



MULTI-HEAT

Models 1.5, 2.5, and 4.0

Automatic Stoker-Fired Boiler Unit

Installation and Operations Manual

Approved forms of fuel:

HS-Tarm Multi-Heat is approved for the following fuels:

Models	Corn with a moisture content of 15% or less	Wood Pellets
1.5	N/A	X
2.5	X	X
4.0	X	X



Model 2.5 Shown

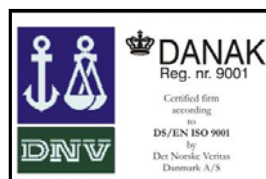


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1.0 Introduction

1.1 Foreword

SAVE THIS INSTRUCTION MANUAL FOR FUTURE REFERENCE

Congratulations on your purchase of the Tarm Multi-Heat stoker boiler!

This quality biomass stoker boiler is produced using the highest quality materials and a modern production system. The use of high technology laser cutting and robotic welding system, accompanied by time honored European craftsmanship and attention to detail, results in a long lasting boiler with unmatched fit and finish.

With proper installation, operation and maintenance your Tarm Multi-Heat stoker boiler will provide years of safe, dependable, economic and earth friendly heating.

This manual contains paragraphs that require your special attention. These paragraphs are marked with the symbols described below:



Warning: there is a risk of an accident of personal injury or serious damage to the property.



Caution: there is a risk of damaging the boiler or its individual components.

It is strongly recommended that the installer resist the temptation to simply get started without reading this manual. Grab a cup of coffee, sit down, and read. Hours of time and frustration can be prevented by a simple understanding of this product. This manual has been written with much care and thought. We want the first time installer to find installation as simple as for the journeyman. Time spent reading now will save more time in the long run.

1.2 Units of Measurement

Most hardware and fittings on the boiler are metric (some plumbing fittings are British Straight Thread). In this manual the convention used for dimensions is that values are presented in English units, followed by metric units in parenthesis, for example: 6" (152 mm).

Note: temperature readings displayed on the Multi-Heat control panel and used for programming are in Centigrade. A conversion table between Centigrade and Fahrenheit is provided in Appendix A. In this manual temperatures are presented first as degrees Centigrade then as degrees Fahrenheit in parenthesis, for example: 80°C (176°F).

1.3 Installation and Warranty Requirements

Please read this entire manual before installation and use of this Multi-Heat Boiler. Failure to follow these instructions could result in property damage, bodily injury, or death.

Installation must be done in accordance with local ordinances, which may differ from this owner's manual. Contact local building or fire officials before installation about restrictions and installation inspection requirements in your area. This boiler is safety tested and listed. It is not ASME stamped.

This product is provided with a limited warranty which is described in section 7.0 of this manual. The warranty is contingent upon the successful and legal installation of the boiler. At a minimum,

- **The installation, adjustment, start up, service, and maintenance of this product must be performed by a licensed professional heating system installer. Where applicable, the installation must be inspected and accepted by the legally responsible entity.**
- **The instructions in this manual and in supporting documentation (additional instructions, diagrams, and component information provided by Tarm USA, Inc.) must be followed. If the instructions are in conflict with local code requirements, the local code requirements will prevail. When in doubt, contact Tarm USA, Inc.**
- **The manual and supporting documentation must be retained by the owner/ system operator for reference and future use.**
- **The installer is responsible for familiarizing the owner/ system operator with all aspects of boiler operations, safety procedures, monitoring and cleaning requirements, shut down procedures, and annual maintenance requirements.**
- **Conditions described in the text of the warranty for keeping it in force must be followed by the owner/ system operator.**

2.0 Product Description and Requirements for Safe Operation

This section presents a general overview of the boiler and what will be required to operate it safely.

2.1 Boiler Overview

2.1.1 Cut-away View

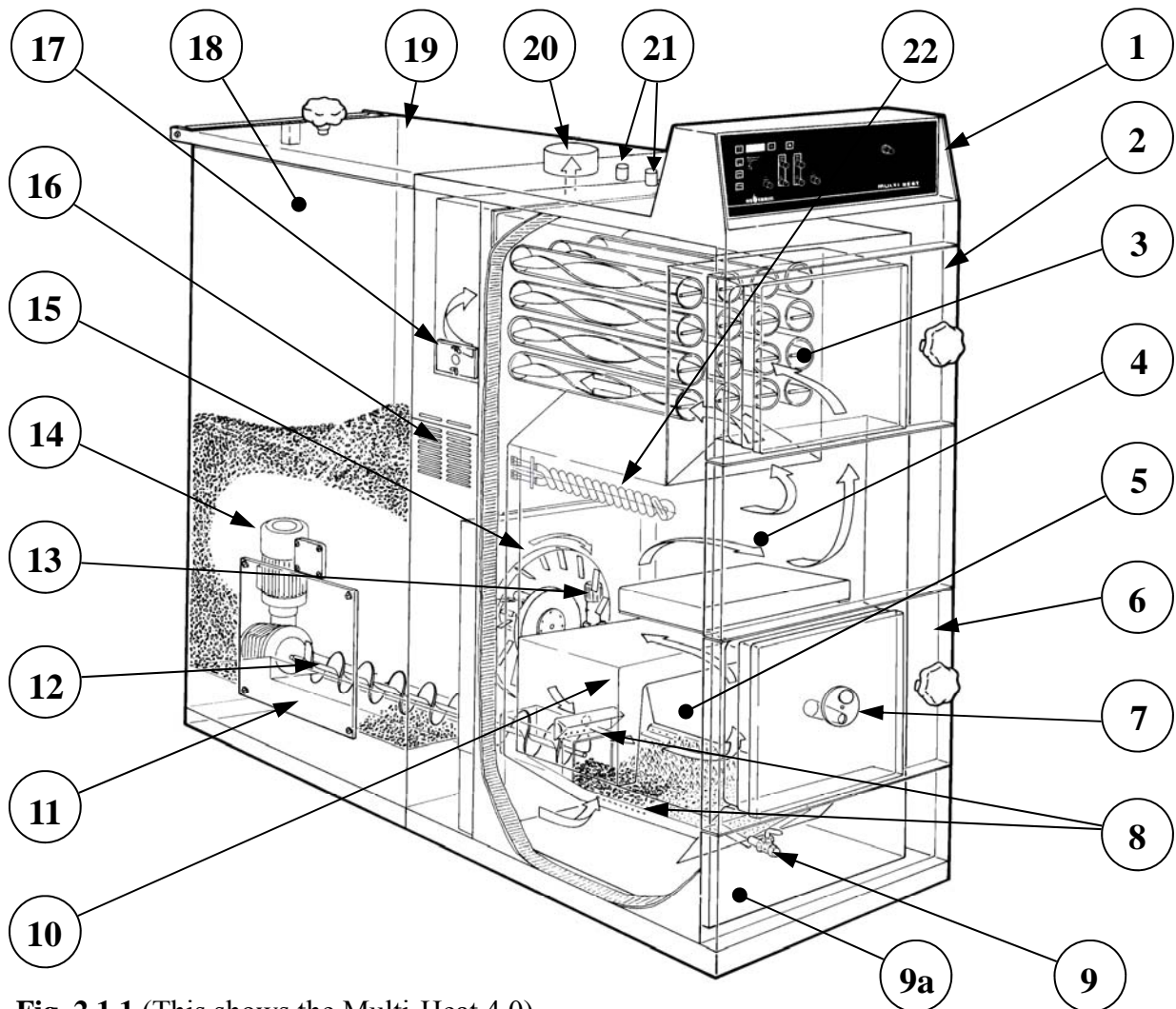


Fig. 2.1.1 (This shows the Multi-Heat 4.0)

- | | |
|---|---|
| 1. Boiler control panel | 10. Combustion chamber refractory |
| 2. Upper cleaning door (reversible) | 11. Cleaning opening (for hopper 2.5 and 4.0 only) |
| 3. Heat exchange tubes and turbulators | 12. Fuel auger (transport the fuel to the combustion area) |
| 4. Combustion area | 13. Burn back safety flood valve |
| 5. Hot combustion area | 14. Auger motor and gearbox |
| 6. Ash door (reversible) | 15. Blower fan |
| 7. Observation flap | 16. Air intake louvers |
| 8. Air apertures for the combustion | 17. Ash cleanout cover (one on each side) |
| 9. Fill/drain connection with valve (on type 2.5 this is placed between the fire box and the hopper) | 18. Fuel storage hopper |
| 9a. Drain plug for air ducts (on type 2.5 this is placed directly over the bottom frame on the right-hand side) | 19. Cover for hopper |
| | 20. Flue gas exhaust collar |
| | 21. Supply and return water connections |
| | 22. Overheat coil |

2.1.2 Boiler Fabrication and Testing

The boiler is supplied fully assembled. Some provided components must be installed in the field near the boiler. After electrical, chimney, and plumbing connections are completed, the boiler can be filled, started, and operated.

The boiler assembly consists of a **boiler body** with a **fuel hopper** (18) bolted to it. Jacket, doors, refractory's, turbulators, blower fan, and overheat coil are preinstalled. The cover door, micro switch, auger, fuel delivery system, auger motor, and gearbox are installed on the hopper.

The control panel is mounted on the top front of the boiler. All sensors and electrical devices are pre-wired to the control panel.

Multi-Heat boilers are designed and built in accordance with European Standard CEN 303-5. Safety and performance testing and listing North American market have been performed by OMNI Test Laboratories, Inc., Beaverton, Oregon. The boiler is tested and listed to applicable UL and other standards. The boiler is not ASME stamped. The boiler should follow local or state installation requirements.

2.1.3 Models and Applications

Three Multi-Heat models are available (the model 1.5, 2.5, and 4.0), covering an output range up to 146,700 Btu/hr. Technical data for each Multi-Heat model is provided in Section 6.1.

The boilers can be utilized as single heat sources, in parallel with other boilers, or in modular (multiple) boiler arrangements (where larger heating requirements exist). Residential and nonresidential applications are appropriate.

2.2 Boiler Function

2.2.1 General Operation

A generalized discussion of fuel stoking and combustion in the Multi-Heat boiler follows. Please refer to the Cut-away View of the Boiler in Section 2.1.1.

The **fuel auger** (12) conveys fuel from the **fuel storage hopper** (18) to the boiler's **combustion area** (4) in pulses of defined duration at preprogrammed intervals.

The **blower fan** (15) supplies air at a programmed intensity, which is ducted directly to the area under the **combustion chamber refractory arch** (10) where combustion occurs.

Hot gases produced by combustion pass upward and through horizontal **heat exchanger tubes** equipped with removable **turbulators**, spiral or zig zag steel inserts which slow the movement of the gases improving heat exchange. Gases are exhausted through the **flue collar** (20) at the top of the boiler.

The **control panel** (1) manages the rate of fuel delivery by the auger and the intensity of the combustion air from the blower fan. Boiler water temperature is monitored and the control panel regulates the combustion rate to keep the temperature near its set-point. Two combustion rates are set (by programming fuel delivery rates and air intensities) and provide a rapid and flexible means of meeting changing heating demands. When the boiler achieves its set-point temperature, the combustion rate is automatically reduced to a lower output rate or a pilot (or standby) level to maintain the fire without increasing water temperature. Programming can be changed seasonally matching heating demand.

2.2.2 Safety Systems

The boiler has internal non-electrical safety systems to prevent damaging equipment in the case that any of three unlikely conditions occur.

- Pressure in the boiler exceeds 30 psi (over-pressure)
- Boiler water temperature exceeds 100 degrees C (over-temperature)
- Burning fuel inside the fuel feed tube through which the auger conveys fuel to the combustion area (burn-back)

To prevent an **over-pressure** condition, a pressure relief valve (provided) installed on the boiler supply piping opens at 30 psi to relieve the boiler pressure.

There are two systems which will activate in **over-temperature** situation. The first system includes a valve with a preset thermal element that opens when it measures boiler water temperature exceeding 100°C, causing cool water to flow through the overheat cooling coil installed in the boiler water jacket, thereby reducing boiler water temperature. The second system is operated by a sensor measuring boiler water temperature (aquastat). When operating temperature exceeds 100°C it stops blower fan and auger operation, interrupting heat production (high temperature reset).

To prevent the boiler from going into **stand-by** for long periods of time, an aquastat (a Honeywell L6006C is provided) is installed to measure return water temperature. This aquastat will activate a heating zone to prevent the boiler from going into stand-by for long periods of time (see page 54).

To extinguish a **burn-back**, a valve with a preset thermal element opens when the temperature at the fuel auger tube exceeds 100 degrees C, causing cool water to flood the auger tube, extinguishing any burning fuel in the tube.

Additional to these safety systems, the control panel continuously monitors various sensors and electrical devices on the boiler. If readings vary from normal settings, the control panel produces audible **alarms**, displays error messages, and may shut the boiler down until the owner/ system operator deals with the condition. See Section 5.1 for a detailed discussion of these conditions.

2.2.3 Accessories

The boiler is shipped with loose and installing parts. See **Section 3.3.1 Receiving the Boiler** for a complete listing of these parts. Cleaning tools are provided with the boiler. An auger extension is provided with models 2.5 and 4.0, for use when burning corn (see page 34).

An **ash hoe** and **ash pan** are available to facilitate ash removal from the boiler. The model 2.5 is provided with two interchangeable ash pans.

A **barometric damper** (draft stabilizer) is available for regulating chimney draft.

Plumbing around the boiler must include a three-port mixing valve in the orientation shown on installation drawing. This valve must be a **Termovar Model 4340A-3** or equal with a 60° C element. Tarm USA Inc provides this valve at extra cost.

An **Automatic Filling Device (AFD)** may be purchased and is required for integrating a bulk fuel storage and conveyance system. The AFD mounts on top of the boiler fuel hopper and has an integral safety fire damper. When fuel inside the hopper is low, the damper automatically opens and the AFD control commands the auger in the fuel conveyance system to deliver fuel into the hopper.

An **Automatic Ash Removal Unit** may be purchased (not available until mid-2008). The unit cycles periodically, conveying ash from the combustion area to an external ash container. Use of the Automatic Ash Removal Unit requires additional clearance on the sides of the boiler.

A **RIB relay** is available. It is required when a boiler circulating pump with a high current draw is wired through the boiler control panel. The RIB relay prevents circulating pump current from passing through the boiler power PC board, where it may cause a fuse to blow, causing the boiler to cease operation until the fuse is replaced.

2.3 Fuels

The boiler has been tested and approved for use with wood pellets and corn. The 1.5 may be used for burning wood pellets only. The 2.5 and 4.0 boilers may be fired with corn, using the auger extension accessory and revised operational settings.

Wood pellets should meet the following specifications:

- Manufactured from pure wood, without additives or synthetic (or chemical) binders
- Dust or sawdust residue maximum: one percent
- Moisture content: <10 %
- Ash content: <3%
- Energy content: approximately 8,200 BTU/ lb (5 KW/ kg)

Corn (maize) should meet the following specifications:

- Kernels only, fuel must be clean and free of cobs, stalks, husks, dirt, and debris
- Moisture content: <15 %
- Energy content: approximately 7,000 BTU/ lb

Poor quality fuel can/will lead to problematic operations and, possibly, unnecessary operational failures. Burning of other solid fuels is not supported by testing and is not encouraged. This practice may result in operating problems and potentially dangerous situations. Do not burn garbage, trash, gasoline, naphtha, oil, fuel oil, other flammable liquids or inappropriate materials (risk of fire, explosion, or equipment damage).

2.4 Building Requirements

- The boiler must be connected to a tile-lined masonry **chimney** or to a factory-built Type UL 103 HT (ULC S629 in Canada) approved chimney in good condition. See the details in Section 3.2.
- A dedicated supply of **fresh combustion** air provided near the boiler is recommended for efficient, safe operation. This supply should not be directly connected to the boiler.
- A pressurized **domestic water supply** must be provided for plumbing to the burn-back suppression system and the overheat cooling coil provided with the boiler.
- A dedicated 240 VAC **power supply is required**. See Section 3.1.5.
- Revision of **existing heating system** piping may be appropriate to properly utilize the equipment. Although Tarm USA, Inc. can provide advice and design detail on the integration of this boiler with the heating system of the building, the ultimate responsibility for the performance of the system rests with the installer.

2.5 Owner Responsibilities

Successful operation of this boiler will require daily involvement by the owner/ system operator. Biomass boilers operate differently from fossil fuel boilers, requiring more oversight and a diligent cleaning regimen.

- The owner/ system operator is responsible for correct operation of the boiler per guidelines in Sections 4.0 and 5.0 of this manual. Circumvention of the guidelines can, among other things, result in a lower efficiency and increased environmental impact, as it may not be possible to achieve the desired flue gas quality levels.
- Incorrect operation can reduce the boiler life.

- It is a precondition that the owner/ system operator has the will and correct attitude for firing with wood pellets or corn. Personal involvement and some work are necessary in order to “harvest the fruits” of this environmentally friendly and economically advantageous form of heating.

Throughout this manual, safety considerations are noted and discussed. A few **general safety considerations** to be considered are:

- Safety faults or deficiencies with the boiler or installation must be rectified as quickly as possible, either by the owner/ system operator or the installer.
- Outlet pipes, ventilation channels, fresh air openings, etc. must not be closed or blocked.
- The water supply for the boilers burn back safety flood device and overheat coil must never be shut off.
- Never use gasoline, gasoline-type lantern fuel, kerosene, charcoal lighter fluid, or similar liquids to start or “freshen up” a fire in this boiler.
- **BOILER IS HOT WHILE IN OPERATION. KEEP CHILDREN, CLOTHING AND FURNITURE AWAY. CONTACT MAY CAUSE SKIN BURNS. DO NOT TOUCH DURING OPERATION.**
- Keep all flammable liquids and combustibles well away from the boiler while it is in use. Do not store fuel or other combustible material within the described installation clearances.

3.0 Boiler Installation & Start-up

This section describes the steps to installing and starting-up the boiler. **This section is directed at the installer.**

3.1 Planning

3.1.1 Sizing the Boiler

The boiler is designed to operate continuously at its rated output. If it will be the only heating source in the building, the boiler should be capable of supplying the building’s total heating load. When plumbed in parallel with a fossil fuel boiler capable of supplying the building’s total heating load it is recommended that the Multi-Heat boiler not be <85% of the total heating load of the building.

NOTE

It is necessary to have a minimum constant load on the boiler when it is operating to prevent it from going into stand-by mode for long periods of time. A constant circulating loop is recommended.

Boiler sizing is the responsibility of the installer. It should be based on a current heat load calculation. Although less desirable, boiler sizing can also be based on historical fuel consumption data from several years. Tarm USA, Inc. bears no responsibility for boiler sizing, but can provide sizing input.

3.1.2 Choosing an Installer

Choosing a competent, licensed installer is critical to the successful installation of the boiler. The installer is responsible for all planning, installation, startup, troubleshooting, owner training, and annual maintenance for the boiler. Some aspects of the system piping, startup, and operation may differ from normal practice in fossil fuel boiler installation. To be successful, the installer must study this manual, follow conceptual drawings and instructions provided, understand the installation tasks, and contact Tarm USA, Inc. for help when necessary. Tarm USA, Inc. will provide phone assistance at no additional cost to assure success.

All boilers must be installed in accordance with national, state and local plumbing, heating and electrical codes and regulations.

3.1.3 Locating the Boiler (Clearances)

DO NOT INSTALL THIS BOILER IN A MOBILE HOME. There is no safe way this boiler can be installed inside a mobile home.

The boiler must be installed with the **minimum installation clearances** to combustible materials outlined below. Clearances may only be reduced by means approved by the regulatory authorities (**also see Positioning Data on page 46**).

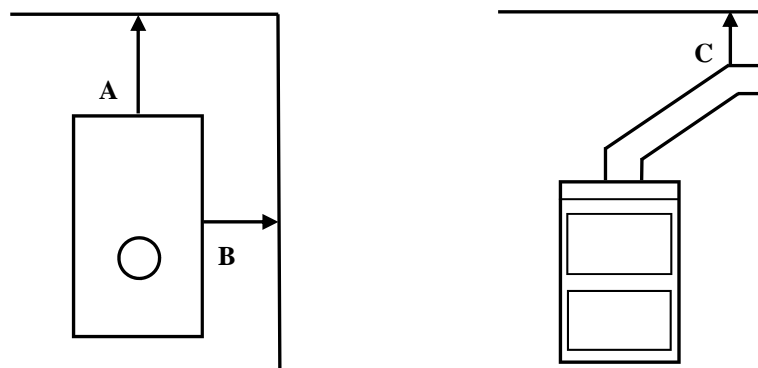


Table 3.1
Clearances to Combustibles

Measurement	Minimum Allowable Distance
A – Backwall to Appliance *	18" (457 mm)
B – Sidewall to Appliance **	6" (152 mm)
C – Combustibles to Pipe	18" (457 mm)
Front of Appliance to Combustibles *	36" (914 mm)
Ceiling to Appliance	18" (457 mm)

* To allow for removal of the feed auger on the Multi-Heat 2.5 and Multi-Heat 4.0 boilers, it is necessary to have 40" (1,016 mm) of clearance either in front of, or to the rear of the boiler.

**A clearance distance of 21" minimum is required on one side of the boiler to perform cleaning and maintenance tasks

*** Sidewall clearances must be increased if use of the automatic ash removal unit is contemplated. Consult Tarm USA, Inc. for additional details.

- The boiler is not suitable for outdoor installation. It must be located in a weather-tight, protected space.
- The boiler must be placed on a level and stable foundation.
- If the floor on which the boiler sits contains combustible material, non-combustible floor protection must be provided a minimum 3/8" (10 mm) thick. It must cover the area under the appliance and the installation clearance area outlined above. Floor protection must also cover the area under the chimney connector and extend at least 2" (50mm) on either side.
- Consider the logistics of delivering fuel to the boiler when choosing a boiler location.
- It is important that enough space be available to ensure that the fuel auger can be removed for service or replacement. For the 1.5 it is necessary to have a minimum clear space of 15" (381 mm) behind the boiler to allow removal of the fuel auger. (If there is insufficient space for this, the fuel auger on the 1.5 can be taken up through the hopper, by first leading the fuel auger 7" (178 mm) further back than the gear motor, and then leading the fuel auger up through the hopper.)

- On the 2.5 and 4.0, the fuel auger can be taken out at either end, and requires 40" (1,016 mm) of clearance either in front or at the rear of the boiler.
- If the boiler is placed in a room nearby inhabited rooms, so that flue gas can easily penetrate into these rooms, a carbon monoxide alarm must be installed that can give a warning regarding possible escapes of carbon monoxide into the inhabited rooms.

3.1.4 Plumbing & Mechanical

The boiler must be connected to a suitable **chimney**. Chimney requirements are discussed in Section 3.2.

A dedicated supply of fresh **combustion air** should be provided near the boiler for efficient and safe operation, but should not be directly connected to the boiler.

A permanent or un-valved pressurized domestic **cold water supply** must be provided for the burn-back safety system and the overheat cooling coil.

For the **heating system piping**, it is possible to use either copper or iron piping materials. The supply and return pipe should be insulated to avoid heat loss. Tarm USA, Inc. can provide conceptual piping diagrams showing the correct layout for a variety of situations.

Use of a suitable **antifreeze mix** is allowed, but will cause a loss in heat transfer efficiency.

If **water quality** is poor, water treatment additives should be considered. Boiler system water pH should be 8.0-8.6.

CAUTION

☀ Any plastic or rubber tubing used with a Tarm boiler must have an **oxygen barrier**, or boiler corrosion will occur. If radiant tubing without an oxygen barrier is installed, water in the tubing part of the heating system must be separated from the boiler. Separation of system components is typically done by using a heat exchanger. Use of radiant tubing without an oxygen barrier will void the boiler warranty.

A **thermostatic mixing valve**, set to open at 60° C, is required to temper return water to prevent cold return water from reaching the boiler. This valve helps prevent boiler corrosion. Tarm USA, Inc. can provide this valve (part # K4340A3), at an additional cost.

An **aquastat** (Honeywell L6006C (provided)) should be installed to sense periods of low heating system load by measuring return water temperature. This aquastat will activate a heating zone to prevent the boiler from going into stand-by for extended periods of time.

An independent **circulating pump** (not provided), either always-on or powered through the boiler control panel with a relay, is required to circulate water continuously through the boiler during operation.

CAUTION

☀ Certain circulating pumps with higher current draw have caused fuse F1 on the Multi-Heat power PC board (see page 25) to blow. This problem can be avoided by wiring the circulator pump through a **RIB type relay** (Functional Devices product # RIBUIC or equal) (available at additional cost from Tarm USA, Inc.). Connect the coil side (120V) to the boiler terminal block. Provide the 120V supply through the normally-open (NO) relay contact to the circulator (see page 51 for wiring diagram).

3.1.5 Electrical

240 VAC, 60 hertz, 4-wire power supply is required. If building power is lower (208 VAC, for example), a boosting transformer should be installed to correct the voltage. This electrical connection should be from a dedicated 15 amp, double-pole circuit breaker.

An external alarm with its own electrical supply (24 V – 3 amp maximum) can be connected to terminal 11 and 12 on Terminal Block J5 on the Power PC Board inside the boiler control panel (see electrical diagram). These terminals provide a switching function only. They are connected to a “normally open” set of contacts and are not powered. These contacts close on any boiler alarm. This feature can be used to provide **remote indication** that an alarm has occurred.

Locally enforced electrical codes must be followed.

3.2 Preparing the Chimney

- The boiler must be connected to a tile-lined chimney or to a Factory-Built Type UL 103 **HT** (ULC S629 in Canada) approved chimney. The chimney must be in good condition. No other appliance should be connected to this flue unless allowed by the local code authority. Consult your local inspector for chimney requirements and install the boiler in accordance with all applicable codes.
- If corn burning is contemplated, use of higher grade stainless steel (a grade of 316 or higher is recommended).
- Follow manufacturer’s installation instructions for installing and supporting any specific chimney product.
- Flue gas exhaust temperatures can be low enough to cause condensation in chimneys. Condensation will, over time, damage a masonry chimney. Accordingly, installation of a stainless steel chimney liner (such as 316 or AL-294C) inside the chimney flue is strongly recommended.
- The boiler has a built-in combustion blower fan. Therefore only small demands are made on the chimney draft. A 5” (127 mm) diameter flue is required for the 1.5. A 6” (152 mm) diameter flue is required for the 2.5 and 4.0.
- At the connection to a factory-built chimney, a dripless adaptor must be used.
- The chimney draft must be stable and between 0.025” (0.6 mm) and 0.05” (1.25 mm) water column.
- The top of chimney must be 3’ above roof and 2’ above any portion of the roof within 10’ measured horizontally.

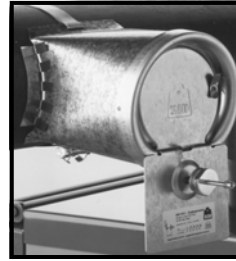
Strong winds or a high chimney can cause excessive chimney draft, > 0.05” (1.25 mm) water column or an unstable draft. The solution to an unstable or high chimney draft is to install a **barometric damper** (draft regulator) to control the chimney draft at around 0.025” (0.6 mm) to 0.05” (1.25 mm) water column. A stable, properly regulated chimney draft also reduces the risk of burn-back in the fuel hopper of the boiler. Tarm USA, Inc. can provide a suitable barometric damper as an accessory to the boiler.

Installation requirements for a barometric damper (draft regulator):

- The diameter of the draft regulator must be equal or greater than that of the chimney connector.
- The draft regulator should be installed as close as possible to the boiler, on the chimney connection or on chimney itself.
- The draft regulator adjustment should be made with a vacuum gauge, if possible, with the boiler operating at full output. If the startup is made in warm weather, a readjustment may be necessary in cold weather.
- If, at the maximum adjustment (maximum opening of the shutter of the draft stabilizer), the draft is always higher than 0.05" (1.25 mm) of water column, a second draft regulator may be required.



Barometric damper
on vertical chimney



Barometric damper on
horizontal chimney

3.3 Setting the Boiler

3.3.1 Receiving the Boiler

Boilers are shipped on a single skid. Loose materials are consolidated into boxes strapped to the skid or placed inside the combustion area or hopper of the boiler.

Please unpack the boiler and boxes and verify that the items on the checklist have been supplied with the boiler (separate check lists for the 1.5, 2.5 and 4.0 boilers are provided below). Make certain that any damage or shortage is noted on the shipping receiver.

Multi-Heat 1.5 Boiler Kit Checklist			
Item Description	Part Number	Quantity	Included
Multi-Heat 1.5 Boiler	MH15200	1	
Multi-Heat series Manual	MHMANUAL	1	
Flue Collar Adaptor 5"	TFCA5MH	1	
Boiler Pressure Relief valve-30psi/525K BTU	1040705	1	
AMTEK Pressure/ Temperature Indicator	PT1088	1	
Boiler Connection Kit			
Honeywell aquastat L6006C	L6006C	1	
Unipac Hemp & Pipe Dope Thread Kit	089089	1	
Coupling Steel 1" BST	3412BB	2	
Tee Steel 1"		1	
Reducer Steel 1" x 3/4"		1	
Conex 18mm compression x 1/2" FIP Adaptor Elbow	122035	2	
"Y" Strainer Brass 1/2" x 1/2" BST		1	
Overheat Coil Assembly Kit			
Thermal Safety Drain Valve		1	
Stainless Steel Tubing 18mm approx. 14 1/4"		1	
Stainless Steel Tubing 18mm approx. 5 3/4"		1	
Sensor well 1/2"		1	
Sensor Well Mounting Plate		1	
Nipple Steel 3/4" x 1 1/2"		1	
Elbow Steel 3/4" x 3/4"		1	
Conex 18mm Compression x 3/4" BST Elbow		1	
Conex 18mm Compression x 3/4" BST		1	
Pressure Tank Kit			
Pressure Tank 24 liter		1	
Tee Steel 3/4"		1	
Check Valve Brass 3/4"		1	
Nipple Steel 3/4" x 4 3/4"		1	
Cleaning Tools			
Cleaning Brush	210201	1	
Ash Shovel	009496	1	
Turbulator Spin Handle	091589	1	

Multi-Heat 2.5 Boiler Kit Checklist			
Item Description	Part Number	Quantity	Included
Multi-Heat 2.5 Boiler	MH25360	1	
Multi-Heat series Manual	MHMANUAL	1	
Flue Collar Adaptor 6"	TFCA6MH	1	
Boiler Pressure Relief valve-30psi/525K BTU	1040705	1	
AMTEK Pressure/ Temperature Indicator	PT1088	1	
Fuel Auger Extension (for use with corn)	023095	2	
Boiler Connection Kit			
Honeywell aquastat L6006C	L6006C	1	
Unipac Hemp & Pipe Dope Thread Kit	089089	1	
Coupling Steel 1" BST	3412BB	2	
Tee Steel 1"		1	
Reducer Steel 1" x 3/4"		1	
Conex 18mm compression x 1/2" FIP Adaptor Elbow	122035	2	
Overheat Coil Assembly Kit			
Thermal Safety Drain Valve with Well		1	
Stainless Steel Tubing 18mm approx. 15 1/2"		1	
Stainless Steel Tubing 18mm approx. 7 1/2"		1	
Sensor Well Mounting Plate		1	
Nipple Steel 3/4" x 1 1/2"		1	
Elbow Steel 3/4" x 3/4"		1	
Conex 18mm Compression x 3/4" BST Elbow		1	
Conex 18mm Compression x 3/4" BST		1	
Pressure Tank Kit			
Pressure Tank 24 liter		1	
Tee Steel 3/4"		1	
Check Valve Brass 3/4"		1	
Nipple Steel 3/4" x 4 3/4"		1	
Cleaning Tools			
Cleaning Brush 2 1/2"	092496	1	
Clean Out Shovel	089401	1	
Clean Out Brush	210204	1	
Ash Shovel	009496	1	
Ashpan	089402	2	

Multi-Heat 4.0 Boiler Kit Checklist			
Item Description	Part Number	Quantity	Included
Multi-Heat 4.0 Boiler	MH40360	1	
Multi-Heat series Manual	MHMANUAL	1	
Flue Collar Adaptor 6"	TFCA6MH	1	
Boiler Pressure Relief valve-30psi/525K BTU	1040705	1	
AMTEK Pressure/ Temperature Indicator	PT1088	1	
Fuel Auger Extension (for use with corn)	023095	1	
Boiler Connection Kit			
Honeywell aquastat L6006C	L6006C	1	
Unipac Hemp & Pipe Dope Thread Kit	089089	1	
Coupling Steel 1" BST	3412BB	2	
Tee Steel 1"		1	
Reducer Steel 1" x 3/4"		1	
Conex 18mm compression x 1/2" FIP Adaptor Elbow	122035	2	
Pressure Tank Kit			
Pressure Tank 24 liter		1	
Tee Steel 3/4"		1	
Check Valve Brass 3/4"		1	
Nipple Steel 3/4" x 4 3/4"		1	
Cleaning Tools			
Clean Out Brush	210204	1	
Ash Shovel	009496	1	
Turbulator Spin Handle	091589	1	

Please contact your dealer or Tarm USA, Inc. immediately if any of the above items are missing! Tarm USA, Inc. reserves the right to substitute equivalent equipment for any of the accessories listed above.

3.3.2 Moving the Boiler

See Section 6.1 Technical Data for weights and measurements of the boiler. **The boiler is heavy and large.** Moving it into place requires planning and resources. The boiler may be unloaded using a pallet jack or forklift. Alternatively, it can be lifted from above by inserting a lifting bolt in holes provided in the flue gas exhaust collar (**Fig. 3.1**).

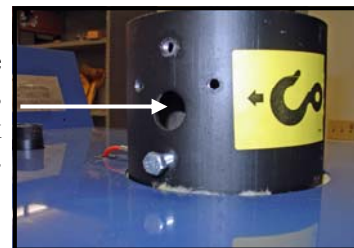


Fig. 3.1

WARNING



Note that the center of gravity is NOT the center of the skid.

3.3.3 Boiler Set-up

After the packaging is removed and the boiler is set into place, it should be checked to assure that all bolts and fittings are tight, gaskets are secure and undamaged, and cabling is undamaged and connected. Loose parts and accessories shipped with the boiler should be removed and stored in a safe place. A copy of this manual is shipped with the boiler for reference during installation. The boiler can be set using leveling bolts located on each corner (**see fig. 3.2**) (accessed in front by removing the lower cover on the 4.0 or opening the lower door on the 2.5) and in the center (accessed by removing



Fig. 3.2

Rear

Front

Side

After positioning the boiler, **remove and discard the wood wedges** which hold the refractory blocks in place (**Fig. 3.3**). Make sure the refractory blocks are in their correct operating position. Push the turbulators fully into the heat exchange tubes. Remove all loose material and debris from the hopper and verify that the auger can turn freely.

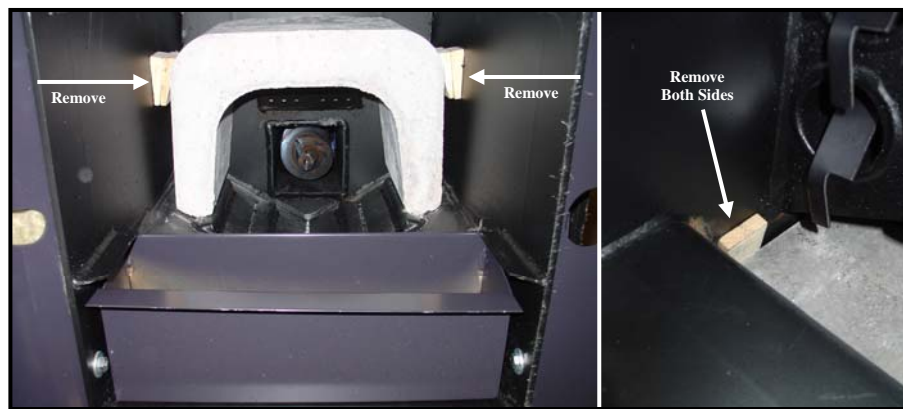


Fig. 3.3

Arch

Upper Flue Tile

3.4 Connections to the Boiler

The following connections must be made to the boiler, in order for it to function:

- The boiler flue gas exhaust collar must be connected to the chimney system, using the flue adapter provided.
- The heating system piping must be connected to the boiler supply and return connections.
- Domestic cold water (pressurized) must be supplied to the burn back safety tank, from the tank to the burn-back safety valve, and to the overheat coil in the boiler.
- Electrical power must be provided at the boiler electrical terminal box.

3.4.1 Chimney Connection

CAUTION

- ☀ Do not install a flue damper in the exhaust venting system of this unit.
- ☀ Do not connect this unit to a chimney flue serving another heating appliance, unless approved by the local code authority.
- ☀ Do not connect the boiler to any air distribution duct or system.
- ☀ Install vent at clearances specified by the vent manufacturer.

The connection between the boiler and the chimney system should be single wall **stainless steel**, minimum 24 MSG, unless prohibited by the local code authority. If burning corn is contemplated, it is recommended that higher grade stainless steel be used (such as grade 316 or higher).

- The single wall chimney connector must not pass through an attic, roof space, closet or similar concealed space, or a floor, or ceiling.
- Where passage through a wall or partition of combustible construction is desired, the installation must conform to NFPA 211 or to Canadian CAN/CSA B365.
- The chimney connection pipe must be placed over the outside of the boiler's flue gas exhaust collar. A boiler flue with an internal dimension of 5.1" (130mm) or 5.9" (150 mm) respectively is used – see technical data in Section 6.1.
 - Multi-Heat 1.5 requires use of the 5-inch (127 mm) diameter Flue Collar Adapter, (provided with the boiler) (Part # TFCA5MH), to adapt the flue gas exhaust collar to 5-inch chimney pipe (See Fig. 3.4).
 - Multi-Heat 2.5 and 4.0 require use of the 6" (152 mm) diameter Flue Collar Adaptor, (provided with the boiler) (Part Number TFCA6MH), to adapt the flue gas exhaust collar to 6" chimney connector (See Fig. 3.4).
- The chimney connector sections must be attached to the boiler and to each other with the crimped (male) end pointing toward the boiler. All joints, including the connection at the boiler collar, must be secured with three sheet metal screws.
- A barometric regulator (draft damper) should be incorporated into the connector.



Flue Collar Adaptor

Smoke Temperature Sensor

Fig. 3.4

3.4.2 Supply and Return Connections

It is important to note that the boiler supply and return connections (size: 1”) at the top of the boiler are British Straight Thread (BST). BST threat pitch is the same as the NPT pitch used in North America but does not incorporate a taper to the thread. To properly adapt between the BST on the boiler and NPT on the heating system piping, Two 1inch BST threaded couplings (part # 3412BB)(**Fig. 3.5**) and a Unipak Hemp & Pipe Dope Thread Kit (part no# 089089)(**Fig. 3.6**) have been provided with the boiler.

Direction for use of the Unipak Hemp & Pipe Dope Thread Kit that is used to fill the taper between BST and NPT:

- Squeeze a “line” of Unipak jointing paste out on the external thread and spread it smoothly. The “hollows” of the thread must be filled with jointing paste;
- Pull out a suitable length of the packing yarn.
- Wind the packing yarn smoothly and tight on the BST connection from the inner most part of the pipe end in the thread direction. The thread should be filled with the packing yarn so that the tops of the threads are still visible. A thin layer of jointing paste is used in order to cover the packing yarn. Packing yarn must not cover the end of the pipe,
- Piping and fittings can be joined right away and the system can be used. The use of Unipak jointing paste and yarn allows adjusting of fittings and pipes. Residual jointing paste and yarn on the pipes can be removed by wiping with a rag or wire brush.

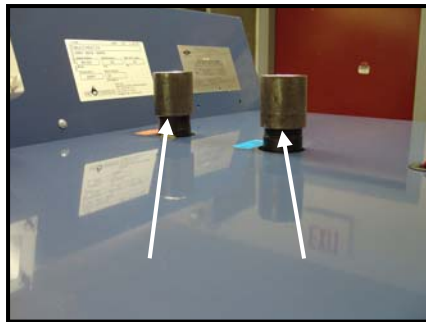


Fig. 3.5

1” BST Threaded Couplings



Fig. 3.6

Unipak Hemp & Pipe Dope Thread Kit

3.4.3 Boiler Safety Drain Valve Connections

The Multi-Heat boiler has two SYR Valve safety devices that need to be connected to a cold water feed and drain. On the Multi-Heat 1.5 and 2.5 this is accomplished by two connections (**Fig. 3.8 and 3.9**). On the Multi-Heat 4.0 there is one connection (**Fig. 3.11 and 3.12**). These connections can be done on either the left or the right hand side of the boiler. On the 1.5 and 2.5 conex compression elbows (part # 122035) are used to connect the water supply to the over-heat cooling coil on the front of the boiler. A Tank is supplied to guarantee a supply of water to the burn-back protection during a power outage. It needs to be installed as per diagram **Fig. 3.7 or Fig. 3.10**. A check valve also needs to be installed (**Fig. 3.7 and 3.10**). A Y-strainer should be installed on the Multi-Heat 1.5 and 2.5 coil connections to prevent sediment from damaging the SYR valve. This can be purchased from Tarm (Tarm part # FY32T2011). There is a y-strainer pre-installed on the Multi-Heat 4.0 (**Fig. 3.7**).

Model 1.5 and 2.5 Boiler Safety Drain Connections

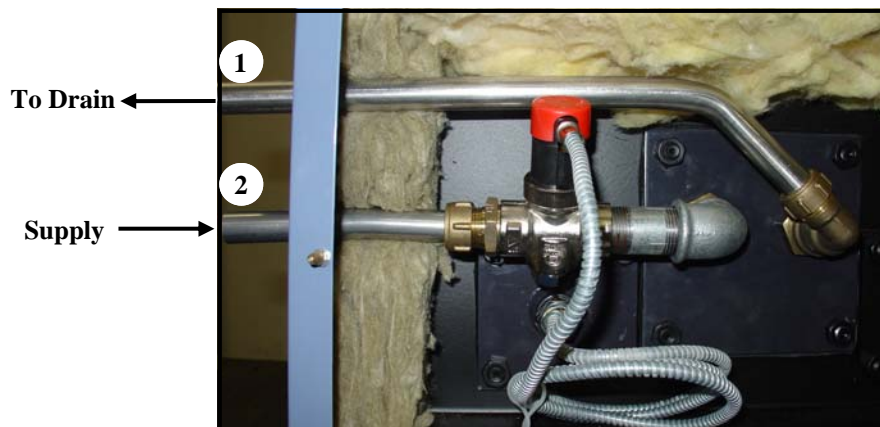
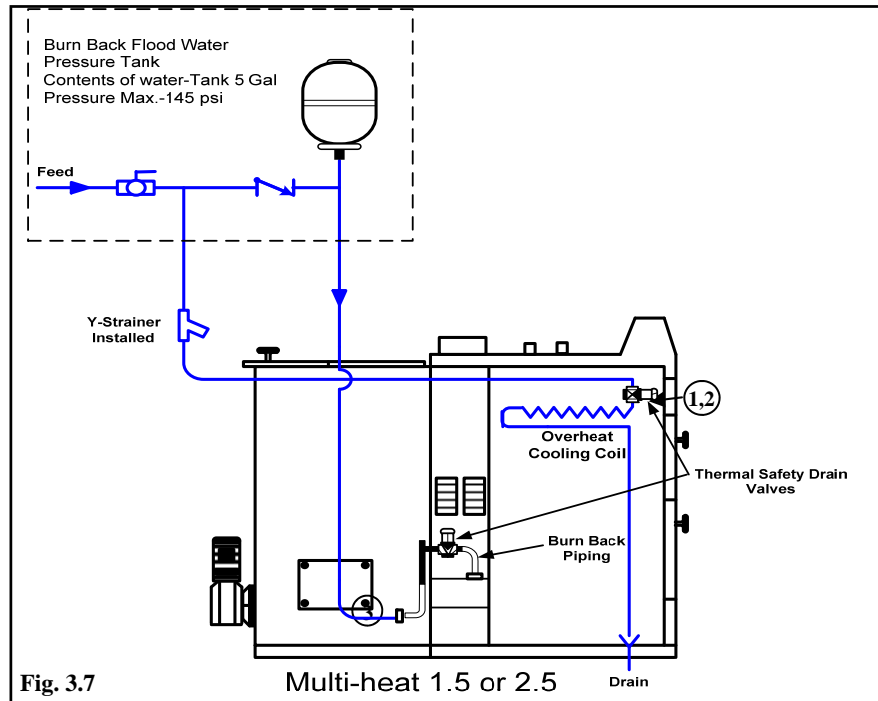


Fig. 3.8 Installed Thermal Safety Drain Valve for Overheat Coil

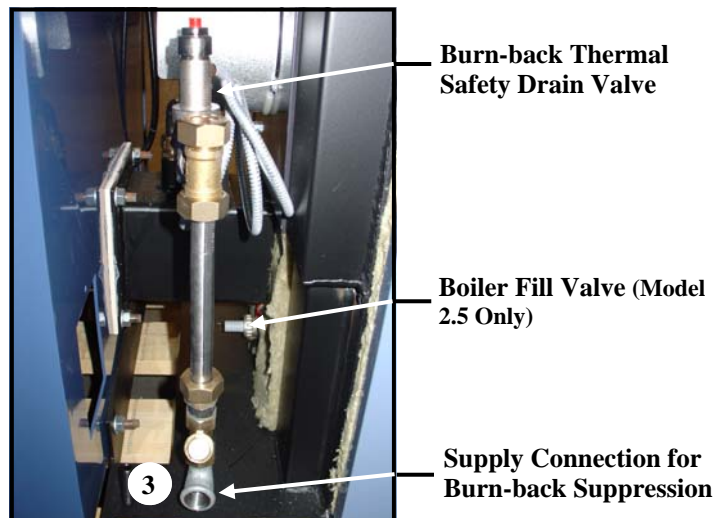
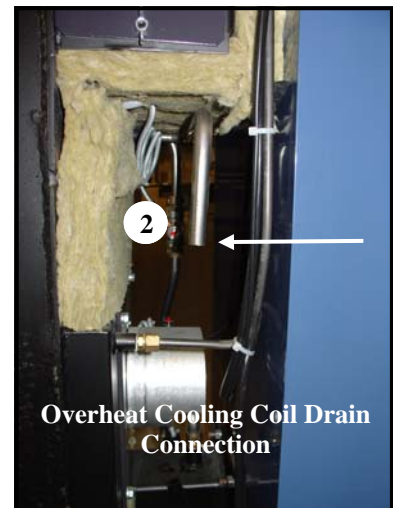
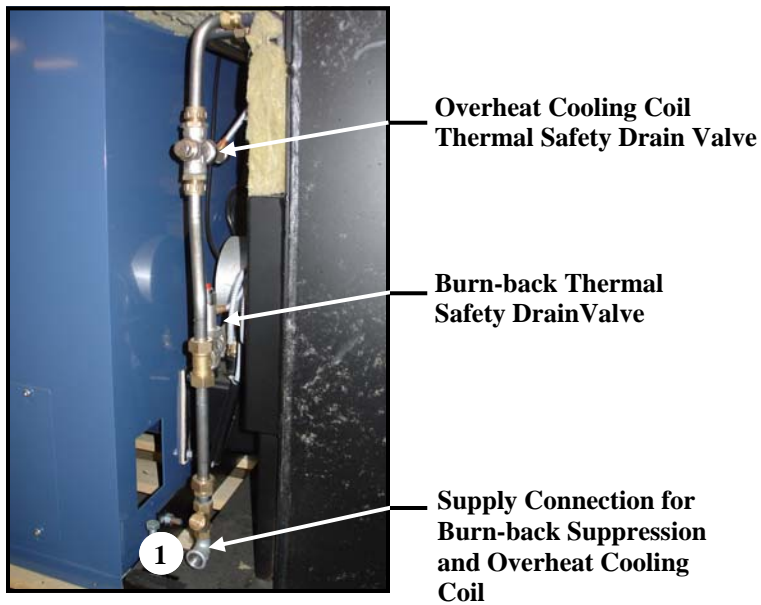
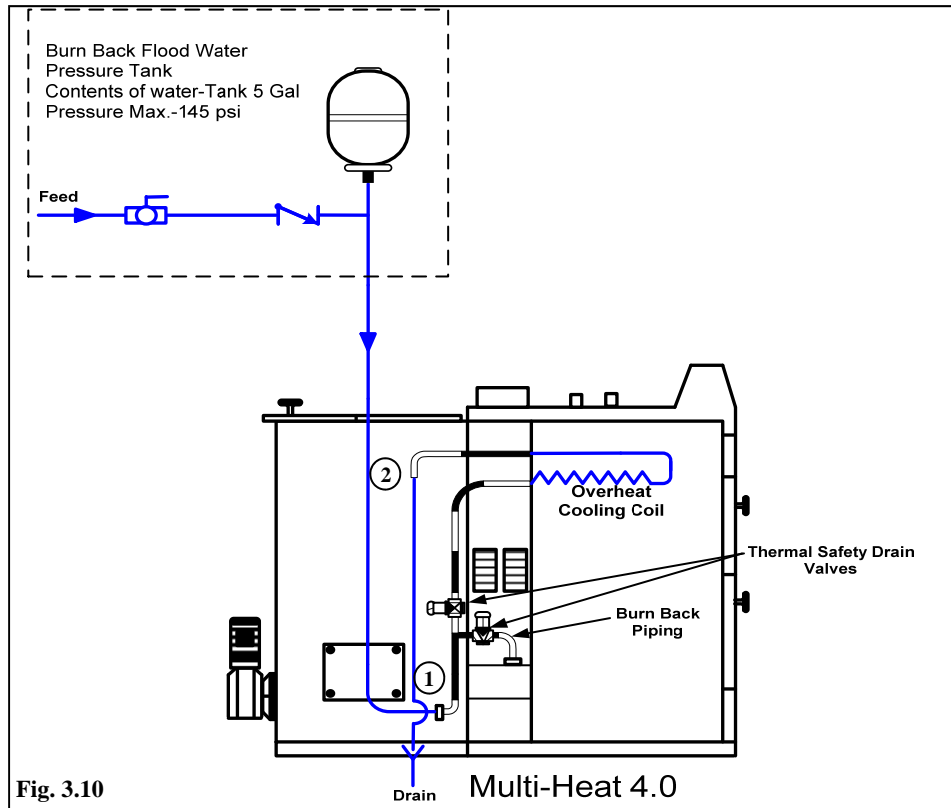
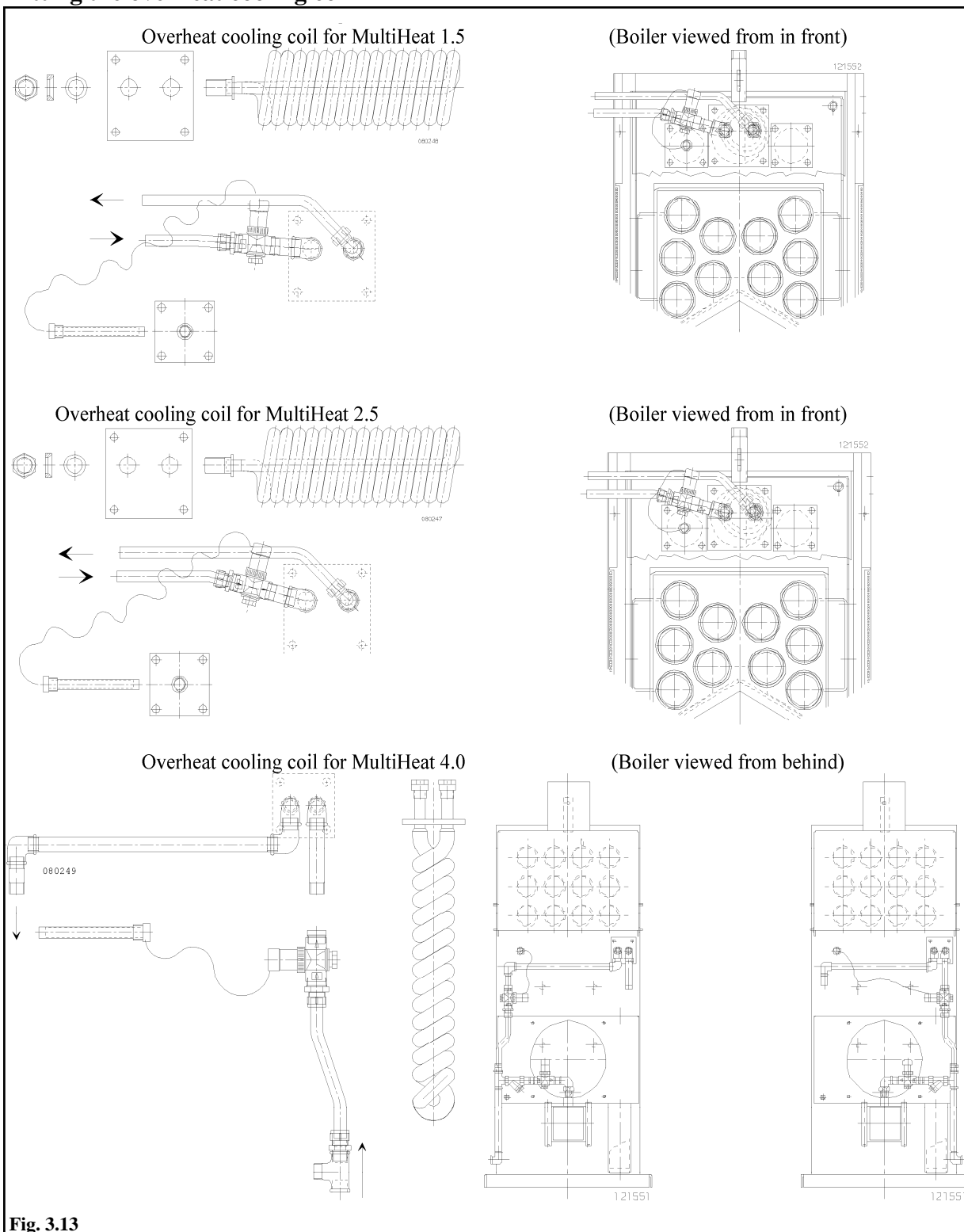


Fig. 3.9

Model 4.0 Boiler Safety Drain Connections



Fitting the overheat cooling coil



3.4.4 Electrical Connections

Electrical connections to the boiler are made on Block X8 in the electrical junction box located on the rear of the boiler control panel (**Fig. 3.14**). See the connection diagram in Section 6.3. L1 and L2 are the two “hot” power legs, N is neutral and Point 4 is for the ground wire.

The boiler circulator pump C-1 (120 volt) can be connected on Block X9 in the junction box through a RIB type relay (**Fig.6.6**). Connecting the circulator directly to the boiler could cause high current draw on the boiler’s power board. **Fig. 3.15** shows a RIB relay mounted to the boiler’s electrical junction box.

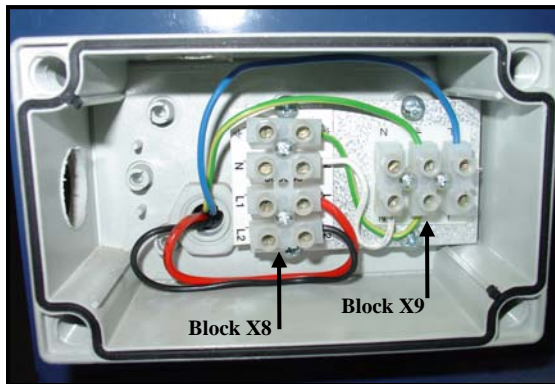


Fig. 3.14 Electrical Junction Box



Fig. 3.15 Mounted RIB Relay

3.5 Heating System Plumbing and Testing

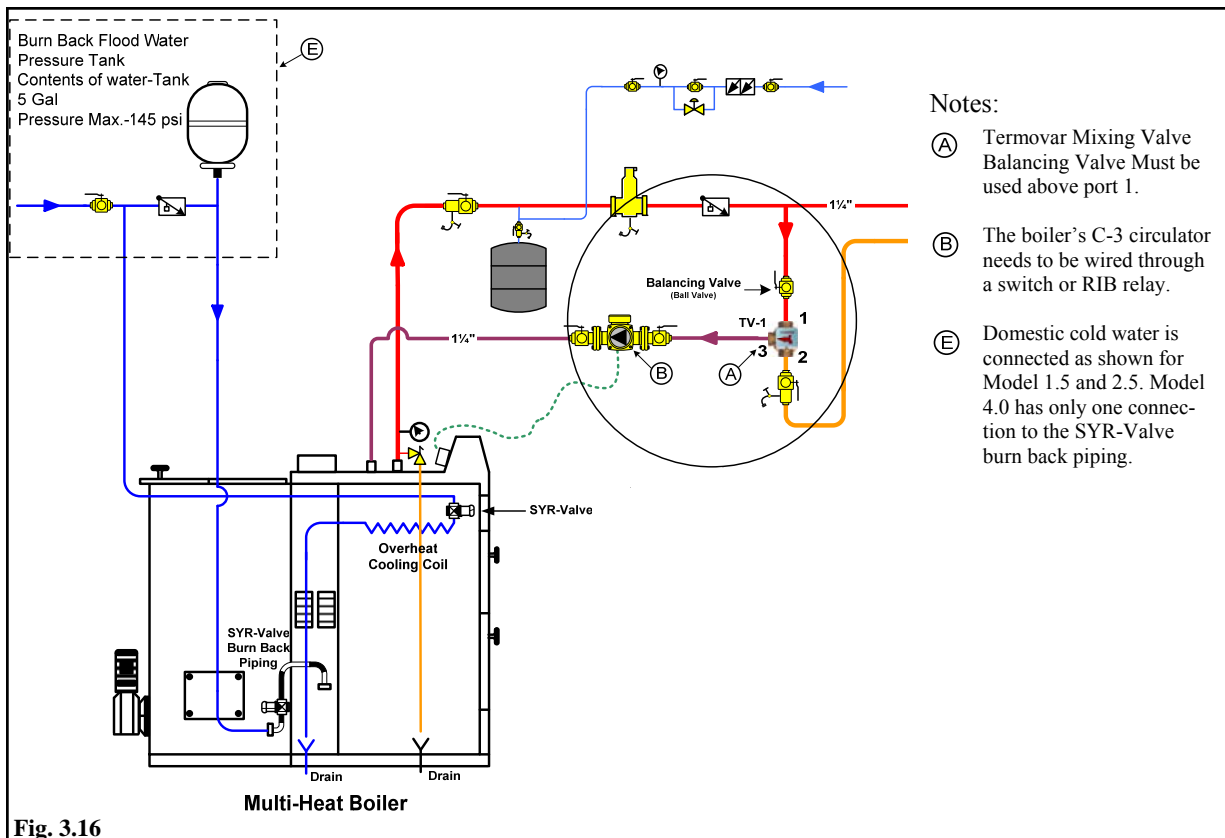


Fig. 3.16

* Complete plumbing diagrams are located on page 54 and 55.

The temperature/ pressure indicator (provided, part # PT1088), boiler pressure relief valve (provided, part # 1040705), thermostatic mixing valve (accessory, part # K4340A3) TV-1, and boiler circulator C-1 (not provided) should be incorporated in the heating system piping exactly as shown (**Fig. 3.16**). The ball valve (not provided) upstream of Port 1 of valve TV-1 should be set at half open (and the handle removed), in order for the tempering loop to function correctly. If accessory K4340A3 Tervoclar mixing valve is provided for use as TV-1, the unions supplied with the valve have internal ball valves which must be fully open.

The Burn-back Flood Water Safety Tank (provided, part # 142100) should be mounted as per **Fig. 3.7 and Fig. 3.10**. The domestic cold water supply piping for the Overheat Cooling Coil and burn-back system must be connected exactly as shown. The supply tap teed off upstream of the line check valve is connected to the thermal valve upstream of the overheat cooling coil. The downstream tap is connected to the thermal valve upstream of the burn-back connection to the auger tube. See the diagram on page 20 (**Fig. 3.13**).

CAUTION

☀ It is important to back flush the burn back plumbing after installation to remove any debris that may be in the system that could prevent operation of the safety flood valve. This includes checking the Y-strainer.

NOTE

The heating system main supply and return piping will need to be at least 1.25" (32 mm) for correct boiler heat output distribution. All field-run piping should be back-flushed to clean and remove debris. Adequate filling and venting ports should be added so that air can be removed from the system. The system should be pressure tested before being placed into service.

3.6 Filling and Venting

If water quality is poor or pH unsatisfactory, the installer should consider water treatment additives during filling and water testing as part of annual maintenance.

The connection for filling the boiler with water (**Fig. 3.17 and 3.18**) is, for the 1.5 and 4.0, situated behind the bottom front jacket panel. For the 2.5, the fill/ drain connection is situated between the fuel hopper and the boiler body. During filling the circulation pump is switched off. Filling takes place through a hose which is screwed onto the fill faucet and connected to a water supply faucet. Fill the hose with water prior to filling the boiler, otherwise air in the hose will be pushed into the boiler system. Remove the hose after filling up. High quality air elimination equipment is recommended in the heating system installation.



Fig. 3.17 Fill Valve Model 2.5



Fig. 3.18 Fill Valve Models 1.5 & 4.0

3.7 Boiler Programming

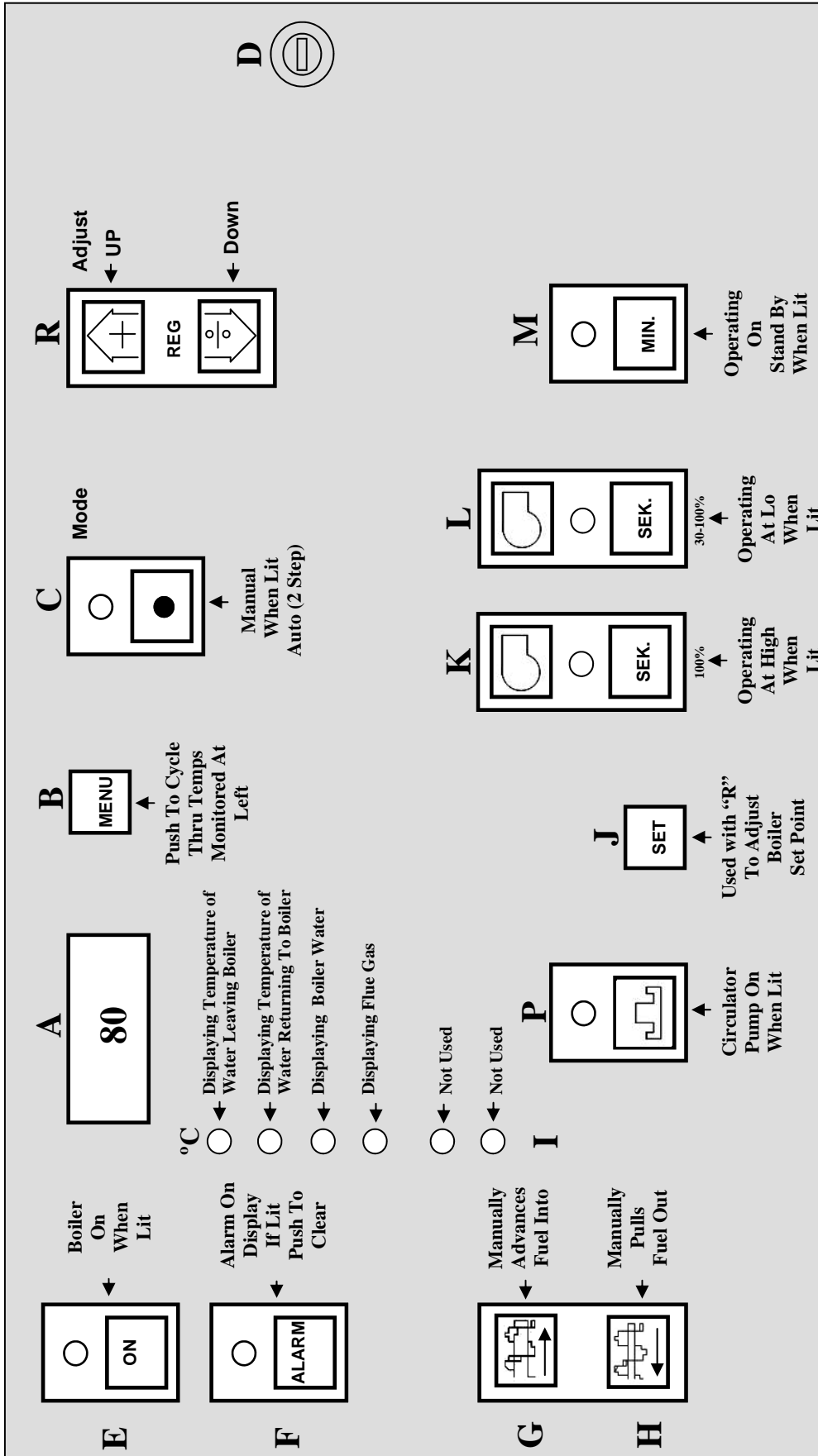


Fig 3.19

Fig 3.19

	Page		Page		Page
A. Display.....	30	F. Alarm reset-cancel alarm.....	32	K. High output.....	31
B. MENU button.....	29	G. Manual worm conveyor/auger-forwards.....	29	L. Low output.....	31
C. Mode of Operation.....	30	H. Manual worm conveyor/auger-backwards.....	29	M. Firing on standby (pilot burn).....	31
D. Overheat aquastat/circuit breaker.....	32	I. Light diodes.....		N. Circulator pump switch.....	32
E. ON/OFF button-ignite/extinguish.....	29	J. SET=boiler temperature.....	29	O. REG (regulation adjustment).....	29

Boiler programming is reviewed and modified from the face of the control panel. Refer to **Figure 3.19** on page 23 for the orientation of the buttons described in the following sections. There are two separately addressed menus of **background programming**, which are discussed in the following sections, and a menu of **operational programming**, which is discussed in Section 4.3.

NOTE

All programming values set at the factory must be reviewed by the installer, and corrected to the values in this manual, if necessary, before the boiler is fired.

Note: Temperature values displayed at the control panel are in degrees Centigrade.

3.7.1 BACKGROUND INSTALLATION MENU PROGRAMMING

Background Programming **INSTALLATION MENU** is addressed and reviewed as follows:

- With power connected to the boiler and on, switch the ON/ OFF Button (E) to OFF.
- Press and hold down simultaneously for several seconds the ALARM RESET (F) and MENU (B) buttons.
- The **INSTALLATION MENU**, starting with the PROM version code, will appear on the control panel display (A).

The programming is now ready for review. Each time the MENU (B) button is pushed, a different program value on the list is displayed in sequence. The sequence is repeated after the last value on the list is displayed. Settings can be changed by displaying the appropriate program value and then pressing the + or – (note the minus symbol on the control panel is shown as “÷”) on the REG (R) button to change the value.

To save a new value, you must have stepped to the next program value with the MENU (B) button. When all values are set correctly, they are stored by pressing the ON/ OFF button (E). If you do not wish to save the new values entered, you can revert to previous values by pressing the ALARM RESET (F) button instead.

Table 3.2 Background Programming Installation Parameters			
	PARAMETER	MEANING	
	(XXX)	PROM version installed (107, 108 or 110). This value cannot be changed. Means release 1 version 07, 08, or 10. (Factory settings are the same in all versions).* If the Prom is version 104, please refer to appendix C.	
	(HXX)	Minimum time allowed (in seconds) between auger pulses. Range of settings is 10-30 seconds. CAUTION: this value effects maximum boiler output.	
	(LXX)	Maximum time allowed (in seconds) between auger pulses. Range of values is 30-60 seconds. CAUTION: this value effects minimum boiler output.	
	(bXX)	Maximum allowed fan intensity (in % of maximum output). Range of values is 30-99%	
	(rXX)	Not used in North America. CAUTION: KEEP THIS VALUE AT THE FACTORY SETTING.	

The correct settings for these parameters are shown below.

Table 3.3 Background Programming Installation Values				
MODEL	(HXX)	(LXX)	(bXX)	(rXX)
MH 1.5	H18= 18 seconds	L60= 60 seconds	b30= 30%	r00
MH 2.5	H20= 20 seconds	L50= 50 seconds	b52= 52%	r00
MH 4.0	H26= 26 seconds	L60= 60 seconds	B92= 92%	r00

3.7.2 Background OPERATION MENU Programming

Background Programming **OPERATION MENU** is addressed and reviewed as follows:

- With power connected to the boiler and on, switch the ON/ OFF Button (E) to OFF.
- Press and hold down simultaneously for several seconds the ALARM RESET (F) and OPERATION MODE (C) buttons.
- The OPERATIONS MENU, starting with three horizontal lines, will appear on the control panel display (A).

The programming is now ready for review. Each time the OPERATION MODE (C) button is pushed, a different program value on the list is displayed in sequence. The sequence is repeated after the last value on the list is displayed. Settings can be changed by displaying the appropriate program value and then pressing the + or – (note the minus symbol on the control panel is shown as “÷”) on the REG (R) button to change the value.

When programming is completed, the new values are saved by pressing the ON/ OFF (E) button. To save a new value, you must have stepped to the next program value with the OPERATION MODE (C) button. If you do not wish to save the new values entered, you can revert to previous values by pressing the ALARM RESET (F) button.

Table 3.4 Background Programming Operational Parameters			
	PARAMETER	MEANING	
	(-XX)	Minimum intensity for the blower (in percent of maximum output). The correct setting is (-20)=20%. Possible settings are 10-20-30-40-50.	
	(HX.X)	Auger running time (duration of an auger pulse in seconds) in high output mode. The correct settings for each model are given in the table below. Possible settings are 0.1 - 6.0 seconds.	
	(LX.X)	Auger running time (duration of an auger pulse in seconds) in low output mode. The correct settings for each model are given in the table below. Possible settings are 0.1 - 6.0 seconds.	
	(PXX)	Blower running time in seconds (with maximum air quantity) in standby (or pilot burn) mode. The correct setting is (P05) = 5 seconds. Possible settings are 0-10 seconds. (Do not go above the 5 second setting, a higher setting will remove the coals)	
	(X.XH)	Not used in North America. Should not appear during review.	
	(X.XL)	Not used in North America. Should not appear during review.	
	(CaL)	Not used in North America. Should not appear during review.	
	(au-)	Not used in North America. Should not appear during review. If any of these four preceding value appears on the display, the boiler is in an operating mode not supported in North America. To change the boiler to the correct mode, go to the (au-) parameter, change it to (no-), and save and confirm. CAUTION: YOUR BOILER SHOULD ONLY OPERATE IN THE (no-) MODE.	
	(no-)	Boiler is in correct operating mode for North America. CAUTION: DO NOT CHANGE THIS PARAMETER.	

Correct settings for (HX.X) and (LX.X) are shown below.


Table 3.5 Background Programming Installation Values		
MODEL	(HX.X)	(LX.X)
MH 1.5	H1.0= 1.0 second	L1.0= 1.0 second
MH 2.5	H0.3= 0.3 seconds	L0.2= 0.2 seconds
MH 4.0	H0.6= 0.6 seconds	L0.3= 0.3 seconds

3.8 Functional Testing

Perform functional testing of devices controlled by the boiler control panel before adding fuel to boiler.

- Measure incoming power (240VAC).
- With power on to the boiler junction box, but with ON/OFF switch (E) OFF, verify that buttons (G) and (H) command the auger in the forward and reverse direction. (The hopper cover must be down and secured for this to happen). The fuel auger must run clockwise in the forward direction. If the direction is not correct, switch the position of the black and orange wires (from the supply cable from the control panel) in the auger motor connection box.

CAUTION

 Before testing the running direction of the fuel auger, check to ensure that all pieces of wood and/ or iron, if any, have been removed from the fuel hopper, that otherwise could prevent the fuel auger from rotating.

- Turn ON/OFF switch (E) ON. Verify that the values represented by LEDs (I) are shown on display (A)
- Verify that Circulator Pump Switch (P) causes the circulator C-1 to turn off and on when pushed. (Only if the circulator is powered from the boiler connection box).
- Verify that the blower fan and auger commence automatic operation when the ON/OFF switch (E) is on.
- Verify that when Operation Mode button (C) is lit and High Output button (K) is lit, fan intensity is higher and auger pulsing is more frequent than when button (C) and Low Output button (L) are lit.
- Verify that fan and auger operation cease when the ON/OFF switch (E) is turned off.
- Verify that the auger motor does not function when the ON/ OFF switch (E) is ON and the hopper cover is open.

3.9 Final Installation Checklist

This final installation checklist should be reviewed before starting up the boiler for the first time:

- **General Boiler Installation**
 - Boiler set and level.
 - Clearances to combustibles maintained.
 - Combustion make-up air provided.
- **Chimney**
 - Appropriate chimney connector installed.
 - Chimney and termination meet requirements.
 - Proper chimney draft.
- **Fuel Hopper**
 - Tightness of bolts attaching fuel hopper to fuel auger tunnel.
 - Tightness of bolts on fuel hopper side panels.
 - Tightness of bolts on fuel hopper lid.
 - Gaskets and seals OK.
- **Plumbing**
 - Plumbing fittings tight.
 - Termovar mixing valve or loading unit installed and oriented correctly.
 - Pressure relief valve installed and tested. Outflow line run to drain.
 - Burn back suppression system plumbed, back flushed and connected to dedicated water supply.
 - Overheat cooling coil plumbed, back flushed, and connected to dedicated water supply.

- **Electrical**
 - Boiler connected to dedicated 240 volt, 60 hertz, 4-wire power supply.
 - Fuel auger rotating in correct direction.
 - Functional testing performed satisfactorily.

3.10 Combustion and Performance Testing

The boiler should be loaded with fuel and fired to test for performance, using Section 4.6 as a guideline.

- Provision should be made for dissipating the heat generated.
- Start by programming the boiler Operational Programming per Table 4.3.1 or 4.3.2.
- Load enough fuel to complete entire testing program.
- Verify all operating modes.
- Verify control strategy.
- Measure combustion gases and efficiency, as required.

If fine adjustment of the Operational Programming is required or desired, follow these guidelines:

The boiler should to be adjusted first at HIGH output (K), which only should be slightly higher than the maximum heating requirement of the house (see Section 4.2 for function of programming buttons). This “high output” may be adjusted seasonally, as heat demands change, to best match output to demand. After this, set at “LOW output”.

When adjusting the boiler it is recommend that the flue gas temperature be at a minimum of 120°C (248°F) when burning wood pellets, and at least 140°C (284°F) when burning corn. Further fine tuning adjustments of the quantities of air and fuel are carried out in accordance with the following guidelines in Table 3.6 by the installer with a combustion gas analyzer.

Table 3.6		
Recommended CO₂ Flue Gas Targets		
	Flue Gas CO ₂ Content (HIGH output)	Flue Gas CO ₂ Content (LOW output)
Fuel type	%	%
Wood Pellets	13-14	9-12
Corn	13-14	9-12



Fig. 3.20 Fire at High Output

The flame should to be yellow and slightly bluish in color and very turbulent (**Fig 3.20**). If the flame is short and blue, either the interval time between fuel auger feeds (pulses) or the air combustion quantity must be reduced incrementally. Flame should completely fill the arch. If the flame is long and reddish-yellow, either the interval time between fuel auger feeds (pulses) or the air combustion quantity must be increased incrementally.

Color of the flue gas:

If the flue gas is black or dark, this is because the fuel is getting insufficient air. The flue gas must be white or light-colored or transparent

Remember: Always ensure that you have a pen and paper ready every time you adjust the settings on the control. (Tables can be seen in Section 4.3) When an adjustment is made on a setting, the information regarding this will be shown in the display for approx. 10 seconds after the last adjustment or until another function is carried out.

4.0 BOILER OPERATION AND MAINTENANCE

4.1 Boiler Control Strategy

The boiler control panel manages the operation of the boiler with the objective of maintaining the boiler supply water temperature at an established set-point. This set-point can be set and modified by the owner/ system operator (see Section 4.2, discussion for button (J)). **Allowable set-point values are 78°C- 82°C (172°F - 180°F), with a recommended value of 80°C (176°F).**

The owner/ system operator programs **two levels of combustion (HIGH**, programmed with double-button K, and **LOW**, programmed with double-button L). Table 4.1 or 4.2 contains recommended settings to be used in the programming for burning of wood pellets and corn, respectively. Programming a combustion level consists of inputting the settings for blower fan intensity (using the top button, with picture of a blower on the face) and time between auger fuel pulses (using the bottom button, with SEK notation). The higher the blower fan intensity and the shorter the time between auger pulses, the higher the combustion level. The settings in Tables 4.1 and 4.2 have been established based on the boiler output ratings and upon efficient combustion benchmarks. HIGH settings will result in heat production at the rated output of the boiler. LOW settings produce heat at approximately 30% of the rated output. Use the settings in section 4.3 to operate the boiler. If you deviate significantly from these settings, contact Tarm USA, Inc. or your dealer for guidance.

The owner/ system operator can select one of **three operating modes**, which will determine how the control panel maintains the boiler set-point. In fulltime **HIGH** mode, the combustion level remains at HIGH level until the set-point is achieved, then is reduced to a **STANDBY** (or Pilot) level which is just sufficient to maintain the fire in the boiler. In fulltime **LOW** mode, the combustion level remains at LOW level until the set-point is achieved, then is reduced to **STANDBY**. In **2-Step** or **AUTOMATIC** mode, the control sets the combustion level in HIGH if the actual boiler water temperature is more than 6°C (11°F) lower than the set-point. When the water temperature is within 3°C (6°F) of set-point, the combustion level is reset to LOW. When the set-point is reached, the combustion level is reduced to **STANDBY**. Instructions on programming the combustion levels and selecting the desired mode of operation are covered in Section 4.2.

It is possible to program a HIGH a “High Output” which is less than the boiler’s rated maximum output, but the heat output should remain greater than the heat requirement of the house.

4.2 Control Panel Orientation

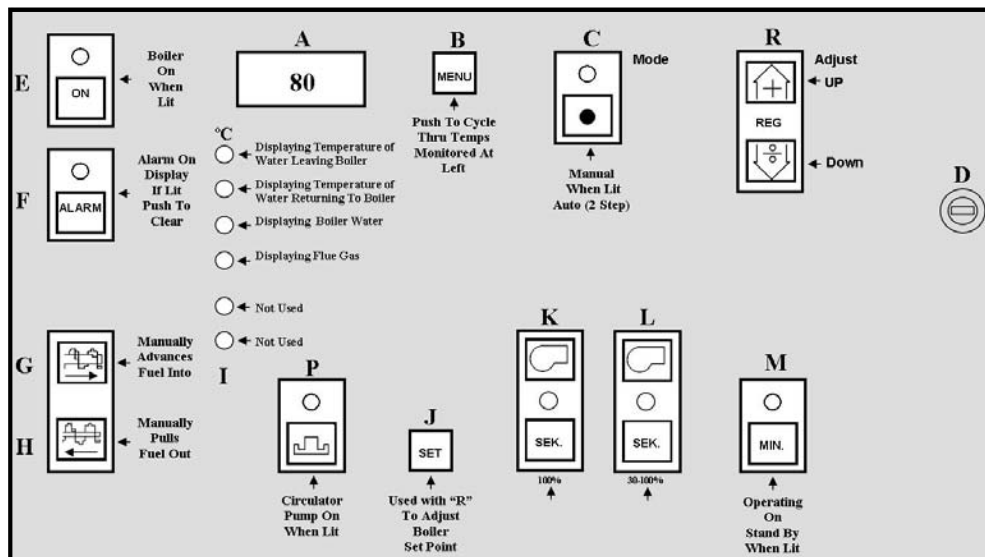
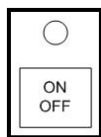


Fig. 4.1 (Refer to page 26 or back of manual for larger image)

Letters in brackets () in this section refer to the button with the corresponding letter on the control panel. All temperature values displayed on the control panel are in degrees Centigrade.

(E) Start/Stop



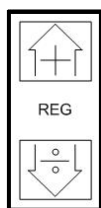
The ON/OFF button (E) is used to start or stop the boiler. If the boiler is ON, the LED above the button will be lit.

(J) Boiler Set Temperature



The boiler operational temperature, or set-point, is adjusted by keeping SET (J) pressed in and simultaneously pressing on + or – on REG (R). The temperature can be adjusted in a range from 60 to 85°C. **The set-point should be kept between 78 - 82°C (172 - 180°F) for proper boiler operation. The recommended value is 80°C (176°F).** (When “SET” is pressed, the LED will light up - “SET” and the adjusted temperature will be shown on the display).

(R) Regulation



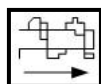
Adjustable parameters can be changed up or down in value by pressing the + or – (note the minus symbol on the control panel is shown as “÷”) on the REG (R).

(B) Menu



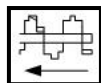
Each time this button is pushed, the display changes to show the current value of the next of the four operational temperatures being monitored. The LED to the left of the displayed parameter will be lit when its value is displayed. (See description below for a listing of monitored parameters). This button is also used for background programming, see Section 3.7.1.

(G) Manual Fuel Auger – Forward



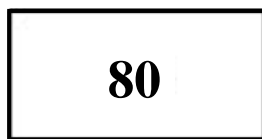
Use this button (G) (with the symbol for the fuel auger with the arrow pointing to the right) to manually advance the fuel auger forward. As long as the button is pressed, the fuel auger will run forward, pushing fuel into the combustion chamber. **However, this button will not operate when the hinged cover on the fuel hopper is open.**

(H) Manual Fuel Auger – Backward



Use this button (H) (with the symbol for the fuel auger with the arrow pointing to the left) to manually turn the fuel auger backward. For safety, the fuel auger will only run backwards for 3 seconds even if the button is depressed longer. **This button will not operate when the hinged cover on the fuel hopper door is open.**

(A) & (I) Operational Temperature Display



During operation of the boiler it is possible with the MENU button (B) to select one of four monitored operational temperatures to be shown on the display (A). Each time the MENU button is pressed the display will scroll to the next temperature and light the diode corresponding to the display temperature on (I).

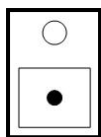
The Operational Temperatures that can be displayed are:

- Supply temperature = boiler supply (outgoing) water temperature.
- Return temperature = boiler return water temperature
- Set temperature = the set-point, or target boiler supply water temperature.
- Smoke temperature = the temperature of the boiler's exhaust gases.

During normal operation it is a good idea to have the smoke exhaust temperature displayed, making it possible to see whether the boiler requires cleaning. The exhaust temperature must not be too low since this can cause condensation in the chimney. How low the temperature should be allowed depends on the chimney, but exhaust gas temperatures below 120°C (248°F), when combustion has been at HIGH or LOW, are not normally recommended.

Note: If you press one of the buttons (J - M), the selected value will be shown for 5 seconds - after which the value you have chosen will be shown once again.

(C) Operation Mode



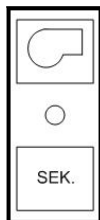
With this button, it is possible to switch between 2-Step or AUTOMATIC mode (LED above button (C) is OFF) or constant HIGH or LOW output mode (LED above button (C) is lit).

Three possible OPERATION MODES that can be selected by pressing button (C):

1. **2-Step Operation (AUTOMATIC)** = no light above button (C).
2. **Fixed High Output (HIGH)** = LEDs on simultaneously above button (C) and on the 100% (K) double button.
3. **Fixed Low Output (LOW)** = LEDs on simultaneously above button (C) and on the 30-100% (L) double button.

The greatest efficiency can be achieved by running the boiler in the 2-Step (AUTOMATIC) operation mode. During 2-step operation, the lowest smoke temperature and the highest efficiency are achieved. The boiler will run at a high output until the supply water temperature is 3°C (6°F) below the set-point temperature, and then switch down to the programmed low output. The operation will continue on a Low Output until the set-point water temperature is achieved. If the supply water temperature cannot be maintained with the Low Output, the boiler will switch back to the High Output when the supply water temperature has dropped to 6°C (11°F) below the boiler set-point value.

(K) High Output (HIGH) mode

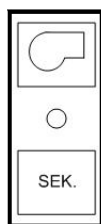


High output for the boiler is set using the double-button above the 100% symbol (K). The lowest button is used to set the number of seconds between each fuel delivery. This can be set between 5 and 30 seconds. To display this setting in the display (A), press in and hold the SEK button and adjust up or down by pressing on “+” or “÷” on REG (R). In the same manner, the upper button is used to set the combustion air intensity from 0 - 100%, where 100% corresponds to maximum air quantity. The blower setting is shown in the display (A) when holding in the upper (K) button.

Note: The fuel quantity and the combustion air intensity are related and must be adjusted together to achieve the best performance.

See Section 4.3 for recommended initial settings.

(L) Low Output (LOW) mode



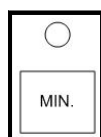
Low Output is set using the double- button above the 30-100% symbol (L). The lowest button is used to set the number of seconds between each fuel delivery - this can be set between 10 and 60 seconds (but should never be less than the setting for High Output). To display the setting in the display (A), press in and hold “SEK” and adjust up or down by means of pressing “+” or “÷” on REG (R). Using the uppermost button, set the blower’s air quantity from 0 to 100, where 100 corresponds to maximum air quantity. The blower setting is shown in the display (A) when holding in the top part of the (L) button.

Note: The fuel quantity and the combustion air intensity are related and must be adjusted together to achieve the best performance.

Note: **Nominal output in this mode should not be less than 30% of full output. See also technical data.**

See Section 4.3 for recommended initial settings.

(M) STANDBY (Pilot) mode



Control of the STANDBY or Pilot Mode is set with the MIN button (M). The setting shown on the display (A) when pushing button (M) is the number of *minutes* between each fuel delivery. This mode is only active when the boiler’s supply water temperature is above the SET temperature. STANDBY can be set between 1 and 60 minutes. STANDBY maintains a small standby "pilot" ember bed in the combustion chamber, hot enough to keep the fire lit but not raising boiler supply water temperature. It must be adjusted by trial and error.

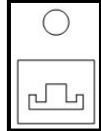
See Section 4.3 for recommended initial settings.

(D) Overheat aquastat



If the boiler supply water temperature reaches 100°C (212 °F) the overheat aquastat/circuit breaker will switch the boiler OFF, and the display will show alarm “A-2” (See Alarm Summary in Section 5.1). **The aquastat/circuit breaker must be reset manually**, after the boiler has cooled down sufficiently (to approximately 70 to 80 °C (158 to 176 °F)). This is accomplished by unscrewing the black protective cap (D) and pressing the pin in the center of the aquastat, until a “click” is heard (be sure to replace the cover). The Alarm Reset button (F) must be pressed to clear the alarm.

(P) Circulator Pump



The circulation pump C-1 for the boiler can be switched ON (LED is lit) or OFF by pressing this button (P). **Circulation pump C-1 should be ON whenever the boiler is in operation**

(F) Alarm Reset



All alarms are reset or cleared with this button. The alarms listed in Section 5.1 will appear on the display (A). If there are no alarms present, the button is used in conjunction with other buttons to enter the background programming menus (see Section 3.7). **Please Refer to Section 5.0, Troubleshooting and Service, to assist in diagnosing the cause and cure for problems that have caused the alarms.**

4.3 Operating Modes Settings

The heat output from the Multi-Heat boiler may be adjusted to meet the seasonal building heating requirements. Seasonal adjustments allow the boiler to cycle frequently enough to meeting the heat requirements and avoid long dormant periods in STANDBY operation. Adjustments for the heat output are carried out using the buttons described above in Section 4.2.

Recommended settings for double buttons (K) **HIGH** Output mode (L) **LOW** Output Mode, and (M) **STANDBY** (Pilot) mode (see discussion in Section 4.2 for an orientation to these buttons) are shown in the table below. Values for blower fan intensity (upper button-with symbol for blower) are in percent and values for time between fuel auger pulses (lower button-labeled SEK) are in seconds.

Operational settings provided below in Tables 4.1 and 4.2 are baselines that were established by testing.

Table 4.1 Recommended Operational Settings for Large and Small Heat Requirements (Firing with WOOD PELLETS – 0.5% Ash and Moisture Content < 8%)												
		Large Heat Requirement					Small Heat Requirement					PILOT
		Boiler Output	Boiler Output	Time between fuel auger pulses	Air Quantity	Fuel Pulse Duration	Boiler Output	Boiler Output	Time between fuel auger pulses	Air Quantity	Fuel Pulse Duration	Standby Interval
MODEL	Output	kW	Btu/hr	(sec)	%	(sec)	kW	Btu/hr	(sec)	%	(sec)	(min)
Multi-Heat 1.5	High (K)	15	51,200	20	20	1	7.7	26,300	30	11	0.8*	-
	Low (L)	4.6	15,700	60	9	1	4.6	15,700	60	9	1	-
	Pilot (M)	-	-	-	-	1	-	-	-	-	1	15
Multi-Heat 2.5	High (K)	25	85,300	20	45	0.3	15	51,200	28	25	0.2*	-
	Low (L)	7.5	25,600	50	12	0.2	7.5	25,600	50	12	0.2	-
	Pilot (M)	-	-			0.2	-	-	-	-	0.2	15
Multi-Heat 4.0	High (K)	43	146,700	26	82	0.6	20	68,200	26	40	0.3*	-
	Low (L)	13	44,000	56	30	0.4	12	40,900	56	30	0.4	-
	Pilot (M)	-	-	-	-	0.4	-	-	-	-	0.4	15

*These values must be changed in the Background Programming Menus- see Section 3.7.

Table 4.2 Recommended Operational Settings for Large and Small Heat Requirements (Firing with CORN – Moisture Content < 15%)												
		Large Heat Requirement					Small Heat Requirement					PILOT
		Boiler Output	Boiler Output	Time between fuel auger pulses	Air Quantity	Fuel Pulse Duration	Boiler Output	Boiler Output	Time between fuel auger pulses	Air Quantity	Fuel Pulse Duration	Standby Interval
MODEL	Output	kW	Btu/hr	(sec)	%	(sec)	kW	Btu/hr	(sec)	%	(sec)	(min)
Multi-Heat 2.5	High (K)	25	85,300	20	52	0.3	15	51,200	28	29	0.2*	-
	Low (L)	7.5	25,600	50	14	0.2	7.5	25,600	50	14	0.2	-
	Pilot (M)	-	-			0.2	-	-	-	-	0.2	15
Multi-Heat 4.0	High (K)	43	146,700	26	92	0.6	20	68,200	26	46	0.3*	-
	Low (L)	13	44,000	56	35	0.4*	12	40,900	56	35	0.4*	-
	Pilot (M)	-	-	-	-	0.4	-	-	-	-	0.4	15

*These values must be changed in the Background Programming Menus- see Section 3.7

4.4 Fuel Monitoring and Filling

Fuel level in the hopper can only be checked by opening the hopper cover. Filling the hopper should be completed before it becomes empty for, uncovering the auger during operation increases the risk of burn-back. The fuel hopper can be refilled when the boiler is in operation. When the fuel hopper cover is opened, the fuel auger will not function, so it is necessary to complete the refilling within approximately ten minutes to avoid the possibility of extinguishing the fire in the combustion chamber.

When filling the fuel hopper, check the fuel hopper lid gasket and check that no fuel remains on the top of the fuel hopper that may prevent the fuel hopper lid from closing tightly. The hopper lid seal must be airtight, and should be checked regularly (monthly).

Store fuel under cover, out of the elements. DO NOT STORE FUEL CLOSER THAN THE REQUIRED CLEARANCES TO COMBUSTIBLES (see Section 3.1.3) OR WITHIN THE SPACE REQUIRED FOR LOADING, ASH REMOVAL AND OTHER ROUTINE MAINTENANCE OPERATIONS.

NOTE

☀ Usage of fuel types other than low ash wood pellets and corn can result in problematic operation, more work for the user, and increased fuel consumption. Further, usage of fuel types other than wood pellets and corn could cause potentially dangerous situations.

WARNING

⚠ Risk of Fire or Explosion – Do not burn garbage, gasoline, engine oil, other flammable liquids or inappropriate materials in this boiler.

If ventilation fans are used in the fuel storage area, they must be installed so as not to create negative pressures in the room where the boiler is located.

4.5 Switching between Wood Pellets and Corn

When firing the 2.5 or 4.0 with corn, the **fuel auger extension** (supplied with the boiler (**Fig. 4.2**)) must be installed to help break up clinkers that can form in the combustion chamber. Use of a high temperature thread lubricant (such as “Anti-Seize”) on the auger extension is recommended to make removal easier. Note that the auger extension is reverse (left-hand) threaded. When the auger extension has shown extensive wear it should be replaced to prevent damage to the auger threaded shaft. If the corn is very corrosive, limestone can be added to the corn.



Fig. 4.2

Table 4.5 Equipment / Fuel Requirements for Multi-Heat Boilers		
	Wood Pellets	Corn
Fuel Auger Refractory Extension	N	Y

Y = must be used N = not be used

The boiler has been tested and is approved only for use with corn with a **moisture content <15%**. When changing fuel-type, the boiler operational settings must be changed. Refer to the tables in Section 4.3.

4.6 Starting the Boiler

Ensure the following before initial boiler firing or after a long shutdown period:

- There is sufficient water in the boiler and heating system.
- The pressurized domestic cold water supply is connected to the back burn safety flood valve and overheat coil and that all supply valves are opened. (See section 5.2 - Back Burn Safety Flood Valve and Section 5.4 – Overheat Cooling Coil).
- The combustion chamber refractory arch (item 9, fig. 1.1) is pushed fully back into position and wood shipping wedges are removed.
- The fuel hopper lid is fully closed, making the hopper air-tight. The built-in micro-switch prevents the fuel feed auger from running with an open lid.
- That air flow and fuel settings as indicated in Section 4.3 of this manual are programmed.

Follow this procedure for igniting a boiler fueled by wood pellets:

1. The ON/OFF button (E) is OFF. Press button (G) feeding wood pellet fuel so that there is a pile of about 5-6 handfuls inside the combustion chamber.
2. Pour a small quantity of gelled alcohol fire starter on the fuel and ignite (various wax impregnated sawdust and wood chip fire starter products also work very well).
3. Ignite the pile with a match or a barbeque lighter.
4. Turn the ON/OFF button (E) to ON.
5. Push the two fan buttons (K and L) to start blower (auger will not operate in this mode).
6. Close doors
7. After the fire is ignited (about 5 minutes) set the control to full time low as explained on page 30 by pushing operation mode button (C). Let the smoke temperature reach 100° C.
8. Upon reaching 100° C, the boiler can be switched to automatic mode.

For igniting a boiler fueled by **corn**, 5-6 handfuls of easily combustible material (such as wood pellets) must be added to the mixture of corn to start combustion. Then follow the above instructions to ignite the mixture.

WARNING



DO NOT OVERFIRE. Do not attempt to feed in more fuel than the automatic feeding allows. If the chimney connector glows, you are over-firing the boiler.



Do not operate with fuel loading or ash removal doors open. Never leave the boiler with an open hopper cover as this can eventually lead to a burn back in the auger feed tube.



Do not use gasoline, kerosene or other flammable liquids to start or maintain a fire in your boiler. Serious burns and property damage may result.



Do not add more gelled alcohol or liquid fire starter after combustion starts.

4.7 Routine Monitoring

Tarm USA, Inc. strongly recommends that the owner/ system operator monitor the boiler daily when in operation. Regular monitoring by the owner/ system operator creates familiarity with the operation of the boiler and an ability to predict when cleaning and fuel filling will be necessary.

Items to check daily are:

- Check fuel in the fuel hopper and fill as necessary.
- Check ash level in the combustion area and remove as necessary.
- Check ash level in heat exchanger area of the boiler, and clean when necessary.
- Check boiler supply water temperature. Make sure it is near the water set-point.
- Check boiler return water temperature. Make sure it is >60°C (140°F).
- Check smoke temperature. Make sure it is within the operating guidelines below.

Smoke Temperature Guidelines are:

- The boiler should not be operated with smoke temperature >220°C (428°F).
- The boiler should be operated to ensure that the smoke temperature does not fall so low that condensation is formed in the chimney. This temperature is dependent on the chimney's diameter and insulation. If chimney condensation presents a problem, several turbulators can be removed from the boiler heat exchanger tubes to raise flue gas temperatures and counteract the condensation. Note: when turbulators are removed, the combustion efficiency will decrease and fuel consumption will increase!
- When using corn, the flue gas must be >140°C (284°F).
- If the flue gas temperature is <100° C (212°F) for more than 30 minutes, an alarm (A-1) will be initiated.


Safely Opening the Doors:

- When opening the doors, one should stand with the doors between you and the boiler interior.
- Crack open the door approximately 1 inch. - Wait for approximately 20 seconds, then open the door slowly.

Wood pellets composed of pure wood residues produce comparatively little ash. Corn is a more difficult fuel to manage due to its higher content of non-combustible constituents, which form ash and cinders. The combustion quality can vary greatly, depending on growing and harvesting conditions, chemical composition, and final moisture content when burned. Poor quality fuel gives more problematic operation.

4.8 Ash Removal

Removing ash and cinders from the combustion chamber should be done as needed (Fig. 4.2). The frequency of removal is dependent on the ash content of the fuel and the rate of fuel consumption.

WARNING	
	The ash pan and cleaning tools can be very hot and cause burns! Use appropriate protective gloves!



Multi-Heat 1.5 and 4.0:

The boiler is not equipped with an internal ash pan. An external **Fig. 4.2** pan can be purchased as an accessory, to be used for removing the ash and cinders from the combustion chamber. Ash and cinder removal should be done in LOW, STANDBY, or when the fire is extinguished. In HIGH operating mode, hot embers are blown to the front of the combustion area against the lower door, making cleaning problematic. A specially shaped shovel tool provided with the boiler is used to remove the ash from the combustion chamber. It is desirable to leave a layer of ash at the base of the combustion chamber approximately level with the lower air holes to achieve effective combustion.

Important: Periodically remove any buildup of dark, tar-like residue forming at the base of the combustion area to the sides and below the entrance of the fuel auger. Use the shovel while the combustion area is still hot to remove residue. Vigorous use of the shovel may be required.

Multi-Heat 2.5:

The boiler is equipped with two ash pans, one of which one is placed in the combustion chamber immediately inside of the lower door.

Ashes should be placed in a metal container with a tight fitting lid. The container should be placed on a noncombustible floor or on the ground, well away from all combustible materials, pending final disposal. If the ashes are disposed of by burial in soil or otherwise locally dispersed, they should be retained in the closed container until all cinders have been thoroughly cooled.

4.9 Extinguishing the Boiler

To extinguish the fire in the combustion area of the boiler, set the ON/OFF button (E) to OFF. Leave the boiler circulator ON to circulate residual heat through the boiler. To ensure that cinders and live coals do not ignite the fuel in the auger tube, it is necessary to physically separate them from the unburned fuel there and move them to the front of the combustion area. After this is done, cold water from a spray bottle can be used to wet the fuel in the auger tube area and the metal faces under the refractory tunnel.

WARNING



It is important to completely extinguish combustion in the area under the combustion chamber refractory, since a few hot embers can reignite the fuel in the auger tube and lead to a burn-back event.

4.10 Routine Cleaning

Cleaning tools are supplied with the boiler:

- Heat exchanger tube cleaning brush.
- Shovel tool for ash removal.
- Turbulator crank handle (for 1.5 and 4.0)

Intervals between cleaning depend upon the type, quality, and quantity of fuel used. A guideline for boilers burning **wood pellets** follows:

- Ash removal: every 2 - 5 days based on fuel consumption.
- Cleaning heat exchanger tubes and walls: every 4 - 15 days based on fuel consumption.

Burning **corn** requires more frequent removal of ashes and cleaning than burning wood pellets. A guideline for boilers burning corn follows:

- Ash removal: every 1 - 3 days based on fuel consumption.
- Heat exchanger tubes and walls: every 3 - 15 days based on fuel consumption.

Frequent cleaning of the boiler guarantees optimal output, good operation of the boiler, and reasonable refractory life.

CAUTION



Do not use cleaning chemicals inside the boiler, as they can cause premature wear on the refractory's, joints, and probes, and damage the boiler metal surfaces.

Heat exchanger tubes and boiler walls require cleaning to remove the buildup of fine ash that, over time, reduces the heat transfer efficiency of the boiler and leads to higher flue gas temperatures. Cleaning is performed after the boiler is extinguished and proceeds from the top of the boiler to the bottom.

Clean the heat exchanger as follows:

- 1) Set the ON/OFF button to OFF.
- 2) Extinguish the fire and allow the boiler to cool.
- 3) Open the upper cleaning door.
- 4) Wearing gloves, remove the turbulators from the heat exchanger tubes.
- 5) Clean the face of the heat exchanger tubes and walls of the boiler using a stiff bristled brush.

- 6) Using the tube cleaning brush, clean the heat exchanger tubes by running the brush all the way through each tube, rotating the brush and pulling it back through. Two full passes (in and out being one pass) with the cleaning brush are typically sufficient to clean the entire surface of each heat exchanger tube.
- 7) The turbulators should be brushed off to remove fly ash and replaced into the heat exchanger tubes.
- 8) Ash should be cleaned off of the shelf below the upper cleaning door. An ash vacuum works best for this job.
- 9) Ash should be removed from the top of the combustion chamber arch through the lowest cleaning door and from the combustion chamber bed.
- 10) Using a scraping tool or wire brush, remove the ash adhering to the interior metal surfaces of the boiler.

While cleaning the boiler check that the gaskets on the lower and upper doors are in good condition and are not a source of any air leaks.

Intermediate Heat Exchanger Cleaning – Multi-Heat 1.5 & Multi-Heat 4.0

The 1.5 and 4.0 boilers are equipped with twisted or spiral turbulators. The turbulator crank handle can be used to spin the turbulators regularly when the user notices a build up of ash in the heat exchanger tubes or an increase in the smoke temperature. By cranking each turbulator approximately fifteen turns, the ash buildup is moved back into the smoke box at the rear of the heat exchanger.

Cleaning of the Ash Cleanout

During boiler operation, ash accumulates in the cleanout area at the rear of the heat exchange tubes (**Fig 4.3**), and should be removed during every other cleaning of the boiler. Cleaning of the cleanout should be performed between steps 6) and 7) described above and would include:



Fig. 4.3

1. Removal of one of the side panels from the Multi-Heat boiler.
2. Remove the ash cleanout cover (**Item 17, Figure 1.1**).
3. Remove ash from ash cleanout area, using a soot vacuum or rake.
4. Replace ash cleanout gasket and cover, and the side panel.

Note: It may be helpful to use an ash vacuum designed and approved for use where hot embers may be present to vacuum out the cleanout and other areas of the boiler.

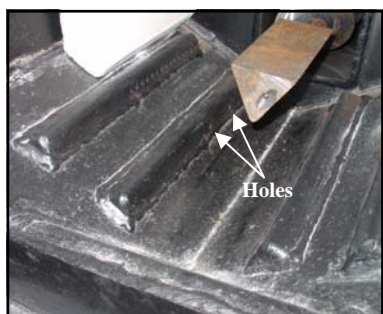


Fig. 4.4

After long time use, primary air holes on the bottom of the combustion area should be checked to make sure that they are clear and functioning (**Fig 4.4**).

4.11 Power Outages

The boiler will not operate in the event of a power failure. It is good practice to extinguish the boiler and pull the fuel away from the back of the combustion chamber. Do not attempt to hand feed pellets or corn into the boiler during a power outage. Do not open the upper or lower doors (except to extinguish the boiler).

4.12 Off-season Shutdown Procedures

If the boiler will not be fired for an extended time period the boiler should be protected from corrosion by taking the following steps:


1. Clean all interior surfaces of the boiler, including the heat exchanger tubes.
 2. Completely remove all ash deposits and fuel from the boiler combustion area with a vacuum cleaner.
 3. Remove and clean the smoke pipe connecting the boiler to the chimney.
 4. Do not replace the smoke pipe (store it near the boiler).
 5. Stuff insulation into the flue outlet of the boiler to block off air passing through the boiler.
- Keep all doors and air dampers closed.

Hang a 15-25 watt light bulb inside the boiler combustion area if condensation starts to form anywhere inside the boiler.

4.13 Annual and Preventive Maintenance

The **chimney system** should be inspected at least once every year and cleaned if necessary. Products of combustion will contain small particles of fly ash. Fly ash collects in the chimney system and restricts the flow of the flue gases. Incomplete combustion, such as occurs during startup, shutdown, or prolonged STANDBY operation of the boiler, can lead to soot formation in the chimney system.

CAUTION

-  Before cleaning, remove the flue gas temperature sensor in the boiler flue collar so it is not bent or damaged during cleaning.

The boiler **pressure relief valve** should be flushed at least once per year. Follow the manufacturer's instructions on the tag attached to the valve.

The **thermal valves for burn-back suppression and over-heat cooling coil activation** should be tested and inspected annually. The pressure in the burn back system should be checked at least once per year to verify the condition of the pressurized tank (which is pre set at 3 – 5 psi. without water content. With water supply attached pressure should be a minimum of 30 psi). The thermal valves can be function-tested by depressing the red buttons on top of the valves. This should cause water to flow through the valves (disconnect the thermal valve from the fuel auger tube before conducting this test).

Sawdust or other fine waste from the fuel will accumulate at the bottom of the fuel hopper over time. **It is necessary twice a year to empty the fuel hopper entirely to remove this sawdust or fine waste in the fuel hopper and along the fuel auger.** This buildup of sawdust is particularly undesirable since it increases the risk of a burn-back event.

The **seal around the fuel hopper lid** and the **gaskets on the cleanout panels** on the sides of the hopper must seal completely and be airtight. They should be checked regularly (at least once a year and after any burn-back event).

5.0 Troubleshooting and Service

5.1 Alarms and Responses

The control panel monitors boiler operating parameters. When these parameters are not within expected values, the control panel creates a visual and audible warning alarm. These alarms require immediate attention. When an alarm is activated, the control panel will flash with the identification code of the alarm and an audible high pitched noise is produced.

Write down the alarm code shown on the control panel before taking action. Keep a written log of alarms with times, dates, and actions taken.

(F) Alarm Reset Alarms are reset or cleared with this button. If there are no alarms present, the button is used in conjunction with other buttons to enter the programming menu (see below).

The alarms listed on the next page will appear on the display (A). **Alarms beginning with A can cause the boiler to shut down.** They may require the owner/ system operator to troubleshoot and restart the boiler.

Alarms beginning in **F** are for information and action but do not result in shut down. **F** alarms can be reset by pressing any key on the display.

Table 5.1 Alarm Summary		
DISPLAY	MEANING	
A-1	The fire in the combustion area is going out! The flue gas temperature has been below 90°C (194°F) for more than 30 minutes while the boiler is in operation.	
A-2	The boiler has overheated. Boiler supply water temperature has exceeded 100°C (212°F), causing the over heat aquastat (D) to switch off the blower and pellet auger. The aquastat can be reset after the supply water cools down (see Section 4.2) OR Fuse F1 on the Stoker Power PC board has blown and must be replaced (replace with a 2.5 amp fuse if this happens) OR The Stoker Control PC board has failed. (Very rare-contact Tarm USA, Inc.)	
A-3	The fuel auger system is not operating correctly. The motor protector has switched off the pellet auger due to high current (possible stalling). It will reset itself and can be tried again. OR The Smoke Sensor has failed. OR Smoke Temperature is above 280°C. Boiler needs to be cleaned.	
A-4	Internal water temperature has significantly exceeded the set-point. Boiler supply water temperature has exceeded 94°C (201°F).	
A-5	There has been an internal communication error between the control PC board and the program. Try restarting the boiler. Contact Tarm USA Inc	
A-6	Not used in North America.	
A-7	Not used in North America. (Lambda is damaged)	
A-8	Not used in North America.	
A-9	Not used in North America.	
A-10	Not used in North America.	
A-11	Not used in North America.	

A-12	The boiler supply water temperature probe is defective and must be replaced. (Short-circuited & measuring < -40°C (-40°F)).	
A-13	The boiler supply water temperature probe is defective and must be replaced. (Open-circuited & measuring greater than 120°C (248°F)).	
A-14	The flue gas temperature probe is defective and must be replaced. (Short-circuited & measuring < -30°C (-22°F) for at least 4 minutes).	
A-15	The flue gas temperature probe is defective and must be replaced. (Open-circuited & measuring >350°C (662°F)).	
F-1	The boiler needs cleaning , especially the heat exchanger tubes. The flue gas temperature exceeded 240°C (464°F) more than three times.	
F-2	Not used in North America	
F-3	Not used in North America	
F-4	The boiler return water temperature probe is defective and must be replaced. (Short-circuited & measuring < -35°C (-31°F)).	
F-5	The boiler return water temperature probe is defective and must be reinstalled or replaced. (Open-circuited & measuring > 120°C (248°F)).	
- - -	The Prom on the control board needs to be changed.	

5.2 Burn-Back Suppression

A thermal burn-back safety flood valve is supplied with the boiler. The safety flood valve is installed on the boiler at the factory. The installer must connect the valve to the domestic cold water supply. If the temperature on the outside of the fuel auger tube exceeds 100°C (212°F), the valve will be open and water will enter the tube, extinguishing any combustion causing the condition. This is called a **burn-back event**. When the temperature decreases, the thermal valve will close, and the flow of water will stop.

The control panel does not directly sense a burn-back event and there is no specific alarm for it. However, the water in the auger tube extinguishes the fire, causing an **A1 alarm**.

After a burn-back event, the boiler will normally require cleaning and restarting.

- The combustion chamber must be dried.
- Remove the water and empty the air chamber by removing the “drain screw” (Situated behind the lowest front plate (**Fig. 5.1 and 5.2**)). Remember to reinstall the “drain screw” after the water is drained out.
- Remove all the fuel from the auger tube and hopper and check for any hot embers. (On the Model 2.5 and 4.0 there are side access panels (**Fig 5.3**)).
- Before restarting up the boiler, determine why the burn-back event happened.
- Check the thermal valve for proper operation.

A **burn-back event** can be caused by leaving the hopper door open, air leakage into the hopper at the hopper or feed tube gaskets, a defective leaking thermal valve, or the boiler has been in stand-by for a long period of time.

While the burn back suppression valve will have normally extinguished any auger burn-back, if a burn-back is suspected, it is good practice to open the hopper door carefully. Smoke and steam may be present. If any hopper surfaces are hot, there may be a fire present in the hopper. **KEEP THE HOPPER LID CLOSED. CALL THE FIRE DEPARTMENT.**

To prevent the boiler from going into stand-by for long periods of time we recommend a constant heat load demand on the boiler. The stand-by time (MIN button) should be set to 15 minutes. We recommend the installation of a Honeywell L6006C aquastat on the return line to the boiler (**as per the plumbing diagram on page 54**). This aquastat will sense periods of no heating system load by measuring return water temperature. If return water temperature exceeds the set-point of the aquastat, it will activate a heating zone. This will first create a load on the boiler, which will cause the auger to advance. Secondly, the zone that the aquastat is attached to will warm up enabling the operator to know that the boiler is running under a small heat load. Ideally this aquastat should be set 1°-2° F higher than the boiler set-point.

Minimum Consistent Heating Loads:

Multi-Heat 1.5 10,000Btuh

Multi-Heat 2.5 15,000Btuh

Multi-Heat 4.0 15,000Btuh

A constantly circulating loop could also be used.

If it has become warm outdoors and the boiler is operating for prolonged periods in stand-by it should be shut down. Do not risk a **burn-back event** for the minimal fuel savings possible on mild temperature days.

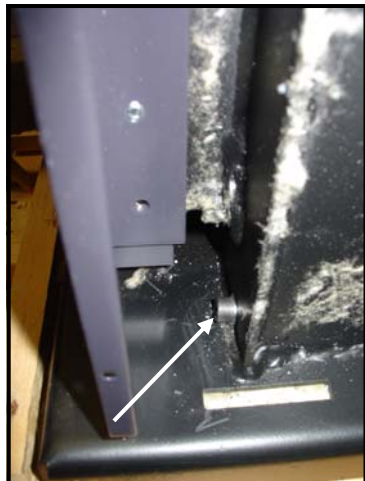


Fig. 5.1 Drain Plug Model 2.5



Fig. 5.2 Drain Plug Models 1.5 and 4.0

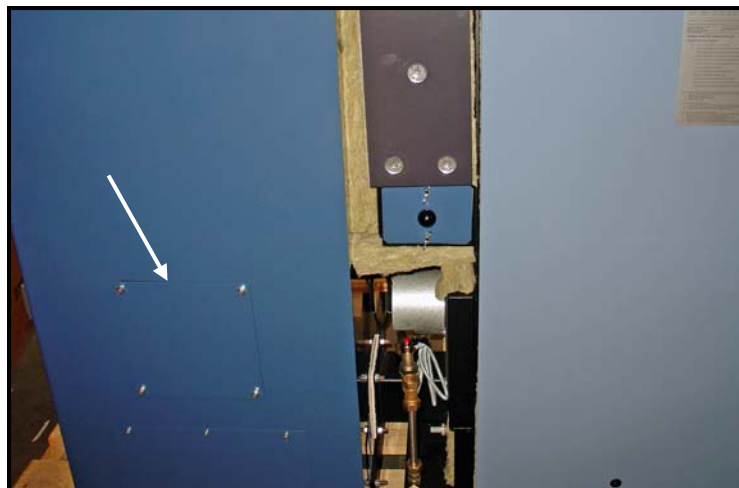


Fig. 5.3 Side Access Panel Model 2.5 and 4.0

5.3 Combustion Problems

Chimney fires are caused when an excessive buildup of creosote in the chimney connector pipe or the chimney is ignited by a racing fire, or when a burning piece of material is swept out of the firebox into the chimney. If you have a chimney fire, you will hear a roaring sound in your chimney, almost like a jet airplane. In addition, sparks may be seen flying from the chimney outside the house. Chimney fires can set fire to the interior of your house or your roof. They are potentially very dangerous, and the following procedure should be followed if you think you have a chimney fire:

1. Call the fire department.
2. Shut all doors and close all air inlets on your boiler.
3. Evacuate your house.
4. If possible, wet your entire roof with a garden hose.

Chimney fires can be avoided by following the recommendations in this manual for minimizing ash formation, by maintaining your chimney in good condition, and by cleaning your chimney regularly. **A chimney fire should never happen with a Multi-Heat boiler!**

5.4 Heat Transmission Issues

If the circulator pump “gurgles”, this means that there is air in the system. Purge the boiler and the entire heat distribution system of all air. **During air purging, the pump must be off.** If the pump “howls” or “wails” this can be because there is insufficient water in the system. The pump’s bearings are lubricated by water, and they will be ruined if there is insufficient water.

To remove heat quickly from an overheated boiler, an **overheat cooling coil** is installed in the boiler water jacket. Upstream of the cooling coil, a thermal valve is installed and connected to pressurized domestic cold water supply (minimum ½” diameter). The thermal valve opens when a fixed sensor installed in the boiler water jacket measures 100°C (212°F). Cold water passes once through the coil, removing heat from the boiler. The thermal valve closes when the boiler water temperature decreases. Water which passes through the coil is very hot and is exhausted outside the boiler to a floor drain.

The control panel does not directly sense an overheat cooling coil activation and there is no specific alarm for it. It is very likely, however, that the boiler will independently generate an A2 or A4 alarm.

An overheat cooling coil activation is an indication that no heat is being removed from the boiler. The owner/ system operator should determine the cause and correct the condition (or extinguish the boiler).

5.5 Technical Assistance

Tarm USA, Inc. will provide free telephone technical assistance at the number below.

5.6 Service and Repair

Tarm USA, Inc. maintains a service parts inventory. Ask for assistance at the number below.

5.7 Troubleshooting Guide

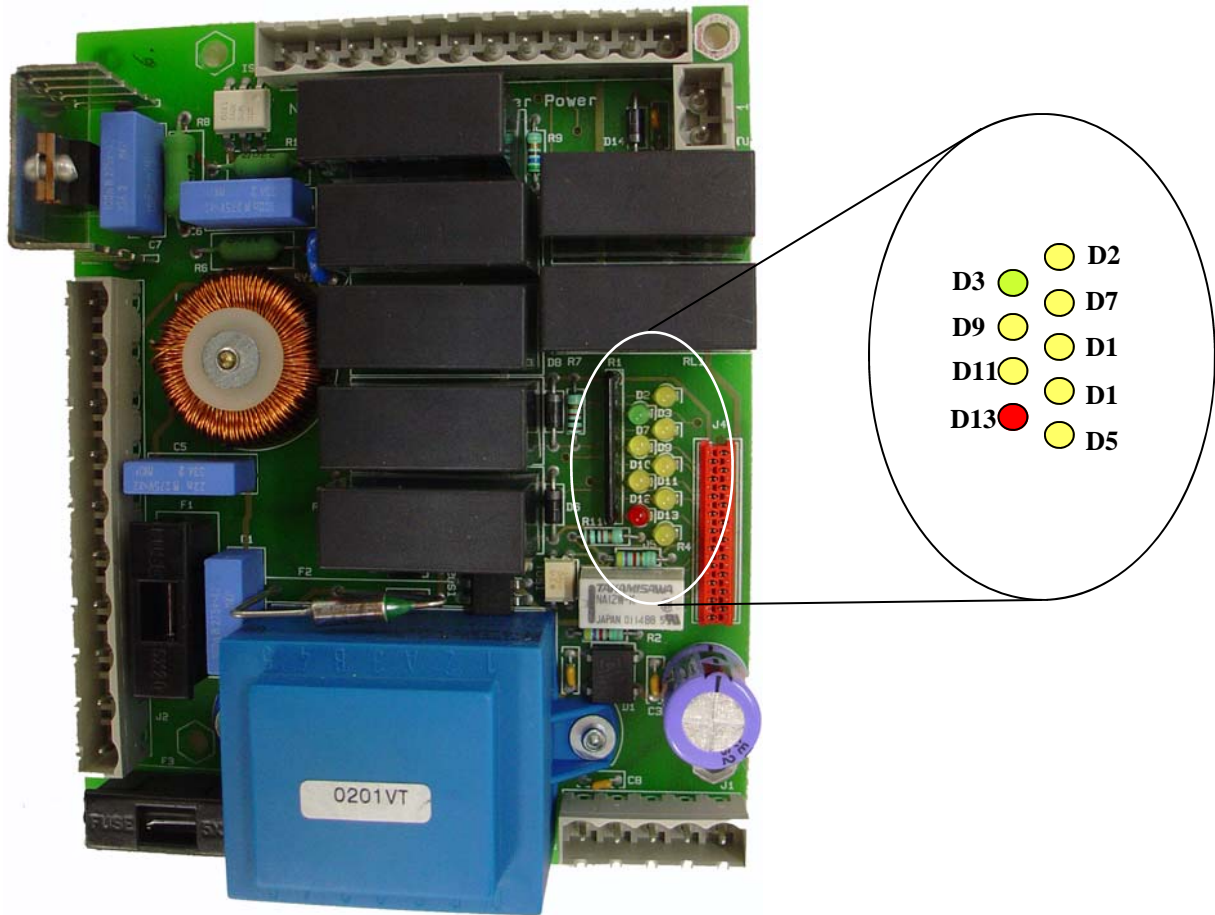
The chart on the next page covers common boiler problems.

Fig. 5.6

MH TROUBLESHOOTING GUIDE				
2/15/2007	PROBLEM	ROOT CAUSE	DIAGNOSIS	CURE
SAFETY	Frequent BURNBACKS	Air flow path thru auger tube to hopper	Inspect all gasketed areas in hopper	Tighten bolts and silicon at edges
		Auger motor is falling	See Auger section	
		Fire migration from long periods in standby	Monitor boiler operating modes/ temperature creep	Extinguish unit/ provide frequent load to unit/ adjust standby program
		Fire migration due to fine dust in auger tube	Inspect auger tube and hopper for wood dust	Clean hopper and auger tube several times per heating season
		Thermal valve defective, failed, or open by debris	Inspect valve	Fix or replace valve
		Thermal valve defective, failed, or obstructed	Check upstream valves, loosen fittings	Turn on supply, purge air
		No water supply	Inspect and test valve	Fix or replace valve, remove obstruction
		Thermal valve probe mislocated	Check probe location	Fix
		Control PCB failure	See A-2 alarm section	Replace control PCB, if fuse F1 was ok
		No power at fan	Check that fan cable is plugged in/ measure supply voltage at pwr PCB	Plug in/ determine if cable or PCB is bad and replace
FUNCTION & CONTROL	FAN does not operate or operates erratically	FAN failure	Fan is noisy/ unplug fan cable and check supply voltage at plug	Replace fan and flange
		Programming is wrong	Check programming against manual	Reset programming to match manual
		F1 fuse is blown	Test both fuses on power PCB	Upgrade F1 fuse to 2.5A/ install RIB relay to run circulator C1
		Type A alarm is present	See alarm section	
	AUGER does not operate or operates erratically	Hopper cover open or micro-switch failed	Check hopper cover and test switch (short circuit when switch depressed)	Micro-switch must be fully depressed/ replace if defective
		Auger shaft is seized	Check for burn-back suppression, check for debris blockage in hopper	Free up auger shaft
		Smoke temp exceeded 260/auger stopped	Check smoke temp on display	Clean boiler, auger will be on-line when smoke temp is below 230
		F1 fuse is blown	See Fan section	
		Incoming power problem	Measure voltage into power PCB (240V at J2 points 1 & 2)	Troubleshoot and correct
		Smoke temp sensor failed	Clean & test sensor (LED D5 on power PCB is on when ok)	Replace sensor (lift wires at J5, resistance should be 1-2 kilohms)
		Motor protection problem	Small test, check & adjust settings & reset, check for loose wires, lift contractor wire & use it to run the motor manually	Replace components and rewrite
		Wiring problem	Check for loose wire, lift motor cable wires at both ends & test resistance	Replace cable
		Power PCB is defective	Check for loose wires, check fuses, reset boiler & check LED status on board	Replace board
		Auger motor is falling	Motor noisy, more pulses needed per rev, periods of poor performance	Replace motor
	A-1 ALARM (smoke temp below 100 long time)	Fire is out in combustion chamber	Check for fire in boiler, check that fan and auger function, check for fuel in hopper	Re-fire boiler
		Burn-back event occurred	Check for burn-back suppression	Free auger shaft
		Hopper cover open or micro-switch failed	Check hopper cover and test switch (short circuit when switch depressed)	Micro-switch must be fully depressed/ replace if defective
		Smoke temp exceeded 260/auger stopped	Check smoke temp	Clean boiler, auger will be on-line when smoke temp is below 230
		Smoke temp sensor failed	Clean & test sensor (LED D5 on power PCB is on when ok)	Replace sensor (lift wires at J5, resistance should be 1-2 kilohms)
	A-2 ALARM (overheat aquastat tripped)	Temperature creep in standby mode	Observe supply water temp in standby mode, check set-point, check damper	Adjust programming for standby mode, adjust set-point, adjust damper
		Backup boiler set-point too high	Backup boiler cycles frequently, pellet boiler supply temp much higher than set-point	Adjust backup boiler set-point
		Aquastat is defective or miss-wired	Check & test aquastat (should be short circuit when cooled & reset)	Fix wiring/ replace aquastat
		Control PCB is defective	Fan runs high speed/ control panel non-responsive, check flat cable, check fuse F1	Replace control PCB if fuse F1 was ok
		See above "Auger does not operate..."	See above	
	A-3 ALARM (auger motor overload trip)	Smoke temp sensor failed	Clean & test sensor (LED D5 on power PCB is on when ok)	Replace sensor (lift wires at J5, resistance should be 1-2 kilohms)
		Smoke temp above 280- needs cleaning	Check for high smoke temp, check boiler cleanliness	Clean boiler
	A-4 ALARM (supply wtr temp above 90)	Temperature creep in standby mode	See A-2 alarm	
		Backup boiler setpoint too high	See A-2 alarm	
		Supply water temp sensor failed	Check & test sensor (lift wires at J5, resistance should be 1-2 kilohms)	Replace sensor
	A-5 ALARM (communication error in program)	Power or control PCB failed	See above for auger, fan and A-2 alarm	
		Cable between PCBs miss-connected	Check connection & remake	Replace flat cable
	F-1 ALARM (smoke temp above 240/ 3 times)	Boiler needs cleaning	Check boiler cleanliness	Clean boiler
		Smoke temp sensor failed	See A-1 alarm	Replace sensor

5.8 Power PCB Board Troubleshooting

Light diodes on power PCB board can be used to trouble shoot.



PCB Trouble Shooting			
LED	Color	Function	Description
D2	Yellow	Alarm Relay	On at Alarm
D3*	Green	12VDC	On when 12VDC supply is OK
D5*	Yellow	Smoke Safety Relay	Off, when flue temperature probe is not OK
D7*	Yellow	Door Switch Relay	Off, when door to hopper is open
D9	Yellow	Auger Reverse Relay	On when Auger Moves in Reverse
D10**	Yellow	Auger Forward Relay	On when Auger Moves Forward
D11*	Yellow	Oxygen Probe Relay	Off when Oxygen Probe is Heated
D12	Yellow	Pump Relay	Off, when pump is on
D13**	Red	Thermal Failure	Off, when over-heat circuit breaker trips at 100° C

* ON with normal PCB

** ON/OFF when auger cycles

6.0 Data and Drawings

6.1 Measurement Data

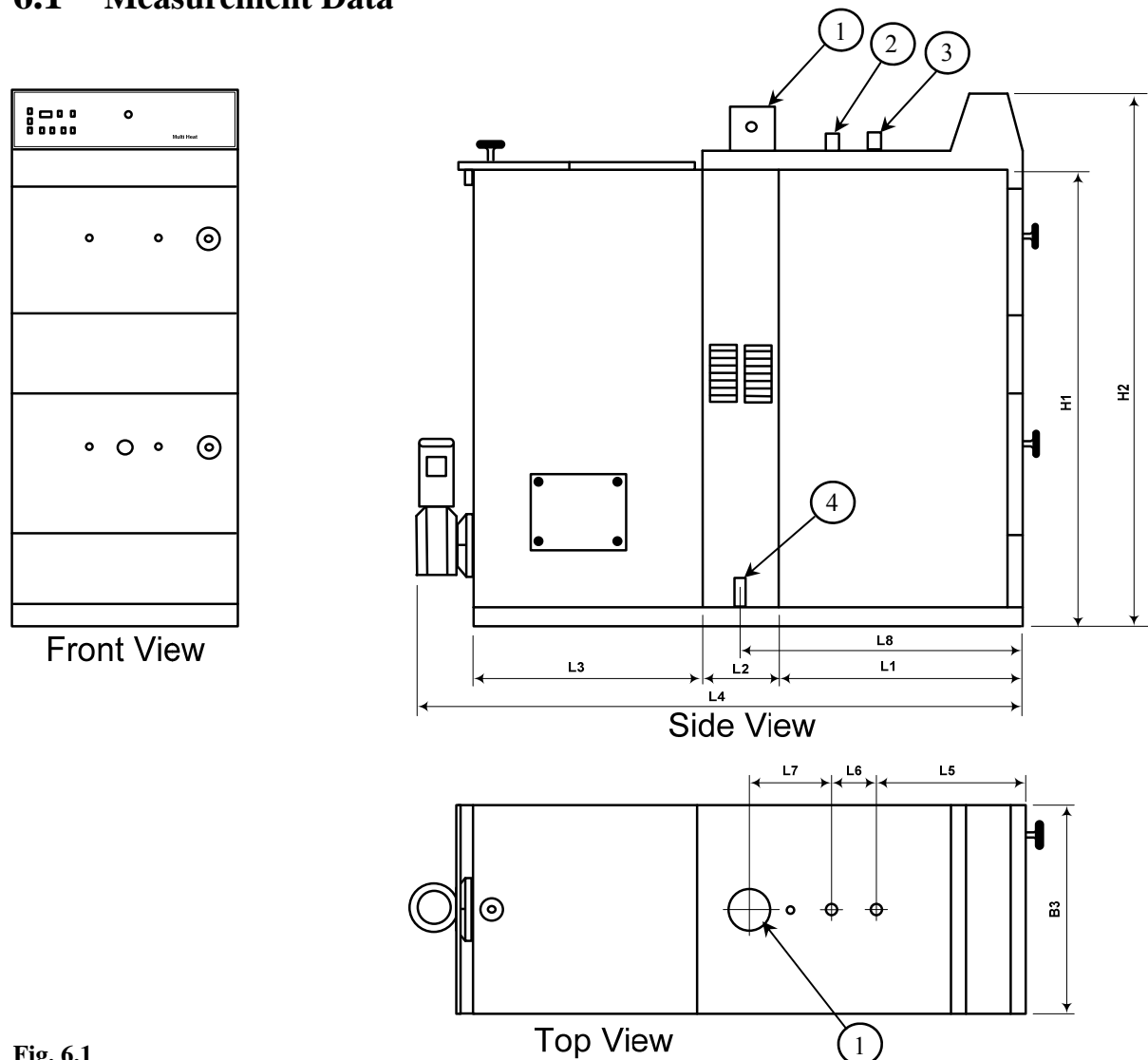
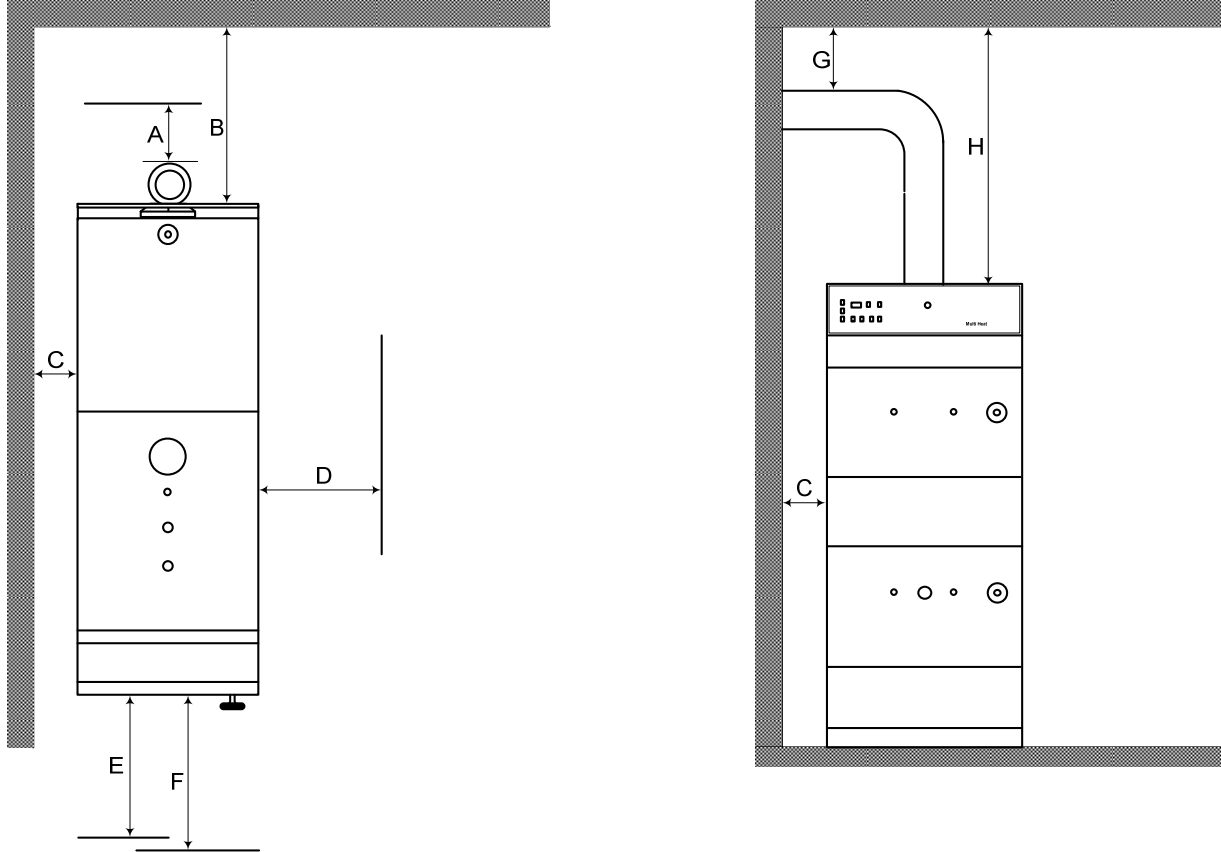


Fig. 6.1

Description	Units	MH 1.5	MH 2.5	MH 4.0
1. Flue Pipe, External Diameter	inches	5.125	5.875	5.875
2. Return Connection	inches	1	1	1
3. Supply Connection	inches	1	1	1
4. Burn-back Protection Connection	inches	.5	.5	.5
L1. Measurement	inches	23	23	27.5
L2. Measurement	inches	7.750	8.5	8.5
L3. Measurement	inches	19.5	24.250	24.250
L4. Measurement	inches	56.5	62.5	66.67
L5. Measurement	inches	14.2	11.5	15.875
L6. Measurement	inches	5	5	5
L7. Measurement	inches	6.5	9.750	9.67
H1. Measurement	inches	39.750	50.375	50.375
H2. Measurement	inches	45.875	50.375	50.375
B3. Measurement	inches	19.750	23.625	23.625

6.2 Positioning Data

Fig. 6.2



Clearances to Combustibles		
Measurement	Minimum Distance	Notes
A-Backwall to Appliance	18"	Minimum Distance
B-Backwall to Appliance	40"	Minimum distance for removal of feed auger from the rear of the MH 2.5 and MH 4.0
C-Sidewall to Appliance	6"	Minimum Distance on left or right side
D-Sidewall to Appliance	21"	Minimum Distance on left or right side to allow clearance for cleaning and maintenance tasks.
E-Front of Appliance	36"	Required distance for cleaning the boiler.
F-Front of Appliance	40"	Minimum distance for removal of feed auger from the front of the MH 2.5 and MH 4.0
G-Combustibles to Pipe	18"	Minimum Distance
H-Ceiling to Appliance	18"	Minimum Distance

6.3 Specification Data**Fig. 6.3**

Technical Data	Units	MH 1.5	MH 2.5	MH 4.0
MEASUREMENTS				
Depth- Boiler & Fuel Hopper- Total	inches	56.5	62.2	66.7
Width- Boiler or Fuel Hopper	inches	19.9	23.6	23.6
Height including smoke pipe stub	inches	45.9	58.1	58.1
Fuel Hopper capacity	Cu ft	7	12.7	12.7
Hopper Hatch dimensions (length x width)	inches	15.8 X 15.8	20.5 X 20.5	20.5 X 20.5
Smoke Pipe Stub outside diameter	inches	5.2	5.9	5.9
Weight- Empty	lbs	750	1168	1279
Water Contents	gallons	13.2	33	39.6
Distance behind Boiler for replacing worm conveyor	inches	31.5	39.4	39.4
Distance in front of Boiler to fully open doors	inches	19.7	23.7	23.7
Space around Hopper for service access	inches	4	4	4
OPERATING DATA				
Operating Temperature-Water	F°	140-185	140-185	140 - 185
Nominal Output-Wood Pellets or Corn	Btu/hr	51,200 (pellets only)	85,300	146,700
Output at 30% (minimum)-Wood Pellets or Corn	Btu/hr	15,700 (pellets only)	25,600	40,950
Approximate Output in Standby	Btu/hr	1,700 (pellets only)	2,700	3,300
Smoke Temperature at Nominal Output-Wood Pellets -Corn	F°	302	356	356
	F°	-	392	392
Smoke Temperature at 30% Output-Wood Pellets - Corn	F°	212	230	230
	F°	-	239	239
Smoke Gas Volume at Nominal Output-Wood Pellets -Corn	Cu meters/hr	36	58	93
	Cu meters/hr	-	60	97
Fuel Consumption at Nominal Output-Wood Pellets -Corn	lbs/hr	7.5	12.6	22
	lbs/hr	-	13.2	24.3
Required Draft	inch WC	.04"- .1"	.04"- .1"	.04"- .1"
Safety Listings	-	UL 391-1995, CAN/CSA B366.1-M91,UL726, ANSI Z21.13-200, CSA 4.9-M2000	UL 391-1995, CAN/CSA B366.1-M91,UL726, ANSI Z21.13-200, CSA 4.9-M2000	UL 391-1995, CAN/CSA B366.1-M91,UL726, ANSI Z21.13-200, CSA 4.9-M2000
Noise Level	Db(A)	<70	<70	<70
ELECTRICAL DATA				
Boiler Power Requirement		240V-60Hz/15A	240V-60Hz/15A	240V-60Hz/15A
Electricity Consumption	KW	.3	.46	.46
Auger Motor	KW	.12	.37	.37
Blower	W	90	90	90
Auger Motor Protection Setting	Amps	1.1	2.3	2.3
PIPING DATA				
Boiler Test Pressure	psi	58	58	58
Cooling Coil Test Pressure	psi	362	362	362
Boiler Relief Valve Setting	psi	30	30	30
Supply & Return pipe stub size (male npt)	inch	1	1	1
Minimum Boiler Loop size	inch	1	1.25	1.25
Cooling coil & fire suppression connection size	inch	.5	.5	.5
Fill/ drain valve size	inch	.5	.5	.5
Pressure Drop for 10 degrees C temperature difference	psi	.067	.178	.435
Mixing Valve Opening Setting	F°	162	162	162
Internal Overheat Aquastat Setting	F°	212	212	212
WOOD PELLET DATA				
Pellet length	inch	0.2-0.8	0.2-0.8	0.2-0.8
Approximate moisture content	%	8	8	8

6.4 Electrical Diagrams

Fig. 6.4

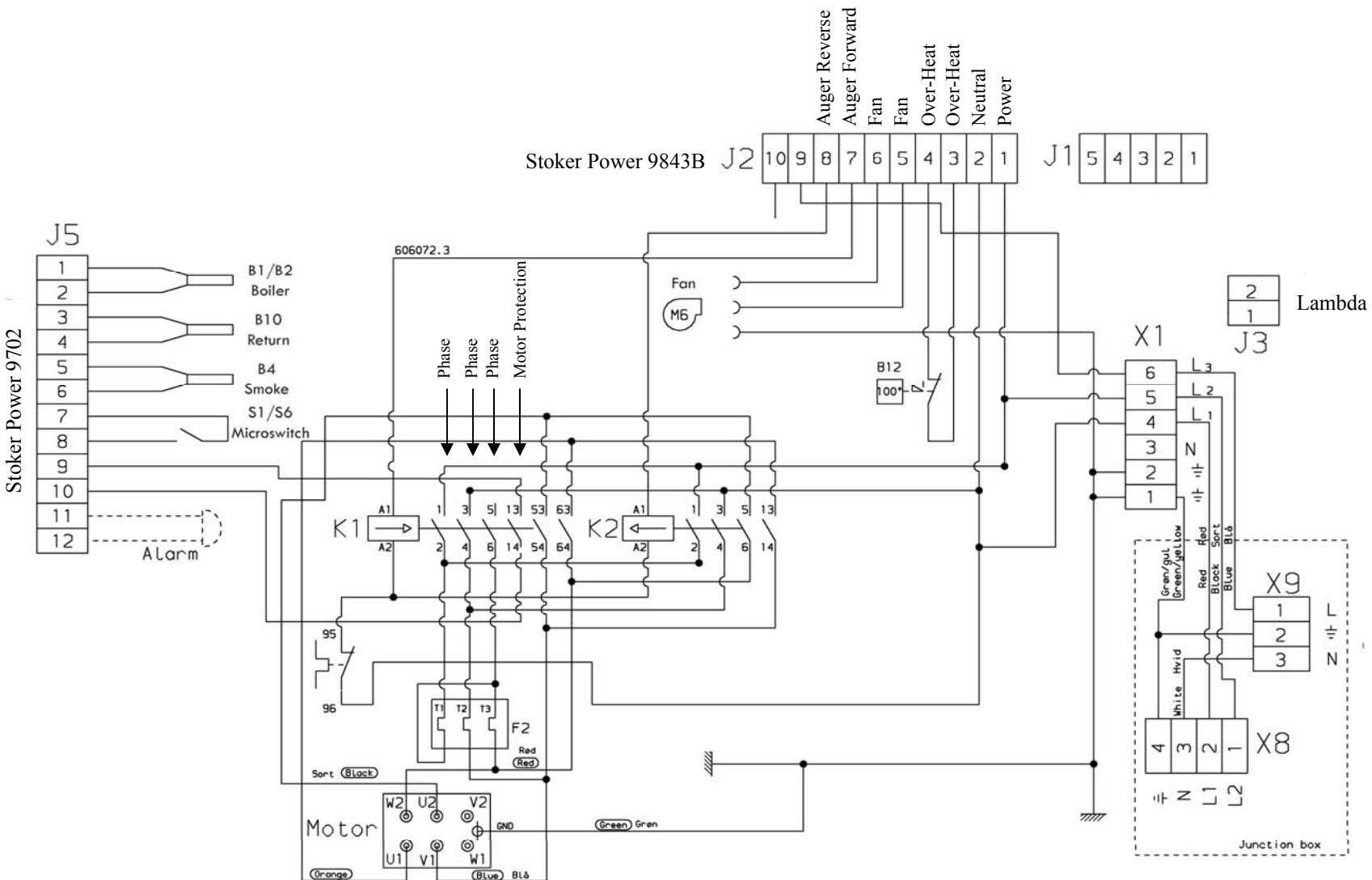


Fig. 6.5

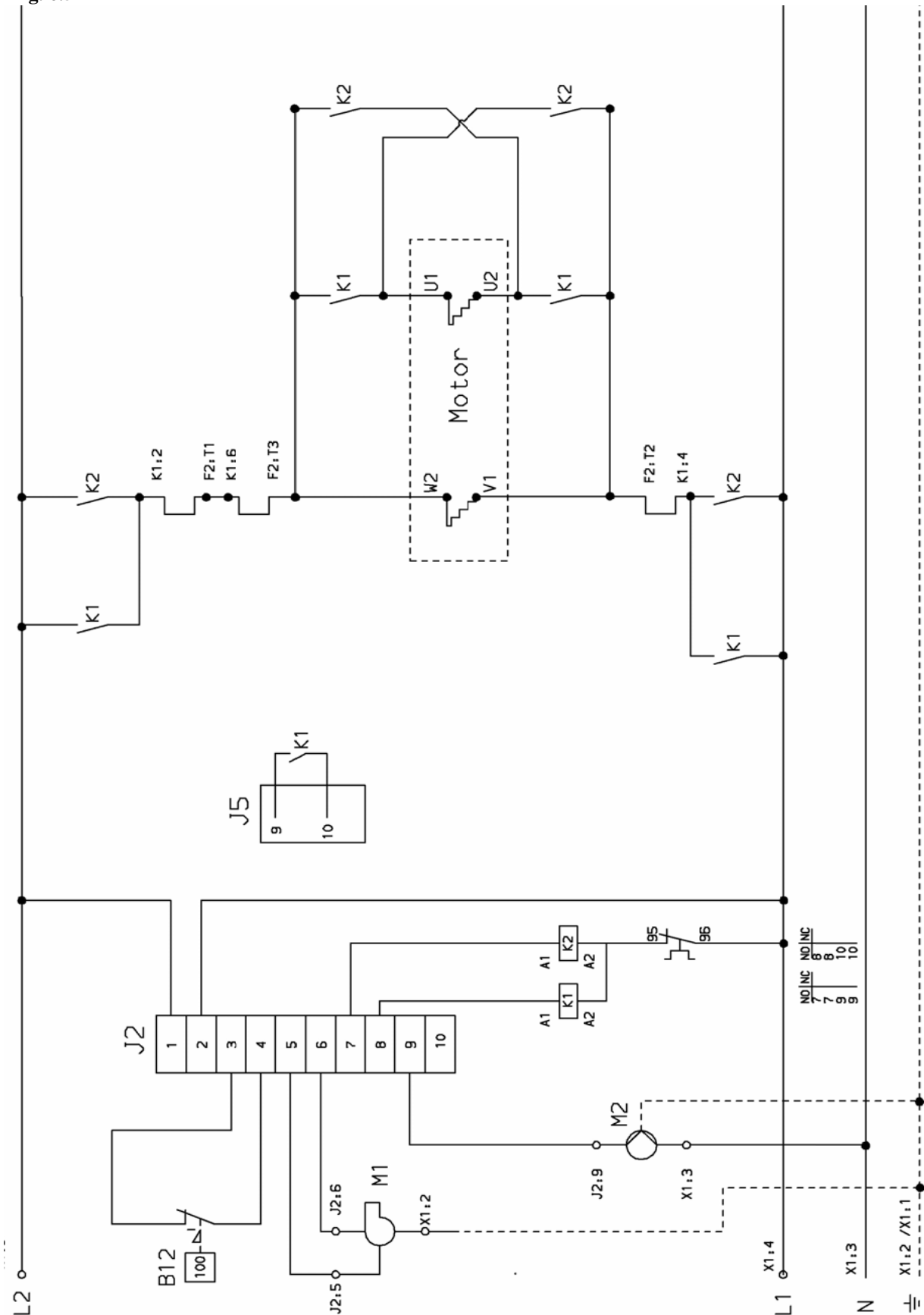
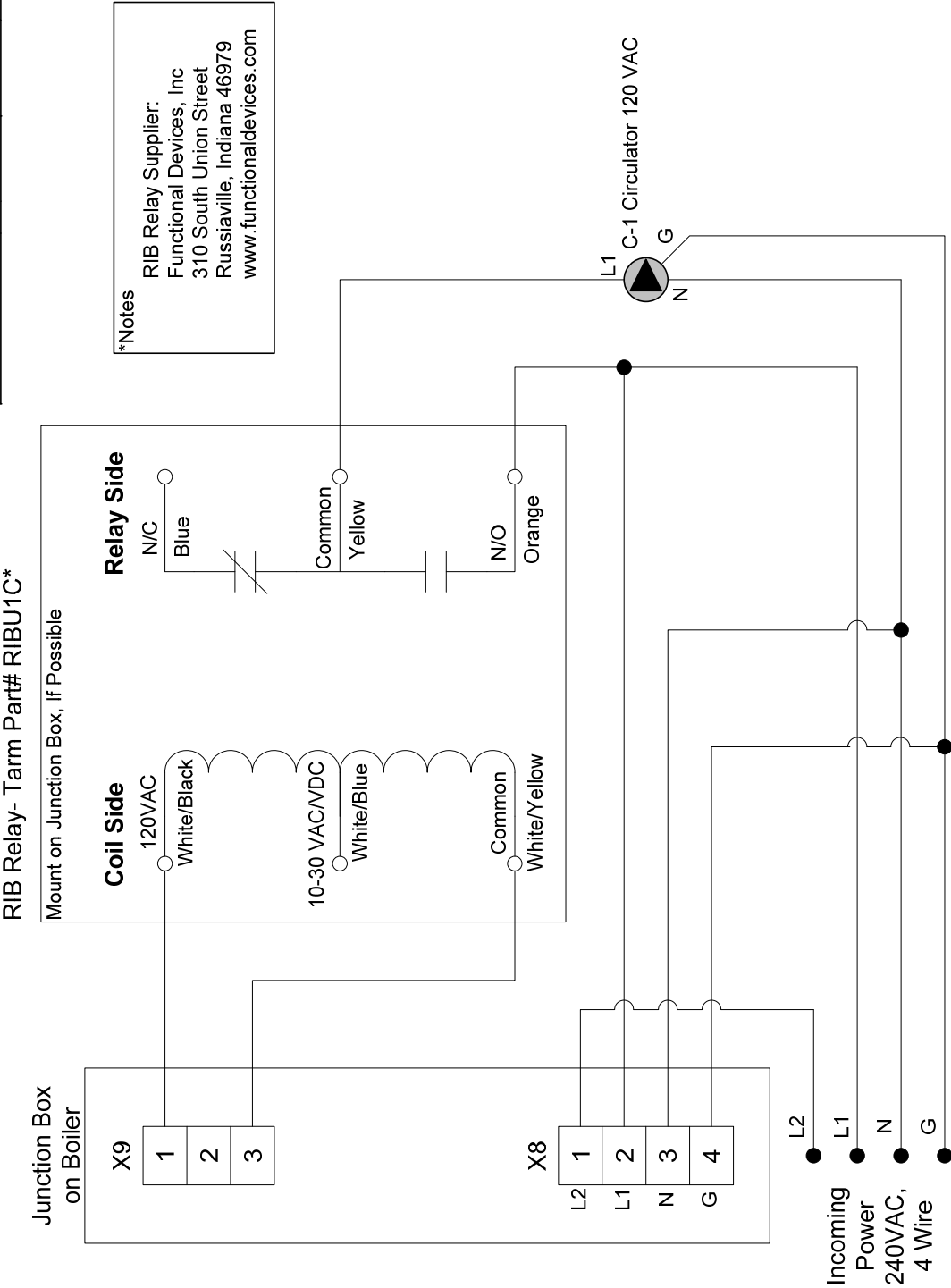


Fig. 6.7

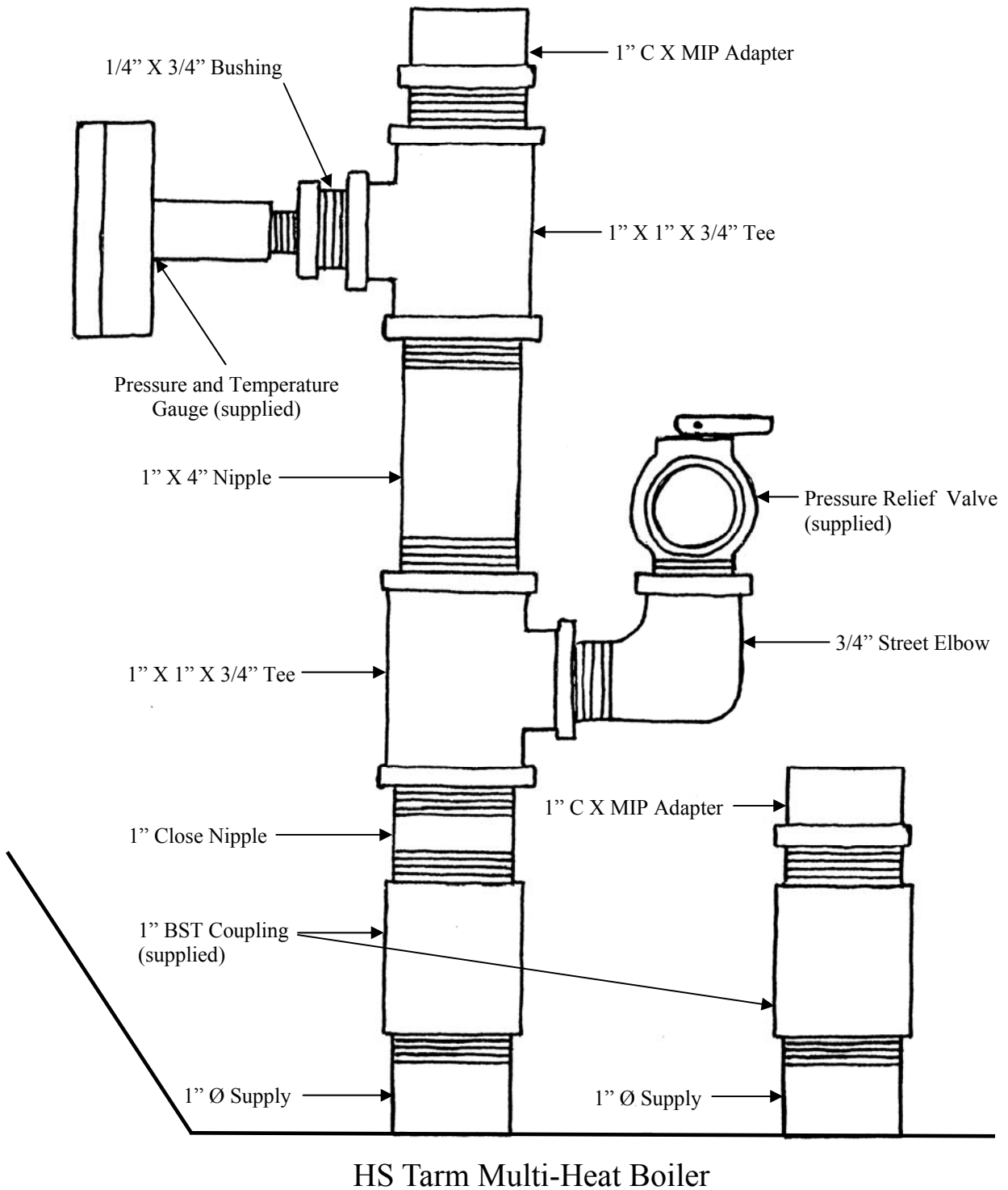
Tarm USA, Inc 4 Britton Lane Lyme, NH 03768				Multi-Heat RIB Relay Wiring Diagram			
Drawn by: TSP		Date 11/02/2007		DWG NO RIB1		REV 1	
Checked by:		SCALE N/A		SHEET 1 OF 1			



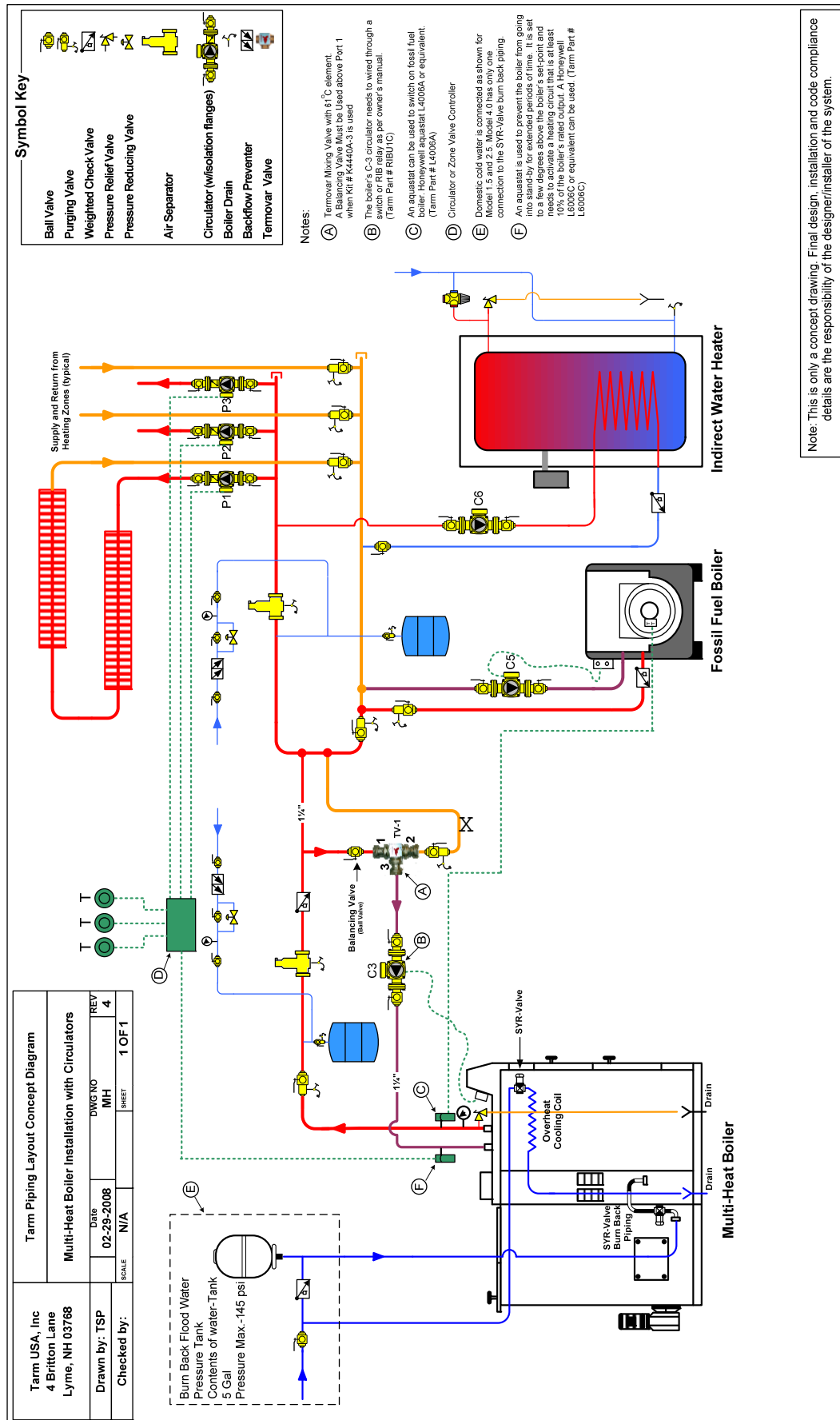
6.5 Plumbing Diagrams

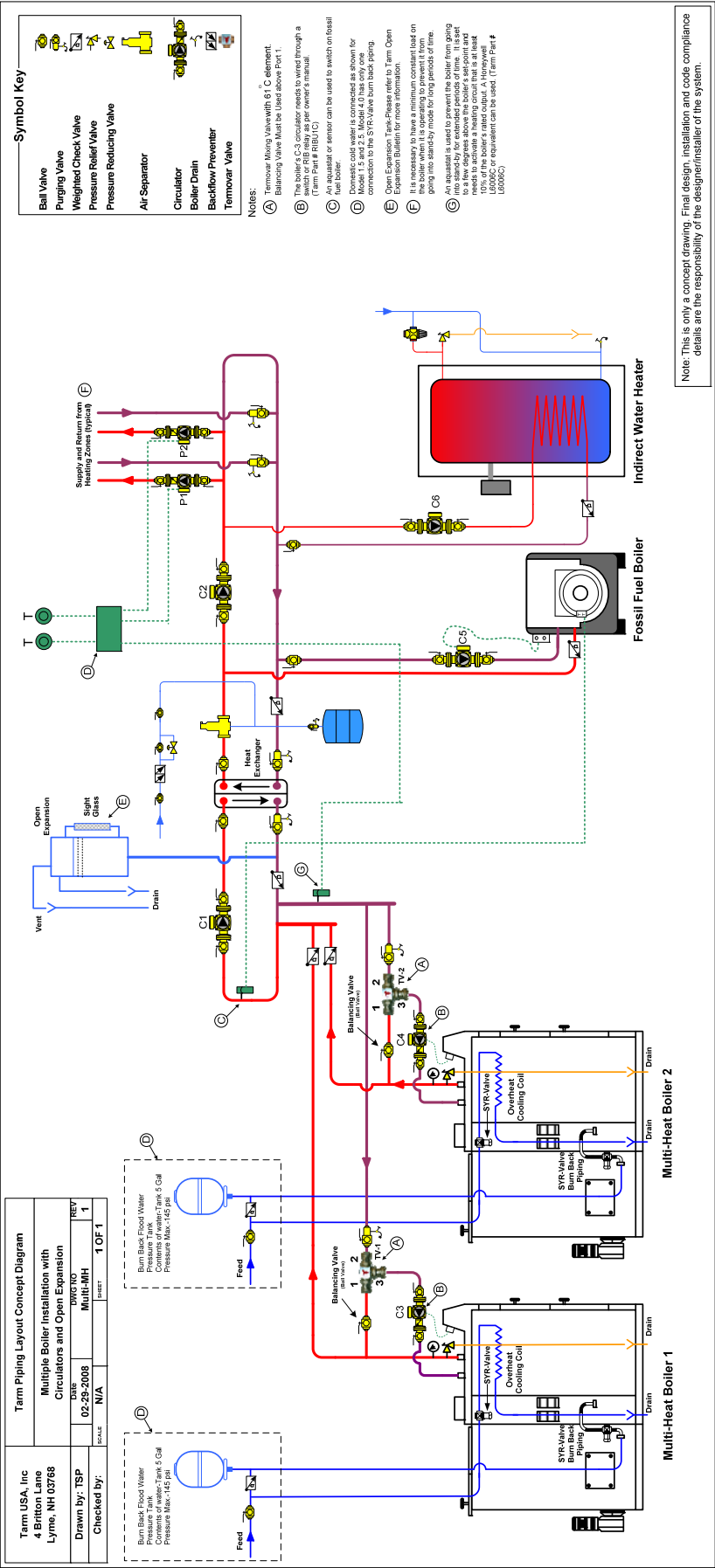
6.51 Recommended Supply and Return Fittings

Fig. 6.6

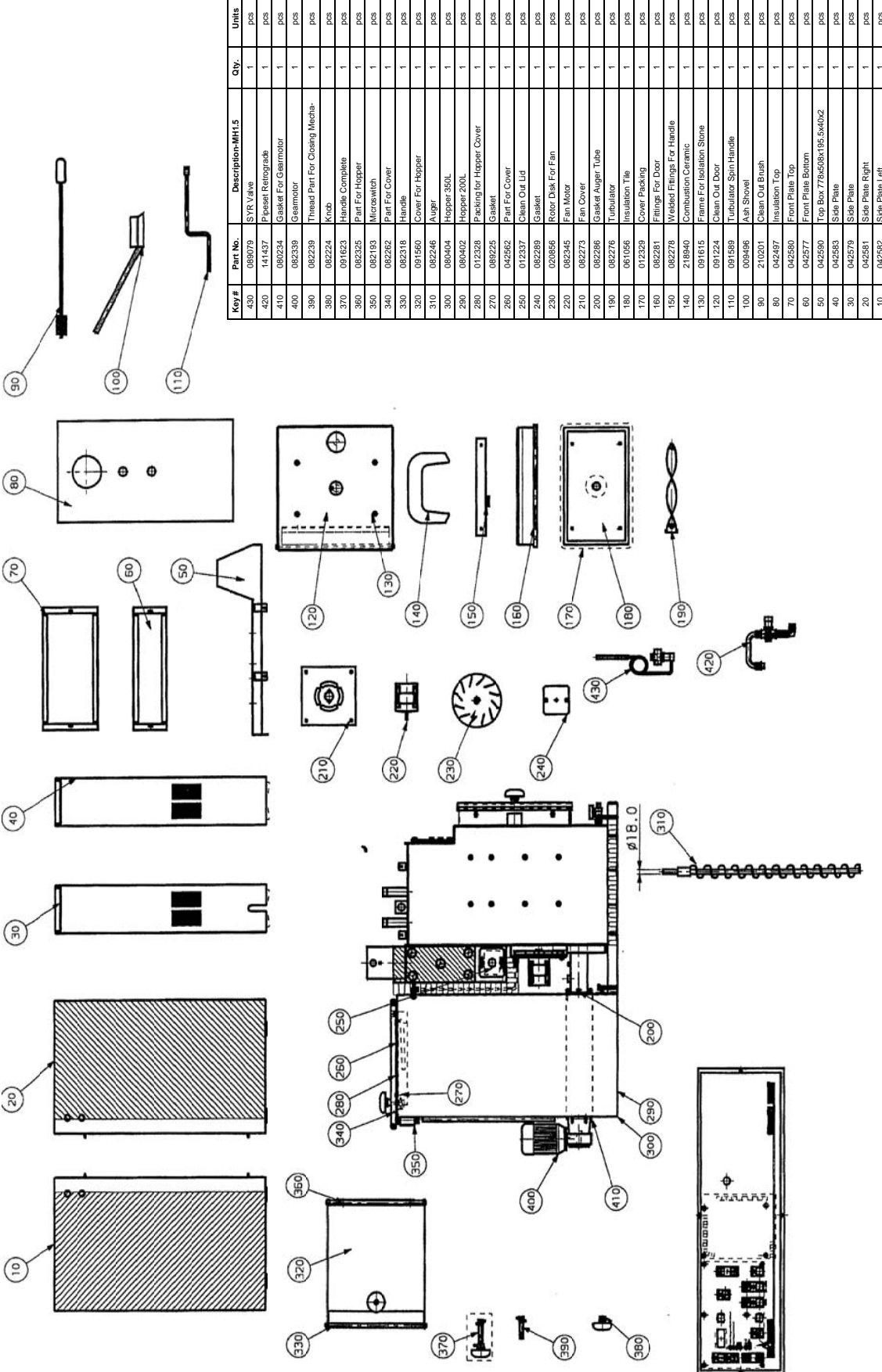


*Note-All fittings should be black iron or copper.





6.6 Parts List



Key #	Part No.	Description-MH1.5	Qty.	Units
430	08079	SYR Valve	1	pos
420	141437	Preset Retrograde	1	pos
410	080234	Gasket For Gearmotor	1	pos
400	082339	Gearmotor	1	pos
390	082239	Thread Part For Closing Media-	1	pos
380	082224	Knob	1	pos
370	091623	Handle Complete	1	pos
360	082325	Part For Hopper	1	pos
350	082193	Microswitch	1	pos
340	082318	Part For Cover	1	pos
330	082318	Handle	1	pos
320	091560	Cover For Hopper	1	pos
310	082246	Auger	1	pos
300	080404	Hopper 350L	1	pos
290	080402	Hopper 200L	1	pos
280	012328	Packing for Hopper Cover	1	pos
270	089225	Gasket	1	pos
260	042592	Part For Cover	1	pos
250	012337	Clean Out Lid	1	pos
240	082289	Gasket	1	pos
230	020856	Rotor Disk For Fan	1	pos
220	082345	Fan Motor	1	pos
210	082273	Fan Cover	1	pos
200	082296	Gasket Auger Tube	1	pos
190	082276	Turbulator	1	pos
180	061056	Insulation Tile	1	pos
170	012329	Cover Packing	1	pos
160	082281	Fittings For Door	1	pos
150	082278	Welded Fittings For Handle	1	pos
140	218940	Combustion Ceramic	1	pos
130	091615	Frame For Isolation Stone	1	pos
120	091224	Clean Out Door	1	pos
110	091589	Turbulator Spin Handle	1	pos
100	009496	Ass. Shovel	1	pos
90	210231	Clean Out Brush	1	pos
80	042497	Insulation Top	1	pos
70	042590	Front Plate Top	1	pos
60	042577	Front Plate Bottom	1	pos
50	042590	Top Box 778x508x195.8x402	1	pos
40	042593	Side Plate	1	pos
30	042579	Side Plate	1	pos
20	042581	Side Plate Right	1	pos
10	042582	Side Plate Left	1	pos

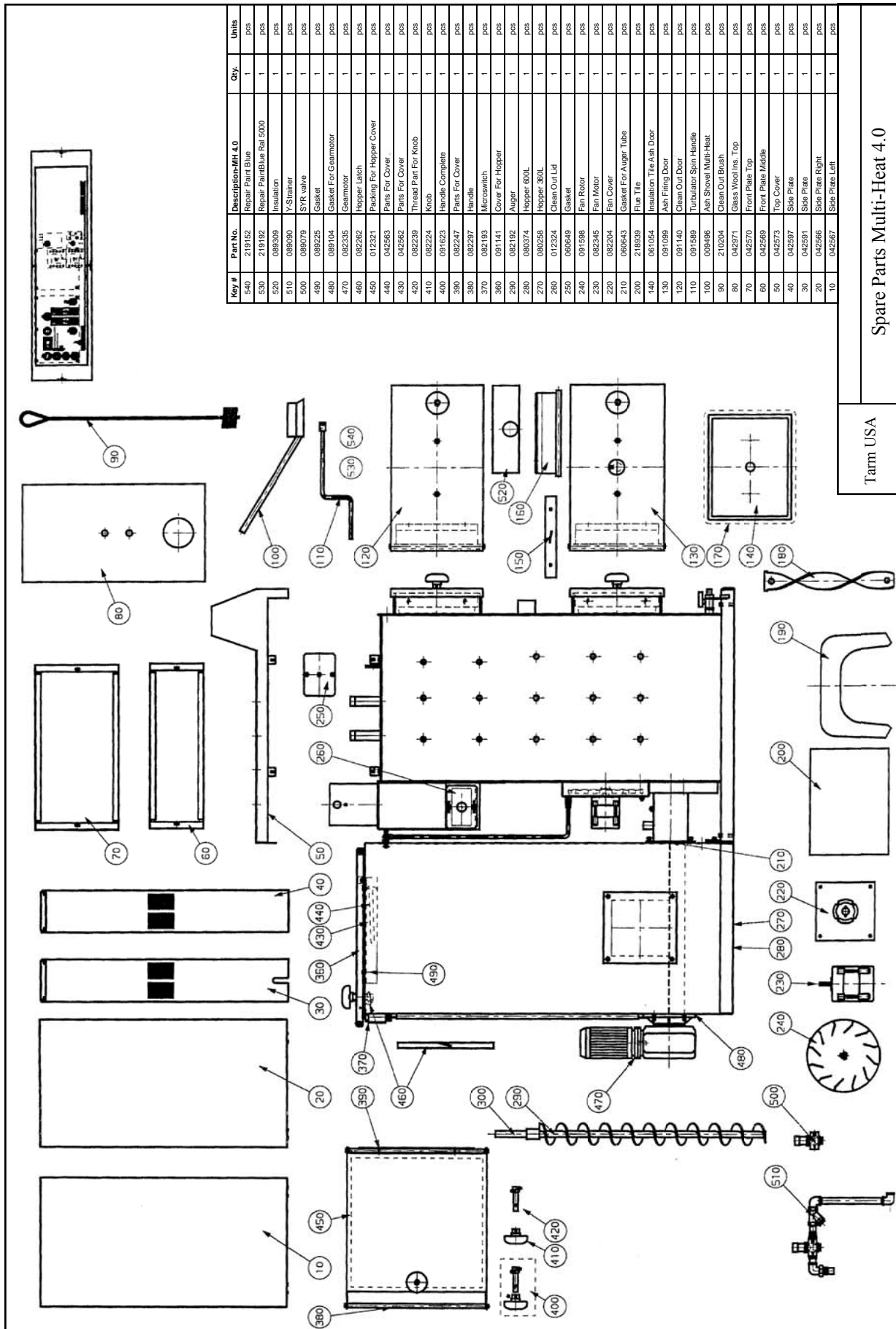
Tarm USA

Spare Parts Multi-Heat 1.5

Key #	Part No.	Description-MH2.5	Qty.	Units
640	219152	Repair Paint Blue	1	pcs
630	219192	Repair Paint Blue, Rat 5000	1	pcs
620	089309	Covering Plate 316x92	1	pcs
610	089308	Covering Plate 48x92x37	1	pcs
480	089100	Plastic Cover 58x47x53x3	1	pcs
590	210204	Clean Out Brush 110x153 L=800	1	pcs
580	089401	Clean Out Shovel	1	pcs
570	092496	Cleaning Brush 25" L=800	1	pcs
560	092496	Ash Shovel Multi-Heat	1	pcs
550	082235	Fittings For Cover	1	pcs
540	082260	Welded Fittings For Handle	1	pcs
530	091824	Frame For Incl. Stone 381x280x85	1	pcs
520	091740	Clean Out Door Multi-Heat 4.0	1	pcs
510	089087	Frame For Incl. Stone 468x12x16	1	pcs
500	089088	Ash/Firing Door MH 2.5	1	pcs
490	089098	Fittings For Door L=503	1	pcs
480	089098	Fittings For Handle	1	pcs
470	017456	Cover Packing Multi-Heat 2.5	1	M
460	089086	Insulation Tile Ash Door	1	pcs
450	017323	Cover Packing Multi-Heat 4.0	1	pcs
440	017054	Insulation Tile Ash Door	1	pcs
430	089649	Packing 154x110x3	1	pcs
420	017324	Clean Out Lid	1	pcs
410	060643	Packing 170x170x1 Heat Resist	1	pcs
400	082204	Fan Cover	1	pcs
390	082190	Fan Motor EB 95 C 292	1	pcs
380	089094	Robot Disk For Fan	1	pcs
370	089374	Hopper 600L	1	pcs
360	089258	Hopper 960L	1	pcs
350	089079	Thermal Valve SYR	1	pcs
340	089090	PipeSet Retrograde Combustion	1	pcs
330	089101	Glass Wood Ins Top 800x600x100	1	pcs
320	089307	Top Box 600x802 MH 2.5	1	pcs
310	089303	Front Plate Middle 595x126x34	1	pcs
300	089304	Front Plate Top 596x234x34	1	pcs
290	089104	Packing Ceramic	1	pcs
280	082335	Gearmotor	1	pcs
270	082326	Gasket	1	pcs
260	042563	Part For Cover 380x452x83	1	pcs
250	042562	Part For Cover 380x452x83	1	pcs
240	082193	Microswitch	1	pcs
230	091141	Covers For Hopper	1	pcs
220	082247	Part For Hopper	1	pcs
210	017321	Packing For Hopper Cover 380x800	1	pcs
200	082297	Handle	1	pcs
190	082192	Auger	1	pcs
180	082192	Auger	1	pcs
170	082262	Hopper Latch	1	pcs
160	082224	Thread Part For Latch	1	pcs
150	082224	Handle Knob	1	pcs
140	091623	Handle Cpl	1	pcs
130	091623	Handle Cpl	1	pcs
120	089096	Flue Tile	1	pcs
110	089402	Combustion Ceramics	1	pcs
100	089402	Ashpan	1	pcs
90	042591	Side Plate	1	pcs
80	042597	Side Plate	1	pcs
70	089302	Side Plate Right	1	pcs
60	089301	Side Plate Left	1	pcs

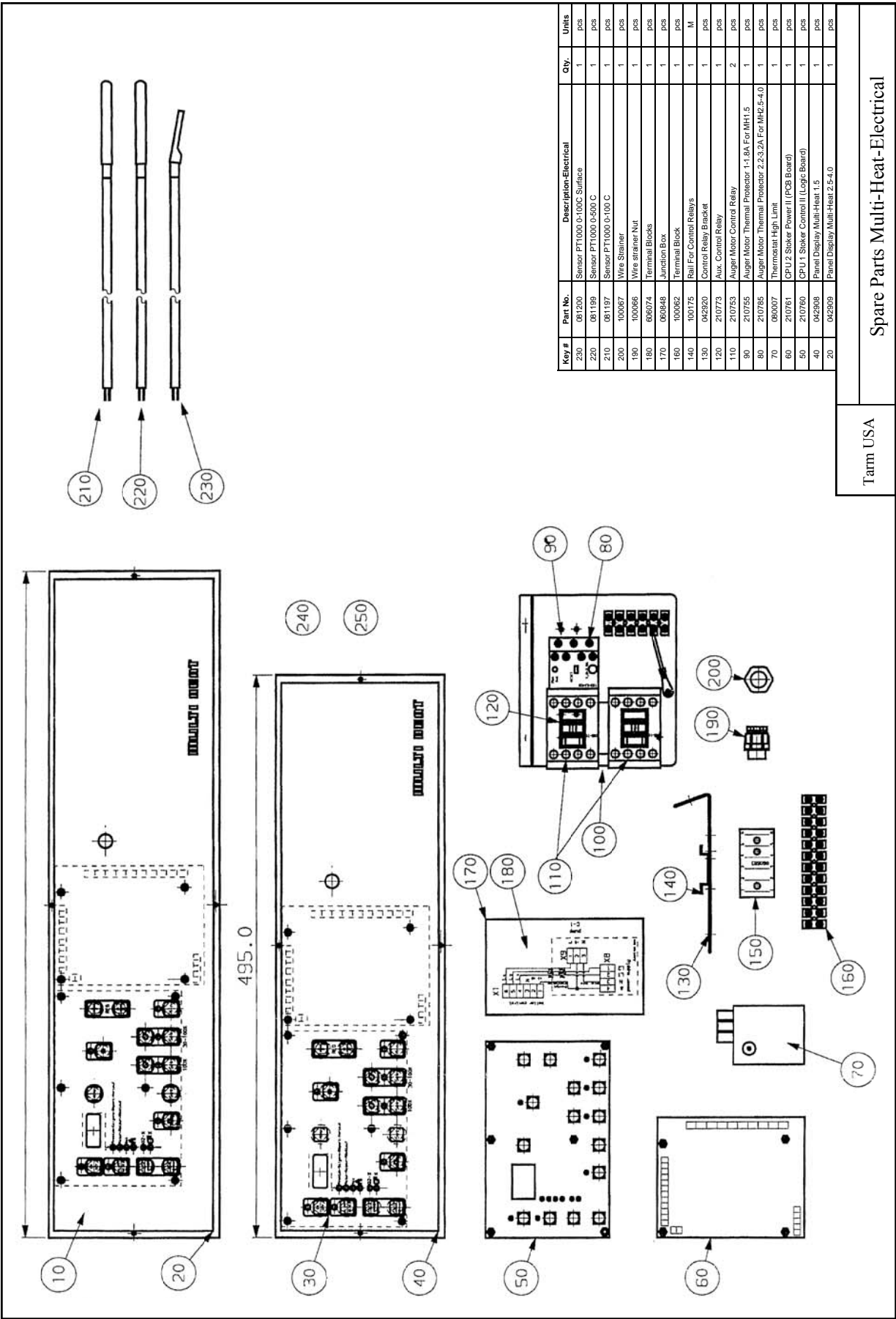
Spare Parts Multi-Heat 2.5

Tarm USA



Spare Parts Multi-Heat 4.0

Tarm USA



Spare Parts Multi-Heat-Electrical

Tarm USA

7.0 Warranty Information

MULTI-HEAT WARRANTY – FOR USE IN U.S.A.

TARM USA INC. (Importer) warrants this residential steel boiler identified below and the motors and the electronic controls and the auger, and the refractory against defects in the material and workmanship under normal home use and service. TO THE ORIGINAL PURCHASER AT THE ORIGINAL INSTALLATION SITE in the United States and Canada under the following terms.

BOILER BODY **LIMITED 5 YEAR WARRANTY**

Subject to all the limitations stated below, Importer warrants the steel boiler body (but not including doors, refractory or other components) against defects in materials and workmanship resulting in breaks or leaks causing significant impairment of performance for a period of 5 years.

IMPORTER'S OBLIGATION. The importer's obligation under this limited warranty is to provide payment of the cost of repair of the warranted boiler, or at its option to replace the warranted boiler. IMPORTER will pay all required labor and the costs of all materials for the repair of the boiler defects arising during the five years of the warranty period. Shipping charges in connection with replacement or repair shall be paid by the owner.

DOORS, REFRACTORY, AUGER, COOLING COIL **LIMITED THREE YEAR WARRANTY**

YEARS ONE THROUGH THREE: subject to all the limitations stated in the following table, Importer warrants the doors, refractory, auger and the cooling coil against defects in materials and workmanship resulting in breaks or leaks causing significant impairment of performance.

Warranty Year	
1	100% of parts and labor
2	100% of parts only
3	50% of parts only

OTHER COMPONENTS **1 YEAR WARRANTY**

Motors, electronic controls, and all other components have a one year warranty.

CONDITIONS OF WARRANTY

This limited warranty covers only repairs or replacements resulting from defects in materials and workmanship.

This warranty shall be void if the boiler is not installed by a qualified heating installer or is not installed, maintained, and operated as per the Instructions Manual. The boiler must be cleaned and maintained above the minimum temperature as specified..

This warranty shall be void if the owner fails to have the boiler serviced or inspected at least once every year by an experienced and qualified service person.

EXCLUSIONS: Expressly excluded from coverage by this limited warranty are the following:

Ordinary wear and tear, repairs or replacements necessitated by normal use as described in the Instructions Manual.

Repairs or replacements arising from the effects of corrosive water supply or corrosive by-products of combustion.

Repairs or replacements of fittings, motors, or any or all controls, relief or regulating valves, transformers, and accessories.

Repairs or replacements to repair damage caused by operation with inadequate draft, too hot or too cool operation, from cold start, or any other use in violation of the instructions or cautions set forth in the installation and operation Instructions Manual.

The repair or replacement of any component furnished by any other supplier, or damage caused by the functioning or malfunctioning of any such component.

PURCHASERS' LEGAL RIGHTS: This warranty gives you specific legal rights, and you may also have other rights which may vary from state to state. This warranty shall not be construed as inconsistent with any federal, state or municipal law or any regulations promulgated in connection herewith.

Questions regarding this warranty may be referred to TARM USA, INC 5 Main St., Lyme, NH 03768 U.S.A.
Phone: 1-800-STAY-WARM

HOW AND WHERE TO GET SERVICE Repairs or replacements under this limited warranty must be performed by your dealer or someone authorized by him. You may be required to present this limited warranty to the dealer before any work is performed. You must pay for any work performed which is not covered by this limited warranty or which is not authorized by the dealer.

8.0 Installation Report for Boiler System

Installation Performed by: _____

Multi-Heat Model / Serial No. _____ / _____

Boiler System Installed and Adjusted: _____
Date

Warranty Certificate Filled and Sent: _____
Date

Measured and Adjusted Values

	Date	Date	Date	Date
Fuel Type (Brand)				
Fuel Moisture Content				
Programmed Minimum Air Quantity				
Programmed Fuel Auger Run Time High (sec)				
Low (sec)				
Programmed time with max air (in standby mode)				
High output: time between fuel auger pulses				
High output: air quantity in %				
Standby firing: adjusted time between fuel auger pulses				
Low output: time between				
Low output: air quantity in %				
Pump adjustment, pump 1				
Pump adjustment, pump 2				
Other data / adjustments				
Adjustment carried out by:				

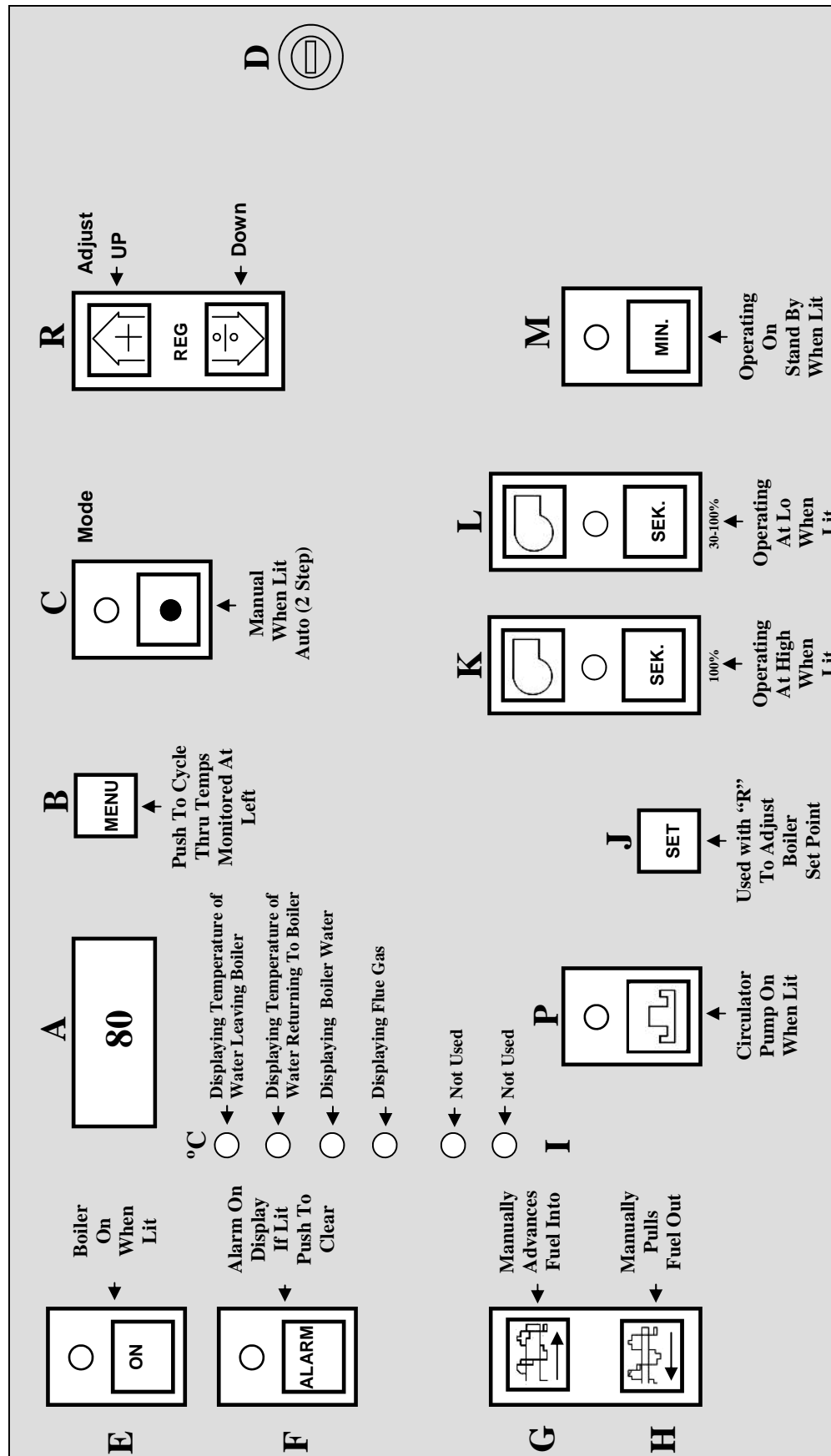
Appendix A - Temperature Conversion

Temperature Conversion Table

°C	°F		°C	°F		°C	°F		°C	°F
40	104		80	176		135	275		220	428
45	113		82	179.6		140	284		225	437
50	122		84	183.2		145	293		230	446
52	125.6		86	186.8		150	302		235	455
54	129.2		88	190.4		155	311		240	464
56	132.8		90	194		160	320		245	473
58	136.4		92	197.6		165	329		250	482
60	140		94	201.2		170	338		255	491
62	143.6		96	204.8		175	347		260	500
64	147.2		98	208.4		180	356		265	509
66	150.8		100	212		185	365		270	518
68	154.4		105	221		190	274		275	527
70	158		110	230		195	383		280	537
72	161.6		115	239		200	392		285	545
74	165.2		120	248		205	401		290	554
76	168.8		125	257		210	410		295	563
78	172.4		130	266		215	419		300	572

Appendix B - Extra Control Panel Layout

Cut Here



Appendix C Prom Version 1.04 Installation Menu Programming

For Boilers with Prom Version 1.04, use the chart below.

Background Programming **INSTALLATION MENU** is addressed and reviewed as follows:

- With power connected to the boiler and on, switch the ON/ OFF Button (E) to OFF.
- Press and hold down simultaneously for several seconds the ALARM RESET (F) and MENU (B) buttons.
- The **INSTALLATION MENU**, starting with the PROM version code, will appear on the control panel display (A).

The programming is now ready for review. Each time the MENU (B) button is pushed, a different program value on the list is displayed in sequence. The sequence is repeated after the last value on the list is displayed. Settings can be changed by displaying the appropriate program value and then pressing the + or – (note the minus symbol on the control panel is shown as “÷”) on the REG (R) button to change the value.

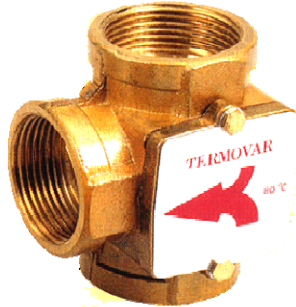
To save a new value, you must have stepped to the next program value with the MENU (B) button. When all values are set correctly, they are stored by pressing the ON/ OFF button (E). If you do not

Table 3.2 Background Programming Installation Parameters		
PARAMETER	MEANING	
(XXX)	[1.04] PROM version installed (104). This value cannot be changed. Means release 1 version 04.	
(PXX)	[P15] Minimum interval (factory setting P15=minimum 15 seconds). Range: 10-30 seconds. The boiler's maximum output can be limited with this parameter/function.	
(bXX)	[b75]Setting for maximum fan output. Range=1%-99% (Factory setting b75=75%, valid for type Multi-Heat 4.0). Standard Values: Multi-Heat 1.5=b35-b40 (35-40%) Multi-Heat 2.5=b50-b60 (50-60%) Multi-Heat 4.0=b75-b99 (75-99%)	

wish to save the new values entered, you can revert to previous values by pressing the ALARM RESET (F) button instead.

Appendix D - Termovar Information Sheet

TERMOVAR 4340A-3 TEMPERING VALVE



The TERMOVAR TEMPERING VALVE is an automatic thermally operated tempering valve for solid-fuel boiler installations with or without a storage tank.

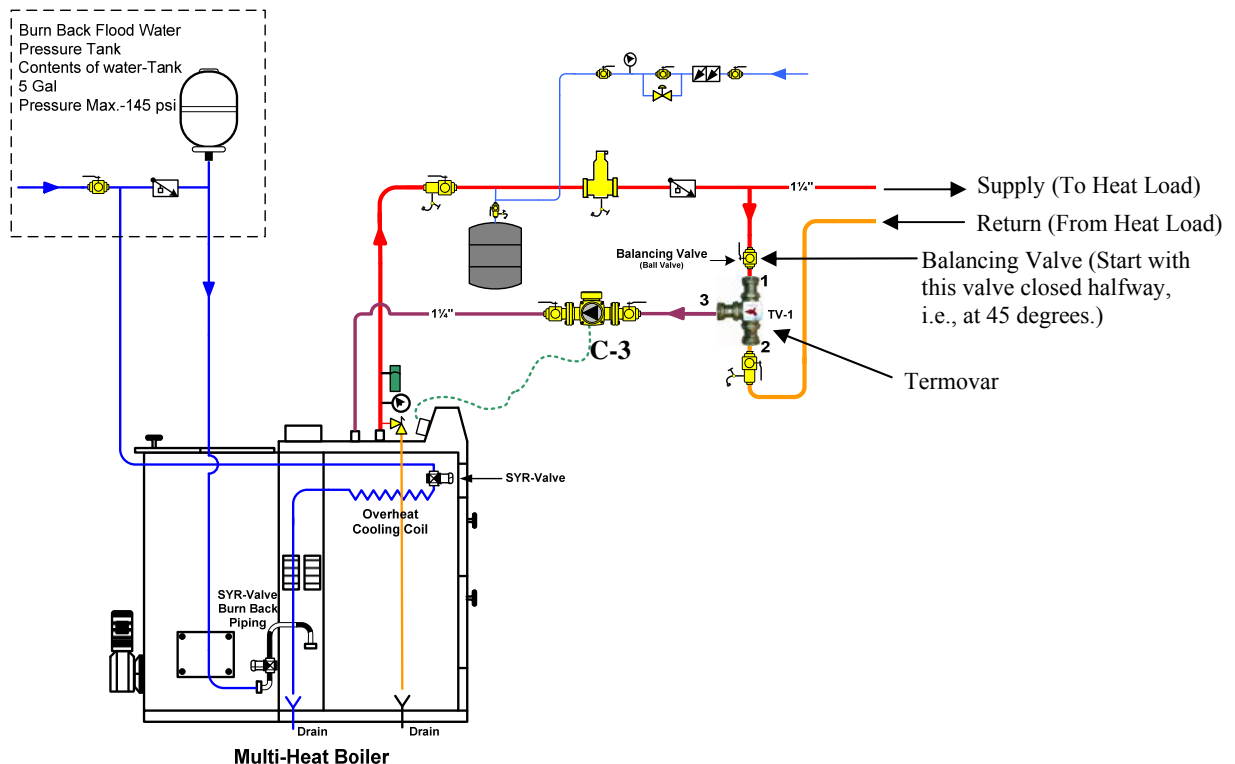
The TERMOVAR ensures a minimum return water temperature to the heating boiler, which increases combustion efficiency, prevents tarring and considerably prolongs the lifetime for the solid-fuel boiler. The TERMOVAR eliminates the risk of destructive thermal shock to both steel and cast iron boilers. The TERMOVAR thermally operated tempering valves render a more effective burning and are therefore a necessary part of a solid-fuel boiler installation.

Installation and Function

The thermostatic element in the TERMOVAR prevents return of cold return water to the boiler until the boiler reaches operating temperature. The TERMOVAR then gradually opens, blending hot boiler supply water with the cold return water. Once system temperature equalizes, the TERMOVAR opens fully to allow full flow to and from the heating load (the house and/or a heat storage system).

The TERMOVAR valve is to be mounted between the boiler and the heat load in the return pipe, as shown in the diagram below.

A circulator (designated C-3) must be installed between the TERMOVAR valve and the boiler. This circulator should be controlled by an aquastat that measures boiler water temperature or, when there is a heat storage tank being used, by a sensor that measures smoke box temperature.



Notes: