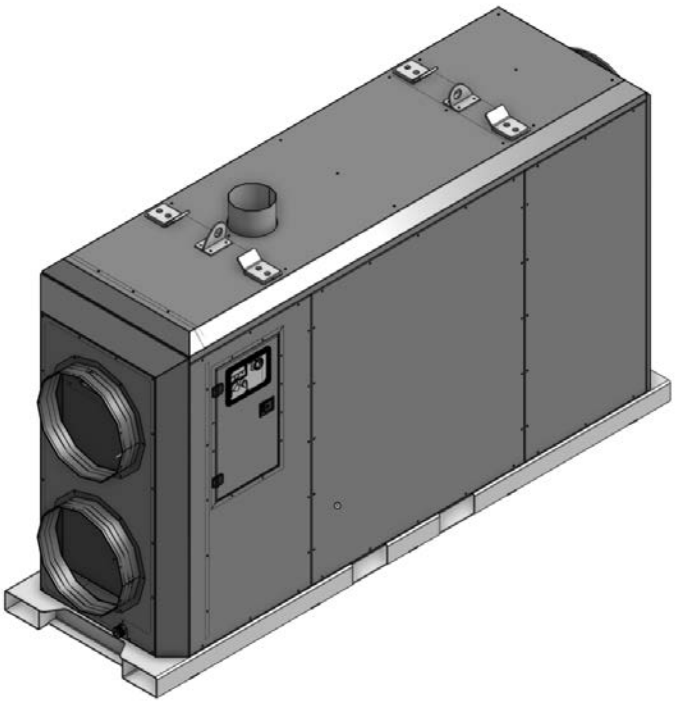
Installation and User Instructions

IAQH Construction Heater

IAQH-1000 / 1,000,000 BTU Indirect Fired



These are the original English instructions

August, 2021
Version 1.2

GENERAL HAZARD WARNING

- FAILURE TO COMPLY WITH THE PRECAUTIONS AND INSTRUCTIONS PROVIDED WITH THIS HEATER CAN RESULT IN DEATH, SERIOUS BODILY INJURY AND PROPERTY LOSS OR DAMAGE FROM HAZARDS OF FIRE, EXPLOSION, BURN, ASPHYXIATION, CARBON MONOXIDE POISONING, AND/OR ELECTRICAL SHOCK.
- ONLY PERSONS WHO CAN UNDERSTAND AND FOLLOW THE INSTRUCTIONS SHOULD USE OR SERVICE THIS HEATER.
- IF YOU NEED ASSISTANCE OR HEATER INFORMATION SUCH AS AN INSTRUCTIONS MANUAL, LABEL, ETC CONTACT THE MANUFACTURER.

WARNING

- FIRE, BURN, INHALATION, AND EXPLOSION HAZARD. KEEP SOLID COMBUSTIBLES, SUCH AS BUILDING MATERIALS, PAPER, OR CARDBOARD, A SAFE DISTANCE AWAY FROM THE HEATER AS RECOMMENDED BY THE INSTRUCTIONS. NEVER USE THE HEATER IN SPACES WHICH DO OR MAY CONTAIN VOLATILE OR AIRBORNE COMBUSTIBLES, OR PRODUCTS SUCH AS GASOLINE, SOLVENTS, PAINT THINNER, DUST PARTICLES OR UNKNOWN CHEMICALS

WARNING

- NOT FOR HOME OR RECREATIONAL VEHICLE USE

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All pertinent state, regional, and local safety regulations shall be observed when installing and using this product. For reasons of safety and to help ensure compliance with documented system data, only the manufacturer shall perform repairs to components.

When devices are used for applications with technical safety requirements, the relevant instructions shall be followed.

Failure to observe this information can result in injury or equipment damage.

Eco Power Equipment Ltd. #8, 26004 TWP 544, Sturgeon County, AB, T8T 0B6
1-833-249-2417 www.ecopowerequip.com

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Product Modifications

Year	Type	Modifications
2021	v1.0	2021 IAQH-1000G Production Release

Document Revisions

Date	Version Number	Document Changes
22-08-2021	1.0	Initial Draft
12-09-2021	1.1	Pre Production 2021 Version
14-09-2021	1.2	2021 Release Version

Testing Agency

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A. PREFACE

a. Description of the User

This manual is intended for both the installer and commissioning technician, and operator of the IAQH Control System. There are multiple user types. Typically in most jurisdictions the installer and commissioning technician are required to be trained and ticked professionals. Consult your local jurisdiction having authority.

This document is intended for the equipment operator and the equipment installer of the IAQH.

The IAQH series of indirect fired heaters are designed to support temporary construction heating applications that support a wide variety of temporary heating. The user of the product is intended to be qualified to install and connect the system. There are three main users of this product: the installer, the operator, and the end-user.

This document is intended to support all levels of the above users.

Consult your local justification having authority regarding restrictions on the users who are permitted to use and install this product, in most jurisdictions a ticketed gas fitter and or electrician may be required to connect and install this product. The operators and end users of this product should be qualified and trained for this product, having read and understood this manual. Eco Power Equipment does offer operator training programs, contact us for more information.

b. Conventions Used in This Manual

The following style conventions are used in this document:

Bold
Names of product elements, commands, options, programs, processes, services, and utilities
Names of interface elements (such windows, dialog boxes, buttons, fields, and menus)
Interface elements the user selects, clicks, presses, or types

Italic
Publication titles referenced in text
Emphasis (for example a new term)
Variables

`Courier`
System output, such as an error message or script
URLs, complete paths, filenames, prompts, and syntax

User input variables

< > Angle brackets surround user-supplied values

[ ] Square brackets surround optional items

| Vertical bar indicates alternate selections - the bar means “or”

c. Explanation of Safety Warnings

⚠DANGER

Danger indicates a hazardous situation that, if not avoided, will result in death or serious injury

⚠WARNING

Warning indicates a hazardous situation that, if not avoided, may result in death or serious injury.

⚠CAUTION

Caution indicates a hazardous situation that, if not avoided, may result in minor or moderate injury.

NOTICE

Indicates information considered important, but not hazard-related.

d. Retaining Instructions

Read and understand this manual and its safety instructions before using this product. Failure to do so can result in serious injury or death.

Follow all the instructions. This will avoid fire, explosions, electric shocks or other hazards that may result in damage to property and/or severe or fatal injuries.

The product shall only be used by persons who have fully read and understand the contents of this user manual.

Keep all safety information and instructions for future reference and pass them on to subsequent users of the product.

The manufacturer is not liable for cases of material damage or personal injury caused by incorrect handling or non-compliance with the safety instructions. In such cases, the warranty will be voided.

e. Obtaining Documentation and Information

i. Internet

The latest version of the documentation is available at the following address:
http://www.ecopowerequip.com

ii. Ordering Documentation

Documentation, user instructions, and technical information can be ordered by calling Eco Power Equipment Ltd. at 1-833-249-2417.

iii. Other languages

This is the English user manual. Manuals in French are available upon request.

iv. Documentation Feedback

If you are reading Eco Power Equipment Ltd. product documentation on the internet, any comments can be submitted on the support website. Comments can also be sent to info@ecopowerequip.com.

We appreciate your comments.

v. Support and service

For information about special tools and materials; for questions, information, technical assistance, or ordering user instructions; or for service related questions please contact:

Eco Power Equipment Ltd.
#8, 26004 TWP 544, Sturgeon County, AB, T8T 0B6
1-833-249-2417
www.ecopowerequip.com

B. DESCRIPTION OF THE PRODUCT

a. Intended Use and Reasonably Foreseeable Misuse

The IAQH is intended to be used as a temporary construction heater, primarily intended for temporary use in heating buildings or structures under construction, alteration, or repair. The unit is ideal for large scale commercial and industrial heating. The unit is intended for indoor air heating and air quality maintenance. It is ideal for construction projects including hospitals, high rise, big-box stores, distribution centers, wood frame multi-family low rise, and other heating and air quality control applications.

The IAQH shall not be used as a permanent heating system, it has been designed and complies with CSA 2.14 and ANSI Z83.7 directives, which are specific to temporary heating of a building structure under construction, alteration, or repair.

Adequate ventilation is critical to application safety and performance, see below for more details.

The heater is designed and approved for use as a construction heater in accordance with the Standard for Gas-Fired Construction Heaters ANSI 283.7 • CSA 2.14. CHECK WITH YOUR LOCAL FIRE SAFETY AUTHORITY IF YOU HAVE QUESTIONS ABOUT APPLICATIONS.

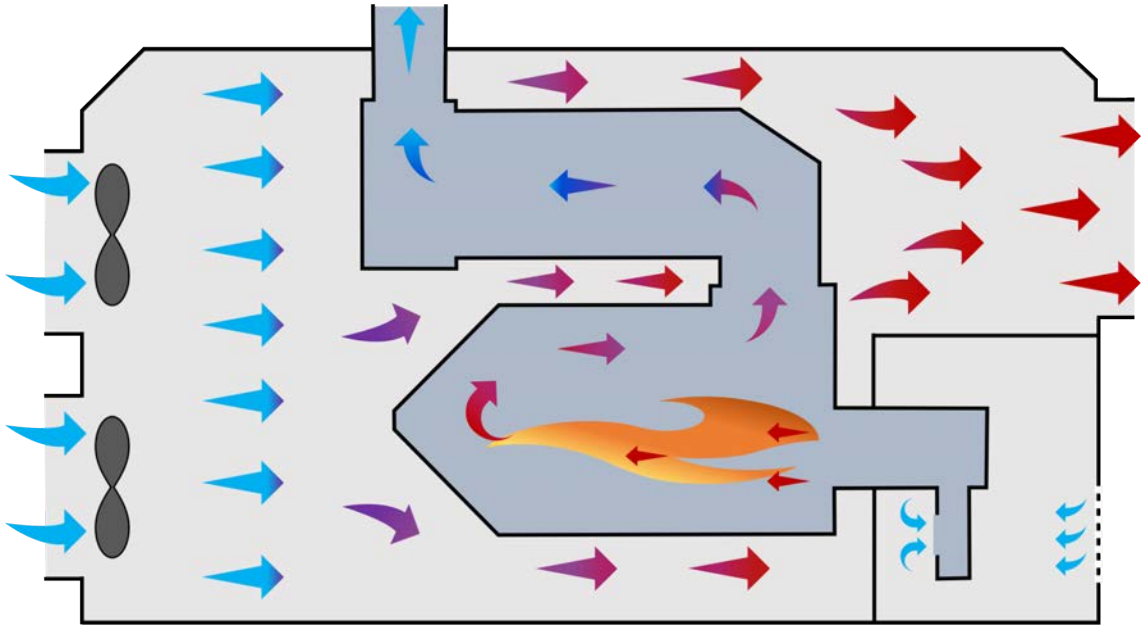
Other standards govern the use of fuel gases and heat producing products in specific applications. Your local authority can advise you about these other standards.

The IAQH shall be used with the following original accessories and components only:

- Eco Power Equipment EHT and ERA Type Ducting
- IAQH Remote Thermostat
- IAQH Temporary Flue System

b. Process Overview

The indirect heat transfer process relies on the heat from the heat exchanger to heat the air through convection, conduction, and radiation. The combustion air does not come in direct contact with air in this process.



c. Technical Data

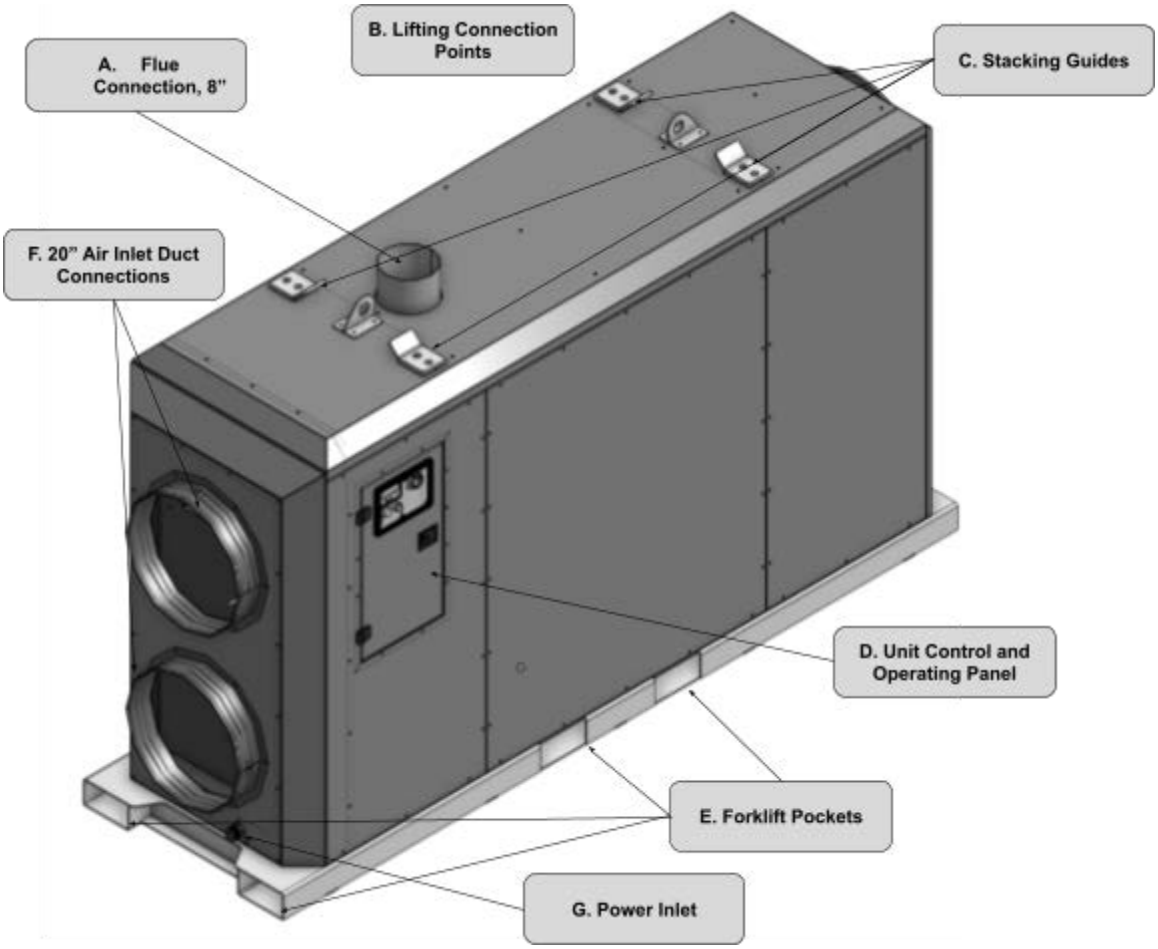
Parameter	Unit
Device name	IAQH Indirect Fired Heater
Designation	IAQH-1000
Type	Indirect Fired
Technical life span	10,000+ Hours
Maximum Input BTU	1,000,000 BTU/HR / 293 kW
Energy consumption	Natural Gas: 1.0551 GJ/hour, 985 ft^3/hour, 27.89 m^3 / hour Liquid Propane: 41.32 LPH / 10.92 GPH
Gas Types	Natural Gas: (Pipeline Quality) (1075 BTH/ft^3) (40.1 MJ/m^3) Liquid Propane: (HD-5 Spec) (2500 BTU/ft^3) (93.1 MJ/m^3)
Weight	2200 lbs / 1225 kg
Input Gas Pressure	10 inH20 / 24.8 mbar / 0.36 psi
Voltage	208/240 Three Phase
Recommended Circuit Size	30 Amps
Full Load Amps	24 Amps
Frequency	60 Hertz
SCCR Rating	10 kA
Max Heater Efficiency	82%
Blower Type	Backwards Inclined EC Type Blower
Heater Air CFM Rating	10 000 CFM
Compliance	ANSI Z83.7 / CSA 2.14 / CSA C22.2 No. 3
Product Certification Agency	Intertek cETLus
Full Load Operating Sound Level	58 dBa @ 7 Meters (with ducting connected to building)
Installation Details	For installation above 2000 ft (610 m), see the “high-altitude rating plate." Unit is automatically de-rated in high elevation conditions.

d. Product Compliance

This product complies with all relevant legislation for portable gas fired construction heaters. The product is in conformity with the following relevant product safety standards:

- ANSI Z83.7-2017: Gas fired construction heaters
- CSA 2.14-2017: Gas fired construction heaters
- CSA C22.2

e. Product Elements



A. Element A: Combustion Exhaust Flue Connection Point, 8”

B. Element B: Lifting Points Connection - See lifting guide below

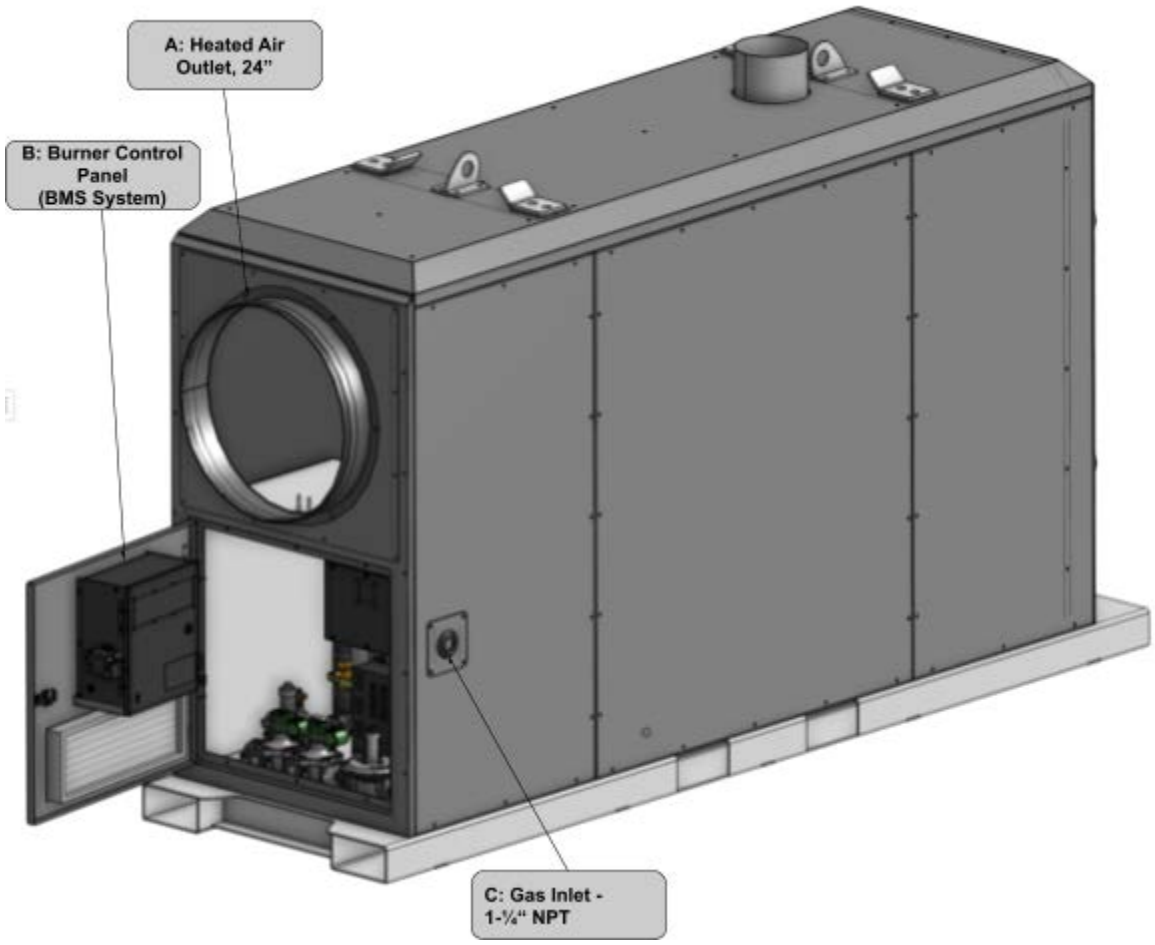
C. Element C: Stacking Points

D. Element D: Unit control and operating panel

E. Element E: Forklift Pockets

F. Element F: Air Inlet Ducting

G. Element G: Power inlet

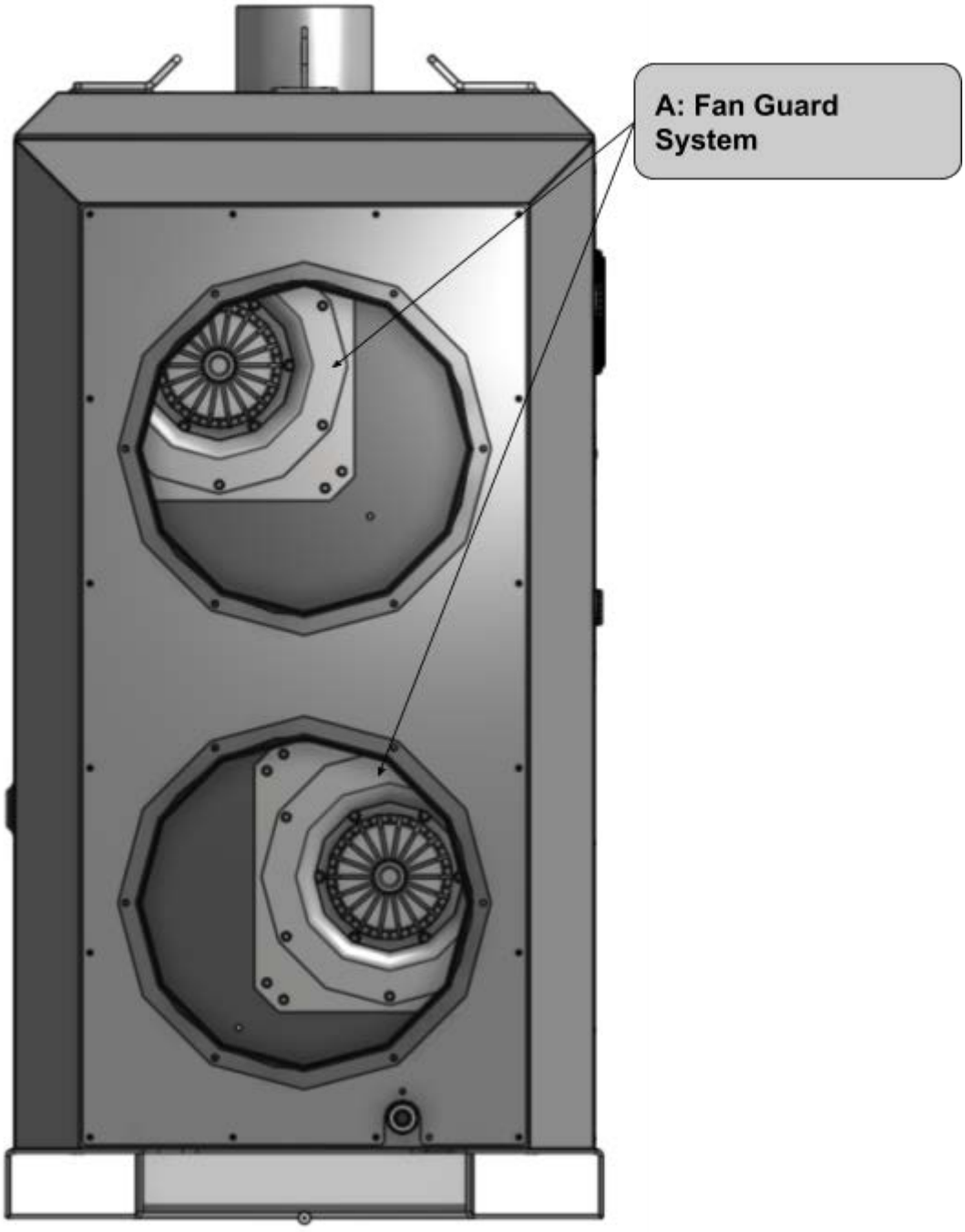


Element A: Heated Air Outlet, 24” Round

Element B: Burner Control Panel and Burner Management System (BMS)

Element C: Fuel Gas Inlet, 10” WC, 1-¼” NPT

f. Machine guards



A. Guard A: Inlet fan guard system. Ensure the inlet is free and clear. We recommend filtration for inlet make-up air.

g. Understanding the user interface

The main user interface of the machine is located in the operating and control panel of the machine. The system utilizes a touchscreen display to allow the user complete control over the unit's operation.

When looking at the front panel of the display, at the bottom of the display are four push buttons.

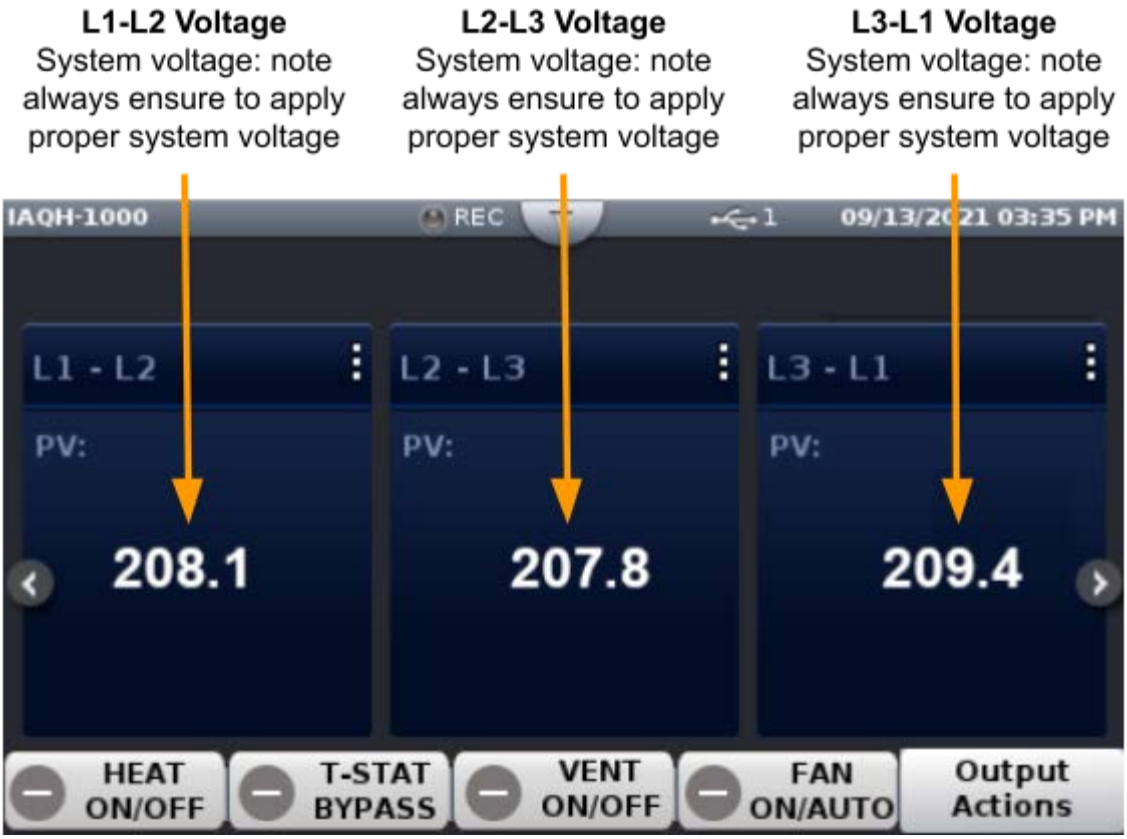
Home: Will always return to the home screen

Menu: Will provide access to the controller settings, as shown below

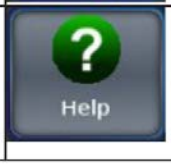
Return: When pressed will take the user back to the previous screen

Help: Will display the help panel with revision and software information

Understanding the menus:

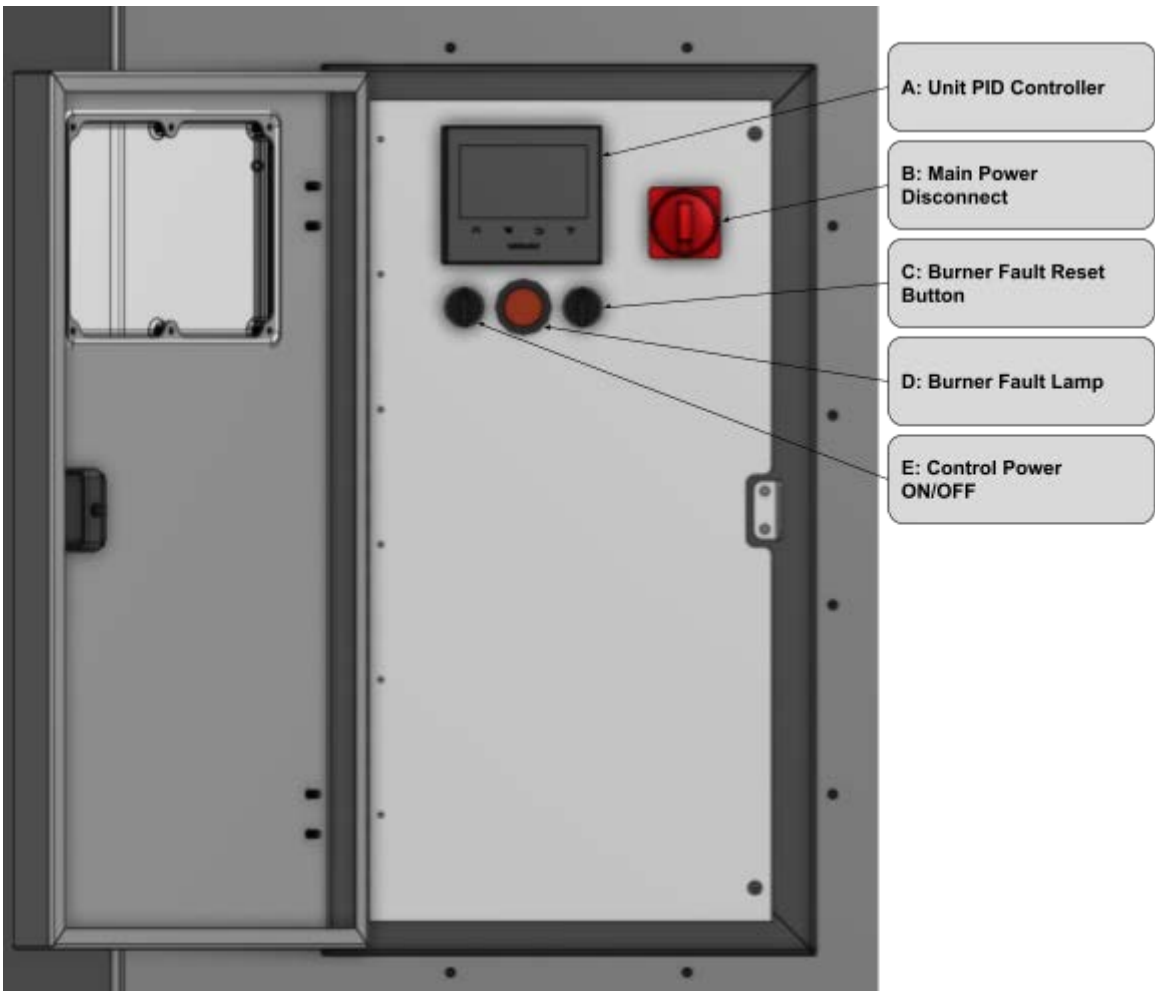

L1-L2 Voltage
System voltage: note always ensure to apply proper system voltage
L2-L3 Voltage
System voltage: note always ensure to apply proper system voltage
L3-L1 Voltage
System voltage: note always ensure to apply proper system voltage
IAQH-1000
REC
1
09/13/2021 03:35 PM
L1 - L2
PV:
208.1
L2 - L3
PV:
207.8
L3 - L1
PV:
209.4
HEAT ON/OFF
T-STAT BYPASS
VENT ON/OFF
FAN ON/AUTO
Output Actions


F4T
REC
1
01/10/2020 01:26 PM
Main Menu
My Menu
Profiles
Operations
Settings
Data Logging
Trending
Batch
File Transfer

Menu Item	Item Options	Menu Item	Item Options
	User-selected parameters		Import/Export Samba TFTP
	Options - Actions		Email Server Settings Contacts Alert Settings Send Test Message
	Control PID loops Profile Events Inputs/Outputs Alarms Limits Machine Controls		Location depends on security settings and installed hardware
	Settings for all Menu Items		Location depends on security settings and installed hardware
	Start Annotation - Logged Data Points Select Data Points - Setup - Data Log File Transfer		Calibration
	Actions		Home screen and menu personalization
	Batch Entry Batch Settings Batch File Transfer		About - Pluggable Modules - Installed Features Screenshot Enable/Disable

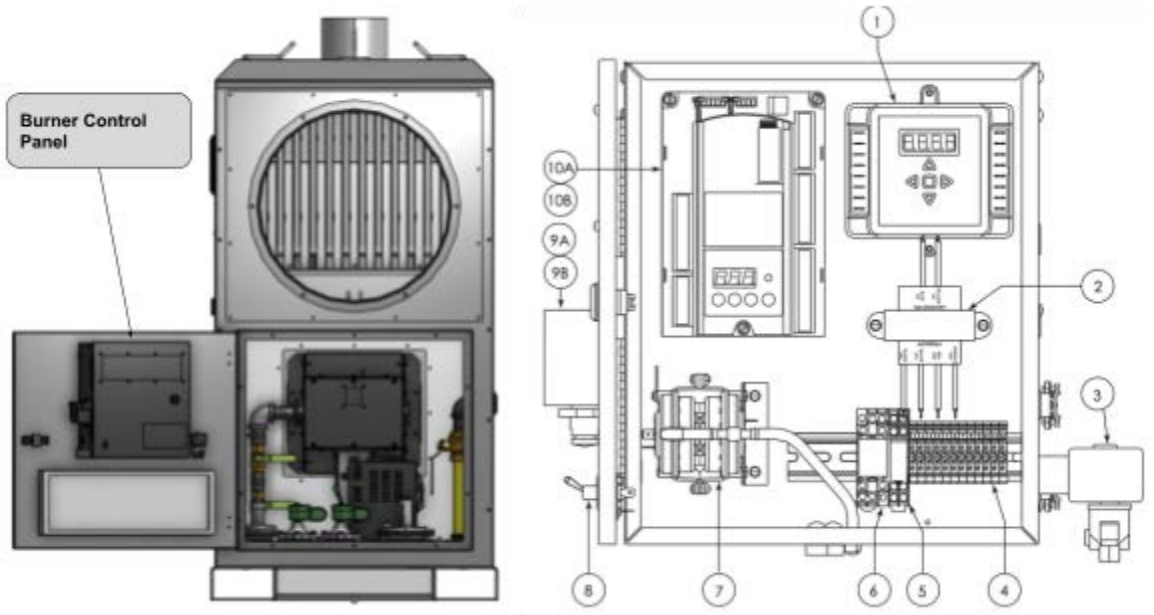
h. Operating Panels

Main Control and Operating Panel:



The main operating panel has all the items required to control, operate and use the system..

Burner Control Panel (BMS):

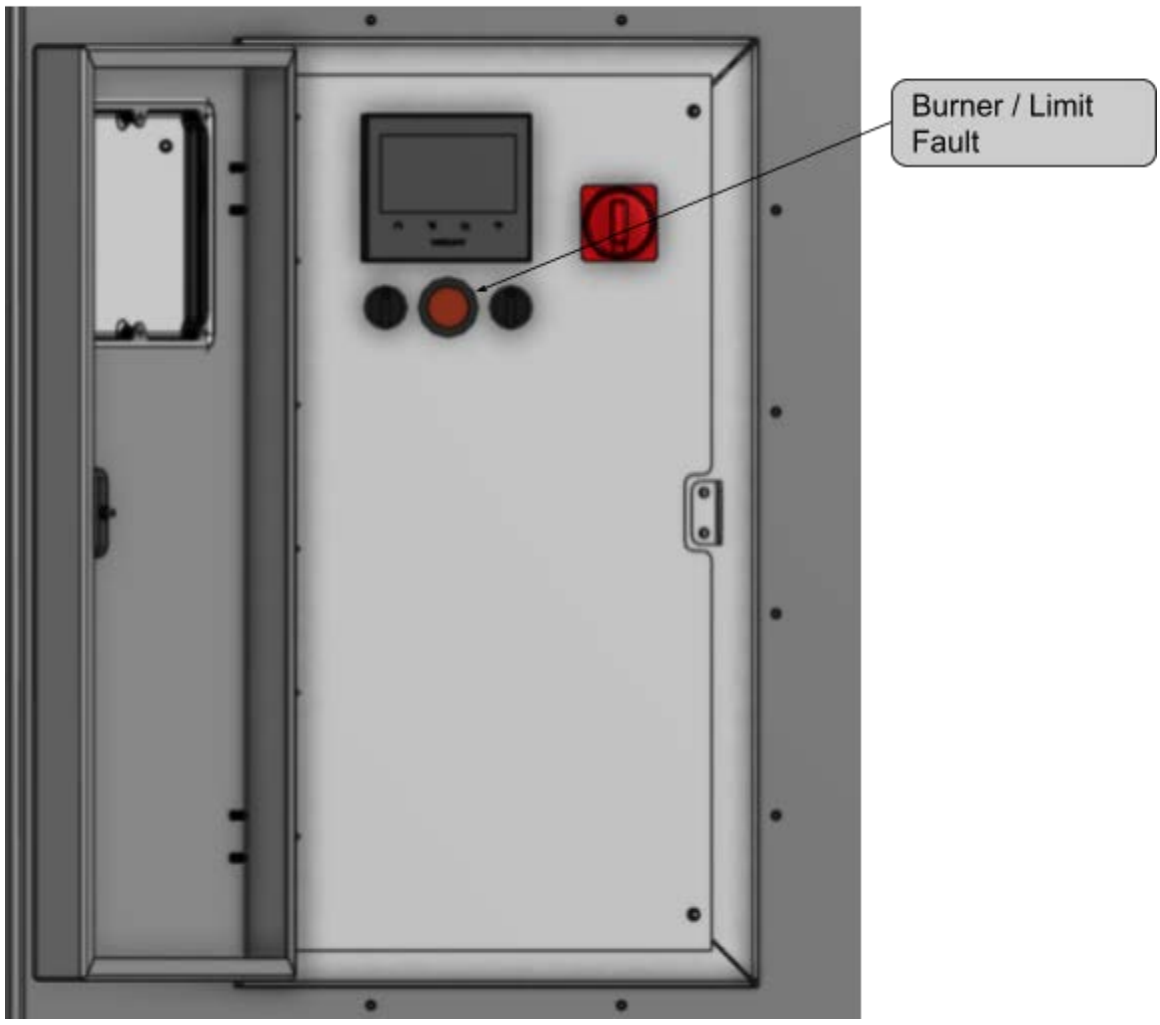


Item#	*Part #*	*Description*
1	*8429-78*	*SCEBM-2 Fan Control*
2	*8447-28*	*120/208/24vac – 24V 40VA Transformer*
3	*8402-50*	*Pilot Solenoid Valve*
4	*8409-25*	*Terminal Block*
5	*8406-98/99*	*Relay "B"*
6	*8406-95/96*	*Relay "A"*
7	*8425-56*	*Air Pressure Switch*
8	*8423-05*	*On/Off Switch*
9A	*8447-22*	*Ignition Transformer*
9B	*8447-39*	*Ignition Transformer*
10A	*8429-69*	*Ignition Control*
10B	*8429-93*	*Ignition Control (UV)*

i. Explanation Visual Signals

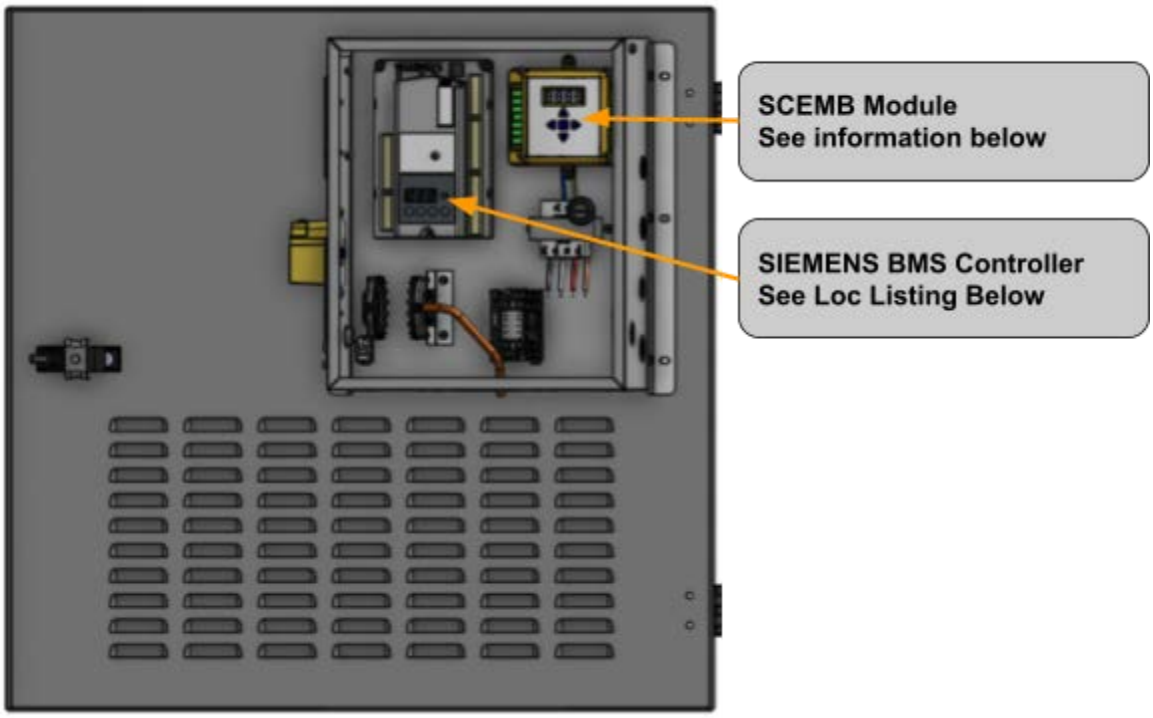
The IAQH-1000 has multiple visual signals within the unit pertaining to different aspects of machine operations

Main Control Panel:



The limit fault light is located at the main control panel. This light becomes active in the event of the one or multiple of the following conditions: High Limit, Tilt Switch Activation, or Burner Management System Fault - in a high limit condition it is recommended that the user look at the display of the Siemens BMS manager for LOC code, this will provide detail into the lock out condition.

See below for common lock out listing.



SCEBM-2 Module is designed to control the speed of the combustion blower based on three input signals and several programmable parameters. It is used to set and tune the combustion air for the burner system. It also automatically stages the combustion motor during the trial for ignition phase.

j. Lifting

i. Lifting accessories

The lifting bail is classified as a "below-the-hook" lifting device; as such, in order to meet the requirements of ASME BTH-01 and B30.20 the lifting bail assembly must undergo an MPI (magnetic particle inspection) by qualified personnel after manufacture on an annual basis. The inspection must conform to B30.20 and OH&S requirements.

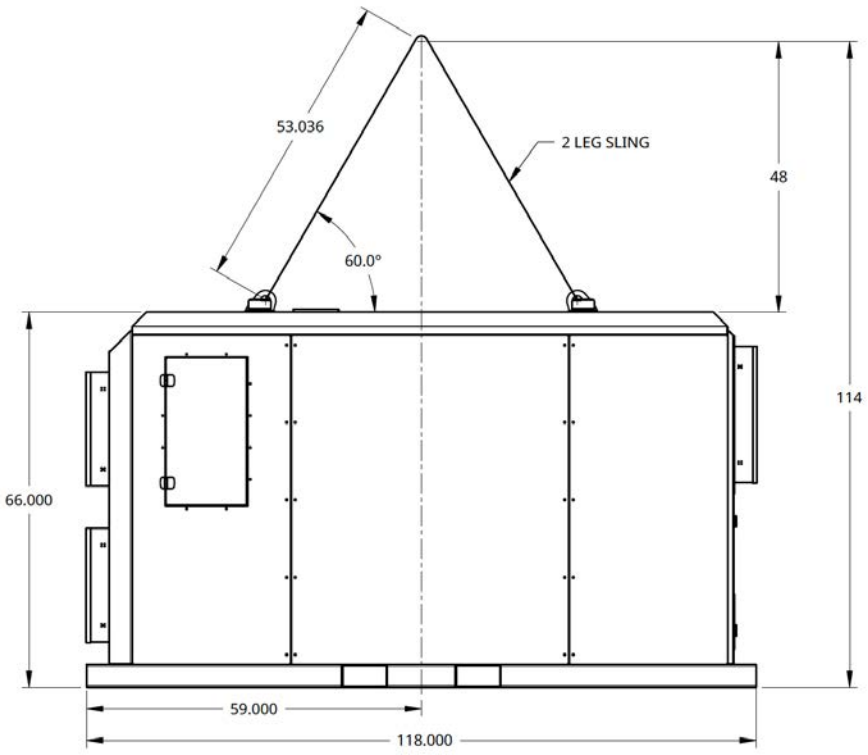
(a) The lifting hook system is designed to lift ONLY the IAHQ-1000 machine as it ships from the factory.

(b) The lifting hook system is designed to lift ONLY the IAQH-1000, with no additional accessories or items connected to the unit.

(c) The lifting assembly is designed to use a 2 leg type sling, connected to both lifting-point connections, to maintain the rated 60 degree angle between the machine and the lifting sling.

(d) Rated lifting capacity: 2,750 lb or 1250 kg

(e) It is the operators responsibility to specify and use appropriately rated lifting accessories including slings, shackles, and other items



C. SAFETY INSTRUCTIONS

Read and understand this manual and its safety instructions before using this product. Failure to do so may result in serious injury or death.

a. How to Use the Product Safely

i. General Hazard Warning

- FAILURE TO COMPLY WITH THE PRECAUTIONS AND INSTRUCTIONS PROVIDED WITH THIS HEATER CAN RESULT IN DEATH, SERIOUS BODILY INJURY, AND PROPERTY LOSS OR DAMAGE FROM HAZARDS OF FIRE, EXPLOSION, BURN, ASPHYXIATION, CARBON MONOXIDE POISONING, AND/OR ELECTRICAL SHOCK.
- ONLY PERSONS WHO CAN UNDERSTAND AND FOLLOW THE INSTRUCTIONS SHOULD USE OR SERVICE THIS HEATER.
- IF YOU NEED ASSISTANCE OR HEATER INFORMATION SUCH AS AN INSTRUCTIONS MANUAL, LABEL, ETC CONTACT THE MANUFACTURER.

ii. Technical life span

- The system is designed to have a long technical lifespan — our system and components are designed to offer long term reliability — machine life in excess of 20,000 hours of operation is feasible — ensure to follow setup instructions, and record and document all initial setups in the machine log (below in manual).

iii. Safety information related to the intended use and reasonably foreseeable misuse;

- The intended use is the temporary heating of a building or structure under construction, alteration, or repair — it has been designed to provide continuous heating and air quality management for buildings and structures in the construction phase.
- This machine has been designed and built strictly for the intended use described above. Using the machine for any other purpose could permanently damage the machine or seriously injure the operator or other persons in the area. Machine damage caused by misuse is not covered under warranty.

- Examples of Misuse:
    - Permanent Heating Applications
    - Connecting the unit to inappropriate voltage or gas pressure
    - Operating the machine in a manner that is inconsistent with any federal, provincial, or local codes and regulations
    - Operating the machine outside of factory specifications
    - Operating the machine in a manner inconsistent with any warnings found on the machine or in the Operator's Manual
- This machine has been designed and built in accordance with the latest Canadian and US safety standards. It has been engineered to eliminate hazards as far as practicable and to increase operator safety through protective guards and labeling. However, some risks may remain even after protective measures have been taken. They are called residual risks. On this machine, they may include exposure to:
    - Electric shock and arc flash
    - Flammable gases and fire or flame hazards

iv. Personal protective Equipment

- Always work with appropriate personal protective equipment, high voltage and natural or propane gas are present.
- Follow all jobsite PPE recommendations and requirements specific to your local jobsite.
- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E, CSA Z462, or NOM-029-STPS.

v. Product limitations and restrictions

- This equipment must only be installed and serviced by qualified personnel.
- The intended use is the temporary heating of a building or structure under construction, alteration, or repair — it has been designed to provide continuous heating and air quality management for buildings and structures in the construction phase.

vi. Installation safety information

- All gas inspection authorities in Canada require that the installation and maintenance of the heater and accessories shall be accomplished by a qualified gas fitter.
- This equipment has been test fired and inspected before shipping. It has been shipped free from defects from our factory. However, during shipment and installation, problems such as loose wires, leaks or loose fasteners may occur. It is the installer's responsibility to inspect and correct any problems that may be found.
- Installation and adjustment of the burner system requires technical knowledge and the use of combustion test tools. Do not tamper with the unit or controls without full knowledge or the process and equipment. Call your qualified service technician. Incorrect operation of the burner could result in severe personal injury, death, or substantial property damage, as well as machine damages.
- Have your equipment inspected and adjusted annually by a qualified service technician to assure continued proper operation for long term performance.

vii. Safety information regarding the use

- Never restrict air openings on the burner or to the room in which the appliance is located. This could result in fire hazard or flue gas leakage, causing severe personal injury, death or substantial property damage.
- Always ensure the unit is set up and tuned as per the instructions in this manual — never allow a heater to run outside of its rated voltage and gas pressure settings.

viii. Maintenance safety information

- Always ensure that you follow a proactive maintenance plan outlined in detail later in this manual.

ix. Safe Disposal

- The unit can be safely disposed of when required; recycle all electronic components and devices in line with your local jurisdiction
- Sheet metal items can be recycled with standard metal recycling means
- Tilt switch contains mercury and requires special recycling in line with your local jususduction

b. Graphical Symbols

i. Explanation of safety information on the packaging and product

Symbol	Meaning
⚠DANGER	Indicates a hazardous situation that, if not avoided, will result in death or serious injury.
⚠WARNING	Indicates a hazardous situation that, if not avoided, may result in death or serious injury.
⚠CAUTION	Indicates a hazardous situation that, if not avoided, may result in minor or moderate injury.
NOTICE	Notice indicates information considered important, but not hazard-related.

c. Explanation of graphical symbols in the user manual

Symbol	Meaning
⚠DANGER	Indicates a hazardous situation that, if not avoided, will result in death or serious injury.
⚠WARNING	Indicates a hazardous situation that, if not avoided, may result in death or serious injury.
⚠CAUTION	Indicates a hazardous situation that, if not avoided, may result in minor or moderate injury.
NOTICE	Notice indicates information considered important, but not hazard-related.

i. Potential Health Consequences

⚠WARNING ***Air Quality Hazard***

Do not use this heater for heating human living quarters.

Use of heaters in the construction environment can result in exposure to levels of CO, CO_2, and NO_2 considered to be hazardous to health and potentially life threatening. This unit is indirectly

fired—meaning the combustion byproduct does not enter the air space; however, all construction environments should be set up with proper mechanical ventilation (make-up air).

Do not use the system in unventilated areas.

Know the signs of CO and CO_2 poisoning:

- Headaches, stinging eyes
- Dizziness, disorientation
- Difficulty breathing, feels of being suffocated

Proper ventilation air exchange (OSHA 29 CFR 1926.57) to support combustion and maintain acceptable air quality shall be provided in accordance with OSHA 29 CFR Part 1926.154, ANSI Al0.10: Safety Requirements for Temporary and Portable Space Heating Devices and Equipment used in the Construction Industry or the Natural Gas and Propane Installation.

Codes CSA B149.1

- Periodically monitor levels of CO, CO_2, and NO_2 existing at the construction site — at the minimum: at the start of the shift and after every 4 hours.
- Provide ventilation air exchange, either natural or mechanical, as required to maintain acceptable indoor air quality.

Electrical Hazard:

Electric shock and arc flash

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E, CSA Z462, or NOM-029-STPS.
- This equipment must only be installed and serviced by qualified electrical personnel.
- Turn off all power supplying this equipment before working on or inside the equipment.
- Always use a properly rated voltage sensing device to confirm all power is off.
- Read and understand this entire instruction bulletin and the latest edition of the included NEMA PB 1.1 standards publication before installing, operating, or maintaining this equipment.

- Local codes vary, but are adopted and enforced to promote safe electrical installations. A permit may be needed to do electrical work, and some codes may require an inspection of the electrical work.

d. Personal Protective Equipment

PPE	Instruction
Job Site Standard	Follow your local jobsite requirements
Eye Wear	Safety Type Glasses
High Visibility Vest	To be worn at all times
Steel Toes	To be worn at all times
Electrical PPE	Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E, CSA Z462, or NOM-029-STPS.

e. Specifications of Tools/Hand Tools to be Used

Tool	Characteristics	Intended use
Combustion Analyzer	Flue Gas Sampling	Evaluate heat exchanger efficiency, exchanger tuning, and more with a combustion analyzer. Intuitive features let you measure oxygen, stack loss, combustion air, ambient temperature and other elements with a press of a button.
Voltage Meter	True RMS Type	Voltmeter, an instrument that measures voltages of either direct or alternating electric current on a scale usually graduated in volts, or millivolts. Many voltmeters are digital, giving readings as numerical displays.
Laptop	Mobile Computer	For advanced programming and diagnostics of controller system - loaded with Composer Software and Ethernet Port
AZL23.00A9	Siemens BMS Remote Display Tool	Advanced programming of LME7 Burner Management System - backlit remote display
TDCCOMBO	Cable for Connecting Tool	Pre-made 7 foot cable and adapter for connecting the AZL23 display to the LME7 base unit

D. PREPARATION

a. How to Transport and Store the Product

⚠WARNING

Safe transport of equipment to and from job sites is critical, always ensuring to properly secure and affix units during transportation, using proper hold down points and lifting points in accordance with factory guidelines. In proper transportation or storage can result in serious injury, death, or damages. Ensure all doors are properly closed and locked during shipping. The truck driver/shipper must ensure reasonable travel speeds to reduce the risk of damaging the unit.

i. Dimensions, mass and centre of gravity

The unit has an equal centre of gravity, see below outline for more detail (see fig. 3).

Dimensions (L x W x H):

118” x 35” x 66”, or
3000 mm x 890 mm x 1680 mm

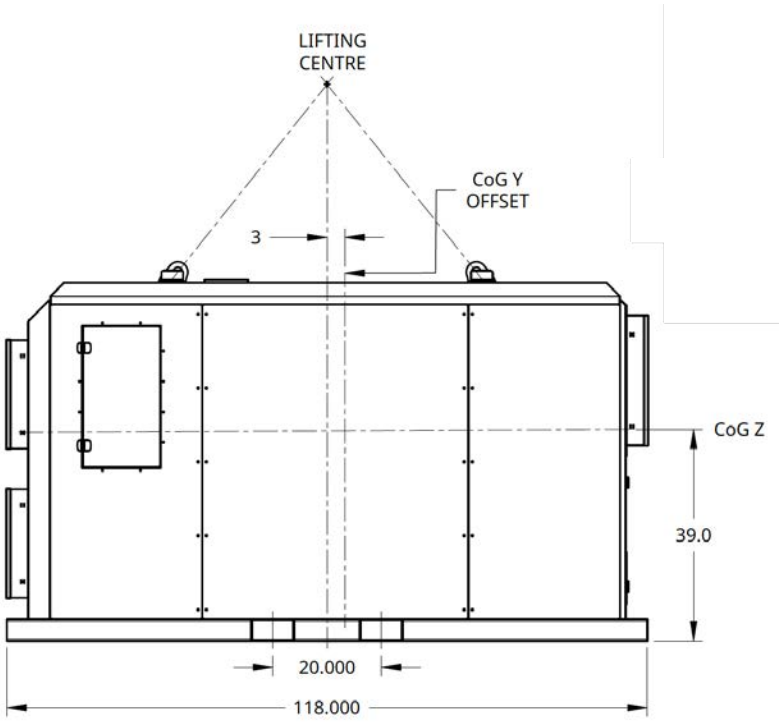


Fig. 3 - Centre of gravity outline

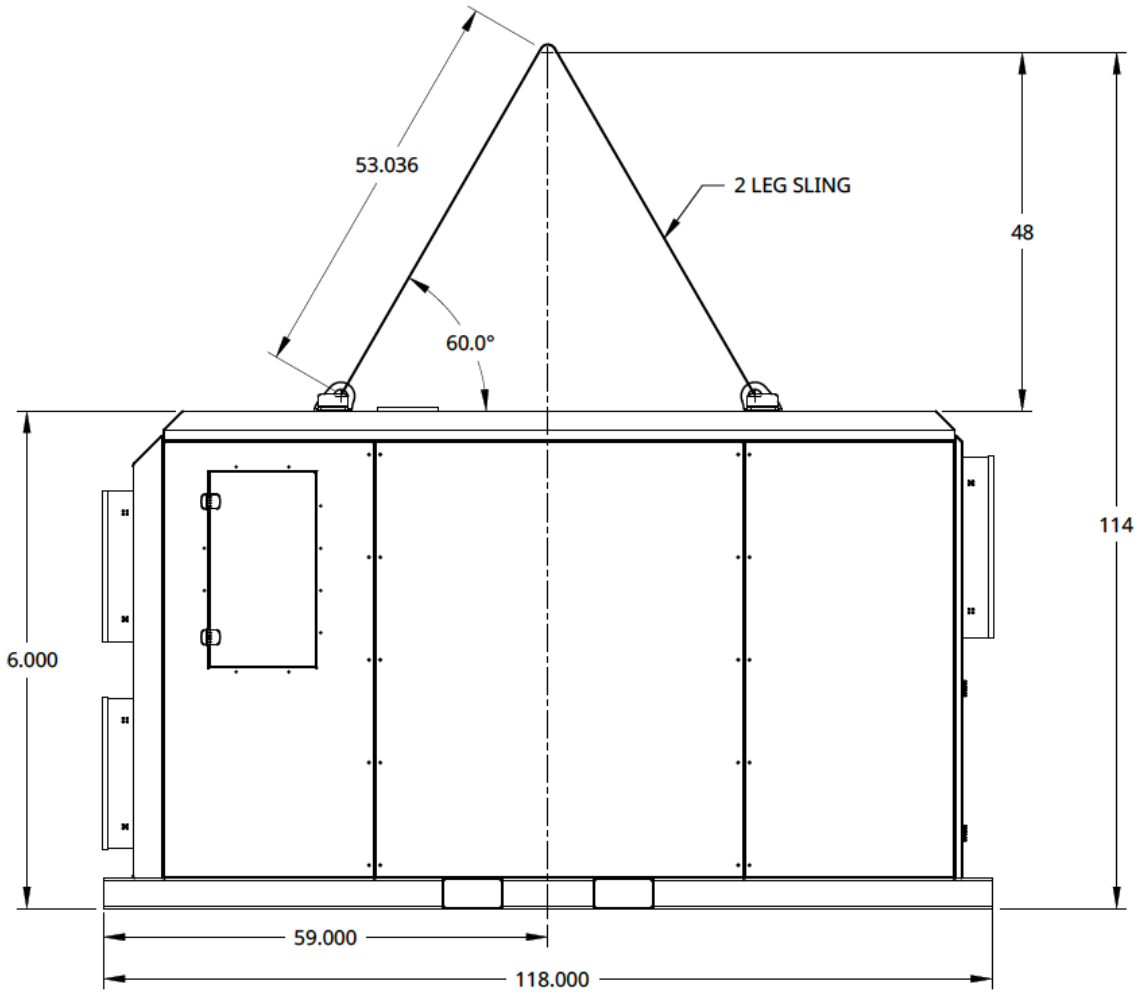
ii. Lifting, handling, and transporting the product

The IAQH-1000 system is designed to be lifted and transported in a number of different ways to facilitate quick, simple, and safe deployment and movement of the unit.

To lift the product safely:

1. Connect Sling and Shackle System to Lifting Points (operator is responsible for ensuring appropriate rating of components)

2. Ensure to select sling length to maintain 60 degree lifting angle



To handle the product safely:

1. Existing fork pockets are designed to allow the use of an appropriately rated forklift to move and locate the unit on location

2. Side pocket spacing is such that an appropriately rated pallet jack can be utilized to move and place unit on sides where a pallet jack is appropriate

To transport the product safely:

1. Always ensure to secure your load in accordance with local guidelines, and in a safe manner

2. Use appropriately rated chains or straps

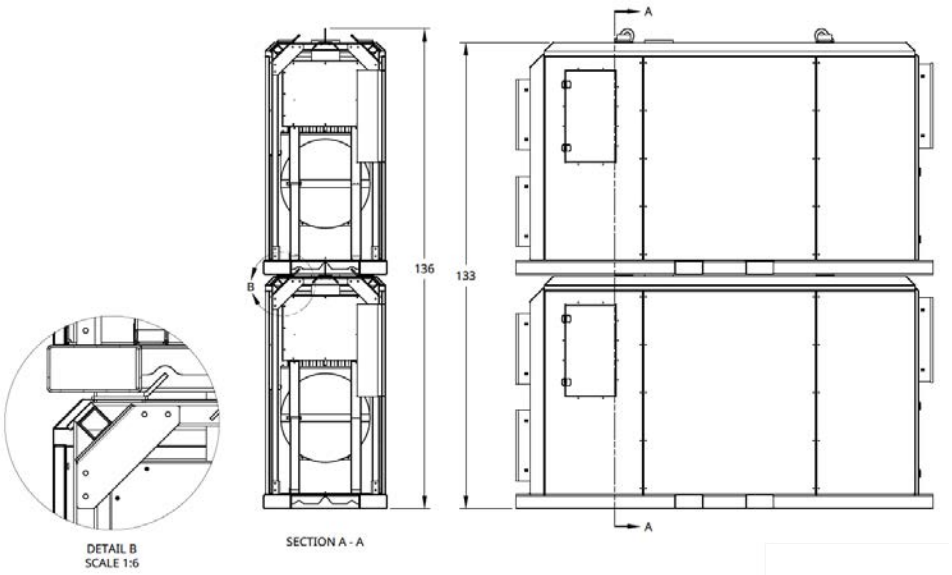
3. The factory recommendation is to utilize chains through the fork pockets, secure with chain boomers, it is not recommended to strap over the enclosure, this will cause damage to the sheet metal system, potentially causing issues in the future along with visual damages to the unit.

iii. Storing the product

The IAQH-1000, being a temporary construction heater, has been designed to be quickly and easily stored during summer or non-use periods.

To store the product safely:

1. Clean and blow out control panel
2. Disassemble and clean oils from gas train components
3. Cover inlet and outlet vents to avoid contamination during the summer months
4. Cover and seal exhaust chimney
5. Unit can be stacked for storage, note, this is only designed to be stacked indoors on reasonably level flooring and it is not suitable for wind load conditions whatsoever. DO NOT STACK UNITS OUTSIDE. DO NOT STACK HIGHER THAN TWO UNITS.



b. How to Install the Product

⚠WARNING

The installation must conform with local codes or in the absence of local codes with the Standard for the Storage and Handling of Liquified petroleum Gases, ANSI/NFPA 58 and/or the National Standards of Canada CAN/CGA B149.2/3 installation codes. The heater must be located more than ten (10) feet (3.05 meters) away from the propane source or propane tank. When the heater is not in use, ensure to shut off the gas supply from the gas source.

i. Packaging contents

The standard IAQH-1000 system comes equipped with the base unit and is ready for use with the following factory accessories:

Additional Options:

- **Remote Thermostat**
- **20" Return Air Ducting**
- **24" High Temperature Ducting**
- **Duct Hold Down Ring**
- **Gas Hose**
- **Second Stage Regulation System**

Minimum space needed

This unit must be installed with a minimum clearance of 7” (180 mm) on the non control panel side, 20” (510 mm) on the control panel side, 18” (460 mm) from the top of the unit, 18” (460 mm) from the flue venting, 18” (460 mm) on the inlet side, and 32” (820 mm) from the burner side access hatch to enable access to the burner controls. The unit must be installed on a level surface, of not greater than 4 degrees of level (see Fig. 4).

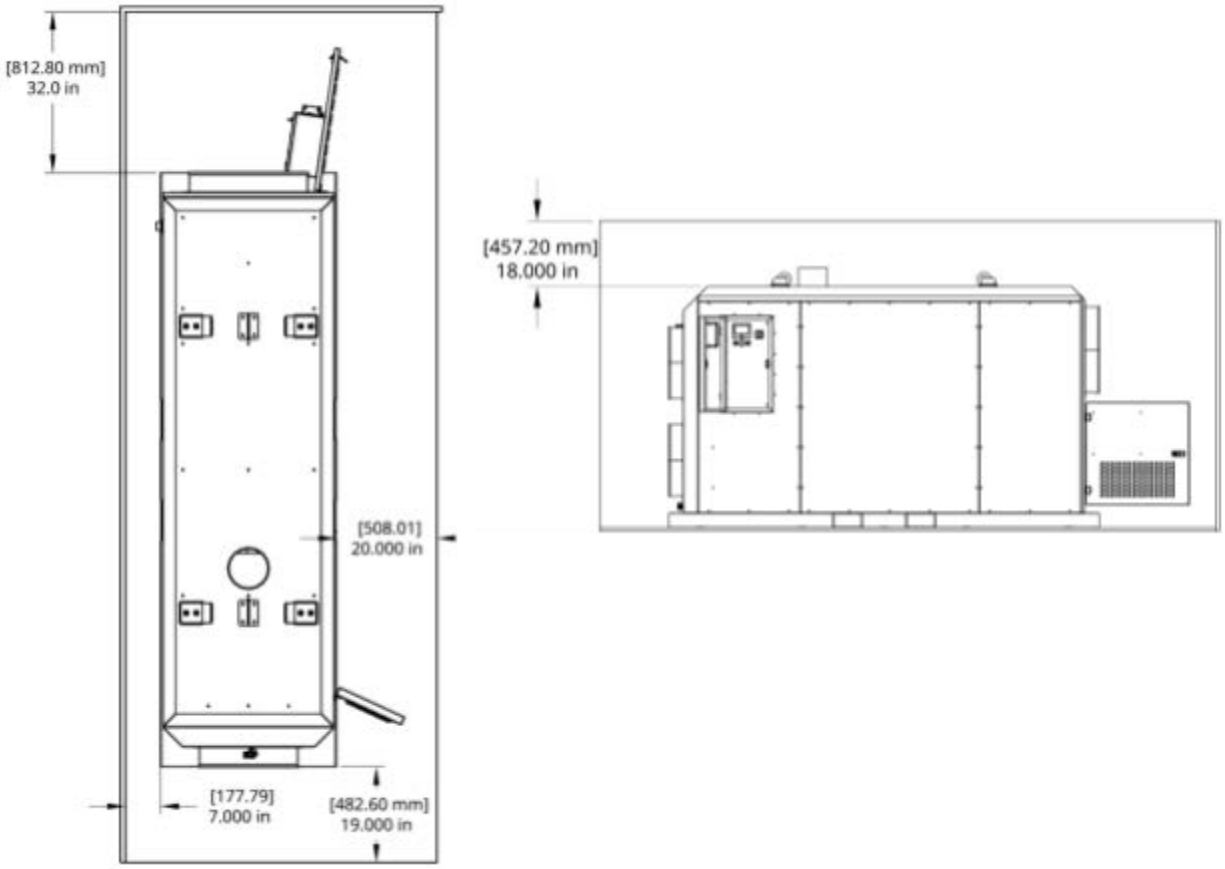


Fig. 4 - Clearance outline of unit to ensure door access and proper clearance (Top and Side View)

ii. Layout Plan

Indoor Mounted System:

This unit is designed to be mounted internally into the structure it is heating, following all clearance distances found in Section 4.2.2. Ensure the unit is only installed onto a non-combustible floor.

Horizontal Venting:

Venting must be done in accordance with CSA B149.1 or NFPA 54 or with appropriate local authorities having jurisdiction.

1. The flue must be securely attached to the unit with tight joints
2. Other appliances must not be connected so as to use the same venting
3. Do not use 90-degree tees or elbows greater than 45-degrees.
4. Do not support the weight of the stack on the flue connection of the heating system, the heat exchanger is not designed to support this additional weight in excess of five vertical feet
5. The maximum flue gas temperature is 650 °F (345 °C). “A” vent, or single wall steel pipe must be used
6. Minimize connecting pipe length and the number of bends by locating the unit as close to the flue pipe as possible
7. Maintain clearances between the flue pipe and combustible materials that are acceptable to the Federal, Provincial and local authorities having jurisdiction. Unit must be connected to a flue having sufficient draft to ensure proper operation of the unit

Vent installations shall conform with local codes, or, in the absence of local codes, with the National Gas and Propane installation Code CSA B149.1 or National Fuel Gas Code, ANSI Z223.1/NFPA 54 (see Fig. 5).

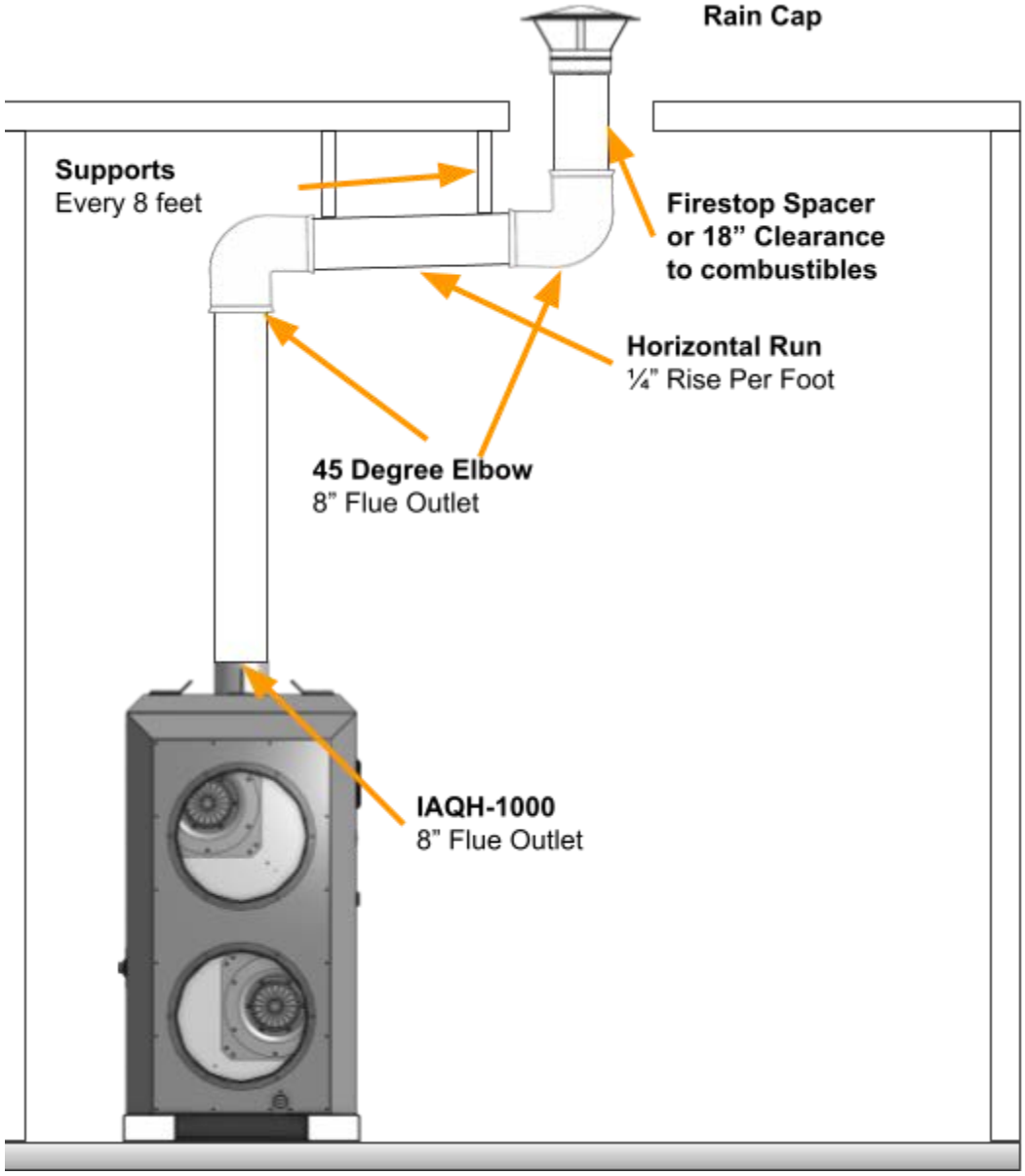


Fig. 5 -Vent installation shall confirm with local codes or in the absence of codes with the National Gas and Propane Installation Code, CSA B149.1, CSA B149.3, or ANSI Z223.1/NFPA 5

1. Maximize the height of the vertical run of the vent pipe. A minimum of three feet (0.91 m) of vertical pipe is required at the heater. The top of the vent must extend at least three feet (0.91 m) above the highest point on the roof. A weatherproof vent cap must be installed to the vent termination. Ensure there are no building air intake vents or windows near exhaust venting system

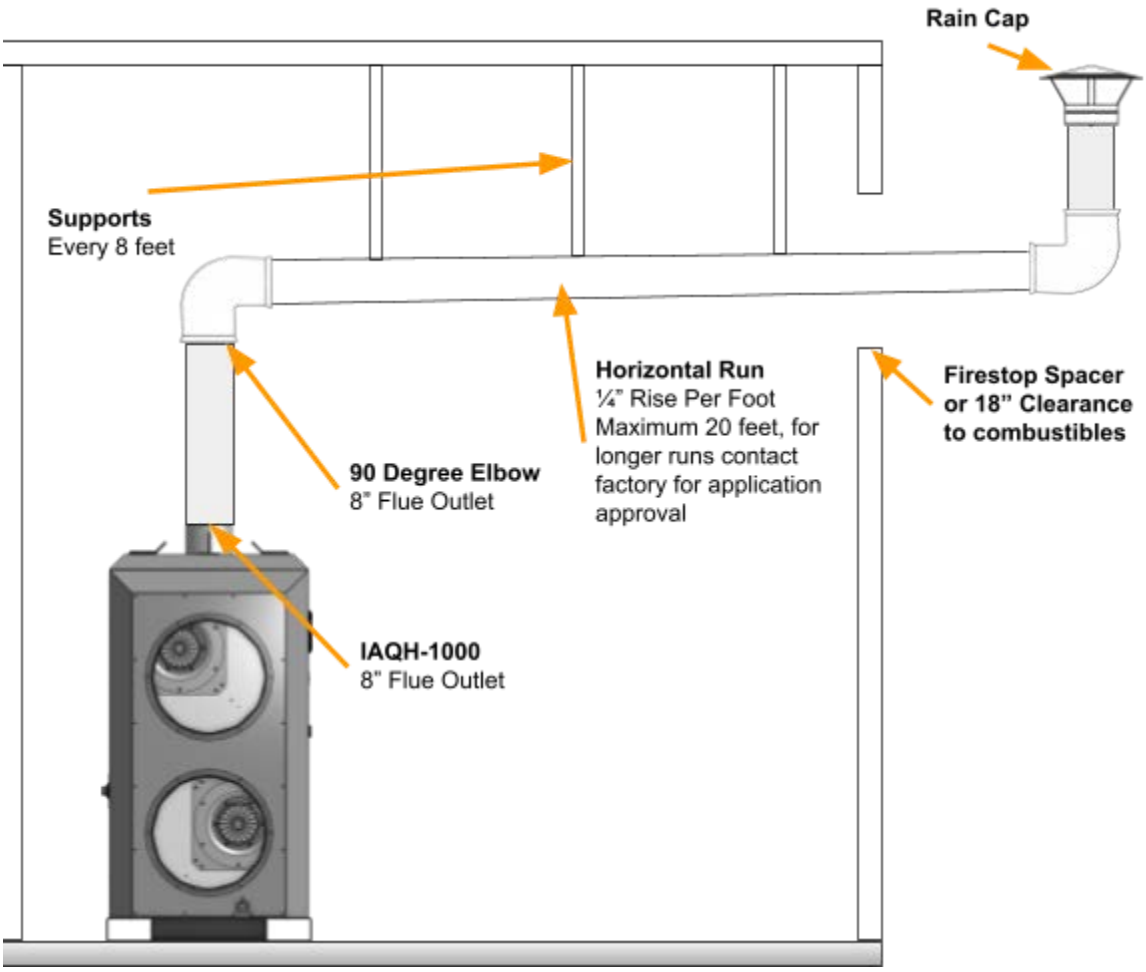
2. Horizontal runs must not exceed 75% of the vertical height of the vent pipe, up to a maximum of ten (10) feet (3 m). Horizontal runs should be pitched upward ¼" per foot (6.35 mm) and should be supported at 8 foot (2.44 m) maximum intervals.

3. Design vent pipe to minimize the use of elbows. Each 90° is equivalent to 5 feet (1.5 m) of straight vent pipe

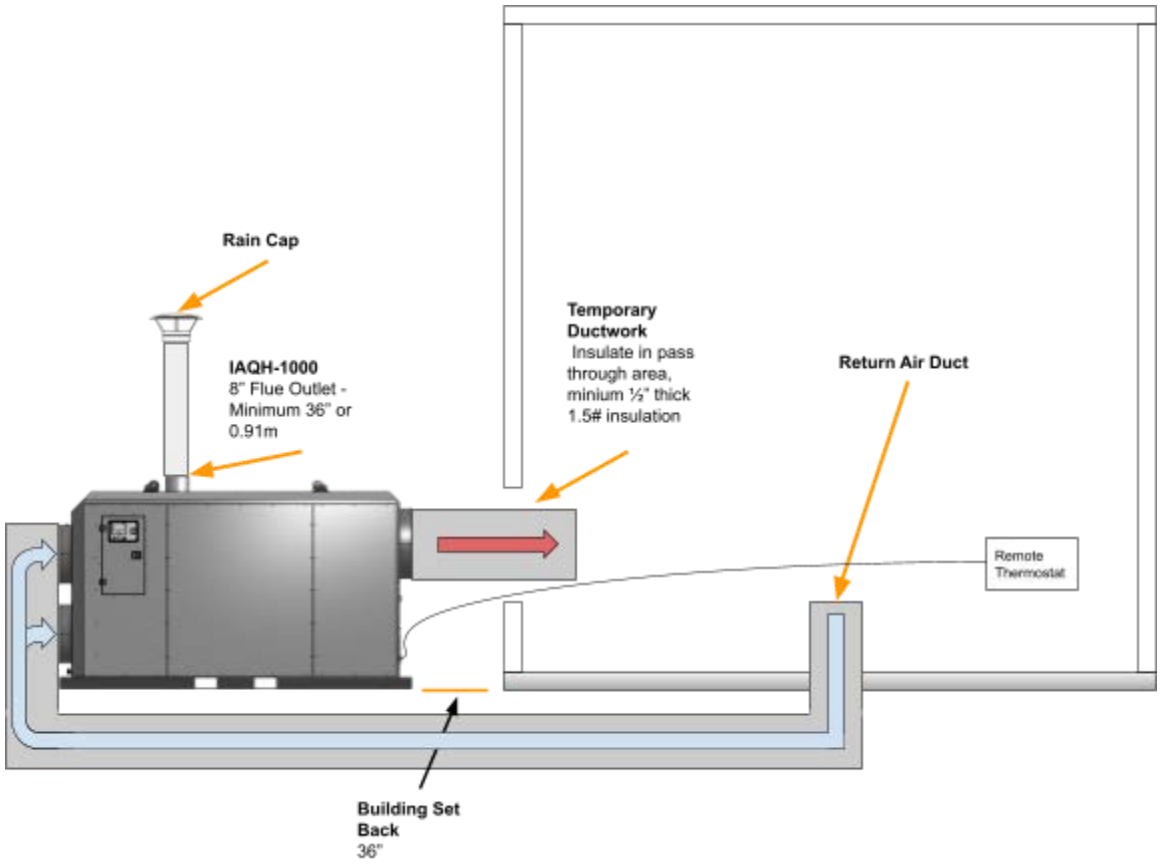
4. Vent pipe should not be run through unheated spaces. If such runs cannot be avoided, utilize insulation on the vent pipe to prevent condensation inside the vent pipe. Insulation should be a minimum of ½" (12.7 mm) thick foil faced fibreglass, minimum 1 ½# density that is appropriately rated for the application

5. Vent pressure must be negative — many construction sites require mechanical ventilation to ensure the building is not under negative pressure

6. The vent must be terminated vertically at the exit point - note this is very important



Exterior Mounted System:



This unit is designed to be mounted externally to the structure it is heating, following all clearance distances found in Section 4.2.2. Ensure the unit is installed onto a non-combustible surface.

To maximize heating system efficiency it is recommended to pull a portion of return air from the structure. Note: Always set up your temporary heating system to overcome any negative building pressure — this typically means having a portion of the heaters on side pulling fresh outside air and forcing it into the structure during temporary heating.

The unit has not been designed to ingest wet or air containing rain or snow - ensure that inlet ducting connections are solid and free from leaks that would allow the ingress of water or debris.

It is recommended that if the heater is being used to draw fresh make up air, that external filtration be provided to the inlet air, and that moisture limiting louvres are installed on the inlet side of these filters.

The exhaust venting chimney must maintain the following clearances from the building area or structure.

Structure / Object	**Minimum Clearance**
Air Intake	0.9m (3’) above and 1.8m (6’) to the side
Combustion air intake from another heater	1.8m (6’) above and 1.8m (6’) to the side
Door, openable window, revolving door or all other openings	1.8m (6’) to the side 0.9m (3’) above
Electrical or gas meter, regulator and relief	1.8m (6’) to the side (Canadian standards) 1.2m (4’) to the side (U.S.A. standards)
Vent outlet from another service	0.9m (3’)
Building or adjacent wall	1.8m (6’) (might have to be increased for horizontal
Sidewalk or parking lot	2.1m (7’) above
Ground vent	0.3m (1’) above snow level
Wall of vent outlet	0.3m (1’) minimum
Roof of vent outlet	0.9m (3’) minimum and 0.6m (2’) above all obstacles within less than 3m (10’)

iii. Installation of IAQH

Required tools:

- Multimeter
- Combustion Analyzer
- 2 x Manometer (s)
- Basic Hand Tools Including: Screwdrivers, Wrenches, Pipe Wrenches

These instructions have been thoroughly written, but they cannot cover every particular installation and contingency. Therefore, if there is any doubt as to the interpretation of any requirements, contact your local authority having jurisdiction, your local dealer, or Eco Power Equipment Ltd.

Read and understand this manual and its safety instructions before using this product. Failure to do so can result in serious injury or death.

1. The installation shall conform with local codes, or, in the absence of local codes, with the National Gas and Propane Installation Code, CSA B149.1 or the National Fuel Gas Code, ANSI Z223.1/NFPA 54.

2. When firing the unit in an enclosed area, ensure fresh air supply to the unit is possible and that the enclosed area is not under negative pressure.

3. Do not operate the unit in partly ventilated areas without a flue pipe connected to the unit.

4. Do not operate the unit in close proximity to combustible materials, surfaces, gasoline, and other flammable vapours and liquids.

5. Install the unit on a level surface with duct connectors facing the target heating area;

    a. Ducting is 24” on the outlet, and 20” on the return air side, ducting should be rated for 150 °C or 302 °F minimum on the outlet, and appropriately for the return air inlet

    b. The maximum rated length of the duct system is 200 feet or 60 m, and this represents the total duct amount, divided between the supply and return portion of the heater.

6. Ensure the unit has the minimum clearance around the perimeter of the machine as described in Section 4.2.2. — more room on the control panel and burner access door to allow easy access to the control panel and burner system for routine inspection and maintenance is recommended.

7. Ensure that the burner intake vents are not blocked and that debris or snow will not enter the enclosure during normal operation.

8. Do not place the unit in close proximity to alternate heat sources. Maintain 6 feet (2 meters) of clearance.

9. Position the unit so that power and gas connections are not in hazardous or high traffic areas.

10. Electrical

    a. This appliance is designed to receive 208 V three phase power with a frequency of 60 hertz — it is important that the supply voltage remains constant and that low and high voltage conditions are avoided.

    b. Size your wire in line with the amperage rating of the circuit, taking into account derating for distances, see cable manufacturer rating for information or refer to CSA C22.1 for additional information as a general reference:

        i. 10 AWG to 50’
        ii. 6 AWG to 100’
        iii. 4 AWG to 200’

    c. The electrical grounding of the appliance shall be in compliance with the National Electrical Code, NFPA 70, or CSA C22.1, Canadian Electrical Code, Part I.

11. Gas Connections

    a. Ensure gas connections are in compliance with the local authority having jurisdiction , or in the absence of local codes CSA B149 or NFPA 54.

    b. Inlet gas train pressure must not exceed 14” W.C — sizing the gas regulation equipment for this equipment is critical to safe and reliable operation.

    c. Sizing of gas supply lines and proper sizing are critical, refer to CSA 149.1 for proper line sizing based on your pressure.

    d. After installation, check the manifold gas assembly for gas leaks by applying a water and soap solution to each connection and observing for bubbles, note in colder weather it is recommended to use a cold weather rated solution

12. Combustion Air

    a. The burner requires combustion air and ventilation air for reliable operation. Assure that the Building and/or combustion air openings comply with National Fuel Gas Code NFPA 54/CSA B149. For appliance/burner units in confined spaces, the room must have an air opening near the top of the room plus one near the floor, each with a free area at least one square inch per 1000 Btu/hr input of all fuel burning equipment in the room. For other conditions, refer to NFPA 31 or CSA B1139-M91.

    b. If there is a risk of the space being under negative pressure or of exhaust fans or other devices depleting available air for combustion and ventilation, the appliance/burner should be installed in an isolated room provided with outside combustion air.

Installation Checklist:

1.	All permits have been acquired based on installation jurisdiction	
2.	Gas Supply pressure is within specification, line sizing is correct and the regulators are appropriately rated for the BTU rating of the appliance as found on the nameplate of the unit	
3.	Fuel supply is a commercial grade, HD5 Propane or 1075 BTU/ft³ NG	
4.	All unions, fittings, and connections are free from leaks and leak tested	
5.	Chimney vent is connected, unobstructed, and meets clearance requirements	
6.	Chimney vent is free of leaks & cracks, and meets layout requirements in 4.2.3	
7.	Duct connections are unobstructed, with minimal bends and restrictions	
8.	Gastrain supports are fully secured and the gas train is stable	
9.	Intake vent is unobstructed, with no ice or debris present	
10.	Heater is level and does not slope any more than 5 degrees in any direction	
11.	Combustion Air Supply meets code requirement	
12.	Electrical connections are in accordance with local authority having jurisdiction and placed in a way to reduce or eliminate trip hazards or risk of damage	
13.	Voltage is within the range specified on the rating plate of the appliance	

Duct Connecting

1. It is recommended to only use Eco Power Equipment brand ducting for your IAQH heater.

    a. Inlet Ducting shall be vinyl type ductings with a minimum 4” pitch for sewn in helical coil, with a cuff and buckle type connections

    b. The Outlet ducting shall be rated at minimum to 300 °F or 148 °C, and have approximately a 6” (150 mm) pitch helical coil, with a cuff and buckle type connections

2. Connect the ducting to the heater, ensuring you have the air flow direction oriented in the correct path

3. TIghten the cuff and buckle connector securely, so as to minimize and eliminate air leakage

4. Route the ducting in such a way that ducting friction loss is reduced, limiting bends and opportunities for air flow to be restricted

5. Note: The intake air of the heater is under higher negative pressure, and kinking or collapse are possible, always stake the ducting and secure it in such a way that this is not possible

NOTE: for optimum efficiency, place the unit as close as possible to the process site and ensure the length of duct is kept to a minimum.

c. How to Commission and Tune the Burner System

i. Training of operators

Contact the factory for operation and service training program information. Ensure that all tasks are performed by qualified individuals, and note that many tasks may be required to be performed by ticked journeyman professionals.

ii. Commissioning the machinery

The following information should only be used by a qualified technician for gas equipment installation with knowledge in electricity, gas and ventilation equipment.

This unit is connected to high voltages and contains moving parts that can start unexpectedly. Electrical shock, severe injury or death could occur if instructions given in this manual are not followed. Always disconnect and lock out power before servicing this equipment. All work should be done by a qualified technician. DO NOT bypass any interlock or safety switches under any circumstances.

Proper commissioning of this equipment is the responsibility of the installing contractor. It is recommended that careful consideration for air ducting installation and design take place. The fans on the unit are capable of system back pressure up to +7" WC. Application back pressure should be considered for heater selection and use. Failure to set up air duct connections can cause injury or death, damage to the equipment, property damage, system operational problems, or be a cause of poor indoor air quality. Please note moisture carryover can also result from improper air flow.

Prior to commissioning:

Ensure the unit is connected to power and that all breakers are turned to the ON position. Once breakers are checked, close the panel and turn the power disconnect to the ON position, and turn the unit toggle switch to ON. Check that the burner control panel's toggle switch is turned to the ON position.

Gas Connection and Burner Setup

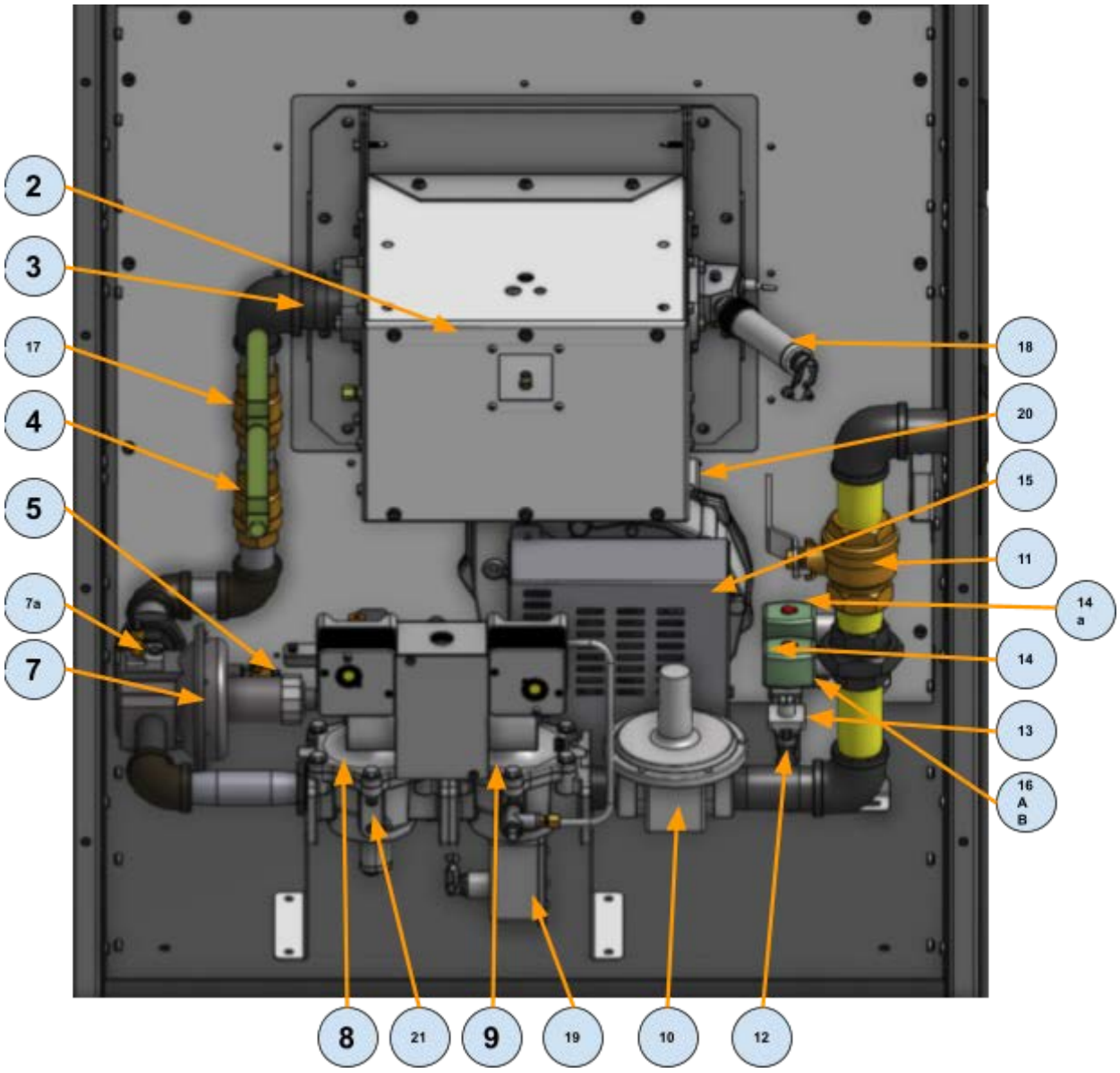


FIgure GT1

Item #	***Part #***	***Description***
1	*2120-01*	*Control Box*
2	*2101-01*	*Burner Housing*
3	*NA*	*Main Gas Manifold Pressure Tap*
4	*NA*	*Manual Firing Valve*
5	*NA*	*Ratio Regulator AIr Pressure Tap*
7	*8614-04*	*Dungs FRG Ratio Regulator*
7a	*NA*	*Low Fire Bypass*
8	*8402-42*	*Main Gas Solenoid 1*
9	*8402-42*	*Main Gas Solenoid 2*
10	*8416-05*	*Main Gas Regulator*
11	*8404-67*	*Main Manual Gas Shutoff Valve*
12	*N/A*	*Supply Gas Pressure Tap*
13	*8400-00*	*Pilot Gas Regulator*
14	*NA*	*Pilot Gas Manifold Pressure Tap*
14A	*N/A*	*Pilot manual shutoff valve*
15	*2117-10*	*Variable Speed Blower*
16A/B	*8402-37*	*Pilot Solenoid Valve*
17	*NA*	*NG LP Gas Selection Valve*
18	*NA*	*UV Scanner*
19	*NA*	*Proof of Closure System*
20	*NA*	*Free Air Adjustment*
21	*NA*	*Main Regulator Test Port*

Step by Step Commissioning Instruction:

1. Use only 1-1/4" NPT gas pipe, the unit is designed for 10 inH20 or 25 mBar or 2.5 kPa inlet pressure operating under load

2. Seal all connections using a thread joining compound approved for natural gas & propane

3. Ensure the orifice selector valve, found in figure GT1, Item number 17 is in the correct position for your selected fuel either natural gas or vapour propane

4. Prior to the first startup, check all connections for leaks:

    a. Tighten all fittings
    b. Close manifold and pilot manual valves
    c. Pressurize system
    d. Test connections with soapy water and watch for bubbles,
    e. Repair joints and repeat as necessary

5. Set inlet pressure to unit while off, the recommended range of 10-14 inH20 (25-35 mBar). It is important to size your gas regulation and line sizes to match the volumes of the heater. During operation, the inlet pressure must not drop below recommended range. See Figure GT1, Item 12.

6. At the main control panel, enter the commissioning password: GASPOWER, then change the HX Control Loop to manual power mode, by pressing the three dots in the top right corner of the control loop widget.

7. On the main control panel, select "Fan Delay" to prevent the fans from blowing during the commissioning process. If they turn on at any point, reselect the "Fan Delay" button.

8. **Purge system**:

    a. Pressurize system

    b. Open the supply tap for 5–10 seconds (item 12). More purge time may be required depending on the gas system design, sizing, and length of new installation

9. **Set Pilot Pressure**:

    a. With the burner and fuel off, install a barb fitting on the 1⁄8" NPT pressure tap downstream of the pilot regulator, this tap is located on the side of the solenoid valve, always pull from the downstream solenoid closest to the burner pilot (See Figure GT1, Item 14)

    b. Use flexible tubing to hook up a manometer to the barb fitting

    c. Open the pilot manual valve

    d. Turn on the heat enable function, this will start the pre purge cycle. After the pre-purge, the pilot valve will open momentarily. Set the pressure to 1.5-2 inH2O (3.7–5 mBar) on natural gas, and set the pressure to 1 inH20 (2.48 mBar) on propane

    Note: if adjustment is necessary the adjustment must be made while the pilot solenoid valve is open and pilot gas is flowing. Keep in mind that on interrupted pilot systems the pilot solenoid valve closes after the main gas is turned on, you may need to cycle the unit on and off multiple times to set this value.

    e. View the burner sight glass with the burner on and inspect the burner for pilot ignition.

10. **Set Low Fire Adjustment**:

    a. Open the manifold manual valve (item 4)

    b. At the main controller, set the power level to 3.1%

    c. Use the sight glass on the burner to view the low fire. If flame is visible through all holes in the burner plate, the lowfire is set within the range of operation of the burner. Use the sight glass on the back plate of the burner to look at the low fire. If light is visible through all of the holes in the burner plate, the low fire is set within the range of operation of the burner. If light is not visible through all of the holes, then the low fire is too low and the low fi re bypass located on the side of the ratio regulator, see Figure GT1 item 7a, needs to be opened (counter-clockwise to open, clockwise to close).

11. **Adjust and Verify Main Gas Regulator**:

    a. Turn the burner up to its maximum firing rate by changing HX Control Loop to manual and power to 100%

    b. Use a manometer to check the inlet pressure on the tee on the upstream side of the pilot regulator, see See Figure GT1, Item 12

    c. Confirm that the inlet pressure remains between the maximum and minimum, for this machine: 7-10 inH20 (17-25 mBar) during the high fire testing

    d. Plug the upstream tee and or use another manometer to check the main gas regulator outlet pressure on the downstream side of the downstream solenoid valve, see See Figure GT1, Item 21, this is also 1/8" NPT

       NOTE: Do not leave the machine in this mode unattended, the unit will continue to heat until the high limit circuit is tripped, the commissioning engineer must watch the system thermal values and ensure to not allow the machine to run for extended periods in this setting.

    e. Set the Main Gas regulator See Figure GT1, Item 10 to be 1 inH20 lower than the upstream side. For example if the inlet is 10 inH20, set downstream to 9 inWC.

12. **Verify the Ratio Regulator Adjustment**

    a. Use a manometer to check the load pressure on the ratio regulator, see See Figure GT1, Item 5

    b. Adjust the burner power until the load line pressure is 2.0 inH20 or 5 mBar.

    c. Check the manifold pressure near where the valve train attaches to the burner, see See Figure GT1, Item 3

    d. Verify that the manifold pressure is 0.8–0.9 inH20 or 2–2.2 mBar on natural gas, and on propane set to 0.3-0.4 inH20 0.74-1 mBar on propane

e. If necessary, turn the screw on the ratio regulator, see Figure Midco 1 below, in order to adjust the manifold pressure. This is done by removing the black plastic cap, and using a flat head screwdriver to adjust the set point. Turn clockwise to increase the pressure.

13. **Set High Fire adjustment**:

a. With the burner off, install a barb fitting on the 1⁄8" NPT pressure tap for manifold pressure test point, See Figure GT1, Item 3

b. Set the burner power to 100%

c. Verify that the manifold pressure is the same as marked on the Burner Rating Label(s) for the actual firing rate, for the IAQH-1000 unit, this should be set at 2.2 inH20 or 5.5 mBar for Natural Gas or 1.2 inH20 or 2.98 mBar for Propane Gas

NOTE: At elevations above sea level increases in manifold pressure settings may be required to achieve full rated input BTU - contact factory for more information

d. If necessary, adjust the Fhi (fan high) setting on the SCEBM-2 module *(Figure RTC)* until the desired manifold pressure is achieved. To adjust Fhi:

i. Press and hold the enter key on the RTC controller to enter the program menu, hold the enter key down for 3 seconds until "APP" is displayed. Use the up and down arrow keys to navigate to the desired parameter as shown in column 1, in this case fHi. To edit a menu parameter, press the right arrow key once on the desired parameter. The current value of the parameter will be displayed. Use the up and down arrow keys again to edit the parameter. Press the enter key to save changes made or press the left arrow key to cancel without saving and return to column 1. If a key is not pressed for 20 seconds or the enter key is held for 3 seconds while in program mode, the control will return to normal mode.

NOTE: Only adjust Fhi settings from factory settings, this number does change with elevation and should be set for each and every installation.

e. *(See figure RTC 2 for a full menu map and layout)*

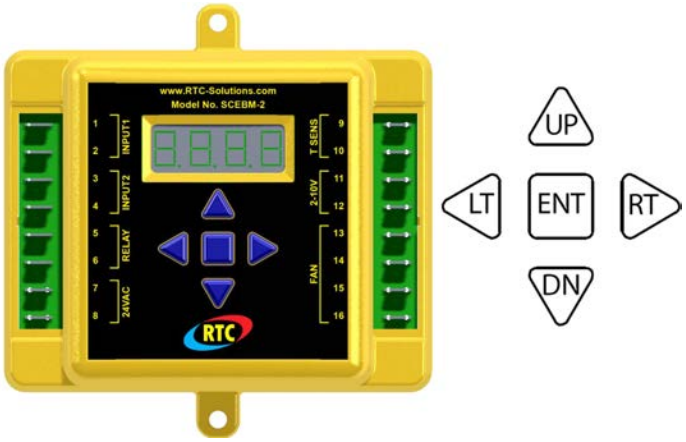
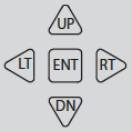


Figure RTC

Figure Midco 1

SCEBM-2 Menu Map

What you want to do	What you see	What it means
Control applications for Variable Air or NOX	APP	Column 1 shows the menu parameters
	vA-A, vA-b, noX	Column 2 shows the factory set defaults for each parameter. Temperature defaults are shown in °F.
	DN▼ UP▲	Arrow Keys:  Up and Down: to navigate or adjust a menu parameter Right: to access column 2 for editing a parameter Left: to return to column 1 without saving a parameter Enter: to return to column 1 with saving a parameter
Set the lowest the user can adjust the temperature to in normal mode for setpoint.	tLo, 40	Low (tLo) can be set from 40°F - 240 °F and must be at least 10°F less than the High. High (thi) can set be from 50°F - 250°F and must be at least 10°F greater than the Low. These will limit how far the user can change the temperature outside of programming mode.
Set the highest the user can adjust the temperature to in normal mode for setpoint.	thi, 90	
Set the minimum percentage the user can adjust the Fan to in normal mode	FLo, 10	
Set the maximum percentage the user can adjust the Fan to in normal mode	Fhi, 100	
Control input modes	inPt, dC, rE, tS	
Override allows the user to manually control the Fan percentage	ovEr, dAbL, EnAb	Setpoint may be adjusted on the main screen with the up and down arrows, then pressing enter to save the selected setpoint.
Select the desired aggression/speed of the PID curve for the valve (Standard, Low, or High).	Pid, Lo, hi, Std	Applications (APP): VA-A is the intermittent piloted burners VA-B is burners with an interrupted pilot NOX is for low nox burners
Set a temperature offset. For examples, to correct for duct losses or sensor calibration errors.	oFS, 0	
Set the control to convert the temperature to display either °F or °C.	ForC, ° F, ° C	Input (inPt) modes: dC: Allows the user to directly control the fan speed with a 2-10V input rE: Allows the user to use an external remote 2-10V input tS: Allows the user to use the built-in onboard setpoint and ignores the 2-10V input
The password may either be enabled or disabled.	PASS, dAbL, EnAb	
View the software version number.	vEr, 1.0	

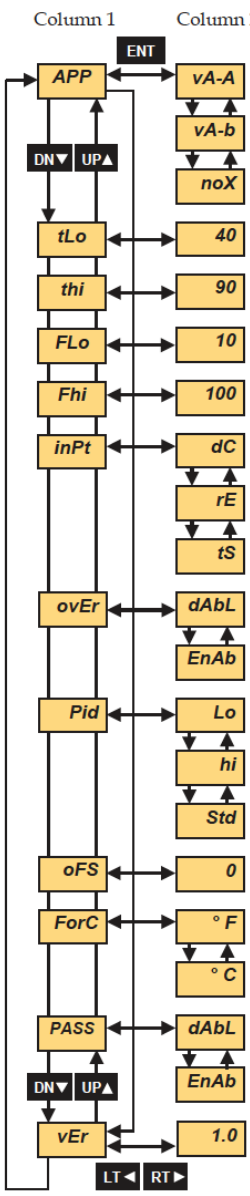


Figure 8.

Figure RTC 2

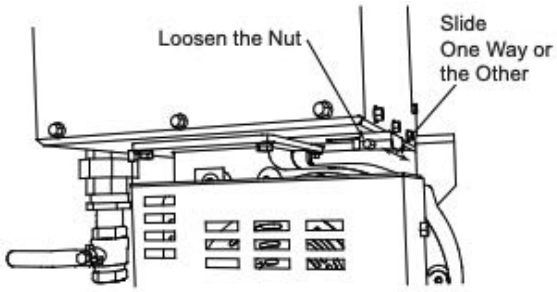
14. Excess Air Adjustment:

    a. If the burner is operated at any firing rate lower than maximum capacity, there is a possibility to have too much excess air.

        i. To increase excess air, loosen the nut on the air orifice plate and slide it outward.

        ii. To decrease the excess air slide the air orifice plate inward.

        iii. Be sure to tighten the nut on the plate.



15. Final Check:

    a. Check the operation of the burner: start and stop several times to check control.

    b. With the burner running, check operation of all limit controls.

    c. Perform the following final adjustments for combustion and flue gas temperature:

        i. Take flue gas samples and temperature immediately upstream of the draft control. The temperature should be above 450 °F but not exceed 650 °F. NOTE: excessive flue gas temperatures will result in low efficiencies. Low temperatures can result in excessive condensation.

        ii. Reduce gas input as necessary to adjust flue temperature.

OPERATION/USE

d. How to Use the Machinery

⚠WARNING

The installation shall conform with local codes, or, in the absence of local codes, with the National Fuel Gas Code, ANSI Z223.1/NFPA 54, or the National Gas and Propane Installation Code, CSA B149.1

i. Heating Mode

1 Turn on the main power disconnect switch, if the ambient temperature is less than 5 °C or 41 °F, wait 10–15 minutes for the control panel heater to bring control system up to operating temperature

2 Turn on the controls ON/OFF switch to the ON position

3 Wait for unit to power up display — this typically takes 30–60 seconds; note in extreme cold weather conditions we recommend you plug in the power and turn on the main power disconnect switch and leave it on for 10–15 minutes to allow the control internal panel heater to come up to temperature and heat all electrical components before turning on the controls ON/OFF switch

4 Setup and deploy remote temperature and humidity sensor probe inside area being controlled; please note: multiple cables can be connected together if required for extra distance, ensure to twist connections together well to prevent moisture from entering the connection, the maximum length is 250 ft or 76 m

5 Set the desired temperature for the space on HX control loop SP (Setpoint) to your desired space temperature

6 Press HEAT ON/OFF button

7 The fan system will automatically turn on once heat in the exchanger area increases, this is to allow for the system to preheat before turning on fans so that only treated air is sent to the heating area

8 The unit will now automatically modulate the heat output to reach the temperature set point (SP) as programmed by the user. The fans on this system never shut off in this operation mode, when the space reaches set point temperature, or as the call for additional heat decreases the unit will automatically decrease heat output temperature according to the maximum output temperature of 158°F or 70 °C. The fans never turn off, however, they do modulate with the demand for heat as the power level demand for the heater drops, the

fans will automatically turn down to maintain optimal efficiency and decrease operating power requirements.

8.1.1 Manual operating techniques

The fan system can be placed into 100% output mode to allow the fans to be at a constant max output.

To do this:

1. Push the FAN ON/AUTO button

8.1.2 Thermostat (Remote) operation

The system is designed to connect a remote thermostat to the system — this remote probe measures temperature and humidity. It has an operating range from -40 °C to 60 °C and displays the temperature and humidity on the operating screen of the heater.

To connect

1. Connect M12 connectors to the probe
2. Connect M12 connector to the heater (located in the front burner compartment)

8.1.3 Manual/Automatic operation

The control loop is normally operated in automatic mode — this mode controls heater output based on heating demand and outlet temperature, automatically scaling BTU input. Manual mode is limited to be used ONLY for commissioning process, or advanced troubleshooting and technical diagnostic work.

To change modes:

1. Click the Menu Button
2. Click Login Button
3. Type in password GASPOWER (all CAPS)
4. Click the home button
5. Click the top right of the HX control l\oop widget (the vertical dots)
6. Change control mode to Manual
7. Change power level to desired output

8. Follow the same process and place the control loop back into AUTO mode

9. **WARNING: This overrides the control loop and can cause the heater to overheat and shutdown, and should only be used by trained personnel for the purpose of commissioning the unit or advanced troubleshooting — the system will automatically switch into manual mode at 0%. The control loop MUST be turned back to auto for proper operation**

8.1.4 Starting/Stopping the product's operation

The system is designed to manage all aspects of the heater operation, see above information for details on operations.

NOTE: It is critical that on shut down of the unit that time is allowed for the cool down cycle of the heat exchanger. Without proper cooling of the heat exchanger expansion and contraction of the heat exchanger can occur at uneven levels causing distortion, heat exchanger damage, even complete heat exchanger failure.

To Properly turn off the unit

1. Press the HEAT ON/OFF button to OFF

2. Ensure Vent ON/OFF is off

3. Wait until fans turn off

4. The unit can now safely be disconnected from power

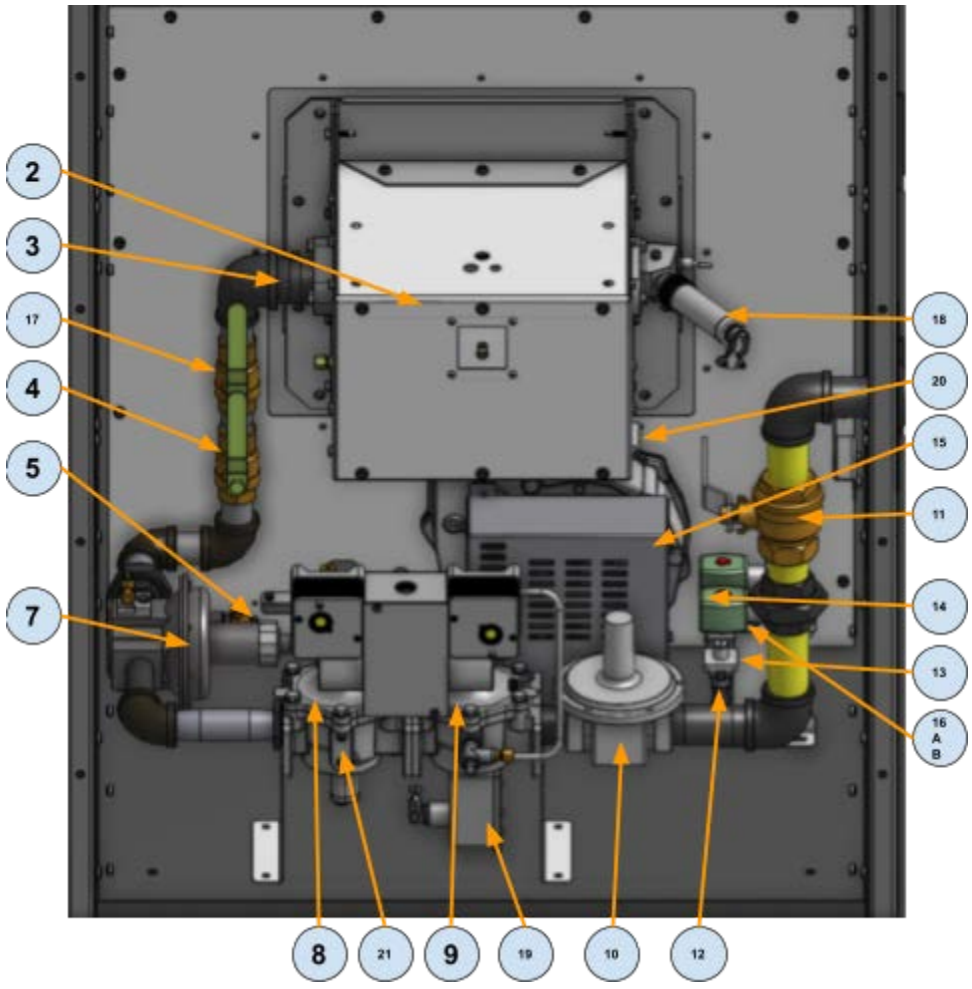
8.2 Switching Between Fuel Sources

8.3 It is common for customers who use the IAQH-1000 heating system to switch between fuel sources as they become available during the construction process. This typically involved starting projects on propane fuel, and switching to natural gas when it becomes available.

The unit is equipped with a quick change lockable orifice valve to switch between fuel orifices. The valve is labeled and includes a lockable connection to allow the position to be set, and locked.

It is very important that the valve be set in the correct position for your fuel selection, ITEM 17 is the orifice valve, and is open for natural gas, and closed for propane operation.

Each time a fuel change occurs, following the section 4.3 startup and commissioning instructions.



8.4 What to Do in Emergency and Exceptional Situations

8.4.1 Emergency Situation

In case of an emergency situation:

1. Turn off gas valve at the gas source, there are also valves at the unit
2. Turn off power by opening source circuit breaker, or main disconnect switch
3. Contact trained personnel

9 MAINTENANCE

⚠WARNING

The IAQH shall only be maintained by a qualified and trained person. Proper annual maintenance is a very important part of maintaining high performance, high reliability heating solutions.

9.1 How to Maintain the Product

9.1.1 Product maintenance by non-skilled persons

9.1.1.1 Cleaning and Storage

Cleaning the unit with standard water and soap, never use a pressure washer in burner compartment or near control panels.

Pressure washers are OK for exterior panels not near the two above areas.

Always ensure to cover and seal the inlet, outlet, and flue venting during seasonal storage.

9.1.2 Product maintenance by skilled persons

9.1.2.1 Maintenance Items

9.1.3 Inspect fans for obstructions

9.1.4 Inspect venting for signs of soot build up or improper combustion

9.1.5 Inspect electrical connections for signs of wear or disconnection

9.1.6 Inspect the burner annually, cleaning and replacing worn items, ensure the ignitor is clean and properly gaped.

⚠WARNING

Make sure to wear appropriate PPE when doing maintenance task. Only use tools as described in section.

9.2 How to Inspect the machinery

9.2.1 Weekly inspection tasks

Task	Action
Inspect for abnormal wear	Review all components
Leak Test Gas Train and Gas System	

9.2.2 Annual Inspection tasks

Task	Action
Heat Exchanger	Review for cracks and leaks
Burner Maintenance	Remove and clean burner and ignition system

10 TROUBLESHOOTING AND REPAIR

10.1 How to Identify and Solve Problems

10.1.1 Troubleshooting and repair by non-skilled persons

⚠WARNING

Our heating systems are designed to deliver high reliability and uptime. The number one and two causes of operational issues are related to fuel or power related issues. It is essential that the proper voltage and gas pressure are maintained to the unit.

Error	Possible Cause(s)	Solution
Controller Does Not Turn On	Blown Fuses, Main Disconnect Open, Loose WIring, Low or Improper System Voltage, Limit Circuit Open	Replace fuses inspect all items in the circuit, close main disconnect, tighten and torque wiring to values found inside panel, use proper rated voltage, review limit circuit vs. wiring diagram
Burner Fault	See full fault listing below	Review screen of BMS and identify source of failure
High Limit Fault	High Limit Condition	Air flow blocked
Heat Output is Low	Controller Set Points, Remote Temperature Set Point	Adjust controller set points to your application requirements

10.1.2 Troubleshooting and repair by skilled persons

⚠WARNING

Advanced diagnostics and troubleshooting should only be done by skilled, qualified professionals who have read and understood this manual, and preferably undergone a detailed factory training program.

IAQH F4T Controller Troubleshooting:

No heat/cool action	Output does not activate load	• Output function is incorrectly set • Control mode is incorrectly set • Algorithm is set off • Output is incorrectly wired • Load, power or fuse is open • Control set point is incorrect • Incorrect controller model for application	• Set output function correctly • Set control mode appropriately (Open vs Closed Loop) • Algorithm is set off • Output is incorrectly wired • Load, power or fuse is open • Control set point is incorrect • Incorrect controller model for application
No Display	No display indication	• Power to controller is off • Breaker tripped • Load, power or fuse is open	• Turn on power • Replace fuse • Reset breaker • Close interlock switch • Reset limit • Correct wiring issue • Apply correct voltage, check part number
Process doesn't control to set point	Process is unstable or never reaches set point	• Controller not tuned correctly • Control mode is incorrectly set • Control set point is incorrect	• Perform autotune or manually tune system • Set control mode appropriately (Open vs Closed Loop) • Set control set point in appropriate control mode and check source of set point: remote, idle, profile, closed loop, open loop
Temperature runway	Process value continues to increase or decrease past set point	• Controller output incorrectly programmed • Thermocouple reverse wired • Controller output wired incorrectly • Short in heater or wiring • Power controller connection to controller defective • Controller output defective	• Verify output function is correct (heat or cool) • Correct sensor wiring (red wire negative) • Verify and correct wiring • Replace heater or repair wiring • Replace or repair power controller • Replace or repair controller
Heater Error	Heater Error	• Current through load is above current trip set point • Current through load is below current trip set point	• Check that the load current is proper. Correct cause of over current and/or ensure current trip set point is correct. • Check that the load current is proper. Correct cause of under current and/or ensure current trip set point is correct.

Current Error	Load Current incorrect	● Shorted solid-state or mechanical relay ● Open solid-state or mechanical relay ● Current transformer load wire associated to wrong output ● Defective current transformer or controller ● Noisy electrical lines	● Replace relay ● Route load wire through current transformer from correct output, select the output that is driving the load. ● Replace or repair sensor or controller ● Route wires appropriately, check for loose connections, add line filters
Menus inaccessible	Unable to access screens or particular parameters of interest	● Security set to incorrect level	● Verify password accuracy ● Login using appropriate credentials

Burner Management System Panel Troubleshooting Guide

LME Burner Management System

The LME7 has an extensive list of fault codes to help clarify the nature of any fault. The next pages describe every fault code in detail and give guidance on how to correct it.

When a fault occurs, the LME7 will alternate between displaying “Loc” and the fault number.

The fault history is stored in the 700 set of parameters. These are only accessible with an AZL23 remote display or through the ACS410 software. To access the 700 set of parameters on the AZL23, press and hold the info button until “SEr” is displayed, then let go. The LME7 stores the last 11 fault codes:

Parameter 701 displays information about the current status of the LME7.

Parameter 702 displays information about the most recent fault.

Parameter 703 displays information about the second most recent fault.

Parameter 711 displays information about the 10th most recent fault.

Each fault code listed has indexes that provide additional information about the fault:

Index 00 = Fault code

Index 01 = Start number

Index 02 = Phase

Index 03 = Load

Index 01 will display a value of "._._". This means that the AZL23 display ran out of room to display the start number. When this happens, hold down the info button to display the value.

An example of how the AZL23 displays a fault code in the fault history is shown below:

Navigating the Fault History

To navigate the fault history, use the following keystrokes on the AZL23.

• When the parameter number is flashing, press the "+" or "-" button to cycle through the list of faults (parameters 701-711).

• When the parameter number is flashing, press and hold the info button to move the cursor from the parameter number to the index number. This will cause the index number to begin flashing.

• When the index number is flashing, press the "+" or "-" button to cycle through the list of indexes (00-03).

• When the index number is flashing, press the "+" and "-" buttons together to escape and move the cursor from the index number to the parameter number. This will cause the parameter number to begin flashing.

Resetting Faults on the LME7 Burner Control

Faults can be reset in one of three ways on the LME7… burner control:

1. Pressing the info button on the LME7 burner control for 1-3 seconds.

Note: Pressing the info button for less than one second has no effect. Pressing the info button for more than three seconds places the LME7 into diagnostic mode.

2. Pressing the info button on the AZL23 remote display until the word “rESET” appears, then releasing.

Note: Releasing the info button before the word “rESET” appears has no effect.

Pressing the info button too long accesses the “InFo” menu.

3. Pushing the burner reset button the main control panel of the unit, note pushing this for less than one second has no effect.

Accessing the Service (SEr) Menu

The service (SEr) menu contains the fault history as well as the 900 series of parameters that

are used for diagnostic purposes, such as flame signal (954) and incoming voltage (951).

1. From the home screen (OFF), press and hold the info button until the word “SEr” is displayed, then release the button. The word “InFo” will briefly be displayed before “SEr”.

2. Press the + or - button to navigate through the parameters in the “SEr” menu.

3. When finished, press the “+” and “-” buttons together to escape.

Figure 7-1: LME7 Fault History Example with Indexes

LME7 BMS Complete Fault Code List

Fault Code	Description of the Fault	Corrective Action
2	No flame at start-up	A flame failure occurred during light off. 1. Check the wiring of the ignition transformer, pilot valve, and main valve(s). 2. Ensure manual shutoff valves on the pilot gas line and main gas line are open. 3. Check the fuel / air ratio at light off. 4. Check the flame detector signal in the presence of a known flame source. Replace the flame detector if it does not produce the anticipated signal.
3	Air pressure switch open	The air pressure switch connected to terminal X3-02.1 is open, causing a fault. Ensure the setpoint of the switch is set to an appropriate value. Check the wiring of the air pressure switch. If no air pressure switch is being used, place a jumper from terminal X2-01.3 to X3-02.1.
4	Extraneous light	An extraneous light (flame signal present when there should be none) fault occurred. 1. Ensure that the source of light is not a flame. If it is, take corrective action immediately. 2. Ambient light can cause an extraneous light fault. Ensure the flame scanner is viewing a dark area. 3. UV scanners typically fail on, giving a false flame signal. Remove the UV scanner and cover the bulb to ensure it is not seeing any light. Look inside the bulb and see if any purple arcs of electricity are occurring between the electrodes in the bulb. If there are, replace the UV scanner.
5	Air pressure switch closed	The air pressure switch connected to terminal X3-02.1 is closed before the blower output is energized in phase 22, causing a fault. Ensure the setpoint of the switch is set to an appropriate value. Check the wiring of the air pressure switch. If no air pressure switch is being used, place a jumper from terminal X2-01.3 to X3-02.1.

6	Actuator position fault	The required position feedback from the connected SQM… actuator was not received. 1. Ensure the potentiometer on the SQM… actuator is wired correctly. -For counter-clockwise actuators (SQM40…, SQM50…), terminal "c" on the potentiometer should be wired to terminal X66.1 on the LME7, and terminal "a" on the potentiometer should be wired to terminal X66.3 on the LME7. -For clockwise actuators (SQM41..., SQM50...R), terminal "a" on the potentiometer should be wired to terminal X66.1 on the LME7, and terminal "c" on the potentiometer should be wired to terminal X66.3 on the LME7. 2. Ensure the SQM... actuator is wired properly to the LME7, especially the position feedback on terminal X2-09.4 of the LME7. 3. Ensure no mechanical stops are preventing the actuator from reaching its expected position. 4. While not common, heavy vibration on the actuator can wear a track in the position feedback potentiometer. If the fault always occurs at the same actuator position, the actuator may need to be replaced, and the vibration needs to be reduced to avoid having a similar issue with the new actuator.
7	Loss of flame	A flame failure occurred during normal operation. 1. Check the fuel / air ratio. 2. Check the flame detector signal in the presence of a known flame source. Replace the flame detector if it does not produce the anticipated signal.
10	Wiring or other error	This fault is a catchall and can be caused by a variety of issues. See Section 7-3 for a list of all known causes of this fault. If none of the causes listed in Section 7-3 appears to be the cause, review all wiring on the LME7 and check to see if a wire is landed on an incorrect terminal.
12	Fuel valve V2 leaking (PME73.840A1) Fuel valve V1 leaking (all other PME7s)	On PME73.840A1, the downstream gas valve V2 failed valve proving. On all other PME7 program modules, the upstream gas valve V1 failed valve proving. 1. Bubble test the gas valve to ensure the valve is not leaking. If the valve is leaking, replace the valve. 2. Ensure that the setpoint of the valve proving pressure switch is set to 50% of the inlet pressure to the upstream gas valve.

13	Fuel valve V1 leaking (PME73.840A1) Fuel valve V2 leaking (all other PME7s)	On PME73.840A1, the upstream gas valve V1 failed valve proving. On all other PME7 program modules, the downstream gas valve V2 failed valve proving. 1. Bubble test the gas valve to ensure the valve is not leaking. If the valve is leaking, replace the valve. 2. Ensure that the setpoint of the valve proving pressure switch is set to 50% of the inlet pressure to the upstream gas valve.
14	Proof-of-closure (POC) switch failure	The POC switch is not in the expected state. If a POC switch exists, ensure it is wired to terminal X2-02.4 on the LME7. On an LME75 burner control, the source of power to the common side of the POC switch must come from terminal X2-02.3. If no POC switch exists, either set parameter 237 to 0 or install a jumper between terminals X2-02.3 and X2-02.4.
20	Gas pressure fault	One of the gas pressure switches wired to terminal X5-01.2 opened, causing a fault. It is common for both the high and low gas pressure switches to be wired to terminal X5-01.2, so the fault could be either a high gas or low gas event. Check the gas supply and open any manual shutoff valves. Check the wiring of all gas pressure switches. Check the setpoint of any gas pressure switches to ensure the setpoint is set to an appropriate value.
21	High gas pressure fault	The high gas pressure switch wired to terminal X2-02.4 (PME75.811A1) or X9-04.2 (PME75.812A1) opened, causing a fault. Check the wiring of the high gas pressure switch. Check the setpoint of the high gas pressure switch and ensure it is set to an appropriate value. Check pressure regulators for ruptured diaphragms or incorrect setpoints.
22	Safety loop open	Check all of the switches wired into the safety loop on terminal X3-04.1. One of the switches opened, causing the fault. Fix the condition that caused the switch to open and reset the fault.
60	Analog input out of range	The 4-20 mA input connected to terminal X65 is out of range. This input determines the position of the actuator or speed of the PWM blower. Check the wiring of the analog input. If a fault is not desired when the input drops below 4 mA, set parameter 654 to a 5.

83	PWM blower speed fault	The speed of the PWM blower does not match the expected speed. More specifically, the blower speed fell outside of tolerance band 1 (parameter 650.00) for a time longer than the maximum speed deviation allowed (parameter 660), or the blower speed fell outside of tolerance band 2 (parameter 650.01). There are many possible corrective actions: 1. Increase ramp time up (parameter 522) and/or ramp time down (parameter 523) to allow the blower more time to achieve the expected speed. 2. Increase the setting of tolerance band 1 (parameter 650.00) and/or tolerance band 2 (parameter 650.01). 3. Ensure that the maximum fan speed (parameter 519) and the number of pulses per revolution (parameter 644) are set correctly for the blower being used. 4. Inspect wiring from PWM blower to LME7 to ensure the tachometer speed feedback signal is wired correctly.
138	Restore process successful	There is no fault. This fault occurs when a parameter set was successfully restored from the PME7 program module to the LME7 base unit. Reset the fault.
139	No program module detected	This fault occurs when no PME7 program module is plugged into the LME7 base unit. Insert a PME7 program module into the LME7 base unit and reset the fault.
167	Manual lockout	A manual lockout is caused by pressing the info button and any other button, either on the LME7 base unit or on the AZL23 remote display. Reset the fault.
206	Inadmissible combination of units (LME7 / AZL23)	Reset the LME7. If the fault occurs continuously, replace the LME7 and / or AZL23.
225	PWM blower speed fault	The speed of the PWM blower dropped below the minimum prepurge speed (parameter 675.00) during prepurge, or the speed of the PWM blower exceeded the maximum ignition speed (parameter 675.01) during ignition. Adjust parameter 675.00 or 675.01, or adjust purge speed (503.01) or ignition speed (403.00).
226	PWM blower parameterization error	The following parameter settings are not allowed. Correct the parameter setting that is incorrect and reset the fault. 1. Speed low-fire (P1) > speed high-fire (P2) 2. Speed low-fire (P0) = 0 3. Maximum blower speed (parameter 519) = 0

227	PWM blower parameterization error	One or more PWM blower settings are not compatible. Make sure the following three conditions on the minimum and maximum speed settings are met. 1. 516.00 ≤ P0 ≤ 516.01 2. 517.00 ≤ P1 ≤ 517.01 3. 518.00 ≤ P2 ≤ 518.01
rSt Er1	Incompatible PME7 and LME7	The PME7 program module and LME7 base unit being used are incompatible. PME71 program modules are only compatible with LME71 base units, PME73 program modules are only compatible with LME73 base units, and PME75 program modules are only compatible with LME75 base units.
rSt Er2		
rSt Er3	Fault during restore process	The PME7 program module was removed during the restore process. Re-install the PME7 program module and reset the fault to complete the restore process.
bAC Er3	Fault during backup process	The PME7 program module was removed during the backup process. Re-install the PME7 program module and reset the fault. Perform the backup process again.
Err PrC	No program module detected	This fault occurs when no PME7 program module is plugged into the LME7 base unit. Insert a PME7 program module into the LME7 base unit and reset the fault.

10.2 DISPOSAL

10.3 How to Dispose the Product

To dispose the product:

1. Review all components and dispose / recycle in line with your local guidelines and laws

10.3.1 Disposal of electronic components

The symbol on the product, the accessories or packaging indicates that this device shall not be treated as unsorted municipal waste, but shall be collected separately! Dispose of the device via a collection point for the recycling of waste electrical and electronic equipment if you live within the EU and in other European countries that operate separate collection systems for waste electrical and electronic equipment. By disposing of the device in the proper manner, you help to avoid possible hazards for the environment and public health that may otherwise be caused by improper treatment of waste equipment. The recycling of materials contributes to the conservation of natural resources. Therefore do not dispose of your old electrical and electronic equipment with the unsorted municipal waste.

RELATED DOCUMENTATION

#	Document Title	Version #
1	IAQH-1000: Electrical Schematics	Rev. A
2	Technical Instructions LME-1000	June 11,2019
3	Midco Unipower VA Series Installation and Service Manual	8471 95
4	F4T® Controller Setup and Operations User Guide	1680-2414 Rev. D
5	IAQH Installation Form and Checklist	Rev A.

INSTALLATION FORM & CHECKLIST

Job Location:

Technician Name:

Unit Model Number:

Unit Serial Number:

Job Elevation:

System Voltage Off:

System Voltage Full Load:

Gas Type:

Inlet Gas Pressure with Machine Off:

Inlet Gas Pressure at High Fire:

Set Air Ratio Regulator for appropriate fuel (Propane or Natural Gas, see section 4.3)

Manifold Pressure @ High Fire:

Checklist

- ☐ Unit Clean and Fully Assembled:
- ☐ Air Ducts clear and clean, sensors mounted and tight
- ☐ Warn personnel of impending startup
- ☐ Leak test all gas components
- ☐ Electrical connections tight, appropriate wire size connected to the unit, unit grounded in accordance with local electrical regulations
- ☐ Pull test all wiring and visual inspection of electrical items
- ☐ Tune Low Fire Bypass

Combustion Analysis

O2	
CO	
CO2	
Efficiency	
Stack Temperature	
Ambient Temperature	
Excess Air	

11 WIRING DIAGRAMS

For high resolution wiring diagrams, scan the QR code fixed to your specific unit or visit:

Http://www.ecopowerequip.com/iaqh-1000man

Wiring Diagrams are confidential and proprietary to Eco Power Equipment Ltd - do not duplicate or distribute without express written permission.

Note: Always ensure that you scan and reference your specific unit and have the correct drawing revision.

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