

Operator's Manual

HER 400
HER 750



Indirect-fired air heaters

HER 400
HER 750



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1. Foreword

1.1 Product identification

This operator's manual refers to the following Munters products:

- HER 400
- HER 750

1.2 Product description

Indirect-fired air heaters, equipped with:

- Stainless steel combustion chamber and heat exchanger
- Centrifugal blower
- Oil or gas burner
- Electrical control box
- Safety and control devices

1.3 Product documentation

- Operator's Manual (this document)
- Burner Instruction Manual
- Spare Part List Booklet

Always keep a copy of the product documentation with the heater for future reference.

Should you miss any of the above listed documents, please contact Munters to get a replacement.

When ordering parts or requesting service information, please provide the machine model number and serial number.

1.4 Intended use

Primary intended use:

- temporary heating and drying in buildings under construction, repair or restoration

Other intended uses:

- heating of large temporary structures for events, exhibitions, meetings, conventions
- heating of large factory sites, warehouses, workshops, exhibition halls, sport facilities
- heating of emergency/first aid/military structures and installations
- heating and drying of structures, buildings and areas affected by weather or other natural calamities
- frost protection and de-icing of machinery on worksites

Do not use the heater for any other purpose or application. In doubt, contact Munters' Customer Service. Using the product in any unauthorized way could:

- permanently damage the machine
- seriously injure the operator or other people
- cause property damage or loss

Any damage to the heaters caused by improper or unauthorized use will be not covered by warranty.

The HER heaters are suitable for both indoor and outdoor installation.

The HER heaters are not intended for the heating of residential domestic premises.

1.5 Residual risks

The HER heaters are designed and manufactured in compliance with the latest safety standards. Residual risks for heaters may include:

- contact with hot surfaces, such as air outlets, air ducts, exhaust gas ducts
- exposure to fuel and fuel vapours

Improper installation or use may expose users to additional risks, including:

- exposure to combustion emissions
- contact with hot exhaust gases
- electrocution
- injury from contact with moving parts

All these risks may be avoided by proper installation, use and maintenance of the heaters. Therefore, to protect yourself and others, thoroughly read, understand and strictly obey all the instructions and warnings contained in this manual.

1.6 Modifications

Any alteration or modification of settings, parts, wiring, accessories made without written authorization by Munters may:

- create serious injury, damage or property loss to the operator and other people in the working area
- permanently damage the product and invalidate warranty

1.7 Disclaimer

Munters reserves the right to make technical modifications to its products, for any reason, even without notice.

The information contained in this manual refer to products manufactured at the date of issue. Munters reserves the right to modify any part of this document without notice.

2. Safety Information

2.1 Signal words



This is the international SAFETY ALERT symbol. It is used to alert you to potential personal hazards. Strictly obey all safety messages that follow this symbol.



DANGER

"DANGER" indicates a hazardous situation which, if not avoided, **will** result in **death or serious injury**.

To avoid death or serious injury from this type of hazard, strictly obey all safety messages that follow this signal word.



WARNING

"WARNING" indicates a hazardous situation which, if not avoided, **could** result in **death or serious injury**.

To avoid possible death or serious injury from this type of hazard, obey all safety messages that follow this signal word.



CAUTION

"CAUTION" indicates a hazardous situation which, if not avoided, **could** result in **minor or moderate injury**.

To avoid possible minor or moderate injury from this type of hazard, obey all safety messages that follow this signal word.

2.2 General safety warnings



WARNING

Read instructions carefully. Read and follow all instructions. Place instructions in a safe place for future reference. Do not allow anyone who has not read these instructions to assemble, light, adjust or operate the heater.

If the information in this manual is not followed exactly, a fire or explosion may result causing property damage, personal injury or loss of life.

All maintenance and repair must be performed by a trained service technician under the guidelines of any governing authority or licensing requirement.

Heaters use air (oxygen) from the area in which they are used. Adequate combustion

and ventilation air must be provided. Refer to instructions.

 **WARNING**

The heater to which this manual refers is designed to function with Fuel Oil (Diesel) No. 1 and No. 2, Natural Gas or Propane burners. The burner operator's manual is an integral part of the product documentation. Read the burner operator's manual carefully before installing, operating or servicing the heater. Qualified personnel is required to connect the heater to any external fuel supply system (diesel tank, gas network, gas tank, etc.) following all instructions contained in this manual and in the burner operator's manual.

 **WARNING**

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

 **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**

Combustion by-products produced when using this product contain Carbon Monoxide, a chemical known to the State of California to cause cancer and birth defects (or other reproductive harm).

 **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, LABELS, ETC. CONTACT THE MANUFACTURER.

 **WARNING**

YOUR SAFETY IS IMPORTANT TO YOU AND TO OTHERS, SO PLEASE READ THESE INSTRUCTIONS BEFORE YOU OPERATE THIS HEATER

 **WARNING**

NOT FOR HOME OR RECREATIONAL VEHICLE USE

- The HER heaters are designed and approved for use as construction heaters in accordance with the Standard ANSI Z83.7 – CGA 2.14. CHECK WITH YOUR LOCAL FIRE SAFETY AUTHORITY IF YOU HAVE QUESTIONS ABOUT APPLICATIONS. Other standard govern the use of fuel gases and heat producing products in specific applications. Your local authority can advise you about these.

- Adequate ventilation must be provided.

 **WARNING**

MAINTAIN THE FOLLOWING MINIMUM CLEARANCES BETWEEN HEATER AND COMBUSTIBLE MATERIALS, WALLS, CEILINGS, ETC:

FRONT:	10 ft	(3.0 m)
REAR:	6 ft	(1.8 m)
SIDES:	4 ft	(1.2 m)
TOP:	4 ft	(1.2 m)

- Electrical grounding of the appliance shall be in compliance with the National Electrical Code ANSI/NFPA 70 or CSA C22.1 Canadian Electrical Code, Part I.
- Installation shall conform with local codes or, in the absence of local codes, with the national Fuel Gas Code ANSI Z223.1/NFPA 54, the Storage and Handling of Liquefied Petroleum Gases, ANSI/NFPA 58, the Natural Gas and Propane Installation Code, CSA B149.1 and, for use with fuel oils (diesel), with the Installation Code for Oil-Burning Equipment CSA B139.
- The heater shall not be directed toward any propane-gas container within 20 feet (6 m).
- An indirect air heaters may operate indoors so long as the combustion gas is ducted outside through an approved vent.
- When an INDIRECT-FIRED heater - connected to a flue pipe - is used in a closed room, provide a minimum opening area of 1 ft² per US gallon capacity at the unit level.
- When an INDIRECT-FIRED heater - NOT connected to a flue pipe - is used in a closed room, provide a minimum opening area of 3 ft² per US gallon capacity at the unit level and a continuous, natural air circulation through windows and doors.
- The heater must be located at least 20 ft (6 m) from any propane gas container.
- The gas shall be turned off at the propane supply container when the heater is not in use.
- When the heater is to be stored indoors, the connection between the propane supply container(s) must be disconnected and the container(s) removed from the heater area and stored in accordance with the Standard for the Storage and Handling of Liquefied Petroleum Gases; ANSI/NFPA 58 and CSA B149.1, Natural Gas and Propane Installation Code.

 **WARNING**

COMBUSTION GAS IS PRODUCED BY THE HEATER; COMBUSTION GAS VENTING MUST CONFORM TO ALL APPLICABLE CODES AND REGULATIONS. COMBUSTION GAS CONTAINS CARBON MONOXIDE, A COLORLESS, ODORLESS AND DEADLY GAS.

 **WARNING**

CONNECTION TO NATURAL GAS OR PROPANE NETWORK MUST BE PERFORMED ONLY BY QUALIFIED PERSONNEL WHO POSSESS CERTIFICATIONS OR LICENSING PERTINENT TO THAT STATE, LOCAL OR PROVINCIAL AS REQUIRED BY LAWS OR CODES.

 **WARNING**

HOT EXHAUST GASES COULD START A FIRE. DO NOT USE THE EQUIPMENT IN AREAS WHERE FLAMMABLE OR EXPLOSIVE MATERIALS OR ANY OPEN FLAME MAY BE PRESENT.

2.3 Safety labels

Label	Contents
Nameplate	<ul style="list-style-type: none"> • Model No • Serial No • Manufacturing year • Weight <p>Record serial no. and keep it a safe place.</p>
Specification plate	<ul style="list-style-type: none"> • Electrical ratings • Airflow/pressure ratings • Natural gas/propane/diesel ratings • Approval markings and standards <p>See also Operator's Manual, par. 7.</p>
Hot surface warning label	<ul style="list-style-type: none"> • Indicates a surface that may be hot during or after operation <p>Do not touch hot surfaces. If needed, use suitable personal protective equipment (PPE).</p>
Hazardous voltage warning label	<ul style="list-style-type: none"> • Indicates a potential electrocution risk due to contact live parts <p>Do not open an enclosure or remove a guard marked with this warning.</p>
Crushing hazard label	<ul style="list-style-type: none"> • Indicates a potential crush and cut risk due to contact with moving or rotating parts <p>Operators: Do not open an enclosure or remove a guard marked with this warning. Service personnel: unplug the heater before opening or removing a guard marked with this warning</p>
Reset label	<ul style="list-style-type: none"> • Indicates a reset pushbutton. <p>In case of lock-out, check and correct the cause(s) of lock-out before resetting the unit.</p>

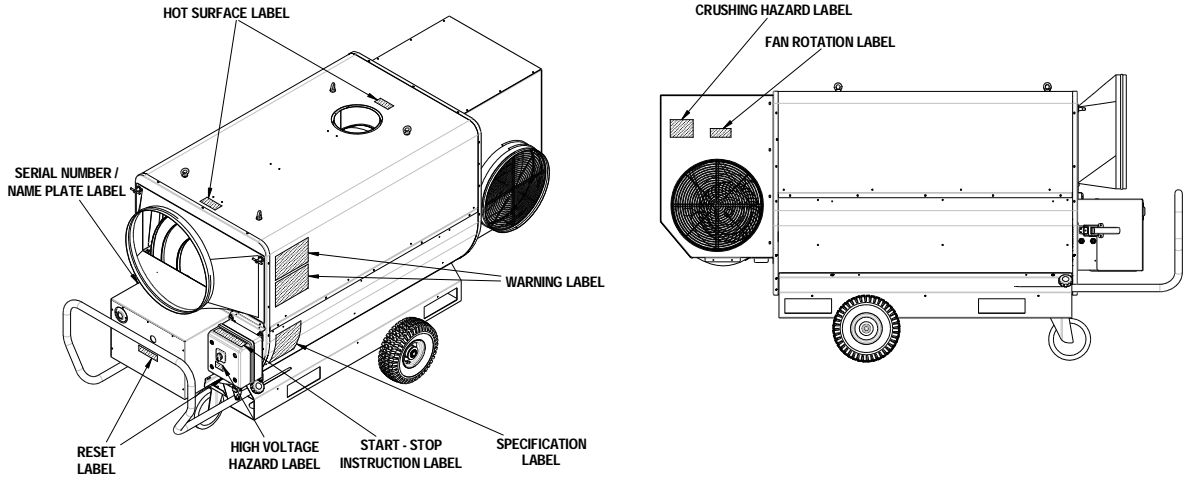


Fig. 2.3.1 Label Location - HER 400

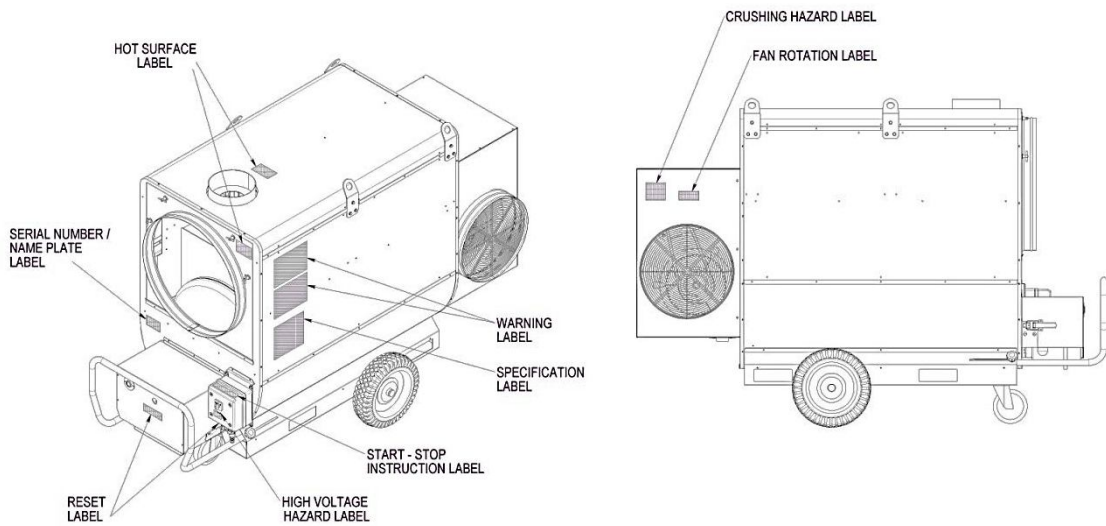


Fig. 2.3.2 Label Location - HER 750

2.4 Product compliance

The HER 400 and HER 750 are CSA approved according to the following standards:

- CSA B140.0
- CSA B140.8
- UL 733

3. Preliminary operations

3.1 Unpacking and lifting

The HER units are delivered in a carton box on a pallet.

- Transport the packed unit to the desired location, using a properly rated and approved forklift truck.



WARNING

Crushing hazard.

Never stand under or on top of a unit while lifted or transported.

Transport and lay down the unit on flat and level ground surfaces only.

Follow all safety procedures for the handling of palletized goods.

- Remove all packaging materials from the unit
- Check the unit for damage. If you see any damage damaged, do not use the heater. Contact your dealer for assistance.
- Check the loose items included with the unit are all present. If not, contact your dealer for assistance.

LIST OF LOOSE ITEMS – HER 400

DESCRIPTION	QUANTITY
Axle cap D.20 mm	2
Seeger ring D.20 mm	2
Toothed lock washer M8	4
Washer M8	4
Washer M6	8
Screw M8x16	4
Screw M6x16	8
Spacer D.25 mm L 20 mm	2
Washer D.60x20 mm	4
Wheel fixing tool	1
Eyebolt M8	4
Washer for eyebolt	4

LIST OF LOOSE ITEMS – HER 750

DESCRIPTION	QUANTITY
Toothed lock washer M8	10
Washer M8	10
Screw M8x16	10
Locking wheel seeger D.25 mm	2
Washer Ext. D. 65 mm Int. D. 26 mm	2

ASSEMBLING EYEBOLTS (HER 400) OR LIFTING BRACKETS (HER 750)

HER 400 (Fig. 3.1.1)

- Screw the four lifting eyebolts supplied into the threaded insert on top of the unit, using the supplied washers.

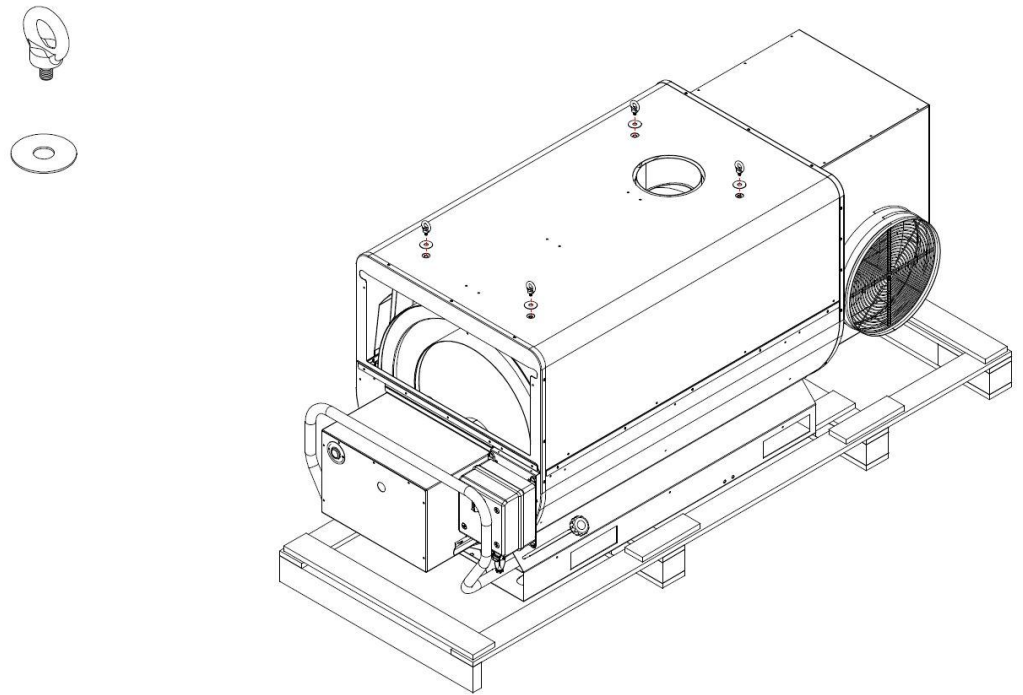


Fig. 3.1.1

- Orient the eyebolts in line with the slings. If the load is applied sideways, the eyebolts may be overstressed.
- Pack washers between the eyebolt and the load surface to ensure that the eyebolt firmly contacts the surface. Ensure that the eyebolt is properly torqued.
- Engage at least 90% of threads in receiving hole when using washers.

HER 750 (Fig. 3.1.2)

- Connect the four lifting brackets supplied to the side inserts using 3 screws and washers for each bracket.
- Make sure the fixing screws are properly torqued.

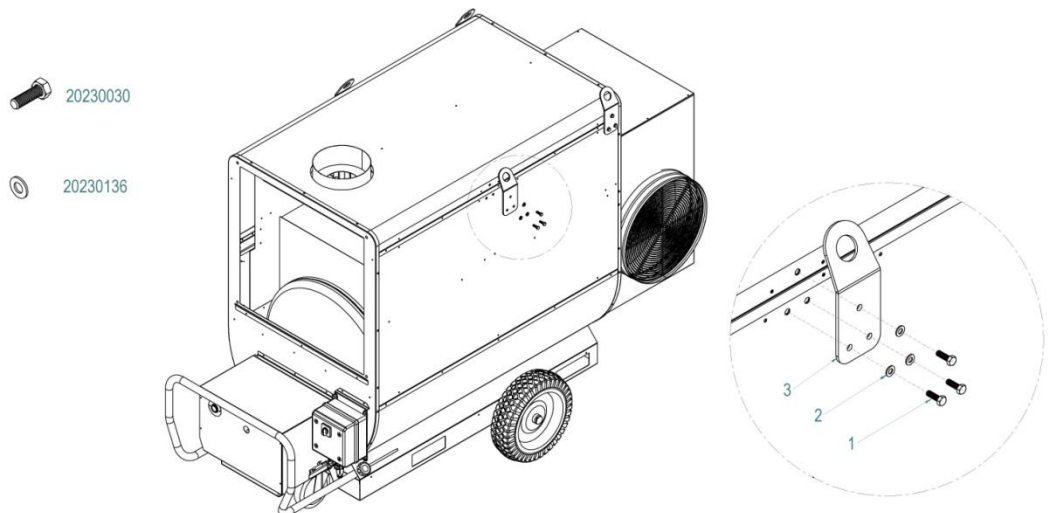


Fig. 3.1.2

LIFTING

- To assemble axle and wheels, lift the heater as necessary, using a properly rated and approved lifting equipment (crane or hoist).

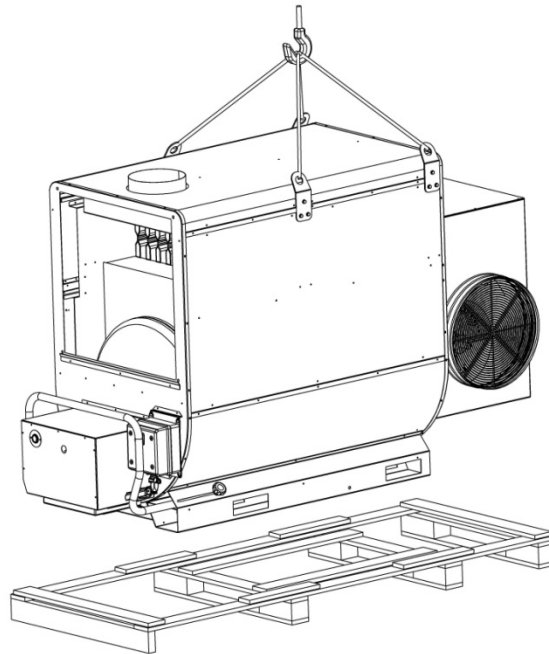


Fig. 3.1.3

- For other lifting and transportation purposes, insert the forks of a suitably rated forklift truck into the fork pockets on the unit and lift the heater as needed.



DANGER

Crushing hazard.

If the lifting equipment fails or the unit is unstable, crushing or other major injury may occur.

Never stand under or onto a unit being lifted.

Use only the recommended lifting points and lifting procedures.

Check for stability and balancing before starting any further operation.

EYEBOLT LIFTING GUIDELINES

- Connect the lifting device to the lifting eyebolts or brackets, using chains, shackles and hooks, or swivel hoist rings.
- Attach only one sling leg to each eyebolt or lifting bracket.
- Before lifting, inspect the eyebolts or lifting brackets for damages or flaws.
- Use eye bolts and lifting brackets with slings at an angle greater than 45°.
- Do not force the slings through eyebolts.
- Do not paint eyebolts. The paint could cover up flaws.
- Do not force hooks or other fittings into the eye. They must fit freely.
- Do not shock load eyebolts.
- Do not use eye bolts with worn threads or other flaws.
- Do not insert the point of an open hook directly into an eye bolt. Use a hook with safety latch or a shackle.

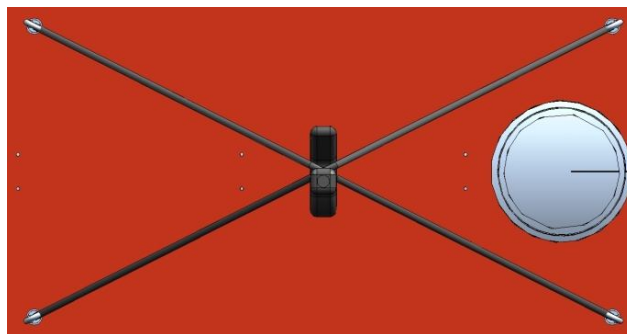
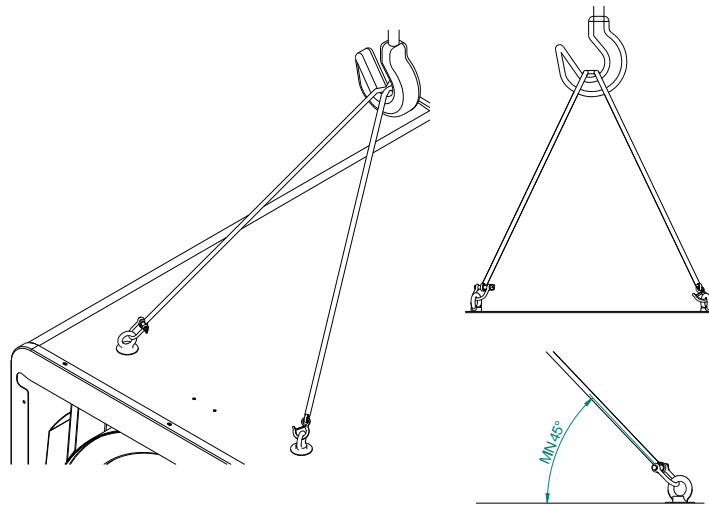


Fig. 3.1.4 HER 400 Top View

3.2 Axle and wheel assembling

- Check that the lifted unit is stable and balanced.

HER 400 (Fig. 3.2.1)

- Connect the axle assembly to the support frame supporting using four screws and washers on each side
- Place in order: 1 spacer, 1 washer, 1 wheel, 1 washer, 1 wheel locking cap on each side of the axle
- Secure the assembly using the special tool supplied and a hammer
- Attach the front pivoting wheel to the support frame using the 4 screws, and washers supplied.
- Lower the unit carefully and check stability

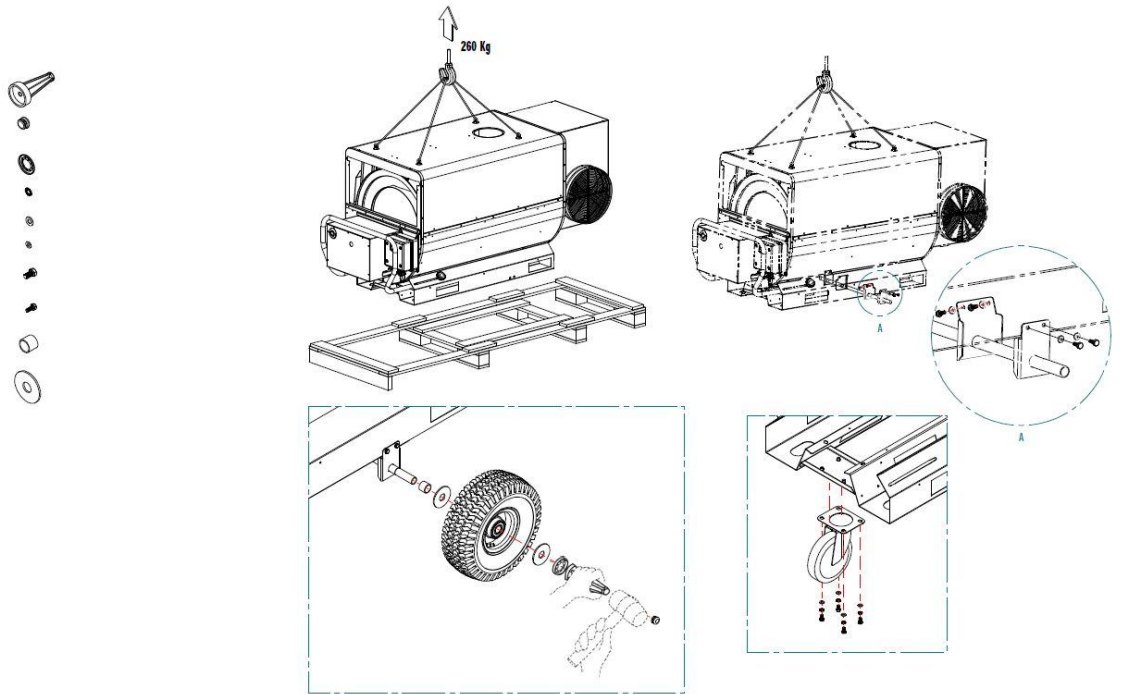


Fig. 3.2.1

HER 750 (Fig. 3.2.2 & Fig. 3.2.3)

- Fix the axle assembly to the support frame of the heater as shown using 3 screws (1), and washers (2) and (3) on each side.

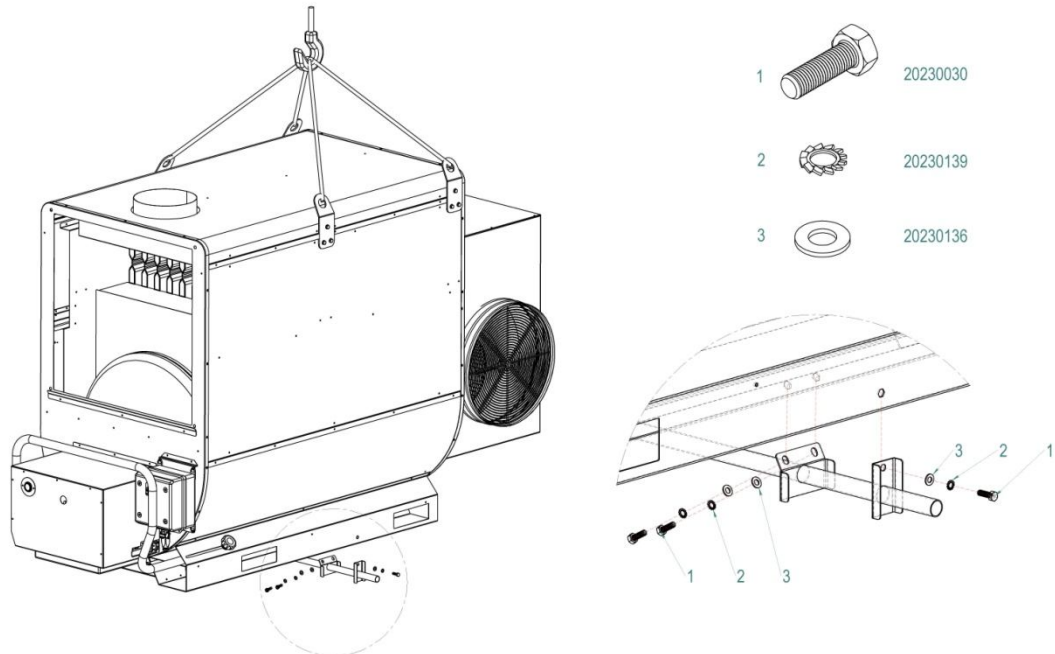


Fig. 3.2.2

- Place in order 1 washer (3), 1 wheel (2) and one locking cap (1) on each side of the axle (see Fig.).
- Secure the whole assembly using the special tool supplied.
- Lower the machine carefully and check stability.

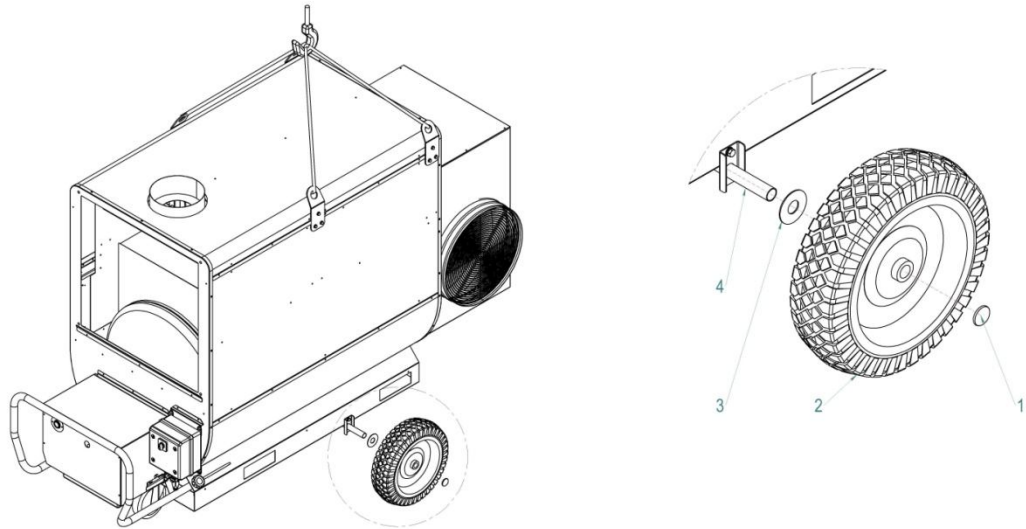


Fig. 3.2.3

3.3 Positioning

- Fully extend the front handle and lock it in extended position tightening the side fixing screws
- Move the heater to the desired location pushing or pulling the retractable handle as needed.

**WARNING**

Only move the unit by hand. The heater must not be towed by vehicles. When moving the heater on the ground, do not exceed a maximum 10° inclination in both axial and lateral directions. Do not move the heater on extremely rough terrain. Use forklift truck for transportation on rough terrain.

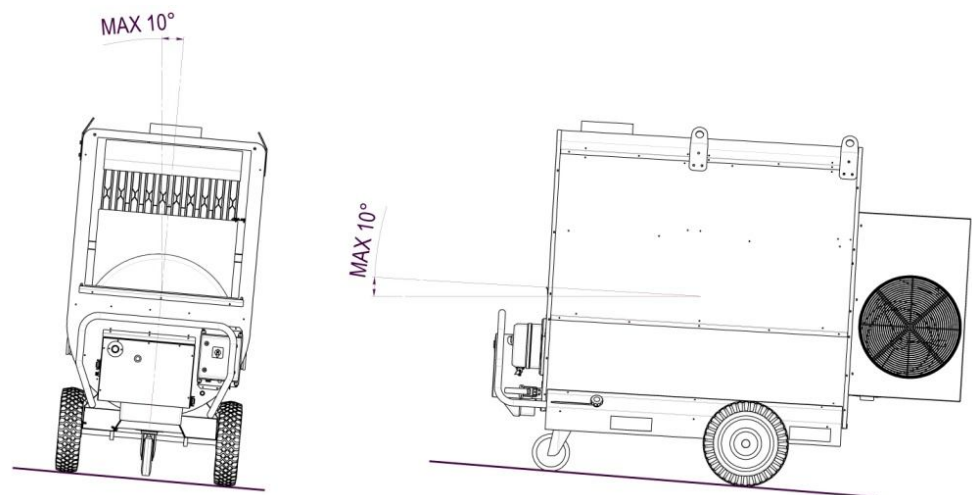


Fig. 3.3.1

- Position the heater in desired location on a firm, level, flat, horizontal surface, able to bear the weight of the unit (see weight specifications)
- Lock the front pivoting wheel



WARNING

MAINTAIN MINIMUM SAFETY CLEARANCES FROM SURROUNDING WALLS, OBJECTS, COMBUSTIBLE OR NON COMBUSTIBLE MATERIALS:

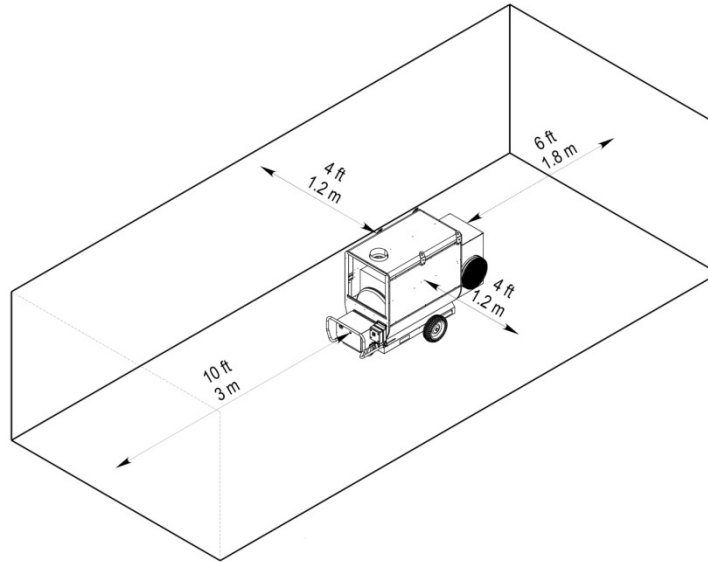


Fig. 3.3.2

- FRONT: 10 ft (3 m)
- SIDES: 4 ft (1.2 m)
- REAR: 6 ft (1.8 m)
- TOP: 4 ft (1.2 m)

3.4 Recommended fuels

- **FUEL OIL (DIESEL)/KEROSENE HEATERS:** operation at different temperatures requires an appropriate choice of liquid fuels. Follow the recommendations below according to the operating conditions:

Ambient temperature	Recommended fuel(s)
From -20F to +10F (-29°C to -12°C)	Kerosene K-1 only
From +10F to +65F (-12°C to 18°C)	Fuel Oil (Diesel) No.2 Fuel Oil (Diesel) No.1 Kerosene K-1
From +65F to +90F (18°C to 32°C)	Fuel Oil (Diesel) No.2 only

- **GAS HEATERS:** the HER heaters are approved for use with Natural Gas (NG) or Propane (LP) Gas. The HER heater are factory set for use with Natural Gas (NG). A conversion kit for use of Propane (LP) is supplied together with the heater. Conversion from NG to LP must be carried out by a licensed technicians only.



WARNING

Only use fuels recommended by the manufacturer. Using different, unapproved fuels or additives may be hazardous, cause malfunctions, damage the heater and void the warranty. Conversion from NG to LP must be carried out only by a licensed, professional gas technician.

3.5 Fuel supply
connections
DIESEL/KEROSENE

- The HER heaters with FUEL OIL (DIESEL)/KEROSENE burner must be connected to an approved external tank of appropriate capacity (not included) by qualified personnel only.



CAUTION

For the design and sizing of the fuel supply line, strictly follow the instructions contained in the burner manual supplied with the unit. Do not exceed the recommended pipe line lengths. At temperatures lower than 32°F, fuel gelling may occur. Make sure that the fuel supply line is able to provide the correct fuel flow to the burner in any operating conditions.

- The HER heaters require a single line (inflow only, no return) fuel supply. The filter/deaerator recirculates the fuel flowing back from the burner and eliminates the air bubbles contained in the fuel before sending it to the burner.
- Connect the fuel line to the 3/8" inlet fitting as shown (Fig. 3.5.1)
- Open the tap on the fuel inlet.

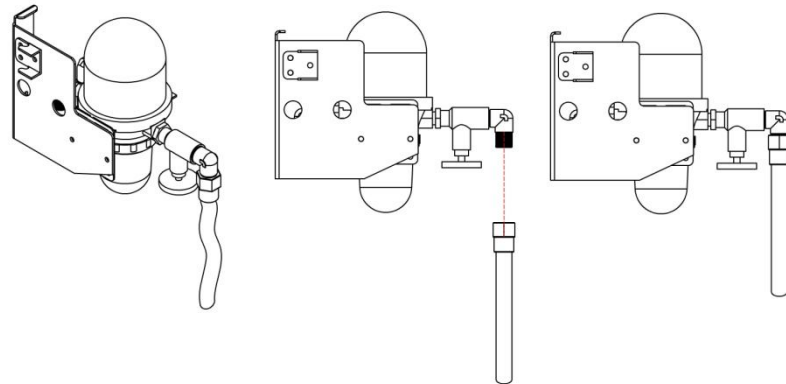


Fig. 3.5.1



WARNING

The oil in the supply line must not be under pressure. Do not insert any additional devices such as pumps, etc. in the fuel supply circuit.

- The burner settings (fuel pressure, air shutter, turbulator) are factory adjusted for use with Fuel Oil (Diesel) No.1 or No.2.
- For operation with Kerosene, the burner setting must be changed according to the specification chart (see Par. 7, Specifications) by qualified personnel.
- Operation at high altitude may require burner setting adjustments on the working site. If combustion is not good, have the heater checked by qualified personnel.

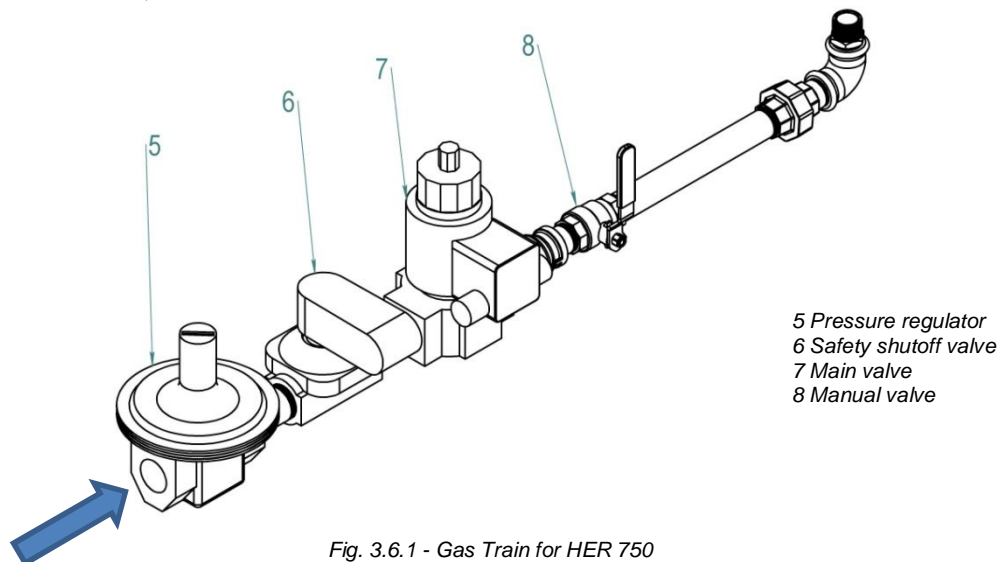
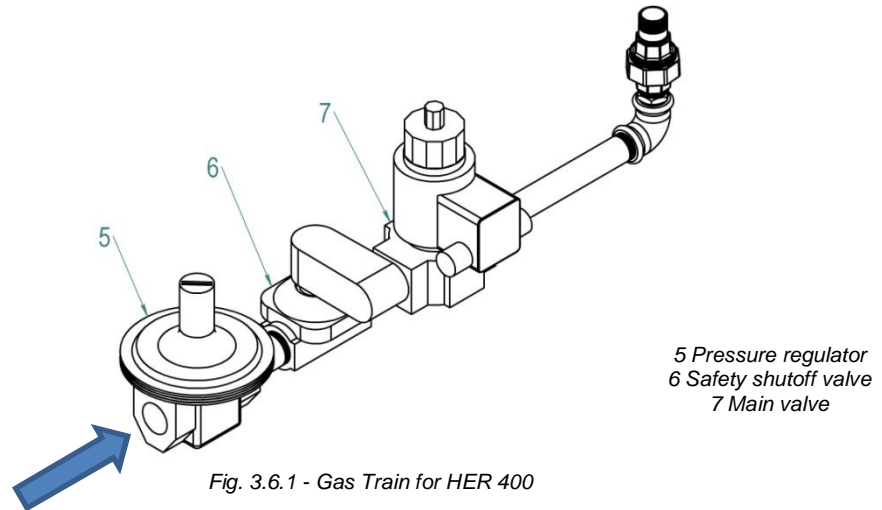


WARNING

DO NOT TAMPER WITH THE UNIT. ONLY QUALIFIED PERSONNEL SHALL PERFORM ANY BURNER SETUP OR ADJUSTMENT.

FOR QUALIFIED TECHNICIANS ONLY

- The HER heaters with GAS burner must be connected to a suitable gas supply line by means of the gas train supplied with the unit by a qualified gas technician. See burner manual for further details.

**WARNING****Fire and explosion hazard.**

Only a licensed qualified gas technician must perform any assembling, connection, adjustment and testing on gas lines. Strictly follow the instructions contained in the Riello burner manual supplied with the unit.

Connections and settings must comply with all local, state, provincial and federal regulations and codes.

PROPANE SUPPLY SIZING GUIDELINES

- The cylinder supply system shall be arranged to provide for vapour withdrawal from the propane cylinder
- To get proper propane vaporization, use the following gas tank specifications as general guidelines:

Input	Propane Tank Capacity
400,000 Btu/h	500 gal
750,000 Btu/h	1000 gal

- Have a qualified gas technician select the correct propane supply for every specific working site.
- If several containers are manifolded together to supply gas to a heater, use a manifold system complying with NFPA 58.



WARNING

Fire and explosion hazard.

DO NOT TAMPER WITH THE UNIT. ONLY QUALIFIED PERSONNEL SHALL PERFORM ANY BURNER SETUP OR ADJUSTMENT.

3.7 Ventilation and venting requirements

- If the heater is installed and operated inside an enclosed space
 - connect the heater to a flue pipe of proper size and shape (see guidelines below) venting the exhaust gases outdoors
 - supply adequate ventilation and combustion air, providing a minimum opening area at the unit level as shown below.

MINIMUM VENTILATION REQUIREMENTS FOR VENTED HEATERS

	Minimum opening area
HER 400	3 ft ²
HER 750	6 ft ²



DANGER

Carbon monoxide (CO) poisoning hazard.

Do not operate the HER heaters in enclosed spaces unless the exhaust gases are vented outside. Exhaust gases contain carbon monoxide, a toxic and deadly gas. Exposure to carbon monoxide can kill people and animals.

- If the heater is installed outdoors,
 - connect the heater to a flue pipe of proper size and shape (see guidelines below). Use a rain cap as needed.

FLUE PIPE DESIGN GUIDELINES (see Fig. 3.7.1)

- Avoid excessive vent elbows and horizontal runs.
- The flue pipe shall terminate in a vertical section at least two feet long and sufficient draft shall be created to assure safe and proper operation of the heater.
- Notes:
 1. Where back drafts may occur, a vent cap should be used on the exit from the flue pipe.
 2. Horizontal runs of flue pipe should have a rise of 1 in 10 away from the heater.
- Recommended chimney draft: 0.06 in w.c.

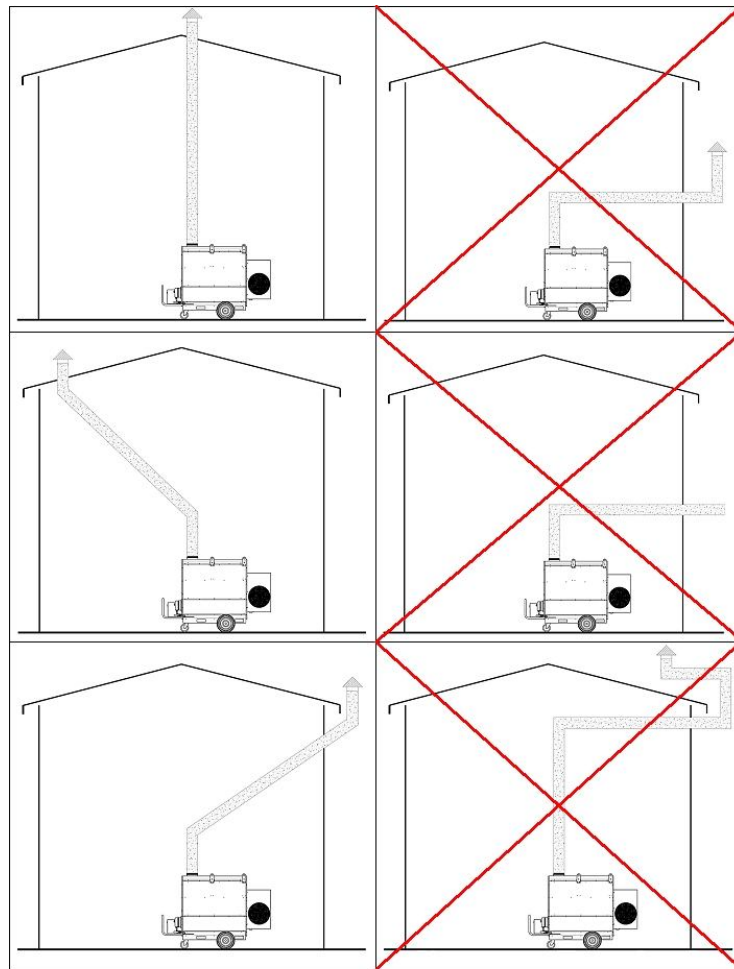


Fig. 3.7.1

3.8 Air ducting and recirculation

- Single, double and triple air outlets are available as accessories (not included, to be purchased separately, Fig. 3.8.1).

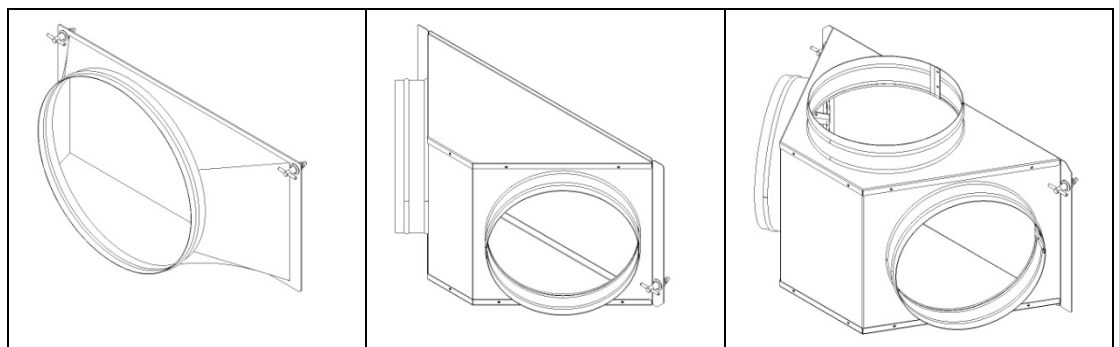


Fig. 3.8.1

- Attach the selected air outlet panel to the front panel of heater. The cam-lock system allows a quick connection and disconnection of the air outlet (Fig. 3.8.2)

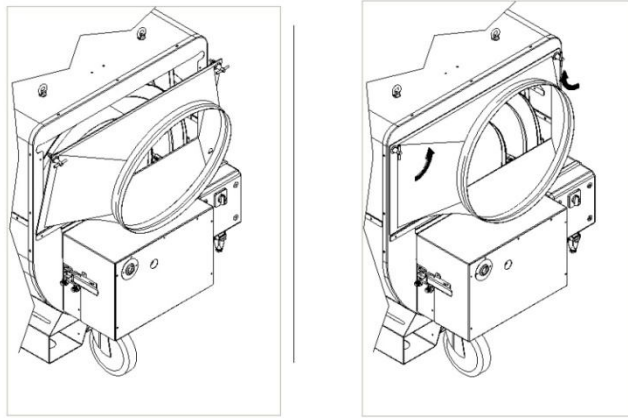


Fig. 3.8.2

**CAUTION**

Do not operate the HER heaters without one air outlet in place.

- The HER heater are suitable for use with ducting systems for air distribution. Flexible hoses of all sizes needed for air ducting are available as accessories.
- In case of outdoor installation, air from the heated area can be recirculated through the heater, for a more efficient performance (Fig. 3.8.4).

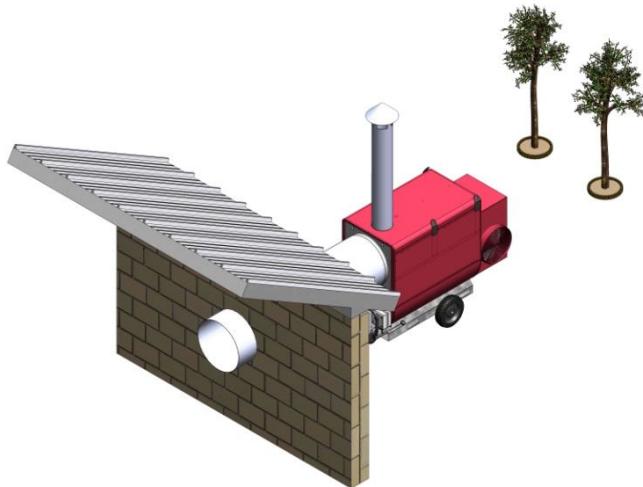


Fig. 3.8.3 - Air ducting without recirculation

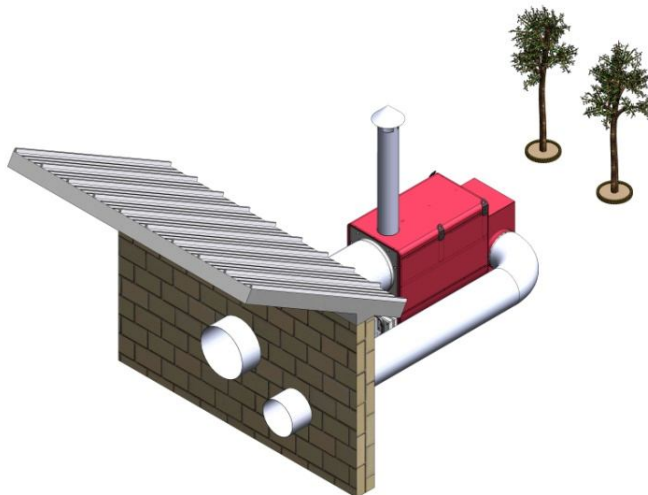


Fig. 3.8.4 - Air ducting with recirculation

- Connect the selected flexible hose(s) to the heater outlet(s) (and inlet, if desired) locking the fixing belt as shown (Fig. 3.8.5)

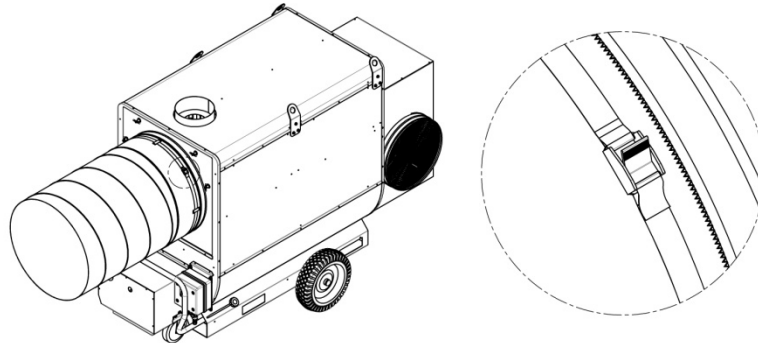


Fig. 3.8.5

NOTICE

Air ducting systems must be properly sized by qualified technicians, based on the maximum static pressure available at the heater outlet (see Par. 7, Specifications and rating label). Incorrect air ducting design may lead to overheating and safety lock-out. Should this occur, reduce the ducting length or review the ducting system design.

**WARNING**

Do not restrict or block any air openings or ducts.

3.9 Remote thermostat

The HER heaters are suitable for connection to a remote ambient thermostat or other external controller (timer, programmer) to maintain a certain temperature in the warmed area or to start and stop the heater at certain times etc. Ambient thermostats are separately available from Munters as accessories.

a) Operation without ambient thermostat

- Make sure the thermostat plug (with internal jumper) supplied with the unit is connected and locked to the socket on the bottom side of control box.

NOTICE

The heater will start only if either
 - the thermostat plug with internal jumper is connected or
 - the remote thermostat is connected and the set temperature is higher than local room temperature

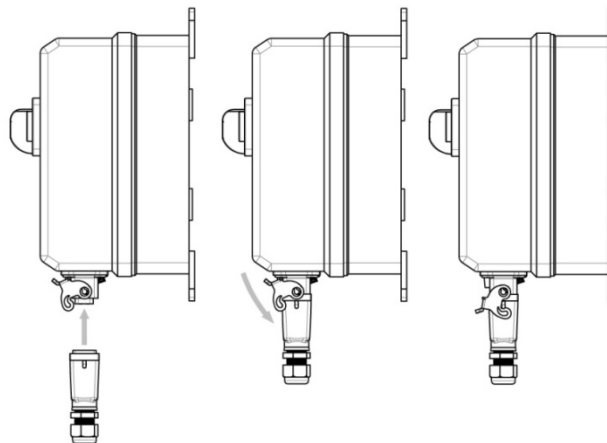
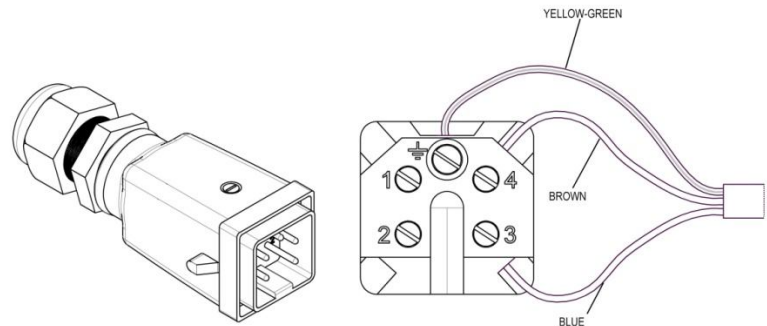


Fig. 3.9.1

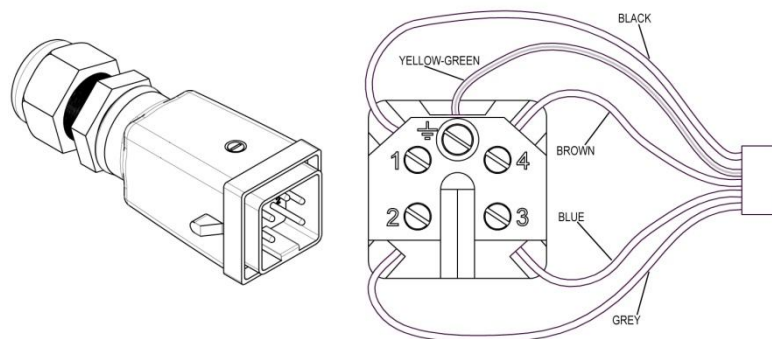
b) Operation with room thermostat (Fig. 3.9.1 & Fig. 3.9.2)

- Wire the thermostat plug as follows (NOTICE: NOT needed for wired thermostats supplied by Munters):

1-2 thermostat **230V 60Hz** power supply (if applicable)
3-4 switching contact



Thermostat plug wiring - Basic



Thermostat plug wiring - With power supply to thermostat

Fig. 3.9.2

- Place thermostat in a proper location inside the area.
- Set thermostat dial on desired room temperature.
- Connect thermostat plug to heater
- Lock out plug.



WARNING

Do not tamper with the unit. Any electrical wiring or re-wiring must be carried out by a qualified electrician only, according to the manufacturer's instructions (see Par. 8, Electrical Schematics). Do not connect thermostats or controllers in any other unauthorized way.

All electrical equipment, thermostats and controllers included, must be grounded.

All electrical equipment used in combination with HER heaters shall have adequate switching capacity and electrical ratings (see Par. 8, Electrical Schematics and Par. 7, Technical Specifications).

3.10 Electrical connections

- Voltage/frequency requirements (see also specification label):
Fan motor: 230-240V 60Hz 1-phase
Burner: 115-120V 60Hz 1-phase
- Connect the heater to an electrical power source with appropriate power, voltage and frequency ratings, using the supplied plug (Fig. 3.10.1). The plug is factory wired as shown below (Fig. 3.10.2)

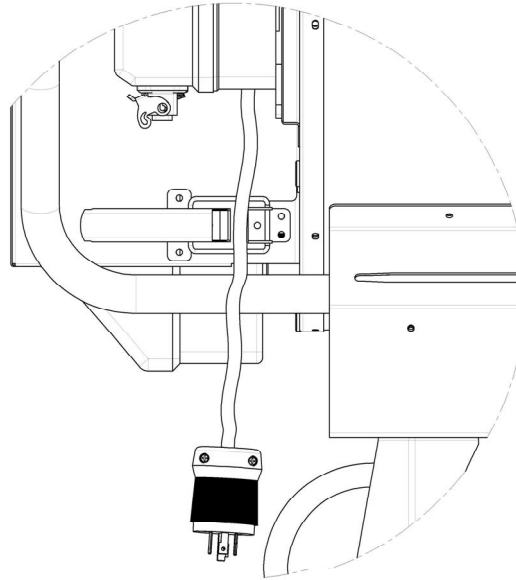


Fig. 3.10.1

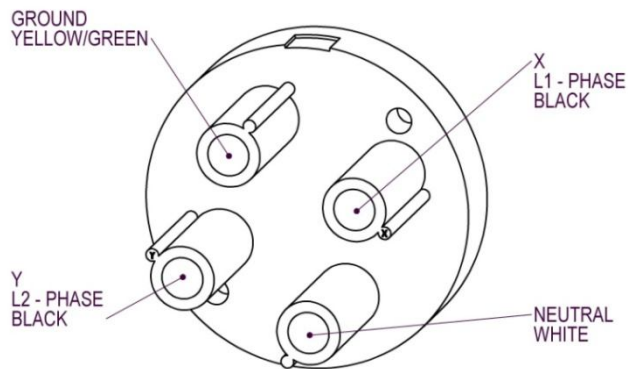


Fig. 3.10.2

**WARNING**

GROUNDING IS MANDATORY. Electrical grounding must comply with the National Electric Code ANSI/NFPA 70 and the CSA 22.1 Canadian Electric Code, Part 1.

- Use only approved, properly sized grounded extension cords rated for heavy duty applications
- Extension cord requirements
 - do not exceed a 100 ft (30 m) maximum length
 - use No. 8 gauge cords for 240 V power supply lines
 - use No.12 gauge cords for 120 V power supply lines

**WARNING**

Electric shock and fire hazard.

Do not use undersized, worn or damaged extension cords.

4. Instructions for use

4.1 Pre-start check list

Item	Check
Heater installation	Installed and positioned according to instructions (par. 3.3)
Fuel supply connections	Connected and leak-free according to instructions par. 3.5 - 3.6)
Fuel supply valve(s)	Closed
Exhaust gas venting system	Connected according to instructions (par. 3.7)
Air outlet panel	In place, according to instructions
Air duct(s)	Connected according to instructions (if applicable)
Electrical supply	Connected, grounded and checked according to instructions (par. 3.10)
Electrical supply circuit breaker	OFF
Ambient thermostat (or plug with internal jumper)	Connected according to instructions (if applicable)
Main heater switch	OFF
Selector switch	"O" (OFF)



WARNING

Fire and explosion hazard.

Check for leaks in the fuel (gas or oil) supply system before starting the heater.

EMERGENCY PROCEDURE IN CASE OF GAS LEAKS

Signs of a gas leak may include:

- A "rotten egg" odor (natural gas)
- A blowing or hissing sound
- Bubbling, when using a leak detector fluid or in wet/flooded areas

If you find or suspect a gas leak, follow these steps:

- Open doors and windows to provide fresh air ventilation in the building and immediately leave the area
- Do not use any electrical device, such as light switches, telephones or other electrical appliances in the area affected by the leak. They could spark and ignite the gas.
- Call for help
- Do not use an open flame, matches or lighters
- Do not try to locate the source of the gas leak
- Do not try to shut off any gas valves or appliances
- Do not start vehicles
- Do not re-enter the building or return to the area until it has been checked and declared safe by qualified personnel

4.2 Start and shutdown

HEATING MODE

- Open valve(s) in the fuel supply system
- Turn circuit breaker(s) in the electrical supply system to I (ON)
- Set ambient thermostat to desired temperature (if applicable)
- Turn main heater switch to I (ON)

- Turn selector switch to "Heat" position (🔥) for heating. The burner will start first and after a time the fan will also start, blowing warm air into the area to be heated.

VENTILATION MODE

- Turn main heater switch to I (ON)
- Turn selector switch to "Fan" position (🌀). Only the fan will start.

SHUTDOWN

- Turn selector switch to "0" (OFF). Allow heater to cool down (post-ventilation, in heating mode).
- After fan has stopped, turn main switch to "0" (OFF).
- Unplug heater as needed.



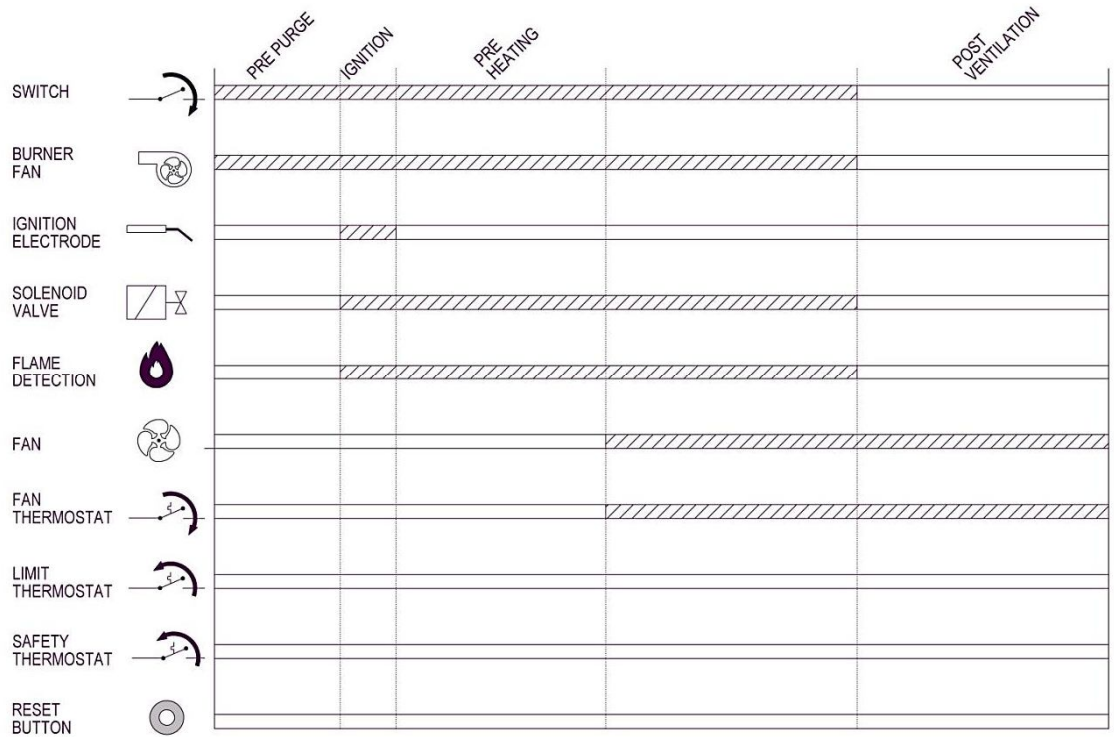
CAUTION

In heating mode, always follow the complete shutdown procedure to stop the heater, namely:

- DO NOT turn main switch to 0 to shut down.
- DO NOT unplug heater to shut down.

Lack of proper cooling at shutdown may cause overheating and damage the unit.

4.3 Normal operation



- Pre-purge: in heating mode, the burner blower starts first, to clean the combustion chamber from any residual gas or fuel vapour.
- Ignition: the ignition system sparks. Fuel is ignited and flame is monitored by the flame detector.
- Air pre-heating: the burner operates for some minutes to warm up the heat exchanger assembly with the fan off. The fan starts with a certain delay, on command of the Fan thermostat, as the internal temperature has reached the correct value.
- Post-ventilation: at shutdown, the burner stops but the fan continues to operate to cool down the heater and will stop as the internal temperature has reached a proper level.



DANGER
Crushing and cut hazard

When the heater is powered, i.e., plugged and main switch is in I (ON) position, the fan motor can start unexpectedly at any time under the control of Fan thermostat.

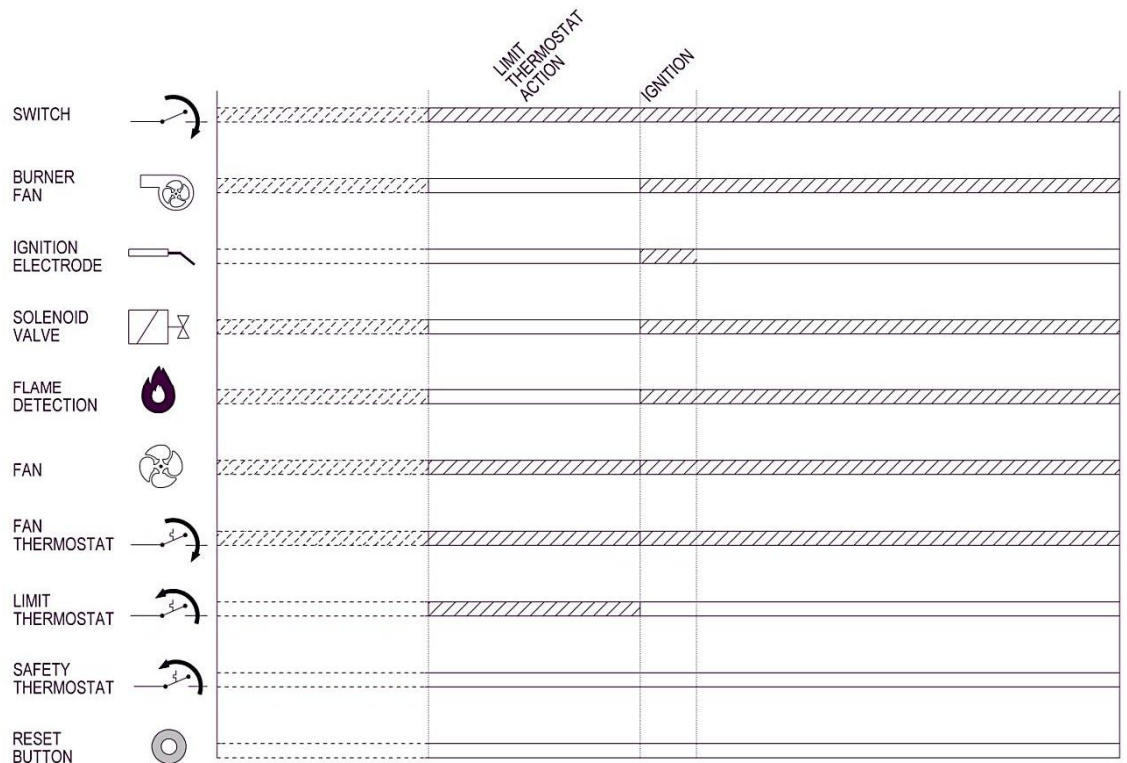
NEVER REMOVE THE FAN MOTOR ENCLOSURE, EVEN FOR SERVICE OR MAINTENANCE, IF THE HEATER IS POWERED. TURN MAIN SWITCH TO 0 (OFF) AND UNPLUG.

NOTE: turning the selector switch to 0 only will not prevent the fan start.

If the warm air temperature exceeds the "Limit" thermostat setting during operation:

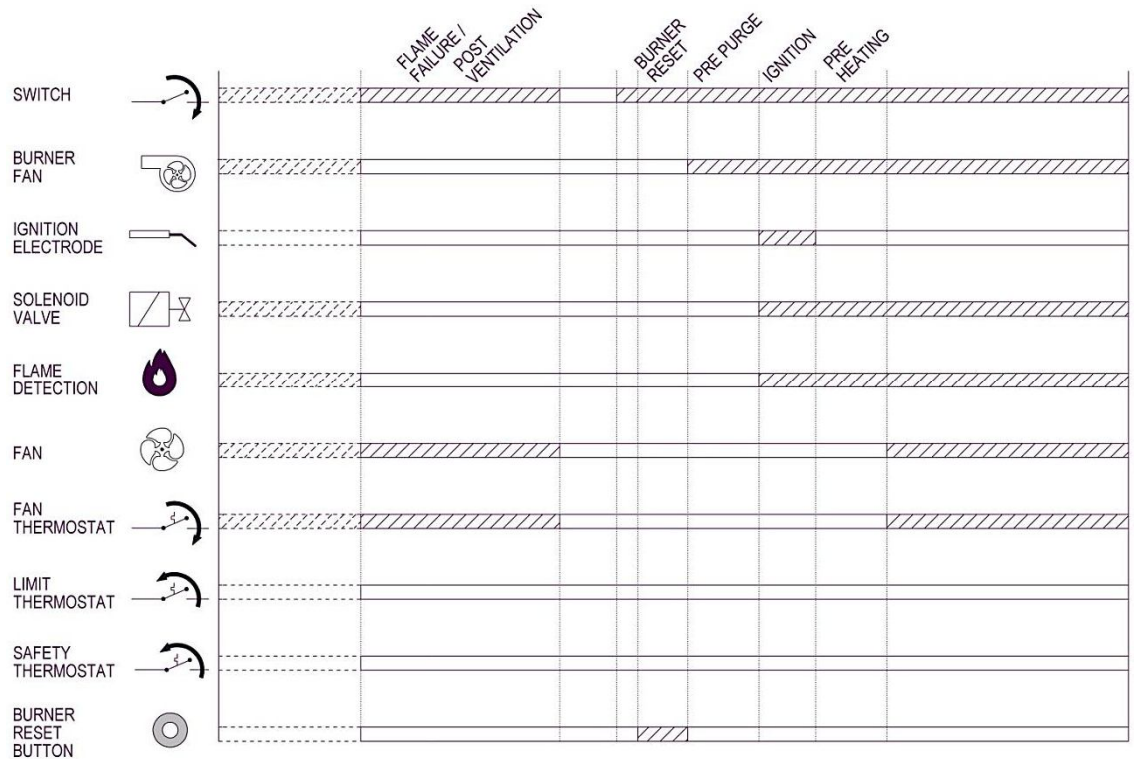
- the burner stops
- the fan continues to work
- the burner restarts automatically as the air temperature falls below the preset limit.

NOTICE: this is not a hazardous situation, but a limit thermostat tripping too frequently may be an early sign of overheating. Refer to section 4.4. below.



4.4 Abnormal operation

a. Burner safety lock-out (flame failure)



In case of flame failure at start or during operation, the heater goes to safety lock-out mode.

In lock-out mode:

- the burner stops immediately
- the fan completes the post-ventilation cycle and then stops
- the reset pushbutton on the burner lights up.

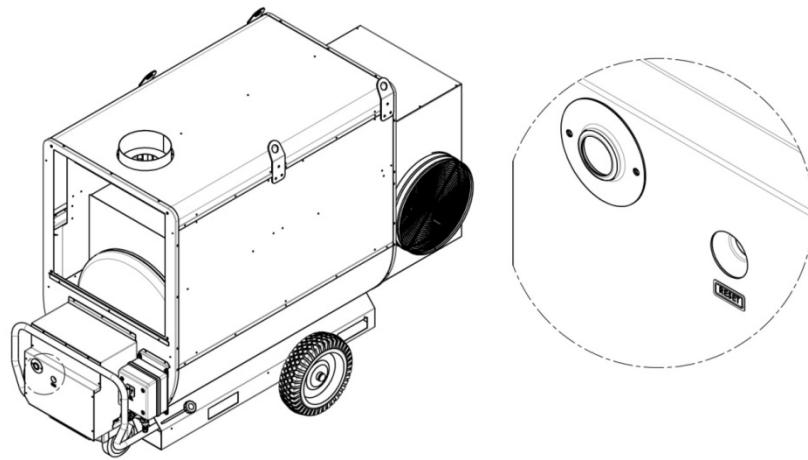
In case of lock-out:

- allow the heater to cool down and stop
- check and correct the cause(s) of flame failure. See chapter "Troubleshooting" for common causes of lock-out. Call qualified personnel for assistance if needed.
- push the burner reset pushbutton to repeat the starting procedure

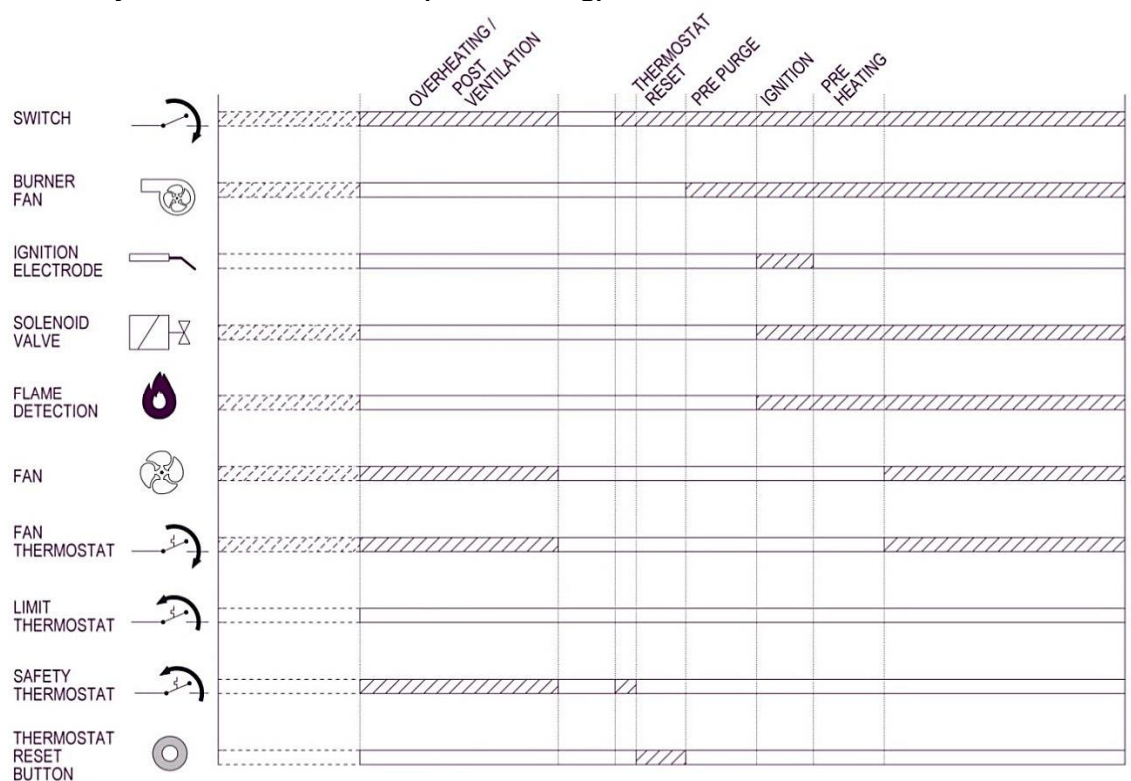


WARNING (Fuel Oil (Diesel)/Kerosene heaters)

If the heater does not start, do not repeat the starting procedure more than 3 times, to prevent excessive accumulation of unburnt fuel in the combustion chamber. The sudden ignition of unburnt fuel may be hazardous and damage the heater. Have the heater checked by a qualified technician before restarting it.



b. Safety thermostat lock-out (overheating)



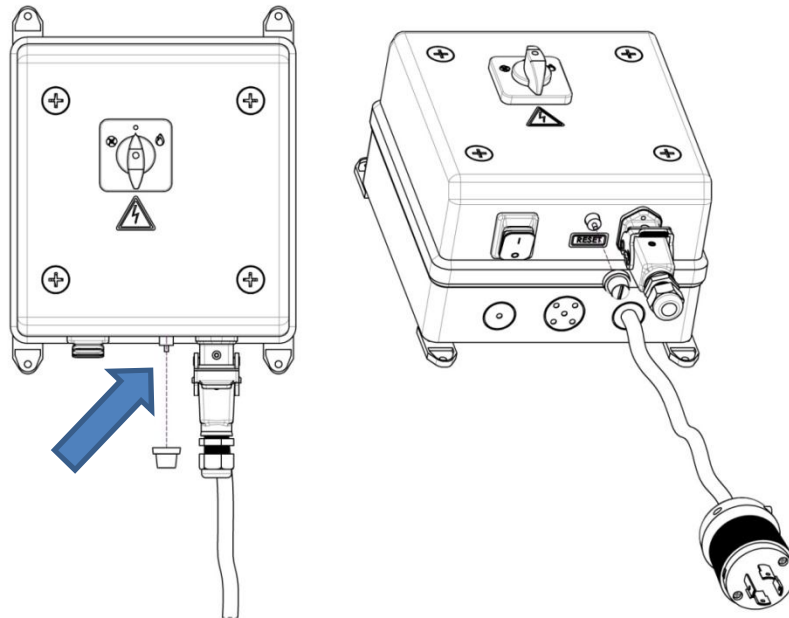
If the air temperature exceeds the setting of the safety thermostat:

- the burner stops immediately
- the fan completes the post-ventilation cycle and then stops

In case of overheating

- allow the heater to cool down and stop
- check and correct the cause(s) of overheating, that may include:
 - incorrect distances around the unit
 - restrictions or blockage of air inlets, outlets, ducts
 - incorrect length/size of air ducts
 - too high ambient temperature
 - incorrect burner settings
 - fan failure
 - supply voltage abnormalities

- push the safety thermostat reset pushbutton located on the lower side of electrical box.



NOTICE: in case of overheating the burner reset pushbutton does not light up and you do not have to push it.

5. Maintenance and cleaning

5.1 Cleaning guidelines



WARNING

Electrical shock and burn hazard.

Before maintenance and cleaning:

- shutdown the heater (main switch on OFF position)
- unplug the heater
- allow the heater to cool down for at least 15 minutes
- do not spray high pressure water to clean the unit
- use personal protective equipment (PPE) as needed

- Regularly clean the heater, depending on operating conditions, to guarantee long and reliable performance
 - remove dust and debris from all air inlets and outlet, including the burner air inlet, using compressed air if needed (maximum air pressure: 50 psi)
 - wipe off dirt and dust from all hoses, fittings and connections
 - keep heater enclosure free from dirt and dust
- The heater must be inspected before each use, and at least annually by a qualified service person.
- The hose assembly shall be visually inspected prior to each use of the heater. If it is evident there is excessive abrasion or wear, or the hose is cut, it must be replaced prior to the heater being put in operation.

5.2 Recommended maintenance schedule

TASK	MINIMUM FREQUENCY			
	Daily, before use	Monthly (every 150h)	Before installation at a new location	Before/after every season (every 1000h)
Conduct an overall inspection	•	•	•	•
Check for gas leaks	•	•	•	•
Check electrical connections and extension cords	•	•	•	•
Clean the unit	•	•	•	•
Inspect fuel filter (replace if necessary)		•	•	•
Check gas supply pressure			✕	✕
Check burner settings (air and pressure), adjust if needed			✕	✕
Inspect and clean photocell				✕
Inspect and clean burner nozzle				✕
Inspect and clean heat exchanger and combustion chamber				✕
Inspect and adjust ignition electrodes				✕
Inspect blower motor and belts (replace belts if necessary)				✕
Conduct a combustion analysis			✕	✕

**WARNING**

- = OPERATOR'S TASK
- ✂ = QUALIFIED TECHNICIAN'S TASK

5.3 Maintenance guidelines

**WARNING**

The maintenance tasks marked with ✂ are strictly reserved to qualified personnel. Do not tamper with the unit.

1. Gas leakage test

- Spray a leak detector liquid (or a water/soap solution) on the connections of gas supply line and gas train. Bubbling indicates a gas leak.
- If this occurs, ask qualified personnel to check and tighten all connections.

**DANGER****Fire and explosion hazard.**

Do not use open flames to check gas leaks.

2. Oil filter inspection and replacement

- Remove filter glass unscrewing the threaded collar as shown (Fig. 5.3.1) and inspect inner filtering cartridge. Replace cartridge if dirty or clogged.

NOTICE

- the oil filter cartridge is not intended to be cleaned
- attempting to open or disassemble the upper part could damage the filter/deaerator

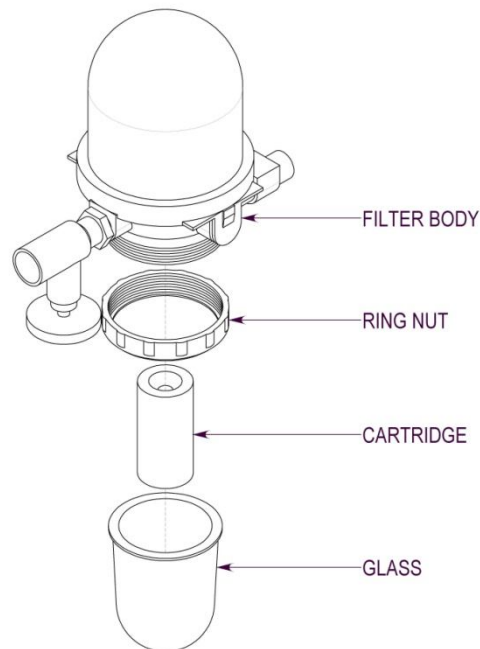


Fig. 5.3.1

3. Heat exchanger/combustion chamber inspection

- Shutdown (main switch on "0" OFF), unplug and allow heater to cool for 15 minutes
- (HER 400 & HER 750) Remove the burner and inspect the combustion chamber through the burner tube. Check chamber walls and welds, clean from soot and carbon if needed
- (HER 750 only) Remove the fan/motor enclosure and the inspection panel on

the rear side of heater. Access and remove the heat exchanger end plates and gaskets. Clean the exchanger elements internally from carbon and soot using a metal brush.

- Check the end gaskets, replace if worn or damaged
- Reassemble gaskets, end plates and tighten firmly the fixing nuts
- Reassemble inspection panel and motor/fan enclosure

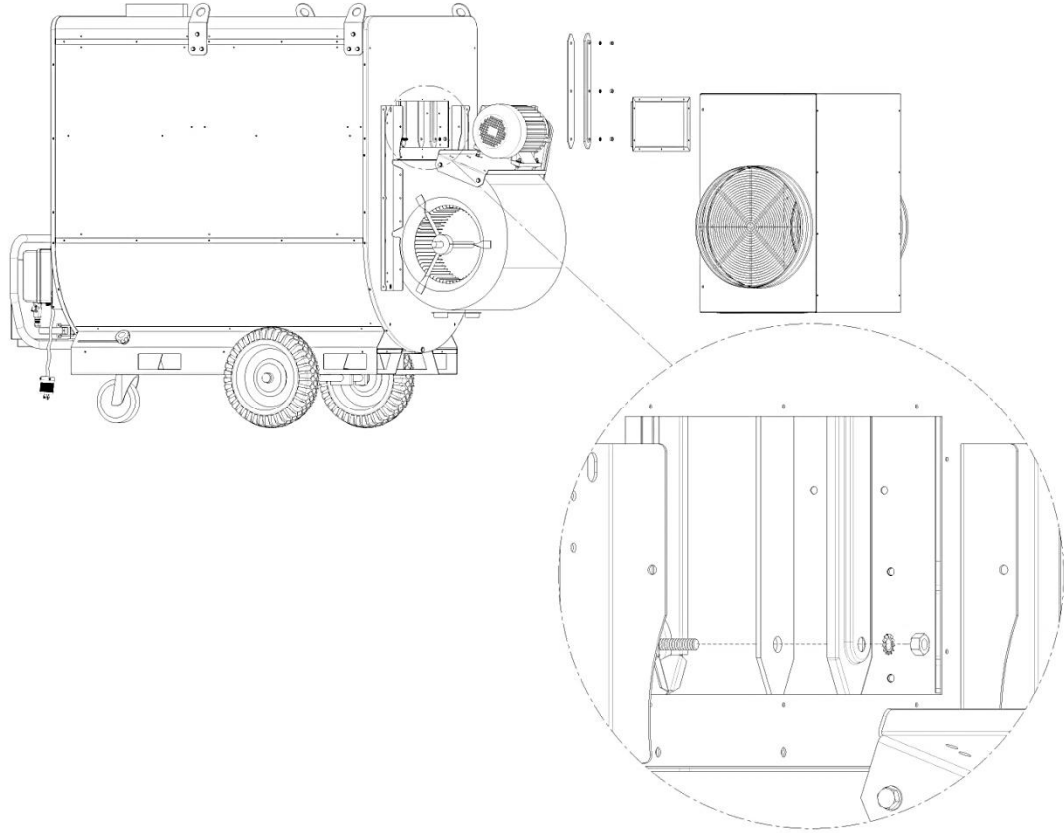


Fig. 5.3.2

4. Blower motor belts - Inspection and adjustments



- Shutdown (main switch on "0" OFF), unplug and allow heater to cool for 15 minutes
- Remove fan/motor enclosure
- Check belt tension (see Fig. 5.3.3)
- Adjust motor plate position to apply tension to the belts, acting on the fixing nuts, until you get the correct deflection at the midpoint of the belts as shown (see Fig.)
- Tighten locking nuts firmly as you have reached the correct tension
- Make sure the motor pulley and blower pulley are perfectly aligned in the same plane.
- Reassemble fan/motor enclosure

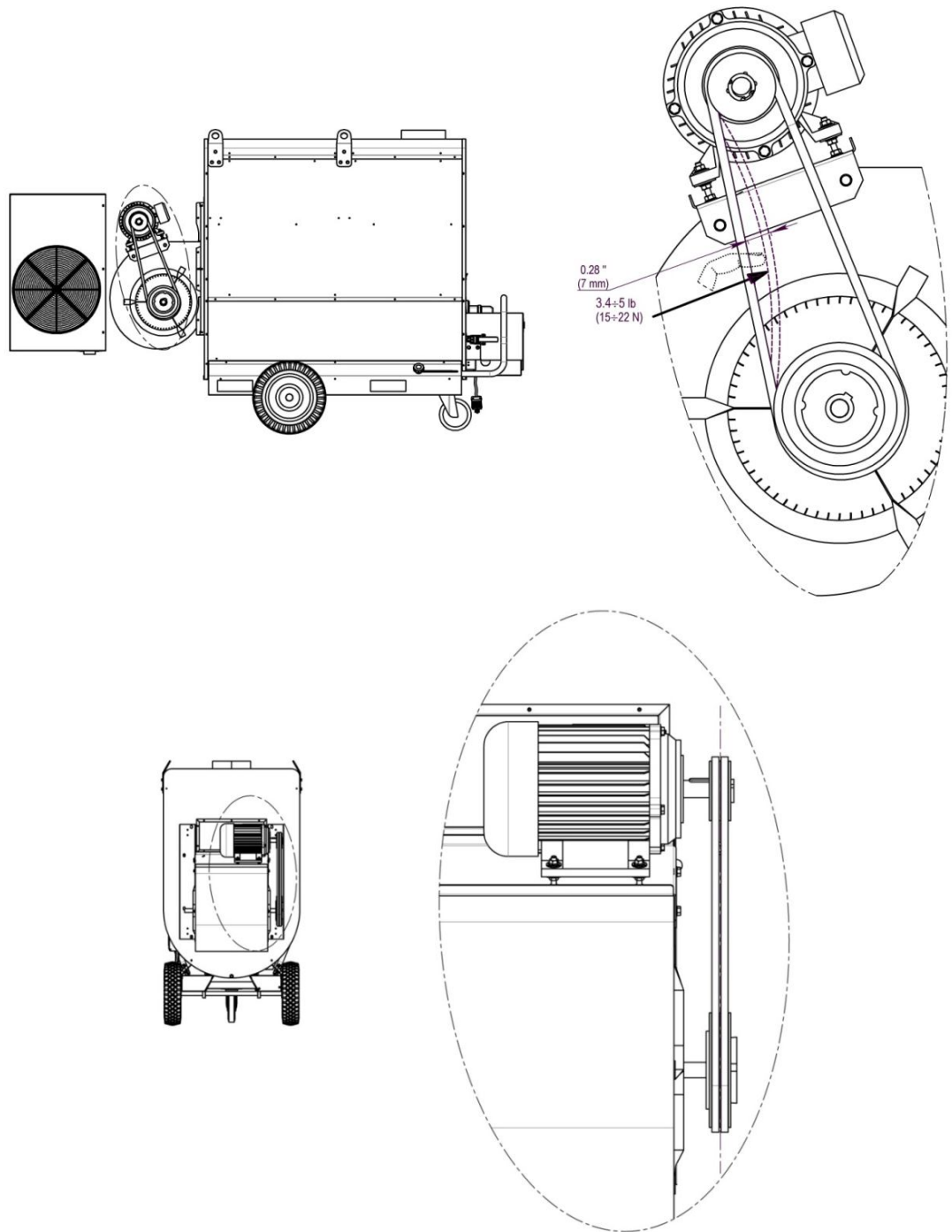


Fig. 5.3.3



DANGER
Crushing and cut hazard

When the heater is powered, i.e., plugged and main switch is in I (ON) position, the blower motor can start unexpectedly at any time under the control of fan thermostat.

NEVER REMOVE THE FAN MOTOR ENCLOSURE, EVEN FOR SERVICE OR MAINTENANCE, IF THE HEATER IS POWERED. TURN MAIN SWITCH TO 0 (OFF) AND UNPLUG.

NOTE: turning the selector switch to 0 only will not prevent the fan start.



5. Burner - Inspection, cleaning and adjustment

- For all details about maintenance, cleaning, adjustment and service of gas and oil burners refer to the relevant burner manual, supplied with this manual.

WARNING

Do not tamper with gas or oil burners. Operation with incorrect burner settings may be hazardous and damage the heater. Have a qualified serviceman perform any maintenance, service, adjustment on burners.

6. Troubleshooting

6.1 Troubleshooting chart

PROBLEM	POSSIBLE CAUSE	SOLUTION
Burner does not start	No power	Check and restore power supply
	Power cable or extension fault	Replace power cable or extension
	Fuse blowout	Replace fuse
	Electronic board fault	Replace electronic board*
	Ambient thermostat setting lower than ambient temperature	Turn thermostat knob to an higher setting
	Burner blockage or fault	Check or replace burner* To reset, press and hold burner RESET button
	Previous lock out or overheating	Check burner* To reset, press and hold burner RESET button
Burner starts, but ignition is unsuccessful and the heater shuts off after few seconds	No fuel or low fuel	Fill tank with fuel
	Dirty or wrong fuel	Use clean, correct fuel
	Gas manual shutoff valve closed	Open gas manual shutoff valve
	Incorrect gas pressure in supply line	Check and correct supply line settings*
	Leaks in gas train	Check gas train fittings*
	Fuel/air filters clogged	Clean or replace fuel/air filter*
	Leaks or restrictions in fuel lines	Repair fuel lines*
	Nozzle clogged	Clean or replace nozzle*
	Electronic board fault	Replace electronic board*
	Ignition transformer fault	Replace ignition transformer*
	High voltage cable fault	Replace high voltage cable*
	Electrodes dirty or faulty	Clean or replace electrodes*
	Flame sensor (photocell) dirty or faulty	Clean or replace flame sensor*
	Incorrect burner settings (too lean or too rich fuel/air mixture)	Check and correct burner settings*
Heater stops during operation	Loss of power supply during operation	Check and restore power supply
	Fuse blowout during operation	Replace fuse
	The desired room temperature has been reached	Normal operation. To restart, turn thermostat knob to an higher setting
	No fuel or low fuel	Fill tank with fuel

	Dirty or wrong fuel	Use clean, correct fuel
	Fan does not start	Check fan thermostat and fan motor*
	Fuel/air filters clogged during operation	Replace fuel/air filter*
	Leaks or restrictions in fuel lines	Repair fuel lines*
	Nozzle clogged during operation	Clean or replace nozzle*
	Electronic board fault	Replace electronic board*
	Flame sensor (photocell) dirty or faulty	Clean or replace flame sensor*
	Flame failure – burner locks out	Identify and correct cause(s) of flame failure* To reset the burner, press and hold burner RESET button
	Heater overheating – safety thermostat action	Check for room ventilation, clearances, burner settings, air inlet/outlet blockage. If air ducts are used, make sure they are not too much long or twisted. Identify and correct cause(s) of overheating (*) To reset, press safety thermostat RESET button
	Fan motor overheating	Allow motor to cool and restart. If safety thermostat has tripped, reset the thermostat. Identify and correct cause(s) of overheating*
	Fan motor blockage or fault during operation	Check or replace motor*
	Incorrect burner settings (too lean or too rich fuel/air mixture)	Check and correct burner settings*
	Burner blockage or fault during operation	Check or replace burner* To reset, press and hold burner RESET button
Heater produces smoke or abnormal noise during operation (signs of bad combustion)	Low fuel level	Fill tank with fuel
	Dirty or wrong fuel	Use clean, correct fuel
	Fuel/air filters partially clogged	Clean or replace fuel/air filter*
	Leaks or restrictions in fuel lines	Repair fuel lines*
	Nozzle partially clogged	Clean or replace nozzle*
	Incorrect burner settings (too lean or too rich fuel/air mixture)	Check and correct burner settings*

6.2 Customer support information

For Spot Climate Control Customer Service (9 am to 5 pm EST): Call (239) 936-1555 and select SCC Customer Service.

7. Technical Specifications

7.1 Data sheets

Model		HER 400			
		NATURAL GAS	PROPANE	DIESEL	KEROSENE
Heat Input	BTU/hr	400,000			
	kW	117			
Air Flow Rating	ft ³ /min	3240			
	m ³ /h	5500			
Electrical ratings		230 V 60 Hz 8 A			
Line fuse rating	A	16			
Minimum Circuit Ampacity		1 x 16 A			
MAX Blower Static Pressure	in w.c.	0.47			
	mm w.c.	12			
MAX air temperature	°F	212			
	°C	100			
Firing Rate	ft ³ /h	413	158	-	-
	m ³ /h	11.7	4.5	-	-
	gal/h	-	-	2.82	2.97
	l/h	-	-	10.7	11.2
Burner model		RIELLO 40 G400		RIELLO 40 F10	
Fuel Nozzle Size		2.2	1.5	2.25 gph 60°S	2.25 gph 60°S
Power consumption	W	1760			
Efficiency (CSA B140.8)	%	84			
Temperature Range					
Heating mode	°F	-20 / +90	-20 / +90	+10 / +90	-20 / +65
	°C	-29 / +32	-29 / +32	-12 / +32	-29 / +18
Ventilation mode	°F	-20 / +103			
	°C	-29 / +40			
Dimensions					
Net Weight	lbs	610			
	kg	277			
Max Length	in	88			
	mm	2240			
Width	in	31.7			
	mm	806			
Height	in	47			
	mm	1202			

Burner settings

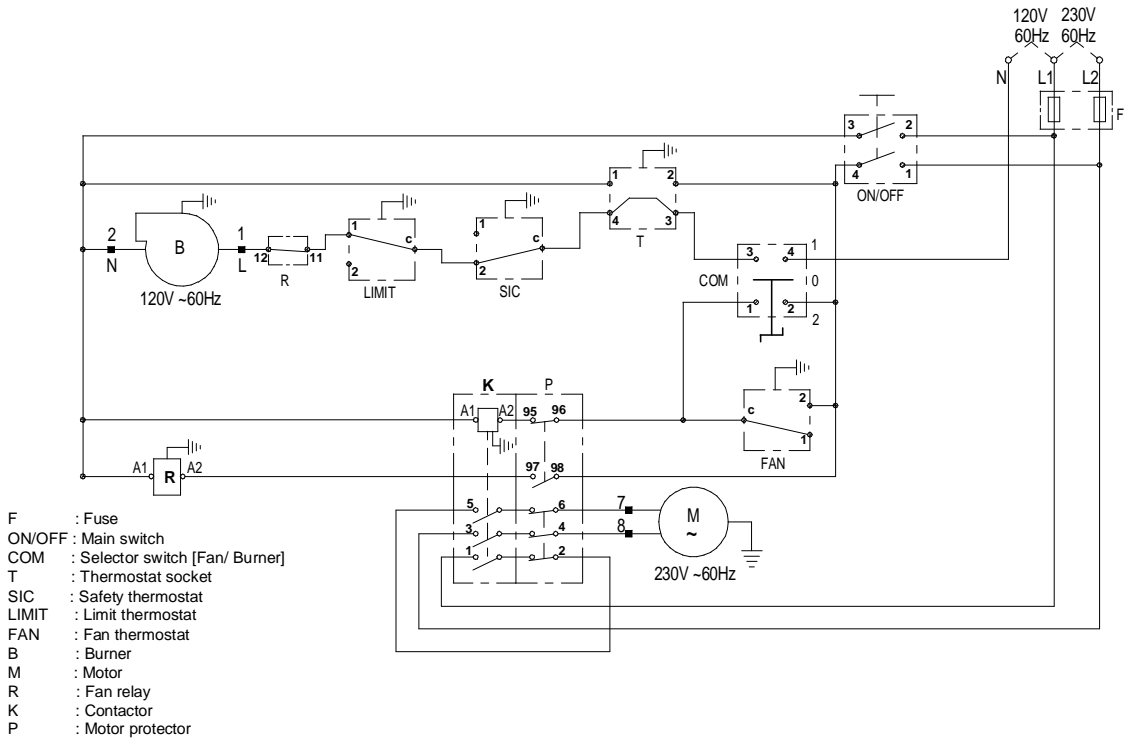
Model		400 NAT. GAS	400 PROPANE	400 DIESEL	400 KEROSENE
Gas Supply Pressure	in w.c.	4-10	8-13	-	-
	mm w.c.	102-255	204-332	-	-
Manifold Gas Pressure	in w.c.	2.36	3.25	-	-
	mm w.c.	60	83	-	-
Fuel Pressure	psi	-	-	185	210
	bar	-	-	12.8	14.5
Air Shutter Position	notches	5	5	7.5	7.5
Burner Head Position	notches	4	4	5	5

Model		HER 750			
		NATURAL GAS	PROPANE	DIESEL	KEROSENE
Heat Input	BTU/hr kW	750,000 220			
Air Flow Rating	ft ³ /min m ³ /h	5300 9000			
Electrical ratings		230 V 60 Hz 17.7 A			
Line fuse rating	A	25			
Minimum Circuit Ampacity		1 x 25 A			
MAX Blower Static Pressure	in w.c. mm w.c.	0.9 23			
MAX air temperature	°F °C	212 100			
Firing Rate	ft ³ /h m ³ /h gal/h l/h	747 21.1 - -	296 8.4 - -	- - 5.13 20.1	- - 5.61 21.2
Burner model		RIELLO G750		RIELLO 40 F15	
Fuel Nozzle Size		3.7	2.0	4.50 gph 60°S	4.50 gph 60°S
Power consumption	W	3750			
Efficiency (CSA B140.8)	%	83.5			
Temperature Range					
Heating mode	°F °C	-20 / +90 -29 / +32	-20 / +90 -29 / +32	+10 / +90 -12 / +32	-20 / +65 -29 / +18
Ventilation mode	°F °C	-20 / +103 -29 / +40			
Dimensions					
Net Weight	lbs kg	950 431			
Max Length	in mm	98 2480			
Width	in mm	35.5 901			
Height	in mm	67.5 1714			

Burner Settings

Model		750 NAT.GAS	750 PROPANE	750 DIESEL	750 KEROSENE
Gas Supply Pressure	in w.c. mm w.c.	7-14 179-358	8-14 204-358	- -	- -
Manifold Gas Pressure	in w.c. mm w.c.	2.28 58	4.05 103	- -	- -
Fuel Pressure	psi bar	- -	- -	185 12.8	195 13.4
Air Shutter Position	notches	4	4.8	5.75	5.75
Burner Head Position	notches	3	3	5	5

8. Electrical schematics



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