

INSTALLATION AND SERVICE MANUAL

gas-fired unit heaters

model HD



All models approved for use in California by the CEC, in New York city by the MEA division, and in Massachusetts. Unit heater is certified for residential and commercial applications.

FOR YOUR SAFETY

The use and storage of gasoline or other flammable vapors and liquids in open containers in the vicinity of this appliance is hazardous.

! WARNING

1. Improper installation, adjustment, alteration, service or maintenance can cause property damage, injury or death, and could cause exposure to substances which have been determined by various state agencies to cause cancer, birth defects or other reproductive harm. Read the installation, operating and maintenance instructions thoroughly before installing or servicing this equipment.
2. Do not locate ANY gas-fired units in areas where chlorinated, halogenated, or acid vapors are present in the atmosphere. These substances can cause premature heat exchanger failure due to corrosion, which can cause property damage, serious injury, or death.

IMPORTANT

The use of this manual is specifically intended for a qualified installation and service agency. All installation and service of these units must be performed by a qualified installation and service agency.

Inspection on Arrival

1. Inspect unit upon arrival. In case of damage, report it immediately to transportation company and your local Modine sales representative.
2. Check rating plate on unit to verify that power supply meets available electric power at the point of installation.
3. Inspect unit upon arrival for conformance with description of product ordered (including specifications where applicable).

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FOR YOUR SAFETY

WHAT TO DO IF YOU SMELL GAS:

1. Open windows.
2. Do not try to light any appliance.
3. Do not touch any electrical switch; do not use any phone in your building.
4. Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions. If you can not reach your gas supplier, call your fire department.

SPECIAL PRECAUTIONS/TABLE OF CONTENTS

SPECIAL PRECAUTIONS

THE INSTALLATION AND MAINTENANCE INSTRUCTIONS IN THIS MANUAL MUST BE FOLLOWED TO PROVIDE SAFE, EFFICIENT AND TROUBLE-FREE OPERATION. IN ADDITION, PARTICULAR CARE MUST BE EXERCISED REGARDING THE SPECIAL PRECAUTIONS LISTED BELOW. FAILURE TO PROPERLY ADDRESS THESE CRITICAL AREAS COULD RESULT IN PROPERTY DAMAGE OR LOSS, PERSONAL INJURY, OR DEATH. THESE INSTRUCTIONS SUBJECT TO ANY MORE RESTRICTIVE LOCAL OR NATIONAL CODES.

HAZARD INTENSITY LEVELS

1. **DANGER:** Indicates an imminently hazardous situation which, if not avoided, WILL result in death or serious injury.
2. **WARNING:** Indicates a potentially hazardous situation which, if not avoided, COULD result in death or serious injury.
3. **CAUTION:** Indicates a potentially hazardous situation which, if not avoided, MAY result in minor or moderate injury.
4. **IMPORTANT:** Indicates a situation which, if not avoided, MAY result in a potential safety concern.

DANGER

Appliances must not be installed where they may be exposed to a potentially explosive or flammable atmosphere.

WARNING

1. Gas fired heating equipment must be vented - do not operate unvented.
2. A built-in power exhauster is provided - additional external power exhausters are not required or permitted.
3. If you are replacing an existing heater, it may be necessary to resize the venting systems. Improperly sized venting systems can result in vent gas leakage or the formation of condensate. Refer to the National Fuel Gas Code ANSI Z223.1 or CSA B149.1 latest edition. Failure to follow these instructions can result in injury or death.
4. All field gas piping must be pressure/leak tested prior to operation. Never use an open flame. Use a soap solution or equivalent for testing.
5. Gas pressure to appliance controls must never exceed 14" W.C. (1/2 psi).
6. To reduce the opportunity for condensation, the minimum sea level input to the appliance, as indicated on the serial plate, must not be less than 5% below the rated input.
7. Disconnect power supply before making wiring connections to prevent electrical shock and equipment damage.
8. All appliances must be wired strictly in accordance with wiring diagram furnished with the appliance. Any wiring different from the wiring diagram could result in a hazard to persons and property.
9. Any original factory wiring that requires replacement must be replaced with wiring material having a temperature rating of at least 105°C.
10. Ensure that the supply voltage to the appliance, as indicated on the serial plate, is not 5% greater than the rated voltage.
11. When servicing or repairing this equipment, use only factory-approved service replacement parts. A complete replacements parts list may be obtained by contacting the factory. Refer to the rating plate on the appliance for complete appliance model number, serial number, and company address. Any substitution of parts or controls not approved by the factory will be at the owners risk.

CAUTION

1. All literature shipped with this unit should be kept for future use for servicing or service diagnostics. Do not discard any literature shipped with this unit.
2. Consult piping, electrical, and venting instructions in this manual before final installation.
3. Do not attach ductwork, air filters, or polytubes to any propeller unit heater.
4. Clearances to combustible materials are critical. Be sure to follow all listed requirements.
5. Do not locate units in tightly sealed rooms or small compartments (commonly referred to as confined spaces) without provisions for adequate combustion air and venting. Combustion air must have access to the confined space through a minimum of two permanent openings in the enclosure, at least one near the bottom. They should provide a free area of one square inch per 1,000 BTU/Hr input rating of the unit with a minimum of 100 square inches for each opening, whichever is greater.
6. Low profile heaters are designed for use in heating applications with ambient temperatures between -40°F and 90°F.
7. Do not install unit outdoors.
8. In garages or other sections of aircraft hangars such as offices and shops that communicate with areas used for servicing or storage, keep the bottom of the unit at least 7' above the floor unless the unit is properly guarded to provide user protection from moving parts. In parking garages, the unit must be installed in accordance with the standard for parking structures ANSI/NFPA 88A, and in repair garages the standard for repair garages NFPA #88B. In Canada, installation of heaters in airplane hangars must be in accordance with the requirements of the enforcing authority, and in public garages in accordance with the current CSA-B149 codes.
9. In aircraft hangars, keep the bottom of the unit at least 10' from the highest surface of the wings or engine enclosure of the highest aircraft housed in the hangars and in accordance with the requirements of the enforcing authority and/or NFPA 409-latest edition.
10. Installation of units in high humidity or salt water atmospheres will cause accelerated corrosion resulting in a reduction of the normal life of the units.
11. Do not install units below 7' measured from the bottom of the unit to the floor in commercial applications (unless unit is properly guarded to provide user protection from moving parts) and 5' measured from the bottom of the unit to the floor in residential applications.
12. Be sure no obstructions block air intake and discharge of unit heaters.
13. The minimum distance from combustible material is based on the combustible material surface not exceeding 160°F. Clearance from the top of the unit may be required to be greater than the minimum specified if heat damage, other than fire, may occur to materials above the unit heater at the temperature described.
14. Allow 18" of clearance at rear (or 6" beyond end of motor at rear of unit, whichever is greater) and access side to provide ample air for combustion and proper operation of fan.
15. Installation must conform with local building codes or in the absence of local codes, with Part 7, Venting of Equipment, of the National Fuel Gas Code, ANSI Z223.1 (NFPA 54) - latest edition. In Canada installation must be in accordance with CSA-B149.1.
16. Purging of air from gas supply line should be performed as described in ANSI Z223.1 - latest edition "National Fuel Gas Code", or in Canada in CSA-B149 codes.

SPECIAL PRECAUTIONS / SI (METRIC) CONVERSION FACTORS / UNIT LOCATION

⚠ CAUTION

- When leak testing the gas supply piping system, the appliance and its combination gas control must be isolated during any pressure testing in excess of 14" W.C. (1/2 psi).
- The unit should be isolated from the gas supply piping system by closing its field installed manual shut-off valve. This manual shut-off valve should be located within 6' of the heater.
- Turn off all gas before installing appliance.
- Ensure that the supply voltage to the appliance, as indicated on the serial plate, is not 5% less than the rated voltage.
- Check the gas inlet pressure at the unit upstream of the combination gas control. The inlet pressure should be 6-7" W.C. on natural gas or 12-14" W.C. on propane. If inlet pressure is too high, install an additional pressure regulator upstream of the combination gas control.
- Service or repairing of this equipment must be performed by a qualified service agency.
- Do not attempt to reuse any mechanical or electronic ignition controllers which has been wet. Replace defective controller.

IMPORTANT

- To prevent premature heat exchanger failure, do not locate ANY gas-fired appliances in areas where corrosive vapors (i.e. chlorinated, halogenated or acid) are present in the atmosphere.
- To prevent premature heat exchanger failure, the input to the appliance as indicated on the serial plate, must not exceed the rated input by more than 5%.
- To check most of the Possible Remedies in the troubleshooting guide listed in Tables 17.1 and 18.1, refer to the applicable sections of the manual.

SI (METRIC) CONVERSION FACTORS

Table 3.1

To Convert	Multiply By	To Obtain	To Convert	Multiply By	To Obtain
"W.C.	0.249	kPa	feet	0.305	m
°F	(°F-32) x 5/9	°C	Gal/Hr.	0.00379	m ³ /hr
Btu	1.06	kJ	Gal/Hr.	3.79	l/hr
Btu/ft ³	37.3	kJ/m ³	gallons	3.79	l
Btu/hr	0.000293	kW	Horsepower	746	W
CFH (ft ³ /hr)	0.000472	m ³ /min	inches	25.4	mm
CFH (ft ³ /hr)	0.00000787	m ³ /s	pound	0.454	kg
CFM (ft ³ /min)	0.0283	m ³ /min	psig	6.89	kPa
CFM (ft ³ /min)	0.000472	m ³ /s	psig	27.7	"W.C.

⚠ CAUTION

- All literature shipped with this unit should be kept for future use for servicing or service diagnostics. Leave manual with the owner. Do not discard any literature shipped with this unit.
- Consult piping, electrical, and venting instructions in this manual before final installation.
- Do not attach ductwork, air filters, or polytubes to any propeller unit heater.

In the U.S., the installation of these units must comply with the "National Fuel Gas Code," ANSI Z223.1, latest edition (also known as NFPA 54) and other applicable local building codes. In Canada, the installation of these units must comply with local plumbing or waste water codes and other applicable codes and with the current code CSA-B149.1.

- All installation and service of these units must be performed by a qualified installation and service agency 6-576.5

only as defined in ANSI Z223.1, latest edition or in Canada by a licensed gas fitter.

- This unit is certified with the controls furnished. For replacements parts, please order according to the replacement parts list on serial plate. Always know your model and serial numbers. The right is reserved to substitute other authorized controls as replacements.
- Unit is balanced for correct performance. Do not alter fan or operate motors at reduced speed.
- Information on controls is supplied separately.
- The same burner is used for natural and propane gas.

UNIT LOCATION

⚠ DANGER

Appliances must not be installed where they may be exposed to a potentially explosive or flammable atmosphere.

⚠ CAUTION

- Clearances to combustible materials are critical. Be sure to follow all listed requirements.
- Do not locate units in tightly sealed rooms or small compartments (commonly referred to as confined spaces) without provisions for adequate combustion air and venting. Combustion air must have access to the confined space through a minimum of two permanent openings in the enclosure, at least one near the bottom. They should provide a free area of one square inch per 1,000 BTU/Hr input rating of the unit with a minimum of 100 square inches for each opening, whichever is greater.
- Low profile heaters are designed for use in heating applications with ambient temperatures between -40°F and 90°F.
- Do not install unit outdoors.
- In garages or other sections of aircraft hangars such as offices and shops that communicate with areas used for servicing or storage, keep the bottom of the unit at least 7' above the floor unless the unit is properly guarded. In parking garages, the unit must be installed in accordance with the standard for parking structures ANSI/NFPA 88A, and in repair garages the standard for repair garages NFPA #88B. In Canada, installation of heaters in airplane hangars must be in accordance with the requirements of the enforcing authority, and in public garages in accordance with the current CSA-B149 codes.
- In aircraft hangars, keep the bottom of the unit at least 10' from the highest surface of the wings or engine enclosure of the highest aircraft housed in the hangars and in accordance with the requirements of the enforcing authority and/or NFPA 409-latest edition.
- Installation of units in high humidity or salt water atmospheres will cause accelerated corrosion resulting in a reduction of the normal life of the units.

IMPORTANT

To prevent premature heat exchanger failure, do not locate ANY gas-fired appliances in areas where corrosive vapors (i.e. chlorinated, halogenated or acid) are present in the atmosphere.

Location Recommendations

- When locating the heater, consider general space and heating requirements, availability of gas and electrical supply, and proximity to vent locations.
- When locating units, it is important to consider that the exhaust vent piping must be connected to the outside atmosphere.

UNIT LOCATION

3. Be sure the structural support at the unit location site is adequate to support the weight of the unit. For proper operation the unit must be installed in a level horizontal position.
4. Do not install units in locations where the flue products can be drawn into the adjacent building openings such as windows, fresh air intakes, etc.
5. Be sure that the minimum clearances to combustible materials and recommended service clearances are maintained. Units are designed for installation with the minimum clearances as shown in table 4.1.

Table 4.1 Clearances

Unit Side	Clearance To Combustible Materials	Recommended Service Clearance
Top and Bottom	1"	1"
Access Side	18"	18"
Non-Access Side	1"	1"
Rear	18"	18"
Vent Connector	4"	4"

6. Do not install units in locations where gas ignition system is exposed to water spray, rain, or dripping water.
7. Mounting Height (measured from bottom of unit) at which unit heaters are installed is critical. Refer to mounting height information and heat throw data on page 16 of this manual. The maximum mounting height for any unit is that height above which the unit will not deliver heated air to the floor.

Combustion Air Requirements

The National Fuel Gas Code defines an "unconfined space" as a space whose volume is greater than 50 cubic feet per 1,000 Btu/Hr input of the installed appliance(s). A confined space is 50 cubic feet or less per 1,000 Btu/Hr input of the installed appliance(s).

It is not recommended to install these unit heaters into residential confined spaces. This recommendation is due to the concern that at some point in time, the combustion air openings provided by the installer may become blocked or eliminated by the owner, either intentionally or unintentionally. Despite this commendation, if these units are installed into a residential confined space, see National Fuel Gas Code ANSI Z223.1 or CSA B149.1 Installation Code, latest edition, for detailed combustion air provisions. These requirements must be adhered to.

Units installed into confined spaces in industrial/commercial installations, must be provided with two permanent openings, one near the top of the confined space and one near the bottom of the confined space. Each opening should have a free area of not less than one square inch per 1,000 Btu/Hr of the total input rating of all units in the confined space, freely communicating with interior areas having, in turn, adequate infiltration from the outside.

For further details on supplying combustion or to a confined (tightly sealed) space or unconfined space, see the National Fuel Gas Code ANSI Z223.1 or CSA B149.1 Installation Code, latest edition.

Turning The Unit 180°

All units are produced at the factory with left-side controls, when looking at the unit. If the installation requires that the controls be on the right side, the unit heater can be "turned over". In addition, the following instructions must be followed:

- By turning the unit 180° from the way it was received from the factory, the sides become opposite but the front and back remain in the same relative position. The bottom panel now becomes the top panel and vice-versa.
- Remove the access panel, turn it 180°, and re-attach it to the unit. This is important so that all the information labels can be read.
- Remove the spring loaded deflector blades, turn them over, replace, and adjust so they are open and in a position to direct the heated air down to the floor.

Unit Mounting

CAUTION

1. Do not install units below 7' measured from the bottom of the unit to the floor in commercial applications (unless unit is properly guarded to provide user protection from moving parts) and 5' measured from the bottom of the unit to the floor in residential applications.
2. Be sure no obstructions block air intake and discharge of unit heaters.
3. The minimum distance from combustible material is based on the combustible material surface not exceeding 160°F. Clearance from the top of the unit may be required to be greater than the minimum specified if heat damage, other than fire, may occur to materials above the unit heater at the temperature described.
4. Allow 18" clearance at rear (or 6" beyond end of motor at rear of unit, whichever is greater) and access side to provide ample air for combustion and proper operation of fan.

1. Be sure the means of suspension is adequate to support the weight of the unit (see page 16 for unit weights).
2. For proper operation, the unit must be installed in a level horizontal position.
3. Clearances to combustibles as previously specified must be strictly maintained.
4. Mounting bracket installation:
Before lifting the heater for suspension, the mounting brackets must be installed. Decide if the unit will be installed as standard; that is with left-side controls when looking at the front of the unit or with right-side controls.
For standard (left side) remove brackets from shipping position and remove the (3) screws along the top edge of both the front and back of unit. Align screw holes on mounting bracket with holes along front and back top edges. Secure (1) mounting bracket to front of unit with retained screws. Secure the other mounting bracket to back of unit in a similar way.
For right-hand, the mounting brackets are attached in a similar manner after the unit is turned over.
- 5a. Suspension by screws/lag bolts:
Secure the mounting brackets to the ceiling joists or truss, using 1/4" screws with 1/2" washers. These 1" - angle, mounting brackets are slotted to accommodate joists on 16" or 24" centerlines.
- 5b. Suspension by threaded rod:
This heater can also be hung utilizing the same mounting brackets and threaded rod. Attach the threaded rod to the unit mounting brackets, securing with a top and bottom nut.
Next, drill holes into a steel channel or angle iron at the same centerline dimensions as those chosen for the heater that is being installed. The steel channels or angle iron pieces need to span and be fastened to appropriate structural members. Cut the threaded rods to the preferred length, push them through the holes in the steel channel or angle iron and secure with washers and lock nuts, lock washers and nuts, or a double nut arrangement like used on the unit heater mounting brackets.
- 5c. Shelf mounted units:
The unit heater can also be installed on a shelf, if so desired. The mounting brackets will need to be attached to the heater the same manner as explained earlier, however, to mount on a shelf the brackets must go on the bottom of the heater. The brackets must be affixed to the shelf using similar screws (1/4" screw with 1/2" washer) as overhead joist or truss mounting. Be sure all clearance to combustible requirements are met.

INSTALLATION

Venting

WARNING

1. Gas fired heating equipment must be vented - do not operate unvented.
2. A built-in power exhauster is provided - additional external power exhausters are not required or permitted.
3. If you are replacing an existing heater, it may be necessary to resize the venting systems. Improperly sized venting systems can result in vent gas leakage or the formation of condensate. Refer to the National Fuel Gas Code ANSI Z223.1 or CSA B149.1 latest edition. Failure to follow these instructions can result in serious injury or death.
4. Under no circumstances should two sections of double wall vent pipe be joined together within one horizontal vent system due to the inability to verify complete seal of inner pipes.

CAUTION

Installation must conform with local building codes or in the absence of local codes, with Part 7, Venting of Equipment, of the National Fuel Gas Code, ANSI Z223.1 (NFPA 54) - latest edition. In Canada installation must be in accordance with CSA B149.1.

Before you start use the following steps to verify that the venting system is adequately sized:

1. Seal any unused openings in the venting system.
2. Inspect the venting system for proper size and horizontal pitch, as required in the National Fuel Gas Code ANSI Z223.1 or CSA B149.1 Installation Code-latest edition and these instructions. Determine that there is no blockage or restriction, leakage, corrosion and other deficiencies, which could cause an unsafe condition.
3. In so far as practical, close all building doors and windows and all doors between the space in which the appliance(s) connected to the venting system are located and other spaces of the building. Turn on clothes dryers and any exhaust fans such as range hoods and bathroom exhausts, so they shall operate at maximum speed. Do not operate a summer exhaust fan. Close fireplace dampers.
4. Follow the lighting instructions. Place the appliance being inspected in operation. Adjust thermostat so that the appliance will operate continuously.
5. After it has been determined that each appliance connected to the venting system properly vents when tested as outlined above, return doors, windows, exhaust fans, fireplace dampers and any other gas-burning appliance to their previous conditions of use.
6. If improper venting is observed during any of the above tests, the venting system must be corrected.

Table 5.1
ANSI Unit Heater Venting Requirements

Category	Description	Venting Requirements
I	Negative vent pressure Non-condensing	Follow standard venting requirements.
II	Negative vent pressure Condensing	Condensate must be drained.
III	Positive vent pressure Non-condensing	Vent must be gas tight.
IV	Positive vent pressure Condensing	Vent must be liquid and gastight. Condensate must be drained.

Note: A vent is the vertical passageway used to convey flue gases from the unit or the vent connector to the outside atmosphere. A **vent connector** is the pipe which connects the unit to a vent or chimney. Vent connectors serving Category I appliances shall not be connected into any portion of mechanical draft systems operating under positive pressure.

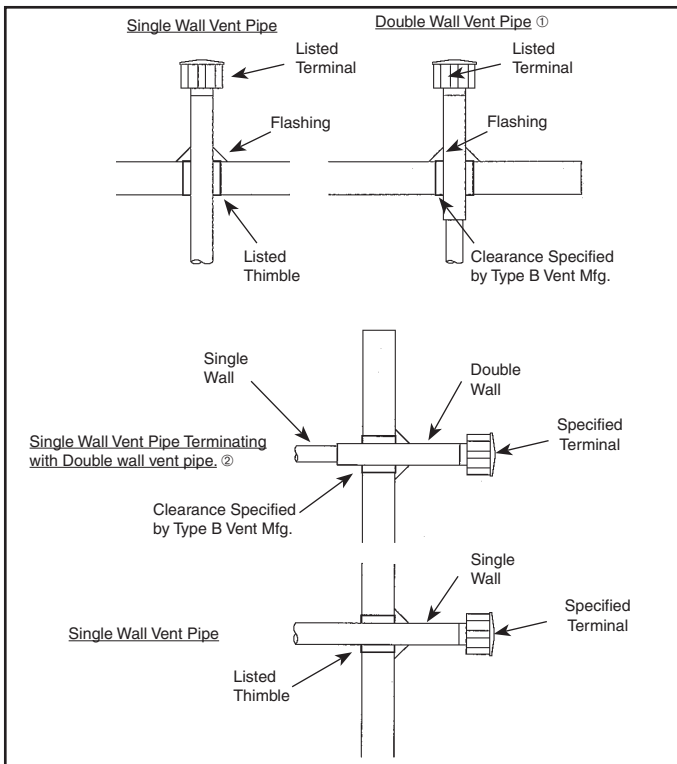
Venting Instructions

1. All vertically vented heaters are category I venting. All horizontally vented heaters are category I or III depending on venting. The pipe should be galvanized steel or other suitable corrosion resistant material (except for category III horizontal, refer to Additional Requirements for Horizontal Category III Venting section). Follow the National Fuel Gas Code for minimum thickness of vent material. The minimum thickness for connectors varies depending on the pipe diameter. Do not vent unit with PVC or other forms of plastic venting material.
2. Vertically vented (horizontal run does not exceed 75% of vertical rise and vent terminates no less than 5' above the vent connector) units may be vented with single or double wall vent pipe. Horizontally vented units must use single wall vent pipe (category III residential may vary) although one continuous section of double wall vent pipe may be used with the vent system.
3. Using Table 5.1, determine the venting requirements for the category determined above. A category III heater must conform to the venting requirements called out in Table 5.1, which are detailed in the following sections, as well as additional requirements also detailed in following sections.
4. A minimum of 12" straight pipe is recommended from the flue outlet before turns in the vent pipe. For vertical venting, it is recommended to install a tee with drip leg and clean out cap to the flue outlet followed by a 90° elbow.
5. All heaters come with a factory installed 3" vent adapter for attaching the vent pipe to the heater. Attach the vent pipe to the adapter with 3 non-corrosive screws. (Drill pilot holes through the vent pipe and adapter prior to screwing in place)
6. Install the vent pipes with a minimum downward slope from the appliance of 1/4 inch per foot and suspend securely from overhead structures at no points greater than 3' apart. Fasten individual lengths of vent together with at least three corrosion resistant sheet metal screws.
7. Keep single wall vent pipe at least 6" from combustible materials. Follow the double wall manufacturer's clearances to combustibles. The minimum distance from combustible materials is based on the combustible material surface not exceeding 160°F. Clearance from the vent pipe (or the top of the unit) may be required to be greater than 6" if heat damage other than fire (such as material distortion or discoloration) could result.
8. Avoid venting through unheated space when possible. When venting does pass through an unheated space or if the unit is installed in an environment that promotes condensation, insulate runs greater than 5' to minimize condensation. Inspect for leakage prior to insulating and use insulation that is noncombustible with a rating of not less than 350°F. Install a tee fitting at the low point of the vent system and provide a drip leg with a clean out cap as shown in Figures 6.2 and 6.3.
9. When the vent passes through a combustible INTERIOR wall or floor, a metal thimble 4" greater than the vent diameter is necessary. If there is 6' or more of vent pipe in the open space between the appliance and where the vent pipe passes through the wall or floor, the thimble need only be 2" greater than the diameter of the vent pipe. If a thimble is not used, all combustible material must be cut away to provide 6" of clearance. Where authorities have jurisdiction type B vent may be used for the last section of vent pipe to maintain clearance to combustibles while passing through wall or floor. See Figure 6.1. Any material used to close the opening must be noncombustible.

INSTALLATION

10. Do NOT use dampers or other devices in the vent or combustion air pipes.
11. Precautions must be taken to prevent degradation of building materials by flue products.
12. Single wall vent pipe must not pass through any unoccupied attic, inside wall, concealed space, or floor.
13. All vertically vented heaters that are category I must be connected to a factory built chimney or vent complying with a recognized standard, or a masonry (or concrete) lined chimney with a material acceptable to the authority having jurisdiction. Venting into an unlined masonry chimney is not permitted. Refer to the National Fuel Gas Code for common venting.
14. The outlet of the vent should extend as shown in Figure 6.3 and Table 6.1 if the following conditions are met: Vent diameter is less than 12", vent is of double wall construction and is a listed product, and the vent does not terminate within 8' of a vertical wall or similar obstruction. For vents that have a diameter of 12" or larger, constructed of single wall, or terminate within 8' of a vertical wall or similar obstruction, the vent pipe shall extend at least 2' higher than any portion of a building within a horizontal distance of 10' (refer to Figure 6.2).
15. The vent system exhaust shall terminate at least 3' above any forced air inlet located within 10', and at least 4' below, 4' horizontally from, or 1' above any door, window, or gravity air inlet into any building and 2' from wall or adjoining building. The bottom of the vent terminal shall be located above the snow line or at least 1' above grade; whichever is greater. When located adjacent to public walkways the vent system shall terminate not less than 7' above grade.
16. A minimum of 4' horizontal terminal clearance (6' for Canada) from gas and electric meters, regulators, and relief equipment is required. The vent terminal shall not terminate closer than 2' to adjacent buildings.
17. Use an approved vent terminal to reduce down drafts and moisture in the vent.

Figure 6.1
Venting Through Combustible Wall or Roof



① See Instructions for attaching single wall pipe to double wall pipe (page 6)

Table 6.1
Minimum Height from Roof to Lowest Discharge Opening

Rise X (in)	Roof Pitch	Min Height H (ft) ①
0-6	Flat to 6/12	1.00
6-7	6/12 to 7/12	1.25
7-8	7/12 to 8/12	1.50
8-9	8/12 to 9/12	2.00
9-10	9/12 to 10/12	2.50
10-11	10/12 to 11/12	3.25
11-12	11/12 to 12/12	4.00
12-14	12/12 to 14/12	5.00
14-16	14/12 to 16/12	6.00
16-18	16/12 to 18/12	7.00
18-20	18/12 to 20/12	7.50
20-21	20/12 to 21/12	8.00

① Size according to expected snow depth.

Figure 6.2
Vertical Venting Through Flat Roof

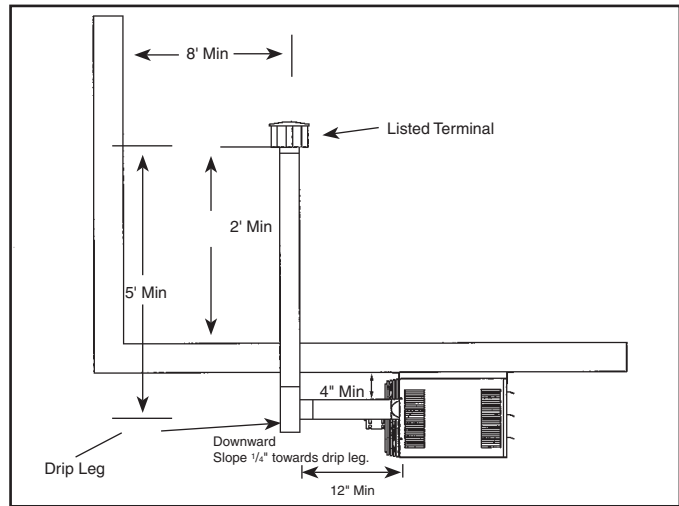
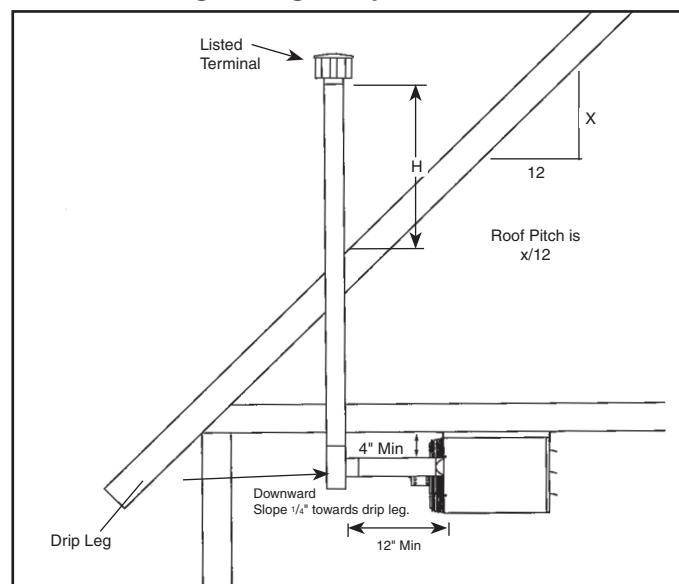


Figure 6.3
Vertical Venting Through Sloped Roof



INSTALLATION

General Instructions For Double Wall (Type B) Terminal Pipe Installation:

1. How to attach a single wall vent terminal to double wall (type B) vent pipe:
 - A. Look for the "flow" arrow on the vent pipe. Attach the vent terminal to the exhaust end of the double wall vent pipe.
 - B. Slide the vent terminal inside the pipe.
 - C. Drill a hole through the pipe and the vent terminal. Using 3/4" long sheet metal screws, attach the cap to the pipe.
2. How to connect a single wall vent system to a double wall (type B) vent pipe:

- A. Slide the single wall pipe inside the inner wall of the double wall pipe.
- B. Drill a hole through both walls of the double wall pipe and through the single wall pipe. Using 3/4" sheet metal screws, attach the two pieces of pipe. Do not over tighten.
- C. Repeat Step B drilling and inserting (2) additional screws, attach the two pieces of pipe. Do not over tighten.
- D. To seal the annular opening, run a large bead of 350°F silastic. The "GAP" between the single and double wall pipe must be sealed but it is not necessary to fill the full volume of the annular area.

Figure 7.1
Horizontal Category III Venting with Upward Pitch

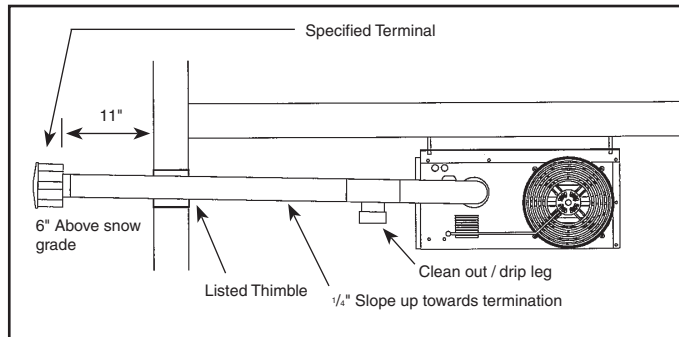


Figure 7.2
Horizontal Category III Venting with Downward Pitch (with drip leg)

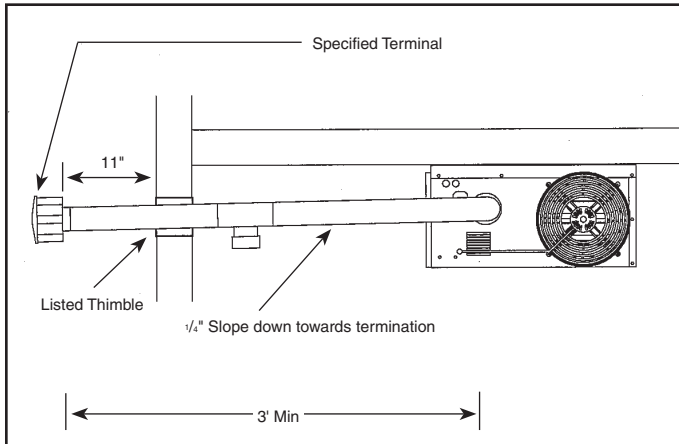
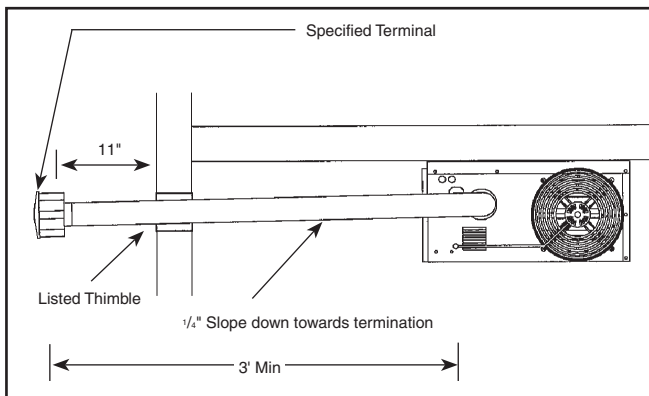


Figure 7.3
Horizontal Category III Venting with Downward Pitch (Condensate Drips Out End)



Additional Requirements For Horizontal Category III Venting:

1. All heaters that are horizontally vented with 3" vent pipe, perform as category III appliance. Category III venting has special venting requirements as follows:
 - A. All residential, horizontally vented category III heaters must be vented with an agency certified category III venting system. Agency certified category III venting systems are available from your local vent pipe distributor. Follow the agency certified category III vent manufacturers instructions for installations.
 - B. For commercial and industrial horizontally vented heaters you may use either agency certified category III venting systems or single wall galvanized or stainless steel vent pipe. If uncertified single wall vent pipe is used, all seams and joints must be sealed with metallic tape or silastic suitable for temperatures up to 400°F. Wrap the tape two full turns around the vent pipe.
2. Limit the total equivalent vent pipe length to a minimum of 3' and a maximum of 30', making the vent system as straight as possible. see Figure 7.1-7.3. (The equivalent length of a 3" elbow is 1').
3. All horizontal category III vents must be terminated with a Gary Steel 1092 or Breidert Type L style vent cap. The vent cap must be 11" from side of wall. Refer to Figures 7.1-7.3.
4. When condensation may be a problem, the vent system shall not terminate over public walkways or over an area where condensate or vapor could create a nuisance or hazard or could be detrimental to the operation of regulators, relief openings, or other equipment.
5. The venting system must be exclusive to a single unit, and no other unit is allowed to be vented into it.
6. When vented horizontally, maintain a 1/4" per foot rise away from the heater. Place a drain tee and clean out near the unit. See Figure 7.1. Where local authorities have jurisdiction, a 1/4" per foot downward slope is acceptable. Use a drain tee with a clean out near the exit of the vent, see Figure 7.2, or allow the condensate to drip out the end. See Figure 7.3.
7. For a vent termination located under an eave, the distance of the overhang must not exceed 24". The clearance to combustibles of the exterior vent must be maintained at a minimum of 11". Consult the National Fuel Gas Code for additional requirements for eaves that have ventilation openings.

Additional Requirements For Horizontal Category I Venting (Residential Only).

1. All heaters installed with category I horizontal vents must be equipped with a vent transition (3" to 4" or 5" depending on vent size selected) attached to the power exhaust adapter located on the unit. All other portions of the vent system shall consist of 4 or 5-inch diameter single wall vent pipe and fittings depending on vent size selected. All seams and joints of the venting system

INSTALLATION

must be sealed with metallic tape or silastic suitable for temperatures up to 400°F. Wrap tape two full turns around the vent pipe joint. One continuous section of double wall vent pipe may be used with the vent system.

2. The maximum length of the horizontal run of the vent shall be limited to the length listed in Table 8.1. The vent terminal for a horizontal category I vent may be either a standard vent TEE, a Gary Steel 1092 or a Breidert Type L style cap. The maximum number of elbows, slope of the horizontal section, and minimum vertical rise from horizontal vent pipe for each configuration is listed in Table 8.1.

A. When using a standard vent TEE, the preferred orientation of the TEE is for the open ends of the TEE to be oriented horizontally. In this orientation, the minimum clearance to combustibles is 6" above the TEE to the eave. If the TEE is oriented vertically, the minimum clearance to combustibles is 27" above the TEE to the eave. Refer to Figure 9.1. The vent TEE should incorporate a bird screen made from corrosion resistant material. The individual strands of mesh in the bird screen must be located at least 1/4" apart.

B. When using a vent cap, the minimum clearance to combustibles is 6" above the cap to the eave. Refer to Figure 9.1.

4. When vented horizontally, maintain a 1/4" per foot rise away from the heater. Place a drain tee and clean out near the vent connector. See Figures 8.1 and 9.3. Where local authorities have jurisdiction, a 1/4" per foot downward slope is acceptable. The Condensate is allowed to drip out of the end when using a TEE terminal. See Figure 9.2. When using a vent cap with an extension, a 3/8" diameter hole is drilled in the low point of the vent by the installer exterior to the space to allow condensation drainage. See Figure 9.4.

Figure 8.1
Horizontal Category I Venting -TEE With Upward Pitch

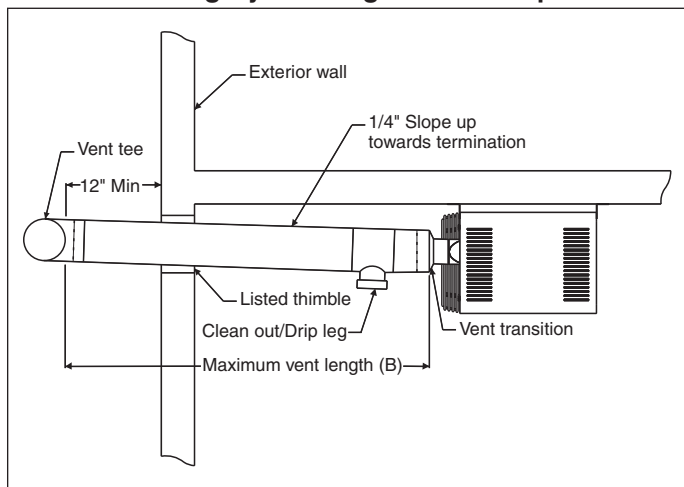


Table 8.1
Allowable Vent Configurations for Category I Horizontal Venting

Model Size	Vent Terminal	Maximum No. Elbows	Minimum Vertical Rise From Horizontal (in) (A)	Maximum Horizontal Vent Length (ft) (B)	Vent Diameter (in)
30	Vent TEE	1	0	10	5
	Vent Cap	2 ①	4 ②	10	5
	Vent TEE	1	0	5	4
	Vent Cap	2 ①	12 ②	5	4
	Vent Cap	2 ①	18 ②	10	4
45	Vent TEE	1	0	10	5
	Vent Cap	2 ①	12 ②	10	5
	Vent Cap	2 ①	18 ②	5	4
60	Vent TEE	1	0	10	5
	Vent Cap	2 ①	15 ②	10	5
75	Vent TEE	1	0	5	5
	Vent Cap	2 ①	18 ②	5	5

① One of the two allowed elbows is required to create the vent extension shown in figures 9.3 and 9.4.

② The vertical rise gained from an elbow is 4". Therefore, 4" may be subtracted from the length of vertical pipe needed in the vent extension. If the minimum vertical rise required is 4" you do not need to add a section of vertical pipe to the vent extension.

INSTALLATION

Figure 9.1
Horizontal Category I Venting - Clearance to Eave

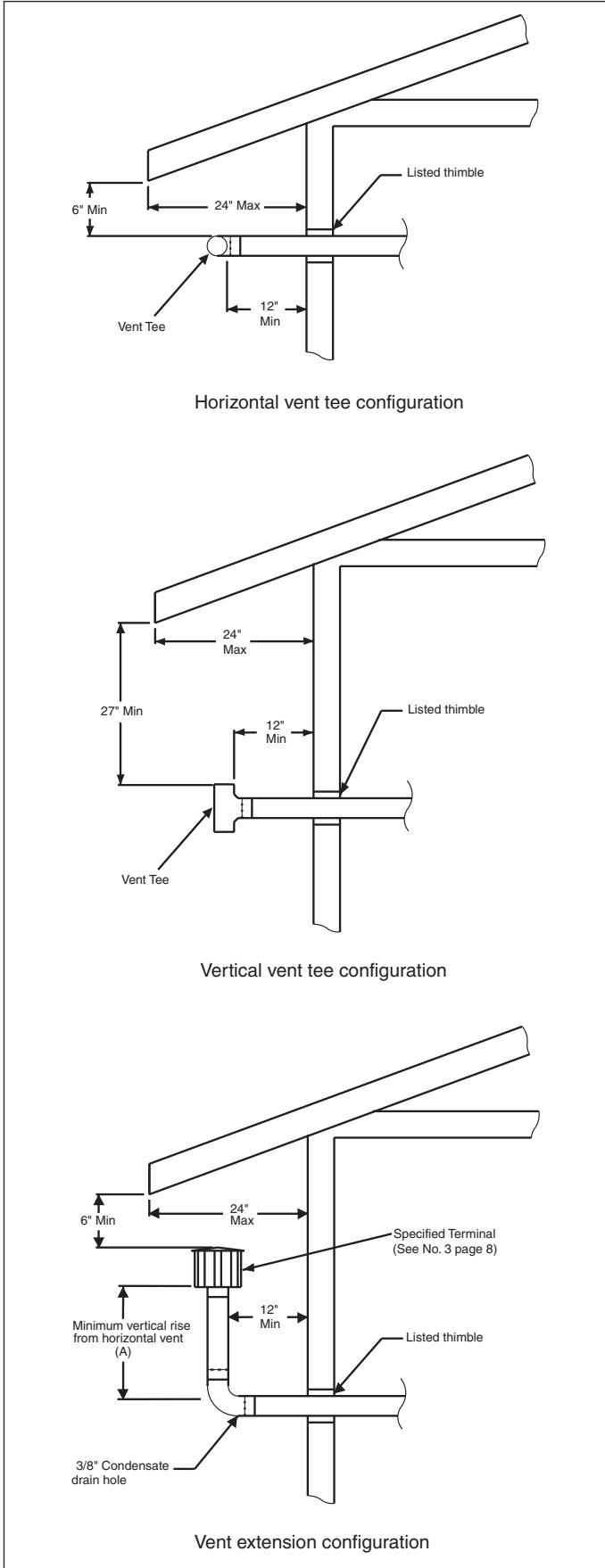


Figure 9.2
Horizontal Category I Venting - TEE With Downward Pitch

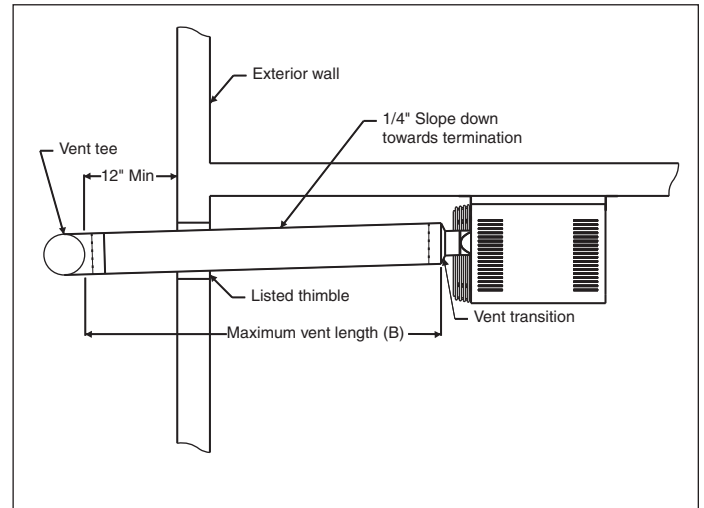


Figure 9.3
Horizontal Category I Venting - Vent Extension With Upward Pitch

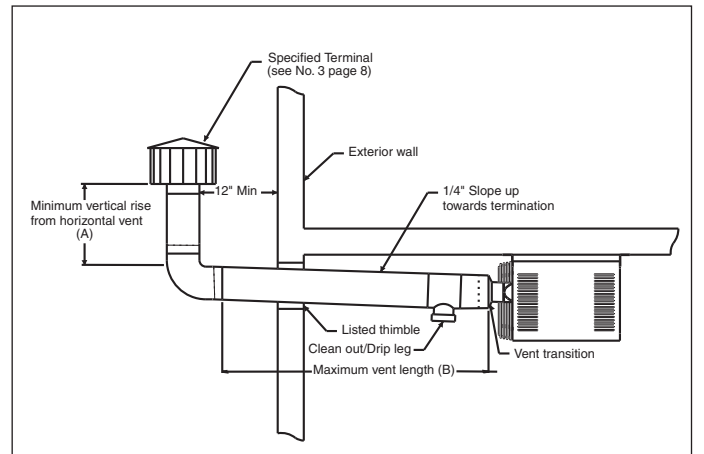
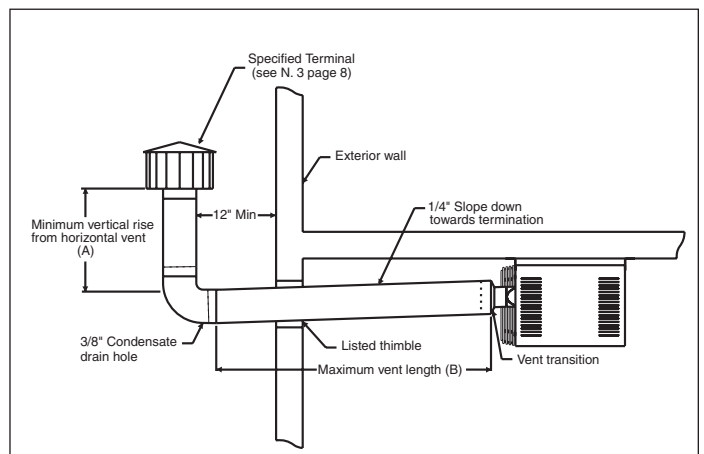


Figure 9.4
Horizontal Category I Venting - Vent Extension With Downward Pitch



UNIT LOCATION

Additional Requirements for Common Venting:

1. The common vent system and all attached appliances must be category I.
2. The vent connector should be routed in the most direct route from the units to the common vent.
3. Where two or more vent connectors enter a common gas vent or chimney flue, the smaller connector shall enter at the highest level consistent with the available head room or clearance to combustible material.

Table 10.1 - Maximum Vent Connector Horizontal Run (ft) Type B Vent connector and Type B Common Vent

Model	Connector Dia.	Vent Height					
		6 ft.	8 ft.	10 ft.	15 ft.	20 ft.	30 ft.
HD30	3	6	8	10	10	11	12
	4	4	4	4	5	5	6
	5	NA	NA	NA	NA	NA	NA
HD45	3	NA	NA	NA	4.5	9	13.5
	4	6	8	10	10	14	15
	5	NA	NA	NA	NA	NA	NA
HD60	3	NA	NA	NA	NA	NA	4.5
	4	6	8	10	15	20	23
	5	6	8	10	14	15	17
HD75	4	NA	NA	10	15	20	30
	5	6	8	10	15	20	24

Based on NFPA Tables 13.6, 13.1 & section 13.2.3

4. Restrictions within the common vent such as elbows should be minimized. Each elbow installed within the common portion of the venting system reduces maximum common vent capacity by 10% (refer to tables 10.2 and 10.4 for capacity)
5. The vent connector capacities included in these tables allow for the use of two 90 degree elbows (or turns). For each additional elbow, the vent connector capacity shall be reduced by 10%. Refer to NFPA54/ IFEC tables for capacity ratings.
6. The common vent cross sectional area must be equal to or greater than the largest vent connector cross-sectional area.
7. If all appliances are located on one level of the building, the vent height shall be measured from the highest draft hood or vent connector to be installed within the common vent system (Refer to figures 11.1 and 11.2).
8. All units must be vented in strict accordance of the common venting tables 10.1, 10.2, 10.3, and 10.4.
9. All masonry chimneys must comply with all applicable local and national codes.
10. When combining multiple vent connectors into a manifold prior to the vertical portion of the common vent, the size of the common vent manifold and the common vent shall be determined by applying a 10% reduction (.90 x maximum vent capacity from table 10.2 or 10.4) to the common vent capacity part of the common vent tables (refer to figure 11.3). The length of the common vent manifold (Lm) may not exceed 18 inches per inch of manifold diameter.
11. Refer to the national fuel gas code for instructions on multi-level common venting and exterior masonry chimneys as well as additional installation of the listed applications.

Table 10.2 - Maximum total appliance input Capacities (MBh) Type B Vent connector and Type B Common Vent

Vent Height (ft)	Area of Common Vent							
	4 in ²		5 in ²		6 in ²		7 in ²	
	Fan+ Fan	Fan+ Nat	Fan+ Fan	Fan+ Nat	Fan+ Fan	Fan+ Nat	Fan+ Fan	Fan+ Nat
6	92	81	140	116	204	161	309	248
8	101	90	155	129	224	178	339	275
10	110	97	169	141	243	194	367	299
15	125	112	195	164	283	228	427	352
20	136	123	215	183	314	255	475	394
30	152	138	244	210	361	297	547	459

Based on NFPA Table 13.6.

Table 10.3 - Maximum Connector Horizontal Run (ft) Type B Vent connector with common vent into Masonry Chimney

Model	Connector Dia. (in)	Vent Height					
		6 ft.	8 ft.	10 ft.	15 ft.	20 ft.	30 ft.
HD30	3	4.5	4.5	4.5	4.5	4.5	4.5
	4	NA	NA	NA	NA	NA	NA
	5	NA	NA	NA	NA	NA	NA
HD45	3	4.5	4.5	4.5	4.5	4.5	4.5
	4	6	6	6	6	6	6
	5	NA	NA	NA	NA	NA	NA
HD60	3	NA	NA	NA	NA	NA	NA
	4	6	6	6	6	6	6
	5	7.5	7.5	7.5	7.5	7.5	7.5
HD75	4	NA	6	6	6	6	6
	5	7.5	7.5	7.5	7.5	7.5	7.5

Based on NFPA table 13.8 & 13.2.2 "Vent Connector Maximum Length" in section 13.2

Table 10.4 - Maximum total appliance input Capacities (MBh) Type B Vent connector with common vent into Masonry Chimney

Vent Height (ft.)	Area of Common Vent							
	12 in ²		19 in ²		28 in ²		38 in ²	
	Fan+ Fan	Fan+ Nat	Fan+ Fan	Fan+ Nat	Fan+ Fan	Fan+ Nat	Fan+ Fan	Fan+ Nat
6	NA	74	NA	119	NA	178	NA	257
8	NA	80	NA	130	NA	193	NA	279
10	NA	84	NA	138	NA	207	NA	299
15	NA	NA	NA	152	NA	233	NA	334
20	NA	NA	NA	NA	NA	250	NA	368
30	NA	NA	NA	NA	NA	270	NA	404

Based on NFPA Table 13.8

Figure 11.1
Common venting into double wall B vent

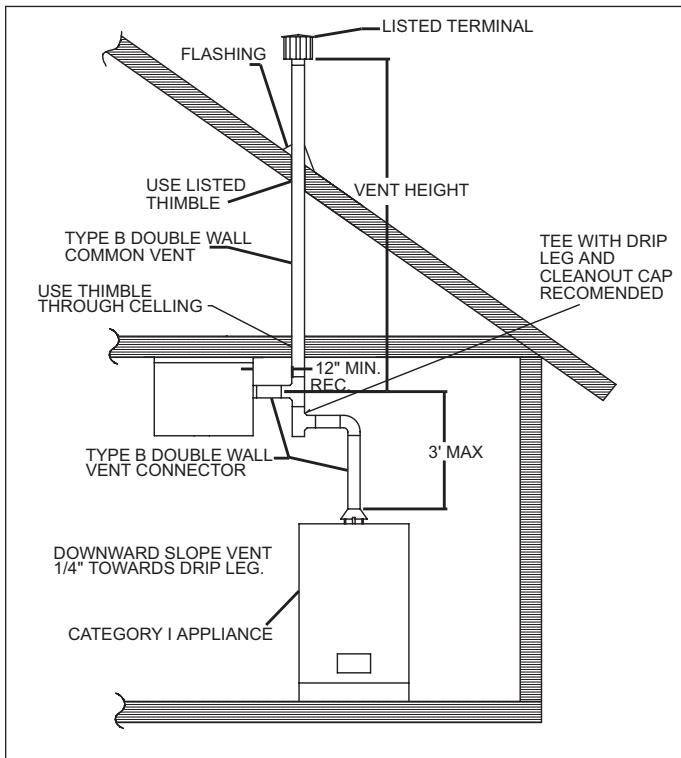


Figure 11.2
Common venting into masonry chimney

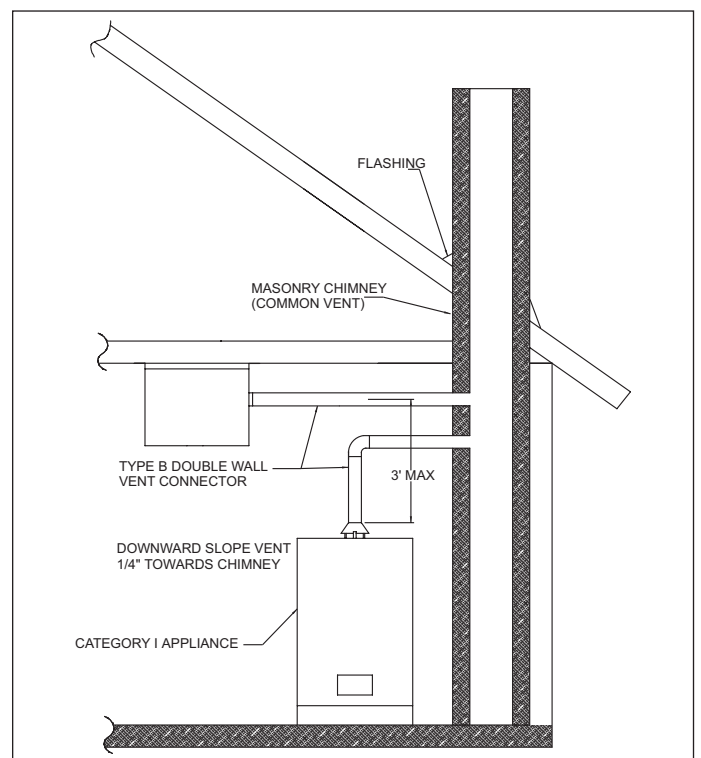
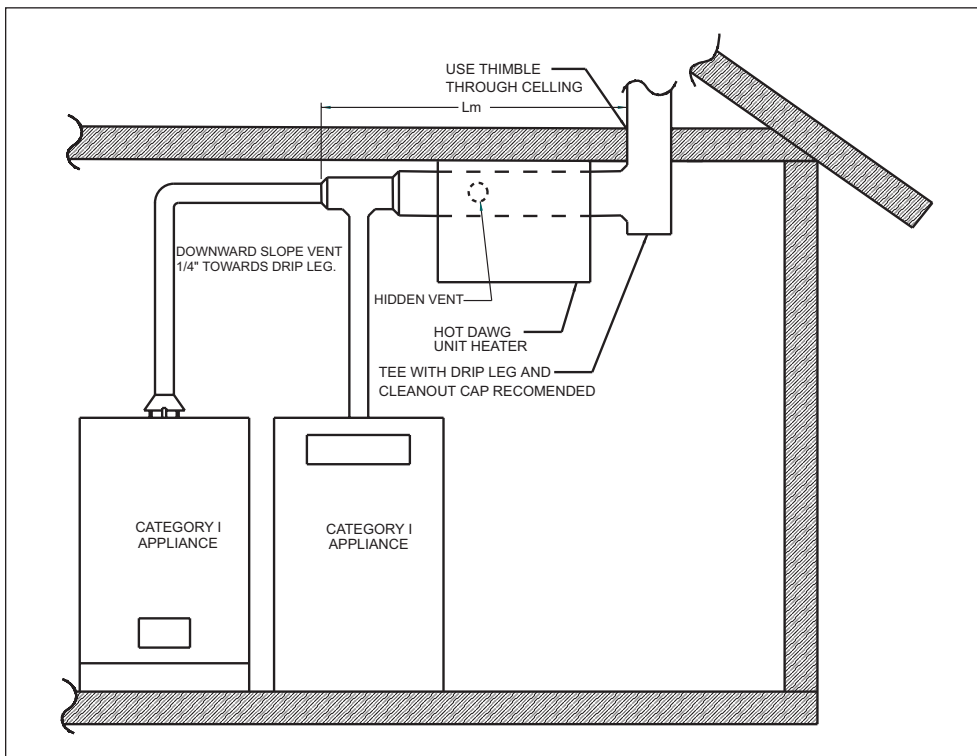


Figure 11.3
Common venting into manifold



INSTALLATION

Gas Connections

⚠ WARNING

1. All field gas piping must be pressure/leak tested prior to operation. Never use an open flame. Use a soap solution or equivalent for testing.
2. Gas pressure to appliance controls must never exceed 14" W.C. (1/2 psi).
3. To reduce the opportunity for condensation, the minimum sea level input to the appliance, as indicated on the serial plate, must not be less than 5% below the rated input, or 5% below the minimum rated input of dual rated units.

⚠ CAUTION

1. Purging of air from gas lines should be performed as described in ANSI Z223.1 - latest edition "National Fuel Gas Code", or in Canada CSA-B149 codes.
2. When leak testing the gas supply piping system, the appliance and its combination gas control must be isolated during any pressure testing in excess of 14" W.C. (1/2 psi).
3. The unit should be isolated from the gas supply piping system by closing its field installed manual shut-off valve. This manual shut-off valve should be located within 6' of the heater.
4. Turn off all gas before installing appliance.

IMPORTANT

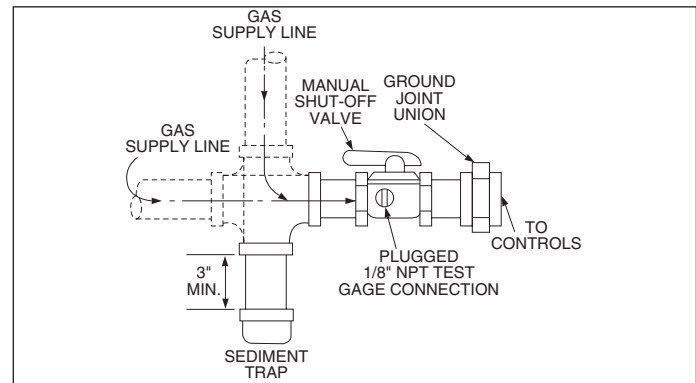
To prevent premature heat exchanger failure, the input to the appliance, as indicated on the serial plate, must not exceed the rated input by more than 5%.

1. Installation of piping must conform with local building codes, or in the absence of local codes, with the National Fuel Gas Code, ANSI Z223.1 (NFPA 54) - latest Edition. In Canada, installation must be in accordance with CSA-B149.1.
2. Piping to units should conform with local and national requirements for type and volume of gas handled, and pressure drop allowed in the line. Refer to Table 13.1 to determine the cubic feet per hour (CFH) for the type of gas

and size of unit to be installed. Using this CFH value and the length of pipe necessary, determine the pipe diameter from Table 12.1. Where several units are served by the same main, the total capacity, CFH and length of main must be considered. Avoid pipe sizes smaller than 1/2". Table 12.1 allows for a 0.3" W.C. pressure drop in the supply pressure from the building main to the unit. The inlet pressure to the unit must be 6-7" W.C. for natural gas and 11-14" W.C. for propane gas. When sizing the inlet gas pipe diameter, make sure that the unit supply pressure can be met after the 0.3" W.C. has been subtracted. If the 0.3" W.C. pressure drop is too high, refer to the Gas Engineer's Handbook for other gas pipe capacities.

3. Install a ground joint union with brass seat and a manual shut-off valve adjacent to the unit for emergency shut-off and easy servicing of controls, including a 1/8" NPT plugged tapping accessible for test gauge connection (See Figure 12.1).
4. Provide a sediment trap before each unit in the line where low spots cannot be avoided. (See Figure 12.1).
5. When Pressure/Leak testing, pressures above 14" W.C. (1/2 psi), close the field installed shut-off valve, disconnect the appliance and its combination gas control from the gas supply line, and plug the supply line before testing. When testing pressures 14" W.C. (1/2 psi) or below, close the manual shut-off valve on the appliance before testing.

Figure 12.1
Recommended Sediment Trap/Manual Shut-off Valve Installation - Side or Bottom Gas Connection^①



① Manual shut-off valve is in the "OFF" position when handle is perpendicular to pipe.

Table 12.1
Gas Pipe Capacities

Gas Pipe Capacities (Up to 14" W.C. Gas Pressure through Schedule 40 Pipe)												
Cubic Feet per Hour with Pressure Drop of 0.3" W.C.												
Natural Gas - Specific Gravity - 0.60												
Propane Gas - Specific Gravity - 1.50												
Length of Pipe (feet)	Pipe Diameter											
	1/2"		3/4"		1"		1-1/4"		1-1/2"		2"	
	Natural	Propane	Natural	Propane	Natural	Propane	Natural	Propane	Natural	Propane	Natural	Propane
10	132	83	278	175	520	328	1050	662	1600	1008	3050	1922
20	92	58	190	120	350	221	730	460	1100	693	2100	1323
30	73	46	152	96	285	180	590	372	890	561	1650	1040
40	63	40	130	82	245	154	500	315	760	479	1450	914
50	56	35	115	82	215	135	440	277	670	422	1270	800
60	50	32	105	66	195	123	400	252	610	384	1150	725
70	46	29	96	60	180	113	370	233	560	353	1050	662
80	43	27	90	57	170	107	350	221	530	334	930	586
100	38	24	79	50	150	95	305	192	460	290	870	548
125	34	21	72	45	130	82	275	173	410	258	780	491
150	31	20	64	40	120	76	250	158	380	239	710	447

INSTALLATION

**Table 13.1
Manifold Pressure & Gas Consumption**

Model Size	BTU/Cu. Ft. Specific Gravity	Natural	Propane	No. of Orifices
		1050 0.60	2500 1.53	
Manifold Pressure In. W.C.		3.5	10.0	
30	CFH	28.6	12.0	2
	Gal/Hr. Propane		.33	
	Sec/cu. ft.	126	300	
	Orifice Drill Size	49	56	
45	CFH	42.9	18.0	3
	Gal/Hr. Propane		.50	
	Sec/cu. ft.	84	200	
	Orifice Drill Size	49	56	
60	CFH	57.1	24.0	4
	Gal/Hr. Propane		.66	
	Sec/cu. ft.	63	150	
	Orifice Drill Size	49	56	
75	CFH	71.4	30.0	5
	Gal/Hr. Propane		.83	
	Sec/cu. ft.	50	180	
	Orifice Drill Size	49	56	

Wiring

WARNING

1. Disconnect power supply before making wiring connections to prevent electrical shock and equipment damage.
2. All appliances must be wired strictly in accordance with wiring diagram furnished with the appliance. Any wiring different from the wiring diagram could result in a hazard to persons and property.
3. Any original factory wiring that requires replacement must be replaced with wiring material having a temperature rating of at least 105°C.
4. Ensure that the supply voltage to the appliance, as indicated on the serial plate, is not 5% greater than rated voltage.

CAUTION

Ensure that the supply voltage to the appliance, as indicated on the serial plate, is not 5% less than the rated voltage.

All field installed wiring must be done in accordance with the National Electrical Code ANSI/NFPA 70 – latest edition or Canadian Electrical Code CSA C22.1 Part 1 or local codes. Unit must be electrically grounded according to these codes. If any of the original wire supplied with the heater must be replaced, replace it with wiring material having a temperature rating of at least 105°C.

The power to these unit heaters should be protected with a circuit breaker.

Location of thermostat should be determined by heating requirements and be mounted on an inside wall about 5' above floor level where it will not be affected by heat from the unit or other sources, or drafts from frequently opened doors. See instructions packed with thermostat.

Prior to Operation

Although this unit has been assembled and fire-tested at the factory, the following pre-operational procedures should be performed to assure proper on-site operation.

1. Turn off power.
2. Check fan clearance. Fan should not contact casing when spun by hand.
3. Check all electrical connections to be sure they are secure.
4. If you are not familiar with the unit's controls (i.e. combination gas control), refer to the control manufacturer's literature supplied with the unit.
5. Check that all horizontal deflector blades are open a minimum of 30° as measured from vertical.

FOR YOUR SAFETY READ BEFORE OPERATING

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

- A. This appliance does not have a pilot. It is equipped with an ignition device which automatically lights the burner. Do not try to light the burner by hand.
- B. BEFORE OPERATING smell all around the appliance area for gas. Be sure to smell next to the floor because some gas is heavier than air and will settle on the floor.

WHAT TO DO IF YOU SMELL GAS

- Do not try to light any appliance.
 - Do not touch any electric switch; do not use any phone in your building.
 - Immediately call your gas supplier from a neighbors phone. Follow the gas supplier's instructions.
 - If you cannot reach your gas supplier, call the fire department.
- C. Use only your hand to move the gas control switch. Never use tools. If the switch will not move by hand, don't try to repair it, call a qualified service technician. Force or attempted repair may result in a fire or explosion.
 - D. Do not use this appliance if any part has been under water. Immediately call a qualified service technician to inspect the appliance and to replace any part to the control system and any gas control which has been under water.

OPERATING INSTRUCTIONS

1. STOP! Read the safety information above.
2. Set thermostat to lowest setting.
3. Turn off all electric power to the appliance.
4. This appliance is equipped with an ignition device which automatically lights the pilot. Do not try to light the pilot by hand.
5. Remove the access panel.
6. Move the gas control switch to the "OFF" position.
7. Wait five (5) minutes to clear out any gas. Then smell for gas, including near the floor. If you smell gas, STOP! follow "B" in the safety information above. If you don't smell gas, go to the next step.
8. Move the gas control switch to the "ON" position.
9. Replace control access panel.
10. Turn on all electric power to the appliance.
11. Set the thermostat to the desired setting.
12. If the appliance will not operate, follow the instructions "To Turn Off Gas to Appliance" and call your service technician or gas supplier.

UNIT COMPONENTS

TO TURN OFF GAS TO APPLIANCE

1. Set thermostat to lowest setting.
2. Turn manual shut-off valve located outside of the unit to the closed position.
3. Turn off all electric power to the appliance if service is to be performed.
4. Remove access panel.
5. Turn the gas valve switch to the "OFF" position.
6. Replace the access panel.

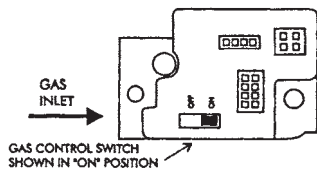
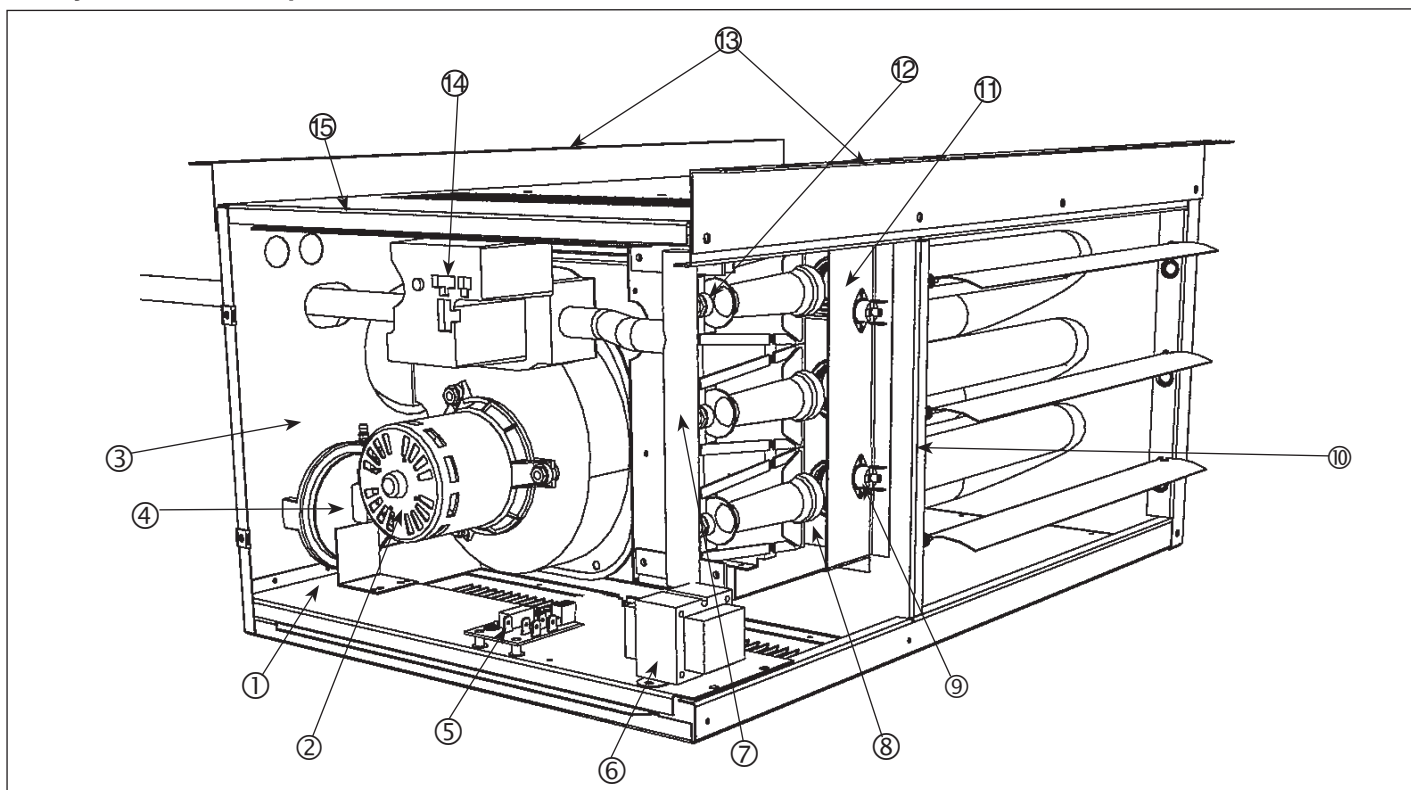


Figure 14.1
Major Gas, Electrical Service,
Safety and Other Components



- | | | |
|-------------------------|----------------------------|---------------------------------------|
| 1. Wiring Diagram | 6. Control Transformer | 11. Hot Surface Igniter (hidden) |
| 2. Power Exhauster | 7. Serial Plate (hidden) | 12. Gas Orifices |
| 3. LED Diagnostic Codes | 8. Flame Sensor (hidden) | 13. Mounting Brackets |
| 4. Pressure Switch | 9. Flame Rollout Switch | 14. Combination Gas Control |
| 5. Terminal Board | 10. Limit Control (hidden) | 15. Common Replacement Parts (hidden) |

For Hot Surface Ignition

Upon a call for heat from the thermostat, power is supplied to the power exhauster motor. The unit will go through a purge period and then the hot surface igniter will be energized. After the igniter has warmed up, the main valve in the combination control valve will open to allow gas to flow to the burners. If the

fan motor has not already started it will start shortly. If a flame is not sensed for any reason the main valve will close and there will be a short purge period before ignition is tried again. If the flame is not sensed after four tries there will be at least a one hour wait before ignition is tried again.

UNIT COMPONENTS

Figure 15.1
Unit Heater Rear View

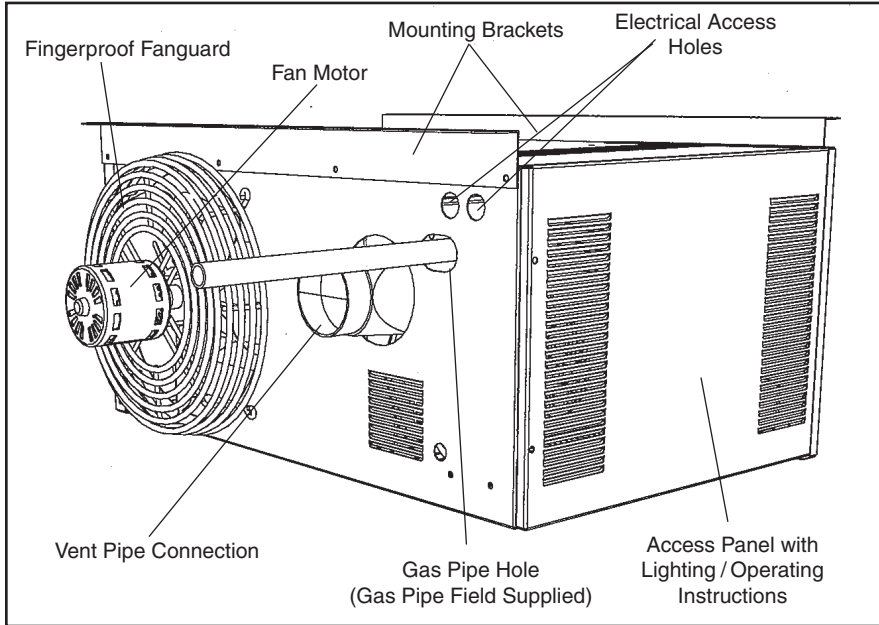


Figure 15.2
Unit Heater in Standard Mounting Configuration
(from factory this orientation - brackets not attached)

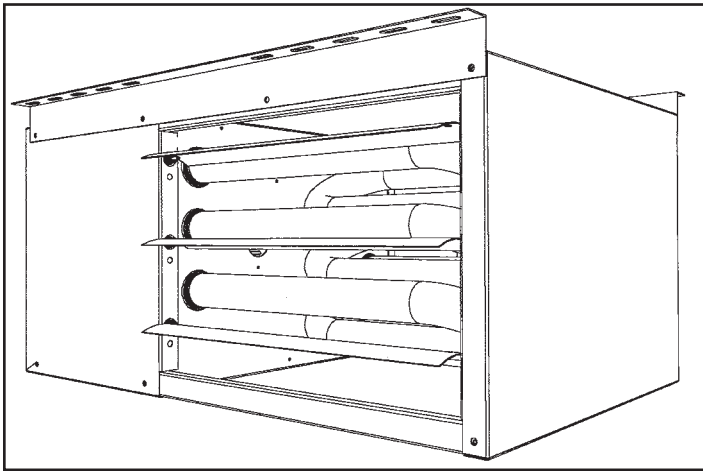
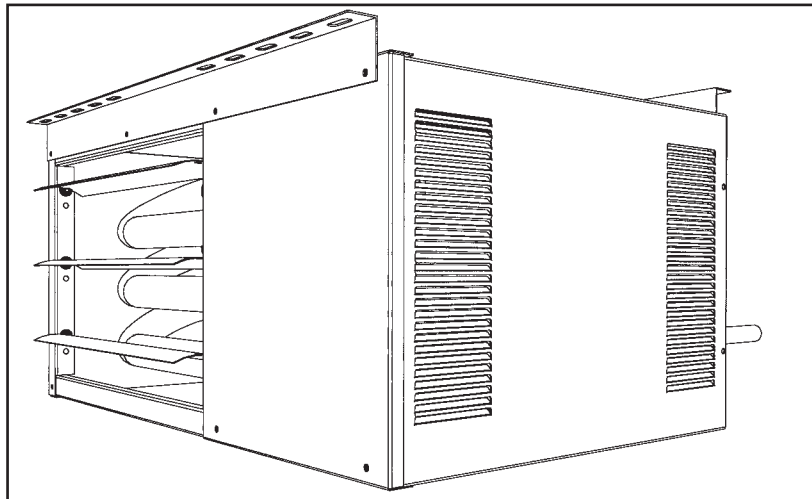
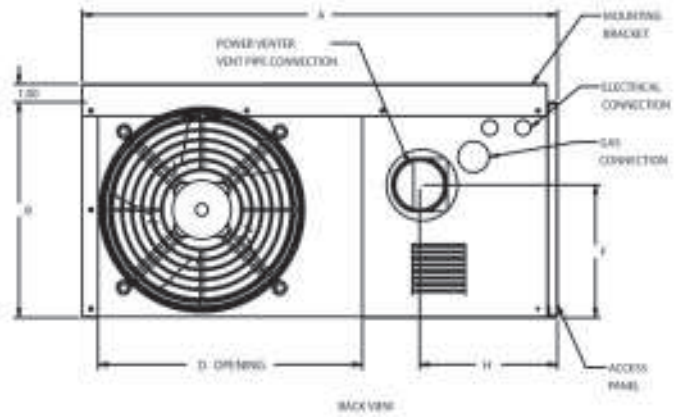
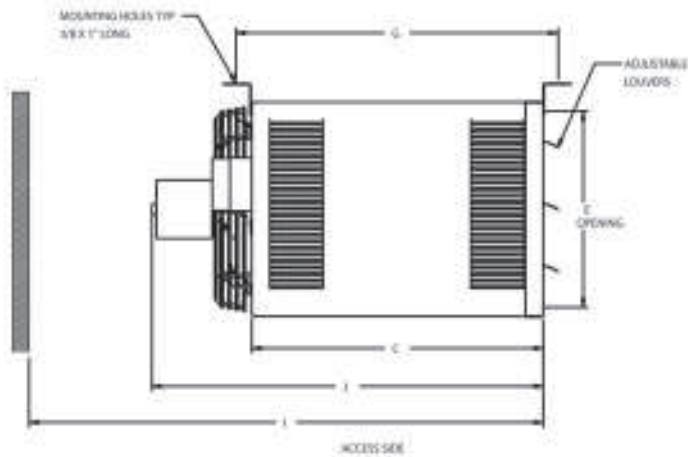


Figure 15.3
Unit Heater Turned 180°
(Access Panel and Heated Air Outlet Change Sides)



DIMENSIONS / GENERAL PERFORMANCE DATA



Performance

Models	HD30	HD45	HD60	HD75	
Btu/Hr Input	30,000	45,000	60,000	75,000	
Btu/Hr Output	24,000	36,000	48,000	60,000	
Entering Airflow (CFM)	505	720	990	1,160	
Outlet Velocity (FPM)	523	749	653	769	
Air Temp. Rise (°F)	44	46	45	48	
Mounting Height (Max ft.)	10	10	12	14	
Heat Throw (ft.)	25	27	36	38	
Motor Data	Horsepower	1/25	1/15	1/12	1/12
	RPM	1,550	1,550	1,625	1,625
	Type	S.P.	S.P.	P.S.C.	P.S.C.
	Amps	1.5	2.4	1.2	1.2
Unit Total Amps	2.8	3.7	2.5	2.5	
Vent Connector Size (in.)	3	3	3	3	

Dimensions (inches)

Models	HD30	HD45	HD60	HD75
A	26.8	26.8	26.8	26.8
B	12.2	12.2	18.0	18.0
C	16.5	16.5	16.5	16.5
D	14.9	14.9	14.9	14.9
E	10.1	10.1	15.9	15.9
F	7.5	7.5	10.7	10.7
G	18.5	18.5	18.5	18.5
H	7.6	7.6	7.8	7.8
Gas Connection	1/2	1/2	1/2	1/2
I	34.5	34.5	34.5	34.5
J	22	22	25	25
Fan Diameter	10	10	14	14
Approx. Shipping Weight (lbs.)	55	60	80	85

Mounting

1" - angle, mounting brackets are slotted to accommodate joists on 16" or 24" centerlines.



Clearances

Unit Side	Clearance To Combustible Materials	Recommended Service Clearance
Top and Bottom	1"	1"
Access Side	18"	18"
Non-Access Side	1"	1"
Rear	18"	18"
Vent Connector	4"	4"

Control Codes

Control System Description	Control Code No.	Service Voltage	Thermostat Voltage	Type of Gas
Single Stage, Hot Surface Ignition, 100% Shut-Off, Multiple Retry with Auto Reset from Lockout. - Utilizes a single-stage combination gas control with built-in ignition control. Gas is lit with a hot surface igniter on call for heat.	34	115V	24V	natural
	74	115V	24V	propane

- Ratings shown are for elevation up to 2000 feet above sea level (in Canada, refer to rating plate). For elevations above 2000 ft., ratings should be reduced by approximately 4% for each 1000 ft. above sea level.
- Mounting Height is measured from the bottom of the unit.
- Heat Throws are calculated at 65°F ambient and unit fired at full rated input. Throws for HD30 and HD45 are based on 8-foot mounting heights and at 10-foot heights for HD60 and HD75.
- S.P. = shaded pole, P.S.C. = permanent split capacitor



Certified for Residential and Commercial Use

SERVICE / MAINTENANCE / TROUBLESHOOTING

WARNING

When servicing or repairing of this equipment, use only factory-approved service replacement parts. A complete replacement parts list may be obtained by contacting the factory. Refer to the rating plate on the appliance for complete appliance model number, serial number, and company address. Any substitution of parts or controls not approved by the factory will be at the owner's risk.

CAUTION

1. Servicing or repairing of this equipment must be performed by a qualified service agency.
2. Do not attempt to reuse any mechanical or electrical controllers which have been wet. Replace defective controller.

IMPORTANT

To check most of the Possible Remedies in the troubleshooting guide listed in Tables 17.1 and 18.1, refer to the applicable sections of the manual.

General Maintenance

The unit and venting system must be checked once a year by a qualified service technician.

Only people trained and familiar with the operation of unit heaters and their controls should service this equipment. Before any service, BE SURE TO TURN OFF GAS AT THE MANUAL SHUT-OFF VALVE AHEAD OF THE COMBINATION GAS CONTROL AND TURN OFF ALL ELECTRIC POWER TO THE HEATER.

**Table 17.1
Troubleshooting**

TROUBLE	POSSIBLE CAUSE	POSSIBLE REMEDY
Unit does nothing.	<ol style="list-style-type: none"> 1. Power supply is off 2. No 24V power to thermostat 3. Thermostat malfunction 4. LED flashes bright / dim 5. Defective control 	<ol style="list-style-type: none"> 1. Turn on main power. 2 a. Check control transformer <ol style="list-style-type: none"> b. If failed transformer - check thermostat wire gage and length 3 a. Verify wire connections to R&W terminals only <ol style="list-style-type: none"> b. Check / replace thermostat 4. Check LED code at gas valve thermostat and connection 5. Replace control
LED light off or flashing.	<ol style="list-style-type: none"> 1. Light off - no power 2. Two flashes - pressure switch closed. 3. Three flashes - pressure switch open. 4. Four flashes - limit or flame rollout switch 5. Five flashes - Flame signal sensed out of sequence. 6. Six flashes - System lockout 	<ol style="list-style-type: none"> 1. Check main power 2 a. Check for blocked or improper venting. <ol style="list-style-type: none"> b. Check vent motor hose / connection replace or reconnect c. Check pressure switch. d. Check power exhaustor motor. 3 a. Check to insure control switch in "ON" position <ol style="list-style-type: none"> b. Check for incorrect or blocked venting c. Check pressure switch 4 a. Check limit and flame controls and connections <ol style="list-style-type: none"> b. If flame rollout switch OK, but tripped: <ol style="list-style-type: none"> 1. Main gas pressure too high 2. Manifold orifice incorrect - too large 3. Incorrect unit clearance to surrounding wall/ceiling 4. Check for negative pressure in building 5. Incorrect or blocked venting 6. Access panel vent louvers wrong direction - reverse panel. 7. Area around main gas orifices blocked with debris 8. Unit louvers closed. 9. Heat exchanger tube(s) blocked with debris 5. Flame at main burners 6 a. Gas supply off or too low. <ol style="list-style-type: none"> b. Damaged or broken Ignitor. c. No line voltage. d. Unit not properly grounded. e. Check flame sense rod.

1. Service air moving components annually.
 - a. Check fan for fit on motor shaft and for damage to blades.
2. Keep unit free from dust, dirt, grease, and foreign matter, paying particular attention to:
 - a. Combustion air inlets.
 - b. Burners and burner orifices. Turn off gas ahead of the combination gas control and shut off electric power to the heater. Remove the access panel, open the union on the gas line, and disconnect the igniter and sensor wires. Remove the screws that attach the burner tray to the header plate and remove the burner tray and manifold assembly from the heater. Carefully clean the burners with a wire brush or other suitable means.

Replace any damaged or deteriorating burners or orifices. Install the burner assembly back on to the header making certain that all screws, pipes and electrical connections are tight.

CAUTION: Be careful when handling the igniter.

1. Inspect the flame sensor and igniter for deterioration and/or cracks.
2. Verify that the burners are touching each other at the carryover points. This will ensure flame carryover from burner to burner.
- c. Clean exterior of heat exchanger tubes.
- d. Fan blade.
3. Check wiring for possible loose connections.
4. Controls – The gas valves and piping should be checked annually for general cleanliness and tightness. The gas controls should be checked to insure that the unit is operating properly. See control instruction sheets furnished separately with the unit heater.
5. Power exhaust assembly/motors – The power exhaust motor bearings have been lubricated for long life and do not require additional lubrication. In dirty atmosphere, it may be desirable to clean the motors and blower housing and blow out the cooling air passages of the motor with compressed air.
6. Perform periodic cleaning of inlet and vent terminal screens.

UNIT WIRING

Table 18.1
Troubleshooting (continued)

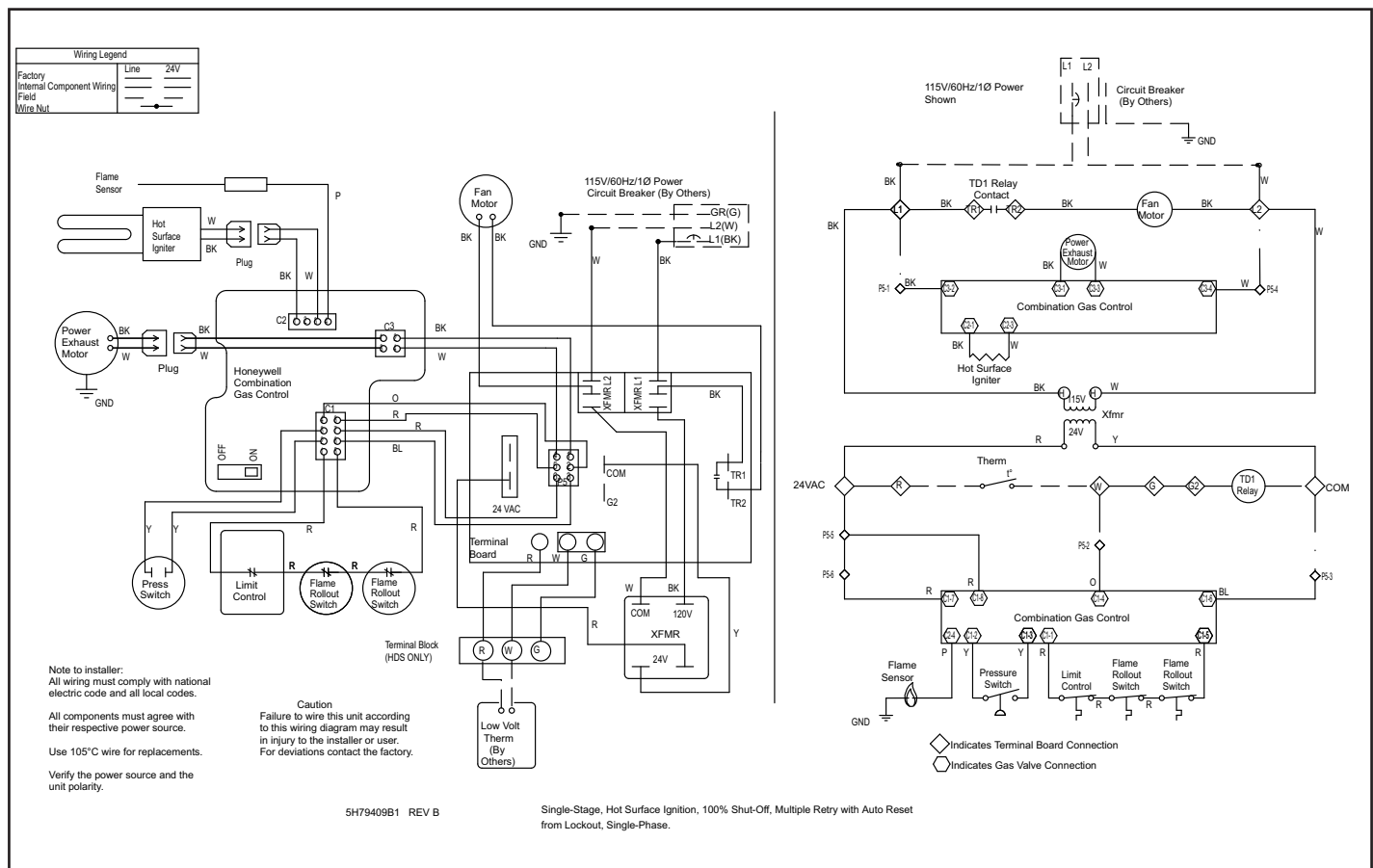
TROUBLE	POSSIBLE CAUSE	POSSIBLE REMEDY
Unit starts but does not ignite.	<ol style="list-style-type: none"> 1. Main gas is off. 2. Air in gas line. 3. Main or manifold gas pressure 4. Check gas valve switch. 	<ol style="list-style-type: none"> 1. Open manual gas valve . 2. Purge gas line. 3. Set gas pressures per manual instructions 4. Set gas valve switch to "ON" position
Unit goes through cycle but the burners go out in less then 10 seconds	<ol style="list-style-type: none"> 1. Reversed main power polarity 2. Unit not grounded 3. Flame not sensed 	<ol style="list-style-type: none"> 1. Black wire - HOT, White wire - NEUTRAL, Green wire - Ground 2. Ground unit and verify quality of ground connection. 3. Check flame sense probe and connection
Air circulating fan inoperable	<ol style="list-style-type: none"> 1. Loose connections 2. Defective Fan time delay relay 3. Defective fan motor 	<ol style="list-style-type: none"> 1. Check all connections 2. Check fan time delay relay 3. Check fan motor

Wiring Diagram Selection

Since internal or factory wiring may vary depending on controls manufacturer, the wiring diagrams must be selected with the series identity number when installing, servicing, or troubleshooting a unit heater control system. Wiring diagrams that follow are for units with the corresponding series identity number that may be found in the 5th through the 7th digits of

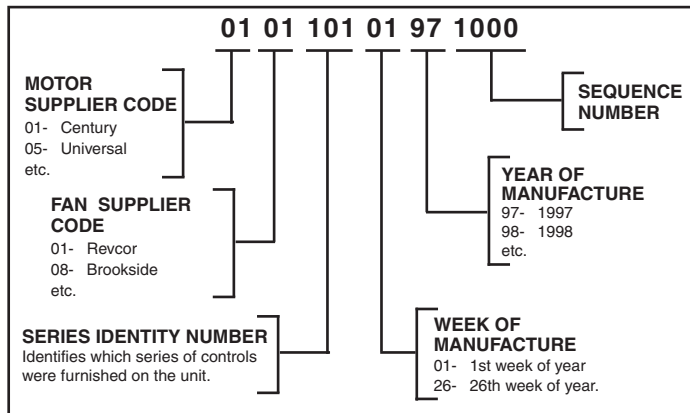
the serial number. For example, a unit with the serial number "30011033605-0981" has the 5th through the 7th digits as 103 as shown underlined above. To use the following diagram the unit series ID must be 103.

Figure 18.1
Unit Heater Wiring Diagram (Series 103)

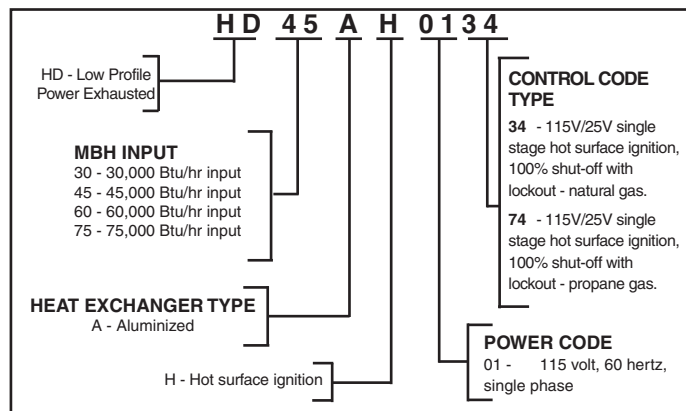


SERVICE / MAINTENANCE / TROUBLESHOOTING

Serial Number Designations (Remove access cover to locate)



Model Number Designations (Remove access cover to locate)



Replacement Parts

When requesting parts please contact your local representative. Please have full model and serial number available. If you require assistance in locating your representative, please call the number located on the back page.

Figure 15.1

Common Replacement Parts ①

Model Size	Heat Exch. Kit	Power Exhauster	Limit Control Switch	Flame Roll-out Switch	Transformer	Pressure Switch	Control Board	Igniter	Combination Gas	
									Control Code 34	Control Code 74
30	3H36919	5H75038	5H75001	5H75002-2	5H75029	5H75030-3	5H78126-1	5H75032	5H76382	5H76383
45	3H36920	5H75038	5H75001	5H75002-2	5H75029	5H75030-3	5H78126-1	5H75032	5H76382	5H76383
60	3H36921	5H75038	5H75769	5H75002-2	5H75029	5H75030-3	5H78126-1	5H75032	5H76382	5H76383
75	3H36922	5H75038	5H75769	5H75002-2	5H75029	5H75030-4	5H78126-1	5H75032	5H76382	5H76383

① The above list is subject to change. Please refer to unit mounted parts list for most up-to-date list.

MODINE MANUFACTURING COMPANY LIMITED WARRANTY (Residential Use Only)

WHAT THIS WARRANTY COVERS

This warranty covers all defects in material and workmanship in your Modine unit heater, when used for your home or garage.

WHAT THIS WARRANTY DOES NOT COVER

Unit heater, or any of its parts:

- which have been improperly installed or removed.
- which have been damaged other than by normal use.
- which have not been properly maintained.
- which have been exposed to gas input more than 5% higher than specified on the serial plate of the unit heater, resulting in over-firing of the heater.
- which have been exposed to possibly corrosive chemicals or chemical vapors (such as found in swimming pools), or potentially explosive or flammable atmospheres laden with grain dust, sawdust, or similar airborne materials.
- where any defect has been caused by abuse, misuse, neglect, carelessness, or accident.
- where the serial number of the unit heater has been altered, defaced, or removed.
- which are used in a confined space without adequate combustion air, such as can be found in more air-tight construction.

WHO THIS WARRANTY COVERS

This warranty covers the purchaser of the unit heater or anyone else who owns it during the warranty period.

HOW LONG THE WARRANTY LASTS

- The warranty for the heat exchanger of the unit heater remains in force for ten years from the date you purchased the unit heater.
- The warranty on all other parts of the heater remains in force for two years from the date you purchased the unit heater.

WHAT MODINE WILL DO TO CORRECT ANY WARRANTY DEFECTS, AND HOW YOU CAN GET WARRANTY SERVICE

In the event of warranty failure, Modine will provide replacement parts at Modine's cost. To obtain warranty repairs or replacement of defective parts, you must, within the period of warranty coverage, contact the agency from whom you purchased the unit heater. That seller, or the service agency performing service for the seller, will determine whether or not the unit heater, or any of its parts, is in fact defective, and will then either repair or obtain and install the necessary replacement parts for you. If it is determined that the unit heater or parts were not defective, you may be charged for any replacement parts.

CAUTION - Do not attempt to repair the unit heater yourself, nor remove it or any of its parts. This must be done by a qualified service agency.

If you have any questions about this warranty, call the person from whom you purchased the unit heater; or a Modine Heating Products Representative at 1-800-828-4328.

WHAT MODINE WILL NOT DO

Modine will not reimburse you for any labor costs or service charges related to warranty repairs or replacements.

INCIDENTAL AND CONSEQUENTIAL DAMAGES DISCLAIMED

This warranty does not cover incidental damages, such as use of substitute heating equipment, or other costs arising from the loss of use of the unit heater. This warranty also does not cover consequential damages, such as the cost of repairing or replacing other property which is damaged when this unit heater does not work properly.

HOW STATE LAW RELATES TO THIS WARRANTY

Some states do not allow the exclusion or limitation of incidental or consequential damages so the above limitations or exclusions may not apply to you.

This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

COMMERCIAL WARRANTY

Seller warrants its products to be free from defects in material and workmanship, EXCLUSIVE, HOWEVER, of failures attributable to the use of materials substituted under emergency conditions for materials normally employed. This warranty covers replacement of any parts furnished from the factory of Seller, but does not cover labor of any kind and materials not furnished by Seller, or any charges for any such labor or materials, whether such labor, materials or charges thereon are due to replacement of parts, adjustments, repairs, or any other work done. This warranty does not apply to any equipment which shall have been repaired or altered outside the factory of Seller in any way so as, in the judgment of Seller, to affect its stability, nor which has been subjected to misuse, negligence, or operating conditions in excess of those for which such equipment was designed. This warranty does not cover the effects of physical or chemical properties of water or steam or other liquids or gases used in the equipment.

BUYER AGREES THAT SELLER'S WARRANTY OF ITS PRODUCTS TO BE FREE FROM DEFECT IN MATERIAL AND WORKMANSHIP, AS LIMITED HEREIN, SHALL BE IN LIEU OF AND EXCLUSIVE OF ALL OTHER WARRANTIES, EITHER EXPRESS OR IMPLIED, WHETHER ARISING FROM LAW, COURSE OF DEALING, USAGE OF TRADE, OR OTHERWISE, **THERE ARE NO OTHER WARRANTIES, INCLUDING WARRANTY OF MERCHANTABILITY OR FITNESS FOR PURPOSE, WHICH EXTEND BEYOND THE PRODUCT DESCRIPTION CONFIRMED BY BUYER AND SELLER AS OF THE DATE OF FINAL AGREEMENT.**

This warranty is void if the input to the product exceeds the rated input as indicated on the product serial plate by more than 5% on gas-fired and oil-fired units, or if the product in the judgment of SELLER has been installed in a corrosive atmosphere, or subjected to corrosive fluids or gases, been subjected to misuse, negligence, accident, excessive thermal shock, excessive humidity, physical damage, impact, abrasion, unauthorized alterations, or operation contrary to SELLER'S printed instructions, or if the serial number has been altered, defaced or removed.

Heat Exchangers

For Seller's non-separated combustion Gas-Fired Unit Heaters

BUYER'S REMEDY FOR BREACH OF WARRANTY, EXCLUSIVE OF ALL OTHER REMEDIES PROVIDED BY LAW, IS LIMITED TO REPAIR OR REPLACEMENT AT THE FACTORY OF SELLER, ANY HEAT EXCHANGER WHICH SHALL, WITHIN TEN YEARS FROM DATE OF FIRST BENEFICIAL USE BY BUYER OR ANY OTHER USER, WITHIN TEN YEARS FROM DATE OF RESALE BY BUYER OR ANY OTHER USER, WITHIN TEN YEARS FROM DATE OF RESALE BY BUYER IN ANY UNCHANGED CONDITION, OR WITHIN ONE HUNDRED TWENTY-SIX MONTHS FROM DATE OF SHIPMENT FROM SELLER, WHICHEVER OCCURS FIRST, BE RETURNED TO SELLER WITH TRANSPORTATION CHARGES PREPAID AND WHICH THE EXAMINATION OF SELLER SHALL DISCLOSE TO HAVE BEEN DEFECTIVE; EXCEPT THAT WHEN THE PRODUCT IS TO BE USED BY BUYER AS A COMPONENT PART OF EQUIPMENT MANUFACTURED BY BUYER, BUYER'S REMEDY FOR BREACH, AS LIMITED HEREIN, SHALL BE LIMITED TO ONE YEAR FROM DATE OF SHIPMENT FROM SELLER. FOR GAS-FIRED PRODUCTS INSTALLED IN HIGH HUMIDITY APPLICATIONS AND UTILIZING STAINLESS STEEL HEAT EXCHANGERS, BUYER'S REMEDY FOR BREACH, AS LIMITED HEREIN, SHALL BE LIMITED TO TEN YEARS FROM DATE OF SHIPMENT FROM SELLER.

For Seller's Low Intensity Gas-Fired Infrared Heaters

BUYER'S REMEDY FOR BREACH OF WARRANTY, EXCLUSIVE OF ALL OTHER REMEDIES PROVIDED BY LAW, IS LIMITED TO REPAIR OR REPLACEMENT AT THE FACTORY OF SELLER, ANY HEAT EXCHANGER WHICH SHALL, WITHIN FIVE YEARS FROM DATE OF FIRST BENEFICIAL USE BY BUYER OR ANY OTHER USER, WITHIN FIVE YEARS FROM DATE OF RESALE BY BUYER OR ANY OTHER USER, WITHIN FIVE YEARS FROM DATE OF RESALE BY BUYER IN ANY UNCHANGED CONDITION, OR WITHIN 66 MONTHS FROM DATE OF SHIPMENT FROM SELLER, WHICHEVER OCCURS FIRST, BE RETURNED TO SELLER WITH TRANSPORTATION CHARGES PREPAID AND WHICH THE EXAMINATION OF SELLER SHALL DISCLOSE TO HAVE BEEN DEFECTIVE; EXCEPT THAT WHEN THE PRODUCT IS TO BE USED BY BUYER AS A COMPONENT PART OF EQUIPMENT MANUFACTURED BY BUYER, BUYER'S REMEDY FOR BREACH, AS LIMITED HEREIN, SHALL BE LIMITED TO ONE YEAR FROM DATE OF SHIPMENT FROM SELLER.

Heat Exchanger (Condensers) for all Seller's products except non-separated combustion Gas-Fired Unit Heaters and Infrared Heaters, all Burners except Infrared Heaters, and Sheet Metal for all Seller's products

BUYER'S REMEDY FOR BREACH OF WARRANTY, EXCLUSIVE OF ALL OTHER REMEDIES PROVIDED BY LAW, IS LIMITED TO REPAIR OR REPLACEMENT AT THE FACTORY OF SELLER, ANY HEAT EXCHANGER (CONDENSER) OR BURNER WHICH SHALL, WITHIN ONE YEAR FROM DATE OF FIRST BENEFICIAL USE BY BUYER OR ANY OTHER USER, WITHIN ONE YEAR FROM DATE OF RESALE BY BUYER IN ANY

UNCHANGED CONDITION, OR WITHIN EIGHTEEN MONTHS FROM DATE OF SHIPMENT FROM SELLER, WHICHEVER OCCURS FIRST, BE RETURNED TO SELLER WITH TRANSPORTATION CHARGES PREPAID AND WHICH THE EXAMINATION OF SELLER SHALL DISCLOSE TO HAVE BEEN DEFECTIVE; EXCEPT THAT WHEN THE PRODUCT IS TO BE USED BY BUYER AS A COMPONENT PART OF EQUIPMENT MANUFACTURED BY BUYER, BUYER'S REMEDY FOR BREACH, AS LIMITED HEREIN, SHALL BE LIMITED TO ONE YEAR FROM DATE OF SHIPMENT FROM SELLER.

Burners

For Seller's Low Intensity Gas-Fired Infrared Heaters

BUYER'S REMEDY FOR BREACH OF WARRANTY, EXCLUSIVE OF ALL OTHER REMEDIES PROVIDED BY LAW, IS LIMITED TO REPAIR OR REPLACEMENT AT THE FACTORY OF SELLER, ANY BURNER WHICH SHALL, WITHIN TWO YEARS FROM DATE OF FIRST BENEFICIAL USE BY BUYER OR ANY OTHER USER, WITHIN TWO YEARS FROM DATE OF RESALE BY BUYER IN ANY UNCHANGED CONDITION, OR WITHIN 30 MONTHS FROM DATE OF SHIPMENT FROM SELLER, WHICHEVER OCCURS FIRST, BE RETURNED TO SELLER WITH TRANSPORTATION CHARGES PREPAID AND WHICH THE EXAMINATION OF SELLER SHALL DISCLOSE TO HAVE BEEN DEFECTIVE; EXCEPT THAT WHEN THE PRODUCT IS TO BE USED BY BUYER AS A COMPONENT PART OF EQUIPMENT MANUFACTURED BY BUYER, BUYER'S REMEDY FOR BREACH, AS LIMITED HEREIN, SHALL BE LIMITED TO ONE YEAR FROM DATE OF SHIPMENT FROM SELLER.

For Seller's High Intensity Gas-Fired Infrared Heaters

BUYER'S REMEDY FOR BREACH OF WARRANTY, EXCLUSIVE OF ALL OTHER REMEDIES PROVIDED BY LAW, IS LIMITED TO REPAIR OR REPLACEMENT AT THE FACTORY OF SELLER, ANY BURNER WHICH SHALL, WITHIN TEN YEARS FROM DATE OF FIRST BENEFICIAL USE BY BUYER OR ANY OTHER USER, WITHIN TEN YEARS FROM DATE OF RESALE BY BUYER IN ANY UNCHANGED CONDITION, OR WITHIN 126 MONTHS FROM DATE OF SHIPMENT FROM SELLER, WHICHEVER OCCURS FIRST, BE RETURNED TO SELLER WITH TRANSPORTATION CHARGES PREPAID AND WHICH THE EXAMINATION OF SELLER SHALL DISCLOSE TO HAVE BEEN DEFECTIVE; EXCEPT THAT WHEN THE PRODUCT IS TO BE USED BY BUYER AS A COMPONENT PART OF EQUIPMENT MANUFACTURED BY BUYER, BUYER'S REMEDY FOR BREACH, AS LIMITED HEREIN, SHALL BE LIMITED TO ONE YEAR FROM DATE OF SHIPMENT FROM SELLER.

All Other Components Excluding Heat Exchanger (Condenser), Burner, and Sheet Metal

For all Seller's products except Direct-Fired Heaters and High Intensity Gas-Fired Infrared Heaters

BUYER'S REMEDY FOR BREACH OF WARRANTY, EXCLUSIVE OF ALL OTHER REMEDIES PROVIDED BY LAW, IS LIMITED TO REPAIR OR REPLACEMENT AT THE FACTORY OF SELLER, ANY PART OR PARTS WHICH SHALL, WITHIN TWO YEARS FROM DATE OF FIRST BENEFICIAL USE BY BUYER OR ANY OTHER USER, WITHIN TWO YEARS FROM DATE OF RESALE BY BUYER IN ANY UNCHANGED CONDITION, OR WITHIN THIRTY MONTHS FROM DATE OF SHIPMENT FROM SELLER, WHICHEVER OCCURS FIRST, BE RETURNED TO SELLER WITH TRANSPORTATION CHARGES PREPAID AND WHICH THE EXAMINATION OF SELLER SHALL DISCLOSE TO HAVE BEEN DEFECTIVE; EXCEPT THAT WHEN THE PRODUCT IS TO BE USED BY BUYER AS A COMPONENT PART OF EQUIPMENT MANUFACTURED BY BUYER, BUYER'S REMEDY FOR BREACH, AS LIMITED HEREIN, SHALL BE LIMITED TO ONE YEAR FROM DATE OF SHIPMENT FROM SELLER.

For Seller's Direct-Fired Heaters and High Intensity Gas-Fired Infrared Heaters

BUYER'S REMEDY FOR BREACH OF WARRANTY EXCLUSIVE OF ALL OTHER REMEDIES PROVIDED BY LAW IS LIMITED TO REPAIR OR REPLACEMENT AT THE SELLER'S OPTION ANY PART OR PARTS WHICH SHALL WITHIN A PERIOD OF ONE YEAR FROM DATE OF FIRST BENEFICIAL USE BY BUYER OR ANY OTHER USER, WITHIN ONE YEAR FROM DATE OF RESALE BY BUYER IN ANY UNCHANGED CONDITION, OR WITHIN 18 MONTHS FROM DATE OF SHIPMENT FROM SELLER, WHICHEVER OCCURS FIRST, BE RETURNED TO SELLER WITH TRANSPORTATION CHARGES PREPAID AND WHICH THE EXAMINATION OF THE SELLER SHALL DISCLOSE TO HAVE BEEN DEFECTIVE. BUYER AGREES THAT IN NO EVENT WILL SELLER BE LIABLE FOR COSTS OF PROCESSING, LOST PROFITS, INJURY TO GOODWILL, OR ANY OTHER CONSEQUENTIAL OR INCIDENTAL DAMAGES OF ANY KIND RESULTING FROM THE ORDER OR USE OF ITS PRODUCT, WHETHER ARISING FROM BREACH OF WARRANTY, NONCONFORMITY TO ORDERED SPECIFICATIONS, DELAY IN DELIVERY, OR ANY LOSS SUSTAINED BY THE BUYER.

Modine Manufacturing Company has a continuous product improvement program;
it reserves the right to change design and specifications without notice.

- FOR RESIDENTIAL USE SEE LIMITED CONSUMER WARRANTY ON PREVIOUS PAGE.



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