AERCO
A WATTS Brand

Installation, Operation, & Maintenance Manual

Modulex EXT – Ufly Controller Commercial Series

Modulating and Condensing Boilers

Applies To Modulex Models:

- MLX EXT 1500 2S
- MLX EXT 2300 2S
- MLX EXT 2600 2S
- MLX EXT 3000 2S

Heating and Hot Water Solutions
AERCO International, Inc. • 100 Oritani Drive • Blauvelt, NY 10913
USA: T: (845) 580-8000 • Toll Free: (800) 526-0288 • AERCO.com
Technical Support • (800) 526-0288 • Mon-Fri, 8 am - 5 pm EST

OMM-0160_B • 3/7/2024

TABLE OF CONTENTS

CONTENTS

CHAPTER 1: SAFETY PRECAUTIONS

The following defined symbols are used throughout this manual to notify the reader of potential hazards of varying risk levels.

DANGER!
Indicates an imminent hazard which if not avoided WILL result in death or serious injury.

⚠ WARNING!
Indicates a potentially hazard which if not avoided MAY result in death or serious injury.

CAUTION!
Indicates a potential hazardous situation which if not avoided COULD result in minor or moderate injury. Also may caution against unsafe practices.

Note that all hazard notifications and notes are presented enclosed in a rectangle as shown below, in order to differentiate them from the main text.

It is of utmost importance to observe all hazard notifications presented in this manual to avoid injury, death, and damage to the equipment. Failure to properly heed safety hazard notifications may result in the voiding of 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 be dangerous to people, animals and property.

NOTE: Carefully read the information on the 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.

(Continued on Next Page)

Important - For Massachusetts Installations

(Continued from Previous Page)

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 Commercial boiler has been designed utilizing the latest heating technologies and in compliance with 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 Commercial 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. Failure to do so could result in severe damage to the boiler.
- The hardness of the main water supply influences the frequency with which the heat exchanger must be cleaned.
- In hard water areas where the main water can exceed 9 grains per gallon (gpg) total hardness, a scale reducing device is recommended.
- 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 in order 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 of the appliance must be carried out by AERCO authorized service 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 boiler or any of the following parts:

- 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 adjusting the screw pipe connections use only properly sized wrenches. The 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 gas or other flammable vapors or liquids in the vicinity of this or any appliance.

⚠ WARNING!

What to do if you smell gas:

- **Do not try to light any appliance.**
- **Do not touch any electrical switch.**
- **Do not use any phone in the building.**
- **Immediately call gas supplier from a neighbor's phone. Follow supplier's 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

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

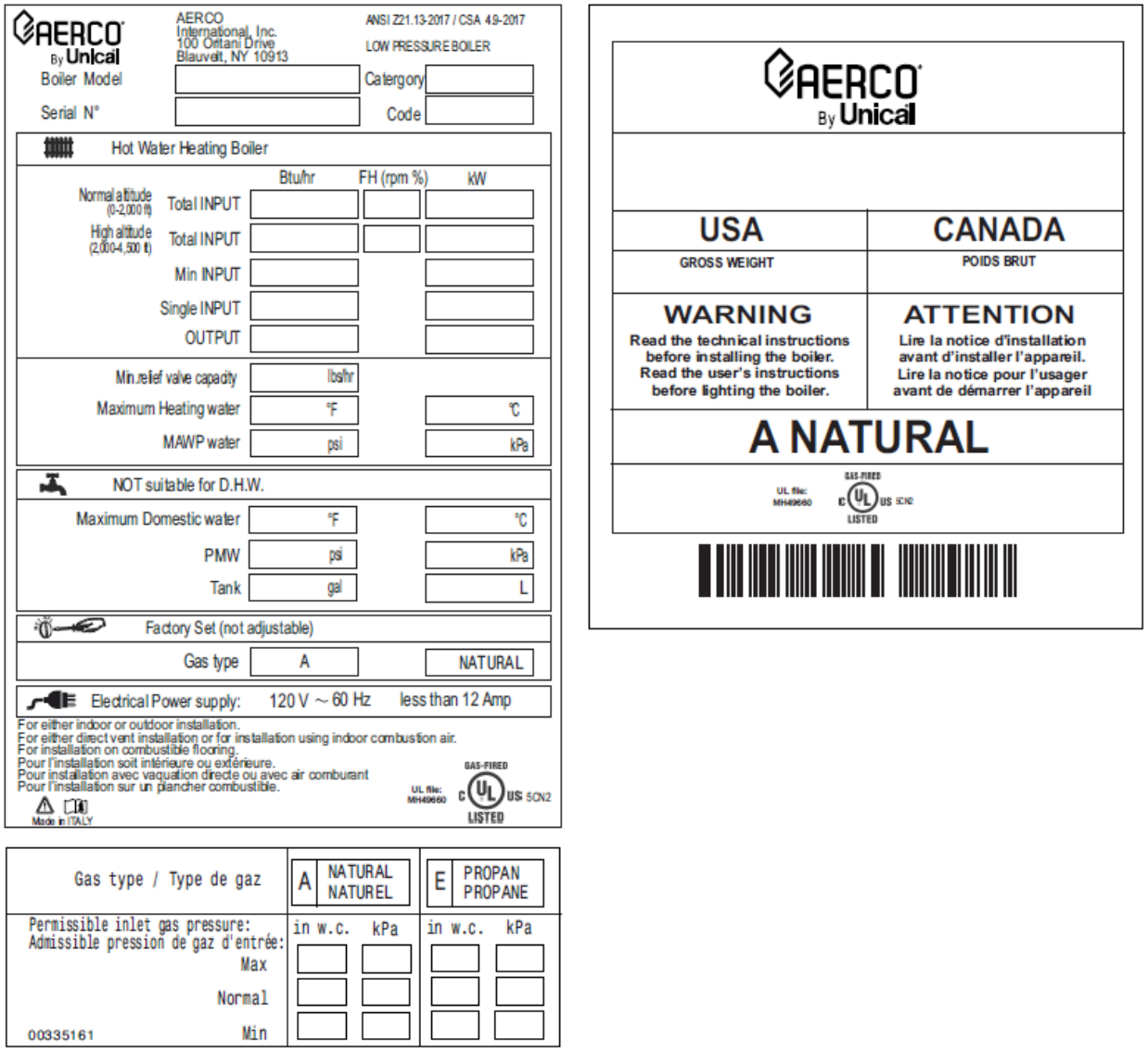


Figure 2-1: MODULEX EXT Commercial Data Plate (L) and Data Packing Label (R)

Each unit is fitted with a data plate, which may be consulted for the details on gas type, power source, and venting classification.

2.8 Operational Requirements

2.8.1 General Requirements

The following instructions MUST be followed:

- The boiler must only be used for its designated purpose as described herein.

- 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 may only be used if specifically designed for the intended application and do not affect system performance or 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 of the boiler or connections 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.
- If you find any defects, you must inform the owner, in writing, of the system defect and the associated hazard.

⚠ WARNING!

Should overheating occur, or the gas supply fail to shut off, do not turn off or disconnect the electrical supply to the pump. Instead, shut off 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.

- Follow all 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, mineralization or distillation to fill the heating system
- 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 Mutli-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 Of Packaging and Parts

- 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 using original spare parts. Non-observance of the above requirement may jeopardize 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 (82° C)
- Max Allowable Working Temperature ASME: 200 °F
- Max. Allowable Working Pressure ASME: 92 psi

CHAPTER 3: TECHNICAL FEATURES & DIMENSIONS

3.1 MODULEX EXT Commercial Technical Features

- Compact, gas fired, Low NO_x, condensing boiler.
- Comprised of one sectional boiler body, suitable as a single boiler or in a cascaded group.
- May be installed either an inside or outside location.
- Rated for ambient temperatures of 5 to 104°F (-15° to 40°C).
- Low internal water volume.
- Fast response to load variations.
- Flue exhaust outlet positionable on three sides.
- Manifold delivery and return.
- Made up of four or more heating elements (4 to 8), 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.
- Individual modules capable of between 83 and 382.5 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)
- Limit thermostat (each heating element)
- Flow NTC sensor (General)
- Return NTC sensor (General)
- Safety thermostat approved (manual reset)
- Flow sensor BCM

3.1.2 Control Panel (Ufly) Includes:

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

3.1.3 Other Features Include:

- NTC heat sensors for global temperature control on the flow and return.
- 0-10 V 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 operation: instantaneous power microprocessor control, with preset parameters for comparison between temperature (or calculated from the external temperature regulation) and global temperature flow.

- Operation modes:
  - Ability to control power to the individual heating elements for any calibration with or without confidential code access.
  - Production of A.C.S. (Active Cooling System) by NTC sensor of priorities for control by boiler feed pump or by three-way diverter valve controller.
- Ufly electronic controller included.
- BCM (Boiler Communication Module) 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.
- Alarm 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 automatically fires 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 by the pump 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. This 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, a back-flow preventer must be installed in the make-up/fill line.

3.4 Dimensional Drawings

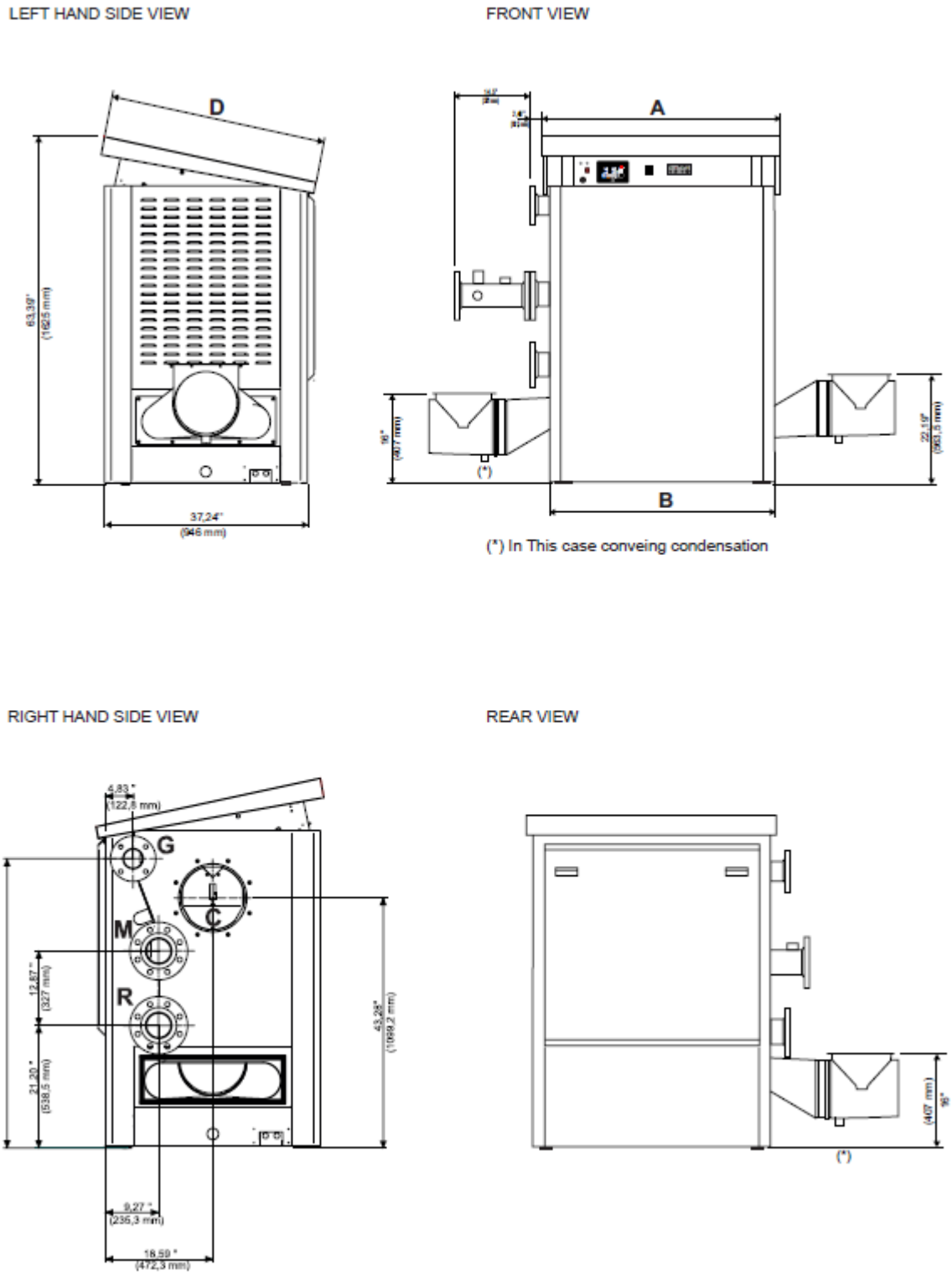


Figure 3-1: MODULEX EXT Commercial Dimensional Drawings

TABLE 3-1: MODULEX EXT Commercial Dimensions and Sizes

DIMENSION MODULEX EXT		1500 2S	2300 2S	2600 2S	3000 2S
No. of modules		4	6	7	8
Height open	inch	63.98"			
	mm	1625			
Height closed	inch	57.2"			
	mm	1453			
Width "A"	inch	42.80"	53.35"	63.90"	63.90"
	mm	1087	1355	1625	1625
Width "B"	inch	40.91'	51.45"	62.00"	62.00"
	mm	1039	1307	1575	1575
Depth "D"	inch	39.6"			
	mm	1006			
Depth "E"	inch	37.24"			
	mm	946			
CONNECTIONS					
G GAS	inch	DN80 - 3"			
	mm	76.1			
M C.H. system Flow	inch	DN100 - 4"			
	mm	101.6			
R C.H. system Return	inch	DN100 - 4"			
	mm	101.6			
Chimney Connection "C"	inch	10"	12"	12"	12"
	mm	254	304	304	304
Condensate drain diameter	inch	1.57"			
	mm	40			

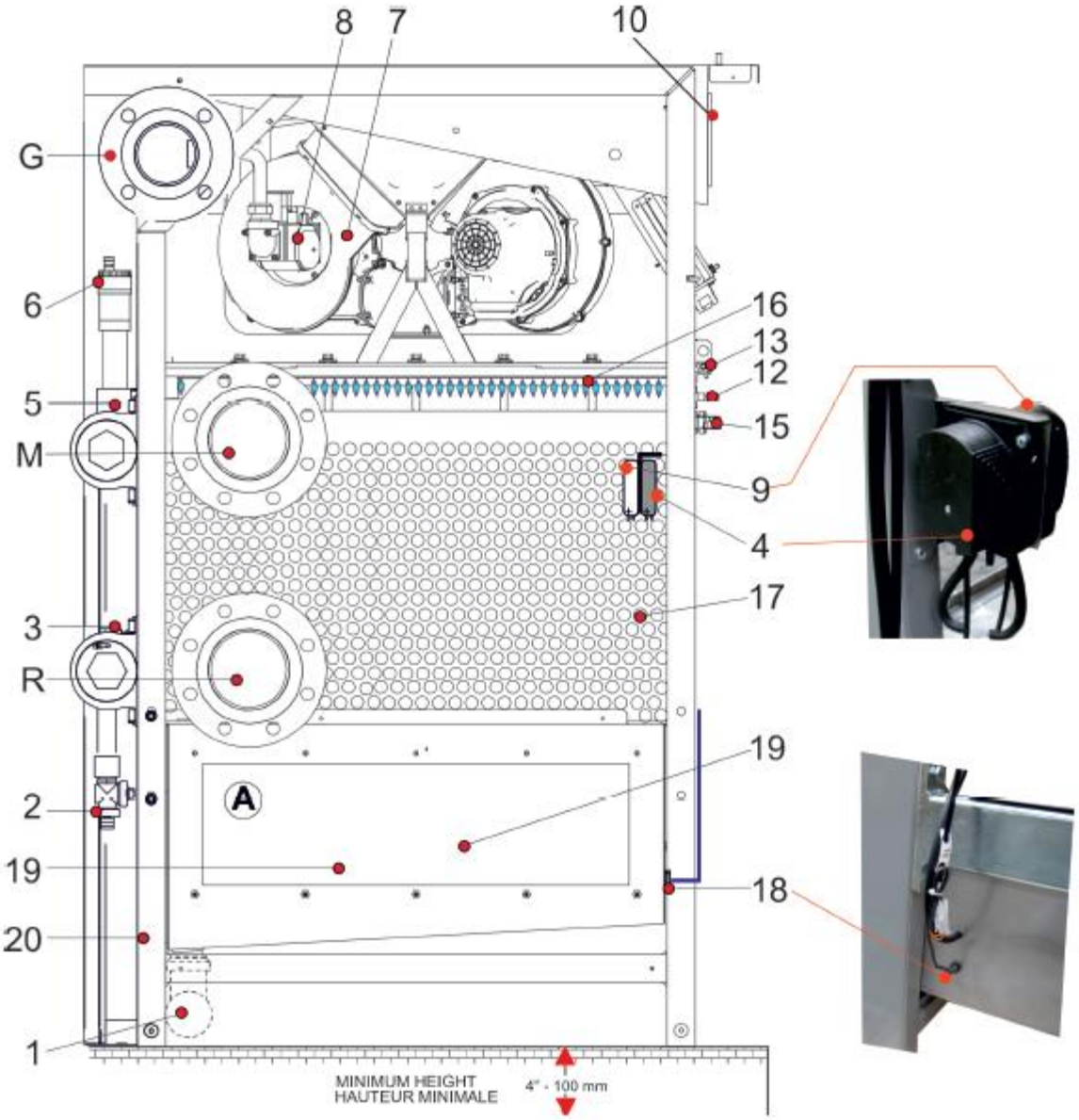


Figure 3-2: MODULEX EXT Commercial Main Components (Right Side View)

No.	S.E.	Description	No.	S.E.	Description
1		Condensate drain tap	13	E. RIL.	Detection electrode
2		Draining tap	15	TL	Limit Thermostat Probe
3	SRR	Global return temp. sensor	16		Burner
4	PF	Max air pressure switch	17		Aluminum silicon heat exchanger
5	SM	Global flow temp. sensor	18	SL	Condensate sensor level
6		Automatic air vent	19		Exhaust manifold
7	VM	Fan	20		Boiler frame
8	VG	Gas Valve	G		Gas inlet
9	PF min	Min air pressure switch	M		Heating system flow
10		Control panel	R		Heating system return
12	E. ACC	Ignition electrode		S.E.	= WIRING DIAGRAM KEY, see par. 4.25

3.5 Performance Data

Model MODULEX EXT	1500 2S	2300 2S	2600 2S	3000 2S
Min. heat input	83,300 Btu/hr (24.4 kW)			
Nominal heat input (low altitude)	1,530,000 Btu/hr 448.4 kW	2,295,000 Btu/hr 672.7 kW	2,677,000 Btu/hr 784.6 kW	3,060,000 Btu/hr 896.9 kW
(*) Nominal heat input (high) (reduction for Altitude)	1,377,000 Btu/hr kW403.6	2,065,500 Btu/hr 605.4 kW	2,409,300 Btu/hr 706.2 kW	2,754,000 Btu/hr 807.2 kW
Nominal heat output (HT)	1,382,202 Btu/hr 405.1 kW	2,073,303 Btu/hr 607.7 kW	2,418,402 Btu/hr 708.8 kW	2,764,404 Btu/hr 810.2 kW
Minimum heat output (HT)	N.R.			
Efficiency at full load (100%)	90.34%	90.34%	90.34%	90.34%
Efficiency at min load	84.23%			
Nominal heat output in condensing mode	1,433,610 Btu/hr 420.2 kW	2,150,415 Btu/hr 603.3 kW	2,508,349 Btu/hr 735.2 kW	2,867,229 Btu/hr 804.4 kW
Min. heat output in condensing mode	81,801 Btu/hr 24.0 kW			
Efficiency at nominal load in condensing mode	93.70%	93.70%	93.70%	93.70%
Efficiency at min load in condensing mode	98.20%			
Combustion efficiency at nomi load	89.82%	89.82%	89.82%	89.82%
Combustion efficiency at min. load	90.52%			
Stand-by losses	0.1%			
Flue gas temperature (Flue gas temp - room temp)	113°F (45°C)			
Air excess l	24.29%			
Condensate production max	11.57 Btu/hr 25.51 kW	23.15 Btu/hr 51.04 kW	28.97 Btu/hr 63.87 kW	34.74 Btu/hr 76.59 kW
Boiler category	II and IV			
Minimum water flow rate in CH circuit Δt 68 °F (20 °C)	3.89 gal/min 14.74 l/min			
Min. pressure in CH circuit	7.25 psi (50 kPa)			
Max pressure in CH circuit	92 psi (630 kPa)			
Water content in primary circu	2.67 gal 10.10 L	4.83 gal 18.30 L	5.92 gal 22.40 L	7.00 gal 26.50 L
Max operating temp	176°F (80°C)			
Min. operating temp.	86°F (30°C)			
Electrical supply	120 - 60 V-Hz			
Electrical req: 120 V 15 AMP m	1.4 FLA	2.8 FLA	3.5 FLA	4.2 FLA
Net weight	1,137 lbs (516 kg)	568 lbs (258 kg)	634 lbs (288 kg)	756 lbs (343 kg)
Gross weight	1,289 lbs (585 kg)	1,558 lbs (707 kg)	1,776 lbs (806 kg)	1,891 lbs (858 kg)
Max dynamic gas pressure A (natural)	10.5 in wc (2.61 kPa)			
Nominal dynamic gas pressure (natural)	7.0 in wc (1.74 kPa)			
Min dynamic gas pressure A (natural gas)	3.5 in wc (0.85 kPa)			
Max dynamic gas pressure E (Propan)	13.0 in wc (3.23 kPa)			
Nominal dynamic gas pressure (Propan)	11.0 in wc (2.74 kPa)			
Min dynamic gas pressure E (Propan)	8.0 in wc (1.99 kPa)			
(*) For adjustments, refer to section 3.30 and 3.31				

NOTE: The Technical data plate is placed under the casing. See section 2.7 for more information.

CHAPTER 4: INSTALLATION INSTRUCTIONS

4.1 Installation Warnings and Requirements

4.1.1 Appropriate Use of the Boiler

This boiler **MUST** be used in the application for which it has been expressly 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:

a) The whole system should be thoroughly flushed in order to remove any residual dirt or grime which could compromise correct boiler operation.

b) Check that the boiler has been preset for operating with the gas type available. This is verifiable via the data badge.

c) 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

Installers **MUST** follow local regulations with respect to installation of Carbon Monoxide (CO) Detectors. Also, they must follow the maintenance recommendations in this manual.

4.1.5 Installation Conformity Requirements

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 method 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 affixed to a pallet. This allows the boiler to be handled by a forklift. The boiler minimum dimension without packaging is 37.2". By removing the sheet metal, the unit can be moved through a standard 36" doorway.

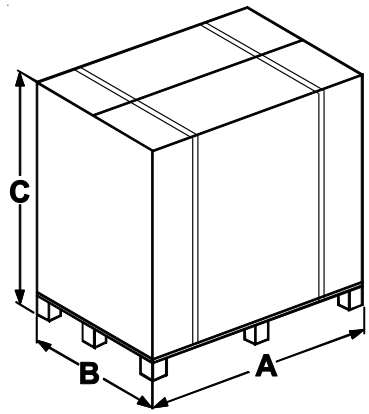


Figure 4-1: MODULEX EXT Shipping Package and Included Parts Location

TABLE 4-1: MODULEX EXT Shipping Package Dimensions

MODEL	A	B	C	GROSS WEIGHT
EXT 1500 2S	49.3‘‘ (1252 mm)	44.8‘‘ (1140 mm)	82.4‘‘ (2095 mm)	1289 lb. (585 kg)
EXT 2300 2S	59.8” (1531 mm)	44.8‘‘ (1140 mm)	82.4‘‘ (2095 mm)	1558 lb. (707 kg)
EXT 2600 2S	71.6‘‘ (1819 mm)	44.8‘‘ (1140 mm)	82.4‘‘ (2095 mm)	1776 lb. 806 kg
EXT 3000 2S	71.6‘‘ (1819 mm)	44.8‘‘ (1140 mm)	82.4‘‘ (2095 mm)	1891 lb. (858 kg)

4.4 Transporting And Securing the Boiler Safely

The boiler is susceptible to serious damage if 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 when moving to prevent it from falling off.
- Protect all parts against impacts during transportation.

4.5 Unpacking The Boiler

CAUTION!

Keep packing elements (straps, bags, etc.) away from children to prevent suffocation. AERCO is not liable for any injury to persons, animals or damage to property derived from not following these directions.

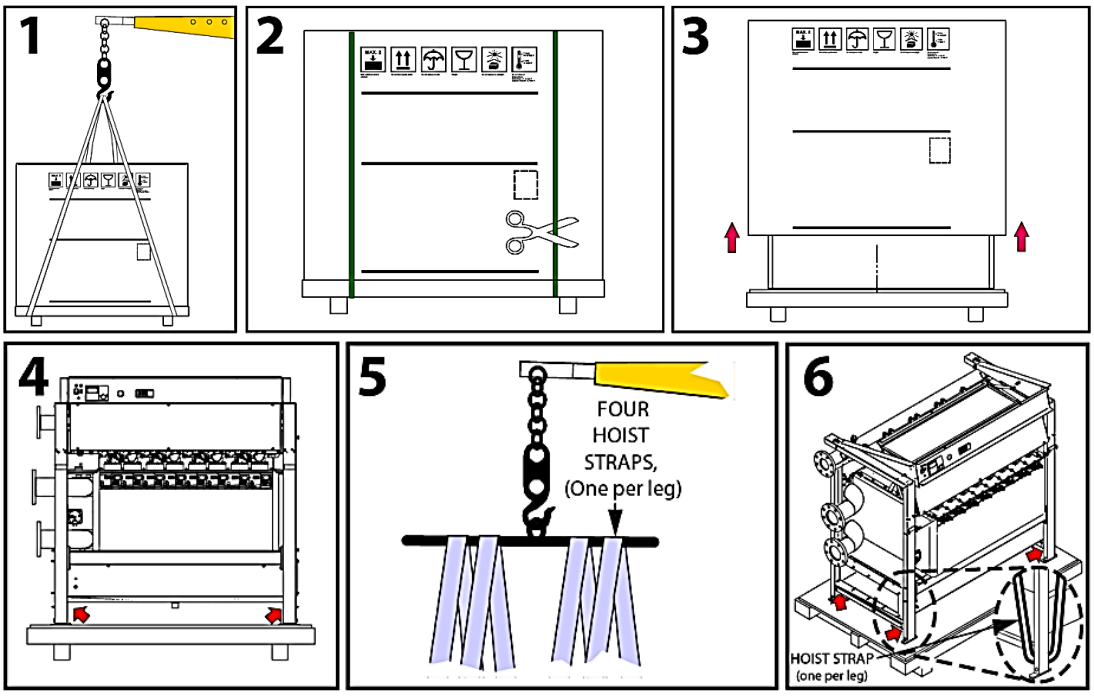


Figure 4-2: Boiler Unpacking and Hoisting

1. Prior to opening, the boiler may be moved by a hoist crane as shown (Panel 1) or forklift.
2. Remove packing straps (Panel 2) and cardboard box (Panel 3), making sure product is intact.
3. Remove boiler from the pallet with a jib crane (Panel 5), to avoid damage during the removal.
4. Prepare boiler for lifting by removing front, rear, right, left and top panel covers (Panel 6).
5. Use the four hoist straps (Panel 5) as slings and place one under each of four boiler legs ensuring that strap is located UNDER the cross bars of the frame as shown in Panel 6.
6. Ensure belts are placed correctly on all four boiler legs before attempting to lift it.

4.6 Boiler Package Contents

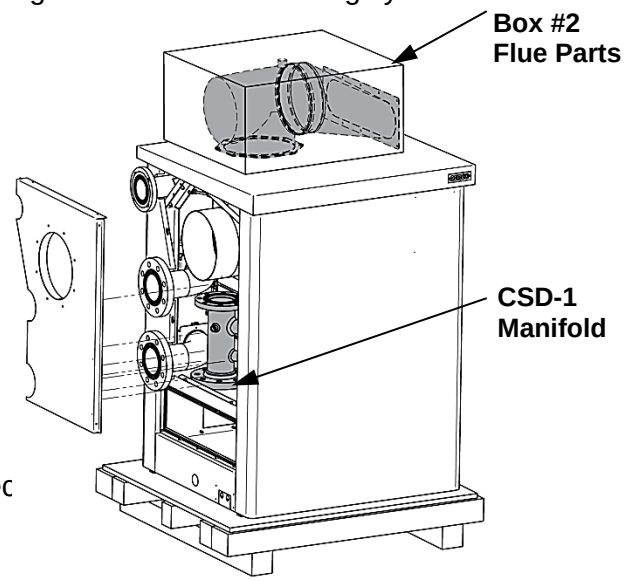
In the packaging, in addition to the boiler, you will also find the following contents:

ON THE LEFT HAND SIDE OF BOILER (UNDER PANEL)

- CSD-1 manifold
- Relief Valve

CARDBOARD BOX #1

- Gasket between exhaust manifold and adaptor
- Four (4) piping elbows, a piping tee, and plastic plug for condensate draining system
- Hardware for assembling exhaust manifold
- Three (3) sensors:
  - Remote temperature sensor
  - DHW Storage tank sensor
  - Outdoor temperature sensor
- Electrical resistor kit for emergency operation
- Combustion sampling port for the flue
- Metal plate and cable for power output



CARDBOARD BOX #2

- European-to-USA vent adaptor
- Two (2) gaskets for air intake and exhaust connec
- One (1) 300 mm diameter gasket

INSIDE CASING ON THE BACK OF THE BOILER

- Two (2) pipes, each 3.3 feet (1 m) long for the condensate draining system

ABOVE THE TOP COVER OF THE BOILER

- Installation and Operation Manual (OMM) and Ufly Controller Instruction Manual.

IN A SEPARATE BOX

- Air intake adaptor for spiral ducting only
- Temperature & Pressure gauge
- Flow Switch
- Pipe adaptor (rubber)

4.7 Location in Boiler Room

Installation must comply with all regulations about boiler enclosures, boiler rooms, installations of heating and hot-water systems, ventilation, 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 4-3), in order to assemble the condensate trap. An alternative to this base may be a 100 mm deep well or trench next to the boiler to accommodate the condensate "U" drain pipe (see Figure 4-3). After installation the boiler shall be perfectly horizontal and stable, to reduce any possible vibrations or noises.

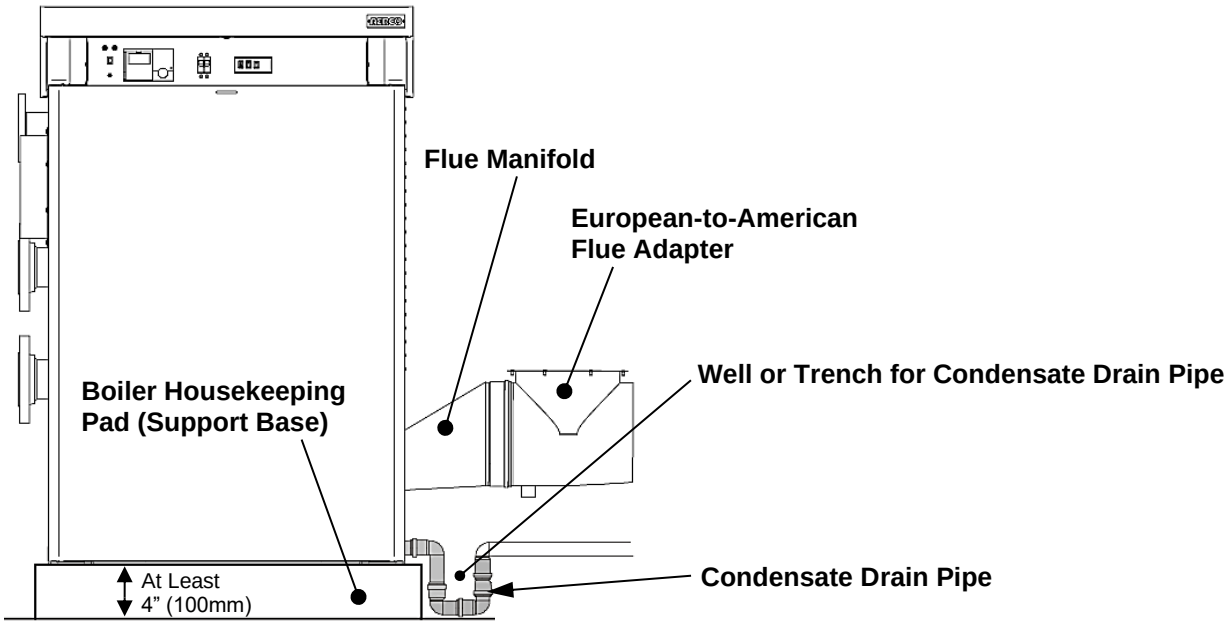


Figure 4-3: Boiler on Housekeeping Pad with Condensate Drain Pipe (Front View)

4.7.1 Boiler Room Safety Concerns

When selecting the position for the installation of the boiler comply with the following 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.
- Never use or store any chlorinated detergents or halogenated hydrocarbons (e.g. in spray cans, solvents and detergents, paints, adhesives) in proximity to 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.

4.7.2 Products to Avoid in the Boiler Room

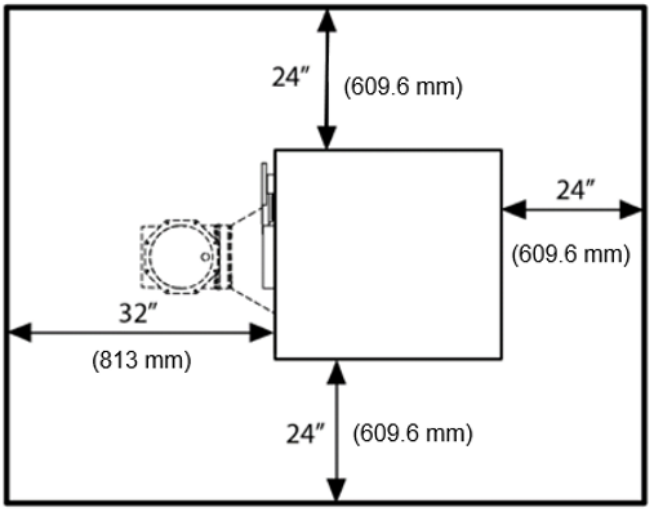
Do NOT store the following in the boiler room and/or around combustion air intake vents.

- 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

4.8 Recommended Clearances for Servicing

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



TOP of the boiler:	24‘‘	(609.6 mm)
FRONT of the boiler:	24’’	(609.6 mm)
UNVENTED side:	24’’	(609.6 mm)
VENTED side:	32’’	(813 mm)
FLOOR/GROUND:	4’’	(100 mm)
REAR of the boiler:	24’’	(609.6 mm)

Figure 4-4: MODULEX EXT Boiler Clearances

It is recommended to install the boiler with the clearances as shown above 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.

4.9 Gas Connection General Information

For **natural gas** connections see Section **4.9.1**. For **propane gas**, see Section **4.9.2**.

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. 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 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 in order to remove any residual grime which could compromise the boilers 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).

Clause 1.34.1b.12: Provisions for combustion and ventilation air in accordance with the section "Air for Combustion and Ventilation," of the National Fuel Gas Code, ANSI Z223.1/NFPA 54, or Sections 8.2, 8.3 or 8.4 of Natural Gas and Propane Installation Code, CAN/CSA B149.1, or applicable provisions of the local building codes.

Clause 1.34.1b.21: A sediment trap must be provided upstream of the gas controls.

⚠ WARNING!

Gas connections must be installed by a registered installer who must comply with all regulations and requirements indicated by the local gas supplier. An incorrect installation can cause injury or death to persons or animals or damage to property. The manufacturer is not 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. The suitable gas type for the boiler is indicated on the packaging label and on the data plate boiler. First check the identification plate on the boiler for the suitable gas type.

Always check the safety of the gas pipe system by means of a soap bubble test using a leak-search spray.

4.9.1 Natural Gas Connections

4.9.1.1 Natural Gas Piping Sizes

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

4.9.1.2 Natural Gas Piping Connections

The boiler gas pipe is equipped with external 3'' ASME B16.5 flange, 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.

4.9.1.3 Natural Gas Supply Pressure Requirements

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

4.9.2 Propane Gas Connections

4.9.2.1 Propane Gas Piping Sizes

Contact your local gas supplier for Propane gas pipe sizes, tanks, and 100% lockup gas pressure regulator.

4.9.2.2 Propane Gas Piping Connections

The boiler pipe is provided with external 3'' ASME B16.5 flange, 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. Use a gas shut off valve compatible with propane gases. A sediment trap must be provided upstream of the gas controls.

4.9.2.3 Propane Gas Supply Pressure Requirements

Pressures required at gas valve inlet pressure port:

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

NOTE: Ensure the high gas pressure regulator is installed at least 6-10 feet upstream of the boiler.

4.10 Flow And Return Pipe Connections

The cold and hot water flow and return circuits must be connected to the boiler via the respective 4" M and R connections as indicated in Table 2-1.

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 is 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.

DO NOT FIT ON-OFF VALVES IN THE PIPING BEFORE THE REQUIRED SAFETY DEVICES.

4.11 Pressure Relief Valve

Each unit is delivered with a 1-1/2 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 4-5).

IMPORTANT! Discharge piping MUST be installed at the relief valve discharge, and must run to a safe place of disposal. The discharge piping must be installed in accordance with local codes.

4.12 CSD-1 Manifold Assembly (Supplied)

The installation of a flow switch and pressure/temperature gauge are required. A 1-1/2" Pressure Relief Valve designed for the boiler output capacity must also be installed:

The 1-1/2" Pressure Relief Valve must be installed on-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 4-5. The manifold assembly components supplied are:

- 1-1/2" Pressure Relief Valve
- Flow Switch
- Pressure/Temperature Gauge

The pressure relief valve and all other manifold components are shown below.

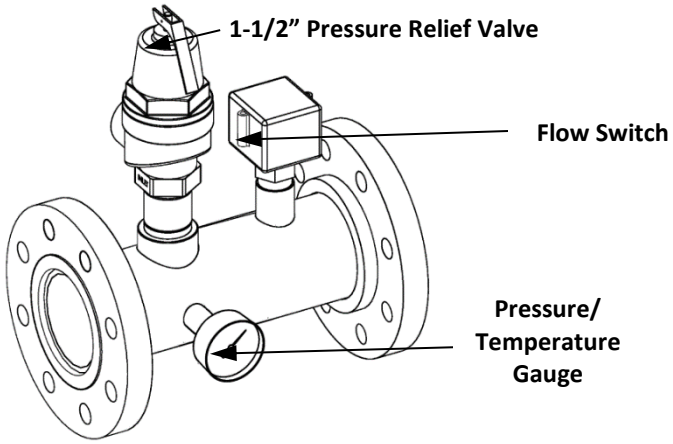


Figure 4-5: CSD-1 Manifold Assembly and Components

Complete the instructions below to install the pressure relief valve and the other components.

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

Installing the Pressure Relief Valve and Flow Switch

1. Attach manifold to the outlet supply connection on the boiler via the flanged connections.
2. Cut the flow switch paddle for 4" 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 the switch counter-clockwise until the switch trips.
   b) Then turn screw 1/2 turn clock-wise and continue installation.
3. Connect the following components to the tapped holes in the manifold assembly, as shown above:
   - Flow Switch
   - Pressure/Temperature Gauge

NOTE: Ensure the flow switch is installed with the "flow" arrow pointing in the direction of the flow.

4. Install the 1-1/2" Pressure Relief Valve to the third tapped hole in the CSD-1 manifold assembly, as shown above.
5. Check to ensure that all components are securely tightened and that the flow switch paddle moves freely without interference.
6. 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.

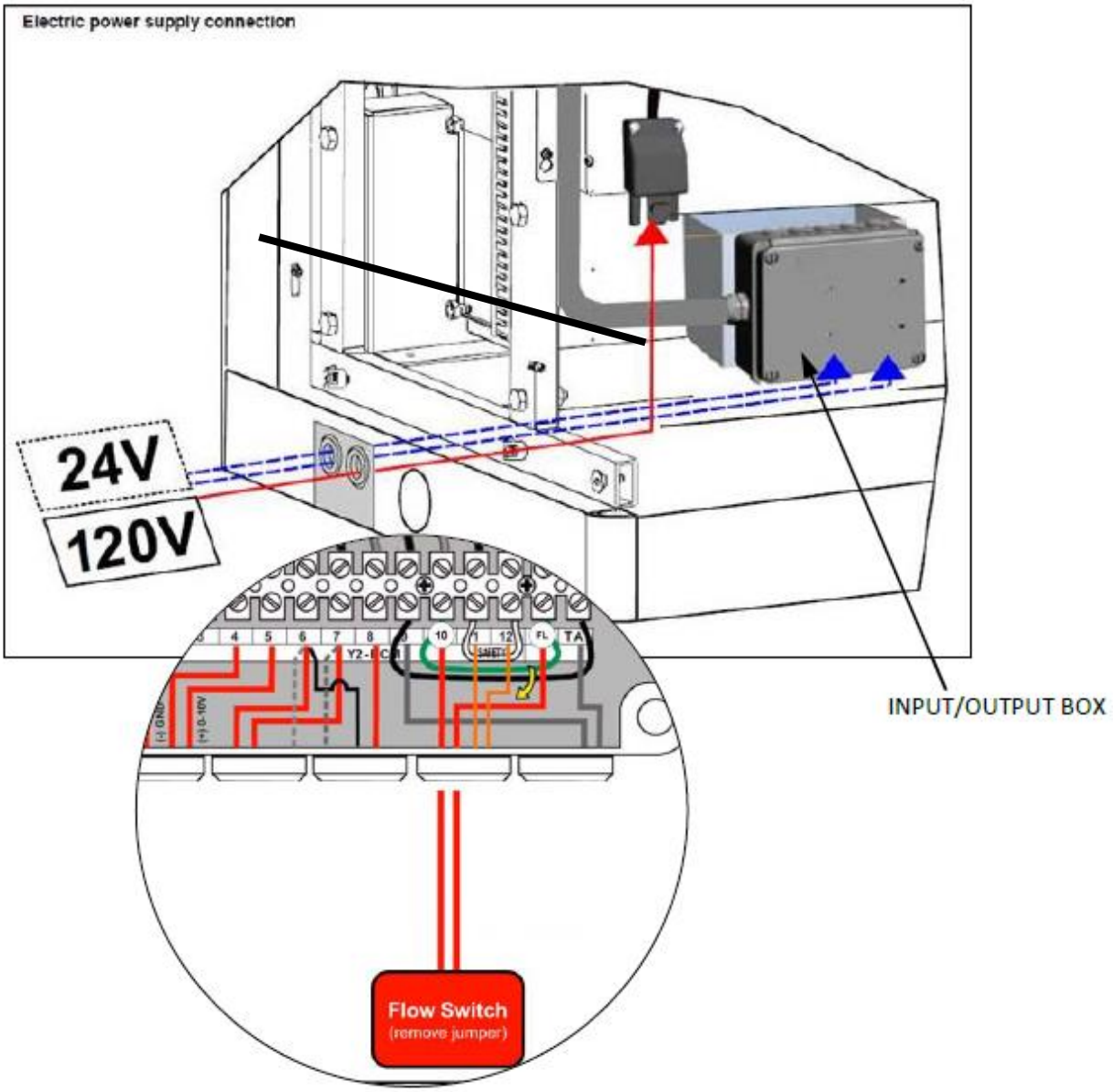


Figure 4-6: BMM Location and Flow Switch Connection

4.13 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 Δt 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.

TABLE 4-2: MODULEX EXT Minimum/Maximum Flow Rates				
BOILER MODEL	**EXT 1500 2S**	**EXT 2300 2S**	**EXT 2600 2S**	**EXT 3000 2S**
Min. flow rate demanded in gpm ΔT 27°F (15°C)	5	5	5	5
Min. flow rate demanded in gpm ΔT 36°F (20°C)	4	4	4	4
Max flow rate demanded in gpm ΔT 27°F (15°C)	102	153	179	205
Max flow rate demanded in gpm ΔT 36°F (20°C)	77	115	134	153

The water side resistance curve of the boiler is shown in the diagram in Figure 4-7.

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.

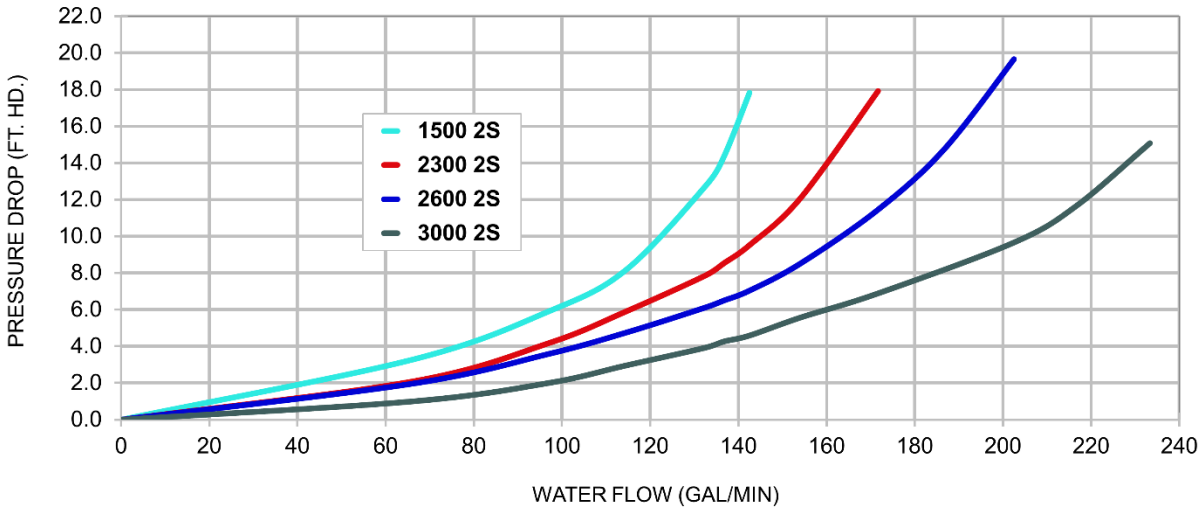


Figure 4-7: MODULEX EXT Water Side Pressure Losses

NOTE: The use of a mixing header fitted between the boiler circuit and the system circuit is always advisable. It becomes INDISPENSABLE if the system requires flow rates superior to the maximum permitted boiler flow rates, which is to say lower than 27° F (15 K).

4.14 Condensate Piping And Drain

To avoid condensate collecting inside the combustion exhaust system, the condensate piping must slope toward the drain at least 3/8 inch per foot (30 mm/m).

The liquid column, inside the condensate siphon, (see Condensate Siphon Filling Plug in Figure 4-8) 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, if other means of neutralizing the waste are not available.

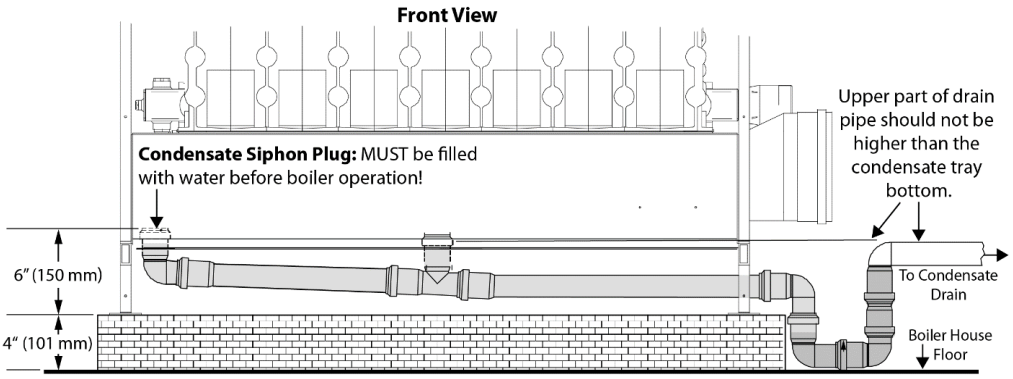


Figure 4-8: MODULEX EXT Condensate Piping

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 4-8.

⚠ WARNING!

Before commissioning the boiler, fill the condensate siphon with water, at the dedicated filling-up plug. See Figure 4-8.

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.

4.15 Water Treatment

The chemical/physical composition of the heating system's water is fundamental to the boiler's correct operation and safety. Among the problems caused by poor quality of feed water, the most frequent and most serious is the buildup of deposits on boiler thermal exchange surfaces.

A less frequent (but still serious) problem is the buildup of deposits on the water circulating piping surfaces caused by improperly treated water. Because of the low thermal conductivity of mineralization deposits, thermal exchange efficiency may be seriously reduced and cause dangerous overheating.

NOTE: Never use water that has been treated by reverse osmosis, deionization, mineralization, or distillation to fill the heating system.

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

- When the hardness of the water is higher than 9 grains per gallons (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 eliminate or substantially reduce lime scale deposit, corrosion sludge, deposits, and 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, use a sediment filter or other device.

Water pH: If water has a pH above 8 or below 5 then the water must be treated to provide a medium pH of between 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.

4.16 Important Installation Warnings

4.16.1 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.

4.16.2 Antifreeze Compatibility Warning

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

4.16.3 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.

4.16.4 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 the cooling cycle.

4.17 Optional Air Intake Connection

Install air intake connector as shown in Figure 4-9. Use silicone to lubricate the internal surface of the seals before assembling. For air intake connection piping use only:

- 10” for MODULEX EXT 1500 2S
- 12” for MODULEX EXT 2300 2S - 3000 2S.

The Air Intake Connector that ships with the unit is for spiral ducts only. For other materials, please contact AERCO directly.

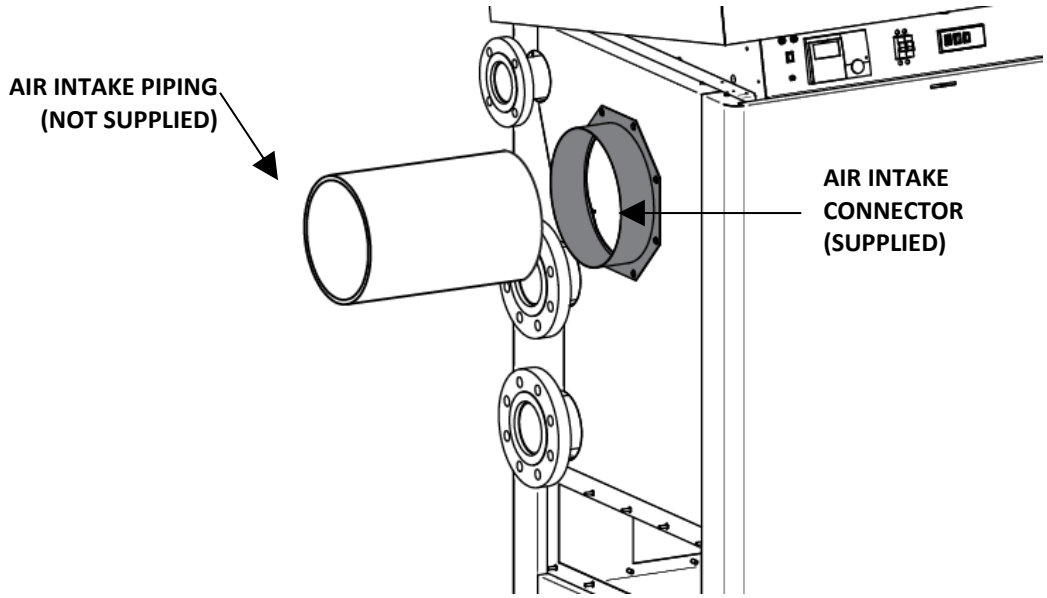


Figure 4-9: MODULEX EXT Air Intake Connection

4.18 Flue Manifold Installation

To assemble the flue manifold to the boiler flue exhaust opening, retrieve the ten (10) nuts and washers from the plastic bag, shipped with the boiler, and affix to the boiler opening per Figure 4-10. The Manifold may be installed on left, front, or rear. If switching to left or rear positions, unused outlet should be covered with the plate and gasket removed from outlet being used.

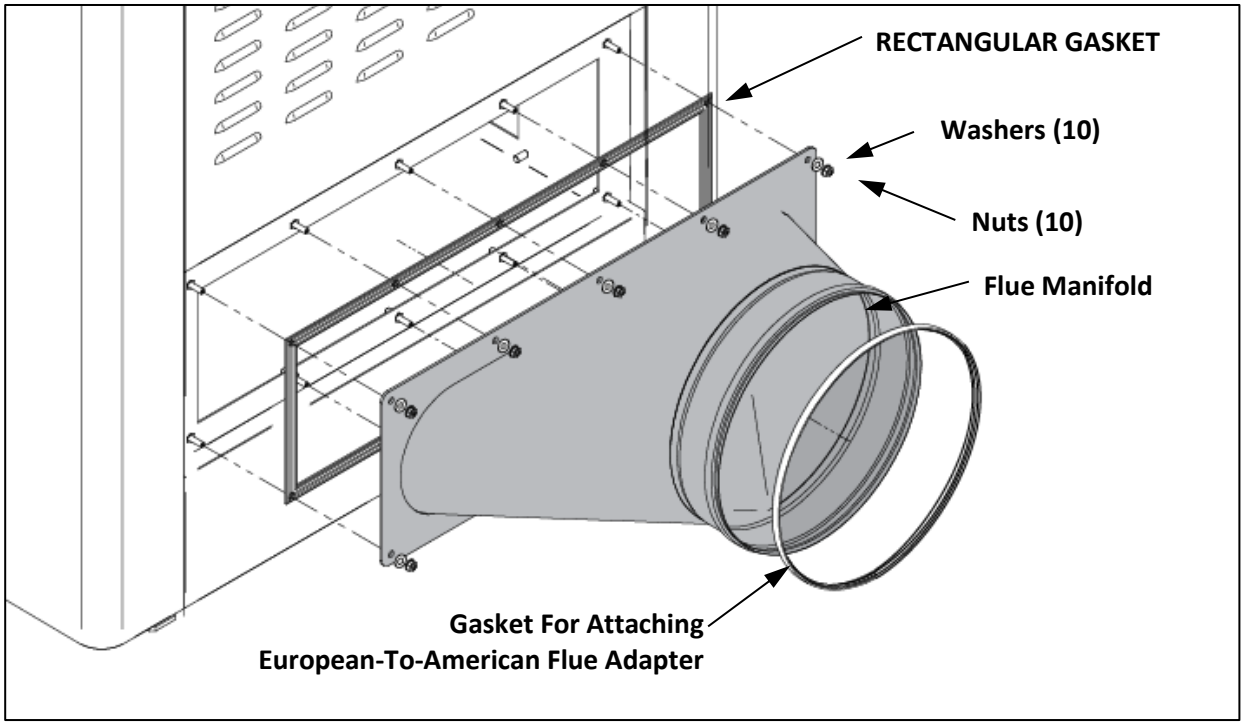


Figure 4-10: Connection of Exhaust Manifold to Boiler Flue Exhaust Outlet

For venting systems in the USA, it is necessary to assemble the Euro-to-USA adaptor to the flue manifold as shown in Figure 4-11.

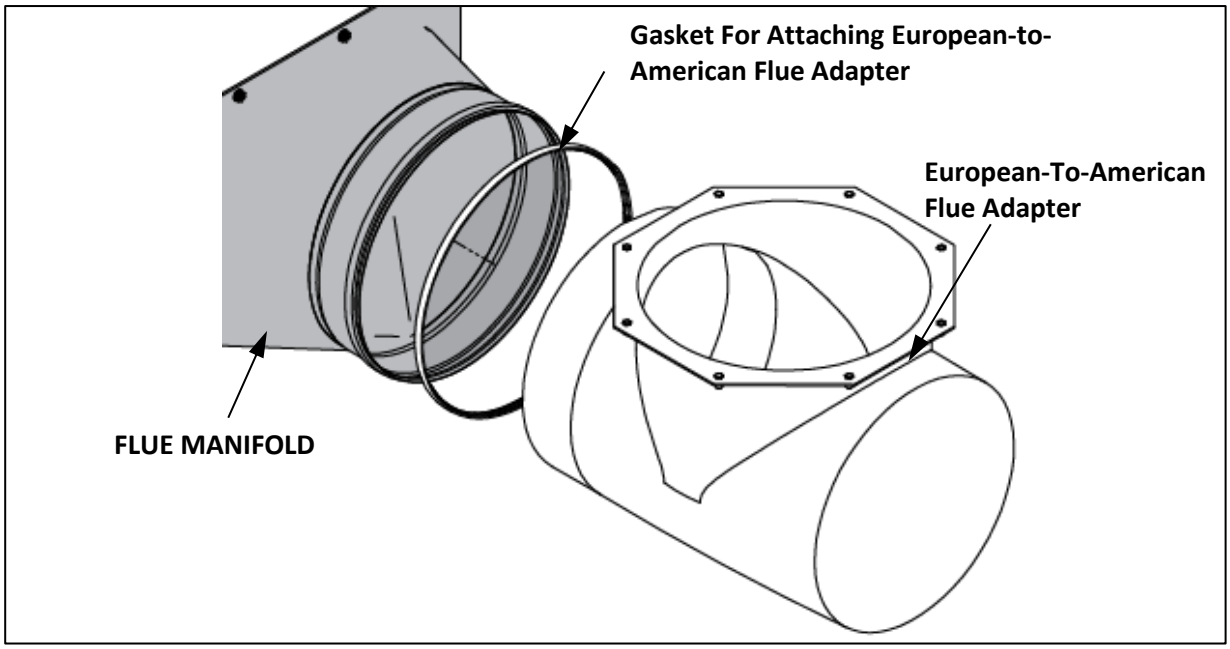


Figure 4-11: Assembly of European-to-American Flue Adaptor to Flue Manifold

NOTE: The gasket may seem large. It is intentionally designed to produce a tight fit.

4.19 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 be 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, refer to national and local codes.

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.

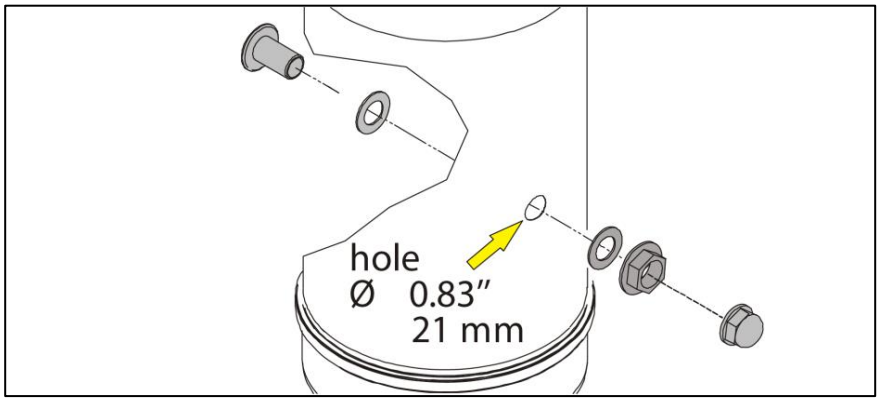


Figure 4-12: Installation of Test Nipple into Flue Manifold Piping

NOTE: 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.

4.20 Vent Starter Pieces

All vent starter pieces for the MODULEX EXT 1500 through 3060 can be purchased directly from the vent manufacturer.

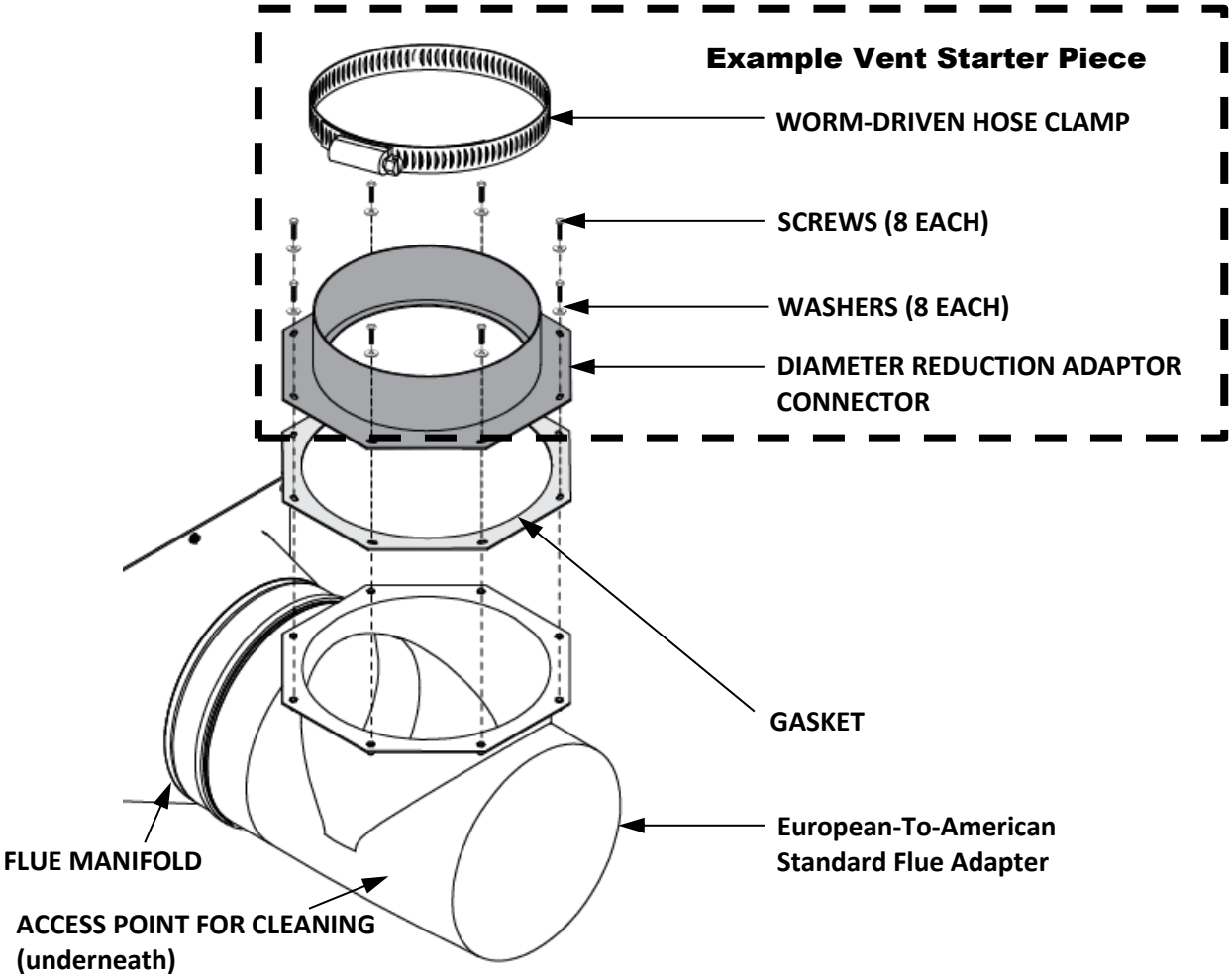


Figure 4-13: Flue Exhaust Diameter Reduction Adaptor Kit

TABLE 4-3: Vent Part Numbers

MODEL	DIA.	MATERIAL	PART NUMBER
EXT 1500 2S	10”	Stainless	Contact vent manufacturer
		Polypropylene	Contact vent manufacturer
		PVC	58115-1
EXT 2300 2S – 3000 2S	12”	Stainless	Contact vent manufacturer
		Polypropylene	Contact vent manufacturer
		PVC	58115-2

In the case of PVC venting, the flue venting pipe is affixed to the adapter using RTV liquid silicone 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.

Please note that 10" and 12" PVC can be heavy and expensive. Alternative vent materials, such as AL29-4C or polypropylene should be considered prior to installation.

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).

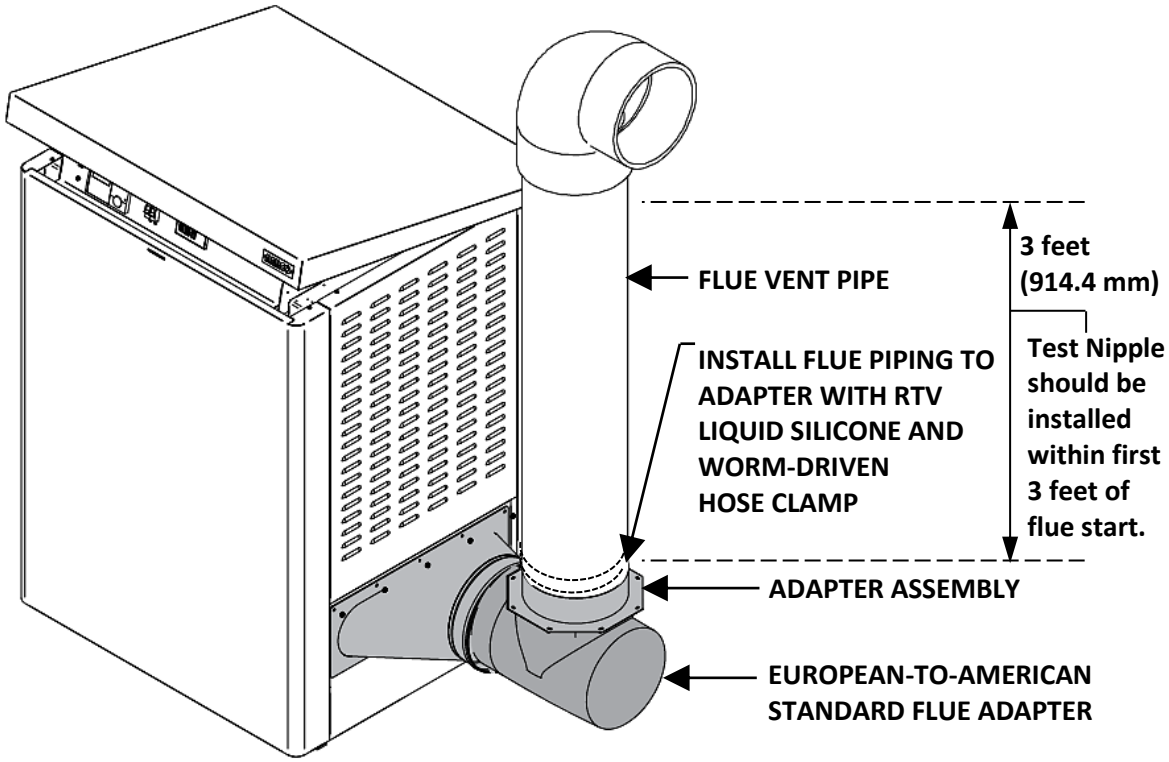


Figure 4-14: Installed Flue Exhaust Diameter Reduction Adaptor Kit

4.21 Combustion Air and Ventilation Openings

Provisions for combustion and ventilation air must be made 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 applicable provisions of the local building codes.

4.21.1 Insufficient Ventilation and Combustion Air

CAUTION

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 combustion air is 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 and 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.

When contaminated combustion air is expected (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.

CAUTION!

See Section 4.7.2 for warnings and guidelines concerning materials and contaminants that should be avoided in the boiler room and near air inlets when operating the boiler.

4.21.2 Room Air Combustion

The boiler 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).

4.21.3 Sealed Combustion

The boiler 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.

4.22 Installing 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 boiler model dependent. The maximum permissible lengths are listed in Section 4.23.

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.

Do not 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.

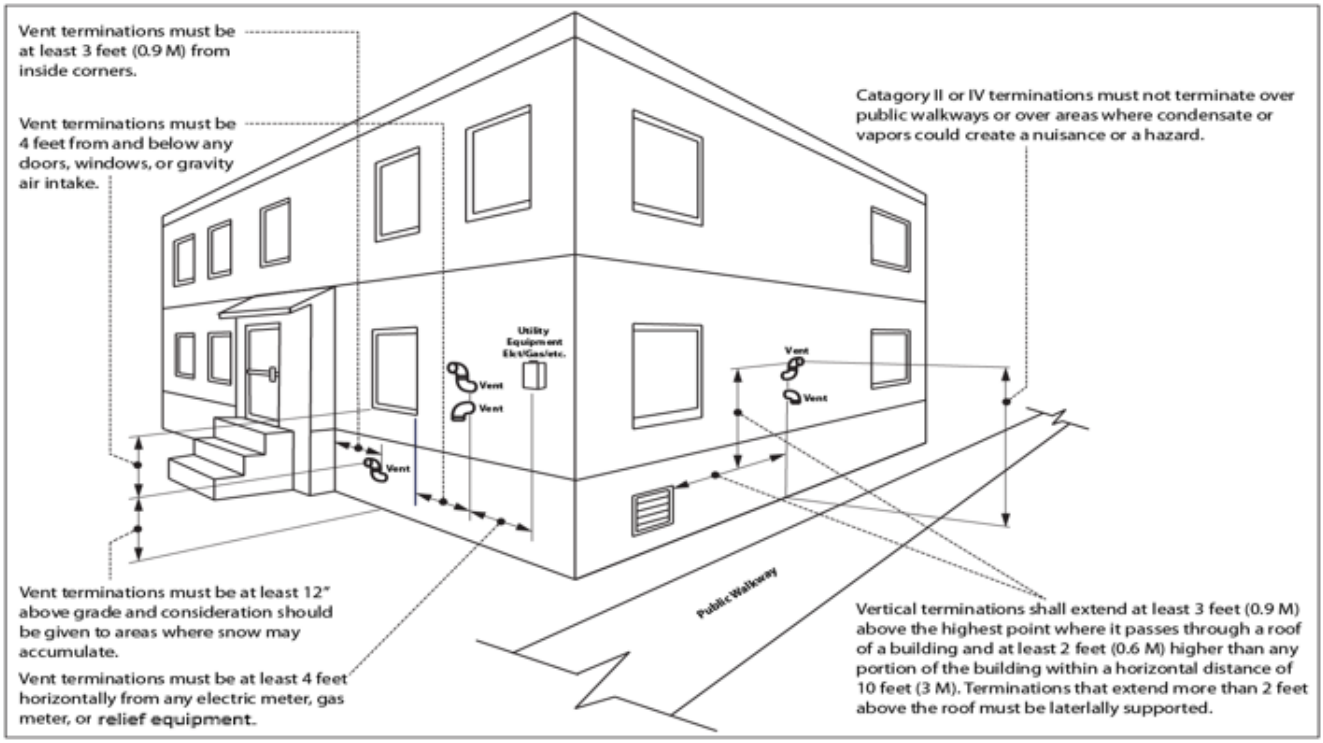


Figure 4-15: Minimum Distances of Exhaust Opening and Building Features

4.22.1 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.

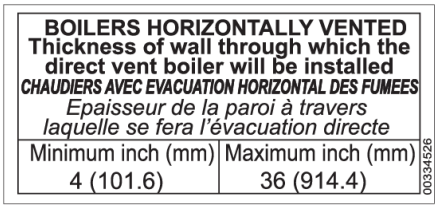
The terminal must not be located in a place likely to cause a nuisance.

Maintain 12" of clearance above the highest anticipated snow level or grade, 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, NOT completely nor partly downwards.

4.22.2 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.



4.23 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: MODULEX 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 1500 2S	4	10" (254 mm)	100 ft. (30 m)	6 + 6 (1.8 + 1.8)
EXT 2300 2S	6	12" (304 mm)	100 ft. (30 m)	6 + 6 (1.8 + 1.8)
EXT 2600 2S	7	12" (304 mm)	100 ft. (30 m)	6 + 6 (1.8 + 1.8)
EXT 3000 2S	8	12" (304 mm)	100 ft. (30 m)	6 + 6 (1.8 + 1.8)

TABLE 4-5: MODULEX EXT Vent and Piping LENGTH Chart

MODEL	VENT PIPE DIAMETER	SHARP 90° ELBOW EQUIVALENT FEET (M)	SWEEP 90° ELBOW EQUIVALENT FEET (M)	45° ELBOW EQUIVALENT FEET (M)	MAXIMUM LENGTH EQUIVALENT FEET (METERS)
EXT 1500 2S	10" (254 mm)	13 Feet (4 m)	7 Feet (2 m)	5 Feet (1.5 m)	100 Feet (30 m)
EXT 2300 2S – EXT 3000 2S	12" (304 mm)	13 Feet (4 m)	7 Feet (2 m)	5 Feet (1.5 m)	100 Feet (30 m)

NOTE: The flue system must be installed in accordance with the local and national Standards.

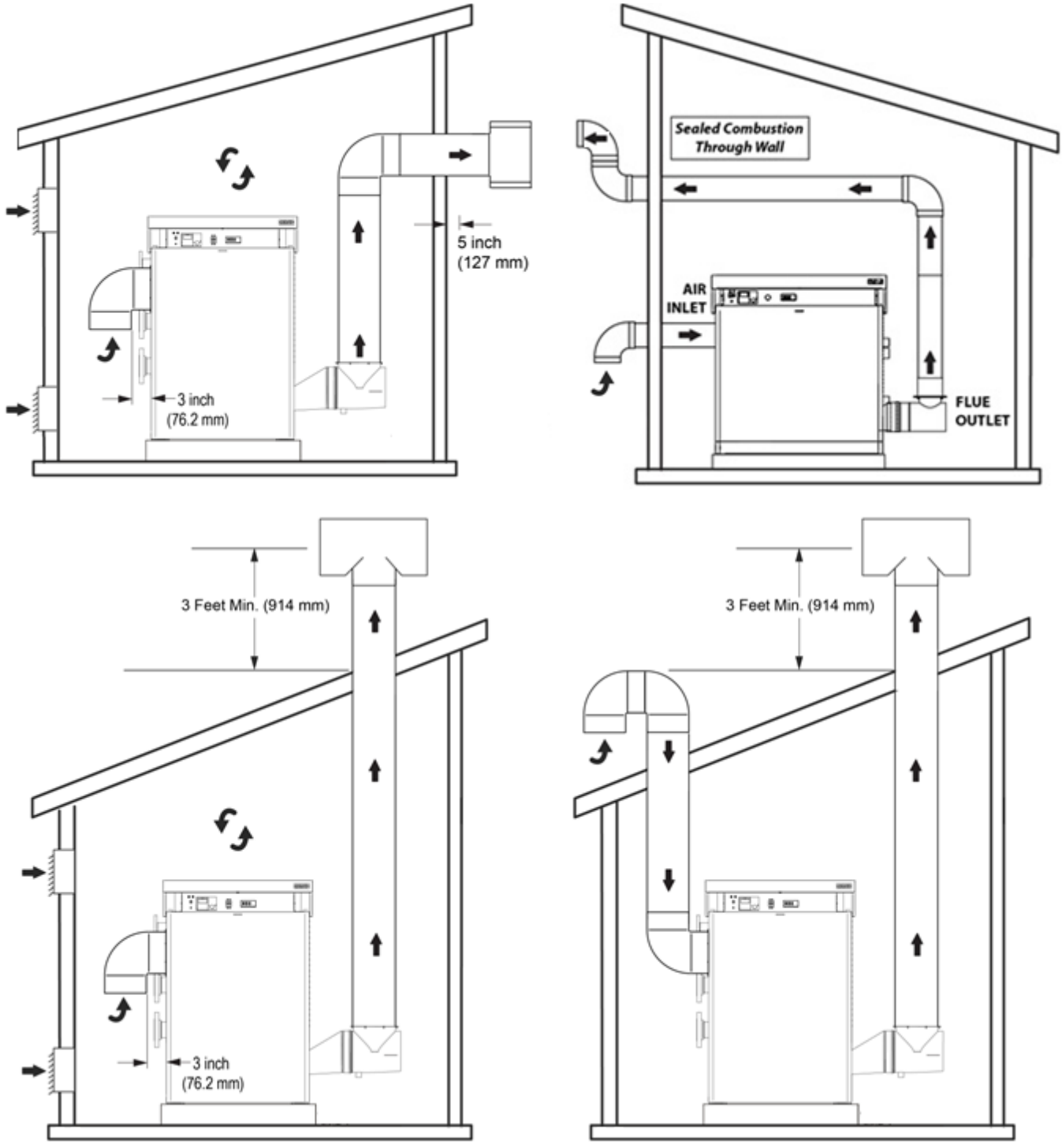


Figure 4-16: MODULEX EXT Allowable Venting Solution Examples

4.24 Electrical Connections

4.24.1 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 should conform with **CSA C22.1** Canadian Electrical Code Part 1, if installed in Canada.

CAUTION!

The boiler must be electrically grounded in accordance with local codes, or in absence of local codes, the National Electrical Code, ANSI/NFPA 70 and/or the CSA C22.1, Electrical Code.

Gas, Domestic Hot Water, and C/H system pipes must NEVER be used 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 does not accept responsibility for any damages arising from failure to correctly electrically ground the boiler.

It is necessary that a qualified technician 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 the appliance's general electrical supply, the use of adaptors, multiple sockets, and/or extension cords is strictly forbidden.

Use of any power supply equipment implies the observance of several 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 or rain unless explicitly prepared and installed for such use.**
- **Do not permit children or inexpert people to use the appliance.**

4.24.2 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 4-18.

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 required 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.

⚠ 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 person. Before carrying out the connections or any other operation on the electrical parts, always switch off and disconnect the electricity supply and ensure for yourself that it cannot be accidentally turned on.

4.24.3 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.

4.24.4 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.

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

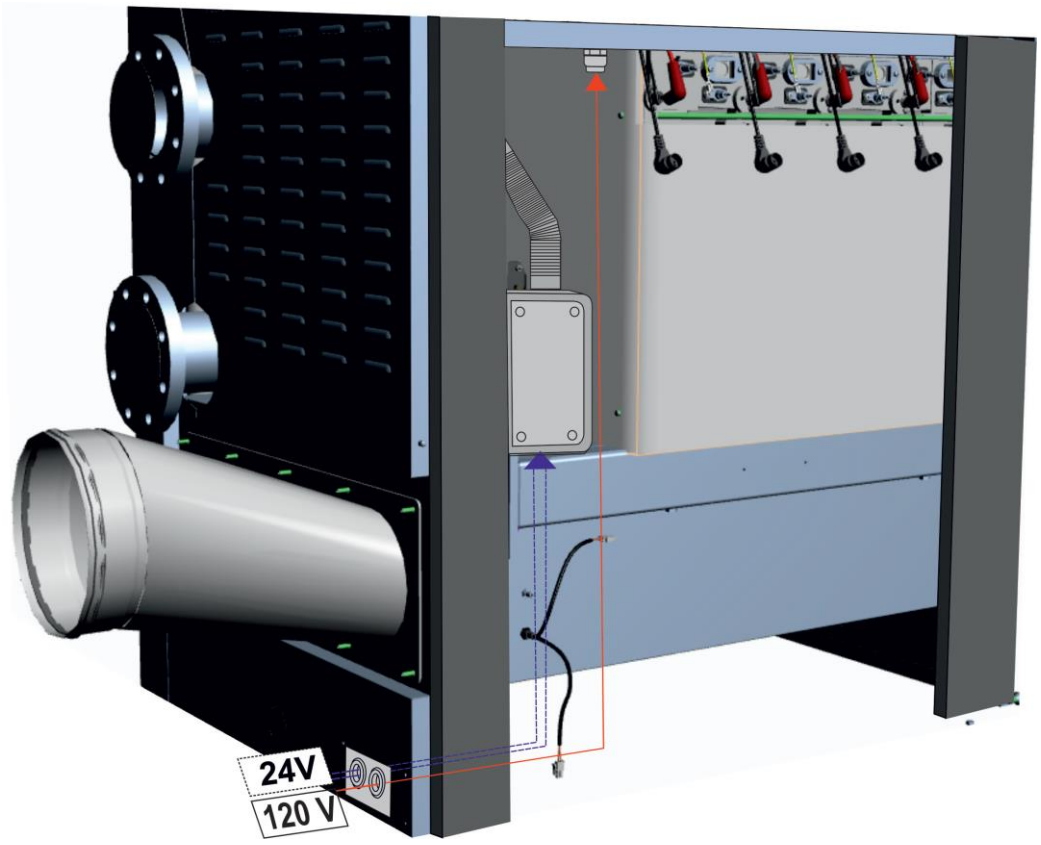


Figure 4-17: 120VAC Power Wiring for Main Electrical Junction Box and Signal Wiring for Ufly Controller and Boiler Control Module (BCM)

⚠ 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.

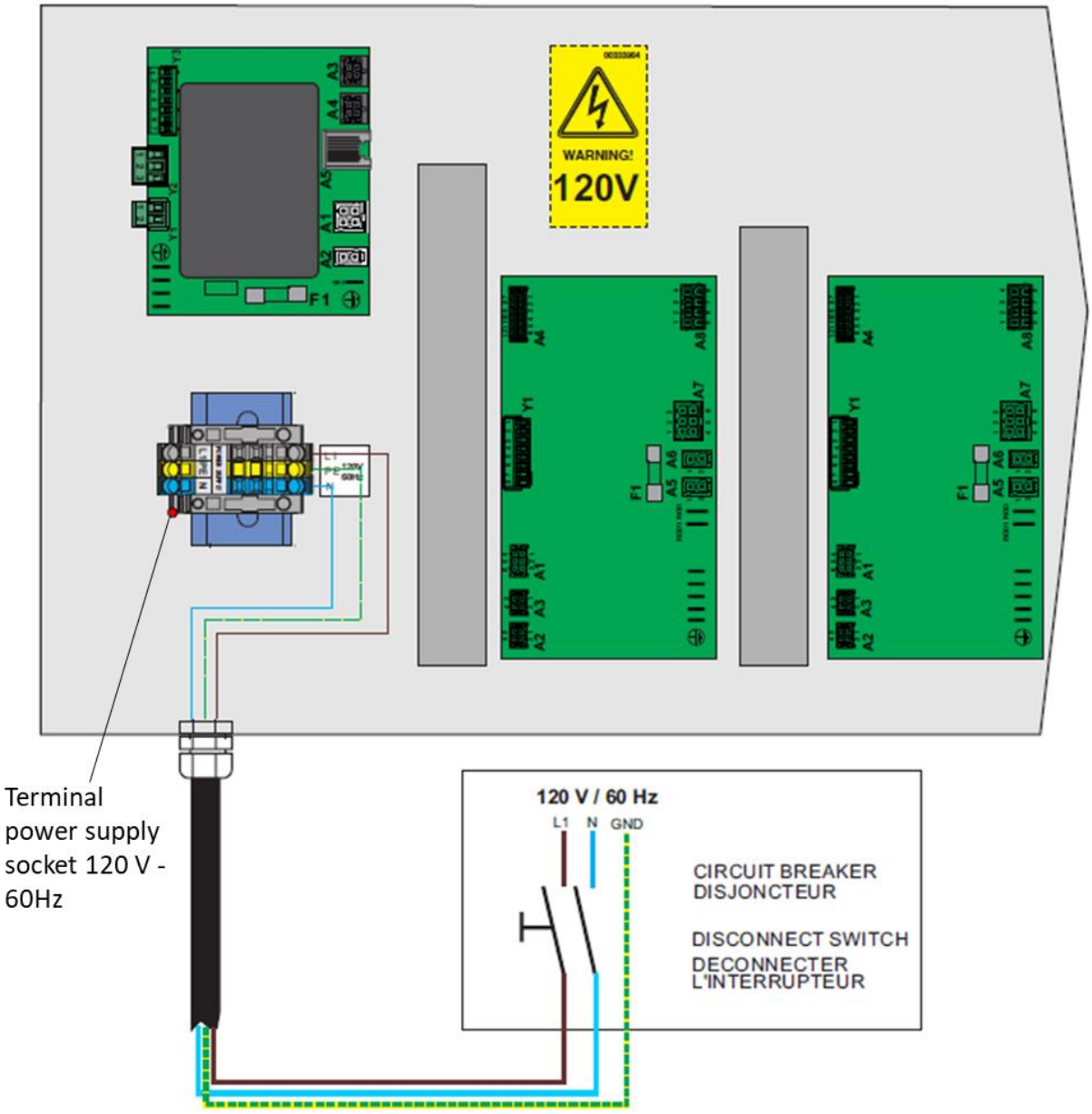
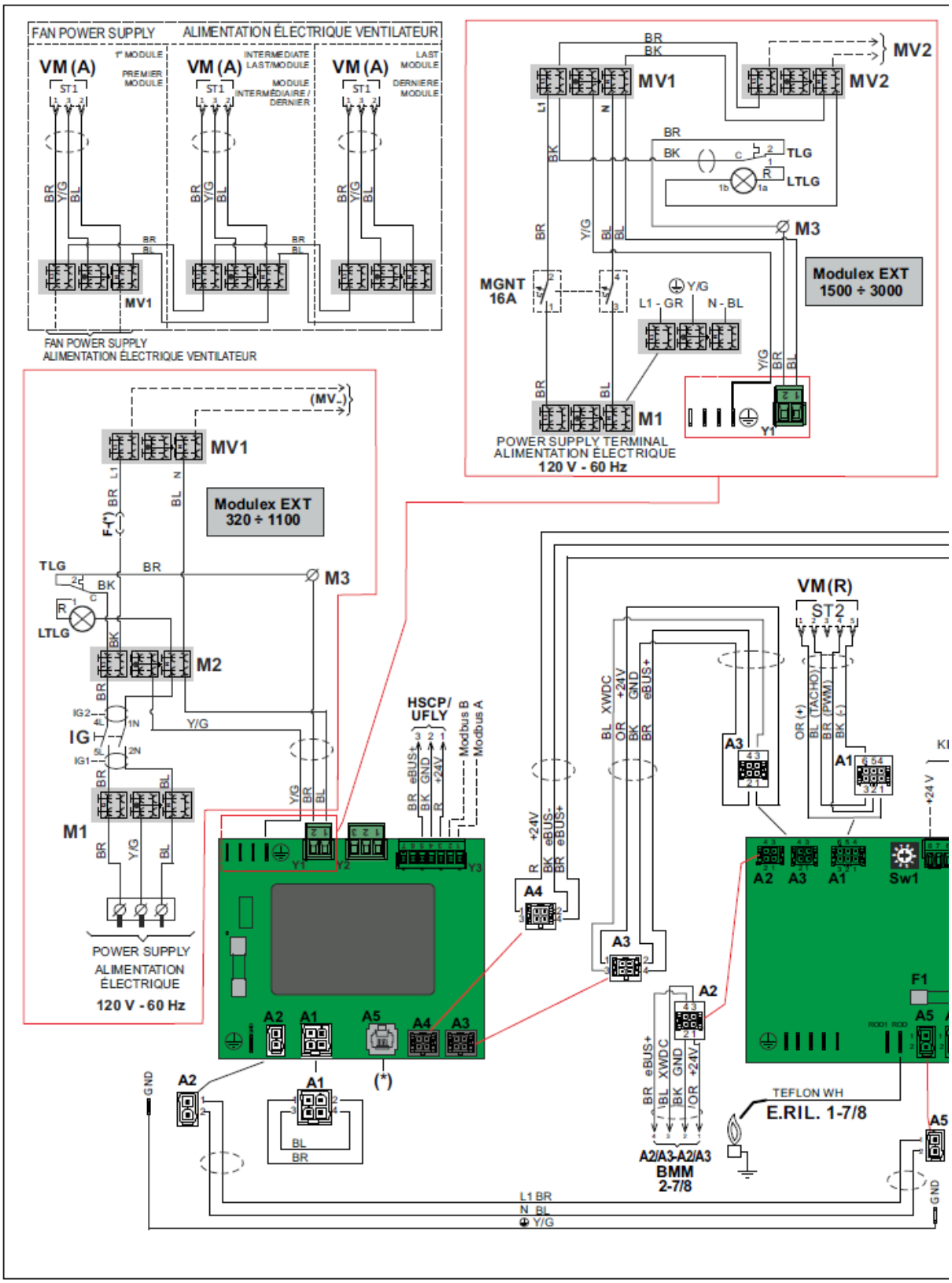
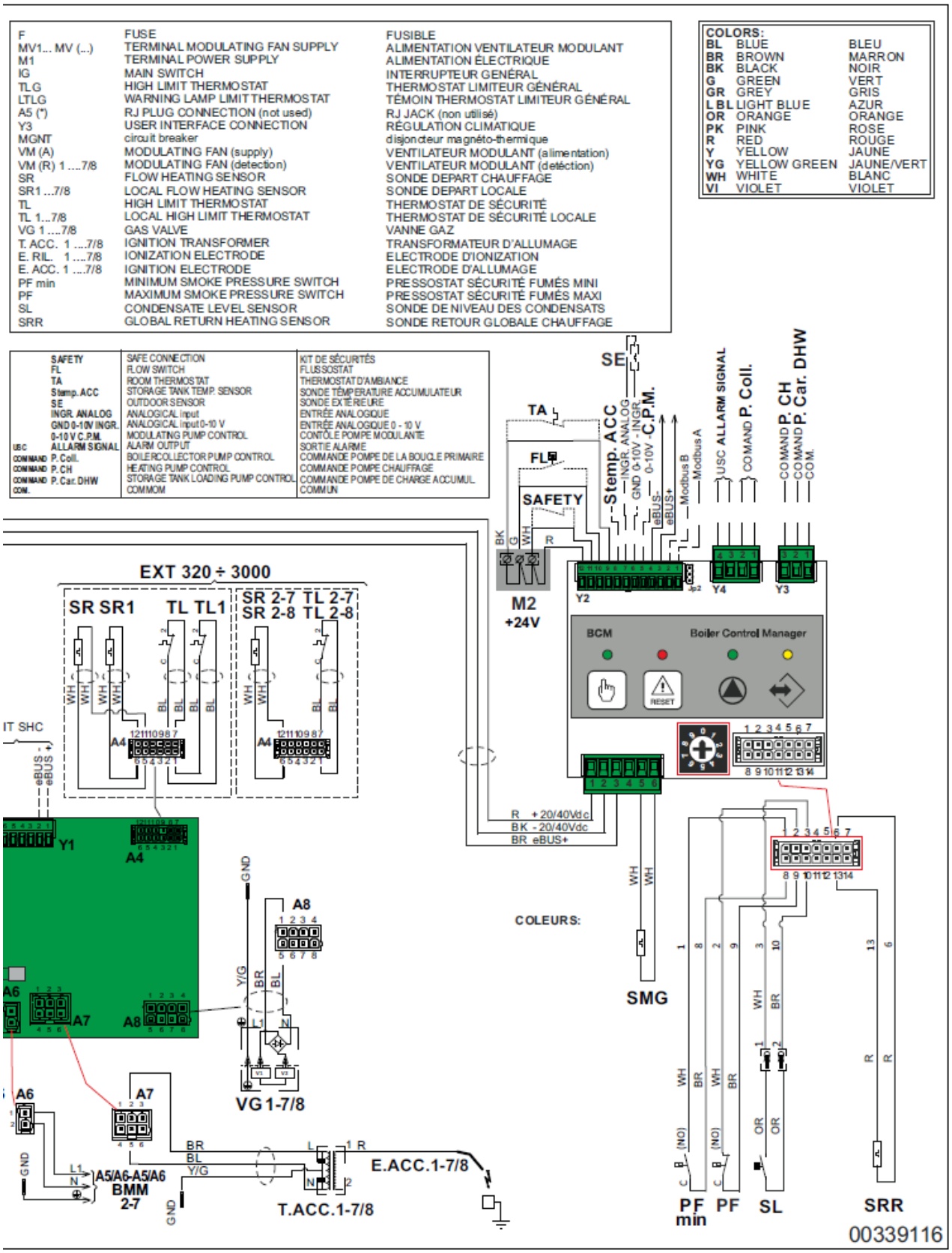


Figure 4-18: Main Power Junction Box Location and 120VAC Wiring

4.25 Functional Wiring Diagram page 1



4.26 Functional Wiring Diagram, page 2



4.27 Module Ladder Diagram

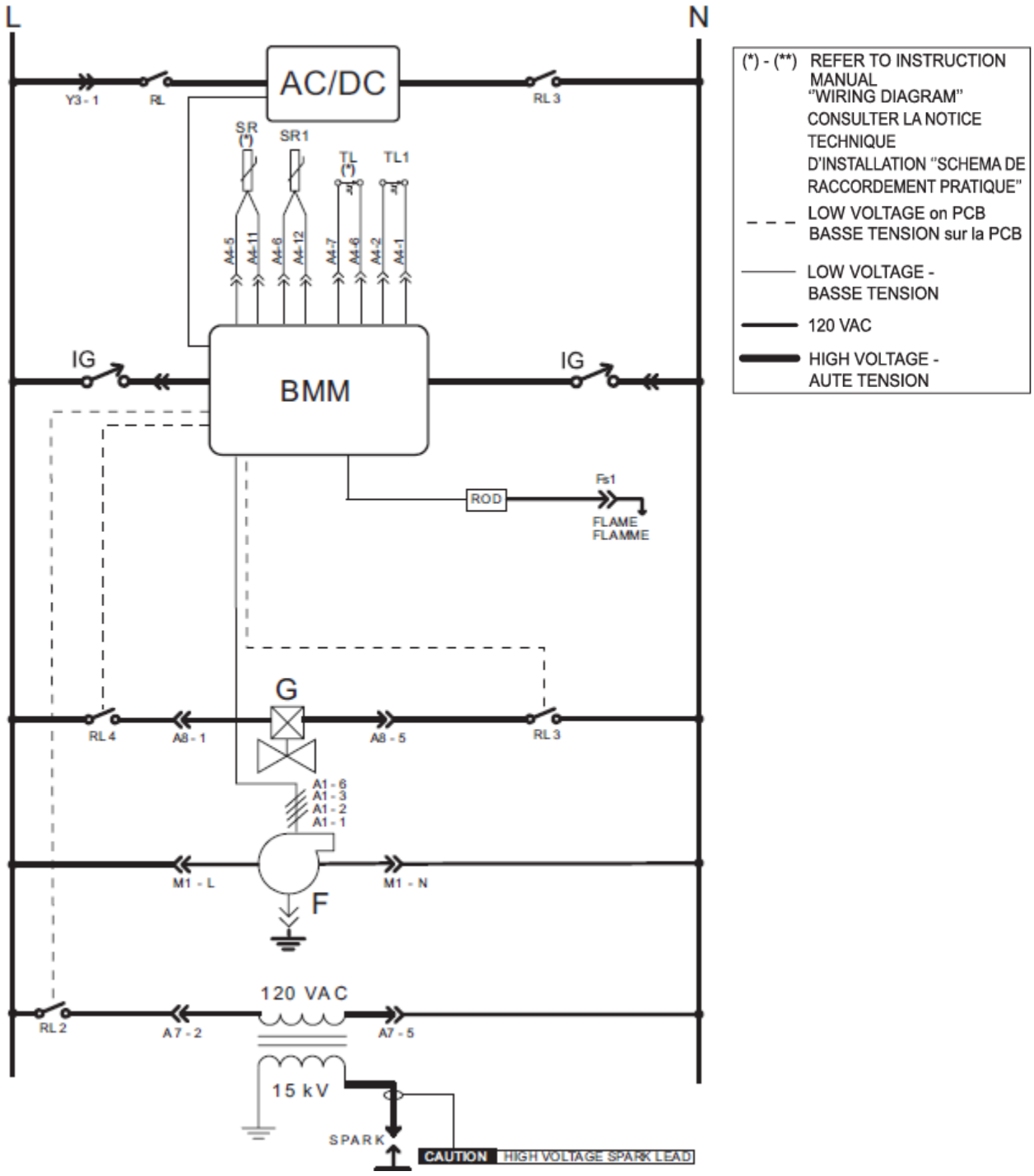


Figure 4-19: Module Ladder Diagram

4.28 General Ladder Diagram

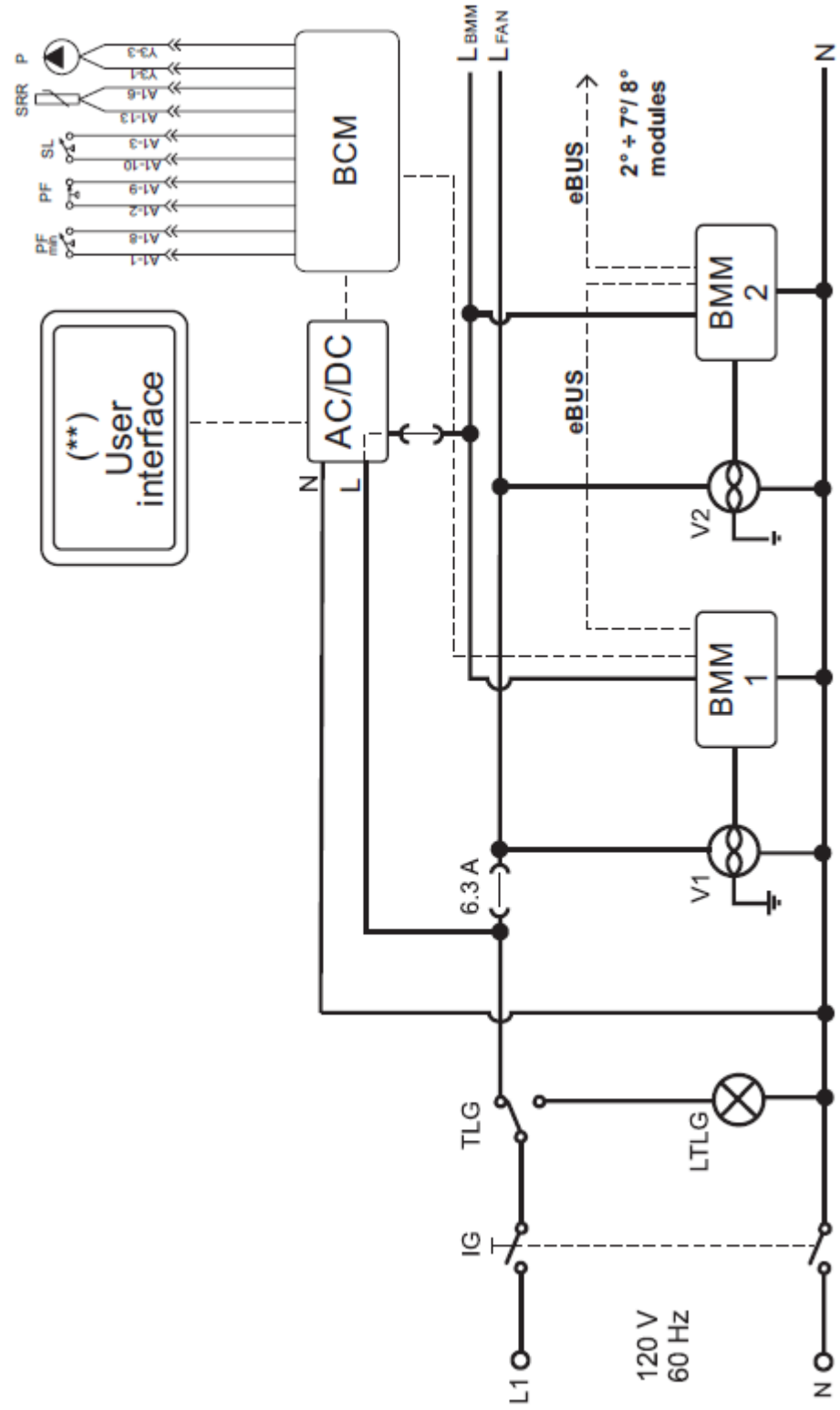


Figure 4-20: General Ladder Diagram

4.29 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 4-21a for terminal block assignments.

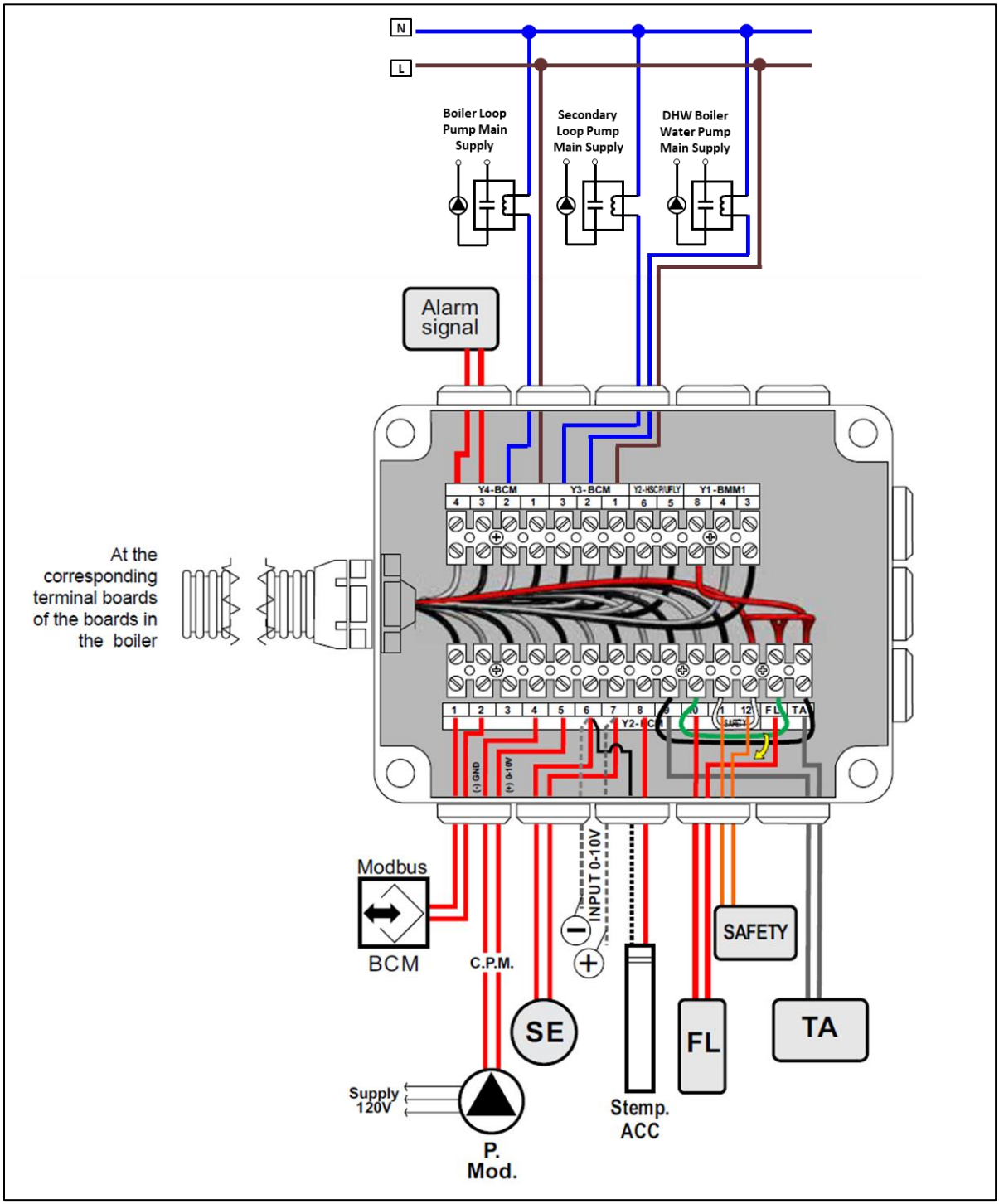


Figure 4-21a: E8 Controller Terminal Assignments

Connections for:		
	Y2 BCM	
Modbus BCM A B	 2 1	Remote boiler control 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 B	 5 6	Remote Temperature Control A (5) Data connection B (6) Data connection
	Y1 BMM1	
SHC (***)	8 - 4 - 3	Optional multifunction module (to be inserted in the box cover)

Figure 4-21b: Sensor and BCM Terminal Assignments

4.30 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)

4.30.1 Necessary Precautions for Safety

The following safety rules **MUST** be observed:

- 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.

4.30.2 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.

4.31 Filling The System

4.31.1 Necessary Precautions While Filling the System

CAUTION

Do not mix the C/H system's water with anti-freeze or anti-corrosion solutions using incorrect concentrations! Doing so can damage the gaskets and cause noise during operation. AERCO is not liable for injury to any persons, animals, or damage to property as a result of disregarding the above warnings and 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 of seals and gaskets in boiler and system 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 void the warranty.

4.31.2 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

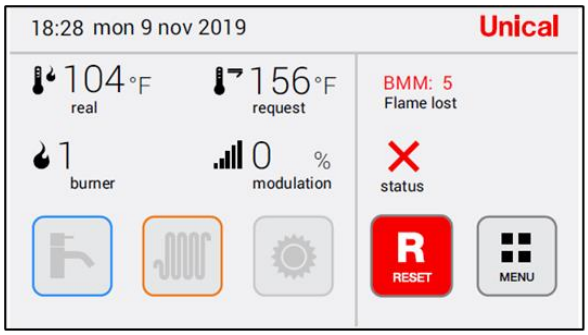
1. **STOP! Read the safety information above on this warning.**
2. Turn off all electric power to the appliance.
3. Open the gas valve.
4. Check gas and water pressure.
5. Wait five (5) minutes to clear out any gas, then smell for gas, including near the floor.
6. If you smell gas, STOP! Follow the instructions "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.

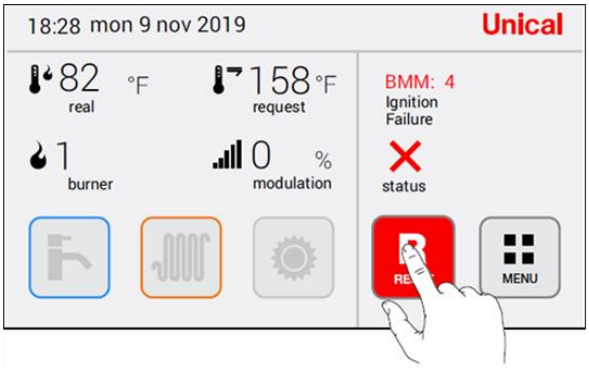
TO TURN OFF GAS TO APPLIANCE

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.

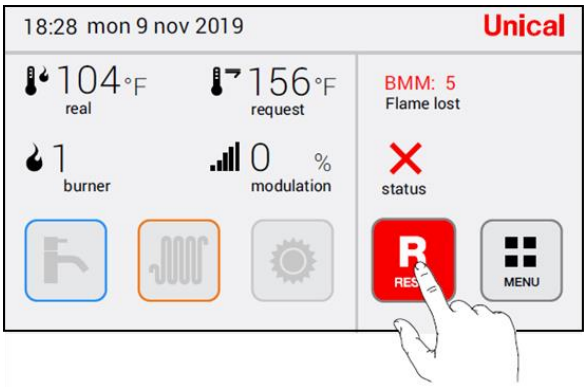
4.32 Testing The Ignition Safety Shut-Off Device

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

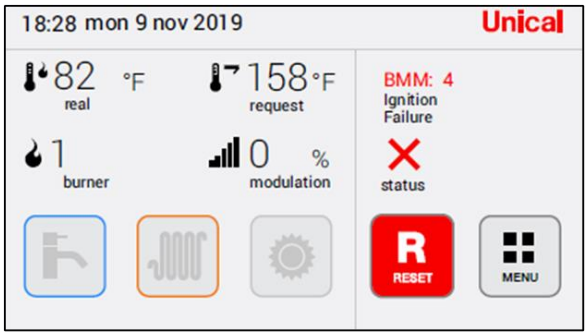




4. Disconnect the plug and socket connection of the ionization cable (WHITE) of BURNER 1.
5. The display will show ERROR CODE 05.



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.

4.33 Burner Calibration

⚠ WARNING!
All the instructions indicated below are for the exclusive use of qualified AERCO service technicians or installers.

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

4.33.1 Installing Gas Analyzer Probe into Flue Outlet

Before adjusting, a gas analyzer sensor probe must be installed into the flue exhaust 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).

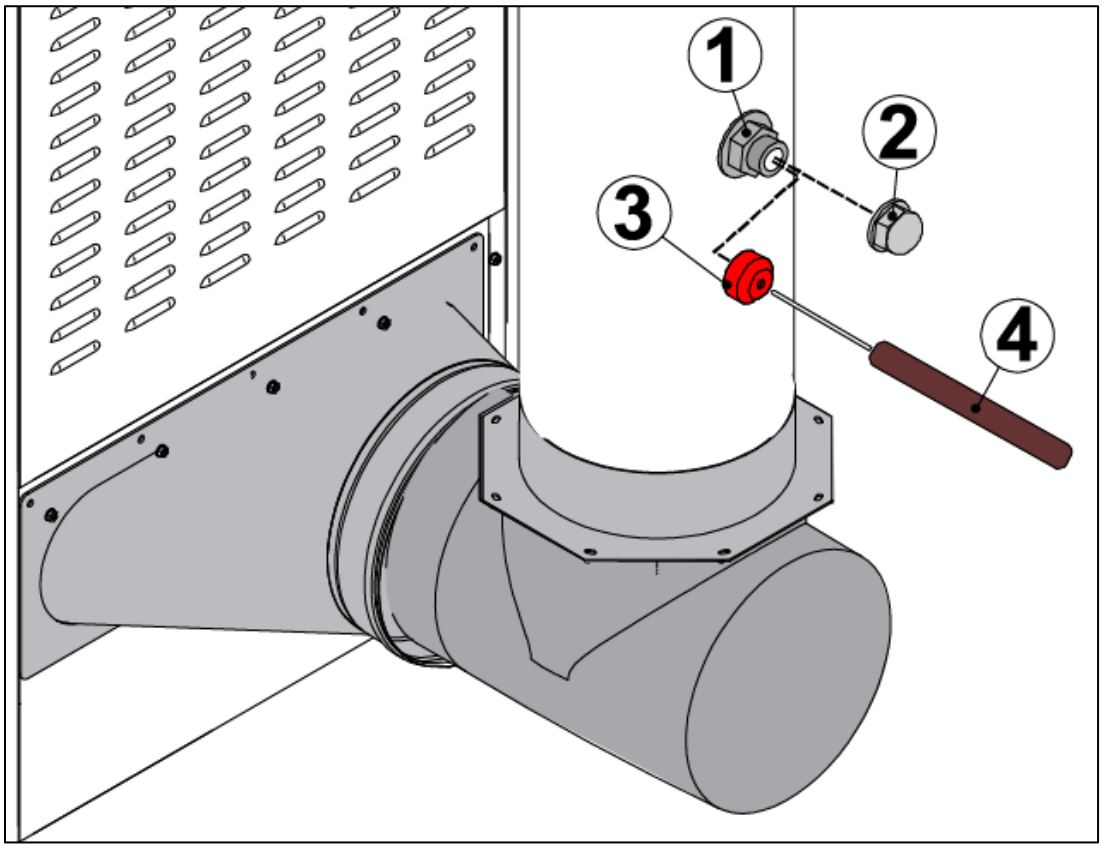


Figure 4-22: Gas Analyzer Probe Location in Flue Outlet

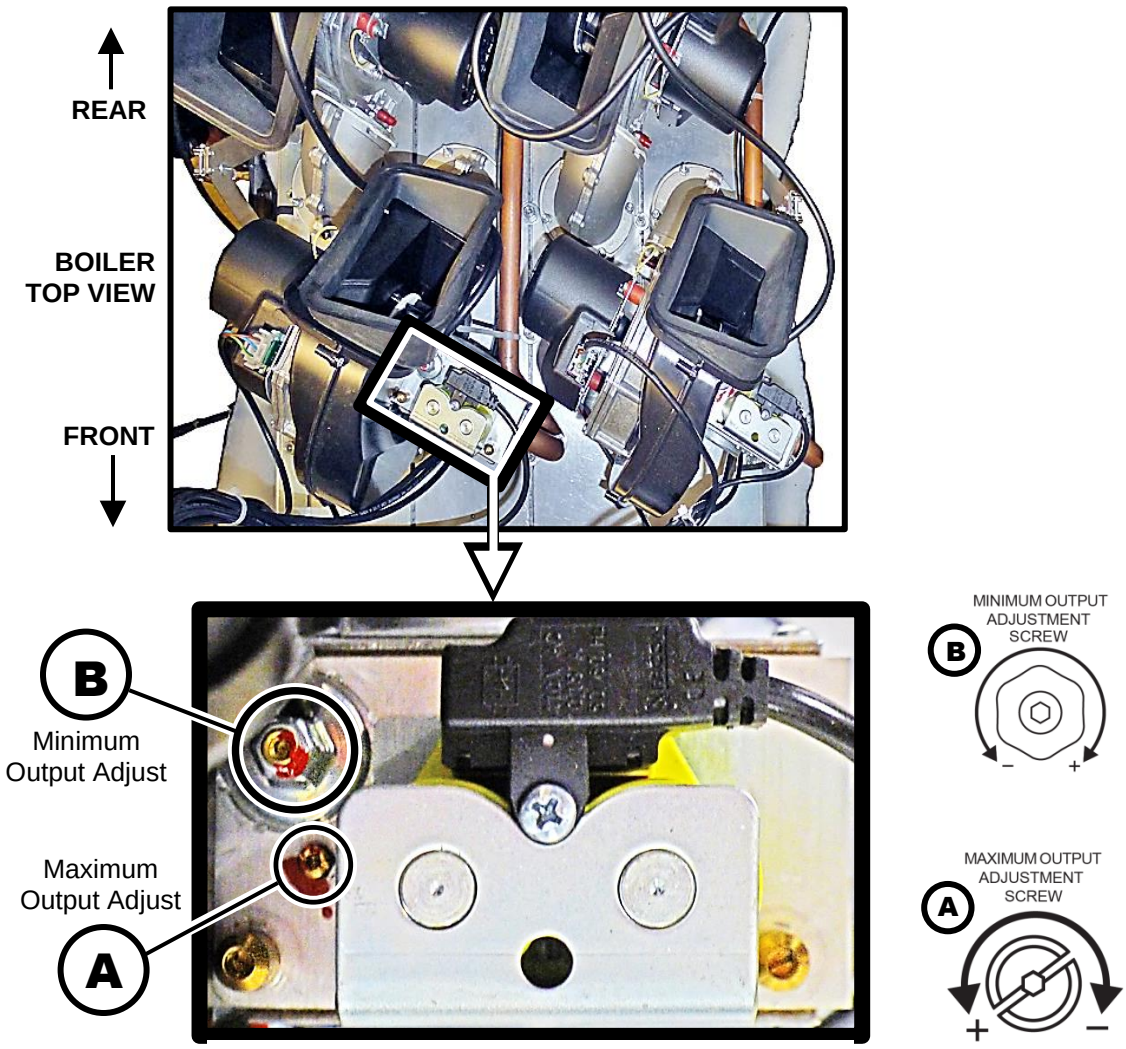


Figure 4-23: Location of Minimum and Maximum Adjustments (Top View)

4.33.2 Maximum Output Calibration

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 and connect a suitable gas analyzer.
2. Operate the burner to a minimum power following the procedure described in Section 4.34 "Service Mode" function (MANUAL BOILER FIRING RATE REQUEST: 100%)
3. Check that the CO_2 values are within the values indicated in Table 4-6, below.
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.

4.33.3 Minimum Output Calibration

After setting the maximum gas output for each valve (section 4.33.2), refer to Figure 4-24, 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 4.34 "Service Mode" function (MANUAL BOILER FIRING RATE REQUEST: 10%).
2. Check that the CO_2 values are within the values indicated in Table 4-6, below.
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 the CO2 percentage is too low, check if the air and exhaust flue are obstructed. If they are not obstructed, check if the burner and/or the exchanger (aluminum sections) are properly cleaned. After confirmation, check the maximum gas settings again (in section 4.33.2).

4.33.4 Final Check and Ignition Failure Adjustment Procedure

After completing the Minimum and Maximum output adjustments, check the CO_2 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:

Ignition Failure Adjustment Procedure:

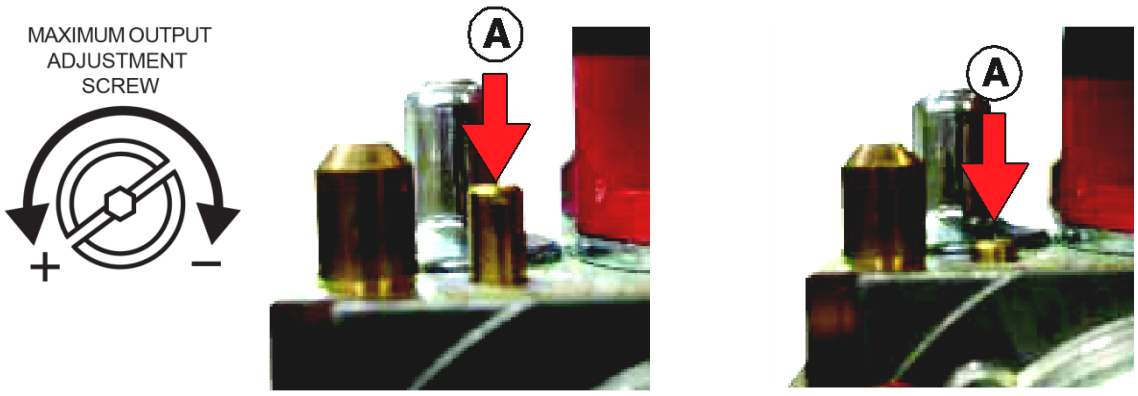


Figure 4-24: Maximum Output Adjustment Screw

1. Tighten the maximum adjustment screw “A” (see Figure 4-24) 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, described in section 4.33.2 and 4.33.3, above.

TABLE 4-6: EXT Pressure, CO2 and O2 Level Calibration

MODULEX EXT 1500 2S

Type of Gas	Supply Press. in w.c. [kPa]	CO_2 levels [%]		O_2 levels [%]		Fan speed		Ø Mixer injectors Øin (mm)	Gas Consumption		Start-output [%]	V max fan
		Min. Output	Max. Output	Min. Output	Max. Output	min. FL	max. FH		Minimum ft³/hr (m³/hr)	Maximum ft³/hr (m³/hr)	IG	FU
Natural	7.0 (1.74)	9.1	9.2	4.8	4.6	31	100	0.35 (9)	80 (2.26)	1466 (41.5)	50	91
Propane	11.0 (2.74)	10.8	10.8	4.5	4.5	31	100	0.35 (9)	32 (0.92)	595 (16.84)	50	87
FOR HIGH ALTITUDE												
Natural	7.0 (1.74)	9.1	9.2	4.6	4.8	31	100	0.35 (9)	80 (2.26)	1319 (37.35)	50	83
Propane	11.0 (2.74)	10.8	10.8	4.5	4.5	31	100	0.35 (9)	32 (0.92)	536 (15.17)	50	79

MODULEX EXT 2300 2S

Type of Gas	Supply Press. in w.c. [kPa]	CO_2 levels [%]		O_2 levels [%]		Fan speed		Ø Mixer injectors Øin (mm)	Gas Consumption		Start-output [%]	V max fan
		Min. Output	Max. Output	Min. Output	Max. Output	min. FL	max. FH		Minimum ft³/hr (m³/hr)	Maximum ft³/hr (m³/hr)	IG	FU
Natural	7.0 (1.74)	9.1	9.2	4.8	4.6	31	100	0.35 (9)	80 (2.26)	2197 (62.2)	50	91
Propane	11.0 (2.74)	10.8	10.8	4.5	4.5	31	100	0.35 (9)	32 (0.92)	893 (25.3)	50	87
FOR HIGH ALTITUDE												
Natural	7.0 (1.74)	9.1	9.2	4.6	4.8	31	100	0.35 (9)	80 (2.26)	1978 (56)	50	83
Propane	11.0 (2.74)	10.8	10.8	4.5	4.5	31	100	0.35 (9)	32 (0.92)	805 (22.8)	50	79

MODULEX EXT 2600 2S

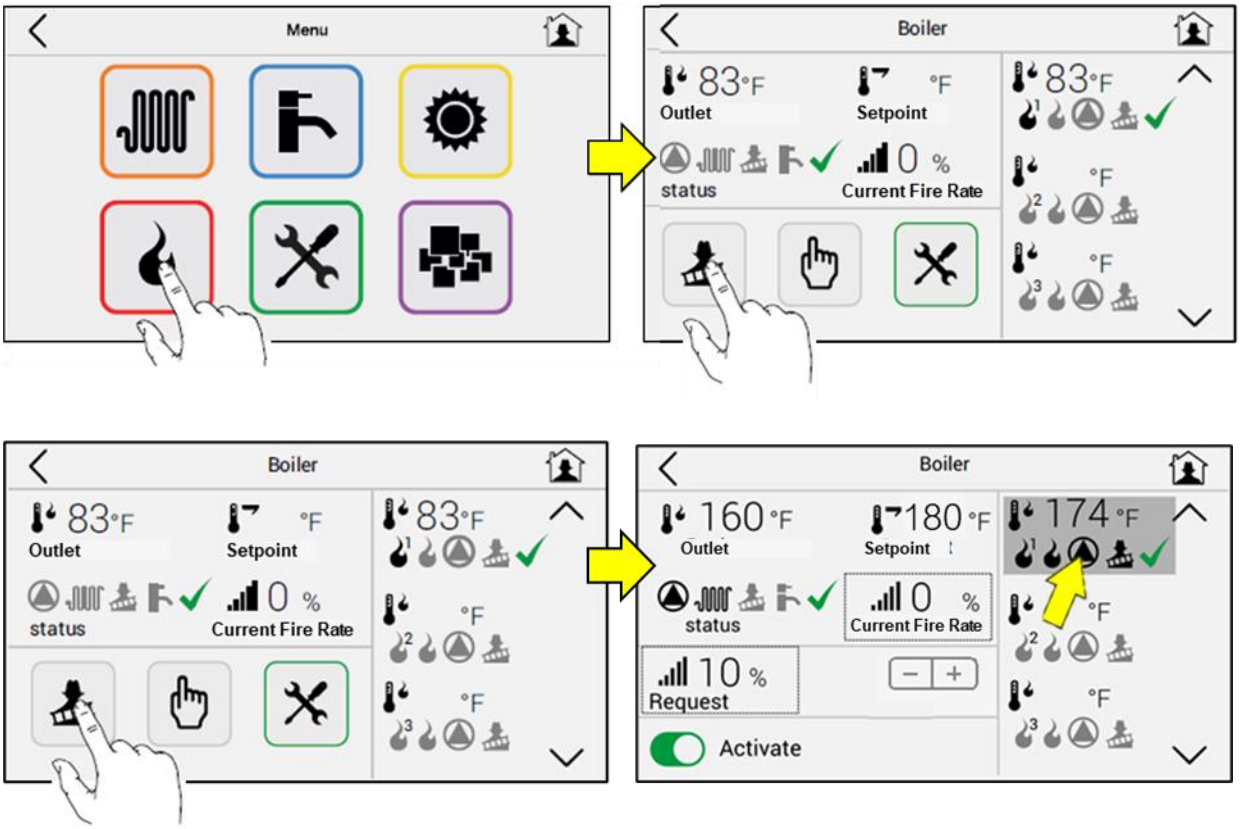
Type of Gas	Supply Press. in w.c. [kPa]	CO_2 levels [%]		O_2 levels [%]		Fan speed		Ø Mixer injectors Øin (mm)	Gas Consumption		Start-output [%]	V max fan
		Min. Output	Max. Output	Min. Output	Max. Output	min. FL	max. FH		Minimum ft³/hr (m³/hr)	Maximum ft³/hr (m³/hr)	IG	FU
Natural	7.0 (1.74)	9.1	9.2	4.8	4.6	31	100	0.35 (9)	80 (2.26)	2564 (72.6)	50	91
Propane	11.0 (2.74)	10.8	10.8	4.5	4.5	31	100	0.35 (9)	32 (0.92)	1042 (29.5)	50	87
FOR HIGH ALTITUDE												
Natural	7.0 (1.74)	9.1	9.2	4.6	4.8	31	100	0.35 (9)	80 (2.26)	2306 (65.3)	50	83
Propane	11.0 (2.74)	10.8	10.8	4.5	4.5	31	100	0.35 (9)	32 (0.92)	939 (26.6)	50	79

MODULEX EXT 3000 2S

Type of Gas	Supply Press. in w.c. [kPa]	CO_2 levels [%]		O_2 levels [%]		Fan speed		Ø Mixer injectors Øin (mm)	Gas Consumption		Start-output [%]	V max fan
		Min. Output	Max. Output	Min. Output	Max. Output	min. FL	max. FH		Minimum ft³/hr (m³/hr)	Maximum ft³/hr (m³/hr)	IG	FU
Natural	7.0 (1.74)	9.1	9.2	4.8	4.6	31	100	0.35 (9)	80 (2.26)	2931 (83)	50	91
Propane	11.0 (2.74)	10.8	10.8	4.5	4.5	31	100	0.35 (9)	32 (0.92)	1190 (33.7)	50	87
FOR HIGH ALTITUDE												
Natural	7.0 (1.74)	9.1	9.2	4.6	4.8	31	100	0.35 (9)	80 (2.26)	2638 (74.7)	50	83
Propane	11.0 (2.74)	10.8	10.8	4.5	4.5	31	100	0.35 (9)	32 (0.92)	1070 (30.3)	50	79

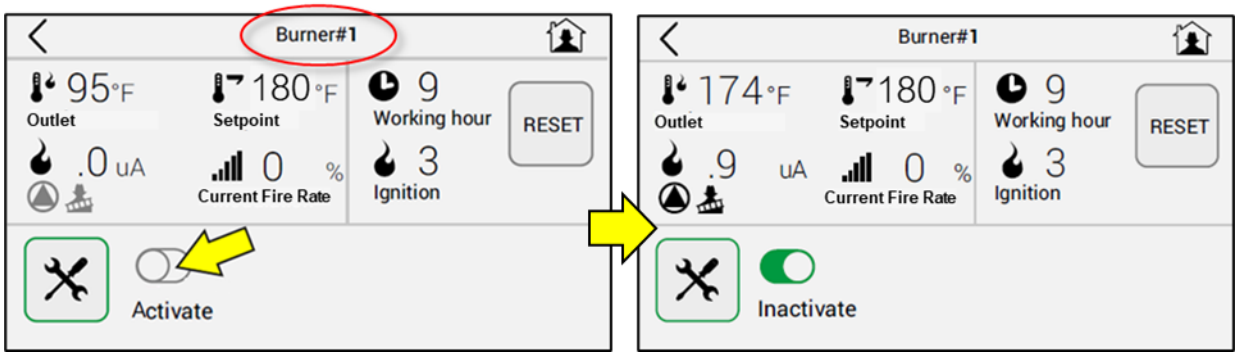
NOTE: Check the O^2 levels often, especially at low flow rates.

4.34 Sweeper Mode (Manual Control)

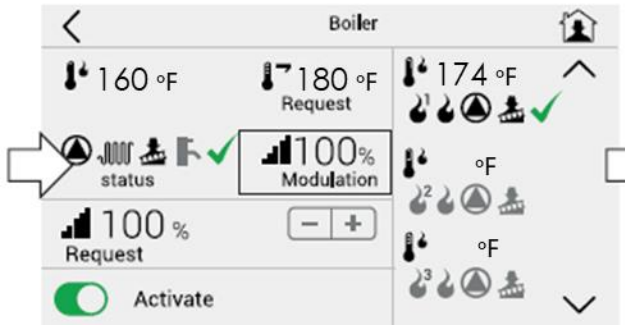


1. Insert psw and select sweeper again. Vary % mod. request from 10% to 100%.
2. Activate Sweeper Mode.
3. Chose burner among those available, e.g.: usually 1 / Modulex (from 1 to 8).

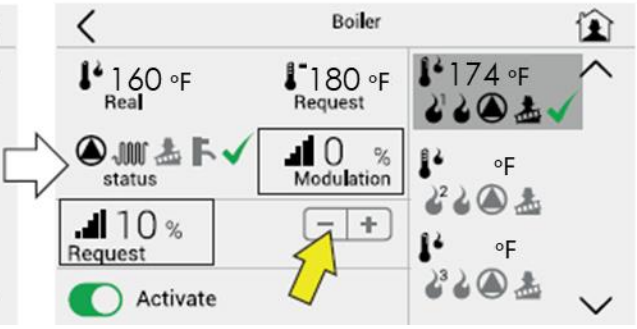
NOTE: Note: once selected the burner, (3) the display page changes: Burner # 1 ..... # 8



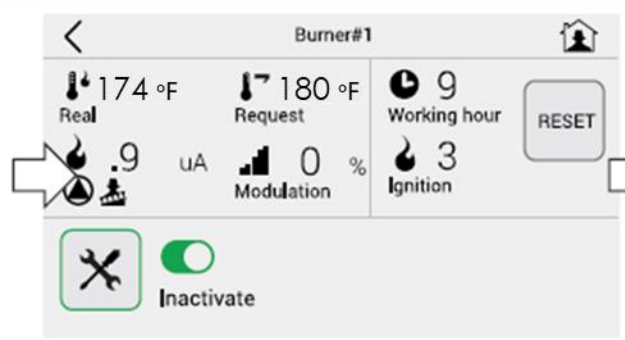
4. Activate manual control of selected burner.



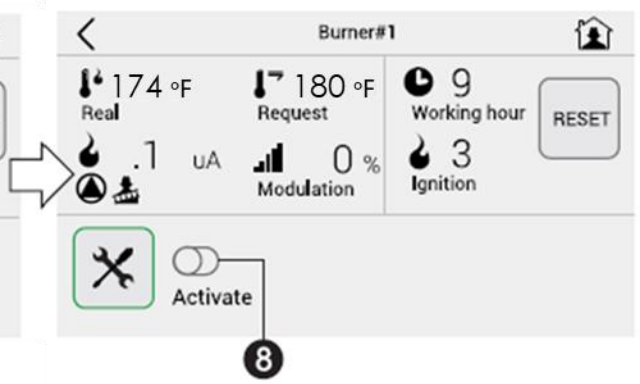
5. Burner operating to maximum power (modulation 100%).



6. Vary % of modulation request to the minimum 10% and select the burner.



7. Boiler operating with modulation min. (modulation 0%).



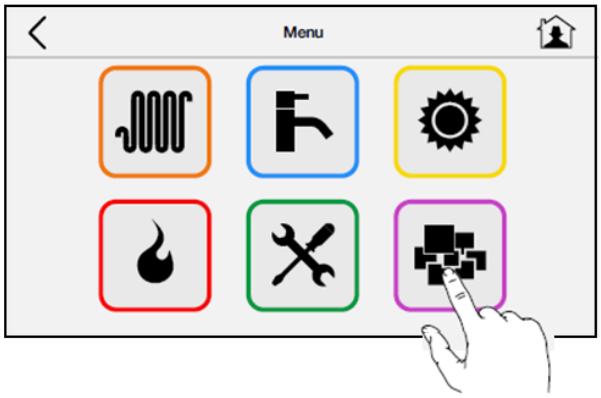
8. Disable SWEEPER function. Exit by pressing Home icon.

NOTE: The function defaults to the previous parameters after 15 minutes if there is no input.

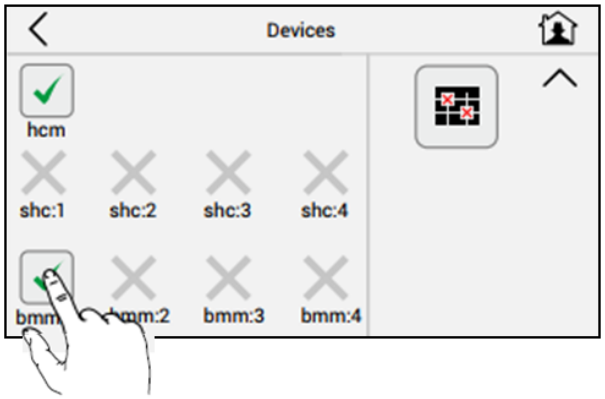
4.35 High Altitude Adjustment

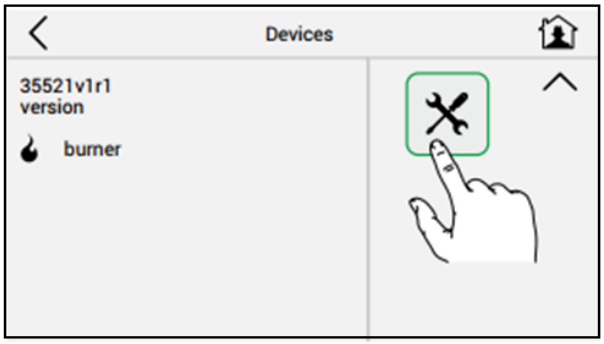
It is necessary to adjust the fan speed at altitudes at or above 5,000 feet. Modify parameter 526 (FU: Fan maximum speed) of the BMM in the Devices Menu.

NOTE: This is modifiable only with an access code.

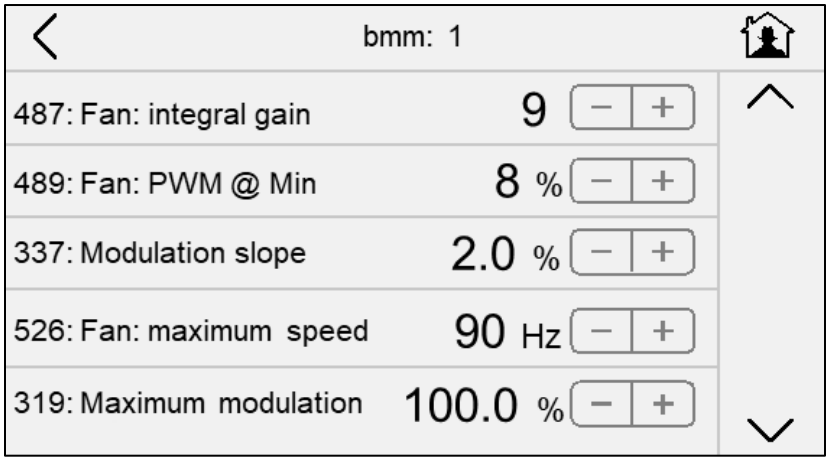


Access the BMM Menu by selecting the **BMM** buttons. **See Section 6.7 for a list of BMM Parameters.**





Scroll to parameter 526 and change value. Refer to appropriate model and fuel on table 4.6.



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

4.36 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 with the appropriate information and applied to the unit in close proximity to the rating label. If the unit is calibrated again for normal altitude operation, the label should be removed.

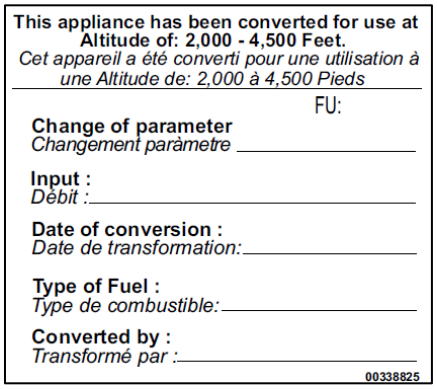


Figure 4-25: High Altitude Conversion Label

4.37 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 Modulex EXT Pressure and CO_2 Level Calibration in Table 4-6 for the appropriate value. This parameter requires a password to change.

2. Adjust CO_2 (%) minimum and maximum levels according to the type of gas as shown in table below. See Section 4.33 - Burner Calibration for more information.

Gas Type	CO_2 Level (%) Minimum Output	CO_2 Level (%) Maximum Output
Natural Gas	9.1	9.2
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:

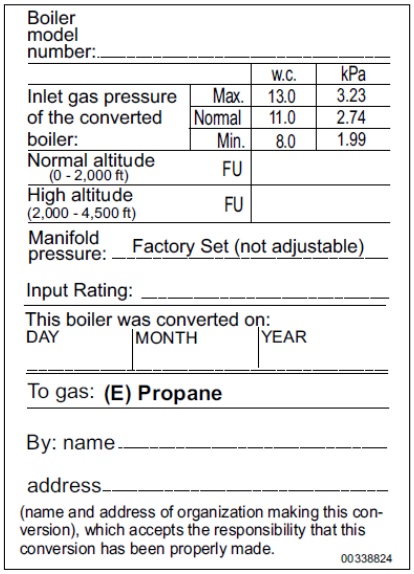


Figure 4-26: MODULEX EXT Label

4.38 Controls And Emergency Functions

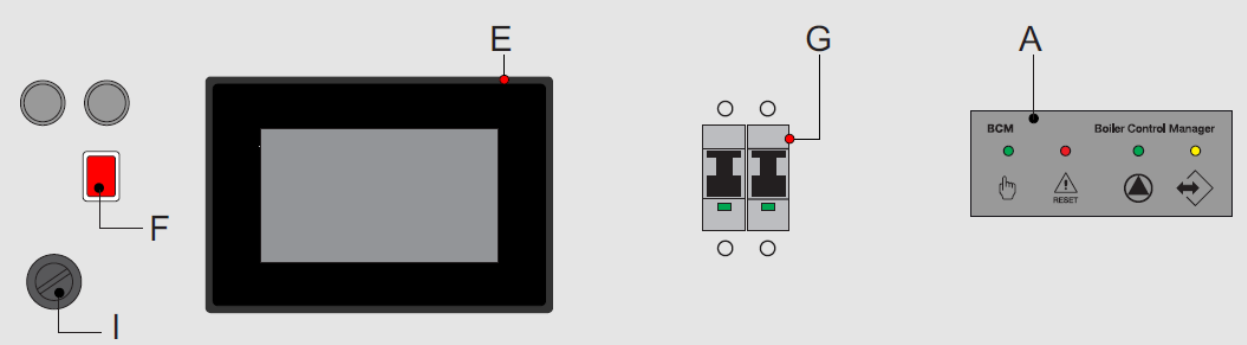


Figure 4-24: MODULEX EXT Panel Controls and Indicators

No.		Description
G	MGNT	Circuit Breaker
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, then press the RESET button on the 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).

4.39 Initial Boiler Ignition

4.39.1 Preliminary Checks

CAUTION!

To ensure safe operation 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 of the system's on/off valves are in the appropriate position (open or closed as required)
- The mains gas supply corresponds to the one the boiler has been calibrated for. Otherwise convert the boiler to 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 boiler system's safety valve is not blocked and is connected to the waste water system.
- The condensate drain line has been filled with water and that it is connected to the waste water system. (For more information, see section 4.14.)

⚠ WARNING!

Before firing up the appliance, be sure to fill up the condensate drain line (see section 4.14) through the filling hole and check the correct drainage of the condensate.

Using the boiler with the condensate drain siphon empty could cause a dangerous condition due to poisonous emissions from the flue exhaust gasses.

- 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.

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
Service present and in operation at that time

Buttons and symbol (outline + empty color area)
Service present but not in operation at that time

Buttons and symbol (outline in dark grey no filled area)
Service disabled or off but installed

Buttons and symbol (outline in ligh grey no filled area)
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

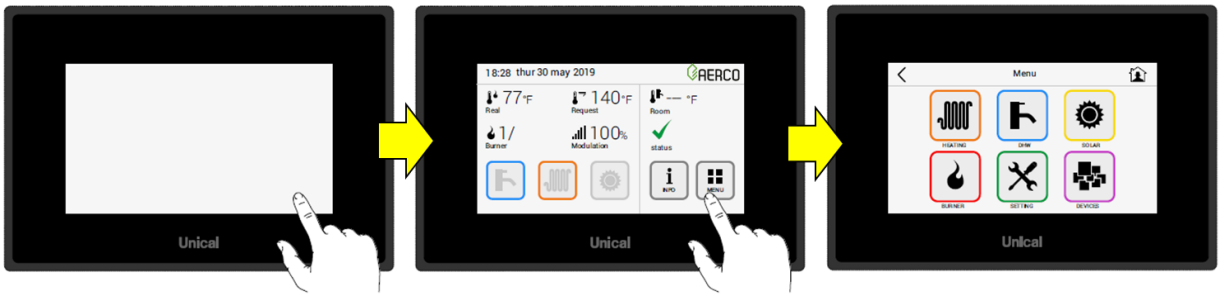
Solar: This menu is currently not available.

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.

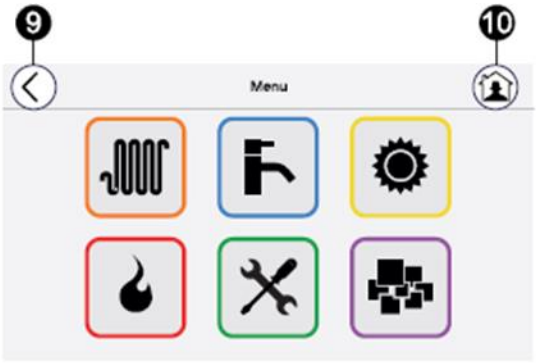
5.1.3 Display Modes

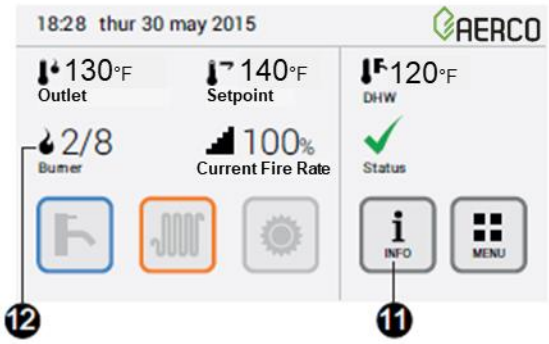


6	Display Mode
	Screen Off

7	Display Mode
	Home Screen

8	Display Mode
	Menu Screen





9	<	One page back
10		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.

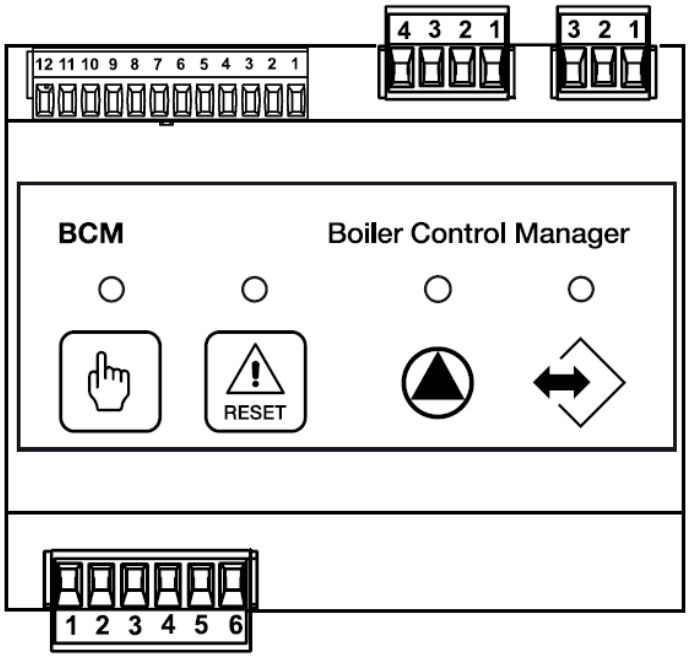
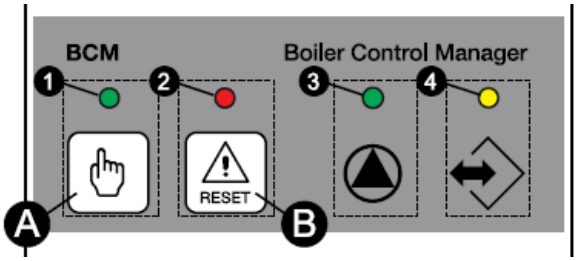


Figure 5-1: Boiler Communications Module (BCM)



KEY		
No.		Description
A		MANUAL request button
1	GREEN	LED
	OFF	MANUAL request NOT active
	ON	MANUAL request active
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

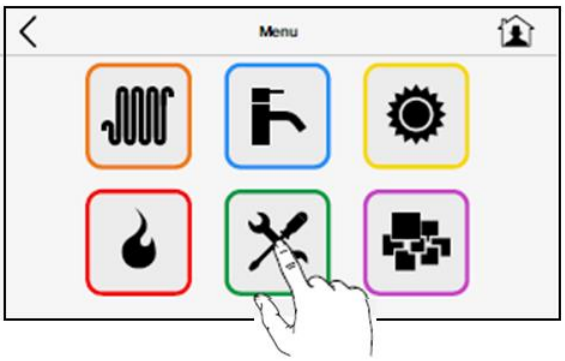
This chapter introduces the Ufly controller basic menu contents needed to set up the MODULEX EXT boiler. For more detailed information concerning the Ufly controller menus, operating modes and functions, refer to the Ufly Controller User Manual (OMM-0159).

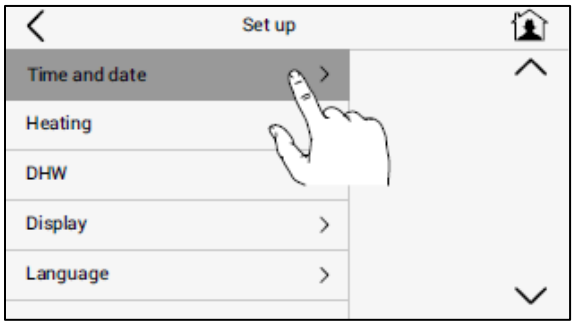
Figure 6-1: Modulex Ufly Controller Main Menu

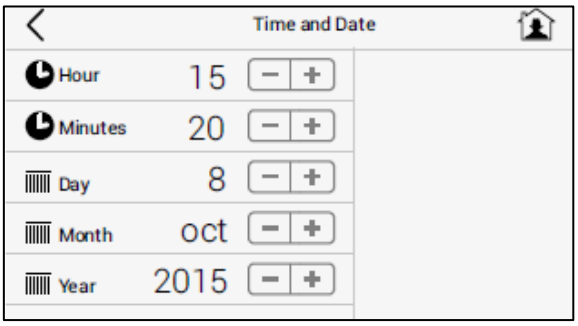
6.1 SETUP MENU

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

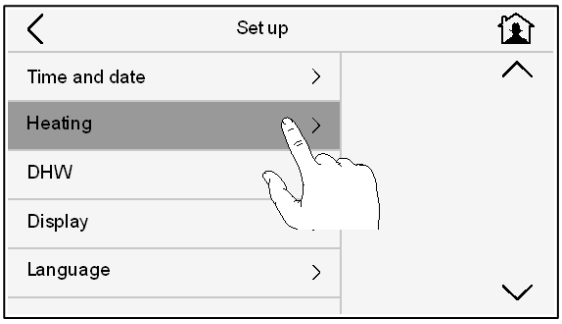


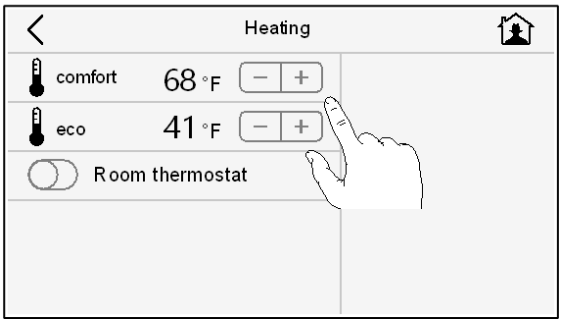




6.1.2 Setting Comfort and Eco Building Reference Temperatures

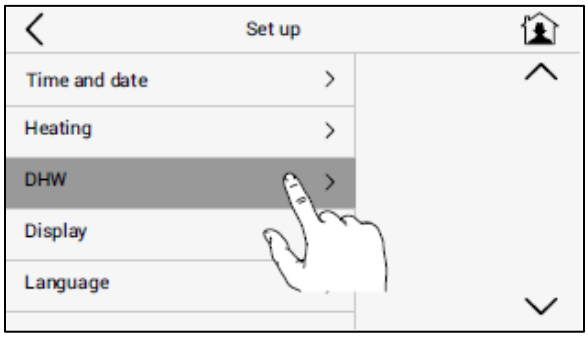
The Comfort and Eco Building Reference Temperatures for the Outdoor Reset Mode are programmed in the Setup Menu. For details on Outdoor Reset Mode and Building Reference Temperature, see section 4.1 of the Control Manual OMM-0159.

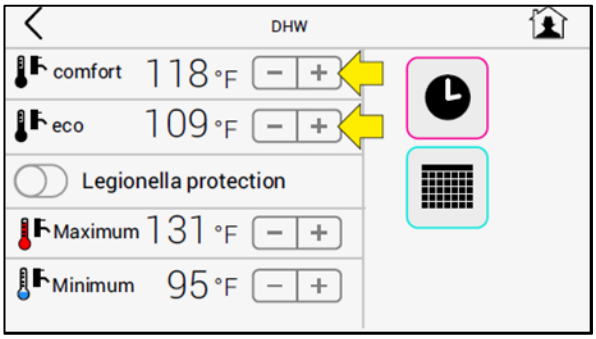




6.1.3 Setting Comfort and Eco Domestic Hot Water Setpoints

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.

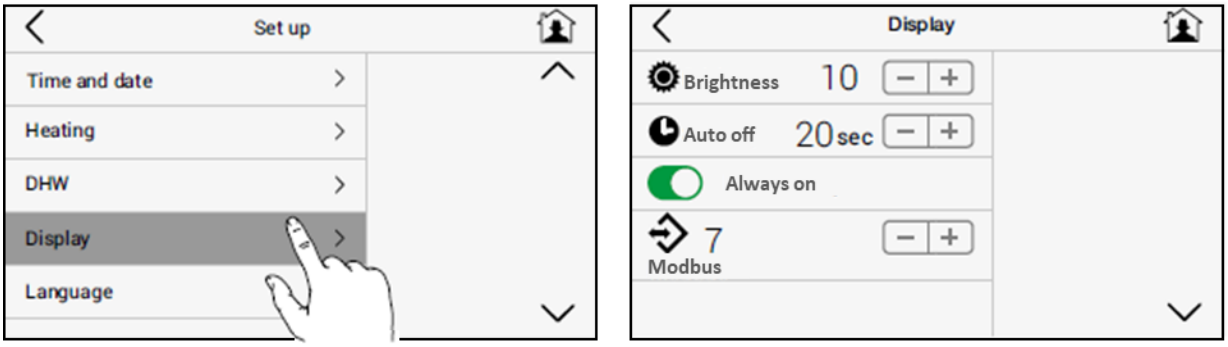




The Ufly screen automatically turns off after 20 seconds (default) of inactivity. If the "Always on" is toggled on like in the image below, the screen will remain on all the time.

NOTE: Do not change the 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



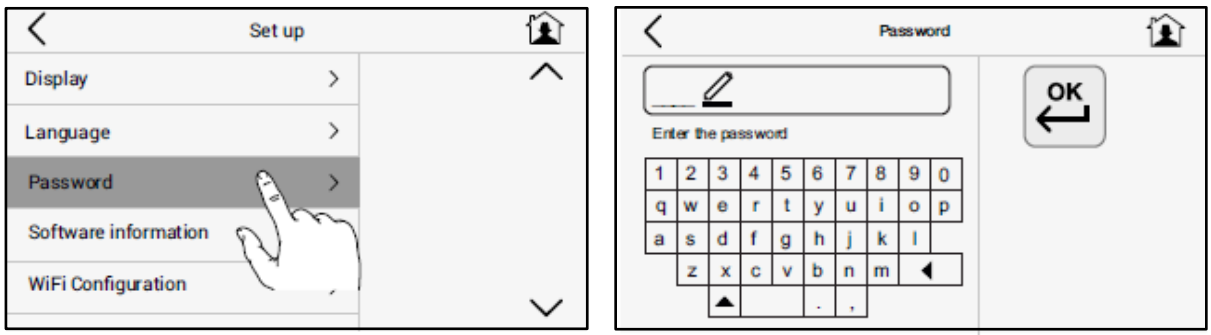
6.1.5 Language and Unit Settings

6.1.6 Password

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

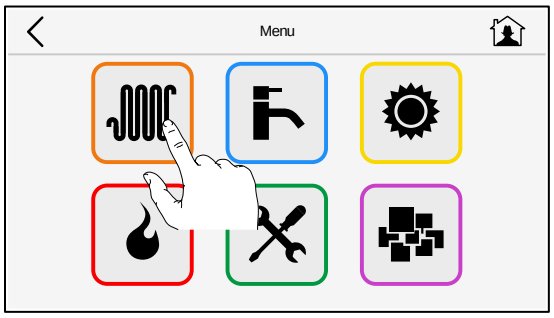
To Change the password:

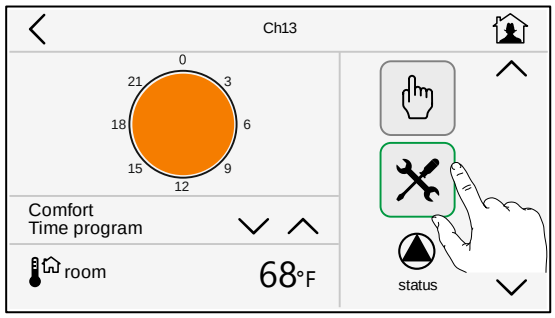
1. Enter the current password and click OK
2. Delete the current password using the backspace button.
3. Enter new password and click OK.



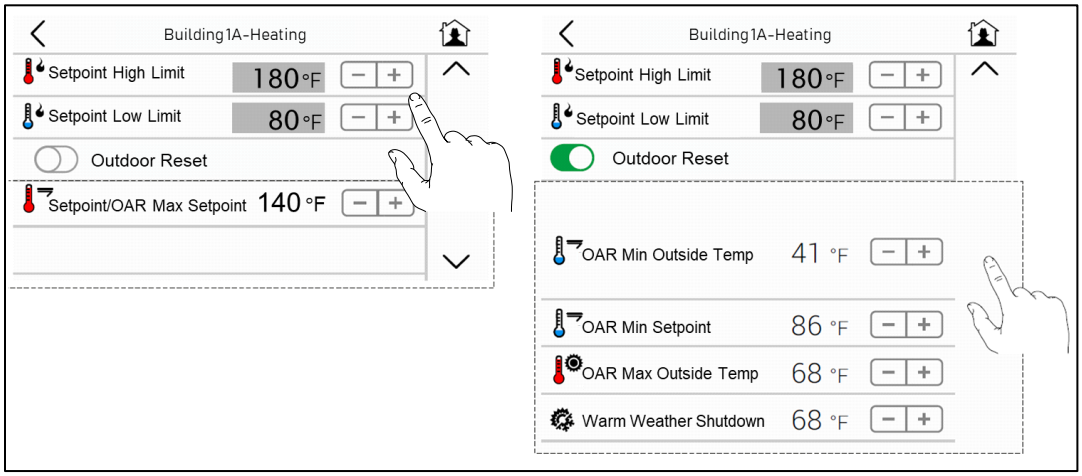
6.2 Heating Menu

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.

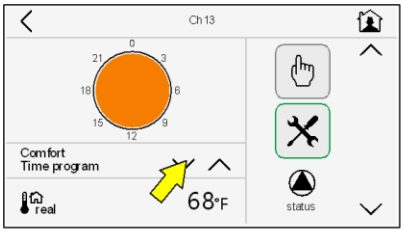


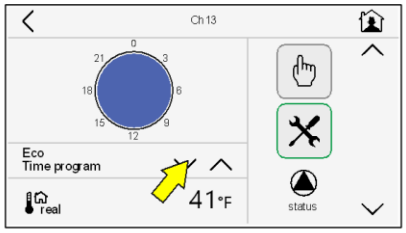


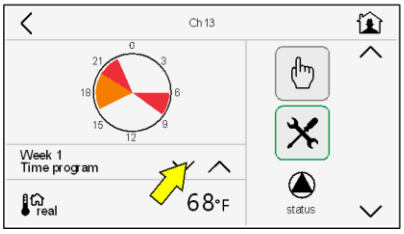
Outdoor Reset Parameter and Space Heating Setpoint can be accessed by clicking the settings button.

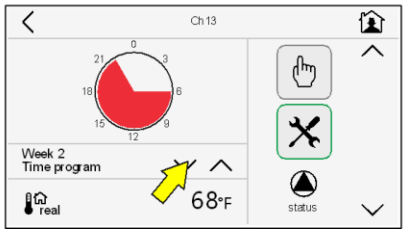


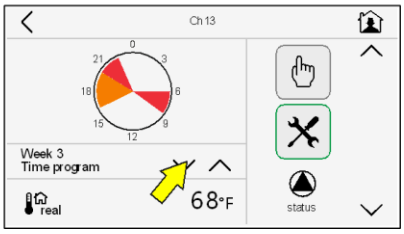
Building Reference Temperatures to use in Outdoor Reset Mode can be selected in the Heating Menu.





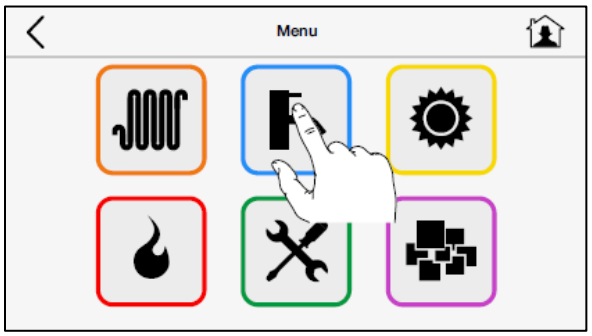




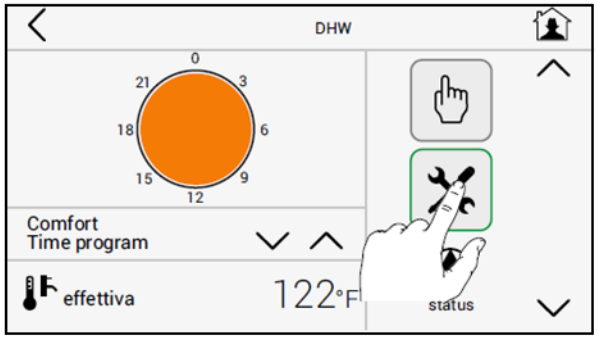


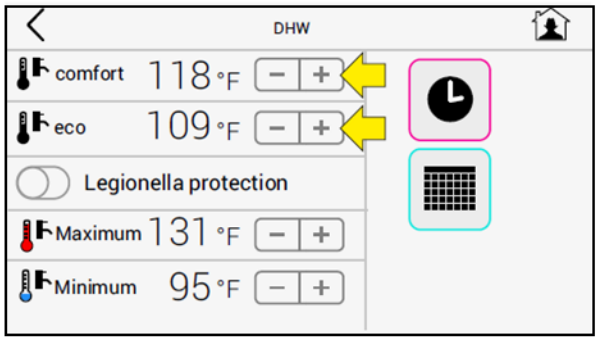
6.3 Domestic Hot Water Menu

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.

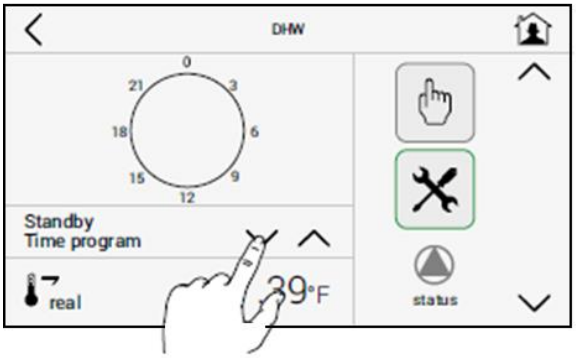


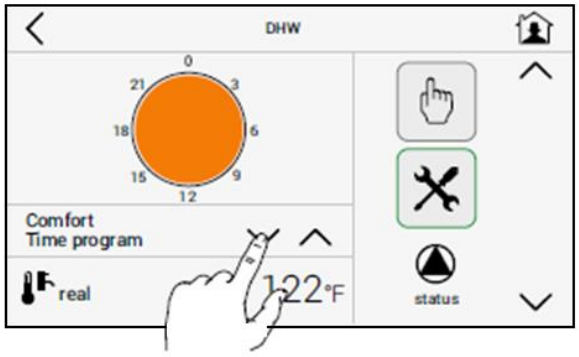
The Comfort and Eco DHW Setpoints can be accessed by clicking the settings button.

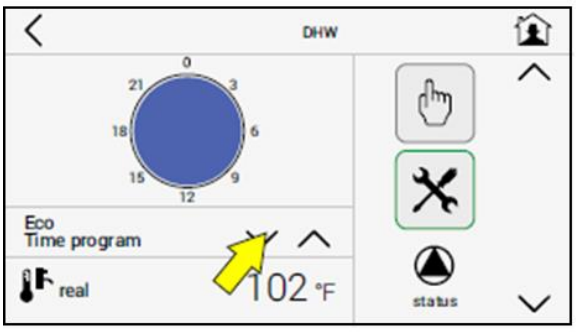


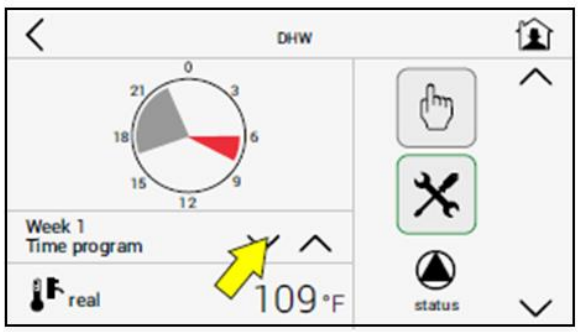


The DHW Setpoint to use can be selected in the Domestic Hot Water Menu



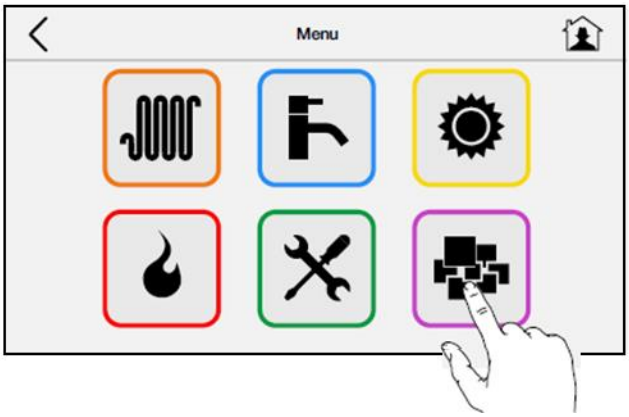




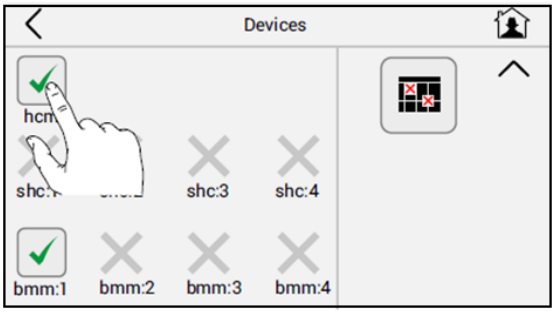


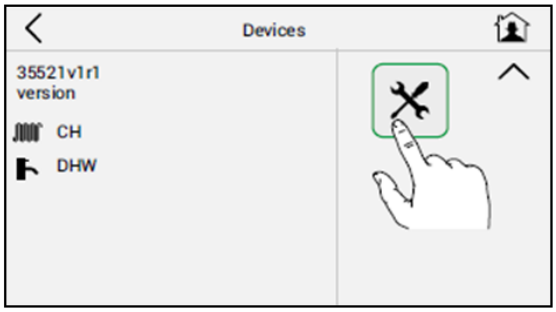
6.4 Devices Menu

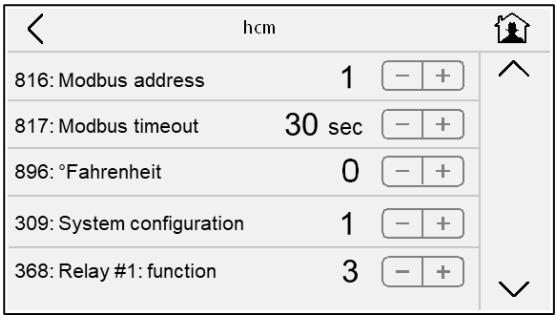
The Devices Menu allows access to BMM (Burner Management Module) parameters, BCM parameters for functions including 0-10V operation and domestic hot water operation, and error history. These parameters are for use by Authorized AERCO sercvice technicians only. Password is required to access this Menu.



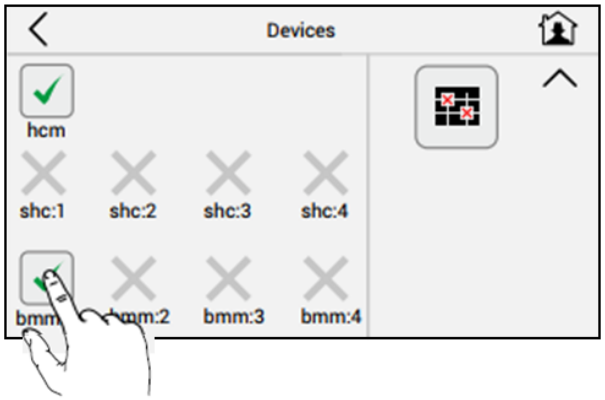
Access the BCM Menu by clicking the **hcm** button. **See Section 6.6 for list of BCM Parameters.**

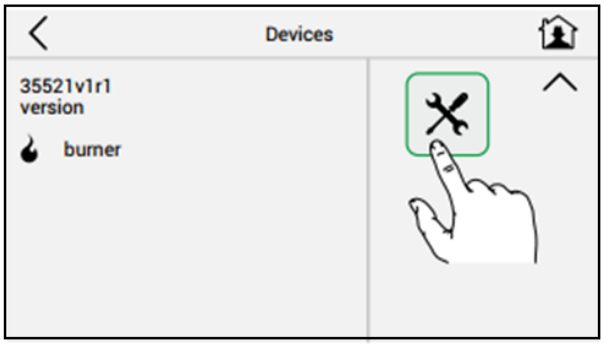


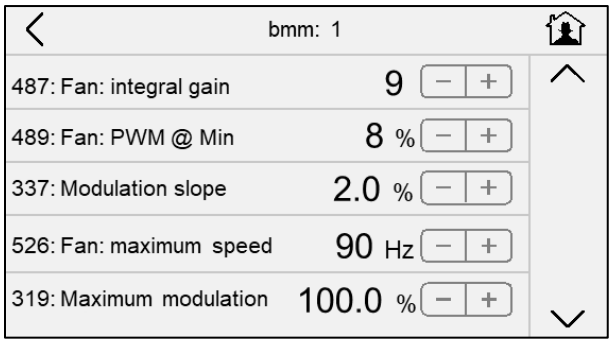




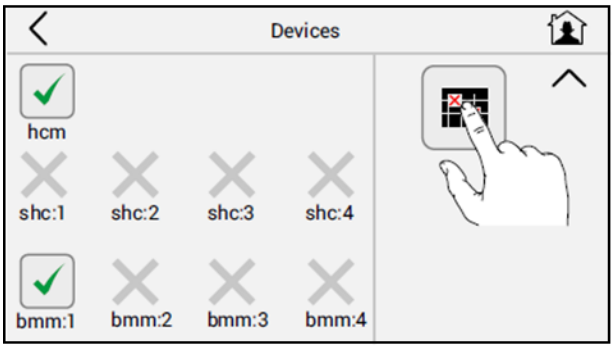
Access the BMM Menu by clicking the **bmm** buttons. **See Section 6.7 for list of BMM Parameters.**

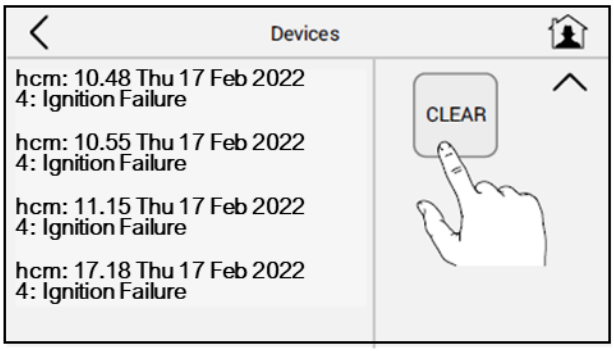






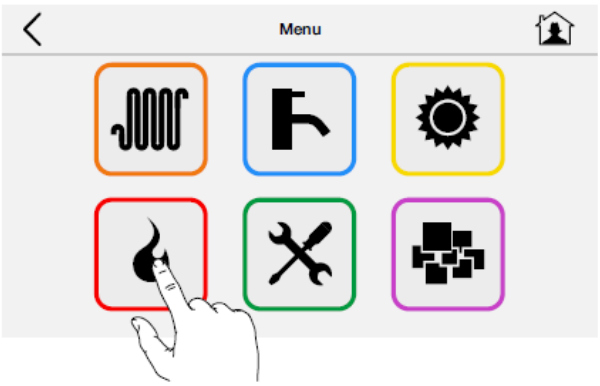
Access and clear error history.





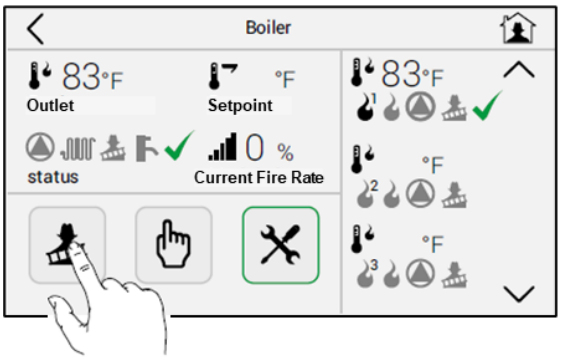
6.5 Burner Menu

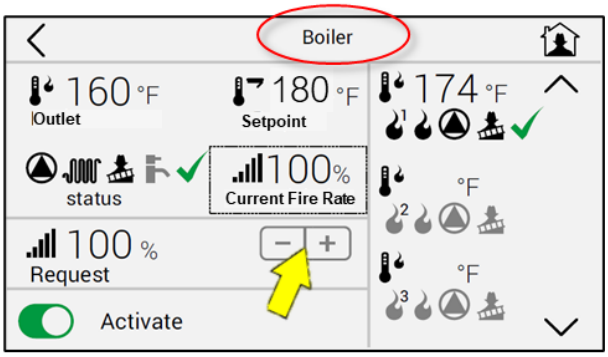
The Burner Menu allows access to calibration, manual operation, and troubleshooting settings. This menu is password protected and is only for authorized AERCO technicians.



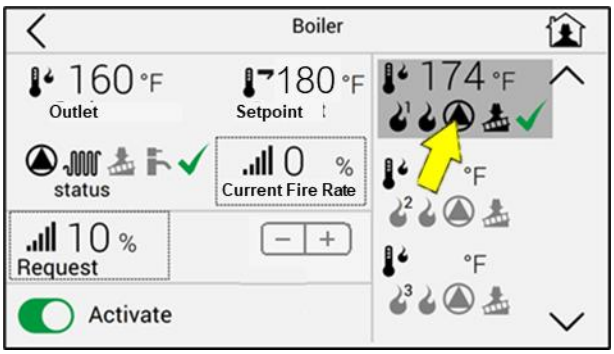
6.5.1 Service Mode/Manual Firing Rate Function

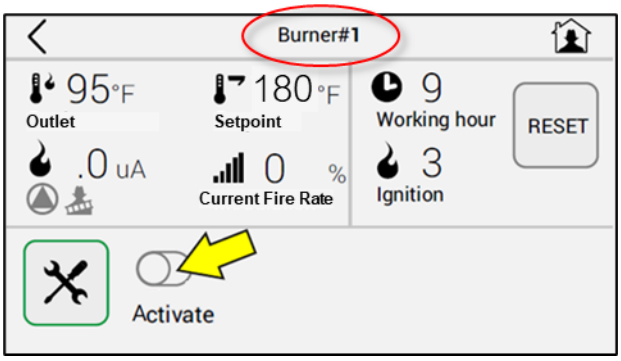
1. Click on the Service Mode icon.
2. Enter the password.
3. Click on the Service Mode Icon again. This will show an Activate Button.
4. Note that at this point, the screen shown if for the whole boiler.
5. Toggling the Activate button allows user to operate the boiler with a manual firing rate
6. Click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

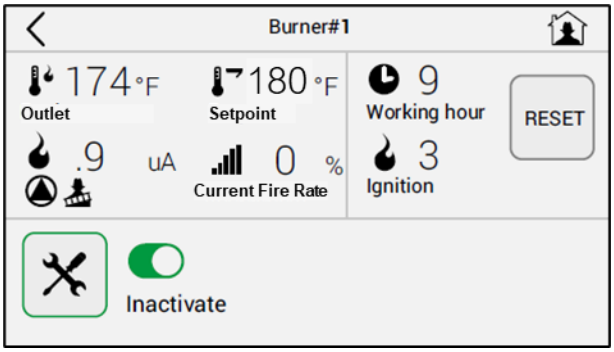




7. If desired, user can select which burner(s) to run during manual firing rate function.
   a. Select one of the available burners .
   b. Note that the next screen shown is for the selected Burner.
   c. Toggle the Activate button to enable burner to run during manual firing rate.
   d. The Current 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 .

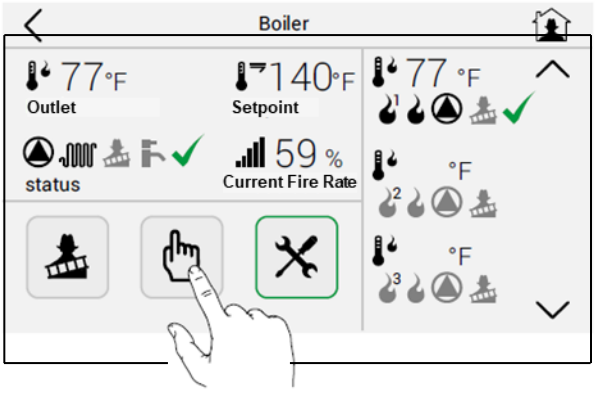


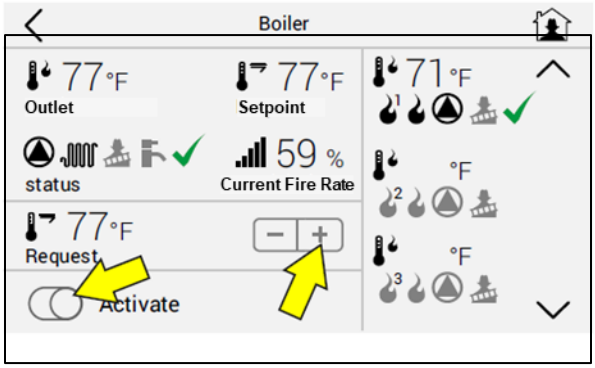




6.5.2 Manual Setpoint Function

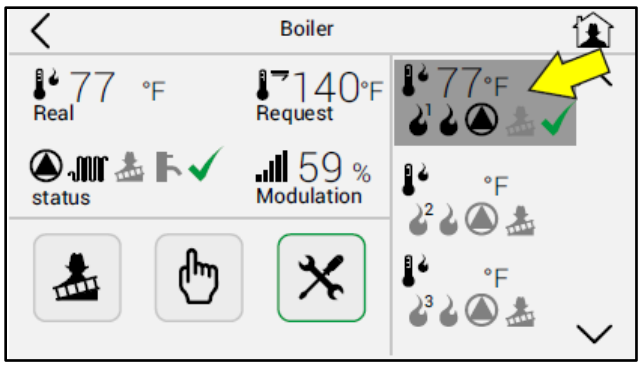
1. Click on the Manual Setpoint button icon. This will show an Activate Button.
2. Toggling the Activate button allows user to operate the boiler with a manual setpoint. Any setpoint in the Heating or DHW Mode are ignored while the Manual Setpoint Function is activated.
3. Click on the Request +/- buttons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



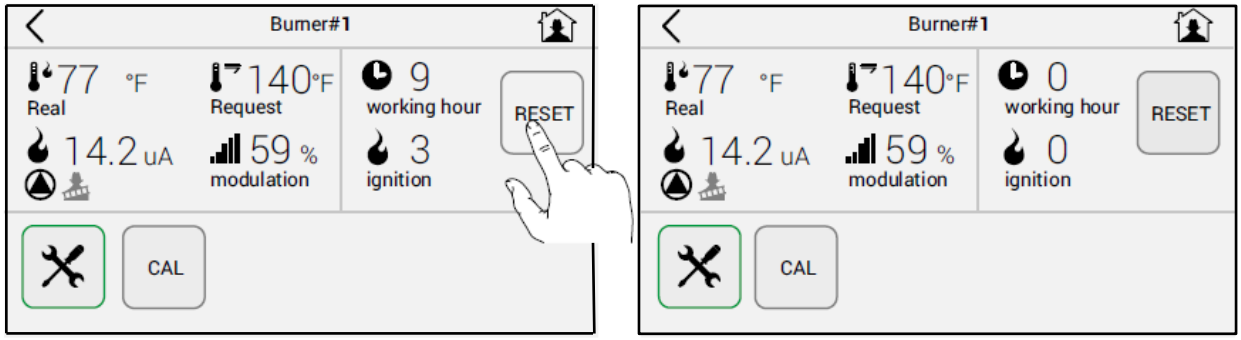


6.5.3 Reset Burner Working Hours and Ignition Count

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	Enabled services 16 = Control via Modbus* 17 = Heating only 18 = Antifreeze only 19 = Heating + Antifreeze 24 = DHW only 25 = Heating + DHW 26 = DHW + Antifreeze 27 = Heating + DHW + Antifreeze ** - Control via Modbus examples: AERCO ACS, Remote Setpoint from BAS/EMS*	See Description	19
483	Maximum Differential Temperature (Water ΔT protection)	0°F/2°F – 90°F (0°C/1°C-50°C) *0 = Disabled;* *Units may be expressed in R or K*	**MLX EXT 450 2S -1100 2S**: 45°F (25°C) **MLX EXT 1500 2S -3000 2S**: 54°F (30°C)
34	Burner Hysteresis	9°F to 36°F (5°C to 20°C) *Units may be expressed in R or K*	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	Analogue input function 0/10 V: 0 = Backup Controller (BCM) target temperature 1 = External temperature sensor 2 = 0-10 V Remote Setpoint *3 = DO NOT USE* *See Controls Manual OMM-0159 Sections 4.1.1, 4.3.2 and 6.3.1*	See Description	1

PARAMETER	DESCRIPTION	ENTRY RANGE	DEFAULT
376	Programmable Input #1 function 0 = CH Service Enable/Disable 1 = System Enable/Disable *2 = DO NOT USE* 3 = Backup Controller (BCM) Remote activation *See Controls Manual OMM-0159 Sections 4.5 and 6.3.2*	See Description	0
322	Pump Off Delay	1 - 10 min	3 min
341	Pump: minimum control (Minimum output pump modulation) *See Controls Manual OMM-0159 Section 6.4.3*	0-10V	3V
313	Pump: maximum control (Maximum output pump modulation) *See Controls Manual OMM-0159 Section 6.4.3*	0-10V	10V
792	CH Maximum modulation	0-100%	100%
611	CH Parallel: maximum error *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.*	0°F to 54°F (0°C to 30°C) *Units may be expressed in R or K*	9°F (5°C)
612	CH Parallel: modulation maximum *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*	0-100%	0%
650	DHW: Minimum Setpoint *DHW setpoint must be set higher than the value of Parameter 650.*	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) *Leave this Parameter set = 0 for a constant boost temperature (Param. 660) when DHW is present*	0-15	0
656	DHW request: tank to target temperature differential • *DHW demand is present when DHW outlet/tank temperature falls below the DHW setpoint by the amount of Parameter 656.* • *DHW demand is satisfied when DHW outlet/tank reaches temp above DHW setpoint by the amount [Param. 657 minus Param. 656]*	-36°F to 36°F (-20°C to 20°C) *Units may be expressed in R or K*	7°F (4C)
657	DHW: Requested Temp. Hysteresis • *DHW demand is satisfied when DHW outlet/tank reaches temp above DHW setpoint by the amount [Param. 657 minus Param. 656]*	2°F to 36°F (1°C to 20°C) *Units may be expressed in R or K*	14°F (8C)
310	DHW Pump Off Delay	5 - 600 sec	60 sec

PARAMETER	DESCRIPTION	ENTRY RANGE	DEFAULT
660	DHW: Maximum Boiler Temperature *Boost temperature: When DHW demand is present, Parameter 660 will be the boiler setpoint.*	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
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 **not** 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 **- NOT APPLICABLE.** Note: Leave at default value of 0		0
648	First Burner Priority **- NOT APPLICABLE.** 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) *Units may be expressed in R or K*	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

PARAMETER	DESCRIPTION	ENTRY RANGE	DEFAULT
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
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 - **NOT APPLICABLE.** Note: Leave at default value of 0		0
768	Min Gas Pressure Sensor - **NOT APPLICABLE.** Note: Leave at default value of 0		0
793	Chimney Obstruction Sensor - **NOT APPLICABLE.** 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 - **NOT APPLICABLE.** 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 - **NOT APPLICABLE.** 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 - **NOT APPLICABLE.** Note: Leave at default value of 0		0
376	Programmable Input #1 function - **NOT APPLICABLE.** Note: Leave at default value of 0		0
322	Pump Off Delay - **NOT APPLICABLE.** Note: Leave at default value of 3 min.		3 min
341	Pump: minimum control - **NOT APPLICABLE.** Note: Leave at default value of 30%		30%
313	Pump: maximum control - **NOT APPLICABLE.** 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 - **NOT APPLICABLE.** Note: Leave at default value of 0 sec		0 sec
783	Burner: recycling - **NOT APPLICABLE.** Note: Leave at default value of 0		0

PARAMETER	DESCRIPTION	ENTRY RANGE	DEFAULT
646	Burner: soft shutdown - **NOT APPLICABLE.** Note: Leave at default value of 0		0
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) *Units may be expressed in R or K*	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) *Units may be expressed in R or K*	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)

PARAMETER	DESCRIPTION	ENTRY RANGE	DEFAULT
483	Maximum Differential Temperature (Water ΔT protection)	0°F/2°F – 90°F (0°C/1°C-50°C) *0 = Disabled; Units may be expressed in R or K*	54°F (30°C)
380	Programmable Sensor #1 function - **NOT APPLICABLE.** Note: Leave at default value of 1		1
777	APS check - **NOT APPLICABLE.** 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.

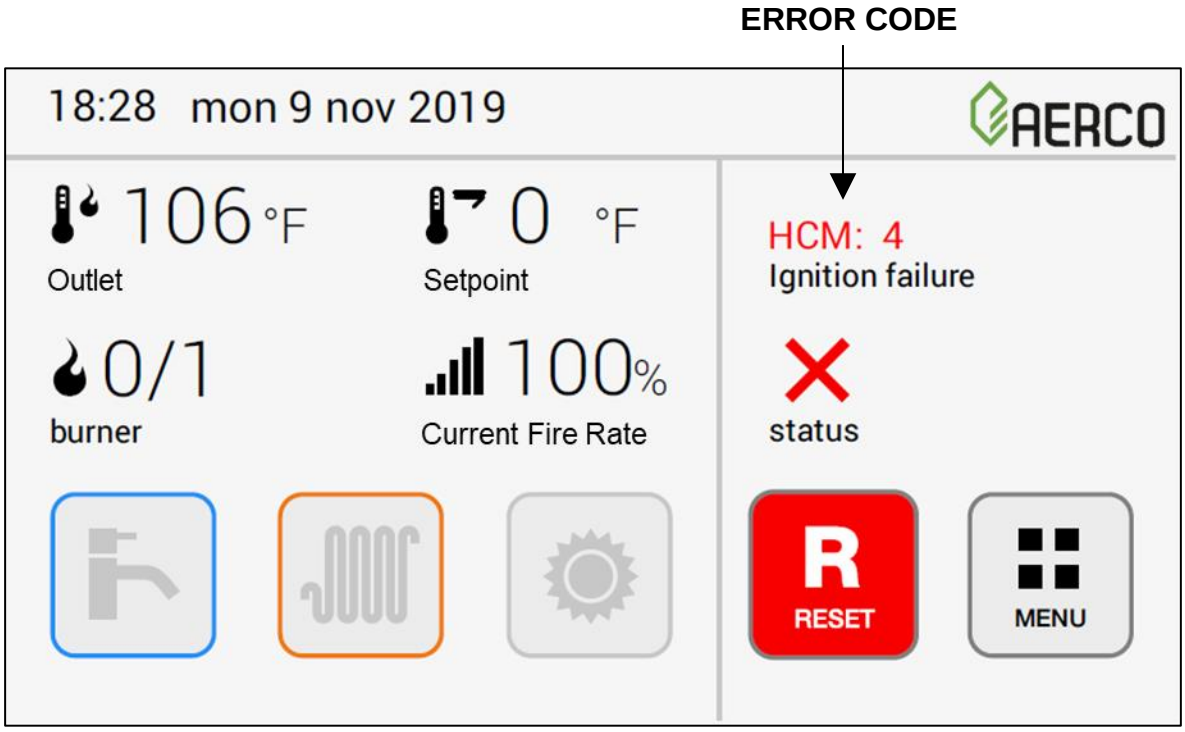


Figure 7-1: Ufly Error Code Location

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
HCM: 2 Low gas pressure	Gas Pressure Switch - **NOT APPLICABLE.**			
HCM: 8 Low water pression	Water Deficiency - **NOT APPLICABLE.**			
HCM: 9 Outer temperature sensor	Outdoor sensor Enabled but not connected	Outdoor Reset not available.		AUTOMATIC - Outdoor Reset will be available once outdoor sensor is connected.
HCM: 13 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
HCM: 14 CH return sensor	Global return sensor failure	All burners turned OFF.	Check return sensor or wiring.	AUTOMATIC
HCM: 17 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.
HCM: 18 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
HCM: 19 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.
HCM: 28 Chimney closed	Flue/Chimney Obstruction	Ignition is inhibited.	Check flue/chimney	MANUAL
HCM: 29 Condense level	Water inside the combustion chamber.	Ignition is inhibited.	Check for water in the exhaust manifold	AUTOMATIC
HCM: 30 Service parameters	Settings corrupted.	Ignition is inhibited.	Contact factory.	MANUAL - push reset switch
HCM: 37 Parameters memory	BCM: Internal fault		Contact factory.	MANUAL
HCM: 38 Factory parameters	Settings corrupted by electromagnetic interference.	Ignition is inhibited.	Contact factory.	MANUAL - push reset switch

FAULT CODE	DESCRIPTION	EFFECT	CORRECTION	RESET
HCM: 39 User parameters	Settings corrupted by electromagnetic interference.	None	Contact factory.	AUTO
HCM: 40 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
HCM: 56 Heat control lack	BCM: No remote control detected		It is possible to activate burner ignition from the BCM manual request button	
HCM: 57 Burners lack	BCM: No BMM detected	Burners turned OFF.	Check electrical connections BMM and e-BUS	AUTOMATIC
HCM: 58 Global temperature sensor	BCM: Sensor global flow detected.	Burners turned OFF.	Check the flow sensor connection. Replace the sensor.	AUTOMATIC
HCM: 73 Flow sensor	Water deficiency pressure switch **- NOT APPLICABLE**			
HCM: 93 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
BMM: 1 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.
BMM: 4 Ignition failure	No flame detected at burner start.	Burner control lockout.	Check flame rod or combustion.	MANUAL - push reset switch or cycle power.
BMM: 5 Flame lost	Flame loss during run.	Ignition retry.	Check combustion and wiring.	MANUAL - push reset switch or cycle power.
BMM: 6 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.
BMM: 10 Internal failure	Internal failure.	Ignition is inhibited.	Contact factory for new BMM.	MANUAL - cycle the power.
BMM: 11 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.
BMM: 12 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
BMM: 14 CH return sensor	Return sensor fault. - **NOT APPLICABLE**			
BMM: 15 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
BMM: 16 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
BMM: 22 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
BMM: 23 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
BMM: 24 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
BMM: 26 High fan speed	Modulating fan speed failure: failed to stop within 30 seconds from end of operation	Ignition is inhibited.	Check fan wiring.	AUTOMATIC
BMM: 27 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
BMM: 30 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.
BMM: 32 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.

Maintenance must be performed annually.

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!

If the boiler is not checked and serviced regularly it could cause damage to the equipment and/or harm to persons.

TABLE 8-1: MODULEX EXT Maintenance Schedule

MAINTENANCE OPERATION	CHECK ONCE A YEAR	CHECK EVERY 2 YEARS
Inspect for acceptable circulating and feed water quality and chemistry.	●	
Inspect gas assembly components.	●	
Inspect safety devices for water and gas.	●	
Inspect and clean the combustion chamber & 8 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 and P-trap, clean if necessary.	●	
Check flow switch in CSD-1 manifold for proper function	●	

8.1 Instructions For Inspection and Maintenance

⚠ WARNING!

To ensure a long life of the boiler components and in order not to alter the conditions of an approved product, ONLY original AERCO spare parts may be used.

Before servicing, always carry out the following steps:

1. Disconnect the mains electrical supply to the boiler.

2. Separate the boiler from the electrical supply by means of a separating device with an open contact of at least 3 mm (for example, safety devices or power switches) and ensure that it cannot be accidentally connected to power.
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. Perform the maintenance in keeping with 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 and full maintenance should be done 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 siphon in particular.

8.3.1 Cleaning the Condensate Drain Line

In order to inspect and clean the condensate line, do the following:

1. Refer to Figure 8-1, disconnect the pipe at location “A“.
2. Check that no deposits have accumulated inside the drain. If there are any deposits flush them out with clean water.
3. Reassemble the drain in reverse order.

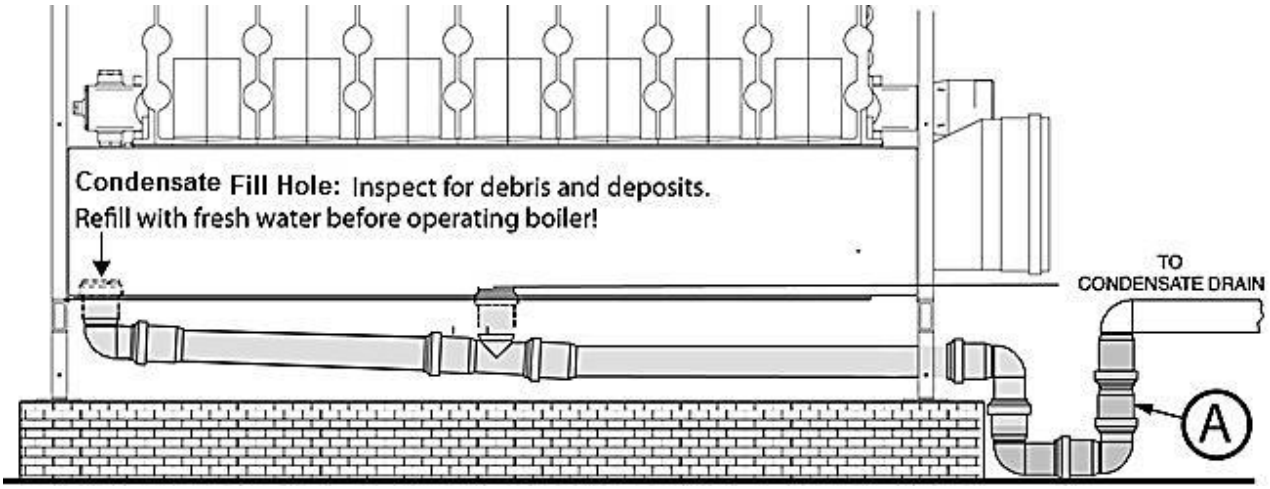


Figure 8-1: Condensate Drain Location

⚠ 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.

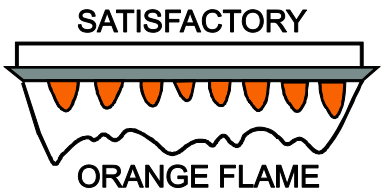
8.5 Visual Inspection Of The Flame

(2 and 4 year maintenance)

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.

8.5.1 Flame Color

- YELLOW = CO_2 HIGH NOT SATISFACTORY
- BLUE = CO_2 LOW NOT SATISFACTORY
- ORANGE = OK SATISFACTORY



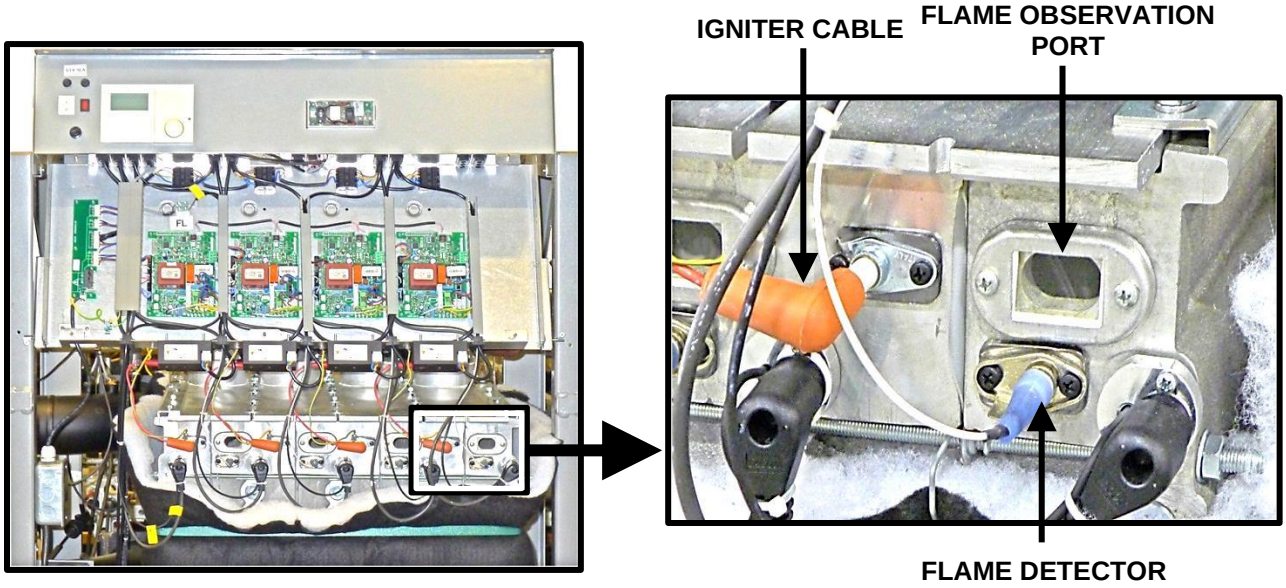


Figure 8-2: Boiler Flame Observation Port Location

8.6 Proper Reassembly And Resealing Of The Vent-Air Intake System

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

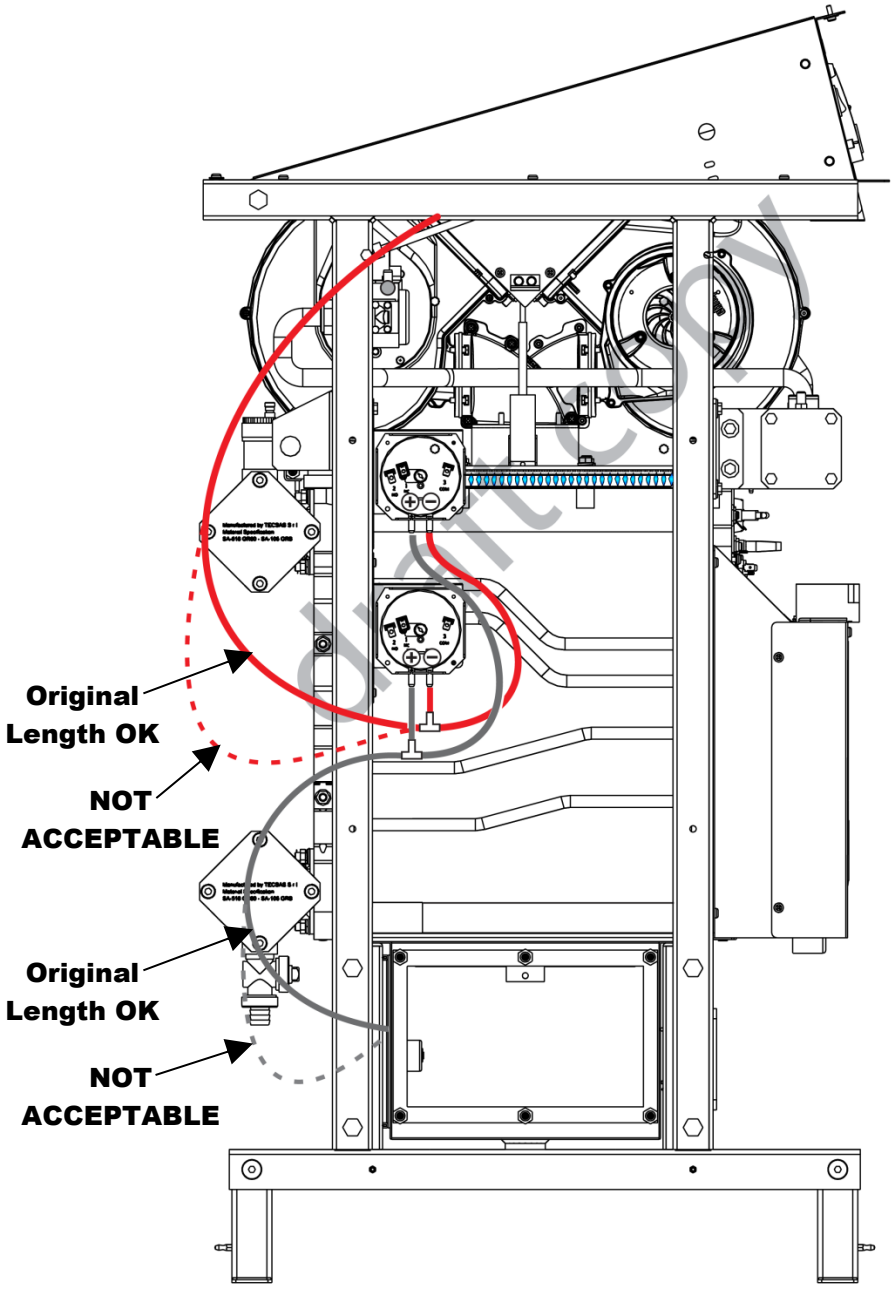


Figure 8-3: Pressure Hose Lengths

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 combustion 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.

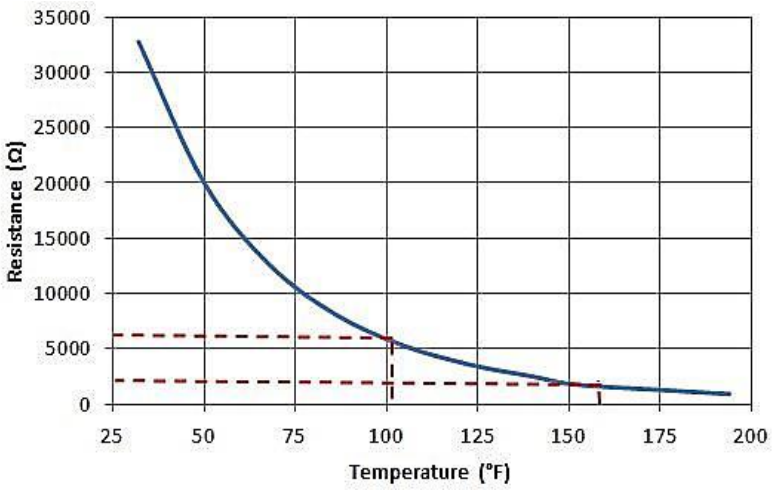
Before cleaning the boiler body sections, check the boiler input and the O_2 percentage (see section 4.33).

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:

1. Switch OFF external electrical power and CLOSE the gas supply valve upstream from the boiler, and ensure it is completely closed.
2. Unlatch the top lid and raise the lid (Figure 8-4).
3. Remove screws from top of unit holding the front, rear and side panels in place (Figure 8-5). Remove the 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.

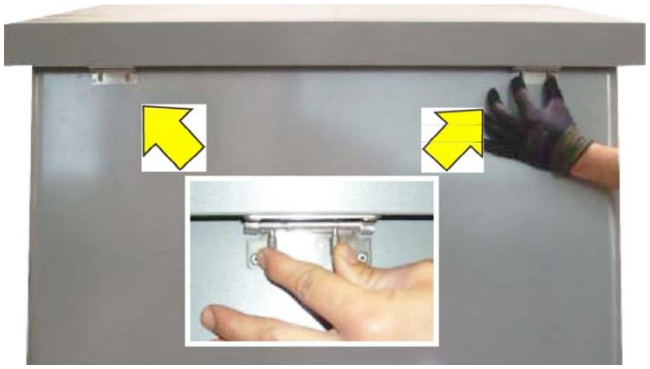


Figure 8- 4: Unlatch Top Lid (Step 2)

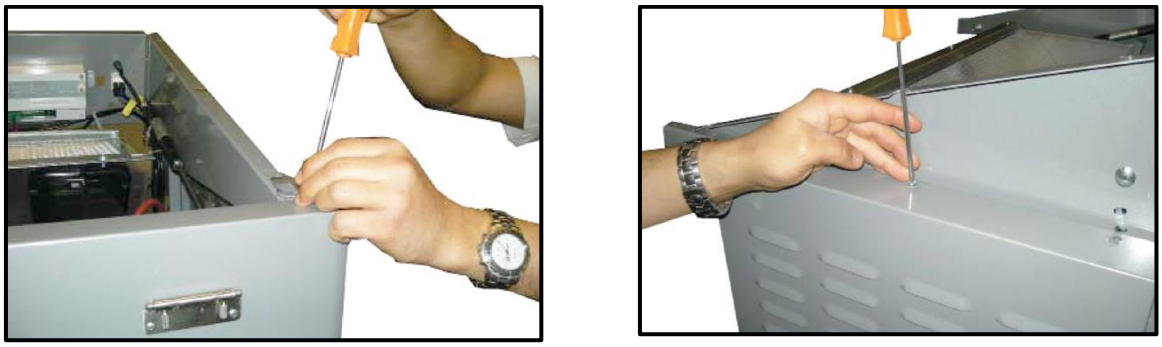


Figure 8-5: Remove Screws at Edges and Remove Side and Rear Panels (Step 3)

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

4. Remove ten (10) screws from around exhaust outlet opening and remove flue assembly from unit (Figures 8-7 & 8-8).

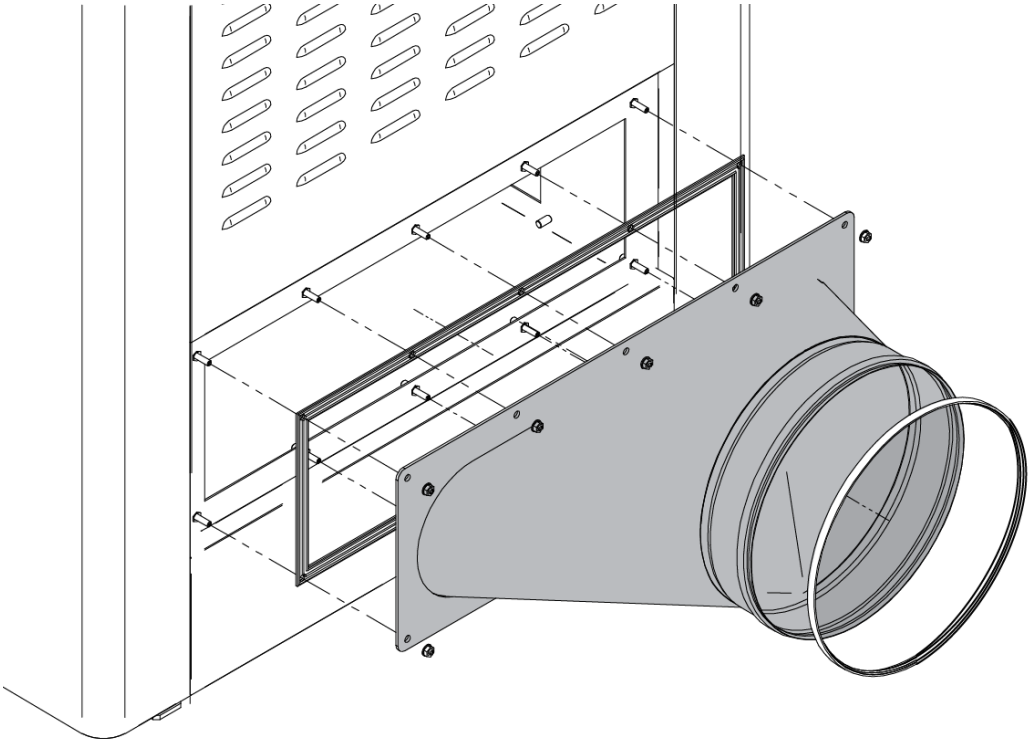


Figure 8-8: Flue Removal (Step 4)

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

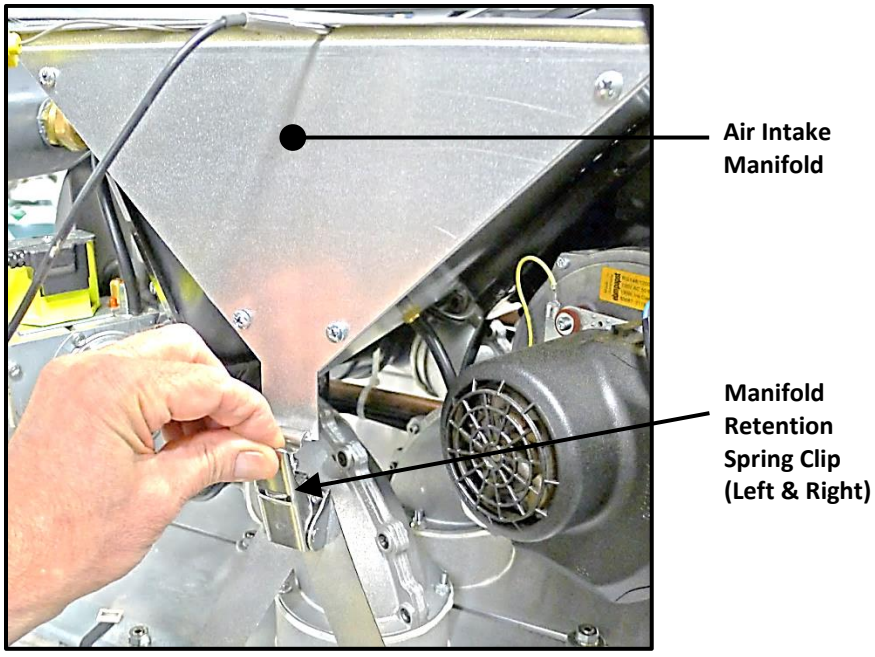


Figure 8-9: Unlatch Spring Clips from Left and Right Side of Manifold (Step 5)

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

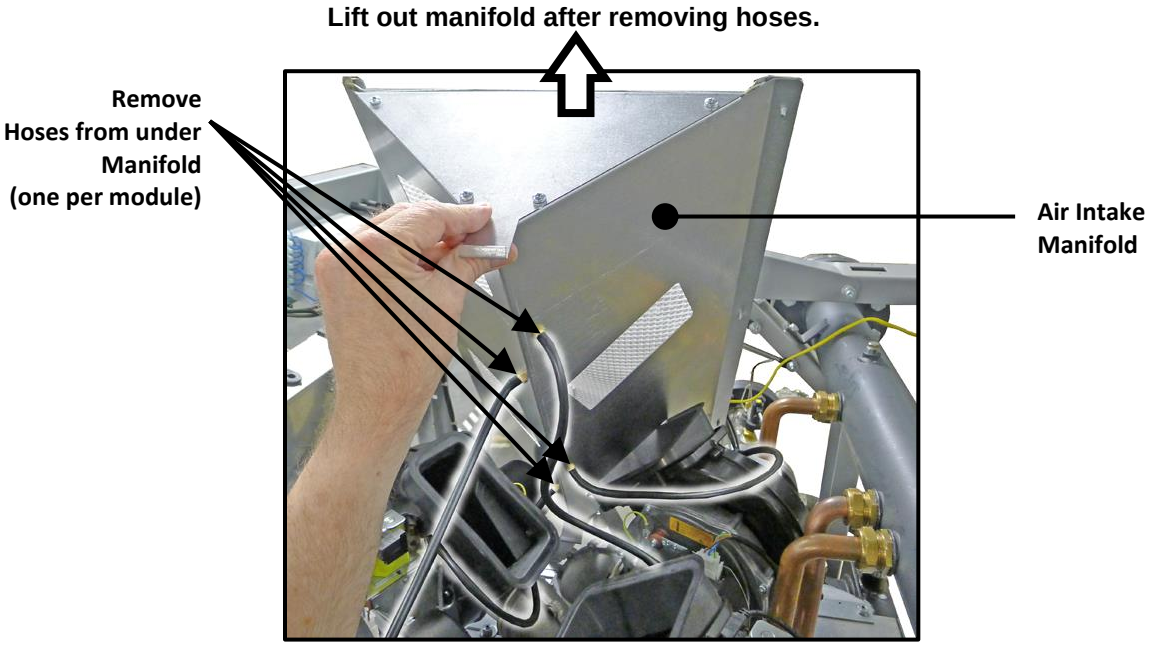


Figure 8-10: Removing Red Hoses and Manifold from Unit (Step 6)

7. 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 (surrounded by horizontal dotted lines in Figure 8-11, 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 (vertical dotted lines in Figure 8-11), 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.

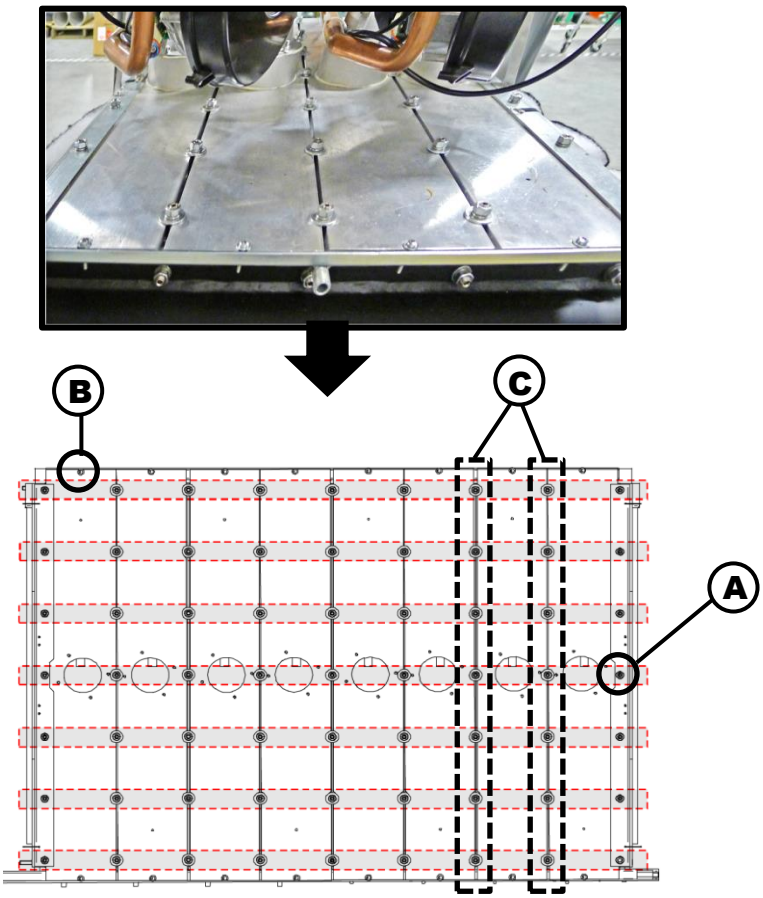


Figure 8-11: Removing the Burner Module Plate Covers (Step 7)

8. Use a 36 mm wrench to disassemble all pipes from the gas manifold. See Figure 8-12.

Figure 8-12: Removing the Gas Pipes from Gas Manifold (Step 8)

9. In order to hold up the burner assembly in place, lift up the front of the burner assembly until the two lift pins are aligned with the left and right side tab holes (refer to Figure 8-13).

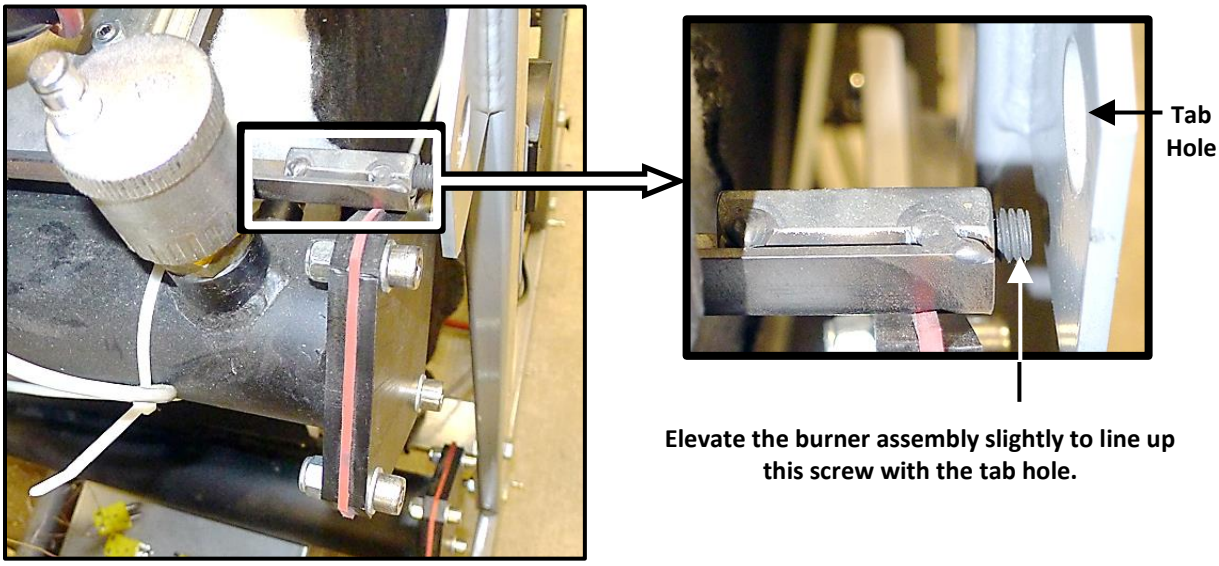


Figure 8-13: Location of Burner Assembly Lifting Screw (Step 9)

10. Use a 4mm hex wrench to adjust the screw until it extends into the tab hole (Figure 8-14 & 8-15).

Figure 8-14: Unscrewing Lift Screw into Tab Hole (Step 10)

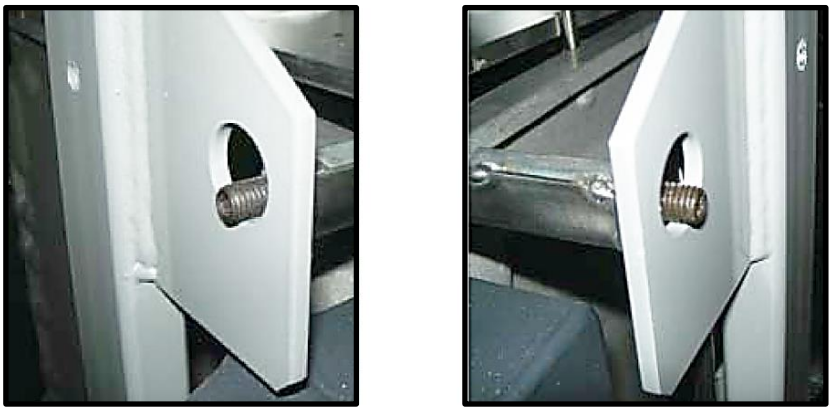


Figure 8-15: Left and Right Lift Screws Extended into Tab Holes (Step 10)

11. Refer to Figure 8-16, lift up the burner plates to expose the burner modules, and latch it in place.

Figure 8-16: Lifting Burner Plates (Left) to Expose Burner Modules (Right)

Figure 8-17: Exposing Burner Modules (Left) and Removing (Right)

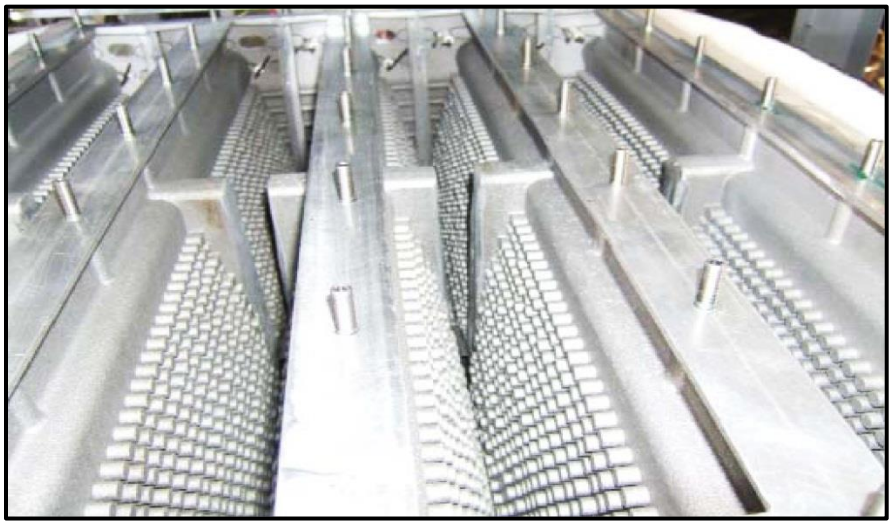


Figure 8-18: Exposed Combustion Chambers under Burner Modules

NOTE

The check valve (**1** in Fig. 7-19) should be checked at this time to ensure that it moves freely and closes properly.

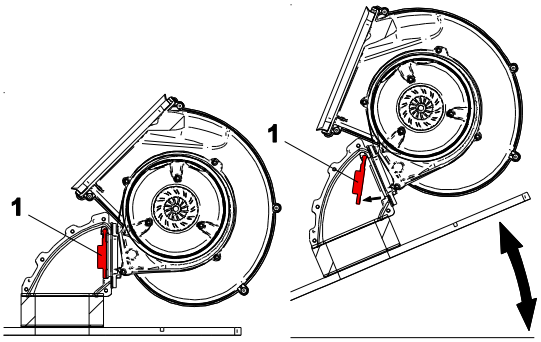


Figure 8-19 Lifting Burner Assembly and Location of the Check Valve

8.11 Cleaning The Burner Module and Combustion Chamber

After completing the previous section, the individual burner modules are exposed and available to be cleaned. Follow the instructions to clean the burner modules.

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.

2. Use only compressed air to clean the burners by blowing into the "flame" side of the burner mesh, as shown in Figure 8-20.

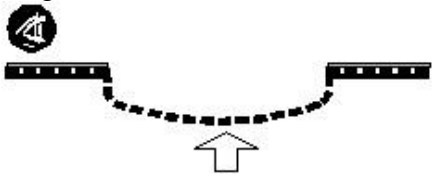


Figure 8-20: Burner Module Profile Compressed Air Orientation (Step 2)

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 entire 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 elements. Routine maintenance may be sufficient to keep these elements clean. However, if the by-product build-up is too great the unit's overall efficiency will decline.

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

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

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.

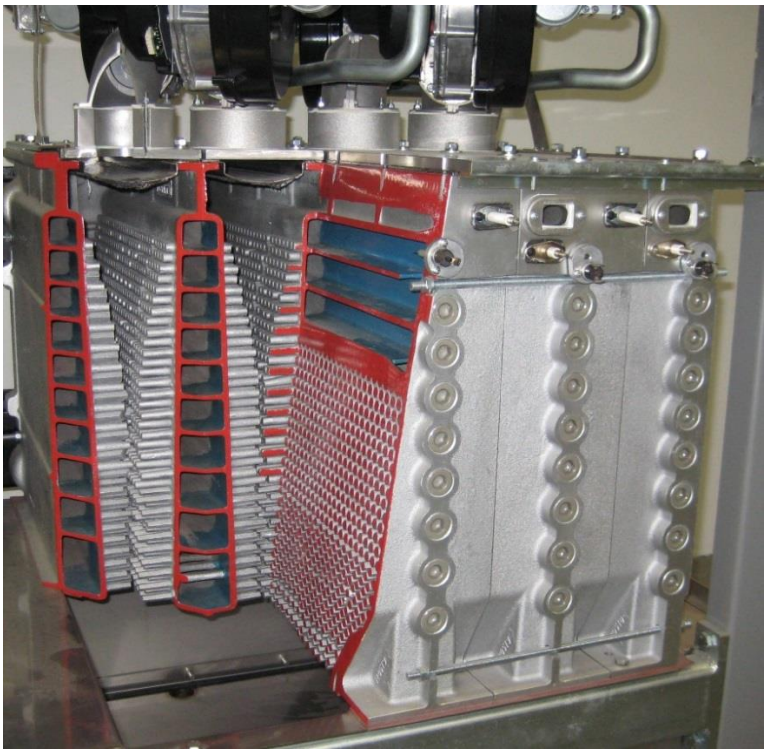


Figure 8-21: Modulex Heat Exchangers – Cut-Away View

CAUTION!

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

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.

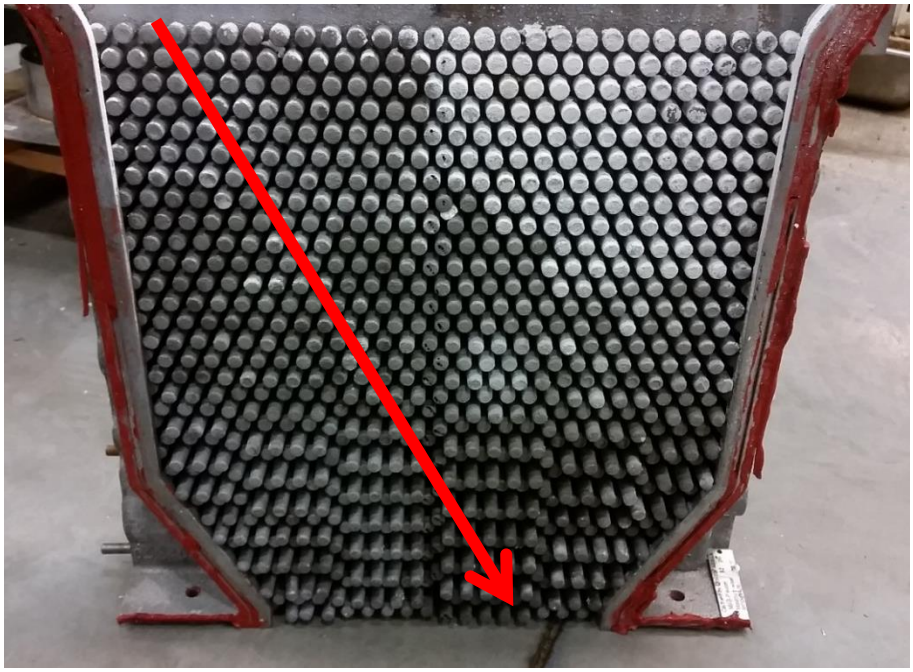


Figure 8-22: Angle of Cleaning Instrument – Heat Exchanger Cut-Away View

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 8-22. Be sure to clean the space between each pin.
4. Repeat the previous step on each burner module in the unit.
5. 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 of the build-up, use 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) 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

Follow the instructions to reassemble the burner modules:

1. After the cleaning of the combustion chamber and/or the burners, inspect the condensate drain pipe to determine if it is free of obstructions; wash water should drain freely from the condensate drain pipe. Also make sure the condensate siphon is free of obstructions, cleaning it if necessary.
2. Reposition the burners into their proper positions.
3. Position the new gaskets onto each burner module and ensure proper positioning. Make sure all surfaces are smooth and free of debris.

⚠ WARNING!
The burner gaskets *MUST* be replaced at every cleaning.

4. Proceed with reassembly, performing whichever disassembly operation was chosen (all or individual method) in reverse order.
   a) Lower burner assembly
   b) Reinstall gas collector tubes to the gas manifold tube.
   c) Reinstall nuts “A,” “C” and “B” screws to secure burner assembly to boiler body.

NOTE: Tighten the burner bolts with a torque of **9.5 ft-lbs (13 Nm)**.

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

8.14 Final Procedures After Maintenance

Before returning the boiler to service, the following procedures must be performed:

1. Before lighting the boiler ensure the condensate line has been 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 (see section 4.33).
5. Make sure that all the pressure test nipples, previously opened, have been closed.

8.15 Maintenance Kit Part Number

To order the MODULEX annual 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.

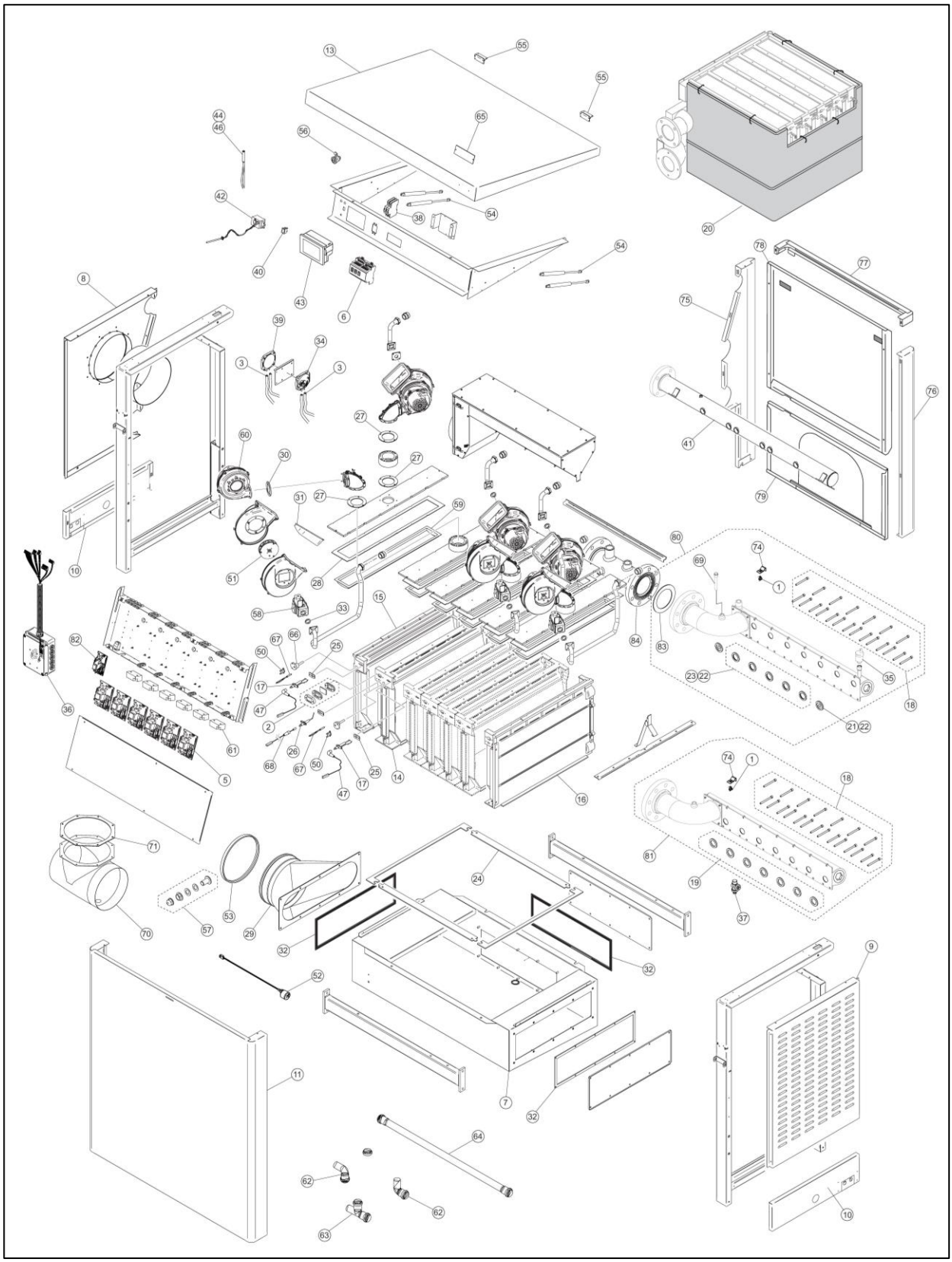
TABLE 8-3: MLX 12-Month Maintenance Kit

P/N	DESCRIPTION
58086-03	**EXT-1500 2S** ANNUAL MAINTENANCE KIT
58086-05	**EXT-2300 2S** ANNUAL MAINTENANCE KIT
58086-06	**EXT-2600 2S** ANNUAL MAINTENANCE KIT
58086-11	**EXT-3000 2S** ANNUAL MAINTENANCE KIT

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

P/N	DESCRIPTION
58086-18	**EXT-1500 2S** 24 MONTH FIRESIDE INSPECTION KIT
58086-20	**EXT-2300 2S** 24 MONTH FIRESIDE INSPECTION KIT
58086-21	**EXT-2600 2S** 24 MONTH FIRESIDE INSPECTION KIT
58086-22	**EXT-3000 2S** 24 MONTH FIRESIDE INSPECTION KIT

CHAPTER 9: SPARE PARTS, DRAWING, AND LISTS



Modulex EXT Commercial Spare Parts List		
No.	**Part Number**	**Description**
1	95262049	Heating Sensor 3/4" T7335D1016 10K
2	95000467	Sightglass Kit - Comb Chamber
3	95000657	Silicone tube 4 X 8
4		
5	95004117	Electronic Board
6	95004116	BCM control unit
7	95213360	Boiler sump assembly MODULEX 4 Elements
	95213365	Boiler sump assembly MODULEX 5 Elements
	95213366	Boiler sump assembly MODULEX 6 Elements
	95213367	Boiler sump assembly MODULEX 7 Elements
	95213368	Boiler sump assembly MODULEX 8 Elements
8	95213960	Left Side Panel MODULEX EXT 440-900
9	95213399	Right Side Panel MODULEX EXT
10	95213400	Plate side closing
11	95213402	Casing Front Panel MODULEX EXT 4M
	95213403	Casing Front Panel MODULEX EXT 5-6M
	95213404	Casing Front Panel MODULEX EXT 7-8M
13	95213408	Casing Top Panel MODULEX 4M
	95213409	Casing Top Panel MODULEX 5-6M
	95213410	Casing Top Panel MODULEX 7-8M
14	95004115	Centre Section
15	95004114	End Section front
16	95004113	End Section rear
17	95250624	Ignitor
18	95004112	Screw UNI 5931 M8X45
19	95250973	EPDM 56X38X5 gasket
20	95250992	Boiler Body Insulation MODULEX 4 Elements
	95250991	Boiler Body Insulation MODULEX 5 Elements
	95250990	Boiler Body Insulation MODULEX 6 Elements
	95250989	Boiler Body Insulation MODULEX 7 Elements
	95251330	Boiler Body Insulation MODULEX 8 Elements
21	95251034	Diaphragm to external modules
22	95251035	Diaphragms flow manifold
23	95251052	Diaphragms + gasket flow manifold
24	95251096	Gasket - H/E-Flue Box MODULEX 4 Elements
	95251095	Gasket - H/E-Flue Box MODULEX 5 Elements
	95000852	Gasket - H/E-Flue Box MODULEX 6 Elements
	95251067	Gasket - H/E-Flue Box MODULEX 7 Elements
	95251652	Gasket - H/E-Flue Box MODULEX 8 Elements
25	95251210	Ignitor gasket
26	95251274	Flame Detector
27	95251592	Silicone gasket
28	95251632	Burner gasket
29	95251633	Flue outlet terminal
30	95251588	Fan NRG137 gasket
31	95251645	Airbox gasket
32	95251650	Sealing Gskt-Flue box Outlet
33	95251654	Gasket 33X21X2
34	95002139	Air Pressure Switch (Max)
35	95260588	Automatic Air Vent G3/4"
36	95003710	Connection box
37	95261357	Boiler Drain Cock G 3/4"
38	95263795	Thermal breaker
39	95263767	Air Pressure Switch (Min)
40	95263570	Signal light

41	95282743	Gas inlet header Modulex 4 Elements
	95282744	Gas inlet header Modulex 5/6 Elements
	95282745	Gas inlet header Modulex 7/8 Elements
42	95003985	THERMOSTAT JUMO 115°C L=3000
43	95004062	Ufly System Manager
44	95000926	External sensor
45		
46	95261535	Tank sensor
47	95611593	Ignitor Cable
48		
49		
50	95263708	Safety Thermostat 120°C
51	95262451	Mixer DUNGS SW16 - RG148 - nozzle D.9
52	95262565	Level sensor
53	95262767	D.300 EPDM Gasket
54	95262926	Gas spring
55	95262930	Hinge casing
56	95262931	Casing Top Panel lock
57	95262932	Inspection flue plug
58	95263546	Gas valve
59	95262961	Mesh Burner
60	95263553	Blower
61	95263579	Ignition Transformer
62	95310512	Drain Elbow HTB DN40
63	95310513	Drain TEE HTEA DN 40/40
64	95310515	Drain Pipe 1M LG. DN 40
65	95004081	Manufacturer plate
66	95371895	Sheat probe holder
67	95611133	Temperature sensor
68	95611410	Flame Detector Cable
69	95004061	Sheat probe holder
70	95251906	Flanged flue outlet terminal
71	95251937	Flue terminal gasket
74	95004111	Heating Sensor bracket
75	95004110	Left Rear Panel
76	95004088	Right Trim Panel
77	95004089	Top Trim Panel 4 elements
	95004090	Top Trim Panel 5 - 6 elements
	95004091	Top Trim Panel 7 - 8 elements
78	95004092	Upper Rear Panel 4 elements
	95004093	Upper Rear Panel 5 - 6 elements
	95004094	Upper Rear Panel 7 - 8 elements
79	95004095	Lower Rear Panel 4 elements
	95004096	Lower Rear Panel 5 - 6 elements
	95004097	Lower Rear Panel 7 - 8 elements
80	95004098	Flow header Modulex 4 Elements
	95004099	Flow header Modulex 5 Elements
	95004100	Flow header Modulex 6 Elements
	95004101	Flow header Modulex 7 Elements
	95004102	Flow header Modulex 8 Elements
81	95004103	Return header 4 Elements
	95004104	Return header 5 Elements
	95004105	Return header 6 Elements
	95004106	Return header 7 Elements
	95004107	Return header 8 Elements
82	95002704	Ufly power supply board
83	95004108	DN 100 gasket
84	95004109	CSD-1 manifold MLX EXT Commercial