



# USER MANUAL

## INSTALLATION, OPERATION & MAINTENANCE

### Modulux EXT Commercial Series

#### Modulating and Condensing Boilers



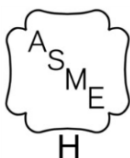
### Modulux EXT

#### APPLIES TO MODELS:

- MLX EXT 1530 / MLX EXT 1500
- MLX EXT 1912
- MLX EXT 2295 / MLX EXT 2300
- MLX EXT 2677 / MLX EXT 2600
- MLX EXT 3060 / MLX EXT 3000

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GAS-FIRED



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# 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 imminently hazardous situation, which if not avoided, **WILL** result in death or serious injury.

## WARNING!

Indicates a potentially hazardous situation, 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 with filleted (round) corners, as shown below, in order to differentiate them from the main text.

It is of utmost importance to observe all **CAUTIONS** and **WARNINGS** presented in this manual to avoid injury, death, and damage to the equipment. Failure to properly heed safety warnings and cautions 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 may be a source of danger for people, animals and property.**

### NOTE:

Carefully read the warranty conditions and clauses 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 can not 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.

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### 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)]**

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## **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 15°F 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 keep 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 (GF-136-V).
- It is absolutely forbidden to make any alterations to the boiler not in keeping with the manufacturers 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 E8 Controller User Manual (GF-136-C).
- 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 the instructions indicated in this manual, which is supplied with the boiler, could cause injury to persons, 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 following parts:

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

### WARNING!

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

## **2.6 FOR APPLIANCES OPERATING WITH PROPANE GAS**

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

### **WARNING!**

Do not store or use gasoline or other flammable vapors or liquids in the vicinity of this or any other appliance..

### **WHAT TO DO IF YOU SMELL GAS:**

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

<b>AERCO</b> By <b>Unical</b>		AERCO International, Inc. 100 Oritani Drive Blauvelt, NY 10913		ANSI Z21.13-2014 / CSA 4.9-2014 LOW PRESSURE BOILER	
Boiler Model				Category	
Serial N°				Code	
<b>Hot Water Heating Boiler</b>					
Normal altitude (0-2,000 ft)		Total INPUT		Btu/hr	FH (rpm %)
High altitude (2,000-4,500 ft)		Total INPUT			
		Min INPUT			
		Single INPUT			
		OUTPUT			
Min. relief valve capacity				lbs/hr	
Maximum Heating water				°F	°C
MAWP water				psi	kPa
<b>NOT suitable for Water Header</b>					
Maximum Domestic water				°F	°C
PMW				psi	kPa
Tank				gal	L
Factory Set (not adjustable)					
Gas type		A		NATURAL	
Electrical Power supply: 120 V ~ 60 Hz less than 12 Amp					
For either indoor or outdoor installation. For either direct vent installation or for installation using indoor combustion air For installation on combustible flooring. Pour l'installation soit intérieure ou extérieure. Pour l'installation avec vaquation directe ou avec air comburant Pour l'installation sur un plancher combustible.					
Made in ITALY		GAS-FIRED c <b>UL</b> US LISTED			

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

+ 00335161

Gas type / Type de gaz		A		B	
		NATURAL NATUREL		PROPAN PROPANE	
Permissible inlet gas pressure: Admissible pression de gaz d'entrée:		in w.c. kPa		in w.c. kPa	
Max		10.5	2.61	13.0	3.23
Normal		7.0	1.74	11.0	2.74
Min		3.5	0.87	8.0	1.99
00335161					

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

### **2.8.2 Regulatory Requirements**

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

- Local building codes regarding the installation.
- Local building codes concerning the air intake and outlet systems and the vent connection.
- Regulations for the power supply connection.
- Technical rules laid down by the gas utility company concerning the connection of the gas connection to the local gas mains.
- Instructions and standards concerning the 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 the gas supply at a location external to the boiler.

### 2.8.3 Water Quality Requirements

#### NOTE:

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

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

- You must follow guidelines for boiler water quality.
- Thoroughly flush the system prior to filling.
- Follow the cleaning instructions.
- Never use water to fill the heating system that has been treated by reverse osmosis, deionization, or distilled water in order to soften the water.
- 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 and using only original spare parts. Non-observance of the above requirement may jeopardize the safety of the appliance and void any warranties.

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

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

### **2.11.3 Installation Materials**

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

### 2.11.4 Preparing Boiler for Servicing

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

### 2.11.5 Returning a Boiler to Service

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

### 2.11.6 Change in Ownership

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

## 2.12 OPERATIONAL LIMITS OF THE BOILER

- Max. boiler temperature: 180° F (80° 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<sub>x</sub>, condensing boiler.
- Comprised of one sectional boiler body, suitable as a single boiler or in a cascaded group.
- May be installed in either an inside or outside location.
- Low internal water volume.
- Fast response to load variations.
- Flue exhaust outlet positionable on three sides.
- Manifold delivery and return.
- 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 (E8) 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.
- E8 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

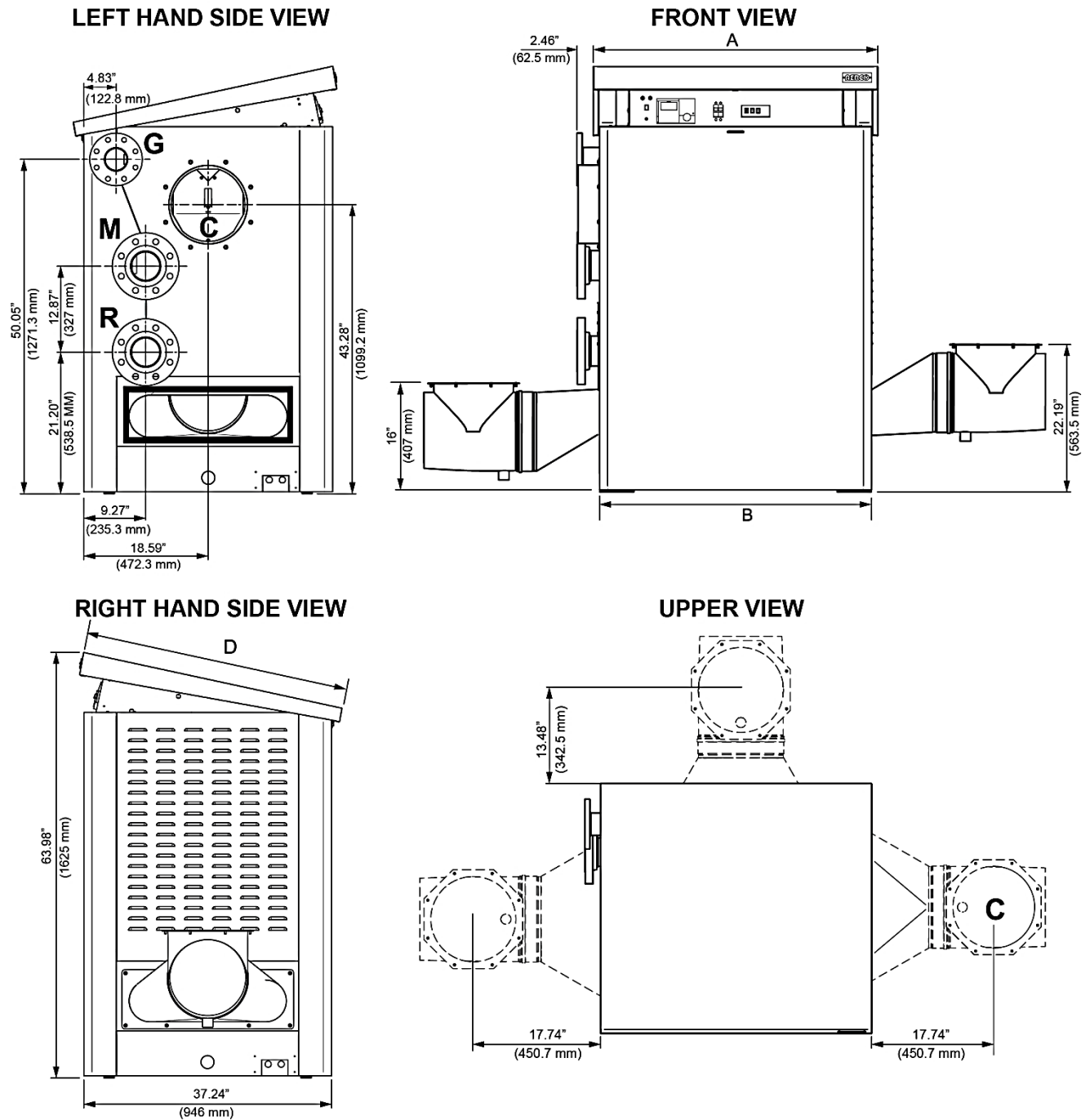
The boiler may be operated from the E8 controller or alternatively from a BCM (Boiler Cascade Manager). The boiler management logic automatically fires the maximum number of simultaneously operating heating elements in order to maximize heat production and overall efficiency. Burner efficiency and a 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 DIMENSIONAL DRAWINGS



**Figure 3-1: MODULEX EXT Commercial Dimensional Drawings**

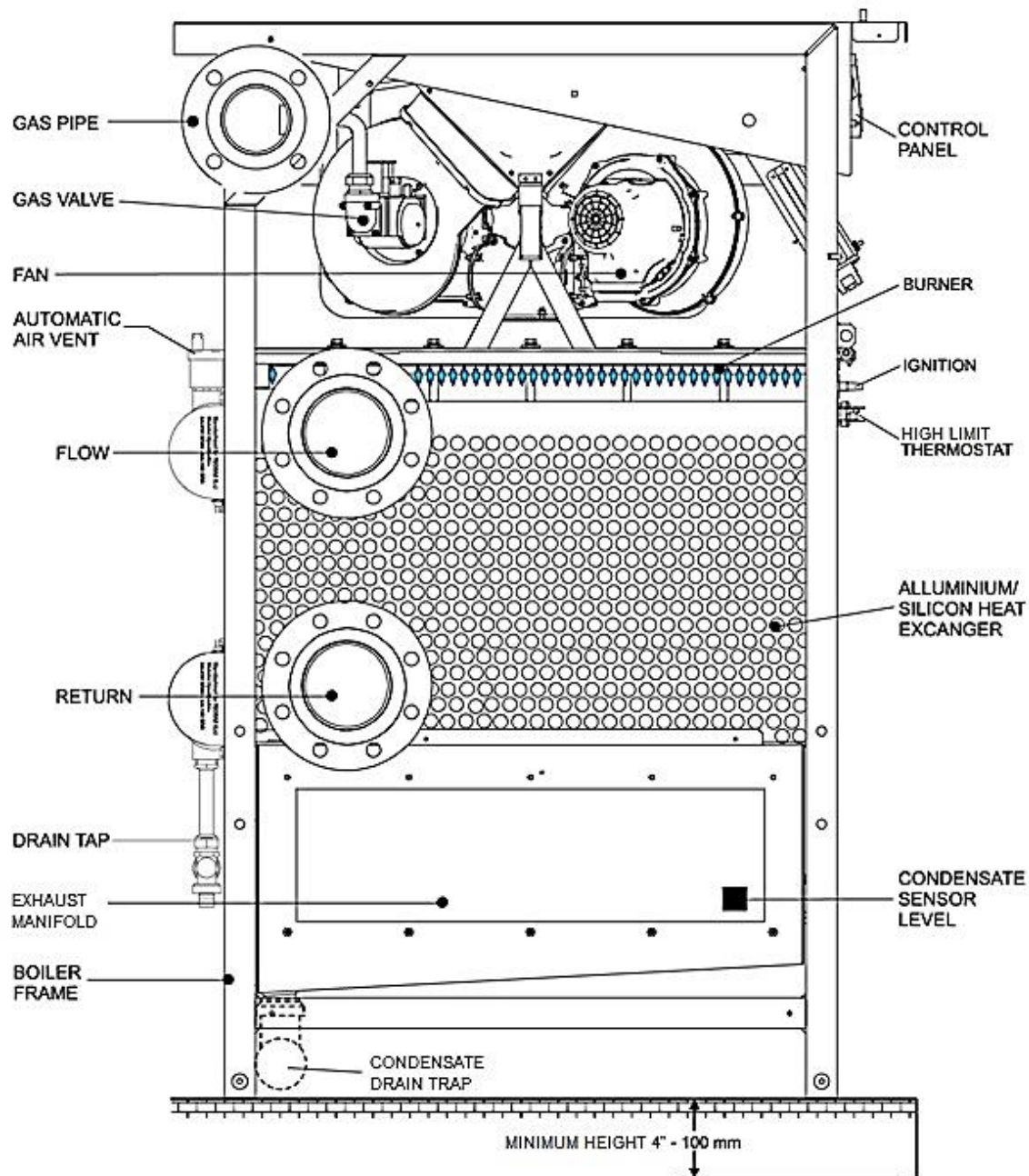
TABLE 3-1: MODULEX EXT Commercial Dimensions and Sizes

MODULEX EXT Dimensions		EXT 1530 1500	EXT 1912	EXT 2295 2300	EXT 2677 2600	EXT 3060 3000
Number of Modules		4	5	6	7	8
Height open	inch	63.98"	63.98"	63.98"	63.98"	63.98"
	mm	1625	1625	1625	1625	1625
Height closed	inch	57.2"	57.2"	57.2"	57.2"	57.2"
	mm	1453	1453	1453	1453	1453
Width "A"	inch	42.80"	53.35"	53.35"	63.90"	63.90"
	mm	1087	1355	1355	1623	1623
Width "B"	inch	40.91"	51.45"	51.45"	62.00"	62.00"
	mm	1039	1307	1307	1575	1575
Depth "D"	inch	39.6"	39.6"	39.6"	39.6"	39.6"
	mm	1006	1006	1006	1006	1006
Depth "E"	inch	37.24"	37.24"	37.24"	37.24"	37.24"
	mm	946	946	946	946	946
Connections						
Gas (*)	inch	DN80- -3"	DN80- -3"	DN80- -3"	DN80- -3"	DN80- -3"
	mm	76,1	76,1	76,1	76,1	76,1
M System Flow (**)	inch	DN100 - 4"	DN100 - 4"	DN100 - 4"	DN100 - 4"	DN100 - 4"
	mm	101,6	101,6	101,6	101,6	101,6
R System Return (**)	inch	DN100 - 4"	DN100 - 4"	DN100 - 4"	DN100 - 4"	DN100 - 4"
	mm	101,6	101,6	101,6	101,6	101,6
Chimney connection / Air Intake "C"	inch	10"	10"	12"	12"	12"
	mm	254	254	304	304	304
Condensate drain diameter	inch	1.57"	1.57"	1.57"	1.57"	1.57"
	mm	40	40	40	40	40

(\*) DN 80 – 3" ASME B16.5 Flange 150 lbs./sq. inch

(\*) DN 100 – 4" ASME B16.5 Flange 150 lbs./sq. inch





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

- **Flue Exhaust** connection is located on the RIGHT HAND side (supply condition), but may be moved to LEFT or REAR positions.
- **Air Intake** connection is located on the LEFT HAND side.
- **Condensate Evacuation** connection is located on the RIGHT HAND side.
- **Cold/Hot Flow** connection is located on the LEFT HAND side.
- **Cold/Hot Return** connection is located on the LEFT HAND side.
- **Gas Connection** is located on the LEFT HAND side.

## 3.4 PERFORMANCE DATA

**TABLE 3-2: MODULEX EXT Commercial Performance Data**

MODULEX EXT MODEL		EXT 1530 1500	EXT 1912	EXT 2295 2300	EXT 2677 2600	EXT 3060 3000
Minimum heat input	[Btu/hr] [kW]	83,300 24.4	83,300 24.4	83,300 24.4	83,300 24.4	83,300 24.4
Nominal heat input (low)	[Btu/hr] [kW]	1,530,000 448.4	1,912,000 560.4	2,295,000 672.7	2,677,000 784.6	3,060,000 896.9
(*) Nominal heat input (high) (reduction for Altitude)	[Btu/hr] [kW]	1,377,000 403.6	1,720,800 504.4	2,065,500 605.4	2,409,300 706.2	2,754,000 807.2
Nominal heat output (HT)	[Btu/hr] [kW]	1,382,202 405.1	1,727,301 506.3	2,073,303 607.7	2,418,402 708.8	2,764,404 810.2
Minimum heat output (HT)	[Btu/hr] [kW]	N.R. N.R.	N.R. N.R.	N.R. N.R.	N.R. N.R.	N.R. N.R.
Efficiency at full load (100%)	[%]	90.34	90.34	90.34	90.34	90.34
Efficiency at min load	[%]	84.23	84.23	84.23	84.23	84.23
Nominal heat output in condensing mode	[Btu/hr] [kW]	1,433,610 420.2	1,791,544 525.1	2,150,415 603.3	2,508,349 735.2	2,867,229 804.4
Minimum heat output in condensing mode	[Btu/hr] [kW]	81,801 24.0	81,801 24.0	81,801 24.0	81,801 24.0	81,801 24.0
Efficiency at nominal load in condensing mode	[%]	93.70	93.70	93.70	93.70	93.70
Efficiency at min load in condensing mode	[%]	98.20	98.20	98.20	98.20	98.20
Combustion efficiency at nominal load	[%]	89.82	89.82	89.82	89.82	89.82
Combustion efficiency at min load	[%]	90.52	90.52	90.52	90.52	90.52
Stand-by losses	[%]	0.1	0.1	0.1	0.1	0.1
Flue gas temp. (Flue gas temp - room temp) at nominal load	[°F] [°C]	113 45	113 45	113 45	113 45	113 45
Air excess l	[%]	24.29	24.29	24.29	24.29	24.29
Condensate production max	[kg/hr] [lb/hr]	11,57 25.51	17,41 38.38	23,15 51.04	28,97 63.87	34,74 76.59
Boiler category		IV	IV	IV	IV	IV
Minimum water flow rate in CH circuit @t 68 °F (20 °C)	[gal/min] [l/min]	3.89 14.74	3.89 14.74	3.89 14.74	3.89 14.74	3.89 14.74
Min. pressure in CH circuit	[psi] (kPa)]	7.29 50	7.29 50	7.29 50	7.29 50	7.29 50
Max. pressure in CH circuit	[psi] [kPa]	91.37 630	91.37 630	91.37 630	91.37 630	91.37 630
Water content in primary circuit	[gal] [L]	2.67 10.1	3.75 14.2	4.83 18.3	5.92 22.4	7.00 26.5
Maximum operating temperature	[°F] [°C]	176 80	176 80	176 80	176 80	176 80
Minimum operating temperature	[°F] [°C]	86 30	86 30	86 30	86 30	86 30
Electrical supply	[V-Hz]	120 - 60	120 - 60	120 - 60	120 - 60	120 - 60
Electrical req: 120 V 15 AMP max.	[FLA]	10	12.5	15	17.5	20
Net weight	[lb] [kg]	1,137 516	1,241 563	1,384 628	1,549 703	1,664 755
Gross weight	[lb] [kg]	1,289 585	1,417 643	1,558 707	1,776 806	1,891 858
Max dynamic gas pressure A (natural)	[in wc (kPa)]	10.5 (2.61)				
Nominal dynamic gas pressure A (natural)	[in wc (kPa)]	7.0 (1.74)				
Min. dynamic gas pressure A (natural)	[in wc (kPa)]	3.5 (0.87)				
Max dynamic gas pressure E (Propane HD)	[in wc (kPa)]	13.0 (3.23)				
Nominal dynamic gas pressure E (Propane HD)	[in wc (kPa)]	11.0 (2.74)				
Min. dynamic gas pressure E (Propane HD)	[in wc (kPa)]	8.0 (1.99)				

**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.

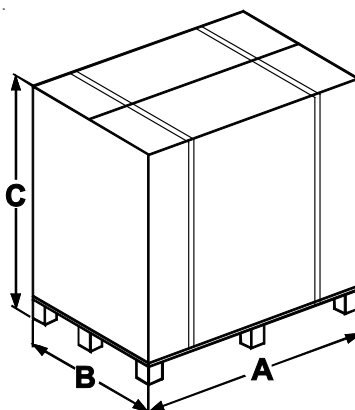
### 4.2 CODE AND STANDARDS APPROVALS

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
<b>EXT 1530 / 1500</b>	49.3" (1252 mm)	44.8" (1140 mm)	82.4" (2095 mm)	1289 lb. (585 kg)
<b>EXT 1912</b>	59.8" (1531 mm)	44.8" (1140 mm)	82.4" (2095 mm)	1417 lb. (643 kg)
<b>EXT 2295 / 2300</b>	59.8" (1531 mm)	44.8" (1140 mm)	82.4" (2095 mm)	1558 lb. (707 kg)
<b>EXT 2677 / 2600</b>	71.6" (1819 mm)	44.8" (1140 mm)	82.4" (2095 mm)	1776 lb. 806 kg
<b>EXT 3060 / 3000</b>	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 when not secured properly.

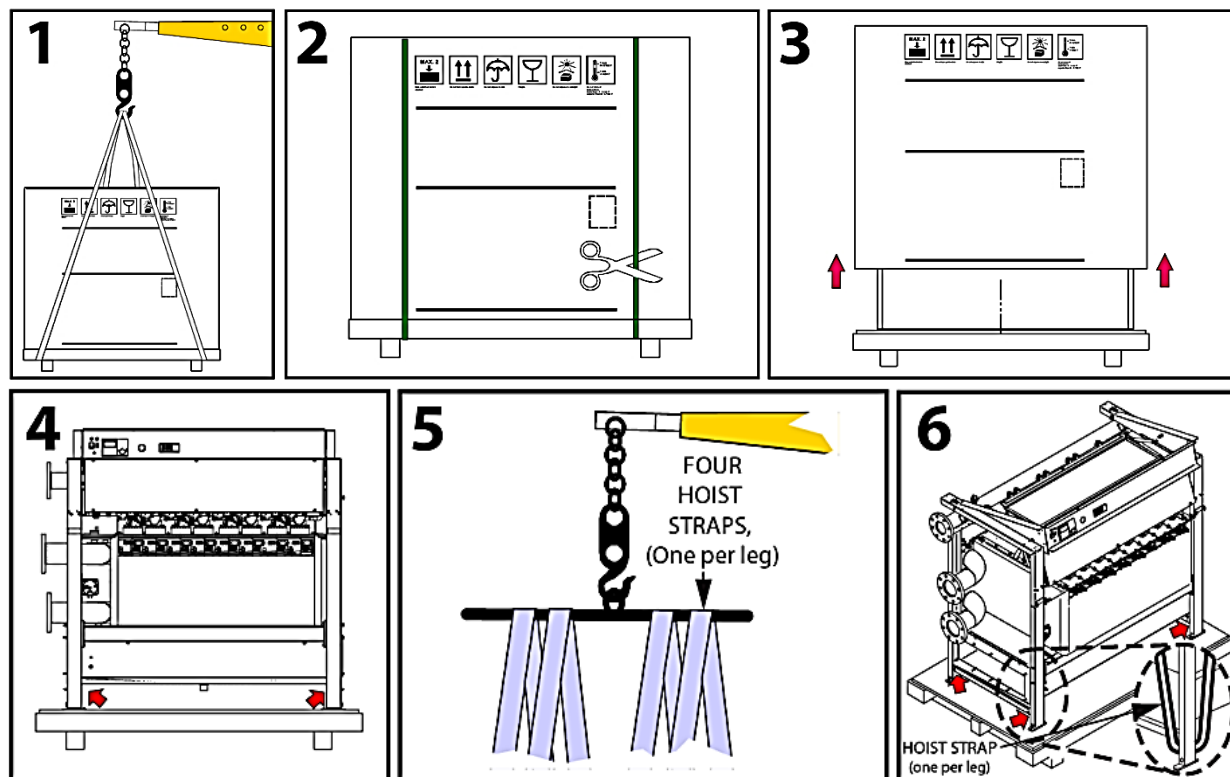
- Follow the transportation instructions on the packaging.
- Only transport the boiler using appropriate transportation equipment, such as a hand-truck with a fastening belt or special equipment for transporting heavy equipment.
- When moving the boiler, it must be secured on the transportation equipment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

## 4.5 UNPACKING THE BOILER

### CAUTION!

The packing elements (cardboard box, straps, plastic bags, etc.) should be kept away from children to prevent suffocation and choking hazards. AERCO refuses all liability for injury to persons, animals or damage to property derived from not respecting the above mentioned recommendations.

Refer to panels 1-6 of Figure 4-2 while unpacking per these instructions:



**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 both packing straps (Panel 2) and, finally, the cardboard box from above (Panel 3), making sure the product is intact.
3. For the removal of the boiler from the pallet it is necessary to have a jib crane (Panel 5), to avoid damage to the boiler during the removal.



4. To prepare the boiler for lifting by the hoist, remove panel covers from front, rear, right, left and top (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)

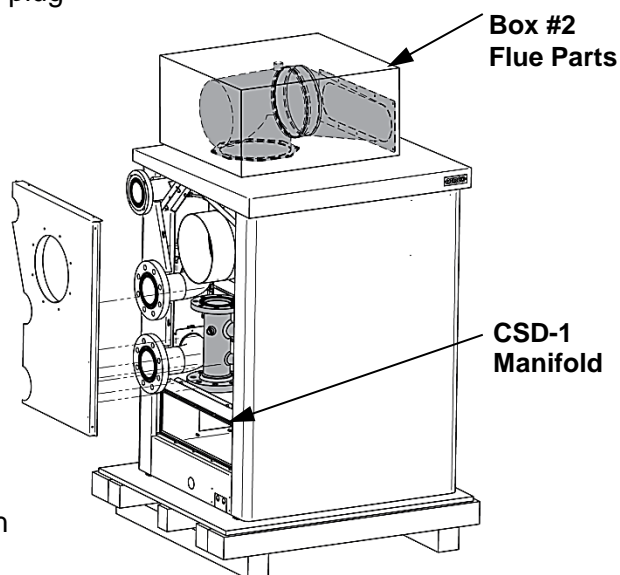
- CSD-1 manifold.

#### 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 exh connections
- One (1) 300 mm diameter gasket



#### INSIDE CASING ON THE BACK OF THE BOILER

- Two (2) pipes, each 39.3 feet (1 m) long for the condensate draining system

#### ABOVE THE TOP COVER OF THE BOILER

- A plastic bag containing:
  - This installation and user manual for the installer.
  - E8 controller instruction manual.

#### IN A SEPARATE BOX

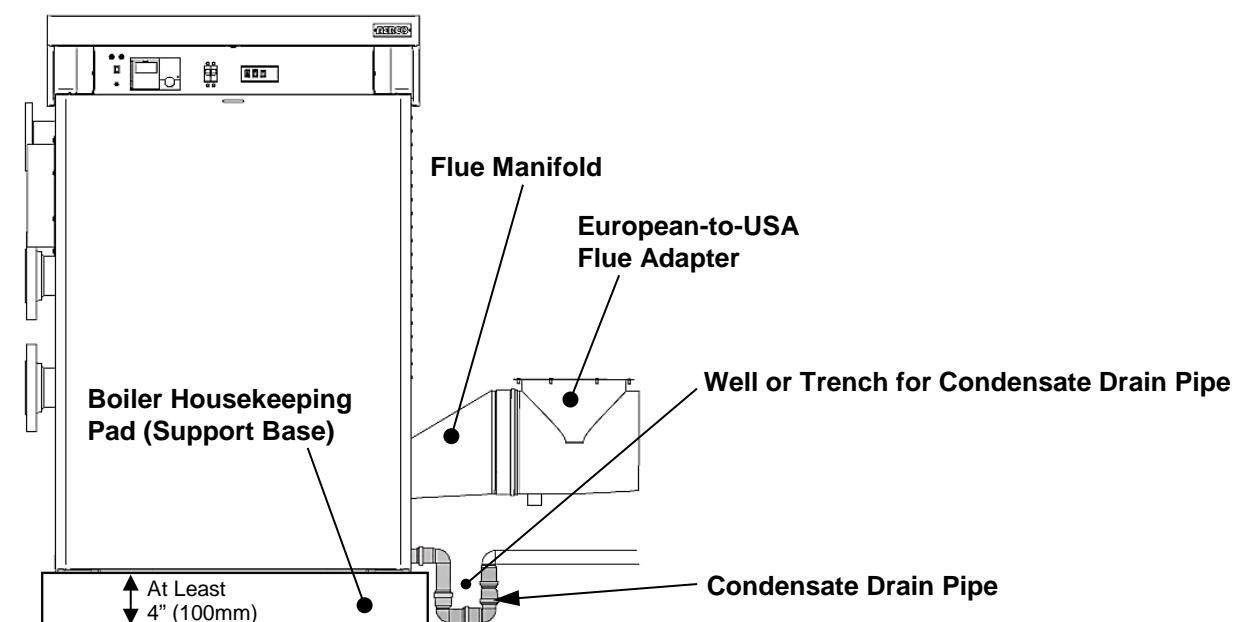
- Air intake adaptor for spiral ducting only
- Temperature & Pressure gauge
- Flow Switch
- Pipe adaptor (rubber)



## **4.7 BOILER LOCATION IN A BOILER ROOM**

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

The boiler can be put on a flat and sufficiently strong base with the same dimensions as the boiler and at least 3.93" (100 mm) high (see Figure 4-3), 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 please comply with the following safety requirements:

- Ensure easy access to the components of the boiler to facilitate maintenance.
- The room where the boiler will be placed must always be frost free.
- Do not store or use gasoline or other flammable vapors and liquids in the vicinity of this or any other appliance.
- Never use or store any chlorinated detergents or halogenated hydrocarbons (e.g. in spraycans, solvents and detergents, paints, adhesives) in proximity to the boiler.
- For outdoor installation see **Warning for Outdoor installation** on page 10.

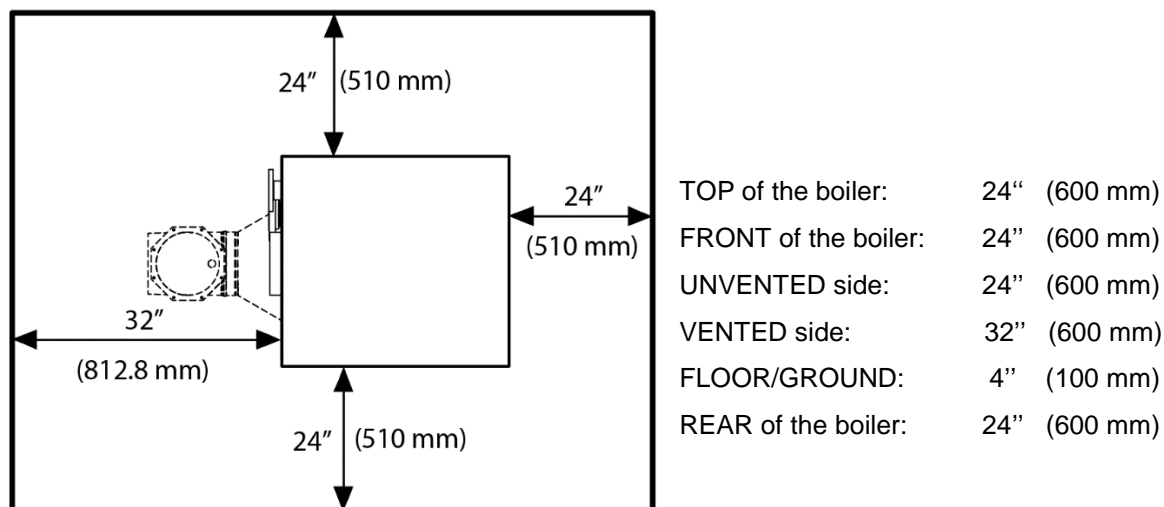
### 4.7.2 Products to Avoid in the Boiler Room

Do NOT store the following products 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):



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

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

## **4.9 GAS CONNECTION GENERAL INFORMATION**

For **natural gas** connections, refer to Section 4.9.1. For **propane gas** connections, refer to 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. (see Fig. 1). The regulator must be installed with at least 2 feet of pipe between the regulator and the unit gas inlet. The regulator discharge range must be able to maintain 3.5" W.C. Gas regulators are self-contained with tapped diaphragm vent ports allowing the diaphragm to change its position. These vents typically require piping to the outside.

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

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

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

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

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

**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!**

THE GAS CONNECTION MUST BE INSTALLED BY A REGISTERED INSTALLER WHO MUST COMPLY WITH THE REGULATIONS IN FORCE AND TO THE REQUIREMENTS INDICATED BY THE LOCAL GAS SUPPLIER. AN INCORRECT INSTALLATION CAN CAUSE INJURY OR DEATH TO PERSONS, ANIMALS OR DAMAGE TO PROPERTY. THE MANUFACTURER SHALL NOT BE HELD LIABLE FOR ANY INJURY AND/OR DAMAGE DUE TO INAPPROPRIATE INSTALLATION.

Do not use the boiler for another type of gas than indicated on the identification plate of the boiler. This will cause improper functioning and can damage the boiler. 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 provide 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 that the high gas pressure regulator is installed at least 6 to 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 it is essential to 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.

IT IS ABSOLUTELY FORBIDDEN TO 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).

On *newer* EXT models (with aluminum headers) the Pressure Relief Valve is factory installed inside the chassis.

### IMPORTANT!

Discharge piping **MUST** be installed at the relief valve discharge. The discharge piping must be installed in accordance with local codes.

On *older* models, the Pressure Relief Valve is not factory installed, but instead 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, 4.12 (see Figure 4-6).

(Image removed)

**Figure 4-5: Pressure Relief Valve**

## 4.12 CSD-1 MANIFOLD ASSEMBLY (SUPPLIED)

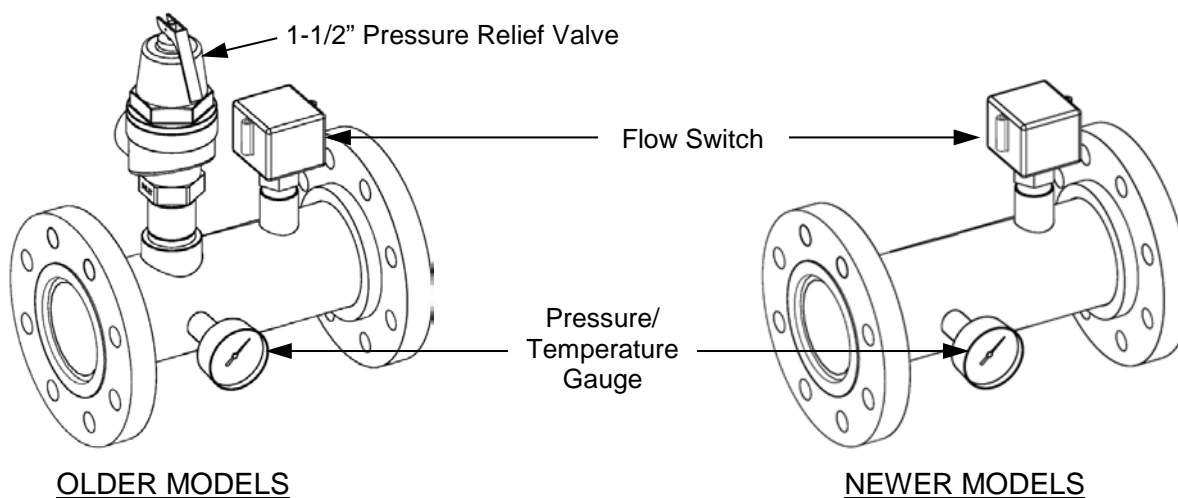
The installation of a flow switch and pressure/temperature gauge are required. A 1-1/2" Pressure Relief Valve designed for the boiler output capacity must also be installed:

- On newer models (with aluminum headers), the 1-1/2" Pressure Relief Valve is pre-installed inside the boiler chassis at the factory.
- On older units, 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 4-6. The manifold assembly components supplied are:

- 1-1/2" Pressure Relief Valve – *must be installed on older models only*
- Flow Switch
- Pressure/Temperature Gauge

The pressure relief valve and all other manifold components are shown in Figure 4-6.



**Figure 4-6: 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 described in the following steps. Refer to Figure 4- 6 for component identification.

### 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.



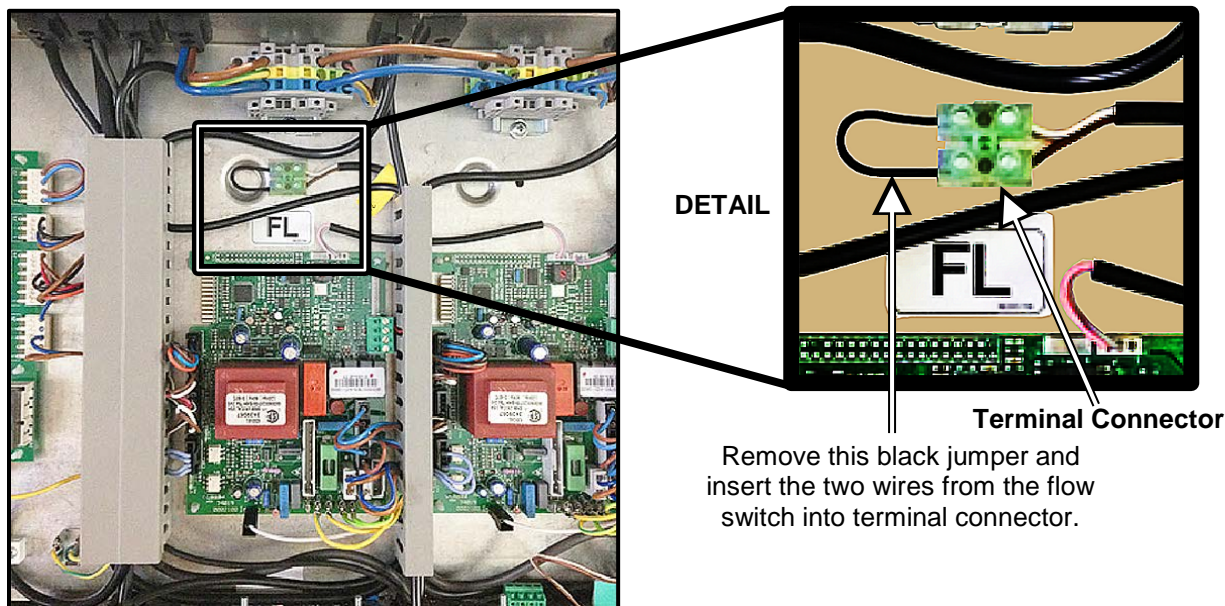
Installing the Pressure Relief Valve and Other Components – Continued

3. Connect the following components to the tapped holes in the manifold assembly, as shown in Figure 4-6, above:
  - Flow Switch
  - Pressure/Temperature Gauge

**NOTE:**

It is important to ensure that the flow switch be installed with the “flow” arrow pointing in the direction of the flow.

4. On *older* models only, also install the 1-1/2” Pressure Relief Valve to the third tapped hole in the CSD-1 manifold assembly, as shown in Figure 4-6, above.
5. Check to ensure that all components are securely tightened and that the flow switch paddle moves freely without interference.
6. Locate the BMM module with the “FL” label (Figure 4-7), and remove the black jumper wire from the terminals of the connector shown in the detail of Figure 4-7. Connect the two flow switch wires to the two terminals. Flow switch wires have no polarity, so can be inserted without regard to position.



**Figure 4-7: BMM Location and Flow Switch Connection**

### **4.13 DETERMINATION OF PRIMARY BOILER PUMP OR BOILER SYSTEM PUMP**

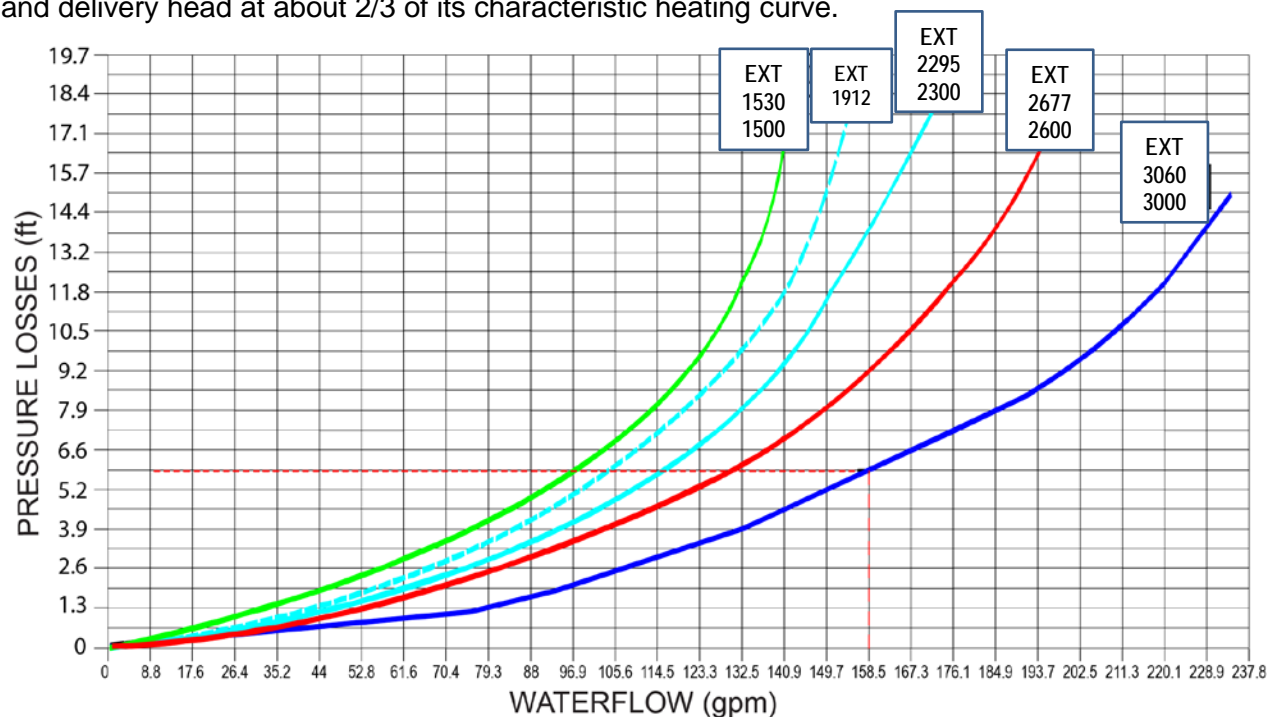
The following table gives an indication of the pump's flow rate in function of the  $\Delta t$  of the primary circuit if the installation has a mixing header.

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

TABLE 4-2: MODULEX EXT Minimum/Maximum Flow Rates					
BOILER MODEL	EXT 1530/1500	EXT 1912	EXT 2295/2300	EXT 2677/2600	EXT 3060/3000
Min. flow rate demanded in gpm $\Delta T$ 27°F (15°C)	5	5	5	5	5
Min. flow rate demanded in gpm $\Delta T$ 36°F (20°C)	4	4	4	4	4
Max flow rate demanded in gpm $\Delta T$ 27°F (15°C)	102	128	153	179	205
Max flow rate demanded in gpm $\Delta T$ 36°F (20°C)	77	96	115	134	153

The water side resistance curve of the boiler is shown in the diagram in Figure 4-8.

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 4-8: 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).



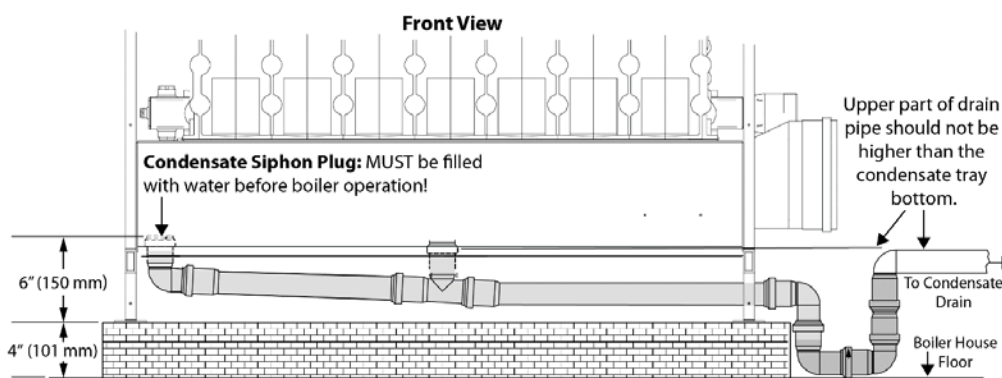
The liquid column, inside the condensate siphon, (see Condensate Siphon Filling Plug in Figure 4-9) needs to be filled with water after installation. The minimum height of the water in the column, when all the fans are in operation, must be at least 25 mm (1 in.).

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 International 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 4-9: 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 4-9.

### WARNING!

- Before commissioning the boiler, fill the condensate siphon with water, at the dedicated filling-up plug. See Figure 4-9.
- 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 for the boiler's correct operation and safety.

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

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

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

- When the hardness of the water is higher than 9 grains (15°F).
- 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 the following problems:

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

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

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

**Water Hardness:** If water hardness is over 6 to 9 grains, a water softener must be used.

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

**Water pH:** If water has a pH above 8, or below 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.

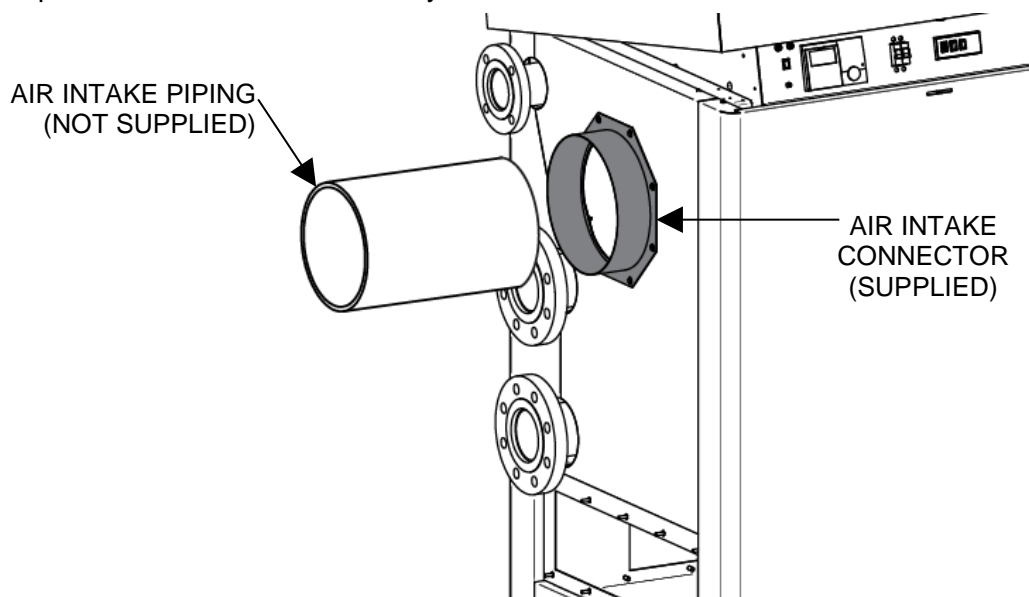
The boiler piping system of a hot water boiler connected to heating coils located in air Handling units where they may be exposed to refrigerated air circulation must be equipped with flow control valves or other automatic means to prevent gravity circulation of the boiler water during the cooling cycle.

## **4.17 OPTIONAL AIR INTAKE CONNECTION**

Install air intake connector as shown in Figure 4-10. Use silicone to lubricate the internal surface of the seals before assembling. For air intake connection piping use only:

- 10" for MODULEX EXT 1530 / 1500, 1912
- 12" for MODULEX EXT 2295 / 2300, 2677 / 2600, 3060 / 3000

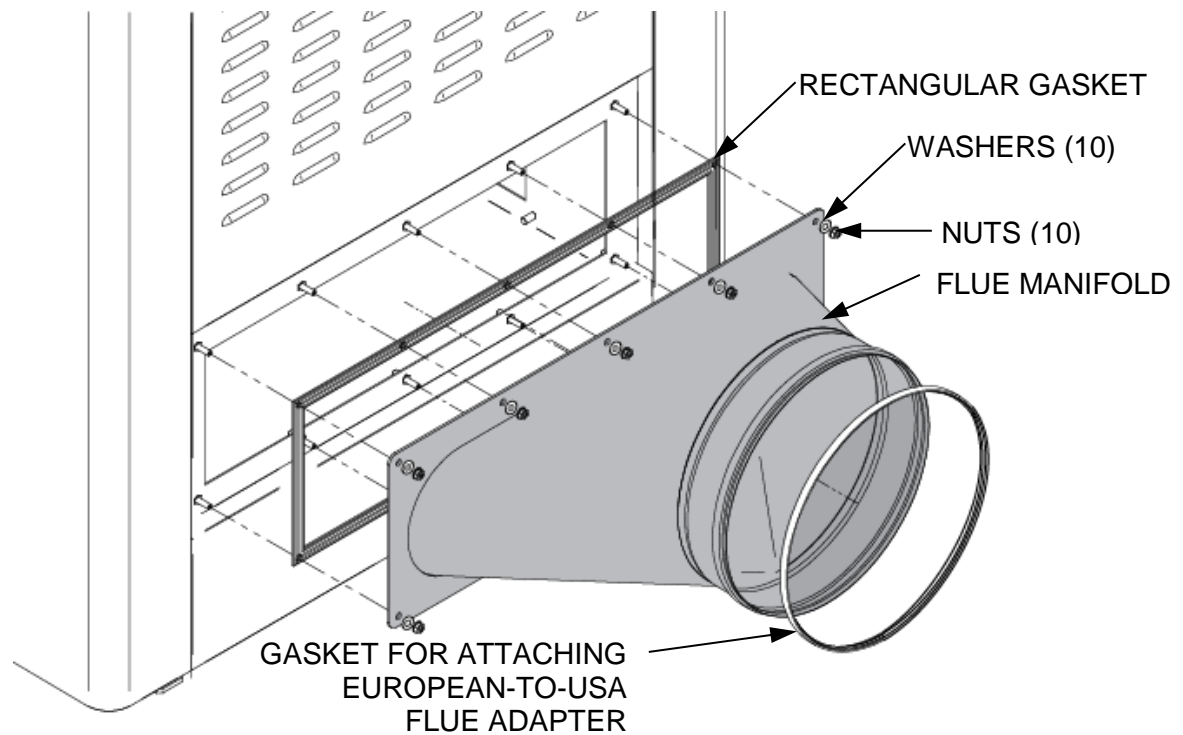
The Air Intake Connector that ships with the unit is for spiral ducts only. For other materials, please contact AERCO directly.



**Figure 4-10: MODULEX EXT Air Intake Connection**

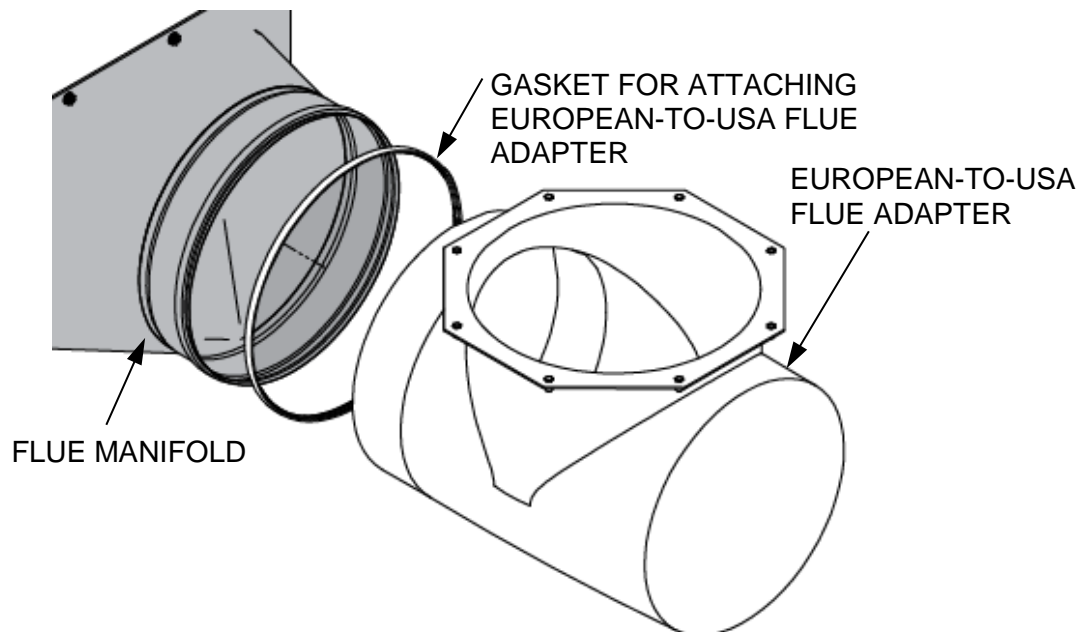
## **4.18 FLUE MANIFOLD INSTALLATION**

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 4-11. 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 4-11: 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 4-12.



**Figure 4-12: Assembly of USA-to-European 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.

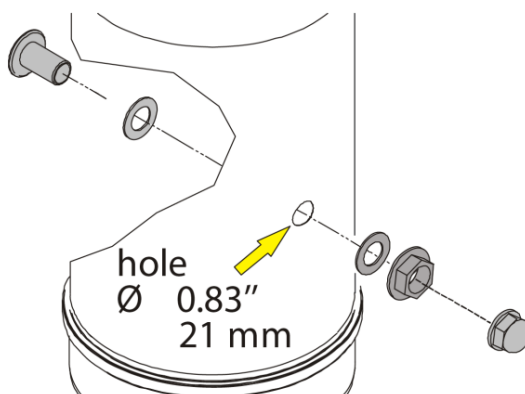
The different joints must be well sealed and equipped with suitable gaskets in order to prevent the escape of condensate and prevent the ingress of air.

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 in Figure 4-13.



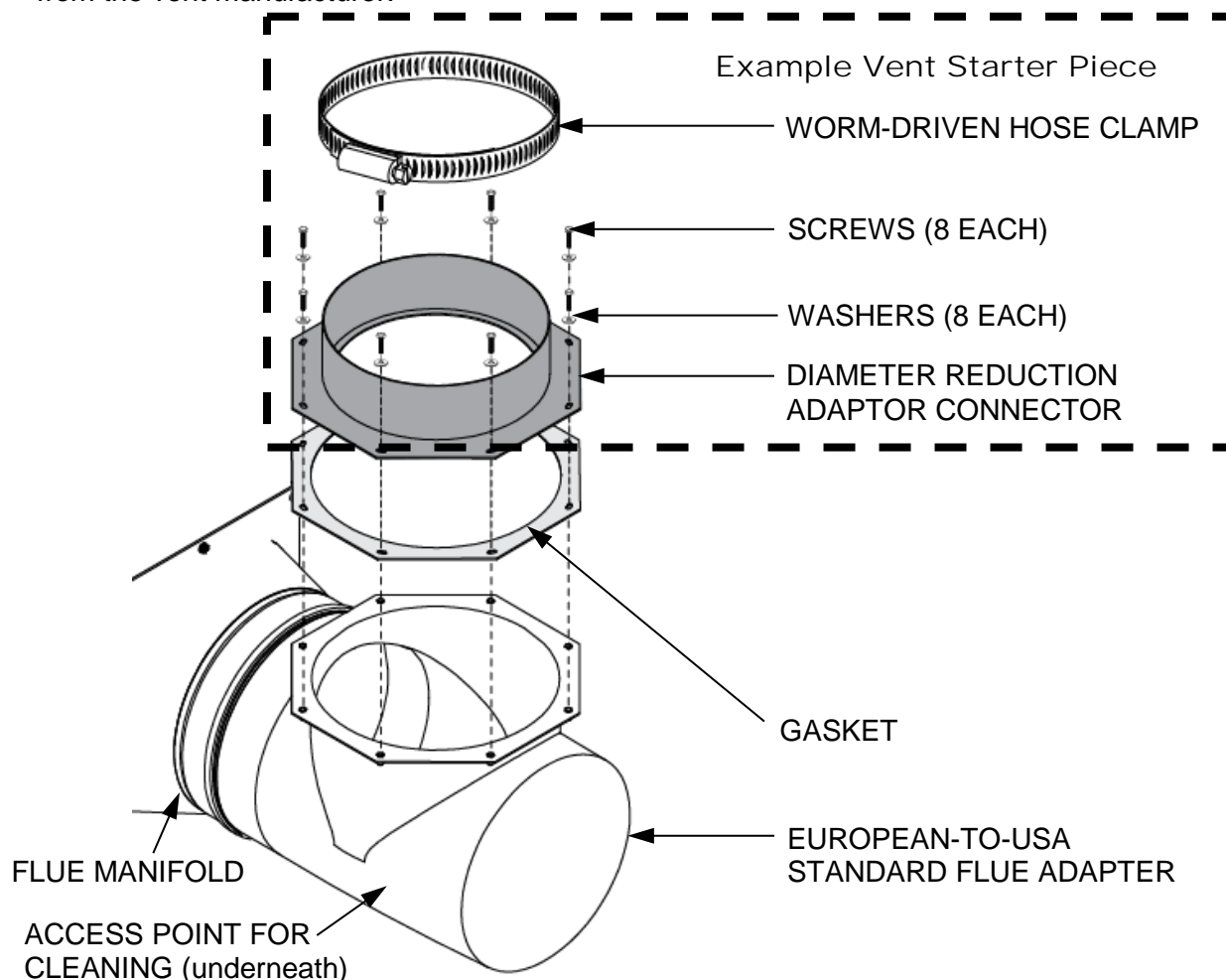
**Figure 4-13: Installation of Test Nipple into Flue Manifold Piping**

**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 4-14: Flue Exhaust Diameter Reduction Adaptor Kit**

**TABLE 4-3: Vent Part Numbers**

MODEL	DIA.	MATERIAL	PART NUMBER
<b>EXT 1530 / 1500</b> <b>EXT 1912</b>	10"	Stainless	Contact vent manufacturer
		Polypropylene	Contact vent manufacturer
		PVC	58115-1
<b>EXT 2295 / 2300</b> <b>EXT 2677 / 2600</b> <b>EXT 3060 / 3000</b>	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.

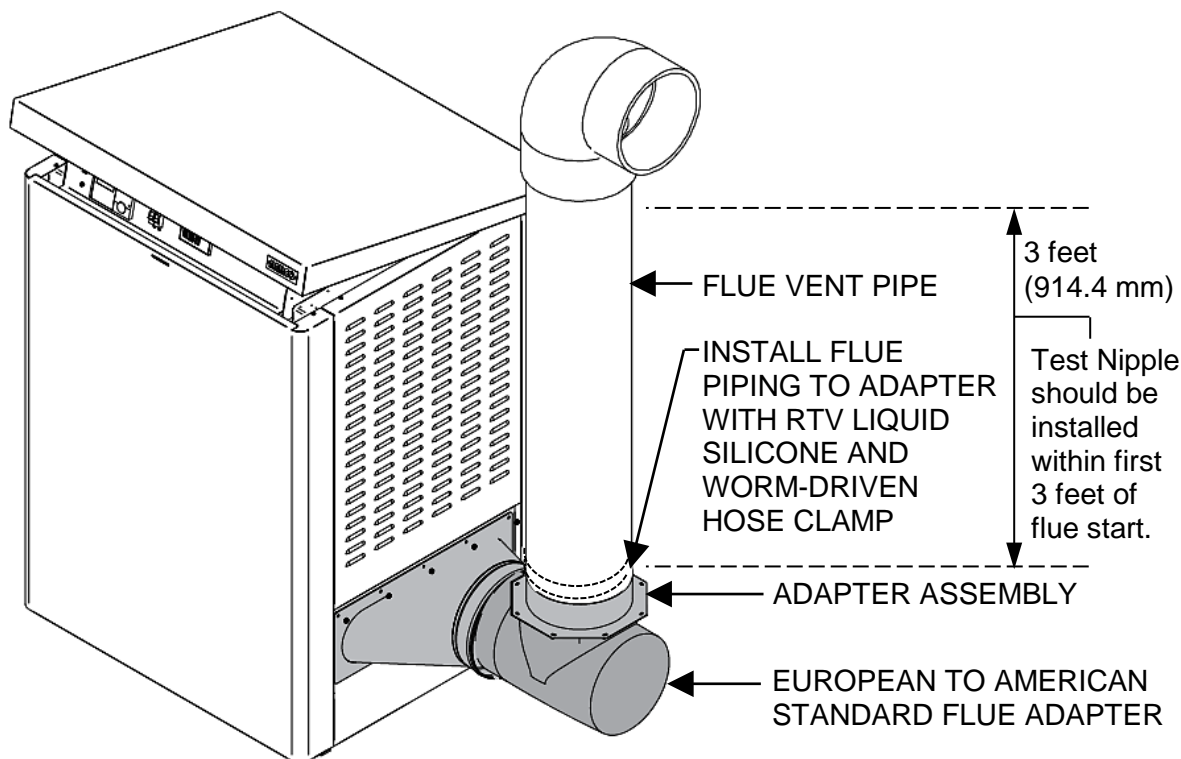
When using non-metallic (plastic) venting materials, use schedule 40 or thicker, single-wall, uninsulated pipes. When using non-metallic (plastic) vent systems for Canadian installations, per CSA B149.1, use vent systems that are certified to the standard for Type BH Gas Venting Systems, ULC-S636.



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 4-15: 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**

**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 the 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. This can result in boiler damage. Note the following:

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

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

### **WARNING!**

Fire danger due to flammable materials or liquids. Do not store flammable materials and liquids in the immediate vicinity of the boiler.

### **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 INSTALLATION OF THE EXHAUST AND AIR INTAKE SYSTEM

### NOTES:

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.

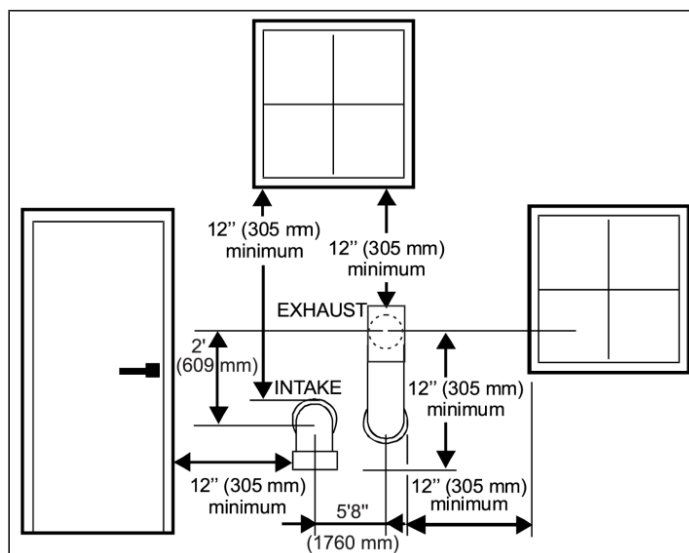
The minimum distance from adjacent public walkways, adjacent buildings, openable windows and building openings shall not be less than those values specified in the National Fuel Gas Code, ANI Z223.1 / NFPA 54 and/or the Natural Gas and Propane Installation Code CAN/CSA B149.1.

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 (see Figure 4-16).

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

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



**Figure 4-16: 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 effect of such condensation must be considered. The terminal must be located in a place not likely to cause a nuisance.

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

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

### 4.22.2 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.

BOILERS HORIZONTALLY VENTED Thickness of wall through which the direct vent boiler will be installed CHAUDIERES AVEC EVACUATION HORIZONTALE DES FUMÉES Epaisseur de la paroi à travers laquelle se fera l'évacuation directe	
Minimum inch (mm)	Maximum inch (mm)
4 (101.6)	36 (914.4)

### 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

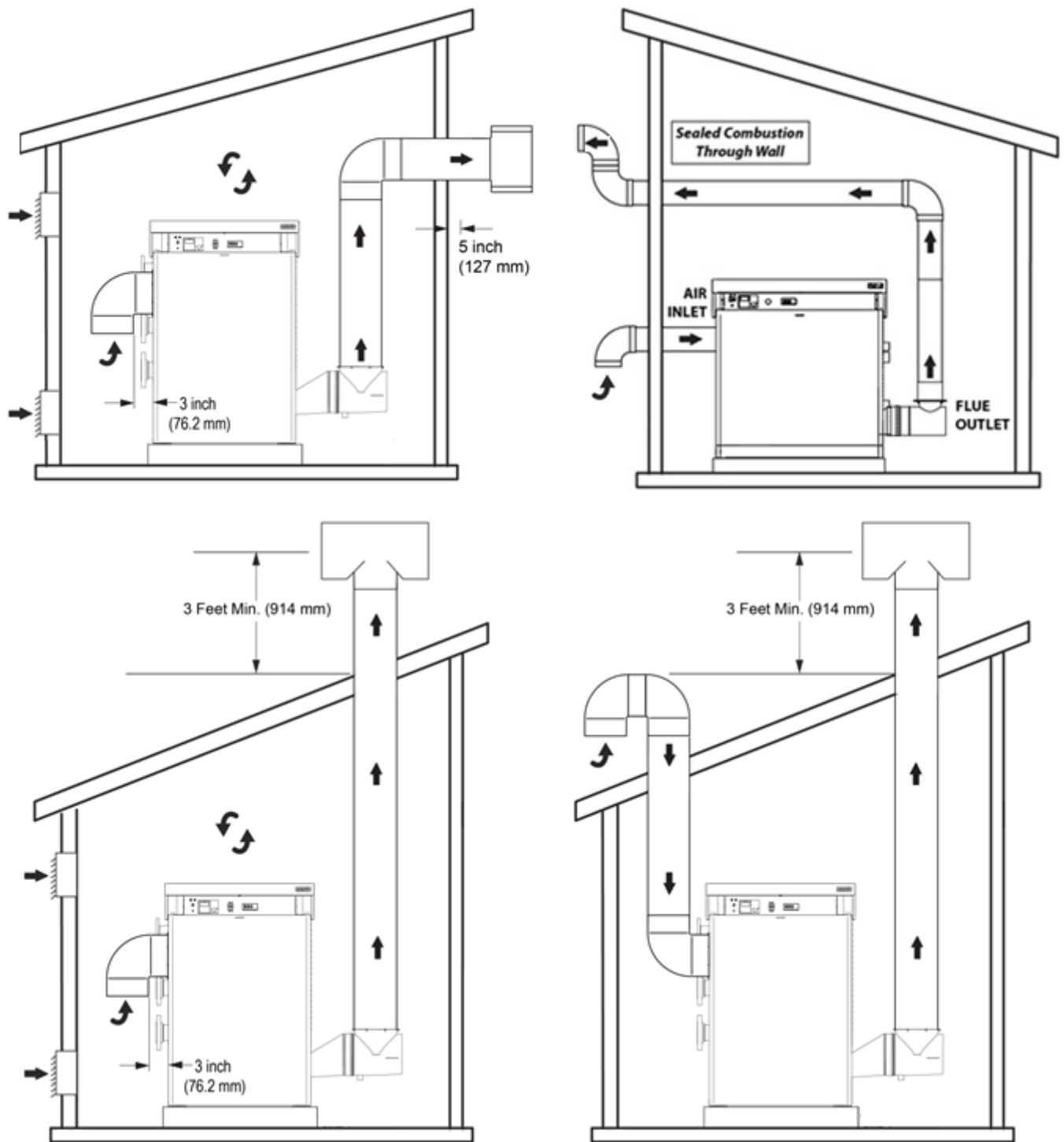
MODEL	NO. OF MODULES	VENT DIAMETER INCHES (MM)	MAX. VENT EQUIV. FEET (M) EXAMPLES 1 & 2	MAX. VENT EQUIV. FEET (M) EXAMPLES 3 & 4
EXT 1530 / 1500	4	10" (254 mm)	100 ft. (30 m)	6 + 6 (1.8 + 1.8)
EXT 1912	5	10" (254 mm)	100 ft. (30 m)	6 + 6 (1.8 + 1.8)
EXT 2295 / 2300	6	12" (304 mm)	100 ft. (30 m)	6 + 6 (1.8 + 1.8)
EXT 2677 / 2600	7	12" (304 mm)	100 ft. (30 m)	6 + 6 (1.8 + 1.8)
EXT 3060 / 3000	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 1530 / 1500	10" (254 mm)	13 Feet (4 m)	7 Feet (2 m)	5 Feet (1.5 m)	100 Feet (30 m)
EXT 1912					
EXT 2295 / 2300	12" (304 mm)	13 Feet (4 m)	7 Feet (2 m)	5 Feet (1.5 m)	100 Feet (30 m)
EXT 2677 / 2600					
EXT 3060 / 3000					

**NOTE:**

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



**Figure 4-17: 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 also 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, with the National Electrical Code, ANSI/NFPA 70 and/or the CSA C22.1, Electrical Code.

The gas, D.H.W. (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.

The 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 the boiler to sunlight, rain, etc., unless it is explicitly prepared and installed for such use.
- Do not permit children or inexperienced 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

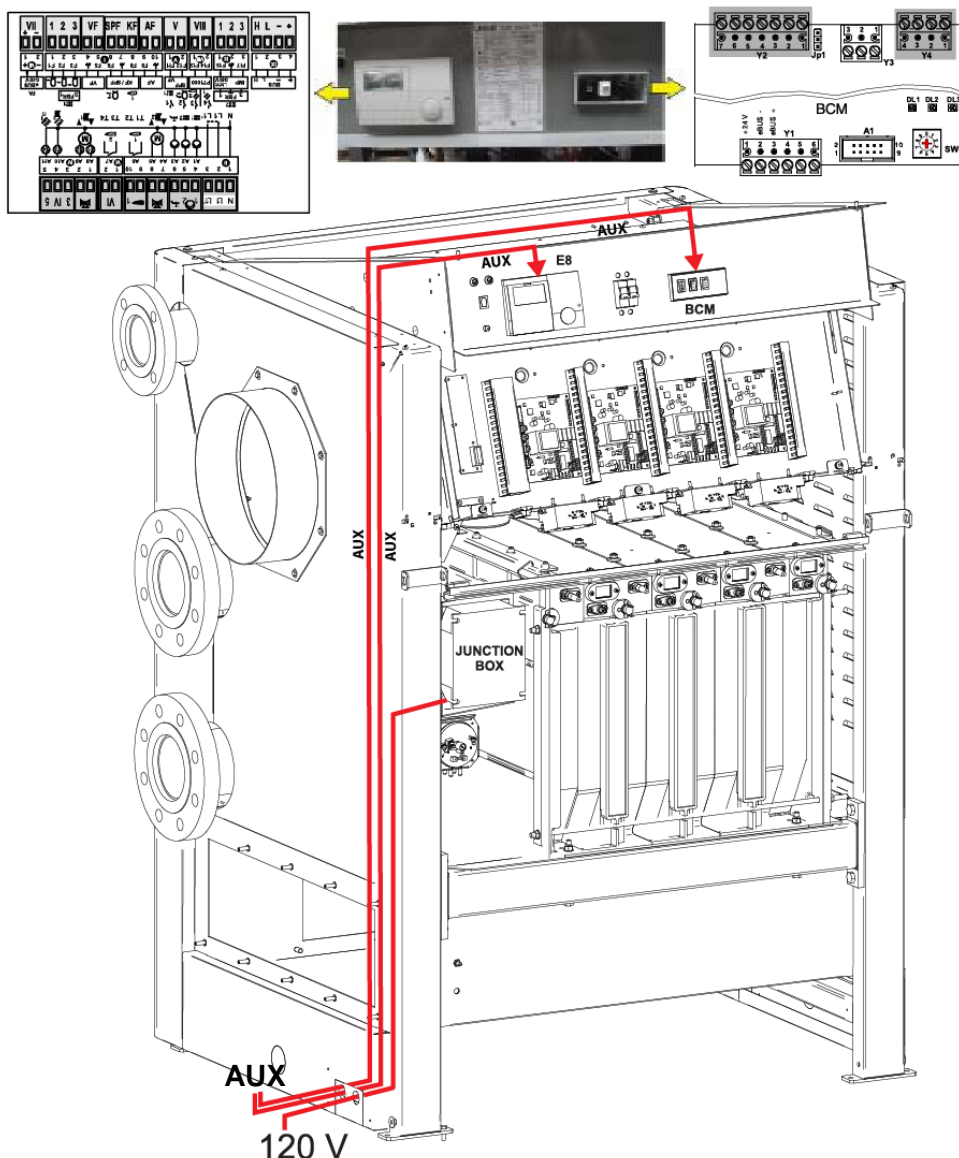
Upstream of the electrical connection, a service relay is required (not supplied) which, when the additional electrical safety devices (if any) intervene, shuts down the electrical supply to the on-off fuel valve fitted on the gas supply circuit, but NOT to the boiler, so as to guarantee the running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

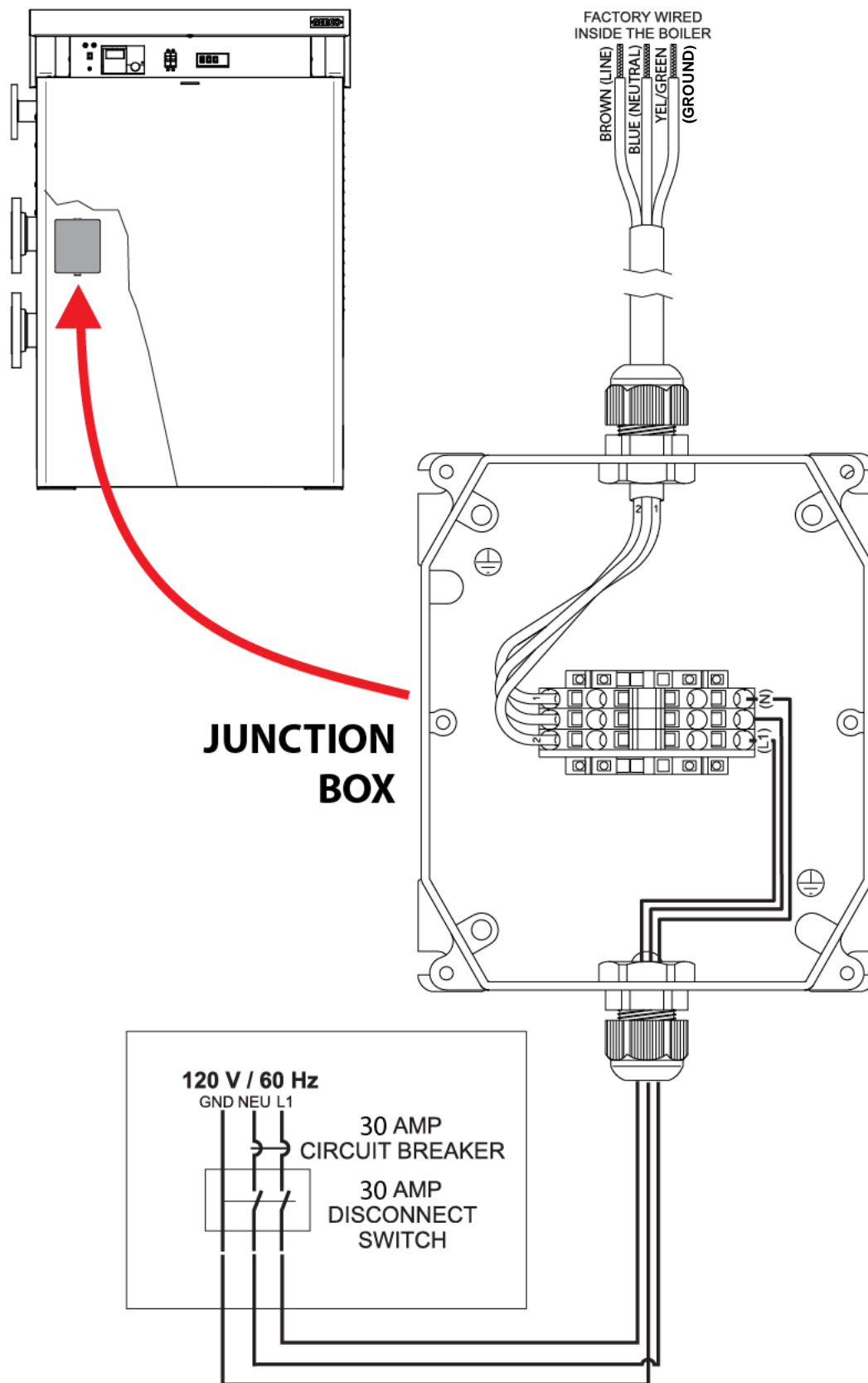
Verify proper operation of the boiler after all servicing operations.



**Figure 4-18: 120VAC Power Wiring for Main Electrical Junction Box and Signal Wiring for E8 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 4-19: Main Power Junction Box Location and 120VAC Wiring**



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4.25 FUNCTIONAL WIRING DIAGRAM

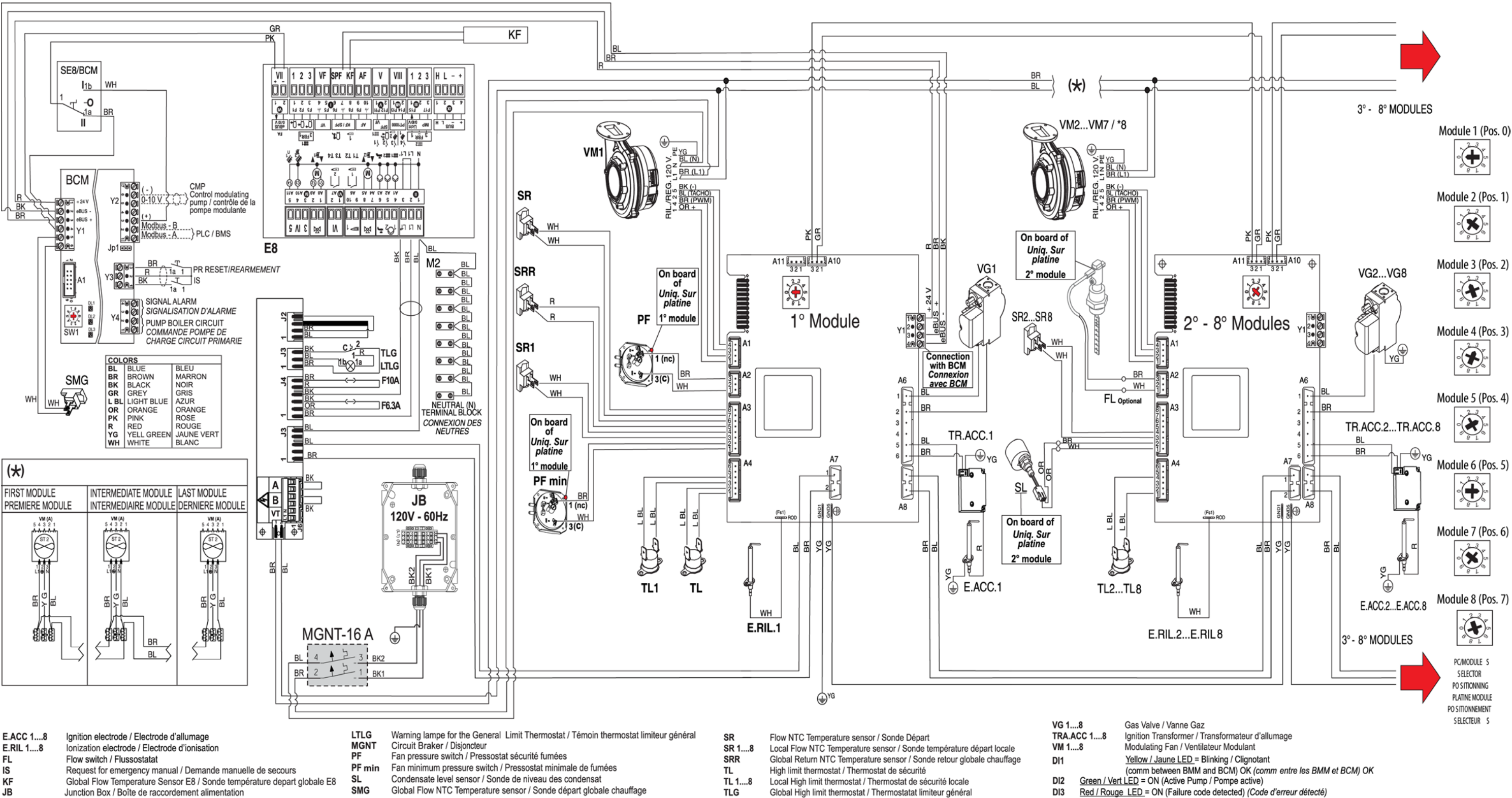
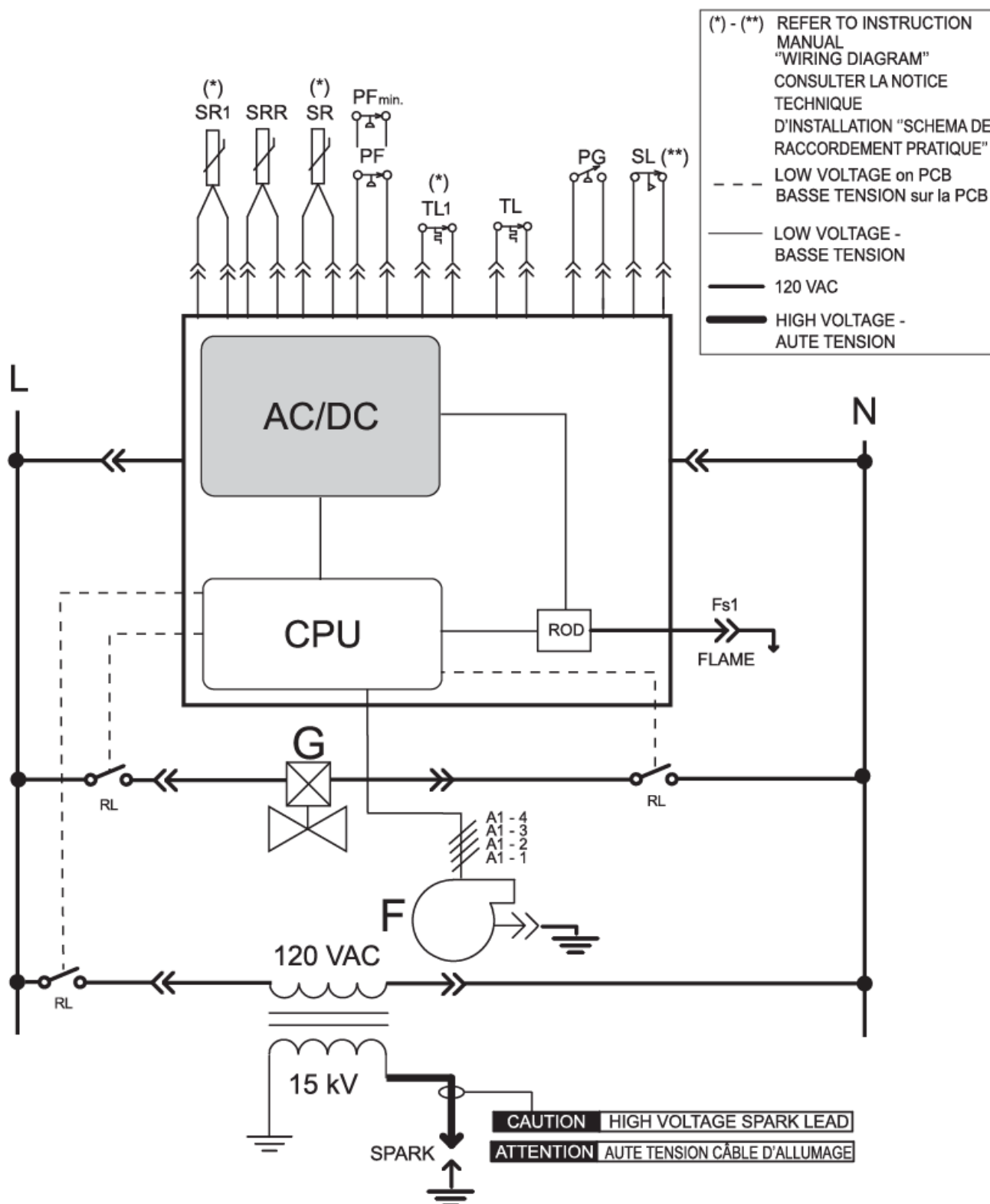


Figure 4-20: MODULEX EXT 1500 through 3060 Wiring Diagram

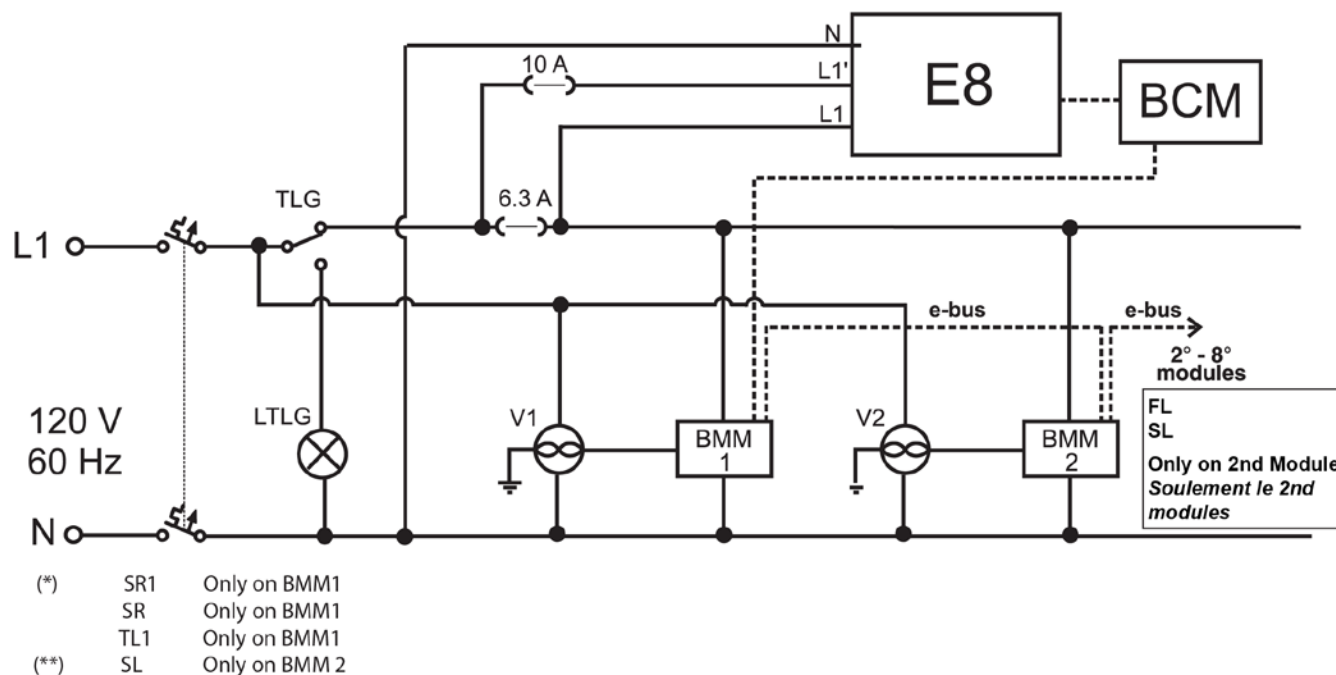


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### 4.26 LADDER DIAGRAMS



## 4.27 GENERAL LADDER DIAGRAM

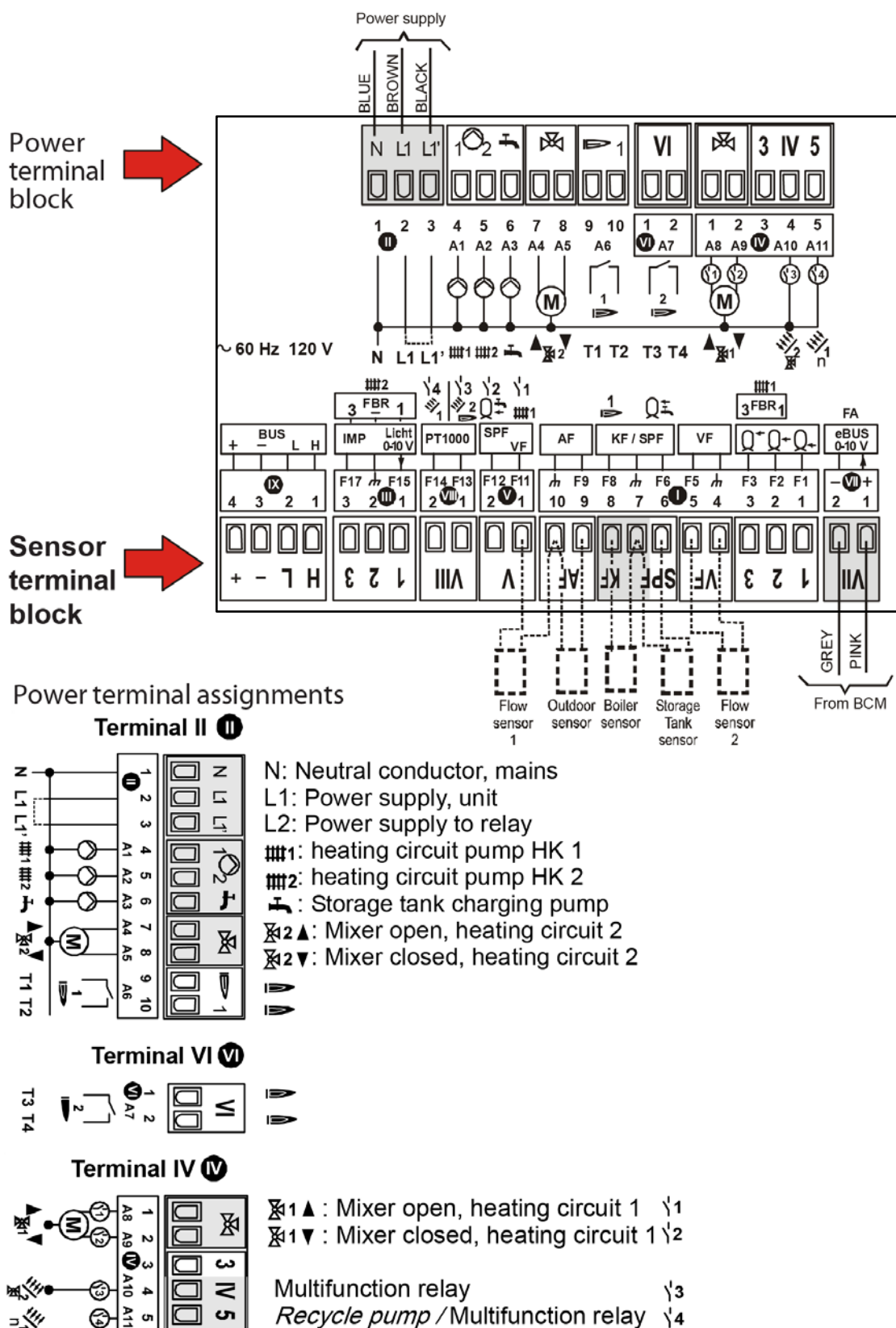


**Figure 4-22: General Ladder Diagram**

## 4.28 E8 CONTROLLER AND BCM TERMINAL ASSIGNMENTS

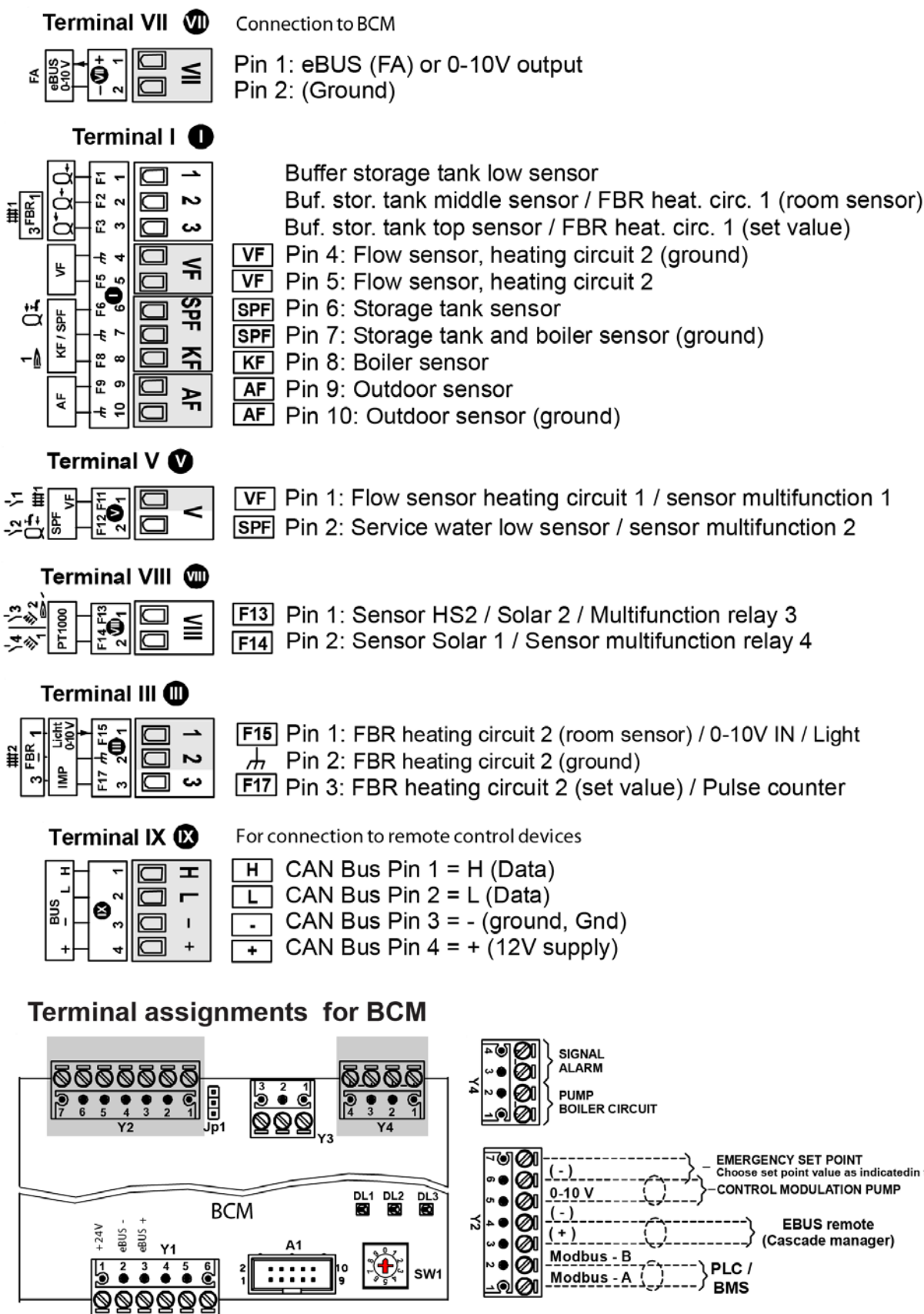
On the rear panel of the E8 controller, there are two terminal blocks, one of which is for the mains (120 V) connections, and the other for the low voltage connections.

The main controls, necessary for the C/H system management and for the boiler control, as well as some components which are part of the boiler housing, must be connected to the terminal blocks. See Figure 4-23 for a wiring diagram showing the E8 controller terminal wiring, and see Figure 4-24 for a wiring diagram of sensor and BCM terminal wiring.



**Figure 4-23: E8 Controller Terminal Assignments**





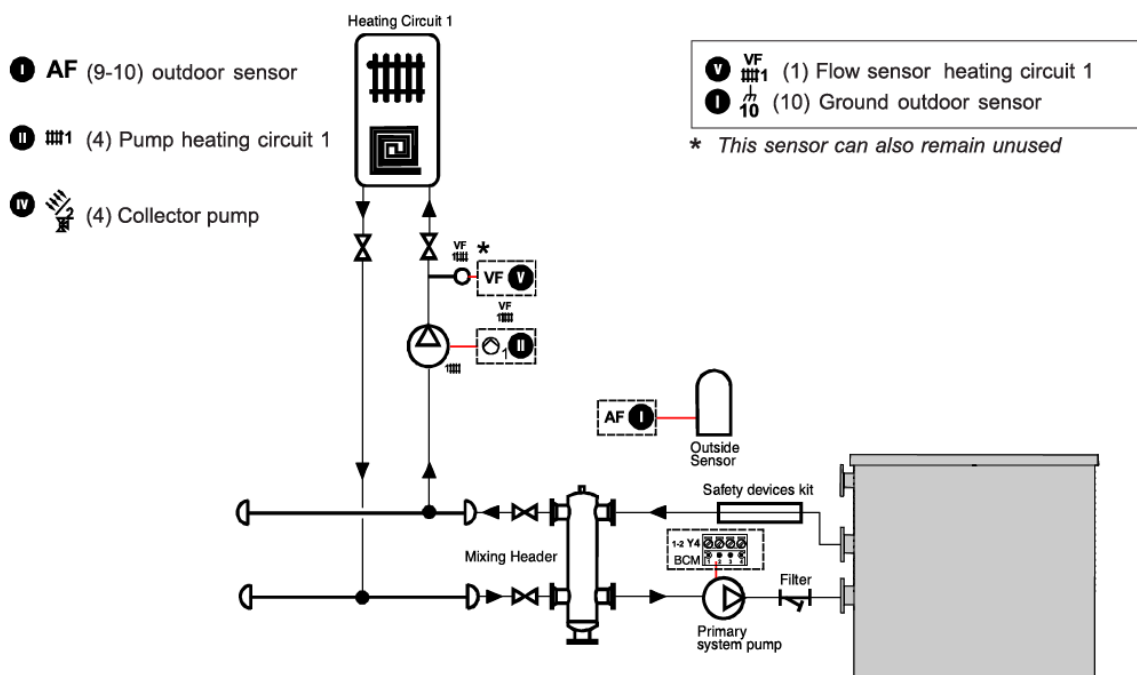
**Figure 4-24: Sensor and BCM Terminal Assignments**



### 4.29 INSTALLATION EXAMPLES

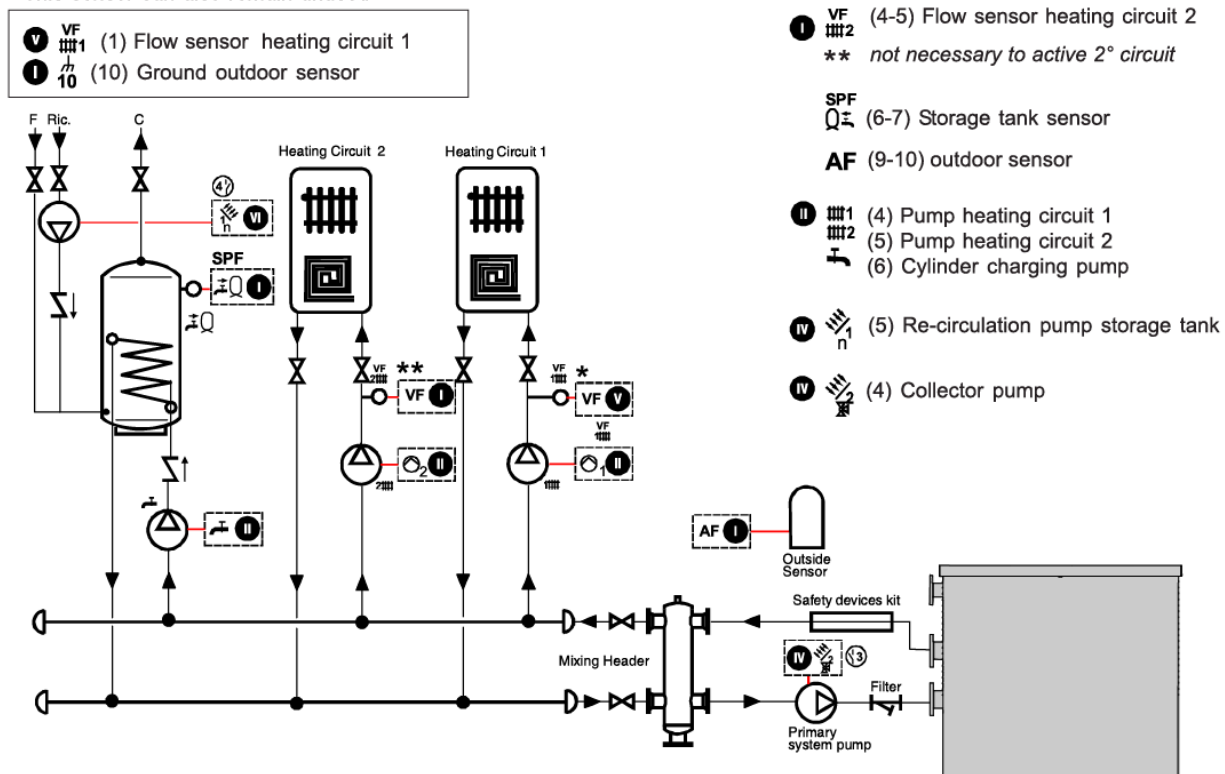
(Functional Wiring and Connections Description)

#### INSTALLATION OF A BOILER WITH CONNECTION TO A DIRECT HEATING ZONE

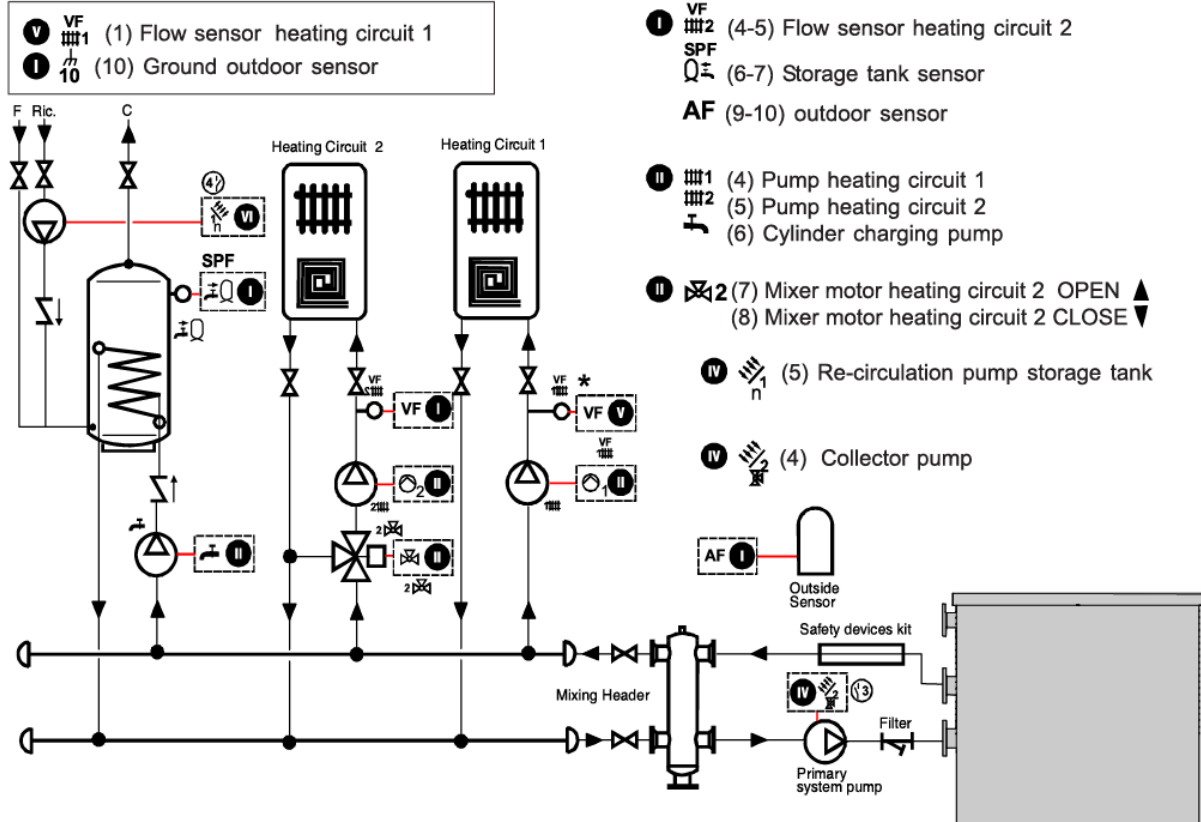


#### INSTALLATION OF A BOILER WITH CONNECTION TO TWO DIRECT HEATING ZONES + D.H.W. PRODUCTION

*\* This sensor can also remain unused*

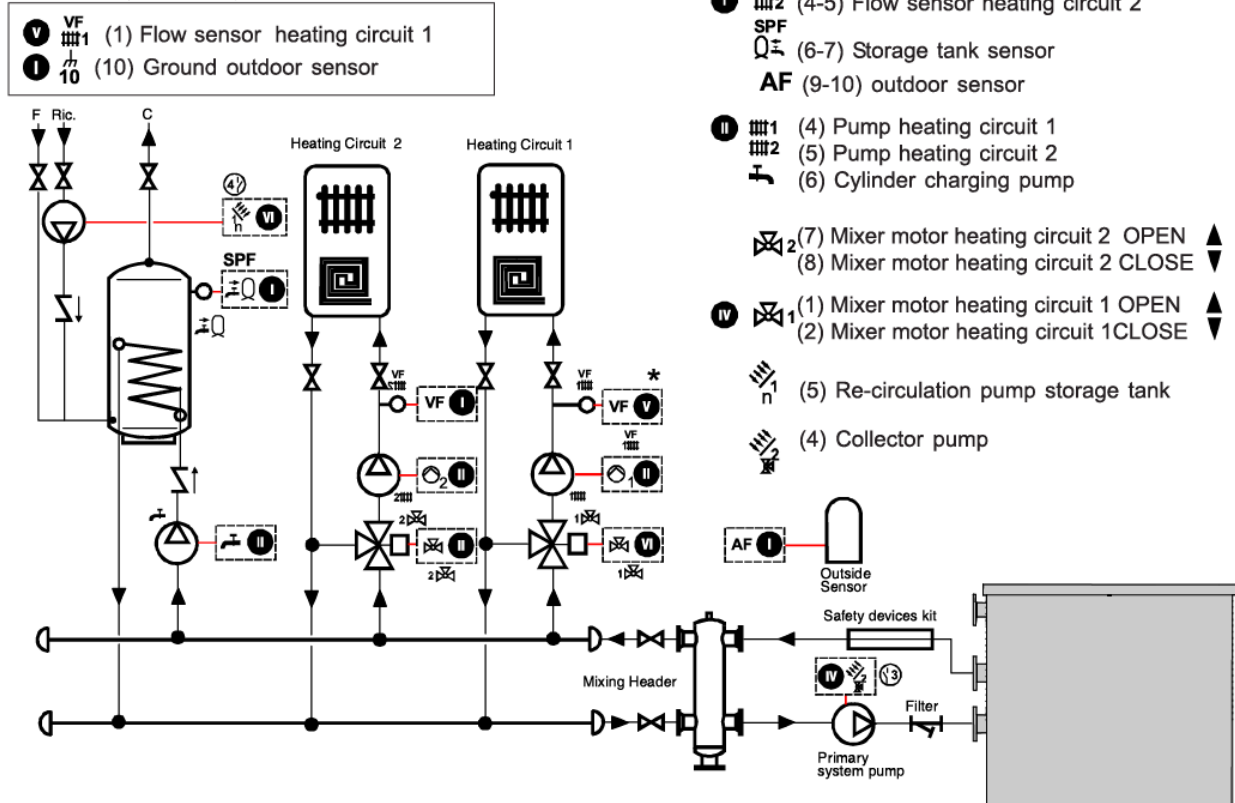


\* This sensor can also remain unused



### INSTALLATION OF A BOILER WITH CONNECTION TO TWO MIXED ZONES + D.H.W. PRODUCTION

\* necessary for mixing valve control



## **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**

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

#### **WARNING!**

AERCO refuses all liability for injury to persons, animals or damage to property deriving from not having respected the above mentioned 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, the water must be treated until below the maximum value of 9 grains.

The pH value of the installation water must be between 6.5 and 8. Check the pH value using proper equipment or by having the water analyzed by a water treatment company.

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

### **WARNING!**

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

### **4.31.2 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 neighbors 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 E8 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

### Ignition Safety Shut-off Device Test

1. Power on by switching on the ON-OFF switch.
2. Create a request in C/H Central Heating using the E8 controller.
3. Turn burners ON.
4. Disconnect the igniter cable (WHITE) of BURNER 1 (See Figure 8-2).

#### NOTE

Ensure the cable end is not grounded to the enclosure frame, or to any other grounded part.

5. The display will show Fault Code **E05** (Loss of Flame).



**Figure 4-25: “Loss of Flame” FaultCode (E 05)**

6. Press Reset Button on E8 Controller.



7. The boiler will retry the ignition cycle and the display will show Fault Code **E04** (No Flame Detected During Ignition).



**Figure 4-26: “No Flame Detected During Ignition” Fault Code (E 04)**

8. Reconnect the ignition cable of BURNER 1.
9. Press Reset Button



10. Check that the boiler starts correctly.

### **WARNING!**

Do not touch the inside of the ignition cable while it is 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.

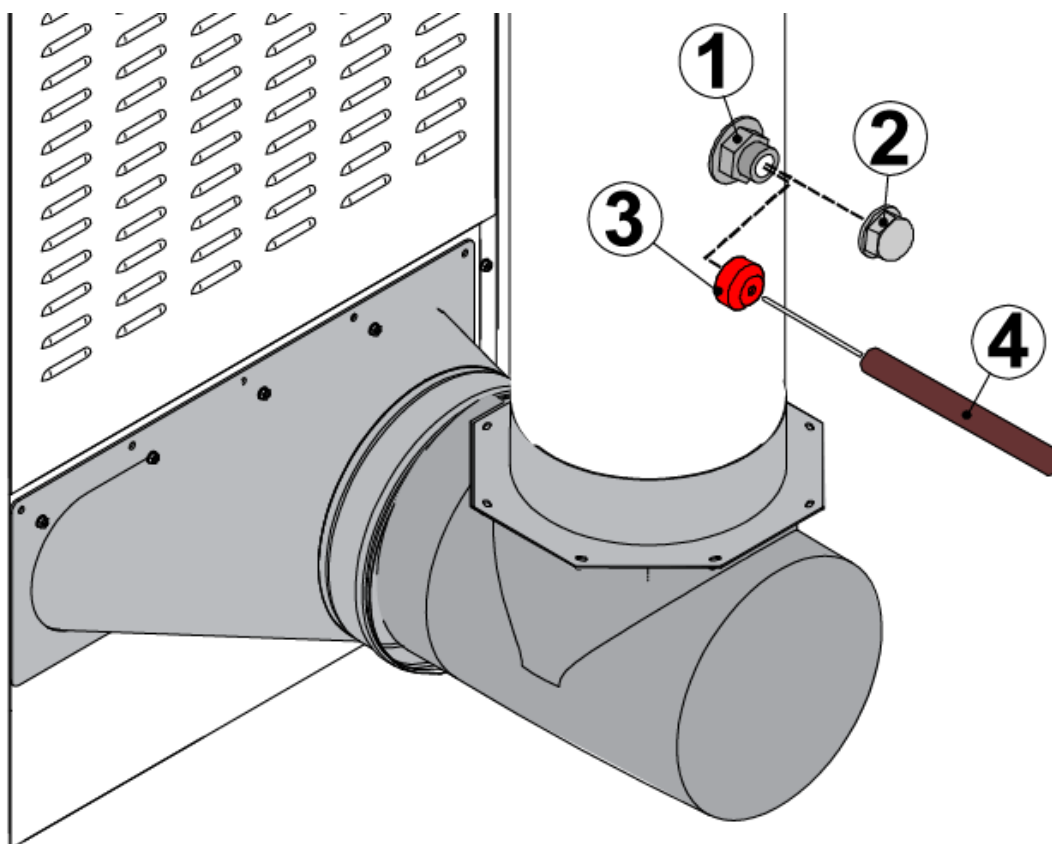
All the boilers are supplied already calibrated and tested. However, if it is necessary to change the calibration due to gas conversion or adaptation to the mains supply system, the gas valve must be re-calibrated (using **Service Mode** function in the E8 controller).

### 4.33.1 Installing the Gas Analyzer Probe

Before making adjustments, a gas analyzer sensor probe must first be installed into the flue exhaust outlet, as shown in Figure 4-27.

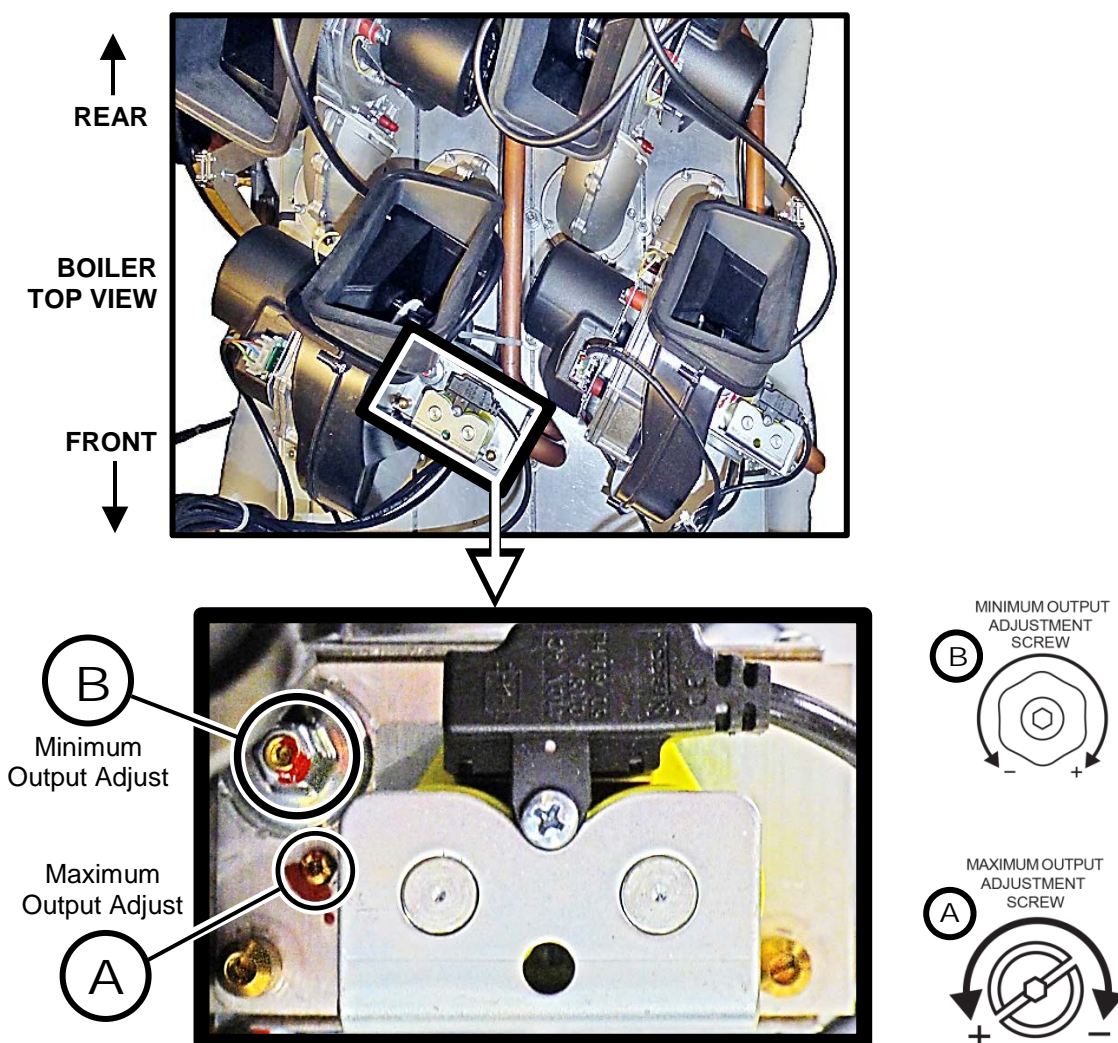
#### Installing the Gas Analyzer Probe into Flue Outlet

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



**Figure 4-27: Gas Analyzer Probe Location in Flue Outlet**





**Figure 4-28: Location of Minimum and Maximum Adjustments (Top View)**

#### **4.33.2 Maximum Output Calibration**

After installing the gas analyzer probe (Figure 4-27), refer to Figure 4-28 to locate the gas valves and the Maximum Gas Adjustment screw (A) on each valve. Follow the instructions below to set the maximum gas output level for each valve.

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

1. Remove the cap of the combustion gases sampling point (Figure 4-27) and connect a suitable gas analyzer.
2. Operate the burner to a minimum power following the procedure described in Section 4.34 (Figure 4-30) "Sweeper" function (CASCADE MAN 100%).
3. Check that the CO<sub>2</sub> 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 4-28, 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 (Figure 4-30) "Sweeper" function (CASCADE MAN 10%).
2. Check that the CO<sub>2</sub> 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

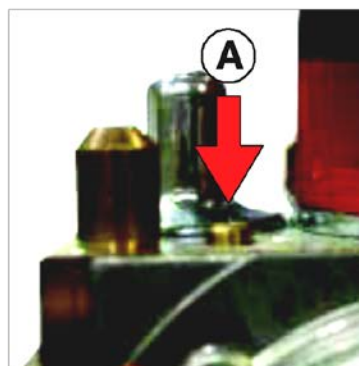
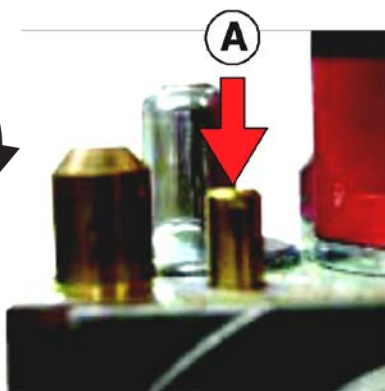
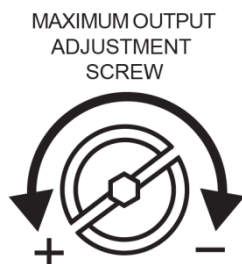
If the CO<sub>2</sub> percentage is too low, check if the air and exhaust flue are obstructed. If they are not obstructed, check if the burner and/or the exchanger (aluminum sections) are properly cleaned. After confirmation, check the maximum gas settings again (in section 4.33.2).

### 4.33.4 Final Check and Ignition Failure Adjustment Procedure

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

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

#### Ignition Failure Adjustment Procedure



**Figure 4-29: Maximum Output Adjustment Screw**

1. Tighten the maximum adjustment screw "A" (see Figure 4-29) 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, CO<sub>2</sub> and O<sub>2</sub> Level Calibration Tables

EXT 1530 /1500											
Gas Type	Supply Pressure Wc (kPa)	CO <sub>2</sub> Level		O <sub>2</sub> Level		Fan Speed		Ø Mixer Injectors Ø in. (mm)	Min. Gas Consumption ft <sup>3</sup> /hr (m <sup>3</sup> /hr)	Max. Gas Consumption ft <sup>3</sup> /hr (m <sup>3</sup> /hr)	Start Output % IG
		(%) Min.	(%) Max.	(%) Min.	(%) Max.	Min. (FL)	Max. (FH)				
NOMINAL ALTITUDE											
Natural	7 (1.74)	8.5	10	3.1	5.8	26	84	0.35 (9)	79.8 (2.26)	1466 (41.5)	50
Propane	11 (2.74)	10	11	1.3	3.1	26	82	0.35 (9)	32.4 (0.92)	595 (16.8)	50
HIGH ALTITUDE											
Natural	7 (1.74)	8.5	10	3.1	5.8	28	100	0.35 (9)	79.8 (2.26)	1411 (39.9)	50
Propane	11 (2.74)	10.8	10.8	1.3	3.1	26	76	0.35 (9)	32.4 (0.92)	536 (19.2)	50

EXT 1912											
Gas Type	Supply Pressure Wc (kPa)	CO <sub>2</sub> Level		O <sub>2</sub> Level		Fan Speed		Ø Mixer Injectors Ø in. (mm)	Min. Gas Consumption ft <sup>3</sup> /hr (m <sup>3</sup> /hr)	Max. Gas Consumption ft <sup>3</sup> /hr (m <sup>3</sup> /hr)	Start Output % IG
		(%) Min.	(%) Max.	(%) Min.	(%) Max.	Min. (FL)	Max. (FH)				
NOMINAL ALTITUDE											
Natural	7 (1.74)	8.5	10	3.1	5.8	26	84	0.35 (9)	79.8 (2.26)	1832 (51.8)	50
Propane	11 (2.74)	10	11	1.3	3.1	26	82	0.35 (9)	32.4 (0.92)	744 (21.1)	50
HIGH ALTITUDE											
Natural	7 (1.74)	8.5	10	3.1	5.8	28	100	0.35 (9)	79.8 (2.26)	1832(51.8)	50
Propane	11 (2.74)	10.2	10.6	1.3	3.1	26	76	0.35 (9)	32.4 (0.92)	670 (19.0)	50

EXT 2295 / 2300											
Gas Type	Supply Pressure Wc (kPa)	CO <sub>2</sub> Level		O <sub>2</sub> Level		Fan Speed		Ø Mixer Injectors Ø in. (mm)	Min. Gas Consumption ft <sup>3</sup> /hr (m <sup>3</sup> /hr)	Max. Gas Consumption ft <sup>3</sup> /hr (m <sup>3</sup> /hr)	Start Output % IG
		(%) Min.	(%) Max.	(%) Min.	(%) Max.	Min. (FL)	Max. (FH)				
NOMINAL ALTITUDE											
Natural	7 (1.74)	8.5	10	3.1	5.8	26	84	0.35 (9)	79.8 (2.26)	2199 (62.2)	50
Propane	11 (2.74)	10	11	1.3	3.1	26	82	0.35 (9)	32.4 (0.92)	893 (25.3)	50
HIGH ALTITUDE											
Natural	7 (1.74)	8.5	10	3.1	5.8	28	100	0.35 (9)	79.8 (2.26)	2199 (62.2)	50
Propane	11 (2.74)	10.2	10.6	1.3	3.1	26	76	0.35 (9)	32.4 (0.92)	804 (22.8)	50

### NOTE:

Check the O<sub>2</sub> levels often, especially at low flow rates.

For high altitude installations, consult document number C302.6 (MLX EXT Alt Derate).

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

EXT 2677 / 2600											
Gas Type	Supply Pressure Wc (kPa)	CO <sub>2</sub> Level		O <sub>2</sub> Level		Fan Speed		Ø Mixer Injectors Ø in. (mm)	Min. Gas Consumption ft <sup>3</sup> /hr (m <sup>3</sup> /hr)	Max. Gas Consumption ft <sup>3</sup> /hr (m <sup>3</sup> /hr)	Start Output % IG
		(%) Min.	(%) Max.	(%) Min.	(%) Max.	Min. (FL)	Max. (FH)				
NOMINAL ALTITUDE											
Natural	7 (1.74)	8.5	10	3.1	5.8	26	84	0.35 (9)	79.8 (2.26)	2565 (72.6)	50
Propane	11 (2.74)	10	11	1.3	3.1	26	82	0.35 (9)	32.4 (0.92)	1042 (29.5)	50
HIGH ALTITUDE											
Natural	7 (1.74)	8.5	10	3.1	5.8	28	100	0.35 (9)	79.8 (2.26)	2565 (72.5)	50
Propane	11 (2.74)	10.2	10.6	1.3	3.1	26	76	0.35 (9)	32.4 (0.92)	938 (26.6)	50

EXT 3060 / 3000											
Gas Type	Supply Pressure Wc (kPa)	CO <sub>2</sub> Level		O <sub>2</sub> Level		Fan Speed		Ø Mixer Injectors Ø in. (mm)	Min. Gas Consumption ft <sup>3</sup> /hr (m <sup>3</sup> /hr)	Max. Gas Consumption ft <sup>3</sup> /hr (m <sup>3</sup> /hr)	Start Output % IG
		(%) Min.	(%) Max.	(%) Min.	(%) Max.	Min. (FL)	Max. (FH)				
NOMINAL ALTITUDE											
Natural	7 (1.74)	8.5	10	3.1	5.8	26	84	0.35 (9)	79.8 (2.26)	2932 (83.0)	50
Propane	11 (2.74)	10	11	1.3	3.1	26	82	0.35 (9)	32.4 (0.92)	1191 (33.7)	50
HIGH ALTITUDE											
Natural	7 (1.74)	8.5	10	3.1	5.8	28	100	0.35 (9)	79.8 (2.26)	2639 (82.9)	50
Propane	11 (2.74)	10.2	10.6	1.3	3.1	26	76	0.35 (9)	32.4 (0.92)	1072 (30.3)	50

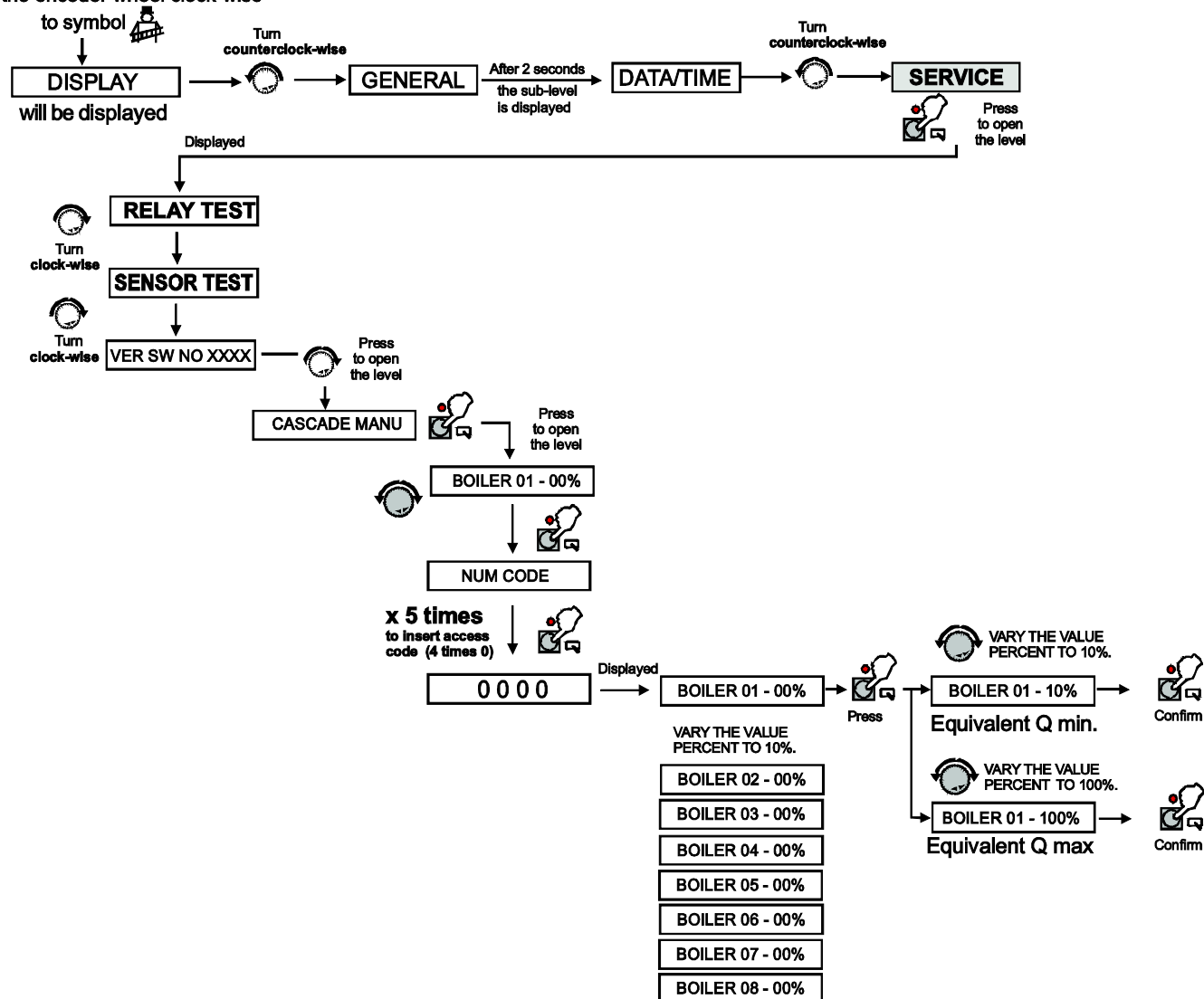
**NOTE:**

Check the O<sub>2</sub> levels often, especially at low flow rates.

For high altitude installations, consult document number C302.6 (MLX EXT Alt Derate).

## 4.34 SWEEPER MODE (MANUAL CONTROL)

Before opening the controller door flap,  
turn the encoder wheel clock-wise



**Figure 4-30: Sweeper Mode (Manual Control)**

### NOTE:

The function is active for 15 minutes, after which it defaults to the previous parameters.

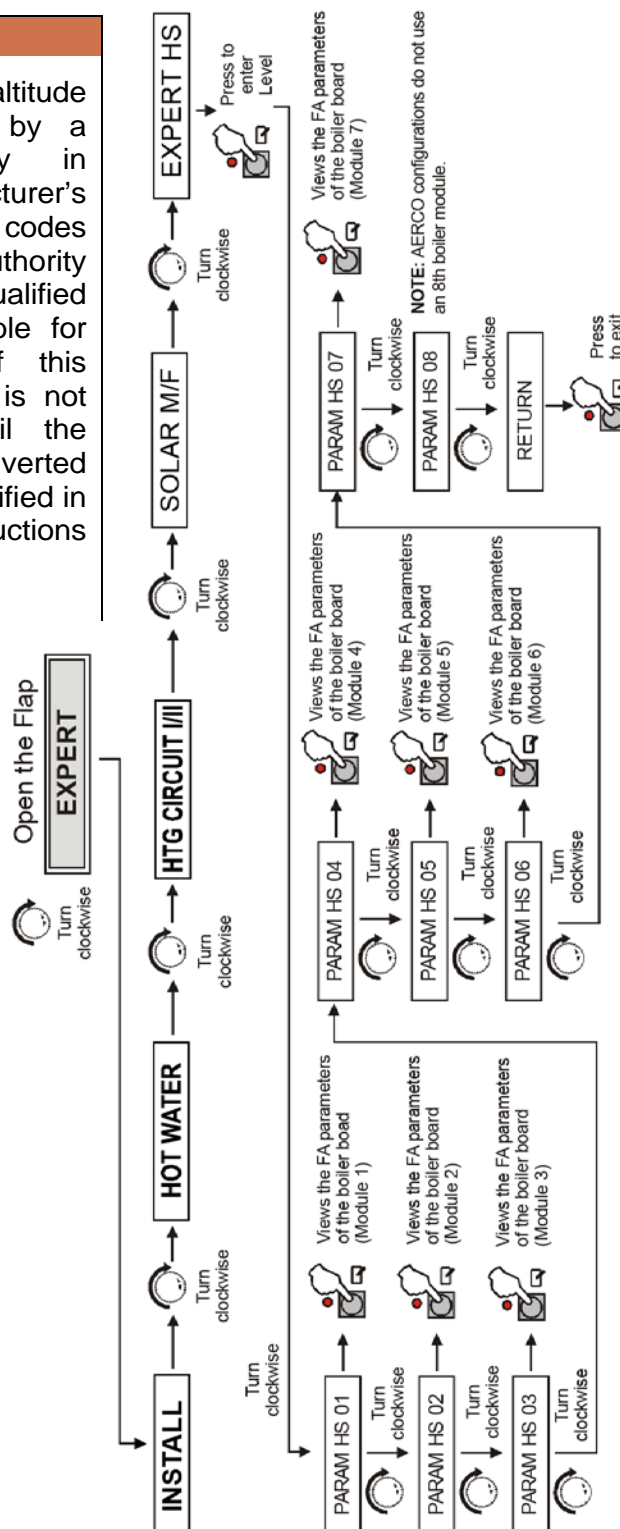


### 4.35 HIGH ALTITUDE ADJUSTMENT

It is necessary to adjust the fan speed at altitudes at or above 5,000 feet. Modify the parameter FAN MAX from the E8 Control Panel. Note that it is modifiable only with an access code. See Table 4-7 on the next page for a list of the FA (Factory) parameters.

## WARNING!

This conversion to high altitude operation shall be made by a qualified service agency in accordance with the manufacturer's instructions and all applicable codes and requirements of the authority having jurisdiction. The qualified service agency is responsible for the proper installation of this conversion. The installation is not proper and complete until the operation of the converted appliance is checked as specified in the manufacturer's instructions supplied with the unit.



## NOTE

See the value of parameter FH (FAN MAX) in **Table 4-7**, MODULEX EXT Pressure and CO<sub>2</sub> Level Calibration Tables.

**Figure 4-31: Adjusting Fan Speed to Set Input Range for High Altitude**

TABLE 4-7: MODULEX EXT FA (Factory) Parameters Set in PARAM HS xx Menu

PARAMETERS	MODULEX EXT	
	FOR LOW ALTITUDE	FOR HIGH ALTITUDE
FAN MOD IGN	80	No Change
FAN MOD STBY	26	No Change
FAN MAX (FH)	84	100
FAN MIN (FL)	31	28
MAX DIFF PRO	30	No Change
MIN FLOW PRO	00	No Change
MIN FLOW RAT	200	No Change
BOIL HYS	5	No Change
BOIL SLP LIM	10	No Change
BOIL P VAL	25	No Change
BOIL I VAL	12	No Change
BOIL D VAL	00	No Change
PUMP OVERRUN	05	No Change
PUMP MIN MOD	----	----
CAP FLOW RATE	----	----
FAN P VAL	04	No Change
FAN I VAL	08	No Change
FAN SLP		
FAN SLP POS	----	----
FAN SLP NEG	----	----
FAN START PW	----	----
FAN ADAPT	----	----
RESTARTS	----	----
SW NO	Software N°	Software N°
SW RWV	Software Revision	Software Revision

### 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.

**This appliance has been converted for use at  
Altitude of: 2,000 - 4,500 Feet.**

FH (rpm %): \_\_\_\_\_

**Change of parameter:** \_\_\_\_\_

**Input :** \_\_\_\_\_

**Date of conversion :** \_\_\_\_\_

**Type of Fuel :** \_\_\_\_\_

**Converted by :** \_\_\_\_\_

00334518

**Figure 4-32: High Altitude Conversion Label**



### 4.37 CONVERSION FROM NATURAL GAS TO PROPANE GAS

To convert the unit to use propane gas, instead of natural gas, do the following:

#### Converting From Natural Gas to Propane Gas

1. Set nominal heat by adjusting the fan speed parameter FH (FAN MAX) from the E8 controller as shown in Table 4-6, MODULEX EXT Pressure and CO<sub>2</sub> Level Calibration Tables in Section 4.33.4. This parameter requires a password to change.
2. Adjust CO<sub>2</sub> (%) minimum and maximum levels according to the type of gas as shown in the table below. See section 4.33 - Burner Calibration, above, for more information.

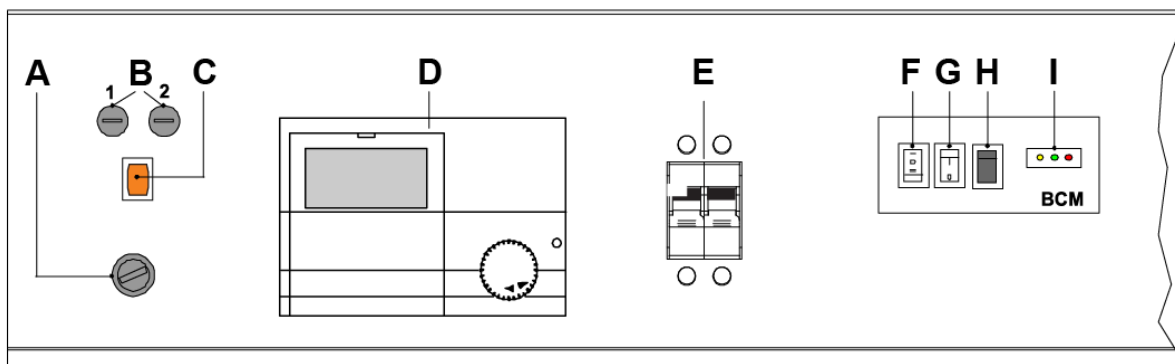
GAS TYPE	CO <sub>2</sub> LEVEL (%) MINIMUM	CO <sub>2</sub> LEVEL (%) MAXIMUM
Natural Gas	8.5	10
Propane Gas	10	11

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

Boiler model number: .....			
		w.c.	kPa
Inlet gas pressure of the converted boiler:	Max.	13.0	3.23
	Normal	11.0	2.74
	Min.	8.0	1.99
Normal altitude (0 - 2,000 ft) FH (rpm %)		82	
High altitude (2,000 - 4,500 ft) FH (rpm %)		76	
Manifold pressure: ..... Factory Set (not adjustable) .....			
Input Rating: .....			
This boiler was converted on:			
DAY	MONTH	YEAR	
.....			
To gas: <b>(E) Propane</b>			
By: name .....			
address .....			
(name and address of organization making this conversion), which accepts the responsibility that this conversion has been properly made.			
00334763			

**Figure 4-33: MODULEX EXT Label**

### 4.38 CONTROLS AND EMERGENCY FUNCTIONS



**Figure 4-34: MODULEX EXT Panel Controls and Indicators**

**TABLE 4-8: Panel Controls and Indicators**

ITEM	COMPONANT/FUNCTION
A	GLT (General Limit Thermostat): when enabled, it cuts the power supply to the boiler and lights the warning lamp (Item D). To reset, remove the cap and push the reset button.
B	Main Power Switch
C	Fuses: 1 = 6.3 A    2 = 10 A
D	Warning lamp of the Thermostatic Lockout from GTL (General Limit Thermostat).
E	Main Switch
F*	Change-over Series/Parallel: 0 = Emergency is active or the control is managed by PLC or BMS. I = Series connection (the cascade is managed by the BCM) II = Parallel connection (condition of supply).
G*	In position "I" the plant will operate when requested at "CONSTANT SETPOINT": 70°C – Max heat output 50%.
H*	Enables burner reset in case of lock-out.
I*	YELLOW LED = Blinking = Communication between BMM and BCM is OK. GREEN LED = ON = Active Pump RED LED = ON = Failure Code Detected

\*See Chapter 5, section 5.2 for more information regarding the BCM (Boiler Communication Module).

#### NOTE:

The emergency function enables the boiler's burners to fire only at 50% and at 50°C in system return. All the system's heating loads, including the header pump, must be controlled manually.

### 4.39 INITIAL BOILER IGNITION

#### 4.39.1 Preliminary Checks

##### CAUTION!

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

Before igniting the boiler, check that:

- The boiler installation has been carried out in accordance with the specific standards as instructed in this manual.
- The combustion air inlet and the discharge of combustion exhaust occur in the correct manner in accordance to the specific standards in force.
- The gas supply system is correctly configured for the boiler's output.
- The boiler's electrical supply is 120 V - 60 Hz.
- The system has been filled with water (pressure registered on the gauge 0.8/1 bar with pump not running).
- All 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 which the boiler has been calibrated for. Otherwise convert the boiler to use the available gas (refer to section: "GAS CONVERSION"). This operation must be carried out by a qualified technician in compliance with the regulations in force.
- The gas supply valve is open.
- There are no gas leaks.
- There are no water leaks.
- The external mains electrical supply switch is on.
- The 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.
- There are no water leaks.

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## CHAPTER 5: E8 CONTROLLER AND BCM MODULES

MODULEX boilers contain advanced and reliable electronic controls, the E8 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 E8 Controller and BCM are described in this chapter.

### CAUTION!

This chapter instructs how to operate and navigate the E8 Controller menus, sub-menus, and parameters, as well as describing the functions of the BCM (Boiler Control Module). However, before the boiler may be used, the E8 controller **MUST** be first initialized by entering language, year, month, day, and hour in the Installation Menu, as described in Chapter 6, section 6.1.

### 5.1 E8 CONTROLLER

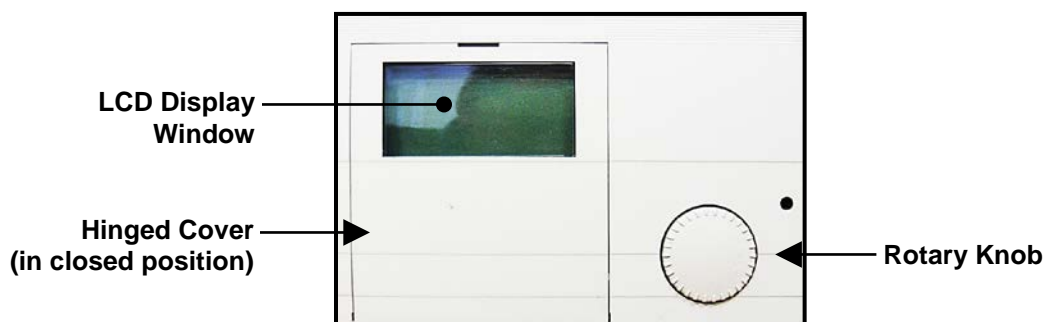
A standard component included in MODULEX units, the E8 Controller is responsible for the staging and modulation of individual thermal heating modules in a MODULEX boiler and also monitors supply and return water temperatures and domestic hot water zones.

The E8 Controller is housed in a compact enclosure measuring 5.7" (145 mm) x 3.9" (100 mm). The Controller is mounted on the front of the MODULEX Boiler and contains all of the controls, indicators and displays necessary to adjust, operate and troubleshoot the MODULEX Boiler. The main components of the closed E8 Controller include the display, door, and data wheel (see Figure 5-1).

#### 5.1.1 E8 Controller Features and Functions

The E8 features the following functions for MODULEX boilers:

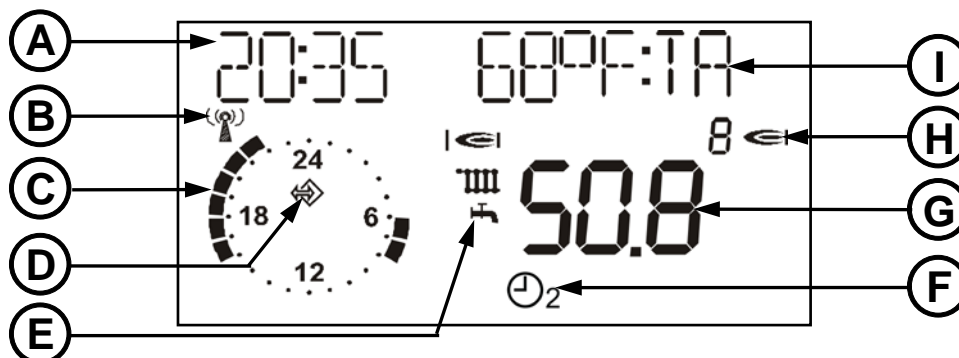
- Shares the heating load among as many of the boiler's thermal heating modules as possible, maximizing the overall operating efficiency of the boiler.
- Provides access to all testing/programming parameters of each individual heating module: operation test, operation time, boiler freeze protection and 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 BMS II and AERCO Control System (ACS) or Building Automation Systems. AERCO also offers a Communication Gateway to support BACnet, Lonworks and N2 system integration.



**Figure 5-1: MODULEX E8 Controller Front Panel (Cover Closed)**

### 5.1.2 E8 Display Functions

The E8 Controller operates in NORMAL Mode when the controller door is closed, which allows for monitoring the boiler status through the display window and setting the HEATING Mode. When the door is opened, the unit enters MENU Mode, and in this mode the boiler may be initialized, configured, and adjusted. The controls and display for the E8 controller are described in the following sub-sections.



**Figure 5-2: E8 (NORMAL Mode) Display Features**

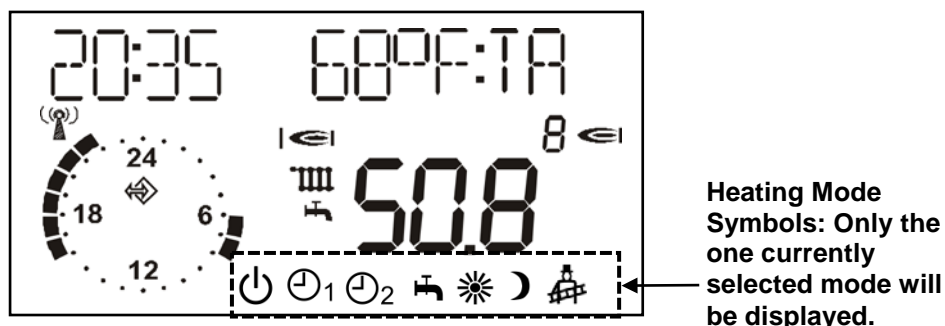
**TABLE 5-1: E8 Display Features and Functions (NORMAL Mode)**

ITEM	FUNCTION
A	Current time (24 hour format)
B	DCF reception OK (only if receiver is connected via eBUS)
C	Display of the active heating program for the first heating circuit (here: 6:00 to 08:00 a.m. and 4:00 to 10:00 p.m.)
D	Bus icon (if this icon does not appear, check data line to connected CAN controllers => check eBUS via DISPLAY level)
E	Status display: Shows symbols for Internal Burner 1 Relay ON; Heating Mode; Hot Water Preparation.
F	Heating Mode display symbol. The display symbols apply to all internal heating circuits for which a separate heating mode has been selected. Note that each symbol occupies a different space across the display bottom. See <b>Figure 5-3</b> .
G	Display of current temperature of HS 1 or header temperature when cascading.
H	Display of number of active heat generators (only applies when cascading).
I	Selectable display and Fault Codes (refer to "DISPLAY SEL" parameter in the USER menu).

### 5.1.3 E8 HEATING Mode Selection

Heating modes may be selected using the Rotary Knob on the controller when the hinged door is in the closed position (NORMAL Mode). As the Rotary Knob is turned, each appropriate heating mode symbol is displayed, in turn, along the lower edge of the display.

Mode changes take effect when the setting is not changed for 5 seconds. The symbols and description for the available heating modes are shown in Figure 5-3.



**Figure 5-3: E8 HEATING Mode Display Features (NORMAL Mode)**

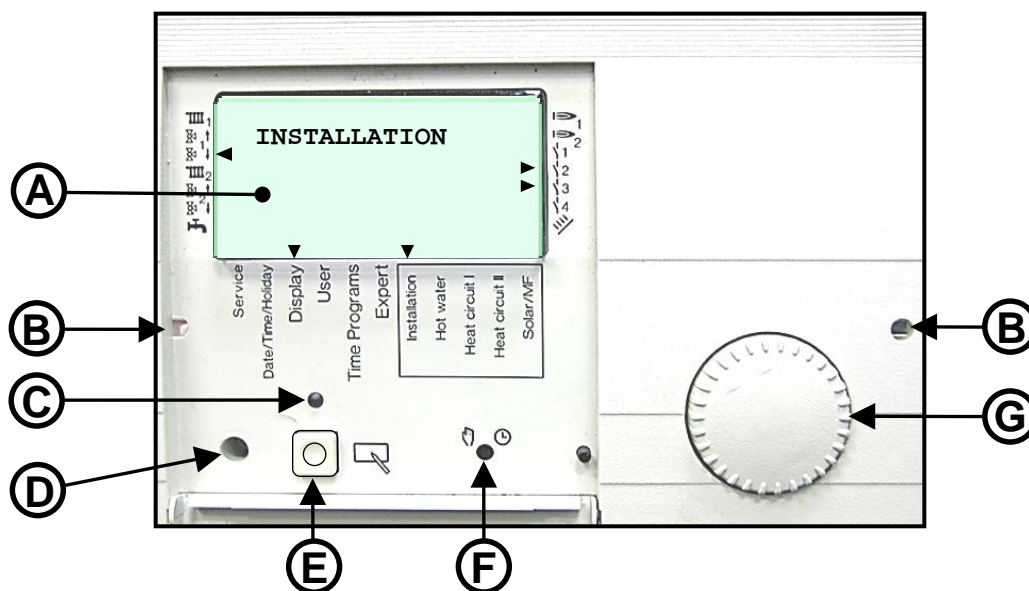
**TABLE 5-2: E8 HEATING Mode Features & Functions (NORMAL Mode)**

SYMBOL	MODE NAME	DESCRIPTION
	<b>Heating Mode Selection</b>	Turn the Rotary Knob to select the heating mode required. The heating mode is indicated by a symbol at the bottom of the display. It takes effect when the setting is not changed for 5 seconds.
	<b>Standby / OFF</b>	Heat OFF and hot water (HW) preparation OFF, only frost protection mode.
	<b>Automatic Mode 1</b>	Heat according to timer program 1; HW according to HW program.
	<b>Automatic Mode 2</b>	Heat according to timer program 2; HW according to HW program.
	<b>Summer Mode</b>	Heating OFF, HW according to HW program.
	<b>Day Mode</b>	24 Hour heating with comfort temperature 1; HW according to HW program.
	<b>Night Mode</b>	24 Hour heating with reduced temperature; HW according to program.
	<b>Service Mode</b>	Automatic reset after 15 minutes. Boiler regulated at max boiler temperature.



### 5.1.4 E8 MENU Mode Operation (Door Open)

Opening the E8 controller hinged door reveals the E8 controls (Figure 5-4) and initiates the MENU Mode, which enables access to an extensive set of software menus.



**Figure 5-4: E8 MENU Mode Display Features**

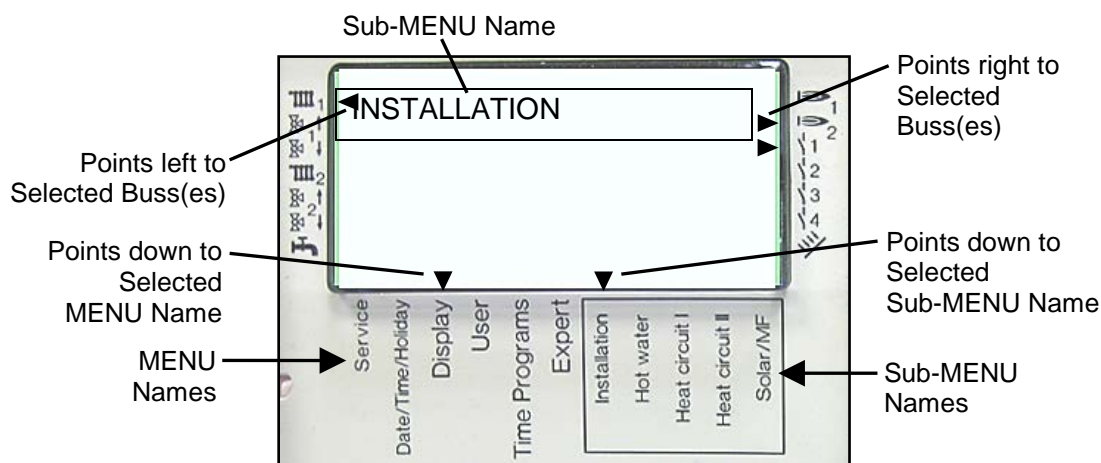
**TABLE 5-3: E8 MENU Mode Features and Functions**

ITEM	FEATURE	FUNCTION
<b>A</b>	<b>LCD display</b>	Selected Menu/Sub-menus, parameter names/values, and selected busses are indicated in the LCD display when in MENU Mode.
<b>B</b>	<b>Mounting Key Access Holes</b>	Insert narrow screwdriver deep into holes and lift up controller to remove.
<b>C</b>	<b>Change LED</b>	When lit, this LED indicates that the value shown in the display can be changed using the Rotary Knob (A).
<b>D</b>	<b>Optical Adaptor</b>	For PC connection
<b>E</b>	<b>Program Key</b>	Used to select a sub-menu level, select a parameter value to change, or save a new parameter value.
<b>F</b>	<b>Manual/ Automatic Switch</b>	A 2-position (10/2 o'clock) screwdriver adjustable switch. Normally, this switch is set to the Automatic (2 o'clock) position to allow program control of the boiler. When set to the Manual (10 o'clock) position, a flashing "EMERG – MODE" message is displayed. Heating Circuit 1 (HC1) pump and the first burner stage are switched on. Pumps for Heating Circuit 2 (HC2) and Domestic Hot Water (DHW) will also be switched on if sensors are installed and enabled. The pump(s) will turn off when the flow temperature reaches the value set for MAX T-FLOW (in EXPERT/HEAT CIRCUIT 1 menu). The first burner stage will cut off when the boiler temperature reaches the value set for MAX T-MODUL (in EXPERT/INSTALLATION menu).
<b>G</b>	<b>Rotary Knob</b>	Used to navigate through menus and parameters or adjust parameters.

### 5.1.5 E8 MENU Navigation and Parameter Settings

The selected Menu and Sub-menu are indicated by two black arrows at display bottom pointing to the Menu and Sub-menu names silk-screened below the display (Figure 5-5).

Following initial startup and one-time entry of the required INSTALLATION menu items (see Chapter 6, section 6.1), to access, view and/or change menu items follow these instructions:



**Figure 5-5: MODULEx E8 Controller Front Panel**


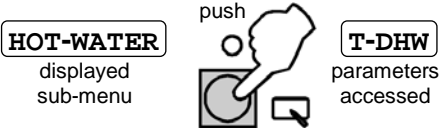
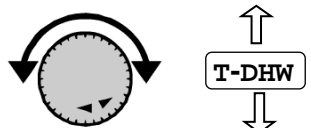
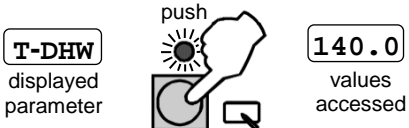
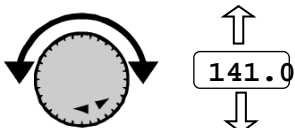
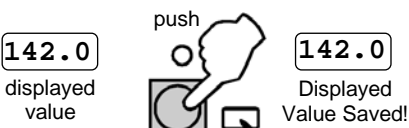
#### E8 Controller Menu Navigation Procedure

1. When the ON/OFF switch on the front of the boiler is turned ON and the swing-down hinged panel is opened, the controller will enter MENU Mode and INSTALLATION will be displayed (Figure 5-5) in the LCD. This is the initial INSTALLATION menu and it is assumed that all entries have already been made. See sub-section 4.8 of the E8 Controller User Manual (GF-115-C) for INSTALLATION menu initial entry information.
2. Turn the Rotary Knob clockwise until the display advances to the DISPLAY menu. The dial on the clock face will rotate one revolution counterclockwise and then go off. The display will then show INSTALLATION, which is the first sub-menu in the DISPLAY menu group (Figure 5-5). The two small black arrows at the bottom of the display will point down to the menu and submenu names, in this case DISPLAY and INSTALLATION, respectively.
3. To view functions included in the INSTALLATION sub-menu, press the Program Key (Item E, Figure 5-4). If desired, turn the Rotary Knob to scroll through the functions in the INSTALLATION sub-menu. As previously mentioned, these display functions are read-only and cannot be changed. Once you reach the end of the sub-menu, RETURN will appear in the display.
4. To exit this sub-menu and advance to the next sub-menu in the DISPLAY menu, press the Program Key while RETURN is displayed. INSTALLATION will again be displayed. Turn the Rotary Knob clockwise until the next sub-menu is displayed.
5. Repeat steps 2, 3 and 4 to view the remaining main menus and their associated sub-menus. The remaining main menus are: USER, TIME PROGRAM, EXPERT, EXPERT HS (Not Applicable to MODULEX), and GENERAL.

### 5.1.6 E8 Parameter Navigation, Selection, and Setting

When in the USER, TIME PROGRAM, EXPERT, or GENERAL Main Menu, virtually all sub-menu items can be changed, if desired. Perform the following steps to access, view, and/or change menu item parameters:

TABLE 5-4: E8 Parameter Navigation, Selection, and Setting

DESCRIPTION	EXAMPLES
Use Rotary Knob to navigate to the desired Menu/Sub-menu. Menu and sub-menu are indicated by two small black arrows at the bottom of the LCD display pointing down to menu/sub-menu names below the display (see Figure 5-5).	<p>Example: User Menu &amp; Hot Water Sub-menu</p>  <p>Display Detail</p> <p><b>HOT-WATER</b> Displayed Sub-menu</p>
Press Program Key to access parameters in the selected (displayed) sub-menu.	 <p><b>HOT-WATER</b> displayed sub-menu</p> <p>push</p> <p><b>T-DHW</b> parameters accessed</p>
Turn Rotary Knob to sequence through the available parameters.	<p>Cycle thru parameters</p>  <p><b>T-DHW</b></p>
To change a parameter value, press the Program Key when the desired parameter is displayed. The Change LED will light up indicating the displayed parameter may now be changed.	 <p><b>T-DHW</b> displayed parameter</p> <p>push</p> <p><b>140.0</b> values accessed</p>
To change the displayed parameter value, turn the Rotary Knob; clockwise to increase value and counter-clockwise to decrease the value.	<p>cycle thru values</p>  <p><b>141.0</b></p>
To save the displayed parameter value to the controller memory, press the Program Key. The Change LED will turn off indicating the new value has been saved.	 <p><b>142.0</b> displayed value</p> <p>push</p> <p><b>142.0</b> Displayed Value Saved!</p>

## **5.2 BCM (BOILER COMMUNICATION MODULE)**

### **NOTE**

Only the basic features and functions of the BCM are described in the following sections. Refer to the E8 Controller User Manual (GF-115-C) for detailed information and diagrams for wiring and using the BCM in its various capacities.

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.

As a back-up controller, the BCM further increases the reliability of a product line already known for its uniquely redundant design. Each MODULEX boiler combines between four and eight independent, 382,000 BTU/hr., pre-assembled thermal modules housed in a common enclosure. Each module has its own dedicated controller with a combustion safeguard, variable-speed fan, modulating gas valve, electronic ignition, modulating burner, flow temperature sensor, thermostat and heat exchanger. The independent operation of these thermal modules increases each boiler's overall reliability. If a single module requires maintenance or repair, the other module(s) in the boiler can maintain the system load requirements -- thereby providing a level of redundancy that was previously only realized in multi-boiler installations.

A photo of the module is shown in Figure 5-6. Additional information for the BCM component can be found in Section 7, 9, and 10 of the E8 Controller User Manual (GF-115-C).

### **5.2.1 BCM Features and Functions**

When installed and enabled, the BCM enhances the range of control functions offered by the MODULEX Boilers. These additional control functions include the following:

- Providing a fault relay which energizes when any fault condition occurs in the MODULEX Boiler.
- Serving as a Back-up Controller in the event that the primary E8 Controller fails.
- Providing a 0-10V output to control a variable speed primary pump
- May be selected as the Primary Controller instead of the E8.
- Functioning as a "Slave" to a "Master" Energy Management System (EMS), Building Automation System (BAS) or AERCO's Boiler Management System II (BMS II/AERCO Control System [ACS]) on a Modbus Network.

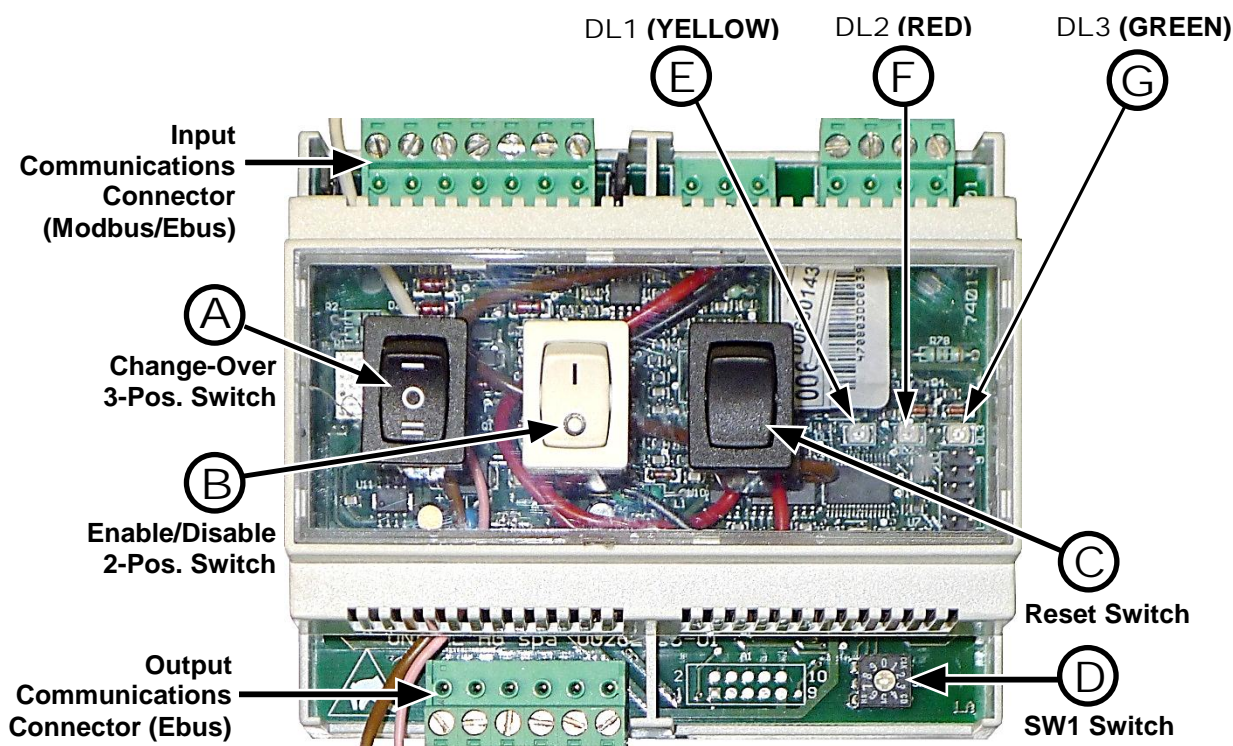
### **5.2.2 BCM Description**

The BCM shown in Figure 5-6 is housed in a compact enclosure measuring 4.13" (105 mm) x 3.50" (89 mm). The BCM is installed on the front of the MODULEX Boiler control panel.

Input/Output (I/O) connections to the BCM are made via four connectors mounted on the Printed Circuit Board (PCB) of the BCM. Three Control Switches are mounted on the clear plastic cover on the front of the BCM. Three LED Status Indicators are mounted directly on the BCM PCB and can be viewed through the clear plastic cover. In addition, the PCB contains an on-board, screwdriver-adjustable 10-position address switch, which is used to set the corresponding address of the boiler on the input Modbus or EBUS Network.

Refer to Tables 5-5 and 5-6 for details on the features and functions of the BCM.





**Figure 5-6: BCM (Boiler Control Module) Features**

**TABLE 5-5: BCM (Boiler Control Module) Features and Functions**

ITEM	FEATURE	FUNCTION								
A	Change-Over Series/Parallel, 3-Position Switch	Three-position rocker switch for setting internal/external boiler control.								
B	Enable/Disable (I/O), 2-Position Switch	Two-position rocker switch enables the BCM to act as a Back-Up Controller when placed in the ON (I) position. See Table 5-6 for description of settings related to Item B switch.								
C	Reset Switch	Momentary two-position rocker switch resets (clears) fault relay and LED when activated.								
D	SW1, 10-Position Rotary Switch	Rotary switch labeled 0 – 9. Sets the corresponding address of Boiler on the input Modbus or EBUS Network.								
E	DL1 LED: (YELLOW)	<div>Communication Status Indicator functions as follows:</div> <table><tr><th>Status</th><th>Description</th></tr><tr><td>OFF</td><td>No devices detected by either communication interface.</td></tr><tr><td>BLINKING</td><td>Only one communication device detected at one communication interface (input or output).</td></tr><tr><td>ON</td><td>Both communication interfaces (input &amp; output) are active.</td></tr></table>	Status	Description	OFF	No devices detected by either communication interface.	BLINKING	Only one communication device detected at one communication interface (input or output).	ON	Both communication interfaces (input & output) are active.
Status	Description									
OFF	No devices detected by either communication interface.									
BLINKING	Only one communication device detected at one communication interface (input or output).									
ON	Both communication interfaces (input & output) are active.									
F	DL2 LED: (RED)	Alarm Status LED lights when a fault is detected by the BCM. Activating the Reset Switch will clear the faults.								
G	DL3 LED: (GREEN)	Pump Status Indicator lights when Pump is running.								

TABLE 5-6: BCM 3-Position and 2-Position Switch Functions

2-POS SWITCH (ENABLE/DISABLE)	3-POS SWITCH (I/O/II)		
	Position I (NOTE 1)	Position O (see NOTE 2)	Position II (See NOTE 3)
O = OFF (Disable)	DO NOT USE	The BCM is the Gate-way for Modbus and external control. The E8 does <b>not</b> control the boiler and the BCM will <b>not</b> take over the boiler if the Modbus signal fails.	The E8 <b>is</b> the primary controller and the BCM allows monitoring through Modbus, but <b>will not</b> take over boiler if the E8 fails.
I = ON (Enable)	DO NOT USE	The BCM is the Gate-way for Modbus and external control. The E8 does <b>not</b> control the boiler and the BCM <b>will</b> take over the boiler if the Modbus signal fails. If E8 is in Standby Mode, BCM will cycle the pump with the boiler. If E8 is in Day Mode, the E8 will continuously run the pump.	The E8 <b>is</b> the primary controller and the BCM allows monitoring, and the BCM <b>will</b> take over the boiler if E8 fails. If E8 is in Standby Mode, E8 will cycle the pump (must use Enable/Disable). If E8 is in Day Mode, the E8 will continuously run the pump.

### NOTES:

- 1) **DO NOT** set the 3-Position Switch to Position I.
- 2) Set the 3-Position Switch to Position **O** ONLY when controlling Boilers from an external Controller via Modbus Communication. See **Paragraph 3.1.2** of the E8 Controller User Manual (GF-115-C) for setting HEAT Modes.
- 3) Position **II** is the **Default** position for the 3-Position Switch. Ensure it is set to this position when it arrives from the Factory. See **Paragraph 3.1.2** of the E8 Controller User Manual (GF-115-C) for setting HEAT Modes.

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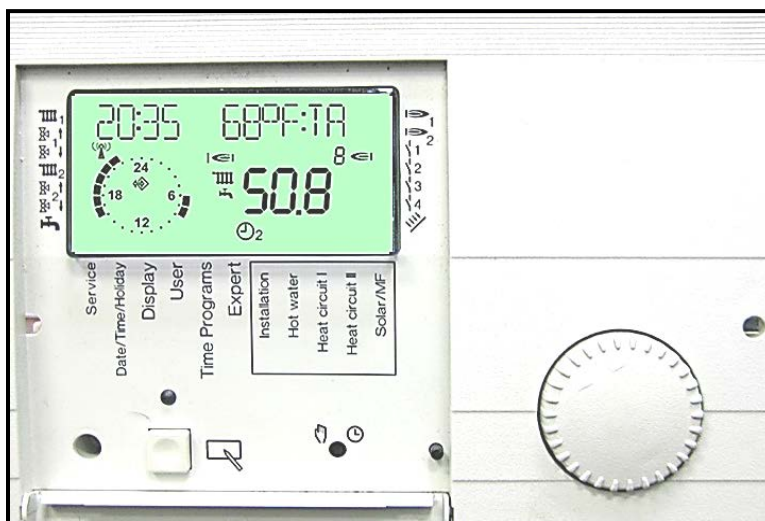


## CHAPTER 6: OPERATION OF THE E8 CONTROLLER

This chapter introduces the E8 controller basic menus/sub-menus needed to set up the MODULEX EXT boiler. Refer to Chapter 4 for instructions for using the E8 controls to navigate and change settings. For more detailed information concerning the E8 controller menus, sub-menus, and functions, refer to the E8 Controller User Manual (GF-115-C).



***MODULEX E8 Controller Front Panel (Cover Closed)***



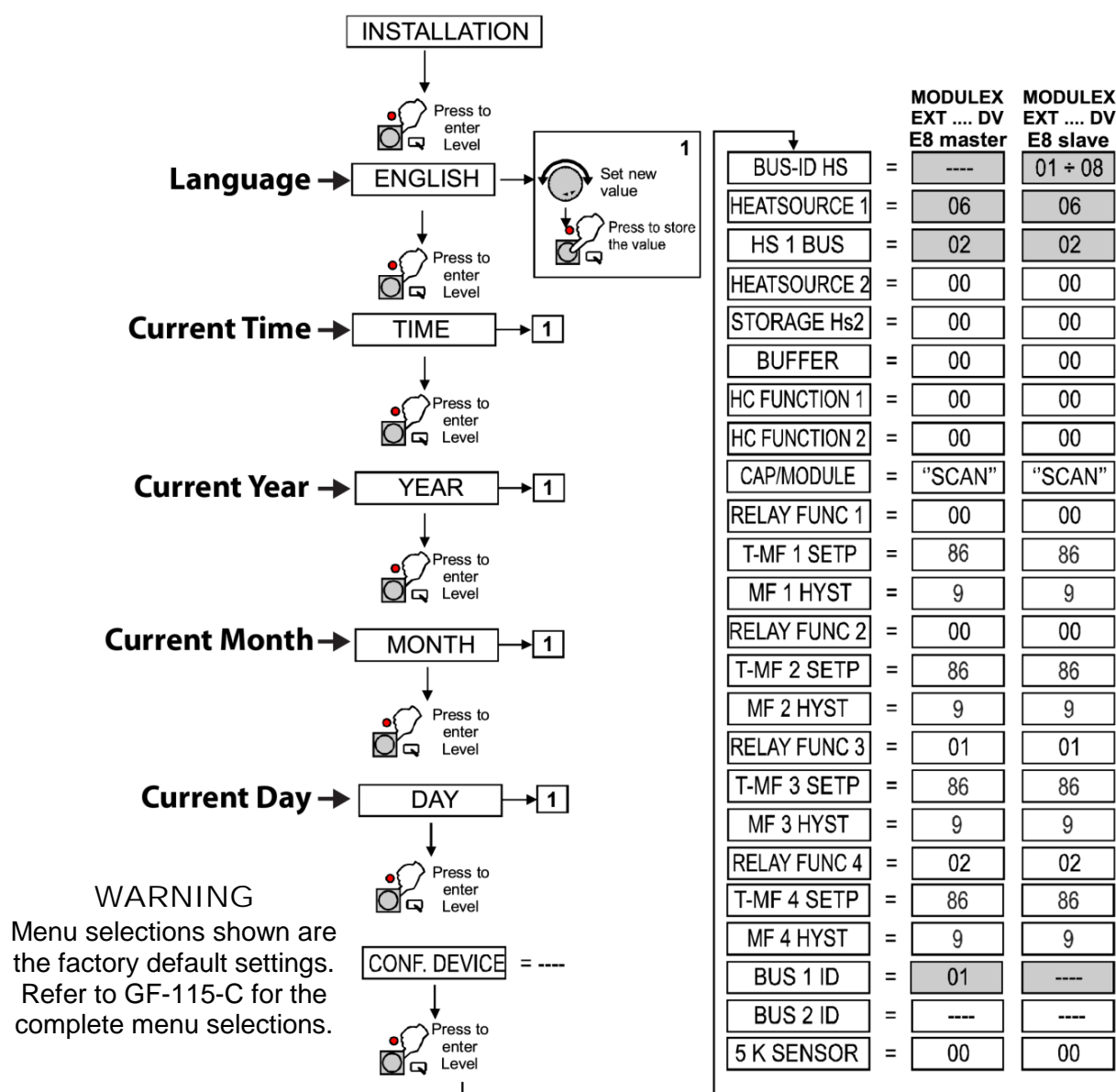
***MODULEX E8 Controller Front Panel (Cover Open)***

### 6.1 INSTALLATION MENU: INITIALIZING THE E8 CONTROLLER

Each time power is applied to the boiler and the E8 controller cover (Figure 7-1) is opened, the **INSTALLATION** Menu is displayed once (only). These values **MUST** be entered in order to initialize the boiler for operation. Once the values grouped here have been entered and accepted, the controller is initiated and operatable and may be configured for your boiler installation. To re-enter the **INSTALLATION** menu, cycle the boiler power and open the cover again.

To initialize the E8 Controller, set the following values in the **INSTALLATION** Menu:

- Set the parameters: **ENGLISH**, **HOURL**, **YEAR**, **MONTH**, and **DAY**.
- Leave the **BUS – ID HS** parameter blank.
- Remaining parameters are already set and do not require any entry.



**Figure 6-1: INSTALLATION Menu**

**WARNING**  
Menu selections shown are the factory default settings. Refer to GF-115-C for the complete menu selections.

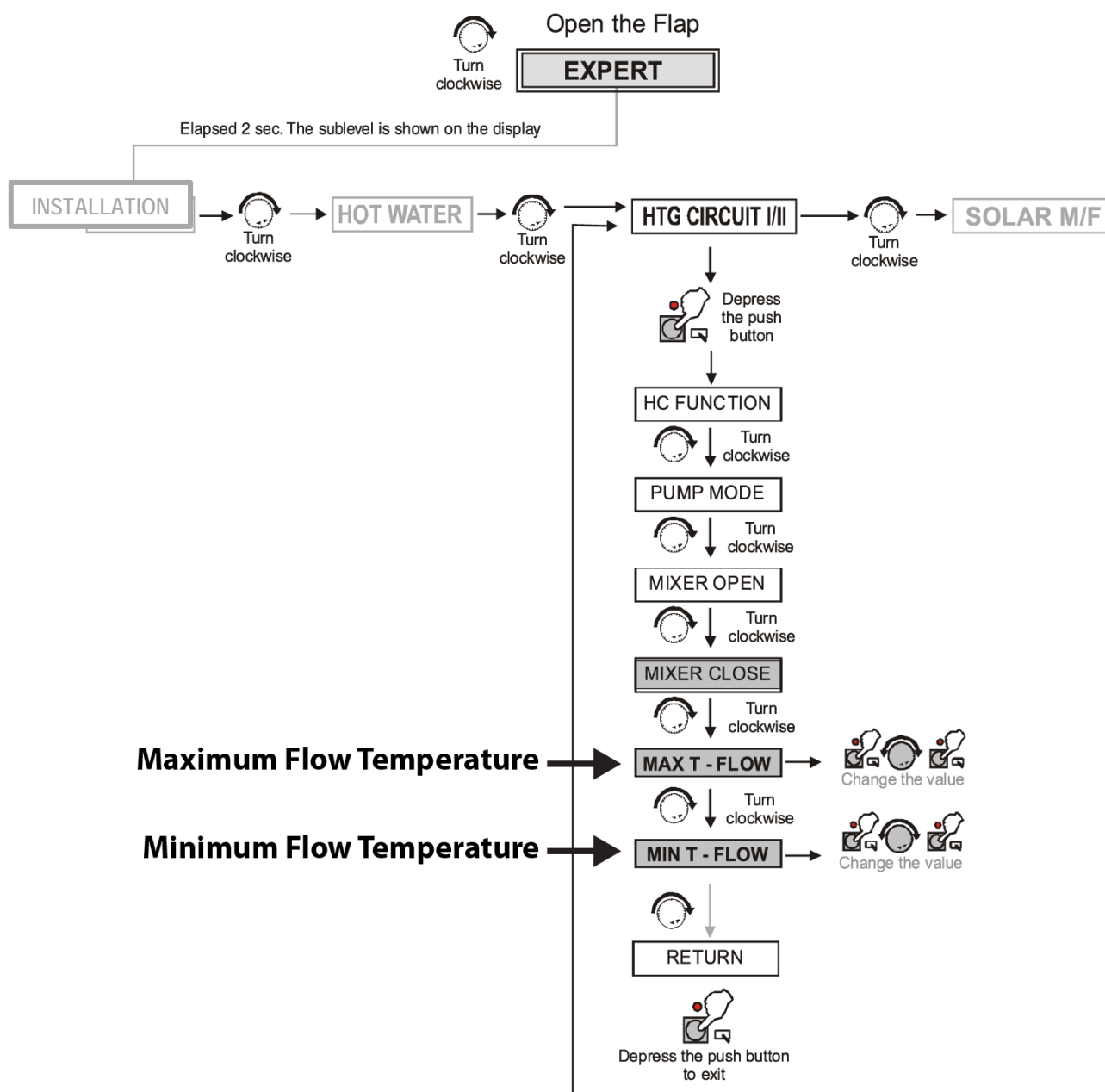
### 6.2 QUICK START INSTRUCTIONS

Below are instructions for setting the most basic settings in the E8 controller, including maximum and minimum flow temperature, room temperature settings, heat slope, and initiation of heating programs.

#### IMPORTANT!

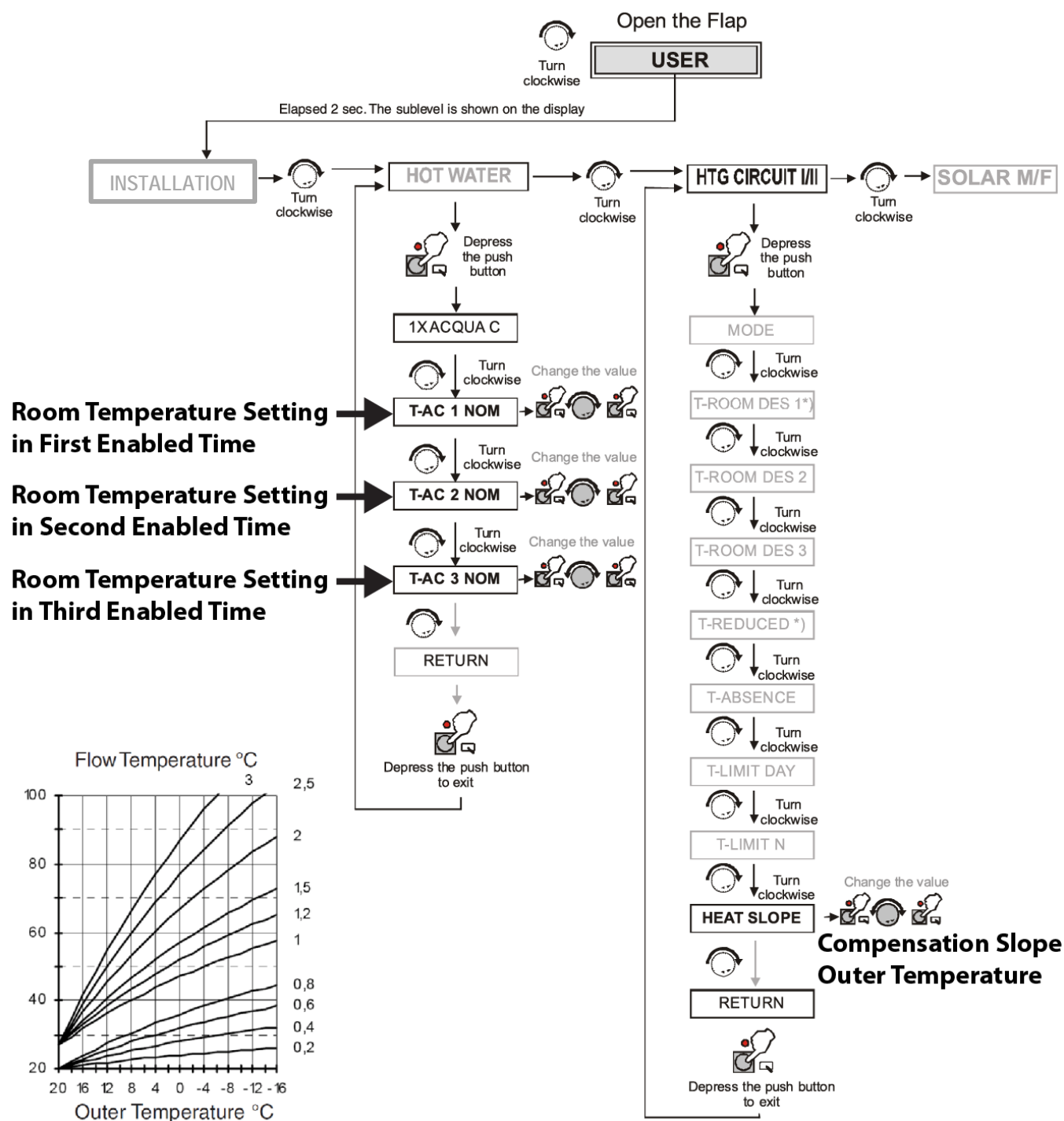
Before the boiler may be used, the E8 controller **MUST** be first initialized by entering language, year, month, day, and hour in the Installation Menu, as described in section 6.1, above.

#### 6.2.1 Setting Maximum and Minimum Flow Temperature



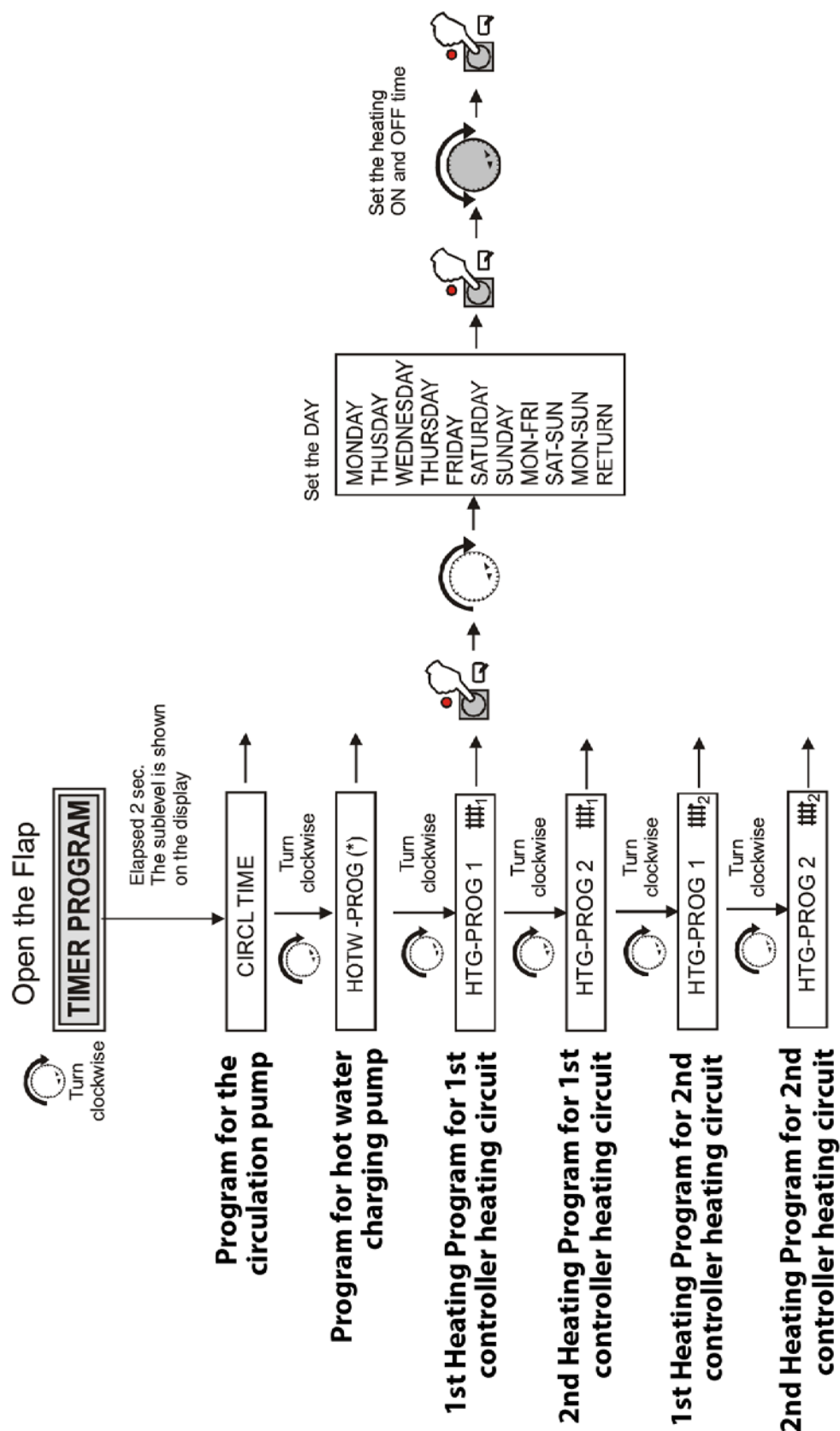
**Figure 6-2: E8 Quick Start, Max. & Min. Flow Temperature Settings**

### 6.2.2 Setting Room Temperature and Outdoor Compensation



**Figure 6-3: E8 Quick Start, Room Temperature and Outdoor Compensation Settings with Outdoor Temperature (Slope) Chart**

### 6.2.3 Setting Heating Programs and Pumps



**Figure 6-4: E8 Quick Start, Heating and Pump Program Settings**

### 6.3 MENU AND SUB-MENU DESCRIPTIONS

There are six top level menus and five sub-menus as listed below.

#### 6.3.1 Menus (Top Level):

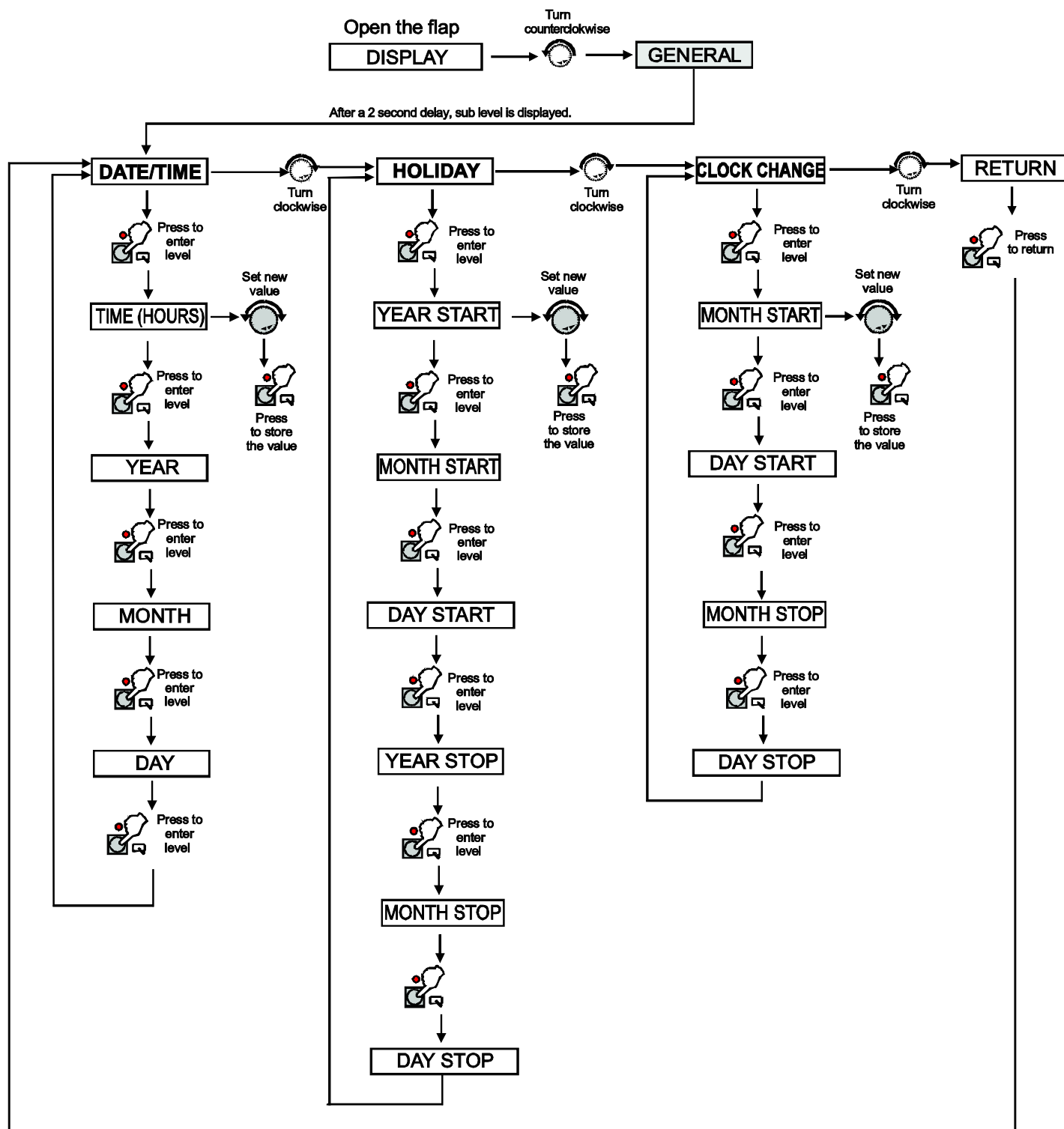
- **GENERAL**  
Value selection summary. Service => for service engineers. Date/Time/Holiday => for users.
- **DISPLAY**  
System value display (e.g. sensor values and setpoints). No adjustments can be made. Operating errors are therefore excluded in this area.
- **USER**  
Summary of settings that can be made by the operator.
- **TIME PROGRAMS**  
Summary of time programs for heating circuits, the hot water circuit and extra functions where applicable
- **EXPERT**  
Summary of values for which expert knowledge is required to make settings (installation technician). Values in the expert level are protected by a code number.
- **EXPERT FA (Only for FA via BUS)**  
Summary of values transmitted by the automatic firing device.

#### 6.3.2 Sub-Menus:

- **INSTALLATION**  
All display values and settings that relate to the unit or the entire system and cannot be assigned to a consumer circuit.
- **HOT WATER**  
All display values and settings that affect central hot water preparation and circulation.
- **HEATING CIRCUIT I**  
All indicator and set values that relate to the consumer circuit 1 (also, for example, as decentralized hot-water circuit).
- **HEATING CIRCUIT II**  
All indicator and set values that relate to the consumer circuit 2 (also, for example, as decentralized hot-water circuit).
- **SOLAR/MF**  
All indicator and set values that relate to solar energy recovery and settings for the multifunction relay.

### 6.4 GENERAL MENU

The GENERAL menu contains the sub-menus DATE/TIME, HOLIDAY, and CLOCK CHANGE.



**Figure 6-5: GENERAL Menu**




TABLE 6-1: GENERAL Menu

LEVEL	DESCRIPTION	ENTRY RANGE
DATE/TIME		
TIME (HOURS)	Current hours blink and can be adjusted	00:00 - 24:00
YEAR	Adjust current year	XXXX
MONTH	Adjust current month	01 - 12
DAY	Adjust current day	01 - 31
HOLIDAY		
YEAR START	Set current holiday start year	XXXX
MONTH START	Set current holiday start month	01 - 12
DAY START	Set current holiday start day	01 - 31
YEAR STOP	Set current holiday end year	XXXX
MONTH STOP	Set current v end year	12 - 31
DAY STOP	Set current holiday end day	01 - 31
CLOCK CHANGE		
MONTH START	Set month for start of summer time	01 - 12
DAY START	Set earliest day for start of summer time	01 - 31
MONTH STOP	Set month for start of winter time	12 - 31
DAY STOP	Set earliest day for start of winter time	01 - 31

### 6.5 SERVICE MENU

The SERVICE menu contains the TEST RELAY, SENSOR TEST, and OTHER PARAMETERS sub-menus as shown below:

#### NOTE

The **SERVICE** menu is accessed as shown below. However, **SERVICE MODE** (  ) is different and can only be accessed when the E8 cover is closed.

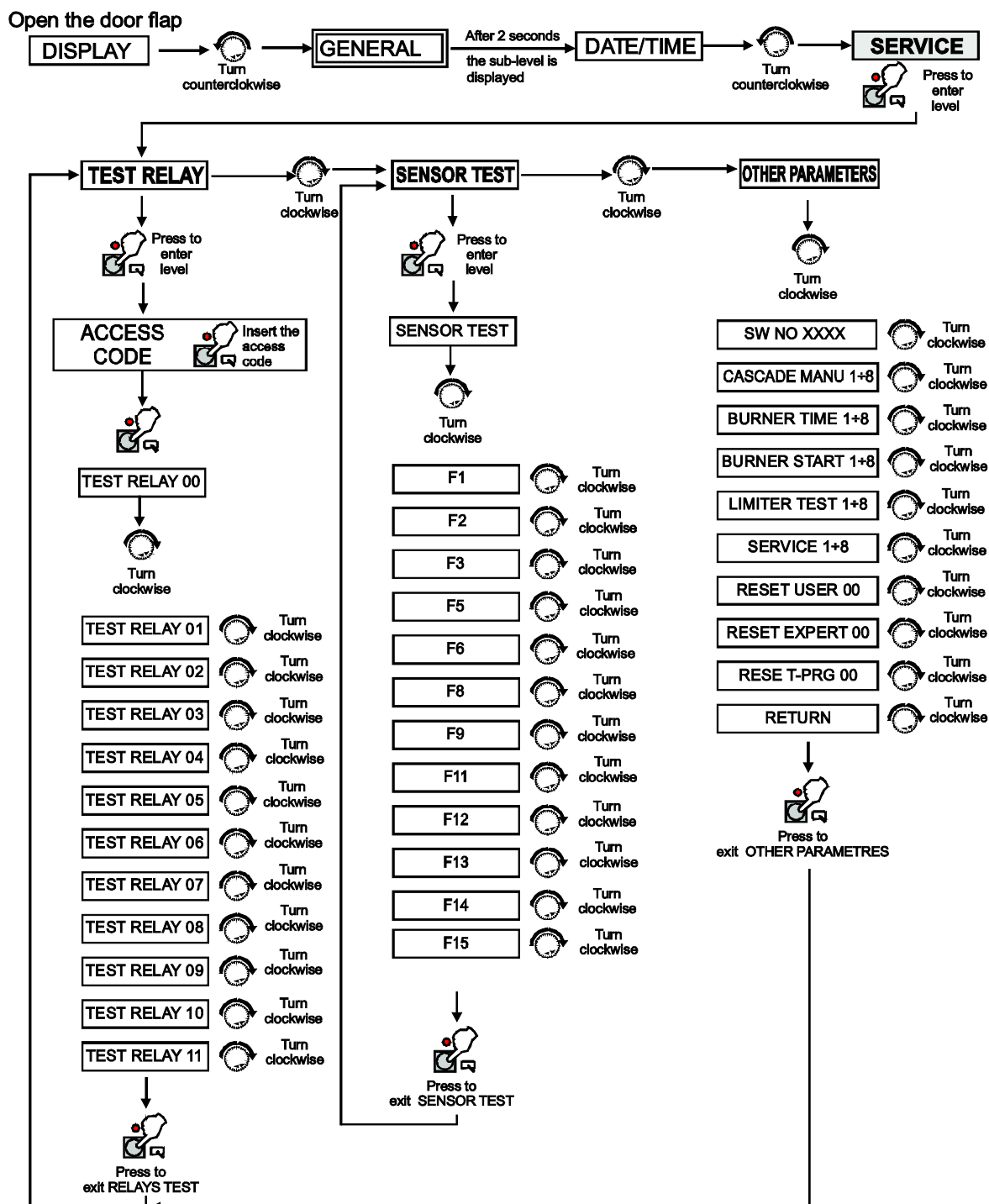


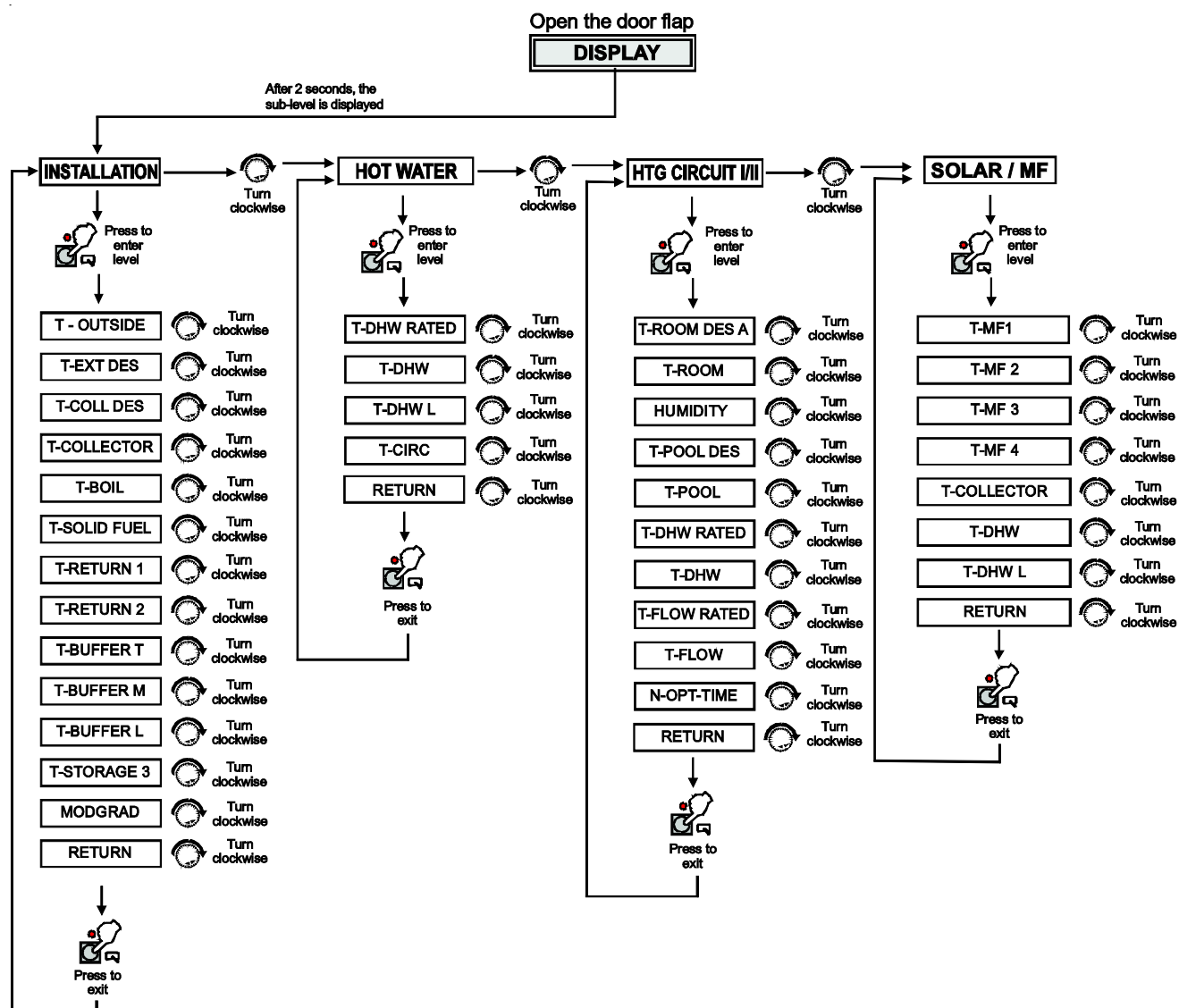
Figure 6-6: SERVICE Menu

**TABLE 6-2: SERVICE Menu**

LEVEL	DESCRIPTION
TEST RELAYS	
RELAY TEST 00	No relay
RELAY TEST 01	A1: Pump heating circuit 1
RELAY TEST 02	A2: Pump heating circuit 2
RELAY TEST 03	A3: Hot water charging pump
RELAY TEST 04	A4: Mixer OPEN heating circuit 2
RELAY TEST 05	A5: Mixer CLOSED heating circuit 2
RELAY TEST 06	A6: Heat Source 1 ON
RELAY TEST 07	A7: Heat Source 2 ON [2 stage: HS 1+2 (after 10s) ON]
RELAY TEST 08	A8: Mixer OPEN heating circuit 1 / Multifunction 1
RELAY TEST 09	A9: Mixer CLOSED heating circuit 1 / Multifunction 2
RELAY TEST 10	A10: Multifunction 3
RELAY TEST 11	A11: Collector pump / Multifunction 4
SENSOR TEST	
F1	Lower buffer storage temperature
F2	Middle buffer storage temperature or room temperature heating circuit 1
F3	Upper buffer storage temperature
F5	Flow temperature heating circuit 2
F6	Upper hot water temperature
F8	Boiler/Header temperature
F9	Outside temperature
F11	Flow temperature heating circuit 1 or temperature multifunction 1
F12	Hot water temperature lower or temperature multifunction 2
F13	Solid fuel boiler temperature or collector 2 or temperature multifunction 3
F14	Collector 1 temperature or temperature multifunction 4
F15	Room temperature heating circuit 2 or measured value of the sensor or voltage value 0-10V input
OTHER PARAMETERS	
SW NO XXX-XX	Software number with index
CASCADE MANU	Manual control of each module
BURNER TIME (1÷8)	Burner time for all stages
BURNER START (1÷8)	Burner start for all stages
LIMITER TEST (1÷8)	Safety temperature limiter test: press and hold button
SERVICE	Date/Hour setting for service purposes
RESET USER 00	Do not use
RESET EXPERT 00	Do not use
RESET T-PRG 00	Do not use
RETURN	

## 6.6 DISPLAY MENU

The DISPLAY menu contains the INSTALLATION, HOT-WATER, HTG CIRCUIT 1/2, and SOLAR / MF sub-menus as shown below:



**Figure 6-7: DISPLAY Menu**

**NOTE:**

Some menus are visible only if the relevant sensor is wired (e.g. HOT WATER is displayed only if the DHW storage sensor is wired).

**TABLE 6-3: DISPLAY Menu**

LEVEL	DESCRIPTION
INSTALLATION	
T-OUTSIDE	Outside temperature
T-EXT DES	External set value specification (0-10 V)
T-COLL DES	HS / Header set value (cascade)
T-COLLECTOR	HS / Header temperature (cascade)
T-BOIL	Temperature and status of the HS (HS1 - HS8)
T-SOLID FUEL	For HS2 = Solid fuel boiler
T-RETURN 1	Return flow temperature of HS 1
T-RETURN 2	Return flow temperature of HS 2
T-BUFFER T	Buffer storage tank temperature: top position
T-BUFFER M	Buffer storage tank temperature: middle position
T-BUFFER L	Buffer storage tank temperature: lower position
T-STORAGE 3	Temperature of storage tank 3 (e.g. solar pool-heating)
MODGRAD	Modulation level for each module
RETURN	
HOT-WATER	
T-DHW RATED	Hot water set temperature value
T-DHW	Hot water temperature value
T-DHW L	Hot water temperature in infeed area
T-CIRC	Recirculating temperature
RETURN	
HTG CIRCUITC 1/2	
T-ROOM DES A	Current value for set room temperature
T-ROOM	Room temperature
HUMIDITY	Displays room humidity (if value is available)
T-POOL DES	Pool set temperature
T-POOL	Pool temperature
T-DHW RATED	Hot water set temperature value
T-DHW	Hot water temperature value
T-FLOW RATED	Current flow temperature setting
T-FLOW	Current flow temperature
N-OPT-TIME	Display of the time last required for heating-up
RETURN	
SOLAR / MF	
T-MF1	Temperature MF sensor 1 (=F11)
T-MF2	Temperature MF sensor 2 (=F12)
T-MF3	Temperature MF sensor 3 (=F13)
T-MF4	Temperature MF sensor 4 (=F14)
T-COLLECTOR	Temperature collector 1
T-DHW	Upper hot water temperature
T-DHW L	Hot water temperature infeed
RETURN	

### 6.7 USER MENU

The USER menu contains the INSTALLATION, HOT-WATER, HTG CIRCUIT 1/2, and SOLAR / MF sub-menus as shown below:

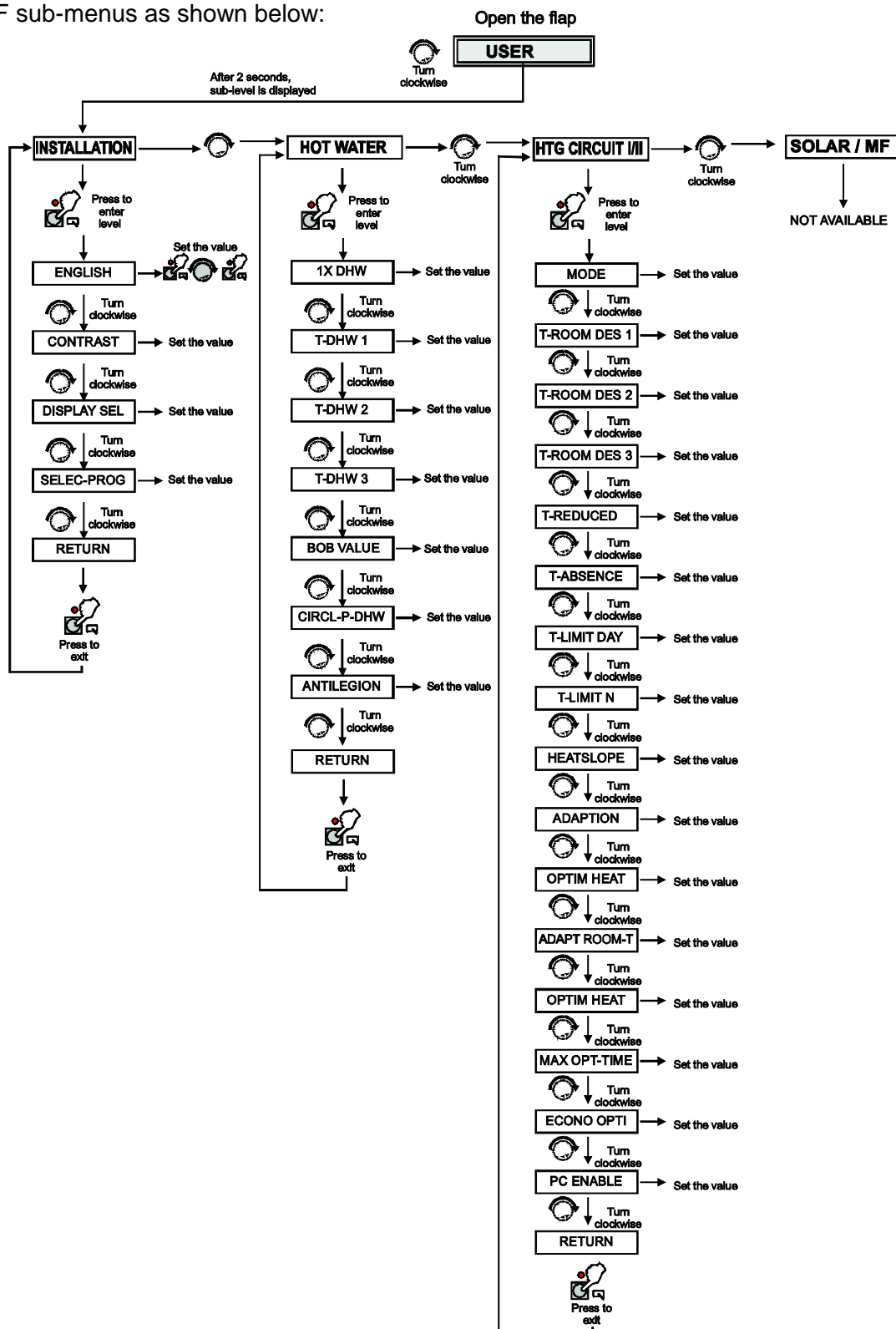


Figure 6-8: USER Menu

**TABLE 6-4: USER Menu**

LEVEL	DESCRIPTION	ENTRY	
INSTALLATION		Default	Range
ENGLISH	Set language	ENG	
CONTRAST	Adjust intensity of display	00	(-20) / (20)
DISPLAY SEL	Select additional display in standard operation	----	
SELEC-PROG	Heating circuit 1 or Heating circuit 2	01	(01 ÷ 02)
RETURN			
HOT WATER			
1-DHW	If the value is 1, the boiler switches on immediatly	00	(01 ÷ 02)
T-DHW 1	Hot water temperature setting in first enable time	140	(50 ÷ 158)
T-DHW 2	Hot water temperature setting in second enable time	140	(50 ÷ 158)
T-DHW 3	Hot water temperature setting in third enable time	140	(50 ÷ 158)
BOB VALUE	Operation without burner (solar or solid fuel integration)	0	(0 ÷ 126)
CIRCL-P-DHW	if the value is 01, the circulation pump runs when the hot water is enabled, but the circulation program is disabled.	0	(0 ÷ 1)
ANTILEGION	If the value is 01, every 20th time that heating takes place or once a week on Saturday at 1:00, the storage tank is heated up to 149° F	0	(0 ÷ 1)
RETURN			
HTG CIRCUIT 1/2			
MODE	When setting an alternative oparating mode this only applies to the assigned heating circuit	-----	
T-ROOM DES 1	Room temperature setting in first enable time	68	(41÷105)
T-ROOM DES 2	Room temperature setting in second enable time	68	(41÷105)
T-ROOM DES 3	Room temperature setting in third enable time	68	(41÷105)
T REDUCED	Required room temperature setting during night reduction	50	(41÷105)
T-ABSENCE	Required room temperature setting during holidays	59	(41÷105)
T-LIMIT DAY	Set the temperature value during heating time	66	(23 ÷ 104)
T-LIMIT N	Set the temperature value during reduction time	50	(23 ÷ 104)
HEATSLOPE	Set the Heatslope according to the installation	1,20	(0 ÷ 3)
ADAPTION	Only active if an FBR analogue room device is connected and an outdoor sensor	0	(0 ÷ 1)
OPTIM HEAT	Activates the function for automatically starting the unit	10	(0 ÷ 20)
ADAP ROOM-T	Room sensor adaptation	0	(-9 ÷ 9)
OPTIM HEAT	Heating optimisation	0	(00 ÷ 02)
MAX OPT-TIME	The start of heating is brought forward by no more than this time	2	(00 ÷ 03)
ECONO OPTI	Automatic reduction of burner disabling to the end of set heating time	0	(00 ÷ 02)
PC-ENABLE	Code number for enabling access to heating circuit data from a PC (0000= access is blocked)	0000	(0000÷9999)
SOLAR / MF			
RETURN	NOT USED		

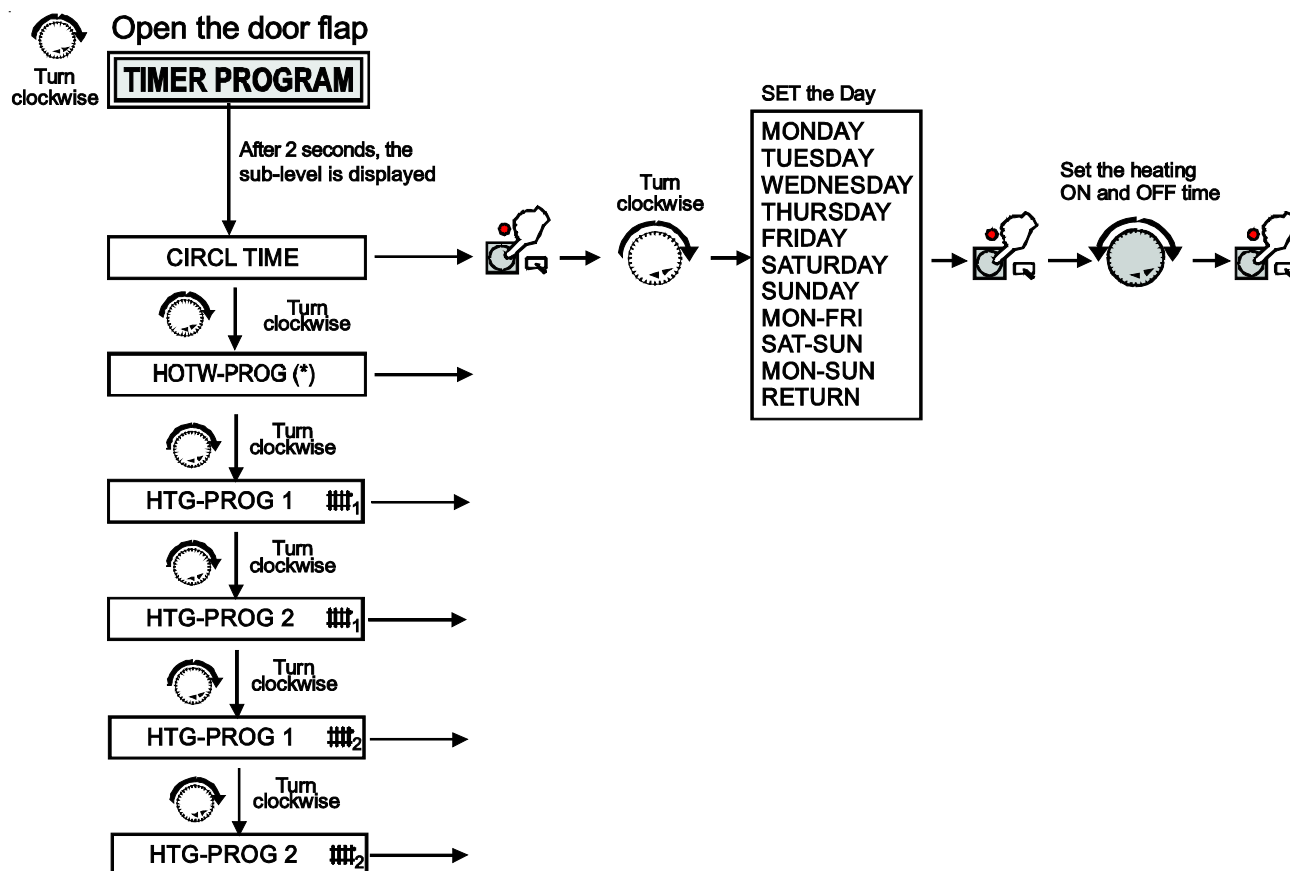
**NOTE:**

Some menus are visible only if the relevant sensor is wired.



### 6.8 TIME PROGRAM MENU

The TIME PROGRAM menu contains the items shown below:



**Figure 6-9: TIME PROGRAM Menu**

TABLE 6-5: TIME PROGRAM Menu	
LEVEL	DESCRIPTION
CIRCL TIME	Program for circulation pump
HOTW-PROG (*)	Program for hot water charging pump
HTG-PROG 1 ### 1	1st Heating program for first controller heating circuit
HTG-PROG 2 ### 1	2nd Heating program for first controller heating circuit
HTG-PROG 1 ### 2	1st Heating program for second controller heating circuit
HTG-PROG 2 ### 2	2nd Heating program for second controller heating circuit

(\*) = Active only with parameter 1 x HW = 00

#### NOTE:

By leaving the hour blank\_\_ : \_\_ the heating period is bypassed.

## 6.9 EXPERT MENU

The EXPERT menu contains the items shown below:

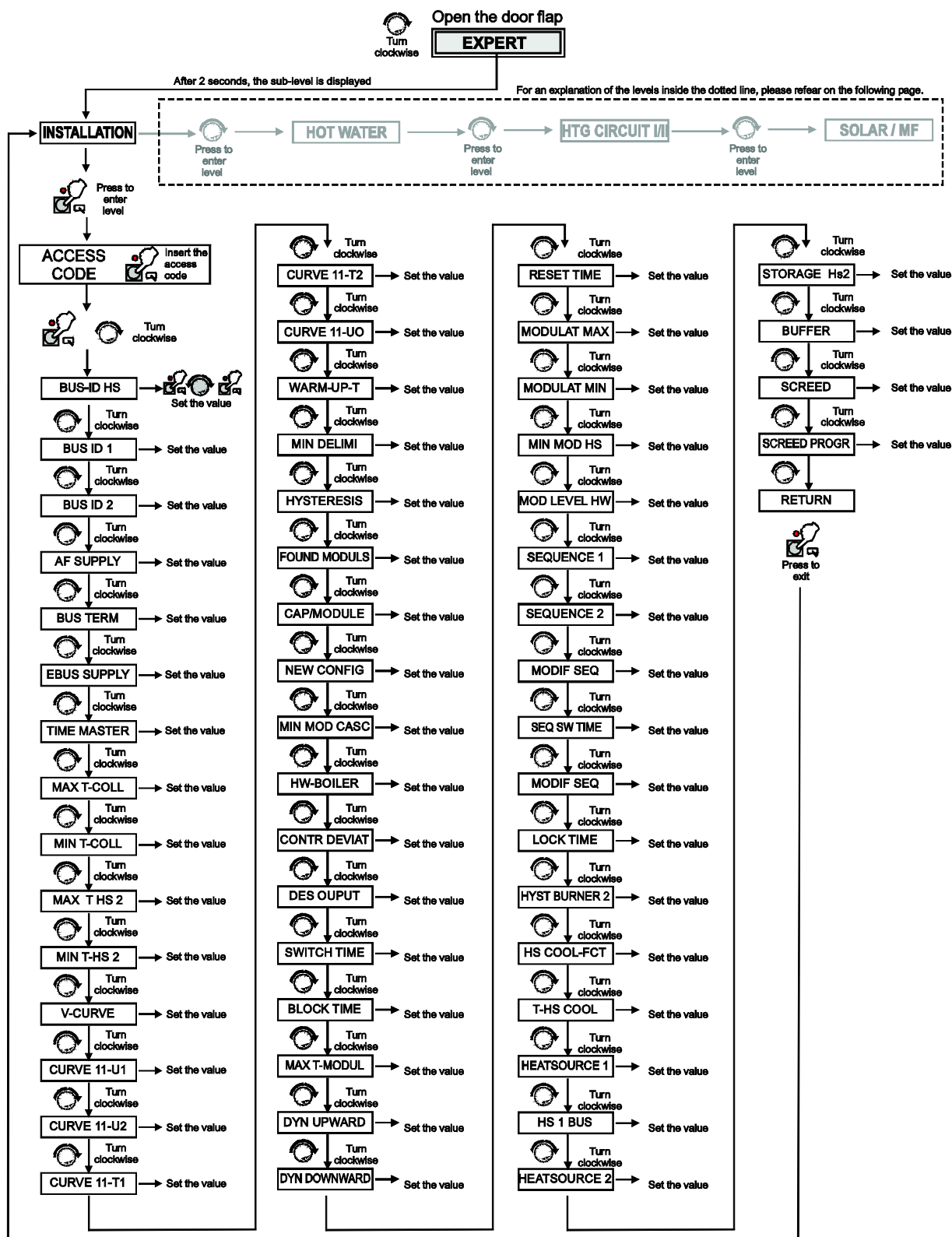
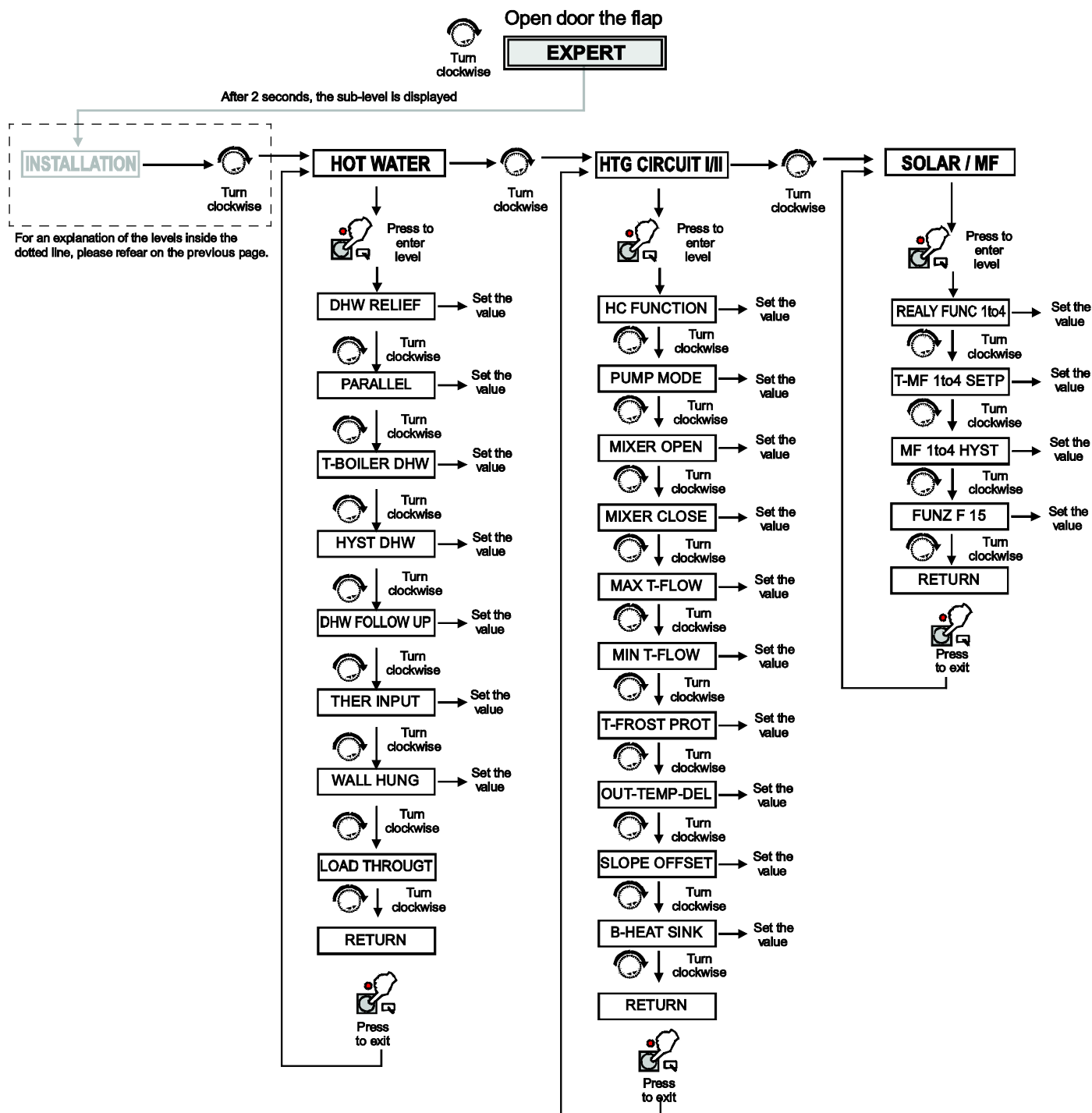


Figure 6-10: EXPERT Menu – 1 of 2



**Figure 6-10: EXPERT Menu – 2 of 2**

### NOTE:

The shaded items in the following table indicate those parameters that change according to the boiler type and whether used singly or in a cascaded configuration.

TABLE 6-6: EXPERT Menu

LEVEL	DESCRIPTION	ENTRY	
INSTALLATION		DEFAULT	RANGE
BUS-ID HS	Boiler Bus address only for cascade of E8 controllers	----	(01 ÷ 08)
BUS ID 1	The heating circuits are sequentially numbered.....	01	(01 ÷ 15)
BUS ID 2	The heating circuits are sequentially numbered.....	--	(01 ÷ 15)
AF SUPPLY	Outdoor sensor power supply	01	(01 ÷ 15)
BUS TERM	Bus terminating resistor	01	(00 ÷ 01)
EBUS SUPPLY	Switching eBUS supply on/off in relation to connected	01	(00 ÷ 01)
TIME MASTER	00 no time master; 01 controller is time master	00	(01 ÷ 01)
MAX T-COLL	Protects the HS from overheating	176°F	(86 ÷ 230)
MIN T-COLL	Decreased condensation build-up in HS with low heat requirement	50°F	(50 ÷ 176)
MAX T-HS2	Protects the HS from overheating	185°F	(86 ÷ 230)
MIN T-HS2	Decreased condensation build-up in HS with low heat requirement	104°F	(50 ÷ 176)
V-CURVE	Only for 0-10V input/output	11	(00 ÷ 11)
CURVE 11 - U1	Low voltage set	0 V	(0 V ÷ 10 V)
CURVE 11 - U2	High voltage set	10 V	(0 V ÷ 10 V)
CURVE 11 - T1	Low temperature level	68°F	(32 ÷ 248)
CURVE 11 - T2	High temperature level	185°F	(32 ÷ 248)
CURVE 11 - UA	Starting with this voltage level	2 V	(0 V ÷ 10 V)
HYSTERESIS	Dyn. Switching hysteresys stage 1	9	(4Ra ÷ 36Ra)
FOUND MODULS	Display of burners automatically reported via BUS	0	(0 ÷ 30 min)
CAP/MODULE	After restarting the controller searches the bus systems	----	(0 ÷ 1000)
NEW CONFIG	New bus configuration		(00 ÷ 01)
MIN MOD CASC	Min. modulation cascade	0	(00 ÷ 100)
HW-BOILER	Number of stages for HW operation	0	(00 ÷ 08)
CONTR DEVIAT	Header control variance		(00 ÷ 08)
DES OUPUT	Required system output [in %]		(0 ÷ 100)
BLOCK TIME	Currently remaining value		
MAX T-MODUL	Maximum temperature of the heat generator	185°F	(122 ÷ 230)
DYN UPWARD	Dynamic heat generator connection	100	(20 ÷ 500)
DYN DOWNWARD	Dynamic heat generator deactivation	80	(20 ÷ 500)
RESET TIME	Resetting time for I-Controller	180	(5 ÷ 500)

TABLE 6-6: EXPERT Menu - Continued

LEVEL	DESCRIPTION	ENTRY	
INSTALLATION (Cont.)		DEFAULT	RANGE
IMODULAT MAX	If this modulation degree is exceeded, the next heat .....	35	(10 - 60)
MODULAT MIN	If values drop this modulation degree, the last heat	35	(10 - 60)
MIN MOD HS	Connection of the next heat generator	35	(0 - 60)
MOD LEVEL HW	Entry of the set modulation degree for the heat generators	80	(40 - 100)
SEQUENCE 1	Boiler sequence 1		12345678
SEQUENCE 2	Boiler sequence 2		87654321
SEQU CHANGE	Sequence change mode	06	(01 - 06)
SEQ SW TIME	Time to sequence change	200	(10 - 800)
LOCK TIME	Min. delay time after switching on or with switching HS	01	(00 - 30)
HYST BURNER2	Solid fuel integration: hysteresys for the charging pump	4	(3.6 – 36)Ra
HS COOL-FCT	Not used	0	(0 - 1)
T-HS COOL	Not used	176	(122 - 203)
HEATSOURCE 1	Primary heat generator type	06	(00 - 06)
HS 1 BUS	Connections for HS	02	(00 - 04)
HEATSOURCE 2	Secondary heat generator type	0	(00 - 05)
STORAGE HS 2	Heat accumulator for HS2	0	(00 - 03)
BUFFER	Heater buffer storage tank	0	(00 - 03)
SCREED	Activation of screed drying process	0	(00 - 01)
SCREED PROGR	Program setting		
RETURN			
HOT-WATER			
DHW RELIEF	The charging pump is not switched until.....	0	(00 - 01)
PARALLEL	Pump parallel running	0	(00 - 03)
T-BOILER DHW	Boiler temperature setting with hot water preparation	36	(00 - 90) Ra
HYST DHW	Hot water hysteresys	5	(9 - 54) Ra
DHW FOLLOWUP	Pump run-down time	0	(00 - 30)
THER INPUT	Storage tank with thermostat	0	(00 - 01)
WALL HUNG	Boiler temperature setting with hot water preparation	0	(00 - 01)
LOAD THROUGH	The charge through function can be activated by...	0	(00 - 01)
RETURN			

TABLE 6-6: EXPERT Menu - Continued

LEVEL	DESCRIPTION	ENTRY	
HTG CIRCUIT 1/2			
HC FUNCTION	Heating circuit function selection	0	(00 ÷ 04)
PUMP MODE	Pump operating mode	00	(00 ÷ 03)
MIXER OPEN	Open mixer dynamic	18	(5 ÷ 25)
MIXER CLOSE	Close mixer dynamic	12	(5 ÷ 25)
MAX T-FLOW	Max flow temperature setting	176	(68 ÷ 230)
MIN T-FLOW	Min flow temperature setting	10	(50 ÷ 230)
T-FROST PROT	Frost protection temperature	32	(5 ÷ 41)
OUT-TEMP-DEL	Ouside temperature delay	0	(0 ÷ 24)
SLOPE OFFSET	Heating slope distance	9	(0 ÷ 90)
B-HEAT SINK	Circuit enable	0	(00 ÷ 01)
RETURN			
SOLAR / MF			
RELAY FUNC 1 to 4	Function selection relay 1 to 4	0	(00 ÷ 26)
T-MF1 to 4 SETP	Switching temperature relay MF1 to 4	86	(86 ÷ 194)
MF 1 to 4 HYST	Hysteresys relay MF1 to 4	9	(4 ÷ 18)
FUNZ. F15	Sersor function F15	0	(00 ÷ 02)
RETURN			

### NOTES:

- There is another sub-menu under the EXPERT menu called EXPERT HS. See section 4.35 – High Altitude Adjustment for details.
- Some menus are visible only if the relevant sensor is wired.

## 6.10 OTHER POSSIBLE SETTINGS

### 6.10.1 Settings for Heating Circuit 1/2

#### 6.10.1.1 Heating Adjustment With Constant Flow Temp

(Without Outer Sensor)

Offers the possibility to have a constant flow temperature on the selected heating circuit.

- INSTALLATION menu > HC FUNC “01”

#### 6.10.1.2 Temperature Settings For Heating Circuits

(Only After Function Selection)

- USER menu ⇒ Heating circuit I / II ⇒ FLOW TEMP DAY
- USER menu ⇒ Heating circuit I / II ⇒ FLOW TEMP NIGHT

### **6.10.1.3 A Second DHW Storage Tank**

(Only After Function Selection)

Offers the possibility to use one of the heating zones for the preparation of a second DHW storage tank.

EXPERT menu ⇒ Heating circuit I/II ⇒ HC FUNC. "03"

### **6.10.1.4 Temperature Setting For Second DHW Storage Tank**

USER menu ⇒ Heating circuit / II ⇒ T- HW

### **6.10.1.5 Swimming Pool**

Offers the possibility to use one of the heating zones for the heating of a swimming pool.

EXPERT menu ⇒ Heating circuit I/II ⇒ HC FUNC "02"

### **6.10.1.6 Swimming Pool Temperature Setting**

(Only After Function Selection)

USER menu ⇒ Heating circuit I / II ⇒ T- POOL 1 / 2 / 3

### **6.10.1.7 Screed Dry Program (For Floor Heating Installation)**

A program setting for drying the screed.

EXPERT menu ⇒ Installation ⇒ SCREED "01"

### **6.10.1.8 Temperature Setting For Screed Program**

USER menu ⇒ Heating circuit I / II

### **6.10.1.9 Signal 0 – 10 V**

Uses a 0-10 V input to control fire rate via an external control..

EXPERT menu ⇒ Solar/MF ⇒ FUNC. F15 "01"

### **6.10.1.10 Slope And Temperature Setting with 0 – 10 V Signal**

See Table 6-7 for values.

EXPERT menu ⇒ Installation ⇒ TENS SLOPE (0 to 11)

EXPERT menu ⇒ Installation ⇒ SLOPE 11 – XX (freely settable)



TABLE 6-7: 0-10V Signal with Slope and Temperature

Curve	U1	U2	T1	T2	UA
0	2.0 V	10.0 V	32° F	194° F	2.0 V
1	2.5 V	0.3 V	100° F	176° F	5.0 V
2	2.5 V	0.3 V	100° F	167° F	5.0 V
3	2.5 V	0.3 V	100° F	113° F	5.0 V
4	4.0 V	0.1 V	68° F	185° F	5.0 V
5	4.0 V	0.1 V	68° F	167° F	5.0 V
6	4.0 V	0.1 V	68° F	131° F	5.0 V
7	4.0 V	0.1 V	68° F	189° F	5.0 V
8	4.0 V	0.1 V	68° F	189° F	5.0 V
9	4.0 V	0.1 V	68° F	163° F	5.0 V
10	4.0 V	0.1 V	68° F	127° F	5.0 V
11	4.0 V	0.1 V	68° F	194° F	5.0 V

### 6.10.2 Setting of DHW Circuit

#### 6.10.2.1 Operation of Pumps In Parallel

Heating pump operation during DHW production.

EXPERT menu ⇒ Hot Water ⇒ F-PUMP PARAL “00,01,02,03”

#### 6.10.2.2 Use of a DHW Storage Tank Thermostat (On/Off)

To use an ON - OFF thermostat instead of DHW sensor.

EXPERT menu ⇒ Hot Water ⇒ THER INPUT “01”

#### 6.10.2.3 Antilegion

Activation of an antilegion program.

EXPERT menu ⇒ Hot Water ⇒ ANTILEGION “01”

#### 6.10.2.4 Setting for Solar Panel Use

Use a PT 1000 sensor as a solar panel sensor.

EXPERT menu ⇒ Solar/ MF ⇒ FUNC RELAY 4 “23”

### 6.11 ACCESS CODE SETTING

To set the access code, press the Programming button to enter the first parameter, use the data knob to select a number, and then press the Programming button to accept the value. Repeat this procedure for each code number position.

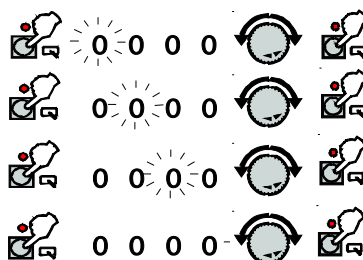


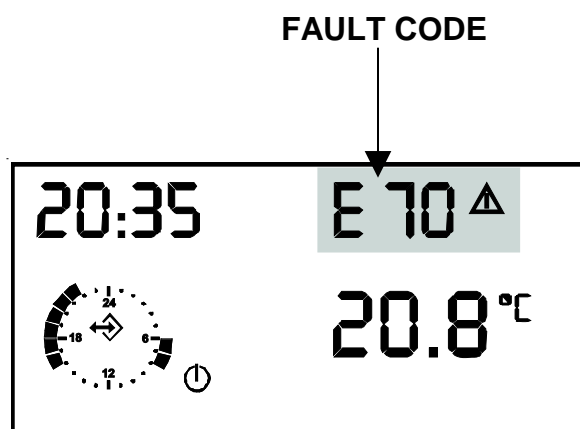
Figure 6-11: Setting the Access Code

## CHAPTER 7: TROUBLESHOOTING

### 7.1 E8 CONTROLLER FAULT CODES

Fault codes are displayed in the upper right hand section of the E8 Controller display (see Figure 7-1). Use **Table 7-1** (next page) to determine the fault message. There are codes for the following three different devices:

- **E8 Controller:** These are divided into four basic categories: PCB element faults, system manager faults, communication faults, and internal faults. These fault codes are shown in **Table 7-2**.
- **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: E8 Fault Code Location**

**NOTE:**

When interpreting fault codes in the E8 display that refer to the E8 controller itself, the code number is directly referenced to a fault description in Table 7-2.

Displayed fault codes not listed in Table 7-2 refer to devices other than the E8 controller, such as the Boiler Management module (BMM) or Burner Controller Module (BCM). Use Table 7-1 (and the formula described below the table) to arrive at a fault number, which can be looked up in Tables 7-3 and 7-4 for the fault description.

In order to derive the fault message from the code displayed in the E8 Controller display, use **Table 7-1** below to determine the working fault code. To use the table, find the displayed number in the first column, identify the affected module from the second column, apply the formula from the third column, and identify the fault table to reference from the fourth column.

**TABLE 7-1: Determining the "Error Code" Reading from the E8 Display**

OBSERVED CODE	OBSERVED CODE	CODE TO LOOK UP IN	TABLE
Code = 0	N/A	No Fault	-
Code between <b>1</b> and <b>255</b>	BMM #0 Fault	Look up code	6-4
Code between <b>256</b> and <b>511</b>	BMM #1 Fault	Subtract <b>256</b> from reading	6-4
Code between <b>512</b> and <b>767</b>	BMM #2 Fault	Subtract <b>512</b> from reading	6-4
Code between <b>768</b> and <b>1023</b>	BMM #3 Fault	Subtract <b>768</b> from reading	6-4
Code between <b>1024</b> and <b>1279</b>	BMM #4 Fault	Subtract <b>1024</b> from reading	6-4
Code between <b>1280</b> and <b>1535</b>	BMM #5 Fault	Subtract <b>1280</b> from reading	6-4
Code between <b>1536</b> and <b>1791</b>	BMM #6 Fault	Subtract <b>1536</b> from reading	6-4
Code between <b>1792</b> and <b>2047</b>	BMM #7 Fault	Subtract <b>1792</b> from reading	6-4
Code between <b>2048</b> and <b>65279</b>	N/A	Invalid Codes	-
Code above <b>65280</b>	BCM Fault	Subtract <b>65280</b> from reading	6-3

### EXAMPLE:

Based on the above, a code reading of "261" means the fault occurred on BMM #1. The fault code is  $(261 - 256 = ) 5$ . An Error Code of 5 from the BMM Fault Codes table means "Flame Loss During Run".

### 7.1.1 E8 Controller Fault Codes

The table below lists the fault codes and fault descriptions associated with the E8 Controller.

TABLE 7-2: E8 Controller Fault Codes

CODE	DESCRIPTION	EFFECT	CORRECTION	RESET
PCB Element Fault				
E 1	Intervention of the high limit thermostat (TL).	Boiler shuts off.	Check for any obstructions in the piping. Ensure sufficient flow.	MANUAL - Pushbutton under cap, located to the left of the E8 controller.
E 2	Insufficient gas pressure.	Boiler will not run.	Check gas supply to the unit and ensure minimum 3.5" w.c. at high fire	AUTOMATIC
E 4	No flame detected during the ignition phase.	Boiler will not remain lit after 3 attempts.	Watch ignition through viewport. Ensure correct 120V wiring to the unit. Clean or replace flame rod.	MANUAL - Clear fault and retry ignition.
E 5	Loss of flame signal during boiler operation.	Boiler fails after establishing flame	Ensure sufficient gas pressure and flow during high fire operation and with any other connected gas equipment running. Check and clean flame rod.	AUTOMATIC - Clear fault and retry ignition.
E 6	Over high water temperature detected by the heating sensor (SR) (>203°F).	Boiler shuts off.	Check for any obstructions in the piping. Ensure sufficient flow.	AUTOMATIC - After temperature falls.
E 10	Internal failure of the local control PCB (BMM).	Module shuts off.	Shut off power to the boiler. Check fuse on BMM. Replace BMM if necessary.	AUTOMATIC - After turning power on to the unit.
E 11	Flame signal detected before the ignition cycle.	Boiler will not attempt ignition.	Allow flame rod to cool. Possibly replace flame rod.	MANUAL - Clear fault and retry ignition.
E 12	Local flow sensor failure SR1 first module.	Module will not run.	Check with multimeter and replace if necessary.	AUTOMATIC
E 14	Failure of the heating return sensor (SRR).	Module will not run.	Check with multimeter and replace if necessary.	AUTOMATIC
E 15	Difference between the global return heating temperature global sensor and the heating flow sensor greater than (>) 86 °F (rp +10).	Boiler shuts off and pump turns on at max speed.	Check for any obstructions in the piping. Ensure sufficient flow.	AUTOMATIC - When $\Delta T <$ protection temperature

**TABLE 7-2: E8 Controller Fault Codes (Continued)**

<b>CODE</b>	<b>DESCRIPTION</b>	<b>EFFECT</b>	<b>CORRECTION</b>	<b>RESET</b>
E 16	Boiler body temperature very low: Ice forming risk	Boiler will not run. Pump runs for 5 minutes.	Carefully defrost boiler.	AUTOMATIC - when sensor is >41°F
E 20	Flame signal detected after burner is OFF.	Boiler will not run.	Allow flame rod to cool. Possibly replace flame rod.	MANUAL - Push reset switch or cycle power.
E 24	Modulating fan speed failure: failed to reach the correct speed within 30 seconds from starting of burner ignition cycle.	Boiler will not ignite.	Check Expert HS fan speed settings. May require a new blower.	AUTOMATIC
E 26	Modulating fan speed failure: failed to stop within 30 seconds from end of operation	Boiler will not ignite.	Check Expert HS fan speed settings. Check fan wiring. May require a new blower.	AUTOMATIC
E 28	Common chimney obstruction.	Boiler will not run.	Check pressure in chimney during operation. Ensure hoses to pressure switches are clear.	MANUAL
E29	Water inside exhaust chamber.	Boiler shuts off.	Check for backed up condensate in exhaust manifold. Clean p-trap and condensate drain line. Check float sensor in exhaust manifold for proper operation.	AUTOMATIC
E 30	Alteration of the operating parameters caused by EMC disturbances.	Boiler will not run. Pump runs for 5 minutes.	Re-program settings. Contact factory.	MANUAL - Push reset switch or cycle power.
E 32	Mains supply voltage < 108 VAC.	Boiler shuts off/will not run.	Check supply voltage.	AUTOMATIC
E 40	Low water flow.	Boiler shuts off/will not run.	Check water flow, flow switch (or LWCO) operation.	AUTOMATIC
E 41	Presence of air in the pump (only with SensorLogic)	n/a	n/a	n/a
E 42	Pump blocked (only with SensorLogic)	n/a	n/a	n/a
E 43	Pump wire failure (only with SensorLogic)	n/a	n/a	n/a

**TABLE 7-2: E8 Controller Fault Codes (Continued)**

<b>CODE</b>	<b>DESCRIPTION</b>	<b>EFFECT</b>	<b>CORRECTION</b>	<b>RESET</b>
<b>System Manager Fault – Sensor Defective (Break/Short Circuit)</b>				
E 69	E8: F5 – Flow temperature sensor heating circuit 2.		Check continuity. Use multimeter to measure sensor.	AUTOMATIC
E 70	E8: F11 – Flow temperature sensor heating circuit 1.		Check continuity. Use multimeter to measure sensor.	AUTOMATIC
E 71	E8: F1 – Lower storage temperature sensor (Buffer).		Check continuity. Use multimeter to measure sensor.	AUTOMATIC
E 72	E8: F3 – Higher storage temperature sensor (Buffer).		Check continuity. Use multimeter to measure sensor.	AUTOMATIC
E 75	E8: F9 – Outer temperature sensor (AF).		Check continuity. Use multimeter to measure sensor.	AUTOMATIC
E 76	E8: F6 – DHW storage temperature sensor (SPF).		Check continuity. Use multimeter to measure sensor.	AUTOMATIC
E 78	E8: F8 – Boiler temperature sensor (KF).		Check continuity. Use multimeter to measure sensor.	AUTOMATIC
E 80	E8: F2 – Room temperature sensor heating circuit 1.		Check continuity. Use multimeter to measure sensor.	AUTOMATIC
E 83	E8: F15 – Room temperature sensor heating circuit 2.		Check continuity. Use multimeter to measure sensor.	AUTOMATIC
E 135	E8: F12 – Lower DHW storage temperature sensor MF2.		Check continuity. Use multimeter to measure sensor.	AUTOMATIC
E 136	E8: F13 – Boiler 2, Manifold 2 MF 3.		Check continuity. Use multimeter to measure sensor.	AUTOMATIC
E 137	E8: F14 – Manifold 1, Multifunction 4.		Check continuity. Use multimeter to measure sensor.	AUTOMATIC
E 138	E8: F15 – Room temperature Hc2.		Check continuity. Use multimeter to measure sensor.	AUTOMATIC
<b>Communication Fault</b>				
E 90	E8: BUS addresses 0 and 1. The BUS codes 0 and 1 cannot be used at the same time.		Check addresses	
E 91	E8: BUS code occupied. The set BUS code is already used by another appliance.		Check addresses	
E 99	E8: Internal failure.		Check E8 settings. Possibly replace E8.	AUTOMATIC

**TABLE 7-2: E8 Controller Fault Codes (Continued)**

<b>CODE</b>	<b>DESCRIPTION</b>	<b>EFFECT</b>	<b>CORRECTION</b>	<b>RESET</b>
E 200	Communication Error HS1		Communications issue with BMM 0. Check all eBUS addresses	
E 201	Communication Error HS1		Communications issue with BMM 1. Check all eBUS addresses	
E 202	Communication Error HS1		Communications issue with BMM 2. Check all eBUS addresses	
E 203	Communication Error HS1		Communications issue with BMM 3. Check all eBUS addresses	
E 204	Communication Error HS1		Communications issue with BMM 4. Check all eBUS addresses	
E 205	Communication Error HS1		Communications issue with BMM 5. Check all eBUS addresses	
E 206	Communication Error HS1		Communications issue with BMM 6. Check all eBUS addresses	
E 207	Communication Error HS1		Communications issue with BMM 7. Check all eBUS addresses	
<b>Internal Fault</b>				
E 81	E8: EEPROM fault. The invalid value has been replaced by the standard value.			



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

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

TABLE 7-3: BCM Fault Codes				
CODE	DESCRIPTION	EFFECT	CORRECTION	RESET
E 17	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.
E 18	Maximum $\Delta$ -temperature protection. Flow temperature - Return Temperature > Water $\Delta$ -Temp Protection + 50°F	All burners turned OFF and Pump ON at maximum speed.	Check the system installation.	AUTOMATIC - when $\Delta$ -temperature < Water $\Delta$ -Temp Protection.
E 19	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.
E 37	BCM: Internal fault			
E 38	Settings corrupted by electromagnetic interference.	Ignition is inhibited. Pump runs for 5 min at max speed.	Re-program the settings. Contact factory.	MANUAL - push reset switch or cycle power.
E 56	BCM: No remote control detected			
E 57	BCM: No BMM detected			
E 58	BCM: Sensor global flow detected.	Ignition is inhibited.	Close request input for manual operation.	MANUAL - push reset switch or cycle power.

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

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

TABLE 7-4: BMM Fault Codes				
CODE	DESCRIPTION	EFFECT	CORRECTION	RESET
<b>E 1</b>	High Limit (STB) Thermostat activated.	All burners turned OFF and pump ON at maximum speed.	Check flow sensor thermal connection to boiler.	MANUAL - push reset switch when temperature goes below limit.
<b>E 2</b>	Low gas pressure.	All burners turned OFF.	Check gas pressure or gas pressure switch.	AUTOMATIC - when gas pressure switch closes.
<b>E 4</b>	No flame detected at burner start.	Burner control lockout.	Check flame rod or combustion.	MANUAL - push reset switch or cycle power.
<b>E 5</b>	Flame loss during run.	Ignition retry.	Check combustion and wiring.	MANUAL - push reset switch or cycle power.
<b>E 6</b>	High outlet temperature. Flow sensor temperature > 203°F.	All burners turned OFF and pump ON at maximum speed.	Check flow sensor or system pump	AUTOMATIC - when Flow sensor < 176°F.
<b>E 10</b>	Internal failure.	Ignition is inhibited.	Contact factory for new BMM.	MANUAL - cycle the power.
<b>E 11</b>	Flame signal detected before ignition.	Ignition is inhibited.	Disconnect flame rod wire from BMM. If problem goes away, change flame rod and/or wire. If problem does not go away, change BMM.	MANUAL - push reset switch or cycle power.
<b>E 12</b>	Flow sensor fault.	All burners turned OFF.	Check flow sensor or wiring.	AUTOMATIC
<b>E 13</b>	Aux sensor fault.	The boiler will operate from the Flow sensor without the Aux sensor.	Check aux sensor or wiring.	AUTOMATIC

TABLE 7-4: BMM Fault Codes

CODE	DESCRIPTION	EFFECT	CORRECTION	RESET
E 14	Return sensor fault.	All burners turned OFF.	Check return sensor or wiring.	AUTOMATIC
E 15	Maximum $\Delta$ -temperature protection. Flow temperature - Return Temperature > Water $\Delta$ -Temp Protection + 50°F.	All burners turned OFF and Pump ON at maximum speed.	Check the system installation.	AUTOMATIC - when $\Delta$ -temperature < Water $\Delta$ -Temp Protection.
E 16	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.
E 20	Flame signal detected after burner is OFF.	Ignition is inhibited.	Disconnect gas valve wire from BMM. If failure goes away, check wiring or change BMM. If failure remains, check or change gas valve.	MANUAL - push reset switch or cycle power.
E 22	No air flow at burner after fan started for 30 seconds.	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 <b>not</b> 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
E 23	The air pressure switch doesn't switch off.	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

TABLE 7-4: BMM Fault Codes

CODE	DESCRIPTION	EFFECT	CORRECTION	RESET
<b>E 24</b>	Fan speed out of control: It doesn't reach pre-purge speed within 30 seconds.	Ignition retry after 60 second delay and failure remains until we have a successful burner operation.	Check fan wiring.	AUTOMATIC/MANUAL
<b>E 26</b>	Fan speed out of control: It doesn't stop within 30 seconds after turned OFF.	Ignition is inhibited.	Check fan wiring.	AUTOMATIC
<b>E 27</b>	Air flow failure during ignition.	Restart pre-purge timer. The failure remains until we have a successful burner operation.	Check fan and wiring. Check air proving switch and wiring.	AUTOMATIC
<b>E 30</b>	Settings corrupted.	Ignition is inhibited. Pump runs for 5 min at max speed.	Re-program the settings. Contact factory.	MANUAL - cycle the power or send reset message.
<b>E 32</b>	Line voltage too low (<96 VAC).	Wait for proper line voltage (>102 VAC).	Check input voltage. Try another BMM.	AUTOMATIC
<b>E 40</b>	Low water flow. Low water flow switch activated.	Burners turned OFF.	Check water flow or check switch.	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.

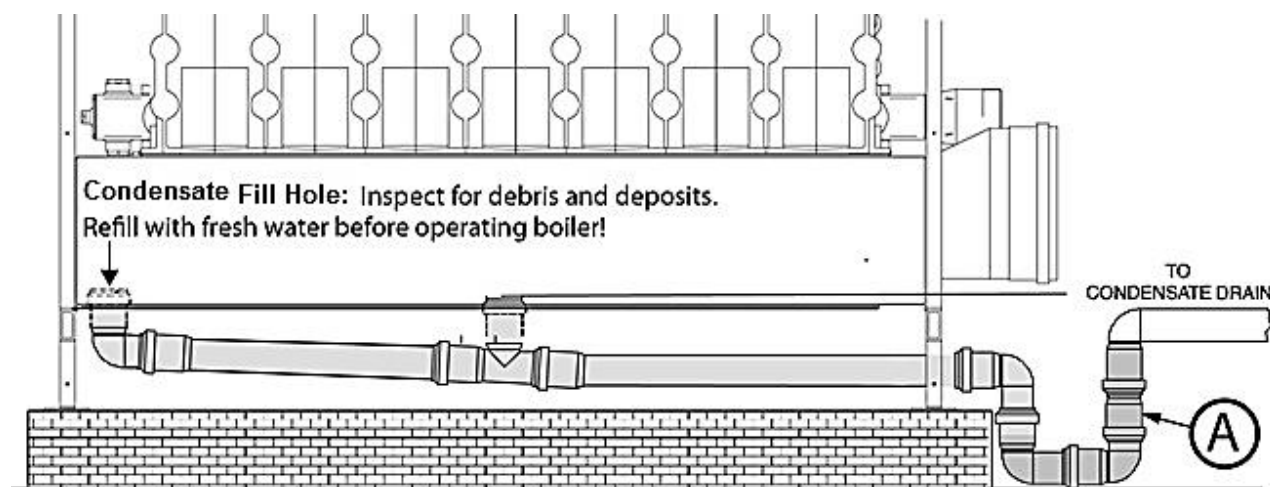
## **8.3 PROPER PROCEDURE FOR CLEANING EXHAUST FLUE**

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 the terminal of the BMM module labeled “FL” or replace with a new flow switch.



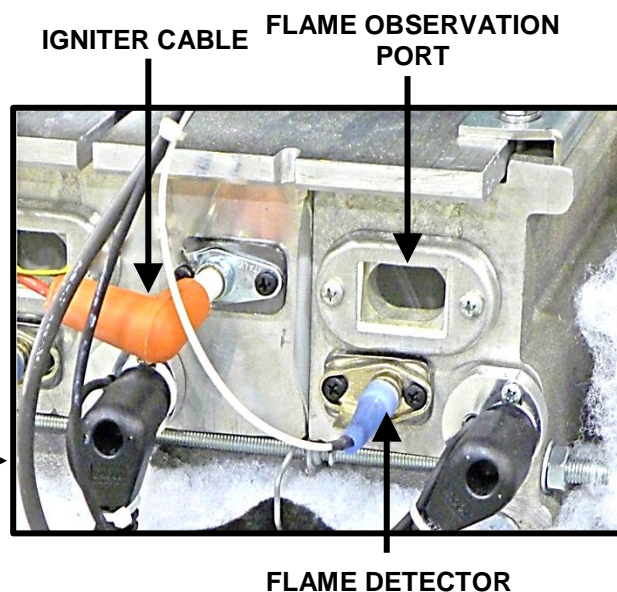
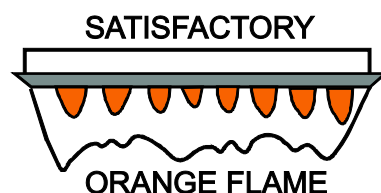
## 8.5 VISUAL INSPECTION OF THE FLAME

### (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<sub>2</sub> HIGH NOT SATISFACTORY
- BLUE = CO<sub>2</sub> LOW NOT SATISFACTORY
- ORANGE = OK SATISFACTORY



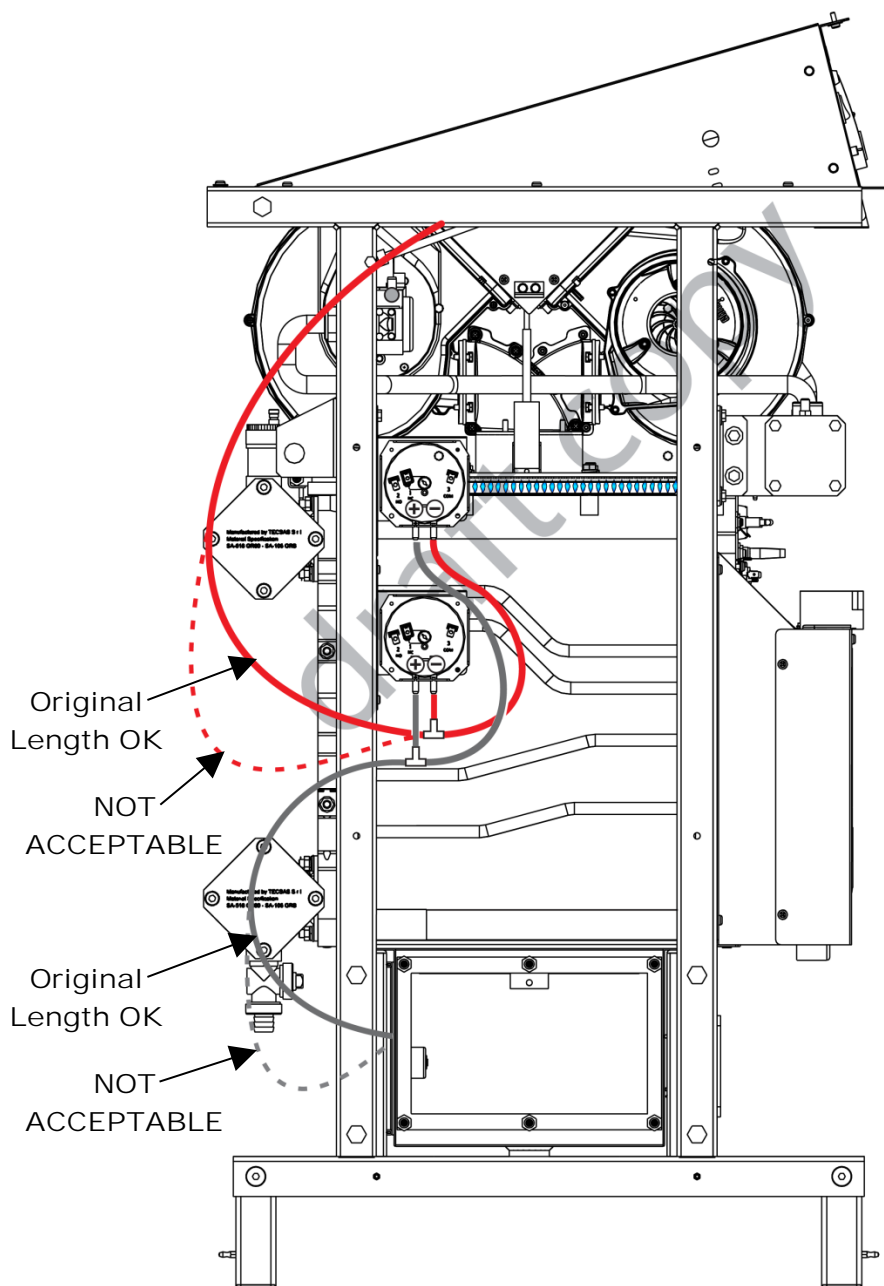
**Figure 8-2: Boiler Flame Observation Port Location**

## 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 (GF-136-V) 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: 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.

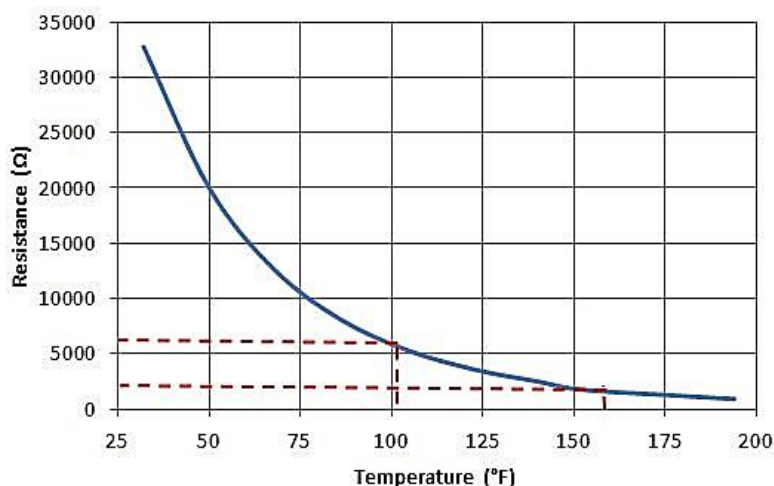
Before cleaning the boiler body sections, check the boiler input and the O<sub>2</sub> percentage (see section 4.33).

## 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:

### Disassembling the EXT Boiler for Maintenance

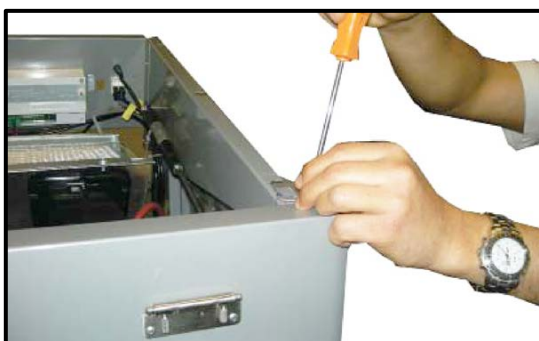
1. Switch OFF external electrical power and CLOSE the gas supply valve upstream from the boiler, and ensure it is completely closed.
2. Unlatch the top lid and raise the lid (Figure 8-4).
3. Remove screws from top of unit holding the front, rear and side panels in place (Figure 8-5). Remove the panels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



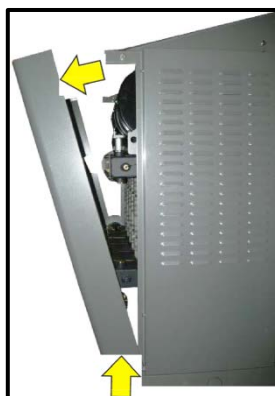
#### NOTE

Commercial units have a special latch kit to hold up the top plate, Unical part number 00362418.

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



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

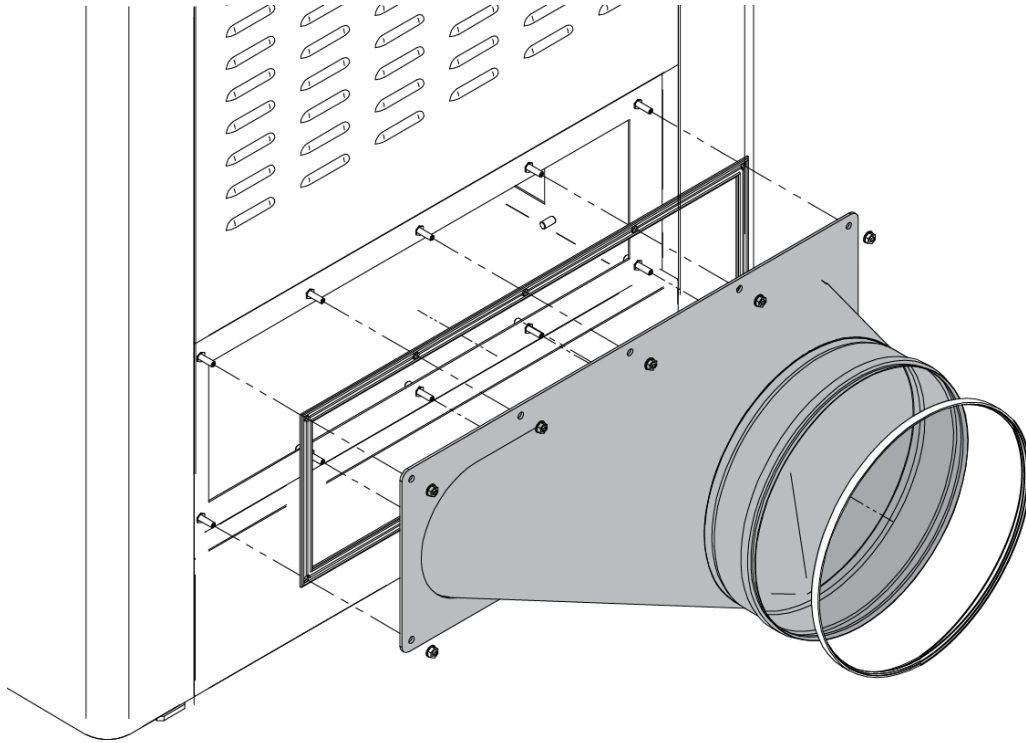


**Figure 8-6: Remove Panels (Step 3) Figure 8-7: Remove Flue Assembly (Step 4)**



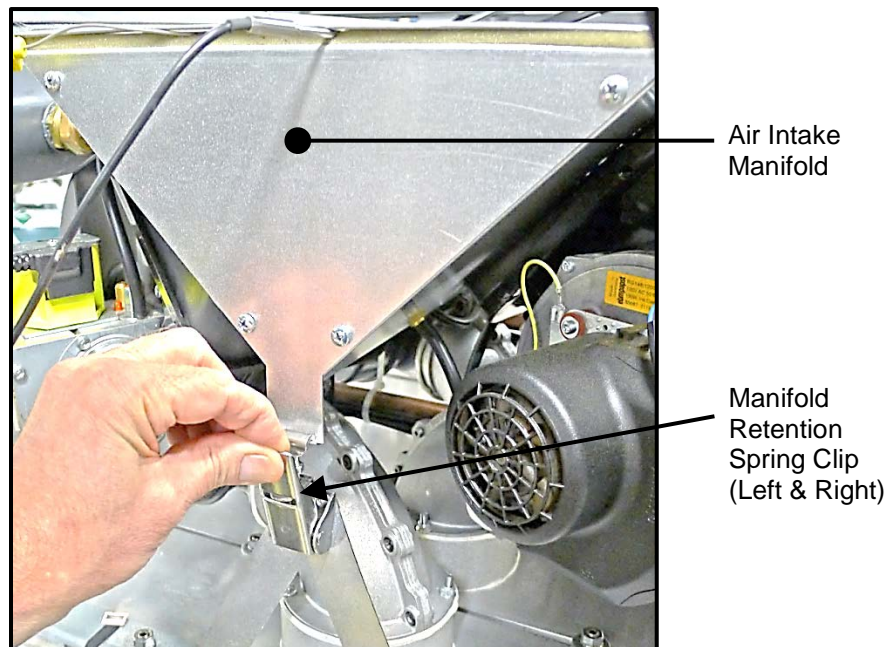
Disassembling the Boiler for Maintenance – Continued

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)**

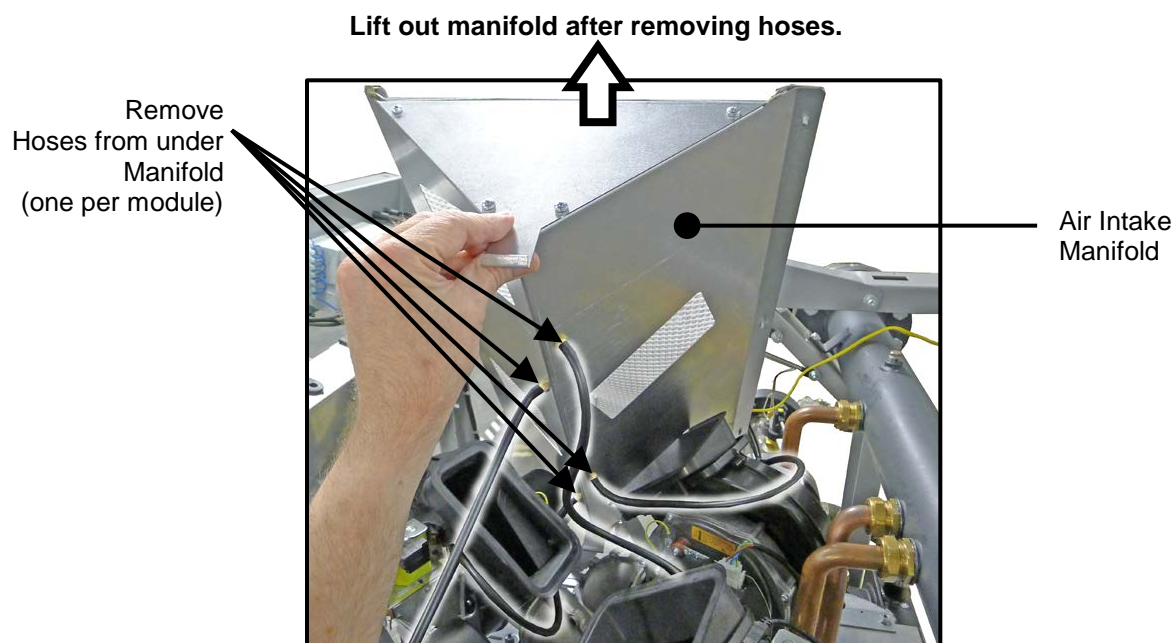
5. On each side of the air intake manifold, unlatch spring clips holding it in place (Figure 8-9).



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

Disassembling the Boiler for Maintenance – Continued

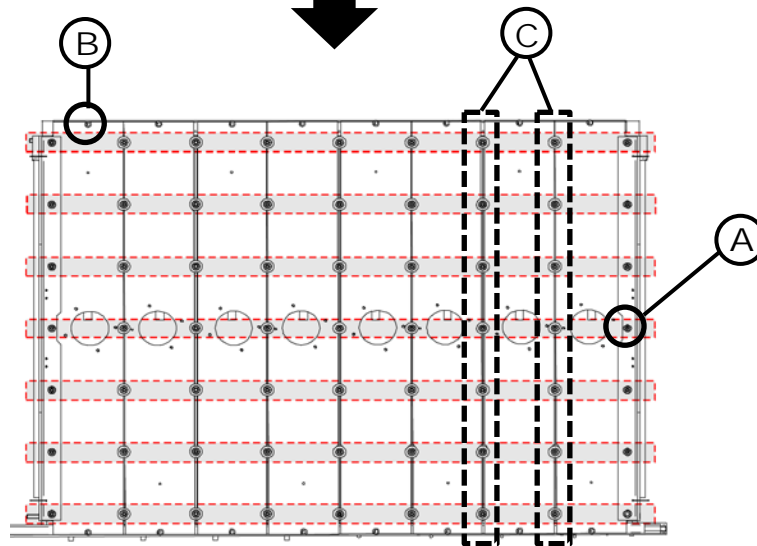
6. Remove the rubber hoses (quantity depends on model) from bottom side of manifold (highlighted in Figure 8-10), then lift entire manifold from the unit.



**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:
- 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.
  - 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.

Disassembling the Boiler for Maintenance – Continued



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

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

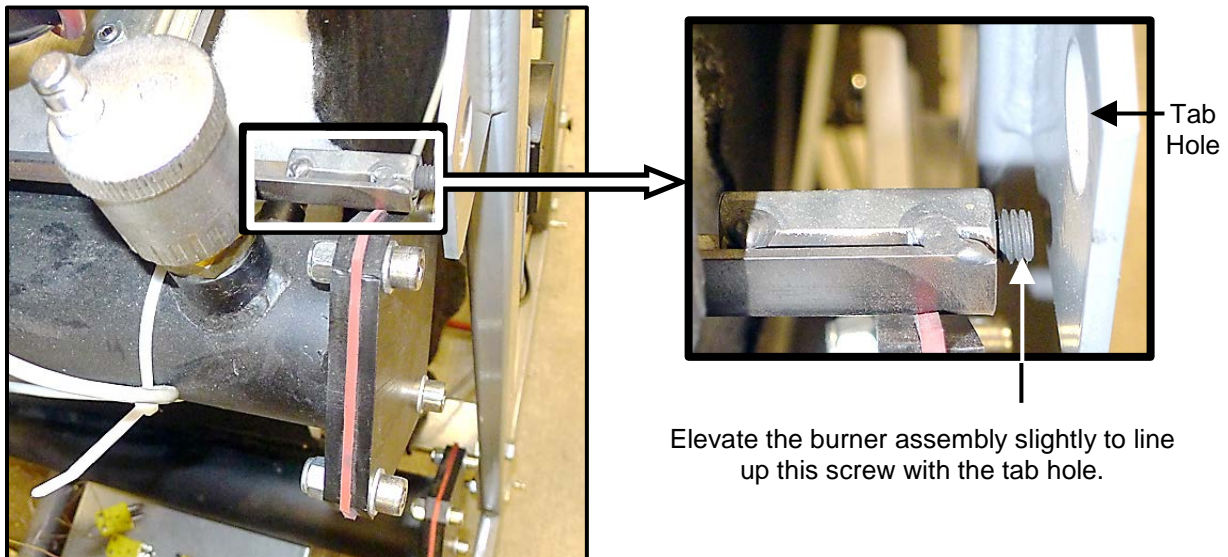


**Figure 8-12: Removing the Gas Pipes from Gas Manifold (Step 8)**



Disassembling the Boiler for Maintenance – Continued

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).

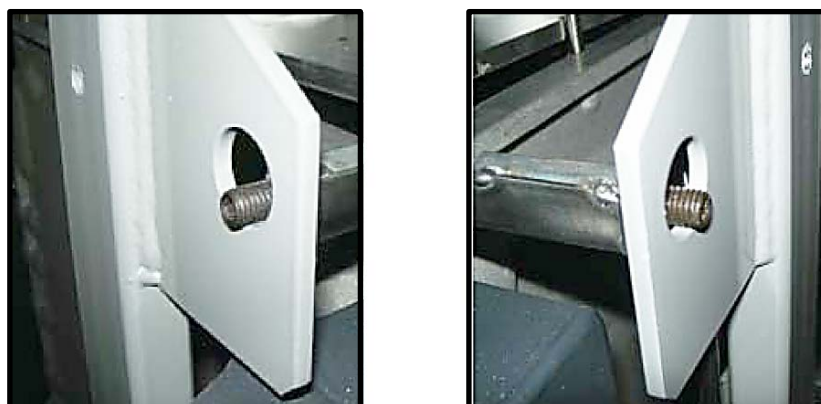


**Figure 8-13: Location of Burner Assembly Lifting Screw (Step 9)**

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



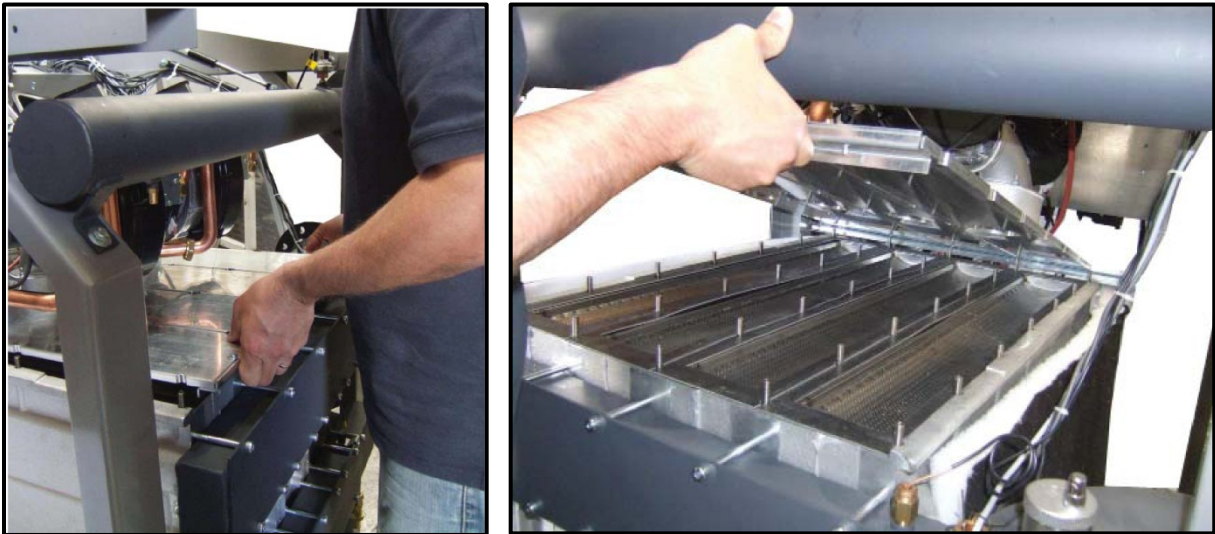
**Figure 8-14: Unscrewing Lift Screw into Tab Hole (Step 10)**



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

Disassembling the Boiler for Maintenance – Continued

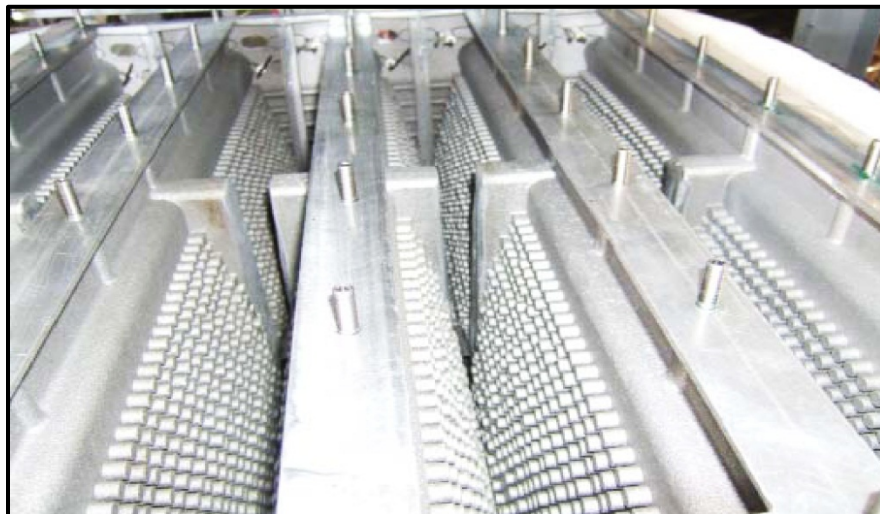
11. Refer to Figure 8-16, lift up the burner plates to expose the burner modules, and latch it in place.



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



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

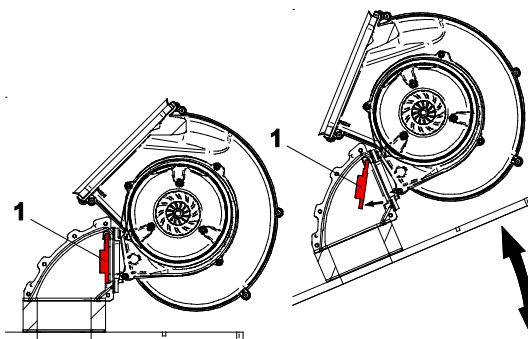


**Figure 8-18: Exposed Combustion Chambers under Burner Modules**

### Disassembling the Boiler for Maintenance – Continued

#### 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

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

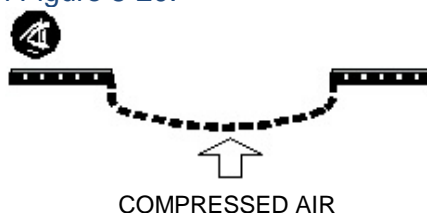
### Cleaning the Burner Modules

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. Inspect the flue exhaust section, including the exhaust piping.

## 8.12 CLEANING THE HEAT EXCHANGER

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



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

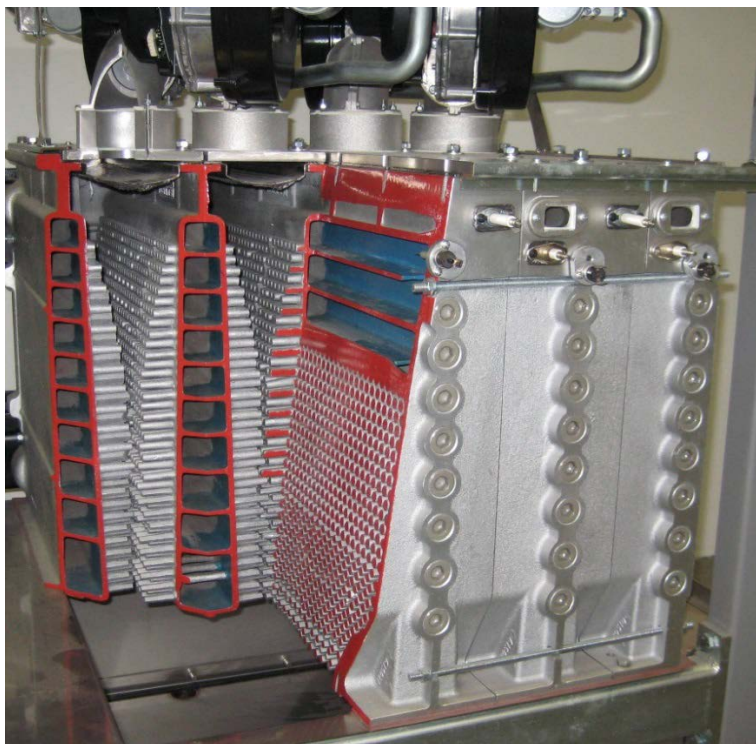
It may not be possible to completely restore the boiler to original factory condition. However, the instructions below should remove most of the by-product buildup. It will also loosen some of the buildup that remains, which the boiler will then shed during normal operation.

### 8.12.1 Mechanical Cleaning of the Heat Exchanger

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

#### Mechanical Cleaning of the Heat Exchanger

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



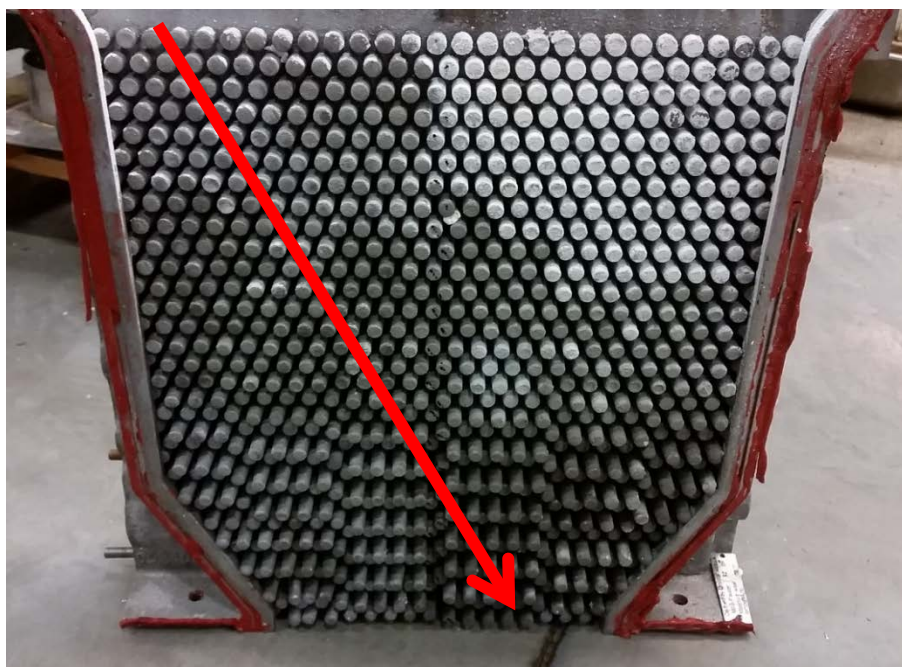
**Figure 8-21: Modulex Heat Exchangers – Cut-Away View**

#### **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.

### Mechanical Cleaning of the Heat Exchanger – Continued



**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, below. Be sure to clean the space between each pin.
4. Repeat the previous step on each burner module in the unit.
5. After mechanical cleaning, rinse each heat exchanger with water until no further debris comes out.
6. After washing the aluminum components, make sure the condensate siphon is free of obstructions, cleaning it if necessary.
7. Blow compressed air into the combustion chamber to remove any dirt clogging the aluminum pins on the combustion chamber walls. Remove any remaining buildup from the heat exchanger, particularly on the lower heat exchanger pins, with a stiff plastic brush.

#### **8.12.2 Cleaning the Heat Exchanger with Cleaning Solution**

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

### CAUTION!

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

### Chemical Cleaning of the Heat Exchanger

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:

### Reassembling 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.

### Reassembling the Burner Modules – Continued

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:

### Final Procedures after Maintenance

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
58086-01	<b>EXT-321</b> , ANNUAL MAINTENANCE KIT
58086-02	<b>EXT-481/450</b> , ANNUAL MAINTENANCE KIT
58086-03	<b>EXT -641/600</b> <u>OR</u> <b>EXT-1530/1500</b> , ANNUAL MAINTENANCE KIT
58086-04	<b>EXT -802/800</b> <u>OR</u> <b>EXT-1912</b> , ANNUAL MAINTENANCE KIT
58086-05	<b>EXT -962</b> <u>OR</u> <b>EXT-2295/2300</b> , ANNUAL MAINTENANCE KIT
58086-06	<b>EXT -1123/1100</b> <u>OR</u> <b>EXT-2677/2600</b> , ANNUAL MAINTENANCE KIT
58086-11	<b>EXT -3060/3000</b> , ANNUAL MAINTENANCE KIT

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

P/N	DESCRIPTION
58086-12	<b>EXT -321</b> , 24 MONTH FIRESIDE INSPECTION KIT
58086-13	<b>EXT -481/450</b> , 24 MONTH FIRESIDE INSPECTION KIT
58086-14	<b>EXT -641/600</b> , 24 MONTH FIRESIDE INSPECTION KIT
58086-15	<b>EXT -802/800</b> , 24 MONTH FIRESIDE INSPECTION KIT
58086-16	<b>EXT -962</b> , 24 MONTH FIRESIDE INSPECTION KIT
58086-17	<b>EXT -1123/1100</b> , 24 MONTH FIRESIDE INSPECTION KIT
58086-18	<b>EXT -1530/1500</b> , 24 MONTH FIRESIDE INSPECTION KIT
58086-19	<b>EXT -1912</b> , 24 MONTH FIRESIDE INSPECTION KIT
58086-20	<b>EXT -2295/2300</b> , 24 MONTH FIRESIDE INSPECTION KIT
58086-21	<b>EXT -2677/2600</b> , 24 MONTH FIRESIDE INSPECTION KIT
58086-22	<b>EXT -3060/3000</b> , 24 MONTH FIRESIDE INSPECTION KIT

## 8.16 ACCESSORY KIT PART NUMBER

The following MODULEX EXT Accessory Kits are available:

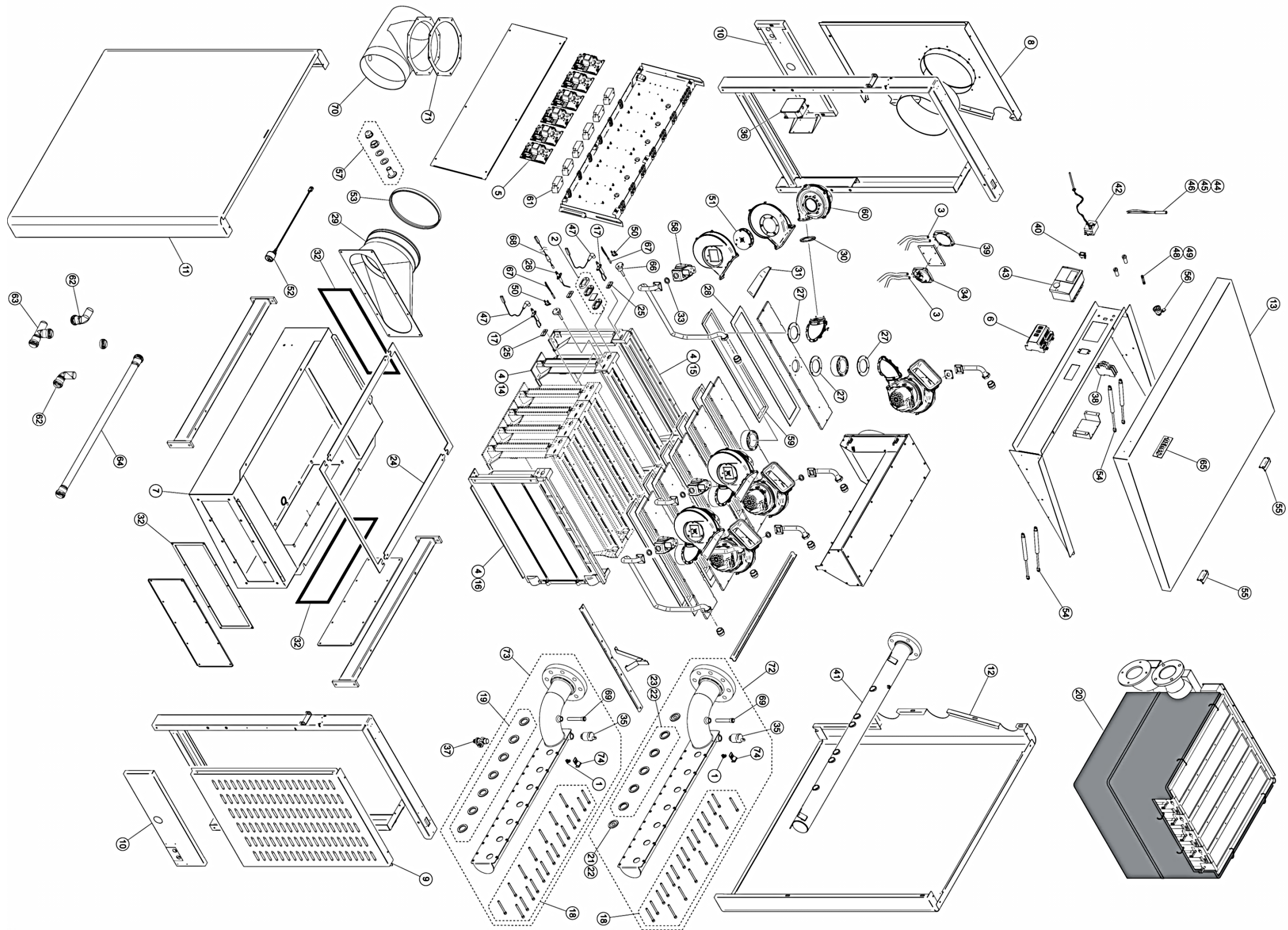
- **58096**, for MODULEX EXT models: 1530 / 1500, 1912
- **58097**, for MODULEX EXT models: 2295 / 2300, 2677 / 2600, 3060 / 3000

The contents of each are listed in the table below:

TABLE 8-5: MLX Accessory Kit (P/N 58096 & 58097)					
ITEM #	QTY.	P/N	DESCRIPTION	Included in Kit	
				58096	58097
1	1	123675-2	GAUGE, PRESSURE/TEMP	✓	✓
2	1	39003-1	10" AIR INLET ADAPTER	✓	
3	1	39003-2	12" AIR INLET ADAPTER		✓
4	1	93087	1-1/2 X 1-1/4 PVC RED.CLAMP	✓	✓
5	1	64105	FLOW SWITCH	✓	✓

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CHAPTER 9: SPARE PARTS DRAWING AND LISTS



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Modulux EXT Commercial Spare Parts List			
Item	Part No.	Description	Quantity
1	95000021	Heating Sensor 3/4" T7335D1016 10K	1
2	95000467	Sight glass Kit - Comb Chamber	1
3	95000657	Silicone tube 4 X 8	1
4	95000970	COMPLETE CASTING SECTIONS ASSEMBLY MLX 1500 & 1530	1
	95000971	COMPLETE CASTING SECTIONS ASSEMBLY MLX 1912	1
	95000972	COMPLETE CASTING SECTIONS ASSEMBLY MLX 2295 & 3000	1
	95000973	COMPLETE CASTING SECTIONS ASSEMBLY MLX 2600 & 2677	1
	95000974	COMPLETE CASTING SECTIONS ASSEMBLY MLX 3000 & 3060	1
5	95000975	BMM ELECTRONIC BOARD MLX 1500 – 3060	1
6	95000962	BCM control unit	1
7	95213360	CONDENSATE TRAY ASSEMBLY MLX EXT 1500 & 1530	1
	95213365	CONDENSATE TRAY ASSEMBLY MLX EXT 1912	1
	95213366	CONDENSATE TRAY ASSEMBLY MLX EXT 2295 & 3000	1
	95213367	CONDENSATE TRAY ASSEMBLY MLX EXT 2600 & 2677	1
	95213368	CONDENSATE TRAY ASSEMBLY MLX EXT 3000 & 3060	1
8	95213960	Left Side Panel MLX EXT 1500 – 3060	1
9	95213399	Right Side Panel MLX EXT 1500 – 3060	1
10	95213400	Plate side closing MLX EXT 1500 – 3060	1
11	95213402	Casing Front Panel MLX EXT 1500 & 1530	1
	95213403	Casing Front Panel MLX EXT 1912 – 2300	1
	95213404	Casing Front Panel MLX EXT 2600 - 3060	1
12	95213405	Casing Rear Panel MLX EXT 1500 & 1530	1
	95213406	Casing Rear Panel MLX EXT 1912 – 2300	1
	95213407	Casing Rear Panel MLX EXT 2600 – 3060	1
13	95213408	Casing Top Panel MLX EXT 1500 & 1530	1
	95213409	Casing Top Panel MLX EXT 1912 – 2300	1
	95213410	Casing Top Panel MLX EXT 2600 – 3060	1
14	95240136	Centre Section MLX EXT 1500 – 3060	1
15	95240137	End Section front MLX EXT 1500 – 3060	1
16	95240138	End Section rear MLX EXT 1500 – 3060	1
17	95250624	Ignitor	1
18	95250669	Screw UNI 5931 M8X80	12
19	95250973	EPDM 56X38X5 gasket	7
20	95250992	Boiler Body Insulation MLX EXT 1500 & 1530	1
	95250991	Boiler Body Insulation MLX EXT 1912	1
	95250990	Boiler Body Insulation MLX EXT 2295 & 2300	1
	95250989	Boiler Body Insulation MLX EXT 2600 & 2677	1
	95251330	Boiler Body Insulation MLX EXT 3000 & 3060	1
21	95251921	Diaphragm to external modules	2
22	95251035	Diaphragms flow manifold	10
23	95251052	Diaphragms + gasket flow manifold	7



Modulux EXT Commercial Spare Parts List			
Item	Part No.	Description	Quantity
24	95251096	Gasket - H/E-Flue Box MLX EXT 1500 & 1530	1
	95251095	Gasket - H/E-Flue Box MLX EXT 1912	1
	95000852	Gasket - H/E-Flue Box MLX EXT 2295 & 3000	1
	95251067	Gasket - H/E-Flue Box MLX EXT 2600 & 2677	1
	95251652	Gasket - H/E-Flue Box MLX EXT 3000 & 3060	1
25	95251210	Ignitor gasket 10	10
26	95251274	Flame Detector	1
27	95251592	Silicone gasket	3
28	95251632	Burner gasket MLX EXT 1500 – 3060	8
29	95251633	Flue outlet terminal MLX EXT 1500 – 3060	1
30	95251644	Fan NRG137 gasket	3
31	95251645	Airbox gasket MLX EXT 1500 – 3060	3
32	95251650	Sealing Gskt-Flue box Outlet MLX EXT 1500 – 3060	1
33	95251654	Gasket 33X21X2	10
34	95263767	Air Pressure Switch (Max)	1
35	95260588	Automatic Air Vent G3/4"	1
36	95611641	Junction box MLX EXT 1530-3060	1
37	95261357	Boiler Drain Cock G 3/4"	1
38	95263795	Thermal breaker	1
39	95263802	Air Pressure Switch MLX EXT 1500 – 3060	1
40	95263570	Signal light	1
41	95282743	Gas inlet header MLX EXT 1500 & 1530	1
	95282744	Gas inlet header MLX EXT 1912 – 2300	1
	95282745	Gas inlet header MLX EXT 2600 – 3060	1
42	95262137	Thermostat 90-110° (104°) L=3000	1
43	95262207	E8 - System Manager	1
44	95262208	External sensor E8 - System Manager	1
45	95262209	Mixed flow sensor E8 - System Manager	1
46	95262211	Tank sensor E8 - System Manager	1
47	95611593	Ignitor Cable	1
48	95262220	10A Fuse	10
49	95262221	6,3A Fuse	10
50	95263708	Safety Thermostat MLX EXT 1500 – 3060	1
51	95262451	Mixer DUNGS SW16 - RG148 - nozzle D.9	1
52	95262565	Level sensor	1
53	95262767	D.300 EPDM Gasket	1
54	95262926	Gas spring	1
55	95262930	Hinge casing	2
56	95262931	Casing Top Panel lock	1
57	95262932	Inspection flue plug	1
58	95263546	Gas valve MLX EXT 1500 – 3060	1
59	95262961	Mesh Burner MLX EXT 1500 – 3060	1
60	95263553	Blower MLX EXT 1500 – 3060	1
61	95263579	Ignition Transformer	1

Modulux EXT Commercial Spare Parts List			
Item	Part No.	Description	Quantity
62	95310512	Drain Elbow HTB DN40	2
63	95310513	Drain TEE HTEA DN 40/40	1
64	95310515	Drain Pipe 1M LG. DN 40	1
65	95362314	AERCO plate	1
66	95371895	Sheath probe holder (FOR CASTING TEMPERATURE SENSOR)	1
67	95611133	CASTING TEMPERATURE SENSOR MLX EXT 1500 – 3060	1
68	95611410	Flame Detector Cable MLX EXT 1500 – 3060	1
69	95900234	Sheat probe holder (FOR OUTLET TEMPERATURE SENSOR)	1
70	95251906	Flanged flue outlet terminal MLX EXT 1500 – 3060	1
71	95251937	Flue terminal gasket MLX EXT 1500 – 3060	1

Modulux EXT Commercial Spare Parts List			
Item	Part No.	Description	Quantity
72	95282672	Flow header MLX EXT 1500& 1530	1
	95282673	Flow header MLX EXT 1912	1
	95282674	Flow header MLX EXT 2295 & 2300	1
	95282675	Flow header MLX EXT 2600 & 2677	1
	95282676	Flow header MLX EXT 3000 & 3060	1
73	95282677	Return header MLX EXT 1500 & 1530	1
	95282678	Return header MLX EXT 1912	1
	95282679	Return header MLX EXT 2295 & 2300	1
	95282680	Return header MLX EXT 2600 & 2677	1
	95282681	Return header MLX EXT 3000 & 3060	1
74	95211352	Heating Sensor bracket	3

## Change Log:

Date	Description	Changed by
07/07/2016	<b>Rev-G:</b> Reformatted, new logo, applied misc. changes per AM. <b>DIR 340:</b> Added combustion chamber cleaning instructions. <b>DIR 368:</b> Changed Spare Parts item 50 P/N from 95363708 to 95263708 on page 137.	Curtis Harvey
09/15/2017	<b>Rev H:</b> <b>DIR 17-008:</b> Added new model numbers for units with aluminum water connections, reformatted per new design standard. <b>DIR 17-011:</b> Revised Section 9: Spare Parts Lists, <b>DIR 17-046:</b> Modified Relief Valve location & mounting instructions (sections 4.11 & 4.12). <b>DIR 17-063:</b> Added new Chapter 1 Safety Precautions, with Massachusetts-specific requirements, renumbered all chapters, sections, figures and tables.	Chris Blair



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