC code requirements.
- Provisions for combustion and ventilation air must be in accordance with Air for Combustion and Ventilation, of the latest edition of the National Fuel Gas Code, ANSI Z223.1. In Canada the latest edition of CGA Standard B149 Installation Code for Gas Burning Appliances and Equipment, or applicable provisions of the local building codes.
- In order to protect electrical components, the boiler room ambient air temperature shall not exceed 100°F.
- The equipment room MUST be provided with properly sized openings to assure adequate combustion and ventilation air when unit is installed with a basic Category IV venting system.

- Note: All additional gas fired equipment should be considered when calculating the necessary air supply.

B.3.b. Direct Vent (Ducted Combustion Air)

If outside air will be drawn through the intake vent directly to this unit for combustion:

- The exhaust vent must be installed with a slight upward slope of not more than ¼ inch per foot of horizontal run to vent terminal.
- The exhaust vent must be insulated through the length of the horizontal run.
- Intake and exhaust vents with vertical termination should have a rain cap installed.
- It is recommended to install a drain on the exhaust vent.
- In cold climates, and to mitigate potential freeze up, Ace Heating Solutions, LLC highly recommends the installation of a motorized sealed damper to prevent circulation of cold air through the boiler during the non – operating hours. When installing motorized damper actuator with switch contacts, prove the damper is fully open to prevent unit from firing when damper is not fully open.

B.3.c. Conventional Combustion Air Supply

U.S. Installations

All Air from inside the building

If all combustion air is drawn from inside the building and the mechanical equipment room does not receive air from outside, the following applies:

- The mechanical room must be provided with two permanent openings communicating directly with additional room(s) of sufficient volume so that the combined volume of all spaces meets the criteria for an unconfined space. (An unconfined space is defined as a space whose volume is more than 50 cubic feet per 1,000 BTUH of the aggregate input rating of all appliances installed in that space. (NFGC).
- Each opening must have a minimum free area of 1 sq. in. per 1,000 BTUH of the total input rating of all gas utilization equipment in the mechanical room.
- One opening must commence within 12" of the top, and one opening must commence within 12" of the bottom of the room.



Ace Heating Solutions, LLC recommends that one opening shall commence with 6" from the top and one opening shall commence 6" from the bottom. The combined area of the two openings should not be less than 200 sq. in. for the first 100,000 BTUH boiler input, and 100 sq. in. for each additional 100,000 BTUH boiler input.

If all the combustion air is drawn from the air outside the building, and the mechanical equipment room directly communicates with outdoor air, either of the following methods can be used:

Method 1

- The mechanical equipment room must be provided with two permanent openings. One commencing within 12" of the top and one commencing within 12" from the bottom of the room.
- The openings must communicate directly, or by ducts, with the outdoors
- Each opening must have a minimum free area of 1 sq. in. per 4,000 BTUH of all equipment in the room when the opening is communicating directly with the outdoors or through vertical ducts. The minimum free area required for horizontal ducts is 1 sq. in. per 2,000 BTUH of the total input rating to all the equipment in the room.

(For addition information, refer to the latest NFGC)

Method 2 (normally applied in cold climate regions):

- The mechanical equipment room must be provided with at least one permanent opening, commencing within 12" of the top of the enclosure.
- The opening must communicate directly or by ducts with the outdoors.
- The opening must have a minimum free area of 1 sq. in. per 3,000 BTUH of the total input rating of all equipment in the room, or no less than the sum of the areas of all vent connectors in the confined space.

(For additional information, refer to the latest NFGC)



Do not use the "one permanent opening" method if the equipment room is under negative pressure conditions or the equipment is common vented with other gas fired appliances.

Louvers and grilles.



The required size openings for combustion, ventilation and dilution air shall be based on the net free area of each opening. Where free area through a louver or grille design is known, it shall be used in calculating the size opening required to provide the free area specified. Where the louver and grille design, and free area are not known, it shall be assumed that wood louvers will have 25% free area, and metal louvers and grilles will have 75% free area (NFGC).

Canadian Installations



All combustion air must be drawn from the outside air of the building; the mechanical equipment room must communicate directly with outdoor air.



Care must be taken to ensure that the equipment room is not under negative pressure conditions.

- Ventilation of the space occupied by the boiler shall be provided by an opening(s) for ventilation air at the highest practical point communicating with the outdoors. The total cross-sectional area of such an opening(s) shall be at least 10% of the area required in (2) below, but no less than 10 sq. in.
- For boilers using a barometric damper vent system there shall be a permanent air supply opening(s) having a cross section area of not less than 1 sq. in. per 7,000 BTUH up to and including 1 million BTUH, plus 1 sq. in. per 14,000 BTUH in excess of 1 million BTUH. This opening(s) shall be located at or ducted to a point no more than 18" nor less than 6" above floor level. The duct can also "goose neck" through the roof. The duct is preferred to be straight down and terminated 18" from the floor, but not near the piping. This air supply opening requirement shall be in addition to the air opening for ventilation air required in (1). (above)

For additional information, refer to CGA, B149

B.4. CONVENTIONAL FLUE VENTING



Proper flue venting is critical for the safe and efficient operation of the boiler.

Definition of ANSI Categories for High Efficiency Appliances

- Boilers are divided into four vent type categories based on the pressure produced in the exhaust and the likelihood of condensate production in the vent. Atlas™ Triton Series™ Boilers require Category IV venting. (See NFGC, NFPA 54, Section 7 “Venting Equipment” for more detailed information).
- Category IV: *A boiler which operates with a positive vent pressure and with a gas temperature that may cause excessive condensate production in the vent.*



This definition applies to the appliance and does not necessarily reflect the performance of the connected vent system.

- For additional information on appliance categorization, see appropriate ANSI Z21 Standard and the NFGC (US), or CGA (Canada) B149, or applicable provisions of local building codes.
- Triton Series™ boilers are designed to operate with a chamber pressure of 0 to +0.5” WC. The boiler is capable of 100 feet of vertical equivalent exhaust when equipped with the standard exhaust vent. When more than 100 feet of exhaust venting is used, the chamber pressure could increase beyond the maximum designed +0.5” WC. An optional enlarged vent may be used to increase vent runs in case more than the 100 ft. maximum is needed, however venting must be designed by a professional engineer to ensure the boiler chamber pressure stays within the designed range. Boiler vents must be constructed of AL29-4C or similar suitable material acceptable for use with exposure to condensate.



Using improper venting materials can result in personal injury, death or property damage.

U.S. Installations

Refer to the latest edition of the National Fuel Gas Code.

- Vent must terminate at least 4 ft. below, 4 ft. horizontally from, or 1 ft. above any door, window or gravity air inlet to the building.
- The vent must not be less than 7 ft. above grade when located adjacent to public walkways.
- Terminate the vent at least 3 ft. above forced air inlet located within 10 ft..
- The vent must terminate at least 4 ft. horizontally, and in no case above or below unless 4 ft. horizontal distance is maintained, from electric meters, gas meters, regulators, and relief equipment.

- Terminate the vent at least 6 ft. away from adjacent walls.
- Do not terminate vent closer than 5 ft. below roof overhang.
- Terminate vent at least 1 ft. above grade, including snow line.
- Multiple direct vent installations require a 4 ft. clearance between the ends of vent caps located on the same horizontal plane.



Canadian Installations

Refer to the latest edition of CGA, B149 Installation Code.

- A vent shall not terminate directly above a paved sidewalk or driveway which is located between two single family dwellings and serves both dwellings.
- A vent shall not terminate less than 7 ft. above a paved sidewalk or paved driveway located on public property.
- A vent shall not terminate within 6 ft. of a mechanical air supply inlet to any building.
- A vent shall not terminate above a meter/regulator assembly within 3 ft. horizontally of the vertical center line of the regulator.
- A vent shall not terminate within 6 ft. of any gas service regulator.
- A vent shall not terminate less than 1 ft. above grade level.
- A vent shall not terminate within 3 ft. of a window or door which can be opened in any building, any non – mechanical air supply inlet of any other appliance.
- A vent shall not terminate underneath a verandah, porch or deck, unless the verandah, porch or deck is fully open on a minimum of two sides beneath the floor, and the distance between the top of the vent termination and the underside of the verandah, porch or deck is greater than 1 ft..

Vent Termination Location



During winter months check the vent termination cap and make sure no blockage occurs from buildup of snow and ice. Condensate can freeze on the cap. Frozen condensate on the vent cap can result in a blocked flue.

- Give special attention to the location of the vent termination to avoid possibility of property damage or personal injury.

-
- Gases may form a white vapor plume in the winter. The plume could allow hazardous flue gas in through an open window or obstruct a window view if the termination is installed near windows.
-
- Prevailing winds, in combination with below freezing temperatures, can cause freezing of condensate and water/ice build up on building, plants or roofs.
-
- The bottom of the vent terminal and air intake shall be located at least 12" above grade, including normal snow line.
-
- Non-insulated single wall Category IV metal vent pipe shall not be used outdoors in cold climates for venting gas-fired equipment without insulation.
-
- Through-the-wall vents for Category IV appliances shall not terminate over public walkways or over an area where condensate or vapor could be detrimental to the operation of regulators, relief valves, or other equipment.
-
- Locate and guard vent termination to prevent accidental contact by people or pets.
-
- Do not terminate vent in a window well, stairwell, alcove, courtyard or other recessed area.
-
- Do not terminate above any door, window, or gravity air intake. Condensate can freeze, causing ice formations.
-
- Locate or guard vent to prevent condensate from damaging exterior finishes. Use a rust resistant sheet metal backing plate against brick masonry surfaces.
-
- Do not extend exposed vent pipe outside of building beyond minimum distance required for vent termination. Condensate could freeze and block vent pipe.

C. INSTALLATION

WARNING:

- Altering any Atlas™ Triton Series™ boiler's pressure vessel by installing replacement heat exchangers, tube bundles, coils or any ASME parts not manufactured and/or approved by Ace Heating Solutions, LLC will instantly void the ASME and E.T.L. rating of the vessel and any warranty on the vessel. Altering the ASME or E.T.L. ratings of the vessel also violates national, state, and local codes.
- Installation and service must be performed by a qualified installer, service agency or gas supplier.
- Improper installation, adjustment, alteration, service or maintenance can cause property damage, personal injury, loss of warranty, exposure to hazardous materials or loss of life. Review the information in this manual carefully.
- Make sure the gas on which the boiler will operate is the same as that specified on the boiler rating plate (natural gas/propane).
- Caution when servicing gas train components. Propane (LPG) is heavier than air and may be trapped in pipes, vents, combustion chamber, or other areas. Always handle with care.
- Should overheating occur or if the gas supply valve fails to shut, do not turn off or disconnect the electrical supply to the boiler. Instead, shut off the gas supply at a location external to the boiler.
- Do not use this boiler if any part has been under water. Immediately call a qualified service technician to inspect the boiler and to replace any part of the control system or any gas control which has been under water.
- To minimize the possibility of improper operation, serious injury, fire, or damage to the boiler:
 1. Always keep area around the unit(s) free of chlorine, combustible materials, gasoline, and other flammable liquids and vapors.
 2. Water to be heated in the boiler should be free or have low levels of chlorine or other chemicals or water conditions that would be harmful to the copper heat exchanger. Boiler room ambient temperature shall not exceed 100 degrees F.
 3. Boiler should never be covered or have any blockage to the flow of fresh air to the boiler.
- Risk of electrical shock. More than one disconnect switch may be required to de-energize the equipment before servicing.
- When servicing ceramic fiber based refractory or insulation blanket, gloves and respirators should be worn to reduce exposure to airborne refractory ceramic fibers.

For Your Safety:

Do not store or use gasoline or other flammable vapors and liquids or other combustible materials in the vicinity of this or any other appliances. To do so may result in an explosion or fire.

WHAT TO DO IF YOU SMELL GAS:

- Do not try to light any appliance
- Open any windows and secure area
- Do not touch any electrical switch; do not use any phone in your building.
- Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions.
- If you cannot reach your gas supplier, call the fire department.

NOTE:

- In order to meet commercial hot water needs, the high limit safety control on this hot water boiler is adjustable up to 240 degrees F. by the OEM or installer only.
- Safety and energy conservation are factors to consider when setting the temperature aquastat on the unit. The most energy-efficient operation will result when the temperature setting is the lowest that satisfies the needs of the application.

C.1. PRODUCT INSPECTION

1. Upon receipt of the boiler, visually inspect the external packaging and unit for damage. If the packaging or boiler is damaged, make a note to that effect on the Bill of Lading when signing for the shipment.

NOTE:

The boiler packaging is equipped with a tip and tell label. If label indicates boiler has been tipped over during shipping, remove crate and inspect before trucker leaves

2. Remove the shipping carton from the boiler and inspect it internally for both damage, and accuracy of the unit against the bill of lading and original purchase order. Report any damage, missing or incorrect parts, or other discrepancy to the carrier and supplier immediately.
 - Claims for damages must be filed with the carrier by the consignee.
 - Permission to return goods must be received from the factory prior to shipping.
 - Goods returned to the factory without an authorized Return Goods Authorization number will not be accepted.
 - Ace Heating Solutions, LLC is not responsible for any dam-

age that the unit receives while in shipping. As each shipping company has its own procedure for filing a claim, please contact the shipper for claim instructions.

C.1.a. Model Identification

- Your Atlas™ Triton Series™ Boiler carries two identification plates. The coil identification plate, which carries the ASME Code Stamping and Registration Number (when applicable), is attached to the water inlet, with a duplicate on the heat exchanger top plate. The unit's nameplate is located on the right side of the rear panel of the unit, and lists information concerning the input and output of the unit, electrical and gas ratings, working pressure and clearance to adjacent construction figures. In addition, the model and serial numbers are on the plate. You will need these to order replacement parts from the manufacturing representative in your area or from the factory.
- The information on the National Board plate is the same as on the nameplate with the exception of the National Board registration number, which is required in most states for installation of the unit.

C.1.b. The Boiler Name Plate

The following illustration is an accurate depiction of the nameplate found on the rear side of the boiler. You will also find an ASME nameplate on the inlet pipe with some of the same information.

Ace Heating Solutions, LLC

DISCRIPTION

MODEL NO. SERIAL NO. MIN. RELIEF VALVE CAP.

MAX. BTU./HR. INPUT BTU./HR. OUTPUT H.P. HEATING SURFACE


MIN. BTU./HR. INPUT BTU./HR. OUTPUT GROSS E.D.R. M.A.W.P.

VOLTS HERTZ PH. AMPS. MOT. AMPS. CTRL. VOLT CTRL. AMP

MIN. GAS PRESS. MAX. GAS PRESS. MANIFOLD PRESS. FUEL TYPE

#2 OIL IF OIL FIRED, DO NOT USE INTEGRAL GROUP OIL HEAVIER THAN #2 PRIMARY SAFETY

**FOR EITHER INDOOR OR OUTDOOR INSTALLATION.
NOT FOR INSTALLATION ON COMBUSTIBLE FLOORING.**



ETL LISTED
CONFORMS TO
UL STD 795
CERTIFIED TO
CAN STD 1-3.1
9900456

MINIMUM CLEARANCES TO
ADJACENT CONSTRUCTION

2701 S. HARBOR BLVD. SANTA ANA, CA 92704
714.437.9050 FAX 714.437.9060



- Minimum Btu/Hr. ratings apply to high-low and modulating type boilers only.
- Boiler output ratings are based on factory tests under appropriate conditions. Field results may vary.
- Maximum allowable working pressure for the boiler relief valve set pressure should not exceed the lowest MAWP of any component in your system.
- Applies to forced draft type burners only.
- Minimum and maximum gas pressure values are measured at the point of connection to the boiler gas train. Manifold gas pressures are measured after the gas train.



Do not remove any of these plates from the unit for any reason. Removal of these plates will void the warranty.

C.1.c The Boiler Model Number

ATLAS T 150 P - W

Brand:

- ATLAS

Boiler Type:

- T = Triton Series

Firing Rate:

080 = 800,000 Btu/Hr	150 = 1,500,000 Btu/Hr
100 = 1,000,000 Btu/Hr	200 = 2,000,000 Btu/Hr

Fuel Type:

- G = Natural Gas
- P = Propane

Cabinet Application:

- W = Outdoor
- (No Suffix refers to Indoor Jacketing)

C.2. RATING AND CERTIFICATIONS

- All units must be installed in accordance with all state and local codes, and national codes, including but not limited to:
 - ANSI Z223.1/ NFPA 54, National Fuel Code
 - ANSI/ NFPA 70, National Electric Code
- All Atlas™ Boilers are National Board approved and designed—certified and tested by Intertek (E.T.L.), standards for the US and Canada (Can Std 1-3.1), and

UL 795. Each unit is constructed in accordance with Section IV of the American Society of Mechanical Engineers (ASME) Boiler Pressure Vessel Code and bears the ASME “HLW” stamp or “H” stamp.

C.3. INSTALLATION CODES

- Installation of the Triton Series™ boilers must conform to the requirements of the authority having jurisdiction, or in the absence of such requirements, to the National Fuel Gas Code, ANSI Z223.1/ NFPA 54, and/ or *Natural Gas and Propane Installation Code, CAN/CSA B149.1*.
- 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 CSD1*

Installations must also follow:

- Local, state, provincial, and national codes, laws, regulations and ordinances.
- National Electrical Code, ANSI/ NFPA 70 – latest edition (NEC).

NOTE:

- If any code listed above conflict, the stricter of the conflicting codes shall be followed for installation.
- Installation and Service must be performed by a qualified installer, service agency or the gas supplier

C.4. PREPARING THE BOILER

NOTE:

Your Atlas™ Triton boiler comes equipped with a steel pallet jack base for safe and easy movement and placement.

1. Place the boiler in its approximate installed location, on a clean, level, structurally sound surface.
2. If the boiler is in its original packaging, remove the banding, carton, corner posts and stand-offs, and discard.
3. Unpack the manifold assembly from the small carton attached to the rear of the boiler.
4. Install the manifold assembly to the hot water outlet at the rear of the boiler until tight, and such that the pressure relief valve is in the vertical, upright position at the top of the manifold.
5. Install the 2 loose wires at the rear of the boiler to the flow switch installed at the side of the manifold as shown in figure C.5.1.

6. Move the boiler to its final installed position.

NOTE:

Ace Heating Solutions, LLC strongly recommends that you secure the boiler to the base pad by the mounting holes provided at the base of the unit.

C.5. WATER SYSTEM PIPING

CAUTION:

This boiler requires forced water circulation when burner is operating. See minimum and maximum flow rates in Table C.3.1. below. Severe damage will occur if the boiler is operated without proper water flow circulation. A flow switch is used to ensure that water flows through the boiler, but does not check for the minimum flow rate into the boiler. Numbers are approximate and may vary depending on installation.

NOTE:

Ace Heating Solutions, LLC strongly recommends that you secure the boiler to the base pad by the mounting holes provided at the base of the unit.

All hot water outlet and return piping is connected at the rear of the boiler. Piping is to be installed per local codes and regulations. Piping for the hot water outlet and return may be connected without removing cabinet panels. Unused connections must be safely blanked off.

MODEL	T-80	T-100	T-150	T-200
Minimum Flow Rate (GPM):	34	43	65	85
Maximum Flow Rate (GPM):	69	85	129	172
Pressure Drop:				

Table C.5.1. Triton Flow Rates.

C.5.a. System Connections

1. Connect cold water return pipe to the primary water inlet on the boiler.
2. Connect outlet system pipe to hot water outlet at manifold.
3. Install drain valve provided in the boiler drain line at bottom rear of the boiler.

C.5.b. Pressure Relief Valve

The pressure relief valve safety is factory assembled on the safety manifold previously installed to the boiler in Section C.2. Discharge piping must be installed to the relief valve outlet to avoid potential scalding of attendants. Discharge piping should be as short and direct as possible and installed and terminated per local codes and regulations.

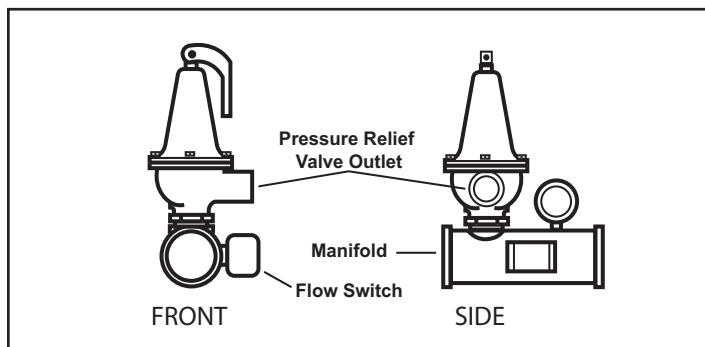


Figure C.5.1. Manifold and Components

C.6. GAS SUPPLY



Make sure the gas on which the boiler will operate is the same as that specified on the boiler rating plate (natural gas/propane).

- The gas line should be a separate line running directly from the gas meter to the unit, unless the existing gas line is of ample capacity. Verify the capacity of the existing gas piping if it is to be used.
 - The gas pipe must have a sediment trap ahead of the boiler connection controls and a manual shut-off valve located outside the boiler cabinet. It is highly recommended that a union be installed in the gas supply line adjacent to the boiler for servicing. The maximum working gas pressure for both natural gas and propane is 14" WC. Keep in mind that an increase in gas pressure, without making additional adjustments, leads to an increased BTU input and a decreased efficiency.
1. Follow the National Fuel Gas Code for instructions on proper gas line piping and gas leak tests.
 2. Measuring gas pressures can help detect leaks in isolated lines. Temporarily install a manometer or pressure gauge with an upper limit of no more than 5 times the testing pressure, 5 x 14" WC = 2.6psi for Triton Series™ boiler installations between the manual gas shut off on the boiler and supply line's regulator.
 3. Leaving the shut off valve closed on the boiler, open the supply line momentarily until the installed manometer reads a stable pressure and record the pressure and ambient temperature.
 4. Close the supply line and monitor the gas pressure for a drop in pressure. The test should be monitored for at least 10 minutes or ½ hour per each 500 ft³ of volume in the testing pipe.
 5. At the end of the monitoring period, record the gas pressure and temperature. If there is a drop in pressure, a gas leak may be present and should be further investigated (Note: significant temperature variations may cause changes in the gas pressure and should be retested).



A sediment trap **MUST** be installed on the gas piping for each gas line.

C.6.a. Testing Gas Line



The boiler must be disconnected from the gas supply during any pressure testing of the gas supply at test pressures in excess of ½ psi (3.5 kPa).

The boiler must be isolated from the gas supply piping system by closing its individual manual shut-off valve during any pressure testing of the gas supply piping system at test pressures equal to or more than ½ psi (3.5 kPa).

Do not use Teflon tape on gas line thread. A pipe compound rated for natural and propane gases are recommended. Apply sparingly only on the male pipe ends, leaving the two end threads bare.

Gas Piping Leak Test

Upon first installing the Triton Series™ boiler, it is important to check the gas line leading up to the unit for gas leaks.

1. Follow the National Fuel Gas Code for instructions on proper gas line piping and gas leak tests.
2. Measuring gas pressures can help detect leaks in isolated lines. Temporarily install a manometer or pressure gauge with an upper limit of no more than 5 times the testing pressure, 5 x 14" WC = 2.6psi for Triton Series™ boiler installations between the manual gas shut off on the boiler and supply line's regulator.
3. Leaving the shut off valve closed on the boiler, open the supply line momentarily until the installed manometer reads a stable pressure and record the pressure and ambient temperature.
4. Close the supply line and monitor the gas pressure for a drop in pressure. The test should be monitored for at least 10 minutes or ½ hour per each 500 ft³ of volume in the testing pipe.
5. At the end of the monitoring period, record the gas pressure and temperature. If there is a drop in pressure, a gas leak may be present and should be further investigated (Note: significant temperature variations may cause changes in the gas pressure and should be retested).



Please refer to the latest National Fuel Gas Code for leak test details. If instructions differ, the Fuel Gas Code shall supersede the instructions in section D.6.a. of these instructions.

C.6.b. Gas Supply Pressure



Relieve the pressure in the gas supply line prior to connecting the boiler and its manual shut off valve to the gas supply line. Failure to follow this procedure may damage the gas valve. Gas valves damaged by high gas pressures are not covered by the warranty.

The boiler and its gas connections must be tested for leaks before operation of the units.

Input may decrease if gas pressure falls below the values shown below. The maximum gas supply pressure is 14" WC for all Triton units. If gas pressure exceeds 14" WC an intermediate gas pressure regulator of the lockup type must be installed. If gas pressures less than those provided below are used, input may be decreased.

MODEL	T-80	T-100	T-150	T-200
Natural Gas (" WC)	5-14	5-14	5-14	5-14
Propane (" WC)	5-14	5-14	5-14	5-14

Table 2.3.1. Triton Gas Pressure Chart.



If the gas pressures exceed 14" WC, a gas pressure regulator must be installed prior to the gas connection to reduce the supply pressure.

When connecting additional gas utilization equipment to the gas piping, the existing piping must be checked to determine if it is adequate for the combined load.

C.6.c. Attach Gas Line

1. Attach main gas supply line to boiler gas shut-off valve located outside at the rear of the boiler cabinet as shown below.

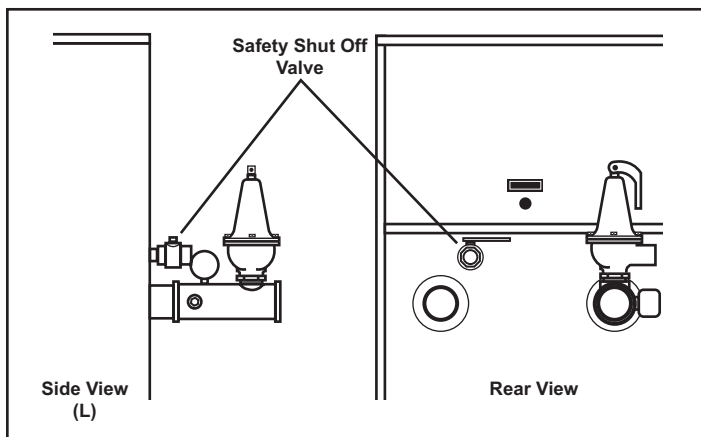


Figure C.6.1. Safety Shut Off Valve

C.7. PUMP INSTALLATION



Electrical Shock Hazard!

- Electrical work must be done by a qualified electrician only.
- National Electrical codes, local codes and regulations must be followed.
- All electrical connections must be performed after the electrical supply has been switched off and secured against unauthorized switching.
- Depending on installation, the pump/motor can become extremely hot. To avoid risk of burning, handle pump with heat resistant gloves or ensure the pump is cool before handling the pump.



Never operate the pump dry, the system must be filled before starting the pump. Ensure all isolation valves are open before start up

- An optional pump can be ordered through Ace Heating Solutions, LLC properly sized for the boiler. Flange kits are also provided with the pump to fit the boiler connection sizes. Please contact an authorized Ace Heating Solutions, LLC representative, or the factory for details.

C.7.a. Pump Overload Protection

- A fused plug or circuit breaker in the power line is required.
- The pump must be connected to the electrical supply via an external contactor/relay to provide thermal overload protection. The contactor/relay must be connected to the built-in thermal overload switch terminals P1 and P2 (potential-free normally closed contact, contact load 250 VAC/1A) to protect the pump against thermal overloading at all speeds.
- If the pump is protected by means of a motor starter, the starter must be set to the current consumption of the pump at the selected speed. The motor starter setting must be changed every time the pump speed is changed. The current consumption at the individual speeds is stated on the pump rating plate.

C.8. ELECTRICAL

WARNING:

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

NOTE:

Installations must follow these codes:

- National Electric Code and any other national, state, provincial or local codes or regulations having jurisdiction
- Safety wiring must be NEC class 1.
- Boiler must be grounded as required by the NEC ANSI/NFPA 70.
- In Canada, CSA C22.1 C.E.C. Part 1.

The Atlas™ Triton Series™ T80 – T100 boilers are wired for 120 VAC, 10 amps, while models T150 – T200 are wired for 120 VAC, 15 amps, although the units current will usually be much lower. Before starting the boiler, check to ensure proper voltage is supplied to the boiler and pump (if supplied).

For multiple unit installations, each unit is to be wired in parallel with other units so that each unit will operate independently (see Section C.9.f).

The circulating pump (and the return pump if used) should be wired in parallel with the unit(s) to run independently of the unit.

If any of the original wiring is replaced, 16 AWG, 105° C. wire or equivalent must be used.

C.8.a. Checking the Power Source

1. Using a multi-meter, check the following voltages at the circuit breaker panel prior to connecting any equipment.
2. Make sure proper polarity is followed and house ground is proved.

AC = 108 VAC Minimum, 132 VAC Max; AB = 108 VAC Minimum, 132 VAC Max; BC = <1 VAC Max

C.6.b. Making the Electrical Connections

- Verify that the circuit breaker is properly sized by referring to the boiler rating plate. A dedicated circuit breaker should be provided.

NOTE:

Current draw on rating plate does not include pump current.

1. Turn off all power to the boiler. Verify that power has been turned off by testing with a multi meter prior to working with any electrical connections or components.
2. Observe proper wire colors while making electrical connections. Many electronic controls are polarity sensitive. Components damaged by improper electrical installation are not covered by warranty.
3. Provide overload protection and a disconnect means for equipment serviceability as required by local and state code.
4. Install boiler controls, thermostats, or building management systems in accordance with the applicable manufacturers' instructions.

NOTE:

A grounding electrode conductor shall be used to connect the equipment grounding conductors, the equipment enclosures, and the grounded service conductor to the grounding electrode.

WARNING:

Conduit should not be used as the earth ground.

CAUTION:

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

DANGER:

Shock Hazard: Make sure electrical power to boiler is disconnected to avoid potential serious injury or damage to components.

C.9. FLUE VENTING

WARNING:

Improper venting may result in property damage and the release of flue gasses which contain deadly carbon monoxide (CO) into the building, which can cause severe personal injury and/or death.

Vent pipe system must be made of materials approved for use with condensing flue gasses.

Do not reduce the diameter of the vent pipe. The vent pipe must not be smaller than the vent connector on the boiler.

- Vent pipe system shall be compatible either by directly connecting, or by use of an adapter, to the boiler vent connection
- Horizontal vent runs must have an upward slope of at least 1/4" per lineal foot (21mm/m). Supports must be used at least every 5' and braces must be used under or near all elbows.
- If any point of the vent pipe system is higher than the boiler flue collar, the vent system must have adequate condensate drain loop(s) to prevent condensate from running back into the boiler.
- For boilers connected to gas vents or chimneys, vent installations shall be in accordance with the NFGC (US) or CGA, B149 (Canada), or applicable provisions of local building codes.
- For boilers for connection to gas vents or chimneys, vent installations shall be in accordance with "Venting of Equipment," of the National Fuel Gas Code, ANSI Z223.1/NFPA 54, or "Venting Systems and Air Supply for Appliances," of the Natural Gas and Propane Installation Code, CAN/ CSA B149.1, or applicable provisions of the local building codes.
- The weight of the vent stack or chimney must not rest on the boiler vent connection. Support must be provided in compliance with applicable codes. The vent should also be installed to maintain proper clearances from combustible materials. Use insulated vent pipe spacers where the vent passes through combustible roofs and walls.
- Vent connectors serving appliances vented by natural draft shall not be connected into any portion of mechanical draft systems operating under positive pressure.
- Use of cellular core PVC (ASTM F891), cellular core CPVC, or Radel® (polyphenolsulfone) in venting systems is prohibited.
- Do not cover non-metallic vent pipe or fittings with thermal insulation.

C.9.a. Vertical Venting (Category IV)

- The maximum and minimum venting length for this Category IV appliance shall be determined per the NFGC (US) or CGA, B149 (Canada).

- The diameter of the vent flue pipe should be sized according to NFGC (US) and Appendix B of the CGA, B149 (Canada). The minimum flue diameter for conventional venting using Category IV, stainless steel AL29-4C vent is:

MODEL	T-80	T-100	T-150	T-200
Flue Pipe Size	6"	6"	8"	8"

Table C.7.1. Triton Flue Pipe Sizing Chart.

- The connections from the appliance vent to stack must be as direct as possible and shall be the same diameter as the vent outlet. The horizontal breaching of a vent must have an upward slope of not less than 1/4" per linear foot from the boiler to vent terminal. The horizontal portions of the vent shall also be supported for the design and weight of the material clearances and to prevent physical damage or separation of joints.

C.9.b. Common Venting



The NFGC does not address sizing guidelines for the common venting of multiple Category IV boilers. When common venting multiple units together, the venting must be designed by a professional engineer to ensure the chamber pressure of each boiler is always below 0.5" WC at high fire.

Vent connectors serving any other appliances shall not be connected into any portion of the mechanical draft systems operating under positive pressure. If a Triton boiler is installed to replace an existing boiler, the vent system must be verified to be of the correct size and of Category IV AL29-4C vent material. If it is not, it must be replaced.



When an existing boiler is removed from a common venting system, the common venting system is likely to be too large for proper venting of the appliances remaining connected to it. 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.

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

3. 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.
4. Place in operation the appliance being inspected. Follow the lighting instructions. Adjust thermostat so appliance will operate continuously.
5. Test for spillage at the draft hood relief opening after 5 minutes of main burner operation. Use the flame of a match or candle, or smoke from a cigarette, cigar, or pipe.
6. After it has been determined that each appliance remaining connected to the common venting system properly vents when tested as outlined above, return doors, windows, exhaust fans, fireplace dampers, and any other gas-burning appliance to their previous condition of use.
7. Any improper operation of the common venting system should be corrected so the installation conforms with the National Fuel Gas Code, ANSI Z223.1/NFPA 54, and/or the Natural Gas and Propane Installation Code, CAN/CSA B149.1. 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 Chapter 13 of the National Fuel Gas Code, ANSI Z223.1/NFPA 54, and/or the Natural Gas and Propane Installation Code, CAN/CSA B149.1.

C.9.c. Termination



A listed vent cap terminal suitable for connection to the Category IV vent materials, adequately sized, must be used to evacuate the flue products from boilers.

The vent termination and cap must be installed as follows:

- Must terminate vertically outside the building at least 2 ft above the highest point of the roof that is within 10 ft.
- Should have minimum clearance of 4 ft horizontally from, and in no case above or below (unless a 4 ft horizontal distance is maintained), electric meters, gas meters, regulators and relief equipment.
- The minimum distance from adjacent public walkways,

adjacent buildings, openable windows and building openings shall not be less than those values specified in the National Fuel Gas Code, ANSI Z223.1/NFPA 54 and/or the Natural Gas and Propane Installation Code, CAN/CSA B149.1.

- Minimum twelve (12) inches above grade plus normally expected snow accumulation or seven (7) feet above grade if located adjacent to public walkways.
- DO NOT INSTALL over public walkway where local experience indicates condensation or vapor from the boiler creates a nuisance or hazard.
- Minimum three (3) feet above any forced air inlet located within ten (10) feet of the vent termination.
- Minimum four (4) feet below, four (4) feet horizontally or one (1) foot above any door, window or gravity air inlet.
- Minimum twelve (12) inches from corners of building.
- Flue vents supported only by flashing and extended above the roof more than 5 ft. should be secured by guy-wires or braced to withstand snow and wind loads.

C.10. CONDENSATE DRAINS

Each Triton Series boiler contains a condensate drain. In addition, most vent configurations require a drain “T” located in the vent piping. Pipe each condensate drain separately to a floor drain or condensate pump/sump.



- Failure to properly pipe the condensate drainage system will greatly reduce boiler life. Do not install plugs, caps or valves on condensate piping.
- Do not manifold boiler condensate drains or vent drains together.
- Do not crimp condensate lines or reduce drain line inner diameter size.
- Each condensate drain must contain a siphon/pigtail or trap to prevent flue gas flow through the condensate piping. The height of the top of the syphon/pigtail loop or trap shall not exceed the height of the condensate drain outlet.
- Do not use material that is not approved for use with flue gas condensate for condensate piping.
- Use continuous Teflon, high temperature resistant silicone tubing, or other tubing material compatible with flue gas condensate for condensate piping.
- Do not install valves on condensate drain lines.

- A common condensate pump/sump may be used. Run separate piping from each condensate drain to the sump. A common drain may be used to discharge condensate from the sump. Consult pump/sump manufacturer for compatibility of pump/sump materials of construction. If a common sump is used, individual drain lines should be connected such that one drain cannot back feed into another drain.

- Consult local authorities regarding disposal of flue gas condensate into public waste water system. Some jurisdictions require that the condensate be buffered before discharge. This buffering is commonly achieved by draining the condensate through a limestone (calcium carbonate) bed. The condensate will be slightly acidic and range between 3-5 on the pH scale. Consult Ace Heating Solutions, LLC, or a chemical treatment company regarding buffering systems.

C.11. MODULAR SYSTEM INSTALLATIONS

Multiple Triton Series boilers may be installed together, or as part of a single, modular lead-lag system. Up to 8 individual boilers may be installed using standard controls.

C.11.a. General

- Read and follow all venting, combustion air, water piping, gas piping and electrical instructions contained in this manual unless otherwise instructed in this section.
- Design and installation of modular systems should only be undertaken by skilled and knowledgeable engineers and contractors.
- Consult Local Building Codes, National Fuel Gas Code, or NFPA 54/ANSI Z223.1 for restrictions and instructions for modular boilers.
- Refer to section 2. **Pre-Installation** for further warnings, cautions, notices and instructions.

C.11.b. Sizing

Consult your system mechanical engineer, or Ace Heating Solutions, LLC for recommended number and size of boilers for a given input.

C.11.c. Venting

This section outlines venting requirements for multiple boiler installations and should be used in addition to the “**B.3. COMBUSTION AND VENTILATION AIR**” and “**B.4. CONVENTIONAL FLUE VENTING**” sections earlier in this manual.

Positive Pressure (Sidewall and Vertical) Venting



DO NOT manifold vent components of multiple boilers without converting to a negative pressure venting arrangement.

- Positive pressure vent systems cannot be manifolded together. Positive pressure systems can be piped individually through a common vertical or horizontal chase provided minimum clearances to combustible materials are maintained. Positive pressure systems can be piped individually through a common vertical chase so that a single roof penetration can be made. Each vent termination must be one (1) foot from all other terminations.

Negative Pressure (Conventional) Venting



Installing multiple vent terminations close together promotes frost build up on buildings. To minimize this possibility, extend the distance from the building to the end of the vent termination and increase the horizontal distance between vent terminations.

- Refer to National Fuel Gas Code to determine required chimney diameter and common venting diameter. Note that combined input, lateral length and chimney height affect vent diameter.
- Install a double acting barometric damper with integral flue spillage interlock.
- Locate boiler(s) with lowest input closest to chimney/vertical common vent.
- Chimney lining must be acceptable for use with condensing flue gases.
- Install a condensate drain to collect any condensate that may form in the lined chimney or vertical common vent.

Air Intake Piping

- Consult the system mechanical engineer or intake pipe manufacturer for common air intake pipe sizing.
- Refer to Figures 11 and 12 for common air intake guidelines for modular boilers.
- Individual air intake pipes may be used in lieu of common air intake piping.
- Common air intake straight lengths and fittings should be assumed to have the equivalent length the same as an individual air intake pipe, used for a given boiler intake pipe diameter.

- Position horizontal air intake termination center line below horizontal vent termination's center line.
- Vertical air intake pipe must terminate at least two (2) feet above the closest portion of the roof.
- Refer to the Combustion Air section for further warnings, cautions, notices and instructions.

C.11.d. Water Piping

- Refer to Figures 13 thru 18 for typical water piping for modular boilers.
- Installing a low water cut-off in the system piping is highly recommended and may be required by Code, if not factory mounted on boiler.
- Refer to Table 1 for pressure drop and flow requirements for each boiler.
- Consult I=B=R Installation and Piping Guide.
- Maintain 1/2" minimum distance between water piping and combustible material.
- Refer to Water Piping and Trim section for further warnings, cautions, notices and instructions.

C.11.e. Gas Piping



The pressure drop given in Table 1 is for the boiler only. The pressure drop of each system fitting and component must be added to the boiler pressure drop to determine the system pressure head requirement. See Table 6 for fitting and component equivalent lengths.

- Refer to National Fuel Gas Code, Local Codes and Tables 2 through 7 for gas pipe sizing.
- Refer to Gas Piping section for further warnings, cautions, notices and instructions.

C.11.f. Electrical

- Each boiler must be provided with a dedicated fused disconnect.
- Install wiring and ground boiler in accordance with requirements of authority having jurisdiction. In absence of such requirements, reference the National Electrical Code, ANSI/NFPA 70 and/or CSA C22.1 Electrical Code.
- Refer to Figure 1 for electrical data for each size boiler.
- Refer to the Electrical section for further warnings, cautions, notices and instructions.



Do not install boiler and circulator pump on the same fused disconnect.

C.11.g. Condensate Piping

- Each boiler requires separate condensate drains. In addition, most venting configurations require separate condensate drains in the vent system.
- Refer to Section **C.10.** for additional information on condensate removal.

D. START UP INSTRUCTIONS



The boiler control parameters and setpoints are pre-programmed at the factory prior to shipping. If allowable operational changes need to be made to the settings, please consult the SOLA control operating instructions.



Your Atlas™ Triton Series™ boiler and its gas connection must be leak tested before placing boiler in operation.

- Your Boiler has been pressure tested in accordance with ASME CODE SECTION IV and fire tested in accordance with UL 795. A copy of the factory test report is included inside the unit behind the display panel, and a test report label is located on the inside of the front door panel.
- It is required that the boiler and the system into which it is installed be tested before operating the system. The exact natures of the tests are listed on the start-up fire test report located in the back of this manual. This start-up fire test report must be filled out and a copy must be sent to Ace Heating Solutions, LLC in the pre-addressed envelope provided with the unit in order to register the unit for the warranty. The description of each of the tests to be completed begins on the next page. This testing should be completed as part of the normal installation procedure by the installing company.
- Once the entire installation is complete, the unit should have an operation test to ensure that the ignition system safety shut off device works properly. Instructions in the manufacturer's literature shall be followed in conducting this test.
- Boilers are pre-wired at the factory according to the wiring diagram supplied with the unit. If additional controls are to be installed, care should be taken not to disturb the continuity of the existing circuit. Refer to the boiler wiring diagram and control manufacturer's instructions supplied with the boiler.

D.1. WATER QUALITY AND TREATMENT

Proper quality of water is essential for the successful operation and longevity of the boiler and heating system components. Examples of typical chemicals found in untreated water along with their potential effects are shown in Table E.1.1. below. In order to avoid problems associated with poor water quality, a comprehensive water treatment plan must be developed to maintain efficiency, reduce re-

pair and/or replacement, and extend the working life of the boiler and other system equipment.

Since water quality and conditions will vary significantly depending on the local area, it will be essential to obtain the expertise of a qualified industrial water treatment professional for establishing a treatment plan. In addition, a periodic testing/sampling plan should be developed. The plan should ensure a process to maintain and confirm the proper chemistry of the water in use.

SYSTEM WATER CHEMICAL AGENTS AND EFFECTS

Compound	Effect
Calcium Carbonate (CaCO ₃)	Soft Scale
Calcium Bicarbonate (CaHCO ₃)	Soft Scale/ CO ₂
Calcium Sulphate (CaSO ₄)	Hard Scale
Calcium Chloride (CaCl ₂)	Corrosion
Magnesium Carbonate (MgCO ₃)	Soft Scale
Magnesium Bicarbonate (MgHCO ₃)	Corrosion/ Scale
Magnesium Sulphate (MgSO ₄)	Corrosion
Silicon Dioxide (SiO ₂)	Hard Scale

Table D.1.1. Water Compounds and Effects

D.2. FILLING THE SYSTEM



The boiler and the entire system should be cleaned and flushed prior to filling.

- After cleaning, begin filling the system.
 - To prevent trapping air in the boiler tubing, open the relief valve located on the water outlet manifold of the boiler to bleed the system. Leave the valve open until a steady flow of water is observed.
 - Close the relief valve and complete the filling of the system.
- The lighting instructions and the wiring diagram for the control system furnished with each boiler are attached to these instructions. After placing the boiler in operation, the ignition system safety shutoff device must be tested.
 - Although the boiler pressure vessel and the gas train are pressure tested prior to shipping, it is possible for components to work loose during shipping. These items may include relief valves and gas train components. These items should be checked and tightened prior to operating the boiler.
 - All Atlas brand boilers are factory fire tested and adjusted. The Factory Test Report (FTR) is sent with each

unit and must be used when starting the installed unit. Like Forced Draft burners, all Pre-Mix burners must be tested and adjusted, as necessary, to the factory settings.

- Prior to Start-Up, check to make sure all the installation procedures have been followed as outlined in this manual. This includes compliance with all local and state codes as well as the manufacturer’s requirements.

D.3. FACTORY TEST REPORT (FTR)

Every Triton Series™ boiler is supplied with a Factory Test Report (FTR). The FTR details the actual factory test settings for this unit as tested prior to shipment.

- When the boiler is started up, it is important to check the following parameters and adjust them to the values seen on the factory test report. Please record the values in the blank spaces below. The values must be within the ranges shown below.

I. Condition	II. Value	III. Acceptable Range
Carbon Monoxide:	ppm	Less Than 100 ppm
Carbon Dioxide:	%	Between 7- 9%
Excess Air:	%	30-45%
NOx:	ppm	Less Than 20 ppm
Comb. Chamber Pressure:	WC	Under 0.5” WC

Table D.3.1. Start Up Parameters

D.4. VERIFICATION

1. Check the boiler nameplate and verify the voltage, type of gas, gas pressure and regulator setting.
2. Verify that a wind deflecting vent cap is securely fastened to the vent outlet to prevent downdrafts.
3. Read and verify the flame safeguard system installed on the unit. All Triton Series™ units have a prepurge and a postpurge time cycle of 7 seconds.

D.5. START-UP DETAIL

1. Verify and record the gas valve model, venturi model, blower model, venting inlet and outlet sizes, and air filter size.
 2. Verify, but do not record the supply gas pressure, the electrical voltage, the vent stack and the free combustion air openings to the boiler room to ensure that they meet the requirements on the nameplate, local codes, gas industry standards and the O & M manual.
- Upon start-up, the flame safeguard will initialize and begin a prepurge cycle. Blower relay energizes and turns on the Combustion Blower and the Auxiliary Blower.
 - Combustion Air Flow Switch closes and the Combustion

Blower drives to prepurge speed.

- Prepurge rate is verified with blower feedback signal and initiates 7 second prepurge.
 - After prepurge is completed, the combustion blower drives to light off rate.
 - After light off rate is verified, 10 second PFEP (Pilot Flame Establishment Period) is initiated.
 - During the first half of PFEP, the Pilot Valve Solenoid and Spark Transformer are both energized.
 - Spark Transformer is de-energized during second half of PFEP and only Pilot Valve is energized.
 - When pilot flame is proven, 4 second MFEP (Main Flame Establishment Period) is initiated.
 - During MFEP, the Main Safety Shutoff Valve and Pilot Valve Solenoids are energized and firing rate is held at light off rate.
 - After MFEP, the Pilot Valve is de energized and the Main Burner modulates its firing rate according to load demand.
3. If a steady flame is not established, check the flame failure signals on the flame safeguard and correct the condition causing the flame failure. Several tries for ignition may be required to purge the air from the gas line.

D.6. START UP AND MAINTENANCE TESTS

D.6.a. Gas Supply Piping Leak Test

Upon first installing the Triton Series™ boiler, it is important to check the gas supply line for leaks.

1. Follow the National Fuel Gas Code for instructions on proper gas line piping and gas leak tests.
2. Measuring gas pressures can help detect leaks in isolated lines. Temporarily install a manometer or pressure gauge with an upper limit of no more than 5 times the testing pressure, 5 x 14” WC = 2.6psi for Triton Series™ boiler installations between the manual gas shut off on the boiler and supply line’s regulator.
3. Leaving the shut off valve closed on the boiler, open the supply line momentarily until the installed manometer reads a stable pressure and record the pressure and ambient temperature.
4. Close the supply line and monitor the gas pressure for a drop in pressure. The test should be monitored for at least 10 minutes or ½ hour per each 500 ft³ of volume in the testing pipe.
5. At the end of the monitoring period, record the gas pressure and temperature. If there is a drop in pressure, a gas leak may be present and should be further investigated (Note: significant temperature variations may cause changes in the gas pressure and should be retested).



Please refer to the latest National Fuel Gas Code for leak test details. If instructions differ, the Fuel Gas Code shall supersede the instructions in this manual.**

D.6.b. Pilot Turndown Test - (Optional at Installation, Required Annually After)

Perform this test to determine the smallest pilot flame that can be seen by the flame amplifier and energize the FLAME LED. This test should be performed annually.

1. Clean the flame detector to make sure that it detects the smallest acceptable pilot flame.
2. Open the Master switch
3. Close the manual main fuel shut off valves.
4. Connect a manometer, or pressure gauge, to measure pilot gas pressure during the turndown test.
5. Open the manual pilot shutoff valves.
6. Close the master switch.
 - a. Go to Pilot Test Mode,
 - b. If using the standard panel, refer to section Pilot Test under the section 3-5 Setup Mode.
 - c. If using the enhanced panel, refer to section 5-10.10 TO ENABLE PILOT TEST
7. Start the system with a call for heat. Raise the set-point of the operating controller. The Flame Safeguard sequence should start, and the prepurge should begin. The sequence will hold in the pilot flame establishing period and the flame led comes on when the pilot flame ignites.



If the sequence does not stop, reset the system and make sure that the Pilot Test is selected.

8. Turn down the pilot gas pressure very slowly, reading the manometer as it drops. Stop instantly when the flame led turns off. Note the pressure reading. The pilot flame is at the minimum turndown position. Immediately turn up the pilot pressure until the flame led comes on again or the flame signal increases to above the flame threshold value, 0.8 Vdc.



If there is no flame for 15 seconds in the TEST position, the Flame Safeguard locks out

9. Repeat step 7 to verify the pilot gas pressure reading at the exact point the Flame LED turns off.
10. Increase the pilot gas pressure immediately until the flame LED turns on, then turn it down slowly to obtain

a pressure reading just above the dropout point or until the flame signal increases to above the flame threshold value, 0.8 Vdc.

11. Turn the pilot hold test off and allow the Flame Safeguard to start a burner cycle. During the Main Flame Establishing Period, make sure the automatic main fuel valve opens. Then smoothly open the manual main fuel shutoff valve and watch for the main burner ignition. If the light off is not rough and the main burner flame is established, go on to step 17.



This step requires 2 people, one to control the manual valve and one to watch for ignition.

12. If the main burner flame is not established within 5 seconds, close the manual main fuel shutoff valve and open the master switch. If the light off is rough, the pilot flame size is too small.
13. Close the master switch and perform another pilot hold test, see step 5.
14. Increase the pilot flame size by increasing its fuel flow until a smooth main flame light off is accomplished.
15. Use orifices in the flame scanner sight tube until the pilot flame signal voltage is in the range of 0.7Vdc above the flame threshold.
16. When the main burner lights reliably with the pilot at turndown, disconnect the manometer and turn up the pilot gas flow to normal pressure of between 1" - 2" WC
17. Run the system through another cycle to check for normal operation.
18. Return the system to normal operation.

D.6.c. Pilot Spark Pick Up Test - (Optional at Installation, Required Annually After)

Perform this pilot spark pick up test to check that the ignition spark is not actuating the Flame LED. This test should be performed annually.

1. Open the Master switch.
2. Close the pilot and main burner manual fuel shut-off valves, see figure 6.2.
3. Close the master switch.
 - d. Go to the S7999 Operator Interface Module.
 - e. Select Diagnostics Test button at the bottom of the display.
 - f. Select Diagnostics Test button at the bottom of this new screen.
 - g. Select Pilot Test at the bottom of this new screen
 - h. Select Start Test at the bottom of this screen.
9. Start the system with a call for heat. Raise the set-point of the operating controller. The Flame Safeguard sequence should start and the prepurge should begin. The sequence will hold in pilot flame establishing period with only the ignition on. Ignition spark should occur

but the flame signal should not be more than .5 Vdc.

- If the flame signal is higher than 0.5 Vdc and the flame LED does come on, contact your local Ace Heating Solutions, LLC representative for more help.

D.6.d. Gas Valve Leak Test

This test is to check the closure tightness of the gas shutoff valve. It should only be performed by trained, experienced, flame safeguard technicians during the initial start up of the burner system and whenever the valve is to be replaced. This test should also be included in the scheduled maintenance and inspection procedures.



REMOVE POWER FROM THE SYSTEM BEFORE BEGINNING THE VALVE LEAK TEST TO PREVENT ELECTRICAL SHOCK.

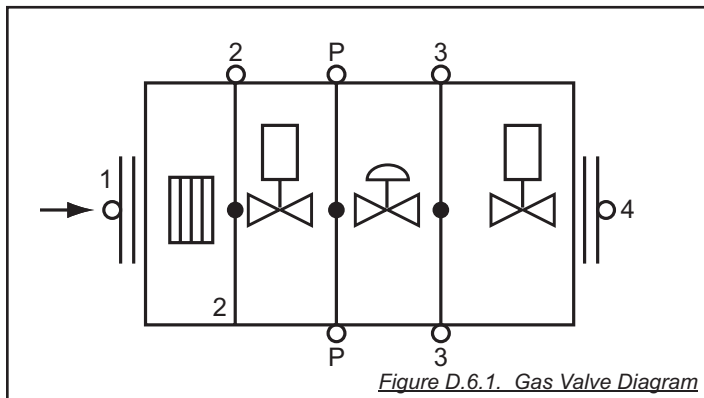


Figure D.6.1. Gas Valve Diagram

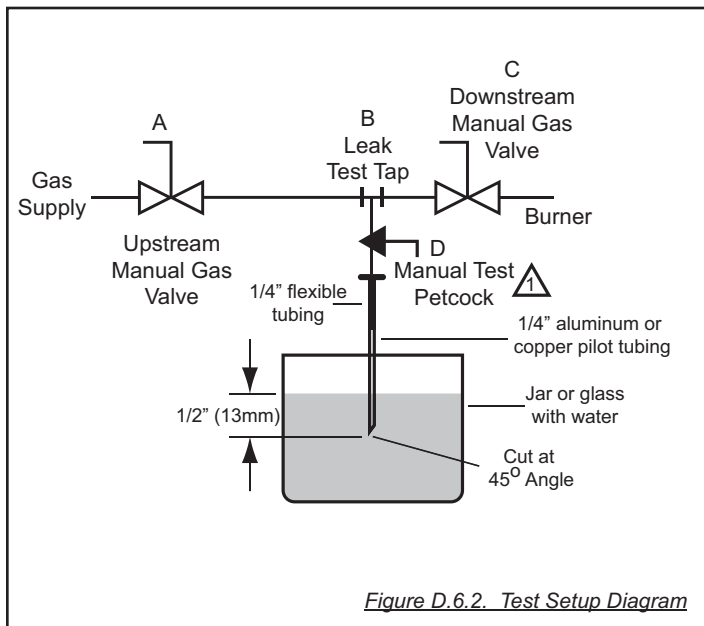


Figure D.6.2. Test Setup Diagram

- De-energize the control system to make sure no power goes to the valves.
- Close the upstream Manual Gas Valve.

- Make sure the Manual Test Valve (D) is closed in the leak test tap assembly
- To test the first Safety Shut Off Valve, remove the 1/8 in. plug from the pressure tap point P.
 - Install the Leak Test Tap into pressure tap point P on the valve body.
- Open the upstream Manual Gas Valve (A) to re-pressurize the first Safety Shut Off Valve.
- Immerse the 1/4in. tube vertically 1/2 in. in a jar of water, see figure 6.2.
- Slowly open the Manual Test Valve (F).
- When the rate of bubbles coming through the water stabilizes, count the number of bubbles appearing during a ten-second period. Each bubble appearing represents a flow rate of .001 cfh. See table below for allowable flow.
- Close the Upstream Manual Gas Valve (A)
- Remove the Leak Test Tap from the valve body.
- Using a small amount of pipe sealant on the 1/8 in. NPT plug, reinstall the plug in Pressure Tap Point (P).
- To test the second safety shut off valve, remove the 1/8" plug from the flange pressure tap point 4.
- Install the leak test tap into pressure tap point 4.
- Close the downstream manual gas cock (C).
- Immerse the 1/4 in. tube vertically 1/2 in. into a jar of water.
- Slowly open the manual test petcock (D)
- When the rate of bubbles coming through the water stabilizes, count the number of bubbles appearing during a ten-second period. Each bubble appearing during a 10 second period represents a flow rate of 0.001 cfh (28 cch). See table 6.1
- Remove the leak test tap from the valve body.
- Using a small amount of pipe sealant on the 1/8 in. plug, reinstall the plug in pressure tap point 4.
- After completing the test, make sure the downstream manual gas cock (C)
- Open the upstream manual gas cock (A) and energize the valve through the safety system.

22. Test with rich soap water solution to make sure there is no leak at the test tap (B) or any pipe adapter/valve mating surfaces.
23. De-energize the valve.
24. Open the downstream manual gas cock (C)
25. Restore the system to normal operation.

Pipe Size (NPT)	Max. Seat Leakage (UL)	Max. Number of Bubbles in 10 Sec
1/2 - 3/4	235 cch	6
1	235 cch	7
1 1/4	235 cch	8

Table D.6.1 Maximum Bubbles per Pipe Size

D.6.e. Gas Train Leak Test

The gas train has been checked before shipping, but could come loose during shipping.

1. Turn "OFF" all electric power and open the main gas valve.
2. Turn the unit's switch to the "ON" position and open the main gas valve and the ball valve to the burner mixer tube (the one between the fuel-air ratio valve and the venturi).
3. If you smell gas, shut the main gas valve to the boiler immediately and check for and eliminate all gas piping leaks!
4. In addition to smelling for gas, it is necessary to spray a soapy water mixture on all of the fitting connections on the gas train, around the pilot assembly, and around the connection between the blower and the top plate.
5. If the soapy water mixture bubbles, then a gas leak is present. If a gas leak is present, shut the main gas valve to the boiler immediately and tighten the fittings and retest until no more bubbles appear.

D.6.f. Safety Shutdown Tests (All Installations)

Perform these tests at the end of startup after all other tests are completed. If used, the external alarm should turn on. Press the RESET pushbutton on the Flame Safe Guard Module to restart the system.

Opening a Lockout Interlock during PREPURGE, PILOT IGN, MAIN IGN or RUN period

- Hold code 67 will be displayed on the Basic Panel or *Lockout ILK* fault is displayed on the Enhanced Panel.
- Safety shutdown occurs.
- For boiler size up to 2.5 MMbtu input will recycle after safety shutdown. For input greater than 2.5MMbtu boiler will lockout after safety shutdown.

Opening a safety limit switch (Gas Pressure, Water Flow, Drain switches and Recycle Interlock) during PREPURGE, PILOT IGN, MAIN IGN or RUN period.

- Hold code 63 will be displayed on the Basic Panel or annunciation of opened limit switch is displayed on the Operator Interface Module.
- Safety shutdown occurs and recycle.

Detection of flame 240 seconds after entry to STANDBY from RUN or detection of flame from 10 seconds up to 30 seconds into PREPURGE time.

- Simulate a flame to cause the flame signal voltage level to rise above the flame threshold value for 240 seconds after entry to STANDBY from RUN and also simulate a flame signal for 10 seconds to 30 seconds for PREPURGE.
- Hold code 105 will be displayed on the Basic Panel or *Flame Detected out of sequence* fault is displayed on the Enhanced Panel.
- Safety shutdown occurs.

Failure to ignite main flame.

1. Open the manual pilot valve(s) and leave the main fuel manual shutoff valve(s) closed.
2. Depress the RESET button.
3. Start the system.
4. The pilot should ignite and the flame signal should be above the flame threshold value but the main burner cannot light.
5. The flame signal should drop below the flame threshold value within the FFRT after the interrupted pilot goes out.
6. Hold code 109 will be displayed on the Basic Panel or *Ignition Failure* fault is displayed on the Enhanced Panel.
7. Safety shutdown occurs and lockout.

Loss of flame during RUN

1. Open the main fuel manual shutoff valve(s) and open manual pilot shutoff valve(s).
2. Depress the RESET button.
3. Start the system. Start-up should be normal and the main burner should light normally.
4. After the sequence is in the normal RUN period for at least 10 seconds with the main burner firing, close the manual main fuel shutoff valve(s) to extinguish the main burner flame.
 - The flame signal should drop below the flame threshold value within the FFRT of the Flame Safe Guard Module after the main flame and/or pilot goes out.
 - Hold code 106, 107 or 108 will be displayed on the Basic Panel or *Main Flame Fail* fault is displayed

- on the Enhanced Panel.
- Safety shutdown and lockout.

D.7. STARTUP COMPONENT ADJUSTMENTS

D.7.a. Firing Rate Check/Fuel Air Ratio Gas Valve ADJUSTMENT



All Triton Series™ Near Condensing Boilers have been factory fire tested and tuned to operate at sea-level standard conditions with up to 60 ft. of equivalent exhaust venting.

Installations with a standard heating value fuel and at elevations below 2,000 feet will generally only require adjustment of the fuel-air ratio valve and air flow switch to correct firing rate at appropriate fuel-air ratios. These adjustments should be done for each fuel valve on combination fuel units.

To adjust fuel air ratio valve at high-fire (100%):

1. Turn off unit by setting the burner cutoff switch to the **OFF** position.
2. Remove the plastic cover over the Throttle screw.
3. Using Enhanced/System Operator Interface Panel, activate boiler demand by temporarily adjusting setpoint (about 40F) above normal operating setpoint by pressing Configure → CH – Central Heat Configuration → CH setpoint Textbox.
4. Set the burner cutoff switch to ON position to start the unit.
5. Wait for the boiler to cycle on. Burner State Run will be displayed on Summary Statue Page.
6. Enter Diagnostic Tests by pressing Diagnostics → Diagnostic Tests on the Operator Interface. Once in diagnostic tests page, and press the Maximum button. RPM rate will be changed to reflect maximum firing rate. Press the Start Test button. Unit will now be running at 100% firing rate. Five minute timer will be started with press of Start Test button.
7. Using the combustion analyzer, adjust the Throttle screw to achieve 30% - 45%, CO is less than 100 ppm, and NOx is less than 15 ppm at 100% firing rate. Adjust counter-clockwise for more gas and clockwise for less gas. Make sure boiler in manual firing mode throughout the adjustment period. Five minute timer will be started with press of Start Test button.
8. Press the Stop Test button again to exit the manual firing mode.
9. Readjust setpoint to normal operating setpoint.
10. Replace the plastic cover over the Throttle screw.

To adjust fuel air ratio valve at low-fire (0%):

1. Turn off unit by setting the burner cutoff switch to the OFF position.

2. Remove aluminum protection screw on the pressure regulator.
3. Using Operator Interface panel, activate boiler demand by temporarily adjusting setpoint (about 40F) above normal operating setpoint by pressing Configure → CH – Central Heat Configuration → CH setpoint Textbox.
4. Set the burner cutoff switch to ON position to start the unit.
5. Wait for the boiler to cycle on. Run state will be displayed on Summary Statue Page.
6. Enter Diagnostic Tests by pressing Diagnostics → Diagnostic Tests on the Operator Interface. Once in diagnostic tests page, and press the Minimum button. RPM rate will be changed to reflect minimum firing rate. Press the Start Test button. Unit will now be running at 0% firing rate. Five minute timer will be started with press of Start Test button.
7. Using the combustion analyzer, adjust the Throttle screw to achieve 30% - 45%, CO is less than 100 ppm, and NOx is less than 15 ppm at 0% firing rate. Adjust clockwise for more gas and counter-clockwise for less gas. Make sure boiler in manual firing mode throughout the adjustment period. Five minute timer will be started with press of Start Test button.
8. Press the Done button on the Basic Panel to exit the manual firing mode.
9. Readjust setpoint to normal operating setpoint.
10. Replace the aluminum protection screw on the pressure regulator.



IN SOME EXTREME CONDITIONS, SUCH AS HIGH ALTITUDES OR LOW HEATING VALUE GAS, IT MAY NOT BE POSSIBLE TO FIRE AT THE RATED MAXIMUM WITH THE APPROPRIATE AMOUNT OF EXCESS AIR. IN THIS CASE, REDUCE THE HIGH-FIRING RATE UNTIL THE DESIRED EXCESS AIR HAS BEEN OBTAINED AT THE MAXIMUM FIRING RATE.

D.7.b. Air Flow Switch Calibration

The air flow switch is a safety device that insures that there is adequate air flow through the blower. The switch is preset at the factory, in case air flow switch needs to be recalibrated:

1. Make sure the boiler main switch is turned off.
2. Remove the Air flow switch cover.
3. Turn the flow switch adjustment screw counter clockwise until the switch is fully open.
4. Then make 4-1/2 full turns clockwise to set the switch to the appropriate setpoint.
5. Replace the air flow switch cover.

D.8. SHUTTING DOWN THE UNIT

1. Set the burner cutoff switch on the display panel to the off position.
2. Wait for the unit to complete its postpurge.
3. Turn off the power supply to the unit via the user installed disconnect switch.
4. Close the unit's main gas valve.

WARNING:

FAILURE TO FOLLOW THE SHUT DOWN PROCEDURE WILL RESULT IN EXCESSIVE WEAR AND WILL VOID YOUR WARRANTY.

D.9. AFTER STARTUP CHECKLIST

1. Check the gas line piping for gas leaks.
2. Check for leaks. Look for water on the floor. Check for water escaping from any part of the unit, valves or piping. Water will continue to flow out of the drain for a few minutes after the unit stops running. If the flow does not stop after 10 minutes, a leak may be present in the coil.
3. Check for proper supports on the water piping and gas lines.

CAUTION:

Keep flammable materials away from the boiler. In the event of the boiler overheating, shut the boiler down as follows:

1. Turn off the manual gas valve located ON THE REAR OF THE BOILER and;
2. Turn off the electricity to the boiler.

E. MAINTENANCE

Maintenance is an important part of keeping the Triton boiler running efficiently and for a long period of time.

NOTE:

Ace Heating Solutions, LLC recommends that a maintenance schedule always be kept.

For extended warranty, schedule must be kept and made available to ACE if failure occurs. A document must be produced for every year of operation, so it is recommended that copies of the maintenance schedule be made before it is used.

CAUTION:

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

Verify proper operation after servicing.

DANGER:

This boiler uses flammable gas, high voltage electricity, moving parts, and very hot water under high pressure. Assure that all gas and electric power supplies are off and that the water temperature is cool before attempting any disassembly or service.

More than one gas shut-off valve and electrical disconnect switch are used on the boiler. Assure that all gas valves and electrical disconnect switches are off before attempting any disassembly or service.

Do not attempt any service work if gas is present in the air in the vicinity of the boiler. Never modify, remove or tamper with any control device.

WARNING:

This boiler must only be serviced and repaired by skilled and experienced service technicians.

If any controls are replaced, they must be replaced with identical components.

Read, understand and follow all the instructions and warnings contained in all the sections of this manual.

Never or bypass or disable any safety or operating control or component of this boiler.

Assure that all safety and operating controls and components are operating properly before placing the boiler back in service.

Triton Recommended Maintenance Schedule Summary	
Daily	<ul style="list-style-type: none"> Inspect Boiler Surrounds/ Area Check Operating Temperature & Pressure Verify Normal Boiler Sound Check Lockout Codes
Monthly	<ul style="list-style-type: none"> Check Operating Control Check Pilot/ Main Flame Signal Inspect Air Filter Inspect/ Clean Condensate Drain Observe Main Flame
Semi Ann.	<ul style="list-style-type: none"> Perform Gas Leak Test (E.4.e) Perform Pilot Spark Test (E.4.c)
Annual	<ul style="list-style-type: none"> Clean Main Burner Clean Heat Exchanger Tubes Clean Gas Inlet Screen Examine Vent System Examine Connections Corrosion Check Combustion Test

Table E.1. Recommended Maintenance

E.1. MAINTENANCE DETAIL

E.1.a. Inspect Boiler Surrounds/ Area (daily)

- Assure area is clean and that proper clearance to combustible materials is maintained. Verify there is no gasoline, or other flammable vapors and liquids in the area.
- Check for the presence of water in the area that may indicate a leak.

E.1.b. Check Operating Temperature (daily)

- With boiler at stable operation, observe the readings on the Temperature/ Pressure gauge and verify that they are within acceptable ranges.

E.1.c. Verify Normal Boiler Sound (daily)

- After boiler has reached stable operation, listen to the boiler and verify there are no unusual noises emitting from the heat exchanger or combustion areas.

E.1.d. Check Lockout Codes (daily)

E.1.e. Check Operating Control (monthly)

- Adjust the temperature necessary to check burner operation.

E.1.f. Check Pilot/ Main Flame Signal (monthly)

- Using a voltmeter, plug into the flame detection port on the flame safeguard. The voltage reading should be between 1-15 VDC.
- Remove the UV scanner and using soft cloth wipe the lens clean.

E.1.g. Inspect Air Filter (monthly)

The main burner air filter is gravity held horizontally at top of the air box as shown. No tools are necessary to inspect or service filter.

- Open front access door.
- Lift air filter frame from the top of the air box and remove filter and frame.
- Clean filter with compressed air or replace filter as necessary.

E.1.h. Inspect /Clean Condensate Drain (monthly)

E.1.i. Check Main Flame Condition (monthly)

- Check to make sure high fire flame is blue.
- If the flame is yellow, adjust gas valve until blue flame is achieved following initial set up procedure. Normal low fire flame is a yellowish-orange.

E.1.j. Perform Gas Valve, Pilot Assembly and Blower Leak Test (semi-annually)

- With the unit running, use soapy water to spray around the pilot assembly, blower, and gas train. If bubbles form, then a leak is present.

E.1.k. Perform Pilot Spark Test (semi-annually)

See section E.4.c..

E.1.l. Clean Main Burner (annually)

- Shut off the manual gas cock at gas inlet.
- Remove electrical power to boiler.
- Remove top panel and open front door.
- Remove nuts connecting blower to the top plate.
- Remove combustion/ gas train assembly.
- Remove burner.
- Use low pressure air to remove dust and a clean soft cloth to wipe the inside of the burner (do not wipe the mesh/outside of burner).

E.1.m. Clean Heat Exchanger Tubes (annually)

1. With burner removed (see F.1.m. above), check tubes with flashlight for soot and remove with soft brush or vacuum.
2. Spray tubes with high pressure water to remove any foreign materials.
3. Check for corrosion of burner, replace if necessary
4. Reassemble burner and combustion assembly as seen in figure 7.

E.1.n. Clean Gas Inlet Screen (annually)

E.1.o. Examine Vent System (annually)

1. Check all joints and vent pipe connections for tightness, corrosion or deterioration.
2. At all connections check for air leak while unit is on low fire so as not to burn yourself.

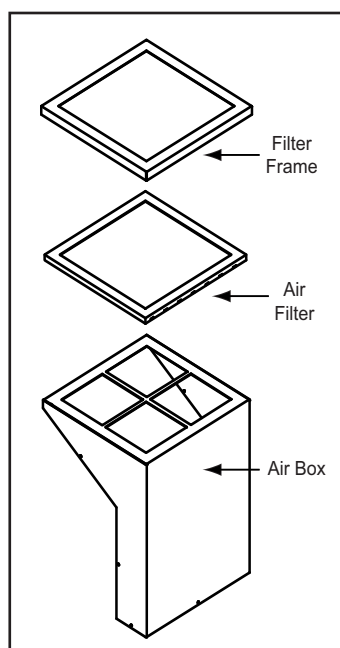


Figure E.1. Air Filter Box Assembly

E.1.p. Examine Joint and Pipe Connections (annually)

1. Check all water pipe connections for leaks while unit is on low fire.
2. If a leak is present around a fitting attempt to tighten the fitting.
3. If a leak is present in the middle of the pipe, contact factory.

E.1.q. Corrosion Check (annually)

1. Check all gas, water, and air pipes to for corrosion and deterioration.
2. If any corrosion or deterioration is present, please contact factory.

E.1.r. Combustion Test (annually)

Adjustments should be made to the gas valve until all readings are within these recommended values.

Condition	Value	Acceptable Range
Carbon Monoxide:	ppm	Less Than 100 ppm
Carbon Dioxide:	%	Between 7- 9%
Excess Air:	%	30-45%
NOx:	ppm	Less Than 20 ppm
Comb. Chamber Pressure:	WC	Under 0.5" WC

Triton High Efficiency Boiler Annual Maintenance Log

E.2. MAINTENANCE LOG

Daily Checks	Notes:
Inspect Boiler Area	
Check Op. Temp & Pres.	
Verify Normal Boiler Sound	
Check Lockout Codes	

Monthly Check	1	2	3	4	5	6	7	8	9	10	11	12
Check Operating Control												
Check Pilot/ Main Flame Signal												
Verify Normal Boiler Sound												
Inspect/ Clean Condensate Drain												
Observe Main Flame												
<i>Indicate "P" (pass) or "F" (fail) monthly for each category. Enter actions taken in the notes area below.</i>												
Notes:												

Semiannual Tests	Result	Date	Initial	Notes
Gas Leak Test #1				
Pilot Spark Test #1				
Gas Leak Test #2				
Pilot Spark Test #2				

Annual Tests	Result	Date	Initial	Notes
Lubricate Pilot Blower				
Clean Main Burner				
Clean HX Tubes				
Clean Gas Inlet Screen				
Examine Vent System				
Examine Connections				
Corrosion Check				
Combustion Test				

F. TROUBLESHOOTING

F.1. CONTROLLER LOCKOUT AND HOLD CODES.



To support the recommended Troubleshooting, the Honeywell SOLA controller has an Alert File. Review the Alert history for possible trends that may have been occurring prior to the actual Lockout.

Note Column: H= Hold message; L=Lockout message;
H or L= either Hold or Lockout depending on Parameter Configuration

Code	Description	Recommended Troubleshooting of Lockout Codes	Note
Safety Data Faults			
1	Unconfigured safety data	<ol style="list-style-type: none"> 1. New Device, complete device configuration and safety verification. 2. If fault repeats, replace module. 	L
2	Waiting for safety data verification	<ol style="list-style-type: none"> 1. Device in Configuration mode and safety parameters need verification and a device needs reset to complete verification. 2. Configuration ended without verification, re enter configuration, verify safety parameters and reset device to complete verification. 3. If fault repeats, replace module. 	L
Internal Operation Errors			
3	Internal fault: Hardware fault	Internal Fault. <ol style="list-style-type: none"> 1. Reset Module. 2. If fault repeats, replace module. 	H
4	Internal fault: Safety Relay key feedback error		H
5	Internal fault: Unstable power (DCDC) output		H
6	Internal fault: Invalid processor clock		H
7	Internal fault: Safety relay drive error		H
8	Internal fault: Zero crossing not detected		H
9	Internal fault: Flame bias out of range		H
10	Internal fault: Invalid Burner control state		H
11	Internal fault: Invalid Burner control state flag		H
12	Internal fault: Safety relay drive cap short		H
13	Internal fault: PII shorted to ILK		H or L
14	Internal fault: HFS shorted to LCI	H or L	
15	Internal fault: Safety relay test failed due to feedback ON	L	
16	Internal fault: Safety relay test failed due to safety relay OFF	L	
17	Internal fault: Safety relay test failed due to safety relay not OFF	L	
18	Internal fault: Safety relay test failed due to feedback not ON	L	
19	Internal fault: Safety RAM write	Internal Fault. <ol style="list-style-type: none"> 1. Reset Module. 2. If fault repeats, replace module. 	L
20	Internal fault: Flame ripple and overflow		H
21	Internal fault: Flame number of sample mismatch		H
22	Internal fault: Flame bias out of range		H
23	Internal fault: Bias changed since heating cycle starts		H
24	Internal fault: Spark voltage stuck low or high		H
25	Internal fault: Spark voltage changed too much during flame sensing time		H

Code	Description	Recommended Troubleshooting of Lockout Codes	Note
26	Internal fault: Static flame ripple	Internal Fault. 1. Reset Module. 2. If fault repeats, replace module.	H
27	27 Internal fault: Flame rod shorted to ground detected		H
28	Internal fault: A/D linearity test fails		H
29	Internal fault: Flame bias cannot be set in range		H
30	Internal fault: Flame bias shorted to adjacent pin		H
31	Internal fault: SLO electronics unknown error		H
32-46	Internal fault: Safety Key 0 through 14		L
System Errors			
47	Flame Rod to ground leakage	Internal Fault. 1. Reset Module. 2. If fault repeats, replace module.	H
48	Static flame (not flickering)		H
49	24VAC voltage low/high	1. Check the Module and display connections. 2. Check the Module power supply and make sure that oth frequency, voltage and VA meet the specifications.	H
50	Modulation fault	Internal sub-system fault.	H
51	Pump fault	1. Review alert messages for possible trends. 2. Correct possible problems.	H
52	Motor tachometer fault	3. If fault persists, replace module.	H
53	AC inputs phase reversed	1. Check the Module and display connections. 2. Check the Module power supply and make sure that both frequency and voltage meet the specifications. 3. On 24Vac applications, assure that J4-10 and J8-2 are connected together.	L
54-57	RESERVED		L
58	Internal fault: HFS shorted to IAS	Internal Fault. 1. Reset Module. 2. If fault repeats, replace module.	L
59	Internal Fault: Mux pin shorted		L
60	Internal Fault: HFS shorted to LFS		L
61	Anti short cycle	Will not be a lockout fault. Hold Only.	H
62	Fan speed not proved		H
63	LCI OFF	1. Check wiring and correct any faults. 2. Check Interlocks connected to the LCI to assure proper function. 3. Reset and sequence the module; monitor the LCI status. 4. If code persists, replace the module.	H
64	PII OFF	1. Check wiring and correct any faults. 2. Check Preignition Interlock switches to assure proper functioning. 3. Check the valve operation. 4. Reset and sequence the module; monitor the PII status. 5. If code persists, replace the module.	H or L
65	Interrupted Airflow Switch OFF	1. Check wiring and correct any possible shorts. 2. Check airflow switches to assure proper functioning. 3. Check the fan/blower operation. 4. Reset and sequence the module; monitor the airflow status. 5. If code persists, replace the module.	H or L
66	Interrupted Airflow Switch ON		H or L
67	ILK OFF	1. Check wiring and correct any possible shorts. 2. Check Interlock (ILK) switches to assure proper function. 3. Verify voltage through the interlock string to the interlock input with a voltmeter. 4. If steps 1-3 are correct and the fault persists, replace the module	H or L
68	ILK ON		H or L
69	Pilot test hold	1. Verify Run/Test is changed to Run. 2. Reset Module. 3. If fault repeats, replace module.	H
70	Wait for leakage test completion	1. Internal Fault. Reset Module. 2. If fault repeats, replace module.	H
71-77	RESERVED		

Code	Description	Recommended Troubleshooting of Lockout Codes	Note
78	Demand Lost in Run	<ol style="list-style-type: none"> 1. Check wiring and correct any possible errors. 2. If previous steps are correct and fault persists, replace the module. 	H
79	Outlet high limit	<ol style="list-style-type: none"> 1. Check wiring and correct any possible errors. 2. Replace the Outlet high limit. 3. If previous steps are correct and fault persists, replace the module. 	H or L
80	DHW high limit	<ol style="list-style-type: none"> 1. Check wiring and correct any possible errors. 2. Replace the DHW high limit. 3. If previous steps are correct and fault persists, replace the module. 	H or L
81	Delta T limit	<ol style="list-style-type: none"> 1. Check Inlet and Outlet sensors and pump circuits for proper operation. 2. Recheck the Delta T Limit to confirm proper setting. 3. If previous steps are correct and fault persists, replace the module. 	H or L
82	Stack limit	<ol style="list-style-type: none"> 1. Check wiring and correct any possible errors. 2. Replace the Stack high limit. 3. If previous steps are correct and fault persists, replace the module. 	H or L
83-90	RESERVED		H or L
Sensor Faults			
91	Inlet sensor fault	<ol style="list-style-type: none"> 1. Check wiring and correct any possible errors. 2. Replace the Inlet sensor. 3. If previous steps are correct and fault persists, replace the module. 	H
92	Outlet sensor fault	<ol style="list-style-type: none"> 1. Check wiring and correct any possible errors. 2. Replace the Outlet sensor. 3. If previous steps are correct and fault persists, replace the module. 	H
93	DHW sensor fault	<ol style="list-style-type: none"> 1. Check wiring and correct any possible errors. 2. Replace the DHW sensor. 3. If previous steps are correct and fault persists, replace the module. 	H
94	Header sensor fault	<ol style="list-style-type: none"> 1. Check wiring and correct any possible errors. 2. Replace the header sensor. 3. If previous steps are correct and fault persists, replace the module. 	H
95	Stack sensor fault	<ol style="list-style-type: none"> 1. Check wiring and correct any possible errors. 2. Replace the stack sensor. 3. If previous steps are correct and fault persists, replace the module. 	H
96	Outdoor sensor fault	<ol style="list-style-type: none"> 1. Check wiring and correct any possible errors. 2. Replace the outdoor sensor. 3. If previous steps are correct and fault persists, replace the module. 	H
97	Internal Fault: A2D mismatch.	Internal Fault.	L
98	Internal Fault: Exceeded VSNSR voltage	<ol style="list-style-type: none"> 1. Reset Module. 2. If fault repeats, replace module. 	L
99	Internal Fault: Exceeded 28V voltage tolerance		L
100	Pressure Sensor Fault	<ol style="list-style-type: none"> 1. Verify the Pressure Sensor is a 4-20ma source. 2. Check wiring and correct any possible errors. 3. Test Pressure Sensor for correct operation. 4. Replace the pressure sensor. 5. If previous steps are correct and fault persists, replace the module. 	H
101-104	RESERVED		
Flame Operation Faults			

Code	Description	Recommended Troubleshooting of Lockout Codes	Note
105	Flame detected out of sequence	<ol style="list-style-type: none"> 1. Check that flame is not present in the combustion chamber. Correct any errors. 2. Make sure that the flame detector is wired to the correct terminal. 3. Make sure the F & G wires are protected from stray noise pickup. 4. Reset and sequence the module, if code reappears, replace the flame detector. 5. Reset and sequence the module, if code reappears, replace the module. 	H or L
106	Flame lost in MFEP	<ol style="list-style-type: none"> 1. Check pilot valve (Main Valve for DSI) wiring and operation - correct any errors. 2. Check the fuel supply. 3. Check fuel pressure and repeat turndown tests. 4. Check ignition transformer electrode, flame detector, flame detector siting or flame rod position. 5. If steps 1 through 4 are correct and the fault persists, replace the module. 	L
107	Flame lost early in run		L
108	Flame lost in run		L
109	Ignition failed		L
110	Ignition failure occurred	Hold time of recycle and hold option. Will not be a lockout fault. Hold Only. Internal hardware test. Not a lockout.	H
111	Flame current lower than WEAK threshold		H
112	Pilot test flame timeout		L
113	Flame circuit timeout		L
114 -121	RESERVED		L
Rate Proving Faults			
122	Lightoff rate proving failed	<ol style="list-style-type: none"> 1. Check wiring and correct any potential wiring errors. 2. Check VFDs ability to change speeds. 3. Change the VFD 4. If the fault persists, replace the module. 	L
123	Purge rate proving failed		L
124	High fire switch OFF	<ol style="list-style-type: none"> 1. Check wiring and correct any potential wiring errors. 2. Check High Fire Switch to assure proper function (not welded or jumpered). 3. Manually drive the motor to the High Fire position and adjust the HF switch while in this position and verify voltage through the switch to the HFS input with a voltmeter. 4. If steps 1-3 are correct and the fault persists, replace the module. 	H
125	High fire switch stuck ON		H
126	Low fire switch OFF	<ol style="list-style-type: none"> 1. Check wiring and correct any potential wiring errors. 2. Check Low Fire Switch to assure proper function (not welded or jumpered). 3. Manually drive the motor to the High Fire position and adjust the LF switch while in this position and verify voltage through the switch to the LFS input with a voltmeter. 4. If steps 1-3 are correct and the fault persists, replace the module. 	H
127	Low fire switch stuck ON		H or L
128	Fan speed failed during prepurge	<ol style="list-style-type: none"> 1. Check wiring and correct any potential wiring errors. 2. Check VFDs ability to change speeds. 3. Change the VFD 4. If the fault persists, replace the module. 	H or L
129	Fan speed failed during preignition		H or L
130	Fan speed failed during ignition		H or L
131	Fan movement detected during standby		H
132	Fan speed failed during run		H
133 -135	RESERVED		
Start Check Faults			
136	Interrupted Airflow Switch failed to close	<ol style="list-style-type: none"> 1. Check wiring and correct any possible wiring errors. 2. Check Interrupted Airflow switch(es) to assure proper function. 3. Verify voltage through the airflow switch to the IAS input with a voltmeter. 4. If steps 1-3 are correct and the fault persists, replace the module. 	H

Code	Description	Recommended Troubleshooting of Lockout Codes	Note
137	ILK failed to close	<ol style="list-style-type: none"> 1. Check wiring and correct any possible wiring errors. 2. Check Interrupted Airflow switch(es) to assure proper function. 3. Verify voltage through the airflow switch to the IAS input with a voltmeter. 4. If steps 1-3 are correct and the fault persists, replace the module. 	H
138-148	RESERVED		
FAULT CODES 149 THROUGH 165 ARE OEM SPECIFIC FAULT CODES.			
149	Flame detected	<p>OEM Specific</p> <ol style="list-style-type: none"> 1. Holds if flame detected during Safe Start check up to Flame Establishing period. 	H or L
150	Flame not detected	<p>OEM Specific</p> <ol style="list-style-type: none"> 1. Sequence returns to standby and restarts sequence at the beginning of Purge after the HF switch opens. if flame detected during Safe Start check up to Flame Establishing period. 	H
151	High fire switch ON	<p>OEM Specific</p> <ol style="list-style-type: none"> 1. Check wiring and correct any potential wiring errors. 2. Check High Fire Switch to assure proper function (not welded or jumpered). 3. Manually drive the motor to the High Fire position and adjust the HF switch while in this position and verify voltage through the switch to the HFS input with a voltmeter. 4. If steps 1-3 are correct and the fault persists, replace the module. 	H or L
152	Combustion pressure ON	OEM Specific	H or L
153	Combustion Pressure Off	<ol style="list-style-type: none"> 1. Check wiring and correct any errors. 2. Inspect the Combustion Pressure Switch to make sure it is working correctly. 3. Reset and sequence the relay module. 4. During STANDBY and PREPURGE, measure the voltage between Terminal J6-5 and L2 (N). Supply voltage should be present. If not, the lockout switch is defective and needs replacing. 5. If the fault persists, replace the relay module. 	H or L
154	Purge Fan switch On	OEM Specific	H or L
155	Purge Fan switch Off	<ol style="list-style-type: none"> 1. Purge fan switch is on when it should be off. 2. Check wiring and correct any errors. 3. Inspect the Purge Fan switch J6 terminal 3 and its connections. Make sure the switch is working correctly and is not jumpered or welded. 4. Reset and sequence the relay module. 5. If the fault persists, replace the relay module. 	H or L
156	Combustion pressure and Flame ON	OEM Specific	H or L
157	Combustion pressure and Flame OFF	<ol style="list-style-type: none"> 1. Check that flame is not present in the combustion chamber. Correct any errors. 2. Make sure that the flame detector is wired to the correct terminal. 3. Make sure the F & G wires are protected from stray noise pickup. 4. Reset and sequence the module, if code reappears, replace the flame detector. 	L
158	Main valve ON	OEM Specific	L
159	Main valve OFF	<ol style="list-style-type: none"> 1. Check Main Valve terminal wiring and correct any errors. 2. Reset and sequence the module. If fault persist, replace the module. 	L
160	Ignition ON	OEM Specific	L
161	Ignition OFF	<ol style="list-style-type: none"> 1. Check Ignition terminal wiring and correct any errors. 2. Reset and sequence the module. If fault persist, replace the module. 	L
162	Pilot valve ON	OEM Specific	L
163	Pilot valve OFF	<ol style="list-style-type: none"> 1. Check Pilot Valve terminal wiring and correct any errors. 2. Reset and sequence the module. If fault persist, replace the module. 	L

Code	Description	Recommended Troubleshooting of Lockout Codes	Note
164	Block intake ON	OEM Specific 1. Check wiring and correct any errors. 2. Inspect the Block Intake Switch to make sure it is working correctly. 3. Reset and sequence the module. 4. During Standby and Purge, measure the voltage across the switch. Supply voltage should be present. If not, the Block Intake Switch is defective and needs replacing. 5. If the fault persists, replace the relay module.	L
165	Block intake OFF		L
166 -171	RESERVED		
Feedback			
172	Main relay feedback incorrect	Internal Fault. 1. Reset Module. 2. If fault repeats, replace module.	L
173	Pilot relay feedback incorrect		L
174	Safety relay feedback incorrect		L
175	Safety relay open		L
176	Main relay ON at safe start check		L
177	Pilot relay ON at safe start check		L
178	Safety relay ON at safe start check		L
179 -183	RESERVED		L
Parameter Faults			
184	Invalid BLOWER/HSI output setting	1. Return to Configuration mode and recheck selected parameters, reverify and reset module. 2. If fault repeats, verify electrical grounding. 3. If fault repeats, replace module.	L
185	Invalid Delta T limit enable setting		L
186	Invalid Delta T limit response setting		L
187	Invalid DHW high limit enable setting		L
188	Invalid DHW high limit response setting		L
189	Invalid Flame sensor type setting		L
190	Invalid interrupted air switch enable setting		L
191	Invalid interrupted air switch start check enable setting		L
192	Invalid igniter on during setting		L
193	Invalid ignite failure delay setting		L
194	Invalid ignite failure response setting		L
195	Invalid ignite failure retries setting		L
196	Invalid ignition source setting		L
197	Invalid interlock open response setting		L
198	Invalid interlock start check setting		L
199	Invalid LCI enable setting		L
200	Invalid lightoff rate setting		L
201	Invalid lightoff rate proving setting		L
202	Invalid Main Flame Establishing Period time		L
203	Invalid MFEP flame failure response setting		L
204	Invalid NTC sensor type setting		L
205	Invalid Outlet high limit response setting		L
206	Invalid Pilot Flame Establishing Period setting		L
207	Invalid PII enable setting		L
208	Invalid pilot test hold setting		L
209	Invalid Pilot type setting		L
210	Invalid Postpurge time setting		L
211	Invalid Power up with lockout setting		L
212	Invalid Preignition time setting		L

Code	Description	Recommended Troubleshooting of Lockout Codes	Note
213	Invalid Prepurge rate setting		L
214	Invalid Prepurge time setting		L
215	Invalid Purge rate proving setting		L
216	Invalid Run flame failure response setting		L
217	Invalid Run stabilization time setting		L
218	Invalid Stack limit enable setting		L
219	Invalid Stack limit response setting		L
220	Unconfigured Delta T limit setpoint setting		L
221	Unconfigured DHW high limit setpoint setting		L
222	Unconfigured Outlet high limit setpoint setting		L
223	Unconfigured Stack limit setpoint setting		L
224	Invalid DHW demand source setting		L
225	Invalid Flame threshold setting		L
226	Invalid Outlet high limit setpoint setting		L
227	Invalid DHW high limit setpoint setting		L
228	Invalid Stack limit setpoint setting		L
229	Invalid Modulation output setting		L
230	Invalid CH demand source setting		L
231	Invalid Delta T limit delay setting		L
232	Invalid Pressure sensor type setting		L
233	Invalid IAS closed response setting		L
234	Invalid Outlet high limit enable setting		L
235	Invalid Outlet connector type setting		L
236	Invalid Inlet connector type setting		L
237	Invalid DHW connector type setting		L
238	Invalid Stack connector type setting		L
239	Invalid Header connector type setting		L
240	Invalid Outdoor connector type setting		L
241 -255	RESERVED		

Table F.1. Lockout and Hold Codes

F.2. CONTROLLER ALERT CODES.

Code	Description
EE Management Faults	
0	None (No alert)
1	Alert PCB was restored from factory defaults
2	Safety configuration parameters were restored from factory defaults
3	Configuration parameters were restored from factory defaults
4	Invalid Factory Invisibility PCB was detected
5	Invalid Factory Range PCB was detected
6	Invalid range PCB record has been dropped
7	EEPROM lockout history was initialized
8	Switched application annunciation data blocks
9	Switched application configuration data blocks
10	Configuration was restored from factory defaults
11	Backup configuration settings was restored from active configuration
12	Annunciation configuration was restored from factory defaults
13	Annunciation configuration was restored from backup

Code	Description
14	Safety group verification table was restored from factory defaults
15	Safety group verification table was updated
16	Invalid Parameter PCB was detected
17	Invalid Range PCB was detected
System Parameter Errors	
18	Alarm silence time exceeded maximum
19	Invalid safety group verification table was detected
20-26	RESERVED
27	Safety processor was reset
28	Application processor was reset
29	Burner switch was turned OFF
30	Burner switch was turned ON
31	Program Module (PM) was inserted into socket
32	Program Module (PM) was removed from socket
33	Alert PCB was configured

Code	Description
34	Parameter PCB was configured
35	Range PCB was configured
36	Program Module (PM) incompatible with product was inserted into socket
37	Program Module application parameter revision differs from application processor
38	Program Module safety parameter revision differs from application processor
39	PCB incompatible with product contained in Program Module
40	Parameter PCB in Program Module is too large for product
41	Range PCB in Program Module was too large for product
42	Alert PCB in Program Module was too large for product
43	IAS start check was forced on due to IAS enabled
System Operation Faults	
44	Low voltage was detected in safety processor
45	High line frequency occurred
46	Low line frequency occurred
47	Invalid subsystem reset request occurred
48	Write large enumerated Modbus register value was not allowed
49	Maximum cycle count was reached
50	Maximum hours count was reached
51	Illegal Modbus write was attempted
52	Modbus write attempt was rejected (NOT ALLOWED)
53	Illegal Modbus read was attempted
54	Safety processor brown-out reset occurred
55	Application processor watchdog reset occurred
56	Application processor brown-out reset occurred
57	Safety processor watchdog reset occurred
58	Alarm was reset by the user at the control
Demand/Rate Command Faults	
59	Burner control firing rate was > absolute max rate
60	Burner control firing rate was < absolute min rate
61	Burner control firing rate was invalid, % vs. RPM
62	Burner control was firing with no fan request
63	Burner control rate (nonfiring) was > absolute max rate
64	Burner control rate (nonfiring) was < absolute min rate
65	Burner control rate (nonfiring) was absent
66	Burner control rate (nonfiring) was invalid, % vs. RPM
67	Fan off cycle rate was invalid, % vs. RPM
68	Setpoint was overridden due to sensor fault
69	Modulation was overridden due to sensor fault
70-74	RESERVED
Fan Parameter Errors	
75	Absolute max fan speed was out of range
76	Absolute min fan speed was out of range
77	Fan gain down was invalid
78	Fan gain up was invalid
79	Fan minimum duty cycle was invalid
80	Fan pulses per revolution was invalid

Code	Description
81	Fan PWM frequency was invalid
82-89	RESERVED
90	Modulation output type was invalid
91	Firing rate control parameter was invalid
92	Forced rate was out of range vs. min/max modulation
93	Forced rate was invalid, % vs. RPM
94	Slow start ramp value was invalid
95	Slow start degrees value was invalid
96	Slow start was ended due to outlet sensor fault
97	Slow start was end due to reference setpoint fault
98	CH max modulation rate was invalid, % vs. RPM
99	CH max modulation rate was > absolute max rate
100	CH modulation range (max minus min) was too small (< 4% or 40 RPM)
101	DHW max modulation rate was invalid, % vs. RPM
102	DHW max modulation rate was > absolute max rate
103	DHW modulation range (max minus min) was too small (< 4% or 40 RPM)
104	Min modulation rate was < absolute min rate
105	Min modulation rate was invalid, % vs. RPM
106	Manual rate was invalid, % vs. RPM
107	Slow start enabled, but forced rate was invalid
108	Analog output hysteresis was invalid
109	Analog modulation output type was invalid
110	IAS open rate differential was invalid
111	IAS open step rate was invalid
112	RESERVED
-114	
Modulation Operation Faults	
115	Fan was limited to its minimum duty cycle
116	Manual rate was > CH max modulation rate
117	Manual rate was > DHW max modulation rate
118	Manual rate was < min modulation rate
119	Manual rate in Standby was > absolute max rate
120	Modulation commanded rate was > CH max modulation rate
121	Modulation commanded rate was > DHW max modulation rate
122	Modulation commanded rate was < min modulation rate
123	Modulation rate was limited due to outlet limit
124	Modulation rate was limited due to Delta-T limit
125	Modulation rate was limited due to stack limit
126	Modulation rate was limited due to anticondensation
127	Fan Speed out of range in RUN
128	Modulation rate was limited due to IAS was open
129	Slow start ramp setting of zero will result in no modulation rate change
130	RESERVED
CH parameter Errors	
131	CH demand source was invalid
132	CH P-gain was invalid
133	CH I-gain was invalid

Code	Description
134	CH D-gain was invalid
135	CH OFF hysteresis was invalid
136	CH ON hysteresis was invalid
137	CH sensor type was invalid
138	CH hysteresis step time was invalid
139	CH remote control parameter was invalid
140	CH ODR not allowed with remote control
141	RESERVED
-145	
<u>CH Operation Faults</u>	
146	CH control was suspended due to fault
147	CH header temperature was invalid
148	CH outlet temperature was invalid
149	CH steam pressure was invalid
<u>CH Parameter errors (continued)</u>	
150	RESERVED
-156	
<u>DHW Parameter Errors</u>	
157	DHW demand source was invalid
158	DHW P-gain was invalid
159	DHW I-gain was invalid
160	DHW D-gain was invalid
161	DHW OFF hysteresis was invalid
162	DHW ON hysteresis was invalid
163	DHW hysteresis step time was invalid
164	DHW sensor type was invalid
165	Inlet sensor type was invalid for DHW
166	Outlet sensor type was invalid for DHW
167	RESERVED
-170	
<u>DHW Operation Faults</u>	
171	DHW control was suspended due to fault
172	DHW temperature was invalid
173	DHW inlet temperature was invalid
174	DHW outlet temperature was invalid
175	RESERVED
-182	
<u>Lead Lag Parameter errors</u>	
183	Lead Lag P-gain was invalid
184	Lead Lag I-gain was invalid
185	Lead Lag D-gain was invalid
186	Lead Lag OFF hysteresis was invalid
187	Lead Lag ON hysteresis was invalid
188	Lead Lag slave enable was invalid
189	Lead Lag hysteresis step time was invalid
190	RESERVED
-203	
<u>Lead Lag Operation Faults</u>	
204	Lead Lag master was suspended due to fault
205	Lead Lag slave was suspended due to fault
206	Lead Lag header temperature was invalid

Code	Description
207	Lead Lag was suspended due to no enabled
208	Lead Lag slave session has timed out
209	RESERVED
-221	
<u>Frost Protection Faults</u>	
220	Lead Lag frost protection rate was invalid
221	Lead Lag drop stage method setting was invalid
222	CH frost protection temperature was invalid
223	CH frost protection inlet temperature was invalid
224	DHW frost protection temperature was invalid
225	RESERVED
-230	
231	LL setpoint was invalid
232	LL time of day setpoint was invalid
233	LL outdoor temperature was invalid
234	LL ODR time of day setpoint was invalid
235	LL ODR time of day setpoint exceeded normal setpoint
236	LL max outdoor temperature was
237	LL min outdoor temperature was
238	LL low water temperature was
239	LL outdoor temperature range was too small (minimum 12 C / 22 F)
240	LL water temperature range was too too small (minimum 12 C / 22 F)
241	RESERVED
-245	
246	CH setpoint was invalid
247	CH time of day setpoint was invalid
248	CH outdoor temperature was invalid
249	CH ODR time of day setpoint was invalid
250	CH ODR time of day setpoint exceeds normal setpoint
251	CH max outdoor setpoint was invalid
252	CH min outdoor setpoint was invalid
253	CH min water setpoint was invalid
254	CH outdoor temperature range was too small (minimum 12 C / 22 F)
255	CH water temperature range was too small (minimum 12 C / 22 F)
256	RESERVED
-260	
261	DHW setpoint was invalid
262	DHW time of day setpoint was invalid
263	RESERVED
-271	
272	Abnormal Recycle: Pressure sensor fault
273	Abnormal Recycle: Safety relay drive test failed
274	Abnormal Recycle: Demand off during Pilot Flame Establishing Period
275	Abnormal Recycle: LCI off during Drive to Purge Rate
276	Abnormal Recycle: LCI off during Measured Purge Time

Code	Description
277	Abnormal Recycle: LCI off during Drive to Lightoff Rate
278	Abnormal Recycle: LCI off during Pre-Ignition test
279	Abnormal Recycle: LCI off during Pre-Ignition time
280	Abnormal Recycle: LCI off during Main Flame Establishing Period
281	Abnormal Recycle: LCI off during Ignition period
282	Abnormal Recycle: Demand off during Drive to Purge Rate
283	Abnormal Recycle: Demand off during Measured Purge Time
284	Abnormal Recycle: Demand off during Drive to Lightoff Rate
285	Abnormal Recycle: Demand off during Pre-Ignition test
286	Abnormal Recycle: Demand off during Pre-Ignition time
287	Abnormal Recycle: Flame was on during Safe Start check
288	Abnormal Recycle: Flame was on during Drive to Purge Rate
289	Abnormal Recycle: Flame was on during Measured Purge Time
290	Abnormal Recycle: Flame was on during Drive to Lightoff Rate
291	Abnormal Recycle: Flame was not on at end of Ignition period
292	Abnormal Recycle: Flame was lost during Main Flame Establishing Period
293	Abnormal Recycle: Flame was lost early in Run
294	Abnormal Recycle: Flame was lost during Run
295	Abnormal Recycle: Leakage test failed
296	Abnormal Recycle: Interrupted air flow switch was off during Drive to Purge Rate
297	Abnormal Recycle: Interrupted air flow switch was off during Measured Purge Time
298	Abnormal Recycle: Interrupted air flow switch was off during Drive to Lightoff Rate
299	Abnormal Recycle: Interrupted air flow switch was off during Pre-Ignition test
300	Abnormal Recycle: Interrupted air flow switch was off during Pre-Ignition time
301	Abnormal Recycle: Interrupted air flow switch was off during Main Flame Establishing Period
302	Abnormal Recycle: Ignition failed due to interrupted air flow switch was off
303	Abnormal Recycle: ILK off during Drive to Purge Rate
304	Abnormal Recycle: ILK off during Measured Purge Time
305	Abnormal Recycle: ILK off during Drive to Lightoff Rate
306	Abnormal Recycle: ILK off during Pre-Ignition test
307	Abnormal Recycle: ILK off during Pre-Ignition time
308	Abnormal Recycle: ILK off during Main Flame Establishing Period
309	Abnormal Recycle: ILK off during Ignition period
310	Run was terminated due to ILK was off
311	Run was terminated due to interrupted air flow switch was off
312	Stuck reset switch

Code	Description
313	Run was terminated due to fan failure
314	Abnormal Recycle: Fan failed during Drive to Purge Rate
315	Abnormal Recycle: Fan failed during Measured Purge Time
316	Abnormal Recycle: Fan failed during Drive to Lightoff Rate
317	Abnormal Recycle: Fan failed during Pre-Ignition test
318	Abnormal Recycle: Fan failed during Pre-Ignition time
319	Abnormal Recycle: Fan failed during Ignition period
320	Abnormal Recycle: Fan failed during Main Flame Establishing Period
321	Abnormal Recycle: Main Valve off after 10 seconds of RUN
322	Abnormal Recycle: Pilot Valve off after 10 seconds of RUN
323	Abnormal Recycle: Safety Relay off after 10 seconds of RUN
324	Abnormal Recycle: Hardware flame bias
325	Abnormal Recycle: Hardware static flame
326	Abnormal Recycle: Hardware flame current invalid
327	Abnormal Recycle: Hardware flame rod short
328	Abnormal Recycle: Hardware invalid power
329	Abnormal Recycle: Hardware invalid AC line
330	Abnormal Recycle: Hardware SLO flame ripple
331	Abnormal Recycle: Hardware SLO flame sample
332	Abnormal Recycle: Hardware SLO flame bias range
333	Abnormal Recycle: Hardware SLO flame bias heat
334	Abnormal Recycle: Hardware SLO spark stuck
335	Abnormal Recycle: Hardware SLO spark changed
336	Abnormal Recycle: Hardware SLO static flame
337	Abnormal Recycle: Hardware SLO rod shorted
338	Abnormal Recycle: Hardware SLO AD linearity
339	Abnormal Recycle: Hardware SLO bias not set
340	Abnormal Recycle: Hardware SLO bias shorted
341	Abnormal Recycle: Hardware SLO electronics
342	Abnormal Recycle: Hardware processor clock
343	Abnormal Recycle: Hardware AC phase
344	Abnormal Recycle: Hardware A2D mismatch
345	Abnormal Recycle: Hardware VSNSR A2D
346	Abnormal Recycle: Hardware 28V A2D
347	Abnormal Recycle: Hardware HFS IAS shorted
348	Abnormal Recycle: Hardware PII INTLK shorted
349	Abnormal Recycle: Hardware HFS LCI shorted
350	Abnormal Recycle: Hardware HFS LFS shorted
351	Abnormal Recycle: Invalid zero crossing
352	Abnormal Recycle: fault stack sensor
353	Abnormal Recycle: stack limit
354	Abnormal Recycle: delta T limit
355	Abnormal Recycle: fault outlet sensor
356	Abnormal Recycle: outlet high limit
357	Abnormal Recycle: fault DHW sensor
358	Abnormal Recycle: DHW high limit
359	Abnormal Recycle: fault inlet sensor
360	Abnormal Recycle: Check Parameters Failed

Code	Description
Internal Errors	
361	Internal error: No factory parameters were detected in control
362	Internal error: PID iteration frequency was invalid
363	Internal error: Demand-Rate interval time was invalid
364	Internal error: Factory calibration parameter for modulation was invalid
365	Internal error: CH PID P-scaler was invalid
366	Internal error: CH PID I-scaler was invalid
367	Internal error: CH PID D-scaler was invalid
368	Internal error: DHW PID P-scaler was invalid
369	Internal error: DHW PID I-scaler was invalid
370	Internal error: DHW PID D-scaler was invalid
371	Internal error: Lead Lag master PID P-scaler was invalid
372	Internal error: Lead Lag master PID I-scaler was invalid
373	Internal error: Lead Lag master PID D-scaler was invalid
374 -359	RESERVED
Debug Faults	
460	LCI lost in run
461	Demand lost in run
462	STAT demand lost in run
463	Demand lost in run due to no flame
464 -466	RESERVED
Internal Data Faults	
467	Internal error: EEPROM write was attempted before EEPROM was initialized
468	Internal error: EEPROM cycle count address was invalid
469	Internal error: EEPROM days count address was invalid
470	Internal error: EEPROM hours count address was invalid
471	Internal error: Lockout record EEPROM index was invalid
472	Internal error: Request to write PM status was invalid
473	Internal error: PM parameter address was invalid
474	Internal error: PM safety parameter address was invalid
475	Internal error: Invalid record in lockout history was removed
476	Internal error: EEPROM write buffer was full
477	Internal error: Data too large was not written to EEPROM
478	Internal error: Safety key bit 0 was incorrect
479	Internal error: Safety key bit 1 was incorrect
480	Internal error: Safety key bit 2 was incorrect
481	Internal error: Safety key bit 3 was incorrect
482	Internal error: Safety key bit 4 was incorrect
483	Internal error: Safety key bit 5 was incorrect
484	Internal error: Safety key bit 6 was incorrect
485	Internal error: Safety key bit 7 was incorrect
486	Internal error: Safety key bit 8 was incorrect

Code	Description
487	Internal error: Safety key bit 9 was incorrect
488	Internal error: Safety key bit 10 was incorrect
489	Internal error: Safety key bit 11 was incorrect
490	Internal error: Safety key bit 12 was incorrect
491	Internal error: Safety key bit 13 was incorrect
492	Internal error: Safety key bit 14 was incorrect
493	Internal error: Safety key bit 15 was incorrect
494	Internal error: Safety relay timeout
495	Internal error: Safety relay commanded off
496	Internal error: Unknown safety error occurred
497	Internal error: Safety timer was corrupt
498	Internal error: Safety timer was expired
499	Internal error: Safety timings
500	Internal error: Safety shutdown

Table F.2. Controller Alert Codes

LIMITED WARRANTY

Ace Heating Solutions, LLC (AHS), warrants to the original owner and at the original installation site subject to the terms and conditions herein that all products manufactured by AHS ("Products") comply, at the time of manufacture, with recognized hydronics industry regulatory agency standards and requirements then in effect and will be free from defects in materials and workmanship for a period of 12 years from date of shipment. (the "Warranty Period"). The burner is also covered under the limited warranty for 5 years from date of shipment (the "Warranty" Period). For products or parts not manufactured by ABI, the warranty obligations of AHS shall, in all respects, be limited to 2 years.

I. REMEDY

A. Should an Atlas Triton Series™ Boiler fail due to defects in materials or workmanship within the Warranty Period, AHS will repair or replace, at AHS's sole discretion, any part found to be defective under conditions of normal use. Labor, transportation, or other expenses for removal and/or installation are not included.

B. Warranty - The owner must notify the original Installer of the Product and AHS in writing, within the Warranty Period, providing a detailed description of all claimed defects. Transportation to a factory or other designated facility for repairs of any products or items alleged defective shall, in all events, be the responsibility and at the cost of the owner.

II. EXCLUSIONS

AHS shall have no liability for and this warranty does not cover:

A. Incidental, special or consequential damages, such as loss of the use of products, facilities or production, inconvenience, loss of time or labor expense involved in repairing or replacing the alleged defective Product.

B. The performance of any Product under conditions varying materially from those under which such Product is usually tested under industry standards as of the time of shipment.

C. Any damage to the Product due to abrasion, erosion, corrosion, deterioration, abnormal temperatures or the influence of foreign matter or energy.

D. The design or operation of owner's plant or equipment or of any facility or system of which any Product may be made a part.

E. The suitability of any Product for any particular application.

F. Any failure resulting from misuse, modification not authorized by AHS in writing, improper installation or lack of, or improper maintenance

G. Equipment furnished by the owner, either mounted or unmounted, or when contracted for by the owner to be installed or handled.

H. Leakage or other malfunction caused by:

1. Defective installations in general and specifically, any installation which is made:
 - a. in violation of applicable state or local plumbing housing or building codes;
 - b. without a certified ASME, pressure relief valve, or;
 - c. contrary to the written instructions furnished with the unit.

2. Adverse local conditions in general and, specifically, sediment or lime precipitation in the tubes and/or headers or corrosive elements in the atmosphere.

3. Misuse in general and, specifically, operation and maintenance contrary to the written instructions furnished with the unit, disconnection, alteration or addition of components or apparatus, not approved by seller, operation with fuels or settings other than those set forth on the rating plate or accidental or exterior damage.

I. Production of noise, odors, discoloration or rusty water.

J. Damage to surrounding area or property caused by leakage or malfunction. Costs associated with the replacement and/or repair of the unit including: any freight, shipping or delivery charges, any removal, installation or reinstallation charges, any material and/or permits required for installation, reinstallation or repair, charges to return the boiler and or components.

Seller's liability under this warranty shall not in any case exceed the amount paid for the Product found to be defective.

III. THIRD-PARTY WARRANTIES

For goods or components not manufactured by Seller, the warranty obligations of Seller shall, in all respects, conform and be limited to one year from the date of shipment.

IV. SEVERABILITY

To the extent that any provision of this warranty would be void or prohibited under applicable law, such provisions shall be limited in effect to the minimum extent necessary to render the remaining provisions hereof enforceable.

V.





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