

## Installation, Operation, & Maintenance Manual

# Modulex EXT - Ufly Controller Light Commercial Series

Modulating and Condensing Boilers

### Applies To Modulex Models:

- MLX EXT 450 2S
- MLX EXT 600 2S
- MLX EXT 800 2S
- MLX EXT 1100 2S



### Disclaimer

The information contained in this manual is subject to change without notice from AERCO International, Inc. AERCO makes no warranty of any kind with respect to this material, including, but not limited to, implied warranties of merchantability and fitness for a particular application. AERCO International is not liable for errors appearing in this manual, not for incidental or consequential damages occurring in connection with the furnishing, performance, or use of these materials.

## TABLE OF CONTENTS

<b>CHAPTER 1: SAFETY PRECAUTIONS</b>	<b>5</b>
<b>CHAPTER 2: GENERAL INFORMATION</b>	<b>7</b>
2.1 Correct Use Of The Appliance	7
2.2 Water Treatment	7
2.3 Information To Be Made Available To The User	7
2.4 Safety Warnings	8
2.5 Modifications To Parts Connected To The Appliance	8
2.6 For Appliances Operating With Propane Gas	8
2.7 Data Plate	9
2.8 Operational Requirements	10
2.8.1 General Requirements	10
2.8.2 Regulatory Requirements	10
2.8.3 Water Quality Requirements	10
2.9 Tools, Materials, And Additional Equipment	11
2.10 Disposal	11
2.11 General Warnings	11
2.11.1 Using the Operation and Maintenance Manual	11
2.11.2 Installation and Servicing Personnel	12
2.11.3 Installation Materials	12
2.11.4 Preparing Boiler for Servicing	12
2.11.5 Returning a Boiler to Service	12
2.11.6 Change in Ownership	12
2.12 Operational Limits Of The Boiler	12
<b>CHAPTER 3: TECHNICAL FEATURES &amp; DIMENSIONS</b>	<b>13</b>
3.1 Modulex Ext Technical Features	13
3.1.1 Temperature Control Devices:	13
3.1.2 Control Panel (Ufly) Includes:	13
3.1.3 Other Features Include:	13
3.2 General Boiler Operation	14
3.3 Boiler Freeze Protection	14
3.4 Dimensional Drawings	15
3.5 Performance Data	19
<b>CHAPTER 4: INSTALLATION INSTRUCTIONS</b>	<b>20</b>
4.1 General Warnings	20
4.1.1 Appropriate Use of the Boiler	20
4.1.2 Prerequisite System Flushing	20
4.1.3 Installation Personnel Qualifications	20
4.1.4 Carbon Monoxide Detector Installation	20
4.2 Code And Standards Approvals	21
4.3 Packaging	21
4.4 Transporting And Securing The Boiler Safely	24
4.5 Removal From Boiler Bed And Installation Of Boiler Feet	24
4.6 Boiler Location Inside A Boiler Room	26
4.6.1 Boiler Room Safety Concerns	26
4.6.2 Products to Avoid in the Boiler Room	27
4.7 Recommended Clearances For Servicing	27
4.8 Boiler Connections	28
4.8.1 Changing Exhaust Outlet Location	28
4.8.2 Reversing Gas Manifold Connections	29
4.8.3 Reversing Cold/Hot Water Flow & Return Connections	30
4.9 Gas Connection General Information	32
4.10 Natural Gas Connections	33
4.11 Propane Gas Connections	33
4.12 Flow And Return Pipe Connections	34
4.13 Pressure Relief Valve (Supplied)	34
4.14 Csd-1 Manifold Assembly (Supplied)	34

4.14.1 Installing the Flow Switch and CSD-1 Components	35
4.15 Determination Of Primary Boiler Pump Or Boiler System Pump	36
4.16 Condensate Piping And Drain	37
4.17 Water Treatment	38
4.18 Important Installation Warnings	39
4.18.1 Oxygen Levels in the System Water Warning	39
4.18.2 Antifreeze Compatibility Warning	39
4.18.3 Lime Scale and Corrosive Water Damage Warning	39
4.18.4 Connection to Refrigeration System Warning	39
4.19 Air Intake Connection	39
4.20 Flue Manifold Connection	40
4.21 Flue Exhaust Piping To Vent	41
4.22 Vent Starter Pieces	42
4.23 Combustion Air And Ventilation Openings	43
4.23.1 Insufficient Ventilations and Combustion Air	43
4.23.2 Room Air Combustion	44
4.23.3 Sealed Combustion	44
4.24 Installation Of The Exhaust And Air Intake System	44
4.24.1 Important Factors for Terminal Orientation and Location	45
4.24.2 Minimum and Maximum Wall Thickness	46
4.25 Vent Pipe Sizing	46
4.26 Electrical Connections	48
4.26.1 Regulations in Force	48
4.26.2 Mains Electrical Supply Connection (120 V – 60 Hz)	48
4.26.3 Service Relay Requirement	49
4.26.4 Electrical Requirements	49
4.27 FUNCTIONAL WIRING DIAGRAM Page 1	51
4.28 FUNCTIONAL WIRING DIAGRAM Page 2	52
4.29 Ladder Diagrams	53
4.30 General Ladder Diagram	54
4.31 Input/Output Box Terminal Assignments	55
4.32 Starting Up: Filling And De-Aerating The Boiler	56
4.32.1 Necessary Precautions for Safety	56
4.32.2 Supply Voltage, Gas Pressure, and Water pressure	56
4.33 Filling The System	57
4.33.1 Necessary Precautions While Filling the System	57
4.33.2 Filling Locations and Preparation	57
4.34 Testing The Ignition Safety Shut Off Device	59
4.35 Burner Calibration	60
4.35.1 Installing the Gas Analyzer Probe	60
4.35.2 Maximum Output Calibration	61
4.35.3 Minimum Output Calibration	62
4.35.4 Final Check and Ignition Failure Adjustment Procedure	62
4.36 Sweeper Mode (Manual Control)	64
4.37 High Altitude Adjustment	66
4.38 High Altitude Conversion Label	67
4.39 Conversion From Natural Gas To Propane Gas	67
4.40 Controls And Emergency Functions	68
4.41 Initial Boiler Ignition	69
4.41.1 Preliminary Checks	69
<b>CHAPTER 5: UFLY CONTROLLER &amp; BCM MODULES</b>	<b>70</b>
5.1 Ufly Controller	70
5.1.1 Ufly Controller Features and Functions	70
5.1.2 Reading the Icons on Home Page	71
5.1.3 Display Modes	72
5.2 BCM (Boiler Communication Module)	72
<b>CHAPTER 6: OPERATION, MENU &amp; PARAMETERS</b>	<b>74</b>
6.1 Setup Menu	75
6.1.1 Setting Time and Date	75

6.1.2 Setting Comfort and Eco Building Reference Temperatures	75
6.1.3 Setting Comfort and Eco Domestic Hot Water Setpoints	76
6.1.4 Display Settings	76
6.1.5 Language and Unit Settings	76
6.1.6 Password	77
6.2 Heating Menu	77
6.3 Domestic Hot Water Menu	78
6.4 Devices Menu	79
6.5 Burner Menu	81
6.5.1 Service Mode/Manual Firing Rate Function	81
6.5.2 Manual Setpoint Function	82
6.5.3 Reset Burner Working Hours and Ignition Count	83
6.6 BCM Parameters	84
6.7 BMM Parameters	88
<b>CHAPTER 7: TROUBLESHOOTING</b>	<b>91</b>
7.1 Ufly Controller Error Codes	91
7.1.1 BCM (Boiler Communications Module) Fault Codes	92
7.1.2 BMM (Burner Management Module) Fault Codes	94
<b>CHAPTER 8: MAINTENANCE SCHEDULE</b>	<b>96</b>
8.1 Instructions For Inspection And Maintenance	96
8.2 Periodic Examination Of Venting System	97
8.3 Proper Procedure For Cleaning Exhaust Flue	97
8.3.1 Cleaning the Condensate Drain Line	97
8.4 Checking Csd-1 Manifold Flow Switch	97
8.5 Visual Inspection Of The Flame	98
8.6 Reassembly And Resealing Of Vent-Air Intake System	98
8.7 Pressure Switch Hoses And Connections	98
8.8 Burner / Heat Exchanger Cleaning Procedure	100
8.9 Heat And Return Sensor Resistance Values	100
8.10 Unit Disassembly	101
8.11 Cleaning THE BURNER MODULE AND COMBUSTION CHAMBER	108
8.12 Cleaning The Heat Exchanger	110
8.12.1 Mechanical Cleaning of the Heat Exchanger	110
8.12.2 Cleaning the Heat Exchanger with Cleaning Solution	112
8.12.3 Repeat Cleaning	112
8.13 Reassembly Of The Burner Modules	113
8.14 Final Procedures After Maintenance	113
8.15 Maintenance Kit Part Numbers	113
<b>CHAPTER 9: SPARE PARTS DRAWING AND LISTS</b>	<b>114</b>

## CHAPTER 1: SAFETY PRECAUTIONS

Observe all **CAUTIONS** and **WARNINGS** in this manual to avoid injury, death, and damage to the equipment. Failure to heed safety warnings and cautions may void applicable warranties.

### **WARNING!**

**Never use flames to detect gas leaks!**

#### **What to do if you smell gas:**

- Do **NOT** try to light or turn on any appliance.
- Do **NOT** touch any electric switch or open switched doors.
- Do **NOT** use any phone or intercom device in your building.
- Do **NOT** touch metal doorknobs or any grounded device or surface without using insulated gloves or other insulated material if you suspect static charge buildup.
- Immediately call your gas supplier from a neighbor's phone or, if you are outside, your cell phone. Follow the gas supplier's instructions.
- If you cannot reach your gas supplier, call the fire department.

### **WARNING!**

**This boiler has been built for installation in the country indicated on the technical data plate. Installation in any other country may be dangerous for people, animals and property.**

**NOTE:** Carefully read all **conditions** and clauses on warranty certificate attached to the boiler.

#### **Important – For Massachusetts Installations**

Boiler Installations within the Commonwealth of Massachusetts must conform to the following requirements:

- Boiler must be installed by a plumber or a gas fitter who is licensed within the Commonwealth of Massachusetts.
- Prior to unit operation, the complete gas train and all connections must be leak tested using a non-corrosive soap.
- If a glycol solution is used as anti-freeze protection, a backflow preventer must be installed upstream of the Fill/Makeup Valve.
- The vent termination must be located a minimum of 4 feet above grade level.
- If side-wall venting is used, the installation must conform to the following requirements **extracted from 248 CMR 5.08 (2)**:
  - A. For all side wall horizontally vented gas fueled equipment installed in every dwelling, building or structure used in whole or in part for residential purposes, including those owned or operated by the Commonwealth and where the side wall exhaust vent termination is less than seven (7) feet above finished grade in the area of the venting, including but not limited to decks and porches, the following requirements shall be satisfied:
    1. **INSTALLATION OF CARBON MONOXIDE DETECTORS.** At the time of installation of the side wall horizontal vented gas fueled equipment, the installing plumber or gasfitter shall observe that a hard wired carbon monoxide detector with an alarm and battery back-up is installed on the floor level where the gas equipment is to be installed. In addition, the installing plumber or gasfitter shall observe that a battery operated or hard wired carbon monoxide detector with an alarm is installed on each additional level of the dwelling, building or structure served by the side wall horizontal vented gas fueled equipment. It shall be the responsibility of the property owner to secure the services of qualified licensed professionals for the installation of hard wired carbon monoxide detectors
      - a) In the event that the side wall horizontally vented gas fueled equipment is installed in a crawl space or an attic, the hard-wired carbon monoxide detector with alarm and battery back-up may be installed on the next adjacent floor level.

- b) In the event that the requirements of this subdivision cannot be met at the time of completion of installation, the owner shall have a period of thirty (30) days to comply with the above requirements; provided, however, that during said thirty (30) day period, a battery-operated carbon monoxide detector with an alarm shall be installed.
2. **APPROVED CARBON MONOXIDE DETECTORS.** Each carbon monoxide detector as required in accordance with the above provisions shall comply with NFPA 720 and be ANSI/UL 2034 listed and IAS certified.
  3. **SIGNAGE.** A metal or plastic identification plate shall be permanently mounted to the exterior of the building at a minimum height of eight (8) feet above grade directly in line with the exhaust vent terminal for the horizontally vented gas fueled heating appliance or equipment. The sign shall read, in print size no less than one-half (1/2) inch in size, "**GAS VENT DIRECTLY BELOW. KEEP CLEAR OF ALL OBSTRUCTIONS**".
  4. **INSPECTION.** The state or local gas inspector of the side wall horizontally vented gas fueled equipment shall not approve the installation unless, upon inspection, the inspector observes carbon monoxide detectors and signage installed in accordance with the provisions of 248 CMR 5.08(2)(a)1 through 4.
- B. **EXEMPTIONS:** The following equipment is exempt from 248 CMR 5.08(2)(a)1 to 4:
1. The equipment listed in Chapter 10 entitled "Equipment Not Required To Be Vented" in the most current edition of NFPA 54 as adopted by the Board; and
  2. Product Approved side wall horizontally vented gas fueled equipment installed in a room or structure separate from the dwelling, building or structure used in whole or in part for residential purposes.
- C. **MANUFACTURER REQUIREMENTS - GAS EQUIPMENT VENTING SYSTEM PROVIDED:**  
When the manufacturer of Product Approved side wall horizontally vented gas equipment provides a venting system design or venting system components with the equipment, the instructions provided by the manufacturer for installation of the equipment and the venting system shall include:
1. Detailed instructions for the installation of the venting system design or the venting system components; and
  2. A complete parts list for the venting system design or venting system.
- D. **MANUFACTURER REQUIREMENTS - GAS EQUIPMENT VENTING SYSTEM NOT PROVIDED:**  
When the manufacturer of a Product Approved side wall horizontally vented gas fueled equipment does not provide the parts for venting the flue gases, but identifies "special venting systems", the following requirements shall be satisfied by the manufacturer:
1. The identification of each "special venting system" shall include the listing of either the website, phone number or manufacturer's address where the venting system installation instructions can be obtained; and
  2. The "special venting systems" shall be Product Approved by the Board, and the instructions provided with the system shall include a parts list and detailed installation instructions.
- E. A copy of all installation instructions for the Product Approved side wall horizontally vented gas fueled equipment, all venting instructions, all parts lists for venting instructions, and/or all venting design instructions shall remain with the appliance or equipment at the completion of the installation.

[End of Extracted Information From 248 CMR 5.08 (2)]



## CHAPTER 2: GENERAL INFORMATION

### 2.1 Correct Use Of The Appliance

The MODULEX EXT boiler has been designed utilizing the latest heating technologies and in compliance with the current safety regulations. However, if not used or operated properly, the unit may cause injury or death to persons, or serious damage to the equipment or surrounding objects.

The MODULEX EXT boiler is designed to be used in pumped hot water central heating systems. Any other use of this appliance shall be considered improper, and AERCO declines any responsibility for damages or injuries caused by the improper use of this equipment. In order to use the equipment appropriately and safely according to its design, it is essential to carefully follow the instructions in this manual.

### 2.2 Water Treatment

- It is vital to maintain the pH of boiler water between 6.5 and 8 to avoid damage to the boiler.
- The hardness of the main water supply affects how often the heat exchanger must be cleaned.
- In hard water areas where the main water can exceed 9 grains per gallon total hardness, a scale reducing device is recommended, taking into consideration the characteristics of the water.
- In order to improve the resistance to lime scale it is recommended that the domestic hot water temperature be as near as possible to the temperature required for end use.
- AERCO recommends inspecting the state of cleanliness of the domestic hot water heat exchanger at the end of the first year and subsequently, on the basis of the lime scale found, this period can be extended to two years after the initial inspection.

### 2.3 Information To Be Made Available To The User

Go through the information in this manual with the owner/operator and make sure that he or she is familiar with all necessary operating instructions, in particular:

- These instructions shall be made available to the end user, together with any other literature regarding this appliance. It is highly recommended that the user keeps these documents in a safe and convenient place to always have them at hand for future reference.
- It is imperative that a proper venting and exhaust system be implemented with this unit. Refer to the AERCO Venting Application Guide (TAG-0098).
- It is absolutely forbidden to make any alterations to the boiler not in keeping with the manufacturer's recommendations and instructions.
- It is critical to check the system's water pressure and ensure it is at the correct pressure.
- For optimal operation of time and temperature controls, thermostats, heating controls and radiators, refer to separate Ufly Controller User Manual (OMM-0159).
- It is obligatory to carry out comprehensive maintenance services annually with a combustion analysis every two years (in compliance with national and local laws).
- If the appliance is sold or transferred to another owner, or if the present user moves from the installation site and leaves the appliance installed, ensure that the manual stays with the boiler so that it can be consulted by the new owner and/or installer.

***Failure to follow these instructions can cause injury to persons or animals or damage to property.  
The manufacturer shall not be held liable for any such injury and/or damage.***

## 2.4 Safety Warnings

### ⚠ WARNING!

- Children must be supervised so they do not play on, around, or with the appliance.
- The installation, adjustment, and servicing of this appliance must be carried out by a competent person and installed in accordance with the current standards and regulations. Failure to correctly install this appliance could cause injury to persons, animals or damage to property. The manufacturer shall not be held liable for any injury and/or damage.
- Servicing or repairs to appliance must be carried out by AERCO authorized technicians; AERCO recommends drawing up a service contract. Incomplete, inappropriate, or irregular servicing could compromise the safe operation of the appliance, and could cause injury to persons, animals or damage to property for which AERCO shall not be held liable.

## 2.5 Modifications To Parts Connected To The Appliance

Do not carry out any modifications to the following parts:

- The boiler
- To the gas, air, water supply pipes and electrical power
- To the flue pipe, safety relief valve and its drainage pipe
- To the constructive components which influence the appliance's safe operation

### ⚠ WARNING!

When tightening or loosening the screw pipe connections, use only properly sized wrenches. The improper use of inadequate equipment can cause damage (for example, water or gas leakages) to the equipment.

## 2.6 For Appliances Operating With Propane Gas

Before installing the appliance, ensure that the gas tank has been purged. For correct instructions on purging the tank, contact the liquid gas supplier or a competent person who is legally authorized to provide such information. If the tank has not been correctly purged, problems may occur during ignition. If this happens contact the liquid gas tank's supplier.

### ⚠ WARNING!

Do not store or use gasoline or any flammable vapors or liquids near this appliance.

### IF YOU SMELL GAS:

- Do not try to light any appliance.
- Do not touch any electrical switch.
- Do not use any phone in the building.
- Immediately call your gas supplier from a neighbor's phone. Follow their instructions.
- If you cannot contact your gas supplier, call the fire department.

### ⚠ WARNING!

The boiler must be protected against environmental variations with:

- The insulation of the hydraulic pipelines and the condensate drain.
- The adoption of specific antifreeze products in the Cold/Hot water installation.



## 2.7 Data Plate

Each unit is fitted with a data plate indicating gas type, power source and venting classification.

A sample Data Plate for a MODULEX EXT boiler is shown in the left figure below. A sample of the Data Packaging label is shown in the right image below.

<b>AERCO</b> By <b>Unical</b>		AERCO International, Inc. 100 Ontani Drive Blauvelt, NY 10913		ANSI Z21.13-2017 / CSA 4.9-2017 LOW PRESSURE BOILER	
Boiler Model				Category	
Serial N°				Code	
<b>Hot Water Heating Boiler</b>					
		Btu/hr	FH (rpm %)	kW	
Normal altitude (0-2,000 ft)	Total INPUT				
High altitude (2,000-4,500 ft)	Total INPUT				
	Min INPUT				
	Single INPUT				
	OUTPUT				
Min relief valve capacity		lb/hr			
Maximum Heating water		°F		°C	
MAWP water		psi		kPa	
<b>NOT suitable for D.H.W.</b>					
Maximum Domestic water		°F		°C	
PMW		psi		kPa	
Tank		gal		L	
Factory Set (not adjustable)					
Gas type		A		NATURAL	
Electrical Power supply: 120 V ~ 60 Hz less than 12 Amp					
<small>For either indoor or outdoor installation. For either direct vent installation or for installation using indoor combustion air. For installation on combustible flooring. Pour l'installation soit intérieure ou extérieure. Pour l'installation avec ventilation directe ou avec air comburant. Pour l'installation sur un plancher combustible.</small>					
Made in ITALY		<small>GAS-FIRED</small> 			

<b>AERCO</b> By <b>Unical</b>	
<b>USA</b>	<b>CANADA</b>
GROSS WEIGHT	POIDS BRUT
<b>WARNING</b> Read the technical instructions before installing the boiler. Read the user's instructions before lighting the boiler.	<b>ATTENTION</b> Lire la notice d'installation avant d'installer l'appareil. Lire la notice pour l'utilisateur avant de démarrer l'appareil.
<b>A NATURAL</b>	
<small>GAS-FIRED</small> 	

Gas type / Type de gaz	A NATURAL NATUREL	E PROPAN PROPANE
Permissible inlet gas pressure: Admissible pression de gaz d'entrée:	in w.c. kPa	in w.c. kPa
Max		
Normal		
Min		
00335161		

**Figure 2-1: MODULEX EXT Data Plate (Left) and Data Packing Label (Right)**

## 2.8 Operational Requirements

### 2.8.1 General Requirements

The following instructions **MUST** be followed:

- Boiler must only be used for its designated purpose as described.
- Each unit is fitted with a data plate. Consult the details on this plate to verify whether the boiler is compliant with its intended location, e.g.: gas type, power source and venting classification.
- Only use the boiler with the accessories and spare parts listed.
- Other combinations of accessories and products must only be used if specifically designed for the intended application and do not affect the system performance or the safety requirements.
- Maintenance and repairs must only be performed by trained professionals.
- Installation of a condensing gas boiler must be approved per all federal and local government codes, regulations, and laws.
- Operation of a condensing gas boiler must use a vent system that has been specifically designed and approved for this type of boiler.
- Note that local permission and approval for the vent system and condensate water connection to a public sewage system may be required.

### 2.8.2 Regulatory Requirements

You must also conform to any rules, regulations, or laws concerning the following:

- Local building codes regarding the installation.
- Local building codes concerning the air intake and outlet systems and the vent connection.
- Regulations for the power supply connection.
- Technical rules laid down by the gas utility company concerning the connection of the gas connection to the local gas mains.
- Instructions and standards concerning safety equipment for the water/space heating system.
- Installation instructions for building heating systems.
- The boiler must be located in an area where leakage will not result in damage to the area adjacent to the boiler or to lower floors of the structure. When such locations cannot be avoided, it is recommended that a suitable drain pan be installed under the boiler.
- Do not restrict or seal any air intake or outlet openings.
- Inform owner, in writing, of any defects found and the associated hazard.

#### **⚠ WARNING!**

**Should overheating occur or gas supply fail to shut off, do not turn off or disconnect the electrical supply to the pump; shut off the gas supply at a location external to the boiler.**

### 2.8.3 Water Quality Requirements

**NOTE:** For additional information concerning water quality and treatment, refer to AERCO technical documents Glycol Directive and AERCO Piping Application Guide (GF-136-P).

Unsuitable heating system water can cause the formation of scale or sludge, which affects system efficiency. It can also cause corrosion and reduce life of the heat exchanger.

- You must follow guidelines for boiler water quality.
- Thoroughly flush the system prior to filling.
- Follow the cleaning instructions.
- Never use water that has been treated by reverse osmosis, deionization, or distilled.
- Do not use inhibitors or other additives unless approved by AERCO for that purpose.
- When frost protection of the heating system is desired, only use AERCO-approved antifreezes. The allowed maximum concentration is 50%.
- When using oxygen-permeable pipes, e. g. for under floor heating systems, you must separate the system from the boiler using plate heat exchangers.

- Close the valves of the boiler while flushing the system, do not introduce any system cleaner into the boiler loop. Flush system thoroughly to remove all system cleaner before filling boiler.

**Approved antifreeze (maximum concentration of 50%):**

- Sentinel X500 (available from AERCO)
- Rhomar RhoGard Multi-Metal (AL safe)
- Noble NoBurst AL

**Approved system cleaners:**

- Sentinel X300 (available from AERCO)
- Noble Noburst Hydronic System Cleaner
- Fernox F3 Cleaner
- Rhomar Hydro-Solv 9100

The system cleaners from NoBurst, Rhomar, and Fernox are NOT to be used in the boiler itself. The boiler must be closed off (valves closed) from the rest of the system or not connected while the cleaners are in the system. The system should then be drained and then thoroughly flushed with clean water to remove all the system cleaner.

**Approved inhibitors:**

- Sentinel X100 (available from AERCO)
- Rhomar Pro-tek 922
- Noble Noburst AL inhibitor
- Intercool NFP-AA
- Cryo-tek 100/Al

## 2.9 Tools, Materials, And Additional Equipment

For the installation and maintenance of the boiler you will need:

- Standard tools for space heating, gas and water fitting
- Manometer that is capable of reading both positive and negative pressures
- Combustion analyzer
- Digital multimeter
- pH digital meter
- Metric Allen wrenches
- Metric socket wrenches

## 2.10 Disposal

Dispose of the boiler packaging in an environmentally sound manner.

Dispose of components of the heating system (e.g. boiler or control device), that must be replaced in an environmentally responsible manner.

## 2.11 General Warnings

### 2.11.1 Using the Operation and Maintenance Manual

This instruction manual is an integral and indispensable part of the product and must be retained by the person in charge of the appliance. Please read the instructions contained in this manual carefully as they provide important information regarding the safe installation, use and servicing of this appliance. Keep this manual in a safe place for future reference.

### **2.11.2 Installation and Servicing Personnel**

Installation and servicing must be carried out in accordance with the regulations in force according to the manufacturer's instructions and by legally competent authorized persons. By definition, a competent person is a person who has a specific technical qualification in the field of components for central heating systems for domestic use, domestic hot water production, and servicing. This person must have the qualifications legitimized by the current laws and regulations in force.

Inappropriate, incomplete, or irregular servicing could compromise the safe operation of the appliance, and could cause injury to persons, animals or damage to property. The manufacturer shall not be held liable for any such injury and/or damage.

Any repairs must be carried out by AERCO authorized technicians and using only original spare parts. Non-observance of the above requirement may jeopardize the safety of the appliance and void any warranties.

In the event of failure and/or faulty functioning of the appliance, switch off the boiler. Do not attempt to make any repairs, but instead contact qualified technicians.

To guarantee the efficiency and correct functioning of the appliance it is required that the boiler be serviced annually by a qualified person.

### **2.11.3 Installation Materials**

The installations for the domestic hot water production **MUST** be built, in their entirety, with materials (taps, pipes, fittings, etc.) approved for drinkable water.

### **2.11.4 Preparing Boiler for Servicing**

Before carrying out any cleaning or servicing turn off the electrical supply to the boiler by means of the ON/OFF switch and/or by means of the appropriate shutdown devices.

### **2.11.5 Returning a Boiler to Service**

Before putting a boiler, which has been unused for a length of time, back into service, rinse the entire domestic hot water system, allowing the water to flow an appropriate amount of time in order to circulate throughout the entire system.

### **2.11.6 Change in Ownership**

If the appliance is sold or transferred to another owner, or if the present user moves from the installation site and leaves the appliance installed, ensure that the manual stays with the appliance so that it can be consulted by the new owner and/or installer.

## **2.12 Operational Limits Of The Boiler**

- Max. boiler temperature: 180° F
- Max Allowable Working Temperature ASME: 200 °F
- Max. Allowable Working Pressure ASME: 92 psi

## CHAPTER 3: TECHNICAL FEATURES & DIMENSIONS

### 3.1 Modulux Ext Technical Features

- Compact, gas fired, Low NO<sub>x</sub>, condensing boiler.
- Comprised of one sectional boiler body, suitable as a single boiler or in a cascaded group.
- May be installed in either an inside or outside location.
- Low internal water volume.
- Fast response to load variations.
- Flue exhaust outlet positionable on three sides.
- Manifold delivery and return (reversible).
- Made up of two or more heating elements (2 to 7), cast aluminum / silicon / magnesium.
- Full range of modulation by variable speed blowers and premix burners.
- Each heating element monitors its own water temperature, and will individually shutdown if flow is interrupted, without affecting the other burner sections.
- One gas supply line (reversible).
- Individual modules capable of between 46 and 160.5 kBTU/hr.

These boilers are designed for use with category IV venting.

The boiler is supplied complete with all the safety and control devices in accordance with all current regulations, and its technical and functional features comply with the regulations prescribed by:  
**ANSI Z21.13 / CSA 4.9 - Gas-fired low pressure steam and hot water boilers.**

#### 3.1.1 Temperature Control Devices:

- |                                                |                                             |
|------------------------------------------------|---------------------------------------------|
| • Local NTC sensor (each heating element)      | • Return NTC sensor (General)               |
| • Limit thermostat room (each heating element) | • Safety thermostat approved (manual reset) |
| • Flow NTC sensor (General)                    | • Flow sensor BCM                           |

#### 3.1.2 Control Panel (Ufly) Includes:

- |                                          |                                          |
|------------------------------------------|------------------------------------------|
| • ON-OFF switch                          | • Air pressure fans                      |
| • Temperature control / Boiler operation | • Condensate level sensor                |
| • Fuses                                  | • Air pressure switch (anti-obstruction) |
| • High limit sensors                     |                                          |

#### 3.1.3 Other Features Include:

- NTC heat sensors for global temperature control on the flow and return.
- 0-10V output to control variable speed primary pump.
- Integral insulation with hypoallergenic synthetic wool.
- Premix fiber mesh modulating burner (premixes into the fan with automatic diaphragm backflow separation from the combustion chamber).
- Less than 49 dBA of noise at maximum power.
- Heating: instantaneous power microprocessor control with preset parameters for comparison between temperature (or calculated from external regulation) and global temperature flow.
- Operation modes:
  - Control power to individual heating elements for calibration with or without code access.
  - ACS control by boiler feed pump or by three-way diverter valve controller.

- Ufly electronic controller included.
- BCM (Boiler Communication Manager) included.
- Ability to control power of the individual heating elements.
- Control of heat demand: constant or remote setpoint.
- Monitoring of operating status and temperature.
- Reporting of alarms.
- Setting of parameters.
- Emergency operation prevents the boiler from shutting down as a result of the interruption of communication with a control system or any remote control unit.
- Alarm management and reset input.
- Warning alarm relay.
- Stainless steel condensate collector tank with siphon, drain trap, and smoke chamber.
- Easily removable stainless steel panels painted for outdoor installation.
- Built-in air vent

### 3.2 General Boiler Operation

The boiler is operated from the Ufly controller. The Boiler Control Manager (BCM) is used for Modbus communication as well as backup operation.

The boiler management logic provides the maximum number of simultaneously operating heating elements in order to maximize heat production and overall efficiency. Burner efficiency and a high heat exchange between surfaces contribute to the reliable and efficient output power. The various components are designed to work together so that operating time is shared equally among the components, thus reducing maintenance and labor costs.

The hot water moved by the pump is pushed to the return of the primary flow of the hydraulic separator. From here a second pump will distribute the hot water to the various destinations. The cooled return water is drawn through the hydraulic separator to resume the cycle via the boiler.

#### **WARNING!**

**If installing to an outdoor location where freezing temperatures may occur, it is necessary to install devices and/or materials to prevent any freezing in the condensate drain and the Flow and Return manifolds. Failure to do so may cause serious damage to the equipment.**

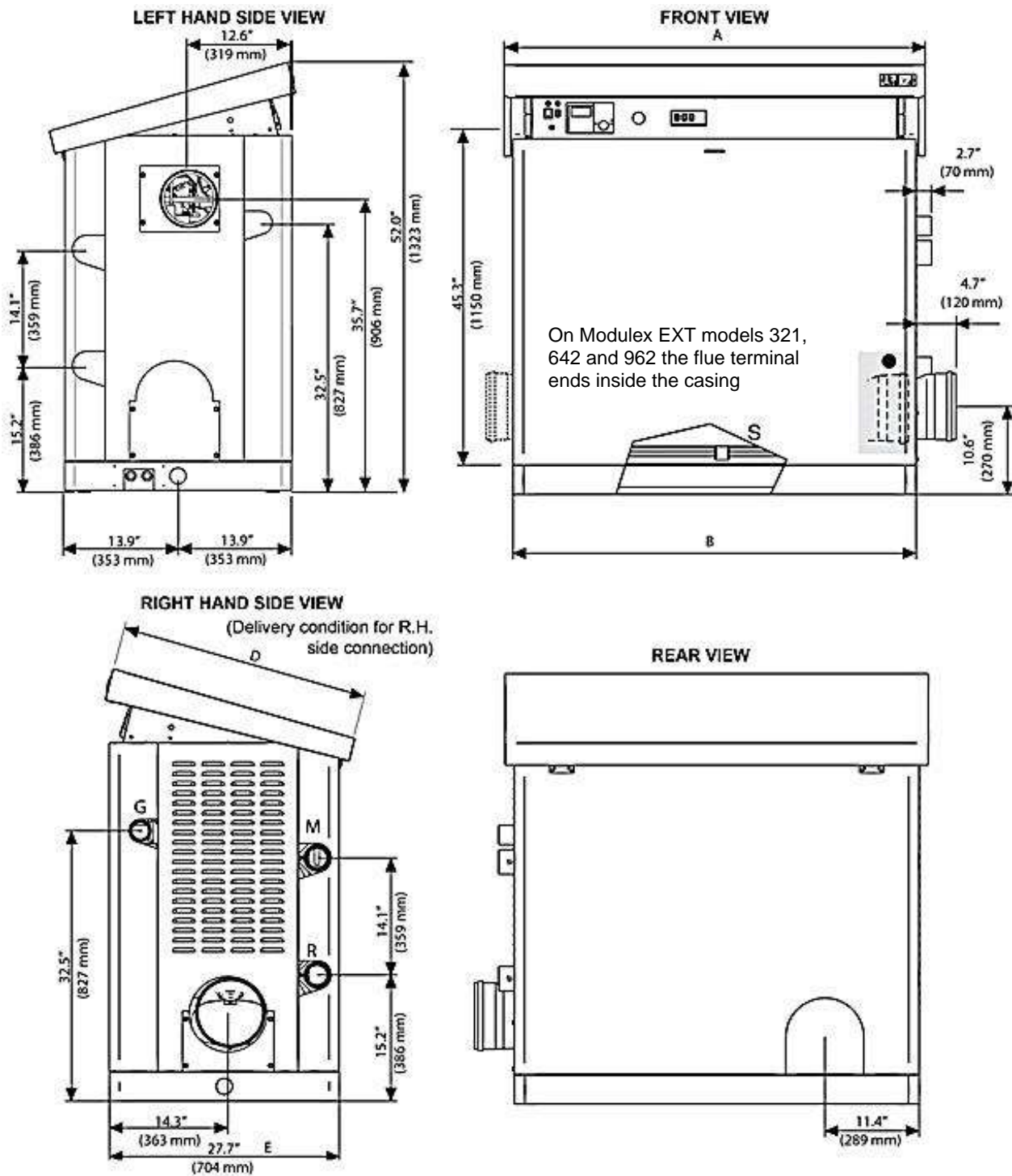
### 3.3 Boiler Freeze Protection

Should the boiler water outlet temperature decrease to less than 44.6°F (7°C), the system pump will start, and all heat modules will start at minimum output until the minimum setpoint (BCM Parameter 31) is reached. Such a protection device is exclusively for the boiler. For the protection of the whole system, a second freeze protection thermostat is necessary to switch on the heating system pump.

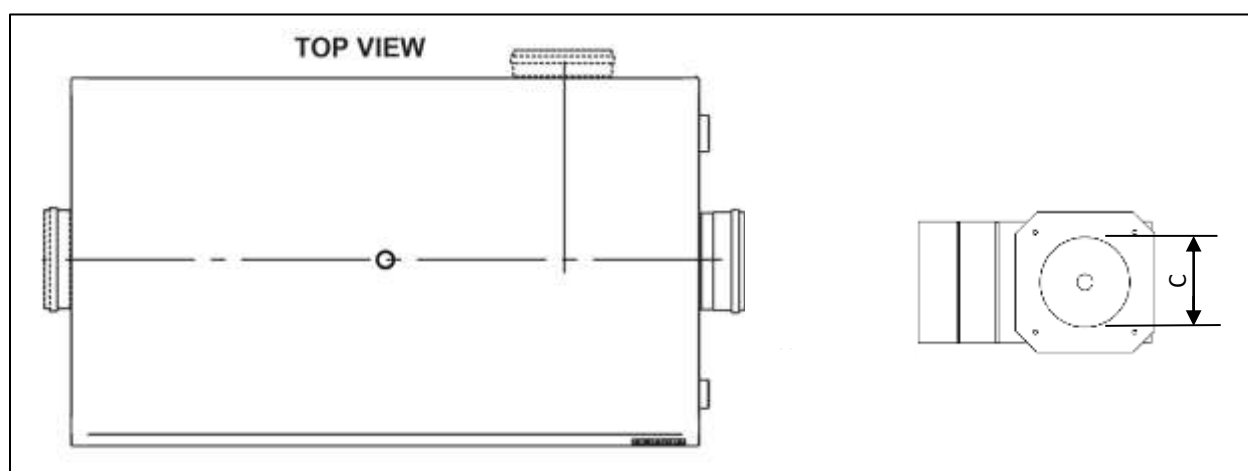
**NOTE:** If glycol is used as antifreeze in the boiler, a back flow preventer must be installed in the make-up/fill line.



### 3.4 Dimensional Drawings

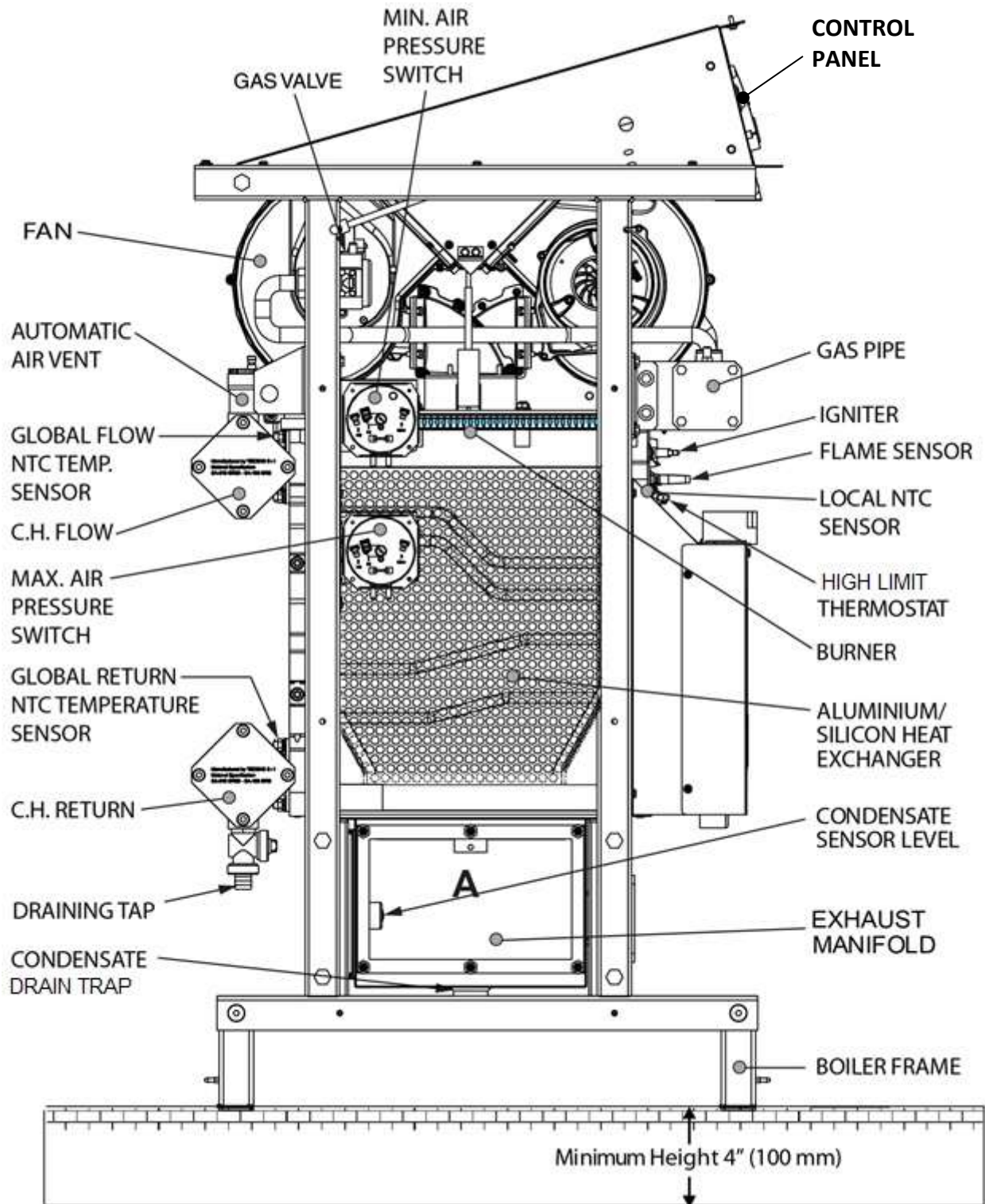


**Figure 3-1: MODULEX EXT Dimensional Drawings (Side Views)**

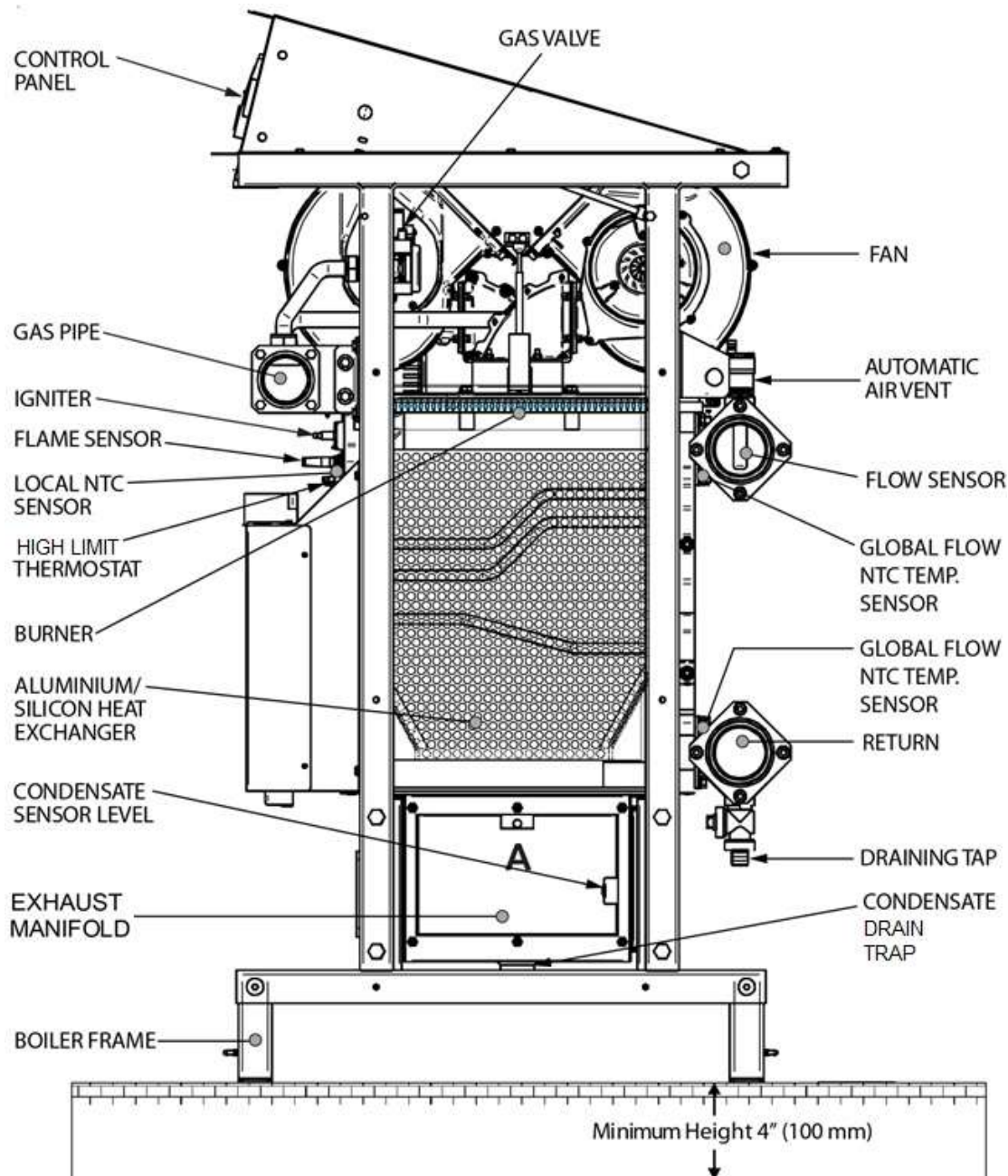


**Figure 3-2: MODULEX EXT and Vent Adaptor Dimensional Drawings (Top View)**

TABLE 3-1: MODULEX EXT Dimensions and Sizes				
Model	450 2S	600 2S	800 2S	1100 2S
Dimensions				
No. of Modules	3	4	5	7
Height (Open) - inches/mm	52.1" 1323	52.1" 1323	52.1" 1323	52.1" 1323
Height (Closed) - inches/mm	45.3" 1150	45.3" 1150	45.3" 1150	45.3" 1150
Width "A" - inches/mm	30.0" 764	40.6" 1032	40.6" 1032	51.2" 1300
Width "B" - inches/mm	27.8" 707	38.4" 975	38.4" 975	48.9" 1243
Depth "D" - inches/mm	30.3" 770	30.3" 770	30.3" 770	30.3" 770
Depth "E" - inches/mm	27.7" 704	27.7" 704	27.7" 704	27.7" 704
Connections				
Gas - inches/mm	2" 60.3	2" 60.3	2" 60.3	2" 60.3
M C/H System Flow - inches/mm	2½" 76.1	2½" 76.1	2½" 76.1	2½" 76.1
R C/H System Return - inches/mm	2½" 76.1	2½" 76.1	2½" 76.1	2½" 76.1
Vent Connection "C" - inches/mm	5.9" 150	5.9" 150	5.9" 150	7.8" 200
Condensate drain diameter - inches/mm	1.57" 40	1.57" 40	1.57" 40	1.57" 40



**Figure 3-3: MODULEX EXT Main Components (Left Side View)**



**Figure 3-4: MODULEX EXT Main Components (Right Side View)**

- **Exhaust and condensate evacuation connections** are on the RIGHT-HAND side (supply condition), but may be moved to the REAR position.
- **Air intake connection:** located on the LEFT HAND side.
- **Cold/Hot flow connection:** on the RIGHT HAND side (supply condition) but may be moved to the LEFT HAND position.
- **Cold/Hot return connection:** on the RIGHT HAND side (supply condition) but may be moved to the LEFT HAND position.
- **Gas connection:** on the RIGHT HAND side (supply condition) but may be moved to the LEFT HAND position.

### 3.5 Performance Data

TABLE 3-2: MODULEX EXT Performance Data				
	EXT 450 2S	EXT 600 2S	EXT 800 2S	EXT 1100 2S
Min Input	46,000	46,000	46,000	46,000
Max Input	481,500	642,000	802,500	1,123,500
Max Output*	422,000- 457,000	564,000- 609,000	707,000- 762,000	993,000- 1,067,000
Efficiency Range	87%-99%	87%-99%	87%-99%	87%-99%
Boiler Category	IV	IV	IV	IV
Gas Connections (NPT)	2"	2"	2"	2"
Max. Gas Pressure	10.5"	10.5"	10.5"	10.5"
Min. Gas Pressure	3.5"	3.5"	3.5"	3.5"
Max. Allowed Working Pressure	92 psi	92 psi	92 psi	92 psi
Electrical Req: 120V	2.7 FLA	3.6 FLA	4.5 FLA	6.3 FLA
Water Connections (NPT)	2 1/2"	2 1/2"	2 1/2"	2 1/2"
Min. Water Flow @ Min. Fire (GPM)	7	9	11	16
Min. Water Flow @ Full Fire (GPM)	18	24	30	42
Max. Water Flow (GPM)	42	56	71	99
Water Pressure Drop @ Max. Flow (Ft. of Hd)	9.5	4.9	5.9	8.0
Water Volume: Gallons	3.8	4.9	5.9	8.0
Thermal Modules	3	4	5	7
Turndown or Operating Range	10.5:1	14:1	17.5:1	24.5:1
Vent & Air Inlet Size	4"	4" air intake 6" exhaust	6"	6"
Vent Materials (as per local code)	Can support PVC, cPVC, Polypropylene or AL29-4C venting materials			
Type of Gas	Natural Gas or Propane			
Temperature Control Range	Units deliver 68°-180°F supply; Min. 35°F inlet water required			
Maximum Noise Level	<50 dBA when operating at or below full fire			
Standard Listings and Approvals	UL, ASME, CSD-1, Mass. Approval, SCAQMD			
Water Quality	PH operating range 6.5 to 8.0 and Glycol (if used) MUST be compatible Cast Aluminum heat exchangers.			

**NOTE:** The Technical data plate is placed under the casing.



## CHAPTER 4: INSTALLATION INSTRUCTIONS

### 4.1 General Warnings

#### 4.1.1 Appropriate Use of the Boiler

This boiler **MUST** be used for the use for which it has been expressively designed. Any other use shall be considered improper and therefore dangerous.

This boiler is designed to heat water at a temperature below the boiling point at atmospheric pressure.

#### 4.1.2 Prerequisite System Flushing

Before installing the boiler, the following actions **MUST** be carried out by a competent engineer or technician:

- The whole system should be thoroughly flushed in order to remove any residual dirt or grime which could compromise correct boiler operation.
- Check that the boiler has been preset for operating with the gas type available. This is verifiable via the indication on the packaging and on the data badge;
- Check that the flue pipe has an adequate draft, does not have any constrictions or obstructions, and that no other appliance's flue outlets have been fitted, unless the flue pipe is serving more than one heating appliance, according to the specific standards and regulations in force. The connection between the boiler and flue outlet can be made only after this verification has been carried out.

#### 4.1.3 Installation Personnel Qualifications

The appliance must be installed by a qualified engineer or technician, who complies with the technical requirements, who, under his own responsibility, guarantees the compliance of the standards according to the latest regulations.

The appliance must be positioned so that at least the minimum operational and servicing clearances are provided.

The boiler must be connected to a heating system which is compatible to its performance and output.

**FOR MASSACHUSETTS INSTALLATIONS:** The boiler **MUST** be installed by a plumber or gas fitter licensed within the Commonwealth of Massachusetts.

#### 4.1.4 Carbon Monoxide Detector Installation

The installation **MUST** conform to the requirements of the authority having jurisdiction or, in the absence of such requirements, to one of the following:

- United States:** Installation must conform to the requirements of the National Fuel Gas Code, **ANSI Z223.1/NFPA 54**.
- Canada:** Installation must conform to the requirements of **CAN/CSA-B149.1** - Natural Gas and Propane Installation Code
- Where required by the authority having jurisdiction, the installation must conform to the Standard ASME CSD-1 Controls and Safety Devices for Automatically Fired Boilers.



## 4.2 Code And Standards Approvals

The MODULEX EXT boiler has been reviewed for compliance with the applicable sections of the following North American Standards:

- **ANSI Z21.13/CSA 4.9:** Gas-fired low pressure steam and hot water boilers
- **ASME SECTION IV:** ASME Boiler and Pressure Vessel Code with addenda, Section IV: Rules for Construction of Heating Boilers
- **BTS – 2000:** Testing standard to determine efficiency of commercial space heating boilers.
- **SCAQMD RULE 1146.2:** Emissions of oxides of nitrogen from large water heaters and small boilers and process heaters.
- **CSD-1:** Controls and safety devices for automatically gas-fired boilers.

## 4.3 Packaging

The MODULEX EXT boiler is delivered assembled and protected by a plastic bag inside a strong cardboard box and fixed on a pallet. This allows the boiler to be handled by a forklift.

### CAUTION!

**Remove straps and cardboard box from above, making sure product is intact. Keep cardboard box, plastic bags, etc. away from children, as these may be suffocation and choking hazards..**

In addition to the boiler you will find the contents listed below (see Figure 4-1 and 4-2):

### On The Boiler Front:

- The European to USA flue adaptor screwed to the front of the frame.
- The sealing gasket for flue outlet and the flue assembly.
- A cardboard box containing:
  - The sealing gasket for connection between exhaust manifold and vent.
  - 5 elbows + 1 Tee piece + 1 plastic plug, Ø 1.6" (40 mm) for condensate drain.
  - the screws necessary for installing the flue exhaust terminal.
  - External sensors: Remote Temperature, D.H.W. storage tank & Outdoor temperature.
  - Combustion analysis sample port for vent.
  - Resistor kit for emergency operation.
  - Cable glands for electrical supply
  - Pins for mounting sockets.
  - Kit sheet for output cables 120 / 24 V.
  - Foam gasket for flanged vent starter piece.
- A cardboard box containing:
  - Four (4) frame support feet.
  - 3 hole covers for switching gas and water piping location.
  - 3 insulation gaskets (for installation outside).
- A cardboard box containing:
  - CSD-1 header
  - Relief valve

### On The Boiler Right Side:

- One 39.3 inch (1 meter) pipe for the condensate evacuation system.
- Left and right skirt pieces.

**On The Back Of The Boiler**

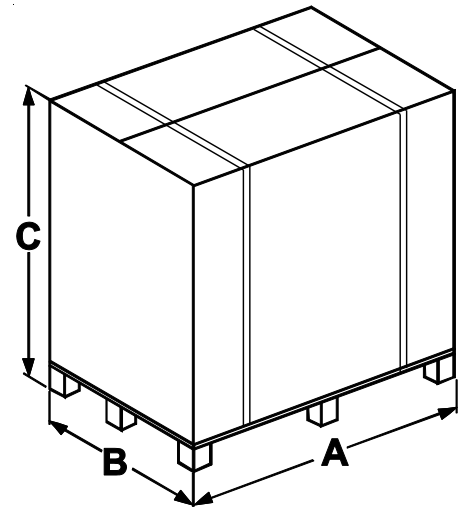
- Front and rear skirt pieces.

**On The Boiler Top:**

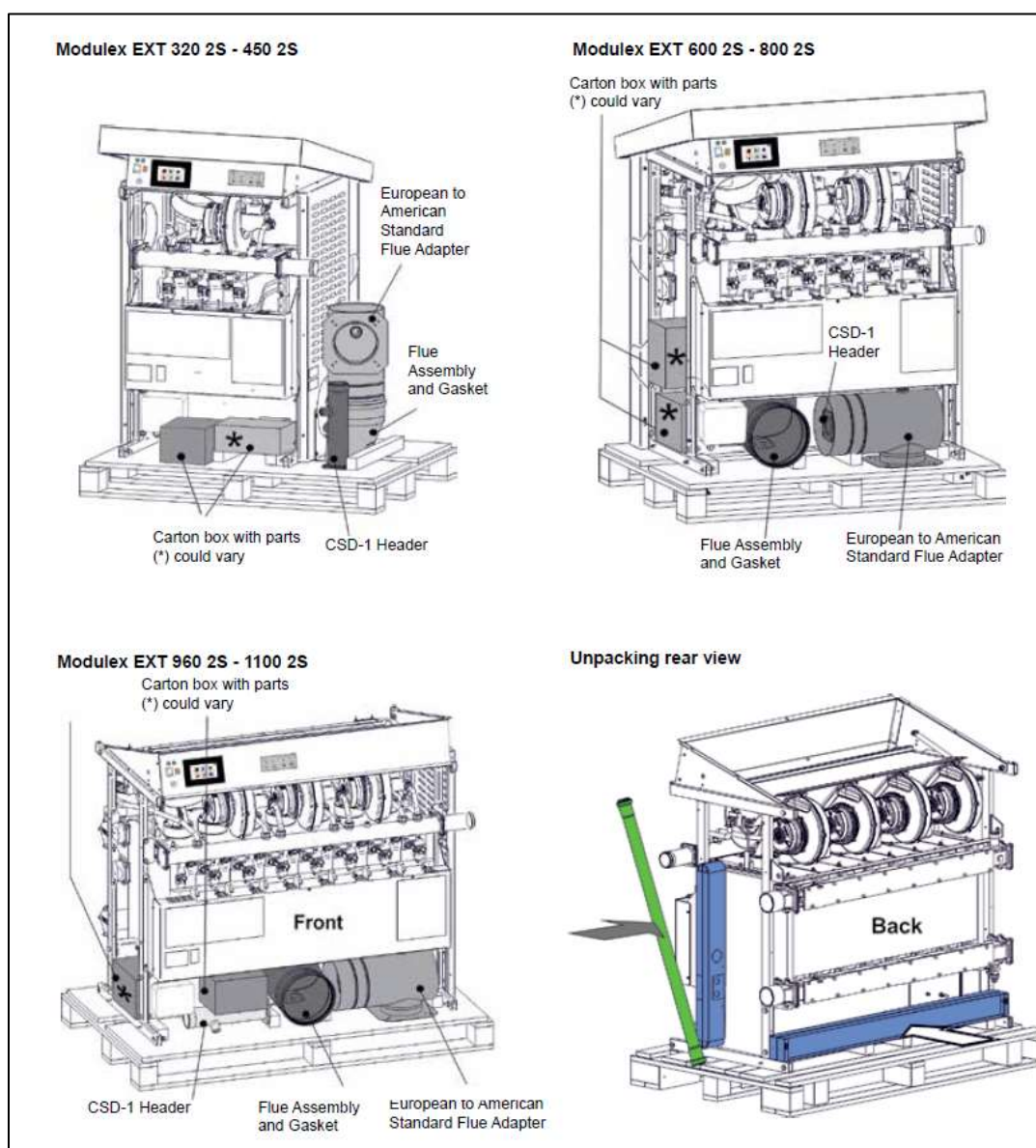
- A plastic bag containing:
  - This installation manual for the installer.
  - User manual for the user.
  - Ufly controller instruction manual.
  - Pins to hold the fan assembly in a raised position.
  - -stickers for propane and high altitude conversions.

**In A Separate Box**

- PVC venting starter piece and pipe clamps.
- Temperature & Pressure gauge.
- Flow Switch.
- Pipe adaptor (rubber) for optional PVC condensate drain.



***Figure 4-1: MODULEX EXT  
Shipping Package***



**Figure 4-2: Unpacking**

<b>TABLE 4-1: MODULEX EXT Shipping Package Dimensions</b>				
<b>Model</b>	<b>A</b>	<b>B</b>	<b>C</b>	<b>Gross Weight</b>
<b>EXT 450 2S</b>	43.7" 1110 mm	35.0" 890 mm	49.2" 1250 mm	520 lb. 236 kg
<b>EXT 600 2S</b>	43.7" 1110 mm	35.0" 890 mm	49.2" 1250 mm	650 lb. 295 kg
<b>EXT 800 2S</b>	43.7" 1110 mm	35.0" 890 mm	49.2" 1250 mm	716 lb. 325 kg
<b>EXT 1100 2S</b>	54.1" 1375 mm	35.0" 890 mm	49.2" 1250 mm	924 lb. 419 kg

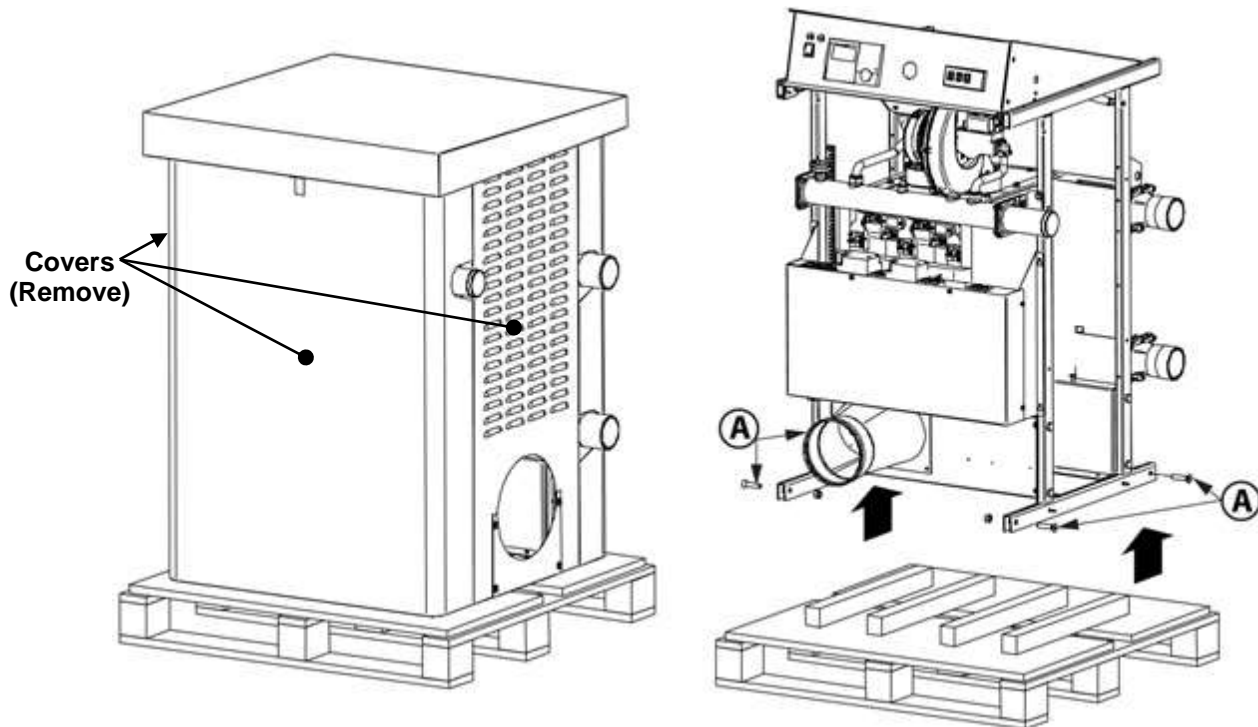
#### 4.4 Transporting And Securing The Boiler Safely

The boiler is susceptible to serious damage when not secured properly.

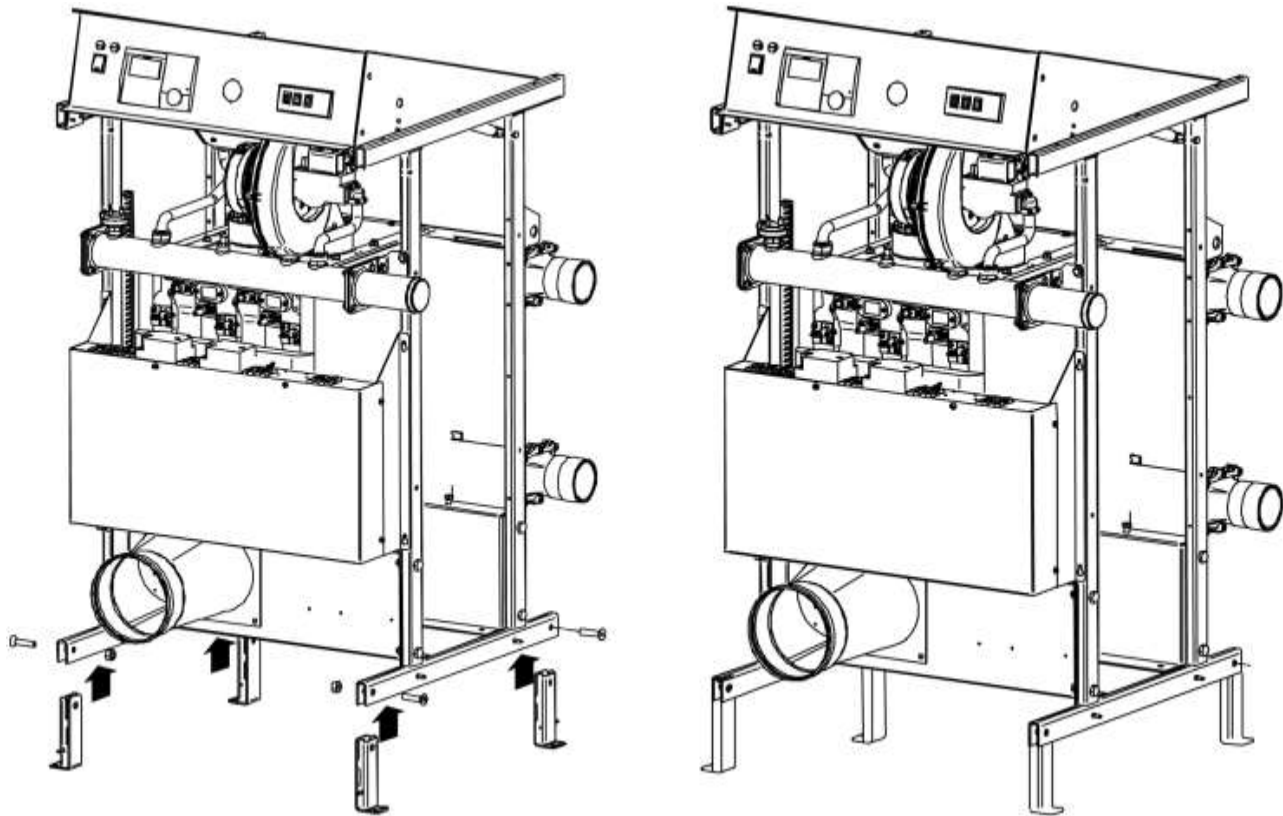
- Follow the transportation instructions on the packaging.
- Only transport the boiler using appropriate transportation equipment, such as a hand-truck with a fastening belt or special equipment for transporting heavy equipment.
- Boiler must be secured to transportation equipment while moving to prevent it from falling.
- Protect all parts against impacts, during transportation.

#### 4.5 Removal From Boiler Bed And Installation Of Boiler Feet

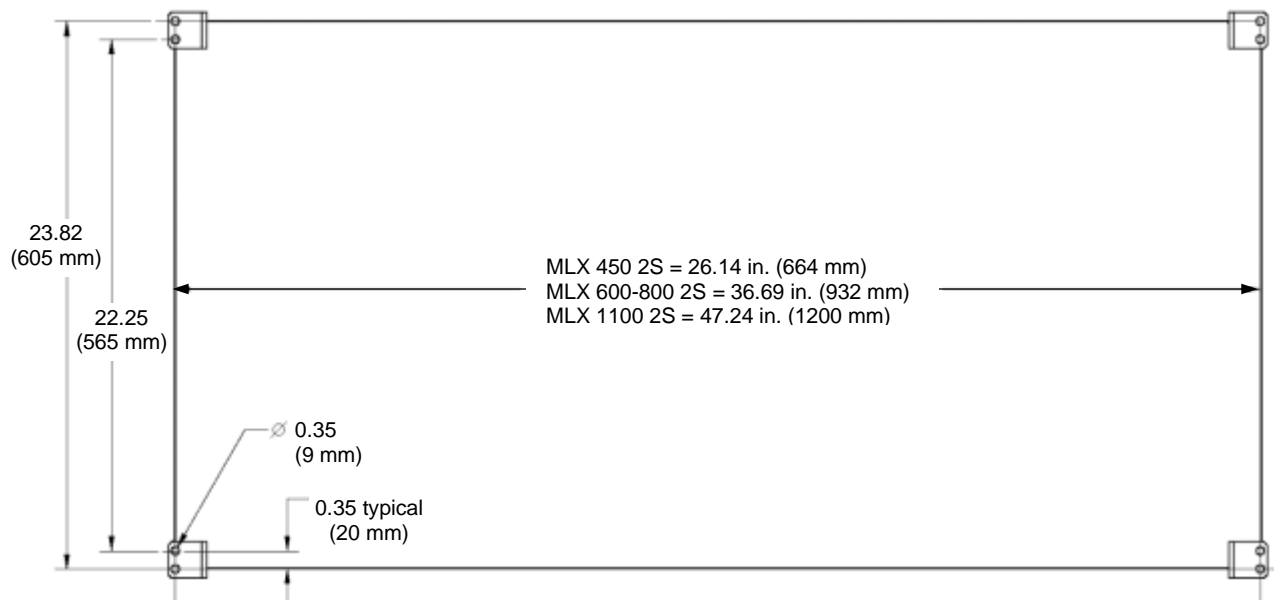
- 1) Remove the covers of the boiler.
- 2) Lift the boiler with a hoist or forklift bands.
- 3) Remove the 4 screws "A".
- 4) Attach four (4) support feet to chassis using four "A" screws removed in Step 3 (Figure 4-5).
- 5) Place the boiler on concrete slab and re-mount the cover(s) over the boiler.



**Figure 4-3: EXT Unpacking (Left = With Covers, Right = Lifted Without Covers)**



**Figure 4-4: EXT Unpacking (Left = Attach Feet, Right = Ready for Cover)**

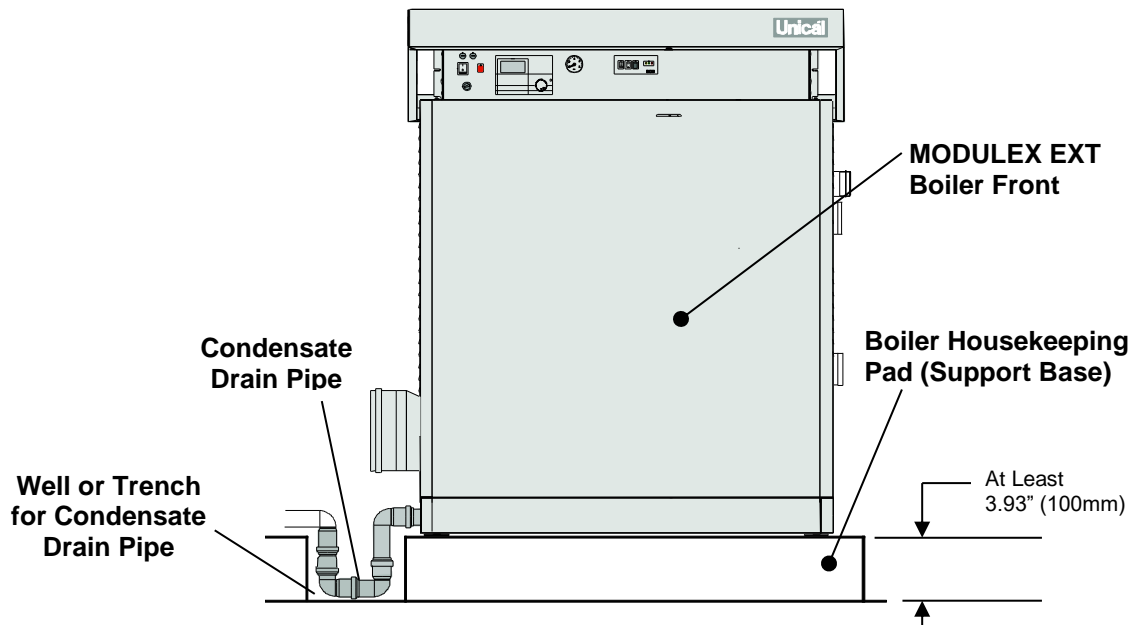


**Figure 4-5: Mounting Hole Locations**

## 4.6 Boiler Location Inside A Boiler Room

Special attention shall be paid to local regulations and laws about boiler enclosures and boiler rooms, particularly to the minimum clearances around the boiler. The installation shall be in compliance with all the latest regulations and laws about boiler enclosures, boiler rooms, installations of heating and hot-water systems, ventilation, vents capable of exhausting the flue gases of condensing boilers, and any other applicable requirements.

The boiler can be put on a flat and sufficiently strong base with the same dimensions as the boiler, and at least 3.93" (100 mm) high (see Figure 4-7), in order to assemble the condensate trap. An alternative to this base may be a 100mm deep well or trench next to the boiler to accommodate the condensate "U" drain pipe (see Figure 4-7). After installation the boiler shall be perfectly horizontal and stable, to reduce any possible vibrations or noises.



**Figure 4-6: Boiler (Front View) on Housekeeping Pad with Condensate Drainpipe**

### 4.6.1 Boiler Room Safety Concerns

When selecting the installation site please comply with the following safety requirements:

- Ensure easy access to the components of the boiler to facilitate maintenance.
- The room where the boiler will be placed must always be frost free.
- Do not store or use gasoline or other flammable vapors and liquids in the vicinity of this or any other appliance.
- Never use or store any chlorinated detergents or halogenated hydrocarbons (e.g. in spraycans, solvents and detergents, paints, adhesives) in proximity to the boiler.
- For outdoor installation see warning in Section 3.2 - General Boiler Operation.



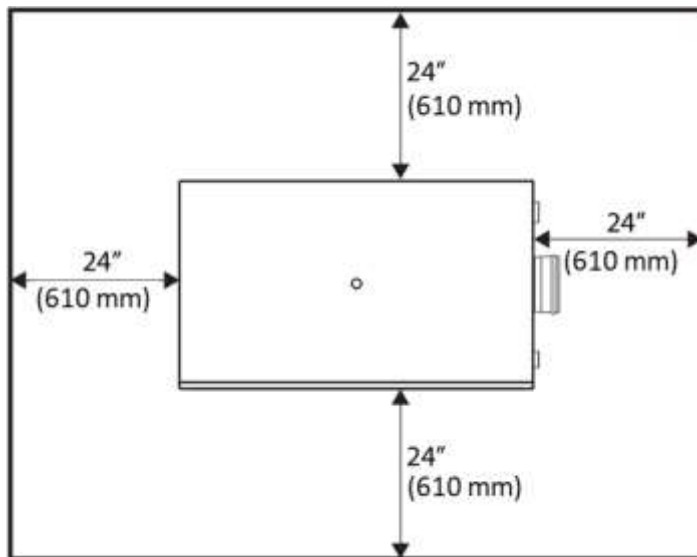
#### 4.6.2 Products to Avoid in the Boiler Room

Do NOT store the following products in boiler room and/or around combustion air intake vents:

- Spray cans containing chlorocarbons/fluorocarbons
- Ammonium and/or ammonium solutions
- Permanent wave solutions
- Chlorinated waxes and/or cleaners
- Chlorinated swimming pool chemicals
- Calcium chloride used for thawing
- Sodium chloride used for water softening
- Refrigerant leaks
- Paint or varnish removers
- Hydrochloric acid/muriatic acid
- Cements and glues
- Antistatic fabric softeners used in clothes dryers
- Chlorine-type bleaches, detergents, and cleaning solvents
- Adhesives used to fasten building products
- Other damaging or flammable products

#### 4.7 Recommended Clearances For Servicing

Recommended clearances around the boiler are listed below (see Figure 4-8):



TOP of the boiler:	24" (610 mm)
FRONT of the boiler:	24" (610 mm)
RIGHT side:	24" (610 mm)
LEFT side:	24" (610 mm)
FLOOR/GROUND:	4" (102 mm)
BACK of the boiler:	24" (610 mm)

**Figure 4-7: EXT Boiler Clearances**

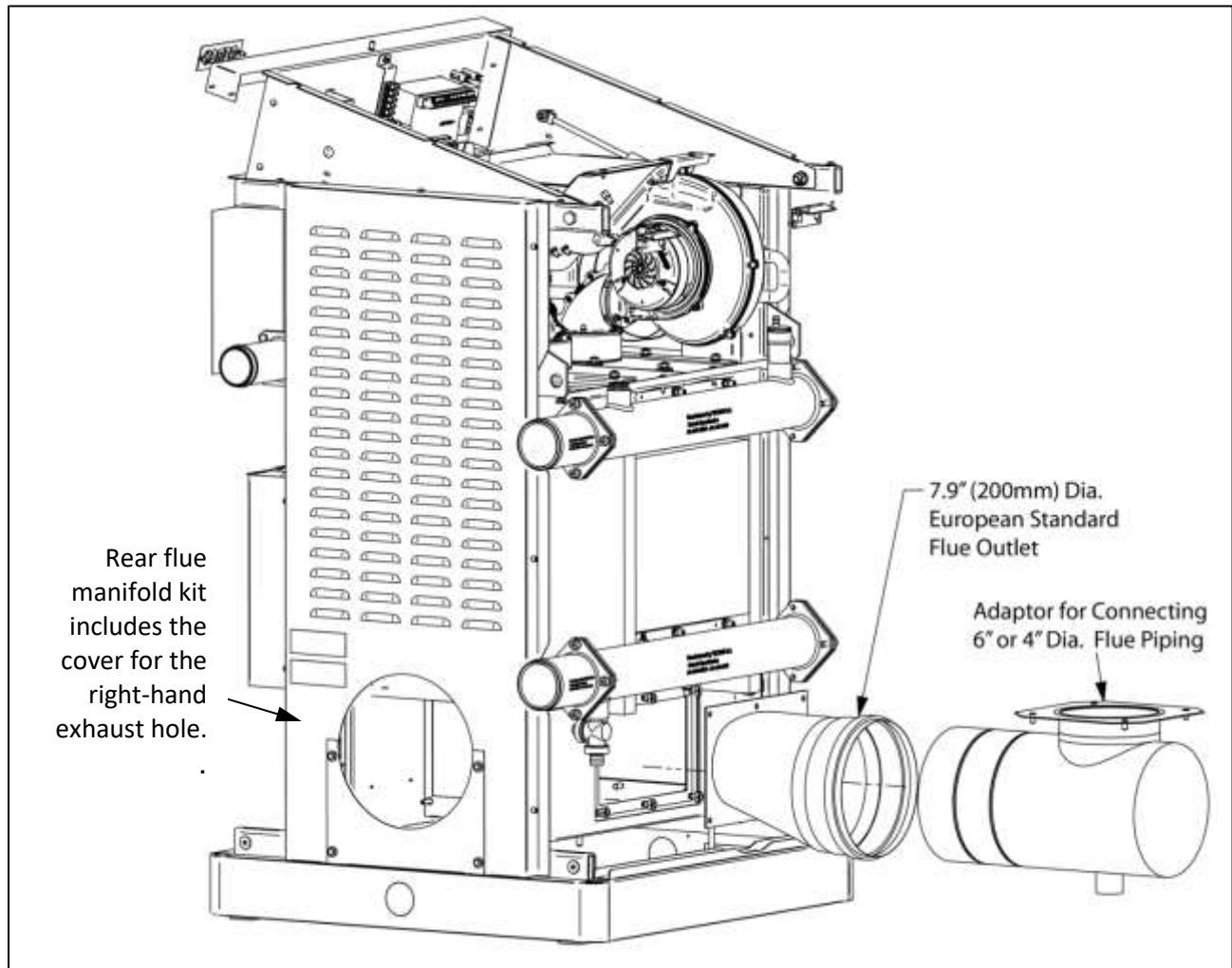
It is recommended to provide the boiler with the clearances as shown in the drawing in order to be able to perform normal service and cleaning operations. Minimum required clearances depend on the piping and venting configuration. For further details, contact your local manufacturer's representative.

## 4.8 Boiler Connections

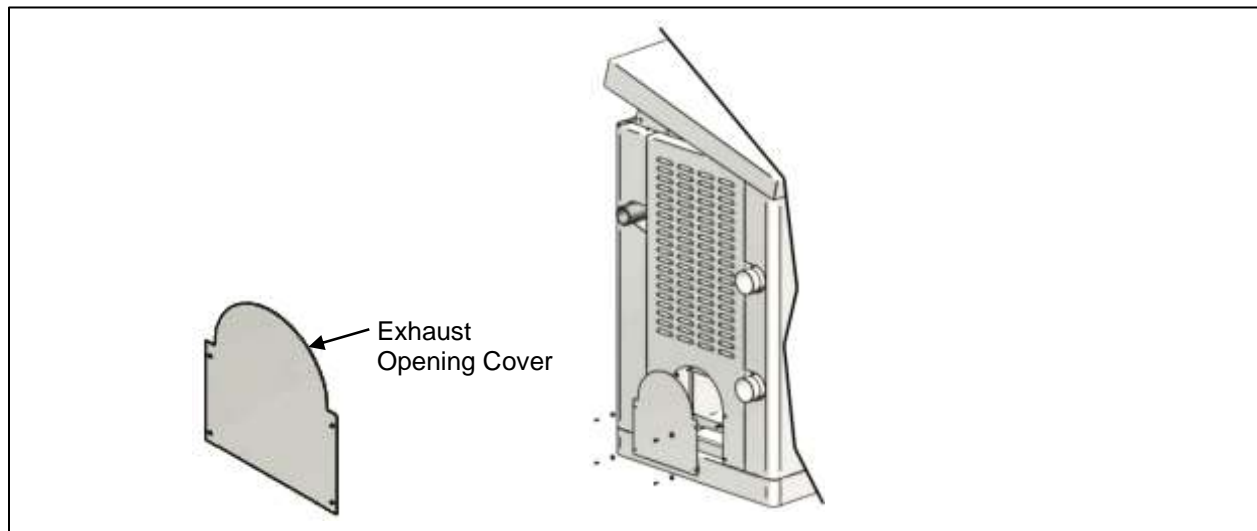
At delivery, the MODULEX EXT boiler is setup with all connections, (i.e. cold/hot water flow & return, gas, and exhaust outlet) on its RIGHT HAND side.

### 4.8.1 Changing Exhaust Outlet Location

To move the flue exhaust outlet terminal from the RIGHT HAND side (standard delivery position) to the REAR position, it is necessary to request the Rear Exhaust kit, which includes a cover for closing off the RIGHT HAND side panel exhaust opening (see Figure 4-10).



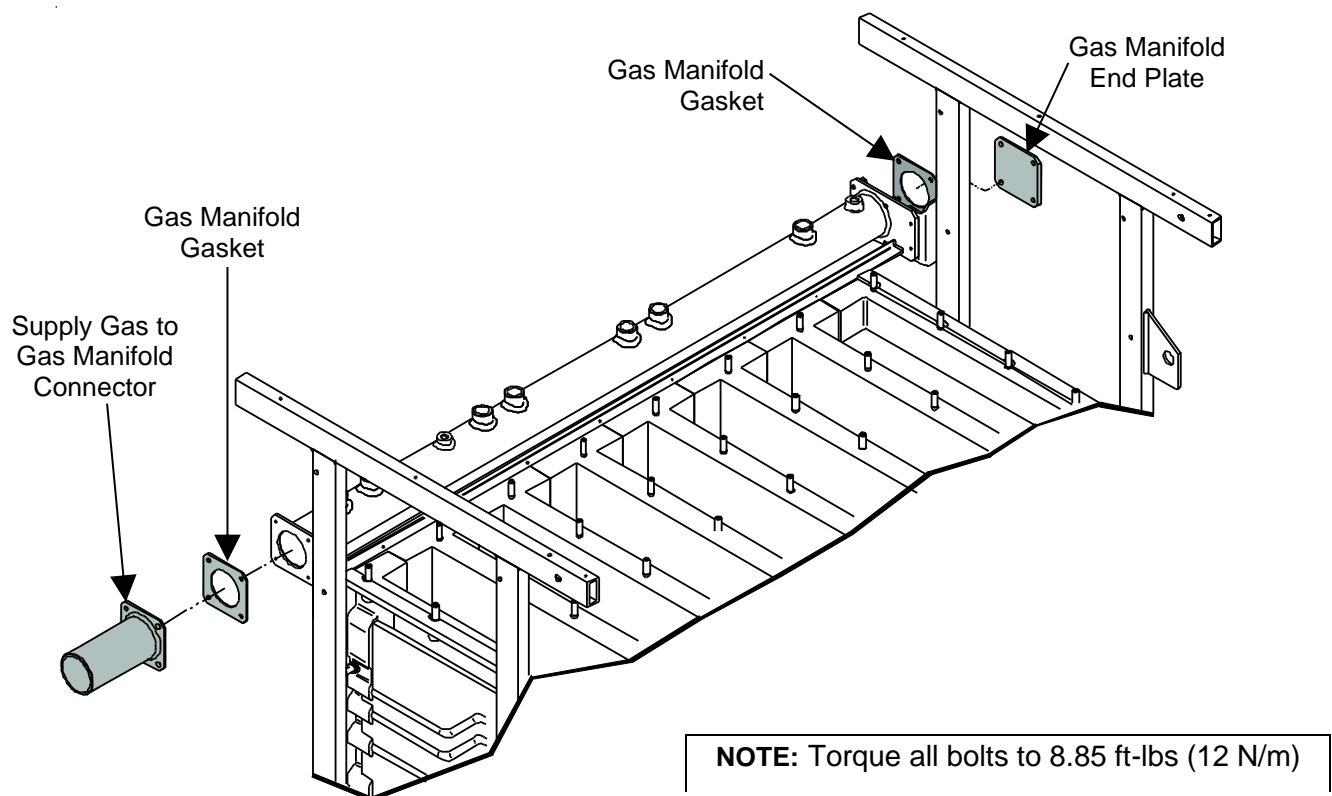
**Figure 4-8: Rear Exhaust Kit for Changing Exhaust Outlet from RIGHT HAND side to REAR on EXT 802, 962, 1123 (only)**



**Figure 4-9: Rear Exhaust Kit for Changing Exhaust Outlet from RIGHT HAND Side to REAR**

#### 4.8.2 Reversing Gas Manifold Connections

To move the gas connection from the RIGHT HAND side (standard delivery position) to the LEFT HAND side, swap the end plate and the gas supply connector screwed onto the gas manifold ends, as shown in Figure 4-11. Ensure that the gaskets for ALL connections are reversed along with the connectors themselves.



**Figure 4-10: Reversing Gas Connections from RIGHT HAND to LEFT HAND**

### 4.8.3 Reversing Cold/Hot Water Flow & Return Connections

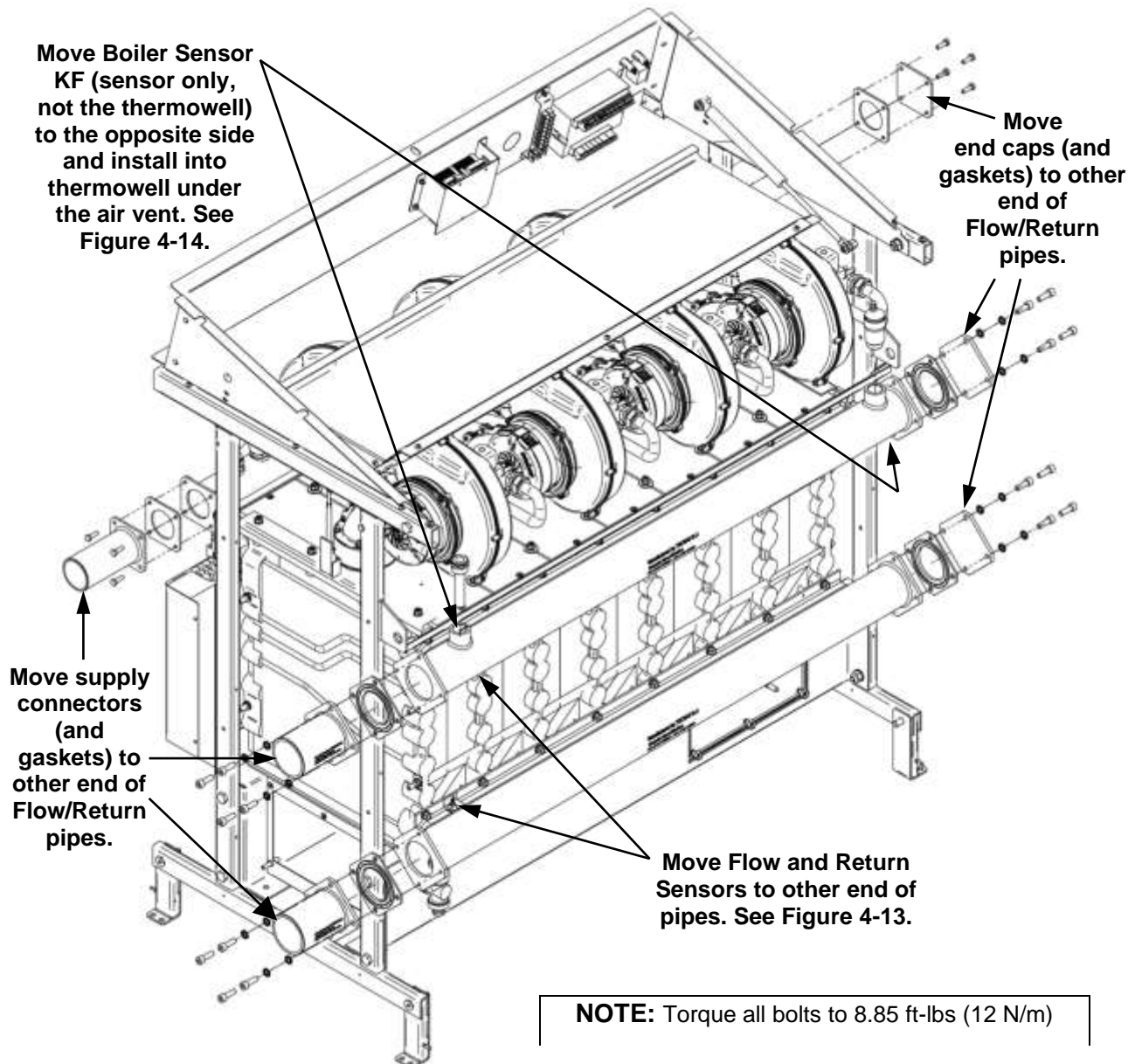
Change of Water Flow and Return connections from RIGHT hand to LEFT hand requires reversing connectors, moving the Flow and Return Temperature Sensors to other end, and exchanging positions of the Boiler Sensor KF and Automatic Air Vent.

**⚠ WARNING!**

Ensure that gaskets for ALL connections are reversed along with the connectors themselves.

#### 4.8.3.1 Reversing Cold/Hot Water Flow & Return Piping Connectors

Refer to Figure 4-12 and reverse the connectors and end caps on Supply, Flow, and Return pipes. Ensure that all gaskets are also reversed.

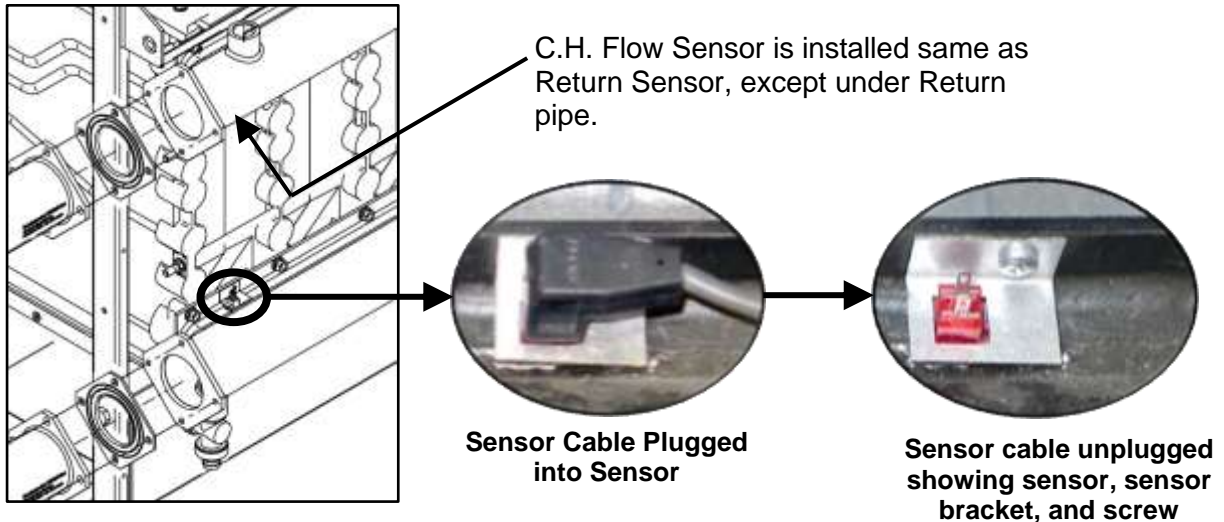


**Figure 4-11: Reversing Cold/Hot Water Flow and Return Connections and Sensors from RIGHT HAND to LEFT HAND**



#### 4.8.3.2 Reversing Flow & Return Temperature Sensors

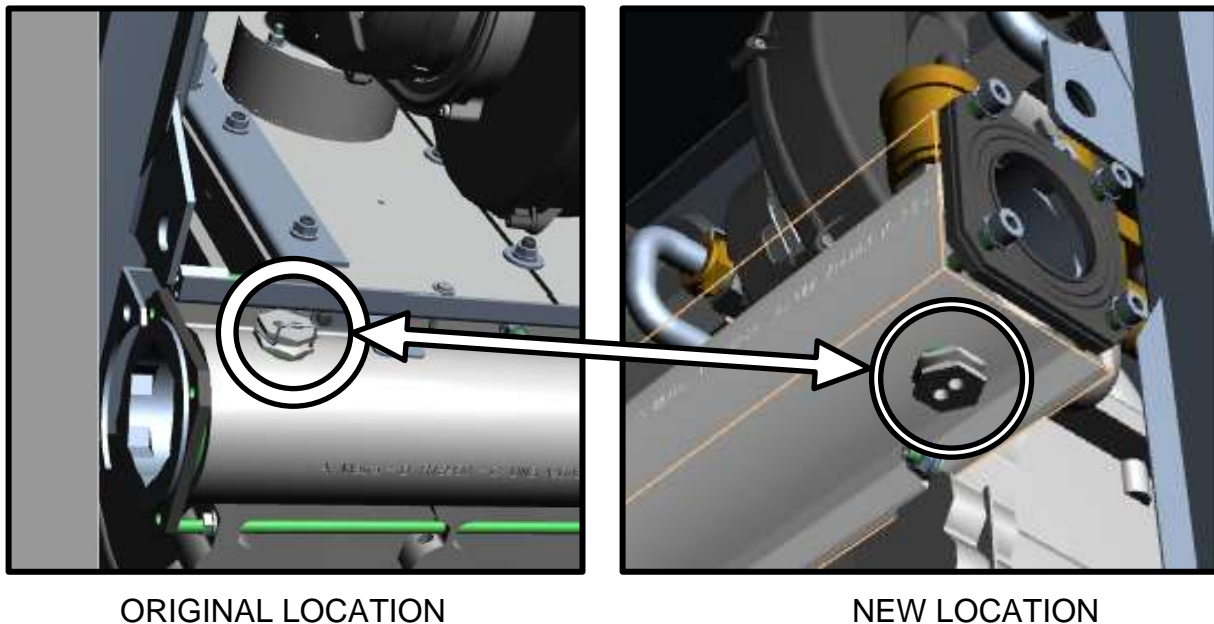
One sensor is located on top of the lower Return pipe railing, the other is located under the upper Flow pipe railing. Move these two sensors to other end of Flow/Return pipes.



**Figure 4-12: Reversing Flow and Return Temperature Sensors**

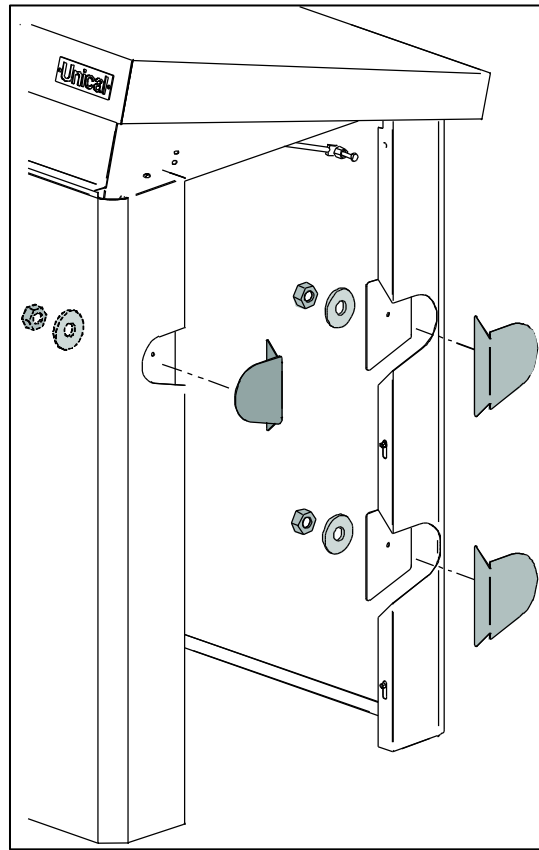
#### 4.8.3.3 Moving Boiler Sensor KF

Move the Boiler Sensor KF (sensor only, not the thermowell) to the opposite side and install into thermowell under the air vent.



**Figure 4-13: Moving Boiler Sensor KF**

**NOTE:** When reversing hydraulic and gas pipe connections, you must close up the chassis openings vacated after the change. See Figure 4-15.



**Figure 4-14: Caps and Plugs Used for Closing Up Vacated Gas and Hydraulic Connection Openings**

#### 4.9 Gas Connection General Information

For natural gas connections, see section 4.10.1. For propane gas, refer to section 4.10.2.

The gas supply connection must comply with local regulations or, if such regulations do not exist, with the National Fuel Gas Code, **ANSI Z223.1/NFPA 54**.

An external gas pressure regulator is mandatory for the State of Massachusetts, regardless of supply pressure; for all other jurisdictions, a lock-up style regulator is required when supply pressure is greater than 10.5" W.C. (see Fig. 1). The regulator must be installed with at least 2 feet of pipe between the regulator and the unit gas inlet. The regulator discharge range must be able to maintain 3.5" W.C. Gas regulators are self-contained with tapped diaphragm vent ports allowing the diaphragm to change its position. These vents typically require piping to the outside.

For Canada, the gas connection must comply with local regulations or, if such regulations do not exist, with the **CAN/CSA-B149.1** - Natural Gas and Propane Installation Code.

Before installing the boiler, it is recommended that all the supply piping be thoroughly cleaned to remove any residual grime which could compromise the boiler's correct functioning.

As a safety measure against gas leaks, AERCO recommends installing a surveillance and protective system made up of a gas leakage detector combined with an on-off solenoid valve on the gas supply line.

The boiler and its individual shutoff valve must be disconnected from the gas supply piping system during any pressure testing of that system at test pressures in excess of 1/2 PSI (3.5kPa).

The boiler must be isolated from the gas supply piping system by closing its individual manual shutoff valve during any pressure testing of the gas supply piping system at test pressures equal to or less than 1/2 PSI (3.5 kPa).



**⚠ WARNING!**

- The gas connection must be installed by a registered engineer who must comply with regulations in force and/or indicated by the local gas supplier. Incorrect installation can cause injury or death to persons or animals, or damage to property. The manufacturer shall not be held liable for any injury and/or damage due to inappropriate installation.
- Do not use the boiler for another type of gas than indicated on the identification plate of the boiler. This will cause improper functioning and can damage the boiler.
- Always check the gas pipe system by means of a soap bubble test using a leak-search spray.

**4.10 Natural Gas Connections**

Contact your local gas supplier for natural gas pipe sizes and meter types.

**4.10.1.1 Natural Gas Piping Connections**

The boiler gas pipe is equipped with external 2" M-NPT thread, onto which the tail piece of the gas shut off valve can be connected. Use appropriate sealing.

The connection to the boiler must include a suitable method of disconnection and a gas control valve must be installed adjacent to the boiler for isolation purposes.

**4.10.1.2 Natural Gas Supply Pressure Requirements**

The nominal inlet working gas pressure at the boiler should be **7" W.C.** (18 mbar) for Natural Gas (Gas A). Maximum pressure with no flow (lockup) or with the boiler running is 10.5 inches W.C. Minimum pressure with the gas flowing (verify during boiler startup) is 4.0 inches W.C.

**4.11 Propane Gas Connections****4.11.1.1 Propane Gas Piping Sizes**

Contact your gas supplier for Propane gas pipe sizes, tanks, and lockup gas pressure regulator.

**4.11.1.2 Propane Gas Piping Connections**

- Use a gas shut off valve compatible with propane gases.
- A sediment trap must be installed upstream of the gas controls.

The boiler pipe is provided with an external 2" MNPT thread, onto which the tail piece of the gas shut off valve can be screwed. Use appropriate sealing.

The connection to the boiler must include a suitable method of disconnection.

The nominal inlet working gas pressure measured at the boiler should be **11" W.C.** (27 mbar) for Propane gas (Gas E).

A gas control valve must be installed adjacent to the boiler for isolation purposes.

**4.11.1.3 Propane Gas Supply Pressure Requirements**

Pressures required at gas valve inlet pressure port:

- Nominal gas pressure – 11 inches W.C.
- Maximum gas pressure – 13 inches W.C. with no flow (lockup) or with boiler running.
- Minimum gas pressure – 8 inches W.C. with gas flowing (verify during boiler startup).

**NOTE:** Install high gas pressure regulator at least 6 to 10 feet upstream of the boiler.

## 4.12 Flow And Return Pipe Connections

The cold and hot water flow and return circuits must be connected to the boiler via the respective 2½" M and R connections, as indicated in Table 3-1 (in Section 3.3, above).

When determining the size of the cold/hot water circuit pipes, bear in mind the pressure losses induced by any of the system's components and by the configuration of the system.

When planning the routing of the cold/hot water piping, take the necessary precautions to avoid air traps and pockets and to facilitate the continuous purging of the system.

### ⚠ WARNING!

- Before installing the boiler, we recommend that the system be flushed out with a suitable cleaning product in order to eliminate any metallic tooling or welding residues, or oil and grime, which could reach the boiler and affect the proper functioning of the boiler.
- Ensure that the system piping is NOT used for earth grounding of electrical or telephone systems. Such grounding of system piping is unsuitable and can cause serious damage to the piping, boiler, and radiators.
- It is absolutely forbidden to fit on-off valves in the piping before the required safety devices.

## 4.13 Pressure Relief Valve (Supplied)

Each unit is delivered with a 3/4 inch, 80 psi Pressure Relief Valve that complies with the ANSI/ASME **ANSI Z21.13 / CSA 4.9** Boiler and Pressure Vessel Code, **Section IV** ("Heating Boilers"), and **CSA B51**, Boiler, Pressure vessel, and Pressure Piping Code, as applicable.

**NOTE:** Lower system pressures require lower rated Pressure Relief Valves (not supplied).

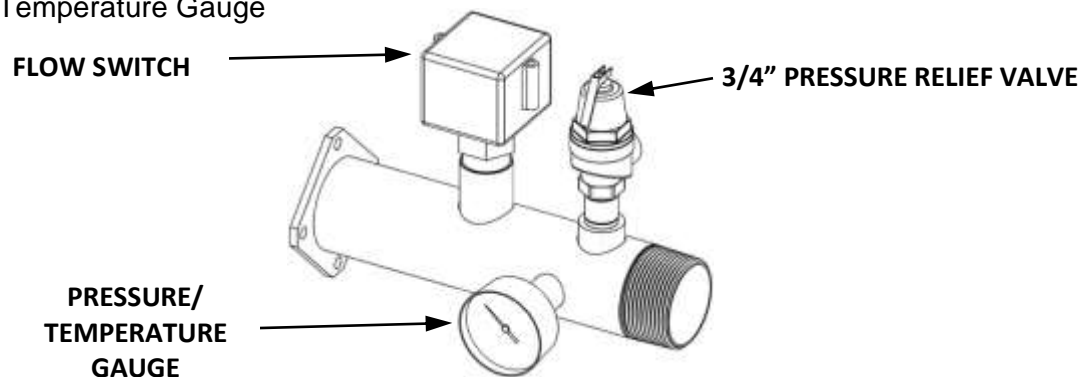
The Pressure Relief Valve is included separately in the shipping container. It must be fitted on the CSD-1 manifold at the site, per the instructions in the next section (see Figure 4-15).

## 4.14 Csd-1 Manifold Assembly (Supplied)

The installation of a flow switch and pressure/temperature gauge are required. A 3/4" Pressure Relief Valve designed for the boiler output capacity must also be installed at the site (see Step 4).

These components are supplied with the boiler and must be assembled and wired when the boiler is installed at the site. The manifold components are shown installed into the CSD-1 manifold in Figure 4-17. The manifold assembly components supplied are:

- 3/4" Pressure Relief Valve
- Flow Switch
- Pressure/Temperature Gauge

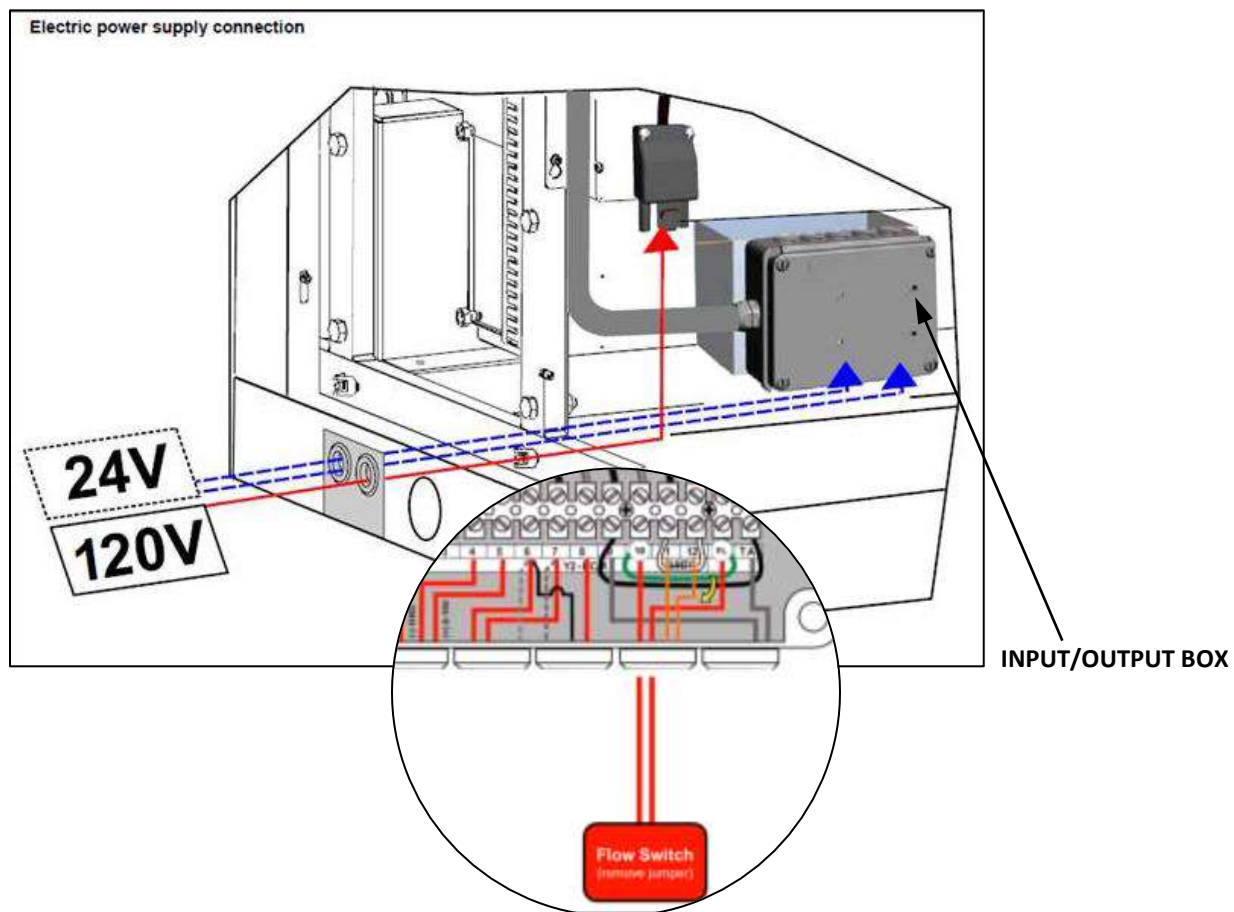


**Figure 4-15: CSD-1 Manifold Assembly and Components**

**NOTE:** Use Teflon tape or suitable pipe joint compound for component and piping connections.

#### 4.14.1 Installing the Flow Switch and CSD-1 Components

1. Attach manifold to the outlet supply connection on the boiler via the flanged connections.
2. Cut the flow switch for 2-1/2" pipe, as directed in the flow switch paddle packaging. For installations expecting less than a 10 gpm flow, the switch must be adjusted as follows:
  - a) With no flow, turn adjustment screw on switch counter-clockwise until switch trips.
  - b) Then turn screw 1/2 turn clock-wise and continue installation.
3. Connect the Flow Switch and Pressure/Temperature Gauge to the tapped holes in the manifold assembly, as shown in Figure 4-15, above.
4. Check to ensure that all components are securely tightened and that the flow switch paddle moves freely without interference.
5. Locate terminals FL and 10 on the Input/Output box. Remove the jumper wire between these terminals and connect the two flow switch wires. The Flow switch wires have no polarity, so can be inserted without regard to position.



**Figure 4-16: Input/Output Box Location and Flow Switch Connection**

#### 4.15 Determination Of Primary Boiler Pump Or Boiler System Pump

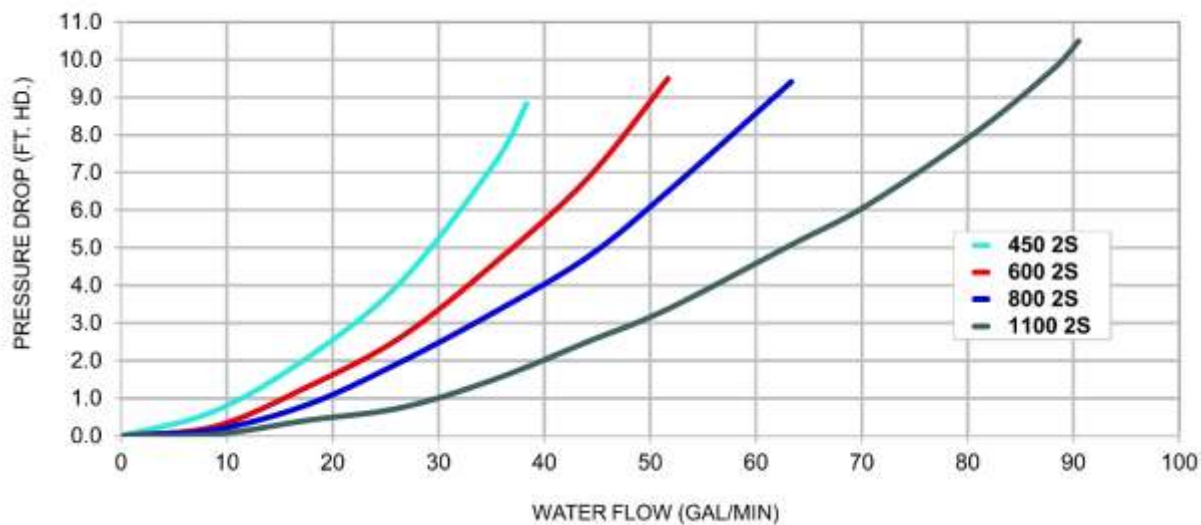
The following table gives an indication of the pump's flow rate in function of the  $\Delta t$  of the primary circuit if the installation has a mixing header.

The size of the pumps must be determined by installers or technical engineers according to boiler data and system design.

<b>TABLE 4-2: MODULEX EXT Minimum/Maximum Flow Rates</b>				
<b>BOILER MODEL</b>	<b>450 2S</b>	<b>600 2S</b>	<b>800 2S</b>	<b>1100 2S</b>
Min. flow rate demanded in gal/min $\Delta T$ 27°F (15°C)	9.7	12.9	16.2	22.7
Min. flow rate demanded in gal/min $\Delta T$ 36°F (20°C)	7.3	9.7	12.1	17.0
Max flow rate demanded in gal/min $\Delta T$ 27°F (15°C)	33.8	45.1	56.4	79.0
Max flow rate demanded in gal/min $\Delta T$ 36°F (20°C)	25.4	33.9	42.3	59.3

The water side resistance curve of the boiler is shown in the diagram in Figure 4-19.

The pump is not an integral part of the boiler. It is recommended to choose a pump with the rate and delivery head at about 2/3 of its characteristic heating curve.



**Figure 4-17: MODULEX EXT Water Side Pressure Losses**

**NOTE:** The use of a mixing header fitted between the boiler circuit and the system circuit is always advisable. See Modulux EXT Piping Applications Guide TAG-0099 for additional details.

## 4.16 Condensate Piping And Drain

To avoid condensate collecting inside the combustion exhaust system, the condensate piping must have an inclination toward the drain of at least 3/8 in./ft (30 mm/m).

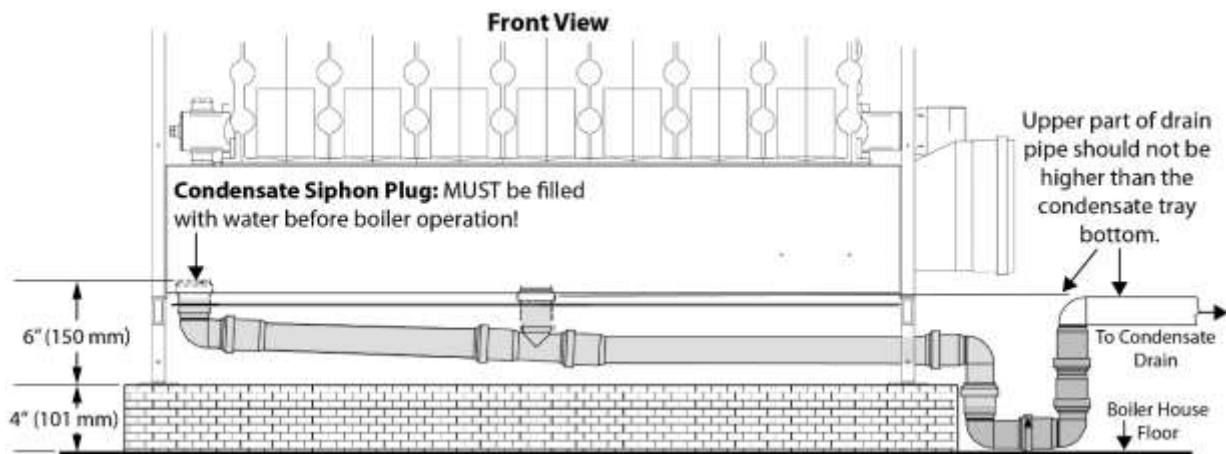
The liquid column, inside the condensate siphon, (see Condensate Siphon Plug in Figure 4-18) needs to be filled with water after installation. The minimum height of the water in the column, when all the fans are in operation, must be at least 25 mm (1 in.).

In order to avoid ice formation while the boiler is operating, which can cause the boiler to stop functioning, the entire condensate evacuation system must be well insulated. Note that it is forbidden to evacuate the condensate through an open gutter to prevent the risk of ice forming and avoid exposure of the corrosive condensate to the external environment.

The condensate must be neutralized before being evacuated to the sewer, which can be achieved by mixing the condensate with lime or with drain water coming from washing machines, dish washing machines, etc., which normally has a base pH.

The connection to the sewer will be through a closed, but visible drain. Given the high acidity (pH 3 to 5) of the condensate, only plastic material may be used for the condensate evacuation pipes. Moreover it must be dimensioned and constructed so as to allow the correct out-flow to the drain, preventing any bottleneck and any leakage.

Consult local codes regarding condensate neutralization. Neutralization may be obtained by mixing it with the buildings drain water or with limestone, which normally has a base pH. AERCO offers a condensate neutralizing kit and a neutralizing tank for preparing condensate waste for safe evacuation into a sewer system.



**Figure 4-18: MODULUX EXT Condensate Piping**

The outlet of the condensate drain pipe exits from the right side of the boiler, just below the RIGHT-SIDE flue outlet opening.

### **IMPORTANT!**

**If it is not possible to use a 4" (101mm) base or housekeeping pad on which to place the boiler, install the boiler on the floor and provide a well or trough (minimum of 4" - 101 mm deep) in which to lodge the U of the condensate piping. See Figure 4-18.**

**⚠ WARNING!**

- Before commissioning the boiler, fill the condensate drain pipe with water, at the dedicated filling-up plug. See Figure 4-18.
- Do not install the condensate drain where freezing may occur.
- Use materials approved by the authority having jurisdiction in your area. In the absence of such authority, PVC and CPVC pipe must comply with ASTM D1785, F441 or D2665. Cement and primer must comply with ASTM D2564 or F493.
- For Canada, use ULC certified PVC or CPVC pipe, fittings and cement.
- Periodic cleaning of the condensate disposal system must be carried out.

## 4.17 Water Treatment

The chemical/physical composition of the heating system's water is fundamental for the boiler's correct operation and safety.

Among the problems caused by poor quality of feed water, the most frequent and the most serious is the buildup of deposits on boiler thermal exchange surfaces.

Less frequent but also serious are deposits on the water circulating piping surfaces. Because of the low thermal conductivity of mineralization desposits from improperly treated water, the thermal exchange efficiency may be seriously reduced and result in dangerous localized overheating.

AERCO suggests treating and conditioning feed water for the heating circuit in the following:

- When the hardness of the water is higher than 9 grains per gallon (gpg).
- For cold/hot water installations with large water content.
- Renewal of the water system due to uncontrolled leakages.
- Subsequent refilling of the system due to maintenance work on the installation.
- Presence of different metals in the water circuit.

Properly treated system and feed water will substantially reduce the following problems:

- lime scale deposit
- corrosion sludge
- deposits
- microbiological growths (molds, bacteria etc.)

An appropriate treatment of the supply water will prevent the above stated problems and will maintain the correct operation and efficiency of the boiler over time.

In order to properly treat water for use in a hydronic boiler heating system, the following physical/chemical characteristics must be addressed.

**Sediment:** If sediment is present in the system, a sediment filter or other appropriate device, must be used.

**Water pH:** If water has a pH above 8, or below 6.5, then the water must be treated to provide a medium pH of between 6.5 and 8.

The system water to be judged for water characteristics should be taken from the return pipe of the primary circuit downstream of the circulating pump.



## 4.18 Important Installation Warnings

### 4.18.1 Oxygen Levels in the System Water Warning

All necessary precautions must be taken for preventing the formation and localization of oxygen in the system's water. For this reason, ensure that the plastic piping used in under-floor heating systems is impermeable to oxygen.

### 4.18.2 Antifreeze Compatibility Warning

If any anti-freeze solutions are used ensure that they are compatible with aluminum and any other boiler components and materials.

### 4.18.3 Lime Scale and Corrosive Water Damage Warning

Any damage caused to the boiler due to the formation of lime scale or by corrosive water will not be covered by the warranty. Appropriate steps must be taken to ensure the indirect tank water heater does not become plugged by scale caused by hard water or sediment. If the indirect tank water heater becomes plugged by either scaling from hard water or sediment it is not the responsibility of AERCO International.

### 4.18.4 Connection to Refrigeration System Warning

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

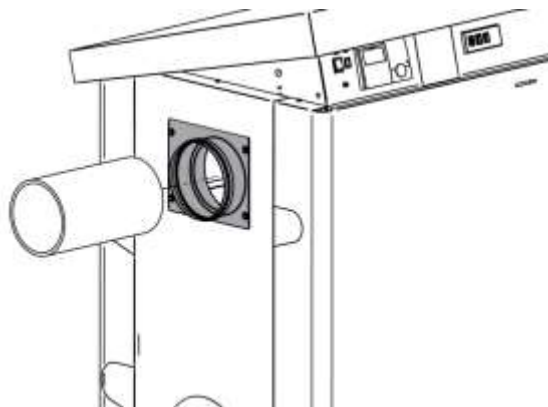
The boiler piping system of a hot water boiler connected to heating coils located in air Handling units where they may be exposed to refrigerated air circulation must be equipped with flow control valves or other automatic means to prevent gravity circulation of the boiler water during cooling.

## 4.19 Air Intake Connection

Install air intake as shown in Figure 4-21. For air intake connection piping use only:

- Ø 4" PVC Pipes Schedule 40 for Modulux EXT 450-600 2S
- Ø 6" PVC Pipes Schedule 40 for Modulux EXT 800-1100 2S

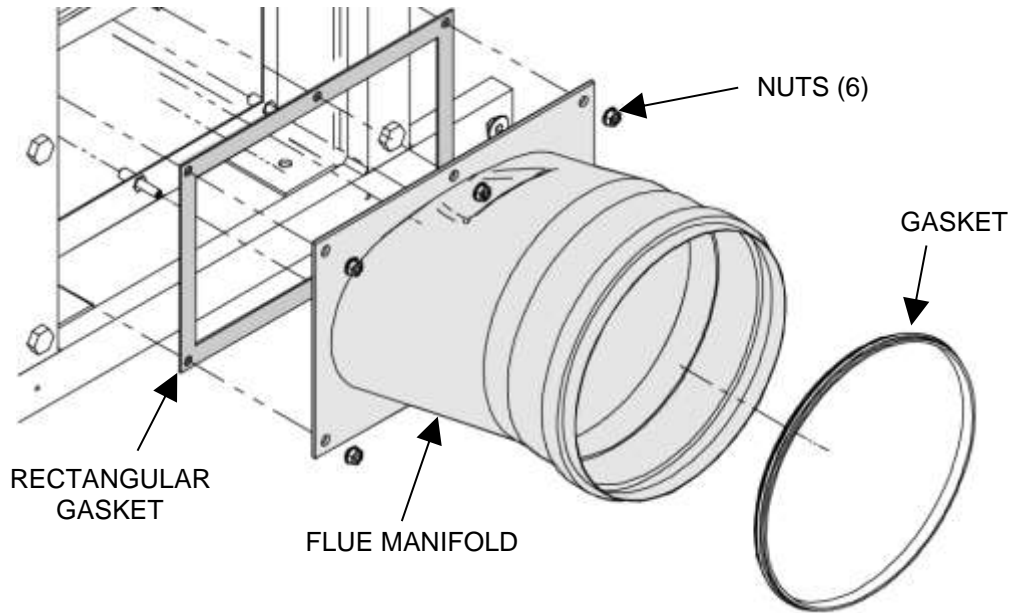
**NOTE:** Use silicone to lubricate the internal surface of the seals before assembling.



**Figure 4-19: MODULEX EXT Air Intake Connection**

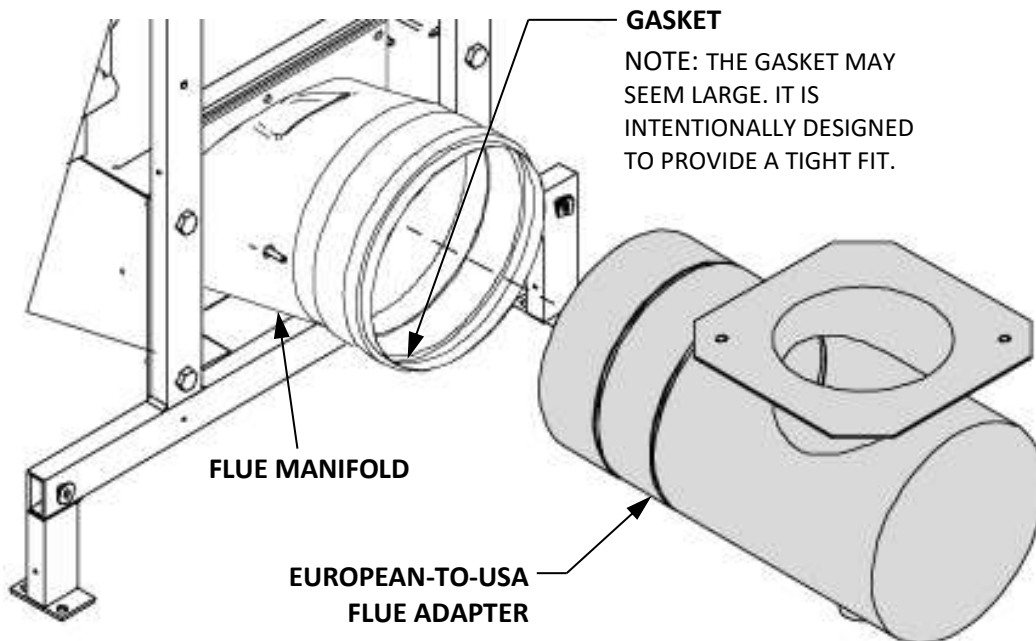
## 4.20 Flue Manifold Connection

To assemble the flue manifold to the boiler flue exhaust opening, retrieve the six (6) nuts and washers from the plastic bag, shipped with the boiler, and affix to the boiler opening per Figure 4-22. The Manifold may be installed on the left, front, or rear. If switching to left or rear positions, the unused outlet should be covered with the plate and gasket removed from outlet being used.



**Figure 4-20: Connection of Flue Manifold to Boiler Exhaust Opening**

For venting systems in the USA, it is necessary to assemble the included European-to-American adaptor to the flue manifold as shown below.



**Figure 4-21: Assembly of European-to-American Flue Adaptor to Flue Manifold**

## 4.21 Flue Exhaust Piping To Vent

In a condensing boiler, the flue exhaust is evacuated at a very low temperature (maximum of about 183°F - 84°C). Thus, it is necessary that the chimney be impermeable to the condensate of the combustion products and is made of corrosion resistant materials.

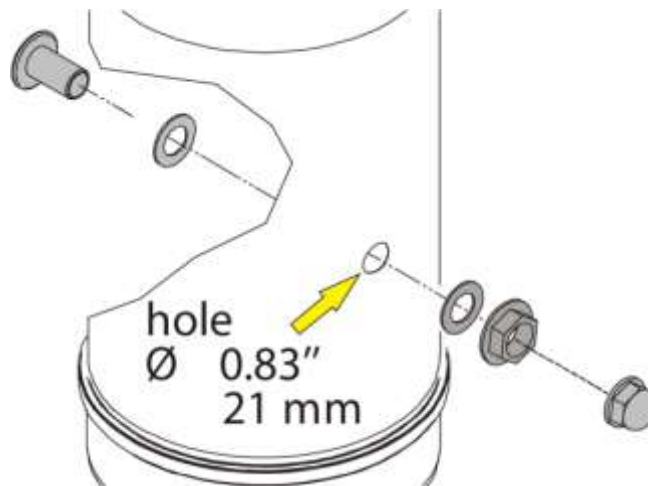
The different joints must be well sealed and equipped with suitable gaskets in order to prevent the escape of condensate and prevent the ingress of air.

To determine the proper cross section and height dimensions of the flue exhaust piping, it is necessary to make reference to national and local rules.

In order to prevent the formation of ice during the operation, the temperature of the internal wall of the flue exhaust system should not be below 32 °F (0 °C) throughout its length.

For efficient venting of the combustion exhaust and to address condensation due to lower external temperatures, ensure that combustion condensation is discharged into the boiler condensate tray or into another separate collection pan according to the installation.

A test nipple, for measuring combustion gases, should be installed onto the first three feet of the exhaust manifold flue. To do this, a hole with a diameter of 0.83" is drilled in a convenient location for testing and the test nipple hardware assembled to the flue pipe, as shown in Figure 4-22.



**Figure 4-22: Installation of Test Nipple into Flue Manifold Piping**

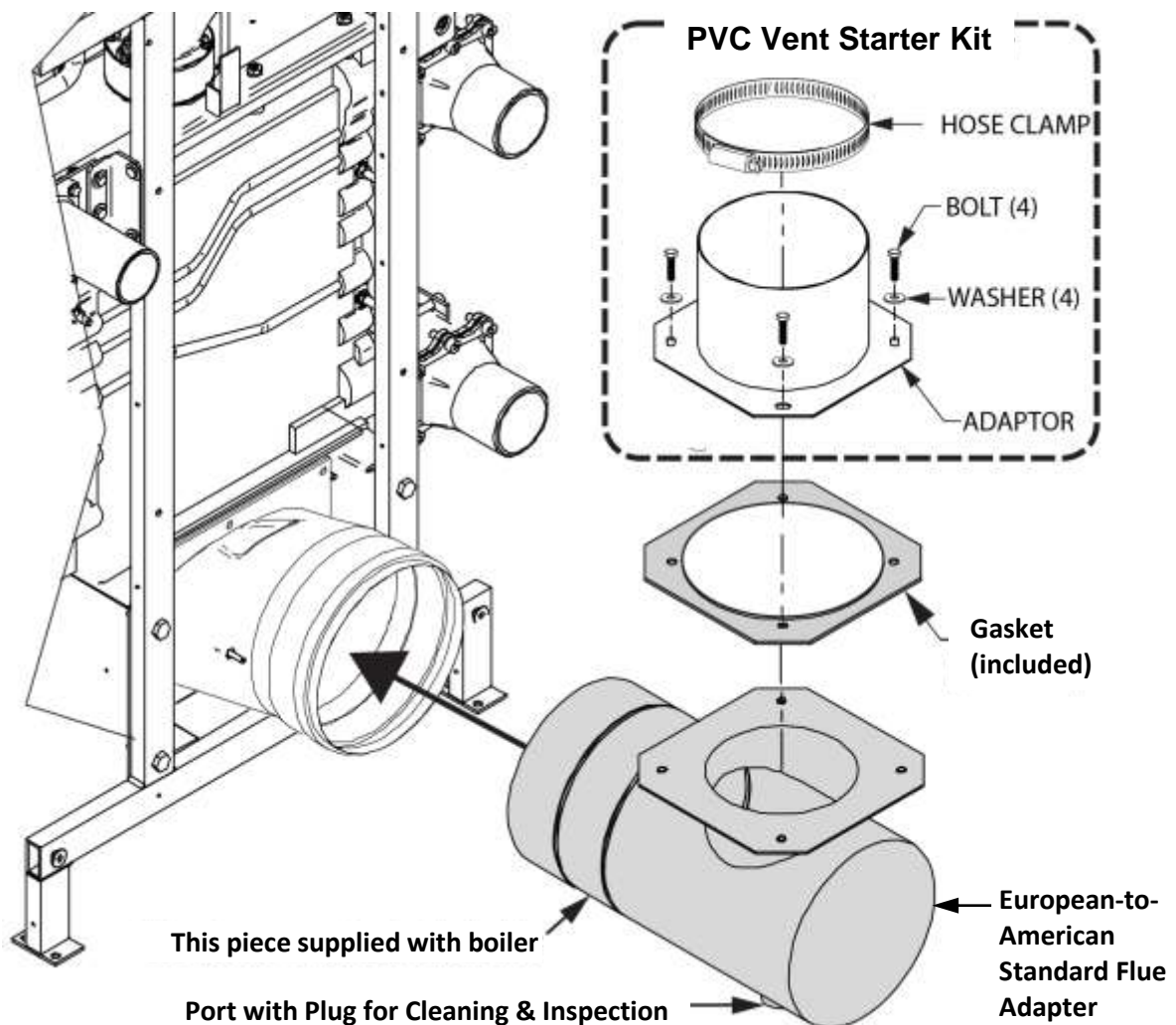
### CAUTION!

Damage caused by mistakes in installation, failure to complete the instructions as written, or the improper use of the flue system are not the responsibility of the supplier.

## 4.22 Vent Starter Pieces

The table below lists the vent starter pieces. PVC starter pieces are included with every unit. For stainless steel and polypropylene vent starter pieces, see the table below for availability and sourcing information.

Starter Pieces			
Boiler Model	Diameter	Material	Kit Part Number
EXT 450 2S	4" Diameter	Stainless Steel	Contact vent supplier directly
		Polypropylene	P/N 39006-1 (for Duravent PolyPro. For other brands, contact manufacturer directly.
		PVC	P/N 49051 (included)
EXT 600-1100 2S	6" Diameter	Stainless Steel	Contact vent manufacturer directly
		Polypropylene	P/N 39006-2 (for Duravent PolyPro. For other brands, contact manufacturer directly.
		PVC	P/N 49050 (included)



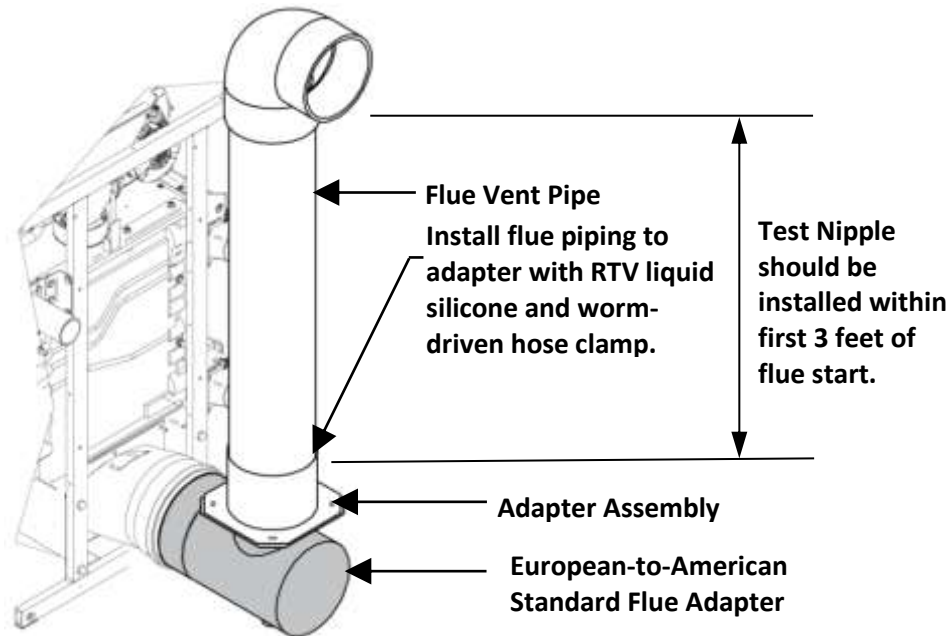
**Figure 4-23: Flue Exhaust Diameter Reduction Adaptor Kit and Parts**

The flue venting pipe is affixed to the adapter using high temperature RTV and then clamped with a worm-driven Hose Clamp.

When using non-metallic (plastic) venting materials, use Schedule 40 or thicker Single-wall, uninsulated pipes. When using non-metallic (plastic) vent systems for Canadian installations, per CSA B149.1, use vent systems that are certified to the standard for Type BH Gas Venting Systems, ULC-S636.

The plastic components, primers and glues of the certified vent system must be from a single system manufacturer and not mixed with other manufacturer's vent system parts.

The Inspection Port should be plugged with an appropriate plug (not included).



**Figure 4-24: Installed Flue Exhaust**

## 4.23 Combustion Air and Ventilation Openings

Provisions for combustion and ventilation air must be in accordance with **section 5.3, Air for Combustion and Ventilation** of the **National Flue Gas Code, ANSI Z223.1/NFPA 54.**, or **Sections 7.2, 7.3 or 7.4 of CAN/CSA-B149.1-05**, installation codes, or local building codes.

### 4.23.1 Insufficient Ventilations and Combustion Air

**BOILER DAMAGE AND OPERATIONAL FAILURES** may occur due to insufficient or improper openings for combustion air and/or ventilation of the boiler room.

Provisions for combustion air and ventilation are always required, regardless of whether taken from the outside (sealed combustion) or inside (room air used as combustion air).

Insufficient ventilation of the boiler room can lead to high air temperatures. This can result in boiler damage. Note the following:

- Make sure that intake and exhaust openings are sufficiently sized, and no reduction or closure of any openings takes place.
- When a combustion air or ventilation problem is not resolved, do not operate the boiler.
- Please note these restrictions and its dangers to the operator of the boiler.

When one expects contaminated combustion air (near swimming pools, chemical cleaning operations, hair salons, etc.), sealed combustion operation is recommended.



**⚠ WARNING!**

**Fire danger due to flammable materials or liquids. Do not store flammable materials and liquids in the immediate vicinity of the boiler.**  
**See Section 4.6.2 for warnings and guidelines concerning materials and contaminants that should be avoided in the boiler room and near air inlets when operating the boiler.**

#### 4.23.2 Room Air Combustion

The boiler closet or room shall be provided with two permanent openings communicating directly with an additional room(s). The total input of all gas utilization equipment installed in the combined space shall be considered in making this determination. Each opening shall have a minimum free area of 1 square inch per 1,000 Btu per hour of total input rating of all gas utilization equipment in the confined space, but no less than 100 square inches. One opening shall commence within 12 inches (305 mm) of the top, and one opening shall commence within 12 inches (305 mm) of the bottom of the enclosure. The minimum dimension of air openings shall not be less than 4 inches (101.6 mm).

#### 4.23.3 Sealed Combustion

The boiler closet or room shall be provided with two permanent openings, one commencing within 12 inches (305 mm) from the top of the enclosure, and one commencing within 12 inches (305 mm) from the bottom of the enclosure. The openings shall communicate directly, or by ducts, with the outdoors or spaces (crawl or attic) that freely communicate with the outdoors. The minimum dimension of air openings shall be no less than 4 inches (101.6 mm).

- 1) Where directly communicating with the outdoors, each opening shall have a minimum free area of 1 square inch per 4,000 Btu/hr of total input rating of all equipment in the enclosure.
- 2) Where communicating with the outdoors through vertical ducts, each opening shall have a minimum free area of 1 square inch per 4,000 Btu/hr of total input rating of all equipment in the enclosure.
- 3) Where communicating with the outdoors through horizontal ducts, each opening shall have a minimum free area of 1 square inch per 2,000 Btu/hr of total input rating of all equipment in the enclosure.
- 4) Where ducts are used, they shall be of the same cross-sectional area as the free area of the opening to which they connect.

#### 4.24 Installation Of The Exhaust And Air Intake System

**NOTE:** Consult local and state codes pertaining to special building code and fire department requirements. Adhere to national code requirements.

Observe the listed maximum lengths of vent system, which are dependent on boiler model. The maximum permissible lengths are listed in section 4.25, below.

Minimum clearance of 4 ft. (1.22m) horizontally from, and in no case above or below, unless a 4 ft (1.22 m) horizontal distance is maintained, from electric meters, gas meters, regulators and relief equipment.

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

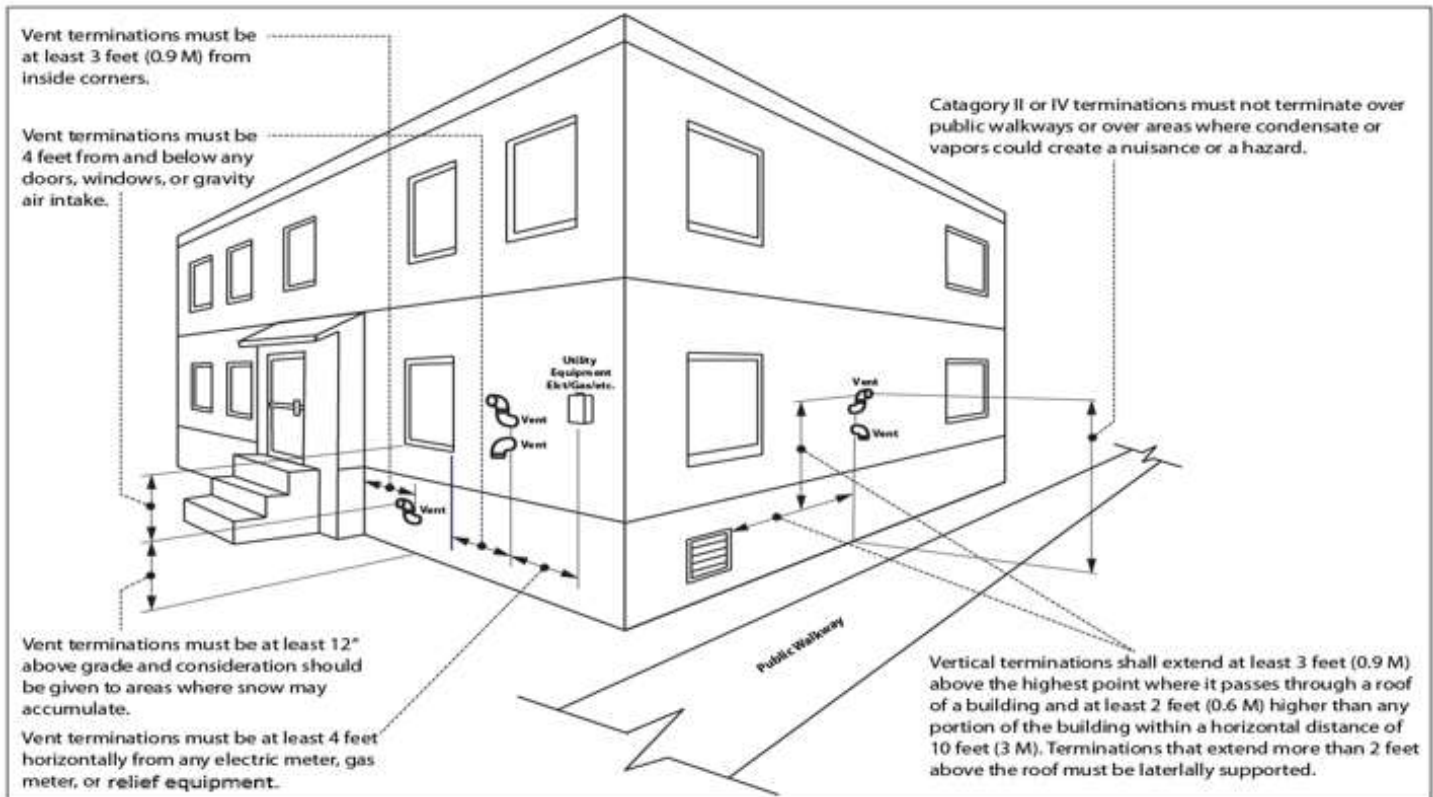
Do not extend exposed vent pipe outside the building beyond recommended distance. Condensate could freeze and block vent pipe.

Vent should terminate at least 3 ft (915 mm) away from adjacent walls, inside corners and 5 ft. (1525 mm) below roof overhang (see Figure 4-27).



It is not recommended to terminate vent above any door or window, as condensate can freeze causing ice formations.

Do not use a chimney as a raceway if another boiler or fireplace is vented into or through the chimney.



**Figure 4-25: Determining a Location for the Vent Outlet**

#### 4.24.1 Important Factors for Terminal Orientation and Location

Terminals should be positioned so as to avoid products of combustion from entering openings into the buildings or other vents.

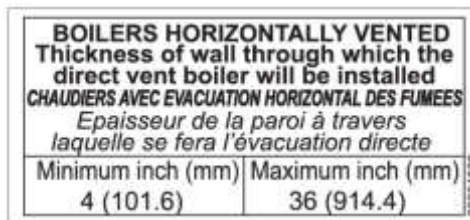
The terminal should be located where dispersal of combustion products is not impeded and with due regard for the damage or discoloration that might occur to building surfaces in the vicinity. In certain weather conditions condensation may also accumulate on the outside of the air inlet pipe. Such conditions must be considered and where necessary insulation of the inlet pipe may be required. In cold and/or humid weather water vapor may condense when leaving the vent terminal. The effect of such condensation must be considered. The terminal must be located in a place not likely to cause a nuisance.

Maintain 12" of clearance above the highest anticipated snow level or grade or whichever is greater. Please refer to your local codes for the snow level in your area.

The whole route of the vent system must be installed upwards and never completely nor partly downwards.

#### 4.24.2 Minimum and Maximum Wall Thickness

The label at right, which is placed on the unit, indicates the minimum and maximum wall thickness through which venting is allowed to penetrate *horizontally*. However, if venting is *vertical*, then there is no minimum wall thickness.



#### 4.25 Vent Pipe Sizing

The maximum length is the combined length of straight horizontal and vertical runs, and the equivalent straight length of fittings. The required lengths for each boiler are as follows:

**NOTE:** The examples referenced in the table below are on the next page.

**TABLE 4-4: Modulux EXT Vent and Piping Diameter Chart**

Model	No. of Modules	Vent Diameter Inches (Mm)	Max. Vent Equiv. Feet (M) Examples 1 & 2	Max. Vent Equiv. Feet (M) Examples 3 & 4
EXT 450 2S	3	4" (101 mm)	100 ft. (30 m)	6 + 6 (1.8 + 1.8)
EXT 600 2S	4	6" (101 mm)	100 ft. (30 m)	6 + 6 (1.8 + 1.8)
EXT 800 2S	5	6" (152 mm)	100 ft. (30 m)	6 + 6 (1.8 + 1.8)
EXT 1100 2S	7	6" (152 mm)	100 ft. (30 m)	6 + 6 (1.8 + 1.8)

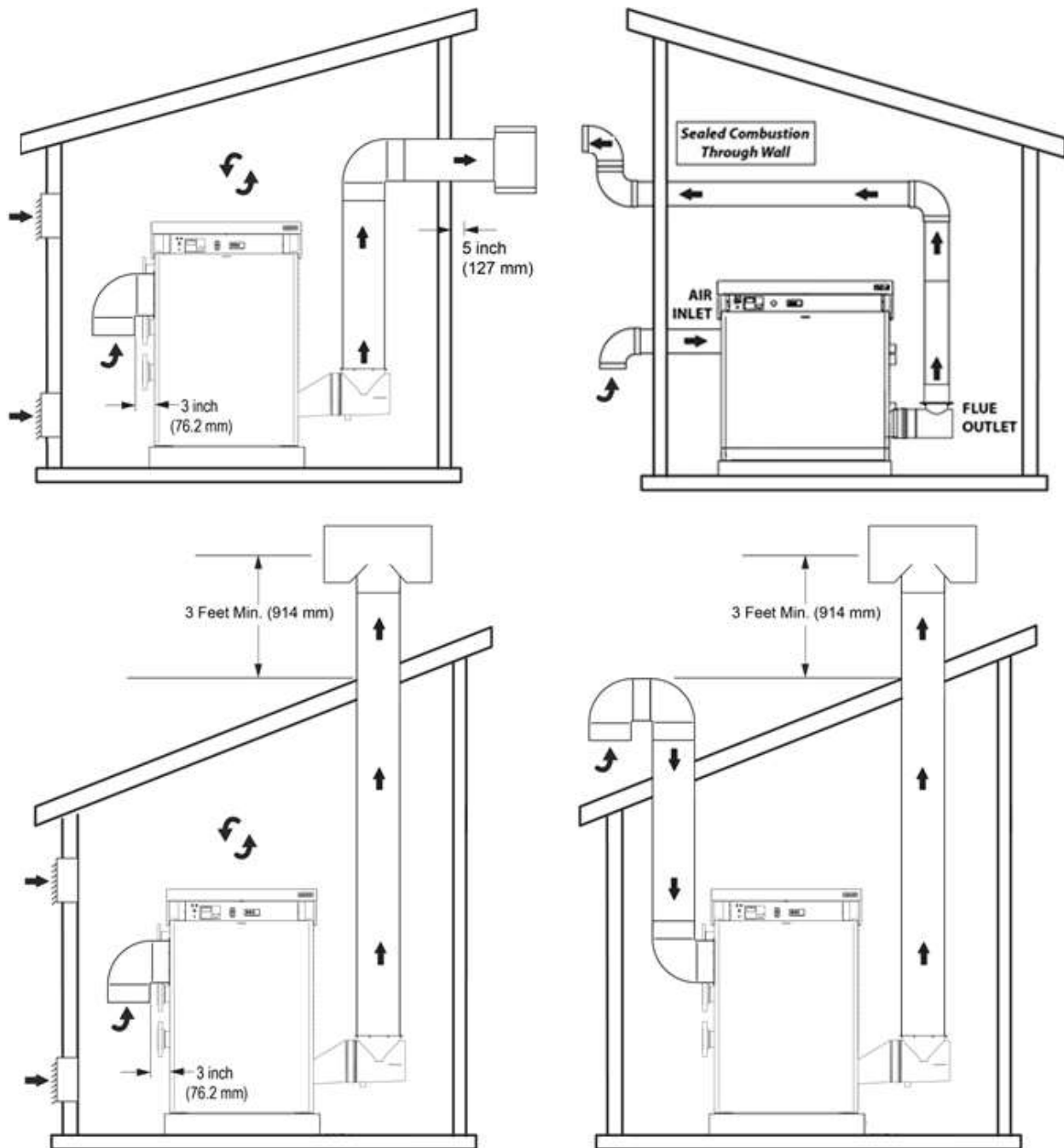
**TABLE 4-5: Modulux EXT Vent and Piping Length Chart**

Model	Vent Pipe Dia.	Sharp 90° Elbow Equivalent Feet (M)	Sweep 90° Elbow Equivalent Feet (M)	45° Elbow Equivalent Feet (M)	Maximum Length Equivalent Feet (Meters)
EXT 450 2S	4" (101 mm)	10 Feet (3 m)	5 Feet (1.5 m)	5 Feet (1.5 m)	100 Feet (30 m)
EXT 600 2S	6" (152 mm)	10 Feet (3 m)	5 Feet (1.5 m)	5 Feet (1.5 m)	100 Feet (30 m)
EXT 800 2S					
EXT 1100 2S					

**NOTE:** maximum pressure drop of the combustion air piping is also 100 equivalent feet (30 m). The flue system must be installed in accordance with the local and national Standards.

**EXAMPLE 1:** A 40 foot (12.2 m) length of vent pipe and 1 sharp 90° elbow add up to 40 ft. + 10 ft. = 50 equivalent ft. (17.4 m).

**EXAMPLE 2:** A 30 foot (10.4 m) length of vent pipe and 2 sharp 90° elbows add up to 30 ft. + (2 x 10 ft.) = 50 equivalent ft. (17.4 m).



**Figure 4-26: Modulux EXT Allowable Venting Solutions**

## 4.26 Electrical Connections

### 4.26.1 Regulations in Force

The electrical connections to the boiler must be made in accordance with all applicable local codes and the latest revision of the National Electrical Code, **ANSI/NFPA-70**.

Installations in Canada should also conform with **CSA C22.1** Canadian Electrical Code Part 1.

#### **⚠ WARNING!**

- The boiler must be electrically grounded in accordance with local codes or the National Electrical Code, ANSI/NFPA 70 and/or the CSA C22.1, Electrical Code.
- NEVER use Domestic Hot Water and C/H system pipes for electrical grounding.
- Ensure that the above safety electrical requirements are instituted. If in doubt, ask a professionally qualified technician to check the appliance's electrical system.
- AERCO accepts no responsibility for damage arising from failure to ground the boiler.
- A qualified technician must verify that the electrical system is adequate to satisfy the appliance's maximum power requirements, indicated on the data plate, verifying in particular that the cables are suitable for the appliance's maximum power use.

#### **CAUTION!**

For general electrical supply, the use of adaptors, multiple sockets, and/or extension cords is strictly forbidden. The use of any power supply equipment implies the observance of fundamental rules, such as:  
Do not touch the appliance with any wet part of your body and/or while barefooted.  
Do not pull the supply cables.  
Do not expose boiler to sunlight, rain, etc., unless prepared and installed for such use.  
Do not permit children or inexperienced people to use the appliance.

### 4.26.2 Mains Electrical Supply Connection (120 V – 60 Hz)

Mains electrical requirements call for a 120V, 60 Hz power source. The electric power connections to the junction box of the boiler are shown in Figure 4-30.

The power supply to the boiler, 120 VAC - 60 Hz single phase, must be made in the JUNCTION BOX of the boiler, with three core cable H05VV-F (PHASE - NEUTRAL - EARTH) according to the polarity of the phase and neutral power supply, with phase and neutral terminals indicated on the plug.

It is necessary to fit a double pole switch on the electrical supply line, having a contact separation in both poles, in an easily accessible position in order to provide a means to remove power from the unit during servicing.

#### **⚡ ELECTRICAL HAZARD WARNING! ⚡**

- Danger of fatal accident due to electric shock! 120 VAC connections may be present on the external connection board when power is supplied to the boiler.
- The electrical connections must be carried out only by a qualified engineer. Before carrying out the connections or any other operation on the electrical parts, always switch off and disconnect the electricity supply and ensure that it cannot be accidentally turned on.

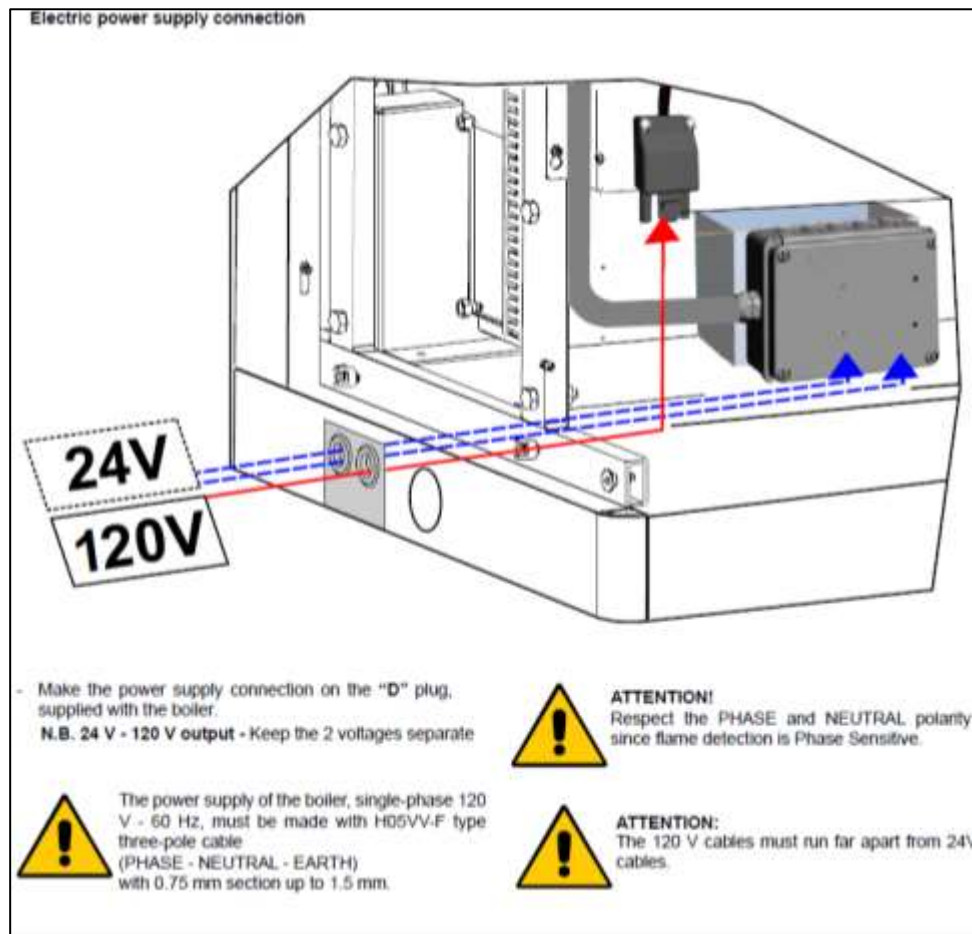
### 4.26.3 Service Relay Requirement

Upstream of the electrical connection, a service relay is required (not supplied) which, when the additional electrical safety devices (if any) intervene, shuts down the electrical supply to the on-off fuel valve fitted on the gas supply circuit, but not to the boiler so as to guarantee the running of the pump and permit the boiler to cool down

### 4.26.4 Electrical Requirements

- No changes may be made to the wiring of the boiler.
- All connections should be designed in accordance with the applicable regulations.
- Label all wires prior to disconnection when servicing controls. Wiring errors can cause improper and dangerous operation.
- Verify proper operation after operation servicing.

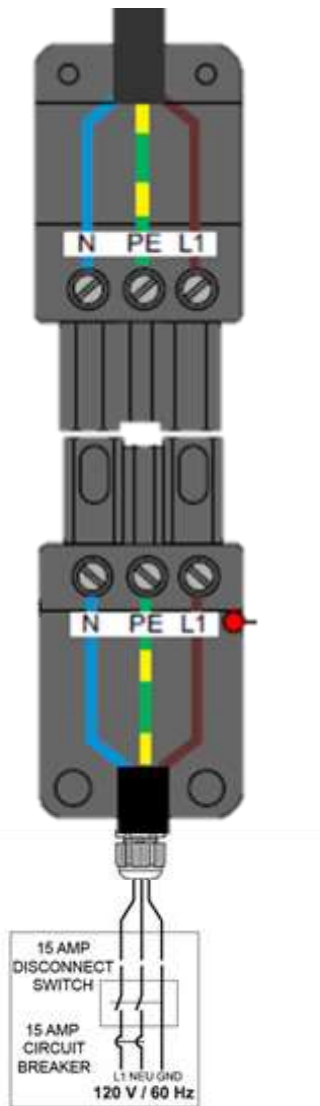
**NOTE:** Verify proper operation of the boiler after all servicing operations.



**Figure 4-27: 120VAC Power Wiring for Main Electrical Junction Box and Signal Wiring for Ufly Controller and Boiler Control Module (BCM)**

**⚠ WARNING!**

120 VAC cables shall be separated from 24VAC and signal wires, using the two plastic conduits supplied within the boiler casing LEFT-HAND side panel.



**NOTE:**

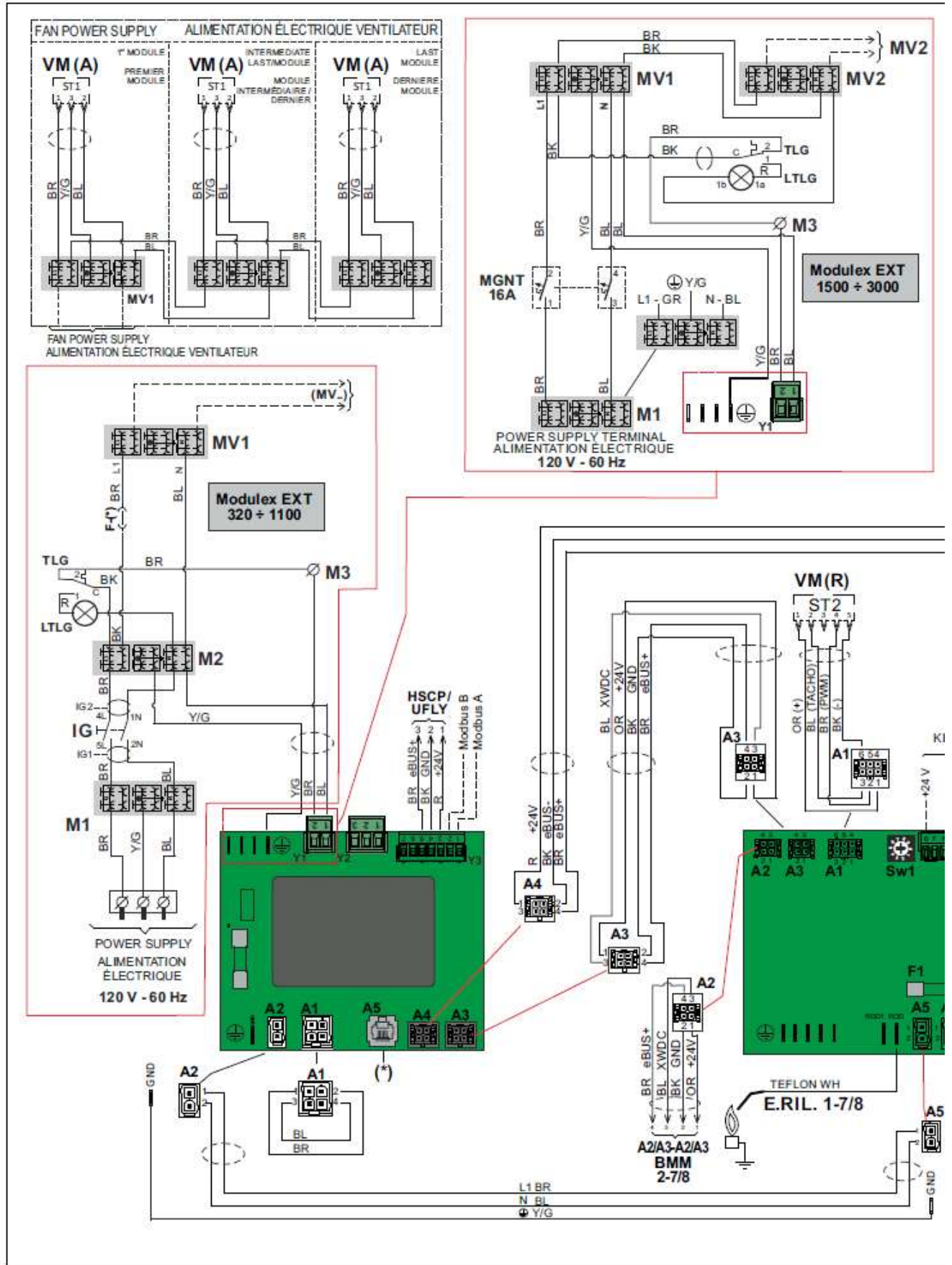
Use the following disconnect switch and circuit breaker size:

- Models MLX EXT 450 2S - 1100 2S: 15 AMP
- Models MLX EXT 1500 2S - 3000 2S: 30 AMP

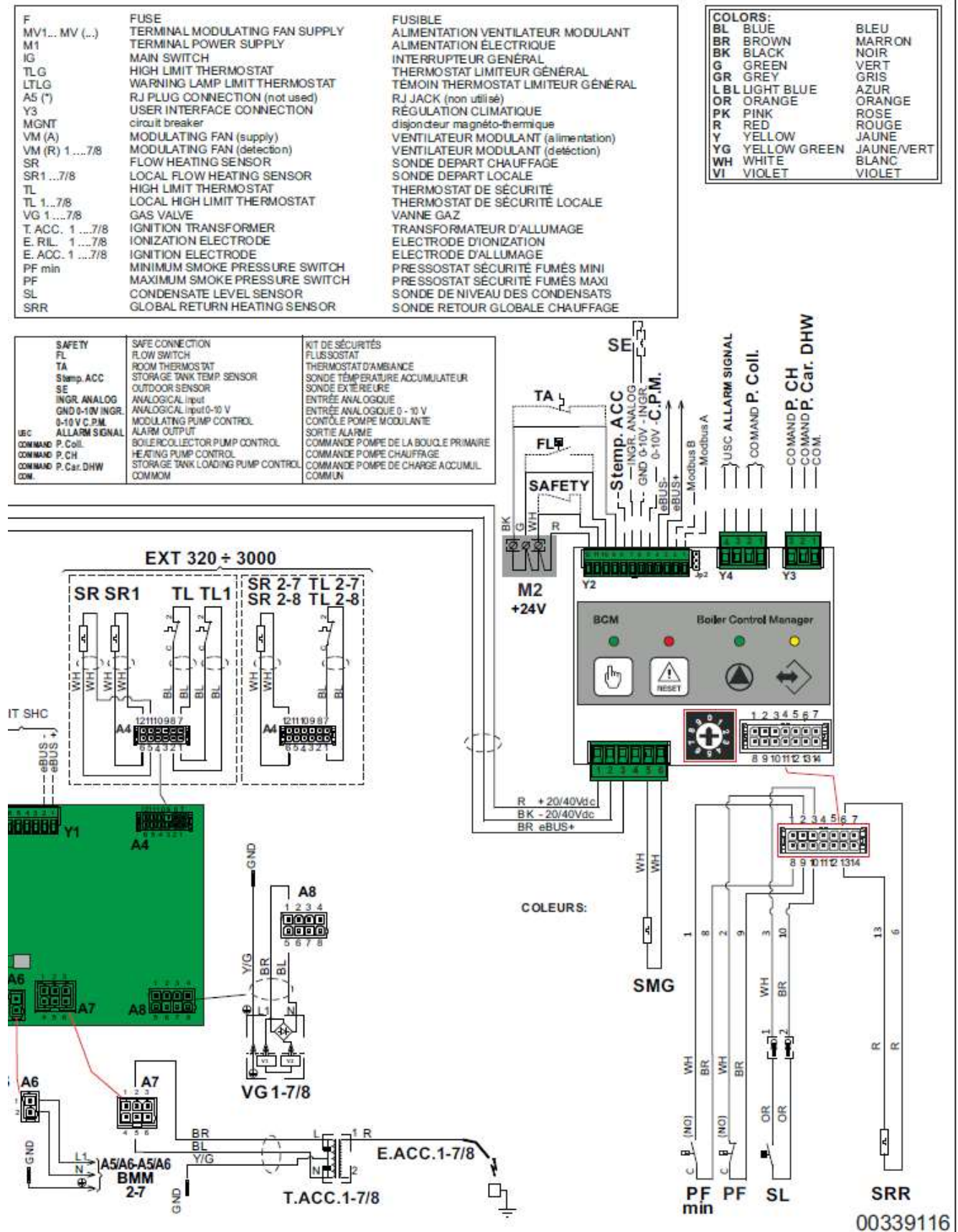
**Figure 4-28: Main Power Junction Box Location and 120VAC Wiring**



**4.27 FUNCTIONAL WIRING DIAGRAM Page 1**



## 4.28 FUNCTIONAL WIRING DIAGRAM Page 2



## 4.29 Ladder Diagrams

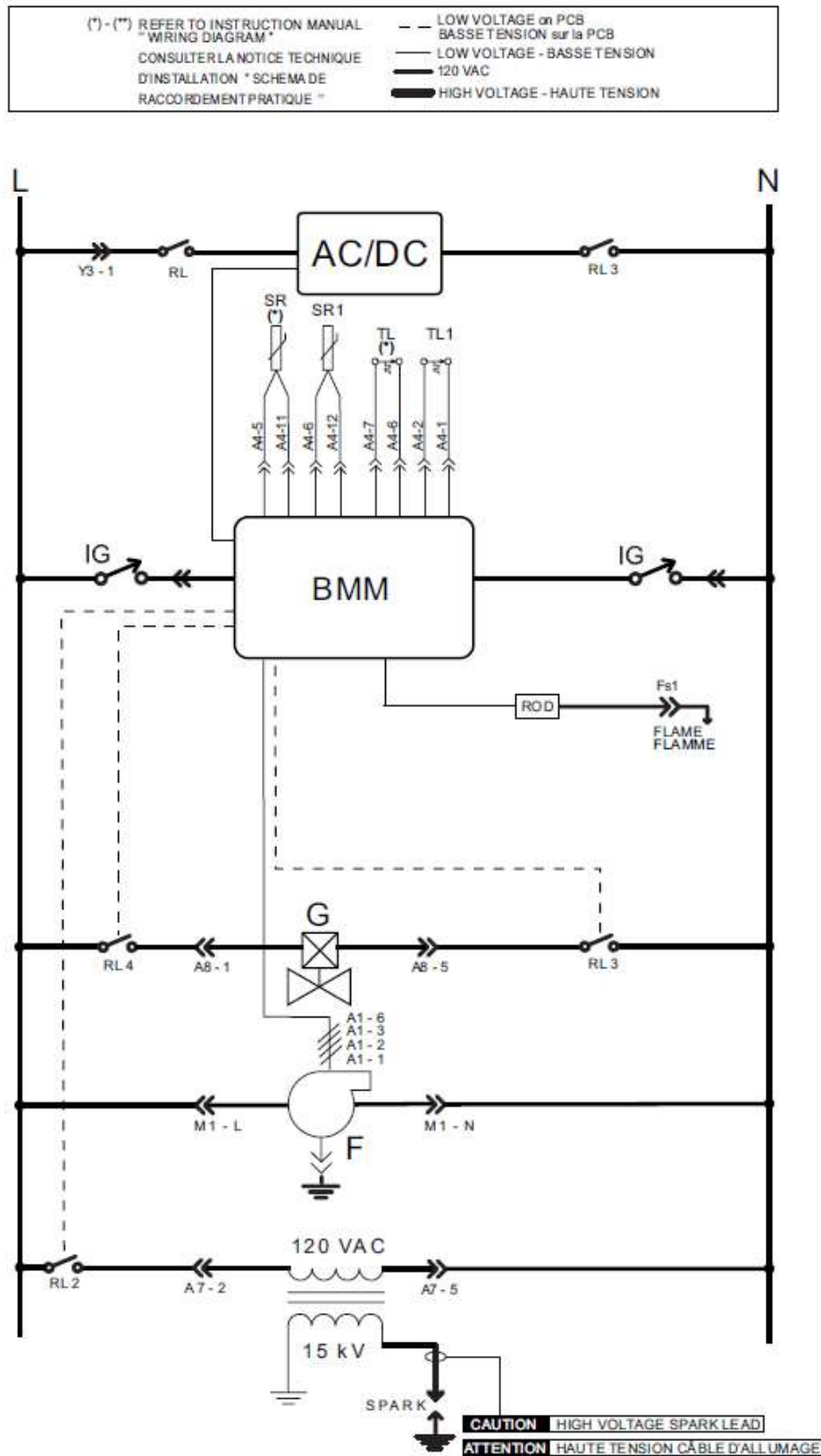


Figure 4-29: Module Ladder Diagram

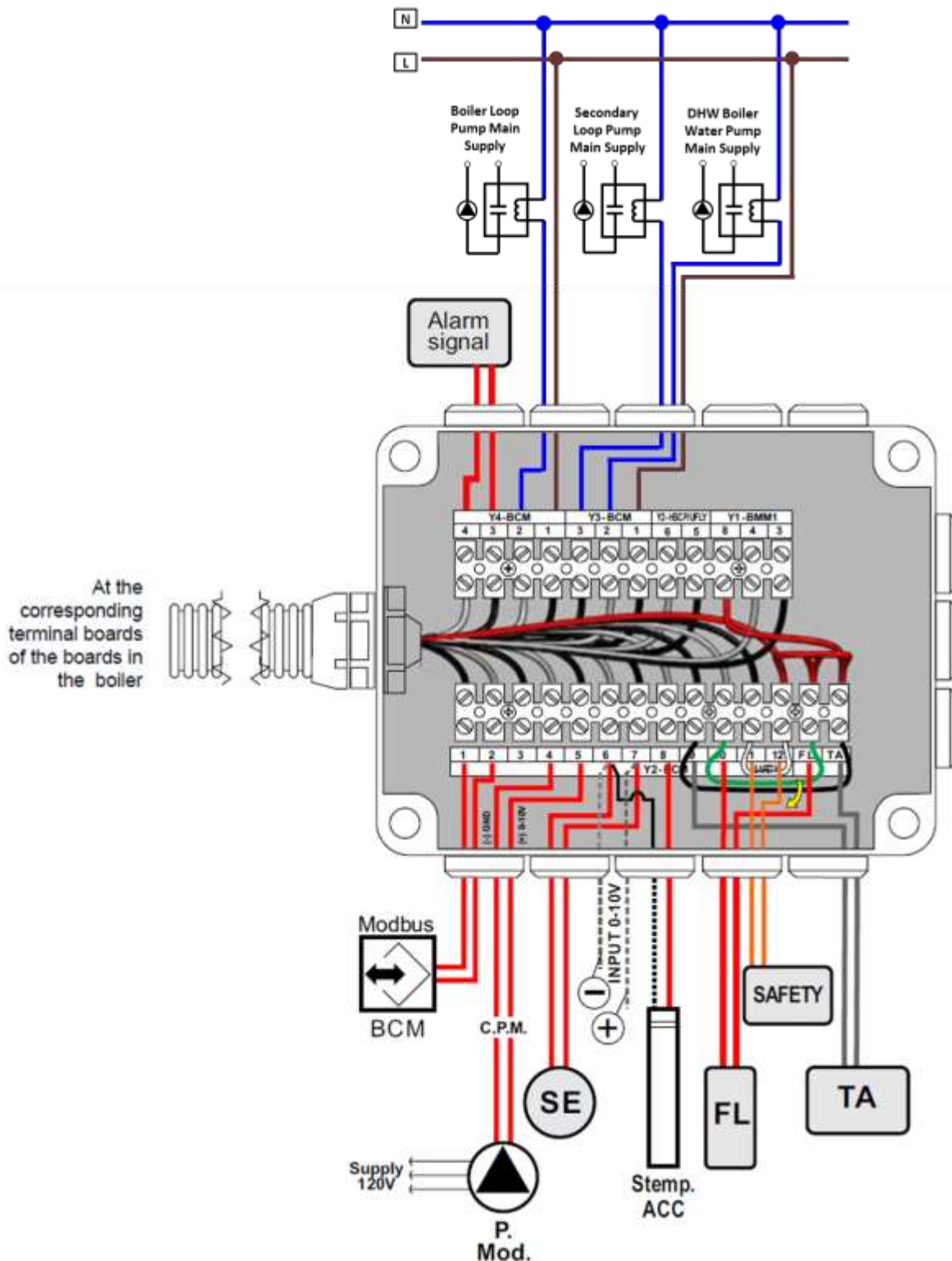
### 4.30 General Ladder Diagram





### 4.31 Input/Output Box Terminal Assignments

Heating system components such as pump, outside air sensor and flow switch must be connected to the Input/Output box. Alarm contact, analog control input (0--10V) and Modbus communication are also connected to the Input/Output box. See figure 4-32 for terminal block assignments.



**Figure 4-31: Ufly Controller Terminal Assignments**

Connections for:		
	Y2 BCM	
Modbus BCM		
A	2	Remote boiler control
B	1	A (-) Data connection B (+) Data connection
P. mod	4 - 5	Modulating heating pump
SE	6 - 7	External sensor
- / +	6 - 7	0 / 10 V signal contact
Stemp ACC (*)	6 - 8	Storage Tank Temperature Sensor
FL	FL - 10	Flow switch (remove jumper)
INAIL	11-12	Safety devices (remove jumper)
TA	TA - 9	Room thermostat / Clock remove jumper

	Y4 - BCM	
Alarm signal (**)	3 - 4	Alarm / signal contact (NO potential-free contact)
P. Coll.	1 - 2	Manifold pump (primary loop)
	Y3 - BCM	
P. CH	1 - 3	Heating circuit pump
P. Car DHW	1 - 2	Storage Tank loading Pump
	Y2 - UFLY	
Modbus Ufly		
A	5	Remote Temperature Control A (5) Data connection
B	6	B (6) Data connection
	Y1 BMM1	
SHC (***)	8 - 4 - 3	Optional multifunction module (to be inserted in the box cover)

**Figure 4-32: Sensor and BCM Terminal Assignments**

### 4.32 Starting Up: Filling And De-Aerating The Boiler

Carry out the following tasks in connection with maintenance, etc. to an already installed unit:

- Shut down all programs
- Close the gas shutoff valve upstream from the boiler
- Shut off the power at the main power switch
- Close the C/H service valves (supply and return)

#### 4.32.1 Necessary Precautions for Safety

Observe the following rules of safety:

- All work on the unit must take place in a dry environment.
- AERCO units should never be in operation without their cover panels, except in connection with maintenance or adjustments.
- Never allow electrical or electronic components to come into contact with water.

#### 4.32.2 Supply Voltage, Gas Pressure, and Water pressure

The unit must be able to function during maintenance procedures or when adjustments are performed. For this reason, the unit's supply voltage, gas pressure and water pressure must be maintained and available during these activities.

#### ⚠ WARNING!

Following maintenance or other activities, always check the integrity of all parts through which gas flows with a bubble test using soap spray to ensure there are no gas leaks.



## 4.33 Filling The System

### 4.33.1 Necessary Precautions While Filling the System

Do not mix the C/H system's water with anti-freeze or anti-corrosion solutions using incorrect concentrations! Doing so can cause damage to the gaskets and might cause noise during normal boiler operation.

**⚠ WARNING!**

**AERCO is not liable for injury to any persons, animals or damage to property as a result of disregarding the above recommendations.**

Before filling the heating system, the complete system, including all zones, must be thoroughly cleaned and flushed to remove sediment.

Flush until clean water runs free of sediment. AERCO suggests using an approved system cleaner to flush the system, but not the boiler. Always use AERCO approved antifreezes. See the list in Section 2.8.3, Water Quality Requirements.

Never use reverse osmosis, deionized, distilled water or mineral treated water for filling the heating system.

**⚠ WARNING!**

**Do not use petroleum-based cleaning or sealing compounds in the boiler system. Damage to seals and gaskets could occur, resulting in substantial property damage and/or danger.**

The central heating installation needs to be filled with clean water. Use only clean water or approved glycol for filling the heating system.

When the water hardness of the filling water exceeds 9 grains per gallon (gpg), the water must be treated until below the maximum value of 9 gpg.

The pH value of the installation water must be between 6.5 and 8.0. Check the pH value using proper equipment or by having the water analyzed by a water treatment company.

If pH differs from above, contact AERCO engineering for further assistance.

**⚠ WARNING!**

**Failure to adhere to the water quality requirements will result in a voidance of warranty.**

### 4.33.2 Filling Locations and Preparation

- For filling the system, a filling tap must be inserted on the system return pipe.
- Filling can also be accomplished through the draining tap on the boiler return manifold.
- In both cases, an approved hydraulic disconnection system must be fitted.
- Before connecting the boiler, carefully rinse out the whole system with running water.

## FOR YOUR SAFETY READ BEFORE OPERATING

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

- A. This appliance does not have a pilot light. It is equipped with an ignition device, which automatically lights the burner. Do NOT try to light the burner by hand.
- B. BEFORE OPERATING smell all around the appliance area for gas. Be sure to smell next to the floor, as some gas is heavier than air and will settle on the floor.
- C. Use only your hand to turn the gas ball-valve knob. Never use tools. If the knob will not turn by hand, do NOT try to repair it, but rather call a qualified service technician. Force or attempted repair may result in a fire or explosion.
- D. Do not use this appliance if any part has been submerged under water. Immediately call a qualified service technician to inspect the appliance and to replace any part of the control system and any gas control device that has been submerged under water.

### WHAT TO DO IF YOU SMELL GAS:

- Do not try to light any appliance
- Do not touch or operate any electric switch
- Do not use any phone in the building
- Immediately call your gas supplier from a neighbor's phone or from outside with your cell phone and follow the gas supplier's instructions.

## OPERATING INSTRUCTIONS

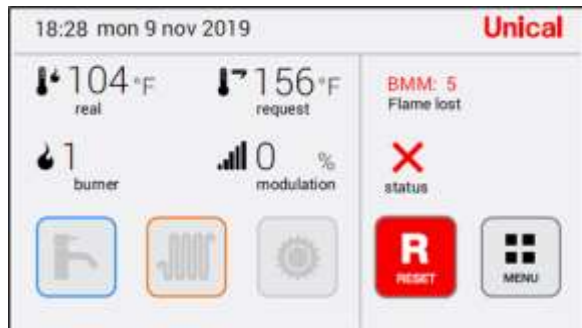
1. **STOP! Read the safety information above on this warning.**
2. Turn off all electric power to the appliance.
3. Open the gas valve.
4. Check gas and water pressure.
5. Wait five (5) minutes to clear out any gas, then smell for gas, including near the floor.
6. If you smell gas, STOP! Follow the instructions "WHAT TO DO IF YOU SMELL GAS" that are printed above in these warnings. If you do not smell gas, go to the next step.
7. Turn on all electric power to the appliance.
8. Turn the start-up switch (next to the Ufly controller) to the ON position. Replace the control access panel.
9. Set Thermostat to the desired temperature.
10. If the appliance will not operate, follow instructions to turn off the gas (see below), and then call your service technician or gas supplier.

## TO TURN OFF GAS TO APPLIANCE

1. Set the thermostat to its lowest setting.
2. Turn off all electric power to the appliance if service is to be performed.
3. Close the gas valve.

#### 4.34 Testing The Ignition Safety Shut Off Device

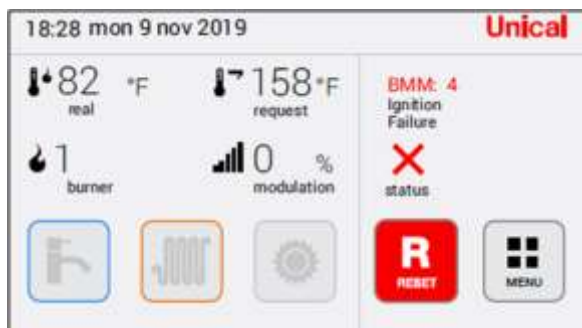
1. Power on by switching on the ON-OFF switch.
2. Create a request in C/H Central Heating.
3. Turn burners ON.



4. Disconnect the plug and socket connection of the ionization cable (WHITE) of BURNER 1.
5. The display will show ERROR CODE 05.



6. Press Reset Button.



7. The boiler will retry ignition cycle and the display shows ERROR CODE 04: Ignition Failure.
8. Connect the plug socket connection of the ionization cable.
9. Press Reset Button and check that the boiler starts correctly.

**⚠ WARNING!**

**Do not touch inside of ignition cable while disconnected during start-up of the boiler.**

## 4.35 Burner Calibration

**⚠ WARNING!**

**These instructions are for qualified AERCO service technicians or installers only.**

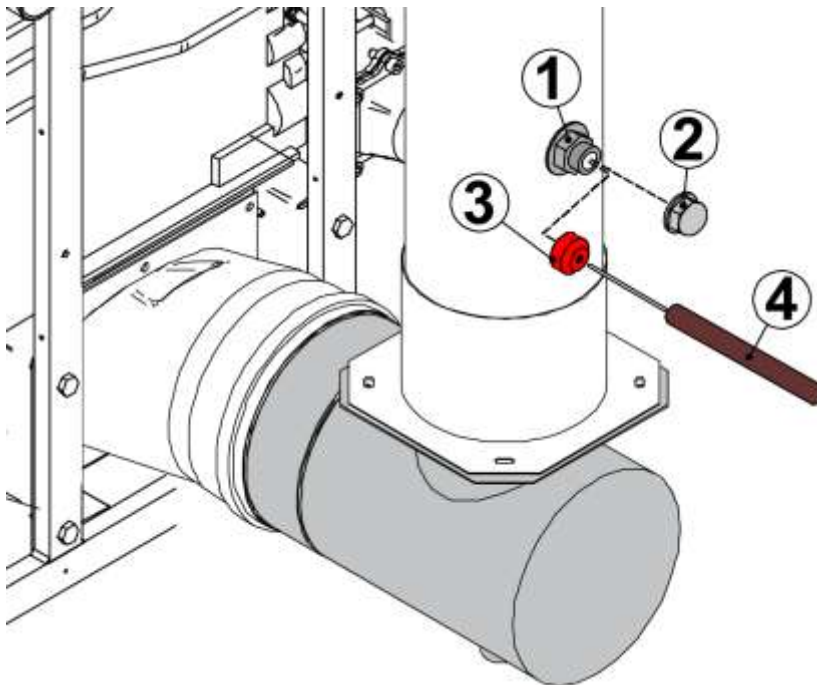
All boilers come pre-calibrated and tested. However, if it is necessary to change the calibration due to gas conversion or adaptation to the main supply system, the gas valve must be re-calibrated (using **Service Mode** in the Burner Menu of the Ufly Controller, see section 6.5).

### 4.35.1 Installing the Gas Analyzer Probe

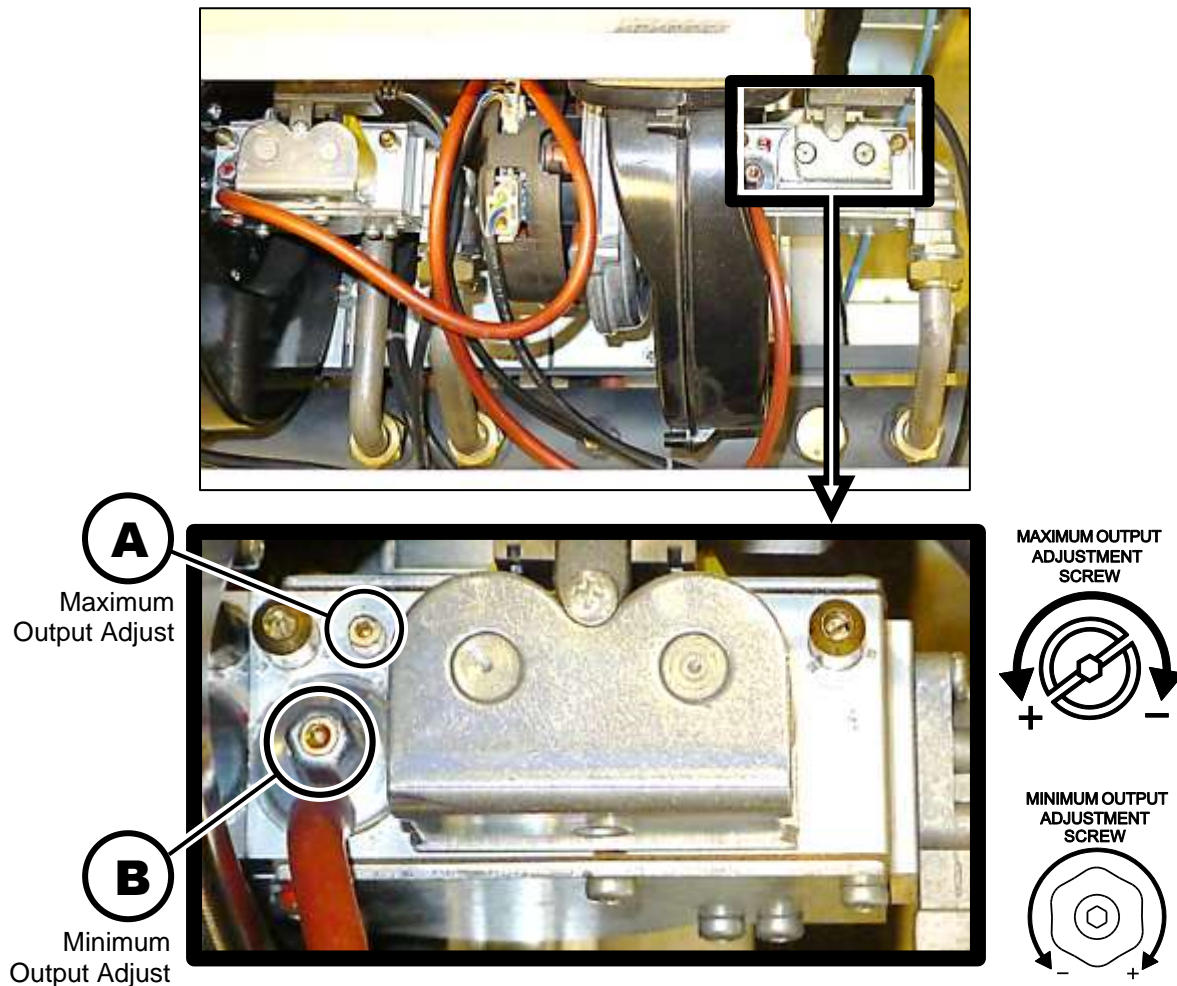
Before adjusting, a gas analyzer sensor probe must first be installed into the flue exhaust outlet as shown in Figure 4-37.

#### Installing the Gas Analyzer Probe into Flue Outlet:

1. Remove the cap (#2) from the gas outlet (#1)
2. Install the probe adapter (#3) into the gas outlet (#1) where cap was removed.
3. Insert the analysis probe (#4) into hole of the probe adaptor.
4. After measurements are taken and adjustments made, remove the probe, probe adaptor, then reinstall the cap (#2) onto the gas outlet (#1).



**Figure 4-33: Gas Analyzer Probe Location in Flue Outlet**



**Figure 4-34: Location of Minimum and Maximum Adjustments (Top View)**

#### 4.35.2 Maximum Output Calibration

After installing the gas analyzer probe (Figure 4-33), refer to Figure 4-38 to locate the gas valves and the Maximum Gas Adjustment screw (A) on each valve. Follow the instructions below to set the maximum gas output level for each valve.

##### Adjusting the Maximum (A) Gas Output Setting:

1. Remove the cap of the combustion gases sampling point (Figure 4-33) and connect a suitable gas analyzer.
2. Operate the burner to a minimum power following the procedure described in Section 4.35 “Service Mode” function (MANUAL BOILER FIRING RATE REQUEST: 100%).
3. Check that the CO<sub>2</sub> values are within the values indicated in Table 4-6.
4. If necessary, correct the value by turning the adjustment screw “A” in a CLOCKWISE direction to decrease the value or ANTICLOCKWISE to increase the value.
5. Repeat the adjustment for all gas valves in the boiler.



### 4.35.3 Minimum Output Calibration

After setting the maximum gas output for each valve (section 4.34.2), refer to Figure 4-38, above, to locate the Minimum Gas Adjustment screw (B) on each valve. Follow the instructions below to set the minimum gas output level for each valve.

#### Adjusting the Minimum (B) Gas Output Setting:

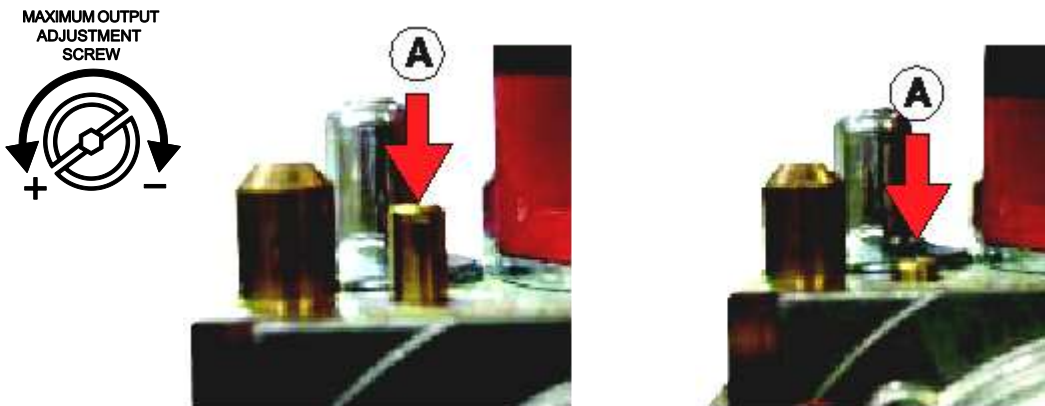
1. Operate the burner to a minimum power following the procedure described in section 4.35 “Service Mode” function (MANUAL BOILER FIRING RATE REQUEST: 10%).
2. Check that the CO<sub>2</sub> values are within the values indicated in Table 4-6.
3. If necessary, correct the value by turning the adjustment screw “B” in a CLOCKWISE direction to increase the value or ANTICLOCKWISE to decrease it the value.
4. Repeat the adjustment for all gas valves in the boiler.

**NOTE:** If CO<sub>2</sub> percentage is too low check air and exhaust flue for obstruction. If not obstructed, check if the burner and/or the exchanger (aluminum sections) are properly cleaned. After confirmation, check the maximum gas settings again, as described in section 4.34.2, above.

### 4.35.4 Final Check and Ignition Failure Adjustment Procedure

After completing the Minimum and Maximum output adjustments, check the CO<sub>2</sub> minimum and maximum values at the flue outlet and, if necessary, make any required adjustments.

If the boiler fails to ignite, perform the following procedure:



**Figure 4-35: Maximum Output Adjustment Screw**

1. Tighten the maximum adjustment screw “A” in a clockwise direction until it is fully abutted into the gas valve body, then slacken back out for nine (9) turns.
2. Verify boiler ignition.
3. If the boiler goes into lockout, slacken the screw “A” again for one turn, then retry ignition.
4. If the boiler goes into lockout again, repeat step 3 and retry ignition.
5. Once ignition succeeds, carry out the minimum and maximum gas output burner adjustments as previously described in sections 4.34.2 and 4.34.3, above.



**TABLE 4-6: Modulux EXT Pressure, CO<sub>2</sub> and O<sub>2</sub> Level Calibration Tables**

EXT 450 2S												
Gas Type	Supply Pressure Wc (kPa)	CO <sub>2</sub> Level (%)		O <sub>2</sub> Level (%)		Fan Speed		Ø Mixer Injectors Ø in. (mm)	Gas Consumption ft <sup>3</sup> /hr (m <sup>3</sup> /hr)		Start Output	V max fun
		Min. Output	Max. Output	Min. Output	Max. Output	Min. (FL)	Max. (FH)		Minimum	Maximum		
NOMINAL ALTITUDE												
Natural	7.0 (1.74)	8.9	9.0	5.1	5.0	34	100	0.27 (7)	46 (1.29)	474 (13.43)	55	90
Propane	11.0 (2.74)	10.8	10.8	4.5	4.5	35	100	0.27 (7)	18 (0.5)	183 (5.19)	55	83
HIGH ALTITUDE												
Natural	7.0 (1.74)	8.9	9.0	5.0	5.1	34	100	0.27 (7)	46 (1.29)	427 (12.08)	50	77
Propane	11.0 (2.74)	10.8	10.8	4.5	4.5	35	100	0.27 (7)	18 (0.5)	165 (4.67)	50	73

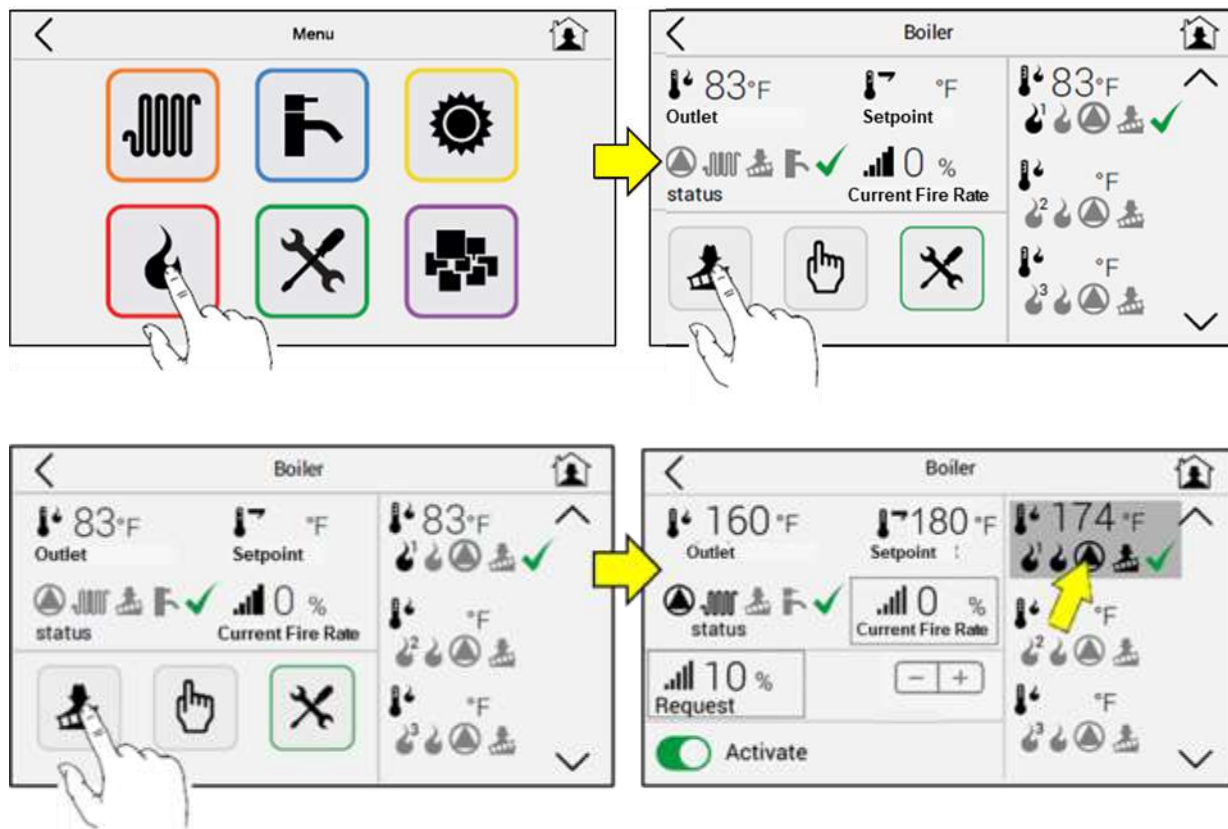
EXT 600 2S												
Gas Type	Supply Pressure Wc (kPa)	CO <sub>2</sub> Level (%)		O <sub>2</sub> Level (%)		Fan Speed		Ø Mixer Injectors Ø in. (mm)	Gas Consumption ft <sup>3</sup> /hr (m <sup>3</sup> /hr)		Start Output	V max fun
		Min. Output	Max. Output	Min. Output	Max. Output	Min. (FL)	Max. (FH)		Minimum	Maximum		
NOMINAL ALTITUDE												
Natural	7.0 (1.74)	8.9	9.0	5.1	5.0	34	100	0.27 (7)	46 (1.29)	631 (17.87)	55	90
Propane	11.0 (2.74)	10.8	10.8	4.5	4.5	35	100	0.27 (7)	18 (0.5)	243 (6.88)	55	83
HIGH ALTITUDE												
Natural	7.0 (1.74)	8.9	9.0	5.0	5.1	34	100	0.27 (7)	46 (1.29)	569 (16.11)	50	77
Propane	11.0 (2.74)	10.8	10.8	4.5	4.5	35	100	0.27 (7)	18 (0.5)	220 (6.23)	50	73

EXT 800 2S												
Gas Type	Supply Pressure Wc (kPa)	CO <sub>2</sub> Level (%)		O <sub>2</sub> Level (%)		Fan Speed		Ø Mixer Injectors Ø in. (mm)	Gas Consumption ft <sup>3</sup> /hr (m <sup>3</sup> /hr)		Start Output	V max fun
		Min. Output	Max. Output	Min. Output	Max. Output	Min. (FL)	Max. (FH)		Minimum	Maximum		
NOMINAL ALTITUDE												
Natural	7.0 (1.74)	8.9	9.0	5.1	5.0	34	100	0.27 (7)	46 (1.29)	791 (22.39)	55	90
Propane	11.0 (2.74)	10.8	10.8	4.5	4.5	35	100	0.27 (7)	18 (0.5)	305 (8.65)	55	83
HIGH ALTITUDE												
Natural	7.0 (1.74)	8.9	9.0	5.0	5.1	34	100	0.27 (7)	46 (1.29)	712 (20.15)	50	77
Propane	11.0 (2.74)	10.8	10.8	4.5	4.5	35	100	0.27 (7)	18 (0.5)	275 (7.79)	50	73

EXT 1100 2S												
Gas Type	Supply Pressure Wc (kPa)	CO <sub>2</sub> Level (%)		O <sub>2</sub> Level (%)		Fan Speed		Ø Mixer Injectors Ø in. (mm)	Gas Consumption ft3/hr (m3/hr)		Start Output	V max fun
		Min. Output	Max. Output	Min. Output	Max. Output	Min. (FL)	Max. (FH)		Minimum	Maximum		
NOMINAL ALTITUDE												
Natural	7.0 (1.74)	8.9	9.0	5.1	5.0	34	100	0.27 (7)	46 (1.29)	1107 (31.34)	55	90
Propane	11.0 (2.74)	10.8	10.8	4.5	4.5	35	100	0.27 (7)	18 (0.5)	428 (12.12)	55	83
HIGH ALTITUDE												
Natural	7.0 (1.74)	8.9	9.0	5.0	5.1	34	100	0.27 (7)	46 (1.29)	996 (28.2)	50	77
Propane	11.0 (2.74)	10.8	10.8	4.5	4.5	35	100	0.27 (7)	18 (0.5)	385 (10.91)	50	73

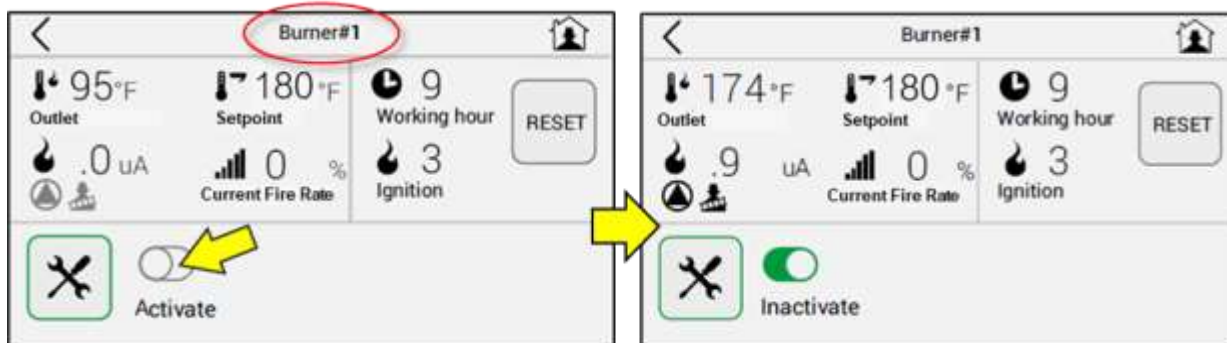
**NOTE:** Check the O<sub>2</sub> levels often, especially at low flow rates. For high altitude installations, consult document number C302.6 (MLX EXT Alt Derate).

### 4.36 Sweeper Mode (Manual Control)

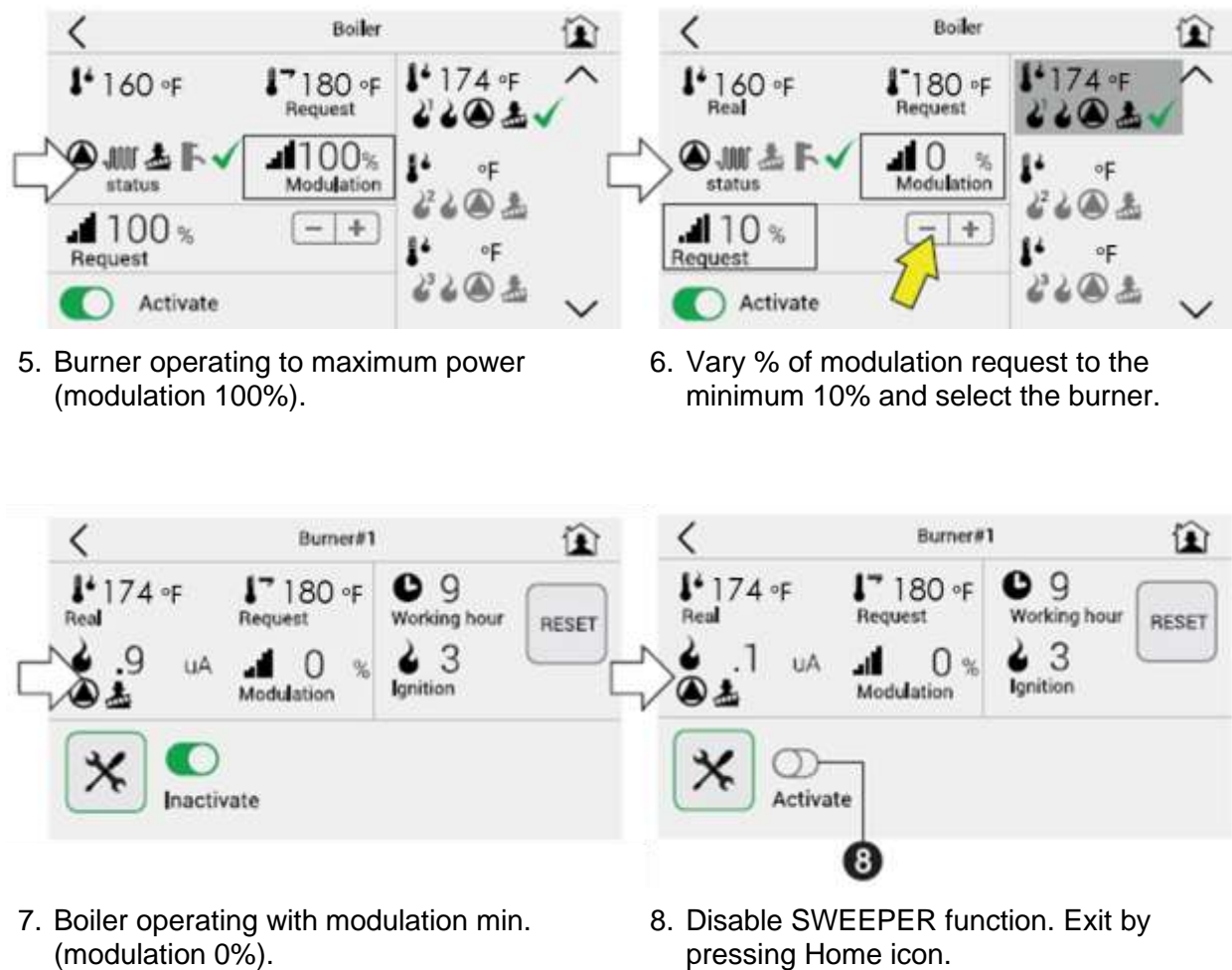


1. Insert psw and select sweeper again. Vary % mod. request from 10% to 100%.
2. Activate Sweeper Mode.
3. Chose burner among those available, e.g.: usually 1 / Modulex (from 1 to 8).

**NOTE:** Note: once selected the burner, (3) the display page changes: Burner # 1 ..... # 8



4. Activate manual control of selected burner.



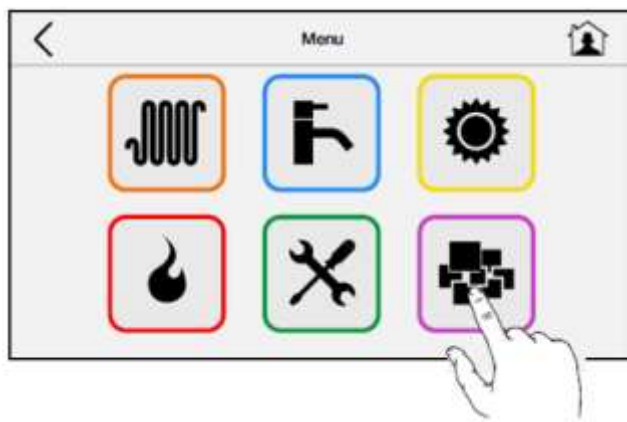
**Figure 4-36: Sweeper Mode (Manual Control)**

**NOTE:** The function is active for 15 minutes, after which, if there is no input, it defaults to the previous parameters.

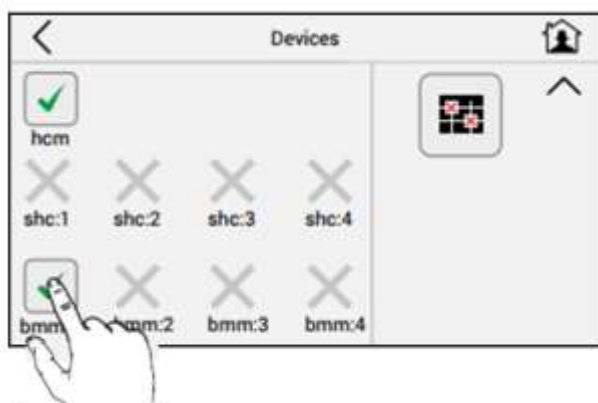
### 4.37 High Altitude Adjustment

It is necessary to adjust the fan speed at altitudes at or above 5,000 feet. Modify parameter 526 (FU: Fan maximum speed) of the BMM (Burner Management Module) in the Devices Menu.

**NOTE:** This is modifiable only with an access code.



Access the BMM Menu by selecting the **bmm** buttons. See Section 6.7 for a list of BMM Parameters.



Change value of parameter 526 - refer to appropriate model and fuel type on table 4.6.

Scroll to parameters 526 and change the values - refer to appropriate model and fuel type on table 4.6.

< bmm: 1 >			
487: Fan: integral gain	9	-	+
489: Fan: PWM @ Min	8 %	-	+
337: Modulation slope	2.0 %	-	+
526: Fan: maximum speed	90 Hz	-	+
319: Maximum modulation	100.0 %	-	+

Repeat the above procedure for the rest of the burners (bmm 2 to bmm7, depending on model).

### 4.38 High Altitude Conversion Label

After calibration of the unit from Normal Altitude (0 - 2,000 feet) to High Altitude (2,000 – 4,500 feet) operation, the label below must be filled out and near the rating label. If the unit is calibrated again for normal altitude operation, the label should be removed.

This appliance has been converted for use at Altitude of: 2,000 - 4,500 Feet. Cet appareil a été converti pour une utilisation à une Altitude de: 2,000 à 4,500 Pieds	
Change of parameter Changement paramètre	FU: _____
Input : Débit :	_____
Date of conversion : Date de transformation:	_____
Type of Fuel : Type de combustible:	_____
Converted by : Transformé par :	_____
00338825	

**Figure 4-37: High Altitude Conversion Label**

### 4.39 Conversion From Natural Gas To Propane Gas

1. Set nominal heat by changing parameter 526 (FU: Fan maximum speed) of the **BMM** in the Devices Menu. Refer to Modulux EXT Pressure and CO<sub>2</sub> Level Calibration in Table 4-6 for appropriate value. This parameter requires a password to change.
2. Adjust CO<sub>2</sub> (%) minimum and maximum levels according to the type of gas as shown in table below. See section 4.34, Burner Calibration for more information.

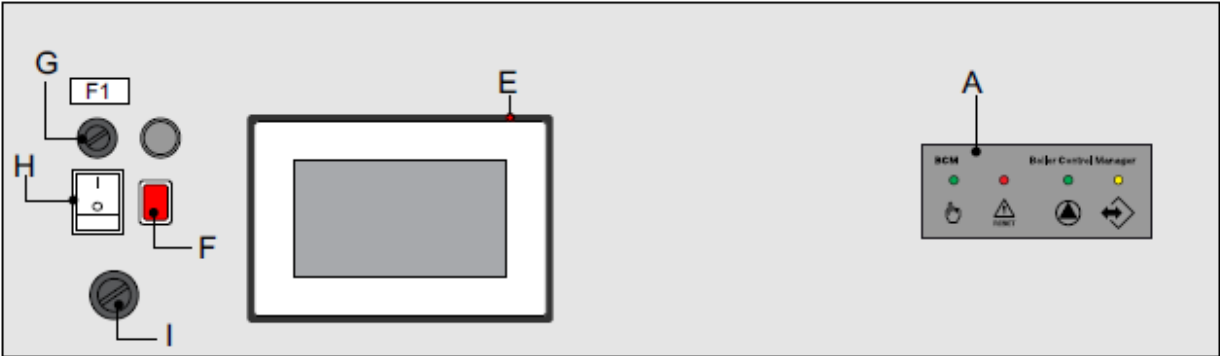
Gas Type	CO <sub>2</sub> Level (%) Minimum Output	CO <sub>2</sub> Level (%) Maximum Output
Natural Gas	8.9	9.0
Propane Gas	10.8	10.8

3. After gas conversion to propane and calibration, the gas installer should complete and apply this label, or equivalent, as close to the rating label as possible:

Boiler model number: _____			
Inlet gas pressure of the converted boiler:	Max.	13.0	3.23
	Normal	11.0	2.74
Normal altitude (0 - 2,000 ft)	Min.	8.0	1.99
	High altitude (2,000 - 4,500 ft)		
Manifold pressure: Factory Set (not adjustable)			
Input Rating: _____			
This boiler was converted on:			
DAY	MONTH	YEAR	
To gas: (E) Propane			
By: name _____			
address _____			
(name and address of organization making this conversion), which accepts the responsibility that this conversion has been properly made.			
00338824			

**Figure 4-38: MODULEX EXT Label**

4.40 Controls And Emergency Functions



KEY		
No.		Description
G		Fuses
H	IG	Main switch
F	LTGL	TLG triggering lamp
I	TLG	Manual reset main Limit Thermostat: when enabled, it cuts the power supply to the boiler and lights the warning ORANGE lamp (F) and description of the fault is displayed on User interface (E). To reset remove the cap and push reset button, done this Push RESET button on BCM.

A	BCM	Boiler controller (see instruction manual BCM boiler control manager, supplied with the boiler).
E	UFLY	User interface (see instruction manual supplied with the boiler).



## 4.41 Initial Boiler Ignition

### 4.41.1 Preliminary Checks

#### **⚠ WARNING!**

To ensure the continued safe operation of the boiler it is highly recommended that it is checked at regular intervals and serviced when necessary, and that only original spare parts are used. Regular attention will prolong the life of the boiler.

Before igniting the boiler check that:

- The boiler installation has been carried out in accordance with the specific standards as instructed in this manual.
- The combustion air inlet and the discharge of combustion exhaust occur in the correct manner in accordance to the specific standards in force.
- The gas supply system is correctly configured for the boiler's output.
- The boiler's electrical supply is 120 V - 60 Hz.
- The system has been filled with water (pressure registered on the gauge 0.8/1 bar with pump not running).
- All on/off valves are in the appropriate position (open or closed as required)
- The mains gas supply corresponds to the one which the boiler has been calibrated for. Otherwise convert the boiler to use the available gas (refer to section: "GAS CONVERSION"). This operation must be carried out by a qualified technician in compliance with the regulations in force.
- The gas supply valve is open.
- There are no gas leaks.
- There are no water leaks.
- The external mains electrical supply switch is on.
- The system's safety valve is not blocked and is connected to the waste water system.
- The condensate drain line (section 4.16) has been filled with water and that it is connected to the waste water system.
- All the necessary ventilation conditions and minimum clearance distances are in place for subsequent servicing in case the boiler is sited in a cupboard compartment.

#### **⚠ WARNING!**

Before firing up the appliance, be sure to fill up the condensate drain line (see section 4.16) through the filling hole and check the correct drainage of the condensate.  
Using the boiler with the condensate drain pipe empty could cause a dangerous condition due to poisonous emissions from the flue exhaust gasses.

## CHAPTER 5: UFLY CONTROLLER & BCM MODULES

MODULEX boilers contain advanced and reliable electronic controls, the Ufly Controller and the BCM (Boiler Communications Module), which provide comprehensive programming and monitoring of the MODULEX boiler and its functions. Features and functions of the Ufly Controller and BCM are described in this chapter.

### 5.1 Ufly Controller

A standard component included in MODULEX units, the Ufly Controller is responsible for the staging and modulation of individual thermal heating modules and also monitors supply and return water temperatures and domestic hot water zones.













The Controller is mounted on the front of the MODULEX Boiler and contains all of the controls, indicators and displays to adjust, operate and troubleshoot the MODULEX Boiler.

#### 5.1.1 Ufly Controller Features and Functions

The Ufly features the following functions for MODULEX boilers:

- Shares the heating load among as many of the boiler's thermal heating modules as possible, maximizing the overall operating efficiency of the boiler.
- Provides access to all testing/programming parameters of each individual heating module: operation test, operation time, boiler freeze protection and pump's anti seize program.
- Drives lead-lag burner operation based on operating hours. The boiler module with the least burner operating hours is the first to start and the burner with the most operating hours is the first to stop.
- Supports DHW (Domestic Hot Water) production using a dedicated sensor to control a dedicated pump or 3-way diverting valve for storage tank temperature control.
- Supports a manual operation service mode to control individual modules during troubleshooting or combustion calibration procedures.
- Drives diagnostics such as relay and sensor testing.
- Supports Modbus integration with AERCO Control System (ACS) or Building Automation Systems. AERCO also offers a Communication Gateway to support BACnet, Lonworks and N2 system integration.

### 5.1.2 Reading the Icons on Home Page

					
Buttons and symbol (outline + filled color area) shown only in Home page			Buttons and symbol (outline + empty color area)		
Service present and in operation at that time			Service present but not in operation at that time		
					
Buttons and symbol (outline in dark grey no filled area)			Buttons and symbol (outline in light grey no filled area)		
Service disabled or off but installed			Service not installed		



**Heating:** Access space heating parameters including setpoint, outdoor reset and building reference temperature.



**Domestic Hot Water:** Access domestic hot water parameters including setpoint, timed programming, and legionella protection function



**Solar:** This menu is currently not available.



**Burner:** Access calibration, manual operation, and troubleshooting settings. This menu is password protected and is only for authorized AERCO technicians.



**Setup:** Access general setup parameters including time and date, display settings, language, and units of measure.



**Devices:** Access BCM parameters for functions including 0-10V operation and domestic hot water operation.

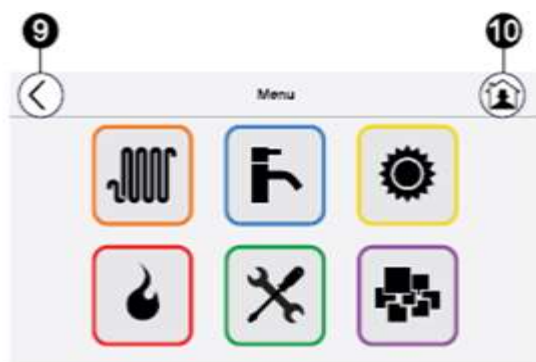
### 5.1.3 Display Modes



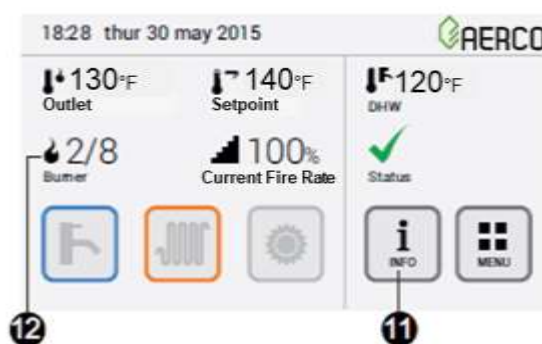
6	Display Mode
	Screen Off

7	Display Mode
	Home Screen

8	Display Mode
	Menu Screen



9	<	One page back
10	Home icon	Return always to Home page



11	INFO: allows user to set parameters on right side of home screen such as Inlet Temp, DHW Outlet, Individual Module temperature, etc.
12	Shows the number of burners that are firing.

### 5.2 BCM (Boiler Communication Module)

The BCM (Boiler Communication Module) is an electronic module in MODULEX boilers, which supports full interoperability to BAS (Building Automation Systems) via Modbus protocol to make remote communications and control possible. In addition, it provides customers with a remote alarm contact to notify customers of faults detected within any of the boiler's multiple thermal modules. Finally, in the event the boiler's master controller stops working, the BCM also takes over operations of the boiler.

The BCM enhances the range of control functions offered by the Modulex Boilers. These additional control functions include the following:

- A fault relay which energizes when any fault condition occurs.
- BCM serves as a Back-up Controller in the event that the primary Ufly Controller fails.
- BCM provides a 0-10V output for controlling a VFD primary pump.
- BCM can function as a "Client" to a "Manager" Energy Management System (EMS), Building Automation System (BAS) or AERCO Control System (ACS) on a Modbus Network.
- BCM can start/stop the primary pump and control a variable speed primary pump via 0-10V analog signal.

Additional BCM information is in Sections 6 and 7 and in Controls Manual OMM-0159.

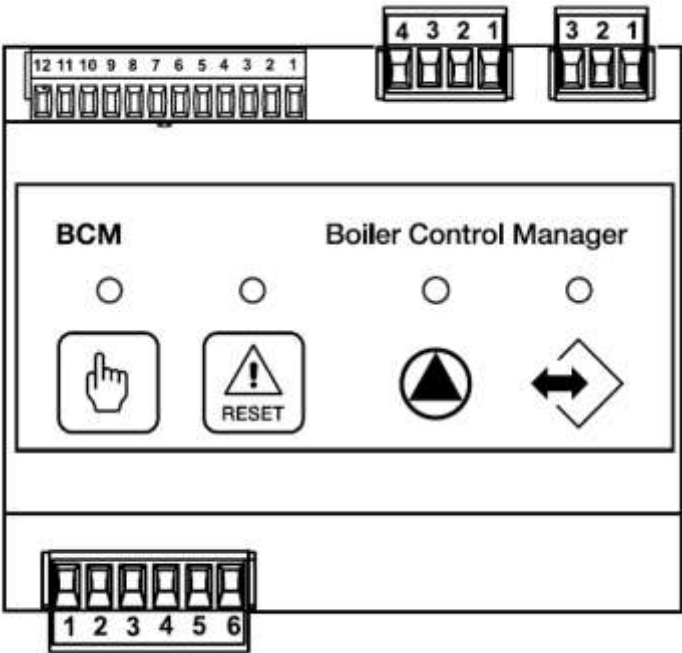
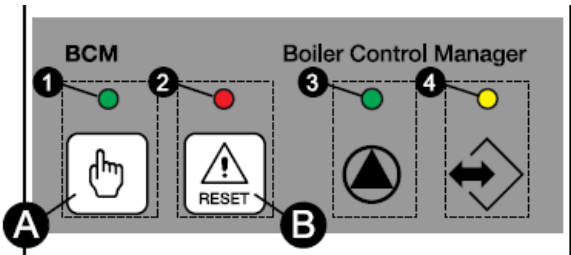


Figure 5-1: Boiler Communications Module (BCM)



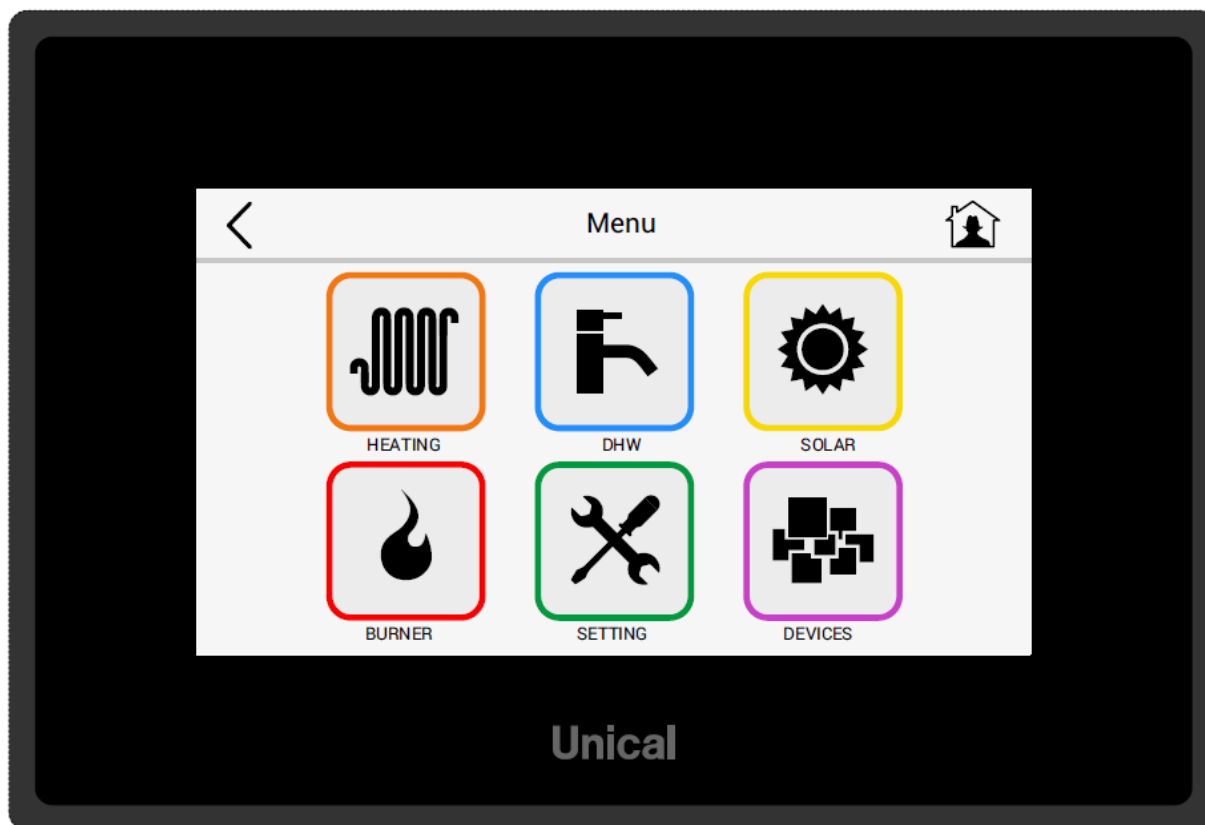
KEY		
No.		Description
<b>A</b>		
MANUAL request button		
1	GREEN	LED
	OFF	MANUAL request NOT active
	ON	MANUAL request active
<b>B</b>		
RELEASE button		
2	RED	LED
	ON	FAULT detected
	FLASH.	ANTIFREEZE protection activation
	OFF	Normal operation
3	GREEN	LED
	ON	CH heating operation or antifreeze protection active
	FLASH.	DHW request operation
	OFF	Standby
4	YELLOW	LED
	ON	BCM communication with local and BCM remote controls (cascade)
	FLASH.	BCM communication with local HSCP or SHC controls
	OFF	No communication with controls (manual A request)

Figure 5-2: BCM Key and LEDs Legend



## CHAPTER 6: OPERATION, MENU & PARAMETERS

This chapter introduces the Ufly controller basic menu contents needed to set up the MODULEX EXT boiler. For more detailed information concerning the Ufly controller menus, operating modes and functions, refer to the Ufly Controller User Manual (OMM-0159).

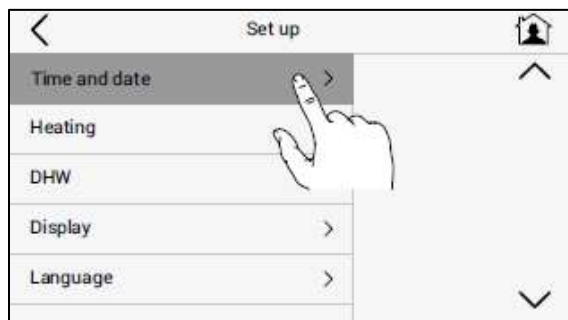
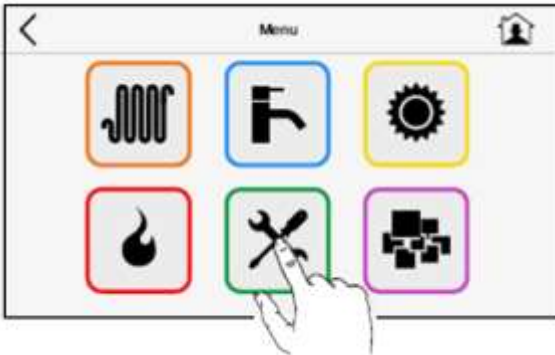


**Figure 6-1: Modulex Ufly Controller Main Menu**

## 6.1 Setup Menu

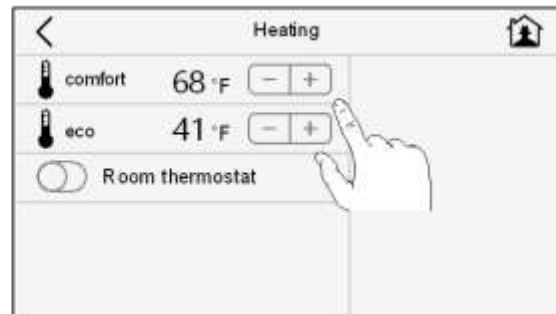
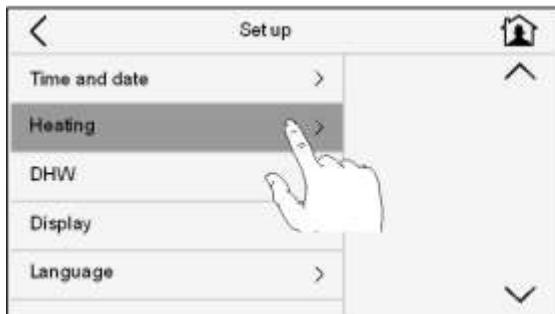
The Setup Menu allows the user to setup time and date, program Building Reference temperatures and domestic hot water setpoint, change display and language settings, and change the password for the Devices.

### 6.1.1 Setting Time and Date



### 6.1.2 Setting Comfort and Eco Building Reference Temperatures

The Comfort and Eco Building Reference Temperatures for the Outdoor Reset Mode are programmed in the Setup Menu. For details on Outdoor Reset Mode and Building Reference Temperature, see section 4.1 of the Control Manual OMM-0159.



### 6.1.3 Setting Comfort and Eco Domestic Hot Water Setpoints

The Comfort and Eco Domestic Hot Water Setpoints are programmed in the Setup Menu. For details on Domestic Hot Water Operation, see section 4.4 of the Control Manual OMM-0159.



The Ufly screen automatically turns off after 20 seconds (default) of inactivity. If the "Always on" is toggled on like in the image below, the screen will remain on all the time.

**NOTE:** Do not change the value of the Modbus address. This is an internal function of the boiler. For Modbus setup when communicating to AERCO ACS or BAS/EMS, see section 6.8 of the Controls Manual OMM-0159.

### 6.1.4 Display Settings



### 6.1.5 Language and Unit Settings

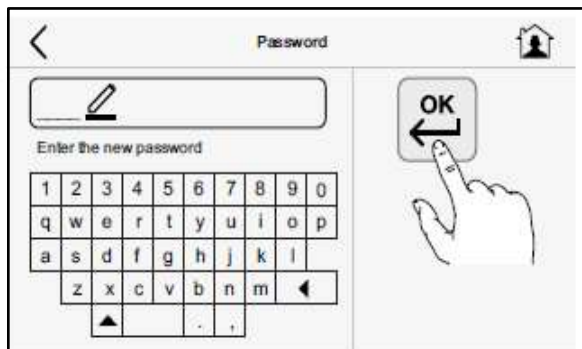
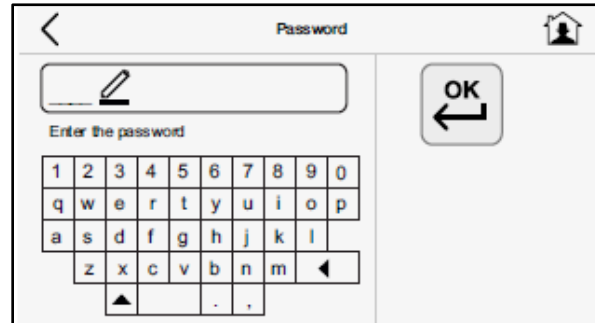
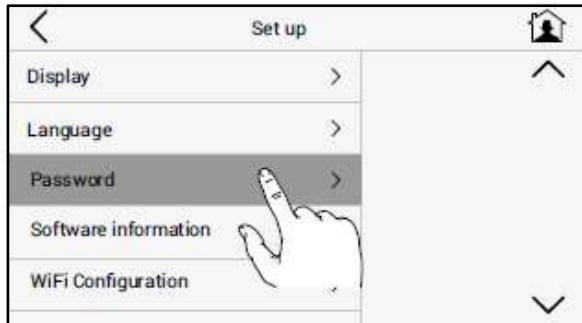


### 6.1.6 Password

For security and protection of the boiler, the default password is only available to Authorized AERCO Service technicians.

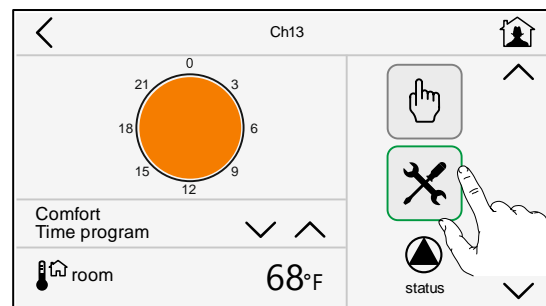
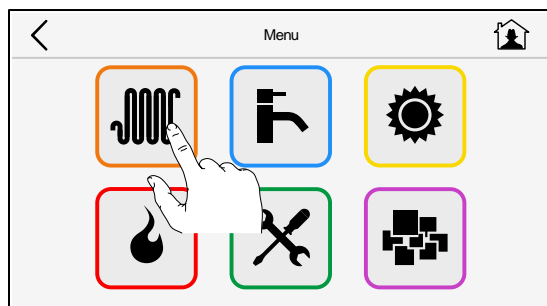
To Change the password:

1. Enter the current password and click OK
2. Delete the current password using the backspace button.
3. Enter new password and click OK.

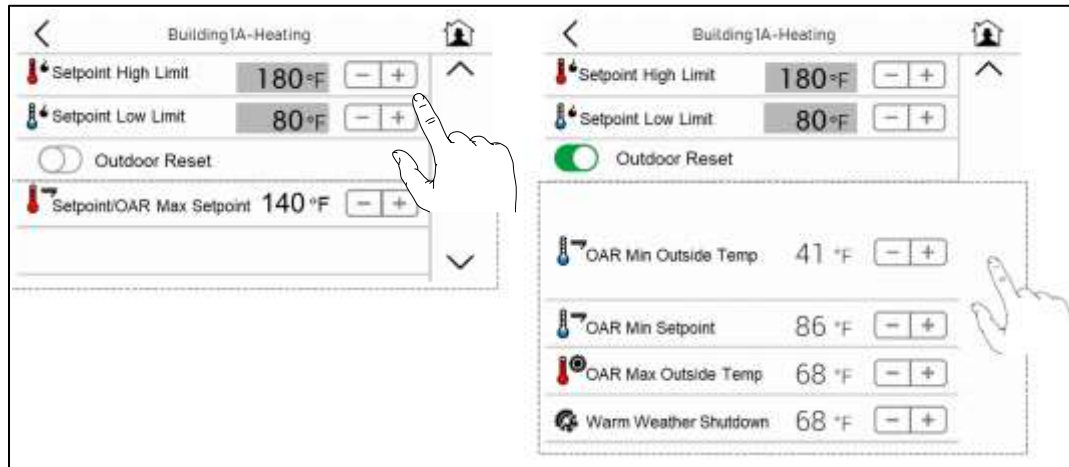


## 6.2 Heating Menu

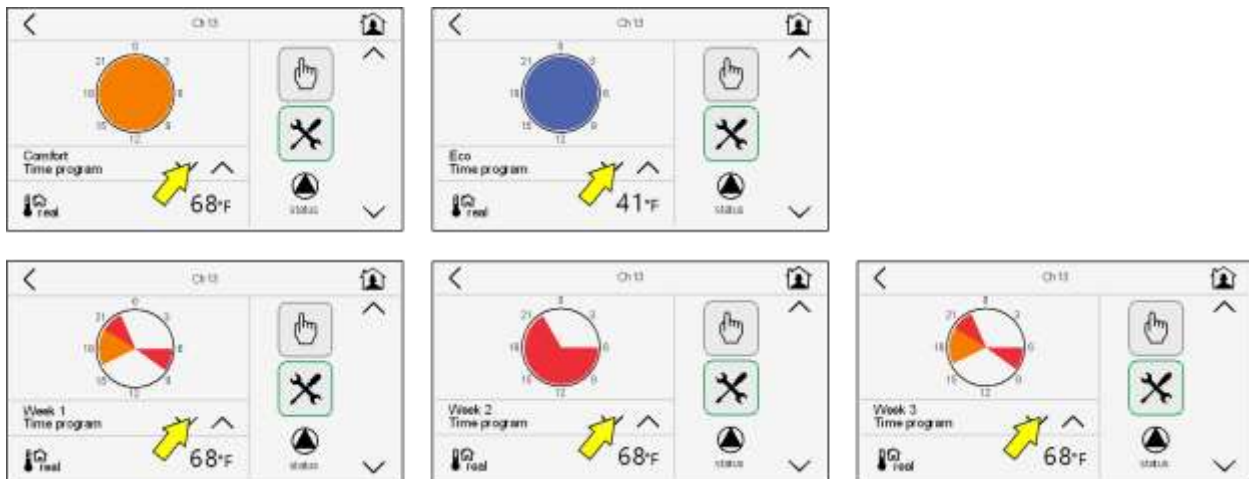
The Heating Menu provides access to Space Heating parameters including Outdoor Reset and Constant Setpoint Mode configurations. For Space Heating programming details, see sections 4.1 and 4.2 of the Control Manual OMM-0159.



Outdoor Reset Parameter and Space Heating Setpoint can be accessed by clicking the settings button.

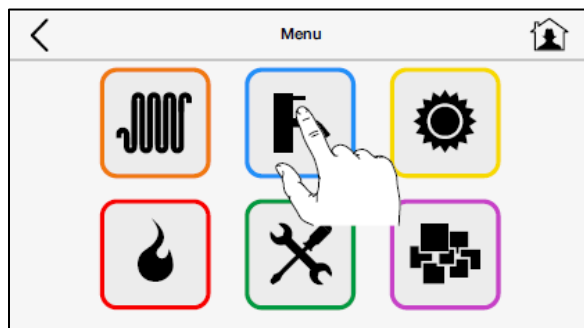


Building Reference Temperatures to use in Outdoor Reset Mode can be selected in the Heating Menu.



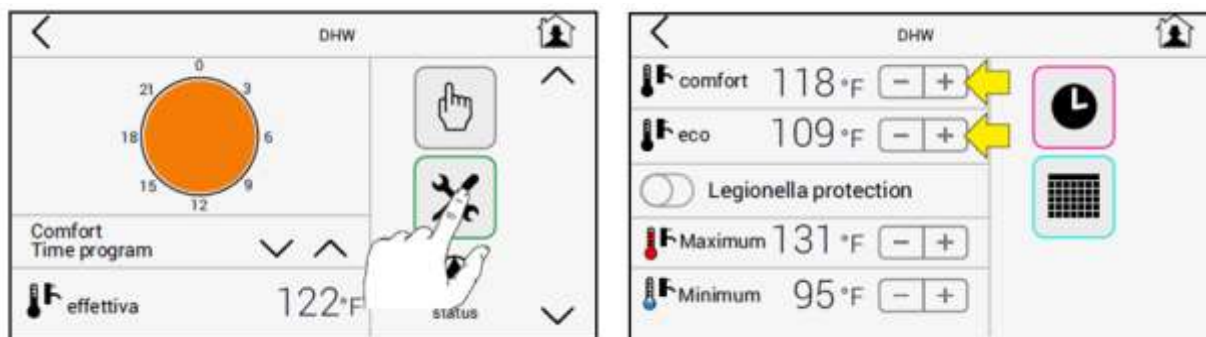
### 6.3 Domestic Hot Water Menu

The Domestic Hot Water Menu provides access to parameters to provide domestic hot water (DHW) using a tank sensor. For DHW programming details, see sections 4.4 of the Controls Manual OMM-0159.

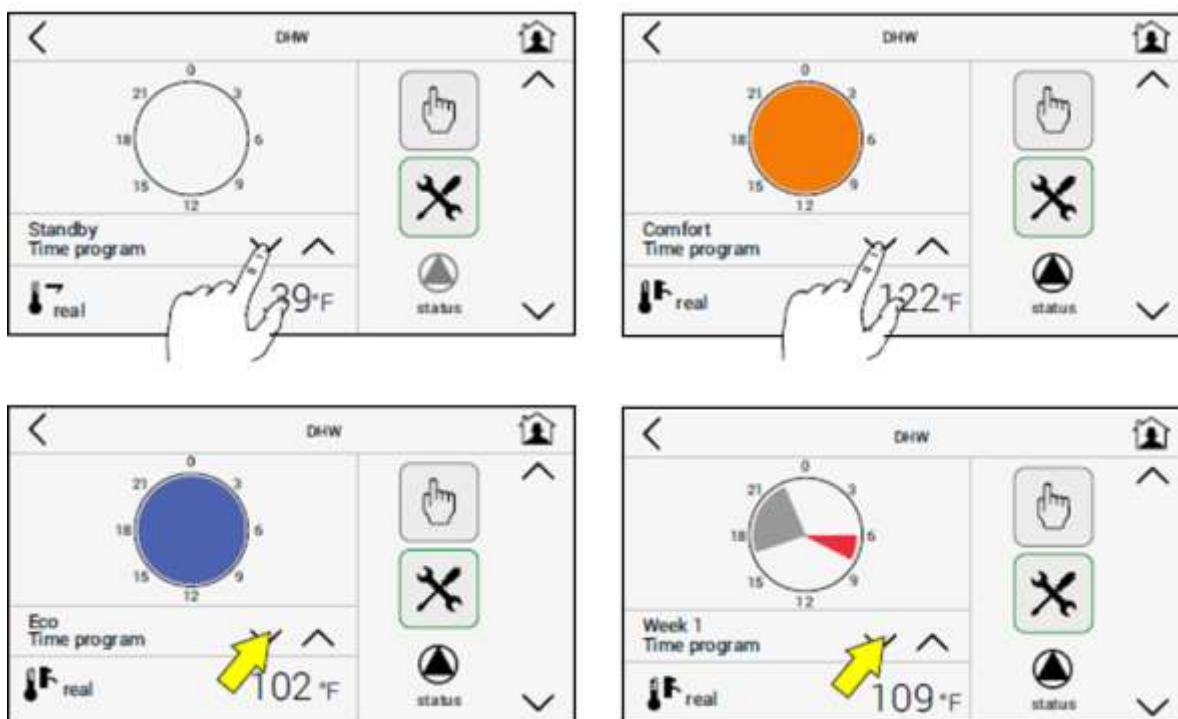


The Comfort and Eco DHW Setpoints can be accessed by clicking the settings button.



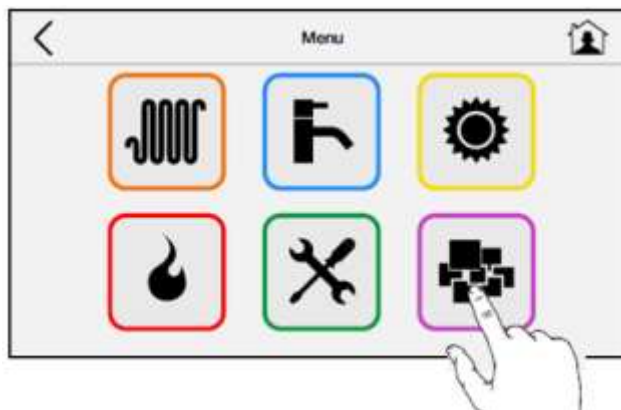


The DHW Setpoint to use can be selected in the Domestic Hot Water Menu

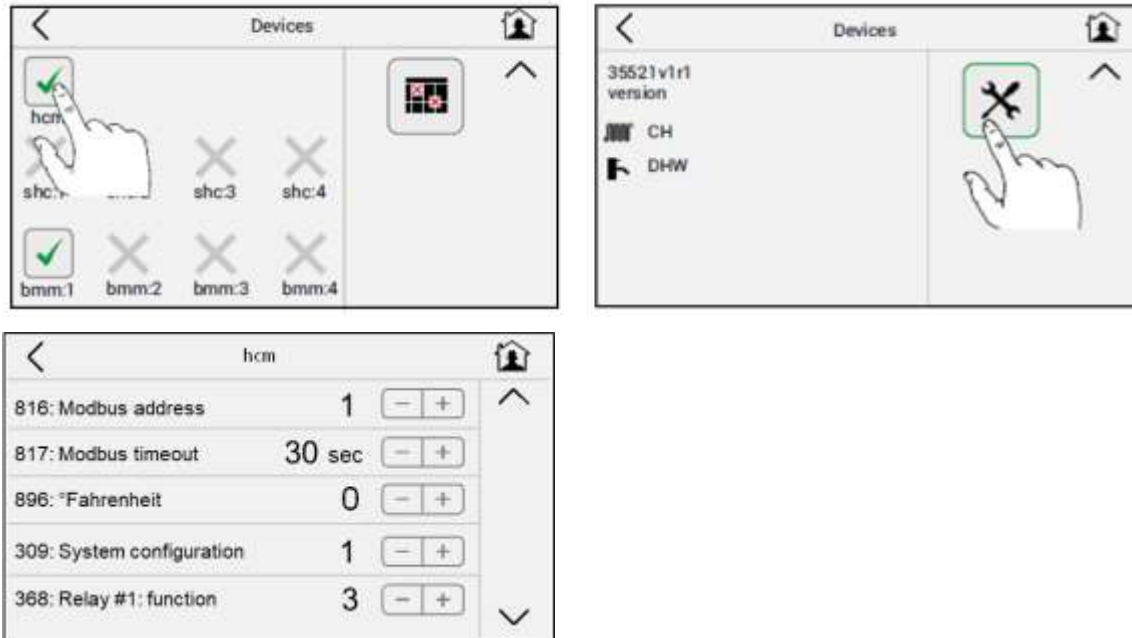


## 6.4 Devices Menu

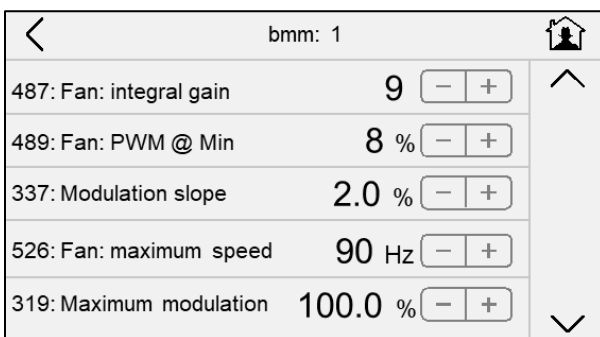
The Devices Menu allows access to BMM (Burner Management Module) parameters, BCM parameters for functions including 0-10V operation and domestic hot water operation, and error history. These parameters are for use by Authorized AERCO service technicians only. Password is required to access this Menu.



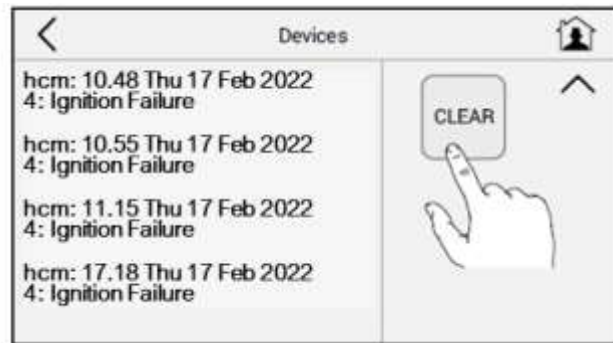
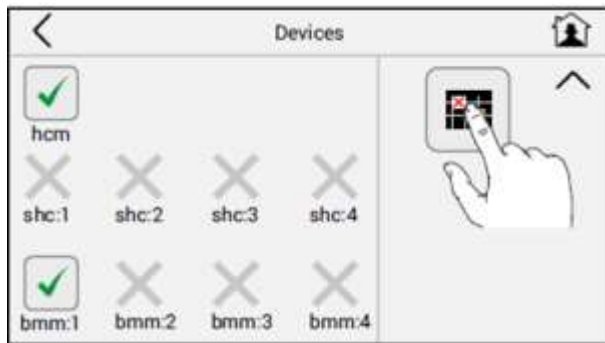
Access the BCM Menu by clicking the **hcm** button. See Section 6.6 for list of BCM Parameters.



Access the BMM Menu by clicking the **bmm** buttons. See Section 6.7 for list of BMM Parameters.

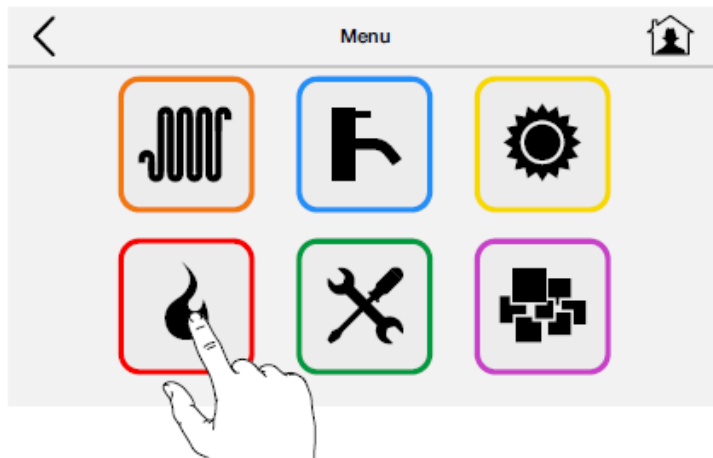


Access and clear error history.




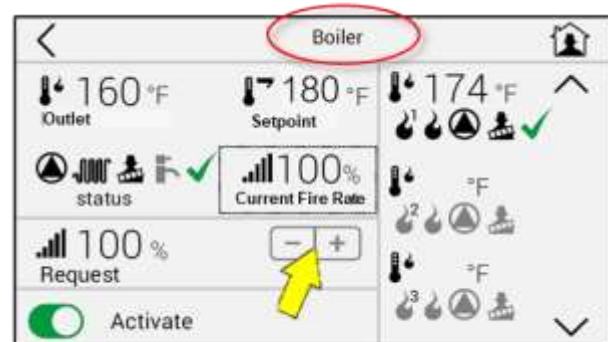
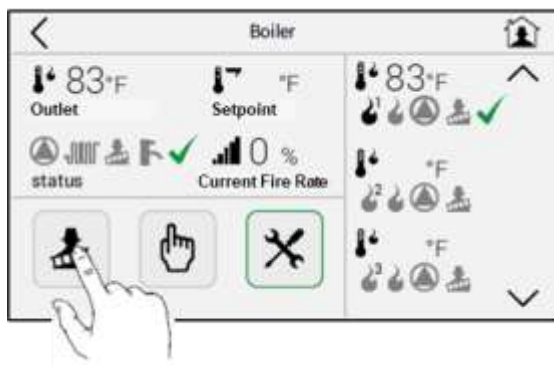
## 6.5 Burner Menu



The Burner Menu allows access to calibration, manual operation, and troubleshooting settings. This menu is password protected and is only for authorized AERCO technicians.

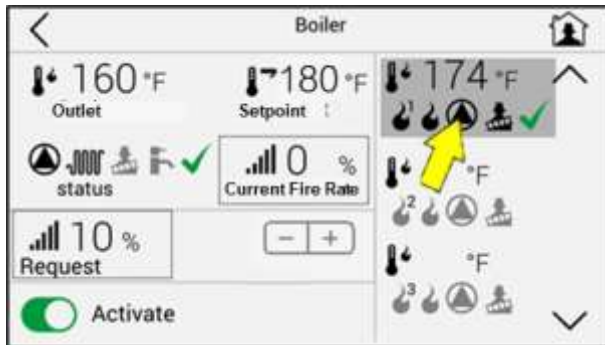


### 6.5.1 Service Mode/Manual Firing Rate Function



1. Click on the Service Mode  icon.
2. Enter the password.
3. Click on the Service Mode Icon again. This will show an Activate Button.
4. Note that at this point, the screen shown is for the whole boiler.
5. Toggling the Activate button allows user to operate the boiler with a manual firing rate
6. Click on the Request +/- buttons to set the boiler manual firing rate desired.

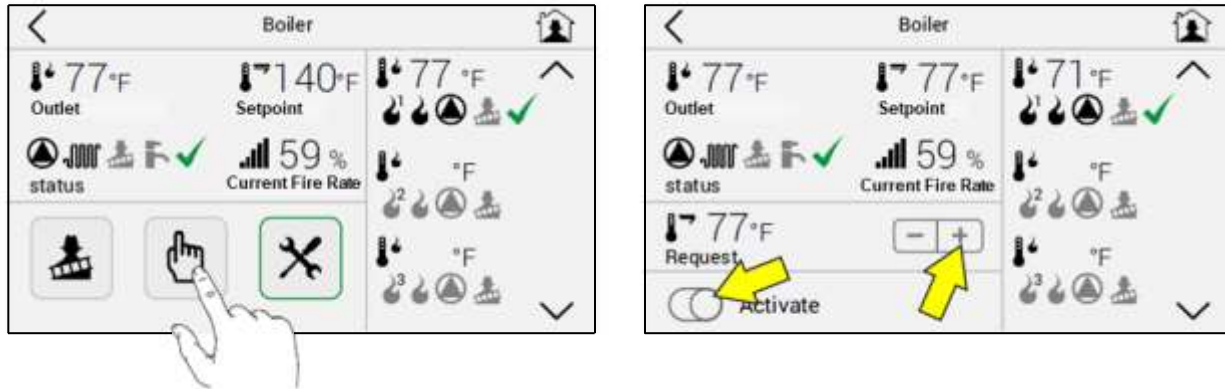


7. If desired, user can select which burner(s) to run during manual firing rate function.
  - a. Select one of the available burners .
  - b. Note that the next screen shown is for the selected Burner.
  - c. Toggle the Activate button to enable burner to run during manual firing rate.
  - d. The Current Fire Rate of activated burners will equal the manual firing rate set in the Boiler Screen.
8. To disable the Sweeper/Manual Firing Rate Function, press the Home button .



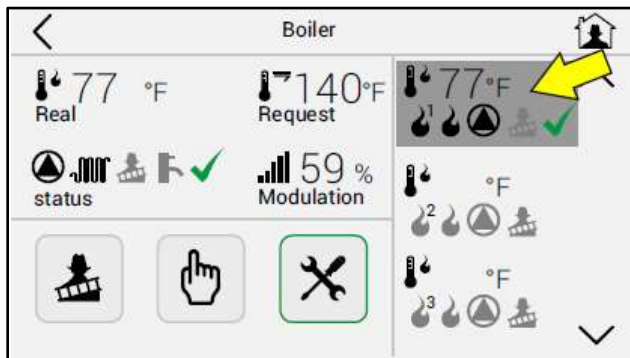
### 6.5.2 Manual Setpoint Function

1. Click on the Manual Setpoint button  icon. This will show an Activate Button.
2. Toggling the Activate button allows user to operate the boiler with a manual setpoint. Any setpoint in the Heating or DHW Mode are ignored while the Manual Setpoint Function is activated.
3. Click on the Request +/- buttons to set the manual setpoint desired.
4. To disable the Manual Setpoint Function, click on the Home button .

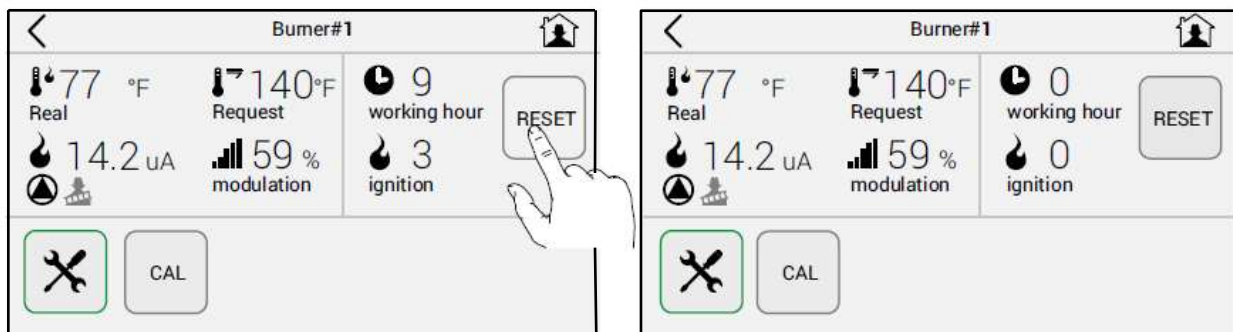


### 6.5.3 Reset Burner Working Hours and Ignition Count

Select one of the available burners



Click the Reset button. Password will be required to proceed.



## 6.6 BCM Parameters

This section provides the list of the parameters in the BCM. See Section 6.4 for instructions on how to navigate to the BCM parameters.

PARAMETER	DESCRIPTION	ENTRY RANGE	DEFAULT
803	<p>Enabled services</p> <p>16 = Control via Modbus*</p> <p>17 = Heating only</p> <p>18 = Antifreeze only</p> <p>19 = Heating + Antifreeze</p> <p>24 = DHW only</p> <p>25 = Heating + DHW</p> <p>26 = DHW + Antifreeze</p> <p>27 = Heating + DHW + Antifreeze</p> <p>* - Control via Modbus examples: AERCO ACS, Remote Setpoint from BAS/EMS</p>	See Description	19
483	Maximum Differential Temperature (Water $\Delta T$ protection)	<p>0°F/2°F – 90°F (0°C/1°C-50°C)</p> <p>0 = Disabled;</p> <p>Units may be expressed in R or K</p>	<p><b>MLX EXT 450 2S</b> <b>-1100 2S:</b> 45°F (25°C)</p> <p><b>MLX EXT 1500 2S</b> <b>-3000 2S:</b> 54°F (30°C)</p>
34	Burner Hysteresis	<p>9°F to 36°F (5°C to 20°C)</p> <p>Units may be expressed in R or K</p>	9°F (5°C)
31	CH#1: Minimum Setpoint	68°F to 221°F (20°C to 105°C)	86°F
39	CH#1: Maximum Setpoint	68°F to 221°F (20°C to 105°C)	185°F
799	<p>Analogue input function 0/10 V:</p> <p>0 = Backup Controller (BCM) target temperature</p> <p>1 = External temperature sensor</p> <p>2 = 0-10 V Remote Setpoint</p> <p>3 = DO NOT USE</p> <p>See Controls Manual OMM-0159 Sections 4.1.1, 4.3.2 and 6.3.1</p>	See Description	1
376	<p>Programmable Input #1 function</p> <p>0 = CH Service Enable/Disable</p> <p>1 = System Enable/Disable</p> <p>2 = DO NOT USE</p> <p>3 = Backup Controller (BCM) Remote activation</p> <p>See Controls Manual OMM-0159 Sections 4.5 and 6.3.2</p>	See Description	0
322	Pump Off Delay	1 - 10 min	3 min
341	<p>Pump: minimum control (Minimum output pump modulation)</p> <p>See Controls Manual OMM-0159 Section 6.4.3</p>	0-10V	3V



PARAMETER	DESCRIPTION	ENTRY RANGE	DEFAULT
313	Pump: maximum control (Maximum output pump modulation) <i>See Controls Manual OMM-0159 Section 6.4.3</i>	0-10V	10V
792	CH Maximum modulation	0-100%	100%
611	CH Parallel: maximum error <i>This is the maximum boiler outlet error that disables the CH and DHW parallel operation. Parallel operation of space heating/DHW is deactivated (space heating secondary pump stops) when boiler outlet temperature falls below Boost Temperature Setpoint (Param. 660) by the amount of Parameter 611.</i>	0°F to 54°F (0°C to 30°C)  <i>Units may be expressed in R or K</i>	9°F (5°C)
612	CH Parallel: modulation maximum <i>This is the maximum firing rate that enables the CH and DHW parallel operation; during parallel operation, space heating secondary pump is allowed to run while DHW demand is present; 0 = No parallel Operation</i>	0-100%	0%
650	DHW: Minimum Setpoint <i>DHW setpoint must be set higher than the value of Parameter 650.</i>	77°F to 113°F (25°C to 45°C)	95°F (35°C)
385	DHW: Maximum Setpoint	122°F to 149°F (50°C to 65°C)	149°F (65C)
360	DHW: tank adjustment (tank temperature regulation gain) <i>Leave this Parameter set = 0 for a constant boost temperature (Param. 660) when DHW is present</i>	0-15	0
656	DHW request: tank to target temperature differential <ul style="list-style-type: none"> <li>DHW demand is present when DHW outlet/tank temperature falls below the DHW setpoint by the amount of Parameter 656.</li> <li>DHW demand is satisfied when DHW outlet/tank reaches temp above DHW setpoint by the amount [Param. 657 minus Param. 656]</li> </ul>	-36°F to 36°F (-20°C to 20°C)  <i>Units may be expressed in R or K</i>	7°F (4C)
657	DHW: Requested Temp. Hysteresis <ul style="list-style-type: none"> <li>DHW demand is satisfied when DHW outlet/tank reaches temp above DHW setpoint by the amount [Param. 657 minus Param. 656]</li> </ul>	2°F to 36°F (1°C to 20°C)  <i>Units may be expressed in R or K</i>	14°F (8C)
310	DHW Pump Off Delay	5 - 600 sec	60 sec
660	DHW: Maximum Boiler Temperature <i>Boost temperature: When DHW demand is present, Parameter 660 will be the boiler setpoint.</i>	122°F to 212°F (50°C to 100°C)	167°F (75C)
48	CH#1: setpoint (CH maximum target temperature)	68°F to 221°F (20°C to 105°C)	185°F (85C)
64	CH#1: parallel DHW (Heating/DHW Parallel Operation) 0 = DHW demand is priority, Parallel Operation is disabled. 1 = Parallel operation of space heating and DHW is allowed provided the Boost Temperature setpoint (Param. 660) is satisfied and the Current Fire Rate is less than a predefined limit (Parameter 612).	See Description	0

PARAMETER	DESCRIPTION	ENTRY RANGE	DEFAULT
649	Burner: Minimum Setpoint	68°F to Param. 39 (20°C to Param. 39)	68F (20C)
346	Minimum modulation: This parameter plays a part (along with others) in the algorithm that determines when burners are turned on/off. NOTE: This is <b>not</b> the minimum firing rate of the boiler.	0-100%	MLX EXT 450 2S -1100 2S: 31%  MLX EXT 1500 2S -3000 2S: 28%
800	Burners: minimum inserted	1-8	1
616	Cascade: insert lock time (Burner insertion delay time)	30 - 900 sec	120 sec
613	Cascade: remove lock time (Burner removal delay time)	30 - 900 sec	MLX EXT 450 2S -1100 2S: 120 sec  MLX EXT 1500 2S -3000 2S: 60 sec
674	Generator: automatic restart (How often the boiler changes the operating burners to balance wear and tear).	1-10 hr	2 H
647	Disable Burners Map - <b>NOT APPLICABLE.</b> Note: Leave at default value of 0		0
648	First Burner Priority - <b>NOT APPLICABLE.</b> Note: Leave at default value of 0		0
336	Temperature control: slope limit	2°F to 54°F/min (1°C to 30°C/min)	9°F/min (5°C/min)
353	Temperature control: proportional band	0°F to 90°F (0°C to 50°C) <i>Units may be expressed in R or K</i>	45°F (25C)
354	Temperature control: integral gain	0-50	12
478	Temperature control: derivative gain	0-50	0
816	Modbus Address	1-127	1
817	Modbus Communication Timeout	0 - 240 sec	30 sec
896	Temperature unit 0: °C 1: °F	See Description	1
309	System configuration (Application Code) 0 = Burner cascade (BMM) 1 = DO NOT USE	See Description	0
368	Programmable Relay #1 (BCM Y4-1/2) Function (BCM connector Y4, terminals 1 and 2) 0 = Primary Pump (boiler loop) control 1 = Boiler status contact (closes when at least one burner is on, opens when all the burners are off)	See Description	0

PARAMETER	DESCRIPTION	ENTRY RANGE	DEFAULT
369	Programmable Relay#2 (Alarm Relay) Function (BCM connector Y4, terminals 3 and 4) 0 = Contact closes if a failure prevents the insertion of the requested number of burner(s) 1 = Contact closes with each failure of the boiler	See Description	1
771	Water Pressure Sensor - <b>NOT APPLICABLE.</b> Note: Leave at default value of 0		0
768	Min Gas Pressure Sensor - <b>NOT APPLICABLE.</b> Note: Leave at default value of 0		0
793	Chimney Obstruction Sensor - <b>NOT APPLICABLE.</b> Note: Leave at default value of 2		2
622	Minimum Flow Sensor Note: Leave at default value of 1 - this will register a global fault when the flow sensor connected to BCM terminals Y2 FL/10 trips.  1 = Enabled Flow Sensor / Global Fault 3 = Enabled Flow Sensor / Local Fault 5 = Enabled Flow Sensor / Global Fault and check Flow Switch fault 7 = Enabled Flow Sensor / Local Fault and check Flow Switch fault	1-7	1
607	CH Manual Request - <b>NOT APPLICABLE.</b> Note: Leave at default value of 0		0

## 6.7 BMM Parameters

This section provides the list of the parameters in the BMM (Burner Management Module) boards. See Section 6.4 for instructions on how to navigate to the BMM parameters.

PARAMETER	DESCRIPTION	ENTRY RANGE	DEFAULT
803	Enabled services - <b>NOT APPLICABLE.</b> Note: Leave at default value of 1		1
48	CH#1: setpoint (CH maximum target temperature)	68°F to 185°F (20°C to 85°C)	176°F (80C)
784	Local BUS address Note: DO NOT CHANGE the value as this is automatically assigned on the bus chain		Automatically assigned
816	Modbus Address	1-127	1
817	Modbus Communication Timeout	0 - 240 sec	30 sec
896	Temperature unit 0: °C 1: °F	See Description	0
799	Analogue input function 0/10 V - <b>NOT APPLICABLE.</b> Note: Leave at default value of 0		0
376	Programmable Input #1 function - <b>NOT APPLICABLE.</b> Note: Leave at default value of 0		0
322	Pump Off Delay - <b>NOT APPLICABLE.</b> Note: Leave at default value of 3 min.		3 min
341	Pump: minimum control - <b>NOT APPLICABLE.</b> Note: Leave at default value of 30%		30%
313	Pump: maximum control - <b>NOT APPLICABLE.</b> Note: Leave at default value of 100%		100%
31	CH#1: Minimum Setpoint	68°F to 104°F (20°C to 40°C)	86°F
39	CH#1: Maximum Setpoint	113°F to 212°F (45°C to 100°C)	203°F
792	CH Maximum modulation	0-100%	100%
619	Ignition Modulation	32-82%	MLX EXT 450 2S -1100 2S: 55%  MLX EXT 1500 2S -3000 2S: 50%
645	Flame stabilization time - <b>NOT APPLICABLE.</b> Note: Leave at default value of 0 sec		0 sec
783	Burner: recycling - <b>NOT APPLICABLE.</b> Note: Leave at default value of 0		0
646	Burner: soft shutdown - <b>NOT APPLICABLE.</b> Note: Leave at default value of 0		0

PARAMETER	DESCRIPTION	ENTRY RANGE	DEFAULT
527	Fan: pulse/revolution Note: Leave at the default value of 2	0/1-4	2
486	Fan regulation: proportional band	0-50	MLX EXT 450 2S -1100 2S: 10  MLX EXT 1500 2S -3000 2S: 30
487	Fan regulation: integral gain	0-50	9
489	Fan: PWM min.	5-15%	8%
337	Modulation Gradient	1-100%	2%
526	Fan: Maximum Speed	50-120Hz	MLX EXT 450 2S -1100 2S: 90Hz  MLX EXT 1500 2S -3000 2S: 91Hz
319	Maximum Modulation	1-100%	100%
346	Minimum modulation (Burner Minimum modulation level)	1-100%	MLX EXT 450 2S -1100 2S: 34%  MLX EXT 1500 2S -3000 2S: 31%
314	Standby modulation	0-100%	MLX EXT 450 2S -1100 2S: 31%  MLX EXT 1500 2S -3000 2S: 33%
620	Postpurge: fan speed	0-100%	MLX EXT 450 2S -1100 2S: 31%  MLX EXT 1500 2S -3000 2S: 33%
617	Ignition: minimum modulation	0-100%	32%
618	Ignition: maximum modulation	0-100%	82%
353	Temperature control: proportional band	0°F to 90°F (0°C to 50°C) <i>Units may be expressed in R or K</i>	45°F (25C)
354	Temperature control: integral gain	0-50	12
478	Temperature control: derivative gain	0-50	0
34	Burner Hysteresis	9°F to 36°F (5°C to 20°C) <i>Units may be expressed in R or K</i>	9°F (5°C)
336	Temperature control: slope limit	0°F to 54°F/min (0°C to 30°C/min)	18°F/min (10°C/min)
483	Maximum Differential Temperature (Water ΔT protection)	0°F/2°F – 90°F (0°C/1°C-50°C) <i>0 = Disabled; Units may be expressed in R or K</i>	54°F (30°C)

PARAMETER	DESCRIPTION	ENTRY RANGE	DEFAULT
380	Programmable Sensor #1 function - <b>NOT APPLICABLE.</b> Note: Leave at default value of 1		1
777	APS check - <b>NOT APPLICABLE.</b> Note: Leave at default value of 0		0
623	Temperature sensors 0: 10K @ 25°C, B=3977 1: 10K @ 25°C, B=3435 Note: Leave at default value of 0	0/1	0
626	Temperature sensor type 0: 10K @ 25°C, B=3977 1: 10K @ 25°C, B=3435 2: PT1000 3: minimum water flow switch Note: Leave at default value of 0	0/1/2/3	0
805	Supply voltage	100-240V	115V
2590	Burner Capacity	10-1000kW	MLX EXT 450 2S -1100 2S: 50kW  MLX EXT 1500 2S -3000 2S: 112kW

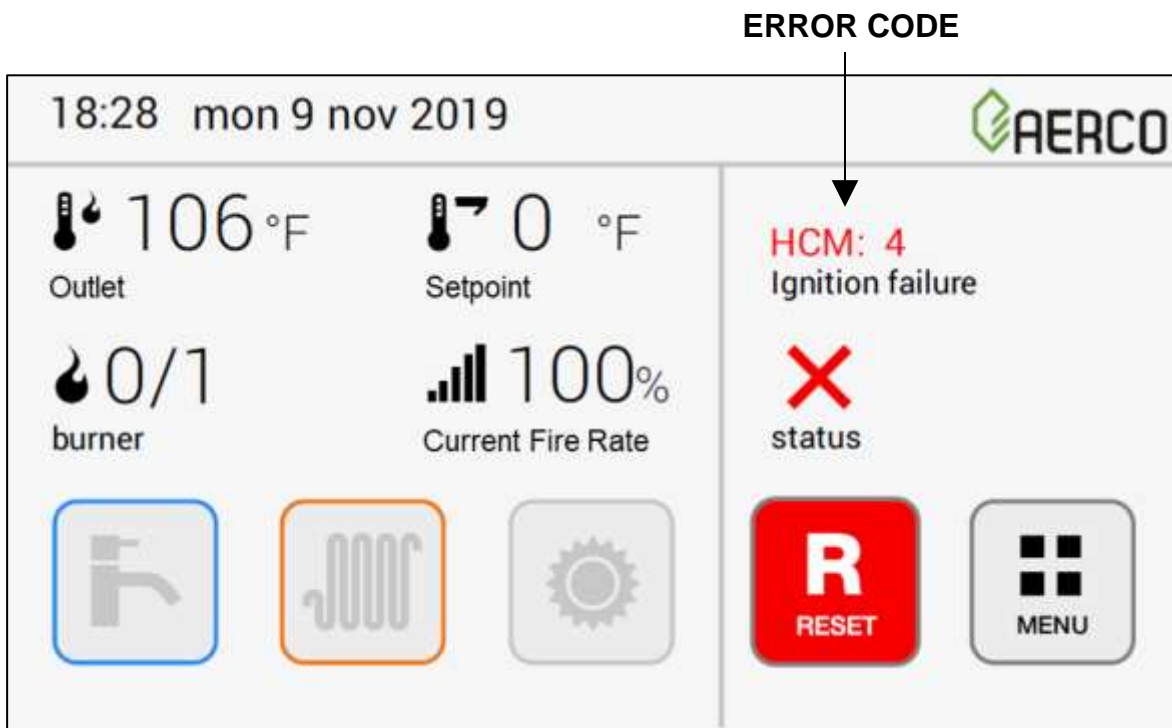


## CHAPTER 7: TROUBLESHOOTING

### 7.1 Ufly Controller Error Codes

Fault codes are displayed in the right hand section of the Ufly Controller display (see Figure-7-1). There are codes for the following two different devices:

- **BCM (Boiler Control Module):** These fault codes are shown in Table 7-3.
- **BMM (Burner Management Module):** These fault codes are shown in Table 7-4.



**Figure 7-1: Ufly Error Code Location**

### 7.1.1 BCM (Boiler Communications Module) Fault Codes

The table below lists the fault codes and troubleshooting tips associated with the BCM.

FAULT CODE	DESCRIPTION	EFFECT	CORRECTION	RESET
<b>HCM: 2</b> Low gas pressure	Gas Pressure Switch - <b>NOT APPLICABLE.</b>			
<b>HCM: 8</b> Low water pressure	Water Deficiency - <b>NOT APPLICABLE.</b>			
<b>HCM: 9</b> Outer temperature sensor	Outdoor sensor Enabled but not connected	Outdoor Reset not available.		AUTOMATIC - Outdoor Reset will be available once outdoor sensor is connected.
<b>HCM: 13</b> DHW Temperature sensor	DOMESTIC HOT WATER sensor fault	DHW service not active	Check DHW sensor and its resistance using the resistance/Temp table); check the sensor connections.	AUTOMATIC
<b>HCM: 14</b> CH return sensor	Global return sensor failure	All burners turned OFF.	Check return sensor or wiring.	AUTOMATIC
<b>HCM: 17</b> Global frozen	Boiler pipe is frozen. Flow sensor temp. is 36°F or less.	Ignition is inhibited. Pump runs for 5 min at max speed.	Carefully defrost boiler.	AUTOMATIC - when Flow sensor is greater than 41°F.
<b>HCM: 18</b> Global differential temperature	Maximum Δ- temperature protection. Fault is detected if [Global FlowSensor – Return Sensor] > [Param 483 + 50°F].  Note: Referred parameter is BCM Param. 483	All burners turned OFF and Pump ON at maximum speed.	Check circulation, check installation	AUTOMATIC - Fault is cleared when [Global FlowSensor – Return Sensor] < Param 483.  Note: Referred parameter is BCM Param. 483
<b>HCM: 19</b> Global overheating	High outlet temperature. Flow sensor temperature > 203°F.	All burners turned OFF and pump ON at maximum speed.	Check Flow Sensor or system pump.	AUTOMATIC - when Flow sensor < 176°F.
<b>HCM: 28</b> Chimney closed	Flue/Chimney Obstruction	Ignition is inhibited.	Check flue/chimney	MANUAL
<b>HCM: 29</b> Condense level	Water inside the combustion chamber.	Ignition is inhibited.	Check for water in the exhaust manifold	AUTOMATIC
<b>HCM: 30</b> Service parameters	Settings corrupted.	Ignition is inhibited.	Contact factory.	MANUAL - push reset switch
<b>HCM: 37</b> Parameters memory	BCM: Internal fault		Contact factory.	MANUAL
<b>HCM: 38</b> Factory parameters	Settings corrupted by electromagnetic interference.	Ignition is inhibited.	Contact factory.	MANUAL - push reset switch
<b>HCM: 39</b> User parameters	Settings corrupted by electromagnetic interference.	None	Contact factory.	AUTO

FAULT CODE	DESCRIPTION	EFFECT	CORRECTION	RESET
<b>HCM: 40</b> Low water flowrate	Low system flow rate. Water flow is not detected by sensor connected to BCM terminal Y2/FL-TA 20 seconds after the Pump activation.	Burners turned OFF.	Check water flow or check switch.	AUTOMATIC
<b>HCM: 56</b> Heat control lack	BCM: No remote control detected		It is possible to activate burner ignition from the BCM manual request button	
<b>HCM: 57</b> Burners lack	BCM: No BMM detected	Burners turned OFF.	Check electrical connections BMM and e-BUS	AUTOMATIC
<b>HCM: 58</b> Global temperature sensor	BCM: Sensor global flow detected.	Burners turned OFF.	Check the flow sensor connection. Replace the sensor.	AUTOMATIC
<b>HCM: 73</b> Flow sensor	Water deficiency pressure switch - <b>NOT APPLICABLE</b>			
<b>HCM: 93</b> Security block	AUXILIARY SAFETY INTERVENTION	Stop burner and stop pump	check the jumper or safety devices wired to connector Y2, terminals 11/2.	MANUAL

### 7.1.2 BMM (Burner Management Module) Fault Codes

The table below lists the fault codes and troubleshooting tips associated with the BMM.

CODE	DESCRIPTION	EFFECT	CORRECTION	RESET
<b>BMM: 1</b> Overheat thermostat	High Limit (STB) Thermostat activated.	All burners turned OFF and pump ON at maximum speed.	Check flow sensor thermal connection to boiler.	MANUAL - push reset switch when temperature goes below limit.
<b>BMM: 4</b> Ignition failure	No flame detected at burner start.	Burner control lockout.	Check flame rod or combustion.	MANUAL - push reset switch or cycle power.
<b>BMM: 5</b> Flame lost	Flame loss during run.	Ignition retry.	Check combustion and wiring.	MANUAL - push reset switch or cycle power.
<b>BMM: 6</b> Overheating	High outlet temperature. Flow sensor temperature > 203°F.	All burners turned OFF and pump ON at maximum speed.	Check flow sensor or system pump	AUTOMATIC - when Flow sensor < 176°F.
<b>BMM: 10</b> Internal failure	Internal failure.	Ignition is inhibited.	Contact factory for new BMM.	MANUAL - cycle the power.
<b>BMM: 11</b> Unexpected flame	Flame signal detected before ignition.	Ignition is inhibited.	Disconnect flame rod wire from BMM. If problem goes away, change flame rod and/or wire. If problem does not go away, change BMM.	MANUAL - push reset switch or cycle power.
<b>BMM: 12</b> CH flow sensor	Flow sensor fault.	All burners turned OFF.	Check flow sensor and its resistance using the resistance/Temp table); check the sensor connections.	AUTOMATIC
<b>BMM: 14</b> CH return sensor	Return sensor fault. - <b>NOT APPLICABLE</b>			
<b>BMM: 15</b> Differential temperature	Maximum Δ-temperature protection. Fault is detected if [Local FlowSensor – Return Sensor] > [Param 483 + 50°F].  Note: Referred parameter is BMM Param. 483	All burners turned OFF and Pump ON at maximum speed.	Check the system installation.	AUTOMATIC - Fault is cleared when [Local FlowSensor – Return Sensor] < Param 483.  Note: Referred parameter is BMM Param. 483
<b>BMM: 16</b> Frozen	Boiler pipe is frozen. Flow sensor temperature is 36°F or less.	Ignition is inhibited. Pump runs for 5 min at max speed.	Carefully defrost boiler.	AUTOMATIC - when flow sensor is greater than 41°F.

CODE	DESCRIPTION	EFFECT	CORRECTION	RESET
<b>BMM: 22</b> Lack air for ignition	Air pressure switch does not close within 30 sec. in the ignition cycle	Ignition retry after 60 second delay and failure remains until a successful burner operation.	If fan is stopped, check supply voltage and fan wiring. If OK, try another fan. If still not working, change the BMM.  If fan is not stopped, check the exhaust gas outlet for blockage. If OK, check the air pressure switch wiring. If still not working, try another air pressure switch. If still not working, change the BMM.	AUTOMATIC/ MANUAL
<b>BMM: 23</b> Unexpected air flux	Air pressure switch always active	Ignition is inhibited.	Disconnect the air proving switch. If problem goes away, install a new switch. If not, check the wiring. If wiring is OK, change BMM.	AUTOMATIC
<b>BMM: 24</b> Low fan speed	Modulating fan speed failure: failed to reach the correct speed within 30 seconds from starting of burner ignition cycle.	Ignition retry after 60 second delay and failure remains until we have a successful burner operation.	Check fan wiring.	AUTOMATIC/ MANUAL
<b>BMM: 26</b> High fan speed	Modulating fan speed failure: failed to stop within 30 seconds from end of operation	Ignition is inhibited.	Check fan wiring.	AUTOMATIC
<b>BMM: 27</b> Lack of air	Air pressure switch fault during the ignition time	Restart pre-purge timer. The failure remains until we have a successful burner operation.	Check fan and wiring. Check air proving switch and wiring.	AUTOMATIC
<b>BMM: 30</b> Service parameters	Alteration of the operating parameters caused by EMC disturbances.	Ignition is inhibited. Pump runs for 5 min at max speed.	Re-program the settings. Contact factory.	MANUAL - cycle the power or send reset message.
<b>BMM: 32</b> Low supply tension	Mains supply voltage < 108 VAC.	Wait for proper line voltage (>102 VAC).	Check input voltage. Try another BMM.	AUTOMATIC

## CHAPTER 8: MAINTENANCE SCHEDULE

The boiler must receive regular, annual maintenance and cleaning in order to ensure reliable and efficient operation. Regular maintenance will prolong the life of the boiler. Refer to Table 8-1 for a suggested schedule of maintenance procedures.

### CAUTION!

To ensure the continued safe and efficient operation of the boiler it is highly recommended that it be checked at regular intervals and serviced when necessary, and that only original spare parts be used. Regular maintenance will prolong the life of the boiler.

### ⚠ WARNING!

Check and service boiler regularly to prevent damage to the equipment and/or harm to persons.

**TABLE 8-1: Modulex EXT Maintenance Schedule**

MAINTENANCE OPERATION	ONCE A YEAR	EVERY 2 YEARS
Inspect circulating and feed water quality and chemistry.	•	
Inspect gas assembly components.	•	
Inspect safety devices for water and gas.	•	
Inspect and clean the combustion chamber & burners.		•
Inspect and clean flame rod and ignitor.	•	
Inspect and clean the fan/blower.	•	
Check the operation of the fan/blower.		•
Check gas pressure and adjust if necessary.	•	
Inspect and clean the flue exhaust assembly.	•	
Check all water connections and valves.		•
Do combustion analysis and recalibrate if necessary.	•	
Check electrical and electronic components		•
Inspect condensate drain pipe and trap, clean if necessary.	•	
Check flow switch in the CSD-1 manifold for proper function.	•	

### 8.1 Instructions for Inspection And Maintenance

### ⚠ WARNING!

To ensure a long life of the boiler ONLY original AERCO spare parts may be used.

1. Disconnect the mains electrical supply to the boiler.
2. Separate boiler from electrical supply via a separating device with open contact of at least 3 mm (i.e. safety devices or power switches).
3. Close the external ON-OFF gas valve installed upstream of the boiler.
4. If necessary, and in keeping with the type of work to be carried out, close any ON-OFF valves fitted on the C/H flow and return pipes, as well as the cold water inlet valve.
5. Remove the boiler front panel.
6. Follow all official instructions and accepted standards and regulations.
7. After completing all the necessary maintenance work, always follow these steps:
  - a) Open the C/H flow and return valves as well as the cold inlet valve (if previously closed).
  - b) Purge and, if necessary, proceed with restoring the heating system's pressure until a pressure of 0.8 – 1.0 bar is reached.



- c) Open the external ON-OFF gas valve installed upstream of the boiler.
  - d) Reconnect the appliance to the electrical supply and switch on the mains electrical supply.
  - e) Test for correct operation, on the gas side and on the water side.
8. Replace the boiler front panel.

## 8.2 Periodic Examination Of Venting System

The inspection of the boiler and venting system should be performed every year, full maintenance every two years. Please contact AERCO for further guidance on the frequency of maintenance and service requirements. Contact details can be found on the back page of this manual.

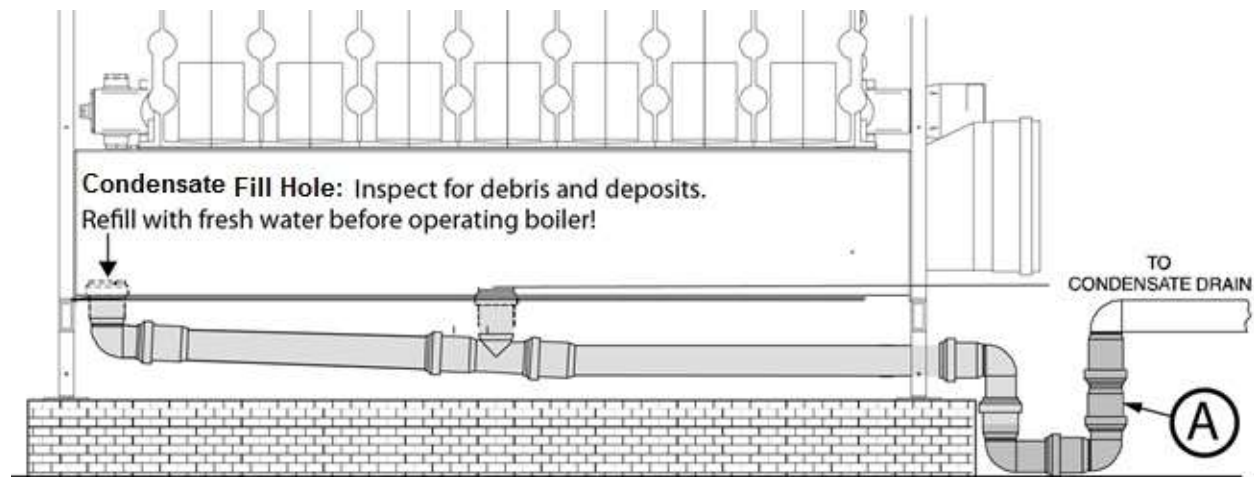
Verify that the air ventilation system, air intake and air intake pipes are unobstructed.

## 8.3 Proper Procedure For Cleaning Exhaust Flue

The flue exhaust system, including condensate evacuation, should be checked annually. Annual maintenance includes verifying that the flue manifold and exhaust vents are clean and unobstructed. It is necessary to inspect and clean the condensate drain pipe in particular.

### 8.3.1 Cleaning the Condensate Drain Line

1. Refer to Figure 8-1, disconnect the pipe at location (A).
2. Use clean water to flush out any deposits that may have accumulated inside the drain.
3. Reassemble the drain pipe in reverse order.



**Figure 8-1: Condensate Drain Location**

#### **⚠ WARNING!**

Before operating the boiler, it is absolutely necessary to verify that the condensate P-trap is filled with water. If the boiler is operated without the P-trap being properly filled, there is a danger of toxic combustion gases escaping from the unfilled condensate drain opening.

## 8.4 Checking Csd-1 Manifold Flow Switch

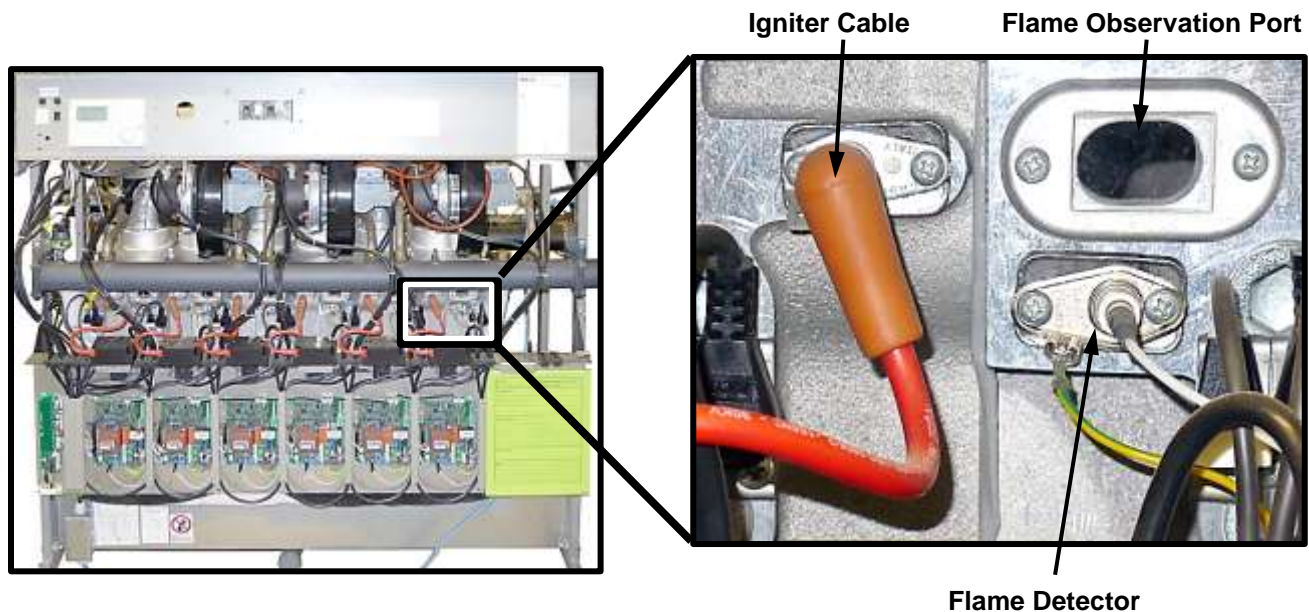
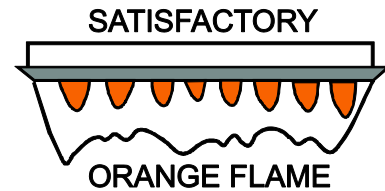
Check the function of the flow switch in the CSD-1 manifold at the boiler hot water outlet. If it is not functioning, check the wiring to terminals FL and 10 on the Input/Output box or replace with a new flow switch.

## 8.5 Visual Inspection Of The Flame

The burner must flame evenly over the entire surface when operating correctly. The flame must burn with a clear, ORANGE, stable flame. Check the flame through the flame observation port (Figure 8-2). The flame pattern should resemble the flame in the illustration below.

### FLAME COLOR:

- YELLOW = CO2 HIGH NOT SATISFACTORY
- BLUE = CO2 LOW NOT SATISFACTORY
- ORANGE = OK SATISFACTORY



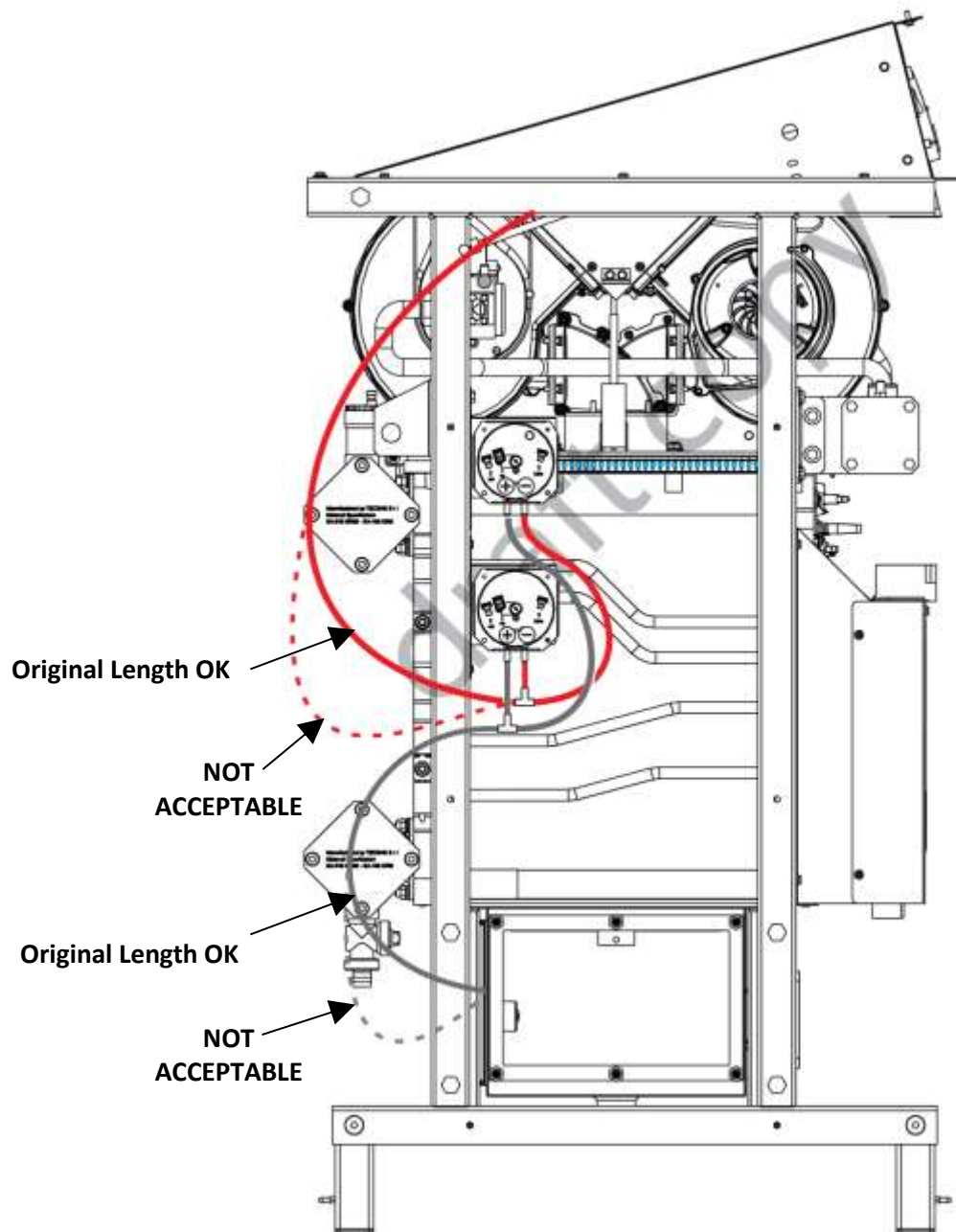
**Figure 8-2: Boiler Flame Observation Port Location**

## 8.6 Reassembly And Resealing Of Vent-Air Intake System

After removing, inspecting, and possibly cleaning the flue pipes and air intake, replace the piping correctly. Refer to AERCO Venting Application Guide (TAG-0098) for information concerning Modulux venting requirements.

## 8.7 Pressure Switch Hoses And Connections

If pressure switch hoses need to be replaced, ensure that new hose lengths are identical to the old hose lengths. If too long, there is an increased chance of condensation problems within the hoses. See Figure 8-3.



**Figure 8-3: Pressure Hose Lengths**

## 8.8 Burner / Heat Exchanger Cleaning Procedure

Dust and other particulate matter infiltrating into the combustion chamber over time will cause a decrease of heating efficiency and output due to the buildup of combusted by-products onto the thermally conductive surfaces. These surfaces must be cleaned from time to time in order to return the unit to its original specifications for thermal efficiency and heat output.

For detailed cleaning instructions, see section 8.11.

**NOTE:** A reduction of the input can be caused by the obstruction of the vent or air intake.

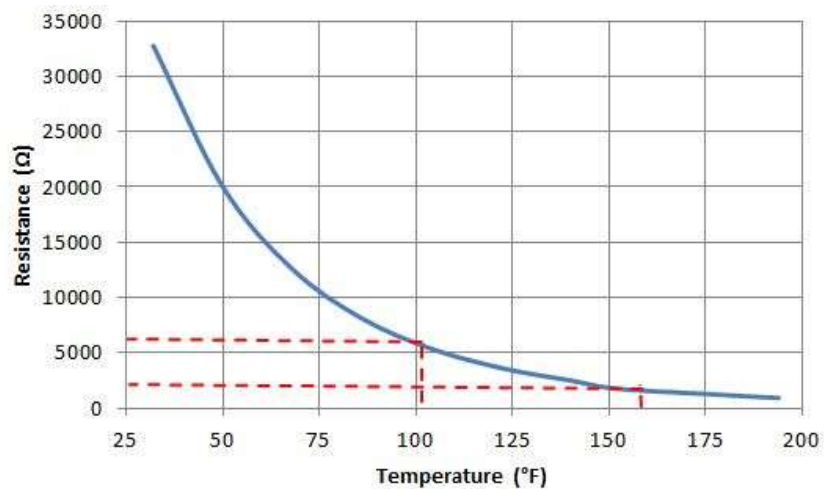
Before cleaning the boiler body sections, check the boiler input and the O<sub>2</sub> percentage (see Section 4.35).

## 8.9 Heat And Return Sensor Resistance Values

Nominal resistance differences at a given temperature ratio between the primary and return heating sensors should be checked periodically by measuring the electrical resistance (ohms) between the two sensors with a voltmeter. Use the chart below to determine the correct resistance values at the given temperature ratios.

**TABLE 8-2: Resistance Values for Primary and Return Heat Sensors**

°F	°C	Resistance (Ω)
32°	0°	32,755
50°	10°	20,003
68°	20°	12,571
86°	30°	8,112
104°	40°	5,363
122°	50°	3,627
140°	60°	2,504
152°	70°	1,762
176°	80°	1,263
194°	90°	920



### EXAMPLE:

At 104 °F (40°C), the nominal resistance is 5,363 Ohm.

At 194 °F (90°C), the nominal resistance is 920 Ohm

## 8.10 Unit Disassembly

To disassemble the unit for maintenance, do the following:

### Disassembling the EXT Boiler for Maintenance

1. Switch OFF external electrical power and CLOSE the gas supply valve upstream from the boiler, and ensure it is completely closed.
2. Unlatch and raise the top lid (Figure 8-4).
3. Remove screws from top of unit holding the rear and side panels in place (Figure 8-5). Remove panels by tilting away from unit, then lifting up and out (Figure 8-6). Note, the front and rear panels must be removed before the side panels can be removed.



**Figure 8-4: Unlatch Top Lid (Step 2)**



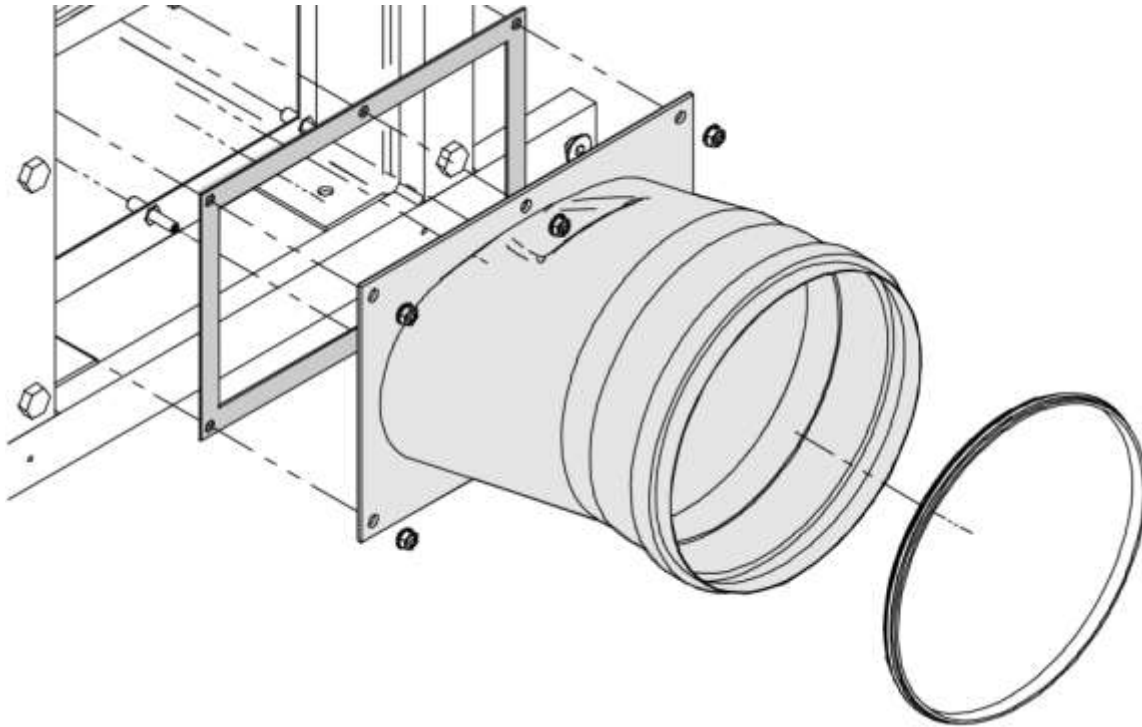
**Figure 8-5: Remove Screws at Edges and Remove Side and Rear Panels (Step 3)**



**Figure 8-6: Remove Panels (Step 3)**      **Figure 8-7: Remove Flue Assembly (Step 4)**

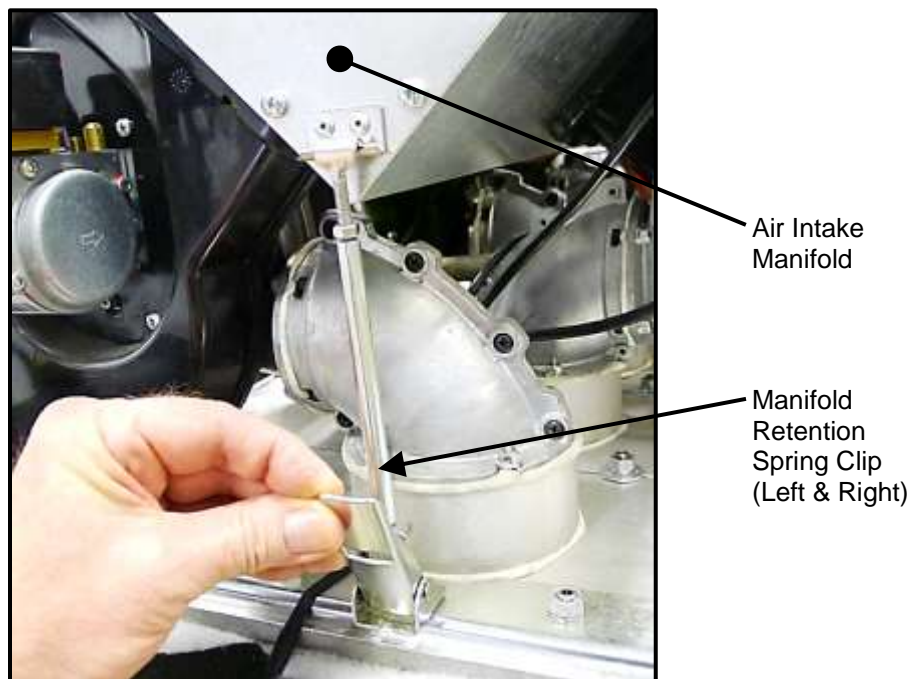


4. Remove screws from around exhaust outlet opening and remove flue assembly from unit (see Figure 8-7 and 8-8).



**Figure 8-8: Flue Removal (Step 4)**

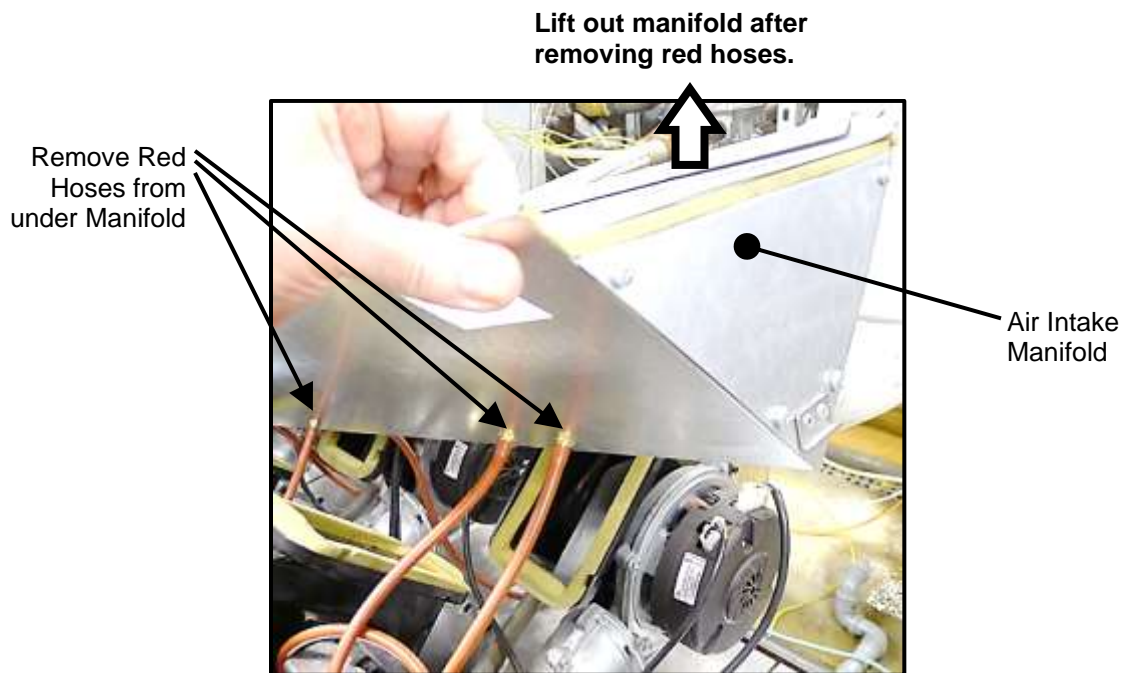
5. On each side of the air intake manifold, unlatch spring clips holding it in place (Figure 8-9).



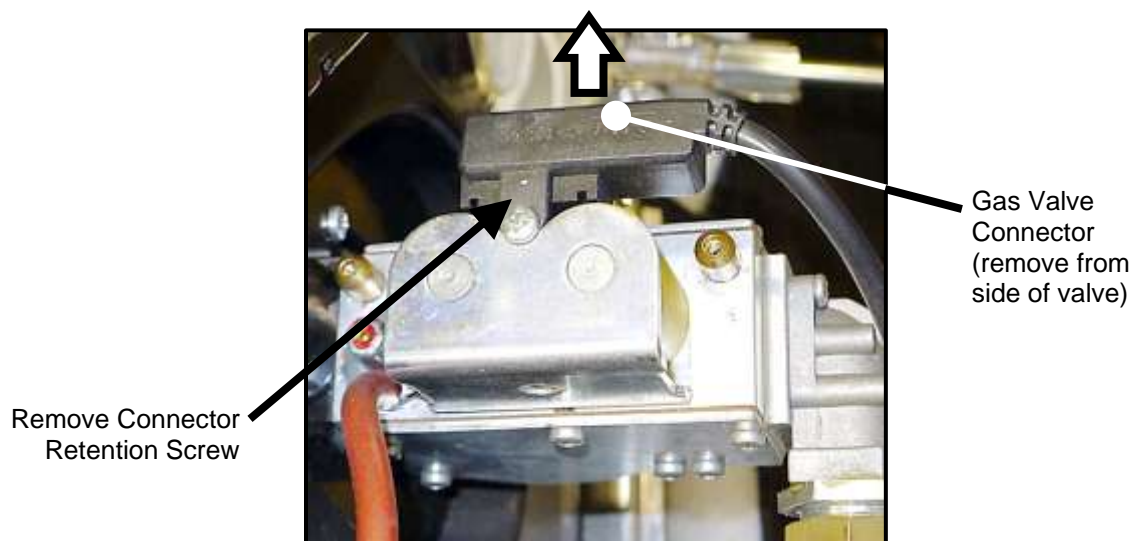
**Figure 8-9: Unlatch Spring Clips from Left and Right Side of Manifold (Step 5)**



6. Remove the red hoses (quantity depends on model) from bottom side of manifold (Figure 8-10), then lift entire manifold from the unit.



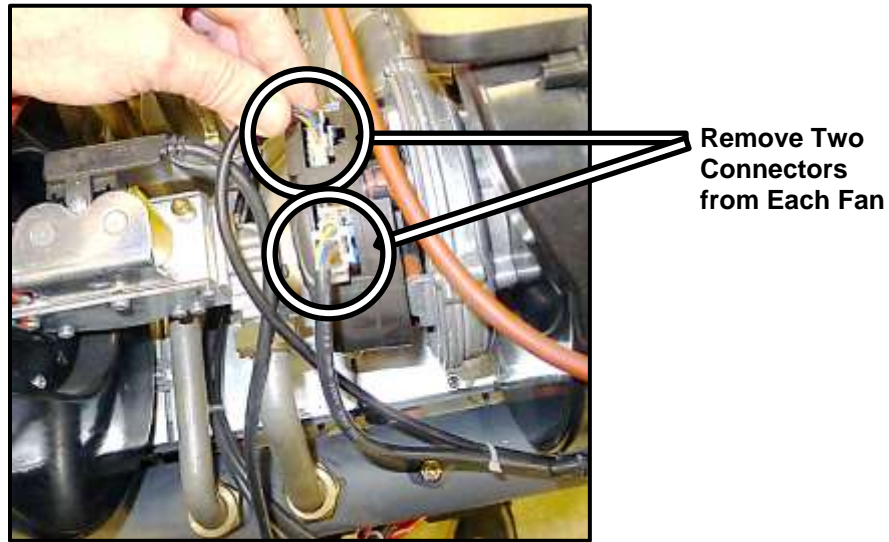
**Figure 8-10: Removing Red Hoses and Manifold from Unit (Step 6)**



**Figure 8-11: Removing Gas Valve Connector from All Gas Valves (Step 7)**

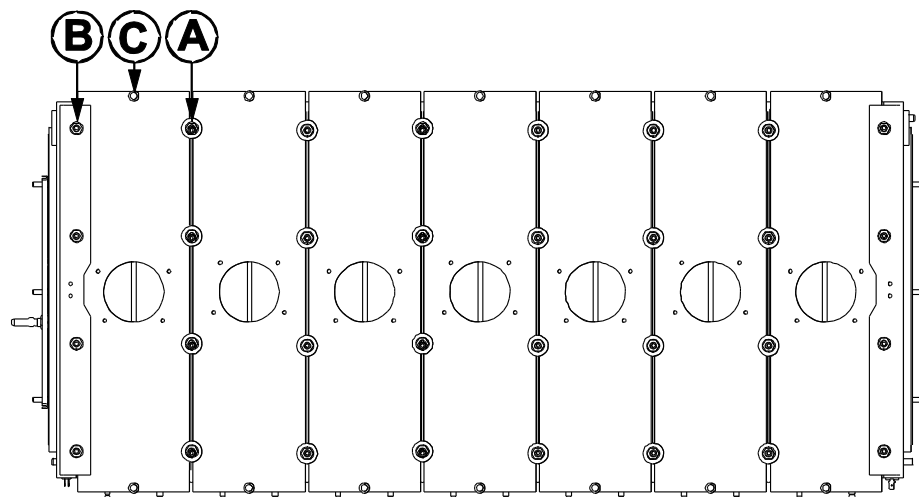
7. On each gas valve, unscrew the Gas Valve Connector with a Phillips head screwdriver. Remove connector (Figure 8-11) from the side of each gas valve.

8. On each fan, remove each (of two) Fan Connectors.



**Figure 8-12: Removing Both Fan Connectors from All Fans**

9. Burner maintenance may be performed on all burner modules simultaneously or on each one separately, as described in a) and b) below:
- a) **All Modules:** Use a 13mm wrench to remove all “A” and “C” nuts in Figure 8-13, below. Leave the “B” screws affixed so all burner plates may be lifted together. Then complete the remainder of the instructions in this section.
  - b) **Separate Modules:** Use a 13mm wrench to remove only the “A” and “C” nuts on either side of the module in question in figure 8-14, then remove the “B” Phillips screw at the end of the burner module. You can then skip the remaining steps in this section and continue with section 8.11 - Cleaning the Burner Module and Combustion Chamber.
10. To access individual burner modules, refer to Figure 8-13 and 8-14 and, using a standard Phillips head screwdriver, remove the “C” screws of each burner module to be accessed. These are the screws that are located at each *end* of each burner plate (2 per plate).

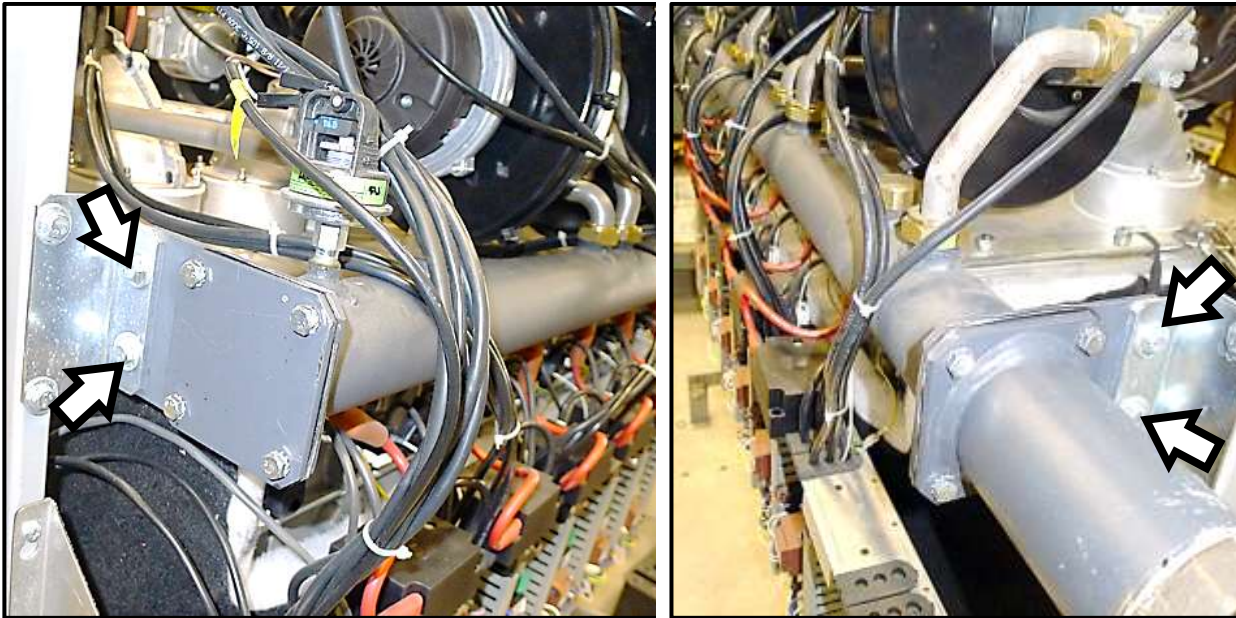


**Figure 8-13: Removal of Burner Plate Hardware (Steps 9, 10, 11)**



**Figure 8-14: Removal of Burner Plate Hardware (Steps 9, 10, 11)**

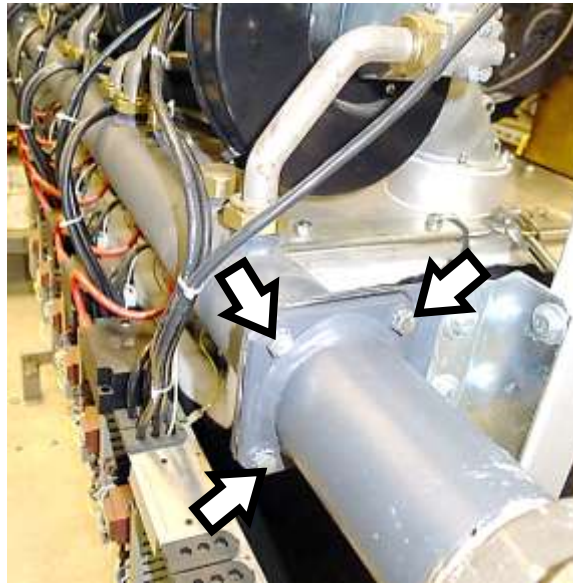
11. Refer to Figure 8-15 and remove the two bolts (white arrows) at each end of the gas collection tube that mount it to the boiler chassis.



**Figure 8-15: Uninstall Gas Collector Tube from Boiler Chassis (Step 12)**

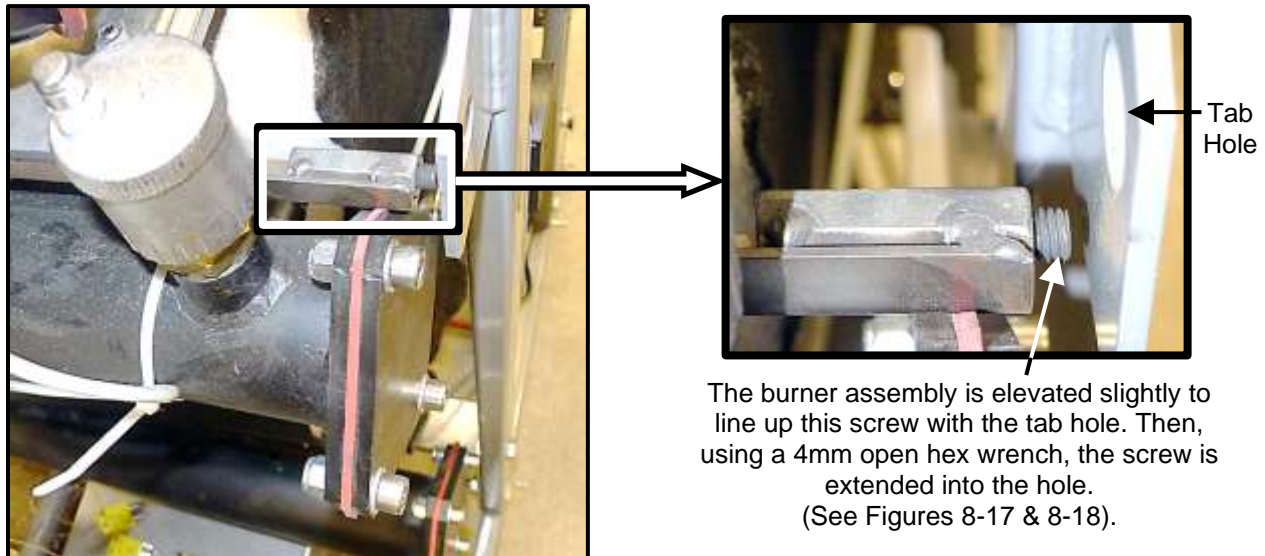


12. Refer to Figure 8-16 and, using a 10mm socket wrench, remove the four bolts/nuts (white arrows) to separate the Gas Collector Tube Flange from the gas supply piping.



**Figure 8-16: Uninstall Gas Collector Flange from Gas Supply Piping (Step 13)**

13. Refer to Figure 8-17 for location of burner assembly lifting screws. There is one at each end. Elevate the burner assembly slightly until screw is lined up with the tab hole, then unscrew the lift screw until it extends into the hole. Do this at both ends.



**Figure 8-17: Location of Burner Assembly Lifting Screw (Step 14)**



**Figure 8-18: Unscrewing Lift Screw into Tab Hole (Step 14)**



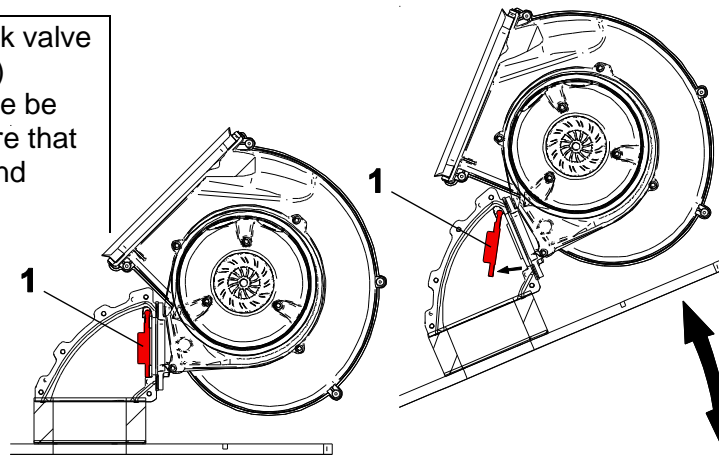
**Figure 8-19: Lift Screws Extended into Tab Holes, Left and Right Sides (Step 14)**

14. Refer to Figure 8-20, then lift up the front of the burner assembly and raise up until the two lift pins can be inserted (Figure 8-22) at the left and right sides in order to hold up the burner assembly.



**Figure 8-20: Lifting Burner Assembly from Front (Step 15)**

**NOTE:** The check valve (1 in Figure 8-21) should at this time be checked to ensure that it moves freely and closes properly.



**Figure 8-21: Lifting Burner Assembly and Location of Check Valve (Step 16)**



**Figure 8-22: Lift Pins Inserted into Lift Holes, Left and Right Sides (Step 17)**

### 8.11 Cleaning THE BURNER MODULE AND COMBUSTION CHAMBER

After lifting up the burner assembly, the individual burner modules are now exposed and may be cleaned. Follow the instructions to clean the burner modules.



**Figure 8-23: Burner Modules Exposed for Cleaning**

1. Carefully lift each burner module from its position. Remove both the module and the gasket. Discard the used gasket, as each one will be replaced at reassembly.

#### **⚠ WARNING!**

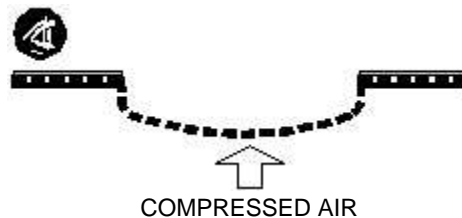
**The burner gaskets *MUST* be replaced at every cleaning.**





**Figure 8-24: Removing Individual Burner Module and Gasket (Step 1)**

2. Use only compressed air to clean the burners by blowing into the “side flame” side of the burner mesh. See Figure 8-25.



**Figure 8-25: Burner Module Profile Compressed Air Orientation (Step 17)**

3. Visually inspect burner mesh and the spot welds at the L profile (where the mesh is welded to the frame) for integrity. If welds are compromised or the burner mesh is damaged, the burner module should be replaced.
4. Once all the burner modules are removed, wash the combustion chamber underneath with water. Avoid getting the electrical harnesses and components wet.
5. During this operation, inspect to the condensate drain pipe to determine if it is free of obstructions; wash water should drain freely from the condensate drain pipe.
6. Blow the combustion chamber with compressed air and attempt to remove any dirt clogging the aluminum pins of the combustion chamber wall. If any buildup is found on the heat exchanger, particularly on the lower heat exchanger pins, remove it with a stiff plastic brush.
7. Once the washing of the aluminum sections is finished, make sure the condensate drain and trap are free of obstructions. Clean them if necessary.
8. Inspect the flue exhaust section, including the exhaust piping.

## 8.12 Cleaning The Heat Exchanger

Over time, hard combustion by-product deposits can form on the combustion chambers' heat exchanger elements. Routine annual maintenance may be sufficient to keep these elements clean. However, if the by-product build-up is too great, the efficiency of the heat exchanger will degrade and the unit's overall efficiency will decline.

If an inspection of the heat exchanger reveals a build-up of combustion by-product deposits, complete the instructions below to clean the heat exchangers mechanically (section 8.12.1) and, if necessary, with a chemical cleaning solution specifically designed for removing combustion by-products from the fire side of aluminum heat exchangers (section 8.12.2).

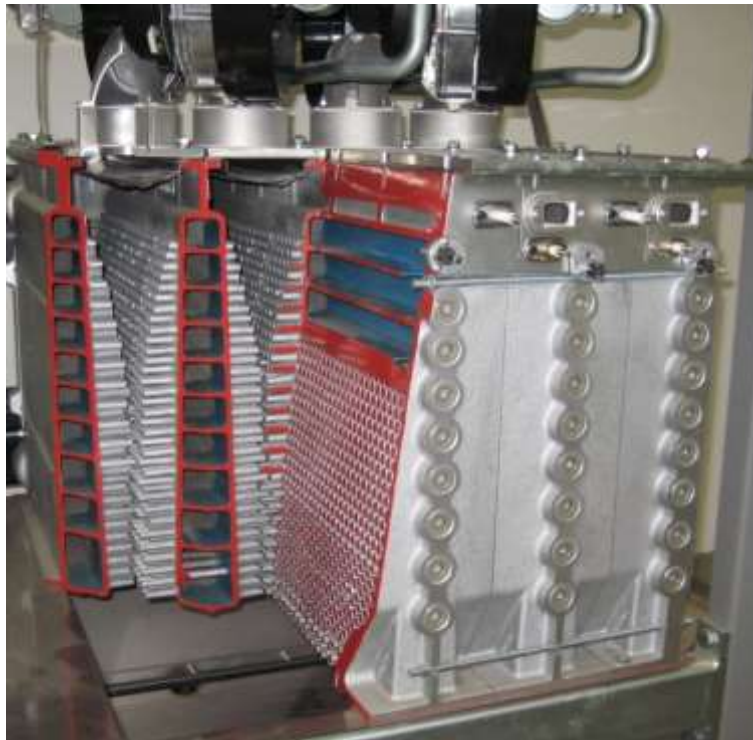
It may not be possible to completely restore the boiler to original factory condition. However, the instructions below should remove most of the by-product buildup. It will also loosen some of the buildup that remains, which the boiler will then shed during normal operation.

### 8.12.1 Mechanical Cleaning of the Heat Exchanger

Complete the instructions below to mechanically remove as much combustion by-product as possible from each burner's combustion chamber.

#### Mechanical Cleaning of the Heat Exchanger

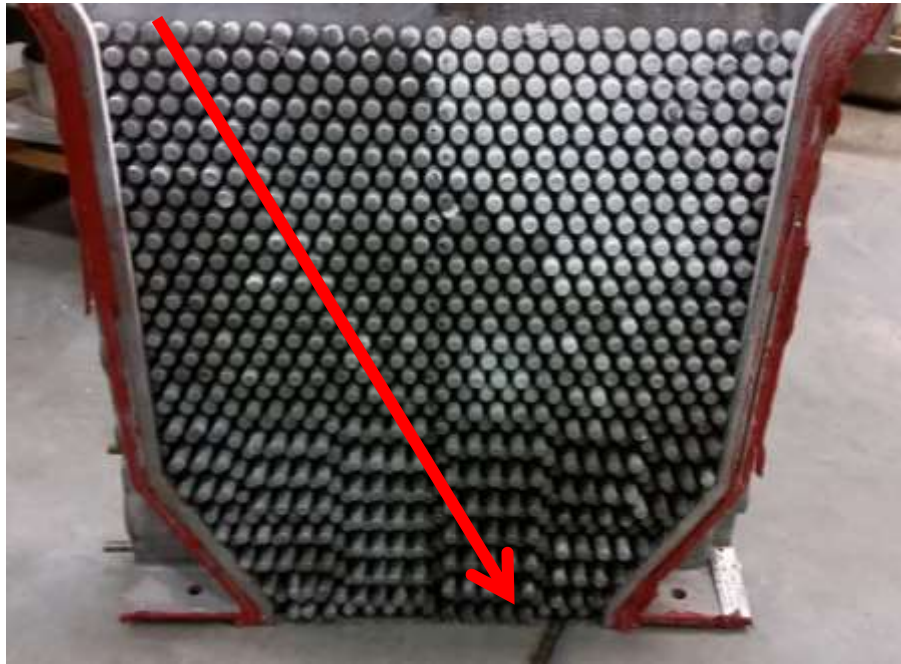
1. Use a stiff, plastic-bristled brush to remove larger deposits from the heat exchanger rods. Try to remove all large deposits. The lower rods, being closer together, are harder to reach. It won't be possible to reach all rows of pins, however a combination of different sized brushes may be useful.



**Figure 8-26: Modulex Heat Exchangers – Cut-Away View**

#### CAUTION!

Use only plastic-bristled brushes, not wire brushes, during cleaning. Wire brushes could damage the surface of the aluminum heat exchanger rods.



**Figure 8-27: Angle of Cleaning Instrument – Heat Exchanger Cut-Away View**

2. Wash the combustion chamber underneath with water. Avoid getting the electrical harnesses and components wet. During this operation, inspect the condensate drain pipe to determine if it is free of obstructions; wash water should drain freely from the condensate drain pipe.
3. The most crucial area to clean is the bottom of the heat exchanger, where the heat exchanger pins are the closest. This can be done by removing one of the exhaust manifold “blanks” and using a pressure washer with angled nozzle to spray upwards. Make sure to cover the top of the heat exchanger with a tarp to prevent water from spraying out of the top of the unit. To clean this area manually, insert your cleaning instrument at an angle between the pins, as shown in Figure 8-27. Be sure to clean the space between each pin.
4. Repeat the previous step on each burner module in the unit.
5. After mechanical cleaning, rinse each heat exchanger with water until no further debris comes out.
6. After washing the aluminum components, make sure the condensate siphon is free of obstructions, cleaning it if necessary.
7. Blow compressed air into the combustion chamber to remove any dirt clogging the aluminum pins on the combustion chamber walls. Remove any remaining buildup from the heat exchanger, particularly on the lower heat exchanger pins, with a stiff plastic brush.

### 8.12.2 Cleaning the Heat Exchanger with Cleaning Solution

---

If mechanical cleaning has not removed all build-up, complete the instructions below to clean the heat exchangers with a cleaning solution specifically designed for removing combustion by-products from aluminum heat exchangers. The product approved by AERCO is **AXI-Therm Boiler Combustion Side Cleaner, Part A** and **Part B**. The instructions below require 4 to 12 oz. (120 mL to 360 mL) *EACH* of Part A and Part B per 100,000 BTU/hr. of unit capacity.

**CAUTION!**

**Use of neoprene gloves and protective goggles is recommended. Consult the Axiom Industries web site ([axiomind.com](http://axiomind.com)) for additional health and safety information.**

1. Spray undiluted AXI-Therm Boiler Combustion Side Cleaner, Part A directly onto all the heat exchanger's internal surfaces, continuing till they are completely wet. A heavy application of the solution should reach most of the surfaces that cannot be seen.
2. Let stand for 10 to 20 minutes to allow the product to react. WARNING: do not let this solution sit for more than 20 minutes, as over-exposure could damage the heat exchanger.
3. Use a plastic bristle brush to clean the elements that can be reached, and then rinse all surfaces with clean water.
4. Next, spray undiluted AXI-Therm Boiler Combustion Side Cleaner, Part B directly onto all heat exchanger surfaces, allow to stand for 10 to 20 minutes, and then rinse with plenty of clean water. This step creates a thin oxide layer on the aluminum pins, which protects them during operation. WARNING: do not let this solution sit for more than 20 minutes, as over-exposure could damage the heat exchanger.
5. Collect and dispose of the used solution and rinse water according to local regulations – DO NOT dispose of rinse water into the environment or local sewer system.

### 8.12.3 Repeat Cleaning

---

The procedure in the previous section will remove smaller deposits and loosen larger deposits. If there are still large deposits, repeat the manual cleaning process in section 8.12.1. At this point a stiff plastic bristle brush should remove a significant amount of buildup.

If large deposits still remain, repeat the chemical cleaning process in section 8.12.2. After cleaning with AXI-Therm, deposits will be loosened. The expansion and contraction of the heat exchanger during normal operation will continue to shed debris.

### 8.13 Reassembly Of The Burner Modules

After cleaning boiler combustion chamber and/or burners, reposition burners. Position the new graphite gaskets **on top** of each burner module and ensure proper positioning.

**⚠ WARNING!**

**The burner gaskets *MUST* be replaced at every cleaning.**

1. Proceed with reassembly, reversing whichever disassembly operation was chosen (all or individual method). For individual burner module reassembly proceed directly to **step e**.
  - a) Lower burner assembly
  - b) Remove left and right lift pins at front and lift screws at rear.
  - c) Reinstall gas supply pipe to gas collector flange (4 bolts).
  - d) Reinstall gas collector tube ends onto boiler frame (2 screws per end).
  - e) Reinstall bolts "A," "B" and "C" screws to secure burner assembly to boiler body.

**NOTE:** Tighten the burner bolts with a torque of 13 Nm.

- f) Reassemble red hoses to the air intake manifold, place manifold onto the blowers, then reattach tension spring clip to left and right ends of manifold.
- g) Proceed to section 8.14 for final procedures before returning boiler to service.

### 8.14 Final Procedures After Maintenance

1. Before lighting boiler make sure condensate drain pipe is filled with water (Figure 8-1).
2. Ensure the seal between the gas supply pipe and the gas collection tube flange are tight. To do this, open the external gas valve and bubble check for leaks using a soap solution.
3. When a single burner is ignited, check immediately to ensure that the gas valve and the relevant premixing chamber are operating correctly.
4. Perform the combustion gas analysis and check all parameters (section 4.35).
5. Make sure that all the pressure test nipples, previously opened, have been closed.

### 8.15 Maintenance Kit Part Numbers

To order the MODULEX 12-Month and 24-Month (Fireside Inspection) maintenance kits, contact AERCO International and use P/N 58086-TAB, replacing the "TAB" with the appropriate suffix as determined in Table 8-3 and 8-4.

Annual Maintenance Kits contain a flame detector and igniter, while the 24-Month Fireside Inspection Kits contain flame detector, igniter, and burner gaskets.

**TABLE 8-3: MLX 12-Month Maintenance Kit**

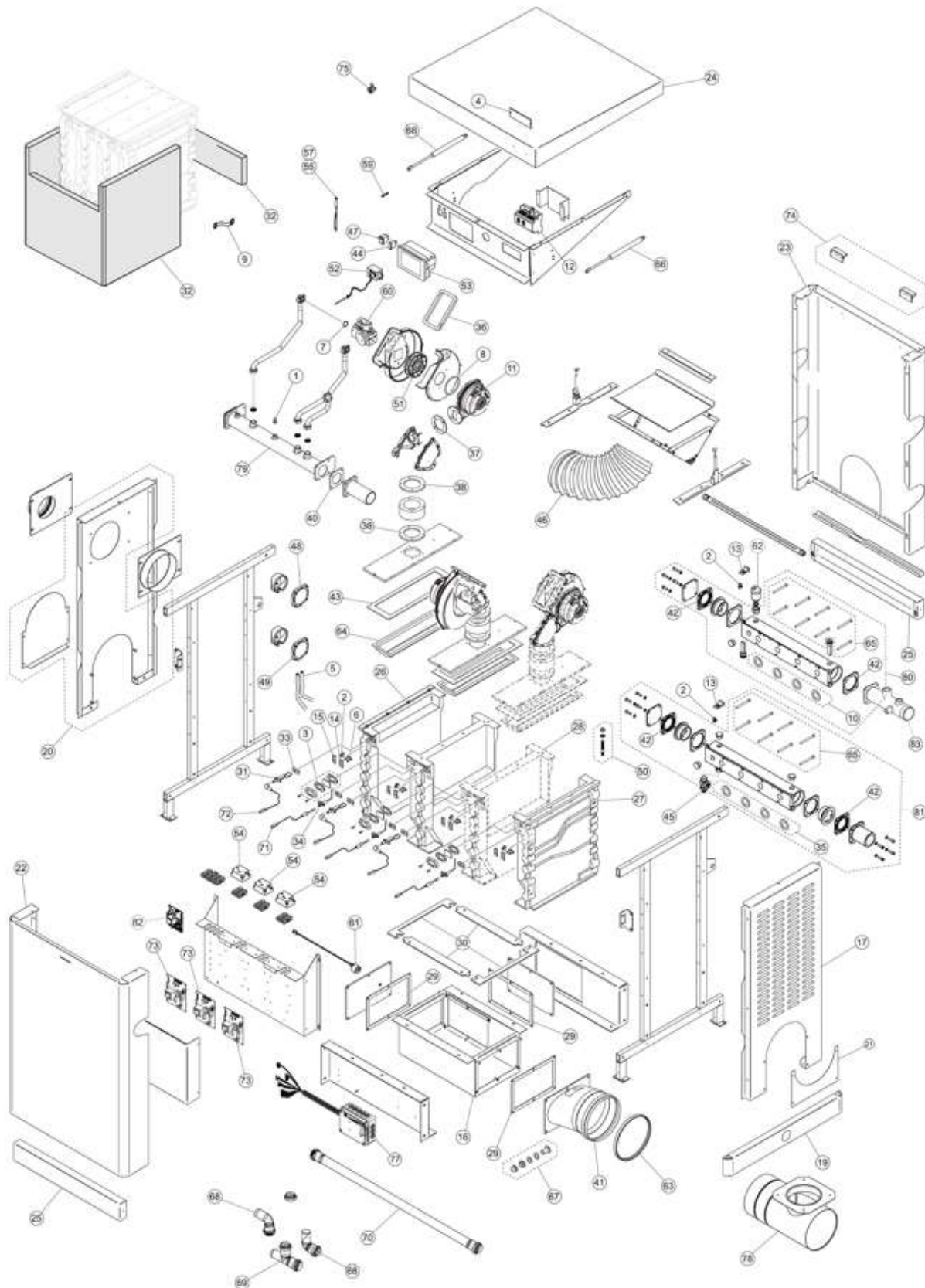
P/N	DESCRIPTION
58086-02	<b>EXT - 450 2S</b> ANNUAL MAINTENANCE KIT
58086-03	<b>EXT - 600 2S</b> ANNUAL MAINTENANCE KIT
58086-04	<b>EXT - 800 2S</b> ANNUAL MAINTENANCE KIT
58086-06	<b>EXT - 1100 2S</b> ANNUAL MAINTENANCE KIT

**TABLE 8-4: MLX 24-Month Maintenance Kit (Fireside Inspection)**

P/N	DESCRIPTION
58086-13	<b>EXT - 450 2S</b> 24 MONTH FIRESIDE INSPECTION KIT
58086-14	<b>EXT - 600 2S</b> 24 MONTH FIRESIDE INSPECTION KIT
58086-15	<b>EXT - 800 2S</b> 24 MONTH FIRESIDE INSPECTION KIT
58086-17	<b>EXT - 1100 2S</b> 24 MONTH FIRESIDE INSPECTION KIT



## CHAPTER 9: SPARE PARTS DRAWING AND LISTS



**MODULEX EXT Light Commercial Part List (EXT 450 2S, 600 2S, 800 2S, 1100 2S)**



<b>MODULEX EXT Light Commercial Part List</b>		
<b>NO.</b>	<b>PART NO.</b>	<b>DESCRIPTION</b>
1	95004080	Outlet pressure G1/8"
2	95262049	Heating Sensor 3/4" T7335D1016 10K
3	95000467	Sightglass Kit - Comb Chamber
4	95004081	Manufacturer plate
5	95000657	Silicone tube 4 X 8
6	95262953	High Water Temp Switch
7	95000709	Gasket OR 22,22 X 2,62
9	95000845	Spring clips
10	95000846	Diaphragms flow manifold
11	95263075	Blower
12	95004082	BCM control unit
13	95004083	Heating Sensor bracket
14	95211357	Safety thermostat bracket
15	95211358	Heating sensor bracket
16	95213277	Boiler sump assembly MODULEX EXT 2M (MLX EXT 320 2S)
	95213280	Boiler sump assembly MODULEX EXT 3M (MLX EXT 450 2S)
	95213284	Boiler sump assembly MODULEX EXT 4M (MLX EXT 600 2S)
	95213287	Boiler sump assembly MODULEX EXT 5M (MLX EXT 800 2S)
	95213291	Boiler sump assembly MODULEX EXT 6M (MLX EXT 960 2S)
	95213294	Boiler sump assembly MODULEX EXT 7M (MLX EXT 1100 2S)
17	95211301	Right Side Panel MODULEX EXT
18	95004084	Left Side Panel MODULEX EXT
19	95213304	RH lateral socle MODULEX EXT
20	95213303	LH lateral socle MODULEX EXT
21	95213305	Locking plate flue MODULEX EXT
22	95213307	Casing Front Panel MODULEX EXT 2-3M
	95213320	Casing Front Panel MODULEX EXT 4-5M
	95213323	Casing Front Panel MODULEX EXT 6-7M
23	95004085	Casing Rear Panel MODULEX EXT 2-3M
	95004086	Casing Rear Panel MODULEX EXT 4-5M
	95004087	Casing Rear Panel MODULEX EXT 6-7M
24	95213309	Casing Top Panel MODULEX 2-3M
	95213318	Casing Top Panel MODULEX 4-5M
	95213327	Casing Top Panel MODULEX 6-7M
25	95213315	Front/Rear socle MODULEX EXT 2-3M
	95213321	Front/Rear socle MODULEX EXT 4-5M
	95213325	Front/Rear socle MODULEX EXT 6-7M
26	95000930	End Section LH
27	95000931	End Section RH
28	95000932	Centre Section
29	95250612	Sealing Gskt-Flue box Outlet
30	95250618	Gasket - H/E-Flue Box MODULEX 7M
	95250619	Gasket - H/E-Flue Box MODULEX 6M
	95250620	Gasket - H/E-Flue Box MODULEX 5M
	95250621	Gasket - H/E-Flue Box MODULEX 4M
	95250622	Gasket - H/E-Flue Box MODULEX 3M

<b>MODULEX EXT Light Commercial Part List</b>		
	95250623	Gasket - H/E-Flue Box MODULEX 2M
31	95250624	Ignitor
32	95250847	Boiler Body Insulation MODULEX 2M
	95250848	Boiler Body Insulation MODULEX 3M
	95250849	Boiler Body Insulation MODULEX 4M
	95250850	Boiler Body Insulation MODULEX 5M
	95250851	Boiler Body Insulation MODULEX 6M
	95250852	Boiler Body Insulation MODULEX 7M
33	95251210	Graphite electrode gasket
34	95251274	Flame Detector
35	95251529	Return manifold gasket
36	95251587	Airbox gasket
37	95251588	Fan NRG118 gasket
38	95251592	Silicone gasket
39	95004061	Sheath bulbs
40	95251607	Gas manifold gasket
41	95251611	Flue terminal D.200 MODULEX EXT
42	95251841	Water manifold gasket
43	95261173	Burner gasket
44	95263570	Signal light
45	95261357	Boiler Drain Cock G 3/4"
46	95263452	Suction hose
47	95261558	Main Switch
48	95263756	Air Pressure Switch 43/40 pa
49	95263767	Air Pressure Switch 280/245 pa
50	95262011	Screw + Washer + Nut kit (12 pcs)
51	95262129	Mixer DUNGS SW12 - RG130 - nozzle D.7
52	95003985	THERMOSTAT JUMO 115°C L=3000
53	95004062	Ufly System Manager
54	95263579	Ignition Transformer
55	95000926	External sensor
57	95261535	Tank sensor
59	95262221	6,3A Fuse
60	95263074	Gas valve
61	95262565	Level sensor
62	95263922	Automatic Air Vent G3/4"
63	95262765	D.200 EPDM Gasket
64	95004063	Mesh Burner
65	95004064	Screw UNI 5931 M8X110
66	95262926	Gas spring
67	95262932	Gas cap inspection
68	95310512	Drain Elbow HTB DN40
69	95310513	Drain TEE HTEA DN 40/40
70	95310515	Drain Pipe 1M LG. DN 40
71	95004065	Flame Detector Cable
72	95611593	Ignitor Cable
73	95004066	Electronic Board

<b>MODULEX EXT Light Commercial Part List</b>		
74	95262930	hinge casing
75	95262931	Casing Top Panel lock
77	95003710	Connection box
78	95251870	Flanged flue outlet terminal
79	95372088	Gas inlet header Modulex 2/3 Elements
	95372089	Gas inlet header Modulex 4/5 Elements
	95372090	Gas inlet header Modulex 6/7 Elements
80	95004067	Flow header Modulex 2 Elements
	95004068	Flow header Modulex 3 Elements
	95004069	Flow header Modulex 4 Elements
	95004070	Flow header Modulex 5 Elements
	95004071	Flow header Modulex 6 Elements
	95004072	Flow header Modulex 7 Elements
81	95004073	Return header Modulex 2 Elements
	95004074	Return header Modulex 3 Elements
	95004075	Return header Modulex 4 Elements
	95004076	Return header Modulex 5 Elements
	95004077	Return header Modulex 6 Elements
	95004078	Return header Modulex 7 Elements
82	95002704	Ufly power supply board
83	95004079	CSD-1 manifold MLX EXT Light Commercial

# NOTES:



© AERCO International, Inc., 2024